VOLUME I OF II
DRAFT FINAL REPORT

REVISED BASELINE RISK ASSESSMENT FOR OPERABLE UNIT NO. 3 FORMER NEBRASKA ORDNANCE PLANT MEAD, NEBRASKA CONTRACT NO. DACA41-96-D-8014 TASK ORDER NO. 0016

Prepared for:

Department of the Army
U.S. Army Engineers District
Kansas City District
Corps of Engineers
Kansas City, Missouri

February 2000

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Commander U.S. Army District, Kansas City
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601 East 12th Street
Kansas City, Missouri 64106-2896

Re: Transmittal of Draft Final
Revised Baseline Risk Assessment Report
Operable Unit No. 3
Former Nebraska Ordnance Plant
Contract No. DACA 41-96-D-8014

Dear Mr. Graff:

We are hereby transmitting five copies of the Operable Unit No. 3 Draft Final Revised Baseline Risk Assessment Report. Distribution of the remaining copies of the report has been made in accordance with the attached list.

Please contact us should you have any questions.

Very truly yours,

Rick A. Nusz, P.HG.
OU3 Project Manager

Douglas E. Fiscus, P.E.
Sr. Project Engineer

Jim Davis For
Robert F. Skach, P.E.
Mead Project Manager

Enclosures

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FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

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The Baseline Risk Assessment (BRA) for Operable Unit 3 (OU3) evaluated potential human health and ecological risks resulting from exposure to contaminated media at areas of concern of the former Nebraska Ordnance Plant (NOP) located near Mead, Nebraska (Site) not previously addressed under BRAs performed for Site-wide soils (Operable Unit 1 [OU1]; Donohue, 1993) and Site groundwater (Operable Unit 2 [OU2]; Woodward-Clyde, 1994a). Areas of concern evaluated under OU3 include the following:

- Soils adjacent to the Load Lines 1, 2, 3, and 4 Bomb Production Buildings
- Load Lines 1, 2, 3, and 4 Paint Operation Areas
- Potential Landfill Area north of the Proving Grounds
- Proving Grounds
- Northeast Boundary Area
- Johnson and Clear Creeks
- Silver Creek
- Nebraska Resource District (NRD) Reservoir

In the Human Health Risk Assessment, the scenarios evaluated in the load line areas included residential (adult and child), trespasser/visitor (adult and juvenile), and on-site worker exposure to surface soil. Scenarios evaluated at the Potential Landfill Area north of the Proving Grounds, Proving Grounds, and the Northeast Boundary Area, included residential (adult and child) and trespasser (adult and juvenile) exposure to surface soil and construction worker exposure to both surface and subsurface soils. Potential health risks were evaluated quantitatively for ingestion and direct dermal contact for all receptors. In addition, residents (adults and children) were evaluated for potential exposure to explosives via a garden vegetable ingestion scenario for the Load Line Bomb Production Building Areas and the Potential Landfill Area north of the Proving Grounds using bioaccumulation data developed by the Army (USACE, 1997). A recreational fishing scenario (adults and children) was also evaluated for Johnson, Clear and Silver Creeks, and the NRD Reservoir. This scenario included an evaluation of direct dermal contact and incidental ingestion of surface water and sediment, and ingestion of fish. Potential excess cancer risks and non-carcinogenic hazards were estimated for exposure to site-related chemicals using both a Reasonable Maximum Exposure (RME) and an Average Exposure (AE) approach. The RME evaluation provides an estimate of potential upperbound risk among exposed individuals, and is commonly used as a basis for site remedial decisions. The AE evaluation, which is also termed the Central Tendency Exposure (CTE) evaluation, provides on estimate of more typical risks among exposed individuals. The AE evaluation has been included to provide site decision makers with additional information that can be used in the remedial decision making process.

The non-carcinogenic cumulative Hazard Indices (HI) exceeded the threshold target of 1 for the RME child resident scenario at the Load Line 1 Bomb Production Area, Load Line 2 Paint Operation Area, the Load Line 4 Paint Operation Areas, and at the Potential Landfill north of the Proving Grounds, and for the recreational child fisherman scenario for Johnson/Clear Creek. A Hazard Index in excess of 1.0 indicates the potential for adverse health effects. An evaluation of the chemicals that contributed to cumulative hazard indices indicates that they do not affect the same target organs, and that exposure to these chemicals is unlikely to result in any additive effects. The

Load Line 1 Bomb Production Area was eliminated as having the potential to pose a hazard once the target organ effects of the Potential Chemicals of Concern (PCOCs) were taken into consideration. Hazards at Johnson/Clear Creek, which were based on modeled fish tissue concentrations, were also considered to be below 1.0 once comparisons were made to fish tissue analytical data from the NRD Reservoir. Antimony is the chemical contributing the majority of the potential hazard in the other three areas. Soil ingestion was the exposure pathway contributing the majority of the hazard.

Potential excess cancer risks are within, or below, the U.S. Environmental Protection Agency (EPA) risk range of 1×10^{-4} to 1×10^{-6} (i.e., 1 in 10,000 to 1 in 1,000,000) for all scenarios and areas evaluated.

An evaluation of the potential health risks to children associated with exposure to lead was conducted for all areas of concern. The results of this evaluation indicate that lead in Site soils is unlikely to pose a health hazard.

The Ecological Risk Assessment (ERA) addressed both terrestrial and aquatic receptors. Terrestrial scenarios were accounted for under the assumptions of the OU1 ERA and were not assessed again.

The ERA, presented as an Appendix to this OU3 BRA, focused upon receptors' exposure to sediment and surface water in Johnson and Clear Creeks, the NRD Reservoir, and Silver Creek. Detected chemicals were conservatively screened against ecological benchmarks, background data, and other criteria to determine which chemicals should be retained for exposure assessment scenarios. No potential chemicals of concern were selected for surface water samples because all detected chemicals were either unrelated to former Nebraska Ordnance Plant (NOP) activities or did not exceed benchmark values. For the same reasons, all volatile organic compounds (VOC) and explosives and most metals and semi-volatile organic compounds (SVOC) detected in sediments were screened out at this step. Corresponding adverse effects from these chemicals to aquatic biota or wildlife on-site are unlikely.

The remaining sediment potential chemicals of concern (selenium, silver, and 4-methylphenol) were included in exposure assessment scenarios, which used Site-specific receptors, benchmarks, and assumptions to more accurately estimate receptors' exposure to chemicals. Assessments using the qualitative weight-of-evidence approach and the semi-quantitative Ecotox Quotient (EQ) approach found that the potential chemicals of concern presented negligible risk to aquatic and terrestrial receptors on-site.

A search for rare, threatened, or endangered species (plant or animal) found indicated that the American burying beetle (*Nicrophorus americanus*), western prairie fringed orchid (*Platanthera praeclara*), and plains topminnow may occur on-site. A survey of the Site by US Fish and Wildlife Service biologists found that past land use had degraded on-site habitat, and that the Site did not contain appropriate habitat for these species.

In summary, the OU3 BRA was conducted according to EPA methodology and guidelines, incorporating conservative and reasonable assumptions and input values to estimate hazards and risks for all areas of concern. On balance, the use of numerous conservative assumptions throughout the BRA tend to bias high the resultant risks and hazards.

Section 1

The former Nebraska Ordnance Plant (NOP) is located one-half mile south of Mead, Nebraska and 30 miles west of Omaha in Saunders County, Nebraska (**Drawing 1-1**). The U.S. Army Corps of Engineers (USACE), Kansas City District (CENWK) is responsible for conducting environmental investigation and remediation activities at the former NOP (Site) under the Defense Environmental Restoration Program (DERP). The investigation of the Site has been divided into three Operable Units (OU1, OU2, and OU3) under the Interagency Agreement dated January 30, 1992 between the U.S. Department of the Army and the U.S. Environmental Protection Agency (EPA) Region VII, and the Nebraska Department of Environmental Quality (NDEQ). OU1 includes explosives contaminated soils within the upper four feet. OU2 includes groundwater and soils identified as subsurface sources of groundwater contamination. OU3 includes other areas at the Site not covered under OU1 or OU2.

Woodward-Clyde (W-C) was retained by the USACE to conduct a Phase I Remedial Investigation (RI) at the Site under Contract DACA41-92-C-0023 and a Phase II RI and Baseline Risk Assessment (BRA) under Contract No. DACA41-96-C-8011. URS Greiner Woodward Clyde Federal Services (URSGWCFS) was subsequently retained to conduct Phase III supplemental sampling for an RI Addendum Report, and to revise the BRA to incorporate this new information, under Contract DACA 41-96-D-8014. This document is the revised BRA Report for OU3 and specifically addresses potential human health effects (i.e., cancer risks and non-carcinogenic health hazards) and ecological effects associated contaminated media at the OU3 areas of concern. The purpose of a BRA, as defined by EPA, is to "provide a framework for developing the risk information necessary to assist decision making at remedial sites" (Risk Assessment Guidance for Superfund; Risk Assessment Guidance for Superfund (RAGS): EPA, 1989a).

SEC Donohue (1993) prepared a final BRA for OU1 to evaluate potential human health effects (i.e., cancer risks and noncarcinogenic health hazards) and ecological effects associated with exposure to contaminated soil at the Site. Woodward Clyde (1994a) conducted a BRA for Operable Unit 2 (OU2) to evaluate potential human health effects associated with exposure to groundwater and subsurface soils at the Site. The Draft Final OU3 BRA (W-C, 1997a) addressed risks at other areas of concern not included in the OU1 and OU2 BRAs. This document (the Revised BRA) represents a revision of the Draft Final OU3 BRA, incorporating new data collected as part of the Phase III supplemental sampling activities.

The organization of this OU3 BRA follows the structure presented in RAGS (EPA, 1989a) and consists of the following:

- Site background information
- Identification of the areas to be evaluated in the OU3 BRA
- Identification of site-specific potential chemicals of concern
- An exposure assessment, including identification of potentially exposed populations (i.e., both current site populations as well as hypothetical future populations) and exposure parameters used to define chemical uptake by these populations
- An assessment of the toxic properties of the potential chemicals of concern
- An estimation of the potential cancer risks and non-carcinogenic health hazards for potentially exposed populations

- An analysis of uncertainties associated with the estimation of potential site-specific risks

In addition to the results of the Human Health Risk Assessment presented in this report, an Ecological Risk Assessment **(Appendix B)** and Plant Uptake Study **(Appendix D)** were also performed under OU3 and have been included as appendices.

1.1 SITE HISTORY

The former NOP occupied 27 square miles in Saunders County and contained an administration area, an ammonium nitrate plant, a bomb booster assembly plant, four bomb load lines, demolition grounds, a sewage treatment plant, analytical laboratories, a laundry, vehicle and equipment maintenance shops, and several square miles of bermed storage igloos and magazines located north and south of the load lines (**Drawing 1-2**).

During World War II, the production facilities were operated by the Nebraska Defense Corporation, a subsidiary of Firestone Tire and Rubber Company. During the interim period 1945 through 1949, production was terminated and decontamination procedures were implemented. Decontamination procedures included cleaning, flushing, and sweeping of floors, rafters, pipes, and ventilation systems, flushing of contaminated ditches, and removal and burning of contaminated soils. At the North and South Burning Grounds near the former NOP Landfill Area, 340,000 pieces of ordnance were destroyed in 1946 (W-C, 1993). Tetryl boosters were destroyed at the Demolition Ground, which is located in the southwestern portion of the former NOP. The former NOP was reactivated in 1950 in order to produce weapons for the Korean Conflict. In 1956 the NOP was again placed on standby status.

In 1959, approximately 960 acres were transferred to the U.S. Army Reserve for training grounds; 2,000 acres were granted to the U.S. Air Force for a missile site; and 40 acres were transferred to the Department of Commerce. From 1959 to 1960, the Offutt Air Force Base Missile Site S-1 launch area, Atlas Missile Area, was built on 1,185 acres north of Load Line 4. Trichloroethene (TCE) was used to degrease and clean pipelines used to carry liquid oxygen fuel for missiles. U.S. Army activities included Nike missile maintenance at the former heavy equipment garage north of Load Line 1. The U.S. Air Force also occupied 34 acres of the northern portion of Load Line 1 for use as a "Tech Area" (W-C, 1993). The silos were abandoned in 1964 and the Launcher Area and the Nike Area were transferred to the Nebraska National Guard.

In 1962, approximately 9,000 acres of the former NOP were purchased by the University of Nebraska for use as their Agricultural Research and Development Center (ARDC). An additional 600 acres were purchased in 1964 for the ARDC. The remaining 5,000 acres were purchased by private individuals and corporations. A fireworks company operated for approximately 20 years at the former bomb booster assembly plant (Bomb Booster Area) until 1989. Two commercial enterprises manufacture insulation board and processed Styrofoam packing material at the former administration buildings (Administration Area).

The University of Nebraska currently owns the former NOP Landfill Area, which is reported to have been first used by the former NOP. The landfill consisted of two trenches north of the former sewage treatment plant that were filled with solid waste and covered with soil.

The Site became a Superfund site when EPA placed it on the National Priorities List (NPL) in August 1990 due to identified groundwater contamination and associated potential risk to human health or the environment.

1.2 SUMMARY OF SITE PHYSICAL CHARACTERISTICS

A detailed description of the Site and its physical characteristics is provided in the OU2 RI (W-C, 1993). A summary of the Site information relevant to the risk assessment is presented below.

The climate of Nebraska is temperate continental and characterized by wide seasonal variations in temperature. Summers are warm (average high temperature in July is 88°F) and winters are cool and dry (the average low temperature in January is 13°F). The average annual precipitation is 33 inches.

The Site is located in Todd Valley, an abandoned stream channel of the ancestral Platte River. The hydrostratigraphy of the Site consists of three aquifers, the Omadi Sandstone aquifer, the Todd Valley aquifer, and the Platte River alluvial aquifer; and three aquitards, the Pennsylvanian, the Omadi Shale, and the Platte River aquitards. The sands and sandy gravels of the Platte River Valley, which are 39 to 49 feet thick, are not correlative to the sands and gravels of Todd Valley. Overbank silts and clays, 10 to 17 feet thick, overlie the Platte River alluvial sands. The Platte River aquitard consists of overbank silts and clays. Where the Omadi Shale is absent, the Omadi Sandstone and Todd Valley aquifers are in hydraulic communication and behave as a single aquifer without hydraulic barriers.

The groundwater surface of Todd Valley aquifer slopes toward the south-southeast at an average gradient of 12 feet/mile. East of Johnson Creek, the hydraulic gradient in the Platte River alluvial aquifer is south with a slight westerly component. A major zone of discharge is located along the western side of the Platte River floodplain southeast of the Site.

The population of Saunders County is 18,285 and is 80 percent rural. Wahoo, population 3,510, is the county seat and the largest community (Bureau of the Census, 1990). Areas adjacent to the Site are primarily used for growing corn with soybeans and sorghum of less but significant importance. Approximately 14 percent of the total area of Saunders County is under irrigation (Nebraska Agricultural Statistics Service, 1989).

1.3 SUBAREAS TO BE EVALUATED IN THE OU3 BRA

This section identifies the areas evaluated in the OU3 BRA and provides pertinent site information for these subareas. In accordance with the OU3 RI Project Work Plan (PWP) (W-C, 1994b), the following investigation areas (**Drawing 1-2**) were evaluated as part of the OU3 RI:

- Load Line 1 Bomb Production Buildings
- Load Line 2 Bomb Production Buildings
- Load Line 3 Bomb Production Buildings
- Load Line 4 Bomb Production Buildings

- Load Line 1 Paint Operation Areas
- Load Line 2 Paint Operation Areas
- Load Line 3 Paint Operation Areas
- Load Line 4 Paint Operation Areas
- Former Raw Products Igloo Storage Areas
- Former Tetryl Pelleting Area
- North Burning Ground
- South Burning Ground
- Proving Grounds
- Potential Landfill Area north of the Proving Grounds
- Former NOP Landfill Area
- Potential Waste Disposal Areas north of the former Nike Maintenance Area
- Potential Waste Disposal Area southeast of the former Bomb Booster Assembly Area
- Potential Waste Disposal Area at the former Atlas Missile Area
- Potential Waste Disposal Area north of the former Ammonium Nitrate Plant
- Demolition Ground
- Detonation Craters
- Bermed Area southwest of Load Line 1
- Former Ammonium Nitrate Plant
- Johnson and Clear Creeks
- Silver Creek
- Underground Storage Tanks at the former Administration, Bomb Booster Assembly, and Atlas Missile Areas, and former Air Force Communications Center
- Geophysical Anomaly at Load Line 3
- Site-Wide Potentially Hazardous Containerized Waste Surveys
- Northeast Boundary Area
- Natural Resource District (NRD) Reservoir

Detailed information on the OU3 RI sampling program, results obtained and evaluation methods, together with, complete result tables are presented in the OU3 RI report (W-C, 1997b) and OU3 RI Addendum Report (URSGWC, 2000). Beginning with a table which describes various notes and sources of information (**Table 1-1**), results from the Phase I, Phase II, and Phase III RI sampling have been summarized for each OU3 investigation area (**Tables 1-2** through **1-58**).[1]

As discussed in both the OU3 Preliminary Data Package (W-C, 1996a), and RI report, a screening process was used to evaluate whether or not additional field activities were required and to determine if results indicated that any of the areas warranted further action. Based on these results, several OU3 investigation areas were identified as not requiring any further action under the CERCLA process. In addition to the use of screening levels, other criteria used to determine if further actions were required included concentrations of analytes consistent with background/regional concentrations, and/or, areas which are not longer considered part of OU3.

The following investigation areas did not satisfy any of the criteria mentioned above, and therefore, are included in the BRA report:

- Soils adjacent to the Load Lines 1, 2, 3, and 4 Bomb Production Buildings
- Load Lines 1, 2, 3, and 4 Paint Operation Areas (Soils)
- Potential Landfill Area (Soils) north of the Proving Grounds
- Proving Grounds (Soils)
- Johnson, Clear and Silver Creeks (Surface Water and Sediment)
- Northeast Boundary Area (Soils)
- NRD Reservoir (Surface Water, Sediment, and Fish Tissue)

Since submittal of the Draft Final BRA, the Load Line Bomb Production Buildings have undergone building demolition and disposal (BDDR). BDDR activities were completed in April 1999. Because the buildings included in the BDDR project no longer exit at the Site, they do not require any further action under OU3. Likewise, because none of the soils beneath the buildings were found to contain explosive concentrations above the current OU1 remediation goals these soils are not further evaluated in the BRA.

1.4 SITE DESCRIPTIONS FOR AREAS OF CONCERN

1.4.1 Load Line Bomb Production Buildings

The principal operation at the load line bomb production buildings was loading bombs (**Drawing 1-2**). Bomb production at each of the four load lines included melt loading and assembly of bombs, shells, warheads, demolition blocks, and practice rockets. This activity began in October 1942 and continued through August 1945, with the lines periodically being deactivated and reactivated for operational changes. The operation of the lines was terminated in

[1] It should be noted that the "average concentrations" identified in Tables 1-2 through 1-58 represent arithmetic mean concentrations that have been calculated assuming one half the reporting limit as a surrogate value for chemicals that were reported as non-detect (i.e., standard risk assessment practice). In instances where detected concentrations are very low, or reporting limits for non-detects are elevated, this can result in estimated mean concentrations that are higher than the maximum detected concentrations.

1945 and reactivated in 1952 for use during the Korean conflict. In 1956, the Site was put on standby notice. Starting in 1958 and continuing through 1971, much of the Site, including the load lines, was "excessed" and disposed or sold. The buildings at each load line (**Drawing 1-3**) were either abandoned, demolished, or used for other purposes. As demonstrated in **Drawing 1-4**, there were ten buildings involved in bomb production at each load line:

- Nose Pour Building
- Amatol Melt Building
- Amatol Screening Building
- East Cooling Building
- West Cooling Building
- TNT Pouring Building
- South TNT Service Building
- North TNT Service Building
- Ammonium Nitrate Service Building
- TNT Screening Building

Previous investigations of the soils and groundwater at each load line area indicated that both soils and groundwater contained chemicals originating from these operations. Groundwater in the vicinity of the buildings was investigated for explosive compounds as well as other chemicals as part of the OU2 RI. During a Confirmation Study, field screening of soil samples collected from the upper foot of soil in drainage ditches indicated the presence of explosives (USACE, 1989). Soils have also been investigated as part of OU1. Explosives have been detected in soils surrounding load line bomb production buildings, primarily in ditches, sumps, and bomb wash pits. The highest concentrations were in the upper foot of soil (RUST, 1993).

Load Line 1 - Current Status of the Area Around the Bomb Production Buildings

Explosive compounds handled at Load Line 1 included TNT, tritonal (80 percent TNT and 20 percent aluminum powder), and Composition B (60 percent RDX and 40 percent TNT) (ESE, 1983). The Bomb Production Buildings at Load Line 1 have undergone significant change since the NOP was closed. Demolition of many of the Load Line 1 Buildings has been completed as part of the Building Demolition and Debris Removal (BDDR). Demolition activities associated with the BDDR were completed in Summer 1999. All Load Line 1 Buildings, with the exception of the Inert Storage Building, have been demolished.

Outside the OU3 investigation area boundaries, buildings on the southeastern side of the Load Line 1 diamond area have been converted into a dairy research station. Part of the Inert Storage Building (**Drawing 1-3**), is currently used for machine storage. There is a machine shop at the north end of the Inert Storage Building, however, according to on-site personnel, the shop may be converted into a storage room in the future. Roughly one-half of the land surrounding Load Line 1 is used for pasture, one-fourth is cultivated, and one-fourth is fallow.

Load Line 2 - Current Status of the Area Around the Bomb Production Buildings

During the Korean Conflict, Load Line 2 was used to load 105-mm Howitzer shells with Composition B, which is 60 percent RDX and 40 percent TNT (ESE, 1983). Several changes have been made to the bomb production buildings at the Load Line 2 diamond area since that time. As part of the BDDR, all Load Line 2 Buildings with the exception of the Inert Storage Building, the Receiving and Painting Building, the South TNT Service Building and the North and South Change Houses, have been demolished.

Outside the OU3 investigation area boundaries at Load Line 2, much of the land has been converted to a turf plot production and research operation. The Inert Storage Building is used for storage (Grain/machinery). Surrounding Load Line 2, 10 percent of the land is used for the turf research plots, 60 percent is cultivated crops, 10 percent is devoted to forestry, and the remaining 20 percent is fallow. A private residence is located northwest of Load Line 2. An energy farm, the ARDC farm shop, a field day program center, an agricultural engineering research area and a center-pivot irrigation research area are also located at the Load Line 2 area.

Load Line 3 - Current Status of the Area Around the Bomb Production Buildings

Tritonal and TNT were the principal explosives used at Load Line 3 (ESE, 1983). As part of the BDDR, all Load Line 3 Buildings have been demolished with the exception of the Inert Storage, Receiving and Painting, and North Painting Storage and Mixing.

Much of the land outside the OU3 investigation area boundaries at Load Line 3 is used for crop production. The Inert Storage Building is used for machine/miscellaneous storage, seed grain storage, seed cleaning plant and office space. In addition, there is a machine shop at the north end of the Inert Storage Building. Approximately 25 percent of the land surrounding Load Line 3 is used for linear-move irrigation research, 20 percent is fallow, 20 percent is pasture research, 30 percent is used for plant pathology, and the remaining 5 percent is occupied by facilities which include the Behlen Observatory.

Load Line 4 - Current Status of the Area Around the Bomb Production Buildings

Practice rockets with stick propellant and black powder were among the munitions produced at Load Line 4 (ESE, 1983). As part of the BDDR, all Load Line 4 Buildings have been demolished with the exception of the Inert Storage, Receiving and Painting Buildings. Some buildings are used for lumber and miscellaneous building material storage. Some buildings are used for hay storage. Areas outside of the diamond area are used for pasture and plant studies. The Disease Control Research Center is located at Load Line 4. Pasture occupies 75 percent of the land, and 10 percent is cultivated, and the remaining 15 percent is fallow.

1.4.2 Load Line Paint Operation Areas

There are three former paint operation buildings at each of the four load lines: the Receiving and Painting Building, Paint Storage and Mixing Building, and South Paint Storage Building (**Drawing 1-5**). The Receiving and Painting Building is located south of the Inert Storage Building. The Paint Storage and Mixing Building is located east of the Receiving and Painting Building. The South Paint Storage Buildings are located west of Load Line Assembly, Pack and

Shipping Buildings in each of the four load lines. Except for the Load Line 1 Receiving and Painting Building (which has been demolished), all other load line paint operation buildings at each of the four load lines have remained virtually intact.

1.4.3 Potential Landfill Area North of the Proving Grounds

The Environmental Monitoring Systems Laboratory (EMSL) Report (EPA, 1987) report identified a "potential landfill area" contiguous with the north side of the Proving Grounds and the northeast side of the North Burning Ground (**Drawing 1-6**). The same potential landfill area was identified in a 1949 aerial photo and covered approximately 10 acres. The eastern one-half boundary of the area is covered by the Natural Resource District (NRD) Reservoir. The Twin City Testing Corp. (TCT) Study (1991) also identified this area specifically as a potential landfill area. The site is presently an untilled grassy area with no visual evidence of past disposal activities. No previous investigations have been conducted in the immediate area. Both shallow and deep soil samples were collected from the Potential Landfill Area north of the Proving Grounds.

1.4.4 Proving Grounds

The Proving Grounds investigation area is bordered by the NRD Reservoir to the east; the North Burning Ground to the west; and the Potential Landfill Area to the north (**Drawing 1-6**). The Proving Grounds also encompasses the excavation boundaries of EA-112. Soil samples were collected during Phase I, II, and III and analyzed for explosives only.

1.4.5 Northeast Boundary Area

The Northeast Boundary Area is located near the far northeast corner of the former NOP in the northeast corner of Section 6.0, Range 9 East, Township 14 North, approximately 600 feet south of an east-west road which forms the northern boundary of the former NOP (**Drawing 1-7**). The name given to this site is solely descriptive in nature and not attributed to any former NOP operation. Of all the sites investigated during the Phase III investigation, the Northeast Boundary Area is the only site which was not also evaluated in the Phase I and II investigations. Soil samples for explosives, VOCs, SVOCs, and metals analyses were collected during Phase III activities.

1.4.6 Johnson and Clear Creeks

Johnson Creek is a natural and channelized drainage located in the eastern portion of the former NOP that flows into Clear Creek. The combined creeks flow in a direction from northeast to southeast on the east side of the Site, eventually discharging into the Platte River off-site (**Drawing 1-1**). Those OU3 investigation areas which contribute surface water runoff to Johnson and Clear Creeks include; Load Lines 2, 3, and 4, former Ammonium Nitrate Plant, Atlas Missile, Bomb Booster Assembly, NOP Landfill, and Raw Products Igloo Storage Areas, and the Burning/Proving Grounds.

As illustrated in **Drawing 1-8**, surface water and sediment samples were collected from Johnson and Clear Creeks from eight sampling stations during two sampling events (high flow and low flow conditions) under the OU3 RI. For purposes of evaluation in the BRA, the data from Johnson and Clear Creeks have been combined.

1.4.7 Silver Creek

Silver Creek flows from northwest to southeast and is located in the southwest corner of the Site (**Drawing 1-1**). Silver Creek is a tributary of Salt Creek, which drains into the Platte River. Surface runoff from Load Line 1 enters Silver Creek through a southerly trending unnamed tributary. This unnamed tributary receives runoff from the Administration, Bomb Booster, and Load Line 1 areas.

Surface water and sediment samples were collected from four sampling locations along Silver Creek (**Drawing 1-8**) in two sampling events (high flow and low flow conditions) under the OU3 RI.

1.4.8 NRD Reservoir

The NRD Reservoir is located at the eastern portion of the site (**Drawing 1-9**). The reservoir is along Johnson Creek and immediately east of the Proving Grounds and Potential Landfill investigation areas. The construction of the dam was completed in 1975 by Morehead Construction of Plattsmouth, Nebraska. The Lower Platte North Natural Resource District (LPNNRD) has had the responsibility for the operation and maintenance of the reservoir and dam since its construction. During Phase III activities, sediments, surface water and fish tissue samples were collected from the reservoir.

1.5 OBJECTIVES OF A BASELINE RISK ASSESSMENT

The primary goal of a BRA is to provide an assessment of the potential health and environmental risks associated with chemicals at a site in the absence of any remedial action. Furthermore, the BRA characterizes the nature of the chemical releases from a site and evaluates potential pathways for exposure to human and ecological receptors. The BRA is ultimately used to estimate potential threats to public health due to chemical releases. Information on the chemical release data and potential risks are important factors in the evaluation of remedial alternatives.

Development of quantitative risk estimates for potentially exposed populations is based on guidance provided in the Risk Assessment Guidance for Superfund, Volume I; Human Health Evaluation, Part A (RAGS, EPA, 1989a). In addition, a variety of factors are used to characterize and quantify potential health risks, including:

- Chemical fate and transport characteristics;
- Basic toxicology information; and
- Site-specific information relative to potential exposure routes, exposure point concentrations, and general site conditions.

The guidance documents used to conduct the human health risk assessment include RAGS (EPA, 1989a), Risk Assessment Handbook, Volume 1, Human Health Evaluation (USACE, 1995), the Superfund Exposure Assessment Manual (SEAM; EPA, 1988), Exposure Factors Handbook (EPA, 1989b, 1997), Health Effect Assessment Summary Tables (HEAST, EPA, 1995a), Supplemental Guidance to RAGS: Calculating the Concentration Term (EPA, 1992a) and Dermal Exposure Assessment: Principles and Applications (EPA, 1992b).

Section 2

The first step in the risk assessment process is the selection process used to identify a group of potential chemicals of concern (PCOCs) for estimation of risks. This group of chemicals, although a subset of all chemicals detected on-site, represents those chemicals posing the greatest potential health risks at the site. Thus, the quantification of potential health risks posed by a site can be focused on the PCOCs without significantly underestimating the total risk. Separate lists of PCOCs have been generated for soils, sediments, and surface water for each of the OU3 areas of concern being investigated, using EPA selection criteria. The following sections present the PCOC selection process.

2.1 DATA SETS EVALUATED IN OU3 BRA

The first step in identification of PCOCs is to identify and evaluate the available data sets to be used in the process. Data sets collected as part of a OU3 Phase I, II and III RI, together with data from the OU1 RI obtained from sampling locations within the OU3 boundaries, were evaluated for possible use. Data sets for comparable media can be combined if the analytical methods are similar, the quality assurance and quality control procedures do not significantly differ, and concentrations between sampling periods are similar. After evaluating the sampling procedures, the analytical methods and reported detection limits, the following data sets were considered to be comparable and were combined for use in the OU3 BRA:

- Data sets collected during the OU3 Phase I, II and III RI.
- OU1 RI soil sample analytical data results obtained within the OU3 investigation area boundaries (**Table 2-1**).

Consistent with the OU1 BRA, soil up to 2 feet below ground surface (bgs) is defined as "surface soil" in the OU3 BRA, while soil samples collected deeper than 2 feet bgs are considered "subsurface soil." At the request of EPA, 0 - 6 inch soils were also evaluated as a subset of the 0 - 2 foot surface soils.

As noted in Section 1.3, the bomb production building structures at each of the four load line bomb production areas have been demolished, and thus are no longer classified as part of the OU3 investigation. Wipe samples from these buildings are no longer relevant. None of the soil samples collected beneath these buildings contained explosives concentrations above the OU1 remediation goals, thus they were not evaluated in this BRA. Surface soils adjacent to the bomb production buildings have been retained in OU3 and as such are evaluated in this BRA.

For the Potential Landfill Area north of the Proving Grounds, both surface soil and subsurface soil (greater than 2 feet bgs) are used in the risk assessment.

Surface water and sediment samples collected from Johnson, Clear and Silver Creeks were analyzed for explosives, metals, VOCs, and SVOCs in the OU3 RI. In addition, surface water, sediment and fish tissues were collected from the NRD Reservoir and analyzed for metals and explosives. It should be noted that the explosives data for fish tissues were rejected as unusable during data validation[2]. No other relevant data sets were identified for inclusion in the BRA.

[2] Because the fish tissue data for explosives were rejected as unusable, risks could not be calculated directly from measured fish tissue residues. In order to evaluate the potential risk impacts, fish tissue explosive concentrations were estimated using a modeling approach (See Section 3.3.16).

2.2 SELECTION OF POTENTIAL CHEMICALS OF CONCERN IN SURFACE AND SUBSURFACE SOIL

PCOCs in surface soil and subsurface soil were identified based on an evaluation of data obtained from the OU3 investigation areas. Although the analytical results identified a number of chemicals present in environmental media from each OU3 investigation area, not all of these chemicals are likely to pose risks to human health. Therefore, it is appropriate to systematically exclude selected chemicals from the BRA so that the quantitative risk characterization can effectively focus on only those chemicals posing the greatest potential health risks. Existing guidance (RAGS; EPA, 1989a; USACE, 1995) provides a list of selection criteria which can be used to identify the PCOCs. Chemicals may be systematically excluded for any of the following reasons:

- The compound was identified as a laboratory contaminant
- The compound was not detected in any sample
- The compound was found at background levels
- The compound has a low inherent toxicity or is an essential element
- The compound was found at a low frequency and concentration

The rationale for excluding chemicals meeting any of these criteria is that their contributions to the incremental health risks posed by the site are negligible.

The following sections present the PCOC selection process and final site-specific lists of PCOCs for each medium and area of concern. The selection process was conducted in a systematic manner. If a chemical was excluded at one stage it was not screened against following criteria (e.g., a chemical excluded because it was not detected was not subsequently screened against background levels). Results of each stage of the screening process for each site and medium are presented in **Appendix A**. The summary tables include the maximum detected concentration and the screening criterion used to exclude the analyte as a PCOC.

2.3 PCOC SELECTION PROCESS

2.3.1 Laboratory Contaminants

Because the data included in the risk assessment were reviewed and validated as part of the OU3 RI process (W-C, 1995 and 1996b), no further identification of laboratory contaminants was required. Detected concentrations of chemicals found to be due to laboratory contamination were qualified as such during the data validation process, following standard procedures as identified in EPA (1990, 1994a, 1994b) data validation functional guidelines.

2.3.2 Chemicals Not Detected

Chemicals that are not detected are typically excluded as PCOCs (Section 5.8 of RAGS [EPA, 1989a]). This approach is predicated on the assumption that the analytical methods are sensitive enough to identify chemicals at health-protective levels. The use of the non-detection criterion was considered acceptable for these chemicals. Those chemicals which were excluded as PCOCs because they were not detected are listed in **Appendix A**.

2.3.3 Chemicals Present at Background Concentration

As noted in RAGS (EPA, 1989a) and USACE guidance (1995), a comparison of sample concentrations to naturally occurring background concentrations can be used to identify non-site-related chemicals. This approach was taken for evaluating inorganic chemicals only. Chemicals were excluded as PCOCs if their maximum concentration was within 2 times the mean background concentration (EPA Region IV, EPA, 1995b). For thallium in soil, because it was detected in one of the 10 background samples, the maximum detected concentration (0.86 mg/kg) was used as the screening criterion. The screening criteria based on the background levels used in the BRA are summarized in **Table 2-2** for soil and sediment. Background samples for soil were collected as part of the OU3 Phase I Remedial Investigation (W-C, 1997b). Background samples for sediment were collected as part of the OU3 Phase III supplemental sampling, and reported in the Draft Remedial Investigation Report (URSGWCFS, 1999). Chemicals excluded as PCOCs in soil because they were detected at background levels are listed in **Appendix A.**

2.3.4 Essential Nutrients

Chemicals that are essential nutrients may be excluded from consideration when they are present at relatively low levels (i.e., levels that are likely to produce beneficial rather than toxic effects). Comparisons were made between the maximum detected concentrations of essential nutrients found in soils or sediments and screening values equivalent to the recommended daily allowances (RDAs) established by the National Research Council (1989).

Screening concentrations equivalent to RDA values were estimated by assuming that an individual ingests 100 mg/day of soil or sediment (the upper-bound daily soil ingestion rate for adults) or 2 liters per day of water. In addition to chemicals with established RDAs, sodium and potassium were excluded based on comparison to recommended daily intake. While sodium is an essential nutrient, there is no established RDA for this element. The normal dietary intake of sodium in the U.S. is greater than 10,000 mg/day (Nelson, 1992), while dietary levels less than 1,000 mg/day are considered "sodium-restricted." The "sodium-restricted" dietary intake of 1,000 mg/day was used to estimate equivalent concentrations. There is also no established RDA for potassium but the recommended daily intake in the U.S. is 1 to 2 meq/kg/d (Nelson, 1992). Assuming a 10 kg body weight for a child, the recommended daily intake is equivalent to 390 to 780 mg/d. The mid-point of the recommended daily intake (585 mg/d) for potassium was used to estimate an equivalent screening concentration for soil, sediment and water. The screening levels based on essential nutrient levels are summarized in **Tables 2-3** and **2-4**.

Those chemicals which were excluded as PCOCs based on their essential nutrient contributions are listed in **Appendix A**.

2.3.5 Chemicals Detected at Low Frequency

Chemicals detected with low frequency do not indicate a clear pattern of contamination. Moreover, the potential health risks that may be associated with low detection frequency compounds are expected to be much lower compared with more prevalent chemicals based on frequency of human exposure.

In accordance with RAGS (EPA, 1989a), a frequency of five percent was used as the assessment criterion (i.e., chemicals were excluded as PCOCs if they were present in ≤ 5 percent of all samples). Prior to excluding chemicals based on low frequency, the maximum detected concentration was compared to EPA (1996) Region III Risk-Based Concentrations (RBCs) to insure "hotspots" were not being excluded from evaluation. Chemicals that were excluded as PCOCs based on low frequency of detection are listed in **Appendix A**.

2.4 POTENTIAL CHEMICALS OF CONCERN IN SURFACE AND SUBSURFACE SOIL

The PCOCs for each medium and site are listed in **Tables 2-5** through **2-15**. The PCOCs identified in these tables are further evaluated in the quantitative risk assessment to determine whether these chemicals may pose a health risk to human receptors. Summary statistics for the PCOCs are provided in **Appendix A**.

2.5 POTENTIAL CHEMICALS OF CONCERN IN SURFACE WATER, SEDIMENTS, AND FISH TISSUE

Johnson, Clear, and Silver Creeks and the NRD Reservoir are primarily of ecological risk concern (see Section 3.0). The selection of ecological PCOCs in surface water and sediments is discussed in the Ecological Risk Assessment (**Appendix B**).

The human health risk assessment also evaluated potential exposure to surface water and sediment from these three creeks and the reservoir. For the human health evaluation, all detected chemicals in surface water were retained for quantitative risk evaluation. Sediment PCOCs were identified using the same selection criteria as used for soils (as discussed in Section 2.3; PCOC Selection Process). Surface water and sediment PCOCs are listed in **Tables 2-16** through **2-18**.

2.6 POTENTIAL CHEMICALS OF CONCERN IN FISH TISSUE

As noted above, Johnson, Clear, and Silver Creeks and the NRD Reservoir are primarily of ecological risk concern. Selection of ecological PCOCs in fish is discussed in the Ecological Risk Assessment (**Appendix B**).

The human health risk assessment evaluated potential ingestion of fish from these three creeks and the reservoir by local anglers. Fish were collected from the NRD Reservoir and fillets were analyzed for metals and explosives. No fish were collected from any of the streams. The PCOCs for fish tissues from the streams were assumed to be the same as for surface water (i.e., surface water PCOCs were modeled to fish tissues). Surface water PCOCs for the streams are presented in **Tables 2-16** and **2-17**. Fish tissue PCOCs for the NRD Reservoir include all chemicals detected in fillets except for two metals (chromium and zinc) which are essential elements present at health-protective levels (**Table 2-18**).

Section 3

The purpose of the exposure assessment is to estimate the magnitude of potential chemical intake for various receptors. The steps required to perform an exposure assessment include the following:

- Identification of potential receptors (i.e., both current populations as well as hypothetical future populations);
- Evaluation of potential exposure pathways for completeness;
- Evaluation of exposure assumptions; and
- Estimation of exposure point concentrations

The approach of this risk assessment is to incorporate conservative exposure assumptions when estimating the magnitude of potential chemical intake, so that potential risks posed by the areas of concern are not underestimated. At the same time, exposure scenarios that are considered unlikely are excluded since they do not reflect realistic exposure conditions. In this risk assessment, exposure is defined for both reasonable maximum exposure (RME) and average exposure conditions. The RME is meant to represent the high end exposure for an individual in a population, while the average exposure represents the exposure for an individual under average or central tendency conditions.

3.1 IDENTIFICATION OF POTENTIAL RECEPTOR POPULATIONS

Potential receptors include human, plant and animal populations and environmental receptors (e.g., streams, ponds, and lakes) that may be impacted by chemicals. Potential human receptor populations evaluated in the OU3 BRA include current populations who exist in the vicinity of the site, as well as hypothetical future populations. These populations are summarized in **Table 3-1** and discussed below.

Load line bomb production buildings and paint operation buildings previously located on-site have since been demolished. Storage rooms, shops, offices, and research farms currently located in the load line areas are not part of the OU3 investigation. However workers in these buildings may visit the bomb production and paint operation areas. In addition, local residents may trespass/visit these sites. These visitors or trespassers may be exposed to the contaminated surface soil surrounding the load line areas.

Outside of the load line areas, much of the land is used for private family farms, commercial feed lots, and farm residences. Although the areas around the bomb production buildings and paint operations areas are not currently used for residential purposes, a farm family scenario is evaluated in the BRA as a potential future use of the property.

The areas around the Proving Grounds and the Potential Landfill Area north of the Proving Grounds are presently untilled grassy areas. These properties are not currently used for industrial, agricultural or residential purposes. Trespasser/visitor populations are thought to represent the most likely current exposure scenarios for these areas. In addition, a farm family scenario is evaluated as a potential future use of these properties.

The Northeast Boundary Area is currently used for crop production. Trespasser/visitor and farm family scenarios, which are evaluated in this BRA, present the most likely current and future uses of this area.

Trace quantities of semi-volatile organic compounds (SVOCs), explosives, and metals were identified in subsurface soil from the Proving Grounds, the Potential Landfill Area north of the Proving Grounds, and the Northeast Boundary Area. In order to evaluate risks associated with exposure to chemicals in both surface and subsurface soils, a hypothetical construction worker performing intrusive (excavation) activities is included for these areas.

In summary, the potential human populations evaluated for exposure to surface soils adjacent to the bomb production buildings and in the paint operations areas at each load line include:

- Current and future on-site workers
- Current and future adult visitors/trespassers
- Current and future juvenile visitors/trespassers
- Potential future farm family adult residents
- Potential future farm family child residents

Potential human populations evaluated for exposure to surface soils at the Proving Grounds, the Potential Landfill north of the Proving Grounds, and the Northeast Boundary Area include:

- Current and future adult visitors/trespassers
- Current and future juvenile visitors/trespassers
- Potential future farm family adult residents
- Potential future farm family child residents

Potential human populations evaluated for exposure to both surface and subsurface soils at the Proving Grounds, the Potential Landfill north of the Proving Grounds, and the Northeast Boundary Area include:

- Potential future construction workers

Detectable concentrations of volatile organic compounds (VOCs), SVOCs, and metals were reported in the surface water and sediment samples in Johnson, Clear and Silver Creeks. The banks of these creeks are very steep, the channel is not easily accessible, and evidence of routine human access is absent. Although, human receptors are unlikely to be exposed to these creeks, direct exposure to surface water or sediment could occur on an infrequent basis during recreational activities such as fishing. In addition, fish could be caught in a few isolated areas in these streams and eaten, although, due to the lack of quality habitat, these streams would not support a large fish population. Ingestion of fish from the streams is likely to only occur on an infrequent basis.

Several explosives and metals were also detected in surface water and sediment samples from the NRD Reservoir. This reservoir is more accessible for fishing than the streams, and it is also able to support a larger fish population. Thus fishing from the reservoir is likely to occur on a more frequent basis than from the streams.

Potential human populations evaluated for exposure to surface water sediment and fish include:

- Potential future farm family adult residents
- Potential future farm family child residents.

Potential ecological receptors are evaluated and discussed in the Ecological Risk Assessment (**Appendix B**).

3.2 EVALUATION OF POTENTIAL EXPOSURE PATHWAYS

An exposure pathway is the mechanism by which a receptor may come into contact with a chemical. As defined by RAGS (EPA, 1989a), there are four major elements that characterize a complete exposure pathway. These elements are:

1. A source and mechanism of chemical release
2. A transport medium for the chemical
3. A point of potential receptor contact with the medium (i.e., an exposure point)
4. A route of exposure (e.g. ingestion) for the receptor to come into contact with the chemical

For an exposure pathway to be complete, all four elements must be present. The absence of any one of these elements results in an incomplete exposure pathway for which site-related health risks do not exist. Thus, the evaluation of potential exposure pathways is necessary to focus on only those pathways which are complete and which could potentially impact human health.

To develop a conceptual understanding of the OU3 investigation areas and their potential for impacting human health and the environment, three separate site conceptual exposure models (SCEMs) were developed, based on the information provided in Section 1.4. The SCEMs provide a means of identifying potentially complete exposure pathways where significant exposure could occur. The potentially complete and significant pathways are evaluated quantitatively in the BRA.

Because the SCEMs are truly conceptual in nature, sites with similar release, transport and exposure characteristics can be grouped into a single SCEM. **Figure 3-1** depicts the SCEM for soils adjacent to the load line bomb production buildings and in the load line paint operations areas, **Figure 3-2** is the SCEM for the Proving Grounds, Potential Landfill north of the Proving Grounds, and Northeast Boundary Area, **Figure 3-3** is the SCEM for Johnson/Clear Creek, Silver Creek, and the NRD Reservoir. These models specifically identify chemical release mechanisms, transport media, exposure routes and receptor populations. An evaluation of potential sources of chemical release receptor populations, exposure media, and exposure routes is presented in the following sections.

3.2.1 Identification of Potential Sources of Chemical Release

Numerous potential sources of chemical release have been identified based on known or suspected Site history (Section 1.2) and Site-specific information (Section 1.6) and will not be repeated here.

3.2.2 Identification of Potential Exposure Routes

An exposure pathway refers to the mechanism by which an individual may come into contact with a contaminant. **Figures 3-1, 3-2,** and **3-3** identify potential exposure pathways evaluated in the BRA. A discussion of these pathways is presented in the following sections.

Potential Soil Exposure Pathways

The ingestion pathway is generally an important source of exposure to contaminated soils. Most humans ingest small amounts of soil every day through incidental hand-to-mouth activity. Infants and adolescent children generally perform this activity more often than older children or adults, and thus, are believed to ingest greater amounts of soil on a daily basis. Dermal contact is another source of soil exposure that occurs primarily as a result of outdoor activities (e.g., working or playing). Both ingestion and dermal contact with surface soil could represent complete exposure pathways for the on-site worker, trespasser and on-site farm family scenarios.

Ingestion of and dermal contact with both surface and subsurface soils can occur during excavation or earth-moving activities. For this reason, exposure to combined surface and subsurface soil is evaluated for a construction worker scenario.

Potential Air Exposure Pathways

Airborne contaminants can be derived from two possible sources:

- Direct volatilization of contaminants in the contaminated media; and
- Fugitive dust emissions from soil containing absorbed contaminants.

Volatilization of VOCs from surface and subsurface soil hypothetically could occur at the OU3 investigation areas. Because of the open conditions at each investigation area, volatilized chemicals (if present) would disperse rapidly. Therefore, inhalation exposure to volatilized chemicals is considered an incomplete exposure pathway and is not evaluated in the BRA.

Exposure to fugitive dust from surface soil is considered an incomplete route of exposure for most areas of concern, because the investigation areas are either covered with grass, rocks, or close to the foundation of buildings. Limited exposed surface would prevent significant dust formation. For the Proving Grounds, Potential Landfill north of the Proving Grounds, and Northeast Boundary Area, exposure to fugitive dust may represent a potentially complete exposure pathway for construction workers. However, this is likely to be a minor exposure route for the following reasons:

- The vegetation cover (grass) provides a wind-break for these areas.
- The soil moisture content retards dust formation. The soil moisture is high because:
  - The areas are located close to surface water (Johnson Creek and NRD Reservoir),
  - The areas are located in a non-arid climate region;
- Installation of underground utilities is the most likely type of excavation activity that would occur in these areas. Typically, this type of activity does not generate significant fugitive dust, nor does this activity occur for any extended time

Therefore, when compared with the oral and dermal exposure routes, inhalation of fugitive dust would be a minor exposure route for construction workers.

Potential Groundwater Exposure Pathways

Because the risks associated with groundwater exposure were evaluated in the OU2 BRA, no further assessment is required in the OU3 BRA.

Potential Surface Water and Sediment Exposure Pathways

As discussed in Section 3.1, Johnson, Clear and Silver Creeks primarily consist of channelized stream beds, with very steep banks that would limit accessibility. Because of the relatively inaccessible nature of these creeks, direct dermal contact and incidental injection of surface water and sediment are considered to represent relatively minor exposure routes. However, potential exposure could occur on an infrequent basis during recreational activities, such as fishing. The NRD Reservoir also presents an area where exposure to sediments and surface water could occur. Because the reservoir is more accessible than the streams, and is also able to support a larger fish population, exposure during recreational activities is expected to occur on a more frequent basis. An evaluation of direct dermal contact and ingestion of surface water and sediment associated with recreational fishing or other recreational activities by adults and 0-6 year old children is included in the BRA.

Potential Food Chain Exposure Pathways - Vegetable Garden

Exposure to contaminants at the Site could occur through ingestion of explosives-contaminated crops. To address this issue, a laboratory bench study was conducted by U.S. Army Corps of Engineers Waterways Experiment Station (WES) to study the bioaccumulation potential of explosives for a variety of food crops (USACE, 1997). The final version of this study is provided in **Appendix D**. An evaluation of potential exposure to explosives via a garden vegetable scenario based on the results of the plant uptake study is included in this BRA.

Potential Food Chain Exposure Pathways - Recreational Fishing

Most stretches of Johnson Creek, Clear Creek and Silver Creek on the former NOP consist of shallow, low flow, channelized steam beds that will not support a large fish population, however, a few isolated areas may contain adequate habitat to support minimal recreational fishing. The NRD Reservoir represents a more plausible area for fishing, since it is more accessible than the streams and can support a larger fish population. An evaluation of potential fish ingestion via a recreational fishing scenario is included in the BRA for the streams and the NRD Reservoir.

3.3 EVALUATION OF EXPOSURE ASSUMPTIONS

In order to calculate the chronic daily intake (CDI) of chemicals from exposure to soil, sediments, surface water, fish and garden vegetables, and to estimate the associated potential health risks, a number of exposure parameters must first be quantified. The exposure parameter values used in the exposure algorithms have been selected from the Exposure Factors Handbook (EPA, 1989b, 1997), OSWER Directive 9285.6-03 (Standard Default Exposure Factors; EPA, 1991) and Risk Assessment Guidance for Superfund (RAGS) (EPA, 1989a). The exposure parameters listed in **Tables 3-2** through **3-9** have been incorporated into the exposure algorithms to estimate the extent of chemical intake. Exposure was evaluated for both RME and average exposure. The RME describes the maximum exposure that can reasonably be expected to occur, while the average exposure represents a more typical exposure (also known as Central Tendency Exposure)[3]. Parameters which are typically quantified include the following:

- Lifespan (days)
- Exposure duration (years)
- Exposure frequency (days/year)
- Soil ingestion rate (mg/day)
- Body weight (kg)
- Exposed skin surface area (cm^2)
- Soil adherence (mg/cm^2)
- Dermal Absorption (unitless)
- Vegetable ingestion rate (kg/day)
- Percent homegrown vegetables (unitless)
- Fractional intake of leafy vegetables, root vegetables and garden fruit (unitless)
- Bioaccumulation factor - garden vegetables (unitless)
- Fish ingestion rate (Kg/day)
- Fraction of fish ingested from contaminated source (unitless)
- Bioconcentration factor - fish (unitless)

Each of these exposure parameters is discussed in the following sections.

3.3.1 Lifespan

The assumed lifespan, as given in the OSWER Directive 9285.6-03 (EPA, 1991) is 70 years (25,550 days) for all receptors.

3.3.2 Exposure Duration

Exposure duration refers to the number of years in which exposure occurs. To evaluate RME exposure, an adult resident residing in the same house for 70 years (RME duration of 70 years) is assumed. For average exposure, an adult resident is assumed to reside in the same residence for 9 years, based on the average time people spend in a single residence (Exposure Factors Handbook; EPA, 1989b). For both RME and average exposure, child residents (0- to 6-years old) are assumed to spend the entire 6-year period in the same house.

[3] The RME evaluation is commonly used as a basis for site remedial decisions. The AE evaluation is included as a means of providing site decision makers with supplemental information useful to the remedial decision making process.

On-site workers are assumed to have an RME duration of 25 years, as given in OSWER Directive 9285.6-03 (EPA, 1991). Consistent with the OU1 BRA, an on-site worker is assumed to have an average exposure duration of 10 years.

The exposure durations for adult trespassers are assumed to be the same as for adult residents (70 years RME; 9 years average). For an 8- to 13-year old juvenile trespasser, the exposure duration is assumed to be 5 years for both RME and average exposure.

Utility installation is considered the most likely future site-specific excavation activity. This type of activity generally occurs over a relatively short duration. Based on professional judgment and known site-specific activities for construction workers, construction activity is assumed to occur for 6 months and 3 months in one year for RME and average exposure, respectively. The use of 6-month and 3-month exposure durations for the construction worker scenario is considered conservative, and should provide a health-protective evaluation for this population.

3.3.3 Exposure Frequency

Exposure frequency refers to the number of days per year spent at or near the Site. Residents are assumed to have an exposure frequency of 350 days per year (RME and average), allowing for 15 days per year for vacations, holidays, etc. (OSWER Directive 9285.6-03; EPA, 1991).

Current and future on-site workers are assumed to spend 250 days per year on-site for both RME and average exposure, based on a 5-day working week for 50 weeks per year (OSWER Directive 9285.6-03; EPA, 1991). Hypothetical future construction workers are assumed to have an exposure frequency of 130 days and 65 days per year for RME and average exposure, respectively. This is based on 5 working days per week for the entire working period (6 months for RME and 3 months for average exposure).

Trespassers/visitors are assumed to visit the Site on an infrequent basis. For both adult and juvenile trespassers, it is assumed that the trespasser will visit the area two days per month (24 days/year) for RME and one day per month (12 days/year) for average exposure, conservatively assuming the individual will stay on-site for the entire day.

3.3.4 Soil Ingestion Rate

The soil ingestion rate refers to the amount of soil that is ingested daily. For RME exposure, Standard Default Exposure Factors (EPA, 1991) recommends soil ingestion rates of 50 mg/day for worker populations. This value is applied to the assessment of an on-site worker scenario. Since soil excavation activity may involve increased exposure to soil, 480 mg/day was used as the RME soil ingestion rate for construction workers. For average exposure, the Exposure Factors Handbook (EPA, 1989b) recommends soil ingestion rates of 10 mg/day for adult populations with average activity. This value is applied to the assessment of both on-site worker and construction worker scenarios.

For both farm family and trespasser/visitor scenarios, EPA recommends the use of soil ingestion rates of 100 mg/day for individuals over the age of 6 years, and 200 mg/day for 0- to 6-year old children (EPA, 1991). Consistent with the OU1 BRA, average soil ingestion was assumed to be one-half the RME rate (i.e., 50 mg/day for individuals over the age of 6 years, and 100 mg/day for 0- to 6-year old children).

3.3.5 Body Weight

Body weights for adults and 0- to 6-year old children were obtained from OSWER Directive 9285.6-03 (EPA, 1991). The assumed body weight for adults is 70 kg. This value was used for adult residents, on-site workers, construction workers and adult trespassers. The body weight for 0- to 6-year old children is given as a time-weighted average of 15 kg. The time-weighted average of an 8- to 13-year old juvenile trespasser is estimated to be 37 kg, based on information supplied in the Exposure Factors Handbook (EPA, 1989b).

3.3.6 Skin Surface Area

Exposed skin surface area is important when evaluating uptake of chemicals that are absorbed dermally. For dermal exposure to soil, an RME surface area of 5,230 cm^2 was estimated for potential adult receptor scenarios (hypothetical construction workers, farm family adults, adult trespassers, and on-site worker) based on the adult surface areas of hands, head, forearms, and lower legs (Exposure Factors Handbook; EPA, 1989b). For average adult exposure, the total exposed surface area was assumed to be limited to the head and hands, and was calculated to be 2,020 cm^2 (EPA, 1989b).

The RME exposed dermal surface area for 0- to 6-year old children (4,331 cm^2) is based on a time-weighted average value for head, hands, arms and legs. The average exposed dermal surface area for a 0- to 6-year old child (1,869 cm^2) is based on a time-weighted average value for hands, one half of arms and one half of legs (EPA, 1989b). Exposed surface area was calculated by multiplying the total body surface area by the fraction of the body that is potentially exposed (see example below). Because the Exposure Factors Handbook (EPA, 1989b) does not present total body surface area data for 0-2 year old children, data for 2-6 year old male children were used to represent the 0-6 year age range. This approach tends to overestimate the surface area of younger children and female children, and as such, should provide a protective evaluation for the 0-6 age group. Surface area values were calculated as follows.

TOTAL BODY SURFACE AREA 3<6 YEAR OLD MALES = 7280 CM^2

AGE	PERCENT OF TOTAL BODY SURFACE AREA					
	HEAD	HANDS	ARMS	LEGS	RME[a]	AVERAGE[b]
3	14.2	5.3	11.8	23.2	54.5	22.8
4	13.6	6.07	14.4	26.8	60.87	26.67
5	13.8	5.7	14.0	27.8	61.3	26.6
6[c]	13.8	5.7	14.0	27.8	61.3	26.6
				2-6 Mean	59.49	25.67

[a] RME = head + hands + arms + legs
[b] Average = hands + (0.5 x arms) + (0.5 x legs)
[c] Percent values for 5-6 year olds not available, 4-5 year age range values were assumed

RME Surface Area = 7280 cm^2 x 0.5949 = 4331 cm^2

Average Surface Area = 7280 cm2 x 0.2567 = 1869 cm^2

For juvenile trespassers, the RME exposed dermal surface area (4,602 cm^2) is based on a time-weighted average value of head, hands, one half of arms and one half of legs for a 8- to 13-year old child. The average exposure exposed dermal surface (2,005 cm^2) is based on the time-weighted average value of 8- to 13-year old child's head and hands (EPA, 1989b). Surface area values for the 8-13 year old trespassers were calculated as follows:

		Percent of Total Body Surface Area				Exposed Surface Area (cm^2)	
Age	Total Body Surface Area (cm^2)	Head	Hands	Arms	Legs	RME[a]	Average[b]
8	9310	13.1	4.71	13.1	27.1	3529	1658
9	11600	12.0	5.3	12.3	28.7	4385	2007
10	11600	12.0	5.3	12.3	28.7	4385	2007
11	11600	12.0	5.3	12.3	28.7	4385	2007
12	14900	8.74	5.39	13.7	30.5	5398	2105
13	14900	9.97	5.11	12.1	32.0	5532	2247
				8-13 Mean		4602	2005

[a] RME = [head + hands + (0.5 x arms) + (0.5 x legs)] x total body surface area
[b] Average = (head + hands) x total body surface area

3.3.7 Soil Adherence

Dermal soil adherence is used, in conjunction with exposed skin surface area, to define the total amount of soil adhering to exposed skin surfaces. EPA recommends 1.0 mg/cm^2 for upperbound (RME) exposure, and 0.2 mg/cm^2 for average exposure (Dermal Exposure Assessment: Principles and Applications; EPA, 1992b).

3.3.8 Dermal Soil Absorption

Dermal soil absorption values used to estimate chemical absorption through the skin are assumed to be 10 percent for organic chemicals and 1.0 percent for inorganic chemicals, as presented in EPA guidance (EPA, 1998).

3.3.9 Vegetable Ingestion Rate

The daily vegetable ingestion rate refers to the total amount of leafy vegetables, root vegetables and garden fruit (e.g., tomatoes) eaten on a daily basis, averaged over an annual (365 day) time period. An ingestion rate of 0.2 kg/day was used to evaluate adult exposure, as recommended in Standard Default Exposure Factors (EPA, 1991). Half the adult rate (0.1 kg/day) was assumed for children. These ingestion rates were used previously to evaluate vegetable ingestion in the OU1 BRA (Donohue, 1991).

3.3.10 Percent Homegrown Vegetables

The percent homegrown vegetables refers to the proportion of overall vegetable intake that originates from a home garden, relative to other sources, such as grocery stores. As recommended in RAGS (EPA, 1989a), 40 percent was assumed for the RME scenario and 25 percent was assumed for the average scenario. These percentages were used previously to evaluate vegetable ingestion in the OU1 BRA (Donohue, 1991).

3.3.11 Fractional Intake of Leafy Vegetables, Root Vegetables and Garden Fruit

Fractional intake refers to the relative proportions of leafy vegetables, root vegetables and garden fruit ingested as part of a normal diet. Because adults and children have different food preferences, the relative proportions used in the BRA have been adjusted to be age-specific. Fractions used to evaluate child ingestion included 10 percent for leafy vegetables, 45 percent for root vegetables, and 45 percent for garden fruits. For adults the proportions were 21 percent for leafy vegetables, 32 percent for root vegetables, and 47 percent for garden fruits. These percentages were used previously to evaluate vegetable ingestion in the OU1 BRA (Donohue, 1991).

3.3.12 Bioaccumulation Factors - Garden Vegetables

The bioaccumulation factor (BAF) refers to the relationship between chemical concentrations in soils and in tissues of plants growing in those soils. BAFs are used to estimate the amount of chemical that could be transferred from soils to plant tissues. Chemical-and plant-specific BAFs are used in this BRA to estimate the amount of explosives that could be transferred from Site soils to leafy vegetables, root vegetables, and garden fruit (i.e., tomatoes). The BAFs used to evaluate the vegetable garden scenario are presented in **Table 3-7**. These BAFs were derived from the maximum measured uptake rates identified in the Plant Biouptake Study conducted by WES (USACE, 1997).

3.3.13 Surface Water Ingestion Rate

The surface water ingestion rate refers to the amount of surface water an angler would ingest incidentally while fishing at the reservoir or in the creeks (**Table 3-8**). This is based on the assumption that an angler may ingest some water via hand-to-mouth activities, but will not drink or swim in surface water. An ingestion rate of 5 ml/hr (i.e., 5000 mg/hr) was assumed for the RME scenario. The average exposure scenario assumes half the ingestion rate of the RME scenario. The RME value is 10 percent of the 50 ml/hr used to evaluate swimmers who swallow a mouthful of water while swimming.

3.3.14 Fish Ingestion Rate

The fish ingestion rate refers to the total amount of fish consumed from all sources, averaged over an annual (365 day) time period **(Table 3-8)**. Ingestion rates of 25 gm/day (RME) and 8 gm/day (average exposure), as recommended by EPA (1997), were used to evaluate adult ingestion. For a 0-6 year old child, half the adult consumption rates (12.5gm/day RME; 4 gm/day average exposure) were assumed.

3.3.15 Fraction Of Fish Ingested From Contaminated Source

The fraction of fish ingested refers to the amount of fish consumed that originates from on-site creeks, relative to the total amount of fish consumed from all sources. Because the on-site creeks are unlikely to support a large fish population, 20 percent fraction ingested was assumed for RME scenarios. Because the NRD Reservoir is more accessible than the creeks, and is also able to support a larger fish population, 100 percent fraction ingested was assumed for the RME scenario at the reservoir (**Table 3-8**). For average exposure scenarios, half the RME values (10 percent for the creeks; 50 percent for the NRD Reservoir) were assumed.

3.3.16 Bioconcentration Factor - Fish

This risk assessment evaluated risks to local angler populations who might fish from Johnson, Clear, or Silver Creeks, or from the NRD Reservoir. In the case of the NRD Reservoir, fish tissues (fillets) were collected and analyzed for metals in order to identify PCOCs and estimate exposure point concentrations. In the case of the streams, no fish tissues were collected. Exposure point concentrations were estimated using a modeling approach. Wherein bioconcentration factors were applied to the surface water PCOCs.[4]

Bioconcentration refers to the tendency for a chemical in an aqueous medium to partition to fish tissue. Where available, published bioconcentration factors (BCFs) were used to evaluate bioconcentration into fish tissues. If no bioconcentration factors were available for a specific chemical, a bioconcentration factor was estimated using a Quantitative Structure Activity Relationship (QSAR). A QSAR is an empirical relationship between two physical/chemical properties (e.g., the octanol/water partition coefficient and BCF). The QSAR used to predict BCFs for organic chemicals was shown in the following equation:

$$BCF = 10^{(0.79 \times LogKow - 0.40)}$$

Where

BCF_{ff} = Bioconcentration factor [(mg/kg)/(mg/L)]
KOW = Octanol/water partition coefficient

BCF values used in the OU3 BRA are presented in **Table 3-9**.

The BCFs were used in conjunction with other factors, such as the lipid content of the organism, fat solubility, and food chain multipliers, to calculate chemical concentrations in fish tissues. As defined by U.S. EPA (1993), food chain multipliers for tropic level 4 fish were used to predict fish tissue concentrations. Tropic level 4 represents piscivorous (fish-eating) fish, including top predators, while tropic levels 1, 2, and 3 are represented respectively, by phytoplankton, zooplankton, and small fish (U.S. EPA 1993).

Food chain multipliers (**FCM**) were based on log Kow according to the tables presented by the U.S. EPA (1993). Because chemicals with low Kows (indicating low fat solubility) generally do not biomagnify through the food chain, food chain multipliers for organic chemicals with Log Kow values below 4 were assumed to be equal to 1.0, consistent with recent EPA guidance (U.S. EPA, 1993). An FCM of greater than 1.0 is applicable to most fat soluble organic

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[4] Because of analytical problems, fish tissues from the NRD Reservoir could not be evaluated for explosives. NRD Reservoir fish tissue exposure point concentrations for explosives were calculated using their modeling approach.

chemicals with log Kows greater than 4.0. For chemicals with a log Kow greater than 6.5, the FCM was assumed to be equal to 1.0, as specified by U.S. EPA (1993).

Organic and inorganic chemical concentrations in fish tissue were calculated using the following equations.

For Organic Chemicals:

$$C_{ff4} = C_{sw} x\ BCF_{ff} x\ Lipid_{ff} x\ FCM_4$$

For Inorganic Chemicals

$$C_{ff4} - C_{sw}\ x\ BCF_{ff}$$

Where:

Cff4	=	Chemical concentration in fish fillet tissue (mg/kg)
Csw	=	Chemical concentration in surface water (mg/L)
BCF_{ff}	=	Bioconcentration factor for fish fillet tissue [(mg/kg)/(mg/L)]
$Lipid_{ff}$	=	Lipid content of fish fillet tissue (4.4 percent assumed)
FCM_4	=	Trophic Level 4 food chain multiplier (unitless)

It should be noted that most fish have a lipid content less than 4.4 percent. The use of a higher lipid content is a conservative approach, since the higher the lipid content the higher the predicted chemical concentration in the fish tissues. These analytical equations are designed to approximate fish tissue concentrations under equilibrium conditions, where the fish is being constantly exposed to the contaminant at a specified water concentration. It is important to note that the BRA conservatively assumed the maximum detected concentration as the surface water equilibrium concentration for use in calculating fish tissue concentrations.

3.4 ESTIMATION OF EXPOSURE POINT CONCENTRATIONS

Exposure point concentrations are the chemical concentrations to which a receptor is exposed when contact is made with a specific environmental medium. Where applicable, exposure point concentrations have been calculated separately for each contaminated medium (surface soil [0- to 2-foot depth; 0- to 6-inch depth] and subsurface soil [deeper than 2 feet]) for each site. For surface water and sediment, the maximum detected concentrations were used as exposure point concentrations, due to the relatively small number of samples collected.

The chemical concentrations presented in **Appendix A** have been used to develop exposure point concentrations in this BRA. The approach used to calculate exposure point concentrations of the PCOCs is that recommended by EPA (1992a), and is based on statistical averaging of all sample data from a site. In locations where the chemical was reported as undetected, the chemical is assumed to be present at one-half of the detection limit, in accordance with EPA (1989b). From this information, a 95 percent upper confidence limit (UCL) on the arithmetic mean was calculated. The concentration associated with the 95 percent UCL or the maximum concentration detected, whichever was lower, was adopted as the RME exposure point concentration for each chemical. Use of the maximum concentration, if less than the upper bound, is supported by EPA (1989b). This approach is supported by the observation that the 95 percent UCL concentration may exceed the maximum reported concentration in instances where the variation of the data is large or when high detection limits (above concentrations detected) strongly influence calculation of 95 percent UCL values. For average exposure, the lower of RME exposure concentration or the arithmetic mean concentration is used as the exposure point concentration. The exposure point concentrations for all the PCOCs at each site are presented in **Tables 3-10** through **3-37**. An example exposure point calculation is provided below:

Equation:

$$UCL = e^{(\bar{x}+0.5s^2+sH \cdot \sqrt{n-1})}$$

where:

UCL = upper confidence limit
e = constant (base of the natural log, equal to 2.718)
$\bar{x}$ = mean of the transformed data
s = standard deviation of the transformed data
H = H statistic (e.g., from table published in Gilbert, 1987)
n = number of samples

Example: chromium (hypothetical)

Measured concentrations (mg/kg) from 15 samples: 10, 13, 20, 36, 41, 59, 67, 110, 110, 136, 140, 160, 200, 230, and 1300.

Transformed data [i.e., ln(x)]: 2.30, 2.56, 3.00, 3.58, 3.71, 4.08, 4.20, 4.70, 4.70, 4.91, 4.94, 5.08, 5.30, 5.44, and 7.17

$\bar{x}$ = 4.38

s = 1.25

H = 3.163 (based on 95 percent)

n = 15

UCL = $e^{(4.38+0.5(1.25)^2+(1.25x3.163)/\sqrt{15-1})}$

= $e^{(6.218)}$

= 502 mg/kg

Section 4

The purpose of a toxicity assessment is to provide a summary of the potential biological effects of the PCOCs found on-site. This section and its associated appendix (**Appendix E**) includes a concise review of the pertinent literature on the toxic effects of the individual compounds. In particular, the acute and chronic toxicity, teratogenic/reproductive effects, mutagenicity, genotoxicity, and carcinogenicity are discussed. When available, results of epidemiological studies have been incorporated into the discussion to provide information regarding the potential effects of chemicals on human health.

In general, the PCOCs identified for the OU3 BRA consist of SVOCs, explosives, and metals. The toxic and carcinogenic effects of these compounds are highly variable, and are discussed in detail in the toxicity profiles presented in **Appendix E** of this BRA.

Critical toxicity values (CTVs) are also presented in this section. The CTVs are values developed by EPA that are used to evaluate potential cancer risks and non-carcinogenic health hazards associated with chemical exposure.

4.1 TOXICITY ASSESSMENT OF NONCARCINOGENIC EFFECTS

The non-carcinogenic CTV is known as the reference dose (RfD). Reference doses are based on the premise that non-carcinogenic (i.e., toxic) effects exhibit a threshold. As long as the chronic daily intake (CDI) of a compound is less than the reference dose, no non-carcinogenic health effect is believed to be posed by the exposure. Reference doses are developed using human and animal studies, and incorporate safety factors to ensure health protection in the most sensitive population.

To develop a toxicity value for noncarcinogenic effects, the approach is to identify this threshold dose or "no-observed-adverse-effect level" (NOAEL). A NOAEL is the highest level (determined in epidemiological studies or animal studies) at which there was no statistically or biologically significant effect of concern, often called the "critical toxic effect." For certain substances, only a LOAEL, or "lowest-observed-adverse-effect level," has been determined. This is the lowest dose of a substance that produces either a statistically or biologically significant indication of the critical toxic effect. The NOAEL or the LOAEL may be used to calculate the RfD (reference dose) of a particular chemical.

RfDs are calculated by dividing the NOAEL (or LOAEL) by uncertainty factors, which generally range from 10 to 1,000. For example, uncertainties include variations in the sensitivity of individuals within a population and the extrapolation of data from experimental animals to humans. The RfD is expressed in units of milligrams of chemical per kilogram of body weight per day (mg/kg/day) for oral exposure.

Dermal RfDs can be derived from oral RfDs by adjusting the oral value to account for the percent of gastrointestinal absorption associated with the study used to derive the RfD (i.e., converting the oral RfD from an "administered" to an "absorbed" dose). However, this approach is not currently recommended by EPA because absorption efficiency is unknown for most compounds. EPA currently recommends use of oral RfDs to evaluate dermal exposure, although it should be noted that this approach may lead to an underestimation of dermal risk for some compounds such as metals, HMX and RDX, which are typically poorly absorbed in the gastrointestinal tract. The methodology for deriving RfDs is more fully described in RAGS (EPA, 1989a).

The EPA defines a chronic RfD as an estimate of a daily exposure level for the human population that is unlikely to result in deleterious effects during a lifetime (i.e., 70 years, according to EPA guidance). A chronic RfD is used to evaluate the potential noncarcinogenic hazards associated with long-term chemical exposures (7 years to a lifetime). It should be noted that chronic RfDs were used to evaluate 0-6 year old child exposure, since it was conservatively assumed that children would remain on-site after the age of six.

Subchronic RfDs have been developed for a few chemicals to characterize potential noncarcinogenic hazards associated with short-term chemical exposures. The EPA defines subchronic exposure as periods ranging from 2 weeks to 7 years (RAGS). In the BRA, subchronic RfDs are used to evaluate construction worker exposures. Subchronic RfDs tend to be higher, generally by an order of magnitude, than chronic RfDs because of the shorter exposure duration.

Chronic and subchronic RfDs for the PCOCs are shown in **Table 4-1**. For the ingestion route, the RfD is for the administered dose (assuming 100 percent absorption by the gastrointestinal tract) unless otherwise noted. RfDs have also been developed from many of the carcinogens to account for their noncarcinogenic effects.

The potential for noncarcinogenic effects to occur as a result of exposure is evaluated by comparing the exposure level, or daily chemical intake, over a specified time period (e.g., subchronic or chronic) with a RfD derived for a similar exposure period. A Hazard Quotient (HQ) is derived for each chemical as follows:

$$HQ = [Chronic\ Daily\ Intake]\ /\ [RfD]$$

If exposure is equivalent to or less than the RfD, the HQ is 1.0 or less, which represents an intake level unlikely to be associated with potential adverse effect due to the chemical. If exposure exceeds the RfD, the resulting HQ exceeds 1.0 and it will be concluded that a hazard may exist. For each noncarcinogenic chemical of potential concern specific to each exposure pathway, a HQ is derived. HQs for each chemical are then summed for each exposure pathway to derive a value referred to as a Hazard Index (HI):

$$HI = HQ_1 + HQ_2 + HQ_3 \ldots\ldots\ldots\ldots + HQ_n$$

As noted in RAGS, if the HI is greater than 1.0 as the result of adding several HQs for different compounds, it may be appropriate to segregate the compounds by effect and mechanisms of action, deriving separate HIs for each group. HIs greater than 1.0 should generally be viewed as indicating that exposure to a particular medium identified in the exposure scenario represents a potential human health hazard. Exposure pathway HIs are summed across pathways whenever appropriate, since individuals may be simultaneously exposed to chemicals via more than one pathway (e.g., to both soil and groundwater).

4.2 TOXICITY ASSESSMENT OF CARCINOGENIC EFFECTS

The carcinogenic CTV is termed the slope factor (SF). Slope factors are developed based on a dose-response curve for carcinogenicity of the specific chemicals. As with RfD values, slope factors are developed from human and animal studies and are designed to be health protective (i.e., to overestimate the actual risks). Given the large degree of uncertainty that exists in predicting actual cancer risks, the EPA takes a precautionary, conservative approach in evaluating excess cancer risks to insure that site risks are not underestimated. The SF is used to estimate an upper-bound probability of an individual developing cancer as a result of exposure to a potential carcinogen. Carcinogens with EPA-derived slope factors are also given an EPA weight-of-evidence classification whereby potential carcinogens are grouped according to the likelihood that the chemical is a human carcinogen, depending on the quality and quantity of carcinogenic potency data for a given chemical. **Table 4-2** presents the EPA weight-of-evidence classification system.

In estimating the risk posed by potential carcinogens, it is the common practice of EPA and other regulatory agencies to assume that any exposure level is associated with a finite probability, however minute, of producing a carcinogenic response. EPA assumes that a small number of molecular events can evoke changes in a single cell that can lead to uncontrolled cellular proliferation. This mechanism for carcinogenicity is referred to as "non-threshold" since there is theoretically no level of exposure for such a substance that does not pose a small, though finite, probability of producing a carcinogenic response.

As with the evaluation of non-cancer effects, it is the common practice of EPA to evaluate dermal exposure to carcinogens using oral toxicity values (e.g., oral slope factors). This approach does not account for loss of chemicals that can occur via biotransformation and/or elimination prior to the chemicals being widely distributed through the body via the systemic circulation. This type of elimination occurs because dermally absorbed chemicals are first transported to the liver, where a variety of detoxification mechanisms exist, prior to being distributed throughout the body of potential target organs. This phenomenon , which can apply to a wide variety of compounds, is usually referred to as "presystemic elimination" or the "first pass effect" (Amdur et al., 1991). For chemicals eliminated by this first pass effect, the use of an oral slope factor to evaluate dermal risks can lead to an overestimation of those risks.

Slope factors are based primarily on the results of animal studies. There is uncertainty whether all animal carcinogens are also carcinogenic in humans. While many chemical substances are carcinogenic in one or more animal species, only a small number of chemical substances are known to be human carcinogens. Part of this uncertainty involves the fact that the human toxicology studies are inadequate to make the determination of whether a number of chemicals are carcinogenic in man. Given this inherent weakness in the toxicology data, the EPA takes a health-protective approach and assumes that humans are as sensitive to all animal carcinogens as the most sensitive animal species. This policy decision is designed to prevent underestimating risk, and introduces the potential to overestimate carcinogenic risk.

It is generally assumed by EPA in developing SFs that the risk of cancer is linearly related to dose. A linearized multistage model is one of the most commonly used models by EPA for low-dose extrapolation of experimentally derived data to the low dose range. This mathematical model is based on the multi-stage theory of carcinogenesis wherein the response is assumed to be linear at low doses. From the slope of the extrapolation curve estimated by the model, EPA calculates the upper 95th percent confidence limit of the slope. This value, the slope factor (SF), expressed in units of $(mg/kg/day)^{-1}$, is used to convert the chronic daily intake of chemical, normalized over a lifetime, directly to a cancer risk. This represents an estimation of an upper-bound incremental lifetime probability that an individual will develop cancer as a result of exposure to a potential carcinogen. This model provides an estimate of cancer risk at low doses, and is likely to overestimate the actual cancer risk. The EPA acknowledges that actual slope factors are likely to be between zero and the estimate provided by the linearized multistage model (EPA, 1989a). The slope factors and weight-of-evidence classifications for the PCOCs are included in **Table 4-1**.

Risks associated with individual PCOCs are derived by multiplying the SF and the estimated chronic daily intake (i.e., average daily intake for entire lifetime) for each exposure pathway as follows:

$$\textit{Risk Estimate} = \textit{Chronic Daily Intake} \times \textit{Slope Factor}$$

An overall risk estimate for each exposure scenario is calculated by combining the risk estimates for individual chemicals and exposure routes. Risk estimates are then compared with EPA's risk range of 1×10^{-4} (1 in 10,000) to 1×10^{-6} (1 in 1,000,000) incremental excess lifetime cancer risk (EPA, 1990).

4.3 SOURCE OF THE CRITICAL TOXICITY VALUES

The RfD and SF values listed in **Table 4-1** were obtained from the following sources:

- EPA's Integrated Risk Information System (EPA, 1997) on-line database system
- EPA's Health Effects Assessment Summary Tables (EPA, 1995a)
- EPA Region III Risk-Based Concentration Table (EPA, 1996)

4.4 LEAD

Lead cannot be evaluated in a BRA using the same methods applied to other chemicals. While it has both carcinogenic and non-carcinogenic properties, EPA does not furnish either reference doses (RfDs) or slope factors (SFs) for lead. Unlike most other carcinogenic chemicals, the primary health concern for lead is related to its non-carcinogenic effects. Lead is a neurodevelopmental toxicant, and its toxic properties are related to an individual's age. Young children are especially sensitive to lead. Relatively low levels of lead exposure can cause adverse effects. These effects are caused by a higher rate of absorption through the gastrointestinal tract than adults and because young children's nervous systems are still developing.

Because of the age-specific effects of lead, EPA has developed two computer models to estimate lead uptake from various environmental media. Since children have been identified as the most sensitive population to the toxic effects of lead, both EPA models address childhood fetal exposure. One model, termed the Integrated Exposure Uptake/Biokinetic (IEUBK) Model, predicts the amount of lead that will be found in the bloodstream of an exposed child, such as may typically be found in a residential setting. The other model, referred to as the Adult Lead Model (EPA, 1996b), is designed to address adult exposure in non-residential settings. The receptor of concern in this Adult Lead Model is the unborn fetus in a pregnant woman. Both models predict blood lead levels in children/fetuses. Epidemiological studies suggest that blood lead concentrations as low as 10 µg/dl may be related to deficits in intelligence. In order to be health protective, EPA has chosen a blood lead level of 10 µg/dl to represent the level of concern for assessing potential risk associated with lead exposure. Because childhood exposure is a possibility at this site, this BRA evaluates potential exposure to lead-contaminated soils using the IEUBK child lead model.

Section 5

The purpose of risk characterization is to quantify the potential health risks associated with site-specific contamination only. Naturally-occurring chemicals, such as arsenic, found at background levels are not evaluated. Likewise, pesticide residues from fields, radon gas from subsurface geologic structures, ionizing radiation, and a whole host of other "background" risk sources are not evaluated.

In this portion of the BRA, potential RME health risks are estimated for each PCOC and exposure pathway. These risk estimates are calculated using the exposure parameters and exposure point concentrations developed in Section 3.0 (**Tables 3-10** through **3-37**) and the CTVs reported in the toxicity assessment (**Table 4-1**).

As discussed in Section 4.0 (Toxicity Assessment), the potential non-carcinogenic health hazard is calculated for each compound as the ratio of the chronic daily intake (CDI) to the respective reference dose (RfD). The ratio is termed the Hazard Quotient (HQ). A HQ in excess of unity (1.0) indicates that the threshold has been exceeded and a potential hazard may exist, while a value less than 1.0 indicates that adverse health effects are extremely unlikely. The summation of the HQs for all compounds is termed the Hazard Index (HI), which is also compared to a threshold value of 1.0. The assumption of additivity of sub-threshold HQ values in calculating an HI is only valid when the following conditions are met:

- Condition 1 - Different chemicals affect the same target organs
- Condition 2 - There are no antagonistic or synergistic effects between compounds (Little is known about these interactions for most chemicals)

The first condition is not true in many cases (see **Appendix E** for a discussion of the target organ effects for each compound). Assuming that no synergistic effects occur, the assumption of additivity does not appear to be valid for all compounds.

Potential excess cancer risks are calculated for each compound as the multiplication product of the CDI and the respective slope factor (SF). The estimated excess cancer risks for each compound may be summed to yield an overall excess cancer risk for each scenario.

Risk and hazard estimates provided in this section were calculated based on an evaluation of PCOCs present in the 0- to 2-foot soil horizon. This was the same soil horizon evaluated in the OU1 BRA, thus providing a consistent basis for comparison between the results of the OU1 and the OU3 BRAs. The same scenarios were also evaluated based on chemicals present in the 0- to 6-inch soil horizon at the request of EPA. Both sets of risk and hazard estimates are provided in the following sections (Sections 5.1 through 5.11). In addition, this section of the report evaluates potential risks and hazards in subsurface soils at the Potential Landfill north of the Proving Grounds, Proving Grounds, and Northeast Boundary Area (Sections 5.12 through 5.14) and in surface water and sediments in Johnson, Clear and Silver Creeks, and the NRD Reservoir (**Sections 5.15 and 5.17**). Potential health effects associated with exposure to lead at all areas are discussed in Section 5.18.

Potential excess cancer risks and non-carcinogenic hazards associated with RME and average exposures were calculated using the contaminant concentrations presented in **Tables 3-10** through **3-37** and the exposure parameters presented in **Tables 3-2** through **3-9**.

5.1 POTENTIAL EXCESS CANCER RISKS AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH SURFACE SOIL ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS

As discussed in Section 3.0 (Exposure Assessment), risks and hazards were estimated for residents, trespassers and workers potentially exposed to surface soil (two different intervals; 0- to 2-foot depth and 0- to 6-inch depth) adjacent to the Load Line 1 Bomb Production Buildings and residents ingesting garden produce grown in these soils. A summary of potential excess cancer risks and non-carcinogenic HIs is presented in **Tables 5-1** and **5-2.** The excess cancer risks and the HQ values for the individual chemicals and pathways are presented in **Appendix C (Tables C-1-1** through **C-1-24** for 0- to 2-foot soils; **Tables C-11-1** through **C-11-24** for 0- to 6-inch soils).

5.1.1 Potential Non-Carcinogenic Health Hazard

The HI values associated with 0- to 2-foot surface soils adjacent to Load Line 1 Bomb Production Buildings range from 0.002 (adult trespasser, average exposure) to 1.3 (child resident, RME). Except for the RME child resident scenario, all HI values are less than the threshold value of 1.0, indicating that exposure to surface soils is unlikely to pose a health hazard to the populations evaluated in the BRA.

In the case of the child resident, the primary contributors to the hazard were arsenic (HI 0.54) and aluminum (HI 0.32). An evaluation of the toxic effects of these chemicals indicates that they do not affect the same target organs. The target organs for arsenic are the skin and vascular system, while the target organ for aluminum is the kidney. As such, the individual HIs for these two chemicals should not be summed when calculating the total HI. Target organ-specific HI values, based on the assumption that the individual HI values for arsenic and aluminum are not additive[5], are below 1.0, indicating that these soils would not pose a health hazard to a resident child population.

The HI values for 0-6 inch soils range from 0.0005 (adult trespasser, average exposure) to 0.5 (child resident, RME). All HI values are less than the threshold value of 1.0, indicating that exposure to these soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

5.1.2 Potential Excess Cancer Risk

Total excess cancer risks associated with hypothetical exposure to 0- to 2-foot surface soils adjacent to the Load Line 1 Bomb Production Buildings range from 5×10^{-8} (5 in 100,000,000) (juvenile trespasser, average exposure) to 5×10^{-5} (5 in 100,000) (adult resident, RME). These values are within, or below, the advisory range of 10^{-6} to 10^{-4} (1 in 1,000,000 to 1 in 10,000) established by EPA.

[5] Using the worst-case assumption that arsenic is additive with all PCOCs except aluminum results in a HI of 0.96.

Total excess cancer risks for the 0-6 inch soils range from 4 x 10^{-10} (4 in 10,000,000,000) (adult trespasser, average exposure) to 2 x 10^{-5} (2 in 100,000) (adult resident, RME). These values are within, or below, the risk range of 10^{-4} to 10^{-6} (1 in 10,000 to 1 in 1,000,000).

5.2 POTENTIAL EXCESS CANCER RISKS AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH SURFACE SOIL ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS

As discussed in Section 3.0 (Exposure Assessment), risks and hazards were estimated for residents, trespassers and workers potentially exposed to surface soil (two different intervals; 0-2 foot depth and 0- to 6-inch depth) adjacent to the Load Line 2 Bomb Production Buildings and residents ingesting garden produce grown in these soils. A summary of potential excess cancer risks and non-carcinogenic Hazard Indices is presented in **Table 5-3** and **5-4**. The excess cancer risks and the HQ values for the individual chemicals and pathways are presented in **Appendix C (Tables C-2-1** through **C-2-24** for 0- to 2-foot soils; **Tables C-12-1** through **C-12-24** for 0- to 6-inch soils) .

5.2.1 Potential Non-Carcinogenic Health Hazard

The HI values associated with 0- to 2-foot surface soils adjacent to Load Line 2 Bomb Production Buildings range from 0.001 (adult trespasser, average exposure) to 0.6 (child resident, RME). All HI values are less than the threshold value of 1.0, indicating that exposure to these surface soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

The HI values for 0-6 inch soils range from 0.001 (adult trespasser, average exposure) to 0.9 (child resident, RME). All HI values are less than the threshold value of 1.0, indicating that exposure to these soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

5.2.2 Potential Excess Cancer Risk

Total excess cancer risks associated with hypothetical exposure to 0- to 2-foot surface soils adjacent to the Load Line 2 Bomb Production Buildings range from 4 x 10^{-8} (4 in 100,000,000) (juvenile trespasser, average exposure) to 4 x 10^{-5} (4 in 100,000) (adult resident, RME). These values are within, or below, the advisory range of 10^{-6} to 10^{-4} (1 in 1,000,000 to 1 in 10,000) established by EPA.

Total excess cancer risks for the 0-6 inch soils range from 4 x 10^{-8} (4 in 100,000,000) (adult trespasser, average exposure) to 5 x 10^{-5} (5 in 100,000) (adult resident, RME). These values are within, or below, the range of 10^{-4} to 10^{-6} (1 in 10,000 to 1 in 1,000,000).

5.3 POTENTIAL EXCESS CANCER RISKS AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH SURFACE SOIL ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS

As discussed in Section 3.0 (Exposure Assessment), risks and hazards were estimated for residents, trespassers and workers potentially exposed to surface soil (two different intervals, 0- to 2-foot depth and 0- to 6-inch depth) adjacent to the Load Line 3 Bomb Production Buildings and residents ingesting garden produce grown in the soils. A summary of potential excess cancer risks and non-carcinogenic Hazard Indices is presented in **Tables 5-5** and **5-6**. The excess cancer risks and the HQ values for the individual chemicals and pathways are presented in **Appendix C (Tables C-3-1** through **C-3-24** for 0- to 2-foot soils; **C-13-1** through **C-13-24** for 0- to 6-inch soils).

5.3.1 Potential Non-Carcinogenic Health Hazard

The HI values associated with 0- to 2-foot surface soils adjacent to the Load Line 3 Bomb Production Buildings range from 0.0003 (adult trespasser, average exposure) to 0.4 (child resident, RME). All HI values are less than the threshold value of 1.0, indicating that exposure to these surface soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

The HI values for 0-6 inch soils range from 0.0003 (adult trespasser, average exposure) to 0.3 (child resident, RME). All HI values are less than the threshold value of 1.0, indicating that exposure to these soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

5.3.2 Potential Excess Cancer Risk

Total excess cancer risks associated with hypothetical exposure to 0- to 2-foot surface soils adjacent to the Load Line 3 Bomb Production Buildings range from 4×10^{-10} (4 in 10,000,000,000) (adult trespasser, average exposure) to 2×10^{-5} (2 in 100,000) (adult resident, RME). These values are within, or below, the acceptable advisory range of 10^{-6} to 10^{-4} (1 in 1,000,000 to 1 in 10,000) established by EPA.

Total excess cancer risks for the 0-6 inch soils range from 5×10^{-10} (5 in 10,000,000,000) (adult trespasser, average exposure) to 2×10^{-5} (2 in 100,000) (adult resident, RME). These values are within, or below, the risk range of 10^{-4} to 10^{-6} (1 in 10,000 to 1 in 1,000,000).

5.4 POTENTIAL EXCESS CANCER RISKS AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH SURFACE SOIL ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS

As discussed in Section 3.0 (Exposure Assessment) risks and hazards were estimated for residents, trespassers and workers potentially exposed to surface soil (two different intervals, 0- to 2-foot depth and 0- to 6-inch depth) adjacent to the Load Line 4 Bomb Production Buildings and residents ingesting garden produce grown in these soils. A summary of potential excess cancer risks and non-carcinogenic Hazard Indices is presented in **Tables 5-7** and **5-8**. The excess cancer risks and the HQ values for the individual chemicals and pathways are presented in **Appendix C (Tables C-4-1** through **C-4-24** for 0- to 2-foot soils; **C-14-1** through **C-14-24** for 0- to 6-inch soils).

5.4.1 Potential Non-Carcinogenic Health Hazard

The HI values associated with 0- to 2-foot surface soils adjacent to the Load Line 4 Bomb Production Buildings range from 0.0007 (adult trespasser, average exposure) to 0.6 (child resident, RME). The HI values are less than the threshold value of 1.0, indicating that exposure to these surface soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

The HI values for 0-6 inch soils range from 0.0007 (adult trespasser, average exposure) to 0.6 (child resident, RME). All HI values are less than the threshold value of 1.0, indicating that exposure to these soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

5.4.2 Potential Excess Cancer Risk

Total excess cancer risks associated with hypothetical exposure to 0- to 2-foot surface soils adjacent to the Load Line 4 Bomb Production Buildings range from 4×10^{-8} (4 in 100,000,000) (adult trespasser, average exposure) to 4×10^{-5} (4 in 100,000) (adult resident, RME). These values are within, or below, the acceptable advisory range of 10^{-6} to 10^{-4} (1 in 1,000,000 to 1 in 10,000) established by EPA.

Total excess cancer risks for the 0-6 inch soils range from 4×10^{-8} (4 in 100,000,000) (adult trespasser, average exposure) to 4×10^{-5} (4 in 100,000) (adult resident, RME). These values are within, or below, the range of 10^{-4} to 10^{-6} (1 in 10,000 to 1 in 1,000,000).

5.5 POTENTIAL EXCESS CANCER RISKS AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH SURFACE SOIL IN THE LOAD LINE 1 PAINT OPERATIONS AREAS

As discussed in Section 3.0 (Exposure Assessment), risks and hazards were estimated for residents, trespassers and workers potentially exposed to surface soil (two different intervals; 0- to 2-foot depth and 0- to 6-inch depth) in the Load Line 1 Paint Operations Areas. A summary of potential excess cancer risks and non-carcinogenic Hazard Indices is presented in **Tables 5-9** and **5-10**. The excess cancer risks and the HQ values for the individual chemicals and pathways are presented in **Appendix C (Tables C-5-1** through **C-5-20** for 0-2-foot soils; **C-15-1** through **C-15-20** for 0- to 6-inch soils).

5.5.1 Potential Non-Carcinogenic Health Hazard

Only four metals (antimony, cadmium, lead, and nickel) were identified as PCOCs in the (0- to 2-foot depth) surface soil in the Load Line 1 Paint Operations Areas. The HI values range from 0.0003 (adult trespasser, average exposure) to 0.2 (child resident, RME). The HI values are less than the threshold value of 1.0, indicating that exposure to these surface soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

The HI values for 0-6 inch soils range from 0.0005 (adult trespasser, average exposure) to 0.8 (child resident, RME). All HI values are less than the threshold value of 1.0, indicating that exposure to these soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

5.5.2 Potential Excess Cancer Risk

None of the identified PCOCs are known or suspected carcinogens.

5.6 POTENTIAL EXCESS CANCER RISKS AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH SURFACE SOIL IN THE LOAD LINE 2 PAINT OPERATIONS AREAS

As discussed in Section 3.0 (Exposure Assessment), risks and hazards were estimated for residents, trespassers and workers potentially exposed to surface soil (two different intervals; 0- to 2-foot depth and 0- to 6–inch depth) in the Load Line 2 Paint Operations Areas. A summary of potential excess cancer risks and non-carcinogenic Hazard Indices is presented in **Tables 5-11** and **5-12**. The excess cancer risks and the HQ values for the individual chemicals and pathways are presented in **Appendix C (Tables C-6-1** through **C-6-20** for 0- to 2-foot soils; **C-16-1** through **C-16-20** for 0- to 6-inch soils**)**.

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5.6.1 Potential Non-Carcinogenic Health Hazard

The HI values for 0- to 2-foot soils range from 0.002 (adult trespasser, average exposure) to 1.2 (child resident, RME). The HI value for the RME child resident exceeds the threshold value of 1.0, indications that potential adverse health effects may occur as a result of exposure.

The HI values for 0-6 inch soils range from 0.003 (adult trespasser, average exposure) to 9.2 (child resident, RME). The HI values for both the RME child and adult resident exceed the threshold value of 1.0, indicating that potential adverse health effects may occur as a result of exposure.

For both the 0- to 2-foot and 0- to 6-inch soils, antimony was the chemical that contributed the majority of the hazard. It should be noted that EPA places a high level of uncertainty on the toxicity value for antimony, applying an uncertainty factor of 1000 x to the RfD.

5.6.2 Potential Excess Cancer Risk

Total excess cancer risks associated with hypothetical exposure to 0- to 2-foot surface soils in the Load Line 2 Paint Operations Areas range from 4×10^{-8} (4 in 100,000,000) (adult trespasser, average exposure) to 3×10^{-5} ((3 in 100,000) (adult resident, RME). These values are within, or below, the acceptable advisory range of 10^{-6} to 10^{-4} (1 in 1,000,000 to 1 in 10,000) established by EPA.

Total cancer risks for the 0-6 inch soils range from 4×10^{-8} (4 in 100,000,000) (adult trespasser, average exposure) to 3×10^{-5} (3 in 100,000) (adult resident, RME). These values are within, or below, the acceptable risk range of 10^{-4} to 10^{-6} (1 in 10,000 to 1 in 1,000,000).

5.7 POTENTIAL EXCESS CANCER RISKS AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH SURFACE SOIL IN THE LOAD LINE 3 PAINT OPERATIONS AREAS

As discussed in Section 3.0 (Exposure Assessment), risks and hazards were estimated for residents, trespassers and workers potentially exposed to surface soil in (two different intervals; 0- to 2-foot depth and 0- to 6-inch depth) the Load Line 3 Paint Operations Areas. A summary of potential excess cancer risks and non-carcinogenic Hazard Indices is presented in **Tables 5-13** and **5-14**. The excess cancer risks and the HQ values for the individual chemicals and pathways are presented in **Appendix C (Tables C-7-1** through **C-7-20** for 0- to 2-foot soils; **C-17-1** through **C-17-20** for 0- to 6-inch soils).

5.7.1 Potential Non-Carcinogenic Health Hazard

The HI values associated with exposure to 0- to 2-foot surface soils in the Load Line 3 Paint Operations Areas range from 0.0004 (adult trespasser, average exposure) to 0.4 (child resident, RME). The HI values are less than the threshold value of 1.0, indicating that exposure to these surface soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

The HI values for 0-6 inch soils range from 0.0005 (adult trespasser, average exposure) to 0.7 (child resident, RME). All HI values are less than the threshold value of 1.0, indicating that exposure to these soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

5.7.2 Potential Excess Cancer Risk

None of the PCOCs in this area are known or suspected carcinogens.

5.8 POTENTIAL EXCESS CANCER RISKS AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH SURFACE SOIL IN THE LOAD LINE 4 PAINT OPERATIONS AREAS

As discussed in Section 3.0 (Exposure Assessment), risks and hazards were estimated for residents, trespassers and workers potentially exposed to surface soil (two different intervals; 0-to 2-foot depth and 0- to 6-inch depth) in the Load Line 4 Paint Operations Areas. A summary of potential excess cancer risks and non-carcinogenic Hazard Indices is presented in **Tables 5-15** and **5-16.** The excess cancer risks and the HQ values for the individual chemicals and pathways are presented in **Appendix C (Tables C-8-1** through **C-8-20** for 0- to 2-foot soils; **C-18-1** through **C-18-20** for 0- to 6-inch soils).

5.8.1 Potential Non-Carcinogenic Health Hazard

The HI values associated with exposure to 0- to 2-foot surface soils in the Load Line 4 Paint Operations Areas range from 0.0006 (adult trespasser, average exposure) to 0.6 (child resident, RME). The HI values are less than the threshold value of 1.0, indicating that exposure to these surface soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

The HI values for 0-6 inch soils range from 0.001 (adult trespasser, average exposure) to 4.2 (child resident, RME). The HI value for the RME child resident exceeds the threshold value of 1.0, indicating that potential adverse health effects may occur as a result of exposure. Antimony is the chemical that contributed the majority of the hazard.

5.8.2 Potential Excess Cancer Risk

None of the PCOCs in this area are known or suspected carcinogens.

5.9 POTENTIAL EXCESS CANCER RISKS AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH SURFACE SOIL AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUNDS

As discussed in Section 3.0 (Exposure Assessment), risks and hazards were estimated for adult and juvenile trespassers potentially exposed to surface soil (two different intervals; 0- to 2-foot and 0- to 6-inch depth) at the Potential Landfill Area north of the Proving Grounds and residents ingesting garden produce grown in these soils. A summary of potential excess cancer risks and non-carcinogenic Hazard Indices is presented in **Tables 5-17** and **5-18.** The excess cancer risks and the HQ values for the individual chemicals and pathways are presented in **Appendix C (Tables C-9-1** through **C-9-20** for the 0- to 2-foot soils and **Tables C-19-1** through **C-19-20** for the 0- to 6-inch soils).

5.9.1 Potential Non-Carcinogenic Health Hazard

The HI values associated with exposure to 0- to 2-foot surface soils at the Potential Landfill Area north of the Proving Grounds range from 0.0009 (adult trespasser, average exposure) to 2.4 (child resident, RME). The HI value for the RME child resident exceeds the threshold value of 1.0, indicating that potential adverse health effects may occur as a result of exposure. Antimony is the chemical that contributed the majority of the hazard.

The HI values for 0-6 inch soils range from 0.0003 (adult trespasser, average exposure) to 0.5 (child resident, RME). All HI values are less than the threshold value of 1.0, indicating that exposure to these soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

5.9.2 Potential Excess Cancer Risk

Total excess cancer risks associated with hypothetical exposure to 0- to 2-foot surface soils at the Potential Landfill Area north of the Proving Grounds range from 1 x 10^{-9} (1 in 1,000,000,000) (adult trespasser, average exposure) to 3 x 10^{-5} (3 in 100,000) (adult resident, RME). These values are below the acceptable advisory range of 10^{-6} to 10^{-4} (1 in 1,000,000 to 1 in 10,000) established by EPA.

Total excess cancer risks for the 0-6 inch soils range from 4 x 10^{-10} (4 in 10,000,000,000) (adult trespasser, average exposure) to 5 x 10^{-6} (5 in 1,000,000) (adult resident, RME). These values are below the risk range of 10^{-4} to 10^{-6} (1 in 10,000 to 1 in 1,000,000).

5.10 POTENTIAL EXCESS CANCER RISKS AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH SUBSURFACE SOIL AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUNDS

As discussed in Section 3.0 (Exposure Assessment), risks and hazards were estimated for construction workers potentially exposed to both surface and subsurface soils at the Potential Landfill Area north of the Proving Grounds. A summary of potential excess cancer risks and non-carcinogenic Hazard Indices is presented in **Table 5-19.** The excess cancer risks and the HQ values for the individual chemicals and pathways are presented in **Appendix C (Tables C-10-1** through **C-10-4).**

5.10.1 Potential Non-Carcinogenic Health Hazard

The HI values associated with the construction worker scenario at the Potential Landfill Area north of the Proving Grounds are 0.006 for average exposure and 0.5 for RME. The HI values are less than the threshold value of 1.0, indicating that exposure to this subsurface soil is highly unlikely to pose a health hazard to construction worker populations.

5.10.2 Potential Excess Cancer Risk

Total excess cancer risks associated with the construction worker scenario at the Potential Landfill Area north of the Proving Grounds are 7×10^{-10} (7 in 10,000,000,000) for average exposure and 3×10^{-8} (3 in 100,000,000) for RME. These values are below the advisory range of 10^{-6} to 10^{-4} (1 in 1,000,000 to 1 in 10,000) established by EPA.

5.11 POTENTIAL EXCESS CANCER RISKS AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH SURFACE SOIL AT THE PROVING GROUNDS

As discussed in Section 3.0 (Exposure Assessment), risks and hazards were estimated for adult and juvenile trespassers potentially exposed to surface soil (two different intervals; 0- to 2-foot and 0- to 6-inch depth) at the Proving Grounds and residents ingesting garden produce grown in these soils. A summary of potential excess cancer risks and non-carcinogenic Hazard Indices is presented in **Tables 5-20** and **5-21.** The excess cancer risks and the HQ values for the individual chemicals and pathways are presented in **Appendix C (Tables C-20-1** through **C-20-20** for the 0- to 2-foot soils and **Tables C-21-1** through **C-21-20** for the 0- to 6-inch soils).

5.11.1 Potential Non-Carcinogenic Health Hazard

The HI values associated with exposure to 0- to 2-foot surface soils at the Proving Grounds range from 0.0002 (adult trespasser, average exposure) to 0.2 (child resident, RME). All HI values are less than the threshold value of 1.0, indicating that exposure to these soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

The HI values for 0-6 inch soils range from 0.0001 (adult trespasser, average exposure) to 0.08 (child resident, RME). All HI values are less than the threshold value of 1.0, indicating that exposure to these soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

5.11.2 Potential Excess Cancer Risk

Total excess cancer risks associated with hypothetical exposure to 0- to 2-foot surface soils at the Proving Grounds range from 7 x 10^{-11} (7 in 100,000,000,000) (adult trespasser, average exposure) to 3 x 10^{-6} (3 in 1,000,000) (adult resident, RME). These values are below the acceptable advisory range of 10^{-6} to 10^{-4} (1 in 1,000,000 to 1 in 10,000) established by EPA.

Total cancer risks for the 0-6 inch soils range from 3 x 10^{-11} (3 in 100,000,000,000) (adult trespasser, average exposure) to 1 x 10^{-6} (1 in 1,000,000) (adult resident, RME). These values are below the risk range of 10^{-4} to 10^{-6} (1 in 10,000 to 1 in 1,000,000).

5.12 POTENTIAL EXCESS CANCER RISKS AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH SUBSURFACE SOIL AT THE PROVING GROUNDS

As discussed in Section 3.0 (Exposure Assessment), risks and hazards were estimated for construction workers potentially exposed to both surface and subsurface soils at the Proving Grounds. A summary of potential excess cancer risks and non-carcinogenic Hazard Indices is presented in **Table 5-22.** The excess cancer risks and the HQ values for the individual chemicals and pathways are presented in **Appendix C (Tables C-22-1** through **C-22-4).**

5.12.1 Potential Non-Carcinogenic Health Hazard

The HI values associated with the construction worker scenario at the Proving Grounds are 0.001 for average exposure and 0.009 for RME. The HI values are less than the threshold value of 1.0, indicating that exposure to this subsurface soil is highly unlikely to pose a health hazard to construction worker populations.

5.12.2 Potential Excess Cancer Risk

Total excess cancer risks associated with the construction worker scenario at the Potential Landfill Area north of the Proving Grounds are 3 x 10^{-11} (3 in 100,000,000,000) for average exposure and 1 x 10^{-9} (1 in 1,000,000,000) for RME. These values are below the advisory range of 10^{-6} to 10^{-4} (1 in 1,000,000 to 1 in 10,000).

5.13 POTENTIAL EXCESS CANCER RISKS AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH SURFACE SOIL AT THE NORTHEAST BOUNDARY AREA

As discussed in Section 3.0 (Exposure Assessment), risks and hazards were estimated for adult and juvenile trespassers potentially exposed to surface soil (two different intervals; 0- to 2-foot and 0- to 6-inch depth) at the Northeast Boundary Area. Residents ingesting garden produce grown in these soils were not evaluated quantitatively because neither RDX nor TNT were present in these soils. A summary of potential excess cancer risks and non-carcinogenic Hazard Indices is presented in **Tables 5-23** and **5-24.** The excess cancer risks and the HQ values for the individual chemicals and pathways are presented in **Appendix C (Tables C-23-1** through **C-23-16** for the 0- to 2-foot soils and **Tables C-24-1** through **C-24-16** for the 0- to 6-inch soils).

5.13.1 Potential Non-Carcinogenic Health Hazard

The HI values associated with exposure to 0- to 2-foot surface soils at the Northeast Boundary Area range from 0.0006 (adult trespasser, average exposure) to 0.5 (child resident, RME). All HI values are less than the threshold value of 1.0, indicating that exposure to these soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

The HI values for 0-6 inch soils range from 0.00002 (adult trespasser, average exposure) to 0.02 (child resident, RME). All HI values are less than the threshold value of 1.0, indicating that exposure to these soils is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

5.13.2 Potential Excess Cancer Risk

None of the PCOCs at the Northeast Boundary Area are known or suspected carcinogens.

5.14 POTENTIAL EXCESS CANCER RISKS AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH SUBSURFACE SOIL AT THE NORTHEAST BOUNDARY AREA

As discussed in Section 3.0 (Exposure Assessment), risks and hazards were estimated for construction workers potentially exposed to both surface and subsurface soils at the Northeast Boundary Area. A summary of potential excess cancer risks and non-carcinogenic Hazard Indices is presented in **Table 5-25.** The excess cancer risks and the HQ values for the individual chemicals and pathways are presented in **Appendix C (Tables C-25-1** through **C-25-4)**.

5.14.1 Potential Non-Carcinogenic Health Hazard

The HI values associated with the construction worker scenario at the Northeast Boundary Area are 0.005 for average exposure and 0.2 for RME. The HI values are less than the threshold value of 1.0, indicating that exposure to this subsurface soil is highly unlikely to pose a health hazard to construction worker populations.

5.14.2 Potential Excess Cancer Risk

None of the PCOCs for the Northeast Boundary Area are known or suspected carcinogens.

5.15 POTENTIAL EXCESS CANCER RISK AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH JOHNSON/CLEAR CREEK

As discussed in Section 3.0 (Exposure Assessment), risks and hazards were estimated for recreational fishermen potentially exposed to surface water and sediment from Johnson/Clear Creek, and who may also eat fish caught in this creek. A summary of potential excess cancer risks and non-carcinogenic hazard indices is presented in **Table 5-26**. The excess cancer risks and the HQ values for the individual chemicals and pathways are presented in **Appendix C (Tables C-26-1** through **C-26-20**).

5.15.1 Potential Non-Carcinogenic Health Hazard

The HI values associated with Johnson/Clear Creek ranged from 0.03 (adult recreational fisherman, average exposure) to 4.9 (child recreational fisherman, RME). The HI values for both the adult and child RME scenario exceed the threshold value of 1.0. Modeled concentrations of mercury and thallium in fish tissue contributed the majority of the hazard. It should be noted that the estimated mercury and thallium fish concentrations for Johnson/Clear Creek were based on a highly conservative model, assuming that these two metals were readily bioavailable (i.e., the model assumed bioconcentration of 5500 for mercury and 44 for thallium). Because of the inherent conservatism of the model, these modeled concentrations were compared to measured fish tissue concentrations of mercury and thallium from the NRD Reservoir as reported in the Draft OU3 Remedial Investigation Report (URSGWCFS, 1999) (i.e., because the reservoir is part of the Johnson/Clear Creek drainage, fish from the reservoir should be impacted by any contaminants in the creek). Neither mercury nor thallium were found in any fish tissue samples, indicating that it is unlikely that either of these chemicals pose a realistic hazard to fishers in the creek.

5.15.2 Potential Excess Cancer Risk

Total excess cancer risks associated with Johnson/Clear Creek ranged from $1x10^{-6}$ (1 in 1,000,000) (adult recreational fisherman, average exposure) to 7×10^{-5} (7 in 100,000) (adult recreational fisherman, RME). These values are within, or below, the acceptable advisory range of 10^{-6} to 10^{-4} (1 in 1,000,0000 to 1 in 10,000) established by EPA.

5.16 POTENTIAL EXCESS CANCER RISKS AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH SILVER CREEK

As discussed in Section 3.0 (Exposure Assessment), risks and hazards were estimated for recreational fishermen potentially exposed to surface water and sediment from Silver Creek, and who may also eat fish caught in this creek. A summary of potential excess cancer risks and non-carcinogenic Hazard Indices is presented in **Table 5-27**, The excess cancer risks and HQ values for individual chemicals and pathways are presented in **Appendix C** (**Tables C-27-1** through **C-27-20**).

5.16.1 Potential Non-Carcinogenic Health Hazard

The HI values associated with Silver Creek ranged from 0.01 (adult recreational fisherman, average exposure) to 0.2 (child recreational fisherman, RME). These values are less than the threshold value of 1.0, indicating that exposure to sediment and surface water and ingestion of fish is highly unlikely to pose a health hazard to any populations evaluated in the BRA.

5.16.2 Potential Excess Cancer Risk

Total excess cancer risks associated with Silver Creek ranged from 4×10^{-7} (4 in 10,000,000) (adult recreational fisherman, average exposure) to 2×10^{-5} (2 in 100,000) (adult recreational fisherman, RME). The values are within, or below, the advisory range of 10^{-6} to 10^{-4} (1 in 1,000,000 to 1 in 10,000) established by EPA.

5.17 POTENTIAL EXCESS CANCER RISKS AND NON-CARCINOGENIC HAZARDS ASSOCIATED WITH THE NRD RESERVOIR

As discussed in Section 3.0 (Exposure Assessment), risks and hazards were estimated for recreational fishermen potentially exposed to surface water and sediment from the NRD Reservoir, and who may also eat fish caught in this impoundment. A summary of potential excess cancer risks and non-carcinogenic Hazard Indices is presented in **Tables 5-28.** The excess cancer risks and the HQ values for the individual chemicals and pathways are presented in **Appendix C (Tables C-28-1** through **C-28-20).**

5.17.1 Potential Non-Carcinogenic Health Hazard

The HI values associated with the NRD Reservoir range from 0.06 (adult recreational fisherman, average exposure) to 1.2 (child recreational fisherman, RME). The RME child recreational fisherman was the only scenario with a HI value greater than the threshold value of 1.0. Measured concentrations of selenium in fish tissue contributed the majority of the hazard (HQ of 0.5 for fish ingestion). The target organs for selenium toxicity are the skin, hair and nervous system. The only other PCOC with similar target organs is silver (target organ is skin). Segregation of the HI values for the RME child recreational fisherman by target organ effects results in all HI values being less than the threshold value of 1.0 (the combined HI for selenium and silver is 0.6). Thus it is highly unlikely that exposure to sediments or surface water, or ingestion of fish from the NRD Reservoir would result in any health hazards to the populations evaluated in the BRA.

5.17.2 Potential Excess Cancer Risk

None of the PCOCs for the NRD Reservoir are known or suspected carcinogens.

5.18 POTENTIAL HEALTH EFFECTS ASSOCIATED WITH LEAD

Lead was identified as PCOC in soils at the Proving Grounds, Potential Landfill North of the Proving Grounds, Northeast Boundary Area, and in the Bomb Production and Paint Operations Areas of all four Load Lines. The highest measured concentration for lead was 4,670 mg/kg, located in soil adjacent to the Load Line 3 Bomb Production Buildings. It is important to note that this single elevated soil concentration is not representative of soils at the Load Line 3 Bomb Production Buildings but rather represents an isolated hotspot. Small, isolated hotspots generally do not reflect exposure conditions. This risk assessment evaluates potential exposure to representative concentrations of lead in each of the exposure areas, using an RME approach. This approach takes into consideration the overall area of exposure and total number of samples collected in order to estimate representative concentrations. This section addresses the potential health effects that could be associated with the exposure to lead at the RME concentrations found on-site (RME concentrations ranged from 24 mg/kg to 400 mg/kg in the 0- to 6-inch soils, and from 49 mg/kg to 290 mg/kg in the 0- to 2-foot soils).

The IEUBK model (version 0.99b) was used to estimate mean blood lead levels in a 0-6 year-old child resident as a result of ingestion of contaminated soil. IW's model is more conservative than the adult lead model. The adult lead model was not run, since this model is not recommended for sites with potential child exposures.

Blood lead concentrations were predicted by using default exposure values built into the model (i.e., absorption rates, and contribution of drinking water sources to total lead body burden). The results of this analysis are presented in **Table 5-29**. The percentage of exposed children predicted to develop a blood lead level of 10 mg/dl or greater ranged from 0.5 to 5.7 percent.

Section 6

The EPA guidance for risk assessment provides a systematic means for organizing, analyzing, and presenting information on the nature and magnitude of potential risks to public health posed by chemical exposures based on current and hypothetical future releases of those chemicals to the environment. As identified in Section 1, the BRA does not address risks or safety hazards from non-COCs. Despite the advanced state of the current methodology, uncertainties and limitations are inherent in the risk assessment process. The uncertainty can lead to an over- or under-estimation of potential risk. **Table 6-1** presents a qualitative assessment of factors that may contribute to uncertainty in the estimation of potential risks. Available data quality, incomplete information about existing conditions and future circumstances, as well as other factors discussed below contribute to these uncertainties and limitations.

This section discusses the following sources of uncertainties associated with the OU3 BRA:

- Data collection and evaluation
- Exposure assessment
- Toxicity assessment
- Risk characterization

6.1 DATA COLLECTION AND EVALUATION

6.1.1 Data Collection

Data collected during the Phase I, Phase II, and Phase III OU3 RI were the primary source of information used in the OU3 BRA. These data were supplemented with OU1 soil sample analytical data collected from OU3 investigation areas. These data are subject to uncertainty associated with sampling and analysis.

Sampling

In the BRA, it was assumed that samples collected were representative of the area to which various populations may be exposed. However, the collected samples may not be completely representative, due to biases in sampling and to random variability of samples. In addition, soils are not homogeneously distributed in the environment. Random variability of the media sampled may result in either an over- or under-estimation of actual chemical concentrations, and thus, site risks.

Analysis

Samples were analyzed using Contract Laboratory Program (CLP) procedures, and were subjected to data validation procedures, to assure that data were suitable for use in decision-making. However, it should be understood that sample analysis is subject to uncertainties associated with precision and accuracy, and detection of chemicals at low concentrations. Analytical precision and accuracy are evaluated through laboratory quality assurance (QA) programs. Uncertainties associated with precision and accuracy of analysis are generally random and may lead to over- or under-estimation of risks. While these errors are typically of low magnitude compared to other sources of uncertainty in the risk assessment, they may lead to a possible over- or under-estimation of risk.

6.1.2 Data Evaluation

In compiling data for use in the risk assessment, arithmetic mean concentrations and 95 UCL percentile on the mean concentrations were compiled for chemicals detected in each medium. For RME exposure scenarios, the 95th percentile UCL concentrations were used to estimate risks, which likely results in over-estimation of potential risk.

In evaluating data, it was assumed that a chemical not detected in a given sample was actually present at one-half of its sample quantitation limit, if that chemical was present in any sample in that medium from that area of concern. The arithmetic mean concentration, which incorporated these half-detection values, was used in evaluation of average exposure scenarios. This approach, as described in RAGS, is a conservative approach that may lead to an over- or under-estimation of risk. Use of this method when the quantitation limits are too high or the measured concentrations are very low may lead to calculated mean concentrations higher than the maximum concentration detected. In some cases, the high estimated risks identified in Section 5.0 (Risk Characterization) are partially due to the high quantitation limits of the analytical methods, and do not necessarily reflect chemical concentrations detected on the site.

Naturally occurring chemicals that are commonly found in soils throughout Nebraska, such as arsenic, are screened out of the risk assessment process when they are found to be present at background levels. Many of these natural soil elements exhibit potentially toxic properties, and contribute to the overall risks to a population, even though they are not site-related contaminants. As an example, the background concentration of arsenic in soils is 13.5 mg/kg, which is roughly equivalent to a residential cancer risk level of 5×10^{-5} (5 in 100,000). Numerous other background risk sources, such as radon, ionizing radiation from the sun, etc., exist in nature, but are not evaluated in the risk assessment because they are not related to site contamination.

6.2 EXPOSURE ASSESSMENT

The exposure assessment is based on a series of assumptions concerning concentrations of chemicals to which humans are exposed (exposure point concentration) and patterns of behavior leading to exposure or intake of chemicals (exposure scenarios).

6.2.1 Exposure Point Concentrations

For the most part, the arithmetic mean and 95 percentile UCL chemical concentrations found in the areas of concern were used as exposure point concentrations. It was conservatively assumed that chemical concentrations observed at each of the areas of concern will remain unchanged with time. The potential reduction in chemical concentrations by migration, degradation, and natural attenuation were not considered. In reality, these processes would reduce the chemical concentrations for future exposure scenarios during the exposure periods considered in the risk assessment. The use of existing chemical concentrations projected into the future may result in over-estimation of potential site risks.

In the case of surface water and sediments, there were an insufficient number of samples to perform UCL calculations. Likewise, the number of metals results from fish tissue from the

NRD Reservoir were limited. Exposure point concentrations for these media were based on the maximum detected concentrations. This conservative approach is likely to contribute to an overestimation of site risks.

Exposure point concentrations for metals and explosives in fish tissue from Johnson/Clear and Silver Creeks were estimated using conservative modeling. This modeling approach was also used to estimate concentrations of explosives in fish tissue at the NRD Reservoir. This model incorporated a number of conservative assumptions, and was based on maximum detected concentrations of the PCOCs found in site surface water. Among the assumptions inherent in the model is the assumption that fish contain a lipid content equivalent to 4.4 percent of their total body mass. Most freshwater fish have a lower lipid content than 4.4 percent (3 percent is often assumed) for bioaccumulative (lipophilic) compounds, the assumption of a relatively high lipid content is conservative, and will result in an overestimation of exposure point concentrations and resultant risks.

6.2.2 Exposure Scenarios

The exposure assessment relied on a number of assumptions for potential human exposure. Assumptions used were based upon:

- Site-specific information
- EPA Guidance, including RAGS (EPA, 1989a), the Exposure Factors Handbook (EPA, 1989b), and Dermal Exposure Assessment: Principles and Applications (EPA, 1992b)
- Professional judgment
- Scenarios previously developed in the OU1 and OU2 Baseline Risk Assessments (Donohue, 1993; Woodward-Clyde, 1994a)

The OU3 BRA evaluated a number of different exposure scenarios, including on-site residents, workers, trespassers, construction workers and recreational fishermen. These scenarios were identified as representing hypothetically "most exposed" populations for the Site. Of these receptors, on-site residents were found to display the greatest degree of potential cancer risks and non-cancer hazards. It is important to note, however, that as the Site currently exists, there are no residential populations in any of the OU3 areas of concern. Worker exposure represents the most plausible current and future use of the Site.

The average case scenarios represent assumptions which are considered central values, or realistically conservative estimates for the exposed population. However, even the average case scenarios assume individuals are exposed on a regular basis over a long period of time, which is an assumption that likely over-estimates actual exposures. There is always uncertainty inherent in these assumptions, and any changes in the parameters used in the risk calculation may affect the final risk estimate.

The RME scenarios are developed to provide an upper bound risk estimate. These scenarios are based on a combination of maximum exposure assumptions for all variables related to exposure, and thus are highly likely to over-estimate potential risks. For example, to provide an evaluation of estimated risk as a function of exposure duration, cancer risks were calculated for adult residents for each of the exposure areas assuming a 70-year exposure duration. In reality, the likelihood of an individual being exposed to the most contaminated soils on a daily basis for his

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or her entire life is very low, particularly since surface soils are covered with snow for a significant portion of the year. For comparative purposes, the average exposure assessment was based on assumptions which are considered central tendency values, although exposure to surface soils is still evaluated assuming daily exposure year round. The average exposure risk assessment is a conservative but more realistic estimate for the exposed population.

In some cases minor exposure routes were identified, but not included in the risk calculations. For example, fugitive dust exposure was identified as a minor exposure route that would be expected to only contribute slightly to the incremental risks. While exclusion of minor pathways from the risk calculations could result a slight underestimation of site risks, the general approach used in this assessment was to use conservative assumptions for identifying complete exposure pathways and intake variables, thus minimizing the likelihood that risks are under-estimated.

There are a number of uncertainties associated with the evaluation of dermal exposure. In particular, the dermal absorption values, areas of exposed skin, and soil adherence rates are highly variable. Factors influencing this variability include the type of chemical, time of year (e.g., summer vs. winter), soil type, the amount of time the contaminant is in direct contact with the skin, etc. These uncertainties can result in either an under- or an overestimation of risk.

6.3 TOXICITY ASSESSMENT

6.3.1 Uncertainties Associated with Critical Toxicity Values

In general, the available scientific information is insufficient to provide a thorough understanding of all the potential toxic properties of chemicals to which humans are potential exposed. Consequently, varying degrees of uncertainty surround the assessment of adverse health effects in the exposed populations. Sources of uncertainty related directly to toxicity data include:

- Use of dose-response data from experiments on homogenous, sensitive animal populations to predict effects in heterogeneous human populations with wide range of sensitivities.
- Extrapolation of data from: 1) high dose animal studies to low dose human exposures; 2) acute or subchronic toxicity studies to chronic exposure scenarios; and 3) one exposure route to another (e.g., from ingestion to inhalation or dermal absorption).
- Use of single-chemical test data that do not account for multiple exposures or synergistic and antagonistic responses. For example, skin lesions are the primary non-carcinogenic health effects associated with arsenic exposure, while chronic antimony exposure results in damage to the nervous system. There is no evidence identifying whether exposure to these two chemicals in combination could result in potential synergistic or antagonistic effects. In the absence of scientific information, the Hazard Quotients (HQs) for individual chemicals are summed for each exposure pathway to derive the Hazard Index (HI).
- Critical toxicity values (RfDs or Slope Factors) are predicted values for the most sensitive subpopulations.
- Because no dermal RfDs have been developed by EPA, the use of oral RfDs to evaluate risks associated with dermal exposure could result in an over- or underestimation of risk for some compounds.

- The RfD for antimony is based on lab studies using a highly soluble form of the metal (potassium antimony tartrate) that is readily absorbed in the gastrointestinal (GI) tract. The solubility of most forms of antimony found in the environment (antimony sulfate, sulfide, chloride or carbonate) is relatively low, and it is likely that GI absorption of these forms would also be low.

Therefore, a high degree of uncertainty may be associated with the Critical Toxicity Values used in the BRA. In an attempt to minimize the consequences of uncertainty, EPA guidance typically relies on a conservative approach. Use of these current critical toxicity values is highly likely to over-estimate the potential risk.

Several explosives compounds found in on-site soils do not have critical toxicity values, and thus cannot be evaluated quantitatively in the BRA. In particular, the compounds 2-amino-4,6-dinitrotoluene and 4-amino-2,6-dinitrotoluene were found in soils in the load line areas and at the Potential Landfill north of the Proving Grounds. These products are breakdown products of TNT, and were typically found associated with TNT, although at lower concentrations. Exclusion of these compounds from quantitative evaluation will likely result in an underestimation of risks.

6.4 RISK CHARACTERIZATION

Because there are uncertainties in each step of the risk assessment process, these uncertainties are often magnified in the final risk characterization. The final quantitative estimates of risk may be one or several orders of magnitude different from the potential risk associated with a given exposure. Because of the conservative approaches used in each step, the overall results of the BRA are more likely to over-estimate than to under-estimate the potential site risks.

6.5 OTHER HAZARDS

Former uses of this area (Proving Grounds, Potential Landfill Area, and North Burning Ground) include disposal of construction debris and other wastes from the nearby University of Nebraska facility. In addition, several tons of Army explosives have been excavated and incinerated from this area, as well as very small amounts of incendiary devices and fuses. U.S. Army Engineering and Support Center, Huntsville, performed an Engineering Evaluation/Cost Analysis for ordnance and explosive removal and, based on site characterization efforts, proposed "no further action" for this area. Based on the foregoing, there might be uncertainties concerning non-COC wastes and other items.

The EPA guidance for risk assessment provides a systematic means for organizing, analyzing, and presenting information on the nature and magnitude of potential risks to public health posed by chemical exposures. Despite the advanced state of the current methodology, uncertainties and limitations are inherent in the risk assessment process. The uncertainty can lead to an over- or under-estimation of potential risk. **Table 6-1** presents a qualitative assessment of factors that may contribute to uncertainty in the estimation of potential risks. Available data quality, incomplete information about existing conditions and future circumstances, as well as other factors discussed below contribute to these uncertainties and limitations.

This section discusses the following sources of uncertainties associated with the OU3 BRA:

- Data collection and evaluation
- Exposure assessment
- Toxicity assessment
- Risk characterization

6.1 DATA COLLECTION AND EVALUATION

6.1.1 Data Collection

Data collected during the Phase I, Phase II, and Phase III OU3 RI were the primary source of information used in the OU3 BRA. These data were supplemented with OU1 soil sample analytical data collected from OU3 investigation areas. These data are subject to uncertainty associated with sampling and analysis.

Sampling

In the BRA, it was assumed that samples collected were representative of the area to which various populations may be exposed. However, the collected samples may not be completely representative, due to biases in sampling and to random variability of samples. In addition, soils are not homogeneously distributed in the environment. Random variability of the media sampled may result in either an over- or under-estimation of actual chemical concentrations, and thus, site risks.

Analysis

Samples were analyzed using Contract Laboratory Program (CLP) procedures, and were subjected to data validation procedures, to assure that data were suitable for use in decision-making. However, it should be understood that sample analysis is subject to uncertainties associated with precision and accuracy, and detection of chemicals at low concentrations. Analytical precision and accuracy are evaluated through laboratory quality assurance (QA) programs. Uncertainties associated with precision and accuracy of analysis are generally random and may lead to over- or under-estimation of risks. While these errors are typically of low magnitude compared to other sources of uncertainty in the risk assessment, they may lead to a possible over- or under-estimation of risk.

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Section 7

The OU3 BRA addresses the potential human health and ecological risks from exposure to contaminated media at selected portions of the Site not previously addressed under OU1 or OU2. The ecological portion of the risk assessment is presented as an appendix to this report. An initial screening was performed and presented in the OU3 RI Report (W-C, 1997b) to identify areas of concern warranting risk evaluation. These areas of concern include the following:

- Soils adjacent to the Load Lines 1, 2, 3, and 4 Bomb Production Buildings
- Load Lines 1, 2, 3, and 4 Paint Operation Areas
- Proving Grounds
- Northeast Boundary Area
- Potential Landfill Area north of the Proving Grounds
- Johnson and Clear Creeks
- Silver Creek
- NRD Reservoir

In the Human Health Risk Assessment, the scenarios evaluated in the load line areas included residential (adult and child), trespasser/visitor (adult and juvenile), and on-site worker exposure to surface soil. Scenarios evaluated at the Proving Grounds, the Potential Landfill north of the Proving Grounds, and the Northeast Boundary Area, included trespasser (adult and juvenile) and residential (adult and child) exposure to surface soil, and construction worker exposure to both surface and subsurface soils. Potential health risks were evaluated quantitatively for ingestion and direct dermal contact for all receptors. In addition, residents (adults and children) were evaluated for potential exposure to explosives via a garden vegetable ingestion scenario for the Load Line Bomb Production Building Areas, the Proving Grounds, and the Potential Landfill Area north of the Proving Grounds using bioaccumulation data developed by the Army (USACE, 1997). A recreational fishing scenario (adults and children) was also evaluated for Johnson, Clear and Silver Creeks and the NRD Reservoir. This scenario included an evaluation of direct dermal contact and ingestion of surface water and sediment, and fish ingestion. Potential cancer risks and non-carcinogenic hazards were estimated for exposure to site-related chemicals using both a Reasonable Maximum Exposure (RME) and an Average Exposure (AE) approach. The RME approach evaluated upperbound exposure using high end exposure assumptions and chemical concentrations. The average approach, intended to provide a realistic estimate of potential health hazards associated with the Site, evaluated risks and hazards based on reasonable average exposure assumptions and arithmetic mean chemical concentrations.

The non-carcinogenic cumulative Hazard Indices (HI) exceeded the threshold target of 1 for the RME child resident scenario at the Load Line 1 Bomb Production Area, Load Line 2 Paint Operations Area (0 - 6 inch and 0 - 2-foot soils), the Load Line 4 Paint Operations Area (0 - 6 inch soils) and the Potential Landfill north of the Proving Grounds (0-2 foot soils) and for the recreational child fisherman scenario in Johnson/Clear Creek. A Hazard Index in excess of 1.0 indicates the potential for adverse health effects. An evaluation of the chemicals that contributed the cumulative hazard indicates that they do not affect the same target organs, and that exposure to these chemicals is unlikely to result in any additive effects. The Load Line 1 Bomb Production Area was eliminated as having the potential to pose a hazard once the target organ effects of the

PCOCs were taken into consideration. Hazards at Johnson/Clear Creek, which were based on modeled fish tissue concentrations, were also considered to be below 1.0 once comparisons were made to fish tissue analytical data from the NRD Reservoir. Antimony is the chemical contributing the majority of the potential hazard for the other three areas. Soil ingestion was the exposure pathway that contributed the majority of the hazard.

Potential cancer risks are within, or below, the U.S. Environmental Protection Agency (EPA) risk range of 1×10^{-4} to 1×10^{-6} (1 in 10,000 to 1 in 1,000,000) for all scenarios and areas evaluated.

An evaluation of potential exposure of small children to lead in Site soils was performed using EPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model. The results of this evaluation indicate that lead is unlikely to pose a health hazard at any of the areas of concern.

The Ecological Risk Assessment (ERA), presented in **Appendix B**, addressed both terrestrial and aquatic receptors. Terrestrial scenarios were accounted for under the assumptions of the OU1 ERA and were not assessed again.

The ERA focused upon receptors' exposure to sediment and surface water in Johnson and Clear Creeks, the Nebraska Resource District (NRD) Reservoir, and Silver Creek. Detected chemicals were conservatively screened against ecological benchmarks, background data, and other criteria to determine which chemicals should be retained for exposure assessment scenarios. No potential chemicals of concern were selected for surface water samples because all detected chemicals were either unrelated to former NOP activities or did not exceed benchmark values. For the same reasons, all volatile organic compounds (VOC) and explosives and most metals and semi-volatile organic compounds (SVOC) detected in sediments were screened out at this step. Corresponding adverse effects from these chemicals to aquatic biota or wildlife on-site are unlikely.

The remaining sediment potential chemicals of concern (selenium, silver, and 4-methylphenol) were included in exposure assessment scenarios, which used Site-specific receptors, benchmarks, and assumptions to more accurately estimate receptors' exposure to chemicals. Assessments using the qualitative weight-of-evidence approach and the semi-quantitative Ecotox Quotient (EQ) approach found that the potential chemicals of concern presented negligible risk to aquatic and terrestrial receptors on-site.

A search for rare, threatened, or endangered species (plant or animal) found indicated that the American burying beetle (*Nicrophorus americanus*), western prairie fringed orchid (*Platanthera praeclara*), and plains topminnow may occur on-site. A survey of the Site by US Fish and Wildlife Service biologists found that past land use had degraded on-site habitat, and that the Site did not contain appropriate habitat for these species.

Section 8

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Tables

Table 1-1

Note List for OU3 Analytical Data Summary Tables 1-2 Through 1-58
Former Nebraska Ordnance Plant, Mead, Nebraska

Column	Heading	Notes
1	Group	EXP = explosives METALS = metals TMET = total metals DMET = dissolved metals SVOC = semi-volatile organic compounds VOC = volatile organic compounds PCB = polychlorinated biphenyl PEST = pesticides and PCBs BTEX = total benzene, toluene, ethylene and xylene (total) TPH = total petroleum hydrocarbons WQ = water quality parameters
2	Analyte	All chemicals included in the group
3	Units	MG/KG = milligrams per kilogram UG/KG = micrograms per kilogram MG/L = milligrams per liter
4	Total	Total number of samples
5	Hits	Total number of samples with detectable concentrations
6	Max. Conc.	Maximum detected concentration
7	Avg. Conc.	Average (i.e., Arithmetic Mean) Concentration. Note that arithmetic mean concentrations are calculated using the standard risk assessment approach of assuming one-half the reporting limit as a surrogate value when a chemical was reported as "non-detected".
8	Screening Level	Screening level concentration * = single screening level for the following combined chemicals: Benzene, Toluene, Ethylene, and Xylene (total) combined. 2-Nitrotoluene, 3-Nitrotoluene, and 4-Nitrotoluene combined. Aroclor 1016, 1221, 1232, 1242, 1248, 1254, and 1260 combined. M/P Xylenes and O-Xylenes combined. Bromodichloromethane, Bromoform, Chloroform, and Dibromochloromethane combined.
9	Source	Sources for screening levels (reference citations are provided in section 8): a = EPA Water Quality Criteria (EPA, 1992c) b = EPA Lifetime Health Advisories (EPA, 1995c) c = EPA 10^{-6} Cancer Risk Health Advisory (EPA, 1995c) d = EPA Maximum Contamination Levels (EPA, 1995c) e = EPA Maximum Contamination Level Goals (EPA, 1995c) f = EPA Region III Risk-Based Concentrations for residential soils (EPA, 1996) b? g = EPA Region IX Preliminary Remedial Goals for residential soils (EPA, 1995d) h = 2 x average Site background concentrations (W-C, 1997) p. 8-3 i = OU1 Remediation Goals (RUST, 1994) j = OU2 Final Target Groundwater Cleanup Goals (W-C, 1994c) k = Generally Recognized as Safe (GRAS) l = Site-Specific Action Level (USACE, 1994) m = Nebraska Leaking Underground Storage Tank Program (NDEQ, 1993) n = No screening level was established

Table 1-2

Summary of OU3 Analytical Data for Load Line 1 Bomb Production Building Adjacent Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene	MG/KG	116	16	0.63	0.25	1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	116	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	116	42	16.7	1.1	17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	116	1	0.48	0.25	0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	116	5	0.28	0.24	0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	116	30	9.8	0.46		
EXP	2-Nitrotoluene	MG/KG	116	4	0.5	0.35	343*	i
EXP	3-Nitrotoluene	MG/KG	116	1	0.52	0.35	343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	116	22	6.7	0.53		
EXP	4-Nitrotoluene	MG/KG	116	1	0.48	0.35	343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	116	17	3	0.41	5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	116	8	0.46	0.33	343	i
EXP	Nitrobenzene	MG/KG	116	1	0.41	0.86		
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	116	22	1.1	0.24	1715.2	i
METALS	Aluminum	MG/KG	113	113	47500	16000	33852	h
METALS	Antimony	MG/KG	75	20	0.88	1.6	31	g
METALS	Arsenic	MG/KG	112	112	17.5	8.2	13.5	h
METALS	Barium	MG/KG	113	113	4710	290	440	h
METALS	Beryllium	MG/KG	113	95	1.9	0.76	1.52	h
METALS	Cadmium	MG/KG	113	91	17.2	0.76	39	g
METALS	Calcium	MG/KG	113	113	79100	7100	GRAS	k
METALS	Chromium	MG/KG	113	113	47	19	37	h
METALS	Cobalt	MG/KG	113	113	20.8	10	17.2	h
METALS	Copper	MG/KG	113	113	44.6	21	33.9	h
METALS	Iron	MG/KG	113	113	46900	19000	GRAS	k
METALS	Lead	MG/KG	112	112	394	55	400	g
METALS	Magnesium	MG/KG	113	113	8950	3800	GRAS	k
METALS	Manganese	MG/KG	113	113	1110	610	1083	h
METALS	Mercury	MG/KG	112	4	0.19	0.061	23	g
METALS	Nickel	MG/KG	113	113	51.7	24	39.3	h
METALS	Potassium	MG/KG	113	113	8210	3500	GRAS	k
METALS	Selenium	MG/KG	112	43	3.1	0.91	390	g
METALS	Silver	MG/KG	113	1	9.9	0.37	380	g
METALS	Sodium	MG/KG	113	43	3500	380	GRAS	k
METALS	Thallium	MG/KG	112	0			1.72	h
METALS	Vanadium	MG/KG	113	113	102	36	72.5	h
METALS	Zinc	MG/KG	113	98	1890	92	119.5	h

Note:

Refer to Note List in Table 1-1 for column headings definitions.

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Table 1-3

Summary of OU3 Analytical Data for Load Line 1 Bomb Production Building Beneath Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene	MG/KG	38	1	0.2	0.28	1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	38	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	38	4	32	1.1	17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	38	1	0.23	0.28	0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	38	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	38	6	0.37	0.27		
EXP	2-Nitrotoluene	MG/KG	38	1	0.69	0.42	343*	i
EXP	3-Nitrotoluene	MG/KG	38	0			343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	38	3	0.23	0.53		
EXP	4-Nitrotoluene	MG/KG	38	0			343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	38	7	5.1	0.67	5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	38	1	0.071	0.41	343	i
EXP	Nitrobenzene	MG/KG	38	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	38	6	1.2	0.31	1715.2	i
METALS	Aluminum	MG/KG	38	38	21900	15000	33852	h
METALS	Antimony	MG/KG	21	2	0.55	0.26	31	g
METALS	Arsenic	MG/KG	38	38	10.6	8.3	13.5	h
METALS	Barium	MG/KG	38	38	334	240	440	h
METALS	Beryllium	MG/KG	38	38	0.95	0.75	1.52	h
METALS	Cadmium	MG/KG	38	25	0.84	0.46	39	g
METALS	Calcium	MG/KG	38	38	9900	4100	GRAS	k
METALS	Chromium	MG/KG	38	38	24.1	17	37	h
METALS	Cobalt	MG/KG	38	38	14.7	10	17.2	h
METALS	Copper	MG/KG	38	38	44.3	20	33.9	h
METALS	Iron	MG/KG	38	38	23600	19000	GRAS	k
METALS	Lead	MG/KG	38	38	26.6	14	400	g
METALS	Magnesium	MG/KG	38	38	6280	3800	GRAS	k
METALS	Manganese	MG/KG	38	38	897	600	1083	h
METALS	Mercury	MG/KG	38	0			23	g
METALS	Nickel	MG/KG	38	38	32.7	23	39.3	h
METALS	Potassium	MG/KG	38	38	11600	3500	GRAS	k
METALS	Selenium	MG/KG	38	15	2	0.88	390	g
METALS	Silver	MG/KG	38	0			380	g
METALS	Sodium	MG/KG	38	0			GRAS	k
METALS	Thallium	MG/KG	38	0			1.72	h
METALS	Vanadium	MG/KG	38	38	46.2	33	72.5	h
METALS	Zinc	MG/KG	38	38	64	53	119.5	h

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-4

Summary of OU3 Analytical Data for Load Line 2 Bomb Production Building Adjacent Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene	MG/KG	138	9	0.6	1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	138	0		3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	138	28	12	17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	138	0		0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	138	0		0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	138	20	1.1		
EXP	2-Nitrotoluene	MG/KG	138	2	0.72	343*	i
EXP	3-Nitrotoluene	MG/KG	138	2	0.39	343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	138	16	0.77		
EXP	4-Nitrotoluene	MG/KG	138	1	0.72	343*	i
EXP	Hexahydro-1,2,3-trinitro-1,2,3-triazine	MG/KG	138	49	4.8	5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	137	10	0.53	343	i
EXP	Nitrobenzene	MG/KG	138	0			
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	138	44	1.1	1715.2	i
METALS	Aluminum	MG/KG	136	136	23600	33852	h
METALS	Antimony	MG/KG	83	31	2.8	31	g
METALS	Arsenic	MG/KG	136	136	15.5	13.5	h
METALS	Barium	MG/KG	136	136	516	440	h
METALS	Beryllium	MG/KG	136	136	0.95	1.52	h
METALS	Cadmium	MG/KG	136	96	12.6	39	g
METALS	Calcium	MG/KG	136	136	173000	GRAS	k
METALS	Chromium	MG/KG	136	135	70.6	37	h
METALS	Cobalt	MG/KG	136	136	14	17.2	h
METALS	Copper	MG/KG	136	136	145	33.9	h
METALS	Iron	MG/KG	136	136	118000	GRAS	k
METALS	Lead	MG/KG	136	136	1040	400	g
METALS	Magnesium	MG/KG	136	136	5970	GRAS	k
METALS	Manganese	MG/KG	136	136	1090	1083	h
METALS	Mercury	MG/KG	136	4	0.39	23	g
METALS	Nickel	MG/KG	136	136	52.4	39.3	h
METALS	Potassium	MG/KG	136	136	4940	GRAS	k
METALS	Selenium	MG/KG	136	75	3.3	390	g
METALS	Silver	MG/KG	136	0		380	g
METALS	Sodium	MG/KG	136	8	2170	GRAS	k
METALS	Thallium	MG/KG	136	0		1.72	h
METALS	Vanadium	MG/KG	136	136	57.9	72.5	h
METALS	Zinc	MG/KG	136	136	654	119.5	h

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-5

Summary of OU3 Analytical Data for Load Line 2 Bomb Production Building Beneath Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene	MG/KG	38	3	1.9	0.3	1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	38	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	38	8	220	6.1	17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	38	3	0.39	0.25	0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	38	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	38	3	0.32	0.25		
EXP	2-Nitrotoluene	MG/KG	38	0			343*	i
EXP	3-Nitrotoluene	MG/KG	38	0			343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	38	1	0.21	0.48		
EXP	4-Nitrotoluene	MG/KG	38	0			343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	38	11	740	20	5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	37	3	0.14	0.35	343	i
EXP	Nitrobenzene	MG/KG	38	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	38	15	35	1.2	1715.2	i
METALS	Aluminum	MG/KG	38	38	20200	14000	33852	h
METALS	Antimony	MG/KG	12	1	0.59	1.3	31	g
METALS	Arsenic	MG/KG	38	38	11.5	8.7	13.5	h
METALS	Barium	MG/KG	38	38	324	220	440	h
METALS	Beryllium	MG/KG	38	36	0.92	0.71	1.52	h
METALS	Cadmium	MG/KG	38	24	0.66	0.32	39	g
METALS	Calcium	MG/KG	38	38	16000	4300	GRAS	k
METALS	Chromium	MG/KG	38	38	23.7	16	37	h
METALS	Cobalt	MG/KG	38	38	12.5	10	17.2	h
METALS	Copper	MG/KG	38	38	25.8	20	33.9	h
METALS	Iron	MG/KG	38	38	23700	19000	GRAS	k
METALS	Lead	MG/KG	38	38	36.3	15	400	g
METALS	Magnesium	MG/KG	38	38	5150	3800	GRAS	k
METALS	Manganese	MG/KG	38	38	898	600	1083	h
METALS	Mercury	MG/KG	38	1	0.38	0.069	23	g
METALS	Nickel	MG/KG	38	38	29.6	24	39.3	h
METALS	Potassium	MG/KG	38	38	3890	2700	GRAS	k
METALS	Selenium	MG/KG	38	14	1.9	0.84	390	g
METALS	Silver	MG/KG	38	0			380	g
METALS	Sodium	MG/KG	38	16	266	180	GRAS	k
METALS	Thallium	MG/KG	38	1	1.4	0.84	1.72	h
METALS	Vanadium	MG/KG	38	38	53.1	32	72.5	h
METALS	Zinc	MG/KG	38	37	66.9	52	119.5	h

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-6

Summary of OU3 Analytical Data for Load Line 3 Bomb Production Building Adjacent Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene	MG/KG	124	12	0.46	1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	124	2	0.42	3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	124	41	15	17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	124	0		0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	124	0		0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	124	35	2.3		
EXP	2-Nitrotoluene	MG/KG	124	0		343*	i
EXP	3-Nitrotoluene	MG/KG	124	1	0.34	343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	124	37	2.7		
EXP	4-Nitrotoluene	MG/KG	124	0		343*	i
EXP	Hexahydro-1,2,3-trinitro-1,2,3-triazine	MG/KG	124	27	4.8	5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	118	4	0.41	343	i
EXP	Nitrobenzene	MG/KG	124	2	1.1		
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	124	33	1.4	1715.2	i
METALS	Aluminum	MG/KG	122	122	23300	33852	h
METALS	Antimony	MG/KG	94	14	1.5	31	g
METALS	Arsenic	MG/KG	122	122	11.8	13.5	h
METALS	Barium	MG/KG	122	122	2380	440	h
METALS	Beryllium	MG/KG	122	122	0.99	1.52	h
METALS	Cadmium	MG/KG	122	110	3.1	39	g
METALS	Calcium	MG/KG	122	122	64100	GRAS	k
METALS	Chromium	MG/KG	122	122	26.8	37	h
METALS	Cobalt	MG/KG	122	122	15.4	17.2	h
METALS	Copper	MG/KG	122	122	157	33.9	h
METALS	Iron	MG/KG	122	122	25000	GRAS	k
METALS	Lead	MG/KG	122	122	4670	400	g
METALS	Magnesium	MG/KG	122	122	8390	GRAS	k
METALS	Manganese	MG/KG	122	122	1030	1083	h
METALS	Mercury	MG/KG	122	23	0.72	23	g
METALS	Nickel	MG/KG	122	122	50.9	39.3	h
METALS	Potassium	MG/KG	122	122	4590	GRAS	k
METALS	Selenium	MG/KG	122	71	2.8	390	g
METALS	Silver	MG/KG	122	5	79.3	380	g
METALS	Sodium	MG/KG	122	16	278	GRAS	k
METALS	Thallium	MG/KG	122	3	1.8	1.72	h
METALS	Vanadium	MG/KG	122	122	51.5	72.5	h
METALS	Zinc	MG/KG	122	122	408	119.5	h

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-7

Summary of OU3 Analytical Data for Load Line 3 Bomb Production Building Beneath Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene	MG/KG	38	7	0.21	0.24	1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	38	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	38	3	0.82	0.27	17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	38	1	3.5	0.34	0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	38	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	38	1	0.073	0.25		
EXP	2-Nitrotoluene	MG/KG	38	0			343*	i
EXP	3-Nitrotoluene	MG/KG	38	1	0.19	0.37	343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	38	2	0.24	0.48		
EXP	4-Nitrotoluene	MG/KG	38	0			343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	38	5	3.6	0.45	5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	38	0			343	i
EXP	Nitrobenzene	MG/KG	38	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	38	22	0.52	0.23	1715.2	i
METALS	Aluminum	MG/KG	38	38	22600	15000	33852	h
METALS	Antimony	MG/KG	17	2	0.63	0.38	31	g
METALS	Arsenic	MG/KG	38	38	11.2	8.1	13.5	h
METALS	Barium	MG/KG	38	38	391	230	440	h
METALS	Beryllium	MG/KG	38	38	0.99	0.73	1.52	h
METALS	Cadmium	MG/KG	38	31	0.61	0.41	39	g
METALS	Calcium	MG/KG	38	38	5660	3600	GRAS	k
METALS	Chromium	MG/KG	38	38	23.3	16	37	h
METALS	Cobalt	MG/KG	38	38	12.9	10	17.2	h
METALS	Copper	MG/KG	38	38	31.6	19	33.9	h
METALS	Iron	MG/KG	38	38	22300	18000	GRAS	k
METALS	Lead	MG/KG	38	38	69	15	400	g
METALS	Magnesium	MG/KG	38	38	4780	3600	GRAS	k
METALS	Manganese	MG/KG	38	38	853	560	1083	h
METALS	Mercury	MG/KG	38	1	0.17	0.064	23	g
METALS	Nickel	MG/KG	38	38	29.8	23	39.3	h
METALS	Potassium	MG/KG	38	38	4210	2900	GRAS	k
METALS	Selenium	MG/KG	38	18	2.1	1	390	g
METALS	Silver	MG/KG	38	0			380	g
METALS	Sodium	MG/KG	38	4	624	190	GRAS	k
METALS	Thallium	MG/KG	38	0			1.72	h
METALS	Vanadium	MG/KG	38	38	48.3	32	72.5	h
METALS	Zinc	MG/KG	38	38	63.5	51	119.5	h

Note:

Refer to Note List in Table 1-1 for column headings definitions.

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Table 1-8

Summary of OU3 Analytical Data for Load Line 4 Bomb Production Building Adjacent Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene	MG/KG	136	6	0.12	1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	136	0		3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	136	40	2	17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	136	1	0.088	0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	136	0		0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	135	19	0.69		
EXP	2-Nitrotoluene	MG/KG	136	1	0.14	343*	i
EXP	3-Nitrotoluene	MG/KG	136	0		343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	135	19	0.41		
EXP	4-Nitrotoluene	MG/KG	136	1	0.14	343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	136	18	3.4	5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	134	0		343	i
EXP	Nitrobenzene	MG/KG	136	3	1.6		
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	136	37	0.85	1715.2	i
METALS	Aluminum	MG/KG	134	134	25600	33852	h
METALS	Antimony	MG/KG	85	18	1.4	31	g
METALS	Arsenic	MG/KG	134	134	15.3	13.5	h
METALS	Barium	MG/KG	134	134	347	440	h
METALS	Beryllium	MG/KG	134	131	1	1.52	h
METALS	Cadmium	MG/KG	134	122	10.3	39	g
METALS	Calcium	MG/KG	134	134	51000	GRAS	k
METALS	Chromium	MG/KG	134	134	57	37	h
METALS	Cobalt	MG/KG	134	134	14.9	17.2	h
METALS	Copper	MG/KG	134	134	112	33.9	h
METALS	Iron	MG/KG	134	134	70600	GRAS	k
METALS	Lead	MG/KG	134	134	313	400	g
METALS	Magnesium	MG/KG	134	134	5260	GRAS	k
METALS	Manganese	MG/KG	134	134	960	1083	h
METALS	Mercury	MG/KG	134	38	0.31	23	g
METALS	Nickel	MG/KG	134	134	61.7	39.3	h
METALS	Potassium	MG/KG	134	134	6090	GRAS	k
METALS	Selenium	MG/KG	134	85	3.3	390	g
METALS	Silver	MG/KG	134	0		380	g
METALS	Sodium	MG/KG	134	33	10200	GRAS	k
METALS	Thallium	MG/KG	134	2	1.5	1.72	h
METALS	Vanadium	MG/KG	134	134	52.3	72.5	h
METALS	Zinc	MG/KG	134	134	234	119.5	h

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-9

Summary of OU3 Analytical Data for Load Line 4 Bomb Production Building Beneath Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene	MG/KG	37	0			1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	37	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	37	1	0.056	0.25	17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	37	0			0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	37	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	37	0				
EXP	2-Nitrotoluene	MG/KG	37	0			343*	i
EXP	3-Nitrotoluene	MG/KG	37	1	0.12	0.37	343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	37	1	0.3	0.5		
EXP	4-Nitrotoluene	MG/KG	37	0			343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	37	10	0.59	0.35	5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	37	0			343	i
EXP	Nitrobenzene	MG/KG	37	1	0.0053	0.97		
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	37	5	0.15	0.23	1715.2	i
METALS	Aluminum	MG/KG	37	37	18300	14000	33852	h
METALS	Antimony	MG/KG	30	0			31	g
METALS	Arsenic	MG/KG	37	37	10	8	13.5	h
METALS	Barium	MG/KG	37	37	302	220	440	h
METALS	Beryllium	MG/KG	37	37	0.89	0.73	1.52	h
METALS	Cadmium	MG/KG	37	37	0.96	0.46	39	g
METALS	Calcium	MG/KG	37	37	8370	3900	GRAS	k
METALS	Chromium	MG/KG	37	37	27.3	16	37	h
METALS	Cobalt	MG/KG	37	37	13.7	10	17.2	h
METALS	Copper	MG/KG	37	37	80.6	21	33.9	h
METALS	Iron	MG/KG	37	37	22000	18000	GRAS	k
METALS	Lead	MG/KG	37	37	16.8	14	400	g
METALS	Magnesium	MG/KG	37	37	4780	3500	GRAS	k
METALS	Manganese	MG/KG	37	37	972	580	1083	h
METALS	Mercury	MG/KG	37	0			23	g
METALS	Nickel	MG/KG	37	37	28.6	22	39.3	h
METALS	Potassium	MG/KG	37	37	3530	2800	GRAS	k
METALS	Selenium	MG/KG	37	27	2.4	1.2	390	g
METALS	Silver	MG/KG	37	0			380	g
METALS	Sodium	MG/KG	37	0			GRAS	k
METALS	Thallium	MG/KG	37	0			1.72	h
METALS	Vanadium	MG/KG	37	37	43.1	30	72.5	h
METALS	Zinc	MG/KG	37	37	60.6	52	119.5	h

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-10

Summary of OU3 Analytical Data for Load Line 1 Paint Operation Areas Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Screening Level	Source
METALS	Aluminum	MG/KG	58	58	24800	33852	h
METALS	Antimony	MG/KG	52	33	47.2	31	g
METALS	Arsenic	MG/KG	58	58	10.7	13.5	h
METALS	Barium	MG/KG	58	58	339	440	h
METALS	Beryllium	MG/KG	58	58	0.94	1.52	h
METALS	Cadmium	MG/KG	58	45	144	39	g
METALS	Calcium	MG/KG	58	58	28300	GRAS	k
METALS	Chromium	MG/KG	58	58	140	37	h
METALS	Cobalt	MG/KG	58	58	13.4	17.2	h
METALS	Copper	MG/KG	58	58	53.6	33.9	h
METALS	Iron	MG/KG	58	58	23800	GRAS	k
METALS	Lead	MG/KG	58	58	794	400	g
METALS	Magnesium	MG/KG	58	58	6360	GRAS	k
METALS	Manganese	MG/KG	58	58	878	1083	h
METALS	Mercury	MG/KG	58	2	0.24	23	g
METALS	Nickel	MG/KG	58	58	49.5	39.3	h
METALS	Potassium	MG/KG	58	58	4850	GRAS	k
METALS	Selenium	MG/KG	58	25	2	390	g
METALS	Silver	MG/KG	58	0		380	g
METALS	Sodium	MG/KG	58	5	215	GRAS	k
METALS	Thallium	MG/KG	58	1	1.5	1.72	h
METALS	Vanadium	MG/KG	58	58	53.1	72.5	h
METALS	Zinc	MG/KG	58	58	266	119.5	h

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-11

Summary of OU3 Analytical Data for Load Line 2 Paint Operation Areas Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Screening Level	Source
METALS	Aluminum	MG/KG	56	56	27000	33852	h
METALS	Antimony	MG/KG	44	20	501	31	g
METALS	Arsenic	MG/KG	56	56	14.6	13.5	h
METALS	Barium	MG/KG	60	60	423	440	h
METALS	Beryllium	MG/KG	56	56	1.1	1.52	h
METALS	Cadmium	MG/KG	60	39	13.8	39	g
METALS	Calcium	MG/KG	56	56	16100	GRAS	k
METALS	Chromium	MG/KG	60	60	840	37	h
METALS	Cobalt	MG/KG	56	56	44.9	17.2	h
METALS	Copper	MG/KG	56	56	86	33.9	h
METALS	Iron	MG/KG	56	56	26800	GRAS	k
METALS	Lead	MG/KG	60	60	3960	400	g
METALS	Magnesium	MG/KG	56	56	6110	GRAS	k
METALS	Manganese	MG/KG	56	56	1080	1083	h
METALS	Mercury	MG/KG	56	6	0.76	23	g
METALS	Nickel	MG/KG	56	56	63	39.3	h
METALS	Potassium	MG/KG	56	56	4430	GRAS	k
METALS	Selenium	MG/KG	56	15	1.9	390	g
METALS	Silver	MG/KG	56	0		380	g
METALS	Sodium	MG/KG	56	4	6100	GRAS	k
METALS	Thallium	MG/KG	56	2	2.2	1.72	h
METALS	Vanadium	MG/KG	56	56	60.5	72.5	h
METALS	Zinc	MG/KG	56	56	486	119.5	h

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Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-12

Summary of OU3 Analytical Data for Load Line 3 Paint Operation Areas Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Screening Level	Source
METALS	Aluminum	MG/KG	56	56	24200	33852	h
METALS	Antimony	MG/KG	38	19	54.8	31	g
METALS	Arsenic	MG/KG	56	56	13.4	13.5	h
METALS	Barium	MG/KG	58	58	516	440	h
METALS	Beryllium	MG/KG	56	56	0.95	1.52	h
METALS	Cadmium	MG/KG	58	48	5.8	39	g
METALS	Calcium	MG/KG	56	56	124000	GRAS	k
METALS	Chromium	MG/KG	58	58	806	37	h
METALS	Cobalt	MG/KG	56	56	25.2	17.2	h
METALS	Copper	MG/KG	56	56	218	33.9	h
METALS	Iron	MG/KG	56	56	45000	GRAS	k
METALS	Lead	MG/KG	58	58	3730	400	g
METALS	Magnesium	MG/KG	56	56	6150	GRAS	k
METALS	Manganese	MG/KG	56	56	813	1083	h
METALS	Mercury	MG/KG	56	25	0.29	23	g
METALS	Nickel	MG/KG	56	56	194	39.3	h
METALS	Potassium	MG/KG	56	56	5290	GRAS	k
METALS	Selenium	MG/KG	56	27	1.8	390	g
METALS	Silver	MG/KG	56	0		380	g
METALS	Sodium	MG/KG	56	1	441	GRAS	k
METALS	Thallium	MG/KG	56	1	1.2	1.72	h
METALS	Vanadium	MG/KG	56	56	59.1	72.5	h
METALS	Zinc	MG/KG	56	56	551	119.5	h

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-13

Summary of OU3 Analytical Data for Load Line 4 Paint Operation Areas Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Screening Level	Source
METALS	Aluminum	MG/KG	61	61	20300	33852	h
METALS	Antimony	MG/KG	32	21	171	31	g
METALS	Arsenic	MG/KG	61	60	9	13.5	h
METALS	Barium	MG/KG	61	61	278	440	h
METALS	Beryllium	MG/KG	61	49	0.88	1.52	h
METALS	Cadmium	MG/KG	61	37	19.7	39	g
METALS	Calcium	MG/KG	61	61	167000	GRAS	k
METALS	Chromium	MG/KG	61	61	123	37	h
METALS	Cobalt	MG/KG	61	61	13	17.2	h
METALS	Copper	MG/KG	61	61	37.2	33.9	h
METALS	Iron	MG/KG	61	61	22000	GRAS	k
METALS	Lead	MG/KG	61	61	600	400	g
METALS	Magnesium	MG/KG	61	61	4090	GRAS	k
METALS	Manganese	MG/KG	61	61	810	1083	h
METALS	Mercury	MG/KG	61	0		23	g
METALS	Nickel	MG/KG	61	61	34.2	39.3	h
METALS	Potassium	MG/KG	61	61	6430	GRAS	k
METALS	Selenium	MG/KG	61	28	2.3	390	g
METALS	Silver	MG/KG	61	0		380	g
METALS	Sodium	MG/KG	61	11	226	GRAS	k
METALS	Thallium	MG/KG	61	2	1.8	1.72	h
METALS	Vanadium	MG/KG	61	61	42	72.5	h
METALS	Zinc	MG/KG	61	61	264	119.5	h

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-14

Summary of OU3 Analytical Data for Load Line Paint Operation Areas November/December 1994
Groundwater Sampling of Existing Monitoring Wells
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
DMET	Aluminum	UG/L	12	12	313	110	37000	g
DMET	Antimony	UG/L	12	0			6	d
DMET	Arsenic	UG/L	12	12	15.4	7.5	50	d
DMET	Barium	UG/L	12	12	456	230	2000	d
DMET	Beryllium	UG/L	12	0			4	d
DMET	Cadmium	UG/L	12	1	0.32	0.23	5	d
DMET	Calcium	UG/L	12	12	74600	57000	GRAS	k
DMET	Chromium	UG/L	12	6	3.3	1.7	100	d
DMET	Cobalt	UG/L	12	1	1.2	0.33	2200	g
DMET	Copper	UG/L	12	2	3	0.58	1300	m
DMET	Iron	UG/L	12	2	334	42	GRAS	k
DMET	Lead	UG/L	12	2	3.6	1.1	15	m
DMET	Magnesium	UG/L	12	12	25500	16000	GRAS	k
DMET	Manganese	UG/L	12	7	37.9	5.8	180	g
DMET	Mercury	UG/L	12	0			2	d
DMET	Nickel	UG/L	12	5	6.6	1.7	100	d
DMET	Potassium	UG/L	12	12	14100	12000	GRAS	k
DMET	Selenium	UG/L	12	12	28	15	50	d
DMET	Silver	UG/L	12	0			100	b
DMET	Sodium	UG/L	12	12	26300	18000	GRAS	k
DMET	Thallium	UG/L	12	4	8.7	3.8	2	d
DMET	Vanadium	UG/L	12	12	10.6	4.9	260	g
DMET	Zinc	UG/L	12	12	8.3	2.2	2000	b
TMET	Aluminum	UG/L	12	12	4160	950	37000	g
TMET	Antimony	UG/L	12	0			6	d
TMET	Arsenic	UG/L	12	8	12.1	5.3	50	d
TMET	Barium	UG/L	12	12	434	240	2000	d
TMET	Beryllium	UG/L	12	2	0.83	0.14	4	d
TMET	Cadmium	UG/L	12	0			5	d
TMET	Calcium	UG/L	12	12	76800	57000	GRAS	k
TMET	Chromium	UG/L	12	4	12.6	3.1	100	d
TMET	Cobalt	UG/L	12	0			2200	g
TMET	Copper	UG/L	12	5	10.5	2.2	1300	m
TMET	Iron	UG/L	12	6	6040	1000	GRAS	k
TMET	Lead	UG/L	12	4	13.6	3.2	15	m
TMET	Magnesium	UG/L	12	12	25500	16000	GRAS	k
TMET	Manganese	UG/L	12	10	345	43	180	g
TMET	Mercury	UG/L	12	0			2	d
TMET	Nickel	UG/L	12	6	27.1	5.7	100	d
TMET	Potassium	UG/L	12	12	12900	9700	GRAS	k
TMET	Selenium	UG/L	12	7	15.9	6	50	d
TMET	Silver	UG/L	12	0			100	b
TMET	Sodium	UG/L	12	12	26100	18000	GRAS	k

Table 1-14

Summary of OU3 Analytical Data for Load Line Paint Operation Areas November/December 1994
Groundwater Sampling of Existing Monitoring Wells
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
TMET	Thallium	UG/L	12	0			2	d
TMET	Vanadium	UG/L	12	12	24.5	7.7	260	g
TMET	Zinc	UG/L	12	10	92.6	19	2000	b

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-15

Summary of OU3 Analytical Data for Load Line Paint Operation Areas March 1995
Groundwater Sampling at Existing Monitoring Wells
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
DMET	Aluminum	UG/L	12	12	145	86	37000	g
DMET	Antimony	UG/L	12	1	12.6	1.9	6	d
DMET	Arsenic	UG/L	12	8	9.7	5.1	50	d
DMET	Barium	UG/L	12	12	475	230	2000	d
DMET	Beryllium	UG/L	12	1	1.2	0.15	4	d
DMET	Cadmium	UG/L	12	1	1.1	0.32	5	d
DMET	Calcium	UG/L	12	12	74500	57000	GRAS	k
DMET	Chromium	UG/L	12	3	4.4	1.7	100	d
DMET	Cobalt	UG/L	12	2	12.9	1.3	2200	g
DMET	Copper	UG/L	12	6	6.1	1.1	1300	m
DMET	Iron	UG/L	12	1	65.4	18	GRAS	k
DMET	Lead	UG/L	12	1	2	0.9	15	m
DMET	Magnesium	UG/L	12	12	24200	16000	GRAS	k
DMET	Manganese	UG/L	12	5	44	4.3	180	g
DMET	Mercury	UG/L	12	1	0.32	0.12	2	d
DMET	Nickel	UG/L	12	5	11.3	2.6	100	d
DMET	Potassium	UG/L	12	12	12400	9900	GRAS	k
DMET	Selenium	UG/L	12	12	31.6	17	50	d
DMET	Silver	UG/L	12	1	2.5	0.48	100	b
DMET	Sodium	UG/L	12	12	27400	18000	GRAS	k
DMET	Thallium	UG/L	12	2	8	3.6	2	d
DMET	Vanadium	UG/L	12	12	17.5	6.2	260	g
DMET	Zinc	UG/L	12	12	25	8.7	2000	b
TMET	Aluminum	UG/L	12	12	2030	420	37000	g
TMET	Antimony	UG/L	12	0			6	d
TMET	Arsenic	UG/L	12	6	9.6	3.9	50	d
TMET	Barium	UG/L	12	12	399	200	2000	d
TMET	Beryllium	UG/L	12	0			4	d
TMET	Cadmium	UG/L	12	0			5	d
TMET	Calcium	UG/L	12	12	72700	51000	GRAS	k
TMET	Chromium	UG/L	12	6	4.7	2.1	100	d
TMET	Cobalt	UG/L	12	3	1.5	0.45	2200	g
TMET	Copper	UG/L	12	5	8.8	1.9	1300	m
TMET	Iron	UG/L	12	4	2300	430	GRAS	k
TMET	Lead	UG/L	12	5	5.5	1.7	15	m
TMET	Magnesium	UG/L	12	12	23100	14000	GRAS	k
TMET	Manganese	UG/L	12	11	67.5	13	180	g
TMET	Mercury	UG/L	12	0			2	d
TMET	Nickel	UG/L	12	8	8.6	2.4	100	d
TMET	Potassium	UG/L	12	12	10900	8000	GRAS	k
TMET	Selenium	UG/L	12	5	19.1	5.1	50	d
TMET	Silver	UG/L	12	1	0.76	0.33	100	b
TMET	Sodium	UG/L	12	12	24800	16000	GRAS	k

Table 1-15

Summary of OU3 Analytical Data for Load Line Paint Operation Areas March 1995
Groundwater Sampling at Existing Monitoring Wells
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
TMET	Thallium	UG/L	12	0			2	d
TMET	Vanadium	UG/L	12	11	11	5.3	260	g
TMET	Zinc	UG/L	12	12	117	23	2000	b

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-16

Summary of OU3 Analytical Data for Raw Products Igloo Storage Areas Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene	MG/KG	22	0			1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	22	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	22	0			17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	22	0			0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	22	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	22	0				
EXP	2-Nitrotoluene	MG/KG	22	0			343*	l
EXP	3-Nitrotoluene	MG/KG	22	0			343*	l
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	22	0				
EXP	4-Nitrotoluene	MG/KG	22	0			343*	l
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	22	8	1.4	0.39	5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	20	3	0.27	0.34	343	i
EXP	Nitrobenzene	MG/KG	22	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	22	2	0.093	0.24	1715.2	i
METALS	Aluminum	MG/KG	12	12	15600	11000	33852	h
METALS	Antimony	MG/KG	10	0			31	g
METALS	Arsenic	MG/KG	12	12	11	7.8	13.5	h
METALS	Barium	MG/KG	12	12	281	190	440	h
METALS	Beryllium	MG/KG	12	0			1.52	h
METALS	Cadmium	MG/KG	12	0			39	g
METALS	Calcium	MG/KG	12	12	12100	6400	GRAS	k
METALS	Chromium	MG/KG	12	12	24.2	15	37	h
METALS	Cobalt	MG/KG	12	12	11	8.2	17.2	h
METALS	Copper	MG/KG	12	12	36.1	19	33.9	h
METALS	Iron	MG/KG	12	12	48700	19000	GRAS	k
METALS	Lead	MG/KG	12	12	118	46	400	g
METALS	Magnesium	MG/KG	12	12	4280	2900	GRAS	k
METALS	Manganese	MG/KG	12	12	635	500	1083	h
METALS	Mercury	MG/KG	12	7	0.44	0.16	23	g
METALS	Nickel	MG/KG	12	12	66.1	25	39.3	h
METALS	Potassium	MG/KG	12	12	3420	2200	GRAS	k
METALS	Selenium	MG/KG	12	1	1.3	0.67	390	g
METALS	Silver	MG/KG	12	1	25.2	3.2	380	g
METALS	Sodium	MG/KG	12	0			GRAS	k
METALS	Thallium	MG/KG	12	0			1.72	h
METALS	Vanadium	MG/KG	12	12	35.8	26	72.5	h
METALS	Zinc	MG/KG	12	12	199	120	119.5	h

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-17

Summary of OU3 Analytical Data for Former Tetryl Pelleting Area Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene	MG/KG	12	0			1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	12	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	12	0			17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	12	0			0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	12	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	12	0				
EXP	2-Nitrotoluene	MG/KG	12	0			343*	i
EXP	3-Nitrotoluene	MG/KG	12	0			343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	12	0				
EXP	4-Nitrotoluene	MG/KG	12	0			343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	12	0			5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	11	5	0.000093	0.1	343	i
EXP	Nitrobenzene	MG/KG	12	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	12	5	0.47	0.27	1715.2	i
METALS	Aluminum	MG/KG	12	12	18200	13000	33852	h
METALS	Antimony	MG/KG	5	4	9.3	3	31	g
METALS	Arsenic	MG/KG	12	12	13	7.2	13.5	h
METALS	Barium	MG/KG	12	12	520	230	440	h
METALS	Beryllium	MG/KG	12	12	0.78	0.66	1.52	h
METALS	Cadmium	MG/KG	12	4	1.4	0.26	39	g
METALS	Calcium	MG/KG	12	12	10400	5100	GRAS	k
METALS	Chromium	MG/KG	12	12	20.5	16	37	h
METALS	Cobalt	MG/KG	12	12	11.4	8.6	17.2	h
METALS	Copper	MG/KG	12	12	34.6	19	33.9	h
METALS	Iron	MG/KG	12	12	19400	16000	GRAS	k
METALS	Lead	MG/KG	12	12	248	75	400	g
METALS	Magnesium	MG/KG	12	12	3430	2800	GRAS	k
METALS	Manganese	MG/KG	12	12	575	490	1083	h
METALS	Mercury	MG/KG	12	1	0.6	0.11	23	g
METALS	Nickel	MG/KG	12	12	29.3	19	39.3	h
METALS	Potassium	MG/KG	12	12	3540	3000	GRAS	k
METALS	Selenium	MG/KG	12	3	1.9	0.82	390	g
METALS	Silver	MG/KG	12	0			380	g
METALS	Sodium	MG/KG	12	5	169	170	GRAS	k
METALS	Thallium	MG/KG	12	0			1.72	h
METALS	Vanadium	MG/KG	12	12	37.2	30	72.5	h
METALS	Zinc	MG/KG	12	12	275	86	119.5	h

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-18

Summary of OU3 Analytical Data for North Burning Ground Soil Sampling
Former Nebraska Ordnance Plant, mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
SVOC	1,2,4-Trichlorobenzene	UG/KG	30	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	30	0			2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	30	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	30	0			7400	g
SVOC	2,2'-oxybis(1-Chloropropane)	UG/KG	30	0				
SVOC	2,4,5-Trichlorophenol	UG/KG	30	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	30	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	30	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	30	0			1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	30	0			130000	g
SVOC	2,4-Dinitrotoluene	UG/KG	30	0			0.9	i
SVOC	2,6-Dinitrotoluene	UG/KG	30	0			0.9	i
SVOC	2-Chloronaphthalene	UG/KG	30	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	30	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	30	0				
SVOC	2-Methylphenol	UG/KG	30	0			3300000	g
SVOC	2-Nitroaniline	UG/KG	30	0			3900	g
SVOC	2-Nitrophenol	UG/KG	30	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	30	0			990	g
SVOC	3-Nitroaniline	UG/KG	30	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	30	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	30	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	30	0				
SVOC	4-Chloroaniline	UG/KG	30	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	30	0				
SVOC	4-Methylphenol	UG/KG	30	0			330000	g
SVOC	4-Nitroaniline	UG/KG	30	0			230000	g
SVOC	4-Nitrophenol	UG/KG	30	0			4800000	f
SVOC	Acenaphthene	UG/KG	30	0			360000	g
SVOC	Acenaphthylene	UG/KG	30	0				
SVOC	Anthracene	UG/KG	30	0			19000	g
SVOC	Benzo(a)anthracene	UG/KG	30	0			610	g
SVOC	Benzo(a)pyrene	UG/KG	30	0			61	g
SVOC	Benzo(b)fluoranthene	UG/KG	30	0			610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	30	0				
SVOC	Benzo(k)fluoranthene	UG/KG	30	0			6100	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	30	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	30	0			74	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	30	3	1222	240	32000	g
SVOC	Butylbenzylphthalate	UG/KG	30	1	57	200	13000000	g
SVOC	Carbazole	UG/KG	30	0			22000	g
SVOC	Chrysene	UG/KG	30	0			24000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	30	0			61	g
SVOC	Dibenzofuran	UG/KG	30	0			260000	g
SVOC	Diethylphthalate	UG/KG	30	2	31	200	52000000	g
SVOC	Dimethylphthalate	UG/KG	30	0			100000000	g

Table 1-18

Summary of OU3 Analytical Data for North Burning Ground Soil Sampling
Former Nebraska Ordnance Plant, mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
SVOC	Di-n-butylphthalate	UG/KG	30	6	3518	690	6500000	g
SVOC	Di-n-octylphthalate	UG/KG	30	0			1300000	g
SVOC	Fluoranthene	UG/KG	30	0			2600000	g
SVOC	Fluorene	UG/KG	30	0			300000	g
SVOC	Hexachlorobenzene	UG/KG	30	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	30	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	30	0			450000	g
SVOC	Hexachloroethane	UG/KG	30	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	30	0			610	g
SVOC	Isophorone	UG/KG	30	0			470000	g
SVOC	Naphthalene	UG/KG	30	0			800000	g
SVOC	Nitrobenzene	UG/KG	30	0				i
SVOC	N-Nitroso-di-n-propylamine	UG/KG	30	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	30	0			91000	g
SVOC	Pentachlorophenol	UG/KG	30	0			2500	g
SVOC	Phenanthrene	UG/KG	30	0				
SVOC	Phenol	UG/KG	30	0			39000000	g
SVOC	Pyrene	UG/KG	30	2	54	200	2000000	g
EXP	1,3,5-Trinitrobenzene	MG/KG	9	0			1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	9	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	9	0			17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	9	0			0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	9	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	9	0				i
EXP	2-Nitrotoluene	MG/KG	9	0				l
EXP	3-Nitrotoluene	MG/KG	9	0				l
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	9	0				i
EXP	4-Nitrotoluene	MG/KG	9	0				l
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	9	0			5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	9	0			343	i
EXP	Nitrobenzene	MG/KG	9	0				i
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	9	1	0.071	0.033	1715.2	i
METALS	Aluminum	MG/KG	30	30	17300	12000	33852	h
METALS	Antimony	MG/KG	30	5	31.6	1.6	31	g
METALS	Arsenic	MG/KG	30	28	13.4	5.5	13.5	h
METALS	Barium	MG/KG	30	30	244	180	440	h
METALS	Beryllium	MG/KG	30	30	3.1	0.67	1.52	h
METALS	Cadmium	MG/KG	30	27	3.1	0.52	39	g
METALS	Calcium	MG/KG	30	30	104000	9000	GRAS	k
METALS	Chromium	MG/KG	30	30	19.6	14	37	h
METALS	Cobalt	MG/KG	30	30	37.7	8.8	17.2	h
METALS	Copper	MG/KG	30	30	206	25	33.9	h
METALS	Iron	MG/KG	30	30	20500	15000	GRAS	k
METALS	Lead	MG/KG	30	30	43	16	400	g
METALS	Magnesium	MG/KG	30	30	4040	2900	GRAS	k
METALS	Manganese	MG/KG	30	30	718	470	1083	h

Table 1-18

Summary of OU3 Analytical Data for North Burning Ground Soil Sampling
Former Nebraska Ordnance Plant, mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
METALS	Mercury	MG/KG	30	0			23	g
METALS	Nickel	MG/KG	30	30	42.7	17	39.3	h
METALS	Potassium	MG/KG	30	30	3440	2300	GRAS	k
METALS	Selenium	MG/KG	30	22	3.7	1.3	390	g
METALS	Silver	MG/KG	30	3	17.1	0.74	380	g
METALS	Sodium	MG/KG	30	1	266	170	GRAS	k
METALS	Thallium	MG/KG	30	1	4.4	0.79	1.72	h
METALS	Vanadium	MG/KG	30	30	52.2	26	72.5	h
METALS	Zinc	MG/KG	30	29	101	58	119.5	h
VOC	1,1,1-Trichloroethane	UG/KG	18	0			3000000	g
VOC	1,1,2,2-Tetrachloroethane	UG/KG	18	0			900	g
VOC	1,1,2-Trichloroethane	UG/KG	18	0			1400	g
VOC	1,1-Dichloroethane	UG/KG	18	0			840000	g
VOC	1,1-Dichloroethene	UG/KG	18	0			38	g
VOC	1,2-Dichloroethane	UG/KG	18	0			440	g
VOC	1,2-Dichloropropane	UG/KG	18	0			680	g
VOC	2-Butanone	UG/KG	18	0			8700000	g
VOC	2-Hexanone	UG/KG	18	0				
VOC	4-Methyl-2-Pentanone	UG/KG	18	0			5200000	g
VOC	Acetone	UG/KG	18	0			2000000	g
VOC	Benzene	UG/KG	18	0			1400	g
VOC	Bromodichloromethane	UG/KG	18	0			1400	g
VOC	Bromoform	UG/KG	18	0			56000	g
VOC	Bromomethane	UG/KG	18	0			15000	g
VOC	Carbon Disulfide	UG/KG	18	0			16000	g
VOC	Carbon Tetrachloride	UG/KG	18	0			470	g
VOC	Chlorobenzene	UG/KG	18	0			160000	g
VOC	Chloroethane	UG/KG	18	0			1100000	g
VOC	Chloroform	UG/KG	18	0			530	g
VOC	Chloromethane	UG/KG	18	0			2000	g
VOC	cis-1,2-Dichloroethene	UG/KG	18	0			59000	g
VOC	cis-1,3-Dichloropropene	UG/KG	18	0			510	g
VOC	Dibromochloromethane	UG/KG	18	0			5300	g
VOC	Ethylbenzene	UG/KG	18	0			690000	g
VOC	M/P-Xylenes	UG/KG	18	0				
VOC	Methylene Chloride	UG/KG	18	0			11000	g
VOC	O-Xylene	UG/KG	18	0				
VOC	Styrene	UG/KG	18	0			2200000	g
VOC	Tetrachloroethene	UG/KG	18	0			7000	g
VOC	Toluene	UG/KG	18	0			1900000	g
VOC	trans-1,2-Dichloroethene	UG/KG	18	0			170000	g
VOC	trans-1,3-Dichloropropene	UG/KG	18	0			510	g
VOC	Trichloroethene	UG/KG	18	1	2.0	5.9	7100	g
VOC	Vinyl Chloride	UG/KG	18	0			5.2	g

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-19

Summary of OU3 Analytical Data for South Burning Ground Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	1,2,4-Trichlorobenzene	UG/KG	51	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	51	1	47	210	2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	51	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	51	0			7400	g
SVOC	2,2'-oxybis(1-Chloropropane)	UG/KG	51	0				
SVOC	2,4,5-Trichlorophenol	UG/KG	51	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	51	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	51	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	51	2	48	210	1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	51	0			130000	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/KG	51	1	48771	1200	900	i
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/KG	51	1	4534	300	900	i
SVOC	2-Chloronaphthalene	UG/KG	51	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	51	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	51	0				
SVOC	2-Methylphenol	UG/KG	51	3	421	220	3300000	g
SVOC	2-Nitroaniline	UG/KG	51	0			3900	g
SVOC	2-Nitrophenol	UG/KG	51	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	51	0			990	g
SVOC	3-Nitroaniline	UG/KG	51	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	51	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	51	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	51	0				
SVOC	4-Chloroaniline	UG/KG	51	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	51	0				
SVOC	4-Methylphenol	UG/KG	51	3	597	220	330000	g
SVOC	4-Nitroaniline	UG/KG	51	0			230000	g
SVOC	4-Nitrophenol	UG/KG	51	0			4800000	f
SVOC	Acenaphthene	UG/KG	51	0			360000	g
SVOC	Acenaphthylene	UG/KG	51	0				
SVOC	Anthracene	UG/KG	51	0			19000	g
SVOC	Benzo(a)anthracene	UG/KG	51	0			610	g
SVOC	Benzo(a)pyrene	UG/KG	51	0			61	g
SVOC	Benzo(b)fluoranthene	UG/KG	51	0			610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	51	0				
SVOC	Benzo(k)fluoranthene	UG/KG	51	0			6100	g
SVOC	Butylbenzylphthalate	UG/KG	51	4	486	220	13000000	g
SVOC	Carbazole	UG/KG	51	0			22000	g
SVOC	Chrysene	UG/KG	51	0			24000	g
SVOC	Di-n-butylphthalate	UG/KG	51	16	17826	1100	6500000	g
SVOC	Di-n-octylphthalate	UG/KG	51	0			1300000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	51	0			61	g
SVOC	Dibenzofuran	UG/KG	51	0			260000	g
SVOC	Diethylphthalate	UG/KG	51	2	871	220	52000000	g

Table 1-19

Summary of OU3 Analytical Data for South Burning Ground Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Dimethylphthalate	UG/KG	51	0			100000000	g
SVOC	Fluoranthene	UG/KG	51	0			2600000	g
SVOC	Fluorene	UG/KG	51	0			300000	g
SVOC	Hexachlorobenzene	UG/KG	51	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	51	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	51	0			450000	g
SVOC	Hexachloroethane	UG/KG	51	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	51	0			610	g
SVOC	Isophorone	UG/KG	51	0			470000	g
SVOC	N-Nitroso-di-n-propylamine	UG/KG	50	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	51	2	4633	290	91000	g
SVOC	Naphthalene	UG/KG	51	2	21	210	800000	g
SVOC	Nitrobenzene (NB)	UG/KG	51	0				
SVOC	Pentachlorophenol	UG/KG	51	0			2500	g
SVOC	Phenanthrene	UG/KG	51	0				
SVOC	Phenol	UG/KG	51	3	477	220	39000000	g
SVOC	Pyrene	UG/KG	51	1	89	210	2000000	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	51	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	51	0			74	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	51	0			32000	g
METALS	Aluminum	MG/KG	51	51	22500	15000	33852	h
METALS	Antimony	MG/KG	19	2	0.56	0.27	31	g
METALS	Arsenic	MG/KG	51	51	10.1	7.1	13.5	h
METALS	Barium	MG/KG	51	51	290	200	440	h
METALS	Beryllium	MG/KG	51	51	0.86	0.7	1.52	h
METALS	Cadmium	MG/KG	51	51	1.1	0.56	39	g
METALS	Calcium	MG/KG	51	51	11000	3700	GRAS	k
METALS	Chromium	MG/KG	51	51	24	16	37	h
METALS	Cobalt	MG/KG	51	51	10.9	9.4	17.2	h
METALS	Copper	MG/KG	51	51	22.5	17	33.9	h
METALS	Iron	MG/KG	51	51	22700	18000	GRAS	k
METALS	Lead	MG/KG	51	51	18	14	400	g
METALS	Magnesium	MG/KG	51	51	6180	3400	GRAS	k
METALS	Manganese	MG/KG	51	51	678	540	1083	h
METALS	Mercury	MG/KG	51	0			23	g
METALS	Nickel	MG/KG	51	51	28.7	21	39.3	h
METALS	Potassium	MG/KG	51	51	3840	2600	GRAS	k
METALS	Selenium	MG/KG	51	38	2.2	1.3	390	g
METALS	Silver	MG/KG	51	0			380	g
METALS	Sodium	MG/KG	51	8	251	180	GRAS	k
METALS	Thallium	MG/KG	51	2	1.4	0.71	1.72	h
METALS	Vanadium	MG/KG	51	51	52.7	33	72.5	h
METALS	Zinc	MG/KG	51	51	89.7	62	119.5	h
VOC	1,1,1-Trichloroethane	UG/KG	34	0			3000000	g

Table 1-19

Summary of OU3 Analytical Data for South Burning Ground Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	1,1,2,2-Tetrachloroethane	UG/KG	34	0			900	g
VOC	1,1,2-Trichloroethane	UG/KG	34	0			1400	g
VOC	1,1-Dichloroethane	UG/KG	34	0			840000	g
VOC	1,1-Dichloroethene	UG/KG	34	0			38	g
VOC	1,2-Dichloroethane	UG/KG	34	0			440	g
VOC	1,2-Dichloropropane	UG/KG	34	0			680	g
VOC	2-Butanone	UG/KG	34	0			8700000	g
VOC	2-Hexanone	UG/KG	34	0				
VOC	4-Methyl-2-Pentanone	UG/KG	34	0			5200000	g
VOC	Acetone	UG/KG	34	1	17	6.7	2000000	g
VOC	Benzene	UG/KG	34	0			1400	g
VOC	Bromodichloromethane	UG/KG	34	0			1400	g
VOC	Bromoform	UG/KG	34	0			56000	g
VOC	Bromomethane	UG/KG	34	0			15000	g
VOC	Carbon Disulfide	UG/KG	34	0			16000	g
VOC	Carbon Tetrachloride	UG/KG	34	0			470	g
VOC	Chlorobenzene	UG/KG	34	0			160000	g
VOC	Chloroethane	UG/KG	34	0			1100000	g
VOC	Chloroform	UG/KG	34	0			530	g
VOC	Chloromethane	UG/KG	34	0			2000	g
VOC	Dibromochloromethane	UG/KG	34	0			5300	g
VOC	Ethylbenzene	UG/KG	34	0			690000	g
VOC	M/P-Xylenes	UG/KG	34	0				
VOC	Methylene Chloride	UG/KG	34	0			11000	g
VOC	O-Xylene	UG/KG	34	0				
VOC	Styrene	UG/KG	34	0			2200000	g
VOC	Tetrachloroethene	UG/KG	34	0			7000	g
VOC	Toluene	UG/KG	34	0			1900000	g
VOC	Trichloroethene (TCE)	UG/KG	34	3	42	8.3	7100	g
VOC	Vinyl Chloride	UG/KG	33	0			5.2	g
VOC	cis-1,2-Dichloroethene	UG/KG	34	0			59000	g
VOC	cis-1,3-Dichloropropene	UG/KG	34	0			510	g
VOC	trans-1,2-Dichloroethene	UG/KG	34	0			170000	g
VOC	trans-1,3-Dichloropropene	UG/KG	34	0			510	g

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-20

Summary of OU3 Analytical Data for Proving Grounds Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene	MG/KG	90	3	30	0.39	1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	90	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	90	22	1500	20	17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	90	1	1.8	0.04	0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	90	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	90	21	14	0.21		
EXP	2-Nitrotoluene	MG/KG	90	1	0.22	0.07	343*	l
EXP	3-Nitrotoluene	MG/KG	90	0			343*	l
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	90	12	6.7	0.12		
EXP	4-Nitrotoluene	MG/KG	90	6	0.03	0.07	343*	l
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	90	14	43	0.56	5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	90	4	1.7	0.05	343	i
EXP	Nitrobenzene	MG/KG	90	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	90	8	10	0.17	1715.2	i
METALS	Aluminum	MG/KG	28	28	19300	11000	33852	h
METALS	Antimony	MG/KG	28	5	4.1	2.9	31	g
METALS	Arsenic	MG/KG	28	25	11	6.0	13.5	h
METALS	Barium	MG/KG	28	28	298	180	440	h
METALS	Beryllium	MG/KG	28	16	0.70	0.57	1.52	h
METALS	Cadmium	MG/KG	28	15	0.99	0.61	39	g
METALS	Calcium	MG/KG	28	28	34000	4800	GRAS	k
METALS	Chromium	MG/KG	28	27	19	12	37	h
METALS	Cobalt	MG/KG	28	26	12	7.7	17.2	h
METALS	Copper	MG/KG	28	27	26	17	33.9	h
METALS	Iron	MG/KG	28	28	22900	14000	GRAS	k
METALS	Lead	MG/KG	28	27	83.5	19	400	g
METALS	Magnesium	MG/KG	28	27	7000	3100	GRAS	k
METALS	Manganese	MG/KG	28	27	791	450	1083	h
METALS	Mercury	MG/KG	28	0			23	g
METALS	Nickel	MG/KG	28	25	34	18	39.3	h
METALS	Potassium	MG/KG	28	27	4210	2200	GRAS	k
METALS	Selenium	MG/KG	28	12	2.1	1.0	390	g
METALS	Silver	MG/KG	28	0			380	g
METALS	Sodium	MG/KG	28	11	373	190	GRAS	k
METALS	Thallium	MG/KG	28	1	1.3	0.73	1.72	h
METALS	Vanadium	MG/KG	28	27	42	23	72.5	h
METALS	Zinc	MG/KG	28	18	127	51	119.5	h
SVOC	1,2,4-Trichlorobenzene	UG/KG	28	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	28	0			2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	28	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	28	0			7400	g
SVOC	2,2'-oxybis(1-Chloropropane)	UG/KG	28	0				
SVOC	2,4,5-Trichlorophenol	UG/KG	28	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	28	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	28	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	28	0			1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	28	0			130000	g

Table 1-20

Summary of OU3 Analytical Data for Proving Grounds Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
SVOC	2,4-Dinitrotoluene	UG/KG	28	0			900	i
SVOC	2,6-Dinitrotoluene	UG/KG	28	0			900	i
SVOC	2-Chloronaphthalene	UG/KG	28	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	28	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	28	0				
SVOC	2-Methylphenol	UG/KG	28	0			3300000	g
SVOC	2-Nitroaniline	UG/KG	28	0			3900	g
SVOC	2-Nitrophenol	UG/KG	28	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	28	0			990	g
SVOC	3-Nitroaniline	UG/KG	28	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	28	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	28	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	28	1	93	200		
SVOC	4-Chloroaniline	UG/KG	28	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	28	0				
SVOC	4-Methylphenol	UG/KG	28	0			330000	g
SVOC	4-Nitroaniline	UG/KG	28	0			230000	g
SVOC	4-Nitrophenol	UG/KG	28	0			4800000	f
SVOC	Acenaphthene	UG/KG	28	0			360000	g
SVOC	Acenaphthylene	UG/KG	28	0				
SVOC	Anthracene	UG/KG	28	0			19000	g
SVOC	Benzo(a)anthracene	UG/KG	28	1	18	200	610	g
SVOC	Benzo(a)pyrene	UG/KG	28	1	18	200	61	g
SVOC	Benzo(b)fluoranthene	UG/KG	28	1	25	200	610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	28	1	26	200		
SVOC	Benzo(k)fluoranthene	UG/KG	28	1	8	190	6100	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	28	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	28	0			74	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	28	6	49	170	32000	g
SVOC	Butylbenzylphthalate	UG/KG	28	2	344	200	13000000	g
SVOC	Carbazole	UG/KG	28	0			22000	g
SVOC	Chrysene	UG/KG	28	1	16	200	24000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	28	0			61	g
SVOC	Dibenzofuran	UG/KG	28	0			260000	g
SVOC	Diethylphthalate	UG/KG	28	0			52000000	g
SVOC	Dimethylphthalate	UG/KG	28	0			100000000	g
SVOC	Di-n-butylphthalate	UG/KG	28	12	3542	700	6500000	g
SVOC	Di-n-octylphthalate	UG/KG	28	0			1300000	g
SVOC	Fluoranthene	UG/KG	28	1	13	190	2600000	g
SVOC	Fluorene	UG/KG	28	0			300000	g
SVOC	Hexachlorobenzene	UG/KG	28	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	28	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	28	0			450000	g
SVOC	Hexachloroethane	UG/KG	28	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	28	0			610	g
SVOC	Isophorone	UG/KG	28	0			470000	g
SVOC	Naphthalene	UG/KG	28	0			800000	g

Table 1-20

Summary of OU3 Analytical Data for Proving Grounds Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
SVOC	Nitrobenzene	UG/KG	28	0				i
SVOC	N-Nitroso-di-n-propylamine	UG/KG	28	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	28	0			91000	g
SVOC	Pentachlorophenol	UG/KG	28	1	14	470	2500	g
SVOC	Phenanthrene	UG/KG	28	0				
SVOC	Phenol	UG/KG	28	0			39000000	g
SVOC	Pyrene	UG/KG	28	4	243	190	2000000	g
VOC	1,1,1-Trichloroethane	UG/KG	18	0			3000000	g
VOC	1,1,2,2-Tetrachloroethane	UG/KG	18	0			900	g
VOC	1,1,2-Trichloroethane	UG/KG	18	0			1400	g
VOC	1,1-Dichloroethane	UG/KG	18	0			840000	g
VOC	1,1-Dichloroethene	UG/KG	18	0			38	g
VOC	1,2-Dichloroethane	UG/KG	18	0			440	g
VOC	1,2-Dichloroethene(Total)	UG/KG	8	0				
VOC	1,2-Dichloropropane	UG/KG	18	0			680	g
VOC	2-Butanone	UG/KG	18	0			8700000	g
VOC	2-Hexanone	UG/KG	18	1	1.0	5.7		
VOC	4-Methyl-2-Pentanone	UG/KG	18	0			5200000	g
VOC	Acetone	UG/KG	18	9	18	7.4	2000000	g
VOC	Benzene	UG/KG	18	0			1400	g
VOC	Bromodichloromethane	UG/KG	18	0			1400	g
VOC	Bromoform	UG/KG	18	0			56000	g
VOC	Bromomethane	UG/KG	18	0			15000	g
VOC	Carbon Disulfide	UG/KG	18	0			16000	g
VOC	Carbon Tetrachloride	UG/KG	18	0			470	g
VOC	Chlorobenzene	UG/KG	18	0			160000	g
VOC	Chloroethane	UG/KG	18	0			1100000	g
VOC	Chloroform	UG/KG	18	0			530	g
VOC	Chloromethane	UG/KG	18	0			2000	g
VOC	cis-1,2-Dichloroethene	UG/KG	10	0			59000	g
VOC	cis-1,3-Dichloropropene	UG/KG	18	0			510	g
VOC	Dibromochloromethane	UG/KG	18	0			5300	g
VOC	Ethylbenzene	UG/KG	18	0			690000	g
VOC	M/P-Xylenes	UG/KG	10	0				
VOC	Methylene Chloride	UG/KG	18	8	19	5.6	11000	g
VOC	O-Xylene	UG/KG	10	0				
VOC	Styrene	UG/KG	18	0			2200000	g
VOC	Tetrachloroethene	UG/KG	18	0			7000	g
VOC	Toluene	UG/KG	18	3	4	5	1900000	g
VOC	Total Xylenes	UG/KG	8	0			990000	g
VOC	trans-1,2-Dichloroethene	UG/KG	10	0			170000	g
VOC	trans-1,3-Dichloropropene	UG/KG	18	0			510	g
VOC	Trichloroethene	UG/KG	18	2	1	5	7100	g
VOC	Vinyl Chloride	UG/KG	18	0			5.2	g

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-21

Summary of OU3 Analytical Data for Proving Grounds June 1995
Groundwater Sampling of Newly Installed Monitoring Well
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
DMET	Aluminum	UG/L	1	1	66.6	67	37000	g
DMET	Antimony	UG/L	1	0			6	d
DMET	Arsenic	UG/L	1	0			50	d
DMET	Barium	UG/L	1	1	320	320	2000	d
DMET	Beryllium	UG/L	1	0			4	d
DMET	Cadmium	UG/L	1	0			5	d
DMET	Calcium	UG/L	1	1	51600	52000	GRAS	k
DMET	Chromium	UG/L	1	0			100	d
DMET	Cobalt	UG/L	1	0			2200	g
DMET	Copper	UG/L	1	1	1.1	1.1	1300	m
DMET	Iron	UG/L	1	0			GRAS	k
DMET	Lead	UG/L	1	0			15	m
DMET	Magnesium	UG/L	1	1	14100	14000	GRAS	k
DMET	Manganese	UG/L	1	1	54	54	180	g
DMET	Mercury	UG/L	1	0			2	d
DMET	Nickel	UG/L	1	1	5.1	5.1	100	d
DMET	Potassium	UG/L	1	1	8770	8800	GRAS	k
DMET	Selenium	UG/L	1	0			50	d
DMET	Silver	UG/L	1	0			100	b
DMET	Sodium	UG/L	1	1	22500	23000	GRAS	k
DMET	Thallium	UG/L	1	0			2	d
DMET	Vanadium	UG/L	1	0			260	g
DMET	Zinc	UG/L	1	1	5.5	5.5	2000	b
EXPL	1,3,5-Trinitrobenzene (1,3,5-TNB)	UG/L	2	0			0.778	j
EXPL	1,3-Dinitrobenzene (1,3-DNB)	UG/L	2	0			1	b
EXPL	2,4,6-Trinitrotoluene (2,4,6-TNT)	UG/L	2	0			2	j
EXPL	2,4-Dinitrotoluene (2,4-DNT)	UG/L	2	0			1.24	j
EXPL	2,6-Dinitrotoluene (2,6-DNT)	UG/L	2	0			0.05	c
EXPL	2-Amino-4,6-dinitrotoluene (2-Am-DNT)	UG/L	2	0				
EXPL	2-Nitrotoluene (2-NT)	UG/L	2	0			61	f
EXPL	3-Nitrotoluene (3-NT)	UG/L	2	0			370	g
EXPL	4-Amino-2,6-dinitrotoluene (4-Am-DNT)	UG/L	2	0				
EXPL	4-Nitrotoluene (4-NT)	UG/L	2	0			370	g
EXPL	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	UG/L	2	0			2	j
EXPL	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	UG/L	2	0			370	g
EXPL	Nitrobenzene (NB)	UG/L	2	0			18	g
EXPL	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	UG/L	2	0			400	j
SVOC	1,2,4-Trichlorobenzene	UG/L	1	0			70	d
SVOC	1,2-Dichlorobenzene	UG/L	1	0			600	d
SVOC	1,3-Dichlorobenzene	UG/L	1	0			600	d
SVOC	1,4-Dichlorobenzene	UG/L	1	0			75	d
SVOC	2,2'-Oxybis(1-chloropropane)	UG/L	1	0				
SVOC	2,4,5-Trichlorophenol	UG/L	1	0			63	a

Table 1-21

Summary of OU3 Analytical Data for Proving Grounds June 1995
Groundwater Sampling of Newly Installed Monitoring Well
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	2,4,6-Trichlorophenol	UG/L	1	0			3	c
SVOC	2,4-Dichlorophenol	UG/L	1	0			20	b
SVOC	2,4-Dimethylphenol	UG/L	1	0			730	g
SVOC	2,4-Dinitrophenol	UG/L	1	0			73	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/L	1	0			1.24	j
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/L	1	0			0.05	c
SVOC	2-Chloronaphthalene	UG/L	1	0			2900	g
SVOC	2-Chlorophenol	UG/L	1	0			40	b
SVOC	2-Methylnaphthalene	UG/L	1	0				
SVOC	2-Methylphenol	UG/L	1	0			1800	g
SVOC	2-Nitroaniline	UG/L	1	0			2.2	g
SVOC	2-Nitrophenol	UG/L	1	0				
SVOC	3,3'-Dichlorobenzidine	UG/L	1	0			0.15	g
SVOC	3-Nitroaniline	UG/L	1	0			110	f
SVOC	4,6-Dinitro-2-methylphenol	UG/L	1	0				
SVOC	4-Bromophenyl phenyl ether	UG/L	1	0			2100	f
SVOC	4-Chloro-3-methylphenol	UG/L	1	0				
SVOC	4-Chloroaniline	UG/L	1	0			150	g
SVOC	4-Chlorophenyl phenyl ether	UG/L	1	0				
SVOC	4-Methylphenol	UG/L	1	0			180	g
SVOC	4-Nitroaniline	UG/L	1	0			110	f
SVOC	4-Nitrophenol	UG/L	1	0			60	b
SVOC	Acenaphthene	UG/L	1	0			370	g
SVOC	Acenaphthylene	UG/L	1	0			520	a
SVOC	Anthracene	UG/L	1	0			1800	g
SVOC	Benzo(a)anthracene	UG/L	1	0			0.092	g
SVOC	Benzo(a)pyrene	UG/L	1	0			2	d
SVOC	Benzo(b)fluoranthene	UG/L	1	0			0.002	c
SVOC	Benzo(g,h,i)perylene	UG/L	1	0				
SVOC	Benzo(k)fluoranthene	UG/L	1	0			0.002	c
SVOC	Butyl benzyl phthalate	UG/L	1	0			7300	g
SVOC	Carbazole	UG/L	1	0			3.4	g
SVOC	Chrysene	UG/L	1	0			9.2	g
SVOC	Di-n-butyl phthalate	UG/L	1	0			3700	g
SVOC	Di-n-octyl phthalate	UG/L	1	0			730	g
SVOC	Dibenzo(a,h)anthracene	UG/L	1	0			0.0092	g
SVOC	Dibenzofuran	UG/L	1	0			150	g
SVOC	Diethyl phthalate	UG/L	1	0			5000	b
SVOC	Dimethyl phthalate	UG/L	1	0			370000	g
SVOC	Fluoranthene	UG/L	1	0			1500	g
SVOC	Fluorene	UG/L	1	0			240	g
SVOC	Hexachlorobenzene	UG/L	1	0			1	d
SVOC	Hexachlorobutadiene	UG/L	1	0			1	e

Table 1-21

Summary of OU3 Analytical Data for Proving Grounds June 1995
Groundwater Sampling of Newly Installed Monitoring Well
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Hexachlorocyclopentadiene	UG/L	1	0			50	d
SVOC	Hexachloroethane	UG/L	1	0			1	b
SVOC	Indeno(1,2,3-cd)pyrene	UG/L	1	0			0.092	g
SVOC	Isophorone	UG/L	1	0			40	c
SVOC	N-Nitroso-di-n-propylamine	UG/L	1	0			0.0096	g
SVOC	N-Nitrosodiphenylamine(1)	UG/L	1	0			14	g
SVOC	Naphthalene	UG/L	1	0			20	b
SVOC	Nitrobenzene (NB)	UG/L	1	0			18	g
SVOC	Pentachlorophenol	UG/L	1	0			1	d
SVOC	Phenanthrene	UG/L	1	0			6.3	a
SVOC	Phenol	UG/L	1	0			2560	a
SVOC	Pyrene	UG/L	1	0			1100	g
SVOC	bis(2-Chloroethoxy)methane	UG/L	1	0				
SVOC	bis(2-Chloroethyl)ether	UG/L	1	0			0.0098	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/L	1	1	2	2	6	d
TMET	Aluminum	UG/L	1	1	352	350	37000	g
TMET	Antimony	UG/L	1	1	2.8	2.8	6	d
TMET	Arsenic	UG/L	1	0			50	d
TMET	Barium	UG/L	1	1	238	240	2000	d
TMET	Beryllium	UG/L	1	0			4	d
TMET	Cadmium	UG/L	1	1	0.4	0.4	5	d
TMET	Calcium	UG/L	1	1	50300	50000	GRAS	k
TMET	Chromium	UG/L	1	0			100	d
TMET	Cobalt	UG/L	1	0			2200	g
TMET	Copper	UG/L	1	1	4.5	4.5	1300	m
TMET	Iron	UG/L	1	1	212	210	GRAS	k
TMET	Lead	UG/L	1	0			15	m
TMET	Magnesium	UG/L	1	1	13500	14000	GRAS	k
TMET	Manganese	UG/L	1	1	69.2	69	180	g
TMET	Mercury	UG/L	1	0			2	d
TMET	Nickel	UG/L	1	1	6.8	6.8	100	d
TMET	Potassium	UG/L	1	1	7350	7400	GRAS	k
TMET	Selenium	UG/L	1	0			50	d
TMET	Silver	UG/L	1	0			100	b
TMET	Sodium	UG/L	1	1	22000	22000	GRAS	k
TMET	Thallium	UG/L	1	0			2	d
TMET	Vanadium	UG/L	1	1	0.67	0.67	260	g
TMET	Zinc	UG/L	1	1	7.3	7.3	2000	b
VOC	1,1,1-Trichloroethane	UG/L	1	0			200	d
VOC	1,1,2,2-Tetrachloroethane	UG/L	1	0			0.055	g
VOC	1,1,2-Trichloroethane	UG/L	1	0			5	d
VOC	1,1-Dichloroethane	UG/L	1	0			810	g
VOC	1,1-Dichloroethene	UG/L	1	0			7	d

Table 1-21

Summary of OU3 Analytical Data for Proving Grounds June 1995 Groundwater Sampling of Newly Installed Monitoring Well Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	1,2-Dibromo-3-chloropropane (DBCP)	UG/L	1	0			0.2	d
VOC	1,2-Dibromoethane (Ethylene dibromide)	UG/L	1	0			0.05	d
VOC	1,2-Dichlorobenzene	UG/L	1	0			600	d
VOC	1,2-Dichloroethane	UG/L	1	0			5	d
VOC	1,2-Dichloropropane	UG/L	2	0			5	d
VOC	1,3-Dichlorobenzene	UG/L	1	0			600	d
VOC	1,4-Dichlorobenzene	UG/L	1	0			75	d
VOC	2-Butanone	UG/L	1	0			1900	g
VOC	2-Hexanone	UG/L	1	0				
VOC	4-Methyl-2-pentanone	UG/L	1	0			2900	g
VOC	Acetone	UG/L	1	1	10	10	610	g
VOC	Benzene	UG/L	1	0			5	d
VOC	Bromochloromethane	UG/L	1	0			90	b
VOC	Bromodichloromethane	UG/L	1	0				
VOC	Bromoform	UG/L	1	0				
VOC	Bromomethane	UG/L	1	0			10	b
VOC	Carbon disulfide	UG/L	1	0			21	g
VOC	Carbon tetrachloride	UG/L	1	0			5	d
VOC	Chlorobenzene	UG/L	1	0			100	d
VOC	Chloroethane	UG/L	1	0			710	g
VOC	Chloroform	UG/L	1	0				
VOC	Chloromethane	UG/L	1	0			3	b
VOC	Cis-1,2-Dichloroethene	UG/L	1	0			70	d
VOC	Cis-1,3-Dichloropropene	UG/L	1	0			0.2	c
VOC	Dibromochloromethane	UG/L	1	0				
VOC	Ethylbenzene	UG/L	1	0			700	d
VOC	Methylene chloride	UG/L	2	1	1	0.75	5	d
VOC	Styrene	UG/L	1	0			100	d
VOC	Tetrachloroethene	UG/L	1	0			5	d
VOC	Toluene	UG/L	1	0			1000	d
VOC	Trans-1,2-Dichloroethene	UG/L	1	0			100	d
VOC	Trans-1,3-Dichloropropene	UG/L	1	0			0.2	c
VOC	Trichloroethene (TCE)	UG/L	2	0			5	d
VOC	Vinyl chloride	UG/L	1	0			2	d
VOC	Xylenes (Total)	UG/L	1	0			10000	d

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-22

Summary of OU3 Analytical Data for Potential Landfill Area North of Proving Grounds Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
SVOC	1,2,4-Trichlorobenzene	UG/KG	16	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	16	0			2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	16	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	16	0			7400	g
SVOC	2,2'-oxybis(1-Chloropropane)	UG/KG	16	0				
SVOC	2,4,5-Trichlorophenol	UG/KG	16	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	16	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	16	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	16	0			1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	16	0			130000	g
SVOC	2,4-Dinitrotoluene	UG/KG	16	0			900	i
SVOC	2,6-Dinitrotoluene	UG/KG	16	0			900	i
SVOC	2-Chloronaphthalene	UG/KG	16	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	16	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	16	0				
SVOC	2-Methylphenol	UG/KG	16	0			3300000	g
SVOC	2-Nitroaniline	UG/KG	16	0			3900	g
SVOC	2-Nitrophenol	UG/KG	16	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	16	0			990	g
SVOC	3-Nitroaniline	UG/KG	16	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	16	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	16	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	16	0				
SVOC	4-Chloroaniline	UG/KG	16	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	16	0				
SVOC	4-Methylphenol	UG/KG	16	0			330000	g
SVOC	4-Nitroaniline	UG/KG	16	0			230000	g
SVOC	4-Nitrophenol	UG/KG	16	0			4800000	f
SVOC	Acenaphthene	UG/KG	16	0			360000	g
SVOC	Acenaphthylene	UG/KG	16	0				
SVOC	Anthracene	UG/KG	16	0			19000	g
SVOC	Benzo(a)anthracene	UG/KG	16	0			610	g
SVOC	Benzo(a)pyrene	UG/KG	16	0			61	g
SVOC	Benzo(b)fluoranthene	UG/KG	16	1	77	190	610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	16	0				
SVOC	Benzo(k)fluoranthene	UG/KG	16	0			6100	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	16	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	16	0			74	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	16	2	701	220	32000	g
SVOC	Butylbenzylphthalate	UG/KG	16	2	1204	300	13000000	g
SVOC	Carbazole	UG/KG	16	0			22000	g
SVOC	Chrysene	UG/KG	16	1	27	190	24000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	16	0			61	g
SVOC	Dibenzofuran	UG/KG	16	0			260000	g
SVOC	Diethylphthalate	UG/KG	16	1	72	190	52000000	g
SVOC	Dimethylphthalate	UG/KG	16	0			100000000	g

Table 1-22

Summary of OU3 Analytical Data for Potential Landfill Area North of Proving Grounds Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
SVOC	Di-n-butylphthalate	UG/KG	16	5	2823	860	6500000	g
SVOC	Di-n-octylphthalate	UG/KG	16	0			1300000	g
SVOC	Fluoranthene	UG/KG	16	0			2600000	g
SVOC	Fluorene	UG/KG	16	0			300000	g
SVOC	Hexachlorobenzene	UG/KG	16	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	16	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	16	0			450000	g
SVOC	Hexachloroethane	UG/KG	16	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	16	0			610	g
SVOC	Isophorone	UG/KG	16	0			470000	g
SVOC	Naphthalene	UG/KG	16	0			800000	g
SVOC	Nitrobenzene	UG/KG	16	0				i
SVOC	N-Nitroso-di-n-propylamine	UG/KG	16	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	16	0			91000	g
SVOC	Pentachlorophenol	UG/KG	16	0			2500	g
SVOC	Phenanthrene	UG/KG	16	0				
SVOC	Phenol	UG/KG	16	1	48	190	39000000	g
SVOC	Pyrene	UG/KG	16	1	89	190	2000000	g
EXP	1,3,5-Trinitrobenzene	MG/KG	158	30	52	0.64	1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	158	7	0.14	0.08	3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	158	71	4700	41	17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	158	8	0.81	0.09	0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	158	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	158	56	11	0.32		
EXP	2-Nitrotoluene	MG/KG	158	0			343*	i
EXP	3-Nitrotoluene	MG/KG	158	0			343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	158	46	5.6	0.30		
EXP	4-Nitrotoluene	MG/KG	158	0			343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	158	68	1400	11	5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	158	18	6600	50	343	i
EXP	Nitrobenzene	MG/KG	158	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	158	64	74	1.5	1715.2	i
METALS	Aluminum	MG/KG	30	30	17900	11900	33852	h
METALS	Antimony	MG/KG	30	9	81.8	7.2	31	g
METALS	Arsenic	MG/KG	30	18	10.5	5.6	13.5	h
METALS	Barium	MG/KG	30	30	353	204	440	h
METALS	Beryllium	MG/KG	30	16	0.82	0.54	1.52	h
METALS	Cadmium	MG/KG	30	15	1.4	0.66	39	g
METALS	Calcium	MG/KG	30	30	136000	9602	GRAS	k
METALS	Chromium	MG/KG	30	30	688	38	37	h
METALS	Cobalt	MG/KG	30	30	18.7	8.8	17.2	h
METALS	Copper	MG/KG	30	28	47.9	19	33.9	h
METALS	Iron	MG/KG	30	30	23800	16500	GRAS	k
METALS	Lead	MG/KG	30	28	2910	130	400	g
METALS	Magnesium	MG/KG	30	30	16700	3940	GRAS	k
METALS	Manganese	MG/KG	30	30	1130	520	1083	h

Table 1-22

Summary of OU3 Analytical Data for Potential Landfill Area North of Proving Grounds Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
METALS	Mercury	MG/KG	30	0			23	g
METALS	Nickel	MG/KG	30	30	37.3	21	39.3	h
METALS	Potassium	MG/KG	30	30	3380	2290	GRAS	k
METALS	Selenium	MG/KG	30	7	3.1	0.87	390	g
METALS	Silver	MG/KG	30	1	6	0.77	380	g
METALS	Sodium	MG/KG	30	13	311	175	GRAS	k
METALS	Thallium	MG/KG	30	1	1.4	0.75	1.72	h
METALS	Vanadium	MG/KG	30	30	42.5	27	72.5	h
METALS	Zinc	MG/KG	30	28	728	87	119.5	h
VOC	1,1,1-Trichloroethane	UG/KG	10	0			3000000	g
VOC	1,1,2,2-Tetrachloroethane	UG/KG	10	0			900	g
VOC	1,1,2-Trichloroethane	UG/KG	10	0			1400	g
VOC	1,1-Dichloroethane	UG/KG	10	0			840000	g
VOC	1,1-Dichloroethene	UG/KG	10	0			38	g
VOC	1,2-Dichloroethane	UG/KG	10	0			440	g
VOC	1,2-Dichloropropane	UG/KG	10	0			680	g
VOC	2-Butanone	UG/KG	10	0			8700000	g
VOC	2-Hexanone	UG/KG	10	0				
VOC	4-Methyl-2-Pentanone	UG/KG	10	0			5200000	g
VOC	Acetone	UG/KG	10	0			2000000	g
VOC	Benzene	UG/KG	10	0			1400	g
VOC	Bromodichloromethane	UG/KG	10	0			1400	g
VOC	Bromoform	UG/KG	10	0			56000	g
VOC	Bromomethane	UG/KG	10	0			15000	g
VOC	Carbon Disulfide	UG/KG	10	0			16000	g
VOC	Carbon Tetrachloride	UG/KG	10	0			470	g
VOC	Chlorobenzene	UG/KG	10	0			160000	g
VOC	Chloroethane	UG/KG	10	0			1100000	g
VOC	Chloroform	UG/KG	10	0			530	g
VOC	Chloromethane	UG/KG	10	0			2000	g
VOC	cis-1,2-Dichloroethene	UG/KG	10	0			59000	g
VOC	cis-1,3-Dichloropropene	UG/KG	10	0			510	g
VOC	Dibromochloromethane	UG/KG	10	0			5300	g
VOC	Ethylbenzene	UG/KG	10	0			690000	g
VOC	M/P-Xylenes	UG/KG	10	0				
VOC	Methylene Chloride	UG/KG	10	0			11000	g
VOC	O-Xylene	UG/KG	10	0				
VOC	Styrene	UG/KG	10	0			2200000	g
VOC	Tetrachloroethene	UG/KG	10	0			7000	g
VOC	Toluene	UG/KG	10	0			1900000	g
VOC	trans-1,2-Dichloroethene	UG/KG	10	0			170000	g
VOC	trans-1,3-Dichloropropene	UG/KG	10	0			510	g
VOC	Trichloroethene	UG/KG	10	0			7100	g
VOC	Vinyl Chloride	UG/KG	10	0			5.2	g

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-23

Summary of OU3 Analytical Data for Potential Waste Disposal Areas North of Former Nike Maintenance Area Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	1,2,4-Trichlorobenzene	UG/KG	42	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	42	0			2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	42	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	42	0			7400	g
SVOC	2,2'-oxybis(1-Chloropropane)	UG/KG	42	0				
SVOC	2,4,5-Trichlorophenol	UG/KG	42	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	42	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	42	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	42	0			1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	42	0			130000	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/KG	42	0			900	i
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/KG	42	0			900	i
SVOC	2-Chloronaphthalene	UG/KG	42	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	42	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	42	0				
SVOC	2-Methylphenol	UG/KG	42	0			3300000	g
SVOC	2-Nitroaniline	UG/KG	42	0			3900	g
SVOC	2-Nitrophenol	UG/KG	42	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	42	0			990	g
SVOC	3-Nitroaniline	UG/KG	42	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	42	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	42	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	42	0				
SVOC	4-Chloroaniline	UG/KG	42	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	42	0				
SVOC	4-Methylphenol	UG/KG	42	0			330000	g
SVOC	4-Nitroaniline	UG/KG	42	0			230000	g
SVOC	4-Nitrophenol	UG/KG	42	0			4800000	f
SVOC	Acenaphthene	UG/KG	42	0			360000	g
SVOC	Acenaphthylene	UG/KG	42	0				
SVOC	Anthracene	UG/KG	42	0			19000	g
SVOC	Benzo(a)anthracene	UG/KG	42	0			610	g
SVOC	Benzo(a)pyrene	UG/KG	42	0			61	g
SVOC	Benzo(b)fluoranthene	UG/KG	42	0			610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	42	0				
SVOC	Benzo(k)fluoranthene	UG/KG	42	0			6100	g
SVOC	Butylbenzylphthalate	UG/KG	42	3	740	210	13000000	g
SVOC	Carbazole	UG/KG	42	0			22000	g
SVOC	Chrysene	UG/KG	42	0			24000	g
SVOC	Di-n-butylphthalate	UG/KG	42	9	3593	760	6500000	g
SVOC	Di-n-octylphthalate	UG/KG	42	0			1300000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	42	0			61	g
SVOC	Dibenzofuran	UG/KG	42	0			260000	g
SVOC	Diethylphthalate	UG/KG	42	0			52000000	g

Table 1-23

Summary of OU3 Analytical Data for Potential Waste Disposal Areas North of Former Nike Maintenance Area Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Dimethylphthalate	UG/KG	42	0			100000000	g
SVOC	Fluoranthene	UG/KG	42	0			2600000	g
SVOC	Fluorene	UG/KG	42	0			300000	g
SVOC	Hexachlorobenzene	UG/KG	42	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	42	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	42	0			450000	g
SVOC	Hexachloroethane	UG/KG	42	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	42	0			610	g
SVOC	Isophorone	UG/KG	42	0			470000	g
SVOC	N-Nitroso-di-n-propylamine	UG/KG	42	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	42	0			91000	g
SVOC	Naphthalene	UG/KG	42	0			800000	g
SVOC	Nitrobenzene (NB)	UG/KG	42	0				
SVOC	Pentachlorophenol	UG/KG	42	0			2500	g
SVOC	Phenanthrene	UG/KG	42	0				
SVOC	Phenol	UG/KG	42	0			39000000	g
SVOC	Pyrene	UG/KG	42	3	164	190	2000000	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	42	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	42	0			74	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	42	0			32000	g
EXP	1,3,5-Trinitrobenzene	MG/KG	42	0			1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	42	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	42	0			17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	42	0			0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	42	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	42	0				
EXP	2-Nitrotoluene	MG/KG	42	0			343*	i
EXP	3-Nitrotoluene	MG/KG	42	0			343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	42	0				
EXP	4-Nitrotoluene	MG/KG	42	0			343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	42	2	0.46	0.38	5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	42	0			343	i
EXP	Nitrobenzene	MG/KG	42	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	42	11	0.94	0.25	1715.2	i
METALS	Aluminum	MG/KG	42	42	20400	8000	33852	h
METALS	Antimony	MG/KG	12	2	0.65	0.28	31	g
METALS	Arsenic	MG/KG	42	33	11.3	5.7	13.5	h
METALS	Barium	MG/KG	42	42	368	170	440	h
METALS	Beryllium	MG/KG	42	42	0.84	0.49	1.52	h
METALS	Cadmium	MG/KG	42	33	1.3	0.49	39	g
METALS	Calcium	MG/KG	42	42	11300	3600	GRAS	k
METALS	Chromium	MG/KG	42	42	21	10	37	h
METALS	Cobalt	MG/KG	42	42	15.8	7.4	17.2	h
METALS	Copper	MG/KG	42	41	23.5	14	33.9	h

Table 1-23

Summary of OU3 Analytical Data for Potential Waste Disposal Areas
North of Former Nike Maintenance Area Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
METALS	Iron	MG/KG	42	42	21700	12000	GRAS	k
METALS	Lead	MG/KG	42	42	20.3	12	400	g
METALS	Magnesium	MG/KG	42	42	4690	2600	GRAS	k
METALS	Manganese	MG/KG	42	42	785	440	1083	h
METALS	Mercury	MG/KG	42	0			23	g
METALS	Nickel	MG/KG	42	42	28	16	39.3	h
METALS	Potassium	MG/KG	42	42	3780	1700	GRAS	k
METALS	Selenium	MG/KG	42	23	2.1	1	390	g
METALS	Silver	MG/KG	42	0			380	g
METALS	Sodium	MG/KG	42	5	1090	240	GRAS	k
METALS	Thallium	MG/KG	42	0			1.72	h
METALS	Vanadium	MG/KG	42	42	39.9	19	72.5	h
METALS	Zinc	MG/KG	42	42	94.7	48	119.5	h
VOC	1,1,1-Trichloroethane	UG/KG	35	0			3000000	g
VOC	1,1,2,2-Tetrachloroethane	UG/KG	35	0			900	g
VOC	1,1,2-Trichloroethane	UG/KG	35	0			1400	g
VOC	1,1-Dichloroethane	UG/KG	35	0			840000	g
VOC	1,1-Dichloroethene	UG/KG	35	0			38	g
VOC	1,2-Dichloroethane	UG/KG	35	0			440	g
VOC	1,2-Dichloropropane	UG/KG	35	0			680	g
VOC	2-Butanone	UG/KG	35	0			8700000	g
VOC	2-Hexanone	UG/KG	35	0				
VOC	4-Methyl-2-Pentanone	UG/KG	35	0			5200000	g
VOC	Acetone	UG/KG	35	0			2000000	g
VOC	Benzene	UG/KG	35	0			1400	g
VOC	Bromodichloromethane	UG/KG	35	0			1400	g
VOC	Bromoform	UG/KG	35	0			56000	g
VOC	Bromomethane	UG/KG	35	0			15000	g
VOC	Carbon Disulfide	UG/KG	35	0			16000	g
VOC	Carbon Tetrachloride	UG/KG	35	0			470	g
VOC	Chlorobenzene	UG/KG	35	0			160000	g
VOC	Chloroethane	UG/KG	35	0			1100000	g
VOC	Chloroform	UG/KG	35	0			530	g
VOC	Chloromethane	UG/KG	35	0			2000	g
VOC	Dibromochloromethane	UG/KG	35	0			5300	g
VOC	Ethylbenzene	UG/KG	35	0			690000	g
VOC	M/P-Xylenes	UG/KG	35	1	1	5.9		
VOC	Methylene Chloride	UG/KG	35	0			11000	g
VOC	O-Xylene	UG/KG	35	0				
VOC	Styrene	UG/KG	35	0			2200000	g
VOC	Tetrachloroethene	UG/KG	35	0			7000	g
VOC	Toluene	UG/KG	35	0			1900000	g
VOC	Trichloroethene (TCE)	UG/KG	35	0			7100	g
VOC	Vinyl Chloride	UG/KG	35	0			5.2	g

Table 1-23

Summary of OU3 Analytical Data for Potential Waste Disposal Areas
North of Former Nike Maintenance Area Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	cis-1,2-Dichloroethene	UG/KG	35	0			59000	g
VOC	cis-1,3-Dichloropropene	UG/KG	35	0			510	g
VOC	trans-1,2-Dichloroethene	UG/KG	35	0			170000	g
VOC	trans-1,3-Dichloropropene	UG/KG	35	0			510	g

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-24

Summary of OU3 Analytical Data for Potential WDA North of Former Nike Maintenance Area Nov. 1994
Groundwater Sampling of Existing Monitoring Well
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
DMET	Aluminum	UG/L	2	2	96.1	85	37000	g
DMET	Antimony	UG/L	2	0			6	d
DMET	Arsenic	UG/L	2	1	5.9	3.8	50	d
DMET	Barium	UG/L	2	2	264	230	2000	d
DMET	Beryllium	UG/L	2	0			4	d
DMET	Cadmium	UG/L	2	0			5	d
DMET	Calcium	UG/L	2	2	86500	82000	GRAS	k
DMET	Chromium	UG/L	2	0			100	d
DMET	Cobalt	UG/L	2	2	1.2	1	2200	g
DMET	Copper	UG/L	2	1	1.3	0.85	1300	m
DMET	Iron	UG/L	2	0			GRAS	k
DMET	Lead	UG/L	2	0			15	m
DMET	Magnesium	UG/L	2	2	15100	14000	GRAS	k
DMET	Manganese	UG/L	2	2	180	180	180	g
DMET	Mercury	UG/L	2	0			2	d
DMET	Nickel	UG/L	2	1	2.1	1.4	100	d
DMET	Potassium	UG/L	2	2	17900	17000	GRAS	k
DMET	Selenium	UG/L	2	2	23.6	18	50	d
DMET	Silver	UG/L	2	0			100	b
DMET	Sodium	UG/L	2	2	22400	21000	GRAS	k
DMET	Thallium	UG/L	2	0			2	d
DMET	Vanadium	UG/L	2	2	2.2	1.8	260	g
DMET	Zinc	UG/L	2	2	1.3	1.2	2000	b
EXPL	1,3,5-Trinitrobenzene (1,3,5-TNB)	UG/L	2	0			0.778	j
EXPL	1,3-Dinitrobenzene (1,3-DNB)	UG/L	2	0			1	b
EXPL	2,4,6-Trinitrotoluene (2,4,6-TNT)	UG/L	2	0			2	j
EXPL	2,4-Dinitrotoluene (2,4-DNT)	UG/L	2	0			1.24	j
EXPL	2,6-Dinitrotoluene (2,6-DNT)	UG/L	2	0			0.05	c
EXPL	2-Amino-4,6-dinitrotoluene (2-Am-DNT)	UG/L	2	0				
EXPL	2-Nitrotoluene (2-NT)	UG/L	2	0			61	f
EXPL	3-Nitrotoluene (3-NT)	UG/L	2	0			370	g
EXPL	4-Amino-2,6-dinitrotoluene (4-Am-DNT)	UG/L	2	0				
EXPL	4-Nitrotoluene (4-NT)	UG/L	2	0			370	g
EXPL	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	UG/L	2	1	1.3	0.68	2	j
EXPL	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	UG/L	2	0			370	g
EXPL	Nitrobenzene (NB)	UG/L	2	0			18	g
EXPL	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	UG/L	2	1	0.12	0.085	400	j
SVOC	1,2,4-Trichlorobenzene	UG/L	2	0			70	d
SVOC	1,2-Dichlorobenzene	UG/L	2	0			600	d
SVOC	1,3-Dichlorobenzene	UG/L	2	0			600	d
SVOC	1,4-Dichlorobenzene	UG/L	2	0			75	d
SVOC	2,2'-Oxybis(1-chloropropane)	UG/L	2	0				
SVOC	2,4,5-Trichlorophenol	UG/L	2	0			63	a

Table 1-24

Summary of OU3 Analytical Data for Potential WDA North of Former Nike Maintenance Area Nov. 1994
Groundwater Sampling of Existing Monitoring Well
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	2,4,6-Trichlorophenol	UG/L	2	0			3	c
SVOC	2,4-Dichlorophenol	UG/L	2	0			20	b
SVOC	2,4-Dimethylphenol	UG/L	2	0			730	g
SVOC	2,4-Dinitrophenol	UG/L	2	0			73	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/L	2	0			1.24	j
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/L	2	0			0.05	c
SVOC	2-Chloronaphthalene	UG/L	2	0			2900	g
SVOC	2-Chlorophenol	UG/L	2	0			40	b
SVOC	2-Methylnaphthalene	UG/L	2	0				
SVOC	2-Methylphenol	UG/L	2	0			1800	g
SVOC	2-Nitroaniline	UG/L	2	0			2.2	g
SVOC	2-Nitrophenol	UG/L	2	0				
SVOC	3,3'-Dichlorobenzidine	UG/L	2	0			0.15	g
SVOC	3-Nitroaniline	UG/L	2	0			110	f
SVOC	4,6-Dinitro-2-methylphenol	UG/L	2	0				
SVOC	4-Bromophenyl phenyl ether	UG/L	2	0			2100	f
SVOC	4-Chloro-3-methylphenol	UG/L	2	0				
SVOC	4-Chloroaniline	UG/L	2	0			150	g
SVOC	4-Chlorophenyl phenyl ether	UG/L	2	0				
SVOC	4-Methylphenol	UG/L	2	0			180	g
SVOC	4-Nitroaniline	UG/L	2	0			110	f
SVOC	4-Nitrophenol	UG/L	2	0			60	b
SVOC	Acenaphthene	UG/L	2	0			370	g
SVOC	Acenaphthylene	UG/L	2	0			520	a
SVOC	Anthracene	UG/L	2	0			1800	g
SVOC	Benzo(a)anthracene	UG/L	2	0			0.092	g
SVOC	Benzo(a)pyrene	UG/L	2	0			2	d
SVOC	Benzo(b)fluoranthene	UG/L	2	0			0.002	c
SVOC	Benzo(g,h,i)perylene	UG/L	2	0				
SVOC	Benzo(k)fluoranthene	UG/L	2	0			0.002	c
SVOC	Butyl benzyl phthalate	UG/L	2	0			7300	g
SVOC	Carbazole	UG/L	2	0			3.4	g
SVOC	Chrysene	UG/L	2	0			9.2	g
SVOC	Di-n-butyl phthalate	UG/L	2	0			3700	g
SVOC	Di-n-octyl phthalate	UG/L	2	0			730	g
SVOC	Dibenzo(a,h)anthracene	UG/L	2	0			0.0092	g
SVOC	Dibenzofuran	UG/L	2	0			150	g
SVOC	Diethyl phthalate	UG/L	2	0			5000	b
SVOC	Dimethyl phthalate	UG/L	2	0			370000	g
SVOC	Fluoranthene	UG/L	2	0			1500	g
SVOC	Fluorene	UG/L	2	0			240	g
SVOC	Hexachlorobenzene	UG/L	2	0			1	d
SVOC	Hexachlorobutadiene	UG/L	2	0			1	e

Table 1-24

Summary of OU3 Analytical Data for Potential WDA North of Former Nike Maintenance Area Nov. 1994 Groundwater Sampling of Existing Monitoring Well Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Hexachlorocyclopentadiene	UG/L	2	0			50	d
SVOC	Hexachloroethane	UG/L	2	0			1	b
SVOC	Indeno(1,2,3-cd)pyrene	UG/L	2	0			0.092	g
SVOC	Isophorone	UG/L	2	0			40	c
SVOC	N-Nitroso-di-n-propylamine	UG/L	2	0			0.0096	g
SVOC	N-Nitrosodiphenylamine(1)	UG/L	2	0			14	g
SVOC	Naphthalene	UG/L	2	0			20	b
SVOC	Nitrobenzene (NB)	UG/L	2	0			18	g
SVOC	Pentachlorophenol	UG/L	2	0			1	d
SVOC	Phenanthrene	UG/L	2	0			6.3	a
SVOC	Phenol	UG/L	2	0			2560	a
SVOC	Pyrene	UG/L	2	0			1100	g
SVOC	bis(2-Chloroethoxy)methane	UG/L	2	0				
SVOC	bis(2-Chloroethyl)ether	UG/L	2	0			0.0098	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/L	2	0			6	d
TMET	Aluminum	UG/L	2	2	133	120	37000	g
TMET	Antimony	UG/L	2	0			6	d
TMET	Arsenic	UG/L	2	2	5.2	4.7	50	d
TMET	Barium	UG/L	2	2	253	220	2000	d
TMET	Beryllium	UG/L	2	0			4	d
TMET	Cadmium	UG/L	2	0			5	d
TMET	Calcium	UG/L	2	2	84800	83000	GRAS	k
TMET	Chromium	UG/L	2	0			100	d
TMET	Cobalt	UG/L	2	1	0.75	0.5	2200	g
TMET	Copper	UG/L	2	0			1300	m
TMET	Iron	UG/L	2	0			GRAS	k
TMET	Lead	UG/L	2	0			15	m
TMET	Magnesium	UG/L	2	2	15100	14000	GRAS	k
TMET	Manganese	UG/L	2	2	185	180	180	g
TMET	Mercury	UG/L	2	0			2	d
TMET	Nickel	UG/L	2	1	3.2	2	100	d
TMET	Potassium	UG/L	2	2	14800	14000	GRAS	k
TMET	Selenium	UG/L	2	1	10.4	6.3	50	d
TMET	Silver	UG/L	2	0			100	b
TMET	Sodium	UG/L	2	2	21000	19000	GRAS	k
TMET	Thallium	UG/L	2	0			2	d
TMET	Vanadium	UG/L	2	2	2.9	2	260	g
TMET	Zinc	UG/L	2	2	1.2	1.2	2000	b
VOC	1,1,1-Trichloroethane	UG/L	2	0			200	d
VOC	1,1,2,2-Tetrachloroethane	UG/L	2	0			0.055	g
VOC	1,1,2-Trichloroethane	UG/L	2	0			5	d
VOC	1,1-Dichloroethane	UG/L	2	0			810	g
VOC	1,1-Dichloroethene	UG/L	2	0			7	d

Table 1-24

Summary of OU3 Analytical Data for Potential WDA North of Former Nike Maintenance Area Nov. 1994 Groundwater Sampling of Existing Monitoring Well Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	1,2-Dibromo-3-chloropropane (DBCP)	UG/L	2	0			0.2	d
VOC	1,2-Dibromoethane (Ethylene dibromide)	UG/L	2	0			0.05	d
VOC	1,2-Dichlorobenzene	UG/L	2	0			600	d
VOC	1,2-Dichloroethane	UG/L	2	0			5	d
VOC	1,2-Dichloropropane	UG/L	2	0			5	d
VOC	1,3-Dichlorobenzene	UG/L	2	0			600	d
VOC	1,4-Dichlorobenzene	UG/L	2	0			75	d
VOC	2-Butanone	UG/L	2	0			1900	g
VOC	2-Hexanone	UG/L	2	0				
VOC	4-Methyl-2-pentanone	UG/L	2	0			2900	g
VOC	Acetone	UG/L	2	0			610	g
VOC	Benzene	UG/L	2	0			5	d
VOC	Bromochloromethane	UG/L	2	0			90	b
VOC	Bromodichloromethane	UG/L	2	0				
VOC	Bromoform	UG/L	2	0				
VOC	Bromomethane	UG/L	2	0			10	b
VOC	Carbon disulfide	UG/L	2	0			21	g
VOC	Carbon tetrachloride	UG/L	2	0			5	d
VOC	Chlorobenzene	UG/L	2	0			100	d
VOC	Chloroethane	UG/L	2	0			710	g
VOC	Chloroform	UG/L	2	0				
VOC	Chloromethane	UG/L	2	0			3	b
VOC	Cis-1,2-Dichloroethene	UG/L	2	0			70	d
VOC	Cis-1,3-Dichloropropene	UG/L	2	0			0.2	c
VOC	Dibromochloromethane	UG/L	2	0				
VOC	Ethylbenzene	UG/L	2	0			700	d
VOC	Methylene chloride	UG/L	2	2	3	1.9	5	d
VOC	Styrene	UG/L	2	0			100	d
VOC	Tetrachloroethene	UG/L	2	0			5	d
VOC	Toluene	UG/L	2	0			1000	d
VOC	Trans-1,2-Dichloroethene	UG/L	2	0			100	d
VOC	Trans-1,3-Dichloropropene	UG/L	2	0			0.2	c
VOC	Trichloroethene (TCE)	UG/L	2	0			5	d
VOC	Vinyl chloride	UG/L	2	0			2	d
VOC	Xylenes (Total)	UG/L	2	0			10000	d

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-25

Summary of OU3 Analytical Data for Potential WDA Southeast of Former Bomb Booster Area Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	1,2,4-Trichlorobenzene	UG/KG	36	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	36	0			2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	36	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	36	0			7400	g
SVOC	2,2'-oxybis(1-Chloropropane)	UG/KG	36	0				
SVOC	2,4,5-Trichlorophenol	UG/KG	36	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	36	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	36	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	36	1	63	200	1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	36	0			130000	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/KG	36	0			900	i
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/KG	36	0			900	i
SVOC	2-Chloronaphthalene	UG/KG	36	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	36	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	36	0				
SVOC	2-Methylphenol	UG/KG	36	1	111	200	3300000	g
SVOC	2-Nitroaniline	UG/KG	36	0			3900	g
SVOC	2-Nitrophenol	UG/KG	36	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	36	0			990	g
SVOC	3-Nitroaniline	UG/KG	36	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	36	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	36	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	36	0				
SVOC	4-Chloroaniline	UG/KG	36	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	36	0				
SVOC	4-Methylphenol	UG/KG	36	1	148	200	330000	g
SVOC	4-Nitroaniline	UG/KG	36	0			230000	g
SVOC	4-Nitrophenol	UG/KG	36	0			4800000	f
SVOC	Acenaphthene	UG/KG	36	0			360000	g
SVOC	Acenaphthylene	UG/KG	36	0				
SVOC	Anthracene	UG/KG	36	0			19000	g
SVOC	Benzo(a)anthracene	UG/KG	36	0			610	g
SVOC	Benzo(a)pyrene	UG/KG	36	0			61	g
SVOC	Benzo(b)fluoranthene	UG/KG	36	0			610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	36	0				
SVOC	Benzo(k)fluoranthene	UG/KG	36	0			6100	g
SVOC	Butylbenzylphthalate	UG/KG	36	3	401	200	13000000	g
SVOC	Carbazole	UG/KG	36	0			22000	g
SVOC	Chrysene	UG/KG	36	0			24000	g
SVOC	Di-n-butylphthalate	UG/KG	36	11	3089	910	6500000	g
SVOC	Di-n-octylphthalate	UG/KG	36	0			1300000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	36	0			61	g
SVOC	Dibenzofuran	UG/KG	36	0			260000	g
SVOC	Diethylphthalate	UG/KG	36	0			52000000	g

Table 1-25

Summary of OU3 Analytical Data for Potential WDA Southeast of Former Bomb Booster Area Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Dimethylphthalate	UG/KG	36	0			100000000	g
SVOC	Fluoranthene	UG/KG	36	0			2600000	g
SVOC	Fluorene	UG/KG	36	0			300000	g
SVOC	Hexachlorobenzene	UG/KG	36	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	36	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	36	0			450000	g
SVOC	Hexachloroethane	UG/KG	36	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	36	0			610	g
SVOC	Isophorone	UG/KG	36	0			470000	g
SVOC	N-Nitroso-di-n-propylamine	UG/KG	36	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	36	0			91000	g
SVOC	Naphthalene	UG/KG	36	0			800000	g
SVOC	Nitrobenzene (NB)	UG/KG	36	0				
SVOC	Pentachlorophenol	UG/KG	36	0			2500	g
SVOC	Phenanthrene	UG/KG	36	0				
SVOC	Phenol	UG/KG	36	3	139	190	39000000	g
SVOC	Pyrene	UG/KG	36	2	123	200	2000000	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	36	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	36	0			74	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	36	0			32000	g
EXP	1,3,5-Trinitrobenzene	MG/KG	36	0			1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	36	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	36	1	0.0014	0.24	17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	36	0			0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	36	1	0.0025	0.24	0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	36	2	0.0025	0.24		
EXP	2-Nitrotoluene	MG/KG	36	2	0.0024	0.35	343*	i
EXP	3-Nitrotoluene	MG/KG	36	0			343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	36	2	0.0019	0.47		
EXP	4-Nitrotoluene	MG/KG	36	2	0.0024	0.35	343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	36	0			5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	36	1	0.00026	0.37	343	i
EXP	Nitrobenzene	MG/KG	36	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	36	7	0.39	0.22	1715.2	i
METALS	Aluminum	MG/KG	36	36	20700	12000	33852	h
METALS	Antimony	MG/KG	21	1	0.54	0.24	31	g
METALS	Arsenic	MG/KG	36	32	9.8	6.1	13.5	h
METALS	Barium	MG/KG	36	36	360	200	440	h
METALS	Beryllium	MG/KG	36	36	0.96	0.59	1.52	h
METALS	Cadmium	MG/KG	36	31	1.4	0.56	39	g
METALS	Calcium	MG/KG	36	36	22400	4300	GRAS	k
METALS	Chromium	MG/KG	36	36	21.4	13	37	h
METALS	Cobalt	MG/KG	36	36	12.7	8.3	17.2	h
METALS	Copper	MG/KG	36	36	25.8	16	33.9	h

Table 1-25

Summary of OU3 Analytical Data for Potential WDA Southeast of Former Bomb Booster Area Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
METALS	Iron	MG/KG	36	36	22000	15000	GRAS	k
METALS	Lead	MG/KG	36	36	28	14	400	g
METALS	Magnesium	MG/KG	36	36	4900	3000	GRAS	k
METALS	Manganese	MG/KG	36	36	818	490	1083	h
METALS	Mercury	MG/KG	36	0			23	g
METALS	Nickel	MG/KG	36	36	30	18	39.3	h
METALS	Potassium	MG/KG	36	36	4790	2800	GRAS	k
METALS	Selenium	MG/KG	36	28	2.2	1.5	390	g
METALS	Silver	MG/KG	36	0			380	g
METALS	Sodium	MG/KG	36	0			GRAS	k
METALS	Thallium	MG/KG	36	0			1.72	h
METALS	Vanadium	MG/KG	36	36	48.4	25	72.5	h
METALS	Zinc	MG/KG	36	36	103	61	119.5	h
PCB	Aroclor-1016	UG/KG	36	0			15000*	I
PCB	Aroclor-1221	UG/KG	36	0			15000*	I
PCB	Aroclor-1232	UG/KG	36	0			15000*	I
PCB	Aroclor-1242	UG/KG	36	0			15000*	I
PCB	Aroclor-1248	UG/KG	36	0			15000*	I
PCB	Aroclor-1254	UG/KG	36	0			15000*	I
PCB	Aroclor-1260	UG/KG	36	2	1105.7	59	15000*	I
VOC	1,1,1-Trichloroethane	UG/KG	28	0			3000000	g
VOC	1,1,2,2-Tetrachloroethane	UG/KG	28	0			900	g
VOC	1,1,2-Trichloroethane	UG/KG	28	0			1400	g
VOC	1,1-Dichloroethane	UG/KG	28	0			840000	g
VOC	1,1-Dichloroethene	UG/KG	28	0			38	g
VOC	1,2-Dichloroethane	UG/KG	28	0			440	g
VOC	1,2-Dichloropropane	UG/KG	28	0			680	g
VOC	2-Butanone	UG/KG	28	0			8700000	g
VOC	2-Hexanone	UG/KG	28	0				
VOC	4-Methyl-2-Pentanone	UG/KG	28	0			5200000	g
VOC	Acetone	UG/KG	28	1	17	6.5	2000000	g
VOC	Benzene	UG/KG	28	0			1400	g
VOC	Bromodichloromethane	UG/KG	28	0			1400	g
VOC	Bromoform	UG/KG	28	0			56000	g
VOC	Bromomethane	UG/KG	28	0			15000	g
VOC	Carbon Disulfide	UG/KG	28	0			16000	g
VOC	Carbon Tetrachloride	UG/KG	28	0			470	g
VOC	Chlorobenzene	UG/KG	28	0			160000	g
VOC	Chloroethane	UG/KG	28	0			1100000	g
VOC	Chloroform	UG/KG	28	0			530	g
VOC	Chloromethane	UG/KG	28	0			2000	g
VOC	Dibromochloromethane	UG/KG	28	0			5300	g
VOC	Ethylbenzene	UG/KG	28	0			690000	g
VOC	M/P-Xylenes	UG/KG	28	0				

Table 1-25

Summary of OU3 Analytical Data for Potential WDA Southeast of Former Bomb Booster Area Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	Methylene Chloride	UG/KG	28	0			11000	g
VOC	O-Xylene	UG/KG	28	0				
VOC	Styrene	UG/KG	28	0			2200000	g
VOC	Tetrachloroethene	UG/KG	28	1	1	6	7000	g
VOC	Toluene	UG/KG	28	2	0.6	5.8	1900000	g
VOC	Trichloroethene (TCE)	UG/KG	28	1	2	6	7100	g
VOC	Vinyl Chloride	UG/KG	28	0			5.2	g
VOC	cis-1,2-Dichloroethene	UG/KG	28	0			59000	g
VOC	cis-1,3-Dichloropropene	UG/KG	28	0			510	g
VOC	trans-1,2-Dichloroethene	UG/KG	28	0			170000	g
VOC	trans-1,3-Dichloropropene	UG/KG	28	0			510	g

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-26

Summary of OU3 Analytical Data for Potential WDA SE of Former Bomb Booster Area Nov. 1994
Groundwater Sampling of Existing Monitoring Well
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
DMET	Aluminum	UG/L	1	1	105	110	37000	g
DMET	Antimony	UG/L	1	0			6	d
DMET	Arsenic	UG/L	1	1	5.9	5.9	50	d
DMET	Barium	UG/L	1	1	722	720	2000	d
DMET	Beryllium	UG/L	1	0			4	d
DMET	Cadmium	UG/L	1	0			5	d
DMET	Calcium	UG/L	1	1	81400	81000	GRAS	k
DMET	Chromium	UG/L	1	1	2.5	2.5	100	d
DMET	Cobalt	UG/L	1	0			2200	g
DMET	Copper	UG/L	1	0			1300	m
DMET	Iron	UG/L	1	0			GRAS	k
DMET	Lead	UG/L	1	0			15	m
DMET	Magnesium	UG/L	1	1	26000	26000	GRAS	k
DMET	Manganese	UG/L	1	0			180	g
DMET	Mercury	UG/L	1	0			2	d
DMET	Nickel	UG/L	1	1	1.9	1.9	100	d
DMET	Potassium	UG/L	1	1	17600	18000	GRAS	k
DMET	Selenium	UG/L	1	1	7.1	7.1	50	d
DMET	Silver	UG/L	1	0			100	b
DMET	Sodium	UG/L	1	1	16600	17000	GRAS	k
DMET	Thallium	UG/L	1	0			2	d
DMET	Vanadium	UG/L	1	1	1.7	1.7	260	g
DMET	Zinc	UG/L	1	1	1.9	1.9	2000	b
EXPL	1,3,5-Trinitrobenzene (1,3,5-TNB)	UG/L	1	0			0.778	j
EXPL	1,3-Dinitrobenzene (1,3-DNB)	UG/L	1	0			1	b
EXPL	2,4,6-Trinitrotoluene (2,4,6-TNT)	UG/L	1	0			2	j
EXPL	2,4-Dinitrotoluene (2,4-DNT)	UG/L	1	0			1.24	j
EXPL	2,6-Dinitrotoluene (2,6-DNT)	UG/L	1	0			0.05	c
EXPL	2-Amino-4,6-dinitrotoluene (2-Am-DNT)	UG/L	1	0				
EXPL	2-Nitrotoluene (2-NT)	UG/L	1	0			61	f
EXPL	3-Nitrotoluene (3-NT)	UG/L	1	0			370	g
EXPL	4-Amino-2,6-dinitrotoluene (4-Am-DNT)	UG/L	1	0				
EXPL	4-Nitrotoluene (4-NT)	UG/L	1	0			370	g
EXPL	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	UG/L	1	0			2	j
EXPL	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	UG/L	1	0			370	g
EXPL	Nitrobenzene (NB)	UG/L	1	0			18	g
EXPL	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	UG/L	1	0			400	j
PEST	4,4'-DDD	UG/L	1	0				
PEST	4,4'-DDE	UG/L	1	0				
PEST	4,4'-DDT	UG/L	1	0				
PEST	Aldrin	UG/L	1	0				
PEST	Alpha chlordane	UG/L	1	0				
PEST	Alpha-BHC	UG/L	1	0				

Table 1-26

Summary of OU3 Analytical Data for Potential WDA SE of Former Bomb Booster Area Nov. 1994
Groundwater Sampling of Existing Monitoring Well
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
PEST	Aroclor-1016	UG/L	1	0				I
PEST	Aroclor-1221	UG/L	1	0				I
PEST	Aroclor-1232	UG/L	1	0				I
PEST	Aroclor-1242	UG/L	1	0				I
PEST	Aroclor-1248	UG/L	1	0				I
PEST	Aroclor-1254	UG/L	1	0				I
PEST	Aroclor-1260	UG/L	1	0				I
PEST	Beta-BHC	UG/L	1	0				
PEST	Delta-BHC	UG/L	1	0				
PEST	Dieldrin	UG/L	1	0				
PEST	Endosulfan I	UG/L	1	0				
PEST	Endosulfan II	UG/L	1	0				
PEST	Endosulfan sulfate	UG/L	1	0				
PEST	Endrin	UG/L	1	0				
PEST	Endrin aldehyde	UG/L	1	0				
PEST	Endrin ketone	UG/L	1	0				
PEST	Gamma chlordane	UG/L	1	0				
PEST	Gamma-BHC (Lindane)	UG/L	1	0				
PEST	Heptachlor	UG/L	1	0				
PEST	Heptachlor epoxide	UG/L	1	0				
PEST	Toxaphene	UG/L	1	0				
PEST	p,p'-Methoxychlor	UG/L	1	0				
SVOC	1,2,4-Trichlorobenzene	UG/L	1	0			70	d
SVOC	1,2-Dichlorobenzene	UG/L	1	0			600	d
SVOC	1,3-Dichlorobenzene	UG/L	1	0			600	d
SVOC	1,4-Dichlorobenzene	UG/L	1	0			75	d
SVOC	2,2'-Oxybis(1-chloropropane)	UG/L	1	0				
SVOC	2,4,5-Trichlorophenol	UG/L	1	0			63	a
SVOC	2,4,6-Trichlorophenol	UG/L	1	0			3	c
SVOC	2,4-Dichlorophenol	UG/L	1	0			20	b
SVOC	2,4-Dimethylphenol	UG/L	1	0			730	g
SVOC	2,4-Dinitrophenol	UG/L	1	0			73	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/L	1	0			1.24	j
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/L	1	0			0.05	c
SVOC	2-Chloronaphthalene	UG/L	1	0			2900	g
SVOC	2-Chlorophenol	UG/L	1	0			40	b
SVOC	2-Methylnaphthalene	UG/L	1	0				
SVOC	2-Methylphenol	UG/L	1	0			1800	g
SVOC	2-Nitroaniline	UG/L	1	0			2.2	g
SVOC	2-Nitrophenol	UG/L	1	0				
SVOC	3,3'-Dichlorobenzidine	UG/L	1	0			0.15	g
SVOC	3-Nitroaniline	UG/L	1	0			110	f
SVOC	4,6-Dinitro-2-methylphenol	UG/L	1	0				

Table 1-26

Summary of OU3 Analytical Data for Potential WDA SE of Former Bomb Booster Area Nov. 1994 Groundwater Sampling of Existing Monitoring Well Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	4-Bromophenyl phenyl ether	UG/L	1	0			2100	f
SVOC	4-Chloro-3-methylphenol	UG/L	1	0				
SVOC	4-Chloroaniline	UG/L	1	0			150	g
SVOC	4-Chlorophenyl phenyl ether	UG/L	1	0				
SVOC	4-Methylphenol	UG/L	1	0			180	g
SVOC	4-Nitroaniline	UG/L	1	0			110	f
SVOC	4-Nitrophenol	UG/L	1	0			60	b
SVOC	Acenaphthene	UG/L	1	0			370	g
SVOC	Acenaphthylene	UG/L	1	0			520	a
SVOC	Anthracene	UG/L	1	0			1800	g
SVOC	Benzo(a)anthracene	UG/L	1	0			0.092	g
SVOC	Benzo(a)pyrene	UG/L	1	0			2	d
SVOC	Benzo(b)fluoranthene	UG/L	1	0			0.002	c
SVOC	Benzo(g,h,i)perylene	UG/L	1	0				
SVOC	Benzo(k)fluoranthene	UG/L	1	0			0.002	c
SVOC	Butyl benzyl phthalate	UG/L	1	0			7300	g
SVOC	Carbazole	UG/L	1	0			3.4	g
SVOC	Chrysene	UG/L	1	0			9.2	g
SVOC	Di-n-butyl phthalate	UG/L	1	0			3700	g
SVOC	Di-n-octyl phthalate	UG/L	1	0			730	g
SVOC	Dibenzo(a,h)anthracene	UG/L	1	0			0.0092	g
SVOC	Dibenzofuran	UG/L	1	0			150	g
SVOC	Diethyl phthalate	UG/L	1	0			5000	b
SVOC	Dimethyl phthalate	UG/L	1	0			370000	g
SVOC	Fluoranthene	UG/L	1	0			1500	g
SVOC	Fluorene	UG/L	1	0			240	g
SVOC	Hexachlorobenzene	UG/L	1	0			1	d
SVOC	Hexachlorobutadiene	UG/L	1	0			1	e
SVOC	Hexachlorocyclopentadiene	UG/L	1	0			50	d
SVOC	Hexachloroethane	UG/L	1	0			1	b
SVOC	Indeno(1,2,3-cd)pyrene	UG/L	1	0			0.092	g
SVOC	Isophorone	UG/L	1	0			40	c
SVOC	N-Nitroso-di-n-propylamine	UG/L	1	0			0.0096	g
SVOC	N-Nitrosodiphenylamine(1)	UG/L	1	0			14	g
SVOC	Naphthalene	UG/L	1	0			20	b
SVOC	Nitrobenzene (NB)	UG/L	1	0			18	g
SVOC	Pentachlorophenol	UG/L	1	0			1	d
SVOC	Phenanthrene	UG/L	1	0			6.3	a
SVOC	Phenol	UG/L	1	0			2560	a
SVOC	Pyrene	UG/L	1	0			1100	g
SVOC	bis(2-Chloroethoxy)methane	UG/L	1	0				
SVOC	bis(2-Chloroethyl)ether	UG/L	1	0			0.0098	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/L	1	0			6	d

Table 1-26

Summary of OU3 Analytical Data for Potential WDA SE of Former Bomb Booster Area Nov. 1994
Groundwater Sampling of Existing Monitoring Well
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
TMET	Aluminum	UG/L	1	1	157	160	37000	g
TMET	Antimony	UG/L	1	0			6	d
TMET	Arsenic	UG/L	1	1	3.6	3.6	50	d
TMET	Barium	UG/L	1	1	662	660	2000	d
TMET	Beryllium	UG/L	1	0			4	d
TMET	Cadmium	UG/L	1	0			5	d
TMET	Calcium	UG/L	1	1	81500	82000	GRAS	k
TMET	Chromium	UG/L	1	1	2.6	2.6	100	d
TMET	Cobalt	UG/L	1	0			2200	g
TMET	Copper	UG/L	1	0			1300	m
TMET	Iron	UG/L	1	0			GRAS	k
TMET	Lead	UG/L	1	0			15	m
TMET	Magnesium	UG/L	1	1	25200	25000	GRAS	k
TMET	Manganese	UG/L	1	1	0.82	0.82	180	g
TMET	Mercury	UG/L	1	0			2	d
TMET	Nickel	UG/L	1	1	1.6	1.6	100	d
TMET	Potassium	UG/L	1	1	14400	14000	GRAS	k
TMET	Selenium	UG/L	1	1	6.8	6.8	50	d
TMET	Silver	UG/L	1	0			100	b
TMET	Sodium	UG/L	1	1	15300	15000	GRAS	k
TMET	Thallium	UG/L	1	0			2	d
TMET	Vanadium	UG/L	1	1	2.4	2.4	260	g
TMET	Zinc	UG/L	1	1	0.67	0.67	2000	b
VOC	1,1,1-Trichloroethane	UG/L	1	0			200	d
VOC	1,1,2,2-Tetrachloroethane	UG/L	1	0			0.055	g
VOC	1,1,2-Trichloroethane	UG/L	1	0			5	d
VOC	1,1-Dichloroethane	UG/L	1	0			810	g
VOC	1,1-Dichloroethene	UG/L	1	0			7	d
VOC	1,2-Dibromo-3-chloropropane (DBCP)	UG/L	1	0			0.2	d
VOC	1,2-Dibromoethane (Ethylene dibromide)	UG/L	1	0			0.05	d
VOC	1,2-Dichlorobenzene	UG/L	1	0			600	d
VOC	1,2-Dichloroethane	UG/L	1	0			5	d
VOC	1,2-Dichloropropane	UG/L	1	0			5	d
VOC	1,3-Dichlorobenzene	UG/L	1	0			600	d
VOC	1,4-Dichlorobenzene	UG/L	1	0			75	d
VOC	2-Butanone	UG/L	1	0			1900	g
VOC	2-Hexanone	UG/L	1	0				
VOC	4-Methyl-2-pentanone	UG/L	1	0			2900	g
VOC	Acetone	UG/L	1	0			610	g
VOC	Benzene	UG/L	1	0			5	d
VOC	Bromochloromethane	UG/L	1	0			90	b
VOC	Bromodichloromethane	UG/L	1	0				
VOC	Bromoform	UG/L	1	0				

Table 1-26

Summary of OU3 Analytical Data for Potential WDA SE of Former Bomb Booster Area Nov. 1994
Groundwater Sampling of Existing Monitoring Well
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	Bromomethane	UG/L	1	0			10	b
VOC	Carbon disulfide	UG/L	1	0			21	g
VOC	Carbon tetrachloride	UG/L	1	0			5	d
VOC	Chlorobenzene	UG/L	1	0			100	d
VOC	Chloroethane	UG/L	1	0			710	g
VOC	Chloroform	UG/L	1	0				
VOC	Chloromethane	UG/L	1	0			3	b
VOC	Cis-1,2-Dichloroethene	UG/L	1	0			70	d
VOC	Cis-1,3-Dichloropropene	UG/L	1	0			0.2	c
VOC	Dibromochloromethane	UG/L	1	0				
VOC	Ethylbenzene	UG/L	1	0			700	d
VOC	Methylene chloride	UG/L	1	1	0.8	0.8	5	d
VOC	Styrene	UG/L	1	0			100	d
VOC	Tetrachloroethene	UG/L	1	0			5	d
VOC	Toluene	UG/L	1	0			1000	d
VOC	Trans-1,2-Dichloroethene	UG/L	1	0			100	d
VOC	Trans-1,3-Dichloropropene	UG/L	1	0			0.2	c
VOC	Trichloroethene (TCE)	UG/L	1	0			5	d
VOC	Vinyl chloride	UG/L	1	0			2	d
VOC	Xylenes (Total)	UG/L	1	0			10000	d

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-27

Summary of OU3 Analytical Data for Potential Waste Disposal Areas at Former Atlas Missile Area Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	1,2,4-Trichlorobenzene	UG/KG	31	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	31	0			2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	31	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	31	0			7400	g
SVOC	2,2'-oxybis(1-Chloropropane)	UG/KG	31	0				
SVOC	2,4,5-Trichlorophenol	UG/KG	31	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	31	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	31	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	31	0			1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	31	0			130000	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/KG	31	0			900	i
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/KG	31	0			900	i
SVOC	2-Chloronaphthalene	UG/KG	31	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	31	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	31	0				
SVOC	2-Methylphenol	UG/KG	31	0			3300000	g
SVOC	2-Nitroaniline	UG/KG	31	0			3900	g
SVOC	2-Nitrophenol	UG/KG	31	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	31	0			990	g
SVOC	3-Nitroaniline	UG/KG	31	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	31	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	31	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	31	0				
SVOC	4-Chloroaniline	UG/KG	31	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	31	0				
SVOC	4-Methylphenol	UG/KG	31	0			330000	g
SVOC	4-Nitroaniline	UG/KG	31	0			230000	g
SVOC	4-Nitrophenol	UG/KG	31	0			4800000	f
SVOC	Acenaphthene	UG/KG	31	0			360000	g
SVOC	Acenaphthylene	UG/KG	31	0				
SVOC	Anthracene	UG/KG	31	0			19000	g
SVOC	Benzo(a)anthracene	UG/KG	31	0			610	g
SVOC	Benzo(a)pyrene	UG/KG	31	0			61	g
SVOC	Benzo(b)fluoranthene	UG/KG	31	0			610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	31	0				
SVOC	Benzo(k)fluoranthene	UG/KG	31	0			6100	g
SVOC	Butylbenzylphthalate	UG/KG	31	6	403	200	13000000	g
SVOC	Carbazole	UG/KG	31	0			22000	g
SVOC	Chrysene	UG/KG	31	0			24000	g
SVOC	Di-n-butylphthalate	UG/KG	31	12	4247	1300	6500000	g
SVOC	Di-n-octylphthalate	UG/KG	31	0			1300000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	31	0			61	g
SVOC	Dibenzofuran	UG/KG	31	0			260000	g
SVOC	Diethylphthalate	UG/KG	31	4	161	180	52000000	g

Table 1-27

Summary of OU3 Analytical Data for Potential Waste Disposal Areas at Former Atlas Missile Area Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Dimethylphthalate	UG/KG	31	0			100000000	g
SVOC	Fluoranthene	UG/KG	31	0			2600000	g
SVOC	Fluorene	UG/KG	31	0			300000	g
SVOC	Hexachlorobenzene	UG/KG	31	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	31	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	31	0			450000	g
SVOC	Hexachloroethane	UG/KG	31	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	31	0			610	g
SVOC	Isophorone	UG/KG	31	0			470000	g
SVOC	N-Nitroso-di-n-propylamine	UG/KG	31	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	31	0			91000	g
SVOC	Naphthalene	UG/KG	31	0			800000	g
SVOC	Nitrobenzene (NB)	UG/KG	31	0				
SVOC	Pentachlorophenol	UG/KG	31	0			2500	g
SVOC	Phenanthrene	UG/KG	31	0				
SVOC	Phenol	UG/KG	31	0			39000000	g
SVOC	Pyrene	UG/KG	31	3	154	190	2000000	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	31	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	31	0			74	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	31	2	2108	270	32000	g
EXP	1,3,5-Trinitrobenzene	MG/KG	31	0			1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	31	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	31	1	0.063	0.24	17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	31	0			0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	31	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	31	1	0.057	0.24		
EXP	2-Nitrotoluene	MG/KG	31	0			343*	i
EXP	3-Nitrotoluene	MG/KG	31	0			343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	31	0				
EXP	4-Nitrotoluene	MG/KG	31	0			343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	31	0			5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	31	3	0.098	0.35	343	i
EXP	Nitrobenzene	MG/KG	31	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	31	16	0.14	0.15	1715.2	i
METALS	Aluminum	MG/KG	31	31	25600	11000	33852	h
METALS	Antimony	MG/KG	18	2	0.67	0.39	31	g
METALS	Arsenic	MG/KG	31	23	10	5.3	13.5	h
METALS	Barium	MG/KG	31	31	341	170	440	h
METALS	Beryllium	MG/KG	31	31	1	0.54	1.52	h
METALS	Cadmium	MG/KG	31	23	1.1	0.43	39	g
METALS	Calcium	MG/KG	31	31	6980	3000	GRAS	k
METALS	Chromium	MG/KG	31	31	27.2	13	37	h
METALS	Cobalt	MG/KG	31	31	14.3	7.4	17.2	h
METALS	Copper	MG/KG	31	31	25.1	13	33.9	h

Table 1-27

Summary of OU3 Analytical Data for Potential Waste Disposal Areas at Former Atlas Missile Area Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
METALS	Iron	MG/KG	31	31	24800	14000	GRAS	k
METALS	Lead	MG/KG	31	31	17.6	11	400	g
METALS	Magnesium	MG/KG	31	31	5210	2800	GRAS	k
METALS	Manganese	MG/KG	31	31	1150	430	1083	h
METALS	Mercury	MG/KG	31	0			23	g
METALS	Nickel	MG/KG	31	31	37.6	17	39.3	h
METALS	Potassium	MG/KG	31	31	4290	2000	GRAS	k
METALS	Selenium	MG/KG	31	19	2.6	1.2	390	g
METALS	Silver	MG/KG	31	0			380	g
METALS	Sodium	MG/KG	31	4	176	150	GRAS	k
METALS	Thallium	MG/KG	31	0			1.72	h
METALS	Vanadium	MG/KG	31	31	59.5	25	72.5	h
METALS	Zinc	MG/KG	31	31	90.6	50	119.5	h
VOC	1,1,1-Trichloroethane	UG/KG	23	0			3000000	g
VOC	1,1,2,2-Tetrachloroethane	UG/KG	23	0			900	g
VOC	1,1,2-Trichloroethane	UG/KG	23	0			1400	g
VOC	1,1-Dichloroethane	UG/KG	23	0			840000	g
VOC	1,1-Dichloroethene	UG/KG	23	0			38	g
VOC	1,2-Dichloroethane	UG/KG	23	0			440	g
VOC	1,2-Dichloropropane	UG/KG	23	0			680	g
VOC	2-Butanone	UG/KG	23	0			8700000	g
VOC	2-Hexanone	UG/KG	23	0				
VOC	4-Methyl-2-Pentanone	UG/KG	23	0			5200000	g
VOC	Acetone	UG/KG	23	0			2000000	g
VOC	Benzene	UG/KG	23	0			1400	g
VOC	Bromodichloromethane	UG/KG	23	0			1400	g
VOC	Bromoform	UG/KG	23	0			56000	g
VOC	Bromomethane	UG/KG	23	0			15000	g
VOC	Carbon Disulfide	UG/KG	23	0			16000	g
VOC	Carbon Tetrachloride	UG/KG	23	0			470	g
VOC	Chlorobenzene	UG/KG	23	0			160000	g
VOC	Chloroethane	UG/KG	23	0			1100000	g
VOC	Chloroform	UG/KG	23	0			530	g
VOC	Chloromethane	UG/KG	23	0			2000	g
VOC	Dibromochloromethane	UG/KG	23	0			5300	g
VOC	Ethylbenzene	UG/KG	23	0			690000	g
VOC	M/P-Xylenes	UG/KG	23	0				
VOC	Methylene Chloride	UG/KG	23	0			11000	g
VOC	O-Xylene	UG/KG	23	0				
VOC	Styrene	UG/KG	23	0			2200000	g
VOC	Tetrachloroethene	UG/KG	23	0			7000	g
VOC	Toluene	UG/KG	23	0			1900000	g
VOC	Trichloroethene (TCE)	UG/KG	23	0			7100	g
VOC	Vinyl Chloride	UG/KG	23	0			5.2	g

Table 1-27

Summary of OU3 Analytical Data for Potential Waste Disposal Areas at Former Atlas Missile Area Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	cis-1,2-Dichloroethene	UG/KG	23	0			59000	g
VOC	cis-1,3-Dichloropropene	UG/KG	23	0			510	g
VOC	trans-1,2-Dichloroethene	UG/KG	23	0			170000	g
VOC	trans-1,3-Dichloropropene	UG/KG	23	0			510	g

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-28

Summary of OU3 Analytical Data for Potential WDAs at Former Atlas Missile Area Nov. 1994 Groundwater Sampling of Existing Monitoring Well Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
DMET	Aluminum	UG/L	5	5	159	120	37000	g
DMET	Antimony	UG/L	5	0			6	d
DMET	Arsenic	UG/L	5	5	23.8	10	50	d
DMET	Barium	UG/L	5	5	813	250	2000	d
DMET	Beryllium	UG/L	5	0			4	d
DMET	Cadmium	UG/L	5	0			5	d
DMET	Calcium	UG/L	5	5	91500	78000	GRAS	k
DMET	Chromium	UG/L	5	0			100	d
DMET	Cobalt	UG/L	5	0			2200	g
DMET	Copper	UG/L	5	0			1300	m
DMET	Iron	UG/L	5	1	1020	210	GRAS	k
DMET	Lead	UG/L	5	0			15	m
DMET	Magnesium	UG/L	5	5	20500	17000	GRAS	k
DMET	Manganese	UG/L	5	4	989	330	180	g
DMET	Mercury	UG/L	5	0			2	d
DMET	Nickel	UG/L	5	3	6.3	2.1	100	d
DMET	Potassium	UG/L	5	5	16600	14000	GRAS	k
DMET	Selenium	UG/L	5	5	19.8	14	50	d
DMET	Silver	UG/L	5	0			100	b
DMET	Sodium	UG/L	5	5	38700	27000	GRAS	k
DMET	Thallium	UG/L	5	0			2	d
DMET	Vanadium	UG/L	5	4	5.6	3	260	g
DMET	Zinc	UG/L	5	5	1.4	0.85	2000	b
EXPL	1,3,5-Trinitrobenzene (1,3,5-TNB)	UG/L	5	0			0.778	j
EXPL	1,3-Dinitrobenzene (1,3-DNB)	UG/L	5	0			1	b
EXPL	2,4,6-Trinitrotoluene (2,4,6-TNT)	UG/L	5	0			2	j
EXPL	2,4-Dinitrotoluene (2,4-DNT)	UG/L	5	0			1.24	j
EXPL	2,6-Dinitrotoluene (2,6-DNT)	UG/L	5	0			0.05	c
EXPL	2-Amino-4,6-dinitrotoluene (2-Am-DNT)	UG/L	5	0				
EXPL	2-Nitrotoluene (2-NT)	UG/L	5	0			61	f
EXPL	3-Nitrotoluene (3-NT)	UG/L	5	0			370	g
EXPL	4-Amino-2,6-dinitrotoluene (4-Am-DNT)	UG/L	5	0				
EXPL	4-Nitrotoluene (4-NT)	UG/L	5	0			370	g
EXPL	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	UG/L	5	0			2	j
EXPL	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	UG/L	5	0			370	g
EXPL	Nitrobenzene (NB)	UG/L	5	0			18	g
EXPL	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	UG/L	5	0			400	j
SVOC	1,2,4-Trichlorobenzene	UG/L	5	0			70	d
SVOC	1,2-Dichlorobenzene	UG/L	5	0			600	d
SVOC	1,3-Dichlorobenzene	UG/L	5	0			600	d
SVOC	1,4-Dichlorobenzene	UG/L	5	0			75	d
SVOC	2,2'-Oxybis(1-chloropropane)	UG/L	5	0				
SVOC	2,4,5-Trichlorophenol	UG/L	5	0			3700	g

Table 1-28

Summary of OU3 Analytical Data for Potential WDAs at Former Atlas Missile Area Nov. 1994 Groundwater Sampling of Existing Monitoring Well Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	2,4,6-Trichlorophenol	UG/L	5	0			3	c
SVOC	2,4-Dichlorophenol	UG/L	5	0			20	b
SVOC	2,4-Dimethylphenol	UG/L	5	0			730	g
SVOC	2,4-Dinitrophenol	UG/L	5	0			73	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/L	5	0			1.24	j
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/L	5	0			0.05	c
SVOC	2-Chloronaphthalene	UG/L	5	0			2900	g
SVOC	2-Chlorophenol	UG/L	5	0			40	b
SVOC	2-Methylnaphthalene	UG/L	5	0				
SVOC	2-Methylphenol	UG/L	5	0			1800	g
SVOC	2-Nitroaniline	UG/L	5	0			2.2	g
SVOC	2-Nitrophenol	UG/L	5	0				
SVOC	3,3'-Dichlorobenzidine	UG/L	5	0			0.15	g
SVOC	3-Nitroaniline	UG/L	5	0			110	f
SVOC	4,6-Dinitro-2-methylphenol	UG/L	5	0				
SVOC	4-Bromophenyl phenyl ether	UG/L	5	0			2100	f
SVOC	4-Chloro-3-methylphenol	UG/L	5	0				
SVOC	4-Chloroaniline	UG/L	5	0			150	g
SVOC	4-Chlorophenyl phenyl ether	UG/L	5	0				
SVOC	4-Methylphenol	UG/L	5	0			180	g
SVOC	4-Nitroaniline	UG/L	5	0			110	f
SVOC	4-Nitrophenol	UG/L	5	0			60	b
SVOC	Acenaphthene	UG/L	5	0			370	g
SVOC	Acenaphthylene	UG/L	5	0				
SVOC	Anthracene	UG/L	5	0			1800	g
SVOC	Benzo(a)anthracene	UG/L	5	0			0.092	g
SVOC	Benzo(a)pyrene	UG/L	5	0			2	d
SVOC	Benzo(b)fluoranthene	UG/L	5	0			0.002	c
SVOC	Benzo(g,h,i)perylene	UG/L	5	0				
SVOC	Benzo(k)fluoranthene	UG/L	5	0			0.002	c
SVOC	Butyl benzyl phthalate	UG/L	5	0			7300	g
SVOC	Carbazole	UG/L	5	0			3.4	g
SVOC	Chrysene	UG/L	5	0			9.2	g
SVOC	Di-n-butyl phthalate	UG/L	5	0			3700	g
SVOC	Di-n-octyl phthalate	UG/L	5	0			730	g
SVOC	Dibenzo(a,h)anthracene	UG/L	5	0			0.0092	g
SVOC	Dibenzofuran	UG/L	5	0			150	g
SVOC	Diethyl phthalate	UG/L	5	0			5000	b
SVOC	Dimethyl phthalate	UG/L	5	0			370000	g
SVOC	Fluoranthene	UG/L	5	0			1500	g
SVOC	Fluorene	UG/L	5	0			240	g
SVOC	Hexachlorobenzene	UG/L	5	0			1	d
SVOC	Hexachlorobutadiene	UG/L	5	0			1	e

Table 1-28

Summary of OU3 Analytical Data for Potential WDAs at Former Atlas Missile Area Nov. 1994
Groundwater Sampling of Existing Monitoring Well
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Hexachlorocyclopentadiene	UG/L	5	0			50	d
SVOC	Hexachloroethane	UG/L	5	0			1	b
SVOC	Indeno(1,2,3-cd)pyrene	UG/L	5	0			0.092	g
SVOC	Isophorone	UG/L	5	0			40	c
SVOC	N-Nitroso-di-n-propylamine	UG/L	5	0			0.0096	g
SVOC	N-Nitrosodiphenylamine(1)	UG/L	5	0			14	g
SVOC	Naphthalene	UG/L	5	0			20	b
SVOC	Nitrobenzene (NB)	UG/L	5	0			18	g
SVOC	Pentachlorophenol	UG/L	5	0			1	d
SVOC	Phenanthrene	UG/L	5	0				
SVOC	Phenol	UG/L	5	0			4000	b
SVOC	Pyrene	UG/L	5	0			1100	g
SVOC	bis(2-Chloroethoxy)methane	UG/L	5	0				
SVOC	bis(2-Chloroethyl)ether	UG/L	5	0			0.0098	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/L	5	2	4	4.2	6	d
TMET	Aluminum	UG/L	5	5	320	180	37000	g
TMET	Antimony	UG/L	5	0			6	d
TMET	Arsenic	UG/L	5	4	23.3	8.4	50	d
TMET	Barium	UG/L	5	5	749	240	2000	d
TMET	Beryllium	UG/L	5	0			4	d
TMET	Cadmium	UG/L	5	0			5	d
TMET	Calcium	UG/L	5	5	96800	76000	GRAS	k
TMET	Chromium	UG/L	5	0			100	d
TMET	Cobalt	UG/L	5	0			2200	g
TMET	Copper	UG/L	5	0			1300	m
TMET	Iron	UG/L	5	4	1110	300	GRAS	k
TMET	Lead	UG/L	5	0			15	m
TMET	Magnesium	UG/L	5	5	19800	16000	GRAS	k
TMET	Manganese	UG/L	5	5	931	320	180	g
TMET	Mercury	UG/L	5	0			2	d
TMET	Nickel	UG/L	5	0			100	d
TMET	Potassium	UG/L	5	5	14800	12000	GRAS	k
TMET	Selenium	UG/L	5	1	12	3.7	50	d
TMET	Silver	UG/L	5	0			100	b
TMET	Sodium	UG/L	5	5	39000	27000	GRAS	k
TMET	Thallium	UG/L	5	0			2	d
TMET	Vanadium	UG/L	5	4	6.2	3.7	260	g
TMET	Zinc	UG/L	5	4	30.4	14	2000	b
VOC	1,1,1-Trichloroethane	UG/L	5	0			200	d
VOC	1,1,2,2-Tetrachloroethane	UG/L	5	0			0.055	g
VOC	1,1,2-Trichloroethane	UG/L	5	0			5	d
VOC	1,1-Dichloroethane	UG/L	5	0			810	g
VOC	1,1-Dichloroethene	UG/L	5	0			7	d

Table 1-28

Summary of OU3 Analytical Data for Potential WDAs at Former Atlas Missile Area Nov. 1994 Groundwater Sampling of Existing Monitoring Well Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	1,2-Dibromo-3-chloropropane (DBCP)	UG/L	4	0			0.2	d
VOC	1,2-Dibromoethane (Ethylene dibromide)	UG/L	4	0			0.05	d
VOC	1,2-Dichlorobenzene	UG/L	4	0			600	d
VOC	1,2-Dichloroethane	UG/L	5	0			5	d
VOC	1,2-Dichloroethene(Total)	UG/L	1	0			55	g
VOC	1,2-Dichloropropane	UG/L	5	0			5	d
VOC	1,3-Dichlorobenzene	UG/L	4	0			600	d
VOC	1,4-Dichlorobenzene	UG/L	4	0			75	d
VOC	2-Butanone	UG/L	5	0			1900	g
VOC	2-Hexanone	UG/L	5	0				
VOC	4-Methyl-2-pentanone	UG/L	5	0			2900	g
VOC	Acetone	UG/L	5	0			610	g
VOC	Benzene	UG/L	5	0			5	d
VOC	Bromochloromethane	UG/L	4	0			90	b
VOC	Bromodichloromethane	UG/L	5	0			100*	d
VOC	Bromoform	UG/L	5	0			100*	d
VOC	Bromomethane	UG/L	5	0			10	b
VOC	Carbon disulfide	UG/L	5	0			21	g
VOC	Carbon tetrachloride	UG/L	5	0			5	d
VOC	Chlorobenzene	UG/L	5	0			100	d
VOC	Chloroethane	UG/L	5	0			710	g
VOC	Chloroform	UG/L	5	0			100*	d
VOC	Chloromethane	UG/L	5	0			3	b
VOC	Cis-1,2-Dichloroethene	UG/L	4	0			70	d
VOC	Cis-1,3-Dichloropropene	UG/L	5	0			0.2	c
VOC	Dibromochloromethane	UG/L	5	0			100*	d
VOC	Ethylbenzene	UG/L	5	0			700	d
VOC	Methylene chloride	UG/L	5	3	4	1.5	5	d
VOC	Styrene	UG/L	5	0			100	d
VOC	Tetrachloroethene	UG/L	5	0			5	d
VOC	Toluene	UG/L	5	0			1000	d
VOC	Trans-1,2-Dichloroethene	UG/L	4	0			100	d
VOC	Trans-1,3-Dichloropropene	UG/L	5	0			0.2	c
VOC	Trichloroethene (TCE)	UG/L	5	1	57	12	5	d
VOC	Vinyl chloride	UG/L	5	0			2	d
VOC	Xylenes (Total)	UG/L	5	0			10000*	d

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-29

Summary of OU3 Analytical Data for Potential Waste Disposal Area North of the Former Ammonium Nitrate Plant Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	1,2,4-Trichlorobenzene	UG/KG	12	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	12	0			2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	12	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	12	0			7400	g
SVOC	2,2'-oxybis(1-Chloropropane)	UG/KG	12	0				
SVOC	2,4,5-Trichlorophenol	UG/KG	12	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	12	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	12	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	12	0			1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	12	0			130000	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/KG	12	0			900	i
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/KG	12	0			900	i
SVOC	2-Chloronaphthalene	UG/KG	12	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	12	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	12	0				
SVOC	2-Methylphenol	UG/KG	12	0			3300000	g
SVOC	2-Nitroaniline	UG/KG	12	0			3900	g
SVOC	2-Nitrophenol	UG/KG	12	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	12	0			990	g
SVOC	3-Nitroaniline	UG/KG	12	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	12	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	12	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	12	0				
SVOC	4-Chloroaniline	UG/KG	12	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	12	0				
SVOC	4-Methylphenol	UG/KG	12	0			330000	g
SVOC	4-Nitroaniline	UG/KG	12	0			230000	g
SVOC	4-Nitrophenol	UG/KG	12	0			4800000	f
SVOC	Acenaphthene	UG/KG	12	0			360000	g
SVOC	Acenaphthylene	UG/KG	12	0				
SVOC	Anthracene	UG/KG	12	0			19000	g
SVOC	Benzo(a)anthracene	UG/KG	12	0			610	g
SVOC	Benzo(a)pyrene	UG/KG	12	0			61	g
SVOC	Benzo(b)fluoranthene	UG/KG	12	0			610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	12	0				
SVOC	Benzo(k)fluoranthene	UG/KG	12	0			6100	g
SVOC	Butylbenzylphthalate	UG/KG	12	1	229	210	13000000	g
SVOC	Carbazole	UG/KG	12	0			22000	g
SVOC	Chrysene	UG/KG	12	0			24000	g
SVOC	Di-n-butylphthalate	UG/KG	12	1	2330	390	6500000	g
SVOC	Di-n-octylphthalate	UG/KG	12	0			1300000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	12	0			61	g
SVOC	Dibenzofuran	UG/KG	12	0			260000	g
SVOC	Diethylphthalate	UG/KG	12	1	527	230	52000000	g

Table 1-29

Summary of OU3 Analytical Data for Potential Waste Disposal Area North of the Former Ammonium Nitrate Plant Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Dimethylphthalate	UG/KG	12	0			100000000	g
SVOC	Fluoranthene	UG/KG	12	0			2600000	g
SVOC	Fluorene	UG/KG	12	0			300000	g
SVOC	Hexachlorobenzene	UG/KG	12	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	12	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	12	0			450000	g
SVOC	Hexachloroethane	UG/KG	12	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	12	0			610	g
SVOC	Isophorone	UG/KG	12	0			470000	g
SVOC	N-Nitroso-di-n-propylamine	UG/KG	12	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	12	0			91000	g
SVOC	Naphthalene	UG/KG	12	0			800000	g
SVOC	Nitrobenzene (NB)	UG/KG	12	0				
SVOC	Pentachlorophenol	UG/KG	12	0			2500	g
SVOC	Phenanthrene	UG/KG	12	0				
SVOC	Phenol	UG/KG	12	0			39000000	g
SVOC	Pyrene	UG/KG	12	1	105	200	2000000	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	12	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	12	0			74	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	12	0			32000	g
EXP	1,3,5-Trinitrobenzene	MG/KG	12	0			1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	12	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	12	0			17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	12	0			0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	12	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	12	0				
EXP	2-Nitrotoluene	MG/KG	12	0			343*	i
EXP	3-Nitrotoluene	MG/KG	12	0			343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	12	0				
EXP	4-Nitrotoluene	MG/KG	12	0			343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	12	0			5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	12	0			343	i
EXP	Nitrobenzene	MG/KG	12	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	12	1	0.1	0.24	1715.2	i
METALS	Aluminum	MG/KG	12	12	18000	11000	33852	h
METALS	Antimony	MG/KG	9	0			31	g
METALS	Arsenic	MG/KG	12	10	10.1	5	13.5	h
METALS	Barium	MG/KG	12	12	303	200	440	h
METALS	Beryllium	MG/KG	12	12	0.81	0.54	1.52	h
METALS	Cadmium	MG/KG	12	10	1.2	0.67	39	g
METALS	Calcium	MG/KG	12	12	16500	4000	GRAS	k
METALS	Chromium	MG/KG	12	12	20.5	13	37	h
METALS	Cobalt	MG/KG	12	12	12.1	7.2	17.2	h
METALS	Copper	MG/KG	12	12	23.6	16	33.9	h

Table 1-29

Summary of OU3 Analytical Data for Potential Waste Disposal Area North of the Former Ammonium Nitrate Plant Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
METALS	Iron	MG/KG	12	12	20100	14000	GRAS	k
METALS	Lead	MG/KG	12	12	30.2	13	400	g
METALS	Magnesium	MG/KG	12	12	9150	3200	GRAS	k
METALS	Manganese	MG/KG	12	12	708	340	1083	h
METALS	Mercury	MG/KG	12	0			23	g
METALS	Nickel	MG/KG	12	12	30.2	16	39.3	h
METALS	Potassium	MG/KG	12	12	4200	2400	GRAS	k
METALS	Selenium	MG/KG	12	3	1.3	0.7	390	g
METALS	Silver	MG/KG	12	0			380	g
METALS	Sodium	MG/KG	12	0			GRAS	k
METALS	Thallium	MG/KG	12	0			1.72	h
METALS	Vanadium	MG/KG	12	12	43.8	25	72.5	h
METALS	Zinc	MG/KG	12	12	87.4	55	119.5	h
VOC	1,1,1-Trichloroethane	UG/KG	10	0			3000000	g
VOC	1,1,2,2-Tetrachloroethane	UG/KG	10	0			900	g
VOC	1,1,2-Trichloroethane	UG/KG	10	0			1400	g
VOC	1,1-Dichloroethane	UG/KG	10	0			840000	g
VOC	1,1-Dichloroethene	UG/KG	10	0			38	g
VOC	1,2-Dichloroethane	UG/KG	10	0			440	g
VOC	1,2-Dichloropropane	UG/KG	10	0			680	g
VOC	2-Butanone	UG/KG	10	0			8700000	g
VOC	2-Hexanone	UG/KG	10	0				
VOC	4-Methyl-2-Pentanone	UG/KG	10	0			5200000	g
VOC	Acetone	UG/KG	10	0			2000000	g
VOC	Benzene	UG/KG	10	0			1400	g
VOC	Bromodichloromethane	UG/KG	10	0			1400	g
VOC	Bromoform	UG/KG	10	0			56000	g
VOC	Bromomethane	UG/KG	10	0			15000	g
VOC	Carbon Disulfide	UG/KG	10	0			16000	g
VOC	Carbon Tetrachloride	UG/KG	10	0			470	g
VOC	Chlorobenzene	UG/KG	10	0			160000	g
VOC	Chloroethane	UG/KG	10	0			1100000	g
VOC	Chloroform	UG/KG	10	0			530	g
VOC	Chloromethane	UG/KG	10	0			2000	g
VOC	Dibromochloromethane	UG/KG	10	0			5300	g
VOC	Ethylbenzene	UG/KG	10	0			690000	g
VOC	M/P-Xylenes	UG/KG	10	0				
VOC	Methylene Chloride	UG/KG	10	0			11000	g
VOC	O-Xylene	UG/KG	10	0				
VOC	Styrene	UG/KG	10	0			2200000	g
VOC	Tetrachloroethene	UG/KG	10	0			7000	g
VOC	Toluene	UG/KG	10	0			1900000	g
VOC	Trichloroethene (TCE)	UG/KG	10	0			7100	g
VOC	Vinyl Chloride	UG/KG	10	0			5.2	g

Table 1-29

Summary of OU3 Analytical Data for Potential Waste Disposal Area North of the Former Ammonium Nitrate Plant Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	cis-1,2-Dichloroethene	UG/KG	10	0			59000	g
VOC	cis-1,3-Dichloropropene	UG/KG	10	0			510	g
VOC	trans-1,2-Dichloroethene	UG/KG	10	0			170000	g
VOC	trans-1,3-Dichloropropene	UG/KG	10	0			510	g

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-30

Summary of OU3 Analytical Data for Demolition Ground Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	1,2,4-Trichlorobenzene	UG/KG	20	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	20	0			2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	20	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	20	0			7400	g
SVOC	2,2'-oxybis(1-Chloropropane)	UG/KG	20	0				
SVOC	2,4,5-Trichlorophenol	UG/KG	20	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	20	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	20	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	20	0			1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	20	0			130000	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/KG	20	0			900	i
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/KG	20	0			900	i
SVOC	2-Chloronaphthalene	UG/KG	20	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	20	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	20	0				
SVOC	2-Methylphenol	UG/KG	20	0			3300000	g
SVOC	2-Nitroaniline	UG/KG	20	0			3900	g
SVOC	2-Nitrophenol	UG/KG	20	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	20	0			990	g
SVOC	3-Nitroaniline	UG/KG	20	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	20	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	20	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	20	0				
SVOC	4-Chloroaniline	UG/KG	20	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	20	0				
SVOC	4-Methylphenol	UG/KG	20	0			330000	g
SVOC	4-Nitroaniline	UG/KG	20	0			230000	g
SVOC	4-Nitrophenol	UG/KG	20	0			4800000	f
SVOC	Acenaphthene	UG/KG	20	0			360000	g
SVOC	Acenaphthylene	UG/KG	20	0				
SVOC	Anthracene	UG/KG	20	0			19000	g
SVOC	Benzo(a)anthracene	UG/KG	20	0			610	g
SVOC	Benzo(a)pyrene	UG/KG	20	0			61	g
SVOC	Benzo(b)fluoranthene	UG/KG	20	0			610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	20	0				
SVOC	Benzo(k)fluoranthene	UG/KG	20	0			6100	g
SVOC	Butylbenzylphthalate	UG/KG	20	1	337	210	13000000	g
SVOC	Carbazole	UG/KG	20	0			22000	g
SVOC	Chrysene	UG/KG	20	0			24000	g
SVOC	Di-n-butylphthalate	UG/KG	20	6	2706	570	6500000	g
SVOC	Di-n-octylphthalate	UG/KG	20	0			1300000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	20	0			61	g
SVOC	Dibenzofuran	UG/KG	20	0			260000	g
SVOC	Diethylphthalate	UG/KG	20	0			52000000	g

Table 1-30

Summary of OU3 Analytical Data for Demolition Ground Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Dimethylphthalate	UG/KG	20	0			100000000	g
SVOC	Fluoranthene	UG/KG	20	0			2600000	g
SVOC	Fluorene	UG/KG	20	0			300000	g
SVOC	Hexachlorobenzene	UG/KG	20	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	20	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	20	0			450000	g
SVOC	Hexachloroethane	UG/KG	20	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	20	0			610	g
SVOC	Isophorone	UG/KG	20	0			470000	g
SVOC	N-Nitroso-di-n-propylamine	UG/KG	20	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	20	0			91000	g
SVOC	Naphthalene	UG/KG	20	0			800000	g
SVOC	Nitrobenzene (NB)	UG/KG	20	0				
SVOC	Pentachlorophenol	UG/KG	20	0			2500	g
SVOC	Phenanthrene	UG/KG	20	0				
SVOC	Phenol	UG/KG	20	0			39000000	g
SVOC	Pyrene	UG/KG	20	1	153	200	2000000	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	20	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	20	0			74	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	20	0			32000	g
EXP	1,3,5-Trinitrobenzene	MG/KG	20	0			1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	20	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	20	0			17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	20	0			0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	20	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	20	0				
EXP	2-Nitrotoluene	MG/KG	20	0			343*	i
EXP	3-Nitrotoluene	MG/KG	20	0			343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	20	0				
EXP	4-Nitrotoluene	MG/KG	20	0			343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	20	0			5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	20	0			343	i
EXP	Nitrobenzene	MG/KG	20	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	20	2	0.066	0.23	1715.2	i
METALS	Aluminum	MG/KG	19	19	18100	9200	33852	h
METALS	Antimony	MG/KG	2	0			31	g
METALS	Arsenic	MG/KG	20	16	9.4	6.5	13.5	h
METALS	Barium	MG/KG	20	20	434	200	440	h
METALS	Beryllium	MG/KG	20	20	0.76	0.53	1.52	h
METALS	Cadmium	MG/KG	20	16	0.82	0.4	39	g
METALS	Calcium	MG/KG	20	20	4230	2900	GRAS	k
METALS	Chromium	MG/KG	20	20	18.5	12	37	h
METALS	Cobalt	MG/KG	20	20	11.4	7.6	17.2	h
METALS	Copper	MG/KG	20	20	21.3	15	33.9	h

Table 1-30

Summary of OU3 Analytical Data for Demolition Ground Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
METALS	Iron	MG/KG	20	20	19900	14000	GRAS	k
METALS	Lead	MG/KG	20	20	15.6	11	400	g
METALS	Magnesium	MG/KG	20	20	3970	2800	GRAS	k
METALS	Manganese	MG/KG	20	20	889	470	1083	h
METALS	Mercury	MG/KG	20	1	0.13	0.062	23	g
METALS	Nickel	MG/KG	20	20	30.1	18	39.3	h
METALS	Potassium	MG/KG	20	20	4460	2200	GRAS	k
METALS	Selenium	MG/KG	20	7	1.8	0.8	390	g
METALS	Silver	MG/KG	20	0			380	g
METALS	Sodium	MG/KG	20	1	750	190	GRAS	k
METALS	Thallium	MG/KG	20	0			1.72	h
METALS	Vanadium	MG/KG	20	20	40.1	23	72.5	h
METALS	Zinc	MG/KG	20	20	68.4	51	119.5	h
VOC	1,1,1-Trichloroethane	UG/KG	16	0			3000000	g
VOC	1,1,2,2-Tetrachloroethane	UG/KG	16	0			900	g
VOC	1,1,2-Trichloroethane	UG/KG	16	0			1400	g
VOC	1,1-Dichloroethane	UG/KG	16	0			840000	g
VOC	1,1-Dichloroethene	UG/KG	16	0			38	g
VOC	1,2-Dichloroethane	UG/KG	16	0			440	g
VOC	1,2-Dichloropropane	UG/KG	16	0			680	g
VOC	2-Butanone	UG/KG	16	0			8700000	g
VOC	2-Hexanone	UG/KG	16	0				
VOC	4-Methyl-2-Pentanone	UG/KG	16	0			5200000	g
VOC	Acetone	UG/KG	16	0			2000000	g
VOC	Benzene	UG/KG	16	0			1400	g
VOC	Bromodichloromethane	UG/KG	16	0			1400	g
VOC	Bromoform	UG/KG	16	0			56000	g
VOC	Bromomethane	UG/KG	16	0			15000	g
VOC	Carbon Disulfide	UG/KG	16	0			16000	g
VOC	Carbon Tetrachloride	UG/KG	16	0			470	g
VOC	Chlorobenzene	UG/KG	16	0			160000	g
VOC	Chloroethane	UG/KG	16	0			1100000	g
VOC	Chloroform	UG/KG	16	0			530	g
VOC	Chloromethane	UG/KG	16	0			2000	g
VOC	Dibromochloromethane	UG/KG	16	0			5300	g
VOC	Ethylbenzene	UG/KG	16	0			690000	g
VOC	M/P-Xylenes	UG/KG	16	0				
VOC	Methylene Chloride	UG/KG	16	0			11000	g
VOC	O-Xylene	UG/KG	16	0				
VOC	Styrene	UG/KG	16	0			2200000	g
VOC	Tetrachloroethene	UG/KG	16	0			7000	g
VOC	Toluene	UG/KG	16	2	0.6	5.3	1900000	g
VOC	Trichloroethene (TCE)	UG/KG	16	1	2	5.8	7100	g
VOC	Vinyl Chloride	UG/KG	16	0			5.2	g

Table 1-30

Summary of OU3 Analytical Data for Demolition Ground Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	cis-1,2-Dichloroethene	UG/KG	16	0			59000	g
VOC	cis-1,3-Dichloropropene	UG/KG	16	0			510	g
VOC	trans-1,2-Dichloroethene	UG/KG	16	0			170000	g
VOC	trans-1,3-Dichloropropene	UG/KG	16	0			510	g

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-31

Summary of OU3 Analytical Data for Demolition Ground November 1994
Groundwater Sampling of Existing Monitoring Wells
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
DMET	Aluminum	UG/L	2	2	130	130	37000	g
DMET	Antimony	UG/L	2	0			6	d
DMET	Arsenic	UG/L	2	2	5.4	5	50	d
DMET	Barium	UG/L	2	2	182	180	2000	d
DMET	Beryllium	UG/L	2	0			4	d
DMET	Cadmium	UG/L	2	0			5	d
DMET	Calcium	UG/L	2	2	48800	38000	GRAS	k
DMET	Chromium	UG/L	2	0			100	d
DMET	Cobalt	UG/L	2	0			2200	g
DMET	Copper	UG/L	2	0			1300	m
DMET	Iron	UG/L	2	0			GRAS	k
DMET	Lead	UG/L	2	0			15	m
DMET	Magnesium	UG/L	2	2	9080	8200	GRAS	k
DMET	Manganese	UG/L	2	1	10.3	5.2	180	g
DMET	Mercury	UG/L	2	0			2	d
DMET	Nickel	UG/L	2	2	1.9	1.4	100	d
DMET	Potassium	UG/L	2	2	11000	11000	GRAS	k
DMET	Selenium	UG/L	2	2	14.1	11	50	d
DMET	Silver	UG/L	2	0			100	b
DMET	Sodium	UG/L	2	2	17300	15000	GRAS	k
DMET	Thallium	UG/L	2	0			2	d
DMET	Vanadium	UG/L	2	2	2.3	2.3	260	g
DMET	Zinc	UG/L	2	1	0.26	0.18	2000	b
EXPL	1,3,5-Trinitrobenzene (1,3,5-TNB)	UG/L	2	0			0.778	j
EXPL	1,3-Dinitrobenzene (1,3-DNB)	UG/L	2	0			1	b
EXPL	2,4,6-Trinitrotoluene (2,4,6-TNT)	UG/L	2	1	0.32	0.19	2	j
EXPL	2,4-Dinitrotoluene (2,4-DNT)	UG/L	2	0			1.24	j
EXPL	2,6-Dinitrotoluene (2,6-DNT)	UG/L	2	0			0.05	c
EXPL	2-Amino-4,6-dinitrotoluene (2-Am-DNT)	UG/L	2	2	0.43	0.3		
EXPL	2-Nitrotoluene (2-NT)	UG/L	2	0			61	f
EXPL	3-Nitrotoluene (3-NT)	UG/L	2	0			370	g
EXPL	4-Amino-2,6-dinitrotoluene (4-Am-DNT)	UG/L	2	0				
EXPL	4-Nitrotoluene (4-NT)	UG/L	2	0			370	g
EXPL	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	UG/L	2	2	0.24	0.22	2	j
EXPL	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	UG/L	2	0			370	g
EXPL	Nitrobenzene (NB)	UG/L	2	0			18	g
EXPL	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	UG/L	2	0			400	j
SVOC	1,2,4-Trichlorobenzene	UG/L	2	0			70	d
SVOC	1,2-Dichlorobenzene	UG/L	2	0			600	d
SVOC	1,3-Dichlorobenzene	UG/L	2	0			600	d
SVOC	1,4-Dichlorobenzene	UG/L	2	0			75	d
SVOC	2,2'-Oxybis(1-chloropropane)	UG/L	2	0				
SVOC	2,4,5-Trichlorophenol	UG/L	2	0			3700	g

Table 1-31

Summary of OU3 Analytical Data for Demolition Ground November 1994
Groundwater Sampling of Existing Monitoring Wells
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	2,4,6-Trichlorophenol	UG/L	2	0			3	c
SVOC	2,4-Dichlorophenol	UG/L	2	0			20	b
SVOC	2,4-Dimethylphenol	UG/L	2	0			730	g
SVOC	2,4-Dinitrophenol	UG/L	2	0			73	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/L	2	0			1.24	j
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/L	2	0			0.05	c
SVOC	2-Chloronaphthalene	UG/L	2	0			2900	g
SVOC	2-Chlorophenol	UG/L	2	0			40	b
SVOC	2-Methylnaphthalene	UG/L	2	0				
SVOC	2-Methylphenol	UG/L	2	0			1800	g
SVOC	2-Nitroaniline	UG/L	2	0			2.2	g
SVOC	2-Nitrophenol	UG/L	2	0				
SVOC	3,3'-Dichlorobenzidine	UG/L	2	0			0.15	g
SVOC	3-Nitroaniline	UG/L	2	0			110	f
SVOC	4,6-Dinitro-2-methylphenol	UG/L	2	0				
SVOC	4-Bromophenyl phenyl ether	UG/L	2	0			2100	f
SVOC	4-Chloro-3-methylphenol	UG/L	2	0				
SVOC	4-Chloroaniline	UG/L	2	0			150	g
SVOC	4-Chlorophenyl phenyl ether	UG/L	2	0				
SVOC	4-Methylphenol	UG/L	2	0			180	g
SVOC	4-Nitroaniline	UG/L	2	0			110	f
SVOC	4-Nitrophenol	UG/L	2	0			60	b
SVOC	Acenaphthene	UG/L	2	0			370	g
SVOC	Acenaphthylene	UG/L	2	0				
SVOC	Anthracene	UG/L	2	0			1800	g
SVOC	Benzo(a)anthracene	UG/L	2	0			0.092	g
SVOC	Benzo(a)pyrene	UG/L	2	0			2	d
SVOC	Benzo(b)fluoranthene	UG/L	2	0			0.002	c
SVOC	Benzo(g,h,i)perylene	UG/L	2	0				
SVOC	Benzo(k)fluoranthene	UG/L	2	0			0.002	c
SVOC	Butyl benzyl phthalate	UG/L	2	0			7300	g
SVOC	Carbazole	UG/L	2	0			3.4	g
SVOC	Chrysene	UG/L	2	0			9.2	g
SVOC	Di-n-butyl phthalate	UG/L	2	0			3700	g
SVOC	Di-n-octyl phthalate	UG/L	2	0			730	g
SVOC	Dibenzo(a,h)anthracene	UG/L	2	0			0.0092	g
SVOC	Dibenzofuran	UG/L	2	0			150	g
SVOC	Diethyl phthalate	UG/L	2	0			5000	b
SVOC	Dimethyl phthalate	UG/L	2	0			370000	g
SVOC	Fluoranthene	UG/L	2	0			1500	g
SVOC	Fluorene	UG/L	2	0			240	g
SVOC	Hexachlorobenzene	UG/L	2	0			1	d
SVOC	Hexachlorobutadiene	UG/L	2	0			1	e

Table 1-31

Summary of OU3 Analytical Data for Demolition Ground November 1994
Groundwater Sampling of Existing Monitoring Wells
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Hexachlorocyclopentadiene	UG/L	2	0			50	d
SVOC	Hexachloroethane	UG/L	2	0			1	b
SVOC	Indeno(1,2,3-cd)pyrene	UG/L	2	0			0.092	g
SVOC	Isophorone	UG/L	2	0			40	c
SVOC	N-Nitroso-di-n-propylamine	UG/L	2	0			0.0096	g
SVOC	N-Nitrosodiphenylamine(1)	UG/L	2	0			14	g
SVOC	Naphthalene	UG/L	2	0			20	b
SVOC	Nitrobenzene (NB)	UG/L	2	0			18	g
SVOC	Pentachlorophenol	UG/L	2	0			1	d
SVOC	Phenanthrene	UG/L	2	0				
SVOC	Phenol	UG/L	2	0			4000	b
SVOC	Pyrene	UG/L	2	0			1100	g
SVOC	bis(2-Chloroethoxy)methane	UG/L	2	0				
SVOC	bis(2-Chloroethyl)ether	UG/L	2	0			0.0098	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/L	2	0			6	d
TMET	Aluminum	UG/L	2	2	158	160	37000	g
TMET	Antimony	UG/L	2	0			6	d
TMET	Arsenic	UG/L	2	2	3.8	3.4	50	d
TMET	Barium	UG/L	2	2	171	170	2000	d
TMET	Beryllium	UG/L	2	0			4	d
TMET	Cadmium	UG/L	2	0			5	d
TMET	Calcium	UG/L	2	2	45100	35000	GRAS	k
TMET	Chromium	UG/L	2	0			100	d
TMET	Cobalt	UG/L	2	0			2200	g
TMET	Copper	UG/L	2	1	3.2	2.2	1300	m
TMET	Iron	UG/L	2	2	187	150	GRAS	k
TMET	Lead	UG/L	2	0			15	m
TMET	Magnesium	UG/L	2	2	8980	8000	GRAS	k
TMET	Manganese	UG/L	2	2	10.9	6.1	180	g
TMET	Mercury	UG/L	2	0			2	d
TMET	Nickel	UG/L	2	0			100	d
TMET	Potassium	UG/L	2	2	9650	9000	GRAS	k
TMET	Selenium	UG/L	2	0			50	d
TMET	Silver	UG/L	2	0			100	b
TMET	Sodium	UG/L	2	2	16900	15000	GRAS	k
TMET	Thallium	UG/L	2	0			2	d
TMET	Vanadium	UG/L	2	1	4	2.7	260	g
TMET	Zinc	UG/L	2	2	28.7	17	2000	b
VOC	1,1,1-Trichloroethane	UG/L	2	0			200	d
VOC	1,1,2,2-Tetrachloroethane	UG/L	2	0			0.055	g
VOC	1,1,2-Trichloroethane	UG/L	2	0			5	d
VOC	1,1-Dichloroethane	UG/L	2	0			810	g
VOC	1,1-Dichloroethene	UG/L	2	0			7	d

Table 1-31

Summary of OU3 Analytical Data for Demolition Ground November 1994
Groundwater Sampling of Existing Monitoring Wells
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	1,2-Dibromo-3-chloropropane (DBCP)	UG/L	2	0			0.2	d
VOC	1,2-Dibromoethane (Ethylene dibromide)	UG/L	2	0			0.05	d
VOC	1,2-Dichlorobenzene	UG/L	2	0			600	d
VOC	1,2-Dichloroethane	UG/L	2	0			5	d
VOC	1,2-Dichloropropane	UG/L	2	0			5	d
VOC	1,3-Dichlorobenzene	UG/L	2	0			600	d
VOC	1,4-Dichlorobenzene	UG/L	2	0			75	d
VOC	2-Butanone	UG/L	2	0			1900	g
VOC	2-Hexanone	UG/L	2	0				
VOC	4-Methyl-2-pentanone	UG/L	2	0			2900	g
VOC	Acetone	UG/L	2	0			610	g
VOC	Benzene	UG/L	2	0			5	d
VOC	Bromochloromethane	UG/L	2	0			90	b
VOC	Bromodichloromethane	UG/L	2	0			100*	d
VOC	Bromoform	UG/L	2	0			100*	d
VOC	Bromomethane	UG/L	2	0			10	b
VOC	Carbon disulfide	UG/L	2	0			21	g
VOC	Carbon tetrachloride	UG/L	2	0			5	d
VOC	Chlorobenzene	UG/L	2	0			100	d
VOC	Chloroethane	UG/L	2	0			710	g
VOC	Chloroform	UG/L	2	0			100*	d
VOC	Chloromethane	UG/L	2	0			3	b
VOC	Cis-1,2-Dichloroethene	UG/L	2	0			70	d
VOC	Cis-1,3-Dichloropropene	UG/L	2	0			0.2	c
VOC	Dibromochloromethane	UG/L	2	0			100*	d
VOC	Ethylbenzene	UG/L	2	0			700	d
VOC	Methylene chloride	UG/L	2	1	0.5	0.75	5	d
VOC	Styrene	UG/L	2	0			100	d
VOC	Tetrachloroethene	UG/L	2	0			5	d
VOC	Toluene	UG/L	2	0			1000	d
VOC	Trans-1,2-Dichloroethene	UG/L	2	0			100	d
VOC	Trans-1,3-Dichloropropene	UG/L	2	0			0.2	c
VOC	Trichloroethene (TCE)	UG/L	2	0			5	d
VOC	Vinyl chloride	UG/L	2	0			2	d
VOC	Xylenes (Total)	UG/L	2	0			10000*	d

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-32

Summary of OU3 Analytical Data for Detonation Craters Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	1,2,4-Trichlorobenzene	UG/KG	11	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	11	0			2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	11	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	11	0			7400	g
SVOC	2,2'-oxybis(1-Chloropropane)	UG/KG	11	0				
SVOC	2,4,5-Trichlorophenol	UG/KG	11	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	11	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	11	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	11	0			1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	11	0			130000	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/KG	11	0			900	i
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/KG	11	0			900	i
SVOC	2-Chloronaphthalene	UG/KG	11	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	11	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	11	0				
SVOC	2-Methylphenol	UG/KG	11	0			3300000	g
SVOC	2-Nitroaniline	UG/KG	11	0			3900	g
SVOC	2-Nitrophenol	UG/KG	11	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	11	0			990	g
SVOC	3-Nitroaniline	UG/KG	11	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	11	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	11	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	11	0				
SVOC	4-Chloroaniline	UG/KG	11	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	11	0				
SVOC	4-Methylphenol	UG/KG	11	0			330000	g
SVOC	4-Nitroaniline	UG/KG	11	0			230000	g
SVOC	4-Nitrophenol	UG/KG	11	0			4800000	f
SVOC	Acenaphthene	UG/KG	11	0			360000	g
SVOC	Acenaphthylene	UG/KG	11	0				
SVOC	Anthracene	UG/KG	11	0			19000	g
SVOC	Benzo(a)anthracene	UG/KG	11	0			610	g
SVOC	Benzo(a)pyrene	UG/KG	11	0			61	g
SVOC	Benzo(b)fluoranthene	UG/KG	11	0			610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	11	0				
SVOC	Benzo(k)fluoranthene	UG/KG	11	0			6100	g
SVOC	Butylbenzylphthalate	UG/KG	11	1	919	270	13000000	g
SVOC	Carbazole	UG/KG	11	0			22000	g
SVOC	Chrysene	UG/KG	11	0			24000	g
SVOC	Di-n-butylphthalate	UG/KG	11	3	2776	640	6500000	g
SVOC	Di-n-octylphthalate	UG/KG	11	0			1300000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	11	0			61	g
SVOC	Dibenzofuran	UG/KG	11	0			260000	g
SVOC	Diethylphthalate	UG/KG	11	0			52000000	g

Table 1-32

Summary of OU3 Analytical Data for Detonation Craters Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Dimethylphthalate	UG/KG	11	0			100000000	g
SVOC	Fluoranthene	UG/KG	11	0			2600000	g
SVOC	Fluorene	UG/KG	11	0			300000	g
SVOC	Hexachlorobenzene	UG/KG	11	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	11	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	11	0			450000	g
SVOC	Hexachloroethane	UG/KG	11	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	11	0			610	g
SVOC	Isophorone	UG/KG	11	0			470000	g
SVOC	N-Nitroso-di-n-propylamine	UG/KG	11	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	11	0			91000	g
SVOC	Naphthalene	UG/KG	11	0			800000	g
SVOC	Nitrobenzene (NB)	UG/KG	11	0				
SVOC	Pentachlorophenol	UG/KG	11	0			2500	g
SVOC	Phenanthrene	UG/KG	11	0				
SVOC	Phenol	UG/KG	11	0			39000000	g
SVOC	Pyrene	UG/KG	11	1	67	190	2000000	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	11	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	11	0			74	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	11	0			32000	g
EXP	1,3,5-Trinitrobenzene	MG/KG	11	0			1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	11	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	11	0			17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	11	0			0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	11	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	11	0				
EXP	2-Nitrotoluene	MG/KG	11	0			343*	i
EXP	3-Nitrotoluene	MG/KG	11	0			343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	11	0				
EXP	4-Nitrotoluene	MG/KG	11	0			343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	11	0			5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	11	1	0.074	0.35	343	i
EXP	Nitrobenzene	MG/KG	11	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	11	5	0.071	0.16	1715.2	i
METALS	Aluminum	MG/KG	11	11	12600	8300	33852	h
METALS	Arsenic	MG/KG	11	11	5.1	3.2	13.5	h
METALS	Barium	MG/KG	11	11	184	130	440	h
METALS	Beryllium	MG/KG	11	11	0.59	0.41	1.52	h
METALS	Cadmium	MG/KG	11	6	2.2	0.27	39	g
METALS	Calcium	MG/KG	11	11	3840	2300	GRAS	k
METALS	Chromium	MG/KG	11	11	16.2	10	37	h
METALS	Cobalt	MG/KG	11	11	7.2	5.5	17.2	h
METALS	Copper	MG/KG	11	11	13.3	8.5	33.9	h
METALS	Iron	MG/KG	11	11	14800	9700	GRAS	k

Table 1-32

Summary of OU3 Analytical Data for Detonation Craters Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
METALS	Lead	MG/KG	11	11	177	24	400	g
METALS	Magnesium	MG/KG	11	11	2720	1700	GRAS	k
METALS	Manganese	MG/KG	11	11	1320	500	1083	h
METALS	Mercury	MG/KG	11	0			23	g
METALS	Nickel	MG/KG	11	11	13.7	10	39.3	h
METALS	Potassium	MG/KG	11	11	2850	1700	GRAS	k
METALS	Selenium	MG/KG	11	9	2.1	1.3	390	g
METALS	Silver	MG/KG	11	0			380	g
METALS	Sodium	MG/KG	11	1	258	250	GRAS	k
METALS	Thallium	MG/KG	11	0			1.72	h
METALS	Vanadium	MG/KG	11	11	25	17	72.5	h
METALS	Zinc	MG/KG	11	11	55.3	35	119.5	h
VOC	1 1,1-Trichloroethane	UG/KG	6	0			3000000	g
VOC	1,1,2,2-Tetrachloroethane	UG/KG	6	0			900	g
VOC	1,1,2-Trichloroethane	UG/KG	6	0			1400	g
VOC	1,1-Dichloroethane	UG/KG	6	0			840000	g
VOC	1,1-Dichloroethene	UG/KG	6	0			38	g
VOC	1,2-Dichloroethane	UG/KG	6	0			440	g
VOC	1,2-Dichloropropane	UG/KG	6	0			680	g
VOC	2-Butanone	UG/KG	6	0			8700000	g
VOC	2-Hexanone	UG/KG	6	0				
VOC	4-Methyl-2-Pentanone	UG/KG	6	0			5200000	g
VOC	Acetone	UG/KG	6	0			2000000	g
VOC	Benzene	UG/KG	6	0			1400	g
VOC	Bromodichloromethane	UG/KG	6	0			1400	g
VOC	Bromoform	UG/KG	6	0			56000	g
VOC	Bromomethane	UG/KG	6	0			15000	g
VOC	Carbon Disulfide	UG/KG	6	0			16000	g
VOC	Carbon Tetrachloride	UG/KG	6	0			470	g
VOC	Chlorobenzene	UG/KG	6	0			160000	g
VOC	Chloroethane	UG/KG	6	0			1100000	g
VOC	Chloroform	UG/KG	6	0			530	g
VOC	Chloromethane	UG/KG	6	0			2000	g
VOC	Dibromochloromethane	UG/KG	6	0			5300	g
VOC	Ethylbenzene	UG/KG	6	0			690000	g
VOC	M/P-Xylenes	UG/KG	6	0				
VOC	Methylene Chloride	UG/KG	6	0			11000	g
VOC	O-Xylene	UG/KG	6	0				
VOC	Styrene	UG/KG	6	0			2200000	g
VOC	Tetrachloroethene	UG/KG	6	0			7000	g
VOC	Toluene	UG/KG	6	0			1900000	g
VOC	Trichloroethene (TCE)	UG/KG	6	0			7100	g
VOC	Vinyl Chloride	UG/KG	6	0			5.2	g
VOC	cis-1,2-Dichloroethene	UG/KG	6	0			59000	g

Table 1-32

Summary of OU3 Analytical Data for Detonation Craters Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	cis-1,3-Dichloropropene	UG/KG	6	0			510	g
VOC	trans-1,2-Dichloroethene	UG/KG	6	0			170000	g
VOC	trans-1,3-Dichloropropene	UG/KG	6	0			510	g

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-33

Summary of OU3 Analytical Data for Bermed Area Southwest of Load Line 1 Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	1,2,4-Trichlorobenzene	UG/KG	9	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	9	0			2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	9	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	9	0			7400	g
SVOC	2,2'-oxybis(1-Chloropropane)	UG/KG	9	0				
SVOC	2,4,5-Trichlorophenol	UG/KG	9	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	9	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	9	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	9	0			1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	9	0			130000	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/KG	9	0			900	i
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/KG	9	0			900	i
SVOC	2-Chloronaphthalene	UG/KG	9	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	9	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	9	0				
SVOC	2-Methylphenol	UG/KG	9	0			3300000	g
SVOC	2-Nitroaniline	UG/KG	9	0			3900	g
SVOC	2-Nitrophenol	UG/KG	9	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	9	0			990	g
SVOC	3-Nitroaniline	UG/KG	9	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	9	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	9	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	9	0				
SVOC	4-Chloroaniline	UG/KG	9	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	9	0				
SVOC	4-Methylphenol	UG/KG	9	0			330000	g
SVOC	4-Nitroaniline	UG/KG	9	0			230000	g
SVOC	4-Nitrophenol	UG/KG	9	0			4800000	f
SVOC	Acenaphthene	UG/KG	9	0			360000	g
SVOC	Acenaphthylene	UG/KG	9	0				
SVOC	Anthracene	UG/KG	9	0			19000	g
SVOC	Benzo(a)anthracene	UG/KG	9	0			610	g
SVOC	Benzo(a)pyrene	UG/KG	9	0			61	g
SVOC	Benzo(b)fluoranthene	UG/KG	9	0			610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	9	0				
SVOC	Benzo(k)fluoranthene	UG/KG	9	0			6100	g
SVOC	Butylbenzylphthalate	UG/KG	9	0			13000000	g
SVOC	Carbazole	UG/KG	9	0			22000	g
SVOC	Chrysene	UG/KG	9	0			24000	g
SVOC	Di-n-butylphthalate	UG/KG	9	1	2331	550	6500000	g
SVOC	Di-n-octylphthalate	UG/KG	9	0			1300000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	9	0			61	g
SVOC	Dibenzofuran	UG/KG	9	0			260000	g
SVOC	Diethylphthalate	UG/KG	9	3	22	140	52000000	g

Table 1-33

Summary of OU3 Analytical Data for Bermed Area Southwest of Load Line 1 Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Dimethylphthalate	UG/KG	9	0			100000000	g
SVOC	Fluoranthene	UG/KG	9	0			2600000	g
SVOC	Fluorene	UG/KG	9	0			300000	g
SVOC	Hexachlorobenzene	UG/KG	9	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	9	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	9	0			450000	g
SVOC	Hexachloroethane	UG/KG	9	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	9	0			610	g
SVOC	Isophorone	UG/KG	9	0			470000	g
SVOC	N-Nitroso-di-n-propylamine	UG/KG	9	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	9	0			91000	g
SVOC	Naphthalene	UG/KG	9	0			800000	g
SVOC	Nitrobenzene (NB)	UG/KG	9	0				
SVOC	Pentachlorophenol	UG/KG	9	0			2500	g
SVOC	Phenanthrene	UG/KG	9	0				
SVOC	Phenol	UG/KG	9	0			39000000	g
SVOC	Pyrene	UG/KG	9	1	121	190	2000000	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	9	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	9	0			74	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	9	0			32000	g
EXP	1,3,5-Trinitrobenzene	MG/KG	9	0			1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	9	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	9	0			17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	9	0			0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	9	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	9	0				
EXP	2-Nitrotoluene	MG/KG	9	0			343*	i
EXP	3-Nitrotoluene	MG/KG	9	0			343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	9	0				
EXP	4-Nitrotoluene	MG/KG	9	0			343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	9	0			5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	9	0			343	i
EXP	Nitrobenzene	MG/KG	9	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	9	3	0.027	0.17	1715.2	i
METALS	Aluminum	MG/KG	9	9	23100	14000	33852	h
METALS	Antimony	MG/KG	4	0			31	g
METALS	Arsenic	MG/KG	9	9	7.2	5.7	13.5	h
METALS	Barium	MG/KG	9	9	278	200	440	h
METALS	Beryllium	MG/KG	9	9	0.88	0.65	1.52	h
METALS	Cadmium	MG/KG	9	9	0.56	0.4	39	g
METALS	Calcium	MG/KG	9	9	178000	23000	GRAS	k
METALS	Chromium	MG/KG	9	9	24.1	16	37	h
METALS	Cobalt	MG/KG	9	9	11.5	8.6	17.2	h
METALS	Copper	MG/KG	9	9	16.6	14	33.9	h

Table 1-33

Summary of OU3 Analytical Data for Bermed Area Southwest of Load Line 1 Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
METALS	Iron	MG/KG	9	9	21300	16000	GRAS	k
METALS	Lead	MG/KG	9	9	15.8	13	400	g
METALS	Magnesium	MG/KG	9	9	4010	3100	GRAS	k
METALS	Manganese	MG/KG	9	9	674	540	1083	h
METALS	Mercury	MG/KG	9	0			23	g
METALS	Nickel	MG/KG	9	9	21.2	17	39.3	h
METALS	Potassium	MG/KG	9	9	3970	2500	GRAS	k
METALS	Selenium	MG/KG	9	7	2	1.4	390	g
METALS	Silver	MG/KG	9	0			380	g
METALS	Sodium	MG/KG	9	0			GRAS	k
METALS	Thallium	MG/KG	9	0			1.72	h
METALS	Vanadium	MG/KG	9	9	49.8	31	72.5	h
METALS	Zinc	MG/KG	9	9	82.4	59	119.5	h
VOC	1,1,1-Trichloroethane	UG/KG	6	0			3000000	g
VOC	1,1,2,2-Tetrachloroethane	UG/KG	6	0			900	g
VOC	1,1,2-Trichloroethane	UG/KG	6	0			1400	g
VOC	1,1-Dichloroethane	UG/KG	6	0			840000	g
VOC	1,1-Dichloroethene	UG/KG	6	0			38	g
VOC	1,2-Dichloroethane	UG/KG	6	0			440	g
VOC	1,2-Dichloropropane	UG/KG	6	0			680	g
VOC	2-Butanone	UG/KG	6	0			8700000	g
VOC	2-Hexanone	UG/KG	6	0				
VOC	4-Methyl-2-Pentanone	UG/KG	6	0			5200000	g
VOC	Acetone	UG/KG	6	0			2000000	g
VOC	Benzene	UG/KG	6	0			1400	g
VOC	Bromodichloromethane	UG/KG	6	0			1400	g
VOC	Bromoform	UG/KG	6	0			56000	g
VOC	Bromomethane	UG/KG	6	0			15000	g
VOC	Carbon Disulfide	UG/KG	6	0			16000	g
VOC	Carbon Tetrachloride	UG/KG	6	0			470	g
VOC	Chlorobenzene	UG/KG	6	0			160000	g
VOC	Chloroethane	UG/KG	6	0			1100000	g
VOC	Chloroform	UG/KG	6	0			530	g
VOC	Chloromethane	UG/KG	6	0			2000	g
VOC	Dibromochloromethane	UG/KG	6	0			5300	g
VOC	Ethylbenzene	UG/KG	6	0			690000	g
VOC	M/P-Xylenes	UG/KG	6	0				
VOC	Methylene Chloride	UG/KG	6	0			11000	g
VOC	O-Xylene	UG/KG	6	0				
VOC	Styrene	UG/KG	6	0			2200000	g
VOC	Tetrachloroethene	UG/KG	6	0			7000	g
VOC	Toluene	UG/KG	6	0			1900000	g
VOC	Trichloroethene (TCE)	UG/KG	6	0			7100	g
VOC	Vinyl Chloride	UG/KG	6	0			5.2	g

Table 1-33

Summary of OU3 Analytical Data for Bermed Area Southwest of Load Line 1 Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	cis-1,2-Dichloroethene	UG/KG	6	0			59000	g
VOC	cis-1,3-Dichloropropene	UG/KG	6	0			510	g
VOC	trans-1,2-Dichloroethene	UG/KG	6	0			170000	g
VOC	trans-1,3-Dichloropropene	UG/KG	6	0			510	g

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-34

Summary of OU3 Analytical Data for Former Ammonium Nitrate Plant
Groundwater Sampling of Newly Installed Well
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
DMET	Aluminum	UG/L	1	1	150	150	37000	g
DMET	Antimony	UG/L	1	0			6	d
DMET	Arsenic	UG/L	1	1	4.3	4.3	50	d
DMET	Barium	UG/L	1	1	122	120	2000	d
DMET	Beryllium	UG/L	1	1	0.33	0.33	4	d
DMET	Cadmium	UG/L	1	0			5	d
DMET	Calcium	UG/L	1	1	101000	100000	GRAS	k
DMET	Chromium	UG/L	1	1	2.4	2.4	100	d
DMET	Cobalt	UG/L	1	0			2200	g
DMET	Copper	UG/L	1	0			1300	m
DMET	Iron	UG/L	1	0			GRAS	k
DMET	Lead	UG/L	1	0			15	m
DMET	Magnesium	UG/L	1	1	23800	24000	GRAS	k
DMET	Manganese	UG/L	1	1	7.7	7.7	180	g
DMET	Mercury	UG/L	1	0			2	d
DMET	Nickel	UG/L	1	0			100	d
DMET	Potassium	UG/L	1	1	7640	7600	GRAS	k
DMET	Selenium	UG/L	1	1	8.5	8.5	50	d
DMET	Silver	UG/L	1	0			100	b
DMET	Sodium	UG/L	1	1	19700	20000	GRAS	k
DMET	Thallium	UG/L	1	0			2	d
DMET	Vanadium	UG/L	1	1	12.5	13	260	g
DMET	Zinc	UG/L	1	1	1.9	1.9	2000	b
TMET	Aluminum	UG/L	1	1	534	530	37000	g
TMET	Antimony	UG/L	1	0			6	d
TMET	Arsenic	UG/L	1	1	4.5	4.5	50	d
TMET	Barium	UG/L	1	1	115	120	2000	d
TMET	Beryllium	UG/L	1	0			4	d
TMET	Cadmium	UG/L	1	0			5	d
TMET	Calcium	UG/L	1	1	103000	100000	GRAS	k
TMET	Chromium	UG/L	1	1	3.9	3.9	100	d
TMET	Cobalt	UG/L	1	0			2200	g
TMET	Copper	UG/L	1	1	1.7	1.7	1300	m
TMET	Iron	UG/L	1	1	290	290	GRAS	k
TMET	Lead	UG/L	1	0			15	m
TMET	Magnesium	UG/L	1	1	23800	24000	GRAS	k
TMET	Manganese	UG/L	1	1	15.6	16	180	g
TMET	Mercury	UG/L	1	0			2	d
TMET	Nickel	UG/L	1	0			100	d
TMET	Potassium	UG/L	1	1	6710	6700	GRAS	k
TMET	Selenium	UG/L	1	1	4.5	4.5	50	d
TMET	Silver	UG/L	1	0			100	b
TMET	Sodium	UG/L	1	1	19100	19000	GRAS	k

Table 1-34

Summary of OU3 Analytical Data for Former Ammonium Nitrate Plant Groundwater Sampling of Newly Installed Well Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
TMET	Thallium	UG/L	1	0			2	d
TMET	Vanadium	UG/L	1	1	13.9	14	260	g
TMET	Zinc	UG/L	1	1	6.3	6.3	2000	b
WQ	Nitrate	MG/L	1	1	41	41	10	d
WQ	Nitrite	MG/L	1	1	41	41	1	d

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-35

Summary of OU3 Analytical Data for Former Ammonium Nitrate Plant March 1995 Groundwater Sampling of Newly Installed Well Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
WQ	Nitrate	MG/L	1	1	40	40	10	d
WQ	Nitrate-Nitrite-N	MG/L	1	1	5.8	5.8	1	d

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-36

Summary of OU3 Analytical Data for Johnson and Clear Creek March 1995 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	1,2,4-Trichlorobenzene	UG/L	4	0			70	d
SVOC	1,2-Dichlorobenzene	UG/L	4	0			600	d
SVOC	1,3-Dichlorobenzene	UG/L	4	0			600	d
SVOC	1,4-Dichlorobenzene	UG/L	4	0			75	d
SVOC	2,2'-oxybis(1-Chloropropane)	UG/L	4	0				
SVOC	2,4,5-Trichlorophenol	UG/L	4	0			63	a
SVOC	2,4,6-Trichlorophenol	UG/L	4	0			3	c
SVOC	2,4-Dichlorophenol	UG/L	4	0			20	b
SVOC	2,4-Dimethylphenol	UG/L	4	0			730	g
SVOC	2,4-Dinitrophenol	UG/L	4	0			73	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/L	4	0			1.24	j
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/L	4	0			0.05	c
SVOC	2-Chloronaphthalene	UG/L	4	0			2900	g
SVOC	2-Chlorophenol	UG/L	4	0			40	b
SVOC	2-Methylnaphthalene	UG/L	4	0				
SVOC	2-Methylphenol	UG/L	4	0			1800	g
SVOC	2-Nitroaniline	UG/L	4	0			2.2	g
SVOC	2-Nitrophenol	UG/L	4	0				
SVOC	3,3'-Dichlorobenzidine	UG/L	4	0			0.15	g
SVOC	3-Nitroaniline	UG/L	4	0			110	f
SVOC	4,6-Dinitro-2-methylphenol	UG/L	4	0				
SVOC	4-Bromophenyl-phenylether	UG/L	4	0			2100	f
SVOC	4-Chloro-3-methylphenol	UG/L	4	0				
SVOC	4-Chloroaniline	UG/L	4	0			150	g
SVOC	4-Chlorophenyl-phenylether	UG/L	4	0				
SVOC	4-Methylphenol	UG/L	4	0			180	g
SVOC	4-Nitroaniline	UG/L	4	0			110	f
SVOC	4-Nitrophenol	UG/L	4	0			60	b
SVOC	Acenaphthene	UG/L	4	0			370	g
SVOC	Acenaphthylene	UG/L	4	0			520	a
SVOC	Anthracene	UG/L	4	0			1800	g
SVOC	Benzo(a)anthracene	UG/L	4	0			0.092	g
SVOC	Benzo(a)pyrene	UG/L	4	0			2	d
SVOC	Benzo(b)fluoranthene	UG/L	4	0			0.002	c
SVOC	Benzo(g,h,i)perylene	UG/L	4	0				
SVOC	Benzo(k)fluoranthene	UG/L	4	0			0.002	c
SVOC	Butylbenzylphthalate	UG/L	4	0			7300	g
SVOC	Carbazole	UG/L	4	0			3.4	g
SVOC	Chrysene	UG/L	4	0			9.2	g
SVOC	Di-n-butylphthalate	UG/L	4	0			3700	g
SVOC	Di-n-octylphthalate	UG/L	4	0			730	g
SVOC	Dibenzo(a,h)anthracene	UG/L	4	0			0.0092	g
SVOC	Dibenzofuran	UG/L	4	0			150	g

Table 1-36

Summary of OU3 Analytical Data for Johnson and Clear Creek March 1995 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Diethylphthalate	UG/L	4	0			5000	b
SVOC	Dimethylphthalate	UG/L	4	0			370000	g
SVOC	Fluoranthene	UG/L	4	0			1500	g
SVOC	Fluorene	UG/L	4	0			240	g
SVOC	Hexachlorobenzene	UG/L	4	0			1	d
SVOC	Hexachlorobutadiene	UG/L	4	0			1	e
SVOC	Hexachlorocyclopentadiene	UG/L	4	0			50	d
SVOC	Hexachloroethane	UG/L	4	0			1	b
SVOC	Indeno(1,2,3-cd)pyrene	UG/L	4	0			0.092	g
SVOC	Isophorone	UG/L	4	0			40	c
SVOC	N-Nitroso-di-n-propylamine	UG/L	4	0			0.0096	g
SVOC	N-Nitrosodiphenylamine (1)	UG/L	4	0			14	g
SVOC	Naphthalene	UG/L	4	0			20	b
SVOC	Nitrobenzene (NB)	UG/L	4	0			18	g
SVOC	Pentachlorophenol	UG/L	4	0			1	d
SVOC	Phenanthrene	UG/L	4	0			6.3	a
SVOC	Phenol	UG/L	4	0			2560	a
SVOC	Pyrene	UG/L	4	0			1100	g
SVOC	bis(2-Chloroethoxy)methane	UG/L	4	0				
SVOC	bis(2-Chloroethyl)ether	UG/L	4	0			0.0098	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/L	4	0			6	d
EXP	1,3,5-Trinitrobenzene (1,3,5-TNB)	UG/L	4	0			0.778	j
EXP	1,3-Dinitrobenzene (1,3-DNB)	UG/L	4	0			1	b
EXP	2,4,6-Trinitrotoluene (2,4,6-TNT)	UG/L	4	0			2	j
EXP	2,4-Dinitrotoluene (2,4-DNT)	UG/L	4	0			1.24	j
EXP	2,6-Dinitrotoluene (2,6-DNT)	UG/L	4	0			0.05	c
EXP	2-Amino-4,6-dinitrotoluene (2-Am-DNT)	UG/L	4	0				
EXP	2-Nitrotoluene (2-NT)	UG/L	4	0			61	f
EXP	3-Nitrotoluene (3-NT)	UG/L	4	0			370	g
EXP	4-Amino-2,6-dinitrotoluene (4-Am-DNT)	UG/L	4	0				
EXP	4-Nitrotoluene (4-NT)	UG/L	4	0			370	g
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	UG/L	4	4	1.8	1.4	2	j
EXP	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	UG/L	4	0			370	g
EXP	Nitrobenzene (NB)	UG/L	4	0			18	g
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	UG/L	4	2	0.54	0.62	400	j
METALS	Aluminum	UG/L	4	4	21000	6100	37000	g
METALS	Antimony	UG/L	4	0			6	d
METALS	Arsenic	UG/L	4	2	11.2	5.9	50	d
METALS	Barium	UG/L	4	4	280	170	2000	d
METALS	Beryllium	UG/L	4	0			4	d
METALS	Cadmium	UG/L	4	0			5	d
METALS	Calcium	UG/L	4	4	86600	60000	GRAS	k
METALS	Chromium	UG/L	4	1	13.7	7.2	100	d

Table 1-36

Summary of OU3 Analytical Data for Johnson and Clear Creek March 1995 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
METALS	Cobalt	UG/L	4	1	10.1	6.3	2200	g
METALS	Copper	UG/L	4	2	32.5	11	12	a
METALS	Iron	UG/L	4	4	18000	5400	GRAS	k
METALS	Lead	UG/L	4	1	10.9	3.5	3.2	a
METALS	Magnesium	UG/L	4	4	17900	15000	GRAS	k
METALS	Manganese	UG/L	4	4	580	350	180	g
METALS	Mercury	UG/L	4	2	0.28	0.18	0.012	a
METALS	Nickel	UG/L	4	2	129	45	100	d
METALS	Potassium	UG/L	4	4	30400	16000	GRAS	k
METALS	Selenium	UG/L	4	0			5	a
METALS	Silver	UG/L	4	0			0.12	a
METALS	Sodium	UG/L	4	4	44200	29000	GRAS	k
METALS	Thallium	UG/L	4	0			2	d
METALS	Vanadium	UG/L	4	2	41	13	260	g
METALS	Zinc	UG/L	4	2	442	120	110	a
VOC	1,1,1-Trichloroethane	UG/L	4	0			200	d
VOC	1,1,2,2-Tetrachloroethane	UG/L	4	0			0.055	g
VOC	1,1,2-trichloroethane	UG/L	4	0			5	d
VOC	1,1-Dichloroethane	UG/L	4	0			810	g
VOC	1,1-Dichloroethene	UG/L	4	0			7	d
VOC	1,2-Dibromoethane	UG/L	4	0			0.05	d
VOC	1,2-Dichlorobenzene	UG/L	4	0			600	d
VOC	1,2-Dichloroethane	UG/L	4	0			5	d
VOC	1,2-Dichloropropane	UG/L	4	0			5	d
VOC	1,3-Dichlorobenzene	UG/L	4	0			600	d
VOC	1,4-Dichlorobenzene	UG/L	4	0			75	d
VOC	2-Butanone	UG/L	1	0			1900	g
VOC	2-Hexanone	UG/L	1	0				
VOC	4-Methyl-2-Pentanone	UG/L	4	0			2900	g
VOC	Acetone	UG/L	1	0			610	g
VOC	Benzene	UG/L	4	0			5	d
VOC	Bromochloromethane	UG/L	4	0			90	b
VOC	Bromodichloromethane	UG/L	4	0			100*	d
VOC	Bromoform	UG/L	4	0			100*	d
VOC	Bromomethane	UG/L	4	0			10	b
VOC	Carbon Disulfide	UG/L	4	0			21	g
VOC	Carbon Tetrachloride	UG/L	4	0			5	d
VOC	Chlorobenzene	UG/L	4	0			100	d
VOC	Chloroethane	UG/L	1	0			710	g
VOC	Chloroform	UG/L	4	0			100*	d
VOC	Chloromethane	UG/L	4	0			3	b
VOC	Dibromochloromethane	UG/L	4	0			100*	d
VOC	Ethylbenzene	UG/L	4	0			700	d

Table 1-36

Summary of OU3 Analytical Data for Johnson and Clear Creek March 1995 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	M/P-Xylenes	UG/L	4	0			10000*	d
VOC	Methylene Chloride	UG/L	4	0			5	d
VOC	O-Xylene	UG/L	4	0			10000*	d
VOC	Styrene	UG/L	4	0			100	d
VOC	Tetrachloroethene	UG/L	4	0			5	d
VOC	Toluene	UG/L	4	0			1000	d
VOC	Trichloroethene (TCE)	UG/L	4	2	4.51	1.5	5	d
VOC	Vinyl Chloride	UG/L	4	0			2	d
VOC	cis-1,2-Dichloroethene	UG/L	4	0			70	d
VOC	cis-1,3-Dichloropropene	UG/L	4	0			0.2	c
VOC	trans-1,2-Dichloroethene	UG/L	4	0			100	d
VOC	trans-1,3-Dichloropropene	UG/L	4	0			0.2	c

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-37

Summary of OU3 Analytical Data for Johnson and Clear Creek May 1996 Surface Water Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene (1,3,5-TNB)	UG/L	8	0			0.778	j
EXP	1,3-Dinitrobenzene (1,3-DNB)	UG/L	8	0			1	b
EXP	2,4,6-Trinitrotoluene (2,4,6-TNT)	UG/L	8	0			2	j
EXP	2,4-Dinitrotoluene (2,4-DNT)	UG/L	8	0			1.24	j
EXP	2,6-Dinitrotoluene (2,6-DNT)	UG/L	8	0			0.05	c
EXP	2-Amino-4,6-dinitrotoluene (2-Am-DNT)	UG/L	8	0				
EXP	2-Nitrotoluene (2-NT)	UG/L	8	0			61	f
EXP	3-Nitrotoluene (3-NT)	UG/L	8	0			370	g
EXP	4-Amino-2,6-dinitrotoluene (4-Am-DNT)	UG/L	8	0				
EXP	4-Nitrotoluene (4-NT)	UG/L	8	0			370	g
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	UG/L	8	0			2	j
EXP	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	UG/L	8	0			370	g
EXP	Nitrobenzene (NB)	UG/L	8	0			18	g
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	UG/L	8	0			400	j
METALS	Aluminum	UG/L	3	3	2380	1800	37000	g
METALS	Antimony	UG/L	3	0			6	d
METALS	Arsenic	UG/L	3	3	7.5	6.4	50	d
METALS	Barium	UG/L	3	3	142	140	2000	d
METALS	Beryllium	UG/L	3	0			4	d
METALS	Cadmium	UG/L	3	0			5	d
METALS	Calcium	UG/L	3	3	93200	85000	GRAS	k
METALS	Chromium	UG/L	3	0			100	d
METALS	Cobalt	UG/L	3	0			2200	g
METALS	Copper	UG/L	3	0			12	a
METALS	Iron	UG/L	3	3	2500	2000	GRAS	k
METALS	Lead	UG/L	3	0			3.2	a
METALS	Magnesium	UG/L	3	3	19700	19000	GRAS	k
METALS	Manganese	UG/L	3	3	406	280	180	g
METALS	Mercury	UG/L	3	2	0.88	0.47	0.012	a
METALS	Nickel	UG/L	3	0			100	d
METALS	Potassium	UG/L	3	3	9910	9400	GRAS	k
METALS	Selenium	UG/L	3	3	8.1	7.3	5	a
METALS	Silver	UG/L	3	0			0.12	a
METALS	Sodium	UG/L	3	3	38400	36000	GRAS	k
METALS	Thallium	UG/L	3	1	16.7	7.9	2	d
METALS	Vanadium	UG/L	3	2	11.8	9.1	260	g
METALS	Zinc	UG/L	3	3	15.5	14	110	a
VOC	1,1,1-Trichloroethane	UG/L	8	0			200	d
VOC	1,1,2,2-Tetrachloroethane	UG/L	8	0			0.055	g
VOC	1,1,2-Trichloroethane	UG/L	8	0			5	d
VOC	1,1-Dichloroethane	UG/L	8	0			810	g
VOC	1,1-Dichloroethene	UG/L	8	0			7	d
VOC	1,2-Dibromo-3-chloropropane	UG/L	8	0			0.2	d

Table 1-37

Summary of OU3 Analytical Data for Johnson and Clear Creek May 1996 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	1,2-Dibromoethane	UG/L	8	0			0.05	d
VOC	1,2-Dichlorobenzene	UG/L	8	0			600	d
VOC	1,2-Dichloroethane	UG/L	8	0			5	d
VOC	1,2-Dichloropropane	UG/L	8	0			5	d
VOC	1,3-Dichlorobenzene	UG/L	8	0			600	d
VOC	1,4-Dichlorobenzene	UG/L	8	0			75	d
VOC	4-Methyl-2-Pentanone	UG/L	8	0			2900	g
VOC	Benzene	UG/L	8	0			5	d
VOC	Bromochloromethane	UG/L	8	0			90	b
VOC	Bromodichloromethane	UG/L	8	0			100*	d
VOC	Bromoform	UG/L	8	0			100*	d
VOC	Bromomethane	UG/L	8	0			10	b
VOC	Carbon Disulfide	UG/L	8	0			21	g
VOC	Carbon Tetrachloride	UG/L	8	0			5	d
VOC	Chlorobenzene	UG/L	8	0			100	d
VOC	Chloroethane	UG/L	8	0			710	g
VOC	Chloroform	UG/L	8	0			100*	d
VOC	Chloromethane	UG/L	8	0			3	b
VOC	Dibromochloromethane	UG/L	8	0			100*	d
VOC	Ethylbenzene	UG/L	8	0			700	d
VOC	M/P-Xylenes	UG/L	8	0			10000*	d
VOC	Methylene Chloride	UG/L	8	0			5	d
VOC	O-Xylene	UG/L	8	0			10000*	d
VOC	Styrene	UG/L	8	0			100	d
VOC	Tetrachloroethene	UG/L	8	0			5	d
VOC	Toluene	UG/L	8	6	1.3	0.39	1000	d
VOC	Trichloroethene (TCE)	UG/L	8	4	6.92	1.9	5	d
VOC	Vinyl Chloride	UG/L	8	0			2	d
VOC	cis-1,2-Dichloroethene	UG/L	8	0			70	d
VOC	cis-1,3-Dichloropropene	UG/L	8	0			0.2	c
VOC	trans-1,2-Dichloroethene	UG/L	8	0			100	d
VOC	trans-1,3-Dichloropropene	UG/L	8	0			0.2	c

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-38

Summary of OU3 Analytical Data for Johnson and Clear Creek July 1996 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene (1,3,5-TNB)	UG/L	8	0			0.778	j
EXP	1,3-Dinitrobenzene (1,3-DNB)	UG/L	8	0			1	b
EXP	2,4,6-Trinitrotoluene (2,4,6-TNT)	UG/L	8	0			2	j
EXP	2,4-Dinitrotoluene (2,4-DNT)	UG/L	8	0			1.24	j
EXP	2,6-Dinitrotoluene (2,6-DNT)	UG/L	8	0			0.05	c
EXP	2-Amino-4,6-dinitrotoluene (2-Am-DNT)	UG/L	8	0				
EXP	2-Nitrotoluene (2-NT)	UG/L	8	0			61	f
EXP	3-Nitrotoluene (3-NT)	UG/L	8	0			370	g
EXP	4-Amino-2,6-dinitrotoluene (4-Am-DNT)	UG/L	8	0				
EXP	4-Nitrotoluene (4-NT)	UG/L	8	0			370	g
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	UG/L	8	0			2	j
EXP	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	UG/L	8	0			370	g
EXP	Nitrobenzene (NB)	UG/L	8	0			18	g
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	UG/L	8	0			400	j
METALS	Aluminum	UG/L	3	3	7060	3300	37000	g
METALS	Antimony	UG/L	3	0			6	d
METALS	Arsenic	UG/L	3	2	6	4.7	50	d
METALS	Barium	UG/L	3	3	211	180	2000	d
METALS	Beryllium	UG/L	3	0			4	d
METALS	Cadmium	UG/L	3	0			5	d
METALS	Calcium	UG/L	3	3	71700	66000	GRAS	k
METALS	Chromium	UG/L	3	0			100	d
METALS	Cobalt	UG/L	3	0			2200	g
METALS	Copper	UG/L	3	1	2	1.3	12	a
METALS	Iron	UG/L	3	3	9670	4600	GRAS	k
METALS	Lead	UG/L	3	0			3.2	a
METALS	Magnesium	UG/L	3	3	15200	15000	GRAS	k
METALS	Manganese	UG/L	3	3	249	170	180	g
METALS	Mercury	UG/L	3	0			0.012	a
METALS	Nickel	UG/L	3	0			100	d
METALS	Potassium	UG/L	3	3	11800	10000	GRAS	k
METALS	Selenium	UG/L	3	2	5.4	4.4	5	a
METALS	Silver	UG/L	3	0			0.12	a
METALS	Sodium	UG/L	3	3	40800	33000	GRAS	k
METALS	Thallium	UG/L	3	2	8.1	6.3	2	d
METALS	Vanadium	UG/L	3	2	20.2	12	260	g
METALS	Zinc	UG/L	3	0			110	a
VOC	1,1,1-Trichloroethane	UG/L	8	0			200	d
VOC	1,1,2,2-Tetrachloroethane	UG/L	8	0			0.055	g
VOC	1,1,2-Trichloroethane	UG/L	8	0			5	d
VOC	1,1-Dichloroethane	UG/L	8	0			810	g
VOC	1,1-Dichloroethene	UG/L	8	0			7	d
VOC	1,2-Dibromo-3-chloropropane	UG/L	8	0			0.2	d

Table 1-38

Summary of OU3 Analytical Data for Johnson and Clear Creek July 1996 Surface Water Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	1,2-Dibromoethane	UG/L	8	0			0.05	d
VOC	1,2-Dichlorobenzene	UG/L	8	0			600	d
VOC	1,2-Dichloroethane	UG/L	8	0			5	d
VOC	1,2-Dichloropropane	UG/L	8	0			5	d
VOC	1,3-Dichlorobenzene	UG/L	8	0			600	d
VOC	1,4-Dichlorobenzene	UG/L	8	0			75	d
VOC	2-Hexanone	UG/L	8	0				
VOC	4-Methyl-2-Pentanone	UG/L	8	0			2900	g
VOC	Acetone	UG/L	8	0			610	g
VOC	Benzene	UG/L	8	0			5	d
VOC	Bromochloromethane	UG/L	8	0			90	b
VOC	Bromodichloromethane	UG/L	8	0			100*	d
VOC	Bromoform	UG/L	8	0			100*	d
VOC	Bromomethane	UG/L	8	0			10	b
VOC	Carbon Disulfide	UG/L	8	0			21	g
VOC	Carbon Tetrachloride	UG/L	8	0			5	d
VOC	Chlorobenzene	UG/L	8	0			100	d
VOC	Chloroethane	UG/L	8	0			710	g
VOC	Chloroform	UG/L	8	0			100*	d
VOC	Chloromethane	UG/L	8	0			3	b
VOC	Dibromochloromethane	UG/L	8	0			100*	d
VOC	Ethylbenzene	UG/L	8	0			700	d
VOC	M/P-Xylenes	UG/L	8	0			10000*	d
VOC	Methylene Chloride	UG/L	8	0			5	d
VOC	O-Xylene	UG/L	8	0			10000*	d
VOC	Styrene	UG/L	8	0			100	d
VOC	Tetrachloroethene	UG/L	8	0			5	d
VOC	Toluene	UG/L	8	2	0.1	0.4	1000	d
VOC	Trichloroethene (TCE)	UG/L	8	4	3.79	1.3	5	d
VOC	Vinyl Chloride	UG/L	8	0			2	d
VOC	cis-1,2-Dichloroethene	UG/L	8	0			70	d
VOC	cis-1,3-Dichloropropene	UG/L	8	0			0.2	c
VOC	trans-1,2-Dichloroethene	UG/L	8	0			100	d
VOC	trans-1,3-Dichloropropene	UG/L	8	0			0.2	c

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-39

Summary of OU3 Analytical Data for Johnson and Clear Creek April 1999 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
DMET	Aluminum	UG/L	8	6	540	200		
DMET	Antimony	UG/L	8	0				
DMET	Arsenic	UG/L	8	8	8.9	5.0		
DMET	Barium	UG/L	8	8	160	120		
DMET	Beryllium	UG/L	8	0				
DMET	Cadmium	UG/L	8	3	0.18	0.37		
DMET	Calcium	UG/L	8	8	83000	49125		
DMET	Chromium	UG/L	8	1	2.2	4.7		
DMET	Cobalt	UG/L	8	0				
DMET	Copper	UG/L	8	0				
DMET	Iron	UG/L	8	6	340	120		
DMET	Lead	UG/L	8	5	1.2	0.45		
DMET	Magnesium	UG/L	8	8	18000	12000		
DMET	Manganese	UG/L	8	8	1300	190		
DMET	Mercury	UG/L	8	0				
DMET	Nickel	UG/L	8	0				
DMET	Potassium	UG/L	8	8	29000	13000		
DMET	Selenium	UG/L	8	6	7.8	3.9		
DMET	Silver	UG/L	8	0				
DMET	Sodium	UG/L	8	8	45000	22000		
DMET	Thallium	UG/L	8	0				
DMET	Vanadium	UG/L	8	0				
DMET	Zinc	UG/L	8	7	34	21		
TMET	Aluminum	UG/L	8	8	7900	3100	37000	g
TMET	Antimony	UG/L	8	0			6	d
TMET	Arsenic	UG/L	8	8	8.4	5.1	50	d
TMET	Barium	UG/L	8	8	460	240	2000	d
TMET	Beryllium	UG/L	8	3	1.3	1.0	4	d
TMET	Cadmium	UG/L	8	0			5	d
TMET	Calcium	UG/L	8	8	94000	57000	GRAS	k
TMET	Chromium	UG/L	8	3	4.5	4.4	100	d
TMET	Cobalt	UG/L	8	2	11	21	2200	g
TMET	Copper	UG/L	8	2	22	13	12	a
TMET	Iron	UG/L	8	8	5600	2500	GRAS	k
TMET	Lead	UG/L	8	8	16	5.9	3.2	a
TMET	Magnesium	UG/L	8	8	20000	14000	GRAS	k
TMET	Manganese	UG/L	8	8	1500	570	180	g
TMET	Mercury	UG/L	8	0			0.012	a
TMET	Nickel	UG/L	8	2	29	22	100	d
TMET	Potassium	UG/L	8	8	32000	14000	GRAS	k
TMET	Selenium	UG/L	8	8	6.2	2.9	5	a
TMET	Silver	UG/L	8	0			0.12	a
TMET	Sodium	UG/L	8	8	48000	23000	GRAS	k
TMET	Thallium	UG/L	8	6	0.57	0.34	2	d
TMET	Vanadium	UG/L	8	1	43	28	260	g
TMET	Zinc	UG/L	8	5	72	32	110	a

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-40

Summary of OU3 Analytical Data for Johnson and Clear Creek Sediment Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	1,2,4-Trichlorobenzene	MG/KG	4	0			620	g
SVOC	1,2-Dichlorobenzene	MG/KG	4	0			2300	g
SVOC	1,3-Dichlorobenzene	MG/KG	4	0			2800	g
SVOC	1,4-Dichlorobenzene	MG/KG	4	0			7.4	g
SVOC	2,2'-oxybis(1-Chloropropane)	MG/KG	4	0				
SVOC	2,4,5-Trichlorophenol	MG/KG	4	0			6500	g
SVOC	2,4,6-Trichlorophenol	MG/KG	4	0			40	g
SVOC	2,4-Dichlorophenol	MG/KG	4	0			200	g
SVOC	2,4-Dimethylphenol	MG/KG	4	0			1300	g
SVOC	2,4-Dinitrophenol	MG/KG	4	0			130	g
SVOC	2,4-Dinitrotoluene	MG/KG	4	0			0.9	i
SVOC	2,6-Dinitrotoluene	MG/KG	4	0			0.9	i
SVOC	2-Chloronaphthalene	MG/KG	4	0			5200	g
SVOC	2-Chlorophenol	MG/KG	4	0			330	g
SVOC	2-Methylnaphthalene	MG/KG	4	0				
SVOC	2-Methylphenol	MG/KG	4	0			3300	g
SVOC	2-Nitroaniline	MG/KG	4	0			3.9	g
SVOC	2-Nitrophenol	MG/KG	4	0				
SVOC	3,3'-Dichlorobenzidine	MG/KG	4	0			0.99	g
SVOC	3-Nitroaniline	MG/KG	4	0			230	f
SVOC	4,6-Dinitro-2-methylphenol	MG/KG	4	0				
SVOC	4-Bromophenyl-phenylether	MG/KG	4	0			4500	f
SVOC	4-Chloro-3-methylphenol	MG/KG	4	0				
SVOC	4-Chloroaniline	MG/KG	4	0			260	g
SVOC	4-Chlorophenyl-phenylether	MG/KG	4	0				
SVOC	4-Methylphenol	MG/KG	4	1	0.154	0.22	330	g
SVOC	4-Nitroaniline	MG/KG	4	0			230	g
SVOC	4-Nitrophenol	MG/KG	4	0			4800	f
SVOC	Acenaphthene	MG/KG	4	0			360	g
SVOC	Acenaphthylene	MG/KG	4	0				
SVOC	Anthracene	MG/KG	4	0			19	g
SVOC	Benzo(a)anthracene	MG/KG	4	0			0.61	g
SVOC	Benzo(a)pyrene	MG/KG	4	0			0.061	g
SVOC	Benzo(b)fluoranthene	MG/KG	4	0			0.61	g
SVOC	Benzo(g,h,i)perylene	MG/KG	4	0				
SVOC	Benzo(k)fluoranthene	MG/KG	4	0			6.1	g
SVOC	Butylbenzylphthalate	MG/KG	4	0			13000	g
SVOC	Carbazole	MG/KG	4	0			22	g
SVOC	Chrysene	MG/KG	4	0			24	g
SVOC	Di-n-butylphthalate	MG/KG	4	1	0.739	0.91	6500	g
SVOC	Di-n-octylphthalate	MG/KG	4	0			1300	g
SVOC	Dibenzo(a,h)anthracene	MG/KG	4	0			0.061	g
SVOC	Dibenzofuran	MG/KG	4	0			260	g

Table 1-40

Summary of OU3 Analytical Data for Johnson and Clear Creek Sediment Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Diethylphthalate	MG/KG	4	0			52000	g
SVOC	Dimethylphthalate	MG/KG	4	0			100000	g
SVOC	Fluoranthene	MG/KG	4	0			2600	g
SVOC	Fluorene	MG/KG	4	0			300	g
SVOC	Hexachlorobenzene	MG/KG	4	0			0.28	g
SVOC	Hexachlorobutadiene	MG/KG	4	0			5.7	g
SVOC	Hexachlorocyclopentadiene	MG/KG	4	0			450	g
SVOC	Hexachloroethane	MG/KG	4	0			32	g
SVOC	Indeno(1,2,3-cd)pyrene	MG/KG	4	0			0.61	g
SVOC	Isophorone	MG/KG	4	0			470	g
SVOC	N-Nitroso-di-n-propylamine	MG/KG	4	0			0.063	g
SVOC	N-Nitrosodiphenylamine (1)	MG/KG	4	0			91	g
SVOC	Naphthalene	MG/KG	4	0			800	g
SVOC	Nitrobenzene	MG/KG	4	0			0	i
SVOC	Pentachlorophenol	MG/KG	4	0			2.5	g
SVOC	Phenanthrene	MG/KG	4	0				
SVOC	Phenol	MG/KG	4	1	0.124	0.21	39000	g
SVOC	Pyrene	MG/KG	4	0			2000	g
SVOC	bis(2-Chloroethoxy)methane	MG/KG	4	0				
SVOC	bis(2-Chloroethyl)ether	MG/KG	4	0			0.074	g
SVOC	bis(2-Ethylhexyl)phthalate	MG/KG	4	1	0.032	0.19	32	g
EXP	1,3,5-Trinitrobenzene	MG/KG	4	0			1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	4	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	4	0			17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	4	0			0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	4	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	4	0				
EXP	2-Nitrotoluene	MG/KG	4	0			343*	i
EXP	3-Nitrotoluene	MG/KG	4	0			343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	4	0				
EXP	4-Nitrotoluene	MG/KG	4	0			343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	4	0			5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	4	0			343	i
EXP	Nitrobenzene	MG/KG	4	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	4	1	0.014	0.19	1715.2	i
METALS	Aluminum	MG/KG	4	4	17200	8500	24200	h
METALS	Antimony	MG/KG	4	0			31	g
METALS	Arsenic	MG/KG	4	3	8.9	4.4	11.4	h
METALS	Barium	MG/KG	4	4	280	140	393	h
METALS	Beryllium	MG/KG	4	2	0.9	0.51	1.17	h
METALS	Cadmium	MG/KG	4	0			39	g
METALS	Calcium	MG/KG	4	4	3970	2800	GRAS	k
METALS	Chromium	MG/KG	4	4	19.7	11	28.3	h

Table 1-40

Summary of OU3 Analytical Data for Johnson and Clear Creek Sediment Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
METALS	Cobalt	MG/KG	4	4	12.5	6.9	14.7	h
METALS	Copper	MG/KG	4	4	20.1	9.9	21.8	h
METALS	Iron	MG/KG	4	4	19700	10000	GRAS	k
METALS	Lead	MG/KG	4	4	19	9.1	400	g
METALS	Magnesium	MG/KG	4	4	3610	2000	GRAS	k
METALS	Manganese	MG/KG	4	4	760	490	860	h
METALS	Mercury	MG/KG	4	0			23	g
METALS	Nickel	MG/KG	4	3	22.4	11	27.5	h
METALS	Potassium	MG/KG	4	4	4150	2000	GRAS	k
METALS	Selenium	MG/KG	4	0			390	g
METALS	Silver	MG/KG	4	2	2.7	1.5	380	g
METALS	Sodium	MG/KG	4	4	275	200	GRAS	k
METALS	Thallium	MG/KG	4	0			0.86	h
METALS	Vanadium	MG/KG	4	4	41.3	21	58	h
METALS	Zinc	MG/KG	4	4	92	52	120	h
VOA	1,1,1-Trichloroethane	MG/KG	4	0			3000	g
VOA	1,1,2,2-Tetrachloroethane	MG/KG	4	0			0.9	g
VOA	1,1,2-Trichloroethane	MG/KG	4	0			1.4	g
VOA	1,1-Dichloroethane	MG/KG	4	0			840	g
VOA	1,1-Dichloroethene	MG/KG	4	0			0.038	g
VOA	1,2-Dichloroethane	MG/KG	4	0			0.44	g
VOA	1,2-Dichloropropane	MG/KG	4	0			0.68	g
VOA	2-Butanone	MG/KG	4	0			8700	g
VOA	2-Hexanone	MG/KG	4	0				
VOA	4-Methyl-2-Pentanone	MG/KG	4	0			5200	g
VOA	Acetone	MG/KG	4	0			2000	g
VOA	Benzene	MG/KG	4	0			1.4	g
VOA	Bromodichloromethane	MG/KG	4	0			1.4	g
VOA	Bromoform	MG/KG	4	0			56	g
VOA	Bromomethane	MG/KG	4	0			15	g
VOA	Carbon Disulfide	MG/KG	4	0			16	g
VOA	Carbon Tetrachloride	MG/KG	4	0			0.47	g
VOA	Chlorobenzene	MG/KG	4	0			160	g
VOA	Chloroethane	MG/KG	4	0			1100	g
VOA	Chloroform	MG/KG	4	0			0.53	g
VOA	Chloromethane	MG/KG	4	0			2	g
VOA	Dibromochloromethane	MG/KG	4	0			5.3	g
VOA	Ethylbenzene	MG/KG	4	0			690	g
VOA	M/P-Xylenes	MG/KG	4	0				
VOA	Methylene Chloride	MG/KG	4	0			11	g
VOA	O-Xylene	MG/KG	4	0				
VOA	Styrene	MG/KG	4	0			2200	g
VOA	Tetrachloroethene	MG/KG	4	0			7	g

Table 1-40

Summary of OU3 Analytical Data for Johnson and Clear Creek Sediment Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOA	Toluene	MG/KG	4	0			1900	g
VOA	Trichloroethene	MG/KG	4	0			7.1	g
VOA	Vinyl Chloride	MG/KG	4	0			0.0052	g
VOA	cis-1,2-Dichloroethene	MG/KG	4	0			59	g
VOA	cis-1,3-Dichloropropene	MG/KG	4	0			0.51	g
VOA	trans-1,2-Dichloroethene	MG/KG	4	0			170	g
VOA	trans-1,3-Dichloropropene	MG/KG	4	0			0.51	g

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-41

Summary of OU3 Analytical Data for Silver Creek March 1995 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	1,2,4-Trichlorobenzene	UG/L	2	0			70	d
SVOC	1,2-Dichlorobenzene	UG/L	2	0			600	d
SVOC	1,3-Dichlorobenzene	UG/L	2	0			600	d
SVOC	1,4-Dichlorobenzene	UG/L	2	0			75	d
SVOC	2,2'-oxybis(1-Chloropropane)	UG/L	2	0				
SVOC	2,4,5-Trichlorophenol	UG/L	2	0			63	a
SVOC	2,4,6-Trichlorophenol	UG/L	2	0			3	c
SVOC	2,4-Dichlorophenol	UG/L	2	0			20	b
SVOC	2,4-Dimethylphenol	UG/L	2	0			730	g
SVOC	2,4-Dinitrophenol	UG/L	2	0			73	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/L	2	0			1.24	j
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/L	2	0			0.05	c
SVOC	2-Chloronaphthalene	UG/L	2	0			2900	g
SVOC	2-Chlorophenol	UG/L	2	0			40	b
SVOC	2-Methylnaphthalene	UG/L	2	0				
SVOC	2-Methylphenol	UG/L	2	0			1800	g
SVOC	2-Nitroaniline	UG/L	2	0			2.2	g
SVOC	2-Nitrophenol	UG/L	2	0				
SVOC	3,3'-Dichlorobenzidine	UG/L	2	0			0.15	g
SVOC	3-Nitroaniline	UG/L	2	0			110	f
SVOC	4,6-Dinitro-2-methylphenol	UG/L	2	0				
SVOC	4-Bromophenyl-phenylether	UG/L	2	0			2100	f
SVOC	4-Chloro-3-methylphenol	UG/L	2	0				
SVOC	4-Chloroaniline	UG/L	2	0			150	g
SVOC	4-Chlorophenyl-phenylether	UG/L	2	0				
SVOC	4-Methylphenol	UG/L	2	0			180	g
SVOC	4-Nitroaniline	UG/L	2	0			110	f
SVOC	4-Nitrophenol	UG/L	2	0			60	b
SVOC	Acenaphthene	UG/L	2	0			370	g
SVOC	Acenaphthylene	UG/L	2	0			520	a
SVOC	Anthracene	UG/L	2	0			1800	g
SVOC	Benzo(a)anthracene	UG/L	2	0			0.092	g
SVOC	Benzo(a)pyrene	UG/L	2	0			2	d
SVOC	Benzo(b)fluoranthene	UG/L	2	0			0.002	c
SVOC	Benzo(g,h,i)perylene	UG/L	2	0				
SVOC	Benzo(k)fluoranthene	UG/L	2	0			0.002	c
SVOC	Butylbenzylphthalate	UG/L	2	0			7300	g
SVOC	Carbazole	UG/L	2	0			3.4	g
SVOC	Chrysene	UG/L	2	0			9.2	g
SVOC	Di-n-butylphthalate	UG/L	2	0			3700	g
SVOC	Di-n-octylphthalate	UG/L	2	0			730	g
SVOC	Dibenzo(a,h)anthracene	UG/L	2	0			0.0092	g
SVOC	Dibenzofuran	UG/L	2	0			150	g

Table 1-41

Summary of OU3 Analytical Data for Silver Creek March 1995 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Diethylphthalate	UG/L	2	0			5000	b
SVOC	Dimethylphthalate	UG/L	2	0			370000	g
SVOC	Fluoranthene	UG/L	2	0			1500	g
SVOC	Fluorene	UG/L	2	0			240	g
SVOC	Hexachlorobenzene	UG/L	2	0			1	d
SVOC	Hexachlorobutadiene	UG/L	2	0			1	e
SVOC	Hexachlorocyclopentadiene	UG/L	2	0			50	d
SVOC	Hexachloroethane	UG/L	2	0			1	b
SVOC	Indeno(1,2,3-cd)pyrene	UG/L	2	0			0.092	g
SVOC	Isophorone	UG/L	2	0			40	c
SVOC	N-Nitroso-di-n-propylamine	UG/L	2	0			0.0096	g
SVOC	N-Nitrosodiphenylamine (1)	UG/L	2	0			14	g
SVOC	Naphthalene	UG/L	2	0			20	b
SVOC	Nitrobenzene (NB)	UG/L	2	0			18	g
SVOC	Pentachlorophenol	UG/L	2	0			1	d
SVOC	Phenanthrene	UG/L	2	0			6.3	a
SVOC	Phenol	UG/L	2	0			2560	a
SVOC	Pyrene	UG/L	2	0			1100	g
SVOC	bis(2-Chloroethoxy)methane	UG/L	2	0				
SVOC	bis(2-Chloroethyl)ether	UG/L	2	0			0.0098	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/L	2	0			6	d
EXP	1,3,5-Trinitrobenzene (1,3,5-TNB)	UG/L	2	0			0.778	j
EXP	1,3-Dinitrobenzene (1,3-DNB)	UG/L	2	0			1	b
EXP	2,4,6-Trinitrotoluene (2,4,6-TNT)	UG/L	2	0			2	j
EXP	2,4-Dinitrotoluene (2,4-DNT)	UG/L	2	0			1.24	j
EXP	2,6-Dinitrotoluene (2,6-DNT)	UG/L	2	0			0.05	c
EXP	2-Amino-4,6-dinitrotoluene (2-Am-DNT)	UG/L	2	0				
EXP	2-Nitrotoluene (2-NT)	UG/L	2	0			61	f
EXP	3-Nitrotoluene (3-NT)	UG/L	2	0			370	g
EXP	4-Amino-2,6-dinitrotoluene (4-Am-DNT)	UG/L	2	1	0.39	0.95		
EXP	4-Nitrotoluene (4-NT)	UG/L	2	0			370	g
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	UG/L	2	0			2	j
EXP	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	UG/L	2	0			370	g
EXP	Nitrobenzene (NB)	UG/L	2	0			18	g
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	UG/L	2	0			400	j
METALS	Aluminum	UG/L	2	2	596	410	37000	g
METALS	Antimony	UG/L	2	0			6	d
METALS	Arsenic	UG/L	2	0			50	d
METALS	Barium	UG/L	2	2	174	170	2000	d
METALS	Beryllium	UG/L	2	0			4	d
METALS	Cadmium	UG/L	2	0			5	d
METALS	Calcium	UG/L	2	2	79700	79000	GRAS	k
METALS	Chromium	UG/L	2	0			100	d

Table 1-41

Summary of OU3 Analytical Data for Silver Creek March 1995 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
METALS	Cobalt	UG/L	2	0			2200	g
METALS	Copper	UG/L	2	0			12	a
METALS	Iron	UG/L	2	2	803	580	GRAS	k
METALS	Lead	UG/L	2	0			3.2	a
METALS	Magnesium	UG/L	2	2	19700	19000	GRAS	k
METALS	Manganese	UG/L	2	2	281	270	180	g
METALS	Mercury	UG/L	2	0			0.012	a
METALS	Nickel	UG/L	2	0			100	d
METALS	Potassium	UG/L	2	2	10900	11000	GRAS	k
METALS	Selenium	UG/L	2	1	5	3.8	5	a
METALS	Silver	UG/L	2	0			0.12	a
METALS	Sodium	UG/L	2	2	40000	39000	GRAS	k
METALS	Thallium	UG/L	2	0			2	d
METALS	Vanadium	UG/L	2	1	6.8	4.7	260	g
METALS	Zinc	UG/L	2	0			110	a
VOC	1,1,1-Trichloroethane	UG/L	2	0			200	d
VOC	1,1,2,2-Tetrachloroethane	UG/L	2	0			0.055	g
VOC	1,1,2-Trichloroethane	UG/L	1	0			5	d
VOC	1,1,2-trichloroethane	UG/L	1	0			5	d
VOC	1,1-Dichloroethane	UG/L	2	0			810	g
VOC	1,1-Dichloroethene	UG/L	2	0			7	d
VOC	1,2-Dibromo-3-chloropropane	UG/L	1	0			0.2	d
VOC	1,2-Dibromoethane	UG/L	2	0			0.05	d
VOC	1,2-Dichlorobenzene	UG/L	2	0			600	d
VOC	1,2-Dichloroethane	UG/L	2	0			5	d
VOC	1,2-Dichloropropane	UG/L	2	0			5	d
VOC	1,3-Dichlorobenzene	UG/L	2	0			600	d
VOC	1,4-Dichlorobenzene	UG/L	2	0			75	d
VOC	4-Methyl-2-Pentanone	UG/L	1	0			2900	g
VOC	Benzene	UG/L	2	0			5	d
VOC	Bromochloromethane	UG/L	2	0			90	b
VOC	Bromodichloromethane	UG/L	2	0			100*	d
VOC	Bromoform	UG/L	2	0			100*	d
VOC	Bromomethane	UG/L	2	0			10	b
VOC	Carbon Disulfide	UG/L	2	0			21	g
VOC	Carbon Tetrachloride	UG/L	2	0			5	d
VOC	Chlorobenzene	UG/L	2	0			100	d
VOC	Chloroform	UG/L	2	0			100*	d
VOC	Chloromethane	UG/L	2	0			3	b
VOC	Dibromochloromethane	UG/L	2	0			100*	d
VOC	Ethylbenzene	UG/L	2	0			700	d
VOC	M/P-Xylenes	UG/L	2	0			10000*	d
VOC	Methylene Chloride	UG/L	2	0			5	d

Table 1-41

Summary of OU3 Analytical Data for Silver Creek March 1995 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	O-Xylene	UG/L	2	0			10000*	d
VOC	Styrene	UG/L	2	0			100	d
VOC	Tetrachloroethene	UG/L	2	0			5	d
VOC	Toluene	UG/L	2	1	0.11	0.31	1000	d
VOC	Trichloroethene (TCE)	UG/L	2	0			5	d
VOC	Vinyl Chloride	UG/L	2	0			2	d
VOC	cis-1,2-Dichloroethene	UG/L	2	0			70	d
VOC	cis-1,3-Dichloropropene	UG/L	2	0			0.2	c
VOC	trans-1,2-Dichloroethene	UG/L	2	0			100	d
VOC	trans-1,3-Dichloropropene	UG/L	2	0			0.2	c

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-42

Summary of OU3 Analytical Data for Silver Creek May 1996 Surface Water Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene (1,3,5-TNB)	UG/L	4	0			0.778	j
EXP	1,3-Dinitrobenzene (1,3-DNB)	UG/L	4	0			1	b
EXP	2,4,6-Trinitrotoluene (2,4,6-TNT)	UG/L	4	0			2	j
EXP	2,4-Dinitrotoluene (2,4-DNT)	UG/L	4	0			1.24	j
EXP	2,6-Dinitrotoluene (2,6-DNT)	UG/L	4	0			0.05	c
EXP	2-Amino-4,6-dinitrotoluene (2-Am-DNT)	UG/L	4	0				
EXP	2-Nitrotoluene (2-NT)	UG/L	4	0			61	f
EXP	3-Nitrotoluene (3-NT)	UG/L	4	0			370	g
EXP	4-Amino-2,6-dinitrotoluene (4-Am-DNT)	UG/L	4	0				
EXP	4-Nitrotoluene (4-NT)	UG/L	4	0			370	g
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	UG/L	4	0			2	j
EXP	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	UG/L	4	0			370	g
EXP	Nitrobenzene (NB)	UG/L	4	0			18	g
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	UG/L	4	0			400	j
VOC	1,1,1-Trichloroethane	UG/L	4	0			200	d
VOC	1,1,2,2-Tetrachloroethane	UG/L	4	0			0.055	g
VOC	1,1,2-Trichloroethane	UG/L	4	0			5	d
VOC	1,1-Dichloroethane	UG/L	4	0			810	g
VOC	1,1-Dichloroethene	UG/L	4	0			7	d
VOC	1,2-Dibromo-3-chloropropane	UG/L	3	0			0.2	d
VOC	1,2-Dibromoethane	UG/L	4	0			0.05	d
VOC	1,2-Dichlorobenzene	UG/L	4	0			600	d
VOC	1,2-Dichloroethane	UG/L	4	0			5	d
VOC	1,2-Dichloropropane	UG/L	4	0			5	d
VOC	1,3-Dichlorobenzene	UG/L	4	0			600	d
VOC	1,4-Dichlorobenzene	UG/L	4	0			75	d
VOC	2-Butanone	UG/L	1	0			1900	g
VOC	2-Hexanone	UG/L	1	0				
VOC	4-Methyl-2-Pentanone	UG/L	4	0			2900	g
VOC	Acetone	UG/L	1	0			610	g
VOC	Benzene	UG/L	4	0			5	d
VOC	Bromochloromethane	UG/L	4	0			90	b
VOC	Bromodichloromethane	UG/L	4	0			100*	d
VOC	Bromoform	UG/L	4	0			100*	d
VOC	Bromomethane	UG/L	4	0			10	b
VOC	Carbon Disulfide	UG/L	4	0			21	g
VOC	Carbon Tetrachloride	UG/L	4	0			5	d
VOC	Chlorobenzene	UG/L	4	0			100	d
VOC	Chloroethane	UG/L	4	0			710	g
VOC	Chloroform	UG/L	4	0			100*	d
VOC	Chloromethane	UG/L	4	0			3	b
VOC	Dibromochloromethane	UG/L	4	0			100*	d
VOC	Ethylbenzene	UG/L	4	0			700	d

Table 1-42

Summary of OU3 Analytical Data for Silver Creek May 1996 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	M/P-Xylenes	UG/L	4	0			10000*	d
VOC	Methylene Chloride	UG/L	4	0			5	d
VOC	O-Xylene	UG/L	4	0			10000*	d
VOC	Styrene	UG/L	4	0			100	d
VOC	Tetrachloroethene	UG/L	4	0			5	d
VOC	Toluene	UG/L	4	3	0.23	0.27	1000	d
VOC	Trichloroethene (TCE)	UG/L	4	0			5	d
VOC	Vinyl Chloride	UG/L	4	0			2	d
VOC	cis-1,2-Dichloroethene	UG/L	4	0			70	d
VOC	cis-1,3-Dichloropropene	UG/L	4	0			0.2	c
VOC	trans-1,2-Dichloroethene	UG/L	4	0			100	d
VOC	trans-1,3-Dichloropropene	UG/L	4	0			0.2	c

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-43

Summary of OU3 Analytical Data for Silver Creek July 1996 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene (1,3,5-TNB)	UG/L	4	0			0.778	j
EXP	1,3-Dinitrobenzene (1,3-DNB)	UG/L	4	0			1	b
EXP	2,4,6-Trinitrotoluene (2,4,6-TNT)	UG/L	4	0			2	j
EXP	2,4-Dinitrotoluene (2,4-DNT)	UG/L	4	0			1.24	j
EXP	2,6-Dinitrotoluene (2,6-DNT)	UG/L	4	0			0.05	c
EXP	2-Amino-4,6-dinitrotoluene (2-Am-DNT)	UG/L	4	0				
EXP	2-Nitrotoluene (2-NT)	UG/L	4	0			61	f
EXP	3-Nitrotoluene (3-NT)	UG/L	4	0			370	g
EXP	4-Amino-2,6-dinitrotoluene (4-Am-DNT)	UG/L	4	0				
EXP	4-Nitrotoluene (4-NT)	UG/L	4	0			370	g
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	UG/L	4	0			2	j
EXP	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	UG/L	4	0			370	g
EXP	Nitrobenzene (NB)	UG/L	4	0			18	g
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	UG/L	4	0			400	j
VOC	1,1,1-Trichloroethane	UG/L	4	0			200	d
VOC	1,1,2,2-Tetrachloroethane	UG/L	4	0			0.055	g
VOC	1,1,2-Trichloroethane	UG/L	4	0			5	d
VOC	1,1-Dichloroethane	UG/L	4	0			810	g
VOC	1,1-Dichloroethene	UG/L	4	0			7	d
VOC	1,2-Dibromo-3-chloropropane	UG/L	4	0			0.2	d
VOC	1,2-Dibromoethane	UG/L	4	0			0.05	d
VOC	1,2-Dichlorobenzene	UG/L	4	0			600	d
VOC	1,2-Dichloroethane	UG/L	4	0			5	d
VOC	1,2-Dichloropropane	UG/L	4	0			5	d
VOC	1,3-Dichlorobenzene	UG/L	4	0			600	d
VOC	1,4-Dichlorobenzene	UG/L	4	0			75	d
VOC	2-Hexanone	UG/L	4	0				
VOC	4-Methyl-2-Pentanone	UG/L	4	0			2900	g
VOC	Acetone	UG/L	4	0			610	g
VOC	Benzene	UG/L	4	0			5	d
VOC	Bromochloromethane	UG/L	4	0			90	b
VOC	Bromodichloromethane	UG/L	4	0			100*	d
VOC	Bromoform	UG/L	4	0			100*	d
VOC	Bromomethane	UG/L	4	0			10	b
VOC	Carbon Disulfide	UG/L	4	0			21	g
VOC	Carbon Tetrachloride	UG/L	4	0			5	d
VOC	Chlorobenzene	UG/L	4	0			100	d
VOC	Chloroethane	UG/L	4	0			710	g
VOC	Chloroform	UG/L	4	0			100*	d
VOC	Chloromethane	UG/L	4	0			3	b
VOC	Dibromochloromethane	UG/L	4	0			100*	d
VOC	Ethylbenzene	UG/L	4	0			700	d
VOC	M/P-Xylenes	UG/L	4	0			10000*	d

Table 1-43

Summary of OU3 Analytical Data for Silver Creek July 1996 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	Methylene Chloride	UG/L	4	1	0.46	1.1	5	d
VOC	O-Xylene	UG/L	4	0			10000*	d
VOC	Styrene	UG/L	4	0			100	d
VOC	Tetrachloroethene	UG/L	4	0			5	d
VOC	Toluene	UG/L	4	3	0.16	0.23	1000	d
VOC	Trichloroethene (TCE)	UG/L	4	0			5	d
VOC	Vinyl Chloride	UG/L	4	0			2	d
VOC	cis-1,2-Dichloroethene	UG/L	4	0			70	d
VOC	cis-1,3-Dichloropropene	UG/L	4	0			0.2	c
VOC	trans-1,2-Dichloroethene	UG/L	4	0			100	d
VOC	trans-1,3-Dichloropropene	UG/L	4	0			0.2	c

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-44

Summary of OU3 Analytical Data for Silver Creek April 1999 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
DMET	Aluminum	UG/L	4	4	380	220		
DMET	Antimony	UG/L	4	0				
DMET	Arsenic	UG/L	4	4	4.4	3.6		
DMET	Barium	UG/L	4	4	160	150		
DMET	Beryllium	UG/L	4	0				
DMET	Cadmium	UG/L	4	0				
DMET	Calcium	UG/L	4	4	47000	43000		
DMET	Chromium	UG/L	4	0				
DMET	Cobalt	UG/L	4	0				
DMET	Copper	UG/L	4	0				
DMET	Iron	UG/L	4	0				
DMET	Lead	UG/L	4	1	0.23	0.43		
DMET	Magnesium	UG/L	4	4	12000	11000		
DMET	Manganese	UG/L	4	4	330	200		
DMET	Mercury	UG/L	1	0				
DMET	Nickel	UG/L	4	0				
DMET	Potassium	UG/L	4	4	16000	13000		
DMET	Selenium	UG/L	4	4	4.7	4.1		
DMET	Silver	UG/L	4	0				
DMET	Sodium	UG/L	4	4	26000	23000		
DMET	Thallium	UG/L	4	0				
DMET	Vanadium	UG/L	4	0				
DMET	Zinc	UG/L	4	2	16	13		
TMET	Aluminum	UG/L	4	4	7800	4400	37000	g
TMET	Antimony	UG/L	4	0			6	d
TMET	Arsenic	UG/L	4	4	7.2	6.8	50	d
TMET	Barium	UG/L	4	4	660	410	2000	d
TMET	Beryllium	UG/L	4	4	1.3	0.73	4	d
TMET	Cadmium	UG/L	4	0			5	d
TMET	Calcium	UG/L	4	4	59000	56000	GRAS	k
TMET	Chromium	UG/L	4	4	5.5	3.8	100	d
TMET	Cobalt	UG/L	4	1	12	22	2200	g
TMET	Copper	UG/L	4	1	26	14	12	a
TMET	Iron	UG/L	4	4	8100	4900	GRAS	k
TMET	Lead	UG/L	4	4	15	10	3.2	a
TMET	Magnesium	UG/L	4	4	15000	14500	GRAS	k
TMET	Manganese	UG/L	4	4	1900	1200	180	g
TMET	Mercury	UG/L	1	0			0.012	a
TMET	Nickel	UG/L	4	1	27	22	100	d
TMET	Potassium	UG/L	4	4	21000	16000	GRAS	k
TMET	Selenium	UG/L	4	4	5.6	4.5	5	a
TMET	Silver	UG/L	4	0			0.12	a
TMET	Sodium	UG/L	4	4	25000	22000	GRAS	k
TMET	Thallium	UG/L	4	1	0 1	0.4	2	d
TMET	Vanadium	UG/L	4	1	45	34	260	g
TMET	Zinc	UG/L	4	4	72	37	110	a

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-45

Summary of OU3 Analytical Data for Silver Creek Sediment Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	1,2,4-Trichlorobenzene	MG/KG	2	0			620	g
SVOC	1,2-Dichlorobenzene	MG/KG	2	0			2300	g
SVOC	1,3-Dichlorobenzene	MG/KG	2	0			2800	g
SVOC	1,4-Dichlorobenzene	MG/KG	2	0			7.4	g
SVOC	2,2'-oxybis(1-Chloropropane)	MG/KG	2	0				
SVOC	2,4,5-Trichlorophenol	MG/KG	2	0			6500	g
SVOC	2,4,6-Trichlorophenol	MG/KG	2	0			40	g
SVOC	2,4-Dichlorophenol	MG/KG	2	0			200	g
SVOC	2,4-Dimethylphenol	MG/KG	2	0			1300	g
SVOC	2,4-Dinitrophenol	MG/KG	2	0			130	g
SVOC	2,4-Dinitrotoluene	MG/KG	2	0			0.9	i
SVOC	2,6-Dinitrotoluene	MG/KG	2	0			0.9	i
SVOC	2-Chloronaphthalene	MG/KG	2	0			5200	g
SVOC	2-Chlorophenol	MG/KG	2	0			330	g
SVOC	2-Methylnaphthalene	MG/KG	2	0				
SVOC	2-Methylphenol	MG/KG	2	0			3300	g
SVOC	2-Nitroaniline	MG/KG	2	0			3.9	g
SVOC	2-Nitrophenol	MG/KG	2	0				
SVOC	3,3'-Dichlorobenzidine	MG/KG	2	0			0.99	g
SVOC	3-Nitroaniline	MG/KG	2	0			230	f
SVOC	4,6-Dinitro-2-methylphenol	MG/KG	2	0				
SVOC	4-Bromophenyl-phenylether	MG/KG	2	0			4500	f
SVOC	4-Chloro-3-methylphenol	MG/KG	2	0				
SVOC	4-Chloroaniline	MG/KG	2	0			260	g
SVOC	4-Chlorophenyl-phenylether	MG/KG	2	0				
SVOC	4-Methylphenol	MG/KG	2	1	2.444	1.4	330	g
SVOC	4-Nitroaniline	MG/KG	2	0			230	g
SVOC	4-Nitrophenol	MG/KG	2	0			4800	f
SVOC	Acenaphthene	MG/KG	2	0			360	g
SVOC	Acenaphthylene	MG/KG	2	0				
SVOC	Anthracene	MG/KG	2	0			19	g
SVOC	Benzo(a)anthracene	MG/KG	2	0			0.61	g
SVOC	Benzo(a)pyrene	MG/KG	2	0			0.061	g
SVOC	Benzo(b)fluoranthene	MG/KG	2	0			0.61	g
SVOC	Benzo(g,h,i)perylene	MG/KG	2	0				
SVOC	Benzo(k)fluoranthene	MG/KG	2	0			6.1	g
SVOC	Butylbenzylphthalate	MG/KG	2	0			13000	g
SVOC	Carbazole	MG/KG	2	0			22	g
SVOC	Chrysene	MG/KG	2	0			24	g
SVOC	Di-n-butylphthalate	MG/KG	2	1	0.575	0.43	6500	g
SVOC	Di-n-octylphthalate	MG/KG	2	0			1300	g
SVOC	Dibenzo(a,h)anthracene	MG/KG	2	0			0.061	g
SVOC	Dibenzofuran	MG/KG	2	0			260	g

Table 1-45

Summary of OU3 Analytical Data for Silver Creek Sediment Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Diethylphthalate	MG/KG	2	0			52000	g
SVOC	Dimethylphthalate	MG/KG	2	0			100000	g
SVOC	Fluoranthene	MG/KG	2	0			2600	g
SVOC	Fluorene	MG/KG	2	0			300	g
SVOC	Hexachlorobenzene	MG/KG	2	0			0.28	g
SVOC	Hexachlorobutadiene	MG/KG	2	0			5.7	g
SVOC	Hexachlorocyclopentadiene	MG/KG	2	0			450	g
SVOC	Hexachloroethane	MG/KG	2	0			32	g
SVOC	Indeno(1,2,3-cd)pyrene	MG/KG	2	0			0.61	g
SVOC	Isophorone	MG/KG	2	0			470	g
SVOC	N-Nitroso-di-n-propylamine	MG/KG	2	0			0.063	g
SVOC	N-Nitrosodiphenylamine (1)	MG/KG	2	0			91	g
SVOC	Naphthalene	MG/KG	2	0			800	g
SVOC	Nitrobenzene	MG/KG	2	0			0	i
SVOC	Pentachlorophenol	MG/KG	2	0			2.5	g
SVOC	Phenanthrene	MG/KG	2	0				
SVOC	Phenol	MG/KG	2	0			39000	g
SVOC	Pyrene	MG/KG	2	1	0.107	0.18	2000	g
SVOC	bis(2-Chloroethoxy)methane	MG/KG	2	0				
SVOC	bis(2-Chloroethyl)ether	MG/KG	2	0			0.074	g
SVOC	bis(2-Ethylhexyl)phthalate	MG/KG	2	0			32	g
EXP	1,3,5-Trinitrobenzene	MG/KG	2	0			1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	2	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	2	0			17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	2	0			0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	2	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	2	0				
EXP	2-Nitrotoluene	MG/KG	2	0			343*	i
EXP	3-Nitrotoluene	MG/KG	2	0			343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	2	0				
EXP	4-Nitrotoluene	MG/KG	2	0			343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	2	0			5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	2	0			343	i
EXP	Nitrobenzene	MG/KG	2	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	2	0			1715.2	i
METALS	Aluminum	MG/KG	2	2	10000	9000	24200	h
METALS	Antimony	MG/KG	2	0			31	g
METALS	Arsenic	MG/KG	2	2	6.9	6.2	11.4	h
METALS	Barium	MG/KG	2	2	237	210	393	h
METALS	Beryllium	MG/KG	2	0			1.17	h
METALS	Cadmium	MG/KG	2	0			39	g
METALS	Calcium	MG/KG	2	2	6400	4800	GRAS	k
METALS	Chromium	MG/KG	2	2	12.8	11	28.3	h

Table 1-45

Summary of OU3 Analytical Data for Silver Creek Sediment Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
METALS	Cobalt	MG/KG	2	2	6.5	5.7	14.7	h
METALS	Copper	MG/KG	2	2	14.1	13	21.8	h
METALS	Iron	MG/KG	2	2	14500	13000	27800	k
METALS	Lead	MG/KG	2	2	11.3	10	29.5	g
METALS	Magnesium	MG/KG	2	2	3020	2600	GRAS	k
METALS	Manganese	MG/KG	2	2	896	700	1083	h
METALS	Mercury	MG/KG	2	0			23	g
METALS	Nickel	MG/KG	2	2	16.1	14	27.5	h
METALS	Potassium	MG/KG	2	2	2220	2000	GRAS	k
METALS	Selenium	MG/KG	2	2	2.2	2.1	390	g
METALS	Silver	MG/KG	2	2	2.3	2.3	380	g
METALS	Sodium	MG/KG	2	2	286	210	GRAS	k
METALS	Thallium	MG/KG	2	0			1.72	h
METALS	Vanadium	MG/KG	2	2	23.2	21	58	h
METALS	Zinc	MG/KG	2	2	58.5	52	95.3	h
VOC	1,1,1-Trichloroethane	MG/KG	2	0			3000	g
VOC	1,1,2,2-Tetrachloroethane	MG/KG	2	0			0.9	g
VOC	1,1,2-Trichloroethane	MG/KG	2	0			1.4	g
VOC	1,1-Dichloroethane	MG/KG	2	0			840	g
VOC	1,1-Dichloroethene	MG/KG	2	0			0.038	g
VOC	1,2-Dichloroethane	MG/KG	2	0			0.44	g
VOC	1,2-Dichloropropane	MG/KG	2	0			0.68	g
VOC	2-Butanone	MG/KG	2	0			8700	g
VOC	2-Hexanone	MG/KG	2	0				
VOC	4-Methyl-2-Pentanone	MG/KG	2	0			5200	g
VOC	Acetone	MG/KG	2	1	0.043	0.026	2000	g
VOC	Benzene	MG/KG	2	0			1.4	g
VOC	Bromodichloromethane	MG/KG	2	0			1.4	g
VOC	Bromoform	MG/KG	2	0			56	g
VOC	Bromomethane	MG/KG	2	0			15	g
VOC	Carbon Disulfide	MG/KG	2	0			16	g
VOC	Carbon Tetrachloride	MG/KG	2	0			0.47	g
VOC	Chlorobenzene	MG/KG	2	0			160	g
VOC	Chloroethane	MG/KG	2	0			1100	g
VOC	Chloroform	MG/KG	2	0			0.53	g
VOC	Chloromethane	MG/KG	2	0			2	g
VOC	Dibromochloromethane	MG/KG	2	0			5.3	g
VOC	Ethylbenzene	MG/KG	2	0			690	g
VOC	M/P-Xylenes	MG/KG	2	0				
VOC	Methylene Chloride	MG/KG	2	0			11	g
VOC	O-Xylene	MG/KG	2	0				
VOC	Styrene	MG/KG	2	0			2200	g
VOC	Tetrachloroethene	MG/KG	2	0			7	g

Table 1-45

Summary of OU3 Analytical Data for Silver Creek Sediment Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	Toluene	MG/KG	2	1	0.246	0.13	1900	g
VOC	Trichloroethene	MG/KG	2	0			7.1	g
VOC	Vinyl Chloride	MG/KG	2	0			0.0052	g
VOC	cis-1,2-Dichloroethene	MG/KG	2	0			59	g
VOC	cis-1,3-Dichloropropene	MG/KG	2	0			0.51	g
VOC	trans-1,2-Dichloroethene	MG/KG	2	0			170	g
VOC	trans-1,3-Dichloropropene	MG/KG	2	0			0.51	g

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-46

Summary of OU3 Analytical Data for Former Administration Area Underground Storage Tanks
Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
BTEX	Benzene	UG/KG	5	0			1000*	n
BTEX	Ethylbenzene	UG/KG	5	0			1000*	n
BTEX	Toluene	UG/KG	5	0			1000*	n
BTEX	Total Xylenes	UG/KG	5	0			1000*	n
SVOC	1,2,4-Trichlorobenzene	UG/KG	6	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	6	0			2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	6	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	6	0			7400	g
SVOC	2,2'-oxybis(1-Chloropropane)	UG/KG	6	0				
SVOC	2,4,5-Trichlorophenol	UG/KG	6	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	6	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	6	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	6	0			1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	6	0			130000	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/KG	6	0			900	i
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/KG	6	0			900	i
SVOC	2-Chloronaphthalene	UG/KG	6	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	6	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	6	0				
SVOC	2-Methylphenol	UG/KG	6	0			3300000	g
SVOC	2-Nitroaniline	UG/KG	6	0			3900	g
SVOC	2-Nitrophenol	UG/KG	6	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	6	0			990	g
SVOC	3-Nitroaniline	UG/KG	6	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	6	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	6	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	6	0				
SVOC	4-Chloroaniline	UG/KG	6	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	6	0				
SVOC	4-Methylphenol	UG/KG	6	0			330000	g
SVOC	4-Nitroaniline	UG/KG	6	0			230000	g
SVOC	4-Nitrophenol	UG/KG	6	0			4800000	f
SVOC	Acenaphthene	UG/KG	6	0			360000	g
SVOC	Acenaphthylene	UG/KG	6	0				
SVOC	Anthracene	UG/KG	6	0			19000	g
SVOC	Benzo(a)anthracene	UG/KG	6	0			610	g
SVOC	Benzo(a)pyrene	UG/KG	6	0			61	g
SVOC	Benzo(b)fluoranthene	UG/KG	6	1	32	150	610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	6	0				
SVOC	Benzo(k)fluoranthene	UG/KG	6	0			6100	g
SVOC	Butylbenzylphthalate	UG/KG	6	1	196	180	13000000	g
SVOC	Carbazole	UG/KG	6	0			22000	g
SVOC	Chrysene	UG/KG	6	0			24000	g

Table 1-46

Summary of OU3 Analytical Data for Former Administration Area Underground Storage Tanks
Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Di-n-butylphthalate	UG/KG	6	4	3206	1200	6500000	g
SVOC	Di-n-octylphthalate	UG/KG	6	0			1300000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	6	0			61	g
SVOC	Dibenzofuran	UG/KG	6	0			260000	g
SVOC	Diethylphthalate	UG/KG	6	0			52000000	g
SVOC	Dimethylphthalate	UG/KG	6	0			100000000	g
SVOC	Fluoranthene	UG/KG	6	1	26	150	2600000	g
SVOC	Fluorene	UG/KG	6	0			300000	g
SVOC	Hexachlorobenzene	UG/KG	6	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	6	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	6	0			450000	g
SVOC	Hexachloroethane	UG/KG	6	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	6	0			610	g
SVOC	Isophorone	UG/KG	6	0			470000	g
SVOC	N-Nitroso-di-n-propylamine	UG/KG	6	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	6	0			91000	g
SVOC	Naphthalene	UG/KG	6	0			800000	g
SVOC	Nitrobenzene (NB)	UG/KG	6	0				
SVOC	Pentachlorophenol	UG/KG	6	0			2500	g
SVOC	Phenanthrene	UG/KG	6	0				
SVOC	Phenol	UG/KG	6	0			39000000	g
SVOC	Pyrene	UG/KG	6	1	94	160	2000000	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	6	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	6	0			74	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	6	1	42	160	32000	g
TPH	TRPH	MG/KG	6	1	21	7.9	10	n

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-47

Summary of OU3 Analytical Data for Former Administration Area Underground Storage Tanks
Hydropunch Groundwater Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
BTEX	Benzene	UG/L	1	0			5	d
BTEX	Ethylbenzene	UG/L	1	0			700	d
BTEX	Toluene	UG/L	1	0			1000	d
BTEX	Total Xylenes	UG/L	1	1	4.3	4.3	10000	d
SVOC	1,2,4-Trichlorobenzene	UG/L	1	0			70	d
SVOC	1,2-Dichlorobenzene	UG/L	1	0			600	d
SVOC	1,3-Dichlorobenzene	UG/L	1	0			600	d
SVOC	1,4-Dichlorobenzene	UG/L	1	0			75	d
SVOC	2,2'-oxybis(1-Chloropropane)	UG/L	1	0				
SVOC	2,4,5-Trichlorophenol	UG/L	1	0			3700	g
SVOC	2,4,6-Trichlorophenol	UG/L	1	0			3	c
SVOC	2,4-Dichlorophenol	UG/L	1	0			20	b
SVOC	2,4-Dimethylphenol	UG/L	1	0			730	g
SVOC	2,4-Dinitrophenol	UG/L	1	0			73	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/L	1	0			1.24	j
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/L	1	0			0.05	c
SVOC	2-Chloronaphthalene	UG/L	1	0			2900	g
SVOC	2-Chlorophenol	UG/L	1	0			40	b
SVOC	2-Methylnaphthalene	UG/L	1	0				
SVOC	2-Methylphenol	UG/L	1	0			1800	g
SVOC	2-Nitroaniline	UG/L	1	0			2.2	g
SVOC	2-Nitrophenol	UG/L	1	0				
SVOC	3,3'-Dichlorobenzidine	UG/L	1	0			0.15	g
SVOC	3-Nitroaniline	UG/L	1	0			110	f
SVOC	4,6-Dinitro-2-methylphenol	UG/L	1	0				
SVOC	4-Bromophenyl-phenylether	UG/L	1	0			2100	f
SVOC	4-Chloro-3-methylphenol	UG/L	1	0				
SVOC	4-Chloroaniline	UG/L	1	0			150	g
SVOC	4-Chlorophenyl-phenylether	UG/L	1	0				
SVOC	4-Methylphenol	UG/L	1	0			180	g
SVOC	4-Nitroaniline	UG/L	1	0			110	f
SVOC	4-Nitrophenol	UG/L	1	0			60	b
SVOC	Acenaphthene	UG/L	1	0			370	g
SVOC	Acenaphthylene	UG/L	1	0				
SVOC	Anthracene	UG/L	1	0			1800	g
SVOC	Benzo(a)anthracene	UG/L	1	0			0.092	g
SVOC	Benzo(a)pyrene	UG/L	1	0			2	d
SVOC	Benzo(b)fluoranthene	UG/L	1	0			0.002	c
SVOC	Benzo(g,h,i)perylene	UG/L	1	0				
SVOC	Benzo(k)fluoranthene	UG/L	1	0			0.002	c
SVOC	Butylbenzylphthalate	UG/L	1	0			7300	g
SVOC	Carbazole	UG/L	1	0			3.4	g
SVOC	Chrysene	UG/L	1	0			9.2	g

Table 1-47

Summary of OU3 Analytical Data for Former Administration Area Underground Storage Tanks
Hydropunch Groundwater Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Di-n-butylphthalate	UG/L	1	1	0.5	0.5	3700	g
SVOC	Di-n-octylphthalate	UG/L	1	0			730	g
SVOC	Dibenzo(a,h)anthracene	UG/L	1	0			0.0092	g
SVOC	Dibenzofuran	UG/L	1	0			150	g
SVOC	Diethylphthalate	UG/L	1	0			5000	b
SVOC	Dimethylphthalate	UG/L	1	0			370000	g
SVOC	Fluoranthene	UG/L	1	0			1500	g
SVOC	Fluorene	UG/L	1	0			240	g
SVOC	Hexachlorobenzene	UG/L	1	0			1	d
SVOC	Hexachlorobutadiene	UG/L	1	0			1	e
SVOC	Hexachlorocyclopentadiene	UG/L	1	0			50	d
SVOC	Hexachloroethane	UG/L	1	0			1	b
SVOC	Indeno(1,2,3-cd)pyrene	UG/L	1	0			0.092	g
SVOC	Isophorone	UG/L	1	0			40	c
SVOC	N-Nitroso-di-n-propylamine	UG/L	1	0			0.0096	g
SVOC	N-Nitrosodiphenylamine (1)	UG/L	1	0			14	g
SVOC	Naphthalene	UG/L	1	0			20	b
SVOC	Nitrobenzene (NB)	UG/L	1	0			18	g
SVOC	Pentachlorophenol	UG/L	1	0			1	d
SVOC	Phenanthrene	UG/L	1	0				
SVOC	Phenol	UG/L	1	0			4000	b
SVOC	Pyrene	UG/L	1	0			1100	g
SVOC	bis(2-Chloroethoxy)methane	UG/L	1	0				
SVOC	bis(2-Chloroethyl)ether	UG/L	1	0			0.0098	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/L	1	0			6	d
TPH	TRPH	MG/L	1	0			2	n

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-48

Summary of OU3 Analytical Data for Former Bomb Booster Assembly Area Underground Storage Tanks Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
BTEX	Benzene	UG/KG	5	0			1000*	n
BTEX	Ethylbenzene	UG/KG	5	0			1000*	n
BTEX	Toluene	UG/KG	5	0			1000*	n
BTEX	Total Xylenes	UG/KG	5	0			1000*	n
SVOC	1,2,4-Trichlorobenzene	UG/KG	6	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	6	0			2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	6	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	6	0			7400	g
SVOC	2,2'-oxybis(1-Chloropropane)	UG/KG	6	0				
SVOC	2,4,5-Trichlorophenol	UG/KG	6	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	6	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	6	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	6	0			1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	6	0			130000	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/KG	6	0			900	i
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/KG	6	0			900	i
SVOC	2-Chloronaphthalene	UG/KG	6	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	6	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	6	0				
SVOC	2-Methylphenol	UG/KG	6	0			3300000	g
SVOC	2-Nitroaniline	UG/KG	6	0			3900	g
SVOC	2-Nitrophenol	UG/KG	6	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	6	0			990	g
SVOC	3-Nitroaniline	UG/KG	6	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	6	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	6	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	6	0				
SVOC	4-Chloroaniline	UG/KG	6	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	6	0				
SVOC	4-Methylphenol	UG/KG	6	0			330000	g
SVOC	4-Nitroaniline	UG/KG	6	0			230000	g
SVOC	4-Nitrophenol	UG/KG	6	0			4800000	f
SVOC	Acenaphthene	UG/KG	6	0			360000	g
SVOC	Acenaphthylene	UG/KG	6	0				
SVOC	Anthracene	UG/KG	6	0			19000	g
SVOC	Benzo(a)anthracene	UG/KG	6	0			610	g
SVOC	Benzo(a)pyrene	UG/KG	6	0			61	g
SVOC	Benzo(b)fluoranthene	UG/KG	6	0			610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	6	0				
SVOC	Benzo(k)fluoranthene	UG/KG	6	0			6100	g
SVOC	Butylbenzylphthalate	UG/KG	6	1	633	270	13000000	g
SVOC	Carbazole	UG/KG	6	0			22000	g
SVOC	Chrysene	UG/KG	6	0			24000	g

Table 1-48

Summary of OU3 Analytical Data for Former Bomb Booster Assembly Area Underground Storage Tanks Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Di-n-butylphthalate	UG/KG	6	3	4222	1600	6500000	g
SVOC	Di-n-octylphthalate	UG/KG	6	0			1300000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	6	0			61	g
SVOC	Dibenzofuran	UG/KG	6	0			260000	g
SVOC	Diethylphthalate	UG/KG	6	0			52000000	g
SVOC	Dimethylphthalate	UG/KG	6	0			100000000	g
SVOC	Fluoranthene	UG/KG	6	0			2600000	g
SVOC	Fluorene	UG/KG	6	0			300000	g
SVOC	Hexachlorobenzene	UG/KG	6	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	6	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	6	0			450000	g
SVOC	Hexachloroethane	UG/KG	6	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	6	0			610	g
SVOC	Isophorone	UG/KG	6	0			470000	g
SVOC	N-Nitroso-di-n-propylamine	UG/KG	6	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	6	0			91000	g
SVOC	Naphthalene	UG/KG	6	0			800000	g
SVOC	Nitrobenzene (NB)	UG/KG	6	0				
SVOC	Pentachlorophenol	UG/KG	6	0			2500	g
SVOC	Phenanthrene	UG/KG	6	0				
SVOC	Phenol	UG/KG	6	0			39000000	g
SVOC	Pyrene	UG/KG	6	0			2000000	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	6	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	6	0			74	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	6	0			32000	g
TPH	TRPH	MG/KG	6	0			10	n

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-49

Summary of OU3 Analytical Data for Former Bomb Booster Area Underground Storage Tanks
Hydropunch Groundwater Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
BTEX	Benzene	UG/L	1	0			5	d
BTEX	Ethylbenzene	UG/L	1	0			700	d
BTEX	Toluene	UG/L	1	0			1000	d
BTEX	Total Xylenes	UG/L	1	0			10000	d
SVOC	1,2,4-Trichlorobenzene	UG/L	1	0			70	d
SVOC	1,2-Dichlorobenzene	UG/L	1	0			600	d
SVOC	1,3-Dichlorobenzene	UG/L	1	0			600	d
SVOC	1,4-Dichlorobenzene	UG/L	1	0			75	d
SVOC	2,2'-oxybis(1-Chloropropane)	UG/L	1	0				
SVOC	2,4,5-Trichlorophenol	UG/L	1	0			3700	g
SVOC	2,4,6-Trichlorophenol	UG/L	1	0			3	c
SVOC	2,4-Dichlorophenol	UG/L	1	0			20	b
SVOC	2,4-Dimethylphenol	UG/L	1	0			730	g
SVOC	2,4-Dinitrophenol	UG/L	1	0			73	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/L	1	0			1.24	j
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/L	1	0			0.05	c
SVOC	2-Chloronaphthalene	UG/L	1	0			2900	g
SVOC	2-Chlorophenol	UG/L	1	0			40	b
SVOC	2-Methylnaphthalene	UG/L	1	0				
SVOC	2-Methylphenol	UG/L	1	0			1800	g
SVOC	2-Nitroaniline	UG/L	1	0			2.2	g
SVOC	2-Nitrophenol	UG/L	1	0				
SVOC	3,3'-Dichlorobenzidine	UG/L	1	0			0.15	g
SVOC	3-Nitroaniline	UG/L	1	0			110	f
SVOC	4,6-Dinitro-2-methylphenol	UG/L	1	0				
SVOC	4-Bromophenyl-phenylether	UG/L	1	0			2100	f
SVOC	4-Chloro-3-methylphenol	UG/L	1	0				
SVOC	4-Chloroaniline	UG/L	1	0			150	g
SVOC	4-Chlorophenyl-phenylether	UG/L	1	0				
SVOC	4-Methylphenol	UG/L	1	0			180	g
SVOC	4-Nitroaniline	UG/L	1	0			110	f
SVOC	4-Nitrophenol	UG/L	1	0			60	b
SVOC	Acenaphthene	UG/L	1	0			370	g
SVOC	Acenaphthylene	UG/L	1	0				
SVOC	Anthracene	UG/L	1	0			1800	g
SVOC	Benzo(a)anthracene	UG/L	1	0			0.092	g
SVOC	Benzo(a)pyrene	UG/L	1	0			2	d
SVOC	Benzo(b)fluoranthene	UG/L	1	0			0.002	c
SVOC	Benzo(g,h,i)perylene	UG/L	1	0				
SVOC	Benzo(k)fluoranthene	UG/L	1	0			0.002	c
SVOC	Butylbenzylphthalate	UG/L	1	0			7300	g
SVOC	Carbazole	UG/L	1	0			3.4	g
SVOC	Chrysene	UG/L	1	0			9.2	g

Table 1-49

Summary of OU3 Analytical Data for Former Bomb Booster Area Underground Storage Tanks Hydropunch Groundwater Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Di-n-butylphthalate	UG/L	1	0			3700	g
SVOC	Di-n-octylphthalate	UG/L	1	0			730	g
SVOC	Dibenzo(a,h)anthracene	UG/L	1	0			0.0092	g
SVOC	Dibenzofuran	UG/L	1	0			150	g
SVOC	Diethylphthalate	UG/L	1	0			5000	b
SVOC	Dimethylphthalate	UG/L	1	0			370000	g
SVOC	Fluoranthene	UG/L	1	0			1500	g
SVOC	Fluorene	UG/L	1	0			240	g
SVOC	Hexachlorobenzene	UG/L	1	0			1	d
SVOC	Hexachlorobutadiene	UG/L	1	0			1	e
SVOC	Hexachlorocyclopentadiene	UG/L	1	0			50	d
SVOC	Hexachloroethane	UG/L	1	0			1	b
SVOC	Indeno(1,2,3-cd)pyrene	UG/L	1	0			0.092	g
SVOC	Isophorone	UG/L	1	0			40	c
SVOC	N-Nitroso-di-n-propylamine	UG/L	1	0			0.0096	g
SVOC	N-Nitrosodiphenylamine (1)	UG/L	1	0			14	g
SVOC	Naphthalene	UG/L	1	0			20	b
SVOC	Nitrobenzene (NB)	UG/L	1	0			18	g
SVOC	Pentachlorophenol	UG/L	1	0			1	d
SVOC	Phenanthrene	UG/L	1	0				
SVOC	Phenol	UG/L	1	1	1	1	4000	b
SVOC	Pyrene	UG/L	1	0			1100	g
SVOC	bis(2-Chloroethoxy)methane	UG/L	1	0				
SVOC	bis(2-Chloroethyl)ether	UG/L	1	0			0.0098	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/L	1	1	0.9	0.9	6	d
TPH	TRPH	MG/L	1	0			2	n

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-50

Summary of OU3 Analytical Data for Former Atlas Missile Area Underground Storage Tanks Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
BTEX	Benzene	UG/KG	12	0			1000*	n
BTEX	Ethylbenzene	UG/KG	12	0			1000*	n
BTEX	Toluene	UG/KG	12	0			1000*	n
BTEX	Total Xylenes	UG/KG	12	0			1000*	n
SVOC	1,2,4-Trichlorobenzene	UG/KG	13	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	13	0			2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	13	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	13	0			7400	g
SVOC	2,2'-oxybis(1-Chloropropane)	UG/KG	13	0				
SVOC	2,4,5-Trichlorophenol	UG/KG	13	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	13	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	13	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	13	0			1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	13	0			130000	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/KG	13	0			900	i
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/KG	13	0			900	i
SVOC	2-Chloronaphthalene	UG/KG	13	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	13	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	13	0				
SVOC	2-Methylphenol	UG/KG	13	0			3300000	g
SVOC	2-Nitroaniline	UG/KG	13	0			3900	g
SVOC	2-Nitrophenol	UG/KG	13	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	13	0			990	g
SVOC	3-Nitroaniline	UG/KG	13	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	13	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	13	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	13	0				
SVOC	4-Chloroaniline	UG/KG	13	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	13	0				
SVOC	4-Methylphenol	UG/KG	13	0			330000	g
SVOC	4-Nitroaniline	UG/KG	13	0			230000	g
SVOC	4-Nitrophenol	UG/KG	13	0			4800000	f
SVOC	Acenaphthene	UG/KG	13	0			360000	g
SVOC	Acenaphthylene	UG/KG	13	0				
SVOC	Anthracene	UG/KG	13	0			19000	g
SVOC	Benzo(a)anthracene	UG/KG	13	0			610	g
SVOC	Benzo(a)pyrene	UG/KG	13	0			61	g
SVOC	Benzo(b)fluoranthene	UG/KG	13	0			610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	13	0				
SVOC	Benzo(k)fluoranthene	UG/KG	13	0			6100	g
SVOC	Butylbenzylphthalate	UG/KG	13	1	1164	270	13000000	g
SVOC	Carbazole	UG/KG	13	0			22000	g
SVOC	Chrysene	UG/KG	13	0			24000	g

Table 1-50

Summary of OU3 Analytical Data for Former Atlas Missile Area Underground Storage Tanks Soil Sampling Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Di-n-butylphthalate	UG/KG	13	3	3327	600	6500000	g
SVOC	Di-n-octylphthalate	UG/KG	13	0			1300000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	13	0			61	g
SVOC	Dibenzofuran	UG/KG	13	0			260000	g
SVOC	Diethylphthalate	UG/KG	13	0			52000000	g
SVOC	Dimethylphthalate	UG/KG	13	0			100000000	g
SVOC	Fluoranthene	UG/KG	13	0			2600000	g
SVOC	Fluorene	UG/KG	13	0			300000	g
SVOC	Hexachlorobenzene	UG/KG	13	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	13	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	13	0			450000	g
SVOC	Hexachloroethane	UG/KG	13	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	13	0			610	g
SVOC	Isophorone	UG/KG	13	0			470000	g
SVOC	N-Nitroso-di-n-propylamine	UG/KG	13	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	13	0			91000	g
SVOC	Naphthalene	UG/KG	13	0			800000	g
SVOC	Nitrobenzene (NB)	UG/KG	13	0				
SVOC	Pentachlorophenol	UG/KG	13	0			2500	g
SVOC	Phenanthrene	UG/KG	13	0				
SVOC	Phenol	UG/KG	13	0			39000000	g
SVOC	Pyrene	UG/KG	13	1	50	180	2000000	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	13	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	13	0			74	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	13	1	246	200	32000	g
TPH	TRPH	MG/KG	13	1	21	6.9	10	n

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-51

Summary of OU3 Analytical Data for Former Atlas Missile Area Underground Storage Tanks
Hydropunch Groundwater Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
BTEX	Benzene	UG/L	2	0			5	d
BTEX	Ethylbenzene	UG/L	2	0			700	d
BTEX	Toluene	UG/L	2	1	2.8	1.7	1000	d
BTEX	Total Xylenes	UG/L	2	0			10000	d
SVOC	1,2,4-Trichlorobenzene	UG/L	2	0			70	d
SVOC	1,2-Dichlorobenzene	UG/L	2	0			600	d
SVOC	1,3-Dichlorobenzene	UG/L	2	0			600	d
SVOC	1,4-Dichlorobenzene	UG/L	2	0			75	d
SVOC	2,2'-oxybis(1-Chloropropane)	UG/L	2	0				
SVOC	2,4,5-Trichlorophenol	UG/L	2	0			3700	g
SVOC	2,4,6-Trichlorophenol	UG/L	2	0			3	c
SVOC	2,4-Dichlorophenol	UG/L	2	0			20	b
SVOC	2,4-Dimethylphenol	UG/L	2	0			730	g
SVOC	2,4-Dinitrophenol	UG/L	2	0			73	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/L	2	0			1.24	j
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/L	2	0			0.05	c
SVOC	2-Chloronaphthalene	UG/L	2	0			2900	g
SVOC	2-Chlorophenol	UG/L	2	0			40	b
SVOC	2-Methylnaphthalene	UG/L	2	0				
SVOC	2-Methylphenol	UG/L	2	0			1800	g
SVOC	2-Nitroaniline	UG/L	2	0			2.2	g
SVOC	2-Nitrophenol	UG/L	2	0				
SVOC	3,3'-Dichlorobenzidine	UG/L	2	0			0.15	g
SVOC	3-Nitroaniline	UG/L	2	0			110	f
SVOC	4,6-Dinitro-2-methylphenol	UG/L	2	0				
SVOC	4-Bromophenyl-phenylether	UG/L	2	0			2100	f
SVOC	4-Chloro-3-methylphenol	UG/L	2	0				
SVOC	4-Chloroaniline	UG/L	2	0			150	g
SVOC	4-Chlorophenyl-phenylether	UG/L	2	0				
SVOC	4-Methylphenol	UG/L	2	0			180	g
SVOC	4-Nitroaniline	UG/L	2	0			110	f
SVOC	4-Nitrophenol	UG/L	2	0			60	b
SVOC	Acenaphthene	UG/L	2	0			370	g
SVOC	Acenaphthylene	UG/L	2	0				
SVOC	Anthracene	UG/L	2	0			1800	g
SVOC	Benzo(a)anthracene	UG/L	2	0			0.092	g
SVOC	Benzo(a)pyrene	UG/L	2	0			2	d
SVOC	Benzo(b)fluoranthene	UG/L	2	0			0.002	c
SVOC	Benzo(g,h,i)perylene	UG/L	2	0				
SVOC	Benzo(k)fluoranthene	UG/L	2	0			0.002	c
SVOC	Butylbenzylphthalate	UG/L	2	2	0.4	0.35	7300	g
SVOC	Carbazole	UG/L	2	0			3.4	g
SVOC	Chrysene	UG/L	2	0			9.2	g

Table 1-51

Summary of OU3 Analytical Data for Former Atlas Missile Area Underground Storage Tanks
Hydropunch Groundwater Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Di-n-butylphthalate	UG/L	2	2	0.5	0.5	3700	g
SVOC	Di-n-octylphthalate	UG/L	2	0			730	g
SVOC	Dibenzo(a,h)anthracene	UG/L	2	0			0.0092	g
SVOC	Dibenzofuran	UG/L	2	0			150	g
SVOC	Diethylphthalate	UG/L	2	0			5000	b
SVOC	Dimethylphthalate	UG/L	2	0			370000	g
SVOC	Fluoranthene	UG/L	2	0			1500	g
SVOC	Fluorene	UG/L	2	0			240	g
SVOC	Hexachlorobenzene	UG/L	2	0			1	d
SVOC	Hexachlorobutadiene	UG/L	2	0			1	e
SVOC	Hexachlorocyclopentadiene	UG/L	2	0			50	d
SVOC	Hexachloroethane	UG/L	2	0			1	b
SVOC	Indeno(1,2,3-cd)pyrene	UG/L	2	0			0.092	g
SVOC	Isophorone	UG/L	2	0			40	c
SVOC	N-Nitroso-di-n-propylamine	UG/L	2	0			0.0096	g
SVOC	N-Nitrosodiphenylamine (1)	UG/L	2	0			14	g
SVOC	Naphthalene	UG/L	2	0			20	b
SVOC	Nitrobenzene (NB)	UG/L	2	0			18	g
SVOC	Pentachlorophenol	UG/L	2	0			1	d
SVOC	Phenanthrene	UG/L	2	0				
SVOC	Phenol	UG/L	2	0			4000	b
SVOC	Pyrene	UG/L	2	0			1100	g
SVOC	bis(2-Chloroethoxy)methane	UG/L	2	0				
SVOC	bis(2-Chloroethyl)ether	UG/L	2	0			0.0098	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/L	2	2	0.7	0.65	6	d
TPH	TRPH	MG/L	2	0			2	n

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-52

Summary of OU3 Analytical Data for Former Global Communications Center Underground Storage Tanks
Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
BTEX	Benzene	UG/KG	16	0			1000*	n
BTEX	Ethylbenzene	UG/KG	16	0			1000*	n
BTEX	Toluene	UG/KG	16	0			1000*	n
BTEX	Total Xylenes	UG/KG	16	0			1000*	n
SVOC	1,2,4-Trichlorobenzene	UG/KG	16	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	16	0			2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	16	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	16	0			7400	g
SVOC	2,2'-oxybis(1-Chloropropane)	UG/KG	16	0				
SVOC	2,4,5-Trichlorophenol	UG/KG	16	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	16	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	16	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	16	0			1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	16	0			130000	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/KG	16	0			900	i
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/KG	16	0			900	i
SVOC	2-Chloronaphthalene	UG/KG	16	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	16	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	16	0				
SVOC	2-Methylphenol	UG/KG	16	0			3300000	g
SVOC	2-Nitroaniline	UG/KG	16	0			3900	g
SVOC	2-Nitrophenol	UG/KG	16	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	16	0			990	g
SVOC	3-Nitroaniline	UG/KG	16	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	16	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	16	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	16	1	90	180		
SVOC	4-Chloroaniline	UG/KG	16	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	16	0				
SVOC	4-Methylphenol	UG/KG	16	0			330000	g
SVOC	4-Nitroaniline	UG/KG	16	0			230000	g
SVOC	4-Nitrophenol	UG/KG	16	0			4800000	f
SVOC	Acenaphthene	UG/KG	16	2	180	180	360000	g
SVOC	Acenaphthylene	UG/KG	16	0				
SVOC	Anthracene	UG/KG	16	4	180	160	19000	g
SVOC	Benzo(a)anthracene	UG/KG	16	5	1100	240	610	g
SVOC	Benzo(a)pyrene	UG/KG	16	4	1100	250	61	g
SVOC	Benzo(b)fluoranthene	UG/KG	16	5	1600	290	610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	16	4	720	210		
SVOC	Benzo(k)fluoranthene	UG/KG	16	5	520	180	6100	g
SVOC	Butylbenzylphthalate	UG/KG	16	2	16	160	13000000	g
SVOC	Carbazole	UG/KG	16	2	230	180	22000	g
SVOC	Chrysene	UG/KG	16	5	930	230	24000	g

Table 1-52

Summary of OU3 Analytical Data for Former Global Communications Center Underground Storage Tanks
Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Di-n-butylphthalate	UG/KG	16	0			6500000	g
SVOC	Di-n-octylphthalate	UG/KG	16	0			1300000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	16	3	170	170	61	g
SVOC	Dibenzofuran	UG/KG	16	0			260000	g
SVOC	Diethylphthalate	UG/KG	16	0			52000000	g
SVOC	Dimethylphthalate	UG/KG	16	0			100000000	g
SVOC	Fluoranthene	UG/KG	16	5	2800	430	2600000	g
SVOC	Fluorene	UG/KG	16	2	87	170	300000	g
SVOC	Hexachlorobenzene	UG/KG	16	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	16	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	16	0			450000	g
SVOC	Hexachloroethane	UG/KG	16	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	16	4	650	200	610	g
SVOC	Isophorone	UG/KG	16	0			470000	g
SVOC	N-Nitroso-di-n-propylamine	UG/KG	16	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	16	0			91000	g
SVOC	Naphthalene	UG/KG	16	1	31	170	800000	g
SVOC	Nitrobenzene (NB)	UG/KG	16	0				
SVOC	Pentachlorophenol	UG/KG	16	2	110	400	2500	g
SVOC	Phenanthrene	UG/KG	16	5	1500	280		
SVOC	Phenol	UG/KG	16	0			39000000	g
SVOC	Pyrene	UG/KG	16	5	2200	360	2000000	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	16	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	16	0			74	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	16	0			32000	g
TPH	TRPH	MG/KG	16	1	13	4.5	10	n

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-53

Summary of OU3 Analytical Data for Former Global Communications Center Underground Storage Tanks
Hydropunch Groundwater Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
BTEX	Benzene	UG/L	2	0			5	d
BTEX	Ethylbenzene	UG/L	2	0			700	d
BTEX	Toluene	UG/L	2	0			1000	d
BTEX	Total Xylenes	UG/L	2	0			10000	d
SVOC	1,2,4-Trichlorobenzene	UG/L	2	0			70	d
SVOC	1,2-Dichlorobenzene	UG/L	2	0			600	d
SVOC	1,3-Dichlorobenzene	UG/L	2	0			600	d
SVOC	1,4-Dichlorobenzene	UG/L	2	0			75	d
SVOC	2,2'-oxybis(1-Chloropropane)	UG/L	2	0				
SVOC	2,4,5-Trichlorophenol	UG/L	2	0			3700	g
SVOC	2,4,6-Trichlorophenol	UG/L	2	0			3	c
SVOC	2,4-Dichlorophenol	UG/L	2	0			20	b
SVOC	2,4-Dimethylphenol	UG/L	2	0			730	g
SVOC	2,4-Dinitrophenol	UG/L	2	0			73	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/L	2	0			1.24	j
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/L	2	0			0.05	c
SVOC	2-Chloronaphthalene	UG/L	2	0			2900	g
SVOC	2-Chlorophenol	UG/L	2	0			40	b
SVOC	2-Methylnaphthalene	UG/L	2	0				
SVOC	2-Methylphenol	UG/L	2	0			1800	g
SVOC	2-Nitroaniline	UG/L	2	0			2.2	g
SVOC	2-Nitrophenol	UG/L	2	0				
SVOC	3,3'-Dichlorobenzidine	UG/L	2	0			0.15	g
SVOC	3-Nitroaniline	UG/L	2	0			110	f
SVOC	4,6-Dinitro-2-methylphenol	UG/L	2	0				
SVOC	4-Bromophenyl-phenylether	UG/L	2	0			2100	f
SVOC	4-Chloro-3-methylphenol	UG/L	2	0				
SVOC	4-Chloroaniline	UG/L	2	0			150	g
SVOC	4-Chlorophenyl-phenylether	UG/L	2	0				
SVOC	4-Methylphenol	UG/L	2	0			180	g
SVOC	4-Nitroaniline	UG/L	2	0			110	f
SVOC	4-Nitrophenol	UG/L	2	0			60	b
SVOC	Acenaphthene	UG/L	2	0			370	g
SVOC	Acenaphthylene	UG/L	2	0				
SVOC	Anthracene	UG/L	2	0			1800	g
SVOC	Benzo(a)anthracene	UG/L	2	0			0.092	g
SVOC	Benzo(a)pyrene	UG/L	2	0			2	d
SVOC	Benzo(b)fluoranthene	UG/L	2	0			0.002	c
SVOC	Benzo(g,h,i)perylene	UG/L	2	0				
SVOC	Benzo(k)fluoranthene	UG/L	2	0			0.002	c
SVOC	Butylbenzylphthalate	UG/L	2	1	4	4.5	7300	g
SVOC	Carbazole	UG/L	2	0			3.4	g
SVOC	Chrysene	UG/L	2	0			9.2	g

Table 1-53

Summary of OU3 Analytical Data for Former Global Communications Center Underground Storage Tanks
Hydropunch Groundwater Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Di-n-butylphthalate	UG/L	2	0			3700	g
SVOC	Di-n-octylphthalate	UG/L	2	0			730	g
SVOC	Dibenzo(a,h)anthracene	UG/L	2	0			0.0092	g
SVOC	Dibenzofuran	UG/L	2	0			150	g
SVOC	Diethylphthalate	UG/L	2	1	1	3	5000	b
SVOC	Dimethylphthalate	UG/L	2	0			370000	g
SVOC	Fluoranthene	UG/L	2	0			1500	g
SVOC	Fluorene	UG/L	2	0			240	g
SVOC	Hexachlorobenzene	UG/L	2	0			1	d
SVOC	Hexachlorobutadiene	UG/L	2	0			1	e
SVOC	Hexachlorocyclopentadiene	UG/L	2	0			50	d
SVOC	Hexachloroethane	UG/L	2	0			1	b
SVOC	Indeno(1,2,3-cd)pyrene	UG/L	2	0			0.092	g
SVOC	Isophorone	UG/L	2	0			40	c
SVOC	N-Nitroso-di-n-propylamine	UG/L	2	0			0.0096	g
SVOC	N-Nitrosodiphenylamine (1)	UG/L	2	0			14	g
SVOC	Naphthalene	UG/L	2	0			20	b
SVOC	Nitrobenzene (NB)	UG/L	2	0			18	g
SVOC	Pentachlorophenol	UG/L	2	1	0.3	6.4	1	d
SVOC	Phenanthrene	UG/L	2	0				
SVOC	Phenol	UG/L	2	0			4000	b
SVOC	Pyrene	UG/L	2	0			1100	g
SVOC	bis(2-Chloroethoxy)methane	UG/L	2	0				
SVOC	bis(2-Chloroethyl)ether	UG/L	2	0			0.0098	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/L	2	0			6	d
TPH	TRPH	MG/L	2	0			2	n

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-54

Summary of OU3 Analytical Data for Geophysical Anomaly at Load Line 3 Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	1,2,4-Trichlorobenzene	UG/KG	12	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	12	0			2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	12	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	12	0			7400	g
SVOC	2,2'-oxybis(1-Chloropropane)	UG/KG	12	0				
SVOC	2,4,5-Trichlorophenol	UG/KG	12	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	12	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	12	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	12	0			1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	12	0			130000	g
SVOC	2,4-Dinitrotoluene (2,4-DNT)	UG/KG	12	0			900	i
SVOC	2,6-Dinitrotoluene (2,6-DNT)	UG/KG	12	0			900	i
SVOC	2-Chloronaphthalene	UG/KG	12	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	12	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	12	0				
SVOC	2-Methylphenol	UG/KG	12	1	69	190	3300000	g
SVOC	2-Nitroaniline	UG/KG	12	0			3900	g
SVOC	2-Nitrophenol	UG/KG	12	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	12	0			990	g
SVOC	3-Nitroaniline	UG/KG	12	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	12	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	12	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	12	0				
SVOC	4-Chloroaniline	UG/KG	12	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	12	0				
SVOC	4-Methylphenol	UG/KG	12	1	101	200	330000	g
SVOC	4-Nitroaniline	UG/KG	12	0			230000	g
SVOC	4-Nitrophenol	UG/KG	12	0			4800000	f
SVOC	Acenaphthene	UG/KG	12	0			360000	g
SVOC	Acenaphthylene	UG/KG	12	0				
SVOC	Anthracene	UG/KG	12	0			19000	g
SVOC	Benzo(a)anthracene	UG/KG	12	1	69	190	610	g
SVOC	Benzo(a)pyrene	UG/KG	12	0			61	g
SVOC	Benzo(b)fluoranthene	UG/KG	12	2	140	180	610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	12	0				
SVOC	Benzo(k)fluoranthene	UG/KG	12	2	148	180	6100	g
SVOC	Butylbenzylphthalate	UG/KG	12	0			13000000	g
SVOC	Carbazole	UG/KG	12	0			22000	g
SVOC	Chrysene	UG/KG	12	1	76	190	24000	g
SVOC	Di-n-butylphthalate	UG/KG	12	2	2666	610	6500000	g
SVOC	Di-n-octylphthalate	UG/KG	12	0			1300000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	12	0			61	g
SVOC	Dibenzofuran	UG/KG	12	0			260000	g
SVOC	Diethylphthalate	UG/KG	12	0			52000000	g

Table 1-54

Summary of OU3 Analytical Data for Geophysical Anomaly at Load Line 3 Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
SVOC	Dimethylphthalate	UG/KG	12	0			100000000	g
SVOC	Fluoranthene	UG/KG	12	1	56	190	2600000	g
SVOC	Fluorene	UG/KG	12	0			300000	g
SVOC	Hexachlorobenzene	UG/KG	12	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	12	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	12	0			450000	g
SVOC	Hexachloroethane	UG/KG	12	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	12	0			610	g
SVOC	Isophorone	UG/KG	12	0			470000	g
SVOC	N-Nitroso-di-n-propylamine	UG/KG	12	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	12	0			91000	g
SVOC	Naphthalene	UG/KG	12	0			800000	g
SVOC	Nitrobenzene (NB)	UG/KG	12	0				
SVOC	Pentachlorophenol	UG/KG	12	0			2500	g
SVOC	Phenanthrene	UG/KG	12	0				
SVOC	Phenol	UG/KG	12	1	86	190	39000000	g
SVOC	Pyrene	UG/KG	12	2	134	180	2000000	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	12	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	12	0			74	g
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	12	2	1691	350	32000	g
EXP	1,3,5-Trinitrobenzene	MG/KG	12	0			1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	12	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	12	0			17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	12	0			0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	12	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	12	0				
EXP	2-Nitrotoluene	MG/KG	12	0			343*	i
EXP	3-Nitrotoluene	MG/KG	12	0			343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	12	0				
EXP	4-Nitrotoluene	MG/KG	12	0			343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	12	0			5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	12	0			343	i
EXP	Nitrobenzene	MG/KG	12	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	12	9	0.062	0.085	1715.2	i
METALS	Aluminum	MG/KG	11	11	19100	11000	33852	h
METALS	Antimony	MG/KG	4	0			31	g
METALS	Arsenic	MG/KG	11	9	9	6.5	13.5	h
METALS	Barium	MG/KG	11	11	343	190	440	h
METALS	Beryllium	MG/KG	11	11	0.79	0.55	1.52	h
METALS	Cadmium	MG/KG	11	9	0.61	0.42	39	g
METALS	Calcium	MG/KG	11	11	10100	4500	GRAS	k
METALS	Chromium	MG/KG	11	11	20.9	13	37	h
METALS	Cobalt	MG/KG	11	11	10.3	7.8	17.2	h
METALS	Copper	MG/KG	11	11	20.7	15	33.9	h

Table 1-54

Summary of OU3 Analytical Data for Geophysical Anomaly at Load Line 3 Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
METALS	Iron	MG/KG	11	11	20400	15000	GRAS	k
METALS	Lead	MG/KG	11	11	15.8	11	400	g
METALS	Magnesium	MG/KG	11	11	6560	3600	GRAS	k
METALS	Manganese	MG/KG	11	11	724	470	1083	h
METALS	Mercury	MG/KG	11	0			23	g
METALS	Nickel	MG/KG	11	11	25.8	18	39.3	h
METALS	Potassium	MG/KG	11	11	3190	2000	GRAS	k
METALS	Selenium	MG/KG	11	5	2.1	1.1	390	g
METALS	Silver	MG/KG	11	0			380	g
METALS	Sodium	MG/KG	11	4	705	230	GRAS	k
METALS	Thallium	MG/KG	11	0			1.72	h
METALS	Vanadium	MG/KG	11	11	45.5	26	72.5	h
METALS	Zinc	MG/KG	11	11	72.1	52	119.5	h
VOC	1,1,1-Trichloroethane	UG/KG	10	0			3000000	g
VOC	1,1,2,2-Tetrachloroethane	UG/KG	10	0			900	g
VOC	1,1,2-Trichloroethane	UG/KG	10	0			1400	g
VOC	1,1-Dichloroethane	UG/KG	10	0			840000	g
VOC	1,1-Dichloroethene	UG/KG	10	0			38	g
VOC	1,2-Dichloroethane	UG/KG	10	0			440	g
VOC	1,2-Dichloropropane	UG/KG	10	0			680	g
VOC	2-Butanone	UG/KG	10	0			8700000	g
VOC	2-Hexanone	UG/KG	10	0				
VOC	4-Methyl-2-Pentanone	UG/KG	10	0			5200000	g
VOC	Acetone	UG/KG	10	0			2000000	g
VOC	Benzene	UG/KG	10	0			1400	g
VOC	Bromodichloromethane	UG/KG	10	0			1400	g
VOC	Bromoform	UG/KG	10	0			56000	g
VOC	Bromomethane	UG/KG	10	0			15000	g
VOC	Carbon Disulfide	UG/KG	10	0			16000	g
VOC	Carbon Tetrachloride	UG/KG	10	0			470	g
VOC	Chlorobenzene	UG/KG	10	0			160000	g
VOC	Chloroethane	UG/KG	10	0			1100000	g
VOC	Chloroform	UG/KG	10	0			530	g
VOC	Chloromethane	UG/KG	10	0			2000	g
VOC	Dibromochloromethane	UG/KG	10	0			5300	g
VOC	Ethylbenzene	UG/KG	10	0			690000	g
VOC	M/P-Xylenes	UG/KG	10	0				
VOC	Methylene Chloride	UG/KG	10	0			11000	g
VOC	O-Xylene	UG/KG	10	0				
VOC	Styrene	UG/KG	10	0			2200000	g
VOC	Tetrachloroethene	UG/KG	10	0			7000	g
VOC	Toluene	UG/KG	10	0			1900000	g
VOC	Trichloroethene (TCE)	UG/KG	10	0			7100	g
VOC	Vinyl Chloride	UG/KG	10	0			5.2	g

Table 1-54

Summary of OU3 Analytical Data for Geophysical Anomaly at Load Line 3 Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
VOC	cis-1,2-Dichloroethene	UG/KG	10	0			59000	g
VOC	cis-1,3-Dichloropropene	UG/KG	10	0			510	g
VOC	trans-1,2-Dichloroethene	UG/KG	10	0			170000	g
VOC	trans-1,3-Dichloropropene	UG/KG	10	0			510	g

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-55

Summary of OU3 Analytical Data for Northeast Boundary Area Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene	MG/KG	9	0			1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	9	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	9	0			17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	9	0			0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	9	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	9	0				
EXP	2-Nitrotoluene	MG/KG	9	0			343*	l
EXP	3-Nitrotoluene	MG/KG	9	0			343*	l
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	9	0				
EXP	4-Nitrotoluene	MG/KG	9	0			343*	l
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	9	0			5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	9	0			343	i
EXP	Nitrobenzene	MG/KG	9	0				
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	9	0			1715.2	i
METALS	Aluminum	MG/KG	9	9	35000	24000	33852	h
METALS	Antimony	MG/KG	9	0			31	g
METALS	Arsenic	MG/KG	9	9	11	8.9	13.5	h
METALS	Barium	MG/KG	9	9	350	280	440	h
METALS	Beryllium	MG/KG	9	9	1.3	1.1	1.52	h
METALS	Cadmium	MG/KG	9	1	0.90	0.36	39	g
METALS	Calcium	MG/KG	9	9	5000	4100	GRAS	k
METALS	Chromium	MG/KG	9	9	38	27	37	h
METALS	Cobalt	MG/KG	9	9	18	13	17.2	h
METALS	Copper	MG/KG	9	9	110	28	33.9	h
METALS	Iron	MG/KG	9	9	28000	23000	GRAS	k
METALS	Lead	MG/KG	9	9	31	20	400	g
METALS	Magnesium	MG/KG	9	9	6500	4800	GRAS	k
METALS	Manganese	MG/KG	9	9	890	740	1083	h
METALS	Mercury	MG/KG	9	0			23	g
METALS	Nickel	MG/KG	9	9	32	25	39.3	h
METALS	Potassium	MG/KG	9	9	5500	3800	GRAS	k
METALS	Selenium	MG/KG	9	2	1.8	1.1	390	g
METALS	Silver	MG/KG	9	0			380	g
METALS	Sodium	MG/KG	9	2	180	60	GRAS	k
METALS	Thallium	MG/KG	9	9	0.50	0.39	1.72	h
METALS	Vanadium	MG/KG	9	9	82	55	72.5	h
METALS	Zinc	MG/KG	9	9	99	75	119.5	h
SVOC	1,2,4-Trichlorobenzene	UG/KG	9	0			620000	g
SVOC	1,2-Dichlorobenzene	UG/KG	9	0			2300000	g
SVOC	1,3-Dichlorobenzene	UG/KG	9	0			2800000	g
SVOC	1,4-Dichlorobenzene	UG/KG	9	0			7400	g
SVOC	2,4,5-Trichlorophenol	UG/KG	9	0			6500000	g
SVOC	2,4,6-Trichlorophenol	UG/KG	9	0			40000	g
SVOC	2,4-Dichlorophenol	UG/KG	9	0			200000	g
SVOC	2,4-Dimethylphenol	UG/KG	9	0			1300000	g
SVOC	2,4-Dinitrophenol	UG/KG	9	0			130000	g

Table 1-55

Summary of OU3 Analytical Data for Northeast Boundary Area Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
SVOC	2,4-Dinitrotoluene	UG/KG	9	0			0.9	i
SVOC	2,6-Dinitrotoluene	UG/KG	9	1	28	28	0.9	i
SVOC	2-Chloronaphthalene	UG/KG	9	0			5200000	g
SVOC	2-Chlorophenol	UG/KG	9	0			330000	g
SVOC	2-Methylnaphthalene	UG/KG	9	0				
SVOC	2-Methylphenol	UG/KG	9	0			3300000	g
SVOC	2-Nitroaniline	UG/KG	9	0			3900	g
SVOC	2-Nitrophenol	UG/KG	9	0				
SVOC	3- & 4-Methylphenol	UG/KG	9	0				
SVOC	3,3'-Dichlorobenzidine	UG/KG	9	0			990	g
SVOC	3-Nitroaniline	UG/KG	9	0			230000	f
SVOC	4,6-Dinitro-2-methylphenol	UG/KG	9	0				
SVOC	4-Bromophenyl-phenylether	UG/KG	9	0			4500000	f
SVOC	4-Chloro-3-methylphenol	UG/KG	9	0				
SVOC	4-Chloroaniline	UG/KG	9	0			260000	g
SVOC	4-Chlorophenyl-phenylether	UG/KG	9	0				
SVOC	4-Nitroaniline	UG/KG	9	0			230000	g
SVOC	4-Nitrophenol	UG/KG	9	0			4800000	f
SVOC	Acenaphthene	UG/KG	9	0			360000	g
SVOC	Acenaphthylene	UG/KG	9	0				
SVOC	Anthracene	UG/KG	9	0			19000	g
SVOC	Benzo(a)anthracene	UG/KG	9	0			610	g
SVOC	Benzo(a)pyrene	UG/KG	9	0			61	g
SVOC	Benzo(b)fluoranthene	UG/KG	9	0			610	g
SVOC	Benzo(g,h,i)perylene	UG/KG	9	1	14	6.5		
SVOC	Benzo(k)fluoranthene	UG/KG	9	0			6100	g
SVOC	bis(2-Chloroethoxy)methane	UG/KG	9	0				
SVOC	bis(2-Chloroethyl)ether	UG/KG	9	0			74	g
SVOC	bis(2-Chloroisopropyl)ether	UG/KG	9	0				
SVOC	bis(2-Ethylhexyl)phthalate	UG/KG	9	0			32000	g
SVOC	Butylbenzylphthalate	UG/KG	9	0			13000000	g
SVOC	Carbazole	UG/KG	9	0			22000	g
SVOC	Chrysene	UG/KG	9	0			24000	g
SVOC	Dibenzo(a,h)anthracene	UG/KG	9	0			61	g
SVOC	Dibenzofuran	UG/KG	9	0			260000	g
SVOC	Diethylphthalate	UG/KG	9	0			52000000	g
SVOC	Dimethylphthalate	UG/KG	9	0			100000000	g
SVOC	Di-n-butylphthalate	UG/KG	9	0			6500000	g
SVOC	Di-n-octylphthalate	UG/KG	9	0			1300000	g
SVOC	Fluoranthene	UG/KG	9	1	21	7.4	2600000	g
SVOC	Fluorene	UG/KG	9	0			300000	g
SVOC	Hexachlorobenzene	UG/KG	9	0			280	g
SVOC	Hexachlorobutadiene	UG/KG	9	0			5700	g
SVOC	Hexachlorocyclopentadiene	UG/KG	9	0			450000	g
SVOC	Hexachloroethane	UG/KG	9	0			32000	g
SVOC	Indeno(1,2,3-cd)pyrene	UG/KG	9	0			610	g

Table 1-55

Summary of OU3 Analytical Data for Northeast Boundary Area Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
SVOC	Isophorone	UG/KG	9	0			470000	g
SVOC	Naphthalene	UG/KG	9	0			800000	g
SVOC	Nitrobenzene	UG/KG	9	0				i
SVOC	N-Nitroso-di-n-propylamine	UG/KG	9	0			63	g
SVOC	N-Nitrosodiphenylamine (1)	UG/KG	9	0			91000	g
SVOC	Pentachlorophenol	UG/KG	9	0			2500	g
SVOC	Phenanthrene	UG/KG	9	0				
SVOC	Phenol	UG/KG	9	0			39000000	g
SVOC	Pyrene	UG/KG	9	1	16	6.9	2000000	g
VOC	1,1,1-Trichloroethane	UG/KG	9	0			3000000	g
VOC	1,1,2,2-Tetrachloroethane	UG/KG	9	0			900	g
VOC	1,1,2-Trichloroethane	UG/KG	9	0			1400	g
VOC	1,1-Dichloroethane	UG/KG	9	0			840000	g
VOC	1,1-Dichloroethene	UG/KG	9	0			38	g
VOC	1,2-Dibromo-3-chloropropane	UG/KG	9	0				
VOC	1,2-Dibromoethane	UG/KG	9	0				
VOC	1,2-Dichlorobenzene	UG/KG	9	0			2300000	g
VOC	1,2-Dichloroethane	UG/KG	9	0			440	g
VOC	1,2-Dichloropropane	UG/KG	9	0			680	g
VOC	1,3-Dichlorobenzene	UG/KG	9	0			2800000	g
VOC	1,4-Dichlorobenzene	UG/KG	9	0			7400	g
VOC	2,2-Dichloropropane	UG/KG	9	0				
VOC	2-Butanone	UG/KG	9	0			8700000	g
VOC	2-Hexanone	UG/KG	9	0				
VOC	4-Methyl-2-Pentanone	UG/KG	9	0			5200000	g
VOC	Acetone	UG/KG	9	0			2000000	g
VOC	Benzene	UG/KG	9	0			1400	g
VOC	Bromochloromethane	UG/KG	9	0				
VOC	Bromodichloromethane	UG/KG	9	0			1400	g
VOC	Bromoform	UG/KG	9	0			56000	g
VOC	Bromomethane	UG/KG	9	0			15000	g
VOC	Carbon Disulfide	UG/KG	9	0			16000	g
VOC	Chlorobenzene	UG/KG	9	0			160000	g
VOC	Chloroethane	UG/KG	9	0			1100000	g
VOC	Chloroform	UG/KG	9	0			530	g
VOC	Chloromethane	UG/KG	9	0			2000	g
VOC	cis-1,2-Dichloroethene	UG/KG	9	0			59000	g
VOC	cis-1,3-Dichloropropene	UG/KG	9	0			510	g
VOC	Dibromochloromethane	UG/KG	9	0			5300	g
VOC	Ethylbenzene	UG/KG	9	0			690000	g
VOC	M/P-Xylenes	UG/KG	9	0				
VOC	Methylene Chloride	UG/KG	9	0			11000	g
VOC	O-Xylene	UG/KG	9	0				
VOC	Styrene	UG/KG	9	0			2200000	g
VOC	Tetrachloroethene	UG/KG	9	0			7000	g
VOC	Toluene	UG/KG	9	0			1900000	g

Table 1-55

Summary of OU3 Analytical Data for Northeast Boundary Area Soil Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
VOC	trans-1,2-Dichloroethene	UG/KG	9	0			170000	g
VOC	trans-1,3-Dichloropropene	UG/KG	9	0			510	g
VOC	Trichloroethene	UG/KG	9	0			7100	g
VOC	Vinyl Chloride	UG/KG	9	0			5.2	g

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-56

Summary of OU3 Analytical Data for NRD Resevoir April 1999 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
DMET	Aluminum	UG/L	5	3	340	190		
DMET	Antimony	UG/L	5	1	1.0	1.4		
DMET	Arsenic	UG/L	5	5	2.8	2.8		
DMET	Barium	UG/L	5	5	130	130		
DMET	Beryllium	UG/L	5	2	1.0	0.9		
DMET	Cadmium	UG/L	5	0				
DMET	Calcium	UG/L	5	5	34000	33000		
DMET	Chromium	UG/L	5	0				
DMET	Cobalt	UG/L	5	0				
DMET	Copper	UG/L	5	0				
DMET	Iron	UG/L	5	0				
DMET	Lead	UG/L	5	1	0.11	0.42		
DMET	Magnesium	UG/L	5	5	16000	15000		
DMET	Manganese	UG/L	5	5	100	95		
DMET	Mercury	UG/L	4	0				
DMET	Nickel	UG/L	5	0				
DMET	Potassium	UG/L	5	5	11000	11000		
DMET	Selenium	UG/L	5	5	7.4	7.2		
DMET	Silver	UG/L	5	0				
DMET	Sodium	UG/L	5	5	39000	38000		
DMET	Thallium	UG/L	5	0				
DMET	Vanadium	UG/L	5	0				
DMET	Zinc	UG/L	5	3	22	15		
EXP	1,3,5-Trinitrobenzene	UG/L	5	0			0.778	j
EXP	1,3-Dinitrobenzene	UG/L	5	0			1	b
EXP	2,4,6-Trinitrotoluene	UG/L	5	0			2	j
EXP	2,4-Dinitrotoluene	UG/L	5	0			1.24	j
EXP	2,6-Dinitrotoluene	UG/L	5	0			0.05	c
EXP	2-Amino-4,6-dinitrotoluene	UG/L	5	5	0.28	0.23		
EXP	2-Nitrotoluene	UG/L	5	0			61	f
EXP	3-Nitrotoluene	UG/L	5	0			370	g
EXP	4-Amino-2,6-dinitrotoluene	UG/L	5	0				
EXP	4-Nitrotoluene	UG/L	5	0			370	g
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	UG/L	5	0			2	j
EXP	Methyl-2,4,6-trinitrophenylnitramine	UG/L	5	0			370	g
EXP	Nitrobenzene	UG/L	5	0			18	g
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	UG/L	5	0			400	j
TMET	Aluminum	UG/L	5	5	1700	1400	37000	g
TMET	Antimony	UG/L	5	0			6	d
TMET	Arsenic	UG/L	5	5	4.6	4.4	50	d
TMET	Barium	UG/L	5	5	220	190	2000	d
TMET	Beryllium	UG/L	5	0			4	d
TMET	Cadmium	UG/L	5	0			5	d
TMET	Calcium	UG/L	5	5	40000	37000	GRAS	k
TMET	Chromium	UG/L	5	0			100	d
TMET	Cobalt	UG/L	5	0			2200	g

Table 1-56

Summary of OU3 Analytical Data for NRD Resevoir April 1999 Surface Water Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
TMET	Copper	UG/L	5	0			12	a
TMET	Iron	UG/L	5	5	2100	1600	GRAS	k
TMET	Lead	UG/L	5	5	6.0	4.2	3.2	a
TMET	Magnesium	UG/L	5	5	18000	17000	GRAS	k
TMET	Manganese	UG/L	5	5	240	190	180	g
TMET	Mercury	UG/L	4	1	0.26	0.14	0.012	a
TMET	Nickel	UG/L	5	1	18	20	100	d
TMET	Potassium	UG/L	5	5	12000	12000	GRAS	k
TMET	Selenium	UG/L	5	5	8.7	7.6	5	a
TMET	Silver	UG/L	5	0			0.12	a
TMET	Sodium	UG/L	5	5	44000	42000	GRAS	k
TMET	Thallium	UG/L	5	0			2	d
TMET	Vanadium	UG/L	5	0			260	g
TMET	Zinc	UG/L	5	0			110	a

Note:
Refer to Note List in Table 1-1 for column headings definitions.

Table 1-57

Summary of OU3 Analytical Data for NRD Resevoir Sediment Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total	Hits	Max conc.	Average conc.	Screening Level	Source
EXP	1,3,5-Trinitrobenzene	MG/KG	5	0			1.7	i
EXP	1,3-Dinitrobenzene	MG/KG	5	0			3.4	i
EXP	2,4,6-Trinitrotoluene	MG/KG	5	0			17.2	i
EXP	2,4-Dinitrotoluene	MG/KG	5	0			0.9	i
EXP	2,6-Dinitrotoluene	MG/KG	5	0			0.9	i
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	5	0				
EXP	2-Nitrotoluene	MG/KG	5	0			343*	i
EXP	3-Nitrotoluene	MG/KG	5	0			343*	i
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	5	0				
EXP	4-Nitrotoluene	MG/KG	5	0			343*	i
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	5	0			5.8	i
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	5	0			343	i
EXP	Nitrobenzene	MG/KG	5	1	0.074	0.057		
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazoci	MG/KG	5	0			1715.2	i
METALS	Aluminum	MG/KG	5	5	47000	36000	24200	h
METALS	Antimony	MG/KG	5	0			31	g
METALS	Arsenic	MG/KG	5	5	12	11	11.4	h
METALS	Barium	MG/KG	5	5	450	380	393	h
METALS	Beryllium	MG/KG	5	5	1.9	1.5	1.17	h
METALS	Cadmium	MG/KG	5	5	0.61	0.43	39	g
METALS	Calcium	MG/KG	5	5	14000	9500	GRAS	k
METALS	Chromium	MG/KG	5	5	48	37	28.3	h
METALS	Cobalt	MG/KG	5	5	15	12	14.7	h
METALS	Copper	MG/KG	5	5	35	29	21.8	h
METALS	Iron	MG/KG	5	5	40000	33000	GRAS	k
METALS	Lead	MG/KG	5	5	30	26	400	g
METALS	Magnesium	MG/KG	5	5	8400	6800	GRAS	k
METALS	Manganese	MG/KG	5	5	820	670	860	h
METALS	Mercury	MG/KG	5	0			23	g
METALS	Nickel	MG/KG	5	5	42	35	27.5	h
METALS	Potassium	MG/KG	5	5	9400	7200	GRAS	k
METALS	Selenium	MG/KG	5	4	1.9	1.5	390	g
METALS	Silver	MG/KG	5	0			380	g
METALS	Sodium	MG/KG	5	5	330	250	GRAS	k
METALS	Thallium	MG/KG	5	5	0.57	0.47		
METALS	Vanadium	MG/KG	5	5	100	78	58	h
METALS	Zinc	MG/KG	5	5	140	120	95.3	h

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 1-58

Summary of OU3 Analytical Data for NRD Resevoir Fish Tissue Sampling
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Hits	Max. conc.	Average conc.	Screening Level	Source
METALS	Aluminum	MG/KG	6	5	11.3	6.6		
METALS	Antimony	MG/KG	6	0				
METALS	Arsenic	MG/KG	6	0				
METALS	Barium	MG/KG	6	1	3.3	1.4		
METALS	Beryllium	MG/KG	6	0				
METALS	Cadmium	MG/KG	6	2	0.1	0.042		
METALS	Calcium	MG/KG	6	6	479	250	GRAS	k
METALS	Chromium	MG/KG	6	6	0.66	0.4		
METALS	Cobalt	MG/KG	6	0				
METALS	Copper	MG/KG	6	6	4.4	2.2		
METALS	Iron	MG/KG	6	6	27.7	15	GRAS	k
METALS	Lead	MG/KG	6	6	2.6	0.95		
METALS	Magnesium	MG/KG	6	6	269	250	GRAS	k
METALS	Manganese	MG/KG	6	0				
METALS	Mercury	MG/KG	6	0				
METALS	Nickel	MG/KG	6	1	0.81	0.22		
METALS	Potassium	MG/KG	6	5	3880	2900	GRAS	k
METALS	Selenium	MG/KG	6	6	2.8	1.6		
METALS	Silver	MG/KG	6	1	0.62	0.21		
METALS	Sodium	MG/KG	6	0			GRAS	k
METALS	Thallium	MG/KG	6	0				
METALS	Vanadium	MG/KG	6	0				
METALS	Zinc	MG/KG	6	3	11.7	7.6		

Note:

Refer to Note List in Table 1-1 for column headings definitions.

Table 2-1

OU1 Soil Analytical Data
Evaluated in OU3 Baseline Risk Assessment

Surface Soil Adjacent to Load Line 1 Bomb Production Buildings
LL1-DP-83
NP-91-LL1-44B
NP-91-LL1-50D
Surface Soil Adjacent to Load Line 2 Bomb Production Buildings
NP-91-LL2-34B
NP-91-LL2-56B
Surface Soil Adjacent to Load Line 3 Bomb Production Buildings
LL3-HB12-01
NP-91-LL3-28D
Surface Soil Adjacent to Load Line 4 Bomb Production Buildings
NP-91-LL4-DP34
LL4-DP-62
Surface Soil at Load Line 2 Paint Operations Area
MNOP-D30-A-0001
MNOP-D30-A-0002
MNOP-D30-B-0001
MNOP-D30-B-0002
Surface Soil at Load Line 3 Paint Operations Area
MNOP-D47-A-0001
MNOP-D47-A-0002

Table 2-2

Summary Of Background Concentrations of Metals in Soils[a] And Sediments[b]
At Former Nebraska Ordnance Plant, Mead, Nebraska

Chemical	Soil			Sediment		
	Frequency Of Detection[c]	Arithmetic Mean Concentration[d] (mg/kg)	Screening Levels[e] (mg/kg)	Frequency Of Detection[c]	Arithmetic Mean Concentration[d] (mg/kg)	Screening Levels[e] (mg/kg)
Aluminum	10/10	1.69E+04	3.39E+04	3/3	1.21E+04	2.42E+04
Arsenic	10/10	6.77E+00	1.35E+01	3/3	5.70E+00	1.14E+01
Barium	10/10	2.20E+02	4.40E+02	3/3	1.97E+02	3.93E+02
Beryllium	10/10	7.60E-01	1.52E+00	3/3	5.87E-01	1.17E+00
Cadmium	9/10	2.00E-01	4.00E-01	1/3	4.20E-01 [f]	4.20E-01 [f]
Calcium	10/10	3.04E+03	6.09E+03	3/3	6.07E+03	1.21E+04
Chromium	10/10	1.85E+01	3.70E+01	3/3	1.42E+01	2.83E+01
Cobalt	10/10	8.60E+00	1.72E+01	3/3	7.33E+00	1.47E+01
Copper	10/10	1.70E+01	3.39E+01	3/3	1.09E+01	2.18E+01
Iron	10/10	1.81E+04	3.63E+04	3/3	1.39E+04	2.78E+04
Lead	10/10	1.45E+01	2.90E+01	3/3	1.47E+01	2.95E+01
Magnesium	10/10	3.35E+03	6.70E+03	3/3	2.83E+03	5.67E+03
Manganese	10/10	5.42E+02	1.08E+03	3/3	4.30E+02	8.60E+02
Nickel	10/10	1.97E+01	3.93E+01	3/3	1.38E+01	2.75E+01
Potassium	10/10	2.74E+03	5.48E+03	3/3	2.90E+03	5.80E+03
Selenium	4/10	6.61E-01	1.32E+00	1/3	9.70E-01 [g]	9.70E-01 [g]
Thallium	1/10	8.60E-01 [h]	8.60E-01 [h]	0/3	ND	ND
Vanadium	10/10	3.63E+01	7.25E+01	3/3	2.90E+01	5.80E+01
Zinc	10/10	5.98E+01	1.20E+02	3/3	4.77E+01	9.53E+01

Note:

[a] OU3 Phase I Remedial Investigation Background Sampling results.

[b] OU3 Supplemental Background Sampling results (Clear, Johnson, and Silver Creeks).

[c] Frequency of detection based on number of samples testing positive, including "J"-coded samples.

[d] Arithmetic mean concentrations were calculated assuming one-half detection limit values for samples listed as non-detect.

[e] Based on USEPA Region IV guidance, the criterion used for determining significance is two times the arithmetic mean background concentration.

[f] The detected concentration was used to calculate the screening level for cadmium in sediment.

[g] The detected concentration was used to calculate the screening level for selenium in sediment.

[h] The detected concentration was used to calculate the screening level for thallium in soil.

Table 2-3

Concentrations Of Essential Nutrients In Soil Or Sediment Equivalent To Recommended Daily Allowance Values

Chemical	Recommended Daily Allowance (RDA)[a] (mg/day)	Allowable Soil Concentration[b] (mg/kg)
Calcium	1200	1,000,000 [e]
Chromium	0.2	2,000
Copper	3	30,000
Iron	30	300,000
Magnesium	400	1,000,000 [e]
Manganese	5	50,000
Potassium	2730[c]	1000000[e]
Selenium	0.075	750
Sodium	1000[d]	1,000,000 [e]
Zinc	19	190,000

Note:

[a] Except where noted, these are recommended daily allowance values from the National Research Council (1989).

[b] Soil concentration required to achieve the RDA assuming an individual who ingests 100 mg/day of site soils.

[c] Recommended Daily Intake (Nelson, 1992)

[d] Normal Daily Intake (Nelson, 1992).

[e] Calculated soil values greater than unity (1,000,000 mg/kg) were set to unity.

Table 2-4

Concentrations Of Essential Nutrients In Water Equivalent To Recommended Daily Allowance Values

Chemical	Recommended Daily Allowance (RDA)[a] (mg/day)	Allowable Water Concentration[b] (mg/L)
Calcium	1200	600
Chromium	0.2	0.10
Copper	3	1.5
Iron	30	15
Magnesium	400	200
Manganese	5	2.5
Potassium	2730[c]	1,365
Selenium	0.075	0.038
Sodium	1000[d]	500
Zinc	19	9.5

Note:

[a] Except where noted, these are recommended daily allowance values from the National Research Council (1989).

[b] Drinking water concentration required to achieve the RDA assuming an individual who ingests 2 liters of site water.
Allowable water concentration = RDA (mg/day) / 2(liters/day)

[c] Recommended Daily Intake (Nelson, 1992)

[d] Normal Daily Intake (Nelson, 1992).

Table 2-5

Potential Chemicals Of Concern (PCOCs) In Surface Soil ($\leq$ 2 Feet)
Adjacent To Load Line 1 Bomb Production Buildings
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	1,3,5-Trinitrobenzene (TNB)
EXP	2,4,6-Trinitrotoluene (TNT)
EXP	2-Amino-4,6-dinitrotoluene (2-Am-DNT)
EXP	4-Amino-2,6-dinitrotoluene (4-Am-DNT)
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
EXP	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
METALS	Aluminum
METALS	Antimony
METALS	Arsenic
METALS	Barium
METALS	Beryllium
METALS	Cadmium
METALS	Cobalt
METALS	Lead
METALS	Nickel
METALS	Vanadium

Note:
EXP - Explosive

Table 2-6

Potential Chemicals Of Concern (PCOCs) In Surface Soil ($\leq$ 2 Feet) Adjacent tTo Load Line 2 Bomb Production Buildings Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	1,3,5-Trinitrobenzene (TNB)
EXP	2,4,6-Trinitrotoluene (TNT)
EXP	2-Amino-4,6-dinitrotoluene (2-Am-DNT)
EXP	4-Amino-2,6-dinitrotoluene (4-Am-DNT)
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
EXP	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
METALS	Antimony
METALS	Arsenic
METALS	Barium
METALS	Cadmium
METALS	Lead
METALS	Nickel

Note:
EXP - Explosive

Table 2-7

Potential Chemicals Of Concern (PCOCs) In Surface Soil (≤ 2 Feet) Adjacent To Load Line 3 Bomb Production Buildings Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	1,3,5-Trinitrobenzene (TNB)
EXP	2,4,6-Trinitrotoluene (TNT)
EXP	2-Amino-4,6-dinitrotoluene (2-Am-DNT)
EXP	4-Amino-2,6-dinitrotoluene (4-Am-DNT)
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
METALS	Antimony
METALS	Barium
METALS	Cadmium
METALS	Lead
METALS	Mercury
METALS	Nickel

Note:
EXP - Explosive

Table 2-8

Potential Chemicals Of Concern (PCOCs) In Surface Soil ($\leq$ 2 Feet) Adjacent To Load Line 4 Bomb Production Buildings Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	2,4,6-Trinitrotoluene (TNT)
EXP	2-Amino-4,6-dinitrotoluene (2-Am-DNT)
EXP	4-Amino-2,6-dinitrotoluene (4-Am-DNT)
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
METALS	Antimony
METALS	Arsenic
METALS	Cadmium
METALS	Lead
METALS	Mercury
METALS	Nickel

Note:
EXP - Explosive

Table 2-9

Potential Chemicals Of Concern (PCOCs) In Surface Soil ($\leq$ 2 Feet) In The Load Line 1 Paint Operations Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
METALS	Antimony
METALS	Cadmium
METALS	Lead
METALS	Nickel

Table 2-10

Potential Chemicals Of Concern (PCOCs) In Surface Soil (≤ 2 Feet) In The Load Line 2 Paint Operations Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
METALS	Antimony
METALS	Arsenic
METALS	Cadmium
METALS	Cobalt
METALS	Lead
METALS	Mercury
METALS	Nickel

Table 2-11

Potential Chemicals Of Concern (PCOCs) In Surface Soil ($\leq$ 2 Feet) In The Load Line 3 Paint Operations Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
METALS	Antimony
METALS	Barium
METALS	Cadmium
METALS	Cobalt
METALS	Lead
METALS	Mercury
METALS	Nickel

Table 2-12

Potential Chemicals Of Concern (PCOCs) In Surface Soil ($\leq$ 2 Feet) In The Load Line 4 Paint Operations Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
METALS	Antimony
METALS	Cadmium
METALS	Lead

Table 2-13

Potential Chemicals Of Concern (PCOCs) In Soil[a] At Potential Landfill North Of Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	1,3,5-Trinitrobenzene (TNB)
EXP	2,4,6-Trinitrotoluene (TNT)
EXP	2,4-Dinitrotoluene (2,4-DNT)
EXP	2-Amino-4,6-dinitrotoluene (2-Am-DNT)
EXP	4-Amino-2,6-dinitrotoluene (4-Am-DNT)
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
EXP	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
METALS	Antimony
METALS	Cadmium
METALS	Lead
SVOC	Benzo(b)fluoranthene
SVOC	bis(2-Ethylhexyl)phthalate
SVOC	Butylbenzylphthalate
SVOC	Chrysene
SVOC	Diethylphthalate
SVOC	Di-n-butylphthalate
SVOC	Phenol
SVOC	Pyrene

Note:

EXP - Explosive

SVOC-Semi-volatile organic compound

(a) Both surface soil (≤ 2 feet bgs) and subsurface soil (> 2 feet bgs) are included.

Table 2-14

Potential Chemicals Of Concern (PCOCs) In Soil[a]
At Proving Grounds
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	2,4,6-Trinitrotoluene (TNT)
EXP	2-Amino-4,6-dinitrotoluene (2-Am-DNT)
EXP	4-Amino-2,6-dinitrotoluene (4-Am-DNT)
EXP	4-Nitrotoluene
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
METALS	Antimony
METALS	Lead
METALS	Cadmium
SVOC	bis(2-Ethylhexyl)phthalate
SVOC	Butylbenzylphthalate
SVOC	Di-n-butylphthalate
SVOC	Pyrene
VOC	2-Hexanone
VOC	Acetone
VOC	Methylene Chloride
VOC	Toluene
VOC	Trichloroethene

Note:

EXP-Explosive

SVOC-Semi-volatile organic compound

VOC - Volatile organic compound

[a] Both surface soil (≤ 2 feet bgs) and subsurface soil (> 2 feet bgs) are included.

Table 2-15

Potential Chemicals Of Concern (PCOCs) In Soil[(a)]
At Northeast Boundary Area
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
METALS	Aluminum
METALS	Cadmium
METALS	Cobalt
METALS	Vanadium
SVOC	2,6-Dinitrotoluene
SVOC	Benzo(g,h,i)perylene
SVOC	Fluoranthene
SVOC	Pyrene

Note:

SVOC-Semi-volatile organic compound

(a) Both surface soil (≤ 2 feet bgs) and subsurface soil (> 2 feet bgs) are included.

Table 2-16

Potential Chemicals Of Concern (PCOCs) In Surface Water And Sediment At Johnson/Clear Creek Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	
	Surface Water[a]	Sediment[b]
SVOC		4-Methylphenol
SVOC		Di-n-butylphthalate
SVOC		Phenol
SVOC		bis(2-Ethylhexyl)phthalate (DEHP)
EXP	Hexahydro-1,2,3-trinitro-1,2,3-triazine (RDX)	
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
METALS	Aluminum	
METALS	Arsenic	
METALS	Barium	
METALS	Beryllium	
METALS	Cobalt	
METALS	Iron	
METALS	Lead	
METALS	Mercury	
METALS	Nickel	
METALS		Silver
METALS	Thallium	
METALS	Vanadium	
VOC	Toluene	
VOC	Trichloroethene (TCE)	

Notes:

EXP - Explosive

SVOC - Semi-volatile organic compound

VOC - Volatile organic compound

[a] Includes all detected metals (total form) and organics in surface water except those below background and RDA levels.

[b] Includes all chemicals detected in sediment except those below background or RDA concentrations.

Table 2-17

Potential Chemicals Of Concern (PCOCs) In Surface Water And Sediment At Silver Creek Former Nebraska Ordnance Plant, Mead, Nebraska

	Chemical	
Group	Surface Water[a]	Sediment[b]
METALS	Aluminum	
METALS	Barium	
METALS	Beryllium	
METALS	Cobalt	
METALS	Iron	
METALS	Lead	
METALS	Nickel	
METALS	Thallium	
METALS		Silver
METALS	Vanadium	
SVOC		4-Methylphenol
SVOC		Di-n-butylphthalate
SVOC		Pyrene
VOC		Acetone
VOC	Methylene chloride	
VOC	Toluene	Toluene

Notes:

SVOC - Semi-volatile organic compound

VOC - Volatile organic compound

[a] Includes all detected metals (total form) and organics in surface water except those below background and RDA levels.

[b] Includes all chemicals detected in sediment except those below background or RDA concentrations.

Table 2-18

Potential Chemicals Of Concern (PCOCs) In Surface Water, Sediment, And Fish Tissue At NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska

	Chemical		
Group	Surface Water[a]	Sediment[b]	Fish Tissue[c]
EXP	2-Amino-4,6-Dinitrotoluene (2-AmDNT)		2-Amino-4,6-Dinitrotoluene (2-AmDNT)
EXP		Nitrobenzene	
METALS		Aluminum	Aluminum
METALS		Arsenic	
METALS		Barium	Barium
METALS		Beryllium	
METALS		Cadmium	Cadmium
METALS			Copper
METALS			Lead
METALS	Mercury		
METALS		Nickel	Nickel
METALS			Selenium
METALS			Silver
METALS		Thallium	

Notes:
EXP - Explosive
[a] Includes all detected metals (total form) and organics in surface water except those below background and RDA levels.
[b] Includes all chemicals detected in sediment except those below background or RDA concentrations.
[c] Includes all detected metals in fish tissue except essential nutrients below RDA concentrations.

Table 3-1

Potential Exposure Scenarios OU3 Baseline Risk Assessment
Former Nebraska Ordnance Plant, Mead, Nebraska

Area and Medium	On-Site Worker	Adult Trespasser	Juvenile Trespasser	Potential Future Resident (Adult)	Potential Future Resident (Child)	Construction Worker	Adult Recreational	Child Recreational
SURFACE SOIL ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS	√	√	√	√	√			
SURFACE SOIL ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDING	√	√	√	√	√			
SURFACE SOIL ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDING	√	√	√	√	√			
SURFACE SOIL ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDING	√	√	√	√	√			
SURFACE SOIL IN THE LOAD LINE 1 PAINT OPERATIONS AREA	√	√	√	√	√			
SURFACE SOIL IN THE LOAD LINE 2 PAINT OPERATIONS AREA	√	√	√	√	√			
SURFACE SOIL IN THE LOAD LINE 3 PAINT OPERATIONS AREA	√	√	√	√	√			
SURFACE SOIL IN THE LOAD LINE 4 PAINT OPERATIONS AREA	√	√	√	√	√			
SURFACE SOIL AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUNDS		√	√	√	√			
SUBSURFACE[(a)] SOIL AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUNDS						√		
SURFACE SOIL AT THE PROVING GROUNDS		√	√	√	√			
SUBSURFACE[(a)] SOIL AT THE PROVING GROUNDS						√		
SURFACE SOIL AT THE NORTHEAST BOUNDARY AREA		√	√	√	√			
SUBSURFACE[(a)] SOIL AT THE NORTHEAST BOUNDARY AREA						√		
JOHNSON/CLEAR CREEK							√	√
SILVER CREEK							√	√
NRD RESEVOIR							√	√

Notes:

[(a)] *Subsurface soil (>2 feet) and surface soil (0 - 2 feet) data were combined for evaluating Construction Worker exposure.*

Table 3-2

OU3 Baseline Risk Assessment Exposure Parameters For Potential Farm Family Scenarios
Former Nebraska Ordnance Plant, Mead, Nebraska

	Potential Future Farm Family (Adult)		Potential Future Farm Family (Child)	
Exposure Parameters	**RME[a]**	**AVERAGE**	**RME[a]**	**AVERAGE**
Exposure Frequency (days/y)	350 [b]	350 [b]	350 [b]	350 [b]
Exposure Duration (y)	70 [c]	9 [d]	6 [e]	6 [e]
Soil Ingestion Rate (mg/d)	100 [f]	50 [g]	200 [f]	100 [f]
Exposed Dermal Surface Area (cm^2)	5,230 [h]	2,020 [h]	4,331 [i]	1,869 [i]
Dermal Soil Adherence (mg/cm^2)	1 [j]	0.2 [j]	1 [j]	0.2 [j]
Dermal Absorption (unitless)	Chemical Specific [k]			
Body Weight (kg)	70 [l]	70 [l]	15 [m]	15 [m]
Averaging Time - Non-carcinogens (days)	25,550 [n]	3,285 [n]	2,190 [n]	2,190 [n]
Averaging Time - Carcinogens (days)	25,550 [o]	25,550 [o]	25,550 [o]	25,550 [o]

Note:

[a] Reasonable Maximum Exposure (RME) is defined by EPA as the reasonable upperbound exposure among potentially exposed populations.

[b] Residents are assumed to have an exposure frequency of 350 days per year (Standard Default Exposure Factors (SDEF), EPA, 1991b).

[c] Adult residents are assumed to have an RME duration of 70 years.

[d] Average adult exposure duration is based on the average time spent in a single residence (Exposure Factors Handbook; EPA, 1989b).

[e] Child residents are assumed to spent the first 6 years of life on Site.

[f] RME soil ingestion rates for a farm family are based on SDEF values of 100 mg/d for adults and 200 mg/day for children (EPA, 1991b).

[g] The recommended value used in the OU1 BRA (SEC Donohue, 1993).

[h] Exposed dermal surface area for adult RME is based on head, hands, forearm and lower legs;
average exposure is based on head and hands (Exposure Factors Handbook; EPA, 1989b).

[i] Exposed dermal surface area for child (0-6 years) RME is based on time-weighted average value for head, hands, arms and legs for 2-6 year old;
average exposure is based on time-weighted average value for hands, one half of arms and one half of legs for 2-6 year old (EPA, 1989b).

[j] The recommended dermal adherence for soil is 1.0 mg/cm^2 and 0.2 mg/cm^2 for RME and average exposure, respectively (EPA, 1992).

[k] 10 percent for organic chemicals and 1 percent for inorganic chemicals (EPA, Region IX, 1998).

[l] A body weight of 70 kg is assumed for all adult receptors (RAGS, EPA, 1989a).

[m] Body weight for 0-6 year old children is based on time-weighted average values from Exposure Factors Handbook (EPA, 1989b).

[n] Averaging time for non-carcinogenic effects is based on the exposure duration.

[o] Averaging time for carcinogenic effects is based on assumed lifetime of 70 years.

Table 3-3

OU3 Baseline Risk Assessment Exposure Parameters For Potential On-Site Worker Scenarios
Former Nebraska Ordnance Plant, Mead, Nebraska

	On-Site Worker	
Exposure Parameters	**RME[a]**	**AVERAGE**
Exposure Frequency (days/y)	250 [b]	250 [b]
Exposure Duration (y)	25 [c]	10 [d]
Soil Ingestion Rate (mg/d)	50 [e]	10 [e]
Exposed Dermal Surface Area (cm^2)	5,230 [f]	2,020 [f]
Dermal Soil Adherence (mg/cm^2)	1 [g]	0.2 [g]
Dermal Absorption (unitless)	Chemical Specific [h]	
Body Weight (kg)	70 [i]	70 [i]
Averaging Time - Non-carcinogens (days)	9,125 [j]	3,650 [j]
Averaging Time - Carcinogens (days)	25,550 [k]	25,550 [k]

Note:

[a] Reasonable Maximum Exposure (RME) is defined by EPA as the reasonable upperbound exposure among potentially exposed populations.

[b] Based on a 5-day working week for 50 weeks per year (OSWER Directive 9285.60-3; EPA, 1991).

[c] Default value recommended by EPA (1991).

[d] The recommended value used in the OU1 BRA (SEC Donohue, 1993).

[e] RME soil ingestion rate for an on-site worker is based on the SDEF value of 50 mg/day (EPA, 1991b);
the average value for an adult worker (10 mg/day) was based on information provided in the (Exposure Factors Handbook (EPA, 1989b).

[f] Exposed dermal surface area for adult RME is based on head, hands, forearm and lower legs;
average exposure is based on head and hands (Exposure Factors Handbook; EPA, 1989b).

[g] The recommended dermal adherence for soil is 1.0 mg/cm^2 and 0.2 mg/cm^2 for RME and average exposure, respectively (EPA, 1992).

[h] 10 percent for organic chemicals and 1 percent for inorganic chemicals (EPA, Region IX, 1998).

[i] A body weight of 70 kg is assumed for all adult receptors (RAGS, EPA, 1989a).

[j] Averaging time for non-carcinogenic effects is based on the exposure duration.

[k] Averaging time for carcinogenic effects is based on assumed lifetime of 70 years.

Table 3-4

OU3 Baseline Risk Asssessment Exposure Parameters For Trespasser Scenarios former Nebraska Ordnance Plant, Mead, Nebraska

	Adult Trespasser		Juvenile Trespasser (8-13 year-old)	
Exposure Parameters	**RME[a]**	**AVERAGE**	**RME[a]**	**AVERAGE**
Exposure Frequency (days/y)	24 [b]	12 [b]	24 [b]	12 [b]
Exposure Duration (y)	70 [c]	9 [c]	5 [c]	5 [c]
Soil Ingestion Rate (mg/d)	100 [d]	50 [e]	100 [d]	50 [e]
Exposed Dermal Surface Area (cm^2)	5,230 [f]	2,020 [f]	4,602 [f,g]	2,005 [f,g]
Dermal Soil Adherence (mg/cm^2)	1 [h]	0.2 [h]	1 [h]	0.2 [h]
Dermal Absorption (unitless)	Chemical Specific [i]			
Bcdy Weight (kg)	70 [j]	70 [j]	37 [k]	37 [k]
Averaging Time - Non-carcinogens (days)	25,550 [l]	3,285 [l]	1,825 [l]	1,825 [l]
Averaging Time - Carcinogens (days)	25,550 [m]	25,550 [m]	25,550 [m]	25,550 [m]

Note:

[a] Reasonable Maximum Exposure (RME) is defined by EPA as the reasonable upperbound exposure among potentially exposed populations.

[b] It is assumed that a trespasser enters the area two days per month for RME and one day per month for average exposure.

[c] The exposure durations for adult trespasser are assumed to be the same as for residents. The exposure duration for 8- to 13-year old juveniles is assumed to be the entire 5-year time period.

[d] Default value recommended by EPA (1991b).

[e] Value used in OU1 BRA (Sec Donohue, 1993).

[f] Exposed dermal surface area for adult RME is based on head, hands, forearms and lower legs; average exposure is based on head and hands (Exposure Factors Handbook; EPA, 1989b).

[g] The exposed surface areas for a juvenile trespassers are based on time-weighted averages for 8-13 year old children (EPA, 1989b).

[h] The recommended dermal adherence for soil is 1.0 mg/cm^2 and 0.2 mg/cm^2 for RME and average exposure, respectively (EPA, 1992).

[i] 10 percent for organic chemicals and 1 percent for inorganic chemicals (EPA, Region IX, 1998).

[j] A body weight of 70 kg is assumed for all adult receptors (RAGS, EPA, 1989a).

[k] Body weight for 8-13 year old children are based on time-weighted average values from the Exposure Factors Handbook (EPA, 1989b).

[l] Averaging time for non-carcinogenic effects is based on the exposure duration.

[m] Averaging time for carcinogenic effects is based on assumed lifetime of 70 years.A11

Table 3-5

OU3 Baseline Risk Assessment Exposure Parameters For Construction Worker Scenario
Former Nebraska Ordnance Plant, Mead, Nebraska

	Construction Worker	
Exposure Parameters	**RME[a]**	**AVERAGE**
Exposure Frequency (days/y)	130 [b]	65 [c]
Exposure Duration (y)	1.0 [d]	1.0 [d]
Soil Ingestion Rate (mg/d)	480 [e]	10 [f]
Exposed Dermal Surface Area (cm^2)	5,230 [g]	2,020 [g]
Dermal Soil Adherence (mg/cm^2)	1 [h]	0.2 [h]
Dermal Absorption (unitless)	Chemical Specific [i]	
Body Weight (kg)	70 [j]	70 [j]
Averaging Time - Non-carcinogens (days)	183 [k]	91 [k]
Averaging Time - Carcinogens (days)	25,550 [l]	25,550 [l]

Note:

[a] Reasonable Maximum Exposure (RME) is defined by EPA as the reasonable upperbound exposure among potentially exposed populations.

[b] As defined in the OU2 BRA (WC, 1994a), RME is based on 5 working days per week for 6 months.

[c] As defined in the OU2 BRA, average exposure is based on 5 working days per week for 3 months (WC, 1994a).

[d] Construction activity is assumed to occur for 6 months and 3 months for RME and average exposure, respectively.

[e] For conservatism, the upperbound soil ingestion rate from Standard Default Exposure Factors (EPA, 1991b) is assumed.

[f] Value used in OU2 BRA (WC, 1994a).

[g] Exposed dermal surface area for adult RME is based on head, hands, forearms and lower legs;
adult average exposure is based on head and hands (Exposure Factors Handbook; EPA, 1989b).

[h] The recommended dermal adherence for soil is 1.0 mg/cm^2 and 0.2 mg/cm^2 for RME and average exposure, respectively (EPA, 1992).

[i] 10 percent for organic chemicals and 1 percent for inorganic chemicals (EPA, Region IX, 1998).

[j] A body weight of 70 kg is assumed for all adult receptors (RAGS, EPA, 1989a).

[k] Averaging time for non-carcinogenic effects is based on the exposure duration.

[l] Averaging time for carcinogenic effects is based on an assumed lifetime of 70 years.

Table 3-6

OU3 Baseline Risk Assessment Exposure Parameters For Vegetable Garden Scenarios
Former Nebraska Ordnance Plant, Mead, Nebraska

	Potential Farm Family (Adult)		Potential Farm Family (Child)	
Exposure Parameters	**RME[a]**	**AVERAGE**	**RME[a]**	**AVERAGE**
Exposure Frequency (d/y)	365 [b]	365 [b]	365 [b]	365 [b]
Exposure Duration (y)	70 [c]	9 [d]	6 [e]	6 [e]
Vegetable Ingestion Rate (kg/d)	0.2 [f]	0.2 [f]	0.1 [f]	0.1 [f]
Percent Homegrown Vegetables (unitless)	40 [f]	25 [f]	40 [f]	25 [f]
Fractional Intake - Leafy Vegetables (unitless)	21 [g]	21 [g]	10 [g]	10 [g]
Fractional Intake - Root Vegetables (unitless)	32 [g]	32 [g]	45 [g]	45 [g]
Fractional Intake - Garden Fruit (unitless)	47 [g]	47 [g]	45 [g]	45 [g]
Bioaccumulation Factor (unitless)	Chemical-specific [j]			
Body Weight (kg)	70 [h]	70 [h]	15 [i]	15 [i]
Averaging Time - Non-carcinogens (d)	25,550 [k]	3,285 [k]	2,190 [k]	2,190 [k]
Averaging Time - Carcinogens (d)	25,550 [l]	25,550 [l]	25,550 [l]	25,550 [l]

Note:

[a] Reasonable Maximum Exposure (RME) is defined by EPA as the reasonable upperbound exposure among potentially exposed populations.

[b] Vegetable ingestion rates supplied by EPA are mean values based on 365 d/y exposure.

[c] Adult residents are assumed to have an RME duration of 70 years.

[d] Average adult exposure duration is based on the average time spent in a single residence (Exposure Factors Handbook; EPA, 1989b).

[e] Child residents are assumed to spend the first 6 years of life on Site.

[f] Recommended values from RAGS (USEPA, 1989a).

[g] Relative dietary proportions of various vegetables as specified in the OU1 BRA (Donohue, 1991).

[h] A body weight of 70 kg is assumed for all adult receptors (RAGS, EPA, 1989a).

[i] Body weight for 0-6 year old children is based on time-weighted average values from Exposure Factors Handbook (EPA, 1989b).

[j] Bioaccumulation factors as identified in the Plant Biouptake Study (USACE, 1997).

[k] Averaging time for non-carcinogenic effects is based on the exposure duration.

[l] Averaging time for carcinogenic effects is based on assumed lifetime of 70 years.

Table 3-7

OU3 Baseline Risk Assessment Bioaccumulation Factors For Garden Vegetables[a]
Former Nebraska Ordnance Plant, Mead, Nebraska

Chemical	Leafy Vegetables[b]	Root Vegetables[c]	Garden Fruits[d]
Hexahydro-1,3,5-trinitro-1,3,4-triazine (RDX)	1.18	0.06	0.09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.32	ND	0
2,4,6-Trinitrotoluene (TNT)	0	ND	0
2-Amino-4,6-dinitrotoluene (2-Am-DNT)	0	ND	0
4-Amino-2,6-dinitrotoluene (4-Am-DNT)	0	ND	0

Notes:

[a] Bioaccumulation factors derived from maximum reported uptake rates in USACE (1997).

[b] Bioaccumulation values as measured in lettuce.

[c] Bioaccumulation values as measured in radish.

[d] Bioaccumulation values as measured in tomatoes.

ND = Not determined. The USACE (1997) study did not evaluate this parameter.

Table 3-8

OU3 Baseline Risk Asssessment Exposure Parameters For Recreational Fishing Scenarios former Nebraska Ordnance Plant, Mead, Nebraska

	Adult Recreational Fisherman		Child Recreational Fisherman (0-6 years old)	
Exposure Parameters	**RME[a]**	**AVERAGE**	**RME[a]**	**AVERAGE**
Surface Water/Sediment Exposure Frequency (dys/yr)	17 [b]	4 [b]	17 [b]	4 [b]
Exposure Duration (yr)	70 [c]	9 [c]	6 [c]	6 [c]
Surface Water Ingestion Rate (liters/hr)	0.005 [d]	0.0025 [e]	0.005 [d]	0.0025 [e]
Surface Water/Sediment Exposed Dermal Surface Area (cm^2)	8,620 [f]	2,800 [f]	6,500 [g]	1,800 [f]
Surface Water Exposure Time (hrs/dy)	2	1 [e]	6	3 [e]
Sediment Ingestion Rate (mg/dy)	100 [k]	10 [l]	200 [k]	100 [e]
Dermal Sediment Adherence (mg/cm^2)	1.00 [h]	0.20 [h]	1.00 [h]	0.20 [h]
Ingestion (Fish) Rate (kg/dy)	0.025 [i]	0.008 [i]	0.0125 [i]	0.004 [i]
Fish Consumption Exposure Frequency (dys/yr)	365 [i]	365 [i]	365 [i]	365 [i]
Fraction Ingested from Contaminated source (unitless)	0.2 / 1.0 [j]	0.1 / 0.5 [j]	0.2 / 1.0 [j]	0.1 / 0.5 [j]
Dermal Absorption Factor (unitless)	Chemical Specific [q]			
Dermal Permeability Constant (cm/h)	Chemical Specific			
Bioconcentration Factor (unitless)	Chemical Specific [r]			
Body Weight (kg)	70 [m]	70 [m]	15 [n]	15 [n]
Averaging Time - Non-carcinogens (dys)	25,550 [o]	3,285 [o]	2,190 [o]	2,190 [o]
Averaging Time - Carcinogens (dys)	25,550 [p]	25,550 [p]	25,550 [p]	25,550 [p]

Note:

[a] Reasonable Maximum Exposure (RME) is defined by EPA as the reasonable upperbound exposure among potentially exposed populations.

[b] Assumes 1 day/week exposure during the 17 weeks of summer for RME and 1 day/month exposure during the 4 months of summer for average exposure.

[c] The exposure durations for an adult recreational fisherman are assumed to be the same as for residents. The exposure duration for a child recreational fisherman (age 0-6) is assumed to be the entire 6-year time period.

[d] Assumed to be one-tenth of the RAGS (USEPA, 1989) recommended surface water ingestion rate while swimming (50 ml/hour).

[e] Assumed value based on one-half the RME value.

[f] The surface area of head, hands, arms, and lower legs is assumed for RME; the surface area of hands, forearms, and feet is assumed for average exposure.

[g] The surface area of whole body is assumed for RME; while the surface area of hands, forearms, and feet is assumed for average exposure.

[h] Dermal adherence based on Dermal Exposure Assessment: Principles and Applications (USEPA, 1992).

[i] The recommended adult daily intake value over a year (365 days) is used to evaluate adult exposure (USEPA, 1997), one-half of the adult rate is assumed for a 0-6 year old child.

[j] For RME, assuming 20 percent of the fish consumed were from the creek or 100 percent from the NRD Reservoir; for average exposure, assuming ten percent of the fish consumed were from the creek or 50 percent from the NRD Reservoir.

[k] For RME, standard default sediment ingestion rates of 100 mg/day for adult resident and 200 mg/day for children were assumed (USEPA, 1991b).

[l] Average ingestion rate as identified in Exposure Factors Handbook (USEPA, 1989b).

[m] A body weight of 70 kg is assumed for all adult receptors (RAGS, EPA, 1989a).

[n] Body weight for 0-6 year old children is based on time-weighted average values from the Exposure Factors Handbook (EPA, 1989b).

[o] Averaging time for non-carcinogenic effects is based on the exposure duration.

[p] Averaging time for carcinogenic effects is based on assumed lifetime of 70 years

[q] Based on the EPA Region IX Guidance (USEPA, 1998), 10% dermal absorption is assumed for organics and 1.0% for inorganics.

[r] Bioconcentration factors are based upon trophic level 4 fish.

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Table 3-9

OU3 Baseline Risk Assessment Bioconcentration Factors For Fish Tissues
Former Nebraska Ordnance Plant, Mead, Nebraska

Chemical	Bioconcentration Factor[a]
Hexahydro-1,3,5-trinitro-1,3,4-triazine (RDX)	1.5
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.49
Aluminum	44
Arsenic	44
Barium	44
Beryllium	44
Cobalt	44
Iron	44
Lead	49
Mercury	5500
Nickel	44
Thallium	44
Vanadium	44
Methylene chloride	2.04
Toluene	34.89
Trichloroethene	4.12

Notes:
[a] Generic bioconcentration factor of 44 for metals was taken from the Human Health Risk Assessment in support of Operable Unit Number 1 Incinerator (Woodward-Clyde, 1997)

Table 3-10

Calculation Of The Exposure Point Concentrations In Surface Soil (≤ 2 Feet) Adjacent To The Load Line 1 Bomb Production Buildings Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD Ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
EXP	1,3,5-Trinitrobenzene (TNB)	MG/KG	116	0.63	0.25	-1.4	0.29	1.733	0.27	0.27	0.25
EXP	2,4,6-Trinitrotoluene (TNT)	MG/KG	116	16.7	1.1	-1.1	1.2	2.447	0.85	0.85	0.85
EXP	2-Amino-4,6-dinitrotoluene (2-Am-DNT)	MG/KG	116	9.8	0.46	-1.2	0.62	1.925	0.39	0.39	0.39
EXP	4-Amino-2,6-dinitrotoluene (4-AM-DNT)	MG/KG	116	6.7	0.53	-0.84	0.52	1.86	0.55	0.55	0.53
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	MG/KG	116	3	0.41	-1	0.44	1.802	0.43	0.43	0.41
EXP	*Methyl-2,4,6-trinitrophenylnitramine (Tetryl)*	MG/KG	116	0.46	0.33	-1.3	1.3	2.577	0.82	0.46	0.33
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	MG/KG	116	1.1	0.24	-1.5	0.51	1.86	0.27	0.27	0.24
METALS	Aluminum	MG/KG	113	47500	16000	9.6	0.28	1.733	17000	17000	16000
METALS	Antimony	MG/KG	75	0.88	1.6	-0.5	1.3	2.577	2	0.88	0.88
METALS	Arsenic	MG/KG	112	17.5	8.2	2.1	0.2	1.714	8.5	8.5	8.2
METALS	Barium	MG/KG	113	4710	290	5.5	0.33	1.754	280	280	280
METALS	Beryllium	MG/KG	113	1.9	0.76	-0.3	0.2	1.697	0.78	0.78	0.76
METALS	Cadmium	MG/KG	113	17.2	0.76	-0.74	0.83	2.075	0.8	0.8	0.76
METALS	Cobalt	MG/KG	113	20.8	10	2.3	0.16	1.697	11	11	10
METALS	Lead	MG/KG	112	394	55	3.4	0.93	2.151	58	58	55
METALS	Nickel	MG/KG	113	51.7	24	3.2	0.2	1.714	25	25	24
METALS	Vanadium	MG/KG	113	102	36	3.5	0.26	1.733	37	37	36

Notes:

EXP - Explosive

[a] Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

[b] Arithmetic average of the natural log transformed data (logarithmic mean)

[c] Standard deviation of the natural log transformed data (logarithmic standard deviation)

[d] H statistic (Gilbert, 1987)

[e] UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

[f] RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

[g] AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-11
Calculation Of The Exposure Point Concentrations In Surface Soil (≤ 2 Feet) Adjacent To Load Line 2 Bomb Production Buildings
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD Ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
EXP	1,3,5-Trinitrobenzene (TNB)	MG/KG	138	0.6	0.25	-1.4	0.29	1.733	0.27	0.27	0.25
EXP	2,4,6-Trinitrotoluene (TNT)	MG/KG	138	12	0.39	-1.4	0.63	1.925	0.34	0.34	0.34
EXP	2-Amino-4,6-dinitrotoluene (2-Am-DNT)	MG/KG	138	1.1	0.26	-1.4	0.25	1.714	0.27	0.27	0.26
EXP	4-Amino-2,6-dinitrotoluene (4-Am-DNT)	MG/KG	138	0.77	0.48	-0.77	0.25	1.733	0.5	0.5	0.48
EXP	Hexahydro-1,2,3-trinitro-1,2,3-triazine (RDX)	MG/KG	138	4.8	0.56	-0.88	0.68	1.96	0.6	0.6	0.56
EXP	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	MG/KG	137	0.53	0.36	-1	0.26	1.733	0.38	0.38	0.36
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	MG/KG	138	1.1	0.23	-1.7	0.79	2.035	0.29	0.29	0.23
METALS	Antimony	MG/KG	83	2.8	0.49	-0.98	0.68	1.96	0.54	0.54	0.49
METALS	Arsenic	MG/KG	136	15.5	8	2.1	0.22	1.714	8.3	8.3	8.0
METALS	Barium	MG/KG	136	516	240	5.5	0.2	1.714	250	250	240
METALS	Cadmium	MG/KG	136	12.6	0.88	-0.51	0.83	2.075	1.0	1.0	0.88
METALS	Lead	MG/KG	136	1040	140	4	1.3	2.577	190	190	140
METALS	Nickel	MG/KG	136	52.4	24	3.1	0.21	1.714	25	25	24

Notes:

EXP - Explosive

(a) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

(b) Arithmetic average of the natural log transformed data (logarithmic mean)

(c) Standard deviation of the natural log transformed data (logarithmic standard deviation)

(d) H statistic (Gilbert, 1987)

(e) UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

(f) RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

(g) AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-12

Calculation Of The Exposure Point Concentrations In Surface Soil (≤ 2 Feet) Adjacent To Load Line 3 Bomb Production Buildings Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD Ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
EXP	1,3,5-Trinitrobenzene (TNB)	MG/KG	124	0.46	0.24	-1.5	0.3	1.733	0.26	0.26	0.24
EXP	2,4,6-Trinitrotoluene (TNT)	MG/KG	124	15	0.63	-1.2	0.82	2.075	0.51	0.51	0.51
EXP	2-Amino-4,6-dinitrotoluene (2-Am-DNT)	MG/KG	124	2.3	0.33	-1.3	0.5	1.83	0.34	0.34	0.33
EXP	4-Amino-2,6-dinitrotoluene (4-Am-DNT)	MG/KG	124	2.7	0.5	-0.83	0.51	1.86	0.55	0.55	0.5
EXP	Hexahydro-1,2,3-trinitro-1,2,3-triazine (Tetryl)	MG/KG	124	4.8	0.58	-0.89	0.68	1.96	0.59	0.59	0.58
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	MG/KG	124	1.4	0.28	-1.4	0.5	1.86	0.3	0.3	0.28
METALS	Antimony	MG/KG	94	1.5	0.31	-1.3	0.41	1.802	0.32	0.32	0.31
METALS	Barium	MG/KG	122	2380	250	5.5	0.32	1.754	260	260	250
METALS	Cadmium	MG/KG	122	3.1	0.51	-1.1	0.87	2.117	0.61	0.61	0.51
METALS	Lead	MG/KG	122	4670	110	3.7	1.1	2.315	98	98	98
METALS	Mercury	MG/KG	122	0.72	0.091	-2.6	0.48	1.83	0.095	0.095	0.091
METALS	Nickel	MG/KG	122	50.9	25	3.2	0.25	1.714	26	26	25

Notes:

EXP - Explosive

[a] Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

[b] Arithmetic average of the natural log transformed data (logarithmic mean)

[c] Standard deviation of the natural log transformed data (logarithmic standard deviation)

[d] H statistic (Gilbert, 1987)

[e] UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

[f] RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

[g] AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-13

Calculation Of The Exposure Point Concentrations In Surface Soil (≤ 2 Feet) Adjacent To Load Line 4 Bomb Production Buildings Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD Ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
EXP	2,4,6-Trinitrotoluene (TNB)	MG/KG	136	2	0.28	-1.4	0.41	1.802	0.29	0.29	0.28
EXP	2-Amino-4,6-dinitrotoluene (2-Am-DNT)	MG/KG	135	0.69	0.26	-1.4	0.24	1.714	0.27	0.27	0.26
EXP	4-Amino-2,6-dinitrotoluene (4-Am-DNT)	MG/KG	135	0.41	0.46	-0.8	0.3	1.733	0.49	0.41	0.41
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	MG/KG	136	3.4	0.43	-1	0.58	1.891	0.48	0.48	0.43
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	MG/KG	136	0.85	0.27	-1.4	0.46	1.83	0.29	0.29	0.27
METALS	Antimony	MG/KG	85	1.4	0.33	-1.2	0.42	1.802	0.35	0.35	0.33
METALS	Arsenic	MG/KG	134	15.3	7.7	2	0.28	1.733	8.1	8.1	7.7
METALS	Cadmium	MG/KG	134	10.3	0.63	-1	0.89	2.117	0.69	0.69	0.63
METALS	Lead	MG/KG	134	313	63	3.6	0.97	2.205	74	74	63
METALS	Mercury	MG/KG	134	0.31	0.095	-2.5	0.44	1.802	0.1	0.1	0.095
METALS	Nickel	MG/KG	134	61.7	23	3.1	0.23	1.714	24	24	23

Notes:

EXP - Explosive

(a) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

(b) Arithmetic average of the natural log transformed data (logarithmic mean)

(c) Standard deviation of the natural log transformed data (logarithmic standard deviation)

(d) H statistic (Gilbert, 1987)

(e) UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

(f) RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

(g) AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-14

Calculation Of The Exposure Point Concentrations In Surface Soil (≤ 2 Feet) In The Load Line 1 Paint Operations Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD Ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
METALS	Antimony	MG/KG	52	47.2	3.7	-0.2	1.5	2.713	3.6	3.6	3.6
METALS	Cadmium	MG/KG	58	144	2.8	-1.4	1.2	2.447	0.72	0.72	0.72
METALS	Lead	MG/KG	58	794	62	3.4	0.99	2.205	63	63	62
METALS	Nickel	MG/KG	58	49.5	22	3	0.31	1.754	23	23	22

Notes:

(a) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

(b) Arithmetic average of the natural log transformed data (logarithmic mean)

(c) Standard deviation of the natural log transformed data (logarithmic standard deviation)

(d) H statistic (Gilbert, 1987)

(e) UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

(f) RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

(g) AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-15

Calculation Of The Exposure Point Concentrations In Surface Soil (≤ 2 Feet) In The Load Line 2 Paint Operations Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD Ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
METALS	Antimony	MG/KG	44	501	15	-0.074	1.9	3.626	16	16	15
METALS	Arsenic	MG/KG	56	14.6	8.7	2.1	0.3	1.733	9.2	9.2	8.7
METALS	Cadmium	MG/KG	60	13.8	0.68	-0.98	0.92	2.151	0.7	0.7	0.68
METALS	Cobalt	MG/KG	56	44.9	11	2.3	0.31	1.754	11	11	11
METALS	Lead	MG/KG	60	3960	110	3.3	1	2.315	59	59	59
METALS	Mercury	MG/KG	56	0.76	0.083	-2.7	0.46	1.83	0.083	0.083	0.083
METALS	Nickel	MG/KG	56	63	24	3.1	0.3	1.733	26	26	24

Notes:

(a) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

(b) Arithmetic average of the natural log transformed data (logarithmic mean)

(c) Standard deviation of the natural log transformed data (logarithmic standard deviation)

(d) H statistic (Gilbert, 1987)

(e) UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

(f) RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

(g) AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-16

Calculation Of The Exposure Point Concentrations In Surface Soil (≤ 2 Feet) In The Load Line 3 Paint Operations Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD Ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
METALS	Antimony	MG/KG	38	54.8	4.1	-0.041	1.6	3.175	7.4	7.4	4.1
METALS	Barium	MG/KG	58	516	240	5.4	0.32	1.754	250	250	240
METALS	Cadmium	MG/KG	58	5.8	0.51	-1.2	0.95	2.205	0.56	0.56	0.51
METALS	Cobalt	MG/KG	56	25.2	10	2.3	0.31	1.754	11	11	10
METALS	Lead	MG/KG	58	3730	130	3.6	1.2	2.447	94	94	94
METALS	Mercury	MG/KG	56	0.29	0.11	-2.4	0.55	1.86	0.12	0.12	0.11
METALS	Nickel	MG/KG	56	194	28	3.2	0.44	1.802	28	28	28

Notes:

[a] *Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the* laboratory detection limit was used in the calculation of the average.

[b] Arithmetic average of the natural log transformed data (logarithmic mean)

[c] Standard deviation of the natural log transformed data (logarithmic standard deviation)

[d] H statistic (Gilbert, 1987)

[e] UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

[f] RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

[g] AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-17

Calculation Of The Exposure Point Concentrations In Surface Soil (≤ 2 Feet) In The Load Line 4 Paint Operations Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD Ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
METALS	Antimony	MG/KG	32	171	8.9	0.22	1.7	3.424	16	16	8.9
METALS	Cadmium	MG/KG	61	19.7	0.82	-1.4	1.3	2.577	0.84	0.84	0.82
METALS	Lead	MG/KG	61	600	49	3.2	0.95	2.205	49	49	49

Notes:

[a] Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

[b] Arithmetic average of the natural log transformed data (logarithmic mean)

[c] Standard deviation of the natural log transformed data (logarithmic standard deviation)

[d] H statistic (Gilbert, 1987)

[e] UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

[f] RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

[g] AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-18

Calculation Of The Exposure Point Concentrations In Surface Soil (≤ 2 Feet) At The Potential Landfill North Of The Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Analyte	Units	Total	Max. conc.	Average conc.	Mean ln Result[b]	SD ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
EXP	1,3,5-Trinitrobenzene	MG/KG	90	0.77	0.079	-3.16	0.92	2.245	0.081	0.081	0.079
EXP	2,4,6-Trinitrotoluene	MG/KG	90	270	4.6	-2.44	1.87	3.343	0.96	0.96	0.96
EXP	2,4-Dinitrotoluene	MG/KG	90	0.27	0.058	-1.59	0.04	2.075	0.21	0.21	0.058
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	90	3	0.22	-2.51	1.28	2.728	0.27	0.27	0.22
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	90	2.5	0.23	-2.48	1.33	2.728	0.3	0.3	0.23
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	90	8.8	0.61	-2.34	1.71	3.2	0.74	0.74	0.61
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	90	0.29	0.09	-3.03	0.97	2.306	0.098	0.098	0.09
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	90	15	0.96	-2.24	1.91	3.533	1.3	1.3	0.96
METALS	Antimony	MG/KG	18	81.8	8.2	0.82	1.72	3.896	50	50	8.2
METALS	Cadmium	MG/KG	18	1.3	0.7	-0.44	0.46	2.028	0.89	0.89	0.7
METALS	Cobalt	MG/KG	18	18.7	9.4	2.17	0.42	1.98	12	12	9.4
METALS	Lead	MG/KG	18	2910	200	3.41	1.45	3.458	290	290	200
METALS	Silver	MG/KG	18	6	0.72	-1.66	1.59	3.675	2.8	2.8	0.72
METALS	Thallium	MG/KG	18	1.4	0.74	-0.34	0.27	1.857	0.83	0.83	0.74
SVOC	Benzo(b)fluoranthene	MG/KG	12	0.077	0.19	-1.67	0.28	1.927	0.23	0.077	0.077
SVOC	bis(2-Ethylhexyl)phthalate	MG/KG	12	0.701	0.24	-1.49	0.36	2.026	0.3	0.3	0.24
SVOC	Butylbenzylphthalate	MG/KG	12	1.204	0.29	-1.44	0.51	2.204	0.38	0.38	0.29
SVOC	Chrysene	MG/KG	12	0.027	0.19	-1.76	0.58	2.271	0.31	0.027	0.027
SVOC	Diethylphthalate	MG/KG	12	0.072	0.19	-1.68	0.3	1.927	0.23	0.072	0.072
SVOC	Di-n-butylphthalate	MG/KG	12	2.789	0.86	-0.84	1.13	3.131	2.4	2.4	0.86
SVOC	Phenol	MG/KG	12	0.048	0.19	-1.72	0.42	2.082	0.25	0.048	0.048
SVOC	Pyrene	MG/KG	12	0.089	0.19	-1.66	0.24	1.883	0.22	0.089	0.089

Notes:

EXP - Explosive

SVOC - Semi-volatile organic compound

(a) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

(b) Arithmetic average of the natural log transformed data (logarithmic mean)

(c) Standard deviation of the natural log transformed data (logarithmic standard deviation)

(d) H statistic (Gilbert, 1987)

(e) UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

(f) RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

(g) AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-19

Calculation Of The Exposure Point Concentrations In Soil[h] At The Potential Landfill North Of The Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
EXP	1,3,5-Trinitrobenzene	MG/KG	158	52	0.64	-3.02	1.35	2.577	0.16	0.16	0.16
EXP	2,4,6-Trinitrotoluene	MG/KG	158	4700	41.00	-2.39	2.28	3.92	2.5	2.5	2.5
EXP	2,4-Dinitrotoluene	MG/KG	158	0.81	0.09	-3.39	1.02	2.315	0.068	0.068	0.068
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	158	11	0.32	-2.63	1.40	2.713	0.26	0.26	0.26
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	158	5.6	0.30	-2.61	1.45	2.713	0.29	0.29	0.29
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	158	1400	11.00	-2.04	2.12	3.586	2.3	2.3	2.3
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	158	6600	50.00	-2.98	1.58	2.853	0.25	0.25	0.25
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	158	74	1.50	-2.13	2.01	3.295	1.5	1.5	1.5
METALS	Antimony	MG/KG	30	81.8	7.20	0.81	1.71	3.463	29	29	7.2
METALS	Cadmium	MG/KG	30	1.4	0.66	-0.65	0.87	2.321	1.1	1.1	0.66
METALS	Lead	MG/KG	30	2910	130.00	2.94	1.49	3.098	140	140	130
SVOC	Benzo(b)fluoranthene	MG/KG	16	0.077	0.19	-1.68	0.25	1.836	0.22	0.077	0.077
SVOC	bis(2-Ethylhexyl)phthalate	MG/KG	16	0.701	0.22	-1.59	0.39	1.957	0.27	0.27	0.22
SVOC	Butylbenzylphthalate	MG/KG	16	1.204	0.30	-1.42	0.55	2.108	0.38	0.38	0.30
SVOC	Chrysene	MG/KG	16	0.027	0.19	-1.74	0.50	2.108	0.26	0.027	0.027
SVOC	Diethylphthalate	MG/KG	16	0.072	0.19	-1.68	0.26	1.874	0.22	0.072	0.072
SVOC	Di-n-butylphthalate	MG/KG	16	2.823	0.86	-0.89	1.15	3.121	2	2	0.86
SVOC	Phenol	MG/KG	16	0.048	0.19	-1.71	0.36	1.957	0.23	0.048	0.048
SVOC	Pyrene	MG/KG	16	0.089	0.19	-1.67	0.21	1.836	0.21	0.089	0.089

Notes:

EXP - Explosive

SVOC - Semi-volatile organic compound

[a] Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample one-half of the laboratory detection limit was used in the calculation of the average.

[b] Arithmetic average of the natural log transformed data (logarithmic mean)

[c] Standard deviation of the natural log transformed data (logarithmic standard deviation)

[d] H statistic (Gilbert, 1987)

[e] UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

[f] RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values

[g] AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

[h] Both surface soil (≤ 2.00 feet bgs) and subsurface soil (> 2.00 feet bgs) are included.

Table 3-20

Calculation Of The Exposure Point Concentrations In Surface Soil (≤ 2 Feet) At The Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	Mean ln Result[b]	SD ln Result[c]	H[d]	UCL[e]	RME[f]	RME[f]	AE[g]
EXP	2,4,6-Trinitrotoluene	MG/KG	51	0.83	0.07	-3.46	-3.4621	0.85	2.158	0.06	0.06	0.06	0.06
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	51	0.82	0.06	-3.38	-3.3779	0.74	2.068	0.06	0.06	0.06	0.06
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	51	0.57	0.05	-3.38	-3.3750	0.64	1.984	0.05	0.05	0.05	0.05
EXP	4-Nitrotoluene	MG/KG	51	0.034	0.05	-2.96	-2.9576	0.23	1.738	0.06	0.03	0.03	0.03
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	51	43	0.88	-3.36	-3.3629	1.08	2.43	0.09	0.09	0.09	0.09
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	51	10	0.23	-3.41	-3.4076	0.87	2.206	0.06	0.06	0.06	0.06
METALS	Antimony	MG/KG	20	4.1	3.00	0.29	0.2930	1.49	3.36	13.00	4.10	4.1	3.00
METALS	Cadmium	MG/KG	20	0.92	0.60	-0.60	-0.6003	0.49	2.002	0.78	0.78	0.78	0.60
METALS	Lead	MG/KG	20	83.5	23	2.96	2.9637	0.60	2.101	31	31	31	23
SVOC	bis(2-Ethylhexyl)phthalate	MG/KG	20	0.049	0.16	-2.07	-2.0711	0.77	2.329	0.26	0.05	0.049	0.05
SVOC	Butylbenzylphthalate	MG/KG	20	0.344	0.21	-1.59	-1.5874	0.18	1.777	0.22	0.22	0.22	0.21
SVOC	Di-n-butylphthalate	MG/KG	20	3.542	0.86	-0.95	-0.9469	1.18	2.962	1.70	1.70	1.7	0.86
SVOC	Pyrene	MG/KG	20	0.145	0.20	-1.62	-1.6236	0.14	1.777	0.21	0.15	0.15	0.15
VOC	2-Hexanone	MG/KG	10	0.001	0.01	-5.26	-5.2639	0.58	2.368	0.01	0.001	0.001	0.001
VOC	Acetone	MG/KG	10	0.014	0.01	-5.03	-5.0317	0.35	2.031	0.01	0.01	0.009	0.01
VOC	Methylene Chloride	MG/KG	10	0.019	0.01	-5.25	-5.2503	0.79	2.710	0.02	0.02	0.015	0.01
VOC	Toluene	MG/KG	10	0.004	0.01	-5.24	-5.2431	0.37	2.089	0.01	0.00	0.004	0.00
VOC	Trichloroethene	MG/KG	10	0.001	0.01	-5.27	-5.2726	0.58	2.368	0.01	0.00	0.001	0.00
SVOC	Phenol	MG/KG	12	0.048	0.19	-1.72	-1.7169	0.42	2.082	0.25	0.05	0.05	0.048
SVOC	Pyrene	MG/KG	12	0.089	0.19	-1.66	-1.6645	0.24	1.883	0.22	0.09	0.09	0.089

Notes:

EXP - Explosive

SVOC - Semi-volatile organic compound

VOC - Volatile organic compound

[a] Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

[b] Arithmetic average of the natural log transformed data (logarithmic mean)

[c] Standard deviation of the natural log transformed data (logarithmic standard deviation)

[d] H statistic (Gilbert, 1987)

[e] UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

[f] RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

[g] AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-21

Calculation Of The Exposure Point Concentrations In Soil[h] At The Proving Grounds

Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
EXP	2,4,6-Trinitrotoluene	MG/KG	90	1500	17	-3.41	1.41	2.713	0.13	0.13	0.13
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	90	14	0.21	-3.35	0.94	2.151	0.068	0.068	0.068
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	90	6.7	0.12	-3.36	0.80	2.035	0.056	0.056	0.056
EXP	4-Nitrotoluene	MG/KG	90	0.03	0.067	-2.91	0.40	1.777	0.063	0.034	0.034
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	90	43	0.56	-3.31	1.11	2.315	0.09	0.09	0.09
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	90	10	0.17	-3.37	0.88	2.117	0.062	0.062	0.062
METALS	Antimony	MG/KG	28	4.1	2.9	0.24	1.53	3.326	11	4.1	2.9
METALS	Cadmium	MG/KG	28	0.99	0.61	-0.63	0.65	2.078	0.85	0.85	0.61
METALS	Lead	MG/KG	28	83.5	19	2.67	0.89	2.344	32	32	19
SVOC	bis(2-Ethylhexyl)phthalate	MG/KG	28	0.049	0.17	-1.96	0.68	2.127	0.23	0.049	0.049
SVOC	*Butylbenzylphthalate*	MG/KG	28	0.344	0.2	-1.61	0.16	1.75	0.21	0.21	0.2
SVOC	Di-n-butylphthalate	MG/KG	28	3.542	0.7	-1.18	1.18	2.789	1.2	1.2	0.7
SVOC	Pyrene	MG/KG	28	0.243	0.19	-1.73	0.53	1.987	0.25	0.24	0.19
VOC	2-Hexanone	MG/KG	18	0.001	0.0057	-5.22	0.43	1.98	0.0073	0.001	0.0057
VOC	Acetone	MG/KG	18	0.018	0.0074	-5.00	0.41	1.98	0.0089	0.0089	0.0074
VOC	Methylene Chloride	MG/KG	18	0.019	0.0056	-5.39	0.68	2.247	0.0083	0.0083	0.0056
VOC	Toluene	MG/KG	18	0.004	0.0053	-5.35	0.63	2.188	0.0081	0.004	0.004
VOC	Trichloroethene	MG/KG	18	0.001	0.0054	-5.33	0.58	2.132	0.0077	0.001	0.001

Notes:

EXP - Explosive

SVOC - Semi-volatile organic compound

VOC - Volatile organic compound

(a) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample one-half of the laboratory detection limit was used in the calculation of the average.

(b) Arithmetic average of the natural log transformed data (logarithmic mean)

(c) Standard deviation of the natural log transformed data (logarithmic standard deviation)

(d) H statistic (Gilbert, 1987)

(e) UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

(f) RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

(g) AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

(h) Both surface soil (≤ 2.00 feet bgs) and subsurface soil (> 2.00 feet bgs) are included.

Table 3-22

Calculation Of The Exposure Point Concentrations In Surface Soil (≤ 2 Feet) At The Northeast Boundary Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
METALS	Aluminum	MG/KG	6	34000	24000	10.08	0.24	2.097	31000	31000	24000
METALS	Cadmium	MG/KG	6	0.9	0.4	-1.03	0.46	2.5	0.66	0.66	0.4
METALS	Lead	MG/KG	6	31	21	3.03	0.21	2.097	26	26	21
SVOC	2,6-Dinitrotoluene	MG/KG	6	0.028	0.029	-3.57	0.18	2.033	0.034	0.028	0.028
SVOC	Fluoranthene	MG/KG	6	0.021	0.0083	-4.94	0.54	2.604	0.016	0.016	0.0083
SVOC	Pyrene	MG/KG	6	0.016	0.0075	-4.99	0.43	2.405	0.012	0.012	0.0075

Notes:

SVOC - Semi-volatile organic compound

[a] Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one- half of the laboratory detection limit was used in the calculation of the average.

[b] Arithmetic average of the natural log transformed data (logarithmic mean)

[c] Standard deviation of the natural log transformed data (logarithmic standard deviation)

[d] H statistic (Gilbert, 1987)

[e] UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

[f] RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

[g] AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-23

Calculation Of The Exposure Point Concentrations In Soil[h] At The Northeast Boundary Area
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
EXP	2,4,6-Trinitrotoluene	MG/KG	90	1500	17	-3.41	1.41	2.713	0.13	0.13	0.13
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	90	14	0.21	-3.35	0.94	2.151	0.068	0.068	0.068
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	90	6.7	0.12	-3.36	0.80	2.035	0.056	0.056	0.056
EXP	4-Nitrotoluene	MG/KG	90	0.03	0.067	-2.91	0.40	1.777	0.063	0.034	0.034
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	90	43	0.56	-3.31	1.11	2.315	0.09	0.09	0.09
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	90	10	0.17	-3.37	0.88	2.117	0.062	0.062	0.062
METALS	Antimony	MG/KG	28	4.1	2.9	0.24	1.53	3.326	11	4.1	2.9
METALS	Cadmium	MG/KG	28	0.99	0.61	-0.63	0.65	2.078	0.85	0.85	0.61
METALS	Lead	MG/KG	28	83.5	19	2.67	0.89	2.344	32	32	19
SVOC	bis(2-Ethylhexyl)phthalate	MG/KG	28	0.049	0.17	-1.96	0.68	2.127	0.23	0.049	0.049
SVOC	Butylbenzylphthalate	MG/KG	28	0.344	0.2	-1.61	0.16	1.75	0.21	0.21	0.2
SVOC	Di-n-butylphthalate	MG/KG	28	3.542	0.7	-1.18	1.18	2.789	1.2	1.2	0.7
SVOC	Pyrene	MG/KG	28	0.243	0.19	-1.73	0.53	1.987	0.25	0.24	0.19
VOC	2-Hexanone	MG/KG	18	0.001	0.0057	-5.22	0.43	1.98	0.0073	0.001	0.001
VOC	Acetone	MG/KG	18	0.018	0.0074	-5.00	0.41	1.98	0.0089	0.0089	0.0074
VOC	Methylene Chloride	MG/KG	18	0.019	0.0056	-5.39	0.68	2.247	0.0083	0.0083	0.0056
VOC	Toluene	MG/KG	18	0.004	0.0053	-5.35	0.63	2.188	0.0081	0.004	0.004
VOC	Trichloroethene	MG/KG	18	0.001	0.0054	-5.33	0.58	2.132	0.0077	0.001	0.001

Notes:

EXP - Explosive

SVOC - Semi-volatile organic compound

VOC - Volatile organic compound

[a] Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample one-half of the laboratory detection limit was used in the calculation of the average.

[b] Arithmetic average of the natural log transformed data (logarithmic mean)

[c] *Standard deviation of the natural log transformed data (logarithmic standard deviation)*

[d] H statistic (Gilbert, 1987)

[e] UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

[f] RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

[g] AE - *Average exposure concentration (mg/kg) which is the lower of RME or Average concentration*

[h] Both surface soil (≤ 2.00 feet bgs) and subsurface soil (> 2.00 feet bgs) are included.

Table 3-24

Calculation Of The Exposure Point Concentrations In Surface Soil (0 - 6 Inches) Adjacent To The Load Line 1 Bomb Production Buildings Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD Ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
EXP	1,3,5-Trinitrobenzene	MG/KG	57	0.63	0.26	-1.4	0.23	1.7	0.27	0.27	0.26
EXP	2,4,6-Trinitrotoluene	MG/KG	57	15	1.4	-1	1.3	2.6	1.2	1.2	1.2
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	57	9.8	0.53	-1.2	0.67	2	0.44	0.44	0.44
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	57	6.7	0.6	-0.81	0.59	1.9	0.59	0.59	0.59
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	57	2.1	0.41	-1	0.42	1.8	0.44	0.44	0.41
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	55	0.46	0.34	-1.1	0.22	1.7	0.36	0.36	0.34
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	57	0.31	0.23	-1.5	0.44	1.8	0.26	0.26	0.23
METALS	Antimony	MG/KG	39	0.88	1.6	-0.5	1.3	2.8	2.5	0.88	0.88
METALS	Barium	MG/KG	57	446	250	5.5	0.18	1.7	250	250	250
METALS	Cadmium	MG/KG	57	17.2	1.1	-0.47	0.91	2.2	1.1	1.1	1.1
METALS	Lead	MG/KG	56	394	86	3.9	1	2.3	110	110	86

Notes:

EXP - Explosive

[a] Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

[b] Arithmetic average of the natural log transformed data (logarithmic mean)

[c] Standard deviation of the natural log transformed data (logarithmic standard deviation)

[d] H statistic (Gilbert, 1987)

[e] UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

[f] RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

[g] AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-25

Calculation Of The Exposure Point Concentrations In Surface Soil (0 - 6 Inches) Adjacent To Load Line 2 Bomb Production Buildings Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD Ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
EXP	1,3,5-Trinitrobenzene	MG/KG	68	0.6	0.26	-1.4	0.28	1.7	0.27	0.27	0.26
EXP	2,4,6-Trinitrotoluene	MG/KG	68	12	0.55	-1.4	0.79	2	0.42	0.42	0.42
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	68	1.1	0.27	-1.3	0.22	1.7	0.28	0.28	0.27
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	68	0.77	0.48	-0.76	0.24	1.7	0.5	0.5	0.48
EXP	Hexahydro-1,2,3-trinitro-1,2,3-triazine	MG/KG	68	4.4	0.56	-0.82	0.62	1.9	0.6	0.6	0.56
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	67	0.53	0.37	-1	0.24	1.7	0.39	0.39	0.37
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	68	0.7	0.21	-1.7	0.73	2	0.26	0.26	0.21
METALS	Antimony	MG/KG	43	2.8	0.62	-0.81	0.77	2.1	0.78	0.78	0.62
METALS	Arsenic	MG/KG	68	15.5	7.4	2	0.25	1.7	7.7	7.7	7.4
METALS	Barium	MG/KG	68	516	230	5.4	0.23	1.7	230	230	230
METALS	Cadmium	MG/KG	68	12.6	1.3	-0.18	0.92	2.2	1.5	1.5	1.3
METALS	Lead	MG/KG	68	1040	250	4.9	1.2	2.4	400	400	250
METALS	Nickel	MG/KG	68	52.4	23	3.1	0.25	1.7	24	24	23

Notes:

EXP - Explosive

(a) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

(b) Arithmetic average of the natural log transformed data (logarithmic mean)

(c) Standard deviation of the natural log transformed data (logarithmic standard deviation)

(d) H statistic (Gilbert, 1987)

(e) UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

(f) RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

(g) AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-26

Calculation Of The Exposure Point Concentrations In Surface Soil (0 - 6 Inches) Adjacent To Load Line 3 Bomb Production Buildings Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[(a)]	Mean In Result[(b)]	SD Ln Result[(c)]	H[(d)]	UCL[(e)]	RME[(f)]	AE[(g)]
EXP	1,3,5-Trinitrobenzene	MG/KG	61	0.46	0.24	-1.44	0.27	1.7	0.26	0.26	0.24
EXP	2,4,6-Trinitrotoluene	MG/KG	61	15	0.94	-1.07	1.07	2.3	0.78	0.78	0.78
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	61	2.3	0.38	-1.2	0.57	1.9	0.39	0.39	0.38
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	61	2.2	0.52	-0.82	0.55	1.9	0.57	0.57	0.52
EXP	Hexahydro-1,2,3-trinitro-1,2,3-triazine	MG/KG	61	4.5	0.57	-0.9	0.65	2	0.57	0.57	0.57
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	61	1.4	0.26	-1.45	0.46	1.8	0.29	0.29	0.26
METALS	Antimony	MG/KG	45	1.5	0.37	-1.16	0.52	1.9	0.42	0.42	0.37
METALS	Barium	MG/KG	61	2380	250	5.39	0.42	1.8	260	260	250
METALS	Cadmium	MG/KG	61	3.1	0.74	-0.64	0.81	2.1	0.87	0.87	0.74
METALS	Lead	MG/KG	61	4670	200	4.53	1.01	2.3	200	200	200
METALS	Mercury	MG/KG	61	0.72	0.1	-2.48	0.55	1.9	0.11	0.11	0.1
METALS	Nickel	MG/KG	61	50.9	24	3.14	0.33	1.8	26	26	24
METALS	Silver	MG/KG	61	79.3	1.5	-2.17	1.18	2.4	0.31	0.31	0.31

Notes:

EXP - Explosive

(a) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

(b) Arithmetic average of the natural log transformed data (logarithmic mean)

(c) Standard deviation of the natural log transformed data (logarithmic standard deviation)

(d) H statistic (Gilbert, 1987)

(e) UCL - 95% Upper confidence Limit (mg/kg) on the lcgarithmic mean (Gilbert, 1987)

(f) RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

(g) AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-27

Calculation Of The Exposure Point Concentrations In Surface Soil (0 - 6 Inches) Adjacent To Load Line 4 Bomb Production Buildings Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD Ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
EXP	2,4,6-Trinitrotoluene	MG/KG	67	2	0.3	-1.3	0.4	1.8	0.31	0.31	0.3
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	67	0.4	0.25	-1.4	0.13	1.7	0.26	0.26	0.25
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	67	0.32	0.47	-0.77	0.22	1.7	0.49	0.32	0.32
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	67	3.4	0.48	-1	0.66	2	0.52	0.52	0.48
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	67	0.85	0.26	-1.4	0.34	1.8	0.28	0.28	0.26
METALS	Antimony	MG/KG	43	1.4	0.39	-1.1	0.52	1.9	0.44	0.44	0.39
METALS	Arsenic	MG/KG	67	15.3	7.3	1.9	0.32	1.8	7.8	7.8	7.3
METALS	Cadmium	MG/KG	67	10.3	0.94	-0.54	0.84	2.1	0.99	0.99	0.94
METALS	Lead	MG/KG	67	313	110	4.3	0.84	2.1	130	130	110
METALS	Mercury	MG/KG	67	0.31	0.097	-2.5	0.46	1.8	0.1	0.1	0.097
METALS	Nickel	MG/KG	67	61.7	23	3.1	0.26	1.7	24	24	23

Notes:

EXP - Explosive

(a) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

(b) Arithmetic average of the natural log transformed data (logarithmic mean)

(c) Standard deviation of the natural log transformed data (logarithmic standard deviation)

(d) H statistic (Gilbert, 1987)

(e) UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

(f) RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

(g) AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-28

Calculation Of The Exposure Point Concentrations In Surface Soil (0 - 6 Inches) In The Load Line 1 Paint Operations Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD Ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
METALS	Antimony	MG/KG	27	47.2	6.4	0.35	1.67	3.5	18	18	6.4
METALS	Cadmium	MG/KG	29	144	5.4	-0.91	1.44	3.1	2.7	2.7	2.7
METALS	Lead	MG/KG	29	794	100	4.02	1.09	2.6	170	170	100
METALS	Mercury	MG/KG	29	0.24	0.069	-2.75	0.33	1.8	0.075	0.075	0.069
METALS	Nickel	MG/KG	29	49.5	21	2.99	0.36	1.9	24	24	21

Notes:

[a] Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

[b] Arithmetic average of the natural log transformed data (logarithmic mean)

[c] Standard deviation of the natural log transformed data (logarithmic standard deviation)

[d] H statistic (Gilbert, 1987)

[e] UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

[f] RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

[g] AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-29

Calculation Of The Exposure Point Concentrations In Surface Soil (0 - 6 Inches) In The Load Line 2 Paint Operations Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD Ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
METALS	Antimony	MG/KG	22	501	29	0.36	2.3	5	220	220	29
METALS	Arsenic	MG/KG	28	14.6	8	2	0.37	1.9	9.2	9.2	8
METALS	Cadmium	MG/KG	32	13.8	0.94	-0.76	0.97	2.4	1.1	1.1	0.94
METALS	Cobalt	MG/KG	28	44.9	11	2.3	0.42	1.9	12	12	11
METALS	Lead	MG/KG	32	3960	180	3.6	1.2	2.7	150	150	150
METALS	Mercury	MG/KG	28	0.76	0.096	-2.6	0.59	2	0.11	0.11	0.096
METALS	Nickel	MG/KG	28	63	24	3.1	0.39	1.9	27	27	24

Notes:

(a) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

(b) Arithmetic average of the natural log transformed data (logarithmic mean)

(c) Standard deviation of the natural log transformed data (logarithmic standard deviation)

(d) H statistic (Gilbert, 1987)

(e) UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

(f) RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

(g) AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-30

Calculation Of The Exposure Point Concentrations In Surface Soil (0 - 6 Inches) In The Load Line 3 Paint Operations Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD Ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
METALS	Antimony	MG/KG	21	54.8	5.4	0.37	1.5	3.5	16	16	5.4
METALS	Barium	MG/KG	30	516	220	5.3	0.41	1.9	260	260	220
METALS	Cadmium	MG/KG	30	5.8	0.75	-0.98	1.1	2.6	1.2	1.2	0.75
METALS	Cobalt	MG/KG	28	25.2	9.8	2.2	0.41	1.9	11	11	9.8
METALS	Lead	MG/KG	30	3730	220	4.1	1.3	2.9	270	270	220
METALS	Mercury	MG/KG	28	0.29	0.11	-2.4	0.6	2.1	0.14	0.14	0.11
METALS	Nickel	MG/KG	28	194	30	3.1	0.6	2	35	35	30

Notes:

[a] Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

[b] Arithmetic average of the natural log transformed data (logarithmic mean)

[c] Standard deviation of the natural log transformed data (logarithmic standard deviation)

[d] H statistic (Gilbert, 1987)

[e] UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

[f] RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

[g] AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-31

Calculation Of The Exposure Point Concentrations In Surface Soil (0 - 6 Inches) In The Load Line 4 Paint Operations Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD Ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
METALS	Antimony	MG/KG	18	171	15	0.62	1.98	4.3	110	110	15
METALS	Cadmium	MG/KG	29	19.7	1.5	-0.93	1.55	3.3	3.4	3.4	1.5
METALS	Lead	MG/KG	29	600	86	3.77	1.13	2.6	140	140	86

Notes:

(a) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

(b) Arithmetic average of the natural log transformed data (logarithmic mean)

(c) Standard deviation of the natural log transformed data (logarithmic standard deviation)

(d) H statistic (Gilbert, 1987)

(e) UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

(f) RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

(g) AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-32

Calculation Of The Exposure Point Concentrations In Surface Soil (0 - 6 Inches) At The Potential Landfill North Of The Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
EXP	1,3,5-Trinitrobenzene	MG/KG	45	0.02	0.58	-3.29	0.77	2.138	0.064	0.02	0.02
EXP	2,4,6-Trinitrotoluene	MG/KG	45	17	0.52	-2.76	1.43	2.936	0.33	0.33	0.33
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	45	2.4	0.17	-2.65	1.14	2.624	0.21	0.21	0.17
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	45	1.8	0.19	-2.58	1.27	2.778	0.29	0.29	0.19
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	45	8.8	0.29	-2.89	1.28	2.778	0.21	0.21	0.21
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	45	0.2	0.9	-3.04	0.97	2.339	0.11	0.11	0.11
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	45	15	0.82	-2.48	1.78	3.415	1.0	1.0	0.82
METALS	Antimony	MG/KG	9	9.1	3.9	0.93	1.13	3.511	19	9.1	3.9
METALS	Cadmium	MG/KG	9	1.3	0.75	-0.32	0.3	2.013	0.93	0.93	0.75
METALS	Lead	MG/KG	9	325	6.2	3.42	1.03	3.511	190	190	6.2
METALS	Silver	MG/KG	9	6.0	0.99	-1.55	1.79	5.356	31	6.0	0.99
SVOC	Benzo(b)fluoranthene	MG/KG	6	0.077	0.19	-1.73	0.41	2.205	0.29	0.077	0.077
SVOC	Chrysene	MG/KG	6	0.027	0.18	-1.91	0.84	2.919	0.63	0.027	0.027
SVOC	Di-n-butylphthalate	MG/KG	6	2.789	0.64	-1.14	1.06	3.511	3.0	2.8	0.64
SVOC	Phenol	MG/KG	6	0.048	0.18	-1.82	0.6	2.441	0.37	0.048	0.048
SVOC	Pyrene	MG/KG	6	0.089	0.19	-1.72	0.35	2.072	0.26	0.089	0.089

Notes:

EXP - Explosive

SVOC - Semi-volatile organic compound

(a) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample one-half of the laboratory detection limit was used in the calculation of the average.

(b) Arithmetic average of the natural log transformed data (logarithmic mean)

(c) Standard deviation of the natural log transformed data (logarithmic standard deviation)

(d) H statistic (Gilbert, 1987)

(e) UCL - 95% Upper Confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

(f) RME - Reasonable Maximum Exposure concentration (mg/kg) is the lower of the logarithmic UCL or maximum values.

(g) AE - Average exposure concentration (mg/kg) is the lower of RME or Average concentration

Table 3-33

Calculation Of The Exposure Point Concentrations In Surface Soil (0 - 6 Inches) At The Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
EXP	2,4,6-Trinitrotoluene	MG/KG	25	0.69	0.057	-3.47	0.77	2.207	0.059	0.059	0.057
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	25	0.073	0.032	-3.51	0.39	1.884	0.038	0.038	0.032
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	25	0.070	0.032	-3.49	0.26	1.816	0.035	0.035	0.032
EXP	4-Nitrotoluene	MG/KG	25	0.034	0.053	-2.95	0.16	1.759	0.056	0.034	0.034
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	25	0.11	0.032	-3.52	0.29	1.816	0.035	0.035	0.032
METALS	Antimony	MG/KG	10	1.4	2.9	0.25	1.49	4.207	31	1.4	1.4
METALS	Cadmium	MG/KG	10	0.92	0.61	-0.53	0.30	1.977	0.75	0.75	0.61
METALS	Lead	MG/KG	10	37	24	3.12	0.30	1.977	29	29	24
SVOC	bis(2-Ethylhexyl)phthalate	MG/KG	10	0.046	0.18	-1.89	0.70	2.532	0.35	0.046	0.046
SVOC	Butylbenzylphthalate	MG/KG	10	0.344	0.22	-1.51	0.16	0.1881	0.23	0.23	0.22
SVOC	Di-n-butylphthalate	MG/KG	10	3.542	1.0	-0.79	1.27	3.92	5.4	3.5	1.0
SVOC	Pyrene	MG/KG	10	0.145	0.20	-1.59	0.13	1.881	0.22	0.15	0.15

Notes:

EXP - Explosive

SVOC - Semi-volatile organic compound

(a) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample one-half of the laboratory detection limit was used in the calculation of the average.

(b) Arithmetic average of the natural log transformed data (logarithmic mean)

(c) Standard deviation of the natural log transformed data (logarithmic standard deviation)

(d) H statistic (Gilbert, 1987)

(e) UCL - 95% Upper Confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

(f) RME - Reasonable Maximum Exposure concentration (mg/kg) is the lower of the logarithmic UCL or maximum values.

(g) AE - Average exposure concentration (mg/kg) is the lower of RME or Average concentration

Table 3-34

Calculation Of The Exposure Point Concentrations In Surface Soil (0 - 6 Inches) At The Northeast Boundary Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	No. of Samples	Max Detected Conc	Average Conc[a]	Mean ln Result[b]	SD ln Result[c]	H[d]	UCL[e]	RME[f]	AE[g]
METALS	Cadmium	MG/KG	3	0.9	0.5	-0.85	0.65	8.5	26	0.9	0.5
METALS	Lead	MG/KG	3	31	23	3.12	0.27	4.1	52	31	23
SVOC	2,6-Dinitrotoluene	MG/KG	3	0.028	0.026	-3.80	0.06	2.8	0.025	0.025	0.025
SVOC	Fluoranthene	MG/KG	3	0.021	0.01	-4.79	0.81	11	6.3	0.021	0.01
SVOC	Pyrene	MG/KG	3	0.016	0.0088	-4.88	0.65	8.5	0.46	0.016	0.0088
METALS	Selenium	MG/KG	3	1.8	1.2	0.09	0.44	5.8	7.3	1.8	1.2

Notes:

SVOC - Semi-volatile organic compound

[a] Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample one-half of the laboratory detection limit was used in the calculation of the average.

[b] Arithmetic average of the natural log transformed data (logarithmic mean)

[c] Standard deviation of the natural log transformed data (logarithmic standard deviation)

[d] H statistic (Gilbert, 1987)

[e] UCL - 95% Upper confidence Limit (mg/kg) on the logarithmic mean (Gilbert, 1987)

[f] RME - Reasonable Maximum Exposure concentration (mg/kg) which is the lower of the logarithmic UCL or maximum values.

[g] AE - Average exposure concentration (mg/kg) which is the lower of RME or Average concentration

Table 3-35

Exposure Point Concentrations[a]
Surface Water and Sediment in Johnson/Clear Creeks
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	*Surface Water* Maximum Concentration (mg/L)	*Sediment* Maximum Concentration (mg/kg)	Fish Tissue Modeled Concentration[b] (mg/kg)
EXP	Hexahydro-1,2,3-trinitro-1,2,3-triazine (RDX)	0.0018		0.00012
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.00054	0.014	0.000012
METALS	Aluminum	21		924
METALS	Arsenic	0.0112		0.49
METALS	Barium	0.46		20.2
METALS	Beryllium	0.0013		0.057
METALS	Cobalt	0.011		0.484
METALS	Iron	18		792
METALS	Lead	0.016		0.78
METALS	Mercury	0.00088		4.84
METALS	Nickel	0.129		5.68
METALS	Thallium	0.0167		0.73
METALS	Silver		2.7	
METALS	Vanadium	0.043		1.89
VOC	Toluene	0.0013		0.045
VOC	Trichloroethene (TCE)	0.00692		0.0013
SVOC	4-Methylphenol		0.154	
SVOC	Di-n-butylphthalate		0.739	
SVOC	Phenol		0.124	
SVOC	bis(2-Ethylhexyl)phthalate (DEHP)		0.032	

Notes:

[a] Due to the relatively small number of samples collected, the maximum detected concentrations were used as exposure point concentrations.

[b] Fish tissue concentrations were modeled from surface water.

EXP - Explosives and explosive residues

SVOC - Semi-volatile organic compound

VOC - Volatile organic compound

Table 3-36

Exposure Point Concentrations[a]
Surface Water and Sediment in Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Surface Water Maximum Concentration (mg/L)	Sediment Maximum Concentration (mg/kg)	Fish Tissue Modeled Concentration[b] (mg/kg)
METALS	Aluminum	7.8		343
METALS	Barium	0.66		29
METALS	Beryllium	0.0013		0.057
METALS	Cobalt	0.012		0.528
METALS	Iron	8.1		356
METALS	Lead	0.0015		0.074
METALS	Nickel	0.027		1.19
METALS	Thallium	0.0001		0.0044
METALS	Silver		0.246	
METALS	Vanadium	0.045		1.98
VOC	Acetone		2.3	
VOC	Methylene chloride	0.00046		0.001
VOC	Toluene	0.00023	0.043	0.00058
SVOC	4-Methylphenol		2.444	
SVOC	Di-n-butylphthalate		0.575	
SVOC	Pyrene		0.107	

Notes:

[a] Due to the relatively small number of samples collected, the maximum detected concentrations were used as exposure point concentrations.

[b] Fish tissue concentrations were modeled from surface water.

SVOC - Semi-volatile organic compound

VOC - Volatile organic compound

Table 3-37

Exposure Point Concentrations[a]
Surface Water and Sediment in NRD Reservoir
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Surface Water Maximum Concentration (mg/L)	Sediment Maximum Concentration (mg/kg)	Fish Tissue Maximum Concentration (mg/kg)
EXP	2-Amino-4,6-Dinitrotoluene (2-AmDNT)	0.28		
EXP	Nitrobenzene		0.074	
METALS	Aluminum		47000	11.3
METALS	Arsenic		12	
METALS	Barium		450	3.3
METALS	Beryllium		1.9	
METALS	Cadmium		0.61	0.1
METALS	Nickel		42	0.81
METALS	Mercury	0.00026		
METALS	Thallium		0.57	
METALS	Copper			4.4
METALS	Lead			2.6
METALS	Selenium			2.8
METALS	Silver			0.62

Notes:

[a] Due to the relatively small number of samples collected, the maximum detected concentrations were used as exposure point concentrations.

EXP - Explosive

Table 4-1

Critical Toxicity Values For Potential Chemicals Of Concern
Former Nebraska Ordnance Plant, Mead, Nebraska

Chemical Name	EPA Weight of Evidence	Oral Slope Factor $(mg/kg\text{-}day)^{-1}$	Oral Reference Dose (mg/kg-day)	
			Subchronic	Chronic
VOCS				
4-Nitrotoluene				1.00E-02 [b]
2-Hexanone (MBK)				4.00E-02 [c]
Acetone	D		1.00E-01 [e]	1.00E-01 [a]
Methylene chloride		7.50E-03 [g]		6.00E-02 [g]
Toluene	D		2.00E-01 [e]	2.00E-01 [a]
Trichloroethene (TCE)	B2	1.10E-02 [c]	6.00E-03 [e]	6.00E-03 [c]
SVOCS				
4-Methylphenol	D		5.00E-03 [e]	5.00E-03 [a]
Benzo(b)fluoranthene	B2	7.30E-01 [c]		
Benzo(g,h,I)perylene				
bis(2-Ethylhexyl)phthalate (DEHP)	B2	1.40E-02 [a]	2.00E-02 [e]	2.00E-02 [a]
Butylbenzylphthalate	C		2.00E-01 [e]	2.00E-01 [a]
Chrysene	B2	7.30E-03 [c]		
Di-n-butylphthalate	D		1.00E+00 [b]	1.00E-01 [a]
Diethylphthalate	D		8.00E+00 [b]	8.00E-01 [a]
Fluoranthene				4.00E-02 [g]
Phenol	D		6.00E-01 [b]	6.00E-01 [a]
Pyrene	D		3.00E-01 [b]	3.00E-02 [a]
EXPLOSIVES				
1,3,5-Trinitrobenzene (TNB)			5.00E-04 [b]	5.00E-05 [a]
2,4,6-Trinitrotoluene (TNT)	C	3.00E-02 [a]	5.00E-04 [b]	5.00E-04 [a]
2,4-Dinitrotoluene (2,4-DNT)		6.80E-01 [h]		2.00E-03 [g]
2,6-Dinitrotoluene (2,6-DNT)			1.00E-02 [b]	1.00E-03 [b]
2-Amino-4,6-dinitrotoluene (2-Am-DNT)				
4-Amino-2,6-dinitrotoluene (4-Am-DNT)				
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	C	1.10E-01 [a]	3.00E-03 [b]	3.00E-03 [a]
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)				
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	D		5.00E-02 [e]	5.00E-02 [a]
METALS				
Aluminum			1.00E+00 [e]	1.00E+00 [c]
Antimony	D		4.00E-04 [e]	4.00E-04 [a]
Arsenic	A	1.50E+00 [a]	3.00E-04 [b]	3.00E-04 [a]
Barium	D		7.00E-02 [b]	7.00E-02 [a]
Beryllium	B2	4.30E+00 [c]	5.00E-03 [b]	5.00E-03 [c]
Cadmium	B1		1.00E-03 [e]	1.00E-03 [a,d]
Cobalt			6.00E-02 [e]	6.00E-02 [c]
Mercury	D		3.00E-04 [e]	3.00E-04 [c]
Nickel	D[f]		2.00E-02 [b]	2.00E-02 [c]
Selenium				5.00E-03 [g]
Silver	D		5.00E-03 [b]	5.00E-03 [a]
Thallium				8.00E-05 [g]
Vanadium	D		7.00E-03 [b]	7.00E-03 [b]

Note:

[a] Data verified in IRIS (February, 1997).

[b] Data verified in Health Effects Assessment Summary Tables (USEPA, 1995).

[c] Data verified in EPA Region III Risk-Based Concentration Tables (USEPA, 1996).

[d] There are two different RfD values for Cadmium, one for food and the other one for drinking water, the value used in the present BRA is the one for food intake.

[e] No subchronic RfD available, the chronic oral RfD value is used.

[f] Drinking Water Regulations and Health Advisories (USEPA, 1995) classifies nickel as "class D" compound via ingestion.

[g] *Data verified in IRIS (October, 1999).*

[h] Used the slope factor for a mixture of 2,6- and 2,4-DNT from IRIS (1999).

Table 4-2

USEPA Weight-Of-Evidence Carcinogenic Classification Of Chemicals

Group	Description	Description of Evidence
A	Human carcinogen	Sufficient evidence from epidemiologic. studies to between exposure and cancer.
BI or B2	Probable human carcinogen	BI indicates that limited human data are available from epidemiologic studies. B2 indicates sufficient evidence in animals and inadequate or no evidence in humans of carcinogenicity.
C	Possible human carcinogen	Limited evidence of carcinogenicity in animals.
D	Not classifiable as to human	Inadequate evidence of carcinogenicity in carcinogenicity animals.
E	No evidence of carcinogenicity in at least humans	No evidence of carcinogenicity in at least humans two adequate animal tests or in both epidemiologic and animal studies.

Note: Substances in groups B and C are considered potential carcinogens.

TABLE 5-1

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 2 FEET) ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	1.38E-06	4.37E-02	2.22E-05	9.07E-02
SOIL DERMAL	4.30E-06	6.97E-03	1.21E-05	9.39E-02
VEGETABLE INGESTION	1.22E-06	2.91E-02	1.60E-05	4.89E-02
TOTAL	6.90E-06	7.98E-02	5.03E-05	2.34E-01
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	8.58E-06	4.08E-01	1.78E-05	8.47E-01
SOIL DERMAL	3.34E-07	3.01E-02	4.00E-06	3.63E-01
VEGETABLE INGESTION	1.14E-06	4.06E-02	1.92E-06	6.83E-02
TOTAL	1.01E-05	4.79E-01	2.37E-05	1.28E+00
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	4.73E-08	1.50E-03	1.52E-06	6.22E-03
SOIL DERMAL	3.98E-09	2.39E-04	8.29E-07	6.44E-03
TOTAL	5.13E-08	1.74E-03	2.35E-06	1.27E-02
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	4.97E-08	2.84E-03	2.06E-07	1.18E-02
SOIL DERMAL	4.15E-10	4.49E-05	9.85E-08	1.07E-02
TOTAL	5.01E-08	2.88E-03	3.04E-07	2.25E-02
		ON-SITE WORKER		
SOIL INGESTION	2.19E-07	6.25E-03	2.83E-06	3.24E-02
SOIL DERMAL	9.20E-08	4.98E-03	3.08E-06	4.95E-02
TOTAL	3.11E-07	1.12E-02	5.92E-06	8.19E-02

TABLE 5-2

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 6 INCHES) ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	7.14E-09	1.00E-02	1.16E-07	2.03E-02
SOIL DERMAL	5.77E-09	4.66E-03	6.05E-07	6.19E-02
VEGETABLE INGESTION	1.23E-06	2.92E-02	1.64E-05	5.02E-02
TOTAL	1.24E-06	4.39E-02	1.72E-05	1.32E-01
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	4.44E-08	9.34E-02	9.25E-08	1.90E-01
SOIL DERMAL	1.66E-08	2.01E-02	2.00E-07	2.39E-01
VEGETABLE INGESTION	1.15E-06	4.08E-02	1.97E-06	7.01E-02
TOTAL	1.21E-06	1.54E-01	2.26E-06	4.99E-01
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	2.45E-10	3.43E-04	7.93E-09	1.39E-03
SOIL DERMAL	1.98E-10	1.60E-04	4.15E-08	4.24E-03
TOTAL	4.43E-10	5.03E-04	4.94E-08	5.64E-03
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	2.57E-10	6.49E-04	1.07E-09	2.63E-03
SOIL DERMAL	2.06E-10	3.00E-04	4.93E-09	7.07E-03
TOTAL	4.64E-10	9.50E-04	6.00E-09	9.70E-03
		ON-SITE WORKER		
SOIL INGESTION	1.13E-09	1.43E-03	1.47E-08	7.25E-03
SOIL DERMAL	4.58E-09	3.33E-03	1.54E-07	4.42E-02
TOTAL	5.71E-09	4.76E-03	1.69E-07	5.15E-02

TABLE 5-3

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 2 FEET) ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
ADULT RESIDENT				
SOIL INGESTION	1.07E-06	2.69E-02	1.73E-05	5.64E-02
SOIL DERMAL	9.07E-09	5.10E-04	9.51E-07	6.95E-03
VEGETABLE INGESTION	1.67E-06	3.96E-02	2.23E-05	6.79E-02
TOTAL	2.75E-06	6.71E-02	4.05E-05	1.31E-01
CHILD RESIDENT (0-6 YR OLD)				
SOIL INGESTION	6.63E-06	2.51E-01	1.38E-05	5.26E-01
SOIL DERMAL	2.61E-08	2.20E-03	3.15E-07	2.68E-02
VEGETABLE INGESTION	1.56E-06	5.54E-02	2.67E-06	9.49E-02
TOTAL	8.22E-06	3.09E-01	1.68E-05	6.48E-01
ADULT TRESPASSER/VISITOR				
SOIL INGESTION	3.65E-08	9.24E-04	1.18E-06	3.87E-03
SOIL DERMAL	3.11E-10	1.75E-05	6.52E-08	4.76E-04
TOTAL	3.69E-08	9.41E-04	1.25E-06	4.34E-03
JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)				
SOIL INGESTION	3.84E-08	1.75E-03	1.60E-07	7.32E-03
SOIL DERMAL	3.24E-10	3.28E-05	7.76E-09	7.93E-04
TOTAL	3.87E-08	1.78E-03	1.68E-07	8.11E-03
ON-SITE WORKER				
SOIL INGESTION	1.69E-07	3.85E-03	2.20E-06	2.01E-02
SOIL DERMAL	7.20E-09	3.64E-04	2.43E-07	4.96E-03
TOTAL	1.76E-07	4.21E-03	2.44E-06	2.51E-02

TABLE 5-4

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 6 INCHES) ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	9.83E-07	2.60E-02	1.60E-05	5.52E-02
SOIL DERMAL	8.42E-08	5.16E-03	8.87E-06	7.05E-02
VEGETABLE INGESTION	1.69E-06	4.00E-02	2.24E-05	6.84E-02
TOTAL	2.75E-06	7.11E-02	4.73E-05	1.94E-01
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	6.11E-06	2.43E-01	1.28E-05	5.15E-01
SOIL DERMAL	2.42E-07	2.23E-02	2.94E-06	2.72E-01
VEGETABLE INGESTION	1.57E-06	5.58E-02	2.69E-06	9.56E-02
TOTAL	7.93E-06	3.21E-01	1.84E-05	8.83E-01
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	3.37E-08	8.91E-04	1.10E-06	3.78E-03
SOIL DERMAL	6.19E-09	3.79E-04	6.08E-07	4.83E-03
TOTAL	3.99E-08	1.27E-03	1.70E-06	8.62E-03
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	3.54E-08	1.69E-03	1.48E-07	7.16E-03
SOIL DERMAL	3.01E-09	3.32E-04	7.23E-08	8.05E-03
TOTAL	3.84E-08	2.02E-03	2.20E-07	1.52E-02
		ON-SITE WORKER		
SOIL INGESTION	1.56E-07	3.71E-03	2.04E-06	1.97E-02
SOIL DERMAL	6.68E-08	3.68E-03	2.26E-06	5.04E-02
TOTAL	2.23E-07	7.40E-03	4.30E-06	7.01E-02

TABLE 5-5

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 2 FEET) ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	6.99E-09	5.23E-03	1.10E-07	1.79E-02
SOIL DERMAL	5.65E-09	3.84E-03	5.75E-08	5.23E-02
VEGETABLE INGESTION	1.75E-06	4.16E-02	2.21E-05	6.73E-02
TOTAL	1.77E-06	5.06E-02	2.22E-05	1.38E-01
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	4.35E-08	4.88E-02	8.79E-08	1.01E-01
SOIL DERMAL	1.63E-09	4.43E-04	1.90E-07	2.02E-01
VEGETABLE INGESTION	1.63E-06	5.81E-02	2.65E-06	9.41E-02
TOTAL	1.68E-06	1.07E-01	2.93E-06	3.98E-01
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	2.40E-10	1.79E-04	7.53E-09	1.23E-03
SOIL DERMAL	1.94E-10	1.32E-04	3.94E-08	3.58E-03
TOTAL	4.34E-10	3.11E-04	4.69E-08	4.81E-03
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	2.52E-10	3.39E-04	1.02E-09	1.41E-03
SOIL DERMAL	2.02E-10	2.47E-04	4.69E-09	5.97E-03
TOTAL	4.54E-10	5.86E-04	5.70E-09	7.38E-03
		ON-SITE WORKER		
SOIL INGESTION	1.11E-09	1.22E-03	1.40E-08	6.39E-03
SOIL DERMAL	4.49E-09	2.74E-03	1.47E-07	3.73E-02
TOTAL	5.60E-09	3.96E-03	1.61E-07	4.37E-02

TABLE 5-6

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE (0 - 6 INCHES) SOIL ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	7.57E-09	5.91E-03	1.19E-07	1.95E-02
SOIL DERMAL	6.12E-09	1.53E-03	6.20E-07	2.02E-02
VEGETABLE INGESTION	1.70E-06	4.04E-02	2.14E-05	6.52E-02
TOTAL	1.72E-06	4.78E-02	2.21E-05	1.05E-01
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	4.71E-08	5.52E-02	9.48E-08	1.16E-01
SOIL DERMAL	1.76E-08	6.59E-03	2.05E-07	7.80E-02
VEGETABLE INGESTION	1.59E-06	5.64E-02	2.56E-06	9.11E-02
TOTAL	1.65E-06	1.18E-01	2.86E-06	2.85E-01
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	2.60E-10	2.03E-04	8.13E-09	1.33E-03
SOIL DERMAL	2.10E-10	5.24E-05	4.25E-08	1.38E-03
TOTAL	4.69E-10	2.55E-04	5.06E-08	2.72E-03
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	2.73E-10	3.84E-04	1.10E-09	1.61E-03
SOIL DERMAL	2.04E-10	9.17E-05	5.05E-09	2.30E-03
TOTAL	4.77E-10	4.75E-04	6.15E-09	3.91E-03
		ON-SITE WORKER		
SOIL INGESTION	1.20E-09	1.32E-03	1.51E-08	6.95E-03
SOIL DERMAL	4.86E-09	2.89E-03	1.58E-07	4.08E-02
TOTAL	6.06E-09	4.21E-03	1.73E-07	4.78E-02

TABLE 5-7

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS
ASSOCIATED WITH SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	1.02E-06	2.00E-02	1.67E-05	4.22E-02
SOIL DERMAL	8.58E-08	2.12E-03	9.12E-06	2.91E-02
VEGETABLE INGESTION	1.30E-06	3.10E-02	1.79E-05	5.47E-02
TOTAL	2.41E-06	5.31E-02	4.37E-05	1.26E-01
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	6.33E-06	1.87E-01	1.33E-05	3.93E-01
SOIL DERMAL	2.47E-07	9.16E-03	3.02E-06	1.12E-01
VEGETABLE INGESTION	1.22E-06	4.32E-02	2.15E-06	7.64E-02
TOTAL	7.79E-06	2.39E-01	1.85E-05	5.82E-01
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	3.49E-08	6.85E-04	1.14E-06	2.89E-03
SOIL DERMAL	2.94E-10	6.74E-06	6.25E-07	1.99E-03
TOTAL	3.52E-08	6.92E-04	1.77E-06	4.89E-03
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	3.67E-08	1.30E-03	1.54E-07	5.47E-03
SOIL DERMAL	3.07E-10	1.26E-05	7.43E-08	3.32E-03
TOTAL	3.70E-08	1.31E-03	2.29E-07	8.79E-03
		ON-SITE WORKER		
SOIL INGESTION	1.62E-07	2.86E-03	2.13E-06	1.51E-02
SOIL DERMAL	6.81E-08	1.52E-03	2.33E-06	2.08E-02
TOTAL	2.30E-07	4.37E-03	4.45E-06	3.58E-02

TABLE 5-8

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 6 INCHES) ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
	ADULT RESIDENT			
SOIL INGESTION	9.71E-07	1.95E-02	1.60E-05	4.15E-02
SOIL DERMAL	8.24E-08	2.12E-03	8.82E-06	2.92E-02
VEGETABLE INGESTION	1.44E-06	3.43E-02	1.95E-05	5.96E-02
TOTAL	2.50E-06	5.59E-02	4.44E-05	1.30E-01
	CHILD RESIDENT (0-6 YR OLD)			
SOIL INGESTION	6.04E-06	1.82E-01	1.28E-05	3.88E-01
SOIL DERMAL	2.37E-07	9.15E-03	2.92E-06	1.13E-01
VEGETABLE INGESTION	1.35E-06	4.79E-02	2.34E-06	8.32E-02
TOTAL	7.62E-06	2.39E-01	1.81E-05	5.84E-01
	ADULT TRESPASSER/VISITOR			
SOIL INGESTION	3.33E-08	6.70E-04	1.10E-06	2.85E-03
SOIL DERMAL	2.83E-09	7.27E-05	6.05E-07	2.00E-03
TOTAL	3.61E-08	7.42E-04	1.70E-06	4.85E-03
	JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)			
SOIL INGESTION	3.50E-08	1.27E-03	1.49E-07	5.39E-03
SOIL DERMAL	2.95E-09	1.37E-04	7.19E-08	3.33E-03
TOTAL	3.79E-08	1.40E-03	2.20E-07	8.72E-03
	ON-SITE WORKER			
SOIL INGESTION	1.54E-07	2.79E-03	2.05E-06	1.48E-02
SOIL DERMAL	6.54E-08	1.51E-03	2.25E-06	2.08E-02
TOTAL	2.19E-07	4.30E-03	4.29E-06	3.57E-02

TABLE 5-9

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 2 FEET) AROUND LOAD LINE 1 PAINT OPERATION BUILDINGS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	0.00E+00	7.35E-03	0.00E+00	1.48E-02
SOIL DERMAL	0.00E+00	5.94E-04	0.00E+00	7.73E-03
TOTAL	0.00E+00	7.94E-03	0.00E+00	2.25E-02
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	0.00E+00	6.86E-02	0.00E+00	1.38E-01
SOIL DERMAL	0.00E+00	2.56E-04	0.00E+00	2.99E-02
TOTAL	0.00E+00	6.88E-02	0.00E+00	1.68E-01
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	0.00E+00	2.52E-04	0.00E+00	1.01E-03
SOIL DERMAL	0.00E+00	2.04E-05	0.00E+00	5.30E-04
TOTAL	0.00E+00	2.72E-04	0.00E+00	1.54E-03
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	0.00E+00	4.77E-04	0.00E+00	1.92E-03
SOIL DERMAL	0.00E+00	3.82E-05	0.00E+00	8.83E-04
TOTAL	0.00E+00	5.15E-04	0.00E+00	2.80E-03
		ON-SITE WORKER		
SOIL INGESTION	0.00E+00	1.05E-03	0.00E+00	5.28E-03
SOIL DERMAL	0.00E+00	4.24E-04	0.00E+00	5.52E-03
TOTAL	0.00E+00	1.47E-03	0.00E+00	1.08E-02

TABLE 5-10

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 6 INCHES) AROUND LOAD LINE 1 PAINT OPERATION BUILDINGS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	0.00E+00	1.37E-02	0.00E+00	6.87E-02
SOIL DERMAL	0.00E+00	3.16E-03	0.00E+00	3.75E-02
TOTAL	0.00E+00	1.69E-02	0.00E+00	1.06E-01
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	0.00E+00	1.28E-01	0.00E+00	6.41E-01
SOIL DERMAL	0.00E+00	5.27E-03	0.00E+00	1.45E-01
TOTAL	0.00E+00	1.33E-01	0.00E+00	7.86E-01
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	0.00E+00	4.69E-04	0.00E+00	4.71E-03
SOIL DERMAL	0.00E+00	4.19E-05	0.00E+00	2.57E-03
TOTAL	0.00E+00	5.11E-04	0.00E+00	7.28E-03
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	0.00E+00	8.88E-04	0.00E+00	8.91E-03
SOIL DERMAL	0.00E+00	7.86E-05	0.00E+00	4.28E-03
TOTAL	0.00E+00	9.67E-04	0.00E+00	1.32E-02
		ON-SITE WORKER		
SOIL INGESTION	0.00E+00	1.96E-03	0.00E+00	2.45E-02
SOIL DERMAL	0.00E+00	8.72E-04	0.00E+00	2.68E-02
TOTAL	0.00E+00	2.83E-03	0.00E+00	5.13E-02

TABLE 5-11

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 2 FEET) AROUND LOAD LINE 2 PAINT OPERATION BUILDINGS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	1.14E-06	4.79E-02	1.89E-05	1.00E-01
SOIL DERMAL	9.25E-08	4.01E-03	9.90E-06	5.43E-02
TOTAL	1.24E-06	5.19E-02	2.88E-05	1.55E-01
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	7.12E-06	4.47E-01	1.51E-05	9.37E-01
SOIL DERMAL	2.66E-07	1.73E-02	3.28E-06	2.10E-01
TOTAL	7.39E-06	4.64E-01	1.84E-05	1.15E+00
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	3.93E-08	1.64E-03	1.30E-06	6.88E-03
SOIL DERMAL	3.17E-09	1.37E-04	6.79E-07	3.72E-03
TOTAL	4.24E-08	1.78E-03	1.98E-06	1.06E-02
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	4.13E-08	3.11E-03	1.75E-07	1.30E-02
SOIL DERMAL	3.31E-09	2.58E-04	8.07E-08	6.19E-03
TOTAL	4.46E-08	3.36E-03	2.56E-07	1.92E-02
		ON-SITE WORKER		
SOIL INGESTION	1.82E-07	6.84E-03	2.41E-06	3.58E-02
SOIL DERMAL	7.34E-08	2.86E-03	2.53E-06	3.88E-02
TOTAL	2.55E-07	9.70E-03	4.94E-06	7.46E-02

TABLE 5-12

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 6 INCHES) AROUND LOAD LINE 2 PAINT OPERATION BUILDINGS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	1.05E-06	6.96E-02	1.89E-05	8.10E-01
SOIL DERMAL	8.49E-08	5.79E-03	9.90E-06	4.26E-01
TOTAL	1.13E-06	7.54E-02	2.88E-05	1.24E+00
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	6.53E-06	6.50E-01	1.51E-05	7.56E+00
SOIL DERMAL	2.44E-07	2.50E-02	3.28E-06	1.65E+00
TOTAL	6.78E-06	6.75E-01	1.84E-05	9.21E+00
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	3.60E-08	2.39E-03	1.30E-06	5.56E-02
SOIL DERMAL	2.91E-09	1.98E-04	6.79E-07	2.92E-02
TOTAL	3.89E-08	2.59E-03	1.98E-06	8.48E-02
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	3.78E-08	4.52E-03	1.75E-07	1.05E-01
SOIL DERMAL	3.04E-09	3.72E-04	8.07E-08	4.86E-02
TOTAL	4.09E-08	4.89E-03	2.56E-07	1.54E-01
		ON-SITE WORKER		
SOIL INGESTION	1.67E-07	9.95E-03	2.41E-06	2.89E-01
SOIL DERMAL	6.73E-08	4.13E-03	2.53E-06	3.04E-01
TOTAL	2.34E-07	1.41E-02	4.94E-06	5.94E-01

TABLE 5-13

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 2 FEET) AROUND LOAD LINE 3 PAINT OPERATION BUILDINGS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	0.00E+00	1.09E-02	0.00E+00	3.38E-02
SOIL DERMAL	0.00E+00	1.06E-03	0.00E+00	2.02E-02
TOTAL	0.00E+00	1.20E-02	0.00E+00	5.40E-02
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	0.00E+00	1.02E-01	0.00E+00	3.15E-01
SOIL DERMAL	0.00E+00	4.59E-03	0.00E+00	7.82E-02
TOTAL	0.00E+00	1.07E-01	0.00E+00	3.94E-01
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	0.00E+00	3.75E-04	0.00E+00	2.32E-03
SOIL DERMAL	0.00E+00	3.65E-05	0.00E+00	1.39E-03
TOTAL	0.00E+00	4.12E-04	0.00E+00	3.71E-03
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	0.00E+00	7.10E-04	0.00E+00	4.38E-03
SOIL DERMAL	0.00E+00	6.85E-05	0.00E+00	2.31E-03
TOTAL	0.00E+00	7.78E-04	0.00E+00	6.70E-03
		ON-SITE WORKER		
SOIL INGESTION	0.00E+00	1.56E-03	0.00E+00	1.21E-02
SOIL DERMAL	0.00E+00	7.60E-04	0.00E+00	1.45E-02
TOTAL	0.00E+00	2.32E-03	0.00E+00	2.65E-02

TABLE 5-14

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 6 INCHES) AROUND LOAD LINE 3 PAINT OPERATION BUILDINGS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	0.00E+00	1.34E-02	0.00E+00	6.32E-02
SOIL DERMAL	0.00E+00	1.27E-03	0.00E+00	3.61E-02
TOTAL	0.00E+00	1.47E-02	0.00E+00	9.93E-02
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	0.00E+00	1.25E-01	0.00E+00	5.90E-01
SOIL DERMAL	0.00E+00	5.49E-03	0.00E+00	1.40E-01
TOTAL	0.00E+00	1.31E-01	0.00E+00	7.29E-01
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	0.00E+00	4.60E-04	0.00E+00	4.33E-03
SOIL DERMAL	0.00E+00	4.36E-05	0.00E+00	2.48E-03
TOTAL	0.00E+00	5.04E-04	0.00E+00	6.81E-03
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	0.00E+00	8.71E-04	0.00E+00	8.19E-03
SOIL DERMAL	0.00E+00	8.18E-05	0.00E+00	4.12E-03
TOTAL	0.00E+00	9.52E-04	0.00E+00	1.23E-02
		ON-SITE WORKER		
SOIL INGESTION	0.00E+00	1.92E-03	0.00E+00	2.26E-02
SOIL DERMAL	0.00E+00	9.08E-04	0.00E+00	2.58E-02
TOTAL	0.00E+00	2.83E-03	0.00E+00	4.83E-02

TABLE 5-15

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 2 FEET) AROUND LOAD LINE 4 PAINT OPERATION BUILDINGS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	0.00E+00	1.59E-02	0.00E+00	5.68E-02
SOIL DERMAL	0.00E+00	1.28E-03	0.00E+00	2.97E-02
TOTAL	0.00E+00	1.71E-02	0.00E+00	8.65E-02
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	0.00E+00	1.48E-01	0.00E+00	5.30E-01
SOIL DERMAL	0.00E+00	5.54E-03	0.00E+00	1.15E-01
TOTAL	0.00E+00	1.54E-01	0.00E+00	6.45E-01
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	0.00E+00	5.44E-04	0.00E+00	3.89E-03
SOIL DERMAL	0.00E+00	4.40E-05	0.00E+00	2.04E-03
TOTAL	0.00E+00	5.88E-04	0.00E+00	5.93E-03
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	0.00E+00	1.03E-03	0.00E+00	7.37E-03
SOIL DERMAL	0.00E+00	8.25E-05	0.00E+00	3.39E-03
TOTAL	0.00E+00	1.11E-03	0.00E+00	1.08E-02
		ON-SITE WORKER		
SOIL INGESTION	0.00E+00	2.27E-03	0.00E+00	2.03E-02
SOIL DERMAL	0.00E+00	9.16E-04	0.00E+00	2.12E-02
TOTAL	0.00E+00	3.18E-03	0.00E+00	4.15E-02

TABLE 5-16

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 6 INCHES) AROUND LOAD LINE 4 PAINT OPERATION BUILDINGS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	0.00E+00	2.59E-02	0.00E+00	3.69E-01
SOIL DERMAL	0.00E+00	2.09E-03	0.00E+00	1.93E-01
TOTAL	0.00E+00	2.80E-02	0.00E+00	5.62E-01
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	0.00E+00	2.42E-01	0.00E+00	3.44E+00
SOIL DERMAL	0.00E+00	9.04E-03	0.00E+00	7.46E-01
TOTAL	0.00E+00	2.51E-01	0.00E+00	4.19E+00
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	0.00E+00	8.89E-04	0.00E+00	2.53E-02
SOIL DERMAL	0.00E+00	7.18E-05	0.00E+00	1.32E-02
TOTAL	0.00E+00	9.61E-04	0.00E+00	3.85E-02
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	0.00E+00	1.68E-03	0.00E+00	4.79E-02
SOIL DERMAL	0.00E+00	1.35E-04	0.00E+00	2.20E-02
TOTAL	0.00E+00	1.82E-03	0.00E+00	6.99E-02
		ON-SITE WORKER		
SOIL INGESTION	0.00E+00	3.70E-03	0.00E+00	1.32E-01
SOIL DERMAL	0.00E+00	1.50E-03	0.00E+00	1.38E-01
TOTAL	0.00E+00	5.20E-03	0.00E+00	2.70E-01

TABLE 5-17

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 2 FEET) AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	1.71E-08	2.36E-02	2.83E-07	1.93E-01
SOIL DERMAL	1.38E-08	3.79E-03	1.48E-06	1.26E-01
VEGETABLE INGESTION	1.83E-06	4.40E-02	2.65E-05	8.23E-02
TOTAL	1.86E-06	7.15E-02	2.83E-05	4.01E-01
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	1.07E-07	2.21E-01	2.26E-07	1.80E+00
SOIL DERMAL	3.98E-08	1.64E-02	4.90E-07	4.86E-01
VEGETABLE INGESTION	1.71E-06	6.13E-02	3.18E-06	1.15E-01
TOTAL	1.85E-06	2.98E-01	3.90E-06	2.40E+00
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	5.87E-10	8.11E-04	1.94E-08	1.32E-02
SOIL DERMAL	4.74E-10	1.30E-04	1.01E-07	8.63E-03
TOTAL	1.06E-09	9.41E-04	1.21E-07	2.19E-02
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	6.17E-10	1.53E-03	2.62E-09	2.50E-02
SOIL DERMAL	4.95E-10	2.44E-04	1.20E-08	1.44E-02
TOTAL	1.11E-09	1.78E-03	1.47E-08	3.94E-02

TABLE 5-18

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 6 INCHES) AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
	ADULT RESIDENT			
SOIL INGESTION	7.00E-09	8.12E-03	1.09E-07	3.57E-02
SOIL DERMAL	5.66E-09	1.23E-03	5.70E-07	2.63E-02
VEGETABLE INGESTION	2.60E-07	1.56E-02	3.90E-06	2.52E-02
TOTAL	2.72E-07	2.50E-02	4.57E-06	8.72E-02
	CHILD RESIDENT (0-6 YR OLD)			
SOIL INGESTION	4.36E-08	7.58E-02	8.71E-08	3.33E-01
SOIL DERMAL	1.63E-08	5.32E-03	1.89E-07	1.02E-01
VEGETABLE INGESTION	1.96E-07	2.16E-02	3.51E-07	3.49E-02
TOTAL	2.56E-07	1.03E-01	6.26E-07	4.70E-01
	ADULT TRESPASSER/VISITOR			
SOIL INGESTION	2.40E-10	2.78E-04	7.47E-09	2.45E-03
SOIL DERMAL	1.94E-10	4.22E-05	3.91E-08	1.80E-03
TOTAL	4.34E-10	3.21E-04	4.65E-08	4.25E-03
	JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)			
SOIL INGESTION	2.52E-10	5.27E-04	1.01E-09	4.63E-03
SOIL DERMAL	2.02E-10	7.93E-05	4.64E-09	3.00E-03
TOTAL	4.55E-10	6.06E-04	5.65E-09	7.63E-03

TABLE 5-19

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SUBSURFACE[(a)] SOILS AT POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		CONSTRUCTION WORKER		
INGESTION	1.30E-10	2.53E-03	1.25E-08	3.90E-01
DERMAL	5.27E-10	3.30E-03	1.37E-08	7.20E-02
TOTAL	6.57E-10	5.83E-03	2.62E-08	4.62E-01

Notes

[(a)] Subsurface soil (>2 feet) and surface soil (0 - 2 feet) data were combined for evaluating Construction Worker exposure.

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TABLE 5-20

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 2 FEET) AT THE PROVING GROUNDS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	1.08E-09	5.66E-03	1.67E-08	1.53E-02
SOIL DERMAL	8.70E-10	5.39E-04	8.76E-08	9.14E-03
VEGETABLE INGESTION	2.67E-07	6.35E-03	3.32E-06	1.02E-02
TOTAL	2.69E-07	1.26E-02	3.43E-06	3.47E-02
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	6.70E-09	5.28E-02	1.34E-08	1.43E-01
SOIL DERMAL	2.50E-09	2.33E-03	2.90E-08	3.53E-02
VEGETABLE INGESTION	2.49E-07	8.87E-03	3.99E-07	1.42E-02
TOTAL	2.58E-07	6.40E-02	4.41E-07	1.93E-01
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	3.69E-11	1.94E-04	1.15E-09	1.05E-03
SOIL DERMAL	2.98E-11	1.85E-05	6.01E-09	6.27E-04
TOTAL	6.67E-11	2.13E-04	7.16E-09	1.68E-03
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	3.88E-11	3.67E-04	1.55E-10	1.99E-03
SOIL DERMAL	3.11E-11	3.47E-05	7.14E-10	1.04E-03
TOTAL	6.99E-11	4.02E-04	8.69E-10	3.03E-03

TABLE 5-21

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 6 INCHES) AT THE PROVING GROUNDS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	5.17E-10	2.92E-03	8.62E-09	6.07E-03
SOIL DERMAL	4.18E-10	3.09E-04	4.51E-08	4.32E-03
VEGETABLE INGESTION	9.60E-08	2.26E-03	1.31E-06	3.96E-03
TOTAL	9.70E-08	5.49E-03	1.36E-06	1.44E-02
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	3.22E-09	2.72E-02	6.90E-09	5.66E-02
SOIL DERMAL	1.20E-09	1.33E-03	1.49E-08	1.67E-02
VEGETABLE INGESTION	8.96E-08	3.17E-03	1.57E-07	5.54E-03
TOTAL	9.40E-08	3.17E-02	1.79E-07	7.89E-02
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	1.77E-11	1.00E-04	5.91E-10	4.16E-04
SOIL DERMAL	1.43E-11	1.06E-05	3.09E-09	2.97E-04
TOTAL	3.21E-11	1.11E-04	3.68E-09	7.13E-04
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	1.86E-11	1.89E-04	7.99E-11	7.87E-04
SOIL DERMAL	1.49E-11	1.99E-05	3.68E-10	4.94E-04
TOTAL	3.36E-11	2.09E-04	4.48E-10	1.28E-03

TABLE 5-22

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SUBSURFACE[a] SOIL AT THE PROVING GROUNDS FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
	FUTURE CONSTRUCTION WORKER			
SOIL INGESTION	5.28E-12	8.33E-04	5.08E-10	1.66E-03
SOIL DERMAL	2.13E-11	4.48E-04	5.53E-10	7.51E-03
TOTAL	2.66E-11	1.28E-03	1.06E-09	9.16E-03

Notes

[a] Subsurface soil (>2 feet) and surface soil (0 - 2 feet) data were combined for evaluating Construction Worker exposure.

TABLE 5-23

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 2 FEET) AT THE NORTHEAST BOUNDARY AREA FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	0.00E+00	1.67E-02	0.00E+00	4.34E-02
SOIL DERMAL	0.00E+00	1.37E-03	0.00E+00	2.29E-02
TOTAL	0.00E+00	1.81E-02	0.00E+00	6.63E-02
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	0.00E+00	1.56E-01	0.00E+00	4.05E-01
SOIL DERMAL	0.00E+00	5.90E-03	0.00E+00	8.85E-02
TOTAL	0.00E+00	1.62E-01	0.00E+00	4.94E-01
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	0.00E+00	5.74E-04	0.00E+00	2.98E-03
SOIL DERMAL	0.00E+00	4.68E-05	0.00E+00	1.57E-03
TOTAL	0.00E+00	6.21E-04	0.00E+00	4.55E-03
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	0.00E+00	1.09E-03	0.00E+00	5.63E-03
SOIL DERMAL	0.00E+00	8.80E-05	0.00E+00	2.61E-03
TOTAL	0.00E+00	1.17E-03	0.00E+00	8.24E-03

TABLE 5-24

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE SOIL (0 - 6 INCHES) AT THE NORTHEAST BOUNDARY AREA FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
		ADULT RESIDENT		
SOIL INGESTION	0.00E+00	5.24E-04	0.00E+00	1.76E-03
SOIL DERMAL	0.00E+00	5.51E-05	0.00E+00	1.09E-03
TOTAL	0.00E+00	5.79E-04	0.00E+00	2.85E-03
		CHILD RESIDENT (0-6 YR OLD)		
SOIL INGESTION	0.00E+00	4.89E-03	0.00E+00	1.64E-02
SOIL DERMAL	0.00E+00	2.38E-04	0.00E+00	4.21E-03
TOTAL	0.00E+00	5.13E-03	0.00E+00	2.07E-02
		ADULT TRESPASSER/VISITOR		
SOIL INGESTION	0.00E+00	1.80E-05	0.00E+00	1.21E-04
SOIL DERMAL	0.00E+00	1.89E-06	0.00E+00	7.47E-05
TOTAL	0.00E+00	1.99E-05	0.00E+00	1.96E-04
		JUVENILE TRESPASSER/VISITOR (8-13 YR OLD)		
SOIL INGESTION	0.00E+00	3.40E-05	0.00E+00	2.29E-04
SOIL DERMAL	0.00E+00	3.55E-06	0.00E+00	1.24E-04
TOTAL	0.00E+00	3.76E-05	0.00E+00	3.53E-04

TABLE 5-25

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SUBSURFACE[a] SOIL AT THE NORTHEAST BOUNDARY AREA FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
	FUTURE CONSTRUCTION WORKER			
SOIL INGESTION	0.00E+00	3.31E-03	0.00E+00	1.42E-01
SOIL DERMAL	0.00E+00	1.34E-03	0.00E+00	2.07E-02
TOTAL	0.00E+00	4.65E-03	0.00E+00	1.62E-01

Notes:
[a] Subsurface soil (>2 feet) and surface soil (0 - 2 feet) data were combined for evaluating Construction Worker exposure.

TABLE 5-26

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE WATER, SEDIMENT AND FISH AT JOHNSON/CLEAR CREEK FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
	ADULT RECREATIONAL FISHERMAN			
SEDIMENT INGESTION	9.02E-14	9.08E-07	2.98E-11	3.86E-05
SEDIMENT DERMAL	5.05E-13	8.27E-07	2.57E-10	5.41E-05
SURFACE WATER INGESTION	1.14E-09	1.14E-04	1.51E-07	1.94E-03
SURFACE WATER DERMAL	1.33E-09	1.35E-04	2.72E-07	3.54E-03
FISH INGESTION	1.45E-06	3.29E-01	7.04E-05	2.05E+00
TOTAL	1.45E-06	3.29E-01	7.08E-05	2.06E+00
	CHILD RECREATIONAL FISHERMAN (0-6 YEARS OLD)			
SEDIMENT INGESTION	2.81E-12	4.24E-05	2.38E-11	3.60E-04
SEDIMENT DERMAL	1.01E-12	2.48E-06	7.75E-11	1.90E-04
SURFACE WATER INGESTION	1.06E-08	1.60E-03	1.81E-07	2.71E-02
SURFACE WATER DERMAL	8.01E-09	1.22E-03	2.46E-07	3.73E-02
FISH INGESTION	2.25E-06	7.67E-01	1.41E-05	4.79E+00
TOTAL	2.27E-06	7.69E-01	1.45E-05	4.86E+00

TABLE 5-27

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE WATER, SEDIMENT AND FISH AT SILVER CREEK FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
	ADULT RECREATIONAL FISHERMAN			
SEDIMENT INGESTION	0.00E+00	8.93E-07	0.00E+00	3.80E-05
SEDIMENT DERMAL	0.00E+00	4.61E-06	0.00E+00	3.02E-04
SURFACE WATER INGESTION	2.81E-10	2.80E-06	3.72E-08	4.76E-05
SURFACE WATER DERMAL	3.15E-10	3.14E-06	6.41E-08	8.22E-05
FISH INGESTION	3.61E-07	1.34E-02	1.76E-05	8.40E-02
TOTAL	3.62E-07	1.34E-02	1.77E-05	8.44E-02
	CHILD RECREATIONAL FISHERMAN (0-6 YEARS OLD)			
SEDIMENT INGESTION	0.00E+00	4.17E-05	0.00E+00	3.54E-04
SEDIMENT DERMAL	0.00E+00	1.38E-05	0.00E+00	1.06E-03
SURFACE WATER INGESTION	2.63E-09	3.92E-05	4.46E-08	6.67E-04
SURFACE WATER DERMAL	1.89E-09	2.83E-05	5.80E-08	8.68E-04
FISH INGESTION	5.62E-07	3.13E-02	3.51E-06	1.96E-01
TOTAL	5.67E-07	3.15E-02	3.62E-06	1.99E-01

TABLE 5-28

NON-CARCINOGENIC AND CARCINOGENIC HEALTH HAZARDS ASSOCIATED WITH SURFACE WATER, SEDIMENT AND FISH AT NRD RESEVOIR FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

	AVERAGE EXPOSURE		RME	
	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX
	ADULT RECREATIONAL FISHERMAN			
SEDIMENT INGESTION	0.00E+00	7.44E-04	0.00E+00	3.16E-02
SEDIMENT DERMAL	0.00E+00	4.17E-04	0.00E+00	2.73E-02
SURFACE WATER INGESTION	0.00E+00	3.39E-07	0.00E+00	5.77E-06
SURFACE WATER DERMAL	0.00E+00	3.80E-07	0.00E+00	9.94E-06
FISH INGESTION	0.00E+00	5.67E-02	0.00E+00	3.55E-01
TOTAL	0.00E+00	5.79E-02	0.00E+00	4.13E-01
	CHILD RECREATIONAL FISHERMAN (0-6 YEARS OLD)			
SEDIMENT INGESTION	0.00E+00	3.47E-02	0.00E+00	2.95E-01
SEDIMENT DERMAL	0.00E+00	1.25E-03	0.00E+00	9.59E-02
SURFACE WATER INGESTION	0.00E+00	4.75E-06	0.00E+00	8.07E-05
SURFACE WATER DERMAL	0.00E+00	3.42E-06	0.00E+00	1.05E-04
FISH INGESTION	0.00E+00	1.32E-01	0.00E+00	8.27E-01
TOTAL	0.00E+00	1.68E-01	0.00E+00	1.22E+00

Table 5-29

Predicted Blood Lead Levels Associated With Surface Soil Lead Concentrations

Location	RME[(a)] Concentration (mg/kg)	Mean Blood Lead Level[(b)] (μg/dl)	Percent of Population with Blood Lead Levels Above 10 μg/dl[(c)]
0 - 2 foot Soil			
Load Line 1 Bomb Production Building	58	3.1	0.7
Load Line 2 Bomb Production Building	190	3.8	1.9
Load Line 3 Bomb Production Building	98	3.4	0.9
Load Line 4 Bomb Production Building	74	3.2	0.8
Load Line 1 Paint Operations Area	63	3.2	0.7
Load Line 2 Paint Operations Area	59	3.2	0.7
Load Line 3 Paint Operations Area	94	3.3	0.9
Load Line 4 Paint Operations Area	49	3.1	0.6
Potential Landfill North of Proving Ground	290	4.3	3.5
Proving Grounds	31	3.0	0.5
Northeast Boundary Area	26	3.0	0.5
0 - 6 inch Soil			
Load Line 1 Bomb Production Building	110	3.4	1.0
Load Line 2 Bomb Production Building	400	4.8	5.7
Load Line 3 Bomb Production Building	200	3.9	2.0
Load Line 4 Bomb Production Building	130	3.5	1.2
Load Line 1 Paint Operations Area	170	3.7	1.7
Load Line 2 Paint Operations Area	150	3.6	1.4
Load Line 3 Paint Operations Area	270	4.2	3.1
Load Line 4 Paint Operations Area	140	3.6	1.3
Potential Landfill North of Proving Ground	190	3.8	1.9
Proving Grounds	29	3.0	0.5
Northeast Boundary Area	31	3.0	0.5

Notes:

(a) Reasonable Maximum Exposure (RME) is defined by the USEPA as the reasonable upperbound exposure among potentially exposed populations.

(b) Mean blood lead concentraions were calculated for a 0 - 6 year old child using the USEPA Integrated Uptake Biokinetic (IUBK) model version 0.99b.

(c) A blood lead level of 10 μg/dl has been identified by USEPA as a threshold concern level for potential neurodevelopmental effects from lead exposure in young children.

Table 6-1

Summary Of Uncertainties Associated With OU3 Baseline Risk Assessment Former Nebraska Ordnance Plant, Mead, Nebraska

Assumption	Estimated Magnitude of Effect on Risk	Direction of Effect on Risk Estimate
Environmental Sampling and Analysis		
Samples Collected were representative of conditions to which various populations may be exposed	Low-Moderate	May over- or underestimate risk
Errors in chemical analysis	Low	May over- or underestimate risk
High detection limit	Low	May over-estimate risk
Chemical concentrations reported as "below method detection limit" are used at one-half detection limit when calculating mean chemical concentrations	Low-Moderate	May over- or underestimate risk
Exposure Point Concentration		
Assumed the chemicals currently in contaminated media persist at same concentration indefinitely	Low-Moderate	May overestimate risk
Modeling fish tissue concentrations	Moderate-High	Likely to overestimate risk
No attenuation/retardation assumed	Moderate	May over-estimate
Toxicological Data		
The conservative USEPA models for developing slope factor (SF)	Moderate - High	May over-estimate risk
The Reference dose (RfD) for a compound is an estimate of the threshold concentration for the most sensitive population associated with the lowest observed adverse effect for that compound	Moderate - High	May overestimate hazard
Hazard indices (HIs) were developed assuming all toxic effects were additive	Low-Moderate	May over- or under estimate hazard

Table 6-1

Summary Of Uncertainties Associated With OU3 Baseline Risk Assessment Former Nebraska Ordnance Plant, Mead, Nebraska

Assumption	Estimated Magnitude of Effect on Risk	Direction of Effect on Risk Estimate
Using oral RfDs to evaluate risks associated with dermal exposure	Moderate - High	May over- or under estimate risk
Exposure Parameters/Pathways		
Not including minor exposure routes/pathways in risk calculation	Low	May underestimate risk
Conservative values were used for exposure duration, frequency and ingestion rate	Low-Moderate	May overestimate risk

Note See Section 6.5 for discussion of other hazards

Table 6-1

Summary Of Uncertainties Associated With OU3 Baseline Risk Assessment Former Nebraska Ordnance Plant, Mead, Nebraska

Assumption	Estimated Magnitude of Effect on Risk	Direction of Effect on Risk Estimate
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Chemical concentrations reported as "below method detection limit" are used at one-half detection limit when calculating mean chemical concentrations	Low-Moderate	May over- or underestimate risk
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Modeling fish tissue concentrations	Moderate-High	Likely to overestimate risk
No attenuation/retardation assumed	Moderate	May over-estimate
Toxicological Data		
The conservative USEPA models for developing slope factor (SF)	Moderate - High	May over-estimate risk
The Reference dose (RfD) for a compound is an estimate of the threshold concentration for the most sensitive population associated with the lowest observed adverse effect for that compound	Moderate - High	May overestimate hazard
Hazard indices (HIs) were developed assuming all toxic effects were additive.	Low-Moderate	May over- or under estimate hazard

Table 6-1

Summary Of Uncertainties Associated With OU3 Baseline Risk Assessment Former Nebraska Ordnance Plant, Mead, Nebraska

Assumption	Estimated Magnitude of Effect on Risk	Direction of Effect on Risk Estimate
Using oral RfDs to evaluate risks associated with dermal exposure	Moderate - High	May over- or under estimate risk
Exposure Parameters/Pathways		
Not including minor exposure routes/pathways in risk calculation	Low	May underestimate risk
Conservative values were used for exposure duration, frequency and ingestion rate	Low-Moderate	May overestimate risk

Figures

Figure 3-1 Site Conceptual Exposure Model
Load Line Bomb Production Buildings/
Paint Operations Areas

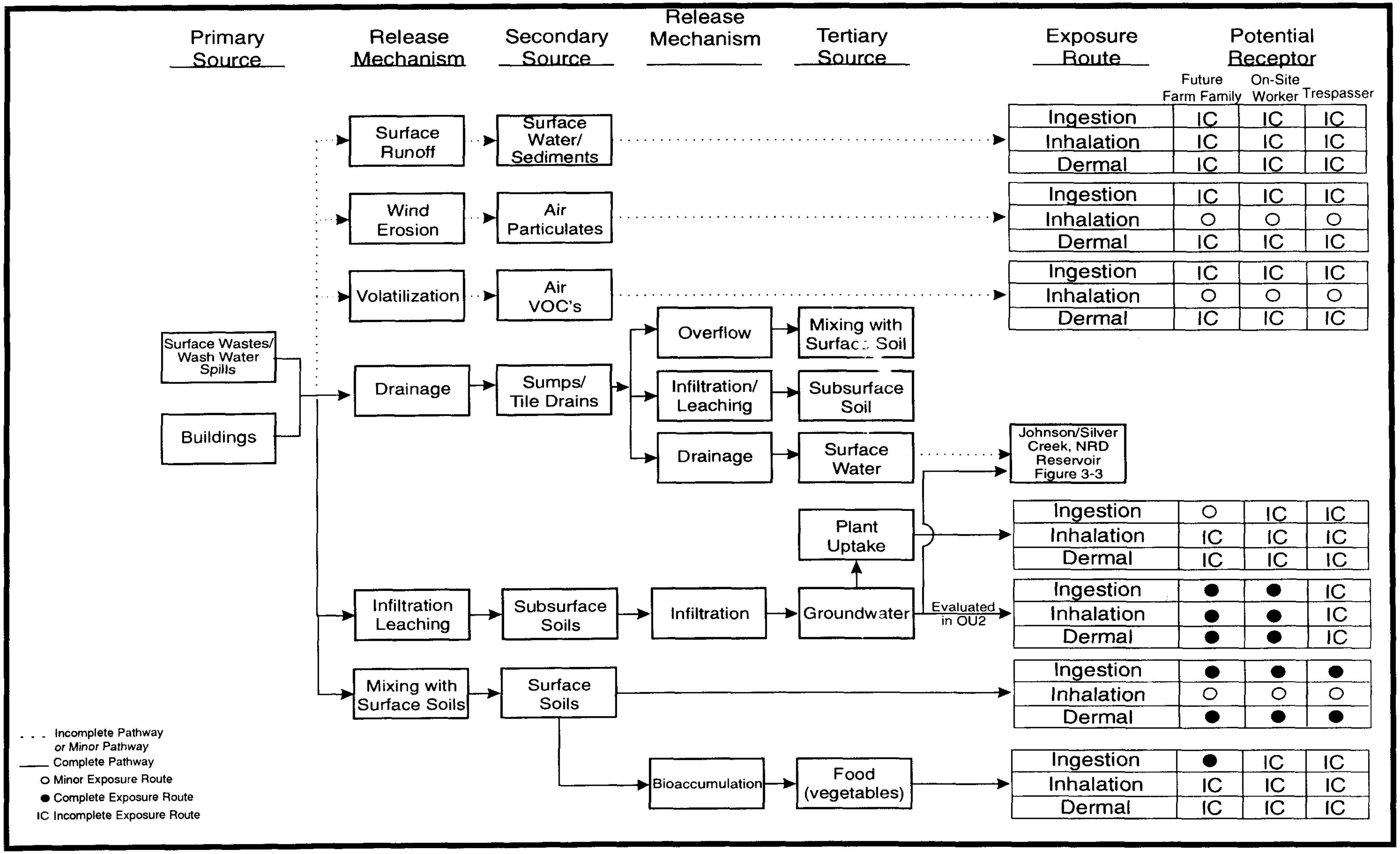

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Figure 3-2 Site Cor ptual Exposure Model
Proving Grounds, Potential Landfill North of
Proving Grounds, and Northeast Boundary Area

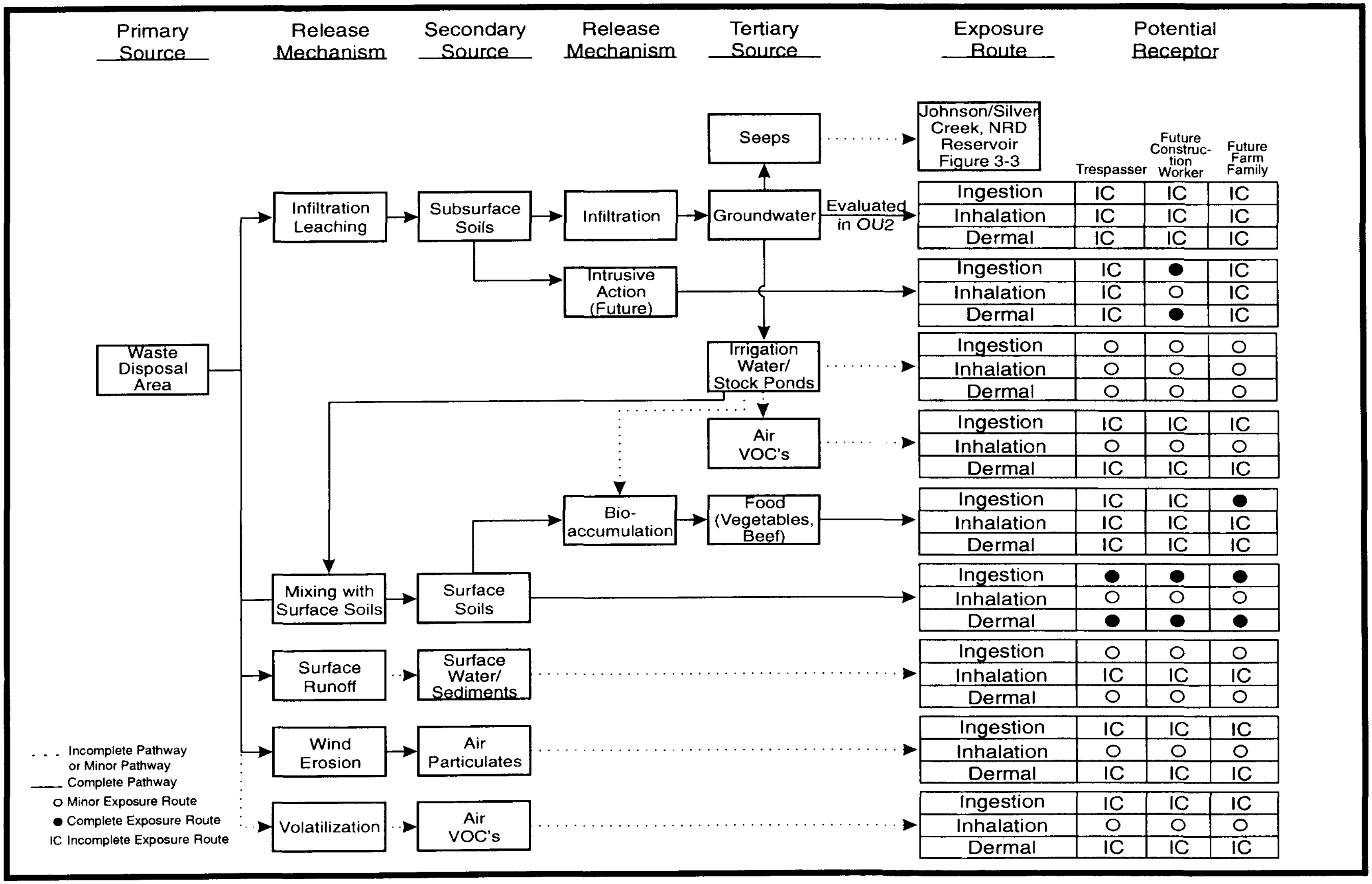

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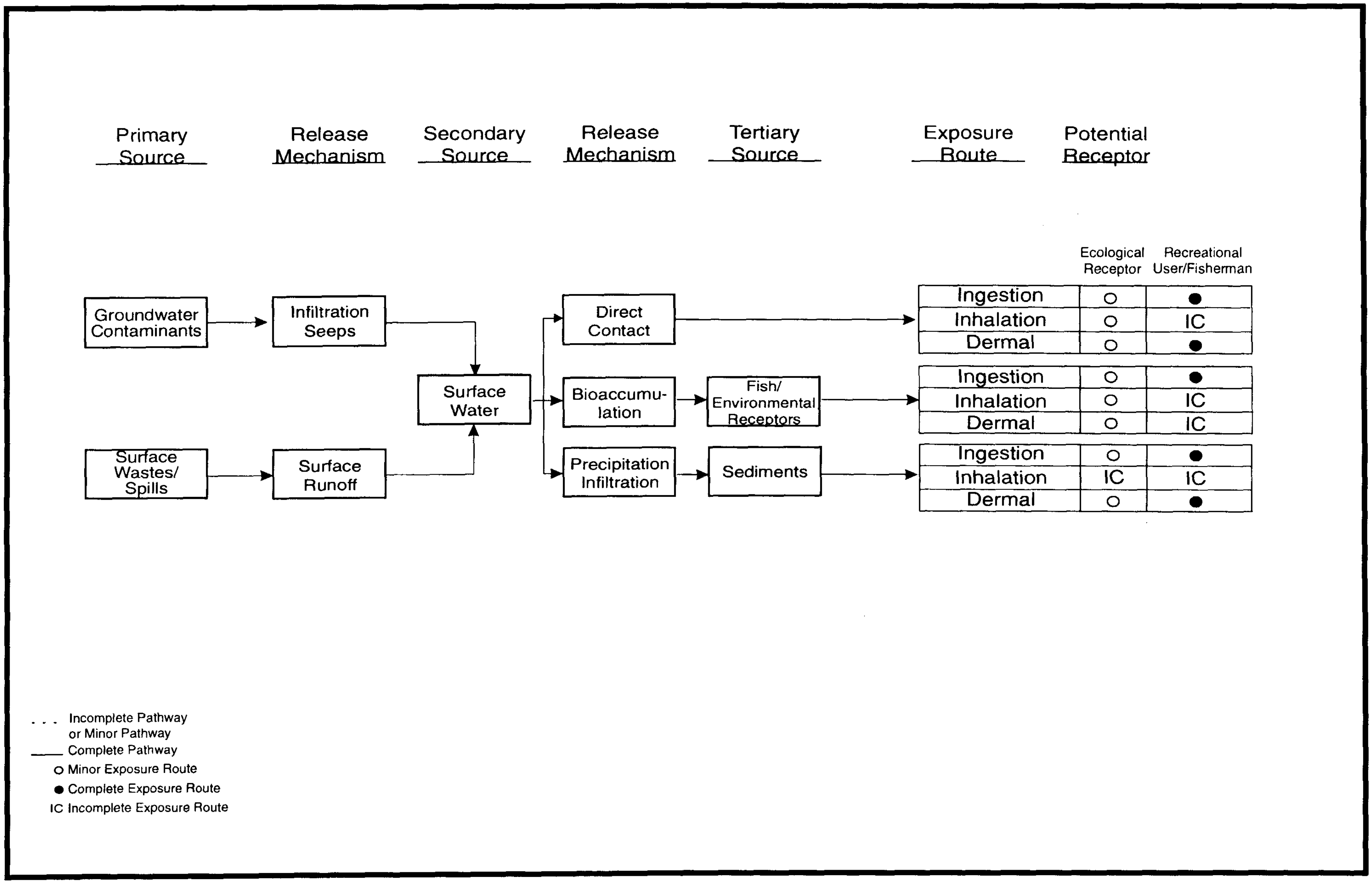
Figure 3-3 Site Conceptual Exposure Model
Johnson Creek/Clear Creek/Silver Creek,
and NRD Reservoir



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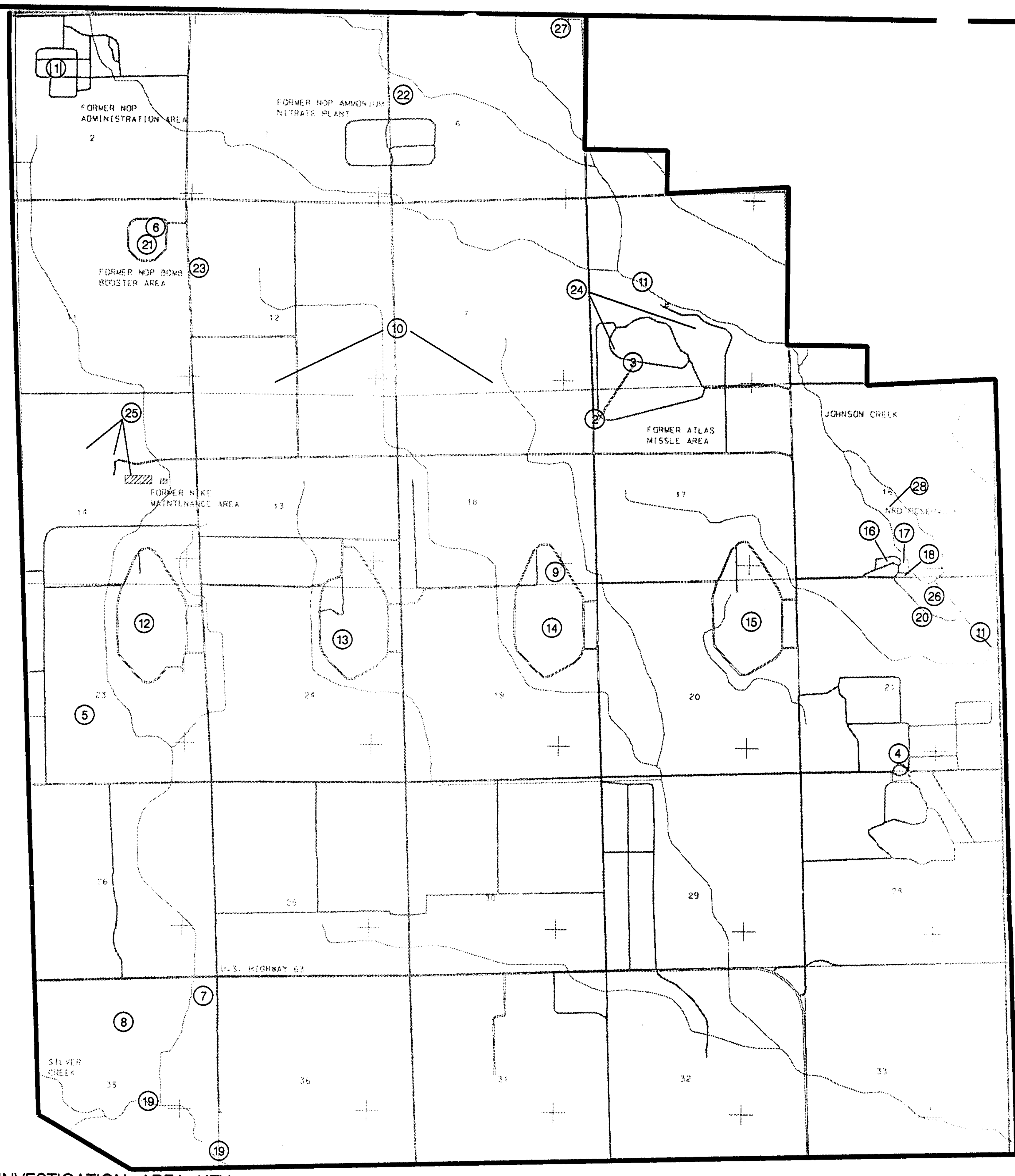
Drawings



INVESTIGATION AREA KEY:

1. Administration Area USTs
2. Atlas Missile Area UST (Gate House)
3. Atlas Missile Area UST (Launch Operations Building)
4. Agronomy Area USTs
5. Bermed Area Southwest of Load Line 1
6. Bomb Booster Area USTs
7. Demolition Ground
8. Detonation Craters
9. Geophysical Anomaly at Load Line 3
10. Raw Products Igloo Storage Areas
11. Johnson Creek
12. Load Line 1
13. Load Line 2
14. Load Line 3
15. Load Line 4
16. North Burning Ground
17. Potential Landfill Area
18. Proving Grounds
19. Silver Creek
20. South Burning Ground
21. Tetryl Pelleting Building
22. Waste Disposal Area North of the Ammonium Nitrate Plant
23. Waste Disposal Area Southeast of Former Bomb Booster Area
24. Waste Disposal Areas at Former Atlas Missile Area
25. Waste Disposal Areas North of Former Nike Maintenance Area
26. Landfill Area
27. Northeast Boundary Area
28. NRD Reservoir

Former NOP Boundary

N

3000 0 3000 6000

SCALE FEET

Revisions			
Symbol	Descriptions	Date	Approved

URS Greiner Woodward Clyde Federal Services
10975 ElMonte, Suite 100
Overland Park, Kansas 66211

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

Designed by: S.J.F.
Drawn by: R.A.D.
Checked by: L.A.T.
Submitted by: RAN

U.S. Army Corps of Engineers

BASELINE RISK ASSESSMENT
FOR OPERABLE UNIT 3
FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.

OPERABLE UNIT 3
INVESTIGATION AREAS

Scale: 1 IN = 3000 FT
Date: FEB 2000
Dwg. No.: 1-2
Sheet number: 1

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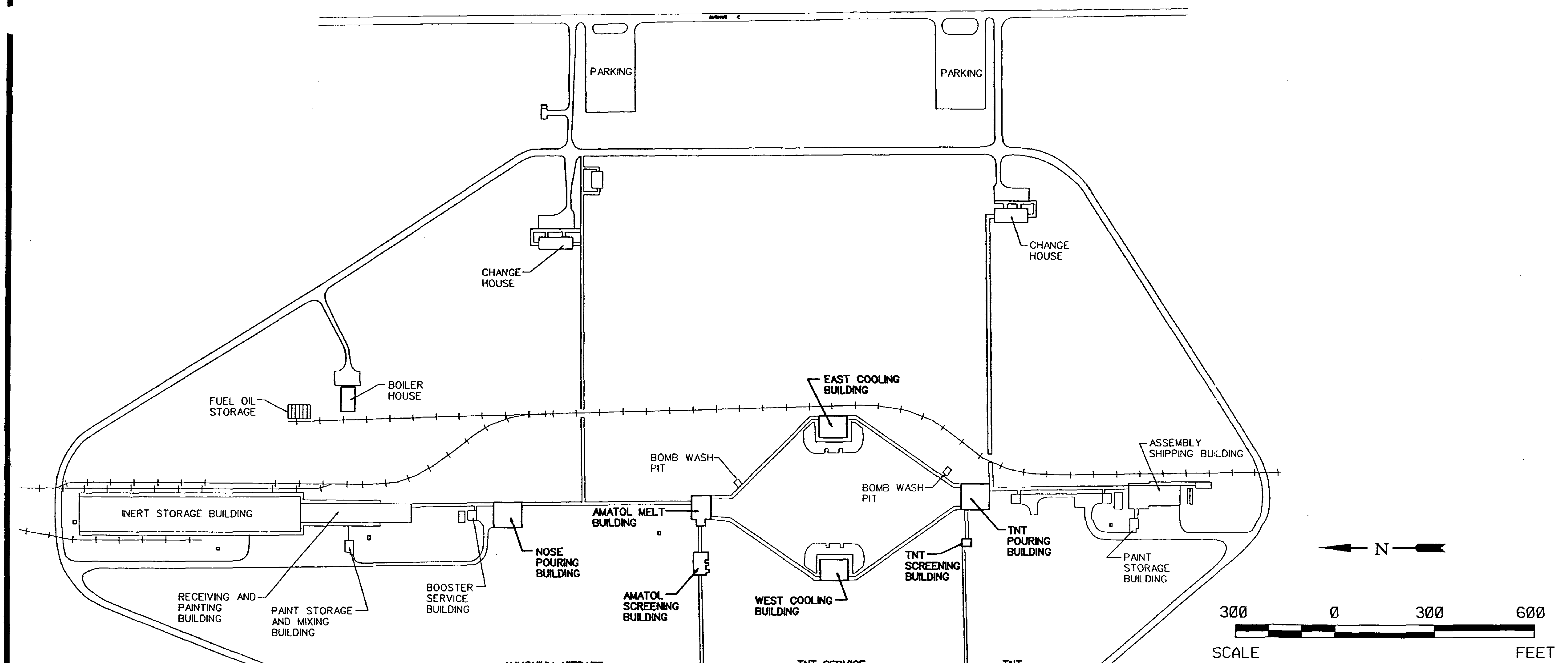

Revisions			
Symbol	Descriptions	Date	Appr'v'd

URS Greiner Woodward Clyde Federal Services
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KANSAS CITY, MISSOURI

Designed by: L.A.T.
Drawn by: R.A.D.
Checked by: L.A.T.
Submitted by: RAN

U.S. Army Corps of Engineers

BASELINE RISK ASSESSMENT
FOR OPERABLE UNIT 3
FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.

BUILDINGS AT A TYPICAL LOAD LINE

Scale: 1 IN - 300 FEET
Sheet number:
Date: FEB 2000
Dwg. No.: 1-3

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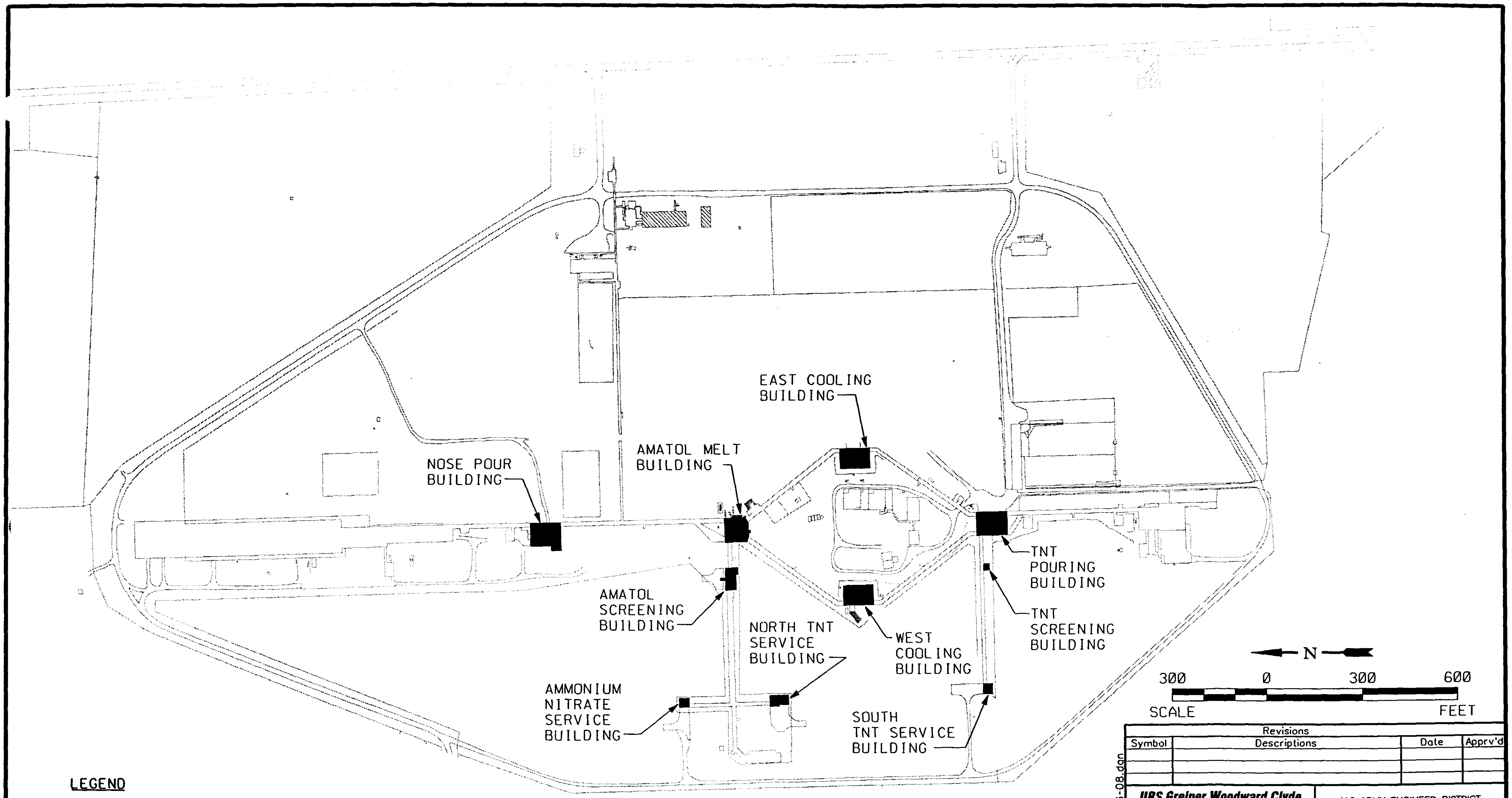

LEGEND

ORIGINAL BOMB PRODUCTION BUILDING LOCATIONS

SOURCE : DONOHUE, 1992B

Revisions			
Symbol	Descriptions	Date	Apprv'd

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U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

Designed by: S.J.F.

Drawn by: R.A.D.

Checked by: L.A.T.

Submitted by: RAN

U.S. Army Corps of Engineers

BASELINE RISK ASSESSMENT
FOR OPERABLE UNIT 3
FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.

LOAD LINE
BOMB PRODUCTION
BUILDINGS

Scale: 1 IN - 300 FEET

Date: FEB 2000

Dwg. No.: 1-4

Sheet number: 1

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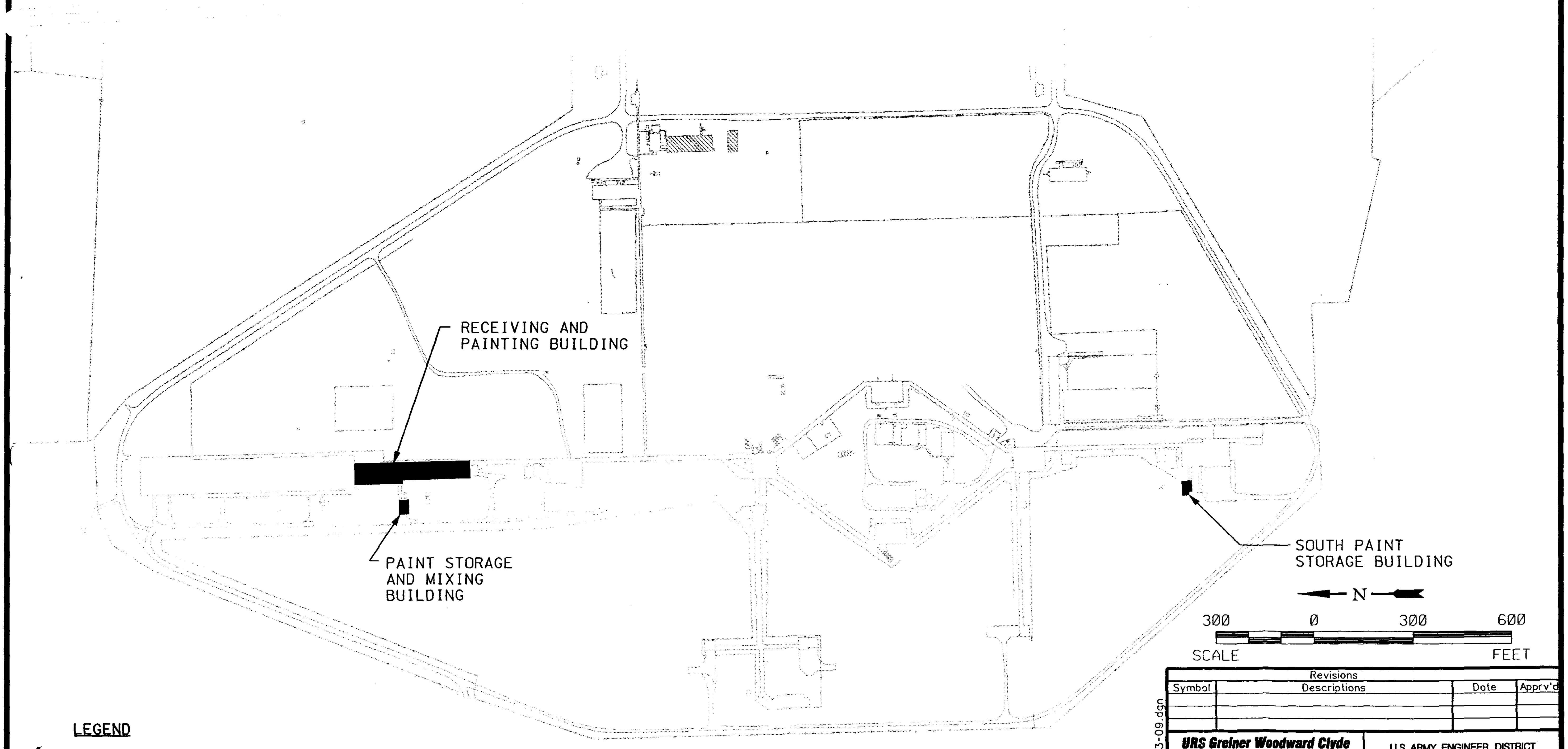

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ORIGINAL PAINT OPERATIONS BUILDING LOCATIONS

SOURCE : DONOHUE, 1992B

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Revisions			
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KANSAS CITY, MISSOURI

Designed by: S.J.F.
Drawn by: R.A.D.
Checked by: L.A.T.
Submitted by: RAW

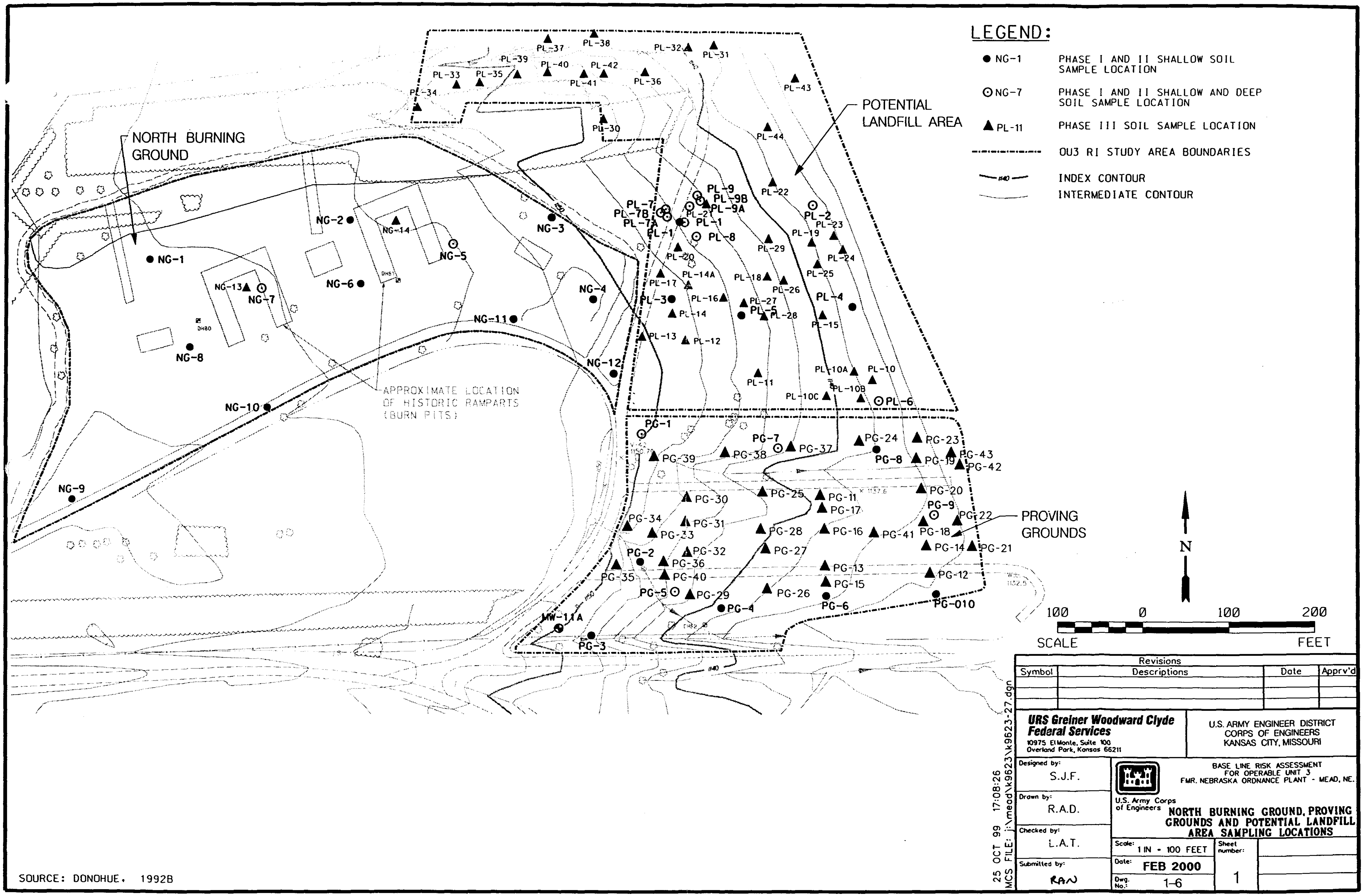
U.S. Army Corps of Engineers

BASELINE RISK ASSESSMENT
FOR OPERABLE UNIT 3
FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.

LOAD LINE
PAINT OPERATIONS
BUILDINGS

Scale: 1 IN - 300 FEET
Date: FEB 2000
Dwg. No.: 1-5
Sheet number: 1

B07NE003703-06024



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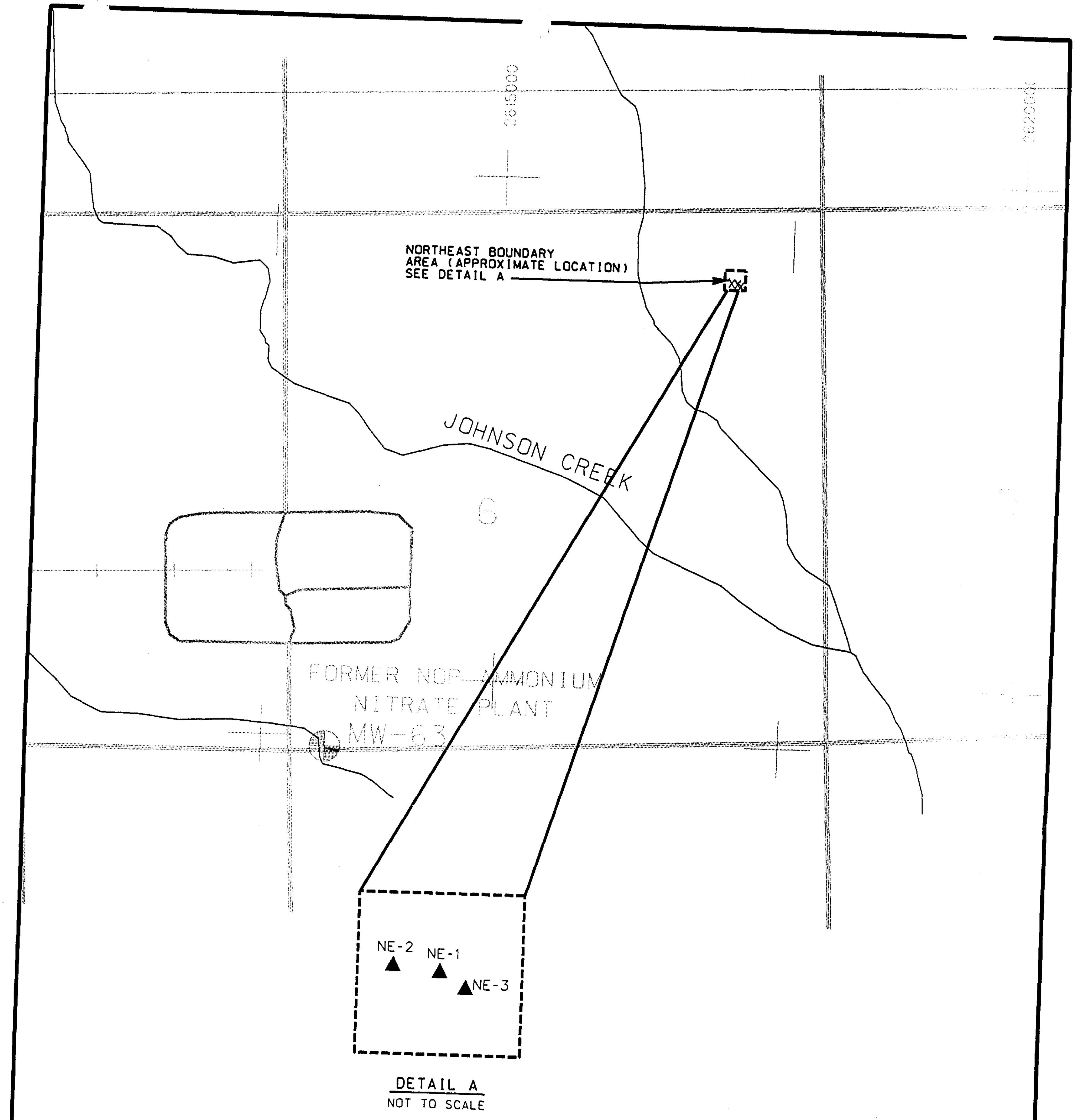

LEGEND:

▲ NE-2 PHASE III SOIL SAMPLING LOCATION

[dashed box] APPROXIMATE BOUNDARY OF NORTHEAST BOUNDARY AREA

N

1000 0 1000 2000

SCALE FEET

SOURCE: USGS, 1969

URS Greiner Woodward Clyde Federal Services 10975 ElMonte, Suite 100 Overland Park, Kansas 66211	U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI
Designed by: R.A.N.	U.S. Army Corps of Engineers BASE LINE RISK ASSESSMENT FOR OPERABLE UNIT 3 FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.
Drawn by: T.R.F.	**NORTHEAST BOUNDARY AREA SAMPLING LOCATIONS**
Checked by: L.A.T.	Scale: AS NOTED
Submitted by: RAN	Date: FEB 2000 — Sheet number: 1
	Dwg. No.: 1-7

25 OCT 99 16:43:37
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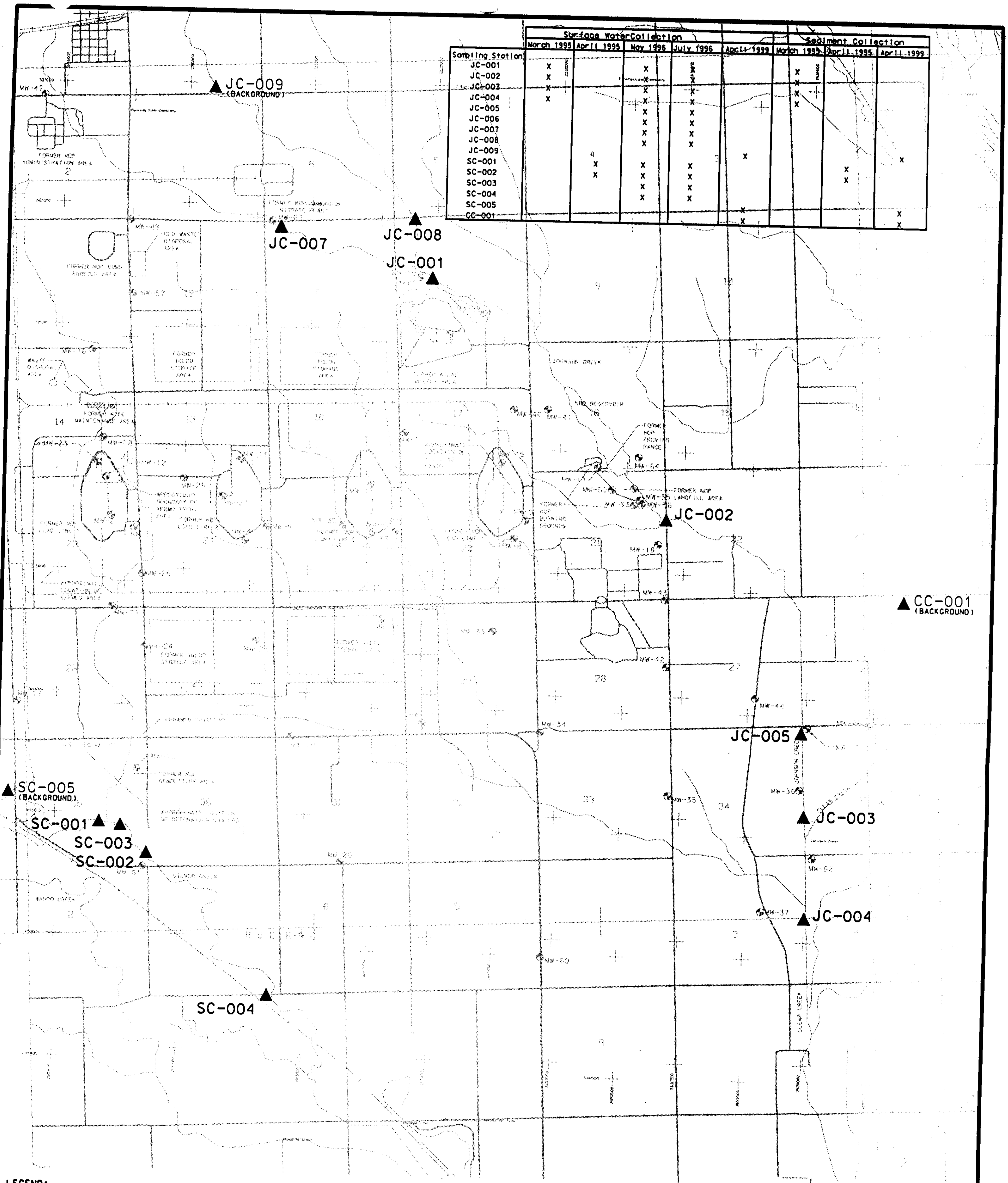

Sampling Station	Surface Water Collection March 1995	April 1995	May 1996	July 1996	April 1999	Sediment Collection March 1995	April 1995	April 1999
JC-001	x		x	x		x		
JC-002	x		x	x		x		
JC-003	x		x	x		x		
JC-004	x		x	x		x		
JC-005			x	x				
JC-006			x	x				
JC-007			x	x				
JC-008			x	x				
JC-009					x			x
SC-001		x	x	x			x	
SC-002		x	x	x			x	
SC-003			x	x				
SC-004			x	x				
SC-005					x			x
CC-001					x			x

LEGEND:

JC-002 JOHNSON CREEK SAMPLING STATION

SC-001 SILVER CREEK SAMPLING STATION

CC-001 CLEAR CREEK SAMPLING STATION

GROUNDWATER MONITORING WELL CLUSTER LOCATION

SECTION

T 14 N TOWNSHIP 14 NORTH

R 9 E RANGE 9 EAST

NOTES:

1. ALL SURFACE WATER SAMPLE LOCATIONS ARE APPROXIMATE BECAUSE THEY ARE NOT SURVEYED.

SCALE 4000 0 4000 8000 FEET

SOURCE: USGS, 1969

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10975 ElMonte, Suite 100
Overland Park, Kansas 66211

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

Designed by: L.A.T.
Drawn by: R.A.D.
Checked by: L.A.T.
Submitted by: RAN

U.S. Army Corps of Engineers

BASELINE RISK ASSESSMENT FOR OPERABLE UNIT 3
FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.

JOHNSON, CLEAR AND SILVER CREEKS SEDIMENT AND SURFACE WATER SAMPLING LOCATIONS

Scale: AS NOTED
Date: FEB 2000
Dwg. No.: 1-8
Sheet number: 1

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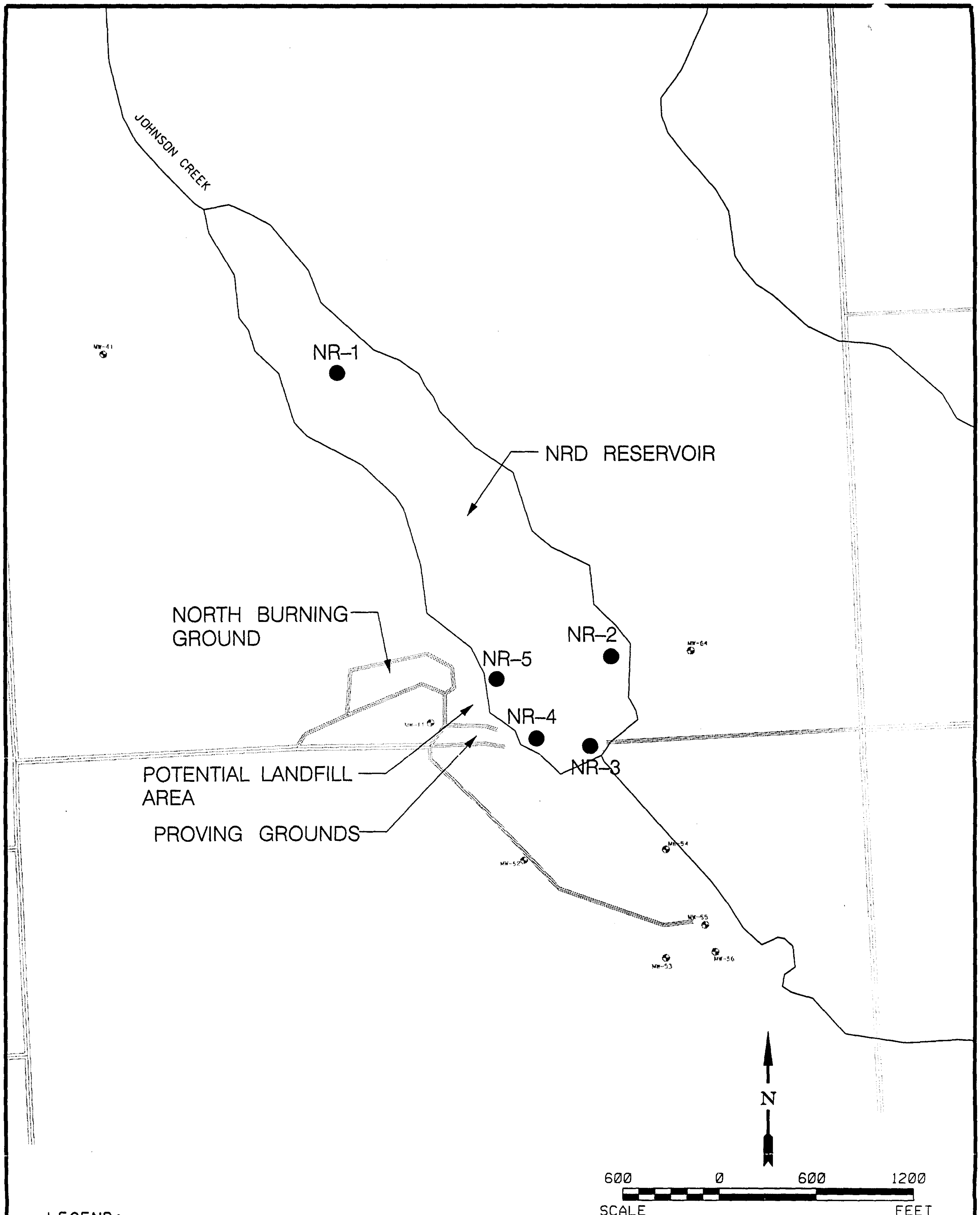

LEGEND:

Existing Groundwater Monitoring Well Cluster

Phase III Surface Water and Sediment Sampling Location

Revisions			
Symbol	Descriptions	Date	Approved

URS Greiner Woodward Clyde Federal Services
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U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

U.S. Army Corps of Engineers

BASE LINE RISK ASSESSMENT
FOR OPERABLE UNIT 3
FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.

NRD RESERVOIR SAMPLING LOCATIONS

Designed by:	L.A.T.
Drawn by:	T.R.F.
Checked by:	L.A.T.
Submitted by:	RAN
Scale:	1 IN = 4000 FT
Date:	FEB 2000
Dwg. No.:	1-9
Sheet number:	1

25 OCT 99 16:38:17
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APPENDIX A TABLE OF CONTENTS

APPENDIX A TABLE OF CONTENTS

APPENDIX A TABLE OF CONTENTS

Table A-1

Selection Of Potential Chemicals Of Concern In
Surface Soil (≤ 2 Feet) Adjacent to Load Line 1 Bomb Production Buildings
Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
EXP	1,3,5-Trinitrobenzene	MG/KG	116	16	0.63	0.11	0.25	16/116	14	PCOC	
EXP	1,3-Dinitrobenzene	MG/KG	116	0				0/116	0	ND	
EXP	2,4,6-Trinitrotoluene	MG/KG	116	42	16.7	0.022	1.1	42/116	36	PCOC	
EXP	2,4-Dinitrotoluene	MG/KG	116	1	0.48	0.48	0.25	1/116	0.86	FREQ	5
EXP	2,6-Dinitrotoluene	MG/KG	116	5	0.28	0.13	0.24	5/116	4.3	FREQ	5
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	116	30	9.8	0.14	0.46	30/116	26	PCOC	
EXP	2-Nitrotoluene	MG/KG	116	4	0.5	0.2	0.35	4/116	3.4	FREQ	5
EXP	3-Nitrotoluene	MG/KG	116	1	0.52	0.52	0.35	1/116	0.86	FREQ	5
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	116	22	6.7	0.13	0.53	22/116	19	PCOC	
EXP	4-Nitrotoluene	MG/KG	116	1	0.48	0.48	0.35	1/116	0.86	FREQ	5
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	116	17	3	0.096	0.41	17/116	15	PCOC	
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	116	8	0.46	0.15	0.33	8/116	6.9	PCOC	
EXP	Nitrobenzene	MG/KG	116	1	0.41	0.41	0.86	1/116	0.86	FREQ	5
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	116	22	1.1	0.028	0.24	22/116	19	PCOC	
METALS	Aluminum	MG/KG	113	113	47500	6450	16000	113/113	100	PCOC	
METALS	Antimony	MG/KG	75	20	0.88	0.47	1.6	20/75	27	PCOC	
METALS	Arsenic	MG/KG	112	112	17.5	3.7	8.2	112/112	100	PCOC	
METALS	Barium	MG/KG	113	113	4710	123	290	113/113	100	PCOC	
METALS	Beryllium	MG/KG	113	95	1.9	0.38	0.76	95/113	84	PCOC	
METALS	Cadmium	MG/KG	113	91	17.2	0.14	0.76	91/113	81	PCOC	
METALS	Calcium	MG/KG	113	113	79100	1750	7100	113/113	100	RDA	1000000
METALS	Chromium	MG/KG	113	113	47	7.9	19	113/113	100	RDA	2000
METALS	Cobalt	MG/KG	113	113	20.8	5.4	10	113/113	100	PCOC	
METALS	Copper	MG/KG	113	113	44.6	8.7	21	113/113	100	RDA	30000
METALS	Iron	MG/KG	113	113	46900	8820	19000	113/113	100	RDA	300000
METALS	Lead	MG/KG	112	112	394	7.7	55	112/112	100	PCOC	
METALS	Magnesium	MG/KG	113	113	8950	1620	3800	113/113	100	RDA	1000000
METALS	Manganese	MG/KG	113	113	1110	258	610	113/113	100	RDA	50000
METALS	Mercury	MG/KG	112	4	0.19	0.13	0.061	4/112	3.6	FREQ	5
METALS	Nickel	MG/KG	113	113	51.7	10.3	24	113/113	100	PCOC	
METALS	Potassium	MG/KG	113	113	8210	1670	3500	113/113	100	RDA	1000000
METALS	Selenium	MG/KG	112	43	3.1	0.88	0.91	43/112	38	RDA	750
METALS	Silver	MG/KG	113	1	9.9	9.9	0.37	1/113	0.88	FREQ	5
METALS	Sodium	MG/KG	113	43	3500	47.1	380	43/113	38	RDA	1000000
METALS	Thallium	MG/KG	112	0				0/112	0	ND	

Table A-1

Selection Of Potential Chemicals Of Concern In Surface Soil (≤ 2 Feet) Adjacent to Load Line 1 Bomb Production Buildings Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
METALS	Vanadium	MG/KG	113	113	102	16.4	36	113/113	100	PCOC	
METALS	Zinc	MG/KG	113	98	1890	26.8	92	98/113	87	RDA	190000

Notes:

(a) EXP - Explosive
METALS - Metals

(b) Total - Total number of samples

(c) # Hits - The number of samples where the chemical was detected.

(d) Max conc - Maximum detected concentration

(e) Min conc - Minimum detected concentration

(f) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample, one-half of the laboratory detection limit was used in the calculation of the average.

(g) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(h) Exclusion Reason - Indicates whether a chemical was retained as a potential chemical of concern (PCOC) or was excluded based of the following sequence of criteria: not-detected(ND), below background (BKG), below levels based on recommended daily allowances (RDA), frequency of detection less than 5 percent (FREQ). Note that once a chemical was excluded based on one criterion it was not further compared to other criteria (e.g., chemical excluded because it was ND was not compared to BKG, a chemical excluded because of BKG was not compared to RDA). Those chemicals excluded because of FREQ were additionally compared to the PRGs to identify potential hot spots.

Table A-2

Chemicals Not Detected In Surface Soil (≤ 2 Feet)
Adjacent to Load Line 1 Bomb Production Buildings
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	1,3-Dinitrobenzene
METALS	Thallium

Notes:
EXP - Explosives
METALS - Metals

Table A-3

Metals In Surface Soil (≤ 2 Feet) Adjacent to
Load Line 1 Bomb Production Buildings Excluded As PCOCs
Based On Their Classification As Essential Nutrients
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Calcium	MG/KG	79100	1000000
METALS	Chromium	MG/KG	47	2000
METALS	Copper	MG/KG	44.6	30000
METALS	Iron	MG/KG	46900	300000
METALS	Magnesium	MG/KG	8950	1000000
METALS	Manganese	MG/KG	1110	50000
METALS	Potassium	MG/KG	8210	1000000
METALS	Selenium	MG/KG	3.1	750
METALS	Sodium	MG/KG	3500	1000000
METALS	Zinc	MG/KG	1890	190000

Notes:
METALS - Metals
(a) Max conc - Maximum detected concentration
(b) Screen criteria based on the recommended daily allowance for the chemical (See Table 2-2)

Table A-4
Chemicals in Surface Soil (≤ 2 Feet) Adjacent to Load Line 1 Bomb Production Buildings Excluded As PCOCs Based on Detection In Less Than 5 Percent Of the Samples Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Frequency[b]	Frequency (Percent)	Screen Criteria[c]
EXP	2,4-Dinitrotoluene	MG/KG	0.48	1/116	0.9	5
EXP	2,6-Dinitrotoluene	MG/KG	0.28	5/116	4.3	5
EXP	2-Nitrotoluene	MG/KG	0.5	4/116	3.4	5
EXP	3-Nitrotoluene	MG/KG	0.52	1/116	0.9	5
EXP	4-Nitrotoluene	MG/KG	0.48	1/116	0.9	5
EXP	Nitrobenzene	MG/KG	0.41	1/116	0.9	5
METALS	Mercury	MG/KG	0.19	4/112	3.6	5
METALS	Silver	MG/KG	9.9	1/113	0.9	5

Notes:
EXP - Explosive
METALS - Metals
(a) Max conc - Maximum detected concentration
(b) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.
(c) Screen Criterion - Frequency of detection

Table A-5

Selection Of Potential Chemicals Of Concern In
Surface Soil (≤ 2 Feet) Adjacent to Load Line 2 Bomb Production Buildings
Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
EXP	1,3,5-Trinitrobenzene	MG/KG	138	9	0.6	0.034	0.25	9/138	6.5	PCOC	
EXP	1,3-Dinitrobenzene	MG/KG	138	0				0/138		ND	
EXP	2,4,6-Trinitrotoluene	MG/KG	138	28	12	0.032	0.39	28/138	20	PCOC	
EXP	2,4-Dinitrotoluene	MG/KG	138	0				0/138		ND	
EXP	2,6-Dinitrotoluene	MG/KG	138	0				0/138		ND	
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	138	20	1.1	0.15	0.26	20/138	14	PCOC	
EXP	2-Nitrotoluene	MG/KG	138	2	0.72	0.52	0.38	2/138	1.4	FREQ	5
EXP	3-Nitrotoluene	MG/KG	138	2	0.39	0.24	0.37	2/138	1.4	FREQ	5
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	138	16	0.77	0.14	0.48	16/138	12	PCOC	
EXP	4-Nitrotoluene	MG/KG	138	1	0.72	0.72	0.37	1/138	0.72	FREQ	5
EXP	Hexahydro-1,2,3-trinitro-1,2,3-triazine	MG/KG	138	49	4.8	0.052	0.56	49/138	36	PCOC	
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	137	10	0.53	0.11	0.36	10/137	7.3	PCOC	
EXP	Nitrobenzene	MG/KG	138	0				0/138		ND	
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	138	44	1.1	0.0036	0.23	44/138	32	PCOC	
METALS	Aluminum	MG/KG	136	136	23600	7150	15000	136/136	100	BKG	33852
METALS	Antimony	MG/KG	83	31	2.8	0.46	0.49	31/83	37	PCOC	
METALS	Arsenic	MG/KG	136	136	15.5	3.7	8	136/136	100	PCOC	
METALS	Barium	MG/KG	136	136	516	128	240	136/136	100	PCOC	
METALS	Beryllium	MG/KG	136	136	0.95	0.35	0.73	136/136	100	BKG	1.52
METALS	Cadmium	MG/KG	136	96	12.6	0.13	0.88	96/136	71	PCOC	
METALS	Calcium	MG/KG	136	136	173000	2440	12000	136/136	100	RDA	1000000
METALS	Chromium	MG/KG	136	135	70.6	10.3	19	135/136	99	RDA	2000
METALS	Cobalt	MG/KG	136	136	14	5	9.8	136/136	100	BKG	17.2
METALS	Copper	MG/KG	136	136	145	12.3	25	136/136	100	RDA	30000
METALS	Iron	MG/KG	136	136	118000	9970	20000	136/136	100	RDA	300000
METALS	Lead	MG/KG	136	136	1040	12.8	140	136/136	100	PCOC	
METALS	Magnesium	MG/KG	136	136	5970	1720	3900	136/136	100	RDA	1000000
METALS	Manganese	MG/KG	136	136	1090	339	580	136/136	100	RDA	50000
METALS	Mercury	MG/KG	136	4	0.39	0.12	0.064	4/136	2.9	FREQ	5
METALS	Nickel	MG/KG	136	136	52.4	11.5	24	136/136	100	PCOC	
METALS	Potassium	MG/KG	136	136	4940	1570	3100	136/136	100	RDA	1000000
METALS	Selenium	MG/KG	136	75	3.3	1	1	75/136	55	RDA	750

Table A-5

Selection Of Potential Chemicals Of Concern In Surface Soil (≤ 2 Feet) Adjacent to Load Line 2 Bomb Production Buildings Former Nebraska Ordnance Plant, Mead, Nebraska

Group[(a)]	Chemical	Units	Total[(b)]	# Hits[(c)]	Max conc[(d)]	Min conc[(e)]	Average conc[(f)]	Frequency[(g)]	% Hits	Exclusion Reason[(h)]	Screen Criteria
METALS	Silver	MG/KG	136	0				0/136		ND	
METALS	Sodium	MG/KG	136	8	2170	259	250	8/136	5.9	RDA	1000000
METALS	Thallium	MG/KG	136	0				0/136		BKG	0.86
METALS	Vanadium	MG/KG	136	136	57.9	17.8	37	136/136	100	BKG	72.5
METALS	Zinc	MG/KG	136	136	654	45.5	110	136/136	100	RDA	190000

Notes:

(a) EXP - Explosive
METALS - Metals

(b) Total - Total number of samples

(c) # Hits - The number of samples where the chemical was detected.

(d) Max conc - Maximum detected concentration

(e) Min conc - Minimum detected concentration

(f) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample, one-half of the laboratory detection limit was used in the calculation of the average.

(g) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(h) Exclusion Reason - Indicates whether a chemical was retained as a potential chemical of concern (PCOC) or was excluded based of the following sequence of criteria: not-detected(ND), below background (BKG), below levels based on recommended daily allowances (RDA), frequency of detection less than 5 percent (FREQ). Note that once a chemical was excluded based on one criterion it was not further compared to other criteria (e.g., chemical excluded because it was ND was not compared to BKG, a chemical excluded because of BKG was not compared to RDA). Those chemicals excluded because of FREQ were additionally compared to the PRGs to identify potential hot spots.

Table A-6

Chemicals Not Detected In Surface Soil (≤ 2 Feet)
Adjacent to Load Line 2 Bomb Production Buildings
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	1,3-Dinitrobenzene
EXP	2,4-Dinitrotoluene
EXP	2,6-Dinitrotoluene
EXP	Nitrobenzene
METALS	Silver
METALS	Thallium

Notes:
EXP - Explosives
METALS - Metals

Table A-7

Metals In Surface Soil (≤ 2 Feet) Adjacent to Load Line 2 Bomb Production Buildings Excluded as PCOCs Based On Comparison To Background Concentrations Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[(a)]	Screen Criteria[(b)]
METALS	Aluminum	MG/KG	23600	33852
METALS	Beryllium	MG/KG	0.95	1.52
METALS	Cobalt	MG/KG	14	17.2
METALS	Vanadium	MG/KG	57.9	72.5

Notes:

METALS - Metals

(a) Max conc - Maximum detected concentration

(b) Screen Criteria are soil background screening levels

Table A-8

Metals In Surface Soil (≤ 2 Feet) Adjacent To Load Line 2 Bomb Production Buildings Excluded As PCOCs Based On Their Classification As Essential Nutrients Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Calcium	MG/KG	173000	1000000
METALS	Chromium	MG/KG	70.6	2000
METALS	Copper	MG/KG	145	30000
METALS	Iron	MG/KG	118000	300000
METALS	Magnesium	MG/KG	5970	1000000
METALS	Manganese	MG/KG	1090	50000
METALS	Potassium	MG/KG	4940	1000000
METALS	Selenium	MG/KG	3.3	750
METALS	Sodium	MG/KG	2170	1000000
METALS	Zinc	MG/KG	654	190000

Notes:

METALS - Metals

(a) Max conc - Maximum detected concentration

(b) Screen criterion based on the recommended daily allowance for the chemical (See Table 2-2)

Table A-9

Chemicals in Surface Soil (≤ 2 Feet) Adjacent to Load Line 2 Bomb Production Buildings Excluded As PCOCs Based On Detected In Less Than 5 Percent of The Samples Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[(a)]	Frequency[(b)]	Frequency (Percent)	Screen Criteria[(c)]
EXP	2-Nitrotoluene	MG/KG	0.72	2/138	1.4	5
EXP	3-Nitrotoluene	MG/KG	0.39	2/138	1.4	5
EXP	4-Nitrotoluene	MG/KG	0.72	1/138	0.7	5
METALS	Mercury	MG/KG	0.39	4/136	2.9	5

Notes:

EXP - Explosive

METALS - Metals

(a) Max conc - Maximum detected concentration

(b) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(c) Screen Criterion - Frequency of detection

Table A-10

Selection of Potential Chemicals Of Concern In
Surface Soil (≤ 2 Feet) Adjacent to Load Line 3 Bomb Production Buildings
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
EXP	1,3,5-Trinitrobenzene	MG/KG	124	12	0.46	0.046	0.24	12/124	9.7	PCOC	
EXP	1,3-Dinitrobenzene	MG/KG	124	2	0.42	0.37	0.25	2/124	1.6	FREQ	5
EXP	2,4,6-Trinitrotoluene	MG/KG	124	41	15	0.052	0.63	41/124	33	PCOC	
EXP	2,4-Dinitrotoluene	MG/KG	124	0				0/124		ND	
EXP	2,6-Dinitrotoluene	MG/KG	124	0				0/124		ND	
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	124	35	2.3	0.094	0.33	35/124	28	PCOC	
EXP	2-Nitrotoluene	MG/KG	124	0				0/124		ND	
EXP	3-Nitrotoluene	MG/KG	124	1	0.34	0.34	0.37	1/124	0.81	FREQ	5
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	124	37	2.7	0.087	0.5	37/124	30	PCOC	
EXP	4-Nitrotoluene	MG/KG	124	0				0/124		ND	
EXP	Hexahydro-1,2,3-trinitro-1,2,3-triazine	MG/KG	124	27	4.8	0.082	0.58	27/124	22	PCOC	
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	118	4	0.41	0.2	0.33	4/118	3.4	FREQ	5
EXP	Nitrobenzene	MG/KG	124	2	1.1	0.2	0.97	2/124	1.6	FREQ	5
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	124	33	1.4	0.043	0.28	33/124	27	PCOC	
METALS	Aluminum	MG/KG	122	122	23300	3500	15000	122/122	100	BKG	33852
METALS	Antimony	MG/KG	94	14	1.5	0.43	0.31	14/94	15	PCOC	
METALS	Arsenic	MG/KG	122	122	11.8	2.1	8	122/122	100	BKG	13.5
METALS	Barium	MG/KG	122	122	2380	85.4	250	122/122	100	PCOC	
METALS	Beryllium	MG/KG	122	122	0.99	0.19	0.73	122/122	100	BKG	1.52
METALS	Cadmium	MG/KG	122	110	3.1	0.13	0.51	110/122	90	PCOC	
METALS	Calcium	MG/KG	122	122	64100	2860	7200	122/122	100	RDA	1000000
METALS	Chromium	MG/KG	122	122	26.8	5	18	122/122	100	RDA	2000
METALS	Cobalt	MG/KG	122	122	15.4	3.1	9.7	122/122	100	BKG	17.2
METALS	Copper	MG/KG	122	122	157	5.7	24	122/122	100	RDA	30000
METALS	Iron	MG/KG	122	122	25000	4890	19000	122/122	100	RDA	300000
METALS	Lead	MG/KG	122	122	4670	14.2	110	122/122	100	PCOC	
METALS	Magnesium	MG/KG	122	122	8390	910	3600	122/122	100	RDA	1000000
METALS	Manganese	MG/KG	122	122	1030	190	580	122/122	100	RDA	50000
METALS	Mercury	MG/KG	122	23	0.72	0.11	0.091	23/122	19	PCOC	
METALS	Nickel	MG/KG	122	122	50.9	6	25	122/122	100	PCOC	
METALS	Potassium	MG/KG	122	122	4590	1210	3200	122/122	100	RDA	1000000
METALS	Selenium	MG/KG	122	71	2.8	1.1	1.2	71/122	58	RDA	750
METALS	Silver	MG/KG	122	5	79.3	0.33	0.8	5/122	4.1	FREQ	5

Table A-10

Selection of Potential Chemicals Of Concern In Surface Soil (≤ 2 Feet) Adjacent to Load Line 3 Bomb Production Buildings Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Total(b)	# Hits(c)	Max conc(d)	Min conc(e)	Average conc(f)	Frequency(g)	% Hits	Exclusion Reason(h)	Screen Criteria
METALS	Sodium	MG/KG	122	16	278	50	160	16/122	13	RDA	1000000
METALS	Thallium	MG/KG	122	3	1.8	1.7	0.71	3/122	2.5	FREQ	5
METALS	Vanadium	MG/KG	122	122	51.5	9.5	34	122/122	100	BKG	72.5
METALS	Zinc	MG/KG	122	122	408	36.4	88	122/122	100	RDA	190000

Notes:

(a) EXP - Explosive
METALS - Metals

(b) Total - Total number of samples

(c) # Hits - The number of samples where the chemical was detected.

(d) Max conc - Maximum detected concentration

(e) Min conc - Minimum detected concentration

(f) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample, one-half of the laboratory detection limit was used in the calculation of the average.

(g) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(h) Exclusion Reason - Indicates whether a chemical was retained as a potential chemical of concern (PCOC) or was excluded based of the following sequence of criteria: not-detected(ND), below background (BKG), below levels based on recommended daily allowances (RDA), frequency of detection less than 5 percent (FREQ). Note that once a chemical was excluded based on one criterion it was not further compared to other criteria (e.g., chemical excluded because it was ND was not compared to BKG, a chemical excluded because of BKG was not compared to RDA). Those chemicals excluded because of FREQ were additionally compared to the PRGs to identify potential hot spots.

Table A-11

Chemicals Not Detected In Surface Soil (≤ 2 Feet)
Adjacent to Load Line 3 Bomb Production Buildings
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	2,4-Dinitrotoluene
EXP	2,6-Dinitrotoluene
EXP	2-Nitrotoluene
EXP	4-Nitrotoluene

Table A-12

Metals In Surface Soil (≤ 2 Feet) Adjacent to Load Line 3 Bomb Production Buildings Excluded as PCOCs Based On Comparison To Background Concentrations Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Aluminum	MG/KG	23300	33852
METALS	Arsenic	MG/KG	11.8	13.5
METALS	Beryllium	MG/KG	0.99	1.52
METALS	Chromium	MG/KG	26.8	37
METALS	Cobalt	MG/KG	15.4	17.2
METALS	Manganese	MG/KG	1030	1083
METALS	Vanadium	MG/KG	51.5	72.5

Notes:

METALS - Metals

(a) Max conc - Maximum detected concentration

(b) Screen Criteria are soil background screening levels

Table A-13

Metals In Surface Soil (≤ 2 Feet) Adjacent to Load Line 3 Bomb Production Buildings Excluded As PCOCs Based on Their Classification As Essential Nutrients Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Calcium	MG/KG	64100	1000000
METALS	Chromium	MG/KG	26.8	2000
METALS	Copper	MG/KG	157	30000
METALS	Iron	MG/KG	25000	300000
METALS	Magnesium	MG/KG	8390	1000000
METALS	Manganese	MG/KG	1030	50000
METALS	Potassium	MG/KG	4590	1000000
METALS	Selenium	MG/KG	2.8	750
METALS	Sodium	MG/KG	278	1000000
METALS	Zinc	MG/KG	408	190000

Notes:

METALS - Metals

(a) Max conc - Maximum detected concentration

(b) Screen criterion based on the recommended daily allowance for the chemical (See Table 2-2)

Table A-14

Chemicals In Surface Soil (≤ 2 Feet) Adjacent to Load Line 3 Bomb Production Buildings Excluded As PCOCs Based On Detection In Less Than 5 Percent Of The Samples Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc(a)	Frequency(b)	Frequency (Percent)	Screen Criteria(c)
EXP	1,3-Dinitrobenzene	MG/KG	0.42	2/124	1.6	5
EXP	3-Nitrotoluene	MG/KG	0.34	1/124	0.8	5
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	0.41	4/118	3.4	5
EXP	Nitrobenzene	MG/KG	1.1	2/124	1.6	5
METALS	Silver	MG/KG	79.3	5/122	4.1	5
METALS	Thallium	MG/KG	1.8	3/122	2.5	5

Notes:

EXP - Explosive

METALS - Metals

(a) Max conc - Maximum detected concentration

(b) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(c) Screen Criterion - Frequency of detection

Table A-15

Selection Of Potential Chemicals Of Concern In Surface Soil (≤ 2 Feet) Adjacent to Load Line 4 Bomb Production Buildings Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
EXP	1,3,5-Trinitrobenzene	MG/KG	136	6	0.12	0.032	0.24	6/136	4.4	FREQ	5
EXP	1,3-Dinitrobenzene	MG/KG	136	0				0/136		ND	
EXP	2,4,6-Trinitrotoluene	MG/KG	136	40	2	0.071	0.28	40/136	29	PCOC	
EXP	2,4-Dinitrotoluene	MG/KG	136	1	0.088	0.088	0.25	1/136	0.74	FREQ	5
EXP	2,6-Dinitrotoluene	MG/KG	136	0				0/136		ND	
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	135	19	0.69	0.079	0.26	19/135	14	PCOC	
EXP	2-Nitrotoluene	MG/KG	136	1	0.14	0.14	0.37	1/136	0.74	FREQ	5
EXP	3-Nitrotoluene	MG/KG	136	0				0/136		ND	
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	135	19	0.41	0.12	0.46	19/135	14	PCOC	
EXP	4-Nitrotoluene	MG/KG	136	1	0.14	0.14	0.37	1/136	0.74	FREQ	5
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	136	18	3.4	0.02	0.43	18/136	13	PCOC	
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	134	0				0/134		ND	
EXP	Nitrobenzene	MG/KG	136	3	1.6	0.72	0.99	3/136	2.2	FREQ	5
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	136	37	0.85	0.05	0.27	37/136	27	PCOC	
METALS	Aluminum	MG/KG	134	134	25600	4950	15000	134/134	100	BKG	33852
METALS	Antimony	MG/KG	85	18	1.4	0.48	0.33	18/85	21	PCOC	
METALS	Arsenic	MG/KG	134	134	15.3	2.3	7.7	134/134	100	PCOC	
METALS	Barium	MG/KG	134	134	347	68.2	230	134/134	100	BKG	440
METALS	Beryllium	MG/KG	134	131	1	0.25	0.73	131/134	98	BKG	1.52
METALS	Cadmium	MG/KG	134	122	10.3	0.13	0.63	122/134	91	PCOC	
METALS	Calcium	MG/KG	134	134	51000	1670	6100	134/134	100	RDA	1000000
METALS	Chromium	MG/KG	134	134	57	8.7	19	134/134	100	RDA	2000
METALS	Cobalt	MG/KG	134	134	14.9	3.7	9.9	134/134	100	BKG	17.2
METALS	Copper	MG/KG	134	134	112	11.7	23	134/134	100	RDA	30000
METALS	Iron	MG/KG	134	134	70600	7250	20000	134/134	100	RDA	300000
METALS	Lead	MG/KG	134	134	313	12.7	63	134/134	100	PCOC	
METALS	Magnesium	MG/KG	134	134	5260	1110	3600	134/134	100	RDA	1000000
METALS	Manganese	MG/KG	134	134	960	218	600	134/134	100	RDA	50000
METALS	Mercury	MG/KG	134	38	0.31	0.13	0.095	38/134	28	PCOC	
METALS	Nickel	MG/KG	134	134	61.7	7.8	23	134/134	100	PCOC	

Table A-15

**Selection Of Potential Chemicals Of Concern In
Surface Soil (≤ 2 Feet) Adjacent to Load Line 4 Bomb Production Buildings
Former Nebraska Ordnance Plant, Mead, Nebraska**

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
METALS	Potassium	MG/KG	134	134	6090	1190	3500	134/134	100	RDA	1000000
METALS	Selenium	MG/KG	134	85	3.3	0.96	1.2	85/134	63	RDA	750
METALS	Silver	MG/KG	134	0				0/134		ND	
METALS	Sodium	MG/KG	134	33	10200	91	820	33/134	25	RDA	1000000
METALS	Thallium	MG/KG	134	2	1.5	1.4	0.8	2/134	1.5	FREQ	5
METALS	Vanadium	MG/KG	134	134	52.3	12.7	34	134/134	100	BKG	72.5
METALS	Zinc	MG/KG	134	134	234	42.1	84	134/134	100	RDA	190000

Notes:

(a) EXP - Explosive
METALS - Metals

(b) Total - Total number of samples

(c) # Hits - The number of samples where the chemical was detected.

(d) Max conc - Maximum detected concentration

(e) Min conc - Minimum detected concentration

(f) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample, one-half of the laboratory detection limit was used in the calculation of the average.

(g) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(h) Exclusion Reason - Indicates whether a chemical was retained as a potential chemical of concern (PCOC) or was excluded based of the following sequence of criteria: not-detected(ND), below background (BKG), below levels based on recommended daily allowances (RDA), frequency of detection less than 5 percent (FREQ). Note that once a chemical was excluded based on one criterion it was not further compared to other criteria (e.g., chemical excluded because it was ND was not compared to BKG, a chemical excluded because of BKG was not compared to RDA). Those chemicals excluded because of FREQ were additionally compared to the PRGs to identify potential hot spots.

Table A-16

Chemicals Not Detected in Surface Soil (≤ 2 Feet)
Adjacent to Load Line 4 Bomb Production Buildings
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	1,3-Dinitrobenzene
EXP	2,6-Dinitrotoluene
EXP	3-Nitrotoluene
EXP	Methyl-2,4,6-trinitrophenylnitramine
METALS	Silver

Notes:
EXP - Explosives
METALS - Metals

Table A-17

Metals In Surface Soil (≤ 2 Feet) Adjacent to Load Line 4 Bomb Production Buildings Exluded as PCOCs Based On Comparison To Background Concentrations Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Aluminum	MG/KG	25600	33852
METALS	Barium	MG/KG	347	440
METALS	Beryllium	MG/KG	1	1.52
METALS	Cobalt	MG/KG	14.9	17.2
METALS	Manganese	MG/KG	960	1083
METALS	Vanadium	MG/KG	52.3	72.5

Notes:

METALS - Metals

(a) Max conc - Maximum detected concentration

(b) Screen Criteria are soil background screening levels

Table A-18

Metals In Load Line 4 Bomb Production Buildings
Adjacent Surface Soil (≤ 2 Feet) Excluded As PCOCs
Based On Their Classification As Essential Nutrients
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Calcium	MG/KG	51000	1000000
METALS	Chromium	MG/KG	57	2000
METALS	Copper	MG/KG	112	30000
METALS	Iron	MG/KG	70600	300000
METALS	Magnesium	MG/KG	5260	1000000
METALS	Manganese	MG/KG	960	50000
METALS	Potassium	MG/KG	6090	1000000
METALS	Selenium	MG/KG	3.3	750
METALS	Sodium	MG/KG	10200	1000000
METALS	Zinc	MG/KG	234	190000

Notes:

METALS - Metals

(a) Max conc - Maximum detected concentration

(b) Screen criterion based on the recommended daily allowance for the chemical (See Table 2-2)

Table A-19

Chemicals In Surface Soil (≤ 2 Feet) Adjacent to Load Line 4 Bomb Production Buildings Excluded As PCOCs Based On Detection In Less Than 5 Percent Of The Samples Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Frequency[b]	Frequency (Percent)	Screen Criteria[c]
EXP	1,3,5-Trinitrobenzene	MG/KG	0.12	6/136	4.4	5
EXP	2,4-Dinitrotoluene	MG/KG	0.088	1/136	0.7	5
EXP	2-Nitrotoluene	MG/KG	0.14	1/136	0.7	5
EXP	4-Nitrotoluene	MG/KG	0.14	1/136	0.7	5
EXP	Nitrobenzene	MG/KG	1.6	3/136	2.2	5
METALS	Thallium	MG/KG	1.5	2/134	1.5	5

Notes:

EXP - Explosive

METALS - Metals

(a) Max conc - Maximum detected concentration

(b) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(c) Screen Criterion - Frequency of detection

Table A-20

Selection Of Potential Chemicals Of Concern In Surface Soil (≤ 2 Feet) Around Load Line 1 Paint Operations Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
METALS	Aluminum	MG/KG	58	58	24800	4620	14000	58/58	100	BKG	33852
METALS	Antimony	MG/KG	52	33	47.2	0.49	3.7	33/52	63	PCOC	
METALS	Arsenic	MG/KG	58	58	10.7	2.1	7.4	58/58	100	BKG	13.5
METALS	Barium	MG/KG	58	58	339	84.8	240	58/58	100	BKG	440
METALS	Beryllium	MG/KG	58	58	0.94	0.24	0.7	58/58	100	BKG	1.52
METALS	Cadmium	MG/KG	58	45	144	0.14	2.8	45/58	78	PCOC	
METALS	Calcium	MG/KG	58	58	28300	1390	4900	58/58	100	RDA	1000000
METALS	Chromium	MG/KG	58	58	140	6.2	21	58/58	100	RDA	2000
METALS	Cobalt	MG/KG	58	58	13.4	4	10	58/58	100	BKG	17.2
METALS	Copper	MG/KG	58	58	53.6	6	21	58/58	100	RDA	30000
METALS	Iron	MG/KG	58	58	23800	6820	18000	58/58	100	BKG	36300
METALS	Lead	MG/KG	58	58	794	7	62	58/58	100	PCOC	
METALS	Magnesium	MG/KG	58	58	6360	1240	3500	58/58	100	BKG	6700
METALS	Manganese	MG/KG	58	58	878	200	590	58/58	100	BKG	1083
METALS	Mercury	MG/KG	58	2	0.24	0.16	0.064	2/58	3.4	FREQ	5
METALS	Nickel	MG/KG	58	58	49.5	7.7	22	58/58	100	PCOC	
METALS	Potassium	MG/KG	58	58	4850	1090	3300	58/58	100	BKG	5480
METALS	Selenium	MG/KG	58	25	2	1	0.9	25/58	43	RDA	750
METALS	Silver	MG/KG	58	0				0/58		ND	
METALS	Sodium	MG/KG	58	5	215	40.2	140	5/58	8.6	RDA	1000000
METALS	Thallium	MG/KG	58	1	1.5	1.5	0.68	1/58	1.7	FREQ	5
METALS	Vanadium	MG/KG	58	58	53.1	14.3	31	58/58	100	BKG	72.5
METALS	Zinc	MG/KG	58	58	266	20	77	58/58	100	RDA	190000

Notes:

(a) METALS - Metals

(b) Total - Total number of samples

(c) # Hits - The number of samples where the chemical was detected.

(d) Max conc - Maximum detected concentration

(e) Min conc - Minimum detected concentration

(f) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample, one-half of the laboratory detection limit was used in the calculation of the average.

(g) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(h) Exclusion Reason - Indicates whether a chemical was retained as a potential chemical of concern (PCOC) or was excluded based of the following sequence of criteria: not-detected(ND), below background (BKG), below levels based on recommended daily allowances (RDA), frequency of detection less than 5 percent (FREQ). Note that once a chemical was excluded based on one criterion it was not further compared to other criteria (e.g., chemical excluded because it was ND was not compared to BKG, a chemical excluded because of BKG was not compared to RDA). Those chemicals excluded because of FREQ were additionally compared to the PRGs to identify potential hot spots.

Table A-21

Chemical Not Detected In Surface Soil ($\leq$ 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
METALS	Silver

Table A-22

Metals In Surface Soil ($\leq$ 2 Feet) Around Load Line 1 Paint Operations Area Excluded as PCOCs Based On Comparison To Background Concentrations Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[(a)]	Screen Criteria[(b)]
METALS	Aluminum	MG/KG	24800	33852
METALS	Arsenic	MG/KG	10.7	13.5
METALS	Barium	MG/KG	339	440
METALS	Beryllium	MG/KG	0.94	1.52
METALS	Cobalt	MG/KG	13.4	17.2
METALS	Iron	MG/KG	23800	36300
METALS	Magnesium	MG/KG	6360	6700
METALS	Manganese	MG/KG	878	1083
METALS	Potassium	MG/KG	4850	5480
METALS	Vanadium	MG/KG	53.1	72.5

Notes:

(a) Max conc - Maximum detected concentration

(b) Screen Criteria are soil background screening levels

Table A-23

Metals In Surface Soil (≤ 2 Feet) Around Load Line 1 Paint Operations Area Excluded As PCOCs Based On Their Classification As Essential Nutrients Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Calcium	MG/KG	28300	1000000
METALS	Chromium	MG/KG	140	2000
METALS	Copper	MG/KG	53.6	30000
METALS	Selenium /	MG/KG	2	750
METALS	Sodium	MG/KG	215	1000000
METALS	Zinc	MG/KG	266	190000

Notes:

(a) Max conc - Maximum detected concentration

(b) Screen criteria based on the recommended daily allowance for the chemical (See Table 2-3)

Table A-24

Chemicals In Surface Soil (≤ 2 Feet) Around Load Line 1 Paint Operations Area Excluded As PCOCs Based On Detection In Less Than 5 Percent Of The Samples Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Frequency[b]	Frequency (Percent)	Screen Criteria[c]
METALS	Mercury	MG/KG	0.24	2/58	3.4	5
METALS	Thallium	MG/KG	1.5	1/58	0.1	5

Notes:

(a) Max conc - Maximum detected concentration

(b) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(c) Screen Criterion - Frequency of detection

Table A-25

Selection Of Potential Chemicals Of Concern In Surface Soil (≤ 2 Feet) Around Load Line 2 Paint Operations Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group[(a)]	Chemical	Units	Total[(b)]	# Hits[(c)]	Max conc[(d)]	Min conc[(e)]	Average conc[(f)]	Frequency[(g)]	% Hits	Exclusion Reason[(h)]	Screen Criteria
METALS	Aluminum	MG/KG	56	56	27000	3380	16000	56/56	100	BKG	33852
METALS	Antimony	MG/KG	44	20	501	0.6	15	20/44	45	PCOC	
METALS	Arsenic	MG/KG	56	56	14.6	1.7	8.7	56/56	100	PCOC	
METALS	Barium	MG/KG	60	60	423	69.5	240	60/60	100	BKG	440
METALS	Beryllium	MG/KG	56	56	1.1	0.22	0.76	56/56	100	BKG	1.52
METALS	Cadmium	MG/KG	60	39	13.8	0.12	0.68	39/60	65	PCOC	
METALS	Calcium	MG/KG	56	56	16100	1350	5000	56/56	100	RDA	1000000
METALS	Chromium	MG/KG	60	60	840	5.8	35	60/60	100	RDA	2000
METALS	Cobalt	MG/KG	56	56	44.9	3.2	11	56/56	100	PCOC	
METALS	Copper	MG/KG	56	56	86	12.8	23	56/56	100	RDA	30000
METALS	Iron	MG/KG	56	56	26800	5320	19000	56/56	100	RDA	300000
METALS	Lead	MG/KG	60	60	3960	11.4	110	60/60	100	PCOC	
METALS	Magnesium	MG/KG	56	56	6110	1390	3900	56/56	100	RDA	1000000
METALS	Manganese	MG/KG	56	56	1080	205	580	56/56	100	BKG	1083
METALS	Mercury	MG/KG	56	6	0.76	0.13	0.083	6/56	11	PCOC	
METALS	Nickel	MG/KG	56	56	63	6.9	24	56/56	100	PCOC	
METALS	Potassium	MG/KG	56	56	4430	1080	3100	56/56	100	RDA	1000000
METALS	Selenium	MG/KG	56	15	1.9	1.1	0.76	15/56	27	RDA	750
METALS	Silver	MG/KG	56	0				0/56	0	ND	
METALS	Sodium	MG/KG	56	4	6100	258	360	4/56	7.1	RDA	1000000
METALS	Thallium	MG/KG	56	2	2.2	1.4	0.71	2/56	3.6	FREQ	5
METALS	Vanadium	MG/KG	56	56	60.5	9.6	38	56/56	100	BKG	72.5
METALS	Zinc	MG/KG	56	56	486	27.8	77	56/56	100	RDA	190000

Notes:

(a) METALS - Metals

(b) Total - Total number of samples

(c) # Hits - The number of samples where the chemical was detected.

(d) Max conc - Maximum detected concentration

(e) Min conc - Minimum detected concentration

(f) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limits in a sample, one-half of the laboratory detection limit was used in the calculation of the average.

(g) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(h) Exclusion Reason - Indicates whether a chemical was retained as a potential chemical of concern (PCOC) or was excluded based of the following sequence of criteria: not-detected(ND),
below background (BKG), below levels based on recommended daily allowances (RDA), frequency of detection less than 5 percent (FREQ). Note that once a chemical was excluded based on one criterion it was not further compared to other criteria (e.g., chemical excluded because it was ND was not compared to BKG, a chemical excluded because of BKG was not compared to RDA). Those chemicals excluded because of FREQ were additionally compared to the PRGs to identify potential hot spots.

Table A-26

Chemical Not Detected In Surface Soil (≤ 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
METALS	Silver

Table A-27

Metals In Surface Soil (≤ 2 Feet) Around Load Line 2 Paint Operations Area Excluded as PCOCs Based On Comparison To Background Concentrations Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Aluminum	MG/KG	27000	33852
METALS	Barium	MG/KG	423	440
METALS	Beryllium	MG/KG	1.1	1.52
METALS	Manganese	MG/KG	1080	1083
METALS	Vanadium	MG/KG	60.5	72.5

Notes:

METALS - Metals

(a) Max conc - Maximum detected concentration

(b) Screen Criteria are soil background screening levels

Table A-28

Metals In Surface Soil (≤ 2 Feet) Around Load Line 2 Paint Operations Area Excluded As PCOCs Based On Their Classification As Essential Nutrients Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Calcium	MG/KG	16100	1000000
METALS	Chromium	MG/KG	840	2000
METALS	Copper	MG/KG	86	30000
METALS	Iron	MG/KG	26800	300000
METALS	Magnesium	MG/KG	6110	1000000
METALS	Potassium	MG/KG	4430	1000000
METALS	Selenium	MG/KG	1.9	750
METALS	Sodium	MG/KG	6100	1000000
METALS	Zinc	MG/KG	486	190000

Notes:

METALS - Metals

(a) Max conc - Maximum detected concentration

(b) Screen criterion based on the recommended daily allowance for the chemical (See Table 2-3)

Table A-29

Chemical In Surface Soil (≤ 2 Feet) Around Load Line 2 Paint Operations Area Excluded As PCOC Based On Detection In Less Than 5 Percent Of The Samples Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[(a)]	Frequency[(b)]	Frequency (Percent)	Screen Criteria[(c)]
METALS	Thallium	MG/KG	2.2	2/56	3.6	5

Notes:

METALS - Metals

(a) Max conc - Maximum detected concentration

(b) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(c) Screen Criterion - Frequency of detection

Table A-30

Selection Of Potential Chemicals Of Concern In Surface Soil (≤ 2 Feet) Around Load Line 3 Paint Operations Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
METALS	Aluminum	MG/KG	56	56	24200	6430	14000	56/56	100	BKG	33852
METALS	Antimony	MG/KG	38	19	54.8	0.58	4.1	19/38	50	PCOC	
METALS	Arsenic	MG/KG	56	56	13.4	2.9	7.7	56/56	100	BKG	13.5
METALS	Barium	MG/KG	58	58	516	58	240	58/58	100	PCOC	
METALS	Beryllium	MG/KG	56	56	0.95	0.31	0.72	56/56	100	BKG	1.52
METALS	Cadmium	MG/KG	58	48	5.8	0.13	0.51	48/58	83	PCOC	
METALS	Calcium	MG/KG	56	56	124000	2770	8300	56/56	100	RDA	1000000
METALS	Chromium	MG/KG	58	58	806	11.3	36	58/58	100	RDA	2000
METALS	Cobalt	MG/KG	56	56	25.2	4.3	10	56/56	100	PCOC	
METALS	Copper	MG/KG	56	56	218	8.5	28	56/56	100	RDA	30000
METALS	Iron	MG/KG	56	56	45000	8050	19000	56/56	100	RDA	300000
METALS	Lead	MG/KG	58	58	3730	12.7	130	58/58	100	PCOC	
METALS	Magnesium	MG/KG	56	56	6150	1670	3700	56/56	100	BKG	6700
METALS	Manganese	MG/KG	56	56	813	243	570	56/56	100	BKG	1083
METALS	Mercury	MG/KG	56	25	0.29	0.11	0.11	25/56	45	PCOC	
METALS	Nickel	MG/KG	56	56	194	10.4	28	56/56	100	PCOC	
METALS	Potassium	MG/KG	56	56	5290	1690	2900	56/56	100	BKG	5480
METALS	Selenium	MG/KG	56	27	1.8	1.1	0.96	27/56	48	RDA	750
METALS	Silver	MG/KG	56	0				0/56		ND	
METALS	Sodium	MG/KG	56	1	441	441	160	1/56	1.8	RDA	1000000
METALS	Thallium	MG/KG	56	1	1.2	1.2	1.2	1/56	1.8	FREQ	5
METALS	Vanadium	MG/KG	56	56	59.1	19.7	32	56/56	100	BKG	72.5
METALS	Zinc	MG/KG	56	56	551	34.4	84	56/56	100	RDA	190000

Notes:

(a) METALS - Metals

(b) Total - Total number of samples

(c) # Hits - The number of samples where the chemical was detected.

(d) Max conc - Maximum detected concentration

(e) Min conc - Minimum detected concentration

(f) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample, one-half of the laboratory detection limit was used in the calculation of the average.

(g) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(h) Exclusion Reason - Indicates whether a chemical was retained as a potential chemical of concern (PCOC) or was excluded based of the following sequence of criteria: not-detected(ND), below background (BKG), below levels based on recommended daily allowances (RDA), frequency of detection less than 5 percent (FREQ). Note that once a chemical was excluded based on one criterion it was not further compared to other criteria (e.g., chemical excluded because it was ND was not compared to BKG, a chemical excluded because of BKG was not compared to RDA). Those chemicals excluded because of FREQ were additionally compared to the PRGs to identify potential hot spots.

Table A-31

Chemical Not Detected In Surface Soil (≤ 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
METALS	Silver

Table A-32

Metals In Surface Soil (≤ 2 Feet) Around Load Line 3 Paint Operations Area Excluded as PCOCs Based On Comparison To Background Concentrations Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Aluminum	MG/KG	24200	33852
METALS	Arsenic	MG/KG	13.4	13.5
METALS	Beryllium	MG/KG	0.95	1.52
METALS	Magnesium	MG/KG	6150	6700
METALS	Manganese	MG/KG	813	1083
METALS	Potassium	MG/KG	5290	5480
METALS	Vanadium	MG/KG	59.1	72.5

Notes:

(a) Max conc - Maximum detected concentration

(b) Screen Criteria are soil background screening levels

Table A-33

Metals In Surface Soil (≤ 2 Feet) Around Load Line 3 Paint Operations Area Excluded As PCOCs Based On Their Classification As Essential Nutrients Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Calcium	MG/KG	124000	1000000
METALS	Chromium	MG/KG	806	2000
METALS	Copper	MG/KG	218	30000
METALS	Iron	MG/KG	45000	300000
METALS	Selenium	MG/KG	1.8	750
METALS	Sodium	MG/KG	441	1000000
METALS	Zinc	MG/KG	551	190000

Notes:

(a) Max conc - Maximum detected concentration

(b) Screen criterion based on the recommended daily allowance for the chemical (See Table 2-3)

Table A-34

Metal In Surface Soil (≤ 2 Feet) Around
Load Line 3 Paint Operations Area Excluded As PCOC
Based On Detection In Less Than 5 Percent Of The Samples
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Frequency[b]	Frequency (Percent)	Screen Criteria[c]
METALS	Thallium	MG/KG	1.2	1/56	1.8	5

Notes:

(a) Max conc - Maximum detected concentration

(b) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(c) Screen Criterion - Frequency of detection

Table A-35

Selection Of Potential Chemicals Of Concern In Surface Soil (≤ 2 Feet) Around Load Line 4 Paint Operations Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
METALS	Aluminum	MG/KG	61	61	20300	3520	13000	61/61	100	BKG	33852
METALS	Antimony	MG/KG	32	21	171	0.46	8.9	21/32	66	PCOC	
METALS	Arsenic	MG/KG	61	60	9	1.5	6.2	60/61	98	BKG	13.5
METALS	Barium	MG/KG	61	61	278	78.2	200	61/61	100	BKG	440
METALS	Beryllium	MG/KG	61	49	0.88	0.19	0.53	49/61	80	BKG	1.52
METALS	Cadmium	MG/KG	61	37	19.7	0.13	0.82	37/61	61	PCOC	
METALS	Calcium	MG/KG	61	61	167000	1800	6500	61/61	100	RDA	1000000
METALS	Chromium	MG/KG	61	61	123	8.5	19	61/61	100	RDA	2000
METALS	Cobalt	MG/KG	61	61	13	2.8	8.4	61/61	100	BKG	17.2
METALS	Copper	MG/KG	61	61	37.2	9.3	18	61/61	100	RDA	30000
METALS	Iron	MG/KG	61	61	22000	5460	16000	61/61	100	BKG	36300
METALS	Lead	MG/KG	61	61	600	9.5	49	61/61	100	PCOC	
METALS	Magnesium	MG/KG	61	61	4090	1370	2900	61/61	100	BKG	6700
METALS	Manganese	MG/KG	61	61	810	151	510	61/61	100	BKG	1083
METALS	Mercury	MG/KG	61	0				0/61		ND	
METALS	Nickel	MG/KG	61	61	34.2	6.7	18	61/61	100	BKG	39.3
METALS	Potassium	MG/KG	61	61	6430	1590	3300	61/61	100	RDA	1000000
METALS	Selenium	MG/KG	61	28	2.3	1.1	0.99	28/61	46	RDA	750
METALS	Silver	MG/KG	61	0				0/61		ND	
METALS	Sodium	MG/KG	61	11	226	89.9	170	11/61	18	RDA	1000000
METALS	Thallium	MG/KG	61	2	1.8	1.4	0.83	2/61	3.3	FREQ	5
METALS	Vanadium	MG/KG	61	61	42	9.9	30	61/61	100	BKG	72.5
METALS	Zinc	MG/KG	61	61	264	30.8	66	61/61	100	RDA	190000

Notes:
(a) METALS - Metals
(b) Total - Total number of samples
(c) # Hits - The number of samples where the chemical was detected.
(d) Max conc - Maximum detected concentration
(e) Min conc - Minimum detected concentration
(f) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample, one-half of the laboratory detection limit was used in the calculation of the average.
(g) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.
(h) Exclusion Reason - Indicates whether a chemical was retained as a potential chemical of concern (PCOC) or was excluded based of the following sequence of criteria: not-detected(ND), below background (BKG), below levels based on recommended daily allowances (RDA), frequency of detection less than 5 percent (FREQ). Note that once a chemical was excluded based on one criterion it was not further compared to other criteria (e.g., chemical excluded because it was ND was not compared to BKG, a chemical excluded because of BKG was not compared to RDA). Those chemicals excluded because of FREQ were additionally compared to the PRGs to identify potential hot spots.

Table A-36

Chemicals Not Detected In Surface Soil (≤ 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
METALS	Mercury
METALS	Silver

Table A-37

Metals In Surface Soil (≤ 2 Feet) Around Load Line 4 Paint Operations Area Excluded as PCOCs Based On Comparison To Background Concentrations

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Aluminum	MG/KG	20300	33852
METALS	Arsenic	MG/KG	9	13.5
METALS	Barium	MG/KG	278	440
METALS	Beryllium	MG/KG	0.88	1.52
METALS	Cobalt	MG/KG	13	17.2
METALS	Iron	MG/KG	22000	36300
METALS	Magnesium	MG/KG	4090	6700
METALS	Manganese	MG/KG	810	1083
METALS	Nickel	MG/KG	34.2	39.3
METALS	Vanadium	MG/KG	42	72.5

Notes:

(a) Max conc - Maximum detected concentration

(b) Screen Criteria are soil background screening levels

Table A-38

Metals In Surface Soil (≤ 2 Feet) Around Load Line 4 Paint Operations Area Excluded As PCOCs Based On Their Classification As Essential Nutrients Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Calcium	MG/KG	167000	1000000
METALS	Chromium	MG/KG	123	2000
METALS	Copper	MG/KG	37.2	30000
METALS	Potassium	MG/KG	6430	1000000
METALS	Selenium	MG/KG	2.3	750
METALS	Sodium	MG/KG	226	1000000
METALS	Zinc	MG/KG	264	190000

Notes:

(a) Max conc - Maximum detected concentration

(b) Screen criterion based on the recommended daily allowance for the chemical (See Table 2-3)

Table A-39

Metal In Surface Soil (≤ 2 Feet) Around Load Line 4 Paint Operations Area Excluded As PCOC Based On Detected In Less Than 5 Percent Of The Samples Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[(a)]	Frequency[(b)]	Frequency (Percent)	Screen Criteria[(c)]
METALS	Thallium	MG/KG	1.8	2/61	3.3	5

Notes:

(a) Max conc - Maximum detected concentration

(b) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(c) Screen Criterion - Frequency of detection

Table A-40

Selection Of Potential Chemicals Of Concern In Surface And Subsurface Soil At Potential Landfill North of Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
EXP	1,3,5-Trinitrobenzene	MG/KG	158	30	52	0.014	0.64	30/158	19	PCOC	
EXP	1,3-Dinitrobenzene	MG/KG	158	7	0.14	0.012	0.083	7/158	4.4	FREQ	5
EXP	2,4,6-Trinitrotoluene	MG/KG	158	71	4700	0.015	41	71/158	45	PCOC	
EXP	2,4-Dinitrotoluene	MG/KG	158	8	0.81	0.015	0.093	8/158	5.1	PCOC	
EXP	2,6-Dinitrotoluene	MG/KG	158	0				0/158	0	ND	
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	158	56	11	0.0095	0.32	56/158	35	PCOC	
EXP	2-Nitrotoluene	MG/KG	158	0				0/158	0	ND	
EXP	3-Nitrotoluene	MG/KG	158	0				0/158	0	ND	
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	158	46	5.6	0.031	0.3	46/158	29	PCOC	
EXP	4-Nitrotoluene	MG/KG	158	0				0/158	0	ND	
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	158	68	1400	0.01	11	68/158	43	PCOC	
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	158	18	6600	0.019	50	18/158	11	PCOC	
EXP	Nitrobenzene	MG/KG	158	0				0/158	0	ND	
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	158	64	74	0.014	1.5	64/158	41	PCOC	
METALS	Aluminum	MG/KG	30	30	17900	636	12000	30/30	100	BKG	33900
METALS	Antimony	MG/KG	30	9	81.8	0.5	7.2	9/30	30	PCOC	
METALS	Arsenic	MG/KG	30	18	10.5	1.6	5.6	18/30	60	BKG	13.5
METALS	Barium	MG/KG	30	30	353	12.3	200	30/30	100	BKG	440
METALS	Beryllium	MG/KG	30	16	0.82	0.04	0.54	16/30	53	BKG	1.52
METALS	Cadmium	MG/KG	30	15	1.4	0.15	0.66	15/30	50	PCOC	
METALS	Calcium	MG/KG	30	30	136000	281	9600	30/30	100	RDA	1000000
METALS	Chromium	MG/KG	30	30	688	1.2	38	30/30	100	RDA	2000
METALS	Cobalt	MG/KG	30	30	18.7	0.36	8.8	30/30	100	PCOC	17.2
METALS	Copper	MG/KG	30	28	47.9	0.91	19	28/30	93	RDA	30000
METALS	Iron	MG/KG	30	30	23800	845	17000	30/30	100	BKG	36300
METALS	Lead	MG/KG	30	28	2910	1.8	130	28/30	93	PCOC	
METALS	Magnesium	MG/KG	30	30	16700	207	3900	30/30	100	RDA	1000000
METALS	Manganese	MG/KG	30	30	1130	26.7	520	30/30	100	RDA	50000
METALS	Mercury	MG/KG	30	0				0/30	0	ND	
METALS	Nickel	MG/KG	30	30	37.3	0.63	21	30/30	100	BKG	39.3

Table A-40

Selection Of Potential Chemicals Of Concern In Surface And Subsurface Soil At Potential Landfill North of Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
METALS	Potassium	MG/KG	30	30	3380	206	2300	30/30	100	BKG	54800
METALS	Selenium	MG/KG	30	7	3.1	1.3	0.87	7/30	23	RDA	750
METALS	Silver	MG/KG	30	1	6	6	0.77	1/30	3.3	FREQ	5
METALS	Sodium	MG/KG	30	13	311	66	170	13/30	43	RDA	1000000
METALS	Thallium	MG/KG	30	1	1.4	1.4	0.75	1/30	3.3	FREQ	5
METALS	Vanadium	MG/KG	30	30	42.5	1.8	27	30/30	100	BKG	72.5
METALS	Zinc	MG/KG	30	28	728	4.7	87	28/30	93	RDA	190000
SVOC	1,2,4-Trichlorobenzene	MG/KG	16	0				0/16	0	ND	
SVOC	1,2-Dichlorobenzene	MG/KG	16	0				0/16	0	ND	
SVOC	1,3-Dichlorobenzene	MG/KG	16	0				0/16	0	ND	
SVOC	1,4-Dichlorobenzene	MG/KG	16	0				0/16	0	ND	
SVOC	2,2'-oxybis(1-Chloropropane)	MG/KG	16	0				0/16	0	ND	
SVOC	2,4,5-Trichlorophenol	MG/KG	16	0				0/16	0	ND	
SVOC	2,4,6-Trichlorophenol	MG/KG	16	0				0/16	0	ND	
SVOC	2,4-Dichlorophenol	MG/KG	16	0				0/16	0	ND	
SVOC	2,4-Dimethylphenol	MG/KG	16	0				0/16	0	ND	
SVOC	2,4-Dinitrophenol	MG/KG	16	0				0/16	0	ND	
SVOC	2,4-Dinitrotoluene	MG/KG	16	0				0/16	0	ND	
SVOC	2,6-Dinitrotoluene	MG/KG	16	0				0/16	0	ND	
SVOC	2-Chloronaphthalene	MG/KG	16	0				0/16	0	ND	
SVOC	2-Chlorophenol	MG/KG	16	0				0/16	0	ND	
SVOC	2-Methylnaphthalene	MG/KG	16	0				0/16	0	ND	
SVOC	2-Methylphenol	MG/KG	16	0				0/16	0	ND	
SVOC	2-Nitroaniline	MG/KG	16	0				0/16	0	ND	
SVOC	2-Nitrophenol	MG/KG	16	0				0/16	0	ND	
SVOC	3,3'-Dichlorobenzidine	MG/KG	16	0				0/16	0	ND	
SVOC	3-Nitroaniline	MG/KG	16	0				0/16	0	ND	
SVOC	4,6-Dinitro-2-methylphenol	MG/KG	16	0				0/16	0	ND	
SVOC	4-Bromophenyl-phenylether	MG/KG	16	0				0/16	0	ND	
SVOC	4-Chloro-3-methylphenol	MG/KG	16	0				0/16	0	ND	

Table A-40

Selection Of Potential Chemicals Of Concern In Surface And Subsurface Soil At Potential Landfill North of Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
SVOC	4-Chloroaniline	MG/KG	16	0				0/16	0	ND	
SVOC	4-Chlorophenyl-phenylether	MG/KG	16	0				0/16	0	ND	
SVOC	4-Methylphenol	MG/KG	16	0				0/16	0	ND	
SVOC	4-Nitroaniline	MG/KG	16	0				0/16	0	ND	
SVOC	4-Nitrophenol	MG/KG	16	0				0/16	0	ND	
SVOC	Acenaphthene	MG/KG	16	0				0/16	0	ND	
SVOC	Acenaphthylene	MG/KG	16	0				0/16	0	ND	
SVOC	Anthracene	MG/KG	16	0				0/16	0	ND	
SVOC	Benzo(a)anthracene	MG/KG	16	0				0/16	0	ND	
SVOC	Benzo(a)pyrene	MG/KG	16	0				0/16	0	ND	
SVOC	Benzo(b)fluoranthene	MG/KG	16	1	0.077	0.077	0.19	1/16	6.3	PCOC	
SVOC	Benzo(g,h,i)perylene	MG/KG	16	0				0/16	0	ND	
SVOC	Benzo(k)fluoranthene	MG/KG	16	0				0/16	0	ND	
SVOC	bis(2-Chloroethoxy)methane	MG/KG	16	0				0/16	0	ND	
SVOC	bis(2-Chloroethyl)ether	MG/KG	16	0				0/16	0	ND	
SVOC	bis(2-Ethylhexyl)phthalate	MG/KG	16	2	0.701	0.091	0.22	2/16	13	PCOC	
SVOC	Butylbenzylphthalate	MG/KG	16	2	1.204	0.769	0.3	2/16	13	PCOC	
SVOC	Carbazole	MG/KG	16	0				0/16	0	ND	
SVOC	Chrysene	MG/KG	16	1	0.027	0.027	0.19	1/16	6.3	PCOC	
SVOC	Dibenzo(a,h)anthracene	MG/KG	16	0				0/16	0	ND	
SVOC	Dibenzofuran	MG/KG	16	0				0/16	0	ND	
SVOC	Diethylphthalate	MG/KG	16	1	0.072	0.072	0.19	1/16	6.3	PCOC	
SVOC	Dimethylphthalate	MG/KG	16	0				0/16	0	ND	
SVOC	Di-n-butylphthalate	MG/KG	16	5	2.823	0.441	0.86	5/16	31	PCOC	
SVOC	Di-n-octylphthalate	MG/KG	16	0				0/16	0	ND	
SVOC	Fluoranthene	MG/KG	16	0				0/16	0	ND	
SVOC	Fluorene	MG/KG	16	0				0/16	0	ND	
SVOC	Hexachlorobenzene	MG/KG	16	0				0/16	0	ND	
SVOC	Hexachlorobutadiene	MG/KG	16	0				0/16	0	ND	
SVOC	Hexachlorocyclopentadiene	MG/KG	16	0				0/16	0	ND	

Table A-40

Selection Of Potential Chemicals Of Concern In Surface And Subsurface Soil At Potential Landfill North of Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
SVOC	Hexachloroethane	MG/KG	16	0				0/16	0	ND	
SVOC	Indeno(1,2,3-cd)pyrene	MG/KG	16	0				0/16	0	ND	
SVOC	Isophorone	MG/KG	16	0				0/16	0	ND	
SVOC	Naphthalene	MG/KG	16	0				0/16	0	ND	
SVOC	Nitrobenzene	MG/KG	16	0				0/16	0	ND	
SVOC	N-Nitroso-di-n-propylamine	MG/KG	16	0				0/16	0	ND	
SVOC	N-Nitrosodiphenylamine (1)	MG/KG	16	0				0/16	0	ND	
SVOC	Pentachlorophenol	MG/KG	16	0				0/16	0	ND	
SVOC	Phenanthrene	MG/KG	16	0				0/16	0	ND	
SVOC	Phenol	MG/KG	16	1	0.048	0.048	0.19	1/16	6.3	PCOC	
SVOC	Pyrene	MG/KG	16	1	0.089	0.089	0.19	1/16	6.3	PCOC	
VOC	1,1,1-Trichloroethane	MG/KG	10	0				0/10	0	ND	
VOC	1,1,2,2-Tetrachloroethane	MG/KG	10	0				0/10	0	ND	
VOC	1,1,2-Trichloroethane	MG/KG	10	0				0/10	0	ND	
VOC	1,1-Dichloroethane	MG/KG	10	0				0/10	0	ND	
VOC	1,1-Dichloroethene	MG/KG	10	0				0/10	0	ND	
VOC	1,2-Dichloroethane	MG/KG	10	0				0/10	0	ND	
VOC	1,2-Dichloropropane	MG/KG	10	0				0/10	0	ND	
VOC	2-Butanone	MG/KG	10	0				0/10	0	ND	
VOC	2-Hexanone	MG/KG	10	0				0/10	0	ND	
VOC	4-Methyl-2-Pentanone	MG/KG	10	0				0/10	0	ND	
VOC	Acetone	MG/KG	10	0				0/10	0	ND	
VOC	Benzene	MG/KG	10	0				0/10	0	ND	
VOC	Bromodichloromethane	MG/KG	10	0				0/10	0	ND	
VOC	Bromoform	MG/KG	10	0				0/10	0	ND	
VOC	Bromomethane	MG/KG	10	0				0/10	0	ND	
VOC	Carbon Disulfide	MG/KG	10	0				0/10	0	ND	
VOC	Carbon Tetrachloride	MG/KG	10	0				0/10	0	ND	
VOC	Chlorobenzene	MG/KG	10	0				0/10	0	ND	
VOC	Chloroethane	MG/KG	10	0				0/10	0	ND	

Table A-40

Selection Of Potential Chemicals Of Concern In
Surface And Subsurface Soil At Potential Landfill North of Proving Grounds
Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
VOC	Chloroform	MG/KG	10	0				0/10	0	ND	
VOC	Chloromethane	MG/KG	10	0				0/10	0	ND	
VOC	cis-1,2-Dichloroethene	MG/KG	10	0				0/10	0	ND	
VOC	cis-1,3-Dichloropropene	MG/KG	10	0				0/10	0	ND	
VOC	Dibromochloromethane	MG/KG	10	0				0/10	0	ND	
VOC	Ethylbenzene	MG/KG	10	0				0/10	0	ND	
VOC	M/P-Xylenes	MG/KG	10	0				0/10	0	ND	
VOC	Methylene Chloride	MG/KG	10	0				0/10	0	ND	
VOC	O-Xylene	MG/KG	10	0				0/10	0	ND	
VOC	Styrene	MG/KG	10	0				0/10	0	ND	
VOC	Tetrachloroethene	MG/KG	10	0				0/10	0	ND	
VOC	Toluene	MG/KG	10	0				0/10	0	ND	
VOC	trans-1,2-Dichloroethene	MG/KG	10	0				0/10	0	ND	
VOC	trans-1,3-Dichloropropene	MG/KG	10	0				0/10	0	ND	
VOC	Trichloroethene	MG/KG	10	0				0/10	0	ND	
VOC	Vinyl Chloride	MG/KG	10	0				0/10	0	ND	

Table A-40

Selection Of Potential Chemicals Of Concern In Surface And Subsurface Soil At Potential Landfill North of Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria

Notes:

(a) EXP - Explosive
METALS - Metals
SVOC - Semi-volatile organic compound
VOC - Volatile organic compound

(b) Total - Total number of samples

(c) # Hits - The number of samples where the chemical was detected.

(d) Max conc - Maximum detected concentration

(e) Min conc - Minimum detected concentration

(f) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample, one-half of the laboratory detection limit was used in the calculation of the average.

(g) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(h) Exclusion Reason - Indicates whether a chemical was retained as a potential chemical of concern (PCOC) or was excluded based of the following sequence of criteria: not-detected(ND), below background (BKG), below levels based on recommended daily allowances (RDA), frequency of detection less than 5 percent (FREQ). Note that once a chemical was excluded based on one criterion it was not further compared to other criteria (e.g., chemical excluded because it was ND was not compared to BKG, a chemical excluded because of BKG was not compared to RDA). Those chemicals excluded because of FREQ were additionally compared to the PRGs to identify potential hot spots.

Table A-41

Chemicals Not Detected In Surface And Subsurface Soil At Potential Landfill North Of Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	2,6-Dinitrotoluene
EXP	2-Nitrotoluene
EXP	3-Nitrotoluene
EXP	4-Nitrotoluene
EXP	Nitrobenzene
METALS	Mercury
SVOC	1,2,4-Trichlorobenzene
SVOC	1,2-Dichlorobenzene
SVOC	1,3-Dichlorobenzene
SVOC	1,4-Dichlorobenzene
SVOC	2,2'-oxybis(1-Chloropropane)
SVOC	2,4,5-Trichlorophenol
SVOC	2,4,6-Trichlorophenol
SVOC	2,4-Dichlorophenol
SVOC	2,4-Dimethylphenol
SVOC	2,4-Dinitrophenol
SVOC	2,4-Dinitrotoluene
SVOC	2,6-Dinitrotoluene
SVOC	2-Chloronaphthalene
SVOC	2-Chlorophenol
SVOC	2-Methylnaphthalene
SVOC	2-Methylphenol
SVOC	2-Nitroaniline
SVOC	2-Nitrophenol
SVOC	3,3'-Dichlorobenzidine
SVOC	3-Nitroaniline
SVOC	4,6-Dinitro-2-methylphenol
SVOC	4-Bromophenyl-phenylether
SVOC	4-Chloro-3-methylphenol
SVOC	4-Chloroaniline
SVOC	4-Chlorophenyl-phenylether
SVOC	4-Methylphenol
SVOC	4-Nitroaniline
SVOC	4-Nitrophenol
SVOC	Acenaphthene
SVOC	Acenaphthylene
SVOC	Anthracene
SVOC	Benzo(a)anthracene
SVOC	Benzo(a)pyrene
SVOC	Benzo(g,h,i)perylene
SVOC	Benzo(k)fluoranthene
SVOC	bis(2-Chloroethoxy)methane

Table A-41

Chemicals Not Detected In Surface And Subsurface Soil At Potential Landfill North Of Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
SVOC	bis(2-Chloroethyl)ether
SVOC	Carbazole
SVOC	Dibenzo(a,h)anthracene
SVOC	Dibenzofuran
SVOC	Dimethylphthalate
SVOC	Di-n-octylphthalate
SVOC	Fluoranthene
SVOC	Fluorene
SVOC	Hexachlorobenzene
SVOC	Hexachlorobutadiene
SVOC	Hexachlorocyclopentadiene
SVOC	Hexachloroethane
SVOC	Indeno(1,2,3-cd)pyrene
SVOC	Isophorone
SVOC	Naphthalene
SVOC	Nitrobenzene
SVOC	N-Nitroso-di-n-propylamine
SVOC	N-Nitrosodiphenylamine (1)
SVOC	Pentachlorophenol
SVOC	Phenanthrene
VOC	1,1,1-Trichloroethane
VOC	1,1,2,2-Tetrachloroethane
VOC	1,1,2-Trichloroethane
VOC	1,1-Dichloroethane
VOC	1,1-Dichloroethene
VOC	1,2-Dichloroethane
VOC	1,2-Dichloropropane
VOC	2-Butanone
VOC	2-Hexanone
VOC	4-Methyl-2-Pentanone
VOC	Acetone
VOC	Benzene
VOC	Bromodichloromethane
VOC	Bromoform
VOC	Bromomethane
VOC	Carbon Disulfide
VOC	Carbon Tetrachloride
VOC	Chlorobenzene
VOC	Chloroethane
VOC	Chloroform
VOC	Chloromethane
VOC	cis-1,2-Dichloroethene

Table A-41

Chemicals Not Detected In Surface And Subsurface Soil
At Potential Landfill North Of Proving Grounds
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
VOC	cis-1,3-Dichloropropene
VOC	Dibromochloromethane
VOC	Ethylbenzene
VOC	M/P-Xylenes
VOC	Methylene Chloride
VOC	O-Xylene
VOC	Styrene
VOC	Tetrachloroethene
VOC	Toluene
VOC	trans-1,2-Dichloroethene
VOC	trans-1,3-Dichloropropene
VOC	Tricnloroethene
VOC	Vinyl Chloride

Table A-42

Metals In Surface And Subsurface Soil At Potential Landfill North Of Proving Grounds Excluded As PCOCs Based On Comparison To Background Concentrations Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Aluminum	MG/KG	17900	33900
METALS	Arsenic	MG/KG	10.5	13.5
METALS	Barium	MG/KG	353	440
METALS	Beryllium	MG/KG	0.82	1.52
METALS	Iron	MG/KG	23800	36300
METALS	Nickel	MG/KG	37.3	39.3
METALS	Potassium	MG/KG	3380	5480
METALS	Vanadium	MG/KG	42.5	72.5

Notes:
(a) Max conc - Maximum detected concentration
(b) Screen Criteria are soil background screening levels

Table A-43

Metals In Surface And Subsurface Soil At Potential Landfill North Of Proving Grounds Excluded As PCOCs Based On Their Classification As Essential Nutrients Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Calcium	MG/KG	136000	1000000
METALS	Chromium	MG/KG	688	2000
METALS	Copper	MG/KG	47.9	30000
METALS	Magnesium	MG/KG	16700	1000000
METALS	Manganese	MG/KG	1130	50000
METALS	Selenium	MG/KG	3.1	750
METALS	Sodium	MG/KG	311	1000000
METALS	Zinc	MG/KG	728	190000

Notes:

(a) Max conc - Maximum detected concentration

(b) Screen criterion based on the recommended daily allowance for the chemical (See Table 2-3)

Table A-44

Chemicals In Surface And Subsurface Soil At Potential Landfill North Of Proving Grounds Excluded As PCOCs Based On Detected in Less Than 5 Percent Of The Samples Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Frequency[b]	Frequency (Percent)	Screen Criteria[c]
EXP	1,3-Dinitrobenzene	MG/KG	0.14	7/158	4.4	5
METALS	Thallium	MG/KG	0.77	1/30	3.3	5
METALS	Silver	MG/KG	1.4	1/30	3.3	5

Notes:

(a) Max conc - Maximum detected concentration

(b) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(c) Screen Criterion - Frequency of detection

Table A-45

Selection Of Potential Chemicals Of Concern In Surface Soil (0-6 Inches) At Potential Landfill North of Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
EXP	1,3,5-Trinitrobenzene	MG/KG	45	3	0.02	0.014	0.58	3/45	6.7	PCOC	
EXP	1,3-Dinitrobenzene	MG/KG	45	1	0.012	0.012	0.53	1/45	2.2	FREQ	5
EXP	2,4,6-Trinitrotoluene	MG/KG	45	22	17	0.018	0.52	22/45	49	PCOC	
EXP	2,4-Dinitrotoluene	MG/KG	45	0				0/45	0	ND	
EXP	2,6-Dinitrotoluene	MG/KG	45	0				0/45	0	ND	
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	45	20	2.4	0.014	0.17	20/45	44	PCOC	
EXP	2-Nitrotoluene	MG/KG	45	0				0/45	0	ND	
EXP	3-Nitrotoluene	MG/KG	45	0				0/45	0	ND	
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	45	16	1.8	0.031	0.19	16/45	36	PCOC	
EXP	4-Nitrotoluene	MG/KG	45	0				0/45	0	ND	
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	45	11	8.8	0.019	0.29	11/45	24	PCOC	
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	45	5	0.2	0.038	0.9	5/45	11	PCOC	
EXP	Nitrobenzene	MG/KG	45	0				0/45	0	ND	
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	45	12	15	0.047	0.82	12/45	27	PCOC	
METALS	Aluminum	MG/KG	9	9	17600	6240	12000	9/9	100	BKG	33852
METALS	Antimony	MG/KG	9	6	9.1	0.5	3.9	6/9	67	PCOC	
METALS	Arsenic	MG/KG	9	7	8.2	2.3	5.4	7/9	78	BKG	13.54
METALS	Barium	MG/KG	9	9	237	74.4	170	9/9	100	BKG	440
METALS	Beryllium	MG/KG	9	6	0.64	0.29	0.55	6/9	67	BKG	1.52
METALS	Cadmium	MG/KG	9	6	1.3	0.51	0.75	6/9	67	PCOC	
METALS	Calcium	MG/KG	9	9	136000	2820	2400	9/9	100	RDA	1000000
METALS	Chromium	MG/KG	9	9	27.6	8.5	15	9/9	100	BKG	36.96
METALS	Cobalt	MG/KG	9	9	12.7	4.7	8.2	9/9	100	BKG	17.2
METALS	Copper	MG/KG	9	9	30.4	11.7	20	9/9	100	BKG	33.9
METALS	Iron	MG/KG	9	9	23600	9540	170	9/9	100	BKG	36280
METALS	Lead	MG/KG	9	9	325	15.1	6.2	9/9	100	PCOC	29
METALS	Magnesium	MG/KG	9	9	16700	2240	530	9/9	100	RDA	1000000
METALS	Manganese	MG/KG	9	9	690	303	480	9/9	100	BKG	1083
METALS	Mercury	MG/KG	9	0				0/9	0	ND	
METALS	Nickel	MG/KG	9	9	31.2	11.4	20	9/9	100	BKG	39.3

Table A-45

Selection Of Potential Chemicals Of Concern In Surface Soil (0-6 Inches) At Potential Landfill North of Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
METALS	Potassium	MG/KG	9	9	3380	1910	2700	9/9	100	BKG	5478
METALS	Selenium	MG/KG	9	4	3.1	1.3	1.1	4/9	44	RDA	750
METALS	Silver	MG/KG	9	1	6	6	0.99	1/9	11	PCOC	
METALS	Sodium	MG/KG	9	5	291	66	180	5/9	56	RDA	1000000
METALS	Thallium	MG/KG	9	0				0/9	0	ND	
METALS	Vanadium	MG/KG	9	9	38.9	12.7	25	9/9	100	BKG	72.5
METALS	Zinc	MG/KG	9	9	728	42	15	9/9	100	RDA	190000
SVOC	1,2,4-Trichlorobenzene	MG/KG	6	0				0/6	0	ND	
SVOC	1,2-Dichlorobenzene	MG/KG	6	0				0/6	0	ND	
SVOC	1,3-Dichlorobenzene	MG/KG	6	0				0/6	0	ND	
SVOC	1,4-Dichlorobenzene	MG/KG	6	0				0/6	0	ND	
SVOC	2,2'-oxybis(1-Chloropropane)	MG/KG	6	0				0/6	0	ND	
SVOC	2,4,5-Trichlorophenol	MG/KG	6	0				0/6	0	ND	
SVOC	2,4,6-Trichlorophenol	MG/KG	6	0				0/6	0	ND	
SVOC	2,4-Dichlorophenol	MG/KG	6	0				0/6	0	ND	
SVOC	2,4-Dimethylphenol	MG/KG	6	0				0/6	0	ND	
SVOC	2,4-Dinitrophenol	MG/KG	6	0				0/6	0	ND	
SVOC	2,4-Dinitrotoluene	MG/KG	6	0				0/6	0	ND	
SVOC	2,6-Dinitrotoluene	MG/KG	6	0				0/6	0	ND	
SVOC	2-Chloronaphthalene	MG/KG	6	0				0/6	0	ND	
SVOC	2-Chlorophenol	MG/KG	6	0				0/6	0	ND	
SVOC	2-Methylnaphthalene	MG/KG	6	0				0/6	0	ND	
SVOC	2-Methylphenol	MG/KG	6	0				0/6	0	ND	
SVOC	2-Nitroaniline	MG/KG	6	0				0/6	0	ND	
SVOC	2-Nitrophenol	MG/KG	6	0				0/6	0	ND	
SVOC	3,3'-Dichlorobenzidine	MG/KG	6	0				0/6	0	ND	
SVOC	3-Nitroaniline	MG/KG	6	0				0/6	0	ND	
SVOC	4,6-Dinitro-2-methylphenol	MG/KG	6	0				0/6	0	ND	
SVOC	4-Bromophenyl-phenylether	MG/KG	6	0				0/6	0	ND	
SVOC	4-Chloro-3-methylphenol	MG/KG	6	0				0/6	0	ND	

Table A-45

Selection Of Potential Chemicals Of Concern In Surface Soil (0-6 Inches) At Potential Landfill North of Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
SVOC	4-Chloroaniline	MG/KG	6	0				0/6	0	ND	
SVOC	4-Chlorophenyl-phenylether	MG/KG	6	0				0/6	0	ND	
SVOC	4-Methylphenol	MG/KG	6	0				0/6	0	ND	
SVOC	4-Nitroaniline	MG/KG	6	0				0/6	0	ND	
SVOC	4-Nitrophenol	MG/KG	6	0				0/6	0	ND	
SVOC	Acenaphthene	MG/KG	6	0				0/6	0	ND	
SVOC	Acenaphthylene	MG/KG	6	0				0/6	0	ND	
SVOC	Anthracene	MG/KG	6	0				0/6	0	ND	
SVOC	Benzo(a)anthracene	MG/KG	6	0				0/6	0	ND	
SVOC	Benzo(a)pyrene	MG/KG	6	0				0/6	0	ND	
SVOC	Benzo(b)fluoranthene	MG/KG	6	1	0.077	0.077	0.19	1/6	17	PCOC	
SVOC	Benzo(g,h,i)perylene	MG/KG	6	0				0/6	0	ND	
SVOC	Benzo(k)fluoranthene	MG/KG	6	0				0/6	0	ND	
SVOC	bis(2-Chloroethoxy)methane	MG/KG	6	0				0/6	0	ND	
SVOC	bis(2-Chloroethyl)ether	MG/KG	6	0				0/6	0	ND	
SVOC	bis(2-Ethylhexyl)phthalate	MG/KG	6	0				0/6	0	ND	
SVOC	Butylbenzylphthalate	MG/KG	6	0				0/6	0	ND	
SVOC	Carbazole	MG/KG	6	0				0/6	0	ND	
SVOC	Chrysene	MG/KG	6	1	0.027	0.027	0.18	1/6	17	PCOC	
SVOC	Dibenzo(a,h)anthracene	MG/KG	6	0				0/6	0	ND	
SVOC	Dibenzofuran	MG/KG	6	0				0/6	0	ND	
SVOC	Diethylphthalate	MG/KG	6	0				0/6	0	ND	
SVOC	Dimethylphthalate	MG/KG	6	0				0/6	0	ND	
SVOC	Di-n-butylphthalate	MG/KG	6	1	2.789	2.789	0.64	1/6	17	PCOC	
SVOC	Di-n-octylphthalate	MG/KG	6	0				0/6	0	ND	
SVOC	Fluoranthene	MG/KG	6	0				0/6	0	ND	
SVOC	Fluorene	MG/KG	6	0				0/6	0	ND	
SVOC	Hexachlorobenzene	MG/KG	6	0				0/6	0	ND	
SVOC	Hexachlorobutadiene	MG/KG	6	0				0/6	0	ND	
SVOC	Hexachlorocyclopentadiene	MG/KG	6	0				0/6	0	ND	

Table A-45

Selection Of Potential Chemicals Of Concern In Surface Soil (0-6 Inches) At Potential Landfill North of Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[(a)]	Chemical	Units	Total[(b)]	# Hits[(c)]	Max conc[(d)]	Min conc[(e)]	Average conc[(f)]	Frequency[(g)]	% Hits	Exclusion Reason[(h)]	Screen Criteria
SVOC	Hexachloroethane	MG/KG	6	0				0/6	0	ND	
SVOC	Indeno(1,2,3-cd)pyrene	MG/KG	6	0				0/6	0	ND	
SVOC	Isophorone	MG/KG	6	0				0/6	0	ND	
SVOC	Naphthalene	MG/KG	6	0				0/6	0	ND	
SVOC	Nitrobenzene	MG/KG	6	0				0/6	0	ND	
SVOC	N-Nitroso-di-n-propylamine	MG/KG	6	0				0/6	0	ND	
SVOC	N-Nitrosodiphenylamine (1)	MG/KG	6	0				0/6	0	ND	
SVOC	Pentachlorophenol	MG/KG	6	0				0/6	0	ND	
SVOC	Phenanthrene	MG/KG	6	0				0/6	0	ND	
SVOC	Phenol	MG/KG	6	1	0.048	0.048	0.18	1/6	17	PCOC	
SVOC	Pyrene	MG/KG	6	1	0.089	0.089	0.19	1/6	17	PCOC	

Notes:

(a) EXP - Explosive
METALS - Metals
SVOC - Semi-volatile organic compound
VOC - Volatile organic compound

(b) Total - Total number of samples

(c) # Hits - The number of samples where the chemical was detected.

(d) Max conc - Maximum detected concentration

(e) Min conc - Minimum detected concentration

(f) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample, one-half of the laboratory detection limit was used in the calculation of the average.

(g) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(h) Exclusion Reason - Indicates whether a chemical was retained as a potential chemical of concern (PCOC) or was excluded based of the following sequence of criteria: not-detected(ND), below background (BKG), below levels based on recommended daily allowances (RDA), frequency of detection less than 5 percent (FREQ). Note that once a chemical was excluded based on one criterion it was not further compared to other criteria (e.g., chemical excluded because it was ND was not compared to BKG, a chemical excluded because of BKG was not compared to RDA). Those chemicals excluded because of FREQ were additionally compared to the PRGs to identify potential hot spots.

Table A-46

Chemicals Not Detected In Surface Soil (0-6 Inches)
At Potential Landfill North Of Proving Grounds
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	2,4-Dinitrotoluene
EXP	2,6-Dinitrotoluene
EXP	2-Nitrotoluene
EXP	3-Nitrotoluene
EXP	4-Nitrotoluene
EXP	Nitrobenzene
METALS	Mercury
METALS	Thallium
SVOC	1,2,4-Trichlorobenzene
SVOC	1,2-Dichlorobenzene
SVOC	1,3-Dichlorobenzene
SVOC	1,4-Dichlorobenzene
SVOC	2,2'-oxybis(1-Chloropropane)
SVOC	2,4,5-Trichlorophenol
SVOC	2,4,6-Trichlorophenol
SVOC	2,4-Dichlorophenol
SVOC	2,4-Dimethylphenol
SVOC	2,4-Dinitrophenol
SVOC	2,4-Dinitrotoluene
SVOC	2,6-Dinitrotoluene
SVOC	2-Chloronaphthalene
SVOC	2-Chlorophenol
SVOC	2-Methylnaphthalene
SVOC	2-Methylphenol
SVOC	2-Nitroaniline
SVOC	2-Nitrophenol
SVOC	3,3'-Dichlorobenzidine
SVOC	3-Nitroaniline
SVOC	4,6-Dinitro-2-methylphenol
SVOC	4-Bromophenyl-phenylether
SVOC	4-Chloro-3-methylphenol
SVOC	4-Chloroaniline
SVOC	4-Chlorophenyl-phenylether
SVOC	4-Methylphenol
SVOC	4-Nitroaniline
SVOC	4-Nitrophenol
SVOC	Acenaphthene
SVOC	Acenaphthylene
SVOC	Anthracene
SVOC	Benzo(a)anthracene
SVOC	Benzo(a)pyrene
SVOC	Benzo(g,h,i)perylene

Table A-46

Chemicals Not Detected In Surface Soil (0-6 Inches) At Potential Landfill North Of Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
SVOC	Benzo(k)fluoranthene
SVOC	bis(2-Chloroethoxy)methane
SVOC	bis(2-Chloroethyl)ether
SVOC	bis(2-Ethylhexyl)phthalate
SVOC	Butylbenzylphthalate
SVOC	Carbazole
SVOC	Dibenzo(a,h)anthracene
SVOC	Dibenzofuran
SVOC	Diethylphthalate
SVOC	Dimethylphthalate
SVOC	Di-n-octylphthalate
SVOC	Fluoranthene
SVOC	Fluorene
SVOC	Hexachlorobenzene
SVOC	Hexachlorobutadiene
SVOC	Hexachlorocyclopentadiene
SVOC	Hexachloroethane
SVOC	Indeno(1,2,3-cd)pyrene
SVOC	Isophorone
SVOC	Naphthalene
SVOC	Nitrobenzene
SVOC	N-Nitroso-di-n-propylamine
SVOC	N-Nitrosodiphenylamine (1)
SVOC	Pentachlorophenol
SVOC	Phenanthrene

Table A-47

Metals In Surface Soil (0-6 Inches) At Potential Landfill North Of Proving Grounds Excluded As PCOCs Based On Comparison To Background Concentrations Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Aluminum	MG/KG	17600	33852
METALS	Arsenic	MG/KG	8.2	13.54
METALS	Barium	MG/KG	237	440
METALS	Beryllium	MG/KG	0.64	1.52
METALS	Chromium	MG/KG	27.6	36.96
METALS	Cobalt	MG/KG	12.7	17.2
METALS	Copper	MG/KG	30.4	33.9
METALS	Iron	MG/KG	23600	36280
METALS	Manganese	MG/KG	690	1083
METALS	Nickel	MG/KG	31.2	39.3
METALS	Potassium	MG/KG	3380	5478
METALS	Vanadium	MG/KG	38.9	72.5

Notes:
(a) Max conc - Maximum detected concentration
(b) Screen Criteria are soil background screening levels

Table A-48

Metals In Surface Soil (0-6 Inches) At Potential Landfill North Of Proving Grounds Excluded As PCOCs Based On Their Classification As Essential Nutrients Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Calcium	MG/KG	136000	1000000
METALS	Chromium	MG/KG	688	2000
METALS	Copper	MG/KG	47.9	3000C
METALS	Magnesium	MG/KG	16700	1000000
METALS	Manganese	MG/KG	1130	50000
METALS	Selenium	MG/KG	3.1	750
METALS	Sodium	MG/KG	311	1000000
METALS	Zinc	MG/KG	728	190000

Notes:
(a) Max conc - Maximum detected concentration
(b) Screen criterion based on the recommended daily allowance for the chemical (See Table 2-3)

Table A-49

Metals In Surface Soil (0-6 Inches) At Potential Landfill North Of Proving Grounds Excluded As PCOCs Based On Detected in Less Than 5 Percent Of The Samples Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Frequency[b]	Frequency (Percent)	Screen Criteria[c]
EXP	1,3-Dinitrobenzene	MG/KG	0.012	1/45	2.2	5

Notes:

(a) Max conc - Maximum detected concentration

(b) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(c) Screen Criterion - Frequency of detection

Table A-50

Selection Of Potential Chemicals Of Concern In Surface And Subsurface Soil At Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
EXP	1,3,5-Trinitrobenzene	MG/KG	90	3	30	0.0081	0.39	3/90	3.3	FREQ	5
EXP	1,3-Dinitrobenzene	MG/KG	90	0				0/90	0	ND	
EXP	2,4,6-Trinitrotoluene	MG/KG	90	22	1500	0.015	20	22/90	24	PCOC	
EXP	2,4-Dinitrotoluene	MG/KG	90	1	1.8	1.8	0.04	1/90	1.1	FREQ	5
EXP	2,6-Dinitrotoluene	MG/KG	90	0				0/90	0	ND	
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	90	21	14	0.012	0.21	21/90	23	PCOC	
EXP	2-Nitrotoluene	MG/KG	90	1	0.22	0.22	0.07	1/90	1.1	FREQ	5
EXP	3-Nitrotoluene	MG/KG	90	0				0/90	0	ND	
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	90	12	6.7	0.027	0.12	12/90	13	PCOC	
EXP	4-Nitrotoluene	MG/KG	90	6	0.03	0.019	0.07	6/90	6.7	PCOC	
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	90	14	43	0.0095	0.56	14/90	16	PCOC	
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	90	4	1.7	0.047	0.05	4/90	4.4	FREQ	5
EXP	Nitrobenzene	MG/KG	90	0				0/90	0	ND	
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	90	8	10	0.04	0.17	8/90	8.9	PCOC	
METALS	Aluminum	MG/KG	28	28	19300	583	11000	28/28	100	BKG	33900
METALS	Antimony	MG/KG	28	5	4.1	0.47	2.9	5/28	18	PCOC	
METALS	Arsenic	MG/KG	28	25	11	1.8	6.0	25/28	89	BKG	13.5
METALS	Barium	MG/KG	28	28	298	7.8	180	28/28	100	BKG	440
METALS	Beryllium	MG/KG	28	16	0.70	0.06	0.57	16/28	57	BKG	1.52
METALS	Cadmium	MG/KG	28	15	0.99	0.12	0.61	15/28	54	PCOC	
METALS	Calcium	MG/KG	28	28	34000	267	4800	28/28	100	RDA	1000000
METALS	Chromium	MG/KG	28	27	19	1.9	12	27/28	96	RDA	2000
METALS	Cobalt	MG/KG	28	26	12	0.52	7.7	26/28	93	BKG	17.2
METALS	Copper	MG/KG	28	27	26	1.3	17	27/28	96	RDA	30000
METALS	Iron	MG/KG	28	28	22900	971	14000	28/28	100	RDA	300000
METALS	Lead	MG/KG	28	27	83.5	1.1	19	27/28	96	PCOC	
METALS	Magnesium	MG/KG	28	27	7000	339	3100	27/28	96	RDA	1000000
METALS	Manganese	MG/KG	28	27	791	8	450	27/28	96	RDA	50000
METALS	Mercury	MG/KG	28	0				0/28	0	ND	
METALS	Nickel	MG/KG	28	25	34	0.96	18	25/28	89	BKG	39.3
METALS	Potassium	MG/KG	28	27	4210	323	2200	27/28	96	RDA	1000000

Table A-50

Selection Of Potential Chemicals Of Concern In Surface And Subsurface Soil At Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
METALS	Selenium	MG/KG	28	12	2.1	1.2	1.0	12/28	43	RDA	750
METALS	Silver	MG/KG	28	0				0/28	0	ND	
METALS	Sodium	MG/KG	28	11	373	59.1	190	11/28	39	RDA	1000000
METALS	Thallium	MG/KG	28	1	1.3	1.3	0.73	1/28	3.6	FREQ	5
METALS	Vanadium	MG/KG	28	27	42	3.4	23	27/28	96	BKG	72.5
METALS	Zinc	MG/KG	28	18	127	5.7	51	18/28	64	RDA	190000
SVOC	1,2,4-Trichlorobenzene	MG/KG	28	0				0/28	0	ND	
SVOC	1,2-Dichlorobenzene	MG/KG	28	0				0/28	0	ND	
SVOC	1,3-Dichlorobenzene	MG/KG	28	0				0/28	0	ND	
SVOC	1,4-Dichlorobenzene	MG/KG	28	0				0/28	0	ND	
SVOC	2,2'-oxybis(1-Chloropropane)	MG/KG	28	0				0/28	0	ND	
SVOC	2,4,5-Trichlorophenol	MG/KG	28	0				0/28	0	ND	
SVOC	2,4,6-Trichlorophenol	MG/KG	28	0				0/28	0	ND	
SVOC	2,4-Dichlorophenol	MG/KG	28	0				0/28	0	ND	
SVOC	2,4-Dimethylphenol	MG/KG	28	0				0/28	0	ND	
SVOC	2,4-Dinitrophenol	MG/KG	28	0				0/28	0	ND	
SVOC	2,4-Dinitrotoluene	MG/KG	28	0				0/28	0	ND	
SVOC	2,6-Dinitrotoluene	MG/KG	28	0				0/28	0	ND	
SVOC	2-Chloronaphthalene	MG/KG	28	0				0/28	0	ND	
SVOC	2-Chlorophenol	MG/KG	28	0				0/28	0	ND	
SVOC	2-Methylnaphthalene	MG/KG	28	0				0/28	0	ND	
SVOC	2-Methylphenol	MG/KG	28	0				0/28	0	ND	
SVOC	2-Nitroaniline	MG/KG	28	0				0/28	0	ND	
SVOC	2-Nitrophenol	MG/KG	28	0				0/28	0	ND	
SVOC	3,3'-Dichlorobenzidine	MG/KG	28	0				0/28	0	ND	
SVOC	3-Nitroaniline	MG/KG	28	0				0/28	0	ND	
SVOC	4,6-Dinitro-2-methylphenol	MG/KG	28	0				0/28	0	ND	
SVOC	4-Bromophenyl-phenylether	MG/KG	28	0				0/28	0	ND	
SVOC	4-Chloro-3-methylphenol	MG/KG	28	1	0.093	0.093	0.2	1/28	3.6	FREQ	5
SVOC	4-Chloroaniline	MG/KG	28	0				0/28	0	ND	
SVOC	4-Chlorophenyl-phenylether	MG/KG	28	0				0/28	0	ND	

Table A-50

Selection Of Potential Chemicals Of Concern In Surface And Subsurface Soil At Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
SVOC	4-Methylphenol	MG/KG	28	0				0/28	0	ND	
SVOC	4-Nitroaniline	MG/KG	28	0				0/28	0	ND	
SVOC	4-Nitrophenol	MG/KG	28	0				0/28	0	ND	
SVOC	Acenaphthene	MG/KG	28	0				0/28	0	ND	
SVOC	Acenaphthylene	MG/KG	28	0				0/28	0	ND	
SVOC	Anthracene	MG/KG	28	0				0/28	0	ND	
SVOC	Benzo(a)anthracene	MG/KG	28	1	0.018	0.018	0.2	1/28	3.6	FREQ	5
SVOC	Benzo(a)pyrene	MG/KG	28	1	0.018	0.018	0.2	1/28	3.6	FREQ	5
SVOC	Benzo(b)fluoranthene	MG/KG	28	1	0.025	0.025	0.2	1/28	3.6	FREQ	5
SVOC	Benzo(g,h,i)perylene	MG/KG	28	1	0.026	0.026	0.2	1/28	3.6	FREQ	5
SVOC	Benzo(k)fluoranthene	MG/KG	28	1	0.008	0.008	0.19	1/28	3.6	FREQ	5
SVOC	bis(2-Chloroethoxy)methane	MG/KG	28	0				0/28	0	ND	
SVOC	bis(2-Chloroethyl)ether	MG/KG	28	0				0/28	0	ND	
SVOC	bis(2-Ethylhexyl)phthalate	MG/KG	28	6	0.049	0.033	0.17	6/28	21	PCOC	
SVOC	Butylbenzylphthalate	MG/KG	28	2	0.344	0.12	0.2	2/28	7.1	PCOC	
SVOC	Carbazole	MG/KG	28	0				0/28	0	ND	
SVOC	Chrysene	MG/KG	28	1	0.016	0.016	0.2	1/28	3.6	FREQ	5
SVOC	Dibenzo(a,h)anthracene	MG/KG	28	0				0/28	0	ND	
SVOC	Dibenzofuran	MG/KG	28	0				0/28	0	ND	
SVOC	Diethylphthalate	MG/KG	28	0				0/28	0	ND	
SVOC	Dimethylphthalate	MG/KG	28	0				0/28	0	ND	
SVOC	Di-n-butylphthalate	MG/KG	28	12	3.542	0.05	0.7	12/28	43	PCOC	
SVOC	Di-n-octylphthalate	MG/KG	28	0				0/28	0	ND	
SVOC	Fluoranthene	MG/KG	28	1	0.013	0.013	0.19	1/28	3.6	FREQ	5
SVOC	Fluorene	MG/KG	28	0				0/28	0	ND	
SVOC	Hexachlorobenzene	MG/KG	28	0				0/28	0	ND	
SVOC	Hexachlorobutadiene	MG/KG	28	0				0/28	0	ND	
SVOC	Hexachlorocyclopentadiene	MG/KG	28	0				0/28	0	ND	
SVOC	Hexachloroethane	MG/KG	28	0				0/28	0	ND	
SVOC	Indeno(1,2,3-cd)pyrene	MG/KG	28	0				0/28	0	ND	
SVOC	Isophorone	MG/KG	28	0				0/28	0	ND	

Table A-50

Selection Of Potential Chemicals Of Concern In Surface And Subsurface Soil At Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
SVOC	Naphthalene	MG/KG	28	0				0/28	0	ND	
SVOC	Nitrobenzene	MG/KG	28	0				0/28	0	ND	
SVOC	N-Nitroso-di-n-propylamine	MG/KG	28	0				0/28	0	ND	
SVOC	N-Nitrosodiphenylamine (1)	MG/KG	28	0				0/28	0	ND	
SVOC	Pentachlorophenol	MG/KG	28	1	0.014	0.014	0.47	1/28	3.6	FREQ	5
SVOC	Phenanthrene	MG/KG	28	0				0/28	0	ND	
SVOC	Phenol	MG/KG	28	0				0/28	0	ND	
SVOC	Pyrene	MG/KG	28	4	0.243	0.013	0.19	4/28	14	PCOC	
VOC	1,1,1-Trichloroethane	MG/KG	18	0				0/18	0	ND	
VOC	1,1,2,2-Tetrachloroethane	MG/KG	18	0				0/18	0	ND	
VOC	1,1,2-Trichloroethane	MG/KG	18	0				0/18	0	ND	
VOC	1,1-Dichloroethane	MG/KG	18	0				0/18	0	ND	
VOC	1,1-Dichloroethene	MG/KG	18	0				0/18	0	ND	
VOC	1,2-Dichloroethane	MG/KG	18	0				0/18	0	ND	
VOC	1,2-Dichloroethene(Total)	MG/KG	8	0				0/8	0	ND	
VOC	1,2-Dichloropropane	MG/KG	18	0				0/18	0	ND	
VOC	2-Butanone	MG/KG	18	0				0/18	0	ND	
VOC	2-Hexanone	MG/KG	18	1	0.001	0.001	0.0057	1/18	5.6	PCOC	
VOC	4-Methyl-2-Pentanone	MG/KG	18	0				0/18	0	ND	
VOC	Acetone	MG/KG	18	9	0.018	0.004	0.0074	9/18	50	PCOC	
VOC	Benzene	MG/KG	18	0				0/18	0	ND	
VOC	Bromodichloromethane	MG/KG	18	0				0/18	0	ND	
VOC	Bromoform	MG/KG	18	0				0/18	0	ND	
VOC	Bromomethane	MG/KG	18	0				0/18	0	ND	
VOC	Carbon Disulfide	MG/KG	18	0				0/18	0	ND	
VOC	Carbon Tetrachloride	MG/KG	18	0				0/18	0	ND	
VOC	Chlorobenzene	MG/KG	18	0				0/18	0	ND	

Table A-51

Chemicals Not Detected In Surface And Subsurface Soil
At Proving Grounds
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	1,3-Dinitrobenzene
EXP	2,6-Dinitrotoluene
EXP	3-Nitrotoluene
EXP	Nitrobenzene
METALS	Mercury
METALS	Silver
SVOC	1,2,4-Trichlorobenzene
SVOC	1,2-Dichlorobenzene
SVOC	1,3-Dichlorobenzene
SVOC	1,4-Dichlorobenzene
SVOC	2,2'-oxybis(1-Chloropropane)
SVOC	2,4,5-Trichlorophenol
SVOC	2,4,6-Trichlorophenol
SVOC	2,4-Dichlorophenol
SVOC	2,4-Dimethylphenol
SVOC	2,4-Dinitrophenol
SVOC	2,4-Dinitrotoluene
SVOC	2,6-Dinitrotoluene
SVOC	2-Chloronaphthalene
SVOC	2-Chlorophenol
SVOC	2-Methylnaphthalene
SVOC	2-Methylphenol
SVOC	2-Nitroaniline
SVOC	2-Nitrophenol
SVOC	3,3'-Dichlorobenzidine
SVOC	3-Nitroaniline
SVOC	4,6-Dinitro-2-methylphenol
SVOC	4-Bromophenyl-phenylether
SVOC	4-Chloroaniline
SVOC	4-Chlorophenyl-phenylether
SVOC	4-Methylphenol
SVOC	4-Nitroaniline
SVOC	4-Nitrophenol
SVOC	Acenaphthene
SVOC	Acenaphthylene
SVOC	Anthracene
SVOC	bis(2-Chloroethoxy)methane
SVOC	bis(2-Chloroethyl)ether
SVOC	Carbazole
SVOC	Dibenzo(a,h)anthracene
SVOC	Dibenzofuran
SVOC	Diethylphthalate

Table A-51

Chemicals Not Detected In Surface And Subsurface Soil
At Proving Grounds
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
SVOC	Dimethylphthalate
SVOC	Di-n-octylphthalate
SVOC	Fluorene
SVOC	Hexachlorobenzene
SVOC	Hexachlorobutadiene
SVOC	Hexachlorocyclopentadiene
SVOC	Hexachloroethane
SVOC	Indeno(1,2,3-cd)pyrene
SVOC	Isophorone
SVOC	Naphthalene
SVOC	Nitrobenzene
SVOC	N-Nitroso-di-n-propylamine
SVOC	N-Nitrosodiphenylamine (1)
SVOC	Phenanthrene
SVOC	Phenol
VOC	1,1,1-Trichloroethane
VOC	1,1,2,2-Tetrachloroethane
VOC	1,1,2-Trichloroethane
VOC	1,1-Dichloroethane
VOC	1,1-Dichloroethene
VOC	1,2-Dichloroethane
VOC	1,2-Dichloroethene(Total)
VOC	1,2-Dichloropropane
VOC	2-Butanone
VOC	4-Methyl-2-Pentanone

Table A-52

Metals In Surface And Subsurface Soil At Proving Grounds Excluded As PCOCs Based On Comparison To Background Concentrations Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[(a)]	Screen Criteria[(b)]
METALS	Arsenic	MG/KG	11.2	13.5
METALS	Barium	MG/KG	298	440
METALS	Beryllium	MG/KG	0.7	1.52
METALS	Cobalt	MG/KG	12	17.2
METALS	Nickel	MG/KG	34.4	39.3
METALS	Vanadium	MG/KG	41.5	72.5

Notes:

(a) Max conc - Maximum detected concentration

(b) Screen Criteria are soil background screening levels

Table A-53

Metals In Surface And Subsurface Soil At Proving Grounds Excluded As PCOCs Based On Their Classification As Essential Nutrients Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[(a)]	Screen Criteria[(b)]
METALS	Calcium	MG/KG	34000	1000000
METALS	Chromium	MG/KG	18.5	2000
METALS	Copper	MG/KG	26	30000
METALS	Iron	MG/KG	22900	300000
METALS	Magnesium	MG/KG	7000	1000000
METALS	Manganese	MG/KG	791	50000
METALS	Potassium	MG/KG	4210	1000000
METALS	Selenium	MG/KG	2.1	750
METALS	Sodium	MG/KG	373	1000000
METALS	Zinc	MG/KG	127	190000

Notes:

(a) Max conc - Maximum detected concentration

(b) Screen criterion based on the recommended daily allowance for the chemical (See Table 2-3)

Table A-54

Metals In Surface And Subsurface Soil At Proving Grounds Excluded As PCOCs Based On Detected in Less Than 5 Percent Of The Samples Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Frequency[b]	Frequency (Percent)	Screen Criteria[c]
EXP	1,3,5-Trinitrobenzene	MG/KG	30	3/90	3.3	5
EXP	2,4-Dinitrotoluene	MG/KG	1.8	1/90	1.1	5
EXP	2-Nitrotoluene	MG/KG	0.22	1/90	1.1	5
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	1.7	4/90	4.4	5
METALS	Thallium	MG/KG	1.3	1/28	3.6	5
SVOC	4-Chloro-3-methylphenol	MG/KG	0.093	1/28	3.6	5
SVOC	Benzo(a)anthracene	MG/KG	0.018	1/28	3.6	5
SVOC	Benzo(a)pyrene	MG/KG	0.018	1/28	3.6	5
SVOC	Benzo(b)fluoranthene	MG/KG	0.025	1/28	3.6	5
SVOC	Benzo(g,h,i)perylene	MG/KG	0.026	1/28	3.6	5
SVOC	Benzo(k)fluoranthene	MG/KG	0.008	1/28	3.6	5
SVOC	Chrysene	MG/KG	0.016	1/28	3.6	5
SVOC	Fluoranthene	MG/KG	0.013	1/28	3.6	5
SVOC	Pentachlorophenol	MG/KG	0.014	1/28	3.6	5

Notes:

(a) Max conc - Maximum detected concentration

(b) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(c) Screen Criterion - Frequency of detection

Table A-55

Selection Of Potential Chemicals Of Concern In Surface Soil (0-6 Inches) At Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
EXP	1,3,5-Trinitrobenzene	MG/KG	25	0				0/25	0	ND	
EXP	1,3-Dinitrobenzene	MG/KG	25	0				0/25	0	ND	
EXP	2,4,6-Trinitrotoluene	MG/KG	25	8	0.69	0.016	0.057	8/25	32	PCOC	
EXP	2,4-Dinitrotoluene	MG/KG	25	0				0/25	0	ND	
EXP	2,6-Dinitrotoluene	MG/KG	25	0				0/25	0	ND	
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	25	7	0.073	0.012	0.032	7/25	28	PCOC	
EXP	2-Nitrotoluene	MG/KG	25	0				0/25	0	ND	
EXP	3-Nitrotoluene	MG/KG	25	0				0/25	0	ND	
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	25	3	0.07	0.045	0.032	3/25	12	PCOC	
EXP	4-Nitrotoluene	MG/KG	25	2	0.034	0.032	0.053	2/25	8	PCOC	
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	25	2	0.11	0.039	0.032	2/25	8	PCOC	
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	25	0				0/25	0	ND	
EXP	Nitrobenzene	MG/KG	25	0				0/25	0	ND	
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	25	1	0.082	0.082	0.03	1/25	4	FREQ	5
METALS	Aluminum	MG/KG	10	10	19300	7540	13000	10/10	100	BKG	33852
METALS	Antimony	MG/KG	10	3	1.4	0.47	2.9	3/10	30	PCOC	
METALS	Arsenic	MG/KG	10	10	11.2	1.8	6.2	10/10	100	BKG	13.54
METALS	Barium	MG/KG	10	10	237	89.5	180	10/10	100	BKG	440
METALS	Beryllium	MG/KG	10	6	0.6	0.5	0.58	6/10	60	BKG	1.52
METALS	Cadmium	MG/KG	10	6	0.92	0.32	0.61	6/10	60	PCOC	0.4
METALS	Calcium	MG/KG	10	10	9600	1960	4200	10/10	100	RDA	1000000
METALS	Chromium	MG/KG	10	10	18.5	7	14	10/10	100	BKG	36.96
METALS	Cobalt	MG/KG	10	10	11.7	4	8.2	10/10	100	BKG	17.2
METALS	Copper	MG/KG	10	10	26	9.9	19	10/10	100	BKG	33.9
METALS	Iron	MG/KG	10	10	22800	7470	15000	10/10	100	BKG	36280
METALS	Lead	MG/KG	10	10	37	14.1	24	10/10	100	PCOC	29
METALS	Magnesium	MG/KG	10	10	5430	1580	3100	10/10	100	BKG	6698
METALS	Manganese	MG/KG	10	10	620	86.6	450	10/10	100	BKG	1083
METALS	Mercury	MG/KG	10	0				0/10	0	ND	
METALS	Nickel	MG/KG	10	10	28	9.6	18	10/10	100	BKG	39.3
METALS	Potassium	MG/KG	10	10	4210	1700	2800	10/10	100	BKG	5478

Table A-55

Selection Of Potential Chemicals Of Concern In Surface Soil (0-6 Inches) At Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
METALS	Selenium	MG/KG	10	5	2.1	1.2	1.1	5/10	50	RDA	750
METALS	Silver	MG/KG	10	0				0/10	0	ND	
METALS	Sodium	MG/KG	10	4	373	92.1	200	4/10	40	RDA	1000000
METALS	Thallium	MG/KG	10	0				0/10	0	ND	
METALS	Vanadium	MG/KG	10	10	41.5	14.6	27	10/10	100	BKG	72.5
METALS	Zinc	MG/KG	10	6	127	53.1	63	6/10	60	RDA	190000
SVOC	1,2,4-Trichlorobenzene	MG/KG	10	0				0/10	0	ND	
SVOC	1,2-Dichlorobenzene	MG/KG	10	0				0/10	0	ND	
SVOC	1,3-Dichlorobenzene	MG/KG	10	0				0/10	0	ND	
SVOC	1,4-Dichlorobenzene	MG/KG	10	0				0/10	0	ND	
SVOC	2,2'-oxybis(1-Chloropropane)	MG/KG	10	0				0/10	0	ND	
SVOC	2,4,5-Trichlorophenol	MG/KG	10	0				0/10	0	ND	
SVOC	2,4,6-Trichlorophenol	MG/KG	10	0				0/10	0	ND	
SVOC	2,4-Dichlorophenol	MG/KG	10	0				0/10	0	ND	
SVOC	2,4-Dimethylphenol	MG/KG	10	0				0/10	0	ND	
SVOC	2,4-Dinitrophenol	MG/KG	10	0				0/10	0	ND	
SVOC	2,4-Dinitrotoluene	MG/KG	10	0				0/10	0	ND	
SVOC	2,6-Dinitrotoluene	MG/KG	10	0				0/10	0	ND	
SVOC	2-Chloronaphthalene	MG/KG	10	0				0/10	0	ND	
SVOC	2-Chlorophenol	MG/KG	10	0				0/10	0	ND	
SVOC	2-Methylnaphthalene	MG/KG	10	0				0/10	0	ND	
SVOC	2-Methylphenol	MG/KG	10	0				0/10	0	ND	
SVOC	2-Nitroaniline	MG/KG	10	0				0/10	0	ND	
SVOC	2-Nitrophenol	MG/KG	10	0				0/10	0	ND	
SVOC	3,3'-Dichlorobenzidine	MG/KG	10	0				0/10	0	ND	
SVOC	3-Nitroaniline	MG/KG	10	0				0/10	0	ND	
SVOC	4,6-Dinitro-2-methylphenol	MG/KG	10	0				0/10	0	ND	
SVOC	4-Bromophenyl-phenylether	MG/KG	10	0				0/10	0	ND	
SVOC	4-Chloro-3-methylphenol	MG/KG	10	0				0/10	0	ND	
SVOC	4-Chloroaniline	MG/KG	10	0				0/10	0	ND	
SVOC	4-Chlorophenyl-phenylether	MG/KG	10	0				0/10	0	ND	

Table A-55

Selection Of Potential Chemicals Of Concern In Surface Soil (0-6 Inches) At Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
SVOC	4-Methylphenol	MG/KG	10	0				0/10	0	ND	
SVOC	4-Nitroaniline	MG/KG	10	0				0/10	0	ND	
SVOC	4-Nitrophenol	MG/KG	10	0				0/10	0	ND	
SVOC	Acenaphthene	MG/KG	10	0				0/10	0	ND	
SVOC	Acenaphthylene	MG/KG	10	0				0/10	0	ND	
SVOC	Anthracene	MG/KG	10	0				0/10	0	ND	
SVOC	Benzo(a)anthracene	MG/KG	10	0				0/10	0	ND	
SVOC	Benzo(a)pyrene	MG/KG	10	0				0/10	0	ND	
SVOC	Benzo(b)fluoranthene	MG/KG	10	0				0/10	0	ND	
SVOC	Benzo(g,h,i)perylene	MG/KG	10	0				0/10	0	ND	
SVOC	Benzo(k)fluoranthene	MG/KG	10	0				0/10	0	ND	
SVOC	bis(2-Chloroethoxy)methane	MG/KG	10	0				0/10	0	ND	
SVOC	bis(2-Chloroethyl)ether	MG/KG	10	0				0/10	0	ND	
SVOC	bis(2-Ethylhexyl)phthalate	MG/KG	10	2	0.046	0.036	0.18	2/10	20	PCOC	
SVOC	Butylbenzylphthalate	MG/KG	10	1	0.344	0.344	0.22	1/10	10	PCOC	
SVOC	Carbazole	MG/KG	10	0				0/10	0	ND	
SVOC	Chrysene	MG/KG	10	0				0/10	0	ND	
SVOC	Dibenzo(a,h)anthracene	MG/KG	10	0				0/10	0	ND	
SVOC	Dibenzofuran	MG/KG	10	0				0/10	0	ND	
SVOC	Diethylphthalate	MG/KG	10	0				0/10	0	ND	
SVOC	Dimethylphthalate	MG/KG	10	0				0/10	0	ND	
SVOC	Di-n-butylphthalate	MG/KG	10	4	3.542	0.181	1	4/10	40	ND	
SVOC	Di-n-octylphthalate	MG/KG	10	0				0/10	0	ND	
SVOC	Fluoranthene	MG/KG	10	0				0/10	0	ND	
SVOC	Fluorene	MG/KG	10	0				0/10	0	ND	
SVOC	Hexachlorobenzene	MG/KG	10	0				0/10	0	ND	
SVOC	Hexachlorobutadiene	MG/KG	10	0				0/10	0	ND	
SVOC	Hexachlorocyclopentadiene	MG/KG	10	0				0/10	0	ND	
SVOC	Hexachloroethane	MG/KG	10	0				0/10	0	ND	
SVOC	Indeno(1,2,3-cd)pyrene	MG/KG	10	0				0/10	0	ND	
SVOC	Isophorone	MG/KG	10	0				0/10	0	ND	

Table A-55

Selection Of Potential Chemicals Of Concern In Surface Soil (0-6 Inches) At Proving Grounds Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
SVOC	Naphthalene	MG/KG	10	0				0/10	0	ND	
SVOC	Nitrobenzene	MG/KG	10	0				0/10	0	ND	
SVOC	N-Nitroso-di-n-propylamine	MG/KG	10	0				0/10	0	ND	
SVOC	N-Nitrosodiphenylamine (1)	MG/KG	10	0				0/10	0	ND	
SVOC	Pentachlorophenol	MG/KG	10	0				0/10	0	ND	
SVOC	Phenanthrene	MG/KG	10	0				0/10	0	ND	
SVOC	Phenol	MG/KG	10	0				0/10	0	ND	
SVOC	Pyrene	MG/KG	10	1	0.145	0.145	0.2	1/10	10	PCOC	

Notes:

(a) EXP - Explosive
METALS - Metals
SVOC - Semi-volatile organic compound
VOC - Volatile organic compound

(b) Total - Total number of samples

(c) # Hits - The number of samples where the chemical was detected.

(d) Max conc - Maximum detected concentration

(e) Min conc - Minimum detected concentration

(f) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample, one-half of the laboratory detection limit was used in the calculation of the average.

(g) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(h) Exclusion Reason - Indicates whether a chemical was retained as a potential chemical of concern (PCOC) or was excluded based of the following sequence of criteria: not-detected(ND), below background (BKG), below levels based on recommended daily allowances (RDA), frequency of detection less than 5 percent (FREQ). Note that once a chemical was excluded based on one criterion it was not further compared to other criteria (e.g., chemical excluded because it was ND was not compared to BKG, a chemical excluded because of BKG was not compared to RDA). Those chemicals excluded because of FREQ were additionally compared to the PRGs to identify potential hot spots.

Table A-56

Chemicals Not Detected In Surface Soil (0-6 Inches)
At Proving Grounds
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	1,3,5-Trinitrobenzene
EXP	1,3-Dinitrobenzene
EXP	2,4-Dinitrotoluene
EXP	2,6-Dinitrotoluene
EXP	2-Nitrotoluene
EXP	3-Nitrotoluene
EXP	Methyl-2,4,6-trinitrophenylnitramine
EXP	Nitrobenzene
METALS	Mercury
METALS	Silver
METALS	Thallium
SVOC	1,2,4-Trichlorobenzene
SVOC	1,2-Dichlorobenzene
SVOC	1,3-Dichlorobenzene
SVOC	1,4-Dichlorobenzene
SVOC	2,2'-oxybis(1-Chloropropane)
SVOC	2,4,5-Trichlorophenol
SVOC	2,4,6-Trichlorophenol
SVOC	2,4-Dichlorophenol
SVOC	2,4-Dimethylphenol
SVOC	2,4-Dinitrophenol
SVOC	2,4-Dinitrotoluene
SVOC	2,6-Dinitrotoluene
SVOC	2-Chloronaphthalene
SVOC	2-Chlorophenol
SVOC	2-Methylnaphthalene
SVOC	2-Methylphenol
SVOC	2-Nitroaniline
SVOC	2-Nitrophenol
SVOC	3,3'-Dichlorobenzidine
SVOC	3-Nitroaniline
SVOC	4,6-Dinitro-2-methylphenol
SVOC	4-Bromophenyl-phenylether
SVOC	4-Chloro-3-methylphenol
SVOC	4-Chloroaniline
SVOC	4-Chlorophenyl-phenylether
SVOC	4-Methylphenol
SVOC	4-Nitroaniline
SVOC	4-Nitrophenol
SVOC	Acenaphthene
SVOC	Acenaphthylene
SVOC	Anthracene

Table A-56

Chemicals Not Detected In Surface Soil (0-6 Inches)
At Proving Grounds
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
SVOC	Benzo(a)anthracene
SVOC	Benzo(a)pyrene
SVOC	Benzo(b)fluoranthene
SVOC	Benzo(g,h,i)perylene
SVOC	Benzo(k)fluoranthene
SVOC	bis(2-Chloroethoxy)methane
SVOC	bis(2-Chloroethyl)ether
SVOC	Carbazole
SVOC	Chrysene
SVOC	Dibenzo(a,h)anthracene
SVOC	Dibenzofuran
SVOC	Diethylphthalate
SVOC	Dimethylphthalate
SVOC	Di-n-octylphthalate
SVOC	Fluoranthene
SVOC	Fluorene
SVOC	Hexachlorobenzene
SVOC	Hexachlorobutadiene
SVOC	Hexachlorocyclopentadiene
SVOC	Hexachloroethane
SVOC	Indeno(1,2,3-cd)pyrene
SVOC	Isophorone
SVOC	Naphthalene
SVOC	Nitrobenzene

Table A-57

Metals In Surface Soil (0-6 Inches) At Proving Grounds Excluded As PCOCs Based On Comparison To Background Concentrations Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Aluminum	MG/KG	19300	33852
METALS	Arsenic	MG/KG	11.2	13.54
METALS	Barium	MG/KG	237	440
METALS	Beryllium	MG/KG	0.6	1.52
METALS	Chromium	MG/KG	18.5	36.96
METALS	Cobalt	MG/KG	11.7	17.2
METALS	Copper	MG/KG	26	33.9
METALS	Iron	MG/KG	22800	36280
METALS	Magnesium	MG/KG	5430	6698
METALS	Manganese	MG/KG	620	1083
METALS	Nickel	MG/KG	28	39.3
METALS	Potassium	MG/KG	4210	5478
METALS	Vanadium	MG/KG	41.5	72.5

Notes:
(a) Max conc - Maximum detected concentration
(b) Screen Criteria are soil background screening levels

Table A-58

Metals In Surface Soil (0-6 Inches) At Proving Grounds Excluded As PCOCs Based On Their Classification As Essential Nutrients Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Calcium	MG/KG	9600	1000000
METALS	Selenium	MG/KG	2.1	750
METALS	Sodium	MG/KG	373	1000000
METALS	Zinc	MG/KG	127	190000

Notes:

(a) Max conc - Maximum detected concentration

(b) Screen criterion based on the recommended daily allowance for the chemical (See Table 2-3)

Table A-59

Metals In Surface Soil (0-6 Inches) At Potential Proving Grounds Excluded As PCOCs Based On Detected in Less Than 5 Percent Of The Samples Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Frequency[b]	Frequency (Percent)	Screen Criteria[c]
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	0.082	1/25	4	5

Notes:
(a) Max conc - Maximum detected concentration
(b) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.
(c) Screen Criterion - Frequency of detection

Table A-60

Selection Of Potential Chemicals Of Concern In Surface And Subsurface Soil At Northeast Boundary Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
EXP	1,3,5-Trinitrobenzene	MG/KG	9	0				0/9	0	ND	
EXP	1,3-Dinitrobenzene	MG/KG	9	0				0/9	0	ND	
EXP	2,4,6-Trinitrotoluene	MG/KG	9	0				0/9	0	ND	
EXP	2,4-Dinitrotoluene	MG/KG	9	0				0/9	0	ND	
EXP	2,6-Dinitrotoluene	MG/KG	9	0				0/9	0	ND	
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	9	0				0/9	0	ND	
EXP	2-Nitrotoluene	MG/KG	9	0				0/9	0	ND	
EXP	3-Nitrotoluene	MG/KG	9	0				0/9	0	ND	
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	9	0				0/9	0	ND	
EXP	4-Nitrotoluene	MG/KG	9	0				0/9	0	ND	
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	9	0				0/9	0	ND	
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	9	0				0/9	0	ND	
EXP	Nitrobenzene	MG/KG	9	0				0/9	0	ND	
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	9	0				0/9	0	ND	
METALS	Aluminum	MG/KG	9	9	35000	16000	24000	9/9	100	PCOC	
METALS	Antimony	MG/KG	9	0				0/9	0	ND	
METALS	Arsenic	MG/KG	9	9	11	6.5	8.9	9/9	100	BKG	13.5
METALS	Barium	MG/KG	9	9	350	230	280	9/9	100	BKG	440
METALS	Beryllium	MG/KG	9	9	1.3	0.8	1.1	9/9	100	BKG	1.52
METALS	Cadmium	MG/KG	9	1	0.90	0.9	0.36	1/9	11	PCOC	
METALS	Calcium	MG/KG	9	9	5000	3000	4100	9/9	100	BKG	6900
METALS	Chromium	MG/KG	9	9	38	21	27	9/9	100	RDA	2000
METALS	Cobalt	MG/KG	9	9	18	9.8	13	9/9	100	PCOC	
METALS	Copper	MG/KG	9	9	110	13	28	9/9	100	RDA	30000
METALS	Iron	MG/KG	9	9	28000	15000	23000	9/9	100	BKG	36300
METALS	Lead	MG/KG	9	9	31	17	20	9/9	100	PCOC	
METALS	Magnesium	MG/KG	9	9	6500	3000	4800	9/9	100	BKG	6700
METALS	Manganese	MG/KG	9	9	890	630	740	9/9	100	BKG	1080
METALS	Mercury	MG/KG	9	0				0/9	0	ND	
METALS	Nickel	MG/KG	9	9	32	17	25	9/9	100	BKG	39.3
METALS	Potassium	MG/KG	9	9	5500	2700	3800	9/9	100	RDA	1000000

Table A-60

Selection Of Potential Chemicals Of Concern In Surface And Subsurface Soil At Northeast Boundary Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
METALS	Selenium	MG/KG	9	2	1.8	1.6	1.1	2/9	22	RDA	750
METALS	Silver	MG/KG	9	0				0/9	0	ND	
METALS	Sodium	MG/KG	9	2	180	150	60	2/9	22	RDA	1000000
METALS	Thallium	MG/KG	9	9	0.50	0.28	0.39	9/9	100	BKG	0.86
METALS	Vanadium	MG/KG	9	9	82	41	55	9/9	100	PCOC	
METALS	Zinc	MG/KG	9	9	99	50	75	9/9	100	BKG	120
SVOC	1,2,4-Trichlorobenzene	MG/KG	9	0				0/9	0	ND	
SVOC	1,2-Dichlorobenzene	MG/KG	9	0				0/9	0	ND	
SVOC	1,3-Dichlorobenzene	MG/KG	9	0				0/9	0	ND	
SVOC	1,4-Dichlorobenzene	MG/KG	9	0				0/9	0	ND	
SVOC	2,4,5-Trichlorophenol	MG/KG	9	0				0/9	0	ND	
SVOC	2,4,6-Trichlorophenol	MG/KG	9	0				0/9	0	ND	
SVOC	2,4-Dichlorophenol	MG/KG	9	0				0/9	0	ND	
SVOC	2,4-Dimethylphenol	MG/KG	9	0				0/9	0	ND	
SVOC	2,4-Dinitrophenol	MG/KG	9	0				0/9	0	ND	
SVOC	2,4-Dinitrotoluene	MG/KG	9	0				0/9	0	ND	
SVOC	2,6-Dinitrotoluene	MG/KG	9	1	0.028	0.028	0.028	1/9	11	PCOC	
SVOC	2-Chloronaphthalene	MG/KG	9	0				0/9	0	ND	
SVOC	2-Chlorophenol	MG/KG	9	0				0/9	0	ND	
SVOC	2-Methylnaphthalene	MG/KG	9	0				0/9	0	ND	
SVOC	2-Methylphenol	MG/KG	9	0				0/9	0	ND	
SVOC	2-Nitroaniline	MG/KG	9	0				0/9	0	ND	
SVOC	2-Nitrophenol	MG/KG	9	0				0/9	0	ND	
SVOC	3- & 4-Methylphenol	MG/KG	9	0				0/9	0	ND	
SVOC	3,3'-Dichlorobenzidine	MG/KG	9	0				0/9	0	ND	
SVOC	3-Nitroaniline	MG/KG	9	0				0/9	0	ND	
SVOC	4,6-Dinitro-2-methylphenol	MG/KG	9	0				0/9	0	ND	
SVOC	4-Bromophenyl-phenylether	MG/KG	9	0				0/9	0	ND	
SVOC	4-Chloro-3-methylphenol	MG/KG	9	0				0/9	0	ND	
SVOC	4-Chloroaniline	MG/KG	9	0				0/9	0	ND	
SVOC	4-Chlorophenyl-phenylether	MG/KG	9	0				0/9	0	ND	

Table A-60

Selection Of Potential Chemicals Of Concern In Surface And Subsurface Soil At Northeast Boundary Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
SVOC	4-Nitroaniline	MG/KG	9	0				0/9	0	ND	
SVOC	4-Nitrophenol	MG/KG	9	0				0/9	0	ND	
SVOC	Acenaphthene	MG/KG	9	0				0/9	0	ND	
SVOC	Acenaphthylene	MG/KG	9	0				0/9	0	ND	
SVOC	Anthracene	MG/KG	9	0				0/9	0	ND	
SVOC	Benzo(a)anthracene	MG/KG	9	0				0/9	0	ND	
SVOC	Benzo(a)pyrene	MG/KG	9	0				0/9	0	ND	
SVOC	Benzo(b)fluoranthene	MG/KG	9	0				0/9	0	ND	
SVOC	Benzo(g,h,i)perylene	MG/KG	9	1	0.014	0.014	0.0065	1/9	11	PCOC	
SVOC	Benzo(k)fluoranthene	MG/KG	9	0				0/9	0	ND	
SVOC	bis(2-Chloroethoxy)methane	MG/KG	9	0				0/9	0	ND	
SVOC	bis(2-Chloroethyl)ether	MG/KG	9	0				0/9	0	ND	
SVOC	bis(2-Chloroisopropyl)ether	MG/KG	9	0				0/9	0	ND	
SVOC	bis(2-Ethylhexyl)phthalate	MG/KG	9	0				0/9	0	ND	
SVOC	Butylbenzylphthalate	MG/KG	9	0				0/9	0	ND	
SVOC	Carbazole	MG/KG	9	0				0/9	0	ND	
SVOC	Chrysene	MG/KG	9	0				0/9	0	ND	
SVOC	Dibenzo(a,h)anthracene	MG/KG	9	0				0/9	0	ND	
SVOC	Dibenzofuran	MG/KG	9	0				0/9	0	ND	
SVOC	Diethylphthalate	MG/KG	9	0				0/9	0	ND	
SVOC	Dimethylphthalate	MG/KG	9	0				0/9	0	ND	
SVOC	Di-n-butylphthalate	MG/KG	9	0				0/9	0	ND	
SVOC	Di-n-octylphthalate	MG/KG	9	0				0/9	0	ND	
SVOC	Fluoranthene	MG/KG	9	1	0.021	0.021	0.0074	1/9	11	PCOC	
SVOC	Fluorene	MG/KG	9	0				0/9	0	ND	
SVOC	Hexachlorobenzene	MG/KG	9	0				0/9	0	ND	
SVOC	Hexachlorobutadiene	MG/KG	9	0				0/9	0	ND	
SVOC	Hexachlorocyclopentadiene	MG/KG	9	0				0/9	0	ND	
SVOC	Hexachloroethane	MG/KG	9	0				0/9	0	ND	
SVOC	Indeno(1,2,3-cd)pyrene	MG/KG	9	0				0/9	0	ND	
SVOC	Isophorone	MG/KG	9	0				0/9	0	ND	

Table A-60

Selection Of Potential Chemicals Of Concern In Surface And Subsurface Soil At Northeast Boundary Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
SVOC	Naphthalene	MG/KG	9	0				0/9	0	ND	
SVOC	Nitrobenzene	MG/KG	9	0				0/9	0	ND	
SVOC	N-Nitroso-di-n-propylamine	MG/KG	9	0				0/9	0	ND	
SVOC	N-Nitrosodiphenylamine (1)	MG/KG	9	0				0/9	0	ND	
SVOC	Pentachlorophenol	MG/KG	9	0				0/9	0	ND	
SVOC	Phenanthrene	MG/KG	9	0				0/9	0	ND	
SVOC	Phenol	MG/KG	9	0				0/9	0	ND	
SVOC	Pyrene	MG/KG	9	1	0.016	0.016	0.0069	1/9	11	PCOC	
VOC	1,1,1-Trichloroethane	MG/KG	9	0				0/9	0	ND	
VOC	1,1,2,2-Tetrachloroethane	MG/KG	9	0				0/9	0	ND	
VOC	1,1,2-Trichloroethane	MG/KG	9	0				0/9	0	ND	
VOC	1,1-Dichloroethane	MG/KG	9	0				0/9	0	ND	
VOC	1,1-Dichloroethene	MG/KG	9	0				0/9	0	ND	
VOC	1,2-Dibromo-3-chloropropane	MG/KG	9	0				0/9	0	ND	
VOC	1,2-Dibromoethane	MG/KG	9	0				0/9	0	ND	
VOC	1,2-Dichlorobenzene	MG/KG	9	0				0/9	0	ND	
VOC	1,2-Dichloroethane	MG/KG	9	0				0/9	0	ND	
VOC	1,2-Dichloropropane	MG/KG	9	0				0/9	0	ND	
VOC	1,3-Dichlorobenzene	MG/KG	9	0				0/9	0	ND	
VOC	1,4-Dichlorobenzene	MG/KG	9	0				0/9	0	ND	
VOC	2,2-Dichloropropane	MG/KG	9	0				0/9	0	ND	
VOC	2-Butanone	MG/KG	9	0				0/9	0	ND	
VOC	2-Hexanone	MG/KG	9	0				0/9	0	ND	
VOC	4-Methyl-2-Pentanone	MG/KG	9	0				0/9	0	ND	
VOC	Acetone	MG/KG	9	0				0/9	0	ND	
VOC	Benzene	MG/KG	9	0				0/9	0	ND	
VOC	Bromochloromethane	MG/KG	9	0				0/9	0	ND	

Table A-61

Chemicals Not Detected In Surface And Subsurface Soil At Northeast Boundary Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	1,3,5-Trinitrobenzene
EXP	1,3-Dinitrobenzene
EXP	2,4,6-Trinitrotoluene
EXP	2,4-Dinitrotoluene
EXP	2,6-Dinitrotoluene
EXP	2-Amino-4,6-dinitrotoluene
EXP	2-Nitrotoluene
EXP	3-Nitrotoluene
EXP	4-Amino-2,6-dinitrotoluene
EXP	4-Nitrotoluene
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine
EXP	Methyl-2,4,6-trinitrophenylnitramine
EXP	Nitrobenzene
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
METALS	Antimony
METALS	Mercury
METALS	Silver
SVOC	1,2,4-Trichlorobenzene
SVOC	1,2-Dichlorobenzene
SVOC	1,3-Dichlorobenzene
SVOC	1,4-Dichlorobenzene
SVOC	2,4,5-Trichlorophenol
SVOC	2,4,6-Trichlorophenol
SVOC	2,4-Dichlorophenol
SVOC	2,4-Dimethylphenol
SVOC	2,4-Dinitrophenol
SVOC	2,4-Dinitrotoluene
SVOC	2,6-Dinitrotoluene
SVOC	2-Chloronaphthalene
SVOC	2-Chlorophenol
SVOC	2-Methylnaphthalene
SVOC	2-Methylphenol
SVOC	2-Nitroaniline
SVOC	2-Nitrophenol
SVOC	3- & 4-Methylphenol
SVOC	3,3'-Dichlorobenzidine
SVOC	3-Nitroaniline
SVOC	4,6-Dinitro-2-methylphenol
SVOC	4-Bromophenyl-phenylether
SVOC	4-Chloro-3-methylphenol
SVOC	4-Chloroaniline
SVOC	4-Chlorophenyl-phenylether

Table A-61

Chemicals Not Detected In Surface And Subsurface Soil
At Northeast Boundary Area
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
SVOC	4-Nitroaniline
SVOC	4-Nitrophenol
SVOC	Acenaphthene
SVOC	Acenaphthylene
SVOC	Anthracene
SVOC	Benzo(a)anthracene
SVOC	Benzo(a)pyrene
SVOC	Benzo(b)fluoranthene
SVOC	Benzo(g,h,i)perylene
SVOC	Benzo(k)fluoranthene
SVOC	bis(2-Chloroethoxy)methane
SVOC	bis(2-Chloroethyl)ether
SVOC	bis(2-Chloroisopropyl)ether
SVOC	bis(2-Ethylhexyl)phthalate
SVOC	Butylbenzylphthalate
SVOC	Carbazole
SVOC	Chrysene
SVOC	Dibenzo(a,h)anthracene
SVOC	Dibenzofuran
SVOC	Diethylphthalate
SVOC	Dimethylphthalate
SVOC	Di-n-butylphthalate
SVOC	Di-n-octylphthalate
SVOC	Fluoranthene
SVOC	Fluorene

Table A-62

Metals In Surface And Subsurface Soil At Northeast Boundary Area Excluded As PCOCs Based On Comparison To Background Concentrations Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Arsenic	MG/KG	11	13.5
METALS	Barium	MG/KG	350	440
METALS	Beryllium	MG/KG	1.3	1.52
METALS	Calcium	MG/KG	5000	6900
METALS	Iron	MG/KG	28000	36300
METALS	Magnesium	MG/KG	6500	6700
METALS	Manganese	MG/KG	890	1080
METALS	Nickel	MG/KG	32	39.3

Table A-63

Metals In Surface And Subsurface Soil At Northeast Boundary Area Excluded As PCOCs Based On Their Classification As Essential Nutrients Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Calcium	MG/KG	34000	1000000
METALS	Chromium	MG/KG	18.5	2000
METALS	Copper	MG/KG	26	30000
METALS	Iron	MG/KG	22900	300000
METALS	Magnesium	MG/KG	7000	1000000
METALS	Manganese	MG/KG	791	50000
METALS	Potassium	MG/KG	4210	1000000
METALS	Selenium	MG/KG	2.1	750
METALS	Sodium	MG/KG	373	1000000
METALS	Zinc	MG/KG	127	190000

Notes:

(a) Max conc - Maximum detected concentration

(b) Screen criterion based on the recommended daily allowance for the chemical (See Table 2-3)

Table A-64

Selection Of Potential Chemicals Of Concern In *Surface Soil (0-6 Inches)* At Northeast Boundary Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
EXP	1,3,5-Trinitrobenzene	MG/KG	3	0				0/3	0	ND	
EXP	1,3-Dinitrobenzene	MG/KG	3	0				0/3	0	ND	
EXP	2,4,6-Trinitrotoluene	MG/KG	3	0				0/3	0	ND	
EXP	2,4-Dinitrotoluene	MG/KG	3	0				0/3	0	ND	
EXP	2,6-Dinitrotoluene	MG/KG	3	0				0/3	0	ND	
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	3	0				0/3	0	ND	
EXP	2-Nitrotoluene	MG/KG	3	0				0/3	0	ND	
EXP	3-Nitrotoluene	MG/KG	3	0				0/3	0	ND	
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	3	0				0/3	0	ND	
EXP	4-Nitrotoluene	MG/KG	3	0				0/3	0	ND	
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	3	0				0/3	0	ND	
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	3	0				0/3	0	ND	
EXP	Nitrobenzene	MG/KG	3	0				0/3	0	ND	
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	3	0				0/3	0	ND	
METALS	Aluminum	MG/KG	3	3	23000	18000	20000	3/3	100	BKG	33852
METALS	Antimony	MG/KG	3	0				0/3	0	ND	
METALS	Arsenic	MG/KG	3	3	8.6	6.5	7.3	3/3	100	BKG	13.54
METALS	Barium	MG/KG	3	3	290	230	260	3/3	100	BKG	440
METALS	Beryllium	MG/KG	3	3	0.98	0.8	0.87	3/3	100	BKG	1.52
METALS	Cadmium	MG/KG	3	1	0.9	0.9	0.5	1/3	33	PCOC	
METALS	Calcium	MG/KG	3	3	4500	3000	3700	3/3	100	BKG	6086
METALS	Chromium	MG/KG	3	3	25	22	24	3/3	100	BKG	36.96
METALS	Cobalt	MG/KG	3	3	12	9.8	11	3/3	100	BKG	17.2
METALS	Copper	MG/KG	3	3	110	13	47	3/3	100	RDA	30000
METALS	Iron	MG/KG	3	3	22000	15000	18000	3/3	100	BKG	36280
METALS	Lead	MG/KG	3	3	31	19	23	3/3	100	PCOC	
METALS	Magnesium	MG/KG	3	3	4000	3000	3400	3/3	100	BKG	6698
METALS	Manganese	MG/KG	3	3	830	630	700	3/3	100	BKG	1083
METALS	Mercury	MG/KG	3	0				0/3	0	ND	
METALS	Nickel	MG/KG	3	3	21	17	19	3/3	100	BKG	39.3
METALS	Potassium	MG/KG	3	3	4200	3300	3800	3/3	100	BKG	5478

Table A-64

Selection Of Potential Chemicals Of Concern In Surface Soil (0-6 Inches) At Northeast Boundary Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
METALS	Selenium	MG/KG	3	1	1.8	1.8	1.2	1/3	33	RDA	750
METALS	Silver	MG/KG	3	0				0/3	0	ND	
METALS	Sodium	MG/KG	3	0				0/3	0	ND	
METALS	Thallium	MG/KG	3	3	0.42	0.28	0.37	3/3	100	BKG	0.86
METALS	Vanadium	MG/KG	3	3	53	44	50	3/3	100	BKG	72.5
METALS	Zinc	MG/KG	3	3	96	50	69	3/3	100	BKG	119.5
SVOC	1,2,4-Trichlorobenzene	MG/KG	3	0				0/3	0	ND	
SVOC	1,2-Dichlorobenzene	MG/KG	3	0				0/3	0	ND	
SVOC	1,3-Dichlorobenzene	MG/KG	3	0				0/3	0	ND	
SVOC	1,4-Dichlorobenzene	MG/KG	3	0				0/3	0	ND	
SVOC	2,4,5-Trichlorophenol	MG/KG	3	0				0/3	0	ND	
SVOC	2,4,6-Trichlorophenol	MG/KG	3	0				0/3	0	ND	
SVOC	2,4-Dichlorophenol	MG/KG	3	0				0/3	0	ND	
SVOC	2,4-Dimethylphenol	MG/KG	3	0				0/3	0	ND	
SVOC	2,4-Dinitrophenol	MG/KG	3	0				0/3	0	ND	
SVOC	2,4-Dinitrotoluene	MG/KG	3	0				0/3	0	ND	
SVOC	2,6-Dinitrotoluene	MG/KG	3	1	0.028	0.028	0.026	1/3	33	PCOC	
SVOC	2-Chloronaphthalene	MG/KG	3	0				0/3	0	ND	
SVOC	2-Chlorophenol	MG/KG	3	0				0/3	0	ND	
SVOC	2-Methylnaphthalene	MG/KG	3	0				0/3	0	ND	
SVOC	2-Methylphenol	MG/KG	3	0				0/3	0	ND	
SVOC	2-Nitroaniline	MG/KG	3	0				0/3	0	ND	
SVOC	2-Nitrophenol	MG/KG	3	0				0/3	0	ND	
SVOC	3- & 4-Methylphenol	MG/KG	3	0				0/3	0	ND	
SVOC	3,3'-Dichlorobenzidine	MG/KG	3	0				0/3	0	ND	
SVOC	3-Nitroaniline	MG/KG	3	0				0/3	0	ND	
SVOC	4,6-Dinitro-2-methylphenol	MG/KG	3	0				0/3	0	ND	
SVOC	4-Bromophenyl-phenylether	MG/KG	3	0				0/3	0	ND	
SVOC	4-Chloro-3-methylphenol	MG/KG	3	0				0/3	0	ND	
SVOC	4-Chloroaniline	MG/KG	3	0				0/3	0	ND	
SVOC	4-Chlorophenyl-phenylether	MG/KG	3	0				0/3	0	ND	

Table A-64

Selection Of Potential Chemicals Of Concern In Surface Soil (0-6 Inches) At Northeast Boundary Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
SVOC	4-Nitroaniline	MG/KG	3	0				0/3	0	ND	
SVOC	4-Nitrophenol	MG/KG	3	0				0/3	0	ND	
SVOC	Acenaphthene	MG/KG	3	0				0/3	0	ND	
SVOC	Acenaphthylene	MG/KG	3	0				0/3	0	ND	
SVOC	Anthracene	MG/KG	3	0				0/3	0	ND	
SVOC	Benzo(a)anthracene	MG/KG	3	0				0/3	0	ND	
SVOC	Benzo(a)pyrene	MG/KG	3	0				0/3	0	ND	
SVOC	Benzo(b)fluoranthene	MG/KG	3	0				0/3	0	ND	
SVOC	Benzo(g,h,i)perylene	MG/KG	3	0				0/3	0	ND	
SVOC	Benzo(k)fluoranthene	MG/KG	3	0				0/3	0	ND	
SVOC	bis(2-Chloroethoxy)methane	MG/KG	3	0				0/3	0	ND	
SVOC	bis(2-Chloroethyl)ether	MG/KG	3	0				0/3	0	ND	
SVOC	bis(2-Chloroisopropyl)ether	MG/KG	3	0				0/3	0	ND	
SVOC	bis(2-Ethylhexyl)phthalate	MG/KG	3	0				0/3	0	ND	
SVOC	Butylbenzylphthalate	MG/KG	3	0				0/3	0	ND	
SVOC	Carbazole	MG/KG	3	0				0/3	0	ND	
SVOC	Chrysene	MG/KG	3	0				0/3	0	ND	
SVOC	Dibenzo(a,h)anthracene	MG/KG	3	0				0/3	0	ND	
SVOC	Dibenzofuran	MG/KG	3	0				0/3	0	ND	
SVOC	Diethylphthalate	MG/KG	3	0				0/3	0	ND	
SVOC	Dimethylphthalate	MG/KG	3	0				0/3	0	ND	
SVOC	Di-n-butylphthalate	MG/KG	3	0				0/3	0	ND	
SVOC	Di-n-octylphthalate	MG/KG	3	0				0/3	0	ND	
SVOC	Fluoranthene	MG/KG	3	1	0.021	0.021	0.01	1/3	33	PCOC	
SVOC	Fluorene	MG/KG	3	0				0/3	0	ND	
SVOC	Hexachlorobenzene	MG/KG	3	0				0/3	0	ND	
SVOC	Hexachlorobutadiene	MG/KG	3	0				0/3	0	ND	
SVOC	Hexachlorocyclopentadiene	MG/KG	3	0				0/3	0	ND	
SVOC	Hexachloroethane	MG/KG	3	0				0/3	0	ND	
SVOC	Indeno(1,2,3-cd)pyrene	MG/KG	3	0				0/3	0	ND	
SVOC	Isophorone	MG/KG	3	0				0/3	0	ND	

Table A-64

Selection Of Potential Chemicals Of Concern In Surface Soil (0-6 Inches) At Northeast Boundary Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
SVOC	Naphthalene	MG/KG	3	0				0/3	0	ND	
SVOC	Nitrobenzene	MG/KG	3	0				0/3	0	ND	
SVOC	N-Nitroso-di-n-propylamine	MG/KG	3	0				0/3	0	ND	
SVOC	N-Nitrosodiphenylamine (1)	MG/KG	3	0				0/3	0	ND	
SVOC	Pentachlorophenol	MG/KG	3	0				0/3	0	ND	
SVOC	Phenanthrene	MG/KG	3	0				0/3	0	ND	
SVOC	Phenol	MG/KG	3	0				0/3	0	ND	
SVOC	Pyrene	MG/KG	3	1	0.016	0.016	0.0088	1/3	33	PCOC	

Notes:

(a) EXP - Explosive
METALS - Metals
SVOC - Semi-volatile organic compound
VOC - Volatile organic compound

(b) Total - Total number of samples

(c) # Hits - The number of samples where the chemical was detected.

(d) Max conc - Maximum detected concentration

(e) Min conc - Minimum detected concentration

(f) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample, one-half of the laboratory detection limit was used in the calculation of the average.

(g) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(h) Exclusion Reason - Indicates whether a chemical was retained as a potential chemical of concern (PCOC) or was excluded based of the following sequence of criteria: not-detected(ND), below background (BKG), below levels based on recommended daily allowances (RDA), frequency of detection less than 5 percent (FREQ). Note that once a chemical was excluded based on one criterion it was not further compared to other criteria (e.g., chemical excluded because it was ND was not compared to BKG, a chemical excluded because of BKG was not compared to RDA). Those chemicals excluded because of FREQ were additionally compared to the PRGs to identify potential hot spots.

Table A-65

Chemicals Not Detected In Surface Soil (0-6 Inches) At Northeast Boundary Area Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	1,3,5-Trinitrobenzene
EXP	1,3-Dinitrobenzene
EXP	2,4,6-Trinitrotoluene
EXP	2,4-Dinitrotoluene
EXP	2,6-Dinitrotoluene
EXP	2-Amino-4,6-dinitrotoluene
EXP	2-Nitrotoluene
EXP	3-Nitrotoluene
EXP	4-Amino-2,6-dinitrotoluene
EXP	4-Nitrotoluene
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine
EXP	Methyl-2,4,6-trinitrophenylnitramine
EXP	Nitrobenzene
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
METALS	Antimony
METALS	Mercury
METALS	Silver
METALS	Sodium
SVOC	1,2,4-Trichlorobenzene
SVOC	1,2-Dichlorobenzene
SVOC	1,3-Dichlorobenzene
SVOC	1,4-Dichlorobenzene
SVOC	2,4,5-Trichlorophenol
SVOC	2,4,6-Trichlorophenol
SVOC	2,4-Dichlorophenol
SVOC	2,4-Dimethylphenol
SVOC	2,4-Dinitrophenol
SVOC	2,4-Dinitrotoluene
SVOC	2-Chloronaphthalene
SVOC	2-Chlorophenol
SVOC	2-Methylnaphthalene
SVOC	2-Methylphenol
SVOC	2-Nitroaniline
SVOC	2-Nitrophenol
SVOC	3- & 4-Methylphenol
SVOC	3,3'-Dichlorobenzidine
SVOC	3-Nitroaniline
SVOC	4,6-Dinitro-2-methylphenol
SVOC	4-Bromophenyl-phenylether
SVOC	4-Chloro-3-methylphenol
SVOC	4-Chloroaniline
SVOC	4-Chlorophenyl-phenylether

Table A-65

Chemicals Not Detected In Surface Soil (0-6 Inches)
At Northeast Boundary Area
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
SVOC	4-Nitroaniline
SVOC	4-Nitrophenol
SVOC	Acenaphthene
SVOC	Acenaphthylene
SVOC	Anthracene
SVOC	Benzo(a)anthracene
SVOC	Benzo(a)pyrene
SVOC	Benzo(b)fluoranthene
SVOC	Benzo(g,h,i)perylene
SVOC	Benzo(k)fluoranthene
SVOC	bis(2-Chloroethoxy)methane
SVOC	bis(2-Chloroethyl)ether
SVOC	bis(2-Chloroisopropyl)ether
SVOC	bis(2-Ethylhexyl)phthalate
SVOC	Butylbenzylphthalate
SVOC	Carbazole
SVOC	Chrysene
SVOC	Dibenzo(a,h)anthracene
SVOC	Dibenzofuran
SVOC	Diethylphthalate
SVOC	Dimethylphthalate
SVOC	Di-n-butylphthalate
SVOC	Di-n-octylphthalate
SVOC	Fluorene
SVOC	Hexachlorobenzene

Table A-66

Metals In Surface Soil (0-6 Inches) At Northeast Boundary Area Excluded As PCOCs Based On Comparison To Background Concentrations Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Aluminum	MG/KG	23000	33852
METALS	Arsenic	MG/KG	8.6	13.54
METALS	Barium	MG/KG	290	440
METALS	Beryllium	MG/KG	0.98	1.52
METALS	Calcium	MG/KG	4500	6086
METALS	Chromium	MG/KG	25	36.96
METALS	Cobalt	MG/KG	12	17.2
METALS	Iron	MG/KG	22000	36280
METALS	Magnesium	MG/KG	4000	6698
METALS	Manganese	MG/KG	830	1083
METALS	Nickel	MG/KG	21	39.3
METALS	Potassium	MG/KG	4200	5478
METALS	Thallium	MG/KG	0.42	0.86
METALS	Vanadium	MG/KG	53	72.5
METALS	Zinc	MG/KG	96	119.5

Notes:
(a) Max conc - Maximum detected concentration
(b) Screen Criteria are soil background screening levels

Table A-67

Metals In Surface Soil (0-6 Inches) At Northeast Boundary Area Excluded As PCOCs Based On Their Classification As Essential Nutrients Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Copper	MG/KG	110	30000
METALS	Selenium	MG/KG	1.8	750

Notes:
(a) Max conc - Maximum detected concentration
(b) Screen criterion based on the recommended daily allowance for the chemical (See Table 2-3)

Table A-68

Selection Of Potential Chemicals Of Concern In Sediment of Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
SVOC	1,2,4-Trichlorobenzene	MG/KG	4	0				0/4		ND	
SVOC	1,2-Dichlorobenzene	MG/KG	4	0				0/4		ND	
SVOC	1,3-Dichlorobenzene	MG/KG	4	0				0/4		ND	
SVOC	1,4-Dichlorobenzene	MG/KG	4	0				0/4		ND	
SVOC	2,2'-oxybis(1-Chloropropane)	MG/KG	4	0				0/4		ND	
SVOC	2,4,5-Trichlorophenol	MG/KG	4	0				0/4		ND	
SVOC	2,4,6-Trichlorophenol	MG/KG	4	0				0/4		ND	
SVOC	2,4-Dichlorophenol	MG/KG	4	0				0/4		ND	
SVOC	2,4-Dimethylphenol	MG/KG	4	0				0/4		ND	
SVOC	2,4-Dinitrophenol	MG/KG	4	0				0/4		ND	
SVOC	2,4-Dinitrotoluene	MG/KG	4	0				0/4		ND	
SVOC	2,6-Dinitrotoluene	MG/KG	4	0				0/4		ND	
SVOC	2-Chloronaphthalene	MG/KG	4	0				0/4		ND	
SVOC	2-Chlorophenol	MG/KG	4	0				0/4		ND	
SVOC	2-Methylnaphthalene	MG/KG	4	0				0/4		ND	
SVOC	2-Methylphenol	MG/KG	4	0				0/4		ND	
SVOC	2-Nitroaniline	MG/KG	4	0				0/4		ND	
SVOC	2-Nitrophenol	MG/KG	4	0				0/4		ND	
SVOC	3,3'-Dichlorobenzidine	MG/KG	4	0				0/4		ND	
SVOC	3-Nitroaniline	MG/KG	4	0				0/4		ND	
SVOC	4,6-Dinitro-2-methylphenol	MG/KG	4	0				0/4		ND	
SVOC	4-Bromophenyl-phenylether	MG/KG	4	0				0/4		ND	
SVOC	4-Chloro-3-methylphenol	MG/KG	4	0				0/4		ND	
SVOC	4-Chloroaniline	MG/KG	4	0				0/4		ND	
SVOC	4-Chlorophenyl-phenylether	MG/KG	4	0				0/4		ND	
SVOC	4-Methylphenol	MG/KG	4	1	0.154	0.154	0.22	1/4	25	PCOC	
SVOC	4-Nitroaniline	MG/KG	4	0				0/4		ND	
SVOC	4-Nitrophenol	MG/KG	4	0				0/4		ND	
SVOC	Acenaphthene	MG/KG	4	0				0/4		ND	
SVOC	Acenaphthylene	MG/KG	4	0				0/4		ND	
SVOC	Anthracene	MG/KG	4	0				0/4		ND	
SVOC	Benzo(a)anthracene	MG/KG	4	0				0/4		ND	

Table A-68

Selection Of Potential Chemicals Of Concern In Sediment of Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
SVOC	Benzo(a)pyrene	MG/KG	4	0				0/4		ND	
SVOC	Benzo(b)fluoranthene	MG/KG	4	0				0/4		ND	
SVOC	Benzo(g,h,i)perylene	MG/KG	4	0				0/4		ND	
SVOC	Benzo(k)fluoranthene	MG/KG	4	0				0/4		ND	
SVOC	Butylbenzylphthalate	MG/KG	4	0				0/4		ND	
SVOC	Carbazole	MG/KG	4	0				0/4		ND	
SVOC	Chrysene	MG/KG	4	0				0/4		ND	
SVOC	Di-n-butylphthalate	MG/KG	4	1	0.739	0.739	0.91	1/4	25	PCOC	
SVOC	Di-n-octylphthalate	MG/KG	4	0				0/4		ND	
SVOC	Dibenzo(a,h)anthracene	MG/KG	4	0				0/4		ND	
SVOC	Dibenzofuran	MG/KG	4	0				0/4		ND	
SVOC	Diethylphthalate	MG/KG	4	0				0/4		ND	
SVOC	Dimethylphthalate	MG/KG	4	0				0/4		ND	
SVOC	Fluoranthene	MG/KG	4	0				0/4		ND	
SVOC	Fluorene	MG/KG	4	0				0/4		ND	
SVOC	Hexachlorobenzene	MG/KG	4	0				0/4		ND	
SVOC	Hexachlorobutadiene	MG/KG	4	0				0/4		ND	
SVOC	Hexachlorocyclopentadiene	MG/KG	4	0				0/4		ND	
SVOC	Hexachloroethane	MG/KG	4	0				0/4		ND	
SVOC	Indeno(1,2,3-cd)pyrene	MG/KG	4	0				0/4		ND	
SVOC	Isophorone	MG/KG	4	0				0/4		ND	
SVOC	N-Nitroso-di-n-propylamine	MG/KG	4	0				0/4		ND	
SVOC	N-Nitrosodiphenylamine (1)	MG/KG	4	0				0/4		ND	
SVOC	Naphthalene	MG/KG	4	0				0/4		ND	
SVOC	Nitrobenzene	MG/KG	4	0				0/4		ND	
SVOC	Pentachlorophenol	MG/KG	4	0				0/4		ND	
SVOC	Phenanthrene	MG/KG	4	0				0/4		ND	
SVOC	Phenol	MG/KG	4	1	0.124	0.124	0.21	1/4	25	PCOC	
SVOC	Pyrene	MG/KG	4	0				0/4		ND	
SVOC	bis(2-Chloroethoxy)methane	MG/KG	4	0				0/4		ND	
SVOC	bis(2-Chloroethyl)ether	MG/KG	4	0				0/4		ND	
SVOC	bis(2-Ethylhexyl)phthalate	MG/KG	4	1	0.032	0.032	0.19	1/4	25	PCOC	

Table A-68

Selection Of Potential Chemicals Of Concern In Sediment of Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group(a)	Chemical	Units	Total(b)	# Hits(c)	Max conc(d)	Min conc(e)	Average conc(f)	Frequency(g)	% Hits	Exclusion Reason(h)	Screen Criteria
EXP	1,3,5-Trinitrobenzene	MG/KG	4	0				0/4		ND	
EXP	1,3-Dinitrobenzene	MG/KG	4	0				0/4		ND	
EXP	2,4,6-Trinitrotoluene	MG/KG	4	0				0/4		ND	
EXP	2,4-Dinitrotoluene	MG/KG	4	0				0/4		ND	
EXP	2,6-Dinitrotoluene	MG/KG	4	0				0/4		ND	
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	4	0				0/4		ND	
EXP	2-Nitrotoluene	MG/KG	4	0				0/4		ND	
EXP	3-Nitrotoluene	MG/KG	4	0				0/4		ND	
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	4	0				0/4		ND	
EXP	4-Nitrotoluene	MG/KG	4	0				0/4		ND	
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	4	0				0/4		ND	
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	4	0				0/4		ND	
EXP	Nitrobenzene	MG/KG	4	0				0/4		ND	
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	4	1	0.014	0.014	0.19	1/4	25	PCOC	
METALS	Aluminum	MG/KG	4	4	17200	1830	8500	4/4	100	BKG	24200
METALS	Antimony	MG/KG	4	0				0/4		ND	
METALS	Arsenic	MG/KG	4	3	8.9	2.5	4.4	3/4	75	BKG	11.4
METALS	Barium	MG/KG	4	4	280	33	140	4/4	100	BKG	393
METALS	Beryllium	MG/KG	4	2	0.9	0.6	0.51	2/4	50	BKG	1.17
METALS	Cadmium	MG/KG	4	0				0/4		ND	
METALS	Calcium	MG/KG	4	4	3970	821	2800	4/4	100	BKG	12100
METALS	Chromium	MG/KG	4	4	19.7	4.1	11	4/4	100	BKG	28.3
METALS	Cobalt	MG/KG	4	4	12.5	3.2	6.9	4/4	100	BKG	14.7
METALS	Copper	MG/KG	4	4	20.1	2.2	9.9	4/4	100	BKG	21.8
METALS	Iron	MG/KG	4	4	19700	2520	10000	4/4	100	BKG	27800
METALS	Lead	MG/KG	4	4	19	2.4	9.1	4/4	100	BKG	29.5
METALS	Magnesium	MG/KG	4	4	3610	469	2000	4/4	100	BKG	5670
METALS	Manganese	MG/KG	4	4	760	136	490	4/4	100	BKG	860
METALS	Mercury	MG/KG	4	0				0/4		ND	
METALS	Nickel	MG/KG	4	3	22.4	4.9	11	3/4	75	BKG	27.5
METALS	Potassium	MG/KG	4	4	4150	511	2000	4/4	100	BKG	5800
METALS	Selenium	MG/KG	4	0				0/4		ND	

Table A-68

Selection Of Potential Chemicals Of Concern In Sediment of Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
METALS	Silver	MG/KG	4	2	2.7	2.1	1.5	2/4	50	PCOC	
METALS	Sodium	MG/KG	4	4	275	53.5	200	4/4	100	RDA	1000000
METALS	Thallium	MG/KG	4	0				0/4		ND	
METALS	Vanadium	MG/KG	4	4	41.3	5	21	4/4	100	BKG	58
METALS	Zinc	MG/KG	4	4	92	20.1	52	4/4	100	BKG	95.3
VOC	1,1,1-Trichloroethane	MG/KG	4	0				0/4		ND	
VOC	1,1,2,2-Tetrachloroethane	MG/KG	4	0				0/4		ND	
VOC	1,1,2-Trichloroethane	MG/KG	4	0				0/4		ND	
VOC	1,1-Dichloroethane	MG/KG	4	0				0/4		ND	
VOC	1,1-Dichloroethene	MG/KG	4	0				0/4		ND	
VOC	1,2-Dichloroethane	MG/KG	4	0				0/4		ND	
VOC	1,2-Dichloropropane	MG/KG	4	0				0/4		ND	
VOC	2-Butanone	MG/KG	4	0				0/4		ND	
VOC	2-Hexanone	MG/KG	4	0				0/4		ND	
VOC	4-Methyl-2-Pentanone	MG/KG	4	0				0/4		ND	
VOC	Acetone	MG/KG	4	0				0/4		ND	
VOC	Benzene	MG/KG	4	0				0/4		ND	
VOC	Bromodichloromethane	MG/KG	4	0				0/4		ND	
VOC	Bromoform	MG/KG	4	0				0/4		ND	
VOC	Bromomethane	MG/KG	4	0				0/4		ND	
VOC	Carbon Disulfide	MG/KG	4	0				0/4		ND	
VOC	Carbon Tetrachloride	MG/KG	4	0				0/4		ND	
VOC	Chlorobenzene	MG/KG	4	0				0/4		ND	
VOC	Chloroethane	MG/KG	4	0				0/4		ND	
VOC	Chloroform	MG/KG	4	0				0/4		ND	
VOC	Chloromethane	MG/KG	4	0				0/4		ND	
VOC	Dibromochloromethane	MG/KG	4	0				0/4		ND	
VOC	Ethylbenzene	MG/KG	4	0				0/4		ND	
VOC	M/P-Xylenes	MG/KG	4	0				0/4		ND	
VOC	Methylene Chloride	MG/KG	4	0				0/4		ND	
VOC	O-Xylene	MG/KG	4	0				0/4		ND	
VOC	Styrene	MG/KG	4	0				0/4		ND	

Table A-68

Selection Of Potential Chemicals Of Concern In Sediment of Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
VOC	Tetrachloroethene	MG/KG	4	0				0/4		ND	
VOC	Toluene	MG/KG	4	0				0/4		ND	
VOC	Trichloroethene	MG/KG	4	0				0/4		ND	
VOC	Vinyl Chloride	MG/KG	4	0				0/4		ND	
VOC	cis-1,2-Dichloroethene	MG/KG	4	0				0/4		ND	
VOC	cis-1,3-Dichloropropene	MG/KG	4	0				0/4		ND	
VOC	trans-1,2-Dichloroethene	MG/KG	4	0				0/4		ND	
VOC	trans-1,3-Dichloropropene	MG/KG	4	0				0/4		ND	

Notes:

(a) EXP - Explosive
METALS - Metals
SVOC - Semi-volatile organic compound
VOC - Volatile organic compound

(b) Total - Total number of samples

(c) # Hits - The number of samples where the chemical was detected.

(d) Max conc - Maximum detected concentration

(e) Min conc - Minimum detected concentration

(f) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample, one-half of the laboratory detection limit was used in the calculation of the average.

(g) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(h) Exclusion Reason - Indicates whether a chemical was retained as a potential chemical of concern (PCOC) or was excluded based of the following sequence of criteria: not-detected(ND), below background (BKG), below levels based on recommended daily allowances (RDA), frequency of detection less than 5 percent (FREQ). Note that once a chemical was excluded based on one criterion it was not further compared to other criteria (e.g., chemical excluded because it was ND was not compared to BKG, a chemical excluded because of BKG was not compared to RDA). Those chemicals excluded because of FREQ were additionally compared to the PRGs to identify potential hot spots.

Table A-69

Chemicals Not Detected In
Sediment of Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	1,3,5-Trinitrobenzene
EXP	1,3-Dinitrobenzene
EXP	2,4,6-Trinitrotoluene
EXP	2,4-Dinitrotoluene
EXP	2,6-Dinitrotoluene
EXP	2-Amino-4,6-dinitrotoluene
EXP	2-Nitrotoluene
EXP	3-Nitrotoluene
EXP	4-Amino-2,6-dinitrotoluene
EXP	4-Nitrotoluene
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine
EXP	Methyl-2,4,6-trinitrophenylnitramine
EXP	Nitrobenzene
METALS	Antimony
METALS	Cadmium
METALS	Mercury
METALS	Selenium
METALS	Thallium
SVOC	1,2,4-Trichlorobenzene
SVOC	1,2-Dichlorobenzene
SVOC	1,3-Dichlorobenzene
SVOC	1,4-Dichlorobenzene
SVOC	2,2'-oxybis(1-Chloropropane)
SVOC	2,4,5-Trichlorophenol
SVOC	2,4,6-Trichlorophenol
SVOC	2,4-Dichlorophenol
SVOC	2,4-Dimethylphenol
SVOC	2,4-Dinitrophenol
SVOC	2,4-Dinitrotoluene
SVOC	2,6-Dinitrotoluene
SVOC	2-Chloronaphthalene
SVOC	2-Chlorophenol
SVOC	2-Methylnaphthalene
SVOC	2-Methylphenol
SVOC	2-Nitroaniline
SVOC	2-Nitrophenol
SVOC	3,3'-Dichlorobenzidine
SVOC	3-Nitroaniline
SVOC	4,6-Dinitro-2-methylphenol
SVOC	4-Bromophenyl-phenylether
SVOC	4-Chloro-3-methylphenol
SVOC	4-Chloroaniline

Table A-69

Chemicals Not Detected In
Sediment of Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
SVOC	4-Chlorophenyl-phenylether
SVOC	4-Nitroaniline
SVOC	4-Nitrophenol
SVOC	Acenaphthene
SVOC	Acenaphthylene
SVOC	Anthracene
SVOC	Benzo(a)anthracene
SVOC	Benzo(a)pyrene
SVOC	Benzo(b)fluoranthene
SVOC	Benzo(g,h,i)perylene
SVOC	Benzo(k)fluoranthene
SVOC	bis(2-Chloroethoxy)methane
SVOC	bis(2-Chloroethyl)ether
SVOC	Butylbenzylphthalate
SVOC	Carbazole
SVOC	Chrysene
SVOC	Dibenzo(a,h)anthracene
SVOC	Dibenzofuran
SVOC	Diethylphthalate
SVOC	Dimethylphthalate
SVOC	Di-n-octylphthalate
SVOC	Fluoranthene
SVOC	Fluorene
SVOC	Hexachlorobenzene
SVOC	Hexachlorobutadiene
SVOC	Hexachlorocyclopentadiene
SVOC	Hexachloroethane
SVOC	Indeno(1,2,3-cd)pyrene
SVOC	Isophorone
SVOC	Naphthalene
SVOC	Nitrobenzene
SVOC	N-Nitroso-di-n-propylamine
SVOC	N-Nitrosodiphenylamine (1)
SVOC	Pentachlorophenol
SVOC	Phenanthrene
SVOC	Pyrene
VOC	1,1,1-Trichloroethane
VOC	1,1,2,2-Tetrachloroethane
VOC	1,1,2-Trichloroethane
VOC	1,1-Dichloroethane
VOC	1,1-Dichloroethene
VOC	1,2-Dichloroethane

Table A-69

Chemicals Not Detected In
Sediment of Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
VOC	1,2-Dichloropropane
VOC	2-Butanone
VOC	2-Hexanone
VOC	4-Methyl-2-Pentanone
VOC	Acetone
VOC	Benzene
VOC	Bromodichloromethane
VOC	Bromoform
VOC	Bromomethane
VOC	Carbon Disulfide
VOC	Carbon Tetrachloride
VOC	Chlorobenzene
VOC	Chloroethane
VOC	Chloroform
VOC	Chloromethane
VOC	cis-1,2-Dichloroethene
VOC	cis-1,3-Dichloropropene
VOC	Dibromochloromethane
VOC	Ethylbenzene
VOC	M/P-Xylenes
VOC	Methylene Chloride
VOC	O-Xylene
VOC	Styrene
VOC	Tetrachloroethene
VOC	Toluene
VOC	trans-1,2-Dichloroethene
VOC	trans-1,3-Dichloropropene
VOC	Trichloroethene
VOC	Vinyl Chloride

Table A-70

Metals In Sediment of Johnson/Clear Creeks Excluded As PCOCs
Based On Comparison To Background Concentrations
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[(a)]	Screen Criteria[(b)]
METALS	Aluminum	MG/KG	17200	24200
METALS	Arsenic	MG/KG	8.9	11.4
METALS	Barium	MG/KG	280	393
METALS	Beryllium	MG/KG	0.9	1.17
METALS	Calcium	MG/KG	3970	12100
METALS	Chromium	MG/KG	19.7	28.3
METALS	Cobalt	MG/KG	12.5	14.7
METALS	Copper	MG/KG	20.1	21.8
METALS	Iron	MG/KG	19700	27800
METALS	Lead	MG/KG	19	29.5
METALS	Magnesium	MG/KG	3610	5670
METALS	Manganese	MG/KG	760	860
METALS	Nickel	MG/KG	22.4	27.5
METALS	Potassium	MG/KG	4150	5800
METALS	Vanadium	MG/KG	41.3	58
METALS	Zinc	MG/KG	92	95.3

Notes:
(a) Max conc - Maximum detected concentration
(b) Screen Criteria are soil background screening levels

Table A-71

Metals In Sediment of Johnson/Clear Creeks Excluded As PCOCs Based On Their Classification As Essential Nutrients Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[(a)]	Screen Criteria[(b)]
METALS	Sodium	MG/KG	275	1000000

Notes:

(a) Max conc - Maximum detected concentration

(b) Screen criterial based on the recommended daily allowance for the chemical (See Table 2-3)

Table A-72

Potential Chemicals Of Concern (PCOCs) In Sediment of Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
SVOC	1,2,4-Trichlorobenzene	MG/KG	2	0				0/2	0	ND	
SVOC	1,2-Dichlorobenzene	MG/KG	2	0				0/2	0	ND	
SVOC	1,3-Dichlorobenzene	MG/KG	2	0				0/2	0	ND	
SVOC	1,4-Dichlorobenzene	MG/KG	2	0				0/2	0	ND	
SVOC	2,2'-oxybis(1-Chloropropane)	MG/KG	2	0				0/2	0	ND	
SVOC	2,4,5-Trichlorophenol	MG/KG	2	0				0/2	0	ND	
SVOC	2,4,6-Trichlorophenol	MG/KG	2	0				0/2	0	ND	
SVOC	2,4-Dichlorophenol	MG/KG	2	0				0/2	0	ND	
SVOC	2,4-Dimethylphenol	MG/KG	2	0				0/2	0	ND	
SVOC	2,4-Dinitrophenol	MG/KG	2	0				0/2	0	ND	
SVOC	2,4-Dinitrotoluene	MG/KG	2	0				0/2	0	ND	
SVOC	2,6-Dinitrotoluene	MG/KG	2	0				0/2	0	ND	
SVOC	2-Chloronaphthalene	MG/KG	2	0				0/2	0	ND	
SVOC	2-Chlorophenol	MG/KG	2	0				0/2	0	ND	
SVOC	2-Methylnaphthalene	MG/KG	2	0				0/2	0	ND	
SVOC	2-Methylphenol	MG/KG	2	0				0/2	0	ND	
SVOC	2-Nitroaniline	MG/KG	2	0				0/2	0	ND	
SVOC	2-Nitrophenol	MG/KG	2	0				0/2	0	ND	
SVOC	3,3'-Dichlorobenzidine	MG/KG	2	0				0/2	0	ND	
SVOC	3-Nitroaniline	MG/KG	2	0				0/2	0	ND	
SVOC	4,6-Dinitro-2-methylphenol	MG/KG	2	0				0/2	0	ND	
SVOC	4-Bromophenyl-phenylether	MG/KG	2	0				0/2	0	ND	
SVOC	4-Chloro-3-methylphenol	MG/KG	2	0				0/2	0	ND	
SVOC	4-Chloroaniline	MG/KG	2	0				0/2	0	ND	
SVOC	4-Chlorophenyl-phenylether	MG/KG	2	0				0/2	0	ND	
SVOC	4-Methylphenol	MG/KG	2	1	2.444	2.444	1.4	1/2	50	PCOC	
SVOC	4-Nitroaniline	MG/KG	2	0				0/2	0	ND	
SVOC	4-Nitrophenol	MG/KG	2	0				0/2	0	ND	
SVOC	Acenaphthene	MG/KG	2	0				0/2	0	ND	
SVOC	Acenaphthylene	MG/KG	2	0				0/2	0	ND	
SVOC	Anthracene	MG/KG	2	0				0/2	0	ND	
SVOC	Benzo(a)anthracene	MG/KG	2	0				0/2	0	ND	
SVOC	Benzo(a)pyrene	MG/KG	2	0				0/2	0	ND	

Table A-72

Potential Chemicals Of Concern (PCOCs) In Sediment of Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
SVOC	Benzo(b)fluoranthene	MG/KG	2	0				0/2	0	ND	
SVOC	Benzo(g,h,i)perylene	MG/KG	2	0				0/2	0	ND	
SVOC	Benzo(k)fluoranthene	MG/KG	2	0				0/2	0	ND	
SVOC	Butylbenzylphthalate	MG/KG	2	0				0/2	0	ND	
SVOC	Carbazole	MG/KG	2	0				0/2	0	ND	
SVOC	Chrysene	MG/KG	2	0				0/2	0	ND	
SVOC	Di-n-butylphthalate	MG/KG	2	1	0.575	0.575	0.43	1/2	50	PCOC	
SVOC	Di-n-octylphthalate	MG/KG	2	0				0/2	0	ND	
SVOC	Dibenzo(a,h)anthracene	MG/KG	2	0				0/2	0	ND	
SVOC	Dibenzofuran	MG/KG	2	0				0/2	0	ND	
SVOC	Diethylphthalate	MG/KG	2	0				0/2	0	ND	
SVOC	Dimethylphthalate	MG/KG	2	0				0/2	0	ND	
SVOC	Fluoranthene	MG/KG	2	0				0/2	0	ND	
SVOC	Fluorene	MG/KG	2	0				0/2	0	ND	
SVOC	Hexachlorobenzene	MG/KG	2	0				0/2	0	ND	
SVOC	Hexachlorobutadiene	MG/KG	2	0				0/2	0	ND	
SVOC	Hexachlorocyclopentadiene	MG/KG	2	0				0/2	0	ND	
SVOC	Hexachloroethane	MG/KG	2	0				0/2	0	ND	
SVOC	Indeno(1,2,3-cd)pyrene	MG/KG	2	0				0/2	0	ND	
SVOC	Isophorone	MG/KG	2	0				0/2	0	ND	
SVOC	N-Nitroso-di-n-propylamine	MG/KG	2	0				0/2	0	ND	
SVOC	N-Nitrosodiphenylamine (1)	MG/KG	2	0				0/2	0	ND	
SVOC	Naphthalene	MG/KG	2	0				0/2	0	ND	
SVOC	Nitrobenzene	MG/KG	2	0				0/2	0	ND	
SVOC	Pentachlorophenol	MG/KG	2	0				0/2	0	ND	
SVOC	Phenanthrene	MG/KG	2	0				0/2	0	ND	
SVOC	Phenol	MG/KG	2	0				0/2	0	ND	
SVOC	Pyrene	MG/KG	2	1	0.107	0.107	0.18	1/2	50	PCOC	
SVOC	bis(2-Chloroethoxy)methane	MG/KG	2	0				0/2	0	ND	
SVOC	bis(2-Chloroethyl)ether	MG/KG	2	0				0/2	0	ND	
SVOC	bis(2-Ethylhexyl)phthalate	MG/KG	2	0				0/2	0	ND	
EXP	1,3,5-Trinitrobenzene	MG/KG	2	0				0/2	0	ND	
EXP	1,3-Dinitrobenzene	MG/KG	2	0				0/2	0	ND	

Table A-72

Potential Chemicals Of Concern (PCOCs) In Sediment of Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
EXP	2,4,6-Trinitrotoluene	MG/KG	2	0				0/2	0	ND	
EXP	2,4-Dinitrotoluene	MG/KG	2	0				0/2	0	ND	
EXP	2,6-Dinitrotoluene	MG/KG	2	0				0/2	0	ND	
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	2	0				0/2	0	ND	
EXP	2-Nitrotoluene	MG/KG	2	0				0/2	0	ND	
EXP	3-Nitrotoluene	MG/KG	2	0				0/2	0	ND	
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	2	0				0/2	0	ND	
EXP	4-Nitrotoluene	MG/KG	2	0				0/2	0	ND	
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	2	0				0/2	0	ND	
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	2	0				0/2	0	ND	
EXP	Nitrobenzene	MG/KG	2	0				0/2	0	ND	
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	2	0				0/2	0	ND	
METALS	Aluminum	MG/KG	2	2	10000	8080	9000	2/2	100	BKG	33852
METALS	Antimony	MG/KG	2	0				0/2	0	ND	
METALS	Arsenic	MG/KG	2	2	6.9	5.4	6.2	2/2	100	BKG	13.5
METALS	Barium	MG/KG	2	2	237	177	210	2/2	100	BKG	440
METALS	Beryllium	MG/KG	2	0				0/2	0	BKG	1.52
METALS	Cadmium	MG/KG	2	0				0/2	0	BKG	0.4
METALS	Calcium	MG/KG	2	2	6400	3160	4800	2/2	100	RDA	1000000
METALS	Chromium	MG/KG	2	2	12.8	9.7	11	2/2	100	RDA	2000
METALS	Cobalt	MG/KG	2	2	6.5	4.9	5.7	2/2	100	BKG	17.2
METALS	Copper	MG/KG	2	2	14.1	10.9	13	2/2	100	RDA	30000
METALS	Iron	MG/KG	2	2	14500	12100	13000	2/2	100	BKG	36300
METALS	Lead	MG/KG	2	2	11.3	9.1	10	2/2	100	BKG	29
METALS	Magnesium	MG/KG	2	2	3020	2130	2600	2/2	100	BKG	6700
METALS	Manganese	MG/KG	2	2	896	506	700	2/2	100	BKG	1083
METALS	Mercury	MG/KG	2	0				0/2		ND	
METALS	Nickel	MG/KG	2	2	16.1	11.6	14	2/2	100	BKG	39.3
METALS	Potassium	MG/KG	2	2	2220	1730	2000	2/2	100	BKG	5480
METALS	Selenium	MG/KG	2	2	2.2	2	2.1	2/2	100	RDA	750
METALS	Silver	MG/KG	2	2	2.3	2.2	2.3	2/2	100	PCOC	
METALS	Sodium	MG/KG	2	2	286	133	210	2/2	100	RDA	1000000
METALS	Thallium	MG/KG	2	0				0/2		BKG	1.72

Table A-72

Potential Chemicals Of Concern (PCOCs) In Sediment of Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
METALS	Vanadium	MG/KG	2	2	23.2	18	21	2/2	100	BKG	72.5
METALS	Zinc	MG/KG	2	2	58.5	45.8	52	2/2	100	RDA	190000
VOC	1,1,1-Trichloroethane	MG/KG	2	0				0/2	0	ND	
VOC	1,1,2,2-Tetrachloroethane	MG/KG	2	0				0/2	0	ND	
VOC	1,1,2-Trichloroethane	MG/KG	2	0				0/2	0	ND	
VOC	1,1-Dichloroethane	MG/KG	2	0				0/2	0	ND	
VOC	1,1-Dichloroethene	MG/KG	2	0				0/2	0	ND	
VOC	1,2-Dichloroethane	MG/KG	2	0				0/2	0	ND	
VOC	1,2-Dichloropropane	MG/KG	2	0				0/2	0	ND	
VOC	2-Butanone	MG/KG	2	0				0/2	0	ND	
VOC	2-Hexanone	MG/KG	2	0				0/2	0	ND	
VOC	4-Methyl-2-Pentanone	MG/KG	2	0				0/2	0	ND	
VOC	Acetone	MG/KG	2	1	0.043	0.043	0.026	1/2	50	PCOC	
VOC	Benzene	MG/KG	2	0				0/2	0	ND	
VOC	Bromodichloromethane	MG/KG	2	0				0/2	0	ND	
VOC	Bromoform	MG/KG	2	0				0/2	0	ND	
VOC	Bromomethane	MG/KG	2	0				0/2	0	ND	
VOC	Carbon Disulfide	MG/KG	2	0				0/2	0	ND	
VOC	Carbon Tetrachloride	MG/KG	2	0				0/2	0	ND	
VOC	Chlorobenzene	MG/KG	2	0				0/2	0	ND	
VOC	Chloroethane	MG/KG	2	0				0/2	0	ND	
VOC	Chloroform	MG/KG	2	0				0/2	0	ND	
VOC	Chloromethane	MG/KG	2	0				0/2	0	ND	
VOC	Dibromochloromethane	MG/KG	2	0				0/2	0	ND	
VOC	Ethylbenzene	MG/KG	2	0				0/2	0	ND	
VOC	M/P-Xylenes	MG/KG	2	0				0/2	0	ND	
VOC	Methylene Chloride	MG/KG	2	0				0/2	0	ND	
VOC	O-Xylene	MG/KG	2	0				0/2	0	ND	
VOC	Styrene	MG/KG	2	0				0/2	0	ND	
VOC	Tetrachloroethene	MG/KG	2	0				0/2	0	ND	
VOC	Toluene	MG/KG	2	1	0.246	0.246	0.13	1/2	50	PCOC	
VOC	Trichloroethene	MG/KG	2	0				0/2	0	ND	
VOC	Vinyl Chloride	MG/KG	2	0				0/2	0	ND	

Table A-72

Potential Chemicals Of Concern (PCOCs) In Sediment of Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
VOC	cis-1,2-Dichloroethene	MG/KG	2	0				0/2	0	ND	
VOC	cis-1,3-Dichloropropene	MG/KG	2	0				0/2	0	ND	
VOC	trans-1,2-Dichloroethene	MG/KG	2	0				0/2	0	ND	
VOC	trans-1,3-Dichloropropene	MG/KG	2	0				0/2	0	ND	

Notes:

(a) EXP - Explosive
METALS - Metals
SVOC - Semi-volatile organic compound
VOC - Volatile organic compound

(b) Total - Total number of samples

(c) # Hits - The number of samples where the chemical was detected.

(d) Max conc - Maximum detected concentration

(e) Min conc - Minimum detected concentration

(f) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample, one-half of the laboratory detection limit was used in the calculation of the average.

(g) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(h) Exclusion Reason - Indicates whether a chemical was retained as a potential chemical of concern (PCOC) or was excluded based of the following sequence of criteria: not-detected(ND), below background (BKG), below levels based on recommended daily allowances (RDA), frequency of detection less than 5 percent (FREQ). Note that once a chemical was excluded based on one criterion it was not further compared to other criteria (e.g., chemical excluded because it was ND was not compared to BKG, a chemical excluded because of BKG was not compared to RDA). Those chemicals excluded because of FREQ were additionally compared to the PRGs to identify potential hot spots.

Table A-73

Chemicals Not Detected In Sediment of Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
SVOC	1,2,4-Trichlorobenzene
SVOC	1,2-Dichlorobenzene
SVOC	1,3-Dichlorobenzene
SVOC	1,4-Dichlorobenzene
SVOC	2,2'-oxybis(1-Chloropropane)
SVOC	2,4,5-Trichlorophenol
SVOC	2,4,6-Trichlorophenol
SVOC	2,4-Dichlorophenol
SVOC	2,4-Dimethylphenol
SVOC	2,4-Dinitrophenol
SVOC	2,4-Dinitrotoluene
SVOC	2,6-Dinitrotoluene
SVOC	2-Chloronaphthalene
SVOC	2-Chlorophenol
SVOC	2-Methylnaphthalene
SVOC	2-Methylphenol
SVOC	2-Nitroaniline
SVOC	2-Nitrophenol
SVOC	3,3'-Dichlorobenzidine
SVOC	3-Nitroaniline
SVOC	4,6-Dinitro-2-methylphenol
SVOC	4-Bromophenyl-phenylether
SVOC	4-Chloro-3-methylphenol
SVOC	4-Chloroaniline
SVOC	4-Chlorophenyl-phenylether
SVOC	4-Nitroaniline
SVOC	4-Nitrophenol
SVOC	Acenaphthene
SVOC	Acenaphthylene
SVOC	Anthracene
SVOC	Benzo(a)anthracene
SVOC	Benzo(a)pyrene
SVOC	Benzo(b)fluoranthene
SVOC	Benzo(g,h,i)perylene
SVOC	Benzo(k)fluoranthene
SVOC	Butylbenzylphthalate
SVOC	Carbazole
SVOC	Chrysene
SVOC	Di-n-octylphthalate
SVOC	Dibenzo(a,h)anthracene
SVOC	Dibenzofuran
SVOC	Diethylphthalate
SVOC	Dimethylphthalate
SVOC	Fluoranthene

Table A-73

Chemicals Not Detected In Sediment of Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
SVOC	Fluorene
SVOC	Hexachlorobenzene
SVOC	Hexachlorobutadiene
SVOC	Hexachlorocyclopentadiene
SVOC	Hexachloroethane
SVOC	Indeno(1,2,3-cd)pyrene
SVOC	Isophorone
SVOC	N-Nitroso-di-n-propylamine
SVOC	N-Nitrosodiphenylamine (1)
SVOC	Naphthalene
SVOC	Nitrobenzene
SVOC	Pentachlorophenol
SVOC	Phenanthrene
SVOC	Phenol
SVOC	bis(2-Chloroethoxy)methane
SVOC	bis(2-Chloroethyl)ether
SVOC	bis(2-Ethylhexyl)phthalate
EXP	1,3,5-Trinitrobenzene
EXP	1,3-Dinitrobenzene
EXP	2,4,6-Trinitrotoluene
EXP	2,4-Dinitrotoluene
EXP	2,6-Dinitrotoluene
EXP	2-Amino-4,6-dinitrotoluene
EXP	2-Nitrotoluene
EXP	3-Nitrotoluene
EXP	4-Amino-2,6-dinitrotoluene
EXP	4-Nitrotoluene
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine
EXP	Methyl-2,4,6-trinitrophenylnitramine
EXP	Nitrobenzene
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
METALS	Antimony
METALS	Beryllium
METALS	Cadmium
METALS	Mercury
METALS	Thallium
VOC	1,1,1-Trichloroethane
VOC	1,1,2,2-Tetrachloroethane
VOC	1,1,2-Trichloroethane
VOC	1,1-Dichloroethane
VOC	1,1-Dichloroethene
VOC	1,2-Dichloroethane
VOC	1,2-Dichloropropane

Table A-73

Chemicals Not Detected In Sediment of Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
VOC	2-Butanone
VOC	2-Hexanone
VOC	4-Methyl-2-Pentanone
VOC	Benzene
VOC	Bromodichloromethane
VOC	Bromoform
VOC	Bromomethane
VOC	Carbon Disulfide
VOC	Carbon Tetrachloride
VOC	Chlorobenzene
VOC	Chloroethane
VOC	Chloroform
VOC	Chloromethane
VOC	Dibromochloromethane
VOC	Ethylbenzene
VOC	M/P-Xylenes
VOC	Methylene Chloride
VOC	O-Xylene
VOC	Styrene
VOC	Tetrachloroethene
VOC	Trichloroethene
VOC	Vinyl Chloride
VOC	cis-1,2-Dichloroethene
VOC	cis-1,3-Dichloropropene
VOC	trans-1,2-Dichloroethene
VOC	trans-1,3-Dichloropropene

Table A-74

Metals In Sediment of Silver Creek Excluded As PCOCs
Based On Comparison To Background Concentrations
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Aluminum	MG/KG	10000	33852
METALS	Arsenic	MG/KG	6.9	13.5
METALS	Barium	MG/KG	237	440
METALS	Beryllium	MG/KG		1.52
METALS	Cadmium	MG/KG		0.4
METALS	Chromium	MG/KG	12.8	37
METALS	Cobalt	MG/KG	6.5	17.2
METALS	Copper	MG/KG	14.1	33.9
METALS	Iron	MG/KG	14500	36300
METALS	Lead	MG/KG	11.3	29
METALS	Magnesium	MG/KG	3020	6700
METALS	Manganese	MG/KG	896	1083
METALS	Nickel	MG/KG	16.1	39.3
METALS	Potassium	MG/KG	2220	5480
METALS	Thallium	MG/KG		1.72
METALS	Vanadium	MG/KG	23.2	72.5
METALS	Zinc	MG/KG	58.5	119.5

Notes:

(a) Max conc - Maximum detected concentration

(b) Screen Criteria are soil background screening levels

Table A-75

Metals In Sediment of Silver Creek Excluded As PCOCs Based On Their Classification As Essential Nutrients Former Nebraska Ordnanace Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[(a)]	Screen Criteria[(b)]
METALS	Calcium	MG/KG	6400	1000000
METALS	Chromium	MG/KG	12.8	2000
METALS	Copper	MG/KG	14.1	30000
METALS	Selenium	MG/KG	2.2	750
METALS	Sodium	MG/KG	286	1000000
METALS	Zinc	MG/KG	58.5	190000

Notes:

METALS - Metals

(a) Max conc - Maximum detected concentration

(b) Screen criterion based on the recommended daily allowance for the chemical (See Table 2-3)

Table A-76

Potential Chemicals Of Concern (PCOCs) In Sediment Of NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
EXP	1,3,5-Trinitrobenzene	MG/KG	5	0				0/5	0	ND	
EXP	1,3-Dinitrobenzene	MG/KG	5	0				0/5	0	ND	
EXP	2,4,6-Trinitrotoluene	MG/KG	5	0				0/5	0	ND	
EXP	2,4-Dinitrotoluene	MG/KG	5	0				0/5	0	ND	
EXP	2,6-Dinitrotoluene	MG/KG	5	0				0/5	0	ND	
EXP	2-Amino-4,6-dinitrotoluene	MG/KG	5	0				0/5	0	ND	
EXP	2-Nitrotoluene	MG/KG	5	0				0/5	0	ND	
EXP	3-Nitrotoluene	MG/KG	5	0				0/5	0	ND	
EXP	4-Amino-2,6-dinitrotoluene	MG/KG	5	0				0/5	0	ND	
EXP	4-Nitrotoluene	MG/KG	5	0				0/5	0	ND	
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine	MG/KG	5	0				0/5	0	ND	
EXP	Methyl-2,4,6-trinitrophenylnitramine	MG/KG	5	0				0/5	0	ND	
EXP	Nitrobenzene	MG/KG	5	1	0.074	0.074	0.057	1/5	20	PCOC	
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	MG/KG	5	0				0/5	0	ND	
METALS	Aluminum	MG/KG	5	5	47000	21000	36000	5/5	100	PCOC	
METALS	Antimony	MG/KG	5	0				0/5	0	ND	
METALS	Arsenic	MG/KG	5	5	12	8.2	11	5/5	100	BKG	13.5
METALS	Barium	MG/KG	5	5	450	260	380	5/5	100	PCOC	
METALS	Beryllium	MG/KG	5	5	1.9	1.0	1.5	5/5	100	PCOC	
METALS	Cadmium	MG/KG	5	5	0.61	0.19	0.43	5/5	100	PCOC	
METALS	Calcium	MG/KG	5	5	14000	6400	9500	5/5	100	RDA	1000000
METALS	Chromium	MG/KG	5	5	48	23	37	5/5	100	RDA	2000
METALS	Cobalt	MG/KG	5	5	15	8.6	12	5/5	100	BKG	17.2
METALS	Copper	MG/KG	5	5	35	20	29	5/5	100	RDA	30000
METALS	Iron	MG/KG	5	5	40000	24000	33000	5/5	100	RDA	300000
METALS	Lead	MG/KG	5	5	30	17	26	5/5	100	PCOC	
METALS	Magnesium	MG/KG	5	5	8400	4900	6800	5/5	100	RDA	1000000
METALS	Manganese	MG/KG	5	5	820	560	670	5/5	100	RDA	50000
METALS	Mercury	MG/KG	5	0				0/5	0	ND	
METALS	Nickel	MG/KG	5	5	42	27	35	5/5	100	PCOC	
METALS	Potassium	MG/KG	5	5	9400	4700	7200	5/5	100	RDA	1000000
METALS	Selenium	MG/KG	5	4	1.9	1.3	1.5	4/5	80	RDA	750
METALS	Silver	MG/KG	5	0				0/5	0	ND	

Table A-76

Potential Chemicals Of Concern (PCOCs) In Sediment Of NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska

Group[a]	Chemical	Units	Total[b]	# Hits[c]	Max conc[d]	Min conc[e]	Average conc[f]	Frequency[g]	% Hits	Exclusion Reason[h]	Screen Criteria
METALS	Sodium	MG/KG	5	5	330	160	250	5/5	100	RDA	1000000
METALS	Thallium	MG/KG	5	5	0.57	0.31	0.47	5/5	100	BKG	0.86
METALS	Vanadium	MG/KG	5	5	100	40	78	5/5	100	PCOC	
METALS	Zinc	MG/KG	5	5	140	83	120	5/5	100	RDA	190000

Notes:

(a) EXP - Explosive
METALS - Metals

(b) Total - Total number of samples

(c) # Hits - The number of samples where the chemical was detected.

(d) Max conc - Maximum detected concentration

(e) Min conc - Minimum detected concentration

(f) Average conc - Arithmetic mean concentration in the designated media. When the concentration of a chemical was reported below laboratory detection limit in a sample, one-half of the laboratory detection limit was used in the calculation of the average.

(g) Frequency - Frequency of detection reported as A/B where A represents the number of samples where the chemical was detected and B represents the total number of samples analyzed at individual sampling locations.

(h) Exclusion Reason - Indicates whether a chemical was retained as a potential chemical of concern (PCOC) or was excluded based of the following sequence of criteria: not-detected(ND), below background (BKG), below levels based on recommended daily allowances (RDA), frequency of detection less than 5 percent (FREQ). Note that once a chemical was excluded based on one criterion it was not further compared to other criteria (e.g., chemical excluded because it was ND was not compared to BKG, a chemical excluded because of BKG was not compared to RDA). Those chemicals excluded because of FREQ were additionally compared to the PRGs to identify potential hot spots.

Table A-77

Chemicals Not Detected In Sediment of NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical
EXP	1,3,5-Trinitrobenzene
EXP	1,3-Dinitrobenzene
EXP	2,4,6-Trinitrotoluene
EXP	2,4-Dinitrotoluene
EXP	2,6-Dinitrotoluene
EXP	2-Amino-4,6-dinitrotoluene
EXP	2-Nitrotoluene
EXP	3-Nitrotoluene
EXP	4-Amino-2,6-dinitrotoluene
EXP	4-Nitrotoluene
EXP	Hexahydro-1,3,5-trinitro-1,3,5-triazine
EXP	Methyl-2,4,6-trinitrophenylnitramine
EXP	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
METALS	Antimony
METALS	Mercury
METALS	Silver

Table A-78

Metals In Sediment of NRD Resevoir Excluded As PCOCs
Based On Comparison To Background Concentrations
Former Nebraska Ordnance Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[a]	Screen Criteria[b]
METALS	Arsenic	MG/KG	12.0	13.5
METALS	Cobalt	MG/KG	15.0	17.2
METALS	Thallium	MG/KG	0.57	0.86

Notes:

(a) Max conc - Maximum detected concentration

(b) Screen Criteria are soil background screening levels

Table A-79

Metals In Sediment of NRD Resevoir Excluded As PCOCs Based On Their Classification As Essential Nutrients Former Nebraska Ordnanace Plant, Mead, Nebraska

Group	Chemical	Units	Max conc[(a)]	Screen Criteria[(b)]
METALS	Calcium	MG/KG	14000	1000000
METALS	Chromium	MG/KG	48	2000
METALS	Copper	MG/KG	35	30000
METALS	Iron	MG/KG	40000	300000
METALS	Magnesium	MG/KG	8400	1000000
METALS	Manganese	MG/KG	820	50000
METALS	Potassium	MG/KG	9400	1000000
METALS	Selenium	MG/KG	1.9	750
METALS	Sodium	MG/KG	330	1000000
METALS	Zinc	MG/KG	140	190000

Notes:

METALS - Metals

(a) Max conc - Maximum detected concentration

(b) Screen criterion based on the recommended daily allowance for the chemical (See Table 2-3)

Appendix B

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For much of its history, the former Nebraska Ordnance Plant (NOP) near Mead, Nebraska (Site) was a loading, assembly and packing facility for bombs, boosters, and shells. The Site has been divided into three Operable Units (OU1, OU2, and OU3) under the Interagency Agreement (IAG) dated January 30, 1992, between the U.S. Department of the Army, the U.S. Environmental Protection Agency (EPA), Region VII, and the Nebraska Department of Environmental Quality (NDEQ). OU1 includes explosives contaminated soils within the upper 4 feet; OU2 includes groundwater as well as explosives-contaminated soil (exclusive of those addressed by OU1) which may be a contributing source of groundwater contamination; and OU3 includes other areas at the Site not addressed under OU1 or OU2. This report presents the Ecological Risk Assessment (ERA) portion of the Baseline Risk Assessment (BRA) for OU3.

1.1 PURPOSE

The purpose of a BRA, as defined by EPA, is to "provide a framework for developing the risk information necessary to assist decision making at remedial sites" (EPA, 1989a). This ERA utilizes existing data and data collected as part of the OU3 Remedial Investigation (RI) to identify the potential for ecological risk to receptors due to exposure to Site-related chemicals identified in OU3 investigation areas. The findings will be used in remedial decision-making for the Site.

1.2 BACKGROUND

A BRA and Site-wide ERA was performed as part of the OU1 investigation (Rust, 1993). The primary focus of the OU1 BRA was to evaluate the potential risk from exposure to contaminated Site surface soils. The scope of the OU1 BRA encompassed all of the terrestrial areas evaluated in OU3 and provided descriptions of habitats and receptor species, identified threatened or endangered species that could exist in the area, and evaluated potentially impacted ecological populations and communities.

The OU1 BRA, which was accepted by the regulators, concluded that contaminants in Site soils would not pose a hazard to the environment. Based on the premises agreed upon in the OU1 BRA, the terrestrial investigation areas identified in the OU3 RI were considered unlikely to pose a threat to the environment at either the population or community level, since OU3 terrestrial areas did not provide significant areas of wildlife habitat. Additionally, the contamination associated with these investigation areas was not ubiquitous (i.e., contamination was localized with little potential impact on ecological receptor communities or populations).

The results and conclusions of the OU1 BRA were incorporated into the OU3 investigation approach, such that, the focus of the OU3 ERA is on Site-related aquatic habitats, including Johnson and Clear Creeks (hereafter referred to as Johnson Creek), the Nebraska Resource District (NRD) Reservoir located along Johnson Creek, and Silver Creek.

1.3 SCOPE

Ecological risk assessment is the process of assessing potential adverse effects to local ecological communities and ecosystems as a result of exposure to identified stressors. The scope of work for the OU3 BRA has been developed based upon the following EPA Guidance Documents for conducting an ecological risk assessment:

- Risk Assessment Guidance for Superfund, Volume II, Environmental Evaluation Manual (Part A) (EPA, 1989b) and EcoUpdates; and,
- Framework for Ecological Risk Assessment (EPA, 1992a)

Since the original submittal of the OU3 BRA, a new EPA guidance document superseding the RAGS-Volume II document has been published. This document was consulted in the final preparation of this ERA:

- Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (USEPA, 1997)

1.4 REPORT ORGANIZATION

The 1997 guidance document describes several steps in the process. These steps are captured in the approach used in the OU3 BRA.

Problem formulation in ecological risk assessment establishes the goals and focus of the risk assessment and begins the characterization of exposure and effects. The first step in ERA problem formulation is characterization of the ecosystems and receptors present and potentially at risk. Next, the ecological conceptual site model identifies all potential pathways that should be considered. Potential chemicals of ecological concern, the ecotoxicology of the contaminants known or suspected to be present, and observed or anticipated ecological effects are also considered in problem formulation. The end product of problem formulation is a conceptual site model that identifies assessment endpoints (e.g., environmental values to be protected), measurement endpoints (e.g., data needed) and analyses to be used.

The organization of the OU3 BRA is described as follows:

Section 1.0 (Introduction) - Describes events leading up to preparation of the OU3 ERA, including the background, the objective, and scope of the evaluation.

Section 2.0 (Site Characterization) - This section summarizes the local and regional features in terms of physiographic setting, hydrology, and flora and fauna of the natural habitats surrounding the facility, consistent with the problem formulation step of USEPA's 1997 guidance..

Section 3.0 (Ecological Conceptual Site Model) - Identifies potential transport pathways for sediment and surface water, and modes of exposure of potential aquatic and terrestrial ecological receptors to these media.

Section 4.0 (Potential Chemicals of Concern) - Provides a general description of contaminant distribution in the sediments and surface waters of the creeks and reservoir. This section also defines the criteria and selects the Site-related chemicals posing ecological threat for surface water and sediments in each of these water bodies. This selection process is also included in the problem formulation of USEPA's 1997 guidance.

Section 5.0 (Exposure Assessment) - Defines complete exposure pathways, and identifies the likelihood of exposure of a receptor species to an identified chemical via a completed exposure pathway.
Section 6.0 (Risk Characterization and Summary) - Couples the exposure characterization results with toxicity information to evaluate the probable effects on ecological receptors and the ecosystem.
Section 7.0 (Limitations and Uncertainties) - Describes the assumptions and estimates used in the risk assessment that may limit the confidence in and applicability of the results.

Habitat information for the OU3 investigation areas, including brief descriptions of each habitat and schematic covertype maps are provided in **Appendix B-1** of this report. **Table B-1-1** includes the size of the investigation areas, potential chemicals of concern, a general indicator of habitat quality, the habitat types and percent cover, and a rationale for exclusion from the ERA, if applicable.

Appendix B-2 contains a printout of known occurrences in Saunders County of Federal and State endangered and threatened species and Nebraska Species of Concern from the Nebraska Natural Heritage Database, as provided by the Nebraska Game and Parks Commission.

Appendix B-3 contains a copy of a letter from Mr. Daylan Figgs (Endangered Species Biologist with the Nebraska Game and Parks Commission), responding to a request for local threatened and endangered species information.

Site characterization provides information on the environmental setting of Johnson Creek, Silver Creek and the NRD Reservoir, habitats which are present in these areas, and biota which may utilize these habitats. Understanding the ecology of these areas provides a basis for identifying the species and habitats potentially at risk. Primary sources of information used for characterization of these areas include the OU1 BRA (Rust, 1993) and systematic field reconnaissance performed by Woodward-Clyde biologists on September 10-11, 1996.

2.1 SITE SETTING

Section 4.0 of the OU1 BRA (Rust, 1993) provides a detailed description of the terrestrial, aquatic, and wetland habitats which occur at the Site. Relevant portions, including tables of biota, are summarized in this section. **Drawing B-1** provides a map of the Site and locations of all OU3 investigation areas.

The former NOP is a 17,258-acre site located in Mead, Nebraska in Saunders County. A grid of public and private roadways traverses the area. Characteristic of the Central Plains, local topography is generally flat. Deeply incised channels of creeks provide drainage from the Site to off-Site areas.

The Site is located in the Dissected Hill Plains Section of the Central Lowlands Physiographic Province in southeast Nebraska. Prior to colonization, native vegetation of this area consisted of tall grass prairie on well-drained uplands and riparian deciduous forest along streams and rivers. At the present time, however, the habitats at the Site and in surrounding region have been highly disturbed by human activities associated with large scale agriculture, the former NOP, and other land use changes. Disturbed areas that are not used for agriculture support a variety of early successional herbaceous, shrub, and/or tree vegetation, that are typical of disturbed habitats.

Surface water flow across the Site is generally southeast toward Johnson Creek. The surface water flows of Johnson Creek combines with those of Clear Creek just outside the boundaries of the former NOP. Both creeks lie within the drainage basin of the Platte River. The aquatic life use classification for the investigated portions of all three streams is Class B warm water (State of Nebraska Title 115). This use classification means that "these are waters where the variety of warm water biota is presently limited by water volume or flow, water quality (natural or irretrievable human-induced conditions). substrate composition. or other habitat conditions."

Data on biota known to occur in Saunders County, and specifically at the Site, are provided in **Tables B-1A** through **B-6**. These data are referred to as appropriate in the following sections.

A qualitative assessment of the in-stream, aquatic habitat surrounding the Site was conducted as part of the OU3 RI investigation during July of 1996 to evaluate the creeks' suitability as habitat for the plains topminnow (*Fundulus sciadicus*), a species of concern. Information collected as part of that assessment form the basis for descriptions of aquatic habitats for the creeks discussed below. Three reaches along Johnson Creek (JC-1, JC-2, and JC-3), one reach along Clear Creek (CC-1), and two along Silver Creek (SC-1 and SC-2) were chosen for assessment (**Drawing B-2**). Within each reach, notes were taken of the vegetation and land usage along the banks and the upland portions of the reach. A stream profile was also taken at a location along each reach observed, which was considered to be representative of the entire reach. Kick-net samples were taken at each reach to determine the benthic species present (**Table B-6**). Water quality parameters consisting of dissolved oxygen (DO), pH, conductivity, temperature, and turbidity were also measured within each reach (**Table B-7**). In-stream velocity measurements were also taken for estimating discharge. While no "control" creek was selected and evaluated as part of this assessment, benthic sampling was performed on Clear Creek (CC-2) at a location upstream of any surface water runoff contributions from the Site.

2.2 JOHNSON CREEK

Johnson Creek traverses the northeast portion of the Site flowing to the southeast (**Drawing B-2**). Johnson Creek flows into Clear Creek several thousand feet downstream of the Site boundaries.

Both natural and channelized reaches with mostly runs and a few small pools occur on-Site. Based on field observations, the substrate of the creek tends to be sandy, limiting the variety and number of benthic Macroinvertebrates that inhabit the creek. Much of the land that drains into Johnson Creek is under cultivation, mainly for hay and row crops. The vegetation along the bank is primarily herbaceous with various grasses, milkweed (*Asclepias syriaca*), and other forbs being present. Some trees are present in a few isolated areas along the bank.

Major on-Site surface features which are located within the drainage basin of Johnson Creek include igloo storage areas, the Atlas Missile Area, former Ammonium Nitrate Plant, Load Lines 2, 3, and 4, and the Burning/Proving Grounds. Drainage ditches from Load Lines 2 and 3 originate in igloo storage areas (presently feed lots) located north of the load lines and pass through the igloo storage areas (presently pasture land) south of the load lines. Drainage from Load Lines 2, 3, and 4 ultimately enter Johnson Creek along a man-made ditch at a point located outside the southeast boundary of the Site. The NRD Reservoir (Section 2.3) is positioned along Johnson Creek near the northeastern corner of the Site.

During the July 1996 assessment, stream width ranged from less than 2 feet above the NRD Reservoir to upwards of 20 feet below Johnson Creeks' confluence with Clear Creek. Depth was from a few inches to approximately 3 feet. In stream velocity ranged from less than 0.5 ft/sec to just over 1.0 ft/sec. During some portions of some years, no flow conditions have been observed in Johnson Creek.

Johnson Creek reach JC-1 is located upstream of the NRD Reservoir (**Drawing B-2**). The topography of the immediate area is gently rolling hills. In this reach the channel has a natural configuration, deeply incised, and has a silt/sandy substrate. During the July 1996 assessment, no pools were observed along this portion of the Creek. The surrounding area is primarily used for cultivation, with row crops found upstream.

The vegetation along the bank reflects the surrounding land usage. The majority of the vegetation is grass with some milkweed (*Asclapias syriaca*) and passion vine. Trees are present on the steep slopes of the banks with cottonwood (*Populus delfoides*), silver maple (*Acer saccharinum*) and mulberry (*Morus album*) comprising less than 5 percent of the cover.

In situ surface water quality data collected indicate the DO was fairly high (8.1 mg/l) at this location (**Table B-7**). The pH approached neutral (6.72), turbidity was low (294 NTU) and flow was fairly sluggish (0.66 ft/sec).

Table B-6 summarizes qualitative benthic macroinvertebrate data collected at reach JC-1. Snails are the dominant organism, along with several oligochaetes and freshwater clams. The low number of organisms observed is likely due to physical habitat features, such as a poor substrate, which limits colonization by benthic fauna.

Johnson Creek reach JC-2 is located downstream of the NRD Reservoir (**Drawing B-2**). Similar to the upstream portion, reach JC-2 has a natural channel configuration. Surface water discharge appears greater than at the JC-1 reach and the channel is not as deeply incised. Short runs that empty into small pools characterize this stretch of Johnson Creek.

Willows (*Salix spp.*) make up a higher percentage of vegetation along the banks. The surrounding vegetation is largely grass with some herbaceous species. The uplands consist of a mix of cultivated and fallow fields, and grass cover.

DO levels were somewhat reduced at 6.8 mg/l compared to the upstream levels (**Table B-7**). The pH approached neutral (6.95), turbidity was somewhat elevated at 3498 NTU, and flow was negligible (0.14 ft/sec).

Table B-6 summarizes qualitative benthic macroinvertebrate data collected at reach JC-2. Benthic fauna was similar to upstream areas and included dominance by snails and aquatic earthworms. Clams, aquatic sowbugs and crayfish were also observed.

Johnson Creek reach JC-3 is located several miles below JC-2 and approximately 200 feet upstream of its confluence with Clear Creek (**Drawing B-2**). The reach has been altered by channelization. The land usage in the surrounding area is row crops. The creek has been straightened, with a high levee along both sides of the channel. The inner banks of the levee have a mixture of grass, cane grass (*Calamagrostis inexpansa*), and horsetails (*Equisetum sp.*). The creek is small with no meanders, and is shallow with a sandy bottom. No pools were observed. No benthic macroinvertebrates were collected at this location despite several attempts.

The benthic sample collected from Clear Creek at a point upstream of any surface water contributions from the Site (CC-2) (**Drawing B-2**) was also devoid of benthic life with the exception of two leeches. Clear Creek is a Class B cold water stream above the confluence with Johnson Creek but is a Class B warm water stream below the confluence.

Reach CC-1 of Clear Creek (**Drawing B-2**) has a streambed approximately twice as wide as Johnson Creek. This section of Clear Creek is not channelized, it has moderate flow and a sandy bottom. No pools were observed during the field assessment. The stream flows through an area of row crops. The banks have a natural contour with grass being the major vegetation. Arrowhead (*Saggitaria sp.*) was found growing in the stream.

For Johnson Creek, the low benthic richness (number of organisms) and density at all stations is due in part to bottom substrate. Coarse sand was the predominant substrate at all sampling stations, except sampling station JC-1. Watercourses with cobbles and gravel beds support the greatest variety of invertebrate life because cobble and gravel provide stable surfaces and hiding places. Predominantly sandy substrate supports very few, if any, invertebrate species because shifting sand does not provide a stable surface to which organisms can attach. Further, the lack of coarse and fine particulate organic matter in the sediment limits food resources for benthic invertebrates in the creeks. Other factors that potentially may limit the quality of the aquatic life within these streams are man-made channelization and dredging, and inputs of sediment, nutrients, pesticides, and salts from agricultural and livestock activities which occur along the banks.

2.3 NRD RESERVOIR

The NRD Reservoir is located in the northeastern corner of the Site along Johnson Creek (**Drawing B-1**). It was created by the placement of a dam on Johnson Creek authorized by the U.S. Department of Agriculture Soil Conservation Service in 1975. The NRD Reservoir has a conservation pool of approximately 78 acres. The floodwater retarding structure was built to maintain flood control during a 100-year multi-day storm (flood) with a drainage area of 11,234 acres (17.5 square miles) and a flood pool of 300 acres. The residence time for surface water in the reservoir depends largely on the amount of precipitation and operation of the outlet gate.

The bottom profile of the reservoir includes the natural steam valley terrace that runs parallel to the reservoir near the shoreline and grades moderately towards the original Johnson Creek streambed. The normal pool depth of the reservoir is approximately 12 to 14 feet. This bathymetry is estimated based on observations made in the fall of 1997 when the reservoir was low due to the open outlet that allowed the reservoir to drain.

Surface water drainage from the former Atlas Missile Area, former Raw Product Igloo Storage Areas and the former Ammonium Nitrate Plant feed into Johnson Creek upstream of the reservoir. The majority of land surrounding the NRD Reservoir is cropland. Areas dominated by herbaceous vegetation occur at the southwest corner of the reservoir, the dam and where Johnson Creek enters the reservoir. The southwestern corner also contains some planted shrubs and small trees. This corner of the reservoir includes the former Proving Grounds and Potential Landfill investigation areas (**Drawing B-1**).

Herbaceous vegetation dominate the riparian zones surrounding the NRD Reservoir, with the exception of the cropfield areas. Several grasses including smooth brome (*Bromus inermis*), nodding fescue (*Festuca obtusa*), redtop (*Agrostis stolonifera*), timothy (*Phleum pratense*) and foxtail (*Setaria faberi*) are common. Some of the broadleaf herbaceous vegetation that can be found here include common milkweed (*Asclepias syriaca*), common ragweed (*Ambrosia artemisiifolia*), western ragweed (*Ambrosia psilostachya*), aster (*Aster* spp.), common chicory (*Cichorium intybus*), and fleabane (*Erigeron* spp.). Limited woody vegetation, planted in the vicinity of the former Proving Grounds and Potential Landfill Area north of the Proving Grounds, includes green ash (*Fraxinus pennsylvanicum*), crab apple (*Malus ioensis*), hawthorn (*Crategus* sp.), and pine (*Pinus* sp.).

The cropfields in the NRD Reservoir area are typically planted in corn (*Zea mays*) and/or soybeans (*Glycine max*). These areas usually contain some weedy species such as black nightshade (*Solanum americanum*), horse nettle (*Solanum carolinese*), bindweed (*Convolvulus sepium*), common ragweed, burdock (*Arctium minus*), pigweed (*Amaranthus retroflexus*), lambs-quarters (*Chenopodium album*), and foxtail. Cropland provides limited wildlife habitat due to the regular disturbance from agricultural operations.

The north end of the reservoir, where Johnson Creek enters, offers more diversity in habitat and wildlife. Along with the aforementioned herbaceous vegetation, this area contains some wetland plants including cattail (*Typha latifolia*), cane grass (*Calamagrostis inexpansa*), sedges (*Carex* sp.), smartweeds (*Polygonum* spp.), curly dock (*Rumex crispus*), and willows (*Salix* sp.). Beaver (*Castor canadensis*) activity was also noted.

During April and May of 1999 fish were collected at the NRD Reservoir for tissue samples. Four species were caught, which include: black bullhead (*Ameiurus melas*), channel catfish (*Ictalurus punctatus*), green sunfish (*Lepomis cyanellus*), and common carp (*Cyprinus carpio*). Black bullhead and common carp were the most common of these species found at the NRD Reservoir.

2.4 SILVER CREEK

Silver Creek traverses the southwest corner of the Site flowing southeast (**Drawing B-1**). Silver Creek drains land in the former Administration, Bomb Booster, and Load Line 1 investigation areas. Drainage from these areas eventually enters a north-south flowing manmade ditch located west of the Demolition Ground. This ditch eventually drains into Silver Creek at a point located near the extreme southwest corner of the Site.

Silver Creek flows primarily through farm and pastureland. A portion of Silver Creek flows through cattle feed lots, and is characterized by highly eroded banks, sparse vegetation and heavy disturbance. The channel has not been straightened and is typically convoluted.

Based on field observations and measurements taken during the July 1996 assessment, Silver Creek's surface water width was slightly wider than that of Johnson Creek (from 10 to 22 feet). The creek depth was generally less than two feet, and the flow was approximately 0.5 ft./sec.

The major vegetation along the creek is grass with a few species of forbs along the banks. Typical of Johnson and other creeks in the area, the substrate of Silver Creek is sandy, which limits the variety and number of aquatic organisms that inhabit the creek.

Two reaches, SC-1 and SC-2, were assessed in Silver Creek as part of the qualitative in-stream habitat survey conducted in 1996 (**Drawing B-1**). Reach SC-1 was found to be a relatively small and unchannelized creek that flows through farm and pasture land. The stream has a moderate cut with several meanders. No pools were observed. Major vegetation in this area is grass with some herbaceous plants along the banks. Beaver (*Castor canadensis*) are active along this stretch.

Silver Creek reach SC-2 flows through an area used for pasturing and unconfined feed lots for cattle. Worn/unvegetated stream banks attributed to cattle activity characterize the general area. No pools were observed. Below the feed lots, the area returns to the high stream bank characteristics observed at other locations along the creek.

In situ water quality data measured in Silver Creek are provided in **Table B-7**. DO ranged from 7.7 mg/l at SC-2 to 8.1 mg/l at SC-1. The pH was slightly higher than that measured in Johnson Creek, but still approached neutral. Turbidity was higher than in Johnson Creek and flow was sluggish.

Benthic macroinvertebrate data collected in kick-net samples are provided in **Table B-6**. Oligochaetes are common or dominated both reaches. It is noteworthy that stonefly larvae were collected from both reaches; stoneflies are known to occur only in fairly clean systems.

2.5 SENSITIVE HABITATS

Sensitive habitats include wetlands and other areas that might provide habitat for protected species. While wetland areas have been observed on-Site, no Federal or State critical habitats were located in or near the Site during OU1 investigations, or during any of the investigations performed for OU3.

The definition of a jurisdictional wetland as stated in the U.S. Army Corps of Engineers Wetlands Delineation Manual (USACE, 1987), is as follows: "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

Very few jurisdictional wetlands are located at the Site, as can be seen on the National Wetland Inventory Map - Mead, Nebraska 7.5 minute quadrangle (USFWS, 1992). Wetlands that do occur within the boundaries of OU3 investigation areas are shown on the schematic covertype maps provided in **Appendix B-1**. The wetlands that are present are typically emergent wetlands associated with the edges of the streams, Johnson and Silver Creeks, the northern edge of the NHRD reservoir or ditches on-Site. Sedges and grasses, with occasional cattails, sapling willows and other forbs typically dominate the emergent wetlands. Other wetlands on-Site are small isolated wetlands. Some of these wetlands are farmed wetlands, and therefore unvegetated. Some of the other isolated wetlands are associated with drainage features in the agricultural fields or leading from the fields.

One isolated wetland area is adjacent to Detonation Craters Nos. 1 and 2 investigation areas (**Appendix B-1, Drawing B-1-8**). The observed area contains an herbaceous vegetation community with limited amounts of standing water which may or may not be seasonal. It was also cleared of trees, which are now piled up adjacent to the area. The dominant vegetation consists of reed grass (*Calamagrostis inexpansa*), sedges (*Carex* sp.), rosinweed (*Silphium integrifolium*), and smartweeds (*Polygonum pennsylvanicum* and *P. lapathifolium*). This area also contains some cattails (*Typha latifolia*). Although this area has the potential to be a wetland, it has not been determined if the hydrology is sufficient to be a jurisdictional wetland and sampling efforts detected no contamination. As a result, this area will not be addressed further in this BRA.

The potential for protected species or their habitats to occur at the Site was assessed as part of the OU3 RI investigations. **Appendix B-2** contains a printout of known occurrences in Saunders County of Federal and State endangered and threatened species and Nebraska Species of Concern from the Nebraska Natural Heritage Database, as provided by the Nebraska Game and Parks Commission (Steinauer, 1991). At that time, two species that were thought to have potential to occur on-Site were the brook stickleback (*Culaea inconstans*) and the plains topminnow.

In April of 1996, Nebraska Game and Parks Commission (NGPC) responded to a request for threatened and endangered species information. It was noted in NGPC's response letter (Figgs, 1996) (**Appendix B-3**) that the OU2 proposed groundwater remediation project could potentially impact the western prairie fringed orchid (*Platanthera praeclara*) and/or the American burying beetle (*Nicrophorus americana*), if they were located on-Site (Figgs, 1996). While neither of these species has been observed on site, some portions of the site may represent suitable habitat. Any area meeting the description of suitable habitat for the western prairie fringed orchid or the

American burying beetle that will be disturbed as part of the site activities will be surveyed before the disturbance occurs.

The western prairie fringed orchid, which is a Federal and State of Nebraska threatened species, is closely associated with tall grass wet meadows and mesic tall grass prairies. Typical habitats are moderate to high quality prairies that have not been subject to large scale disturbance such as plowing, extreme overgrazing, or heavy herbicide use. This species initiates growth in late spring with flowering occurring in late June to early July (Figgs, 1996).

The American burying beetle, a member of the carrion beetle family Silphidae, is the largest carrion beetle in North America. Carrion beetles, as their name implies, are an important part of a vast host of scavengers that are responsible for recycling decaying materials back into the ecosystem. *Nicrophorus* species require carrion as a reproductive resource, and therefore utilize small vertebrate carcasses that can be buried quickly or rolled down a hole and concealed. In general, *Nicrophorus* species exhibit one of the highest levels of care of any beetle in the insect order Coleoptera, a group which numbers over 350,000 species (USFWS, 1991).

The American burying beetle has been recorded historically from 35 states in the eastern and central United States, as well as the southern fringes of Ontario, Quebec, and Nova Scotia in Canada. Currently, the species is known only from Nebraska, Oklahoma, and Arkansas (USFWS, 1991). The beetle has been collected in Saunders and Dodge Counties, Nebraska, and therefore is in the vicinity of the Site. Potential habitat also can be found in short segments along Highway 63 (Figgs, 1996).

Two rare species, the brook stickleback and plains topminnow were observed in 1977 (T 14 N, R 9 E, Sections 12 and 35) and in 1985 (T 15 N, R 9 E, Sections 13 and 23) respectively, in tributaries to Clear Creek east of the Site (Rust, 1993). The brook stickleback prefers clear, cool, heavily weeded, spring-fed ponds and streams. This type of habitat does not occur on-Site. The plains topminnow occurs in small to medium-sized, clear, sandy to rocky streams with rapid to moderate flow with pools and backwaters.

A systematic habitat assessment for the plains topminnow, was conducted in July 1996 as part of the OU3 RI on Johnson, Silver, and Clear Creeks. That assessment formed the basis for much of the habitat descriptions provided in the above sections. Based on the habitat assessment it was determined that habitat conditions did not favor the plains topminnow.

Information concerning potential chemical sources (Section 4.0) and the ecology of the Site (Section 2.0) was used to develop an Ecological Conceptual Site Model (ECSM) for Johnson Creek, Silver Creek and the NRD Reservoir. The ECSM provides a schematic representation of potential ecological exposure pathways from chemical sources to potential receptors within each water body. These pathways are further evaluated in the exposure assessment to identify the most representative and complete exposure scenarios. A complete exposure pathway requires five basic elements:

- A source of chemicals (e.g., sediment)
- A mechanism of chemical release (e.g., contact, uptake)
- An environmental transport medium (e.g., surface water)
- An exposure point where receptors are present
- An intake route (e.g., ingestion, direct contact)

A pathway is not complete and ecological exposure cannot occur if one of these elements is missing. This risk assessment addresses only the pathways associated with the creeks and reservoir that are considered complete based on the data reviewed, the assumptions described below, and in the exposure assessment (Section 5.0).

3.1 EXPOSURE PATHWAYS

Prior to development of the ECSM for the aquatic habitats, exposure pathway matrices (**Table B-8**) were developed to identify potentially complete pathways to general receptor categories in the creeks and reservoir. An "X" placed at the intersection of each pathway and receptor category indicates a potentially complete exposure pathway.

The general receptor categories in **Table B-8** represent the trophic relationships in the aquatic food web at the Site. The food web represents the movement of energy within the aquatic system from the primary producers (algae, which transform solar energy into carbohydrates) up through the various consumer levels. Information from the food web is used to identify key receptors to be used in the exposure assessment for the aquatic habitats at the Site.

The ECSM (**Figure B-1**) has similar basic components such as a primary source and an exposure pathway leading to higher consumers, yet the specific ecological receptors comprising the various trophic levels vary. In the aquatic habitats, sediments are considered to be the primary source of potential contamination. The principal release mechanisms are direct contact, ingestion, or uptake by primary receptors.

There are several potential exposure pathways for chemicals in the creeks and reservoir. Potential direct exposure may occur through contact with and/or ingestion of the sediment, which is the principal contaminant source. Principal receptor groups are benthic macroinvertebrates (insects and snails), fish, waterfowl, wading birds, and omnivorous mammals. Receptor species and exposure pathway scenarios will be more fully developed in Section 3.1.2., Key Receptors and Section 5.0, the Exposure Assessment.

Both direct and indirect food web pathways which could potentially provide a route for chemical exposure to receptors other than avian species and predatory terrestrial mammals exist at the

Site. This ERA focused on those receptors whose exposure potential was considered to be the greatest.

Ecological endpoints, which include both assessment endpoints and measurement endpoints, are described in Section 3.1.1. Key receptors, the specific species within ecosystems that may be adversely affected by a pollutant, are selected and described in Section 3.1.2.

3.1.1 Ecological Endpoints

The ERA provides risk estimates for the occurrence of adverse toxicological effects to selected assessment endpoints. The decision framework for evaluating risks and acceptable exposure levels is presented in these assessment endpoints. The endpoints apply to several components representing different levels of organization. Endpoints are explicitly defined by federal guidance (USEPA, 1997) and an adaptation of the definition is presented in the following bullet:

- Definition of Assessment Endpoints - Explicit expressions of the actual environmental value(s) that is to be protected. The unacceptable risks for those values that drive decision-making are those which may reduce key populations of species or significantly disrupt community structure.

The specific assessment endpoints for Silver and Johnson Creeks and the NRD Reservoir are defined below:

- Assessment Endpoint 1 - Survival, growth, and reproduction of fish and aquatic invertebrates under chronic exposure
- Assessment Endpoint 2 - Survival, growth, and reproduction of benthic organisms under chronic exposure
- Assessment Endpoint 3 - Survival, growth, and reproduction of aquatic birds under chronic exposure
- Assessment Endpoint 4 - Survival, growth, and reproduction of semi-aquatic mammals under chronic exposure

The primary assessment endpoint considered in this ERA was potential toxic impacts to biotic populations using the aquatic habitats (e.g., macroinvertebrates, fish, waterfowl, and omnivorous mammals). Measurement endpoints are measurable responses to a contaminant that are related to the valued characteristics (i.e., assessment endpoints) chosen to be evaluated in a risk assessment. The corresponding measurement endpoints for these assessment endpoints are chronic or sub-lethal responses for species of interest or their surrogates.

Actual measurement endpoints were beyond the scope of this ERA. Instead, the lowest reasonable toxic or lethal doses or dietary chemical concentrations as reported in the literature were used as estimated toxic thresholds (i.e., endpoints) to assess potential adverse effects.

3.1.2 Key Receptors

The selection of potential key receptors for this ERA was based on several selection criteria, some of which are objective (e.g., listing as a species of special concern), and some which require professional judgments (e.g., identifying key components within a food web). Selection of key receptor species or surrogates included consideration of the following criteria:

- Known or suspected occurrence in the aquatic habitats of the Site
- Potential exposure to Site-related chemicals
- Availability of toxicological information for the species or a surrogate species (e.g., mallard as a surrogate species for waterfowl)
- Documented sensitivity to potential chemicals of concern
- Listing as a species of concern by the state or federal government
- Game species or commercially important species
- A key component of ecosystem structure and function (e.g., abundant prey for other important species)
- Limited mobility or home range that limits exposure to other sources of chemicals

Habitat preferences, food preferences, and other behavioral characteristics that can significantly affect the potential for exposure or determine population size and distribution in the site vicinity are additional characteristics that were considered in the selection of key receptor species.

Based on the results of Site characterization, ECSM development, and analysis of potential chemicals of concern, "Potential Ecological Exposure Scenarios" were developed. The scenarios, which are discussed in Section 5.0, identify key receptor categories and/or species within a single plausible exposure pathway. The following is a discussion of key receptors relevant to the aquatic habitats of the Site.

Five receptor categories and four key receptors were selected:

Receptor Categories	Species
Benthic macroinvertebrates	Benthic macroinvertebrate communities
Fish	Benthivorous Fish
Waterfowl	Mallard
Wading Birds	Great Blue Heron
Omnivorous mammals	Raccoon

Benthic macroinvertebrates are known to inhabit the sediments in the creeks and reservoir of the Site. They were selected as receptors since they are in direct contact with sediments and many deposit-feeding forms ingest sediments. Benthic macroinvertebrates may also serve as a food source to higher level consumers.

Bullhead and common carp were selected to represent fish because they inhabit the reservoir. Their diets primarily consist of insect larvae, fish, crustaceans, and almost anything on the reservoir bottom that is available (Palmer and Fowler, 1975). Waterfowl, omnivorous mammals, or other fish may consume these species.

The mallard (*Anas rubripes*) was selected to represent waterfowl because it is omnivorous and has been observed at the Site. Mallards feed by dabbling for food along the water surface and in the sediment. Mallard diet includes ample quantities of aquatic macrophytes, grain and plant seeds, terrestrial invertebrates, and snails.

The great blue heron (*Ardea herodias*) is a common piscivorous wading bird known to feed in aquatic habitats at the Site from time to time. Since nearly all of its diet consists of aquatic animal life (e.g. frogs, large aquatic invertebrates, and fish), the great blue heron is likely to contact contaminated sediments, feed on potentially contaminated prey, and ingest contaminated sediments within potential areas of concern at the Site. Fish are the preferred prey of this species (Peifer, 1979). The great blue heron, as well as other piscivorous birds, use areas where fish are plentiful (Spendelow and Patton, 1988, Short and Cooper, 1985). While the stream reaches associated with this Site may contain fish, the Reservoir and nearby Platte River are ideal locations containing populations of small fish. Based on this information, it is unlikely that great blue herons will have high use rates in the creeks on-Site.

The raccoon (*Procyon lotor*) is omnivorous and feeds on vegetables, insects, and aquatic organisms (Palmer and Fowler, 1975). Due to its habit and preference for aquatic biota, the raccoon is likely to contact contaminated sediments, which it may directly ingest on a frequent basis while feeding on aquatic biota, washing its food and cleaning its fur. The raccoon was chosen as a key receptor to represent other small omnivorous mammals that may occur at the Site.

Ecological chemicals of concern are site-related elements or compounds that may pose a risk to ecological receptors if the exposure pathway is complete. The process of identifying potential chemicals of concern (PCOCs) for evaluation in this ERA is discussed in the following sections. In general, the process involved evaluating the concentration of each detected analyte against screening criteria appropriate for each environmental matrix (surface water and sediments). Owing to the former activities at the Site and the different matrices, the PCOCs at the various OU3 investigation areas are expected to be different. Therefore, separate PCOC determinations were performed for Johnson Creek, NRD Reservoir, and Silver Creek.

4.1 DATA USED IN ASSESSMENT

Surface water and sediment data collected from the three water bodies during several sampling events were evaluated for the identification of ecological PCOCs. Sediment and surface water data from Johnson and Silver Creeks and the NRD Reservoir were screened against ecologically-appropriate benchmarks. The results are summarized in **Tables B-9** through **B-14** and discussed in Sections 4.3 through 4.5. Screening criteria described in Section 4.2 were applied to determine if a chemical found in any one of the media should be identified as a PCOC and carried through the exposure assessment.

Surface water, sediment, and fish tissues were the appropriate matrices for the purpose of this ERA, since these are the potentially affected exposure media present in Johnson Creek, Silver Creek, and the NRD Reservoir. Surface water data were evaluated from samples collected at eight Johnson Creek sampling stations (JC-001 through JC-008) in 1995-1999, four Silver Creek stations (SC-001 through SC-004) in 1995-1999 and five locations in the NRD Reservoir in 1999. In addition, reference data were collected from three upstream locations (JC-009, CC-001, and SC-005) in 1999.

Sediment data were evaluated from four locations in Johnson/Clear Creek (JC-001 through JC-004) in 1995, two stations in Silver Creek (SC-001 and SC-002) in 1995 and five locations in the NRD Reservoir in 1999. Sediment reference data were collected from the same stations where surface water reference data were collected in 1999 **(Drawing B-2)**.

Based upon the Site historical activities and results of soils and groundwater sampling near presumed source locations (load line buildings, waste disposal areas, landfills, etc.), the appropriate constituents to consider in this ERA are explosives, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals.

Fish tissue data were collected in 1999 from the NRD Reservoir and a background reservoir (**Appendix B-1, Drawing B-1-10**). These data were collected to provide known concentrations of Site-related chemicals in fish receptors and consequently their contribution to diets of higher order consumers. Samples were analyzed for lipid content, explosive compounds and metals. Whole fish samples were collected at six areas around the Reservoir and common carp and bullhead species were chosen. These fishes represented the majority of biomass sampled in the Reservoir and were considered to be the prominent benthivorous species in the region. The results are presented in **Tables B-15** and **B-16** and expressed in wet weight.

The following sections describe how surface water and sediment data were evaluated to select the PCOC for each area and sampling matrix. Fish tissue data are also discussed.

4.2 SELECTION OF POTENTIAL CHEMICALS OF CONCERN

Surface water and sediment in the creeks and the reservoir represent a potential source of PCOCs to the biota that may use these areas. The following criteria were used for the selection of ecological PCOCs in surface water and sediment at the Site:

- Exceedance of screening criteria
- Chemical known to have a Site-related (e.g. former NOP-related) source
- Potential for persistence or transfer and bioaccumulation through food chain
- Detected chemical not present in blanks or known as a laboratory contaminant
- Chemical is generally recognized as safe (GRAS)

Initial screening excluded chemicals which were (1) not detected, (2) only detected in concentrations similar to those in blanks, or (3) were determined to be essential nutrients. To be selected from the full list of detected analytes for inclusion as an ecological PCOC, a chemical had to be detected at least once at a level greater than its method detection limit (MDL) or instrument detection limit (IDL) in at least one of the matrices. Based on EPA guidance (EPA, 1989c), if a sample contains a chemical that is also present in an associated sampling (trip or field) or laboratory blank, the sample is considered positive only if it contains ten times more than the amount in the blank for common laboratory contaminants (i.e., acetone, 2-butanone, methylene chloride, toluene, and phthalate esters), or five times more than the amount in the blank for other chemicals. Results of trip, field, and laboratory blank analyses were reviewed as part of the data validation for detected levels of chemicals. If the blanks contained significant concentrations of a chemical, the associated site sample analyte results were qualified or "non-detect". Additionally, chemicals such as calcium, magnesium, potassium, and sodium were not evaluated because they are essential nutrients for most forms of biota and pose little if any threat of impact.

Reported detection limits for chemicals that were not detected were compared to available screening criteria to determine whether the methods allow a conservative screen for those chemicals. Chemicals that had detection limits greater than the applicable screening criteria were retained for further evaluation if detected. If not detected these chemicals were addressed in the Limitations and Uncertainties Section (7.0). Chemicals that were not detected and had screening levels below the detection limit were excluded from further screening.

Chemicals are often present in surface water and sediment at detectable concentrations due to natural conditions or anthropogenic activities unrelated to Site operations. Extensive review of past investigation results and available historical records of the Site indicate that the principal Site-related constituents are explosives and some volatiles (especially trichloroethylene). While elevated concentrations of lead were found near Site buildings (i.e. former load line paint buildings), it is considered unlikely that surface runoff and soil erosion processes would have resulted in its migration to the creeks or reservoir.

Chemical concentrations in surface water and sediment upstream, in off-site areas, provide natural background levels. Reference stations for both Silver and Johnson Creeks were sampled to provide this data for comparison with site related constituents. Since chemical constituents vary naturally by geographic area, regional background values were used to screening data if the detected value was higher than conventional benchmark levels. Detected chemicals in sediment and surface water Site samples that were less than or equal to upstream reference values were excluded from further consideration as PCOCs.

The potential for persistence in the environment, bioaccumulation, and/or biomagnification of any chemical (e.g., mercury, DDT) was considered an important selection criterion. Chemicals with known accumulation potential were selected as PCOCs if detected above background levels, whether they exceeded screening criteria or not.

Maximum values for detected chemicals retained through the preceding criteria were compared to screening benchmark levels and those with concentrations exceeding the criteria were retained as the preliminary PCOCs for sediment and surface water.

It should be noted that these screening values are not deterministic, and was not considered the overriding variable in the PCOC selection. An exceedance of a screening level alone did not qualify any chemical as a PCOC and professional judgment was allowed to prevail. As stated in RAGS (EPA, 1989a) and USACE guidance (1995), a comparison of sample concentrations to naturally occurring background concentrations can be used to identify non-site-related chemicals. This approach was taken for evaluating inorganic chemicals only. Chemicals were excluded as PCOCs if their maximum concentration was within 2 times the mean background concentration (EPA Region IV, EPA, 1995).

4.2.1 Selection of Surface Water Screening Values

The preferred surface water benchmarks used for this evaluation were the EPA Aquatic Water Quality Criteria (AWQC) values (EPA, 1992b, 1995b). Second priority was given to chronic Tier II values, developed using Great Lakes Water Quality Initiative (GLWQI) methods (EPA, 1995b). Since Tier II values were developed for total metals they were not applied to dissolved metals data. Instead, if AWQC values could not be found for dissolved metals National Recommended Water Quality Criteria were applied (EPA, 1999). Because total hardness was not recorded for water samples, a total hardness of 100 mg $CaCO_3$/L was assumed for metals requiring water hardness adjustment. Third priority was given to Nebraska Water Quality Criteria (NWQC) for chronic exposure of aquatic life in Class B Warmwater streams (Title 117). Surface water reference values were substituted if the values exceeded conventional screening benchmarks.

4.2.2 Selection of Sediment Screening Values

The preferred sediment benchmarks used were Sediment Quality Criteria (SQC), which were calculated from the AWQC with an equilibrium partitioning approach (EPA, 1993a). The second preferred benchmarks were Sediment Quality Benchmarks (SQBs), which apply the same approach to Tier II water benchmarks to derive a sediment value. The third preferred benchmarks were Effects Range-Low (ER-L) values, which use the lower 10th-percentile concentration in a database of effect concentrations. ER-Ls are especially conservative values, representing the concentration at which the very most sensitive species show sublethal chronic effects. Moreover, ER-Ls were developed primarily with marine and estuarine data (Long et al., 1995), further limiting their use for nontidal freshwater systems. Sediment reference concentrations were used for screening values if reference concentrations exceeded conventional screening benchmarks.

If none of the above benchmarks were available for a constituent, the most conservative value available from existing literature was used, with a preference for chronic sublethal effects. A safety factor of 100X was applied to the selected value for added conservatism. Other literature values were collected from guideline benchmarks published by regulatory agencies. The benchmark for silver, for example, is a Probable Effects Level (PEL) developed by Florida's Department of Environmental Protection (FDEP) to reflect the "lower limit of the range of contaminant concentrations that are usually or always associated with biological effects" (Jones et al., 1996). It represents the 85th percentile of the "no effects" data and 50th percentile of the "effects" data, making it an appropriate screening level for this assessment. Like the ER-Ls, the PEL values were developed using marine and estuarine data. If a surface water benchmark was identified for the constituent, and no appropriate sediment value could be found, a sediment value was calculated using an equilibrium partitioning approach.

4.3 SURFACE WATER POTENTIAL CHEMICALS OF CONCERN

Dissolved metal data are primarily used to determine metal PCOCs in Site surface water samples since they constitute the most bioavailable forms for respiratory and dermal absorption by aquatic animals. Additionally, regional land use and area soil types contribute to high turbidity within the watersheds on-Site. Unfiltered samples are high in turbidity and high in crustal metals bound to suspended clay and organic particles. Consequently, sample data contains elevated amounts of metals reported as total metals that are not bioavailable. Filtered samples report the dissolved or uncomplexed concentrations and are a more appropriate indicator of potential toxicity.

Some metals, such as mercury, are especially toxic and are known to exist in complex forms, increasing their availability even when bound to particles in the water. Data were examined to identify these metals.

4.3.1 Johnson Creek

Two explosives (RDX and HMX), two volatiles (toluene and tetrachloroethylene [TCE]), and 20 metals were detected in Johnson Creek surface water samples. Maximum detections of volatiles and explosives were two to five orders of magnitude lower than their screening benchmark, so they were eliminated from further consideration. Based on dissolved metals data, of the 14 metals were detected, of these, four metals were excluded from further consideration as PCOCs because they are essential nutrients. Four of the remaining ten dissolved metals exceeded their screening benchmark at one or more locations.

Aluminum, barium and manganese are common elements found in this region. In eight filtered surface water samples, dissolved concentrations of aluminum, manganese, and barium exceeded their benchmarks once, twice, and three times, respectively. Dissolved surface water concentrations of aluminum, barium, and manganese were generally low and consistent with concentrations that would be expected based on concentrations measured in regional soils. Mean dissolved aluminum and barium concentrations were below or nearly equal to the upstream reference concentration. Mean dissolved manganese was present at two times the upstream reference concentration, or only 0.14 µg/1. These data indicate that concentrations of aluminum, barium, and manganese in the surface water of Johnson Creek are not attributable to a Site-related source. Hence, these metals were not retained as PCOC for Johnson Creek surface water.

The distribution of selenium indicated it was not likely Site-related. Dissolved concentrations of selenium exceeded the screening benchmark at three locations, with a maximum of 7.8 µg/l at JC-008 (refer to **Drawing B-2**). Similar to other dissolved metals detected in Johnson Creek, the average dissolved concentration of selenium was below the screening value. Since this environment is lotic and continually mixing, a maximum concentration in the surface water may not automatically pose a significant risk to the aquatic communities therein. Selenium was not retained as a PCOC for Johnson Creek surface water.

4.3.2 NRD Reservoir

One explosive (2-Amino-4,6-dinitrotoluene) and 17 metals were detected in Johnson Creek surface water samples. The maximum detection of the explosive was two orders of magnitude lower than the screening benchmark, so it was eliminated from further consideration. Based on dissolved metals data, of the 13 metals detected, four metals were eliminated from further consideration as PCOC's because they are essential nutrients. Two of the remaining nine dissolved metals exceeded their screening benchmark at one or more location. Mercury was detected in one total metal sample and given further examination because of its toxicity and bioaccumulation potential in aquatic systems.

Mercury was only detected in one unfiltered surface water sample from the NRD Reservoir. Additionally, the detected value was below the National Recommended Water Quality Criteria for the protection of aquatic life of 0.77 µg/l (EPA, 1999) for dissolved mercury. When this evidence was combined with the lack of detection of mercury in any other dissolved surface water or sediment sample taken in Johnson Creek and the NRD Reservoir, it was removed from further consideration.

Barium was consistently detected at the same concentration in all samples in the NRD Reservoir. The persistence of this metal in surface water samples coupled with its prevalence in background soil samples indicates barium naturally occurs within this region and is not Site-related. The similarity of concentrations between the background surface water sample and the average concentration within the NRD Reservoir further augment the evidence.

Selenium concentrations in the NRD Reservoir were higher than the screening level at all sampling stations. The reference surface water value for selenium in Johnson Creek was less than twice the average level in the reservoir, however, the value for Silver Creek was within the accepted range.

There is no known source of selenium on Site. Elevated levels of selenium may be due to several confounding variables. First, soil concentrations reported for the eastern part of Nebraska range from 0.3-5 ppm (Shacklette and Boerngen, 1984). Although selenium is not consistently detected in soil samples it varies throughout the Site as high as 1.2 mg/kg in background samples and 3.7 mg/kg in site samples. These findings are consistent with ordinary variability associated with natural conditions (Eisler, 1985). Groundwater samples from background wells not associated with Site activities reported dissolved selenium levels as high as 30.6 µg/l.

Land use in the area may also contribute to recorded levels. Agriculture and ranching are two primary land uses both on-Site and in the watershed. Land irrigation is often implicated in watershed contamination studies involving selenium conducted in the western United States (ATSDR, 1996; Eisler, 1985). This is due in part to selenium's natural soil concentrations, low to moderate solubility, and high persistence in aquatic systems. Finally, selenium is an essential element required in the diets of animals.

Literature indicates that selenium is moderately bioaccumulative and expected to be found in somewhat higher concentrations in fish tissues compared to surface water (Hamilton et al., 1998, ATSDR, 1996 and Eisler, 1985). Selenium concentrations were estimated in all samples with little difference between the NRD and background reservoirs. This similarity between fish tissue concentrations, for a metal reported as moderately bioaccumulative, indicates the watershed contains naturally elevated levels of selenium.

Collectively, this evidence indicates that selenium is not a Site-related metal. Therefore no PCOCs were retained for the surface water in the NRD Reservoir.

4.3.3 Silver Creek

One explosive (4-Am-DNT), two volatiles (methylene chloride and toluene), and 19 metals were detected in Silver Creek surface water. Toluene was only present at concentrations at least an order of magnitude lower than the conservative benchmark value used, so it was excluded from PCOC consideration. Since methylene chloride is a common laboratory contaminant, was detected once (0.46 μg/l) at about one fifth the reported detection limit of 2 μg/l, and it is not considered to be Site-related, it was excluded from the PCOC list as well.

Twelve dissolved metals were detected in the sample or retained because of reporting levels. Four are essential nutrients and were not considered PCOCs. Of the remaining eight metals, two dissolved metals exceeded screening levels and one metal, vanadium had reporting limits that exceeded the total metal screening level.

Aluminum exceeded the screening benchmark in one location. The consistency of the detection of aluminum in background soil samples and surface water indicates that these detections were not attributed to a Site-related source. Rather, they are likely associated with Site soils. The low degree of exceedance coupled with an average below background levels further underscore this point. It was not retained as PCOC.

As with aluminum, selenium exceeded the benchmark at one location. Due to the low degree of the exceedance (0.1 μg/l) and the lack of known sources of selenium on-Site, it was excluded from further consideration as a PCOC.

No surface water screening benchmark could be developed for 4-Am-DNT. Though 4-Am-DNT is a Site-related chemical, only a single "J" qualified detection of 4-Am-DNT was recorded (0.39 μg/l) at SC-002 (refer to **Drawing B-2**). The detection represents an uncertainty in the BRA.

No chemicals were retained as PCOCs for Silver Creek surface water.

4.4 SEDIMENT POTENTIAL CHEMICALS OF CONCERN

4.4.1 Johnson Creek

One volatile (acetone) and 18 metals were detected in Johnson Creek sediment. Acetone is a common laboratory contaminant that was detected at relatively low concentrations (up to 48 μg/kg). Owing to its relatively low concentrations, and since it is not Site-related, acetone was eliminated from further consideration.

Six semi-volatile compounds were initially retained because the reporting limits exceeded screening levels. These compounds were not detected in sediment or surface water samples, and with one exception, were not recorded as PCOCs in Investigation Area soil samples. Benzo(b)fluoranthene was detected as a PCOC in the Potential Landfill Area north of the Proving Grounds. The Landfill Area is located along the southeastern shore of the NRD Reservoir, within this watershed. Benzo(b)fluoranthene was not detected in the sediment or surface water samples taken at the NRD Reservoir. Hence, none of these six compounds were retained as PCOCs for Johnson Creek sediment. These analytes represent uncertainty in the BRA and will be addressed in that section.

Of the 18 detected metals, five are essential nutrients, and eleven did not exceed their conservative screening benchmarks at any location. Two metals (manganese, and silver) exceeded their benchmarks. Manganese was also detected in background soils at concentrations comparable to those in the sediment. Since erosion of streambank soil likely constitutes the major source of creek sediment, the similarity in concentrations between soils and sediment is expected. Consequently, manganese was excluded from consideration as a PCOC.

Silver was detected in two of four sediment samples from Johnson Creek, with a maximum concentration of 2.3 mg/kg, which exceeded its benchmark (1.8 mg/kg). While it is not known to be a Site-related constituent, since silver was not detected in any background soil samples, it was retained as a PCOC for Johnson Creek sediment.

4.4.2 NRD Reservoir

One explosive and 21 metals were detected in NRD Reservoir sediment samples. No sediment screening benchmark could be developed for nitrobenzene. Nitrobenzene is a Site-related chemical and a breakdown component of explosive compounds. One "J" qualified detection (estimated below the method detection limit) was recorded (74 μg/kg) at NR-005 (refer to **Drawing B-2**). The isolated detection, at a very low concentration, indicates that the presence of nitrobenzene is highly localized. In addition, this chemical is not known to significantly bioaccumulate in aquatic organisms. Nitrobenzene was not retained as a PCOC and the detection represents an uncertainty in the BRA.

Eleven metals exceeded their sediment benchmark values in the NRD Reservoir. The other 10 detected metals were either essential nutrients or did not exceed screening benchmarks. Thallium had reporting limits higher than the screening value of 0.7 mg/kg. However, it was detected at levels below this screening value and eliminated as a PCOC. Zinc and copper were excluded as PCOCs because the exceedances were relatively low, infrequent, and average concentrations were less than the screening benchmarks.

Aluminum, arsenic, beryllium, manganese, nickel, selenium, and vanadium were present at concentrations similar to those in background sediment or soils. These metals were common elements sampled in the region soils. Due to the similarities between metals and soils data, as well as the accepted variability associated with background sediment (EPA Region IV, EPA, 1995), these metals were not considered PCOCs.

While silver was nondetect in all sediment samples, the reporting limits were higher than the screening level. Reporting limits for silver averaged 2.0 mg/kg, close to the screening value of 1.8 mg/kg. This metal was not consistently detected in Site soils, nor historically considered Site-related. Its presence may be due to an upstream off-Site source. Silver was also undetected in whole body fish tissue samples taken in the reservoir (Section 4.5). Although this metal is not bioaccumulative, the lack of detection in benthic fishes known to ingest sediment indicates its presence is not widespread. Collectively, this evidence indicates that silver was probably not detected in sediments. Hence, it was not retained as a PCOC for the Reservoir.

No PCOCs were retained for the NRD Reservoir sediment.

4.4.3 Silver Creek

Two volatiles (acetone and toluene), three semi-volatiles (p-cresol, di-n-butylphthalate, and pyrene), and 18 metals were detected in Silver Creek sediment samples. As with Johnson Creek, acetone was excluded from PCOC consideration because it is a common laboratory contaminant and is not known to be Site-related. Toluene, di-n-butylphthalate, and pyrene were all detected at concentrations three to 20 times lower than their conservative benchmarks. As a result they were also excluded from further consideration.

Six additional semi-volatile compounds were initially retained because the reporting limits exceeded screening levels or no screening values could be found. No detections were recorded for these compounds in sediment or surface water samples taken within the watershed. In addition, the chemicals in question were not recorded as PCOCs in Investigation Area soil samples with the exception of benzo(b)fluoranthene, which was observed in the Potential Landfill Area north of the Proving Grounds. The Landfill Area is located along the southeastern shore of the NRD Reservoir, within the Johnson Creek watershed. Benzo(b)fluoranthene was not detected in the sediment or surface water samples taken within that watershed. These six chemicals were not retained as PCOCs for the sediment in Silver Creek. These analytes represent uncertainty in the BRA and will be addressed in that section.

P-cresol was measured at a concentration of 2,444 µg/kg at SC-001, over its screening benchmark of 170 µg/kg. Though it is not a known to be a Site-related chemical, the degree of exceedance and absence from available background samples indicate that p-cresol should be considered a PCOC. However, it should be noted that the only sampling station with a detectable concentration of p- cresol (SC-001) (refer to **Drawing B-2**) is upstream of all surface water contribution from any OU3 investigation area.

Five metals exceeded their benchmark values (selenium, silver, manganese, thallium, and vanadium). The other 14 detected metals were either essential nutrients or did not exceed screening benchmarks. Manganese and vanadium were not known Site-related chemicals and were present at concentrations similar to those in background sediment and soils. As a result, they were not considered PCOCs. While thallium was not detected in any sample, its reporting limit exceeded the screening value. Since thallium reporting limits were similar to the screening value, it was also removed from further consideration.

Silver concentrations exceeded the benchmarks in both Silver Creek sediment samples. Although silver not known to be Site-related, its presence may be due to upstream and off-Site contributions. Consequently, it was retained as a PCOC.

As with silver, selenium was reported at concentrations higher than the screening benchmark. Selenium levels in on-Site soils ranged higher than sediment levels while background soil data were within twice the concentrations reported. This evidence indicates that selenium levels are reflective of regional concentrations, not Site-related activities. However, since Silver Creek sediment levels were the highest observed on-Site and selenium does pose risks within the environment, it was retained as a PCOC.

4.5 FISH TISSUE RESIDUES

Fish tissue samples collected from the NRD Reservoir and background reservoir in 1999 were analyzed for explosive compounds and metals and expressed in mg/kg wet weight.

Laboratory detection methods have been unable to accurately measure explosives compounds in fish tissue, resulting in a high level of uncertainty. Therefore, these data were not reliable. Only two compounds, nitrobenzene and 2-amino-4,6 dinitrotoluene were estimated in reservoir sediment and surface water samples, respectively. Nitrobenzene was estimated in only one sediment sample. 2-amino-4,6 dinitrotoluene was estimated in five surface water samples. Literature states that explosive compounds do not readily bioaccumulate in fish (Talmage et al., 1999, Lang et al., 1997, EPA 1995c, ATSDR 1995,1995b, and Ryon 1987). Therefore, further assessments of explosive tissue residue data were not performed, representing limitations discussed in Section 7.3.

A total of 14 metals were detected in both the NRD and background reservoir fish tissue samples. Of the two metals, silver and selenium, that were retained as PCOCs in the ERA, silver was not detected in tissue samples even though it was detected in the reservoir watershed. Selenium was estimated in all samples with little difference between the NRD and background reservoirs. This resemblance between fish tissues likely indicates the watershed contains naturally elevated levels of selenium.

Metals concentrations in fish tissues were similar between reservoirs except for aluminum, manganese, copper, lead, and zinc. Variability in these metal concentrations did not show any trends. Aluminum and manganese concentrations were higher in background tissue samples, while zinc, copper, and lead were higher in the NRD Reservoir samples. No metals showed levels that would indicate the presence of site-related contamination.

4.6 SUMMARY

The chemical screening described in the previous sections identified the following PCOCs for the Site:

Investigation Area	Surface Water	Sediment
Johnson Creek	None	Silver
NRD Reservoir	None	None
Silver Creek	None	Silver, Selenium, p- Cresol

4.7 TOXICITY PROFILES

In order to develop the exposure scenarios and conduct the ecological effects assessment discussed in Section 5.0, the toxicological characteristics of the individual PCOCs must be taken into consideration. Much of the information regarding the toxicity of each PCOC is presented as the basis for the development of exposure assumptions and in the discussion of ecological effects.

4.7.1 Toxicity Overview

Many of the literature reports reviewed for this assessment did not specify the chemical form of an element when discussing its toxicity. In these instances, it was assumed that only the total concentration of the chemical was known. For most reports and in this assessment, if the basis for expressing concentrations of the element in plant or animal tissues is not specified, a dry-weight basis can be assumed.

The toxicity of a substance is generally determined in aquatic systems by the lethal concentrations and in terrestrial systems by the lethal dose (in relation to body weight or growth medium). Lethal concentrations and doses are also usually expressed in terms of an exposure duration. Amounts of a chemical in relation to body weight are typically expressed as ingested amounts on a daily basis (i.e., mg/kg-bw/day). Exposure concentrations for aquatic organisms and dietary concentrations for terrestrial organisms are expressed as mg/l or mg/kg, with duration usually expressed in terms of acute or chronic exposure. Dietary concentrations are reported on a wet weight basis in most toxicological studies. Comparison with dry weight dietary concentrations is generally ignored as the moisture content of laboratory diets is typically less than 10 percent (Beyer and Stafford, 1993).

To be toxic, an element must be "available" to the receptors. In order for this to occur, the chemical must exist in a form that can enter tissues of the organisms either in solution (generally aqueous) or as a solid (food item). Animals or plants are likely to contact this form either directly or indirectly. Total amounts of a chemical in the environment are not relevant to an adequate estimation of potential toxicity unless it can be shown that the element exists in an available form under existing environmental conditions.

4.7.2 Silver

Chemistry and Environmental Fate

Silver is a rare element that is distributed in the earth's crust at a concentration of about 0.1 ppm (NAS, 1980) and is usually found in very low concentrations in the aquatic environment (Callahan et al., 1979). Silver can occur as native silver, in mineral form, and as complex sulfides. In aqueous solution, silver may exist in a variety of forms such as aquated cations, metal-inorganic complexes, and metal-organic complexes. Sorption and precipitation are likely the most important processes controlling the fate and transport of silver in the aquatic environment. These processes are effective in reducing the concentration of dissolved silver, resulting in higher concentrations in the bed sediments than in overlying waters. Manganese dioxide, ferric compounds, and clay minerals all appear to have some degree of adsorptive affinity for silver and are involved in its deposition into sediments. Precipitation with halides also probably plays a role in the mobility of silver in the aquatic environment. Some silver is also accumulated in tissues (EPA, 1980a; Callahan et al., 1979).

Aquatic Residues

The bioaccumulation of silver appears to be primarily a function of sorption/desorption from sediments (Callahan et al., 1979). Silver is not present in aquatic animals at very high concentrations because most of its compounds are sparingly soluble in water. Although silver is generally highly toxic to aquatic life, there seems to be little food-chain magnification (Callahan et al., 1979). Based on a review of several studies, biomagnification of silver over several trophic levels does not occur in the aquatic food web (Kay, 1984).

Water-to-tissue bioconcentration factors (BCFs) for silver have been estimated at 3,080 for freshwater invertebrates and fish (Chapman et al., 1968). Results of two studies have documented silver accumulation in marine bivalves (Thomson et al., 1984; Pesch et al., 1977). However, the low solubility of silver compounds greatly reduces sediment-to-tissue BCFs to 1 or less in most biota (EPA, 1978).

Terrestrial Residues

Silver has been shown to exhibit antagonistic effects to selenium, vitamin E, and copper, inducing deficiency symptoms in animals fed adequate diets or aggravating deficiency symptoms when the animals' diets lacked one or more of the nutrients. The effects have been described in dogs, sheep, pigs, rats, chicks, turkey poults, and ducklings (EPA, 1980a).

Ecotoxicity - Aquatic Biota

Silver is one of the most toxic metals to aquatic life, particularly freshwater species (EPA, 1980a). Species mean acute values (SMAVs) have been calculated for several freshwater species based on the available toxicity literature. Some species mean acute values (or LC_{50}s - concentration acutely toxic to 50 percent of test organisms) are as follows: for the cladoceran (*Daphnia magna*) - 0.25 to 49 µg/l, midge (*Tanytarsus dissimilis*) -3,200 µg/l, rainbow trout

(*Salmo gairdneri*) - 5.3 to 240 μg/l, fathead minnow (*Pimephales promelas*) - 3.9 to 270 μg/l, and bluegill (*Lepomis macrochirus*) - 64 μg/l (EPA, 1980a).

Emergents contain more silver than other life forms (Outridge and Noller, 1991), although adverse effects of silver on freshwater plant species range from 30 to 7,500 μg/l. Adverse effects of silver on plants are not likely at concentrations which will not adversely affect freshwater animals (EPA, 1980a).

Ecotoxicity - Terrestrial Biota

Little information is available on the toxicity of silver to birds and other wildlife. Limited studies are available on silver toxicity to poultry, mice, and rats. Hill et al. (1964) demonstrated that 10 to 100 mg/kg of dietary silver had no adverse effects on chickens grown to 3 weeks of age in a dose-response experiment. Jensen et al. (1974) found that at 300 mg/kg of dietary silver the rate of weight gain was reduced, and at 900 mg/kg the heart was enlarged, the gizzard musculature was dystrophic, weight gain was severely depressed, and the blood packed cell volume was decreased in growing turkeys. Little information is available on the health effects resulting from short- or long-term exposure of animals to food containing specific levels of silver, however limited information is available on effects from exposure in drinking water (ATSDR, 1990a). Death occurred in rats after a two-week exposure to 2,589 mg/kg silver in drinking water. Sluggish behavior was noted in mice after a 125-day exposure to 95 mg/kg silver in drinking water, and decreased weight gain was noted in rats after a 37-week exposure to 1,587 mg/kg silver in drinking water (ATSDR, 1990a).

4.7.3 Selenium

Chemistry and Environmental Fate

Selenium is widely distributed in nature, being especially abundant with sulfide minerals of various metals. Changes in the five states of selenium: 1) -2 (hydrogen selenide), 2) 0 (elemental selenium), 3) +2 (selenium dioxide - byproduct of combustion), 4) +4 (selenite - form taken up by plants), and 5) +6 (selenate - for dissolved in water) are associated with its geologic distribution, redistribution, and use. Selenium concentrations in non-biological materials extend several orders of magnitude (0.01 to 480 μg/kg in water and 0.25 to 14.5 μg/kg in sediment). Selenium occurs in the earth's crust at a concentration of 0.05 μg/kg (Frost and Ingvoldstad, 1975). Soil concentrations reported for the eastern part of Nebraska range from 0.3-5 ppm (Shacklette and Boerngen, 1984).

Residues

Selenium reportedly protects mammals and some birds against the toxic effects of several chemicals (Hill, 1975; Wilber, 1983). Selenites of mercury, silver, copper, and cadmium are very insoluble although their insolubility may be the basis for the reported detoxification of methylmercury by dietary selenite, and for the decreased heavy metal toxicity associated with selenium. Metallic selenides are biologically important in sequestering both selenium and heavy metals in a largely unavailable form.

The biological availability of selenium is higher in plant foods than foods of animals origin (Lo and Sandi, 1980). Selenium is nutritionally important as an essential trace element, but is harmful at slightly higher concentrations. In general, selenium deficiency does not appear to be a factor when diets contain 50 to 100 µg/kg. Current recommendations for protection of freshwater aquatic life are that inorganic selenite concentrations in water should not exceed 35 µg/l on a daily average, or 260 µg/l at any time.

Selenium is known to bioconcentrate to a limited degree. Bioconcentration and accumulation of selenium from the water column by numerous species of algae, fish, and invertebrates is documented at levels between 0.015 and 3.3 µg/l. Though water-to-tissue BCFs for selenium can range up to 32,000 (Patrick, 1978; Lemly, 1985), sediment-to-tissue BCFs appear more moderate, in the range of 2 to 4 for plants and fish (ERG, 1993). The sediment-based BCFs showed less variability among individuals than did the water-based BCFs, and may represent the more reliable measure of natural conditions.

Ecotoxicity - Aquatic Biota

Table B-17 shows the available toxicity data for selenium. No Observable Adverse Effect Level (NOAEL) values for aquatic biota are sparse, with only a single value from the shrimp *Mysidopsis bahia* at a concentration of 0.143 mg/l. Frog tadpoles (*Xenopus laevis*) exhibited LC_{50} at 1.8 mg/l at ten days (Brown and Dumont, 1979). The mosquito (*Culex fatigans)* exhibits a 48 hr LC_{50} at <3.1 mg/l (Nassos et al., 1980), and the midge (*Tanytarsus dissimilis)* exhibits a 96 hr LC_{50} at 42.4 mg/l of selenium (EPA, 1980b).

No chronic studies of selenium toxicity to fish could be located. The 96-hour LC_{50} for the sheepshead minnow (*Cyprinidon variegatus*) is 6/7 mg/l. Other studies summarized by EPA in development of ambient water quality criteria for selenium reported acute toxicity values (96-hour LC_{50}) for the bluegill (*Lepomis macrochirus*) range from 0.62 to 28.5 mg/l, and for the fry fathead minnow (*Pimephales promelas*) are 2.1 mg/l (EPA, 1980b).

Ecotoxicity - Terrestrial Biota

Ohlendorf and Harrison (1986) reported severe reproductive effects in ducks (*Anas* spp.) using ponds with selenium concentrations of 0.3 mg/l in the water. The reproductive effects included dead embryos and obvious external anomalies of beaks, eyes, wings, legs, or feet. The hatchability of eggs is reduced by concentrations of selenium in feed (6 to 9 mg/kg) that were too low to produce poisoning in avian species.

Heinz et al. (1987) report several dose-responses for the mallard: at a dose of 100 mg/kg sodium selenite, adult mallards experienced mortality and weight loss; at 25 mg/kg sodium selenite, adult mallards again experienced mortality, and depressed body weight in adults and ducklings, reduced egg laying, reduced duckling survival, and lower Radcliffe index; at 10 mg/kg selenomethionine, mallards experienced reduced duckling survival, low hatching success, abnormal embryos (18 percent), multiple malformations, and depressed body weight; and at 10 mg/kg sodium selenite mallards exhibited multiple malformations.

In mammals, selenium concentrations of 8 to 30 mg/kg in the diet have been associated with chronic toxicity (Wilbur, 1980). A threshold range of harmful dietary selenium concentrations in mammals has been estimated to be 2 to 5 mg/kg (McVey and Macler, no date).

4.7.4 P- Cresol

Chemistry and Environmental Fate

P-cresol (listed as 4-Methlyphenol in the laboratory results) is released to the environment in automobile exhaust, coal tar refining, and manufacturing (ATSDR, 1988a). Releases to the atmosphere have resulted in the widespread of p - cresol into the environment, especially near roads and cities. While it is mobile within soil, sediment, and water, it degrades rapidly in oxygenated environments, with a half-life on the order of hours in most environments. Biodegradation by bacteria is the dominant degradation activity.

Residues

P - cresol uptake by organisms can occur through inhalation or consumption of contaminated food items. It is readily assimilated by most organisms, but its short half-life, and ability to be excreted by most biota, and metabolization by most vertebrates limits its potential for bioaccumulation. As a result, though invertebrates may have tissue concentrations similar to their environment, p-cresol does not accumulate through the food chain.

Ecotoxicity-- Aquatic Biota

Table B-17 shows the available toxicological information on cresols. Comparative studies have found that o- and p-cresol have similar toxicity, with m-cresol being slightly less toxic (ATSDR, 1988a). Chronic data are sparse relative to acute data, likely due to the short half-life of cresols in the environment. A chronic maximum allowable toxicant concentration (MATC), which is equivalent to a NOAEL, for the fathead minnow (*Pimephales promelas*) was 1.81 mg/l p-cresol. The chronic toxicity threshold (TT), also equivalent to a NOAEL, was observed for *Entosiphon sulcatum*, a protozoan, at 17 mg/l o-cresol. Various studies observed acute lethal and sublethal effects in fish at levels from 7 to 40 mg/l cresols.

Ecotoxicity-- Terrestrial Biota

Available data on toxicity of cresols to terrestrial biota are limited to mammalian receptors. No data could be located for avian species. Available NOAELs range from 5 mg/kg/day observed in rabbits (CMA, 1988) to 219 mg/kg/day for mink (Opresko et al., 1995). Higher doses were observed to cause hyperactivity, respiratory system distress, and death. Acute LC_{50}s in feed for rats and mice range from 500 to 2050 mg/kg, and minimum lethal concentrations for rabbits and ferrets were 620 mg/kg and 200 mg/kg, respectively (ATSDR, 1997).

5.1 CONCEPT

Exposure assessment includes preliminary identification of the source-receptor exposure pathways taking into account environmental fate and transport through both physical and biological means. Pathways are described in terms of the ecological PCOCs, environmental media involved, and potential ecological receptors. The exposure assessment consisted of the following steps:

Step 1: Evaluation of the actual or potential source-receptor pathways for completeness and significance

Step 2: Determination of exposure points and concentrations

Step 3: Estimation of chemical intake by key receptors

Step 4: Estimation of exposure duration, frequency, and area use

5.1.1 Potential Exposure Routes

Exposure routes or pathways define the migration routes that chemicals may take from a source to various exposure points. The transport media, chemicals involved, potential ecological receptors, and potential uptake of chemicals by receptors (exposure route) are described for the principal ecological exposure pathways for Johnson Creek, Silver Creek, and the NRD Reservoir (discussed in Section 3.0, Ecological Conceptual Site Model) and more fully developed in following sections.

There are two potential exposure routes for aquatic receptors: direct contact and ingestion. Direct contact can be important for PCOCs that are relatively soluble in water. Direct contact can also be important for PCOCs that enter through the gills or skin surfaces of receptors. Because no PCOCs were retained for surface water exposure assessment in Section 4.0, the pathway of direct contact with contaminated water was considered to be insignificant relative to the sediment ingestion (and food chain bioconcentration) pathway. For the purposes of this ERA, ingestion of sediments and biota were the only exposure routes considered.

Of the three potential exposure routes (inhalation, dermal absorption, and ingestion) for the key terrestrial receptors only the route of ingestion was considered to contribute to uptake owing to the nature of the PCOCs and the receptors. The chemicals that were retained in the PCOCs screening in Section 4.0 (p-cresol, silver, and selenium) are generally non-volatile, and present minimal inhalation exposure at the levels present in surface water and sediments. Moreover, most of the PCOCs that become attached to furred or feathered animals are ultimately ingested during grooming activity.

5.1.2 Assessment Approaches

The exposure assessment consisted of a conservative dose estimation of the reasonable exposure of the key receptors to the PCOCs. Two assessment approaches were used in the exposure evaluation: the "weight-of-evidence" approach (for aquatic receptors) and the ecotoxicological or "Ecotox" Quotient (EQ) (for mallard duck, great blue heron, and raccoon) approach. Because the literature data available do not permit a quantitative evaluation of exposure for the Site's key aquatic receptors, the weight-of-evidence approach, which involved consideration of media concentrations and qualitative habitat assessment, was used for these receptors

The EQ (adapted from Barnhouse et al., 1986; Watkin and Stelljes, 1993) approach was used for the exposure of the mallard duck and raccoon. Potential impacts attributable to PCOCs would most likely result from toxic effects due to ingestion of contaminated environmental media or food items. Because one of the PCOCs (selenium) is known to bioaccumulate, the bioaccumulation pathway was evaluated in the exposure assessment for the mallard duck and raccoon, the two high-level receptors in this ERA, by including sediment-to-tissue BCFs for their prey items in the EQ calculations. For these scenarios, the EQ approach was used to evaluate potential risk to ecological receptors.

5.1.3 Potential Source-Receptor Pathways

The potential exposure pathways to aquatic biota that live in the creeks and reservoir and to wildlife that forage at the creeks and reservoir were evaluated. Sediments would be the major potential abiotic source of PCOCs in the creeks and reservoir. None of the PCOC were detected in surface water above benchmark values. Therefore, the primary aquatic scenario is associated with the sediment as the exposure medium for biota using the creeks and reservoir.

Benthic macroinvertebrates and fish may be exposed to PCOCs in sediment though direct ingestion and consumption of contaminated food items. Based on the field reconnaissance and their exposure to PCOCs, benthic macroinvertebrates and benthivorous fish (specifically bullhead and common carp) were selected as aquatic receptors.

Wildlife that visit the creeks and reservoir to drink the water, forage for aquatic vegetation, or to catch prey species may also be exposed to sediment PCOCs through incidental sediment ingestion and consumption of contaminated prey. Mallard ducks, great blue herons, and raccoons were selected as avian and mammalian receptors based on their semi-aquatic habits, feeding preferences, and known presence on-Site.

5.1.4 Receptor Exposure Points and Intake Routes

The exposure point and intake route of PCOCs for each of the key receptors (benthic macroinvertebrate, benthivorous fish, mallard duck, great blue heron, and raccoon) are presented below:

Benthic Macroinvertebrates

The close association of benthic macroinvertebrates with sediment, along with their role as a food source for higher trophic level consumers, makes them key receptors of PCOCs in sediment. Many benthic taxa burrow in sediment and feed upon organic detritus. As a result, they directly consume sediment with their food throughout their lifespan. Additionally, some macroinvertebrates prey upon smaller macroinvertebrates. The benthic communities on-Site are generally limited due to the sandy, unstable nature of the sediment in the creeks and reservoir and lack of organic matter in the creeks.

Benthivorous Fish

The benthic feeding habits and long lifespan of bullhead and common carp make them key receptors for sediment-borne PCOCs. The frequency of their exposure is nearly continuous. Young bullhead and common carp feed on organic detritus, benthic algae, and benthic macroinvertebrates. Older bullhead add larger macroinvertebrates and small fish to their diets. Adult bullhead and common carp incidentally ingest sediment along with these larger prey. The direct ingestion of detritus and benthic algae by young fish exposes them to maximum sediment PCOC concentrations during their early life stages. However, their exposure to PCOCs, which bioconcentrate in the food chain probably increases as they reach maturity and consume larger prey.

Mallard Duck

The primary exposure point and intake route for mallard ducks is the consumption of PCOCs associated with sediment and their food items. The exposure assessment used the mallard duck, rather than migratory geese, since the duck's longer residence time on-Site increases their potential exposure. Mallard ducks feed along the bottom of surface water features, ingesting aquatic macrophytes, algae, seeds from emergent plants, and sediment. Since sediment can contribute from 1 percent to 47 percent of their daily intake (Goodman and Fisher, 1962; Beyer et al., 1991), this is an important intake route that must be considered in the risk assessment. Due to the sparse aquatic vegetation and benthic macroinvertebrate supply in the creeks, terrestrial plant materials (seeds, fruits, leaves) probably comprise a substantial portion of the diet of mallard ducks on-Site. In addition to migrating prior to the onset of winter, the mallards do not forage exclusively on-Site and make greater use of other nearby habitat such as the Platte River and its tributaries. These behavior patterns reduce the area use factor for the mallard duck to 50 percent.

Great Blue Heron

Ingestion of fish and incidental ingestion of sediment are the primary exposure points and intake routes for the great blue heron. The exposure assessment used the great blue heron because it has been observed on-Site and consumes mostly aquatic species. The great blue heron feeds along shorelines of bays, streams, and lakes, wading for fish and other aquatic animals. While sediment is not usually ingested, incidental ingestion and consumption of benthic species can contribute sediment to their daily intake. Due to winter migration and the Site's proximity to quality habitats along the Platte River and its tributaries, great blue herons probably do not forage exclusively on-Site. These habitat preferences reduce the area use factor for the great blue heron to 50 percent or less in the creeks.

Raccoon

Raccoons may be exposed to PCOCs by drinking surface water in the creeks and reservoir and by incidental ingestion of sediment along with aquatic prey. The raccoon was selected as the key receptor for the exposure evaluation due to their habit of consuming aquatic prey. Raccoons are known residents of the Site, using buildings and wood piles as nesting habitat. As a result, their exposure to food items from the Site is likely to be continuous. They likely use surface water in the creeks and reservoir for drinking, and forage for benthic macroinvertebrates, small fish, and other prey. With the abundance of crop plants on-Site, their diet is likely dominated by corn, soybeans, or other crop products.

5.2 ASSESSMENT

Maximum concentrations of silver, selenium, and p-cresol in the creek sediments were used to evaluate exposure of benthic macroinvertebrates, benthivorous fish, mallard duck, and raccoon in this section. The section is divided by investigation area; within each area the different scenarios are discussed.

5.2.1 Johnson Creek

Silver was the only PCOC retained for exposure assessment in Johnson Creek. No PCOCs were selected for Johnson Creek surface water. Only sediment pathways were assessed for the key receptor species.

Benthic Macroinvertebrate Exposure

A semi-quantitative method was employed to assess exposure of benthic macroinvertebrates to PCOCs. Due to the lack of dose and ingestion data for aquatic species in general, and invertebrates in particular, converting toxicity test results from effects concentrations (e.g., mg/kg) to effects doses (e.g., mg/kg/d) was not possible for the exposure assessment. Instead, the assessment estimated risk to benthic macroinvertebrates using a comparison of effects concentrations in water and sediment with PCOC concentrations on-Site, and qualitative analysis of the benthic macroinvertebrate community data.

To provide a more accurate estimate of silver toxicity to benthic macroinvertebrates, a search of the literature for effects concentrations was conducted. The range of LC_{50} values found was from 0.25 μg/l to 3,200 μg/l (**Table B-17**), indicating that silver toxicity is greatly dependent on environmental conditions and species sensitivity. Because respiration of silver-contaminated water is thought to be a major pathway for silver exposure to aquatic biota, toxicity of silver in sediment hinges upon its solubility constant (K_d). Values for the K_d of silver range from 10 to 1000, depending upon water conditions such as redox potential, pH, and TSS, and sediment conditions such as TOC, grain size, and redox state (Dragun, 1988). These uncertainties in estimating silver toxicity make derivation of a Species-specific Screening Value (SSV) impractical for this PCOC.

Additionally, the richness and abundance of benthic macroinvertebrates in Johnson Creek were compared to expected characteristics for similar habitat in the absence of PCOCs. Given the poor physical quality of the creek habitat for benthic macroinvertebrates, one would not expect to find many species or sensitive taxa in the creeks. The sediment in Johnson Creek consisted of 70 to 80 percent sand, with silty material constituting the remainder. Little organic matter was observed in the creek sediments, and was assumed to be 0.2 percent by weight in risk calculations. This substrate type does not typically support a large benthic community, regardless of contamination. Deposit-feeders, leaf shredders, and other feeding habits depend upon organic matter as the primary food source. The sandy nature of the sediment is also not well suited to tube-dwelling taxa such as chironomids. Further, the maintenance of the creek channel disrupts benthic structure, keeping the community in a constant state of recovery. These factors all contribute to the lack of high quality benthic habitat in Johnson Creek. As a result, the presence of a significant benthic community would provide an indication that potential effects due to PCOCs were negligible, particularly if the species present were from sensitive taxa.

Benthivorous Fish Exposure

An approach similar to benthic macroinvertebrates was applied to the exposure assessment of benthivorous fish. The lack of readily available information regarding body size and sediment intake rates prevented a quantitative comparison of effects doses to site doses from being performed. The assessment used available toxicological data to develop an SSV for benthivorous fish in Johnson Creek.

A search of the available literature on silver toxicity to fish found LC_{50} values from 3.9 μg/l to 270 μg/l for the fathead minnow, and LC_{50} values within this range for other species (**Table B-17**). Because silver was not detected in on-Site surface water (with a reported detection limit of 5 μg/l), no direct comparison with these values can be made. The wide range of LC_{50}s within a single species indicates that silver toxicity in fish, as in benthic macroinvertebrates, varies with environmental conditions and species tested. Given the great uncertainty involved in the environmental characteristics and solubility of silver on-Site, the general screening value of 1.8 mg/kg was used in the exposure assessment. This value is a probable effects value (PEL) developed by the Florida Department of Environmental Protection for screening sediments.

Mallard Duck Exposure .4.4 Mallard Duck Exposure

The EQ Method (Barnhouse et al., 1986) was used to evaluate the mallard duck's exposure to silver from direct ingestion of sediment and food in Johnson Creek. The EQ method, as applied to environmental risk, is similar to that for calculating a Hazard Index for human health assessments (see Risk Assessment Guidance for Superfund, Volume I, Human Health (EPA, 1989a)). To obtain an EQ, the maximum detection in sediment was used to calculate an estimated daily dose for the mallard duck, which was then compared to the SSV developed from published toxicological literature.

The SSVs represented NOAEL doses of PCOCs for the key receptor species being considered. These benchmarks reflect the differences in toxicity of PCOCs between taxa, allowing a more accurate estimate of potential risk than general screening criteria. Where NOAEL values could not be identified, they were calculated, based upon other chronic (LOAELs, TD_{LO}s) or acute (LD_{LO}s, LD_{50}s) benchmark values which were available. EPA (1996) suggests use of 1/5th the LD_{50} for non-endangered wildlife as the "no-effects" level at which minimal mortality is likely. For endangered wildlife, 1/5th the LD_{10} or 1/10th the LD_{50} is recommended. An uncertainty factor of 100 is used in the derivation of ambient water quality criteria (AWQC) for the protection of aquatic organisms from acute values (usually 24-hour, 48-hour, or 96-hour LC_{50}S).

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For this analysis, the following safety factors were used to derive conservative SSVs for wildlife in aquatic habitats:

$$SSV = LD_{50}\ (mg/kg\text{-}bw/day)/100$$
$$SSV = LD_{LO}(mg/kg\text{-}bw/day)/10$$
$$SSV = TD_{LO}\ (mg/kg\text{-}bw/day)/5$$

The EQ approach incorporates several assumptions which are discussed in the following paragraphs.

The SSV for silver in the mallard duck was taken from a NOAEL in chickens (NAS, 1980). This benchmark provided a conservative estimate of the threshold of probable effects for silver in mallard ducks. Weight and food intake values for test organisms such as a chicken were taken from NIOSH (1987) or EPA, 1993c). Where food intake was unknown for the test organism, the Nagy (1987) allometric equations were used.

The EQ for each food component's exposure pathway was summed to obtain an EQ for each PCOC. These were also summed to obtain an overall Total EQ for the receptor.

Bioconcentration factors (BCFs) from sedimen to food types were either taken from available literature or conservatively estimated for PCOCs by dividing water-to-food item (invertebrates, macrophytes, fish) BCF values from the literature by the expected PCOC concentration in porewater, derived from K_d values for metals and K_{oc} (octanol water particion coefficient) values for organics.

The mallard duck's diet was assumed to be 50 percent plant material, 30 percent incidentally ingested sediment, and 20 percent aquatic invertebrates and fish, making conservative assumptions based upon data in the Wildlife Exposures Handbook (EPA, 1993b). Though terrestrial plant material, which would have PCOCs well below that of aquatic plant material, probably constitutes a major portion of the mallard duck's diet on-Site, it was not included in this assessment.

Because metals tend to adsorb to sediment particles or combine with organic matter in food, their bioavailability is much less than that from metals administered to laboratory animals. Reported assimilation factors in animals for metals range from 0.5 percent to 3.2 percent for cadmium (ATSDR, 1991) up to 20 percent to 30 percent for zinc (ATSDR, 1988b). In this assessment, it was assumed that 30 percent of ingested metals were assimilated to their consumer's bloodstream, which provided an extra conservative factor to the assessment.

Finally, the EQ approach assumes that chemical effects are additive. This may be an overly conservative assumption, as different classes of chemicals tend to affect different target organs. Further, some metals, such as silver and selenium, have antagonistic effects, resulting in less toxicity in combination than when present in isolation (Eisler, 1985).

Chemical Dose Calculation Chemical dose from sediments and food for the mallard duck was determined using the following equations:

$$chemical\,dose_{(sed)}(mg/kg - bw/day) =$$

$$CD_{sed} = \frac{C_{sed} \times SI \times P \times AVF}{BW}$$

$$CD_{food} = \frac{C_{food} \times FI \times P \times AVF}{BW}$$

where:

$_{sed}$	=	*chemical concentration in sediment (mg - chem/kg - $_{sed}$)*
SI	=	*Sediment Intake (kg/day)*
FI	=	*Food Intake (kg/day)*
P	=	*Proportion in Diet (unitless)*
AVF	=	*Area Use Factor (percent)*
BW	=	*Body Weight (kg)*
Cd_{sed}	=	*Chemical Dose from Sediment (mg/kg - bw/day)*
Cd_{food}	=	*Chemical Dose from Food (mg/kg - bw/day)*
C_{food}	=	*Chemical Concentration in Food (mg - chem/kg - food)*

Parameters used in the calculation of sediment and food intake for the mallard are as follows:

Mallard:

body weight (female) = 1.2 kg (Teres 1991)
food intake = 0.066 kg/day (Nagy 1987)
sediment intake = 0.022 kg/day (30% of food intake)

Food consumption for the mallard is based on body weight using the following allometric equation from Nagy (1987):

Food Intake (kg/day) = 0.0582 [(Wt-kg)$^{0.651}$][-63 + 169%]

[-63+169%] = 95% confidence interval of the food intake as a percent of the predicted food intake

Great Blue Heron Exposure

Exposure

The great blue heron's exposure to PCOCs in Johnson Creek was addressed using the EQ method. The dose equations shown above for the mallard duck were modified for the heron. The principal differences in exposure between the mallard duck and the heron were their body size, food intake, and dietary composition. The following equation developed for wading birds was used to determine the food intake rate for herons (Kushlan, 1978):

$$Log\ (Food\ Intake\ (kg/day)) = 0.966 Log(BW) - 0.640$$

Several assumptions were made to build the exposure model. The same SSV for silver used in the mallard exposure assessment was used for the great blue heron because it was taken from an avian species. Since the diet of the great blue heron is almost entirely composed of aquatic life, the diet composition for the exposure assessment was considered to be 100% fish. Incidental ingestion of sediment was assumed to be 30% of the food intake rate. This estimate may be overly conservative because herons are specialist feeders and do not forage in sediments.

The BCF applied to aquatic macroinvertebrates and fish was the same that was used for the mallard duck. Since silver is not known to bioaccumulate in the food chain, and it has a low K_d, the sediment-to-prey BCF of 1 used in the assessment was an appropriately conservative value.

The values that differ from the mallard duck model are presented below:

Great Blue Heron:

body weight = 2.2 kg (EPA, 1993c)
food intake = 0.40 kg/day (Kushlan, 1978)
sediment intake = 0.12 (30% of food intake)

Raccoon Exposure

The raccoon's exposure to PCOCs in Johnson Creek was addressed using the EQ method, as was the mallard duck and great blue heron. The dose equations shown above for the mallard duck were modified for the raccoon. The principal differences in exposure between the mallard duck and the raccoon were their body size, food intake, dietary composition, and the SSV selected.

Due to the lack of toxicological data on the effects of silver on terrestrial mammals, the SSV selected for the raccoon was a TD_{50} concentration for rats divided by a safety factor of five (ATSDR, 1990a). Because the TD_{50} was derived using a mammalian receptor, no additional safety factors were applied.

The diet of the raccoon varies greatly with location and season. The data (EPA, 1993c) indicate that the diet used in the exposure assessment (30 percent aquatic invertebrates and fish, 60 percent plant material, and 10 percent sediment) presents a conservative estimate. It probably overestimates the proportion of animal prey and sediment in the diet of raccoons living among corn fields.

The BCF applied to aquatic macroinvertebrates and fish was the same that was used for the mallard duck. Since silver is not known to bioaccumulate in the food chain, and it has a low K_d, the sediment-to-prey BCF of 1 used in the assessment was an appropriately conservative value. The assessment assumed that the PCOC concentration in the plant material consumed by the raccoon was zero, since terrestrial crop plants are the preferred food of raccoons when available, and silver concentrations in surface soils throughout the Site were mostly non-detectable.

The values that differ from the mallard duck model are presented below:

Raccoon:

body weight (male) = 7.6 kg (EPA, 1993c)
food intake = 0.364 kg/day (Nagy, 1987)
sediment intake = 0.0364 (10% of food intake)

5.2.2 NRD Reservoir

No PCOCs were retained for exposure evaluation for sediment and surface water of the NRD Reservoir.

5.2.3 Silver Creek

Silver, selenium, and p-cresol were retained as sediment PCOCs for the exposure assessment. No PCOCs were selected for Silver Creek surface water. Hence, only sediment pathways were assessed for the key receptor species.

Benthic Macroinvertebrate Exposure

SSVs for selenium and p-cresol were developed for benthic macroinvertebrates using available literature data (**Table B-17**). Favoring chronic to acute endpoints, and assuming that m-cresol and o-cresol have similar toxicity, the SSV selected for p-cresol was a toxicity threshold from a chronic toxicity test of the *Entosiphon sulcatum*, a protozoan. The SSV for selenium is a NOAEL for *Mysidopsis bahia*, a shrimp. These values were expressed in water concentrations in their source documents. Using the K_{oc} data (cited in ATSDR, 1997) and assuming $f_{oc} = 0.002$, the p-cresol benchmark converts to 1.69 mg/kg in sediment. Using the K_d values for selenium, the selenium value converts to a range from 0.2 mg/kg to 1.2 mg/kg in sediment. As previously noted, the values for each benchmark are highly dependent on environmental conditions, and have substantial uncertainty.

As with Johnson Creek, no SSV could be developed to assist in the assessment of silver toxicity risk to benthic macroinvertebrates which occur in Silver Creek. This risk was evaluated by comparing the general screening benchmark to Site sediment concentrations and analysis of available on-Site benthic macroinvertebrate data.

Silver Creek's benthic substrate was composed of 80 to 100 percent sand, with rocks dominating the remainder of the sediment. Little to no organic matter was observed in Silver Creek. Like Johnson Creek, it is regularly dredged to prevent flooding. As a result of these characteristics, Silver Creek's sediment is even less suited to supporting a rich benthic community than Johnson Creek. Consequently, finding a substantial benthic community in Silver Creek should be interpreted as evidence that PCOC effects to benthic macroinvertebrates are minimal.

Benthivorous Fish Exposure

SSVs were developed for selenium and p-cresol using available literature benchmarks (**Table B-17**). Preferring chronic to acute data and assuming all m- and o-cresol have similar toxicity, the selected literature value was a Maximum Acceptable Toxicant Concentration (MATC) from a chronic toxicity test for the fathead minnow (*Pimephales promelas)*. Using the equilibrium partitioning approach, the sediment concentration matching the MATC is 0.17 mg/kg. The selenium SSV for benthivorous fish came from an LC_{50} using the sheepshead minnow. Using a 100x safety factor, the water benchmark is 0.067 mg/l, which converts to 0.0938 to 0.567 mg/kg sediment. Again, these benchmarks have considerable uncertainty owing to the dependence of K_{oc} and K_d values upon environmental conditions. As with Johnson Creek, no SSV could be developed to assist in the assessment of silver toxicity risk to benthivorous fish. This risk was evaluated by comparing the general screening benchmark to Site sediment concentrations.

Mallard Duck Exposure

The mallard duck exposure scenario for Silver Creek carried the same assumptions for silver exposure as the Johnson Creek scenario. The assessment of exposure to selenium and p-cresol differed from that of silver in the SSVs selected. Additionally, because two additional PCOCs were retained for Silver Creek, additional BCFs and assimilation factors were developed.

The SSVs selected for selenium and p-cresol in Silver Creek sediment were taken from estimated NOAEL concentrations in Opresko et al. (1995) and ATSDR (1997), respectively. The selenium value was taken from a study which used sodium selenite in mallard ducks. Because the study recorded a NOAEL level and the receptor in the subject was the same as the receptor in this assessment, no safety factor was applied to the result. No studies for avian receptors were found for p-cresol, so the SSV selected was the most conservative mammalian value available (derived from a NOAEL for rabbits).

The sediment-to-food item BCF estimates for selenium were taken from an Eastern Research Group (ERG, 1993) study of selenium uptake by aquatic plants, benthic macroinvertebrates, and fish. The BCF for p-cresol was based on the assumption that it can be excreted by most biota and can be metabolized by vertebrates. The value derived for selenium concentrations in aquatic macroinvertebrates and fish corresponds to the maximum dry weight level reported in fish collected in the NRD Reservoir. These fish were mature and likely not available as prey, indicating that estimated values used in the assessment represent extremely conservative concentrations in food items. Both PCOCs are likely present as overestimates of the available concentrations of these constituents in food. Selenium assimilation was assumed to be 30 percent in this assessment, based on the data for metals assimilation in ATSDR (1988a, 1988c, 1990a, 1990b, 1990c, and 1991). Due to the lack of information on p-cresol assimilation, it was conservatively assigned as assimilation factor of 1.

Great Blue Heron Exposure

The assumptions of the great blue heron exposure assessment scenario for Silver Creek were used in the Johnson Creek scenario. The sediment-to-aquatic macroinvertebrate/fish BCFs for the heron were the same as for mallard ducks.

Raccoon Exposure

The assumptions of the raccoon exposure assessment scenario for Silver Creek used the same body size, food intake, and dietary assumptions as the Johnson Creek scenario. The sediment-to-aquatic macroinvertebrate/fish BCFs for the raccoon were the same as for mallard ducks. The BCF for plants was again assumed to be zero, due to raccoons' preference for terrestrial crop plant food when available.

5.3 RESULTS

None of the key receptors in this exposure assessment showed a summed EQ greater than 1, indicating that effects due to PCOCs are unlikely to occur. No EQ estimation was possible for benthic macroinvertebrates or benthivorous fish, but the weight-of-evidence evaluation shows little exposure to these receptors from PCOCs. Selenium presented the major contribution to the

EQ values for the mallard duck, great blue heron, and the raccoon, in large part due to the high sediment-to-food BCF assigned to it. EQs developed for silver and p-cresol were minimal for these key receptor species.

5.3.1 Johnson Creek

Assessment of the exposure of benthic invertebrates and benthivorous fish depends upon a comparison of the general screening value for silver of 1.8 mg/kg and the Johnson Creek sediment maximum (2.3 mg/kg). The SSV ratio is 1.28. The summed EQs for the mallard duck, great blue heron, and raccoon in Johnson Creek were 0.0008, 0.0047, and 0.0008, respectively (**Tables B-18** through **B-20**).

5.3.2 NRD Reservoir

No PCOCs were identified in the NRD Reservoir sediment and surface water, hence, no exposure assessment was necessary for the NRD Reservoir.

5.3.3 Silver Creek

The sediment maxima for silver, selenium, and p-cresol exceed the generic benchmarks by a small margin. Selenium and p-cresol exceeded their respective calculated sediment SSVs for benthic macroinvertebrates and benthivorous fish by a factor of up to 24 times. The uncertainty associated with the calculated SSVs represents an uncertainty in the BRA. The summed EQs for the mallard duck, great blue heron, and raccoon in Silver Creek were 0.105, 0.578, and 0.206, respectively (**Tables B-21** through **B-23**). In each case, selenium from food items contributed the majority of the potential exposure observed.

The potential risk to key ecological receptors at the Site were evaluated in this ERA using the weight-of-evidence approach and the EQ approach. The weight-of-evidence approach includes a semi-quantitative comparison of Site media concentrations with screening values and a qualitative evaluation of other factors, including habitat quality and receptor population data. The EQ approach is more quantitative, comparing estimated doses of PCOCs to benchmark doses to derive a single EQ value representing potential risk for the receptor.

EQs of one or below indicate a "low probability" for an impact to occur. Quotient values from 1 to 10 indicate a "possibility" for ecological impacts. While these are still relatively low values, they need to be interpreted in light of the uncertainty in the SSV estimates and exposure concentrations. Values greater than 10 indicate that it is "more probable" that ecological impacts may occur due to the presence of chemicals in the environment (Watkin and Stelljes, 1993). Values greater than 1 or 10 are cause for further detailed consideration of the uncertainties and limitations involved in the calculation of the EQ and the nature of the potential hazardous effects, as represented by the SSV. Correct interpretation and usage of this approach is highly dependent on professional judgment and an understanding of the assumptions and uncertainties involved in the calculations, particularly in instances where the Total EQ approaches 1 (Watkins and Stelljes, 1993; EPA, 1989c).

Each of the methods used in this BRA employed a number of assumption-based parameters, each with some degree of associated uncertainty. Because of this uncertainty, interpretation of results was also appropriately conservative. Limitations and uncertainties associated with these approaches are discussed in Section 7.0.

The exposure calculations described above were used to identify portions of the OU3 investigation areas which may present potential ecological risk. In this section, the results of the exposure assessment are used to characterize potential risk summarized for each of the OU3 investigation areas assessed in this ERA.

6.1 JOHNSON CREEK

The exposure assessment performed for Johnson Creek involved the identification and evaluation of risks to key ecological receptors exposed to PCOCs in sediment. The only PCOC identified for this area of the Site was silver, which was selected due to its elevated sediment concentration and known toxicity to biota. The key ecological receptors identified for inclusion in the assessment were the benthic macroinvertebrate community, benthivorous fish, mallard duck, great blue heron, and raccoon.

Based on the assessment, the following potential risk was identified for Johnson Creek:

- Two sediment samples from JC-001 and JC-002 had silver concentrations that exceed the PEL by a factor of 1.28. Low level exceedance of PEL is considered to represent only a minimal risk to aquatic biota and negligible risk to the key receptors evaluated in the exposure assessment.
- Potential ecological risks to benthic macroinvertebrate communities inhabiting and consuming sediments appear to be negligible. Though sediment concentrations exceed the PEL benchmark, the slight degree of exceedance and the presence of relatively sensitive taxa in the benthic samples indicate that silver toxicity is unlikely to affect the benthic community.

Moreover, the negative effects of the relatively poor substrate, regular dredging of the creeks, and clearing of vegetation to the edge of the creek all greatly outweigh any potential effect from silver.

- Potential ecological risk to benthivorous fish associated with consuming contaminated food items and incidental ingestion of sediment appears to be minimal. Though sediment concentrations exceed the PEL benchmark, the slight degree of exceedance and the presence of young bullhead and common carp on-Site indicate that silver toxicity is unlikely to affect fish populations. The damage done to the benthic community by dredging also affects food abundance for fish, making human disturbance the major factor reducing fish abundance in Johnson Creek.
- Potential ecological risks to mallard ducks and great blue herons associated with consuming contaminated food items and incidental ingestion of sediment are negligible. The EQ value was 0.0008 and 0.0047 respectively, indicating that the sediment levels in Johnson Creek are considered unlikely to pose any risk.
- Potential ecological risk to raccoons associated with consuming contaminated food items and incidental ingestion of sediment are negligible, based on the EQ value of 0.0008.

The potential risks summarized above must be considered in conjunction with the uncertainties surrounding the data used and the assumptions made for each of the scenarios. Uncertainties and limitations are further developed in Section 7.0.

6.2 NRD RESERVOIR

As described throughout the text, concentrations of PCOCs measured in the sediment from the NRD Reservoir are consistent with those of local soils. No risks attributable to previous NOP-related activities are anticipated for the NRD Reservoir. Instead, the matrix composition of the substrate in the flooded areas, unregulated changes in pool level, and the lack of organic matter inflows from Johnson Creek all limit the capacity of the NRD Reservoir to support diverse or abundant aquatic life.

6.3 SILVER CREEK

The exposure assessment performed for Silver Creek involved the identification and evaluation of risks to key ecological receptors exposed to PCOCs in sediment. The PCOCs identified for this area of the Site were silver, selenium, and p-cresol. These PCOCs were selected due to their elevated concentrations in creek sediment and known toxicity to biota. The key ecological receptors identified for inclusion in the assessment were the benthic macroinvertebrate community, benthivorous fish, mallard duck, great blue heron, and raccoon.

The assessment approach used was the EQ approach based on the exposure source (sediment) and the known toxic mechanism of silver. Based on the assessment, the following potential risk was identified for Silver Creek:

- Silver exceeded its screening benchmark in both sediment samples from Silver Creek by a factor of 1.28. Selenium exceeded the screening benchmark by about 2.3 times and p-cresol exceeded its benchmark by about 14 times. As in Johnson Creek, the low level exceedance of PEL and background levels for silver and selenium is considered to represent only a minimal risk to aquatic biota.
- As with Johnson Creek, the weight-of-evidence assessments find potential ecological impacts to benthic macroinvertebrates and to fish to be minimal. The exceedance of sediment benchmarks does not necessarily indicate risk to benthic macroinvertebrates; rather, it indicates a possibility of risk. Though selenium and p-cresol exceeded calculated sediment toxicity values, the uncertainties involved in converting effects levels in water to sediment effects levels limit the use of results from this approach. The lack of surface water exceedances for these PCOCs in Silver Creek suggests that actual sediment toxicity may be lower than the calculated values indicate. Background soil and sediment data for selenium, coupled with natural variation in soils and the similar levels in the background reservoir fish tissues indicate it is occurring naturally throughout the region. The presence of fish and sensitive benthic taxa in spite of extensive human disturbance and poor substrate, further suggest that the limiting factor for the benthic macroinvertebrate and fish communities in Silver Creek is habitat quality, not PCOCs.
- Potential ecological risk to mallard ducks and great blue herons associated with consuming contaminated food items and incidental ingestion of sediment is negligible. The summed EQ value for all three PCOCs was 0.105 and 0.578 respectively, which indicates that the sediment levels present are unlikely to pose a risk to aquatic birds.
- Potential ecological impacts to raccoons associated with consuming contaminated food items and incidental ingestion of sediment appear to be negligible. The summed EQ value for all three PCOCs was 0.206, which indicates that the sediment levels present are unlikely to pose a risk to omnivorous mammals.

Toxicity information on the PCOCs for the receptors at the Site was not complete. In the absence of complete information, the approach used in this BRA was to make conservative assumptions and calculations for these parameters to ensure that potential ecological risk associated with exposure of receptors to the ecological PCOC at the Site was not underestimated. Assumptions for the OU3 BRA were made in the compilation of environmental media data, the selection of key receptors, the exposure evaluation and development of toxicity screening values (i.e., thresholds), ecological effects evaluation, and the risk analysis. When many conservative assumptions are used to develop an overall risk characterization, the result may be overly conservative and the actual risks are likely to be below those predicted. Other assumptions, such as the representativeness of the existing data, may underestimate potential hazards. The assumptions or other factors that tend to overestimate, underestimate, or have an unknown effect on the OU3 ERA are presented below with a discussion of their uncertainty.

7.1 FACTORS THAT MAY OVERSTATE POTENTIAL RISKS

Several assumptions were made that may result in overstating potential risks. The major assumptions contributing to a conservative assessment are discussed below.

Exposure Point Chemical Concentrations and Area Use

The expected chemical concentrations used for comparison to reference toxicity thresholds primarily were the maximum detections on-Site. Since, the average concentration to which receptors are exposed is lower than the maximum, use of the maximum contributes to an overstatement of potential risk.

In general, assumptions made in terms of amount of time spent at the Site or feeding at the Site by receptors are likely to be overestimations. Receptors are not likely to feed solely from portions of the creeks with maximum concentrations.

Toxicity Screening Thresholds

Satisfactory systems are not readily available in the literature for identifying toxicity-based "safe" threshold values for wildlife. Toxic dose values for laboratory organisms are likely to be substantially lower than those for wildlife due to the sensitive strains of laboratory animals used and the direct means by which they are dosed. Moreover, the benchmarks selected were typically the most conservative chronic values available for the appropriate receptor group. Actual toxicity, by definition, is closer to median values in most cases than the minimum used here.

The use of alternate benchmarks when NOAELs were not available introduces additional uncertainty. The PEL level used for silver, for example, was developed primarily from data from marine and estuarine environments. Metals are typically more available for uptake by biota in marine environments, This assessment used a safety factor of 100 when applying LC_{50} results for use as NOAELs. Where both acute and chronic data are available, LC_{50} results are typically between 10 and 50 times higher than NOAEL, indicating that the 100x safety factor overestimates the toxicity of the PCOC. As a result, the general and species-specific screening benchmarks developed for this assessment represent only one part of the evaluation, along with the other criteria cited in Sections 4.0 and 5.0, of PCOCs and the risks associated with them.

PCOC Availability and Bioconcentration Factors

This assessment assumed that 30 percent of silver and selenium and 100 percent of p-cresol in sediment were available for assimilation by biota, though studies indicate that from <1 percent to 30 percent of most metals are actually available. Further, the sediment-to-biota BCFs used in this assessment represent extremely conservative estimates of BCFs, with safety factors added to each. For example, silver and p-cresol were not known to bioaccumulate in tissues, so the factor of 1 assigned to these two PCOC was a conservative estimate. Additionally, Total Organic Carbon (TOC) fractions in sediment greatly affect the toxicity of metals and semi-volatiles to aquatic life. PCOCs adsorb to TOC and can become "tied up" in organic matter, making it unavailable to receptors, even when ingested. This assessment assumed that the TOC fraction was extremely low on-Site, 0.2 percent. A higher TOC fraction would elevate the benchmark values calculated for the Site.

Weight and Food/Soil/Sediment Intake Parameters

Actual food, soil, and sediment intake parameters for most wildlife are unknown and may have been either overestimated or underestimated in this ERA. Animal live-weight and food-intake parameters for laboratory organisms were obtained from the Wildlife Exposure Factors Handbook (EPA, 1993b). Live-weight and food-intake parameters for wildlife (e.g., waterfowl and mammals) were estimated based on available literature values. Confidence intervals for these modeled parameters are broad and reflect a considerable degree of uncertainty.

Assumption of Additive Risks

Two PCOCs for this Site (silver and selenium) are known to have antagonistic effects, resulting in less then additive toxicity (Eisler, 1985). However, for this evaluation, they were assumed to have additive effects.

7.2 FACTORS THAT MAY UNDERSTATE POTENTIAL RISKS

Various aspects of the ERA may also result in an understatement of potential risks. Some of the major assumptions or data characteristics that could contribute to an understatement are discussed below.

Evaluation of Individual Ecological PCOCs

The evaluation of risks for individual ecological PCOCs may understate the cumulative risk to the receptors by not considering additive or synergistic effects. Though silver and selenium are known to have antagonistic action, their interaction with p-cresol is not known. It is frequently assumed that toxic effects are additive when data describing the toxic levels of chemical combinations are lacking. In this ERA, the risk evaluation assumed that the toxicity of individual PCOCs was additive.

Exposure Pathways

This ERA was limited to an evaluation of the oral ingestion pathway for all receptors. Information on other exposure pathways (inhalation, dermal absorption) that may be applied to wildlife are generally lacking. By not considering these additional exposure pathways, exposure concentrations may be underestimated.

PCOC Selection and Evaluation

The screening criteria used for the selection of PCOCs in sediment and surface water are largely based on the protection of aquatic organisms. These guideline criteria are not necessarily protective of non-aquatic or semi-aquatic organisms (e.g., waterfowl and mammals) which are directly exposed to chemicals in the ecosystem. The exposure assessment counteracted this potential underestimation by locating species-specific benchmarks developed for waterfowl and mammals.

Detection Limits Greater than Screening Values

Several constituents were either reported at levels greater than or had detection limits greater than their screening values, including benzo(b)fluoranthene, benzo(g,h,I)perylene, benzo(k)fluoranthene, Dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, p-cresol, acetone, arsenic, aluminum, barium, beryllium, copper, zinc, manganese, vanadium, nickel, selenium, and silver. Each of these constituents was evaluated for their potential risk using the other criteria in Section 4. Of these, only p-cresol, selenium, and silver were selected. The others were not carried into the exposure assessment because they were either lab contaminants, not detected in other media, not known to be Site-related, not especially toxic, or present in background samples. As a result, any minimal risk they may present was not considered in the exposure assessment.

No Screening Value Available

If no ecological screening value was available for a chemical, the toxicity of the chemical was assessed using other appropriate toxicity benchmarks described in Section 4. Thallium was detected in Johnson Creek surface water and the NRD Reservoir. It is not known to be Site-related, but no benchmark was available and it was undetected in background samples. The infrequency and low levels of thallium detected in samples limits the potential exposure of receptors. An explosive, 4-Am-DNT, was detected and is known to be Site-related, but without a surface water screening level it could not be evaluated in the exposure assessment. It is unlikely that 4-Am-DNT poses a significant risk to biota with only one "J" qualified detection.

7.3 FACTORS WITH UNKNOWN EFFECT ON POTENTIAL RISKS

Few Samples

The low number of samples collected for this ERA, particularly for sediment (five in the NRD Reservoir, two in Silver Creek, four in Johnson Creek), may not be fully representative of the concentrations throughout the system. If the samples were located in "hot spot" areas, risk was overstated. Alternatively, the sampling may have missed a "hot spot" area, understating risk. The low number of samples also limited the use of statistics to find trends in the data. However, the data available allowed for a reasonable evaluation of PCOC risks to biota.

Conversion of Water and Sediment Benchmarks

Several screening benchmarks for the general screening and for the exposure assessment were derived using solubility constant and equilibrium partitioning calculations. These calculated values are influenced by environmental variables, many of which were not measured in the sample collection event. Consequently, great caution should be applied when interpreting data using the benchmarks derived with these calculations. The exposure assessment applied a weight-of-evidence approach using these benchmarks and considered surface water results, habitat quality, and population surveys.

Explosive Tissue Analysis in Fish

Unavailability of laboratory techniques to accurately measure explosive residues in aquatic tissue represents an unknown effect on risk characterization in the ERA. Compounds estimated in the NRD Reservoir are virtually absent from fish tissue, while tissue data contain compounds undetected in the media samples. In addition, tissue samples from the background reservoir appear to contain more explosive compounds than the fish tissue collected on-Site. Literature states that explosive compounds do not readily bioaccumulation in fish (Talmage et al., 1999; Lang et al.; 1997, EPA, 1995c; ATSDR, 1995; 1995b; and Ryon, 1987). These findings, combined with current literature regarding the fate and transport of explosive compounds in aquatic systems, indicate that fish should reflect levels found within their environment. Therefore, risks to higher order consumers should be minimal since explosive compounds do not biomagnify and media samples contained only trace concentrations.

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TABLE B-1A
BIRD SPECIES OBSERVED AND EXPECTED AT THE
FORMER NEBRASKA ORDNANCE PLANT MEAD, NEBRASKA

Scientific Name	Common Name	Resident/ Migrant(1)	Estimated Abundance(2)	Functional Group(3)	Previously Observed On Site	1999 Receptor Survey
GREBES (Family Podicipedidae)						
Podilymbus podiceps	Pied-billed Grebe	M	I	C		X
CORMORANTS (Family Phalacrocoracidae)						
Phalacrocorax auritus	Double-crested Cormorant	M	R	C		
HERONS (Family Ardeidae)						
Ardea herodias	Great Blue Heron	S	I	C	X	
Butorides striatus	Green-backed Heron	S	I	C	X	
Nycticorax nycticorax	Black-crowned Night-heron	S	I	C		
WATERFOWL (Family Anatidae)						
Anser albifrons	White-fronted Goose	M	I	G, H		
Branta canadensis	Canada Goose	M, R	A	G, H	X	
Chen caerulescens	Snow/Blue Goose	M	A	G, H	X	
Aix sponsa	Wood Duck	M	I	G, H	X	
Anas americana	American Widgeon	M	A	H, O		X
Anas clypeta	Shoveler	M	C	H, O		
Anas crecca	Green-winged Teal	M	A	H, O	X	X
Anas discors	Blue-winged Teal	M	C	H, O	X	X
Anas rubripes	American Black Duck	M	I	H, O		
Anas strepera	Gadwall	M	C	H, O		X
Anus acuta	Northern Pintail	M	C	H, O		
Anus platyrhynchos	Common Mal'ard	M, S	A	H, O	X	X
Atyha affinis	Lesser Scaup	M	A	O		X
Aytha americana	Redhead	M	C	O		
Aytha collaris	Ring-necked Duck	M	C	O		
Aytha valisineria	Canvasback	M	C	O		
Bucephala albeola	Bufflehead	M	C	O		
Bucephala clangula	Common Goldeneye	M	C	O		
Oxyura jamaicensis	Ruddy duck	M	I	O		
Lophodytes cucullatus	Hooded merganser	M	I	C		
Mergus merganser	Common Merganser	M	I	C		
Mergus serrator	Red-breasted Merganser	M	I	C		
TURKEYS (Family Meleagridae)						
Meleagris gallopavo	Wild Turkeys	R	I	G, I	X	

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TABLE B-1A
BIRD SPECIES OBSERVED AND EXPECTED AT THE FORMER NEBRASKA ORDNANCE PLANT MEAD, NEBRASKA

Scientific Name	Common Name	Resident/ Migrant(1)	Estimated Abundance(2)	Functional Group(3)	Previously Observed On Site	1999 Receptor Survey
PHEASANTS & QUAIL (Family Phasianidae)						
Colinus virginianus	Bobwhite	R	C	G, I	X	
Phasianus colchicus	Ring-necked Pheasant	R	A	G, I	X	X
HAWKS,EAGLES & FALCONS (Family Accipitridae)						
Buteo swainsoni	Swainson's Hawk	S	I	C		
Buteo jamaicensis	Red-tailed Hawk	R	C	C	X	X
Circus cyaneus hudsonius	Northern Harrier	R	C	C	X	X
Falco sparverius	American Kestrel	R	C	C	X	
BARN OWLS (Family Tytonidae)						
Tyto alba	Barn Owl	R	I	C		
OWLS (Family Strigidae)						
Asio flammeus	Short-eared Owl	R	C	C		
Asio otus	Long-eared Owl	R	R	C		
Athene cunicularia	Burrowing Owl	R	R	C, I		
Bubo virginianus	Great Horned Owl	R	C	C	X	X
Otus asio	Eastern Screech-owl	R	I	C, I		
RAILS (Family Rallidae)						
Fulica americana	American Coot	S, M	C	O		X
Porzana carolina	Sora Rail	S, M	I	O		
Rallus elegans	King Rail	S, M	R	O		
CRANES (Family Ciconiidae)						
Grus canadensis	Sandhill Cranes	M	I	O		
PLOVERS (Family Charadriidae)						
Charadrius vociferus	Killdeer	S, M	C	O	X	X
Pluvialis dominica	Lesser Golden Plover	M	I	O		
Pluvialis squatarola	Black-bellied Plover	M	I	O		
SANDPIPERS (Family Scolopacidae)						
Actitis macularia	Spotted Sandpiper	S, M	C	O		
Bartramia longicauda	Upland Sandpiper	S	C	O		
Calidris alpina	Dunlin	M	I	I		
Catoptrophorus semipalmatus	Willet	M	I	I		
Limnodromus scolopaceus	Long-billed Dowitcher	M	I	I		
Tringa flavipes	Lesser Yellowlegs	M	C	I		

TABLE B-1A
BIRD SPECIES OBSERVED AND EXPECTED AT THE
FORMER NEBRASKA ORDNANCE PLANT MEAD, NEBRASKA

Scientific Name	Common Name	Resident/ Migrant(1)	Estimated Abundance(2)	Functional Group(3)	Previously Observed On Site	1999 Receptor Survey
Tringa melanoleuca	Greater Yellowlegs	M	C	I		X
PIGEONS & DOVES (Family Columbidae)						
Columba livia	Rock Dove	R	C	G, I	X	
Zenaida macroura	Mourning Dove	S, M	C	G, I	X	X
CUCKOOS (Family Cuculidae)						
Coccyzus americanus	Yellow-billed Cuckoo	S	C	I		
Coccyzus erythropthalmus	Black-billed Cuckoo	S	C	I		
NIGHTHAWKS (Family Caprimuligidae)						
Chordeiles minor	Common Nighthawk	S	I	I		
SWIFTS (Family Apodidae)						
Chaetura pelagica	Chimney Swift	S		I		
KINGFISHERS (Family Alcedinidae)						
Megaceryle alcyon	Belted Kingfisher	R	I	C	X	
WOODPECKERS (Family Picidae)						
Colaptes auratus	Common Flicker	R	C	I, O	X	X
Melanerpes erythrocephalus	Red-headed Woodpecker	S	;	I, O		
Picoides pubescens	Downy Woodpecker	R	I	I, O		X
Picoides villosus	Hairy Woodpecker	R	I	I, O		
FLYCATCHERS (Family Tyrannidae)						
Contopus virens	Eastern Pewee	S	I	I		
Empidonax traillii	Willow Flycatcher	S	I	I		
Myiarchus crinitus	Great Crested Flycatcher	S	I	I		
Sayornis phoebe	Eastern Phoebe	S	C	I		
Tyrannus tyrannus	Eastern Kingbird	S	C	I	X	
Tyrannus verticalis	Western Kingbird	S	I	I		
LARKS (Familiy Alaudidae)						
Eremophila alpestris	Horned Lark	S, R	C	G, I	X	
SWALLOWS (Family Hirundinidae)						
Hirundo rustica	Barn Swallow	S	C	I	X	X
Petrochelidon pyrrhonota	Cliff Swallow	S	C	I	X	
Progne subis	Purple Martin	S	I	I		
Riparia riparia	Bank Swallow	S	I	I		
Stelgidopteryx ruficollis	Rough-winged Swallow	S	I	I		

TAB... B-1A
BIRD SPECIES OBSERVED AND EXPECTED AT THE
FORMER NEBRASKA ORDNANCE PLANT MEAD, NEBRASKA

Scientific Name	Common Name	Resident/ Migrant(1)	Estimated Abundance(2)	Functional Group(3)	Previously Observed On Site	1999 Receptor Survey
CROWS & JAYS (Familiy Corvidae)						
Corvus brachyrhynchos	American Crow	R	A	O	X	X
Cyanocitta cristata	Blue Jay	R	C	O	X	
WRENS (Family Troglodytidae)						
Troglodytes aedon	House Wren	S	C	I	X	
MOCKINGBIRDS & THRASHERS (Family Mimidae)						
Mimus polyglottos	Northern Mockingbird	R	C	I, H	X	X
Dumetella carolinensis	Gray Catbird	S	C	I, H	X	
Toxostoma rufum	Brown Thrasher	S	C	I, H	X	
THRUSHES (Family Turdidae)						
Turdus migratorius	American Robin	S	A	I, H	X	X
Sialia sialis	Eastern Bluebird	S	C	I, H	X	
SHRIKES (Family Laniidae)						
Lanius ludovicianus	Loggerhead Shrike	S	I	C, I		
STARLINGS (Family Sturnidae)						
Sturnus vulgaris	European Starling	R	C	O	X	
VIREOS (Family Vireonidae)						
Vireo olivaceus	Red-eyed Vireo	S	I	I		
WOOD WARBLERS (Family Parulidae)						
Setophaga ruticilla	American Redstart	S, M	I	I		
Dendroica petechia	Yellow Warbler	S, M	I	I		
Geothlypis trichas	Common Yellowthroat	S, M	I	I		
Icteria virens	Yellow-breasted Chat	S, M	I	I		
OLD WORLD SPARROWS (Family Ploceidae)						
Passer domesticus	House Sparrow	R	C	G, I	X	X
BLACKBIRDS (Family Icteridae)						
Aegelaius phoeniceus	Red-winged Blackbird	R	A	I, G	X	X
Dolichonyx oryzivorus	Bobolink	S	C	I, G	X	X
Icterus galbula	Baltimore Oriole	S	I	H, I		
Molothrus ater	Brown-headed Cowbird	S, R	A	I, G	X	X
Quiscalus quiscula	Common Grackle	R	A	I, G	X	X
Sturnella magna	Eastern Meadowlark	R	A	I, G	X	X
Sturnella neglecta	Western Meadowlark	R	C	I, G		

TABLE B-1A
BIRD SPECIES OBSERVED AND EXPECTED AT THE FORMER NEBRASKA ORDNANCE PLANT MEAD, NEBRASKA

Scientific Name	Common Name	Resident/ Migrant(1)	Estimated Abundance(2)	Functional Group(3)	Previously Observed On Site	1999 Receptor Survey
FINCHES, SPARROWS & BUNTINGS (Family Fringillidae)						
Ammodramus savannarum	Grasshopper Sparrow	S	I	G, I		
Cardinalis cardinalis	Northern Cardinal	R	C	G, I	X	
Carduelis pinus	Pine Siskin	W	I	G, I		
Carduelis tristis	American Goldfinch	R	A	G, I	X	X
Carpodacus purpureus	Purple Finch	W	I	G, I		
Chondestes grammacus	Lark Sparrow	S	I	G, I		
Guiraca caerulea	Blue Grosbeak	S	I	G, I		
Junco hyemalis	Northern Junco	W	C	G, I	X	
Passerina cyanea	Indigo Bunting	S	C	G, I	X	X
Pheuctius ludovicianus	Rose-breasted Grosbeak	S	I	G, I		
Piplo erthropthalmus	Rufous-sided Towhee	R	C	G, I		
Pooeccetes gramineus	Vesper Sparrow	M	I	G, I		
Spiza americana	Dickcissel	S	A	G, I	X	X
Spizella arborea	American Tree Sparrow	W	I	G, I	X	
Spizella passerina	Chipping Sparrow	S	C	G, I		
Spizella pusilla	Field Sparrow	S	C	G, I	X	

Sources:

Supplemental RI/FS Former NOP Site Operable Unit 1, Mead, Nebraska, Volume 1 of 2 Sec Donohue, 1993 (Johnsgard,1979)

Petesons Field Guide to the Birds of Eastern North America (Peterson, 1980)

Notes:

1999 Receptor Survey focused on ecological resources in the NRD Reservoir Area. (Performed in April 1999)

(1) Resident/Migrant
R - Resident throughout the year
S - Summer resident in the region
W - Winter resident in the region
M - Migrant

(2) Estimated Abundance
A - Abundant
C - Common
I - Infrequent
R - Rare or Absent

(3) Functional Group
C - Carnivore
I - Insectivore
O - Omnivore
H - Herbivore
G - Granivore

TABLE B-1B
MIGRATORY WATERFOWL DISTRIBUTION (1000'S) BY FLYWAY, 1966-69
FORMER NEBRASKA ORDNANCE PLANT ERA
MEAD, NEBRASKA

Species	Central Flyway	Mississippi Flyway
Geese		
Snow/Blue	300	350
White-fronted	16	34
Canada	243	491
Ducks		
American Widgeon	125	577
Gadwall	75	942
Green-winged Teal	155	820
Mallard	1973	3042
"Mottled Duck"	7	59
Black Duck	0	161
Pintail	423	978
Blue winged and Cinnamon Teal	19	133
Shoveler	28	270
Canvasback	9	45
Redhead	321	43
Ring-necked Duck	6	141
Scaups	45	700
Eiders and Scoters	0	transient
Oldsquaw	0	2
Bufflehead	4	6
Goldeneyes	8	29
Mergansers	71	44
Ruddy Duck	15	35

Source: Supplemental RI/FS Former NOP Site Operable Unit 1, Mead, Nebraska, Volume 1 of 2, Sec Donohue, 1993 (Johnsgard, 1975)

TABLE B-2
MAMMALS OBSERVED AND EXPECTED AT THE
FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Scientific Name	Common Name	Estimated Abundance(1)	Functional Group(2)	Previously Observed On Site	1999 Receptor Survey
ORDER MARSUPIALIA - MARSUPIALS					
Opossums (Family Didelphiidae)					
Didelphis virginiana	Virginia Opossum	A	O	X	X
ORDER INSECTIVORA - INSECTIVORES					
Shrews (Family Soridae)					
Blarina brevicauda	Northern Short-tailed Shrew	C	I, C		
Cryptotis parva	Least Shrew	C	I, C		
Sorex cinereus	Masked Shrew	I	I, C		
Moles (Family Talpidae)					
Scalopus aquaticus	Eastern Mole	C	I, O	X	
ORDER CHIROPTERA - BATS					
Plainnose Bats (Family Vespertilionidae)					
Eptesicus fuscus	Big Brown Bat	C	I	X	
Lasionycteris noctivagans	Silver-haired Bat	I	I		
Lasiurus borealis	Eastern Red Bat	C	I		
Lasiurus cinereus	Hoary Bat	I	I		
Myotis keenii	Keen's Myotis	I	I		
Myotis lucifugus	Little Brown Myotis	C	I		
Nycticeius humeralis	Evening Bat	I	I		
Pipistrellus subflavus	Eastern Pipistrelle	I	I		
Freetail Bats (Family Molossidae)			I		
Tadarida brasiliensis	Free-tailed Bat	R	I		
ORDER CARNIVORA - CARNIVORES					
Wolves & Foxes (Family Canidae)					
Canis latrans	Coyote	A	C, O	X	X
Urocyon cinereoargenteus	Common Gray Fox	I	C, O		
Vulpes velox	Kit Fox	R	C, O		
Vulpes vulpes	Red Fox	C	C, O	X	X
Raccoons (Family Procyonidae)					
Procyon lotor	Raccoon	A	O	X	X

TABLE B-2
MAMMALS OBSERVED AND EXPECTED AT THE
FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Scientific Name	Common Name	Estimated Abundance(1)	Functional Group(2)	Previously Observed On Site	1999 Receptor Survey
Weasels & Skunks (Family Mustelidae)					
Lutra canadensis interior	River Otter	I	C		
Mephitis mephitis	Striped Skunk	A	O, C	X	
Mustela frenata primulina	Long-tailed Weasel	I	C	X	X
Mustela nivalis campestris	Least Weasel	I	C		
Mustela vison	Mink	C	C		X
Spilogale putorius	Eastern Spotted Skunk	R	O, C		
Taxidea taxus	American Badger	C	C		X
ORDER RODENTIA - RODENTS					
Squirrels (Family Sciuridae)					
Marmota monax	Woodchuck	A	H, G	X	X
Sciurus niger	Eastern Fox Squirrel	C	H, G	X	
Spermophilus franklinii	Franklins' Ground Squirrel	I	H, G		
Spermophilus tridecemlineatus	Thirteen-lined Ground Squirrel	A	H, G	X	X
Tamias striatus	Eastern Chipmunk	I	H, G		
Pocket Gophers (Family Geomyidae)					
Geomys bursarius majusculus	Plains Pocket Gopher	C	H, G		
Pocket Mice (Family Heteromyidae)					
Chaetodipus hispidus	Hispid Pocket Mouse	I	H, G		
Perognathus flavescens flavescens	Plains Pocket Mouse	C	H, G		
Beavers (Family Castoridae)					
Castor canadensis	Beaver	C	H	X	X
Voles, Mice & Rats (Family Cricetidae)					
Microtus longicaudus	Long-tailed Vole	I	H, G		
Microtus ochrogaster	Prairie Vole	C	H, G		
Microtus pennsylvanicus	Meadow Vole	C	H, G	X	X
Ondatra zibethicus	Muskrat	A	H, G		X
Onychomys leucogaster	Northern Grasshopper Mouse	C	H, G		
Peromyscus leucopus	White-footed Mouse	C	H, G	X	X
Peromyscus maniculatus	Deer Mouse	C	H, G		
Reithrodontomys montanus	Plains Harvest Mouse	I	H, G		

TABLE B-2
MAMMALS OBSERVED AND EXPECTED AT THE
FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Scientific Name	Common Name	Estimated Abundance(1)	Functional Group(2)	Previously Observed On Site	1999 Receptor Survey
Sigmodon hispidus	Hispid Cotton Rat	I	H, G		
Synaptomys cooperi gussii	Southern Bog Lemming	I	H, G		
Jumping Mice (Family Zapodidae)					
Zapus hudsonius pallidus	Meadow Jumping Mouse	I	H, G		
Porcupines (Family Erthizontidae)					
Erethizon dorsatum	Common Porcupine	I	H		
ORDER LAGOMORPHA - HARES & RABBITS					
Hares & Rabbits (Family Leporidae)					
Lepus californicus	Black-tailed Jackrabbit	R	H		
Lepus townsendii	White-tailed Jackrabbit	I	H	X	
Sylvilagus floridanus	Eastern Cottontail	C	H	X	X
ORDER ARTIODACTYLA - ARTIODACTYLS					
Deer (Family Cervidae)					
Odocoileus virginianus	White-Tailed Deer	C	H	X	X

Sources:
Supplemental RI/FS Former NOP Site Operable Unit 1, Mead, Nebraska, Volume 1 of 2 Sec Donohue, 1993 (Jones et al.,1983)
Petesons Field Guide to the Mammals of Eastern North America (Burt and Grossenheider, 1980)

Notes:
1999 Receptor Survey focused on ecological resources in the NRD Reservoir Area. (Performed in April 1999)

(1) Estimated Abundance
A - Abundant
C - Common
I - Infrequent
R - Rare or Absent

(2) Functional Group
C - Carnivore
I - Insectivore
O - Omnivore
H - Herbivore
G - Granivore

TABLE B-3
FISH POTENTIALLY OCCURRING IN WATER BODIES OF THE FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Family Name	Common Name	Scientific Name	Previously Observed On Site	NRD Reservoir Fish Sampling
Cyprinidae	Creek Chub	*Semotilus atromaculatus*		
	Common Shiner	*Luxilus cornutus*		
	Plains Minnow	*Hybognathus placitus*		
	Fathead Minnow	*Pimephales promelas*		
	Blacknose Dace	*Rhinichthys atratulus*		
	Longnose Dace	*Rhinichthys cataractae*		
	Common Carp	*Cyprinus carpio*	X	X
Ictaluridae	Black Bullhead	*Ameiurus melas*		X
	Yellow Bullhead	*Ameiurus natalis*		
	Channel Catfish	*Ictalurus punctatus*		X
	Unidentified Catfish	*Ameiurus* spp.	X	
Centrarchidae	Green Sunfish	*Lepomis cyanellus*		X
	Bluegill	*Lepomis macrochirus*		
	Largemouth Bass	*Micropterus salmoides*		

Source:
Nebraska Game and Parks Commission, 1987

Note:
NRD Reservoir Fish Sampling took place in April and May 1999.

TABLE B-4
REPTILES AND AMPHIBIANS POTENTIALLY OCCURRING AT THE SITE
FORMER NEBRASKA ORDNANCE PLANT ERA
MEAD, NEBRASKA

Scientific Name	Common Name	Estimated Abundance	Functional Group	Previously Observed On Site	1999 Receptor Survey
CLASS REPTILIA - REPTILES					
ORDER TESTUDINES - TURTLES					
Snapping Turtles (Family Chelydridae)					
Chelydra serpentina	Common snapping turtle	C	O	X	X
Box & Water Turtles (Family Emydidae)					
Chrysemys picta bellii	Western painted turtle	C	O	X	
Terrapene ornata ornata	Ornate box turtle	I	O		
Softshell Turtles (Family Trionychidae)					
Apalone mutica mutica	Midland smooth softshell turtle	I	O		
Apalone spinifera hartwegi	Western spiny softshell turtle	I	O		
ORDER SQUAMATA - LIZARDS & SNAKES					
Whiptail & Racerunner Lizards (Family Teiidae)					
Cnemidophorus sexlineatus viridis	Prairie racerunner	I	I		
Colubrid Snakes (Family Colubridae)					
Coluber constrictor flaviventris	Eastern yellowbelly racer	I	C		
Diadophis punctatus arnyi	Prairie ringneck snake	I	C	X	
Elaphe obsoleta obsoleta	Black rat snake	I	C		
Heterodon platirhinos	Eastern hognose snake	C	C	X	
Lampropeltis calligaster calligaster	Praire kingsnake	I	C		
Lampropeltis triangulum gentilis	Central plains milk snake	C	C		
Nerodia sipedon sipedon	Northern water snake	C	C		
Pituophis melanoleucus sayi	Bullsnake	C	C	X	
Regina grahamii	Grahm's crayfish snake	I	C		
Thamnophis radix	Plains garter snake	A	C	X	
Thamnophis sirtalis parietalis	Red-sided garter snake	C	C		
CLASS AMPHIBIA - AMPHIBIANS					
ORDER CAUDATA - SALAMANDERS					
Mole Salamanders (Family Ambystomatidae)					
Ambystoma tigrinum mavortium	Barred tiger salamander	C	I, C		
ORDER ANURA - TOADS & FROGS					
Toads (Family Bufonidae)					
Bufo cognatus	Great plains toad	A	I	X	
Bufo woodhousii woodhousii	Woodhouse's toad	C	I	X	X
Treefrogs (Family Hylidae)					
Acris crepitans blanchardi	Blanchard's cricket frog	C	I		
Pseudacris triseriata triseriata	Western chorus frog	C	I		
True Frogs (Family Ranidae)					
Rana blairi	Plains leopard frog	A	I	X	X
Rana catesbeiana	Bullfrog	A	I, C	X	X

Source:
Petesons Field Guide to the Reptiles & Amphibians of Eastern North America (Conant, R. and J.T. Collins, 1975)

Notes:
1999 Receptor Survey focused on ecological resources in the NRD Reservoir Area. (Performed in April 1999)

1. Estimated Abundance
A - Abundant
C - Common
I - Infrequent
R - Rare or Absent

2. Functional Group
C - Carnivore
I - Insectivore
O - Omnivore
H - Herbivore
G - Granivore

TABLE B-5
PLANT SPECIES IDENTIFIED ON SITE
FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Scientific Name	Common Name	1999 Receptor Survey
Equistaceae - Horsetail Family		
Equistum hyemale	Scouring Rush	
Pinaceae - Pine Family		
Pinus sp.	Pine	X
Cupressaceae - Cypress Family		
Juniperus virginiana	Red Cedar	
Typhaceae - Cattail Family		
Typha latifolia	Common Cattail	X
Alismaceae - Water Plantain Family		
Sagittaria latifolia	Common Arrowhead	
Saggitaria sp.	Arrowhead	
Poaceae - Grass Family		
Agropyron eristatum	Crested Wheatgrass	
Agrositis stolonifera	Redtop	X
Andropogon scoparius	Little Bluestem	
Bouteloua curtipendula	Side-oats Grama	
Bromus inermis	Smooth Brome	X
Calamagrostis inexpansa	Blue Joint Grass	X
Digitaria sanguinalis	Crabgrass	X
Echinochloa muricata	Barnyard Grass	
Echinochloa crus-galli	Barnyard Grass	
Elymus canadensis	Canada Wild Rye	
Festuca obtusa	Nodding Fescue	X
Hordeum jubatum	Foxtail Barley	
Panicum virgatum	Switchgrass	
Phalaris arundinacea	Reed Canarygrass	
Phleum pratense	Timothy	X
Poa pratensis	Bluegrass	
Setaria faberii	Giant Foxtail	X
Setaria glauca	Yellow Foxtail	
Sorghum bicolor	Grain Sorghum	
Sorghum halepense	Johnson Grass	
Sorghastrum avenaceum	Indian-grass	X
Triticum aestivum	Wheat	
Zea mays	Corn	X
Cyperaceae - Sedge Family		
Carex cephalophora	Woodbank Sedge	
Carex sp.	Sedge	X
Carex vulpinoidea	Fox Sedge	X
Eleocharis acicularis	Needle Spikesedge	
Scirpus sp.	Bulrush	X
Juncaceae - Rush Family		
Juncus interior	Inland Rush	X
Juncus tenuis	Path Rush	
Liliaceae - Lily Family		
Allium canadense	Wild Onion	

TABLE B-5
PLANT SPECIES IDENTIFIED ON SITE
FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Scientific Name	Common Name	1999 Receptor Survey
Smilax hispida	Bristly Greenbriar	
Salicaceae - Willow Family		
Populus deltoides	Cottonwood	
Salix amygdaloides	Peach-leaved Willow	
Salix nigra	Black Willow	X
Juglandaceae - Walnut Family		
Juglans nigra	Black Walnut	
Fagaceae - Beech & Oak Family		
Quercus macrocarpa	Bur Oak	
Ulmaceae - Elm Family		
Celtis occidentalis	Hackberry	
Ulmus americana	American Elm	
Ulmus pumila	Siberian Elm	X
Moraceae - Mulberry Family		
Humulus lupulus	Common Hop	
Morus rubra	Red Mulberry	
Maclura pomifera	Osage Orange	
Polygonaceae - Smartweed Family		
Polygonum hydropiperoides	Mild Water Pepper	
Polygonum lapathifolium	Pale Smartweed	
Polygonum pensylvanicum	Pennsylvania Smartweed	X
Rumex crispus	Curly Dock	X
Chenopodiaceae - Goosefoot Family		
Chenopodium album	Lamb's Quarters	X
Chenopodium hybrium	Maple-leaved Goosefoot	
Amaranthaceae - Pigweed Family		
Amaranthus retroflexus	Rough Pigweed	X
Caryophyllaceae - Chickweed Family		
Cerastium vulgatum	Common Mouse-earred Chickweed	
Silene stellata	Starry Campion	
Stellaria media	Common Chickweed	
Ranunculaceae - Buttercup Family		
Ranunculus abortivus	Small-flowered Crowfoot	
Ranunculus acris	Tall Buttercup	
Brassicaceae - Mustard Family		
Brassica nigra	Black Mustard	
Capsella bursa-pastoris	Shepherd's Purse	
Lepidium densiflorum	Peppergrass	
Thlaspi arvense	Penny Cress	
Rosaceae - Rose Family		
Crategus sp.	Hawthorn	X
Fragaria virginiana	Wild Strawberry	
Geum sp.	Avens	
Malus ioensis	Prairie Crab Apple	X
Potentilla arguta	Tall Cinquefoil	
Prunus americana	Wild Plum	X

TABLE B-5
PLANT SPECIES IDENTIFIED ON SITE
FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Scientific Name	Common Name	1999 Receptor Survey
Prunus serotina	Black Cherry	X
Prunus virginiana	Choke Cherry	
Rosa arkansana	Prairie Wild Rose	
Rubus sp.	Blackberry	
Fabaceae - Pea Family		
Desmanthus illinoensis	Bundleflower	
Cassia fasciculata	Partridge Pea	
Desmodium canescens	Hoary Tickclover	
Glycine max	Soybean	X
Lespedeza capitata	Bush Clover	
Lotus corniculatus	Bird's-foot Trefoil	X
Medicago sativa	Alfalfa	
Melilotus albus	White Sweet Clover	X
Melilotus officinales	Yellow Sweet Clover	X
Trifolium pratense	Red Clover	X
Trifolium repens	White Clover	X
Euphorbiaceae - Spurge Family		
Acalypha virginica	Three-seeded Mercury	
Euphorbia corollata	Flowering Spurge	
Anacardiaceae - Cashew Family		
Rhus glabra	Smooth Sumac	
Toxicodentron radicans	Poison Ivy	
Celastraceae - Bittersweet Family		
Cleastrus scandens	Climbing Bittersweet	
Malvaceae - Mallow Family		
Abutilon theophrasti	Velvet-leaf	
Hypericaceae - St. John's-wort Family		
Hypericum punctatum	Spotted St. John's-wort	
Violaceae - Violet Family		
Viola nephrophylla	Northern Blue Violet	
Passifloraceae - Passion Flower Family		
Passiflora incarnata	Large Passion-flower	
Elaeagnaceae - Elaeagnus Family		
Elaeagnus angustifolia	Russian Olive	
Onagraceae - Evening Primrose Family		
Oenothera biennis	Common Evening Primrose	
Carrots (Family Apiaceae)		
Daucus carota	Queen Anne's Lace	
Pastinaca sativa	Wild Parsnip	
Sanicula canadensis	Canada Sanicle	
Zitzia aurea	Golden Alexanders	
Cornaceae - Dogwood Family		
Cornus stolonifera	Red Osier	
Oleacea - Ash Family		
Fraxinus pennsylvanica	Green Ash	X

TABLE B-5
PLANT SPECIES IDENTIFIED ON SITE
FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Scientific Name	Common Name	1999 Receptor Survey
Apocynaceae - Dogbane Family		
Apocynum cannabinum	Dogbane	
Asclepiadaceae - Milkweed Family		
Asclepias incarnata	Swamp Milkweed	X
Asclepias syriaca	Common Milkweed	X
Convolvulaceae - Morning-Glory Family		
Convolvulus sepium	Hedge Bindweed	X
Verbenaceae - Verbena Family		
Verbena hastata	Blue Vervain	X
Lamiaceae - Mint Family		
Hedeoma hispida	Rough Pennyroyal	
Lamnium amplexicaule	Henbit	X
Lamnium purpureum	Purple Dead Nettle	X
Lycopus americanus	Water Horehound	
Mentha arvensis	Field Mint	
Monardo fistula	Wild Bergamot	
Nepeta cataria	Catnip	
Prunella vulgaris	Selfheal	
Teucrium canadense	American Germander	X
Solanaceae - Nightshades Family		
Physalis virginiana	Ground Cherry	X
Solanum americanum	Black Nightshade	X
Solanum carolinese	Horse Nettle	X
Scropulariaceae - Figwort Family		
Penstemon sp.	Beardstongue	
Verbascum thapsus	Woolly Mullein	X
Plantaginaceae - Plantain Family		
Plantago rugelii	Rugel's Plaintain	X
Rubiaceae - Madder Family		
Galium sp.	Bedstraw	
Caprifoliaceae - Honeysuckle Family		
Sambucus canadensis	Elderberry	
Symphoricarpos orbiculatus	Coralberry	X
Cucurbitaceae - Squash Family		
Echinocystis lobata	Wild Cucumber	
Asteraceae - Aster Family		
Achiliea millefolium	Yarrow	X
Ambrosia artemisiifolia	Common Ragweed	X
Ambrosia psilostachya	Western Ragweed	X
Ambrosia trifida	Giant Ragweed	
Arctium minus	Common Burdock	X
Aster ericoides	White Aster	X
Bidens frondosa	Beggarticks	
Cichorium intybus	Common Chicory	X
Cirsium vulgare	Bull thistle	X
Erigeron philadelphicus	Philadelphia Fleabane	X

TABLE B-5
PLANT SPECIES IDENTIFIED ON SITE
FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Scientific Name	Common Name	1999 Receptor Survey
Erigeron strigosus	Daisy Fleabane	
Eupatoria perfoliatum	Boneset	
Eupatorium rugosum	White Snakeroot	
Helianthus annuus	Common Sunflower	
Silphium integrifolium	Wholeleaf Rosinweed	
Solidago canadensis	Canada Goldenrod	X
Sonchus asper	Bristly Sowthistle	
Taraxacum officinale	Common Dandelion	X
Trapogon pratensis	Goat's-beard	
Xanthium strumarium	Cocklebur	

Source:
Supplemental RI/FS Former NOP Site Operable Unit 1, Mead, Nebraska, Volume 1 of 2, Sec Donohue, 1993 (GPFA, 1977)

Notes:
1999 Receptor Survey focused on ecological resources in the NRD Reservoir Area. (Performed April 1999)

TABLE B-6
BENTHIC MACROINVERTEBRATES COLLECTED IN JOHNSON, CLEAR AND SILVER CREEKS IN JULY 1996 USING A KICK NET SAMPLER
FORMER NEBRASKA ORDNANCE PLANT ERA
MEAD, NEBRASKA

	Sample Location						
Benthic Group	**JC-1**	**JC-2**	**JC-3**	**CC-1**	**CC-2**	**SC-1**	**SC-2**
Oligochchaeta (Aquatic earthworms)	2	14	0	0	0	5	16
Hirudinea (Leeches)	0	0	0	0	2	0	0
Gastropoda (Snails)	24	12	0	0	0	1	0
Bivalvia (Bivalves)	6	2	0	0*	0	0	0
Isopoda (Isopods)	0	4	0	0	0	0	0
Decapoda (Crayfish)	0	1	0	0	0	0	0
Plecoptera (Stone flies)	0	0	0	0	0	6	2
Coleoptera (Water beetles)	0	0	0	0	0	2	1
Diptera (Blackflies, craneflies, midges)	0	0	0	0	1	0	0
Number of Benthic Groups	**3**	**5**	**0**	**1***	**2**	**4**	**3**
Total number of organisms	**32**	**33**	**0**	**1***	**3**	**14**	**19**
Bottom Substrate							
% sand	20	90	95	90	--	80	100
% silt	80	10	5	10	--	--	--
% gravel	0	0	0	0	--	20	--

--: *Not measured*

* While no benthic organisms were collected in the kicknet sample one large three ridge (*Ambelma plicata*) was collected by hand. This was an eleven year old specimen and the only benthic invertebrate seen.

TABLE B-7
IN SITU WATER QUALITY DATA MEASURED IN JOHNSON, SILVER AND CLEAR CREEKS IN JULY 1996
FORMER NEBRASKA ORDNANCE PLANT ERA
MEAD, NEBRASKA

Water Quality Parameter	Sample Locations						
	JC-1	JC-2	JC-3	CC-1	CC-2	SC-1	SC-2
D.O. (mg/l)	8.1	6.8	7.6	8	--	8.1	7.7
pH	6.72	6.95	6.88	6.79	--	7.15	7.21
Conductivity (mmho)	825	300	210	500	--	550	750
Turbidity (NTU)	294	3498	1648	978	--	6820	7620
Flow (ft/sec)	0.66	0.14	1.05	0.48	--	0.6	0.56
Temperature (°C)	--	24	21	20.5	--	21	22
Width across water (feet)	3.1	5.2	5.7	18	--	10.8	22

--: Not measured

TABLE B-8
POTENTIAL EXPOSURE PATHWAYS
FORMER NEBRASKA ORDNANCE PLANT ERA
MEAD, NEBRASKA

Source / Release Mechanism	Ecological Receptors: Primary Producers	Primary Consumers	Secondary Consumers	Tertiary Consumers
Sediment				
Direct Contact	X	X	X	X
Ingestion		X	X	X
Primary Producers				
Ingestion		X	X	X
Primary Consumers				
Ingestion			X	X
Secondary Consumers				
Ingestion				X
Tertiary Consumers				
Ingestion				X

Table B-9
Surface Water Screening Summary- Johnson and Clear Creeks
Former Nebraska Ordnance Plant, Mead, Nebraska

Chemical	Screening Level	Source	Number of Samples	Number of Detects	Number Exceeding Screening	Maximum Detected Value	Minimum Value(1)	Mean(2)	Median(2)
EXPLOSIVES UG/L									
Hexahydro-1,3,5-trinitro-1,3,5-triazine	190	Talmage et al. 1999	20	4	0	1.8	ND (0.4)	0.59	0.40
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	3300	Bausum 1989	20	2	0	0.54	ND (0.25)	0.44	0.40
TOTAL METALS MG/L									
Aluminum	4.4	Background	18	18	4	21	0.401	4	2
Arsenic	0.15	AWQC	18	15	0	0.0112	0.0019	0.005	0.006
Barium	**0.19**	**Background**	**18**	**18**	**5**	**0.46**	**0.107**	**0.20**	**0.16**
Beryllium	0.0051	Teir II	18	3	0	0.0013	ND (0.00025)	0.0011	0.001
Calcium	GRAS		18	18	--	94	17	64	68
Chromium	0.05	AWQC	18	4	0	0.0137	0.0027	0.0049	0.0050
Cobalt	**0.017**	**Background (Silver Ck.)**	**18**	**3**	**6**	**0.011**	**ND (0.0045)**	**0.012**	**0.008**
Copper	**0.03**	**Background (Silver Ck.)**	**18**	**5**	**1**	**0.0325**	**ND (0.001)**	**0.009**	**0.008**
Iron	**2.8**	**Background**	**18**	**18**	**5**	**18**	**0.438**	**3.4**	**2.0**
Lead	**0.0074**	**Background**	**18**	**9**	**4**	**0.016**	**0.00094**	**0.0038**	**0.0015**
Magnesium	GRAS		18	18	--	20	4.5	15	15
Manganese	**0.21**	**Background**	**18**	**18**	**11**	**1.5**	**0.104**	**0.41**	**0.24**
Mercury	**0.00077**	**AWQC**	**18**	**4**	**1**	**0.00088**	**ND (0.0001)**	**0.0002**	**0.0001**
Nickel	0.16	AWQC	18	4	0	0.129	ND (0.0075)	0.02	0.02
Potassium	GRAS		18	18	--	32	6.8	13	10
Selenium	**0.005**	**AWQC**	**18**	**13**	**6**	**0.0081**	**0.00073**	**0.004**	**0.003**
Sodium	GRAS		18	18	--	48	3.3	28	31
Thallium	**0.012**	**Tier II Secondary Chronic**	**18**	**9**	**1**	**0.0167**	**0.000046**	**0.0032**	**0.0030**
Vanadium	0.051	Background (Silver Ck.)	18	7	0	0.043	ND (0.0025)	0.019	0.023
Zinc	**0.105**	**AWQC**	**18**	**10**	**1**	**0.442**	**ND (0.0025)**	**0.045**	**0.014**
DISSOLVED METALS MG/L									
Aluminum	**0.47**	**Background**	**8**	**6**	**1**	**0.54**	**ND (0.1)**	**0.20**	**0.18**
Arsenic	0.15	AWQC	8	8	0	0.0089	0.0021	0.0050	0.0039
Barium	**0.11**	**Background**	**8**	**8**	**3**	**0.16**	**0.077**	**0.12**	**0.11**
Cadmium	0.001	AWQC	8	3	0	0.00018	0.00013	0.00037	0.0005
Calcium	GRAS		8	8	--	83	13	49	49
Chromium	0.043	AWQC	8	1	0	0.0022	0.0022	0.0047	0.0050
Iron	0.44	Background	8	6	0	0.34	ND (0.025)	0.12	0.11
Lead	0.0025	AWQC	8	5	0	0.0012	0.00014	0.00045	0.000435
Magnesium	GRAS		8	8	--	18	3.1	12	13
Manganese	**0.17**	**Background**	**8**	**8**	**2**	**1.3**	**0.0038**	**0.19**	**0.0079**
Potassium	GRAS		8	8	--	29	6.8	13	12
Selenium	**0.0046**	**AWQC**	**8**	**6**	**3**	**0.0078**	**0.0013**	**0.0039**	**0.0036**
Sodium	GRAS		8	8	--	45	3.6	22	19
Zinc	0.105	AWQC	8	7	0	0.034	0.0057	0.02	0.023

Table B-9
Surface Water Screening Summary- Johnson and Clear Creeks
Former Nebraska Ordnance Plant, Mead, Nebraska

Chemical	Screening Level	Source	Number of Samples	Number of Detects	Number Exceeding Screening	Maximum Detected Value	Minimum Value(1)	Mean(2)	Median(2)
VOLATILES UG/L									
Toluene	130	Tier II	20	8	0	1.3	0.08	0.4	0.5
Trichloroethene	807	NEWQC	20	10	0	6.92	0.33	1.6	0.5

Notes:

(1)If the minimum concentration is a nondetect value, the acronym ND is shown. The minimum detection limit is provided in ( ).

(2)Nondetects were included at one-half the detection limit in the calculation of the arithmetic mean and the median.

-- Screening not performed because screening level not available or chemical is classified as GRAS

Background = Except as noted, concentration measured at Johnson Creek background station (JC-009) upgradient to the site.

GRAS=generally recognized as safe

NA-screening level is not available

Rows in bold contain concentrations and or reporting limits that exceed screening levels.

Table B-10
Surface Water Screening Summary - Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Chemical	Screening Level	Source	Number of Samples	Number of Detects	Number Exceeding Screening	Maximum Detected Value	Minimum Value[1]	Mean[2]	Median[2]
EXPLOSIVES UG/L									
4-Amino-2,6-dinitrotoluene	NA		10	1	--	0.39	0.39	0.51	0.4
TOTAL METALS MG/L									
Aluminum	9.1	Background	6	6	0	7.8	0.213	3.08	3.15
Arsenic	0.15	AWQC	6	4	0	0.0072	ND (0.003)	0.01	0.00655
Barium	0.76	Background	6	6	0	0.66	0.171	0.33	0.33
Beryllium	0.0051	Tier II	6	4	0	0.0013	0.0005	0.0008	0.0008
Calcium	GRAS		6	6	--	79.7	53	63.85	58
Chromium	0.18	AWQC	6	4	0	0.0055	0.0026	0.004	0.00465
Cobalt	0.017	Background	6	1	3	0.012	ND (0.005)	0.02	0.0185
Copper	0.03	Background	6	1	0	0.026	ND (0.0025)	0.01	0.01
Iron	9.4	Background	6	6	0	8.1	0.365	3.44	3.7
Lead	0.018	Background	6	4	0	0.015	ND (0.001)	0.01	0.0083
Magnesium	GRAS		6	6	--	19.7	14	16.13	15
Manganese	2.3	Background	6	6	0	1.9	0.249	0.86	0.905
Nickel	0.16	AWQC	6	1	0	0.027	ND (0.0075)	0.02	0.02
Potassium	GRAS		6	6	--	21	10.6	14.42	14.5
Selenium	0.005	AWQC	6	5	1	0.0056	ND (0.0025)	0.004	0.00475
Sodium	GRAS		6	6	--	40	16	27.73	24.5
Thallium	0.012	Tier II Secondary Chronic	6	1	0	0.0001	0.0001	0.001	0.0005
Vanadium	0.051	Background	6	2	0	0.045	ND (0.0025)	0.02	0.02975
Zinc	0.105	AWQC	6	4	0	0.072	ND (0.0025)	0.03	0.024
DISSOLVED METALS MG/L									
Aluminum	**0.35**	**Background**	**4**	**4**	**1**	**0.38**	**0.089**	**0.22**	**0.2**
Arsenic	0.15	AWQC	4	4	0	0.0044	0.0032	0.0036	0.0033
Barium	0.2	Background	4	4	0	0.16	0.15	0.15	0.15
Calcium	GRAS		4	4	--	47	36	43.25	45
Lead	0.0025	AWQC	4	1	0	0.00023	0.00023	0.0004	0.0005
Magnesium	GRAS		4	4	--	12	9.2	11.05	11.5
Manganese	0.79	Background	4	4	0	0.33	0.012	0.20	0.22
Potassium	GRAS		4	4	--	16	11	13.25	13
Selenium	**0.0046**	**AWQC**	**4**	**4**	**1**	**0.0047**	**0.003**	**0.004**	**0.00435**
Sodium	GRAS		4	4	--	26	14	22.50	25
Zinc	0.105	AWQC	4	2	0	0.016	ND (0.01)	0.01	0.012

Table B-10
Surface Water Screening Summary - Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Chemical	Screening Level	Source	Number of Samples	Number of Detects	Number Exceeding Screening	Maximum Detected Value	Minimum Value(1)	Mean(2)	Median(2)
VOLATILES UG/L									
Methylene Chloride	1.93	EPA Region IV	10	1	0	0.46	0.46	1.05	1
Toluene	130	Tier II	10	7	0	0.23	0.11	0.26	0.185

Notes:

(1)If the minimum concentration is a nondetect value, the acronym ND is shown. The minimum detection limit is provided in ( ).

(2)Nondetects were included at one-half the detection limit in the calculation of the arithmetic mean and the median.

-- Screening not performed because screening level not available or chemical is classified as GRAS

Background - Except as noted, concentration measured at Johnson Creek background station (JC-009) upgradient to the site.

GRAS -generally recognized as safe

NA-screening level is not available

Rows in bold contain concentrations and or reporting limits that exceed screening levels.

Table B-11
Surface Water Screening Summary - NRD Reservoir
Former Nebraska Ordnance Plant, Mead, Nebraska

Chemical	Screening Level	Source	Number of Samples	Number of Detects	Number Exceeding Screening	Maximum Detected Value	Minimum Value(1)	Mean(2)	Median(2)
EXPLOSIVES UG/L									
2-Amino-4,6-dinitrotoluene	20	Talmage et al. 1999	5	5	0	0.28	0.21	0.23	0.22
TOTAL METALS MG/L									
Aluminum	4.4	Background	5	5	0	1.7	1.1	1.4	1.4
Arsenic	0.15	AWQC	5	5	0	0.0046	0.0042	0.0044	0.0044
Barium	**0.19**	**Background**	**5**	**5**	**1**	**0.22**	**0.18**	**0.19**	**0.18**
Calcium	GRAS		5	5	0	40	36	37	37
Cobalt	**0.017**	**Background (Silver Ck.)**	**5**	**0**	**5**		**ND (0.025)**	**0.03**	**0.025**
Iron	2.8	Background	5	5	0	2.1	1.2	1.60	1.6
Lead	0.0074	Background	5	5	0	0.006	0.0036	0.0042	0.0037
Magnesium	GRAS		5	5	0	18	17	17	17
Manganese	**0.21**	**Background**	**5**	**5**	**1**	**0.24**	**0.17**	**0.19**	**0.18**
Mercury	0.00077	AWQC	5	1	0	0.00026	ND (0.0001)	0.0001	0.0001
Nickel	0.16	AWQC	5	1	0	0.018	0.018	0.02	0.02
Potassium	GRAS		5	5	0	12	11	12	12
Selenium	**0.005**	**AWQC**	**5**	**5**	**5**	**0.0087**	**0.0068**	**0.01**	**0.0074**
Sodium	GRAS		5	5	0	44	42	42	42
DISSOLVED METALS MG/L									
Aluminum	0.47	Background	5	3	0	0.34	ND (0.1)	0.19	0.13
Antimony	NA		5	1	--	0.00096	0.00096	0.0014	0.0015
Arsenic	0.15	AWQC	5	5	0	0.0028	0.0027	0.0028	0.0028
Barium	**0.11**	**Background**	**5**	**5**	**5**	**0.13**	**0.13**	**0.13**	**0.13**
Beryllium	NA		5	2	--	0.001	0.0004	0.0009	0.001
Calcium	GRAS		5	5	0	34	32	33	33
Lead	0.0025	AWQC	5	1	0	0.00011	0.00011	0.00042	0.0005
Magnesium	GRAS		5	5	0	16	15	15.20	15
Manganese	0.17	Background	5	5	0	0.1	0.09	0.10	0.097
Potassium	GRAS		5	5	0	11	10	10.60	11
Selenium	**0.0046**	**AWQC**	**5**	**5**	**5**	**0.0074**	**0.007**	**0.007**	**0.0072**
Sodium	GRAS		5	5	0	39	37	38	38
Zinc	0.105	AWQC	5	3	0	0.022	ND (0.01)	0.01	0.015

Notes:
(1)If the minimum concentration is a nondetect value, the acronym ND is shown. The minimum detection limit is provided in ( ).
(2)Nondetects were included at one-half the detection limit in the calculation of the arithmetic mean and the median.
-- Screening not performed because screening level not available or chemical is classified as GRAS
Background = Except as noted, concentration measured at Johnson Creek background station (JC-009) upgradient to the site.
GRAS=generally recognized as safe
NA=screening level is not available

Table B-11
Surface Water Screening Summary - NRD Reservoir
Former Nebraska Ordnance Plant, Mead, Nebraska

Chemical	Screening Level	Source	Number of Samples	Number of Detects	Number Exceeding Screening	Maximum Detected Value	Minimum Value(1)	Mean(2)	Median(2)

Rows in bold contain concentrations and or reporting limits that exceed screening levels.

Table B-12
Sediment Screening Summary - Johnson and Clear Creeks
Former Nebraska Ordnance Plant, Mead, Nebraska

Chemical	Screening Level	Source	Number of Samples	Number of Detects	Number Exceeding Screening	Maximum Detected Value	Minimum Value[1]	Mean[2]	Median[2]
SEMIVOLATILES UG/KG									
4-Methylphenol	**170**	**USEPA 1994**	**4**	**0**	**4**		**ND (434)**	**240**	**236**
Benzo(b)fluoranthene	**27**	**USEPA 1996**	**4**	**0**	**4**		**ND (434)**	**240**	**236**
Benzo(g,h,i)perylene	**170**	**OME 1993**	**4**	**0**	**4**		**ND (434)**	**240**	**236**
Benzo(k)fluoranthene	**240**	**OME 1993**	**4**	**0**	**2**		**ND (434)**	**240**	**236**
Dibenzo(a,h)anthracene	**60**	**OME 1993**	**4**	**0**	**4**		**ND (434)**	**240**	**236**
Indeno(1,2,3-cd)pyrene	**200**	**OME 1993**	**4**	**0**	**4**		**ND (434)**	**240**	**236**
METALS MG/KG									
Aluminum	27000	WSDE 1994	4	4	0	15900	1830	8053	7240
Arsenic	10	Background	4	2	0	8.3	ND (1.6)	3.9	3.2
Barium	500	GH 1990	4	4	0	245	33	129	120
Beryllium	1	Background	4	2	0	0.82	ND (0.53)	0.49	0.44
Calcium		GRAS	4	4	--	3690	821	2423	2590
Chromium	81	ERL	4	4	0	16.8	4.1	10	10
Cobalt	50	OME 1993	4	4	0	12.6	2.9	6.6	5.5
Copper	34	ERL	4	4	0	17.8	2.2	9.1	8.2
Iron		GRAS	4	4	0	17400	2520	9353	8745
Lead	47	ERL	4	4	0	18.3	2.4	8.7	7.1
Magnesium		GRAS	4	4	0	3310	469	1877	1864
Manganese	**640**	**Background**	**4**	**4**	**1**	**706**	**136**	**437**	**452**
Nickel	24	Background	4	2	0	19.6	ND (4)	10	9.0
Potassium		GRAS	4	4	--	3900	511	1940	1675
Silver	**1.8**	**PEL**	**4**	**2**	**2**	**2.3**	**ND (1.3)**	**1.4**	**1.4**
Sodium		GRAS	4	4	--	275	53.5	166	167
Vanadium	50	Background	4	4	0	38.8	5	20	18
Zinc	120	OME 1993	4	4	0	90.2	20.1	52	48
VOLATILES UG/KG									
Acetone	**9.1**	**PEL**	**4**	**2**	**2**	**48**	**ND (13)**	**27**	**27**

Notes:

(1)If the minimum concentration is a nondetect value, the acronym ND is shown. The minimum detection limit is provided in ( ).

(2)Nondetects were included at one-half the detection limit in the calculation of the arithmetic mean and the median.

-- Screening not performed because screening level not available or chemical is classified as GRAS

Background = Concentration measured at Johnson Creek station (JC-009) upgradient to the site.

GRAS generally recognized as safe

NA=screening level is not available

Rows in bold contain concentrations and or reporting limits that exceed screening levels.

Table B-13
Sediment Screening Summary - Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Chemical	Screening Level	Source	Number of Samples	Number of Detects	Number Exceeding Screening	Maximum Detected Value	Minimum Value(1)	Mean(2)	Median(2)
SEMIVOLATILES UG/KG									
4-Methylphenol	**170**	**USEPA 1994**	**2**	**1**	**2**	**2444**	**ND (589)**	**1369.25**	**1369.25**
Benzo(b)fluoranthene	**27**	**USEPA 1996**	**2**	**0**	**2**		**ND (516)**	**276.25**	**276.25**
Benzo(g,h,i)perylene	**170**	**OME 1993**	**2**	**0**	**2**		**ND (516)**	**276.25**	**276.25**
Benzo(k)fluoranthene	**240**	**OME 1993**	**2**	**0**	**2**		**ND (516)**	**276.25**	**276.25**
Dibenzo(a,h)anthracene	**60**	**OME 1993**	**2**	**0**	**2**		**ND (516)**	**276.25**	**276.25**
Di-n-butylphthalate	11000	SQB	2	1	0	575	ND (589)	434.75	434.75
Di-n-octylphthalate	NA	NA	2	0	--		ND (516)	276.25	276.25
Indeno(1,2,3-cd)pyrene	**200**	**OME 1993**	**2**	**0**	**2**		**ND (516)**	**276.25**	**276.25**
Pyrene	660	ERL	2	1	0	107	107	182.5	182.5
METALS MG/KG									
Aluminum	27000	WSDE 1994	2	2	0	10000	8080	9040	9040
Arsenic	8.2	ERL	2	2	0	6.9	5.4	6.15	6.15
Barium	500	GH 1990	2	2	0	237	177	207	207
Calcium	GRAS		2	2	--	6400	3160	4780	4780
Chromium	81	ERL	2	2	0	12.8	9.7	11.25	11.25
Cobalt	50	OME 1993	2	2	0	6.5	4.9	5.7	5.7
Copper	34	ERL	2	2	0	14.1	10.9	12.5	12.5
Iron	GRAS		2	2	--	14500	12100	13300	13300
Lead	47	ERL	2	2	0	11.3	9.1	10.2	10.2
Magnesium	GRAS		2	2	--	3020	2130	2575	2575
Manganese	**480**	**Background**	**2**	**2**	**2**	**896**	**506**	**701**	**701**
Nickel	21	ERL	2	2	0	16.1	11.6	13.85	13.85
Potassium	GRAS		2	2	--	2220	1730	1975	1975
Selenium	**0.97**	**Background**	**2**	**2**	**2**	**2.2**	**2**	**2.1**	**2.1**
Silver	**1.8**	**PEL**	**2**	**2**	**2**	**2.3**	**2.2**	**2.25**	**2.25**
Sodium	GRAS		2	2	--	286	133	209.5	209.5
Thallium	**0.7**	**approx. value***	**2**	**0**	**2**		**ND (1.9)**	**1**	**1**
Vanadium	**18**	**Background**	**2**	**2**	**1**	**23.2**	**18**	**20.6**	**20.6**
Zinc	120	OME 1993	2	2	0	58.5	45.8	52.15	52.15
VOLATILES UG/KG									
Acetone	**9.1**	**PEL**	**2**	**1**	**1**	**43**	**ND (18)**	**26**	**26**
Toluene	670	SQB	2	1	0	246	ND (18)	127.5	127.5

Notes:
(1)If the minimum concentration is a nondetect value, the acronym ND is shown. The minimum detection limit is provided in ( ).
(2)Nondetects were included at one-half the detection limit in the calculation of the arithmetic mean and the median.
-- Screening not performed because screening level not available or chemical is classified as GRAS
Background = Concentration measured at Silver Creek background station (SC-005) upgradient to the site.
GRAS - generally recognized as safe
NA=screening level is not available

Table B-13
Sediment Screening Summary - Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska

Chemical	Screening Level	Source	Number of Samples	Number of Detects	Number Exceeding Screening	Maximum Detected Value	Minimum Value(1)	Mean(2)	Median(2)

Rows in bold contain concentrations and or reporting limits that exceed screening levels.

* Approximate crustal abundance (ORNL-RAIS:Thallium, 1994).

Table B-14
Sediment Screening Summary - NRD Reservoir
Former Nebraska Ordnance Plant, Mead, Nebraska

Chemical	Screening Level	Source	Number of Samples	Number of Detects	Number Exceeding Screening	Maximum Detected Value	Minimum Value(1)	Mean(2)	Median(2)
EXPLOSIVES UG/KG									
Nitrobenzene	NA		5	1	0	74	ND (98)	57	55
METALS MG/KG									
Aluminum	**27000**	**WSDE 1994**	**5**	**5**	**3**	**47000**	**21000**	**36200**	**42000**
Arsenic	**10**	**Background**	**5**	**5**	**4**	**12**	**8.2**	**11**	**11**
Barium	500	GH 1990	5	5	0	450	260	380	410
Beryllium	**1**	**Background**	**5**	**5**	**4**	**1.9**	**1**	**1.5**	**1.7**
Cadmium	1	EPA Region IV	5	5	0	0.61	0.19	0.43	0.40
Calcium	GRAS		5	5	--	14000	6400	9540	9500
Chromium	81	ERL	5	5	0	48	23	37	43
Cobalt	50	OME 1993	5	5	0	15	8.6	12	13
Copper	**34**	**ERL**	**5**	**5**	**1**	**35**	**20**	**29**	**29**
Iron	GRAS		5	5	--	40000	24000	33000	35000
Lead	47	ERL	5	5	0	30	17	26	29
Magnesium	GRAS		5	5	--	8400	4900	6780	7400
Manganese	**640**	**Background**	**5**	**5**	**2**	**820**	**560**	**666**	**640**
Nickel	**24**	**Background**	**5**	**5**	**5**	**42**	**27**	**35**	**34**
Potassium	GRAS		5	5	--	9400	4700	7200	8200
Selenium	**0.97**	**Background**	**5**	**4**	**5**	**1.9**	**1.3**	**1.5**	**1.5**
Silver	**1.8**	**PEL**	**5**	**0**	**5**		**ND (1.9)**	**1.0**	**1.1**
Sodium	GRAS		5	5	--	330	160	246	260
Thallium	**0.7**	**approx. value***	**5**	**5**	**5**	**0.57**	**0.31**	**0.47**	**0.49**
Vanadium	**50**	**Background**	**5**	**5**	**4**	**100**	**40**	**78**	**94**
Zinc	**120**	**OME 1993**	**5**	**5**	**2**	**140**	**83**	**115**	**120**

Notes:
(1)If the minimum concentration is a nondetect value, the acronym ND is shown. The minimum detection limit is provided in ( ).
(2)Nondetects were included at one-half the detection limit in the calculation of the arithmetic mean and the median.
-- Screening not performed because screening level not available or chemical is classified as GRAS
Background = Concentration measured at Johnson Creek background station (JC-009) upgradient to the site.
GRAS=generally recognized as safe
NA=screening level is not available
Rows in bold contain concentrations and or reporting limits that exceed screening levels.
* Approximate crustal abundance (ORNL-RAIS:Thallium, 1994).

Table B-15
Summary of Fish Tissue Samples with Detected Compounds - NRD Reservoir
Operable Unit No. 3, Former Nebraska Ordnance Plant, Mead, Nebraska

	NRF-0W1-049			NRF-0W2-049			NRF-0W3-049			NRF-0W4-049			NRF-0W4-049A			NRF-0W5-049			NRF-0W5-049A			NRF-0W6-049		
	R	Q	QL	R	Q	QL	R	Q	QL	R	Q	QL	R	Q	QL	R	Q	QL	R	Q	QL	R	Q	QL
EXPLOSIVES (µg/kg)																								
2,4,6-Trinitrotoluene (2,4,6-TNT)		U	(23)		U	(23)		U	(23)		U	(23)	270	J			U	(23)	390	J			U	(23)
2,6-Dinitrotoluene (2,6-DNT)		U	(11)		U	(11)		U	(11)		U	(11)		U	(210)		U	(11)		U	(220)		U	(11)
Nitrobenzene (NB)		U	(30)		U	(30)	31				U	(30)		U	(90)		U	(30)		U	(95)		U	(30)
METALS (mg/kg)																								
Aluminum	14.6	J		6.1	J		9.2	J		10.7	J			NA		16.7	J			NA		9.9	J	
Barium	3.4	J			U	(2.1)	6.3	J		9	J			NA		8.7	J			NA		7.6	J	
Cadmium		U	(0.05)		U	(0.05)		U	(0.05)	0.05	J			NA			U	(0.05)		NA		0.05	J	
Calcium	6010			3920			21700			13700				NA		12600				NA		10700		
Chromium	0.36	J		0.37	J		0.5	J		0.5	J			NA		0.46	J			NA		0.45	J	
Copper	2.4			3.5			1.6	J		1.6	J			NA		1.8	J			NA		1.6	J	
Iron	36.2	J		22.7	J		22.7	J		51.8				NA		65.5				NA		34.3	J	
Lead	0.39	J		0.59	J		0.62	J		0.69	J			NA		0.87	J			NA		4.3		
Magnesium	295	J		248	J		553			434	J			NA		398	J			NA		414	J	
Manganese	3.3	J			U	(2.8)	6	J		3.8	J			NA		4.2	J			NA		3.2	J	
Nickel		U	(0.21)		U	(0.21)		U	(0.21)		U	(0.22)		NA			U	(0.2)		NA			U	(0.21)
Potassium	2500	J		2200	J		2080	J		2500	J			NA		2700	J			NA		2180	J	
Selenium	1.2	J		1.4	J		1.5	J		2	J			NA		2.1	J			NA		2.2	J	
Silver		U	(0.26)		U	(0.26)		U	(0.25)		U	(0.27)		NA			U	(0.25)		NA			U	(0.25)
Sodium		UJ	(1010)		UJ	(1010)	1010	J			UJ	(1040)		NA			UJ	(970)		NA		1040	J	
Zinc	17.1	J		16.6	J		32.4	J		62.6				NA		48.2				NA		49		

Header Notes
R = Result
Q = Qualifier
QL = Quantitation Limit

Qualifier Notes
J = Concentration is an estimated quantity
R = Presence/absence cannot be verified from the existing data
U = There is no detection for this compound at the given quantitation limit
UJ = This chemical was not detected at the given quantitation limit; value is an estimate
NA = Sample not analyzed for this compound

Table B-16

Summary of Fish Tissue Samples with Detected Compounds - Background Reservoir
Operable Unit No. 3, Former Nebraska Ordnance Plant, Mead, Nebraska

	BKF-0W1-049			BKF-0W1-049A			BKF-0W2-049			BKF-0W3-049			BKF-0W3-049A			BKF-0W4-049			BKF-0W5-049			BKF-0W6-049		
	R	Q	QL	R	Q	QL	R	Q	QL	R	Q	QL	R	Q	QL	R	Q	QL	R	Q	QL	R	Q	QL
EXPLOSIVES (µg/kg)																								
2,6-Dinitrotoluene (2,6-DNT)		UJ	(11)		U	(220)		U	(11)		UJ	(11)		U	(220)	69				U	(11)		U	(11)
4-Nitrotoluene (4-NT)		UJ	(13)		U	(180)		U	(13)		UJ	(13)	300	J			U	(13)		U	(13)		U	(13)
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)		UJ	(25)		U	(160)		U	(25)		UJ	(25)		U	(160)		U	(25)		U	(25)		U	(25)
Nitrobenzene (NB)		UJ	(30)	280	J			U	(29)	87	J			U	(95)	190				U	(30)		U	(30)
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)		UJ	(8.5)	980	J			U	(8.3)		UJ	(8.4)		U	(210)		U	(8.4)		U	(8.5)		U	(8.5)
METALS (mg/kg)																								
Aluminum	60.9				NA			J		4.7	J			NA		21.7			10.2	J		43.1		
Barium	12.9	J			NA			U	(2.1)		U	(2.1)		NA		12.5	J			U	(2.2)	5.4	J	
Cadmium	0.07	J			NA			U	(0.05)		U	(0.05)		NA			U	(0.05)		U	(0.05)		U	(0.05)
Calcium	13800				NA		4050			3470				NA		21900			4320			7140		
Chromium	0.49	J			NA		0.26	J			U	(0.26)		NA		0.45	J		0.28	J		0.33	J	
Copper	0.98	J			NA		0.59	J		0.48	J			NA		0.82	J		0.47	J		0.66	J	
Iron	206				NA		38.1	J		23.2	J			NA		105			28.9	J		125		
Lead	0.81	J			NA		0.41	J		0.31	J			NA		0.56	J		0.44	J		0.37	J	
Magnesium	548				NA		315	J		237	J			NA		663			288	J			J	
Manganese	47.5				NA		7.1	J		2	J			NA		15.7			3.2	J		12.2		
Potassium	3550	J			NA		2320	J		1910	J			NA		2880	J		2090	J		2140	J	
Selenium	1.3	J			NA		1.4	J		1.1	J			NA		1.3	J		1	J		1.1	J	
Sodium	1350	J			NA		1120	J		1190	J			NA			UJ	(1050)	1040	J		1290	J	
Zinc	28.1	J			NA		16.2	J		10.9	J			NA		28.1	J		11.7	J		14.8	J	

Header Notes
R - Result
Q - Qualifier
QL - Quantitation Limit

Qualifier Notes
J - Concentration is an estimated quantity
R - Presence/absence cannot be verified from the existing data
U - There is no detection for this compound at the given quantitation limit
UJ = This chemical was not detected at the given quantitation limit, value is an estimate
NA = Sample not analyzed for this compound

TABLE B-17
LITERATURE EFFECTS LEVELS FOR COCS FOR BENTHIC MARCOINVERTEBRATES AND FISH
MEAD NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Chemical	Species	Endpoint	Duration (hours)	Result	Unit	Reference(1)	Safety Factor	Surface Water Benchmark (mg/l)
				Silver				
Silver	*Daphnia magna*	LC50	48	0.25 - 49	ug/l	1	100	0.0000025 - 0.00049
Silver	*Tanytarsus dissimilis*	LC50	48	3.2	mg/l	1	100	0.032
Silver	*Salmo gairdneri*	LC50	Chronic	5.3 - 240	ug/l	1	100	0.000053 - 0.0024
Silver	*Pimephales promelas*	LC50	Chronic	3.9 - 270	ug/l	1	100	0.000039 - 0.0027
Silver	*Lepomis macrochirus*	LC50	Chronic	64	ug/l	1	100	0.00064
				Selenium				
Selenium	***Cyprinidon variegatus***	**LC50**	**96**	**6.7**	**mg/l**		**100**	**0.067**
Selenium	***Mysidopsis bahia (s)***	**NOAEL**	**96**	**0.143**	**mg/l**		**1**	**0.143**
				Cresols				
o-Cresol	***Entosiphon sulcatum***	**TT**	**Chronic**	**17**	mg/l		**1**	**17**
m-Cresol	*Uronema parduczi*	TT	Chronic	62	mg/l		1	62
o-Cresol	*Uronema parduczi*	TT	Chronic	31	mg/l		1	31
o-cresol	*Ambystoma mexicanum*	LC50	48	40	mg/l		100	0.4
m-Cresol	*Gammarus pulex*	PL	Chronic	0.7	mg/l		1	0.7
p-Cresol	***Pimephales promelas***	**MATC**	**Chronic**	**1.81**	mg/l	**2**	**1**	**1.81**
o-Cresol	*Carassius auratus*	TLm	96	19	mg/l		10	1.9
m-Cresol	*Carassius carassius*	TLm	24	25	mg/l		10	2.5
m-Cresol	*Gambusia affinis*	TLm	96	24	mg/l		10	2.4
m-Cresol	*Lepomis macrochirus*	TLm	96	10-13.6	mg/l		10	1
m-Cresol	*Oncorhynchus mykiss (embryo)*	TLm	24	7	mg/l		10	0.7
m-Cresol	*Rutilis rutilis*	TLm	24	23	mg/l		10	2.3
o-Cresol	*Rutilis rutilis*	TLm	24	16	mg/l		10	1.6
m-Cresol	*Gadus morrhua (fert. eggs)*	LC50	96	30	mg/l		100	0.3
o-Cresol	*Lebistes reticulatus*	LC50	96	18	mg/l		100	0.18
p-Cresol	*Oncorhynchus mykiss*	LC100	Chronic	5	mg/l		0	

Notes:
(1) All references cited in Ramamoorthy and Baddaloo 1995, except as noted below.
  1 USEPA 1980
  2 Russom 1991 in ASTER Toxicity Profile for Cresols, USEPA 1994.
(2) Bold rows include values used in Exposure Assessment

TABLE B-18
ECOTOX QUOTIENT CALCULATION FOR DUCKS AT JOHNSON CREEK
FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Chemical of Concern	Ag
Mallard Duck	
Intake (kg/day)	0.066
Body weight (kg)	1.2
Area Use Factor	0.5
Aquatic Macroinvertebrates and Fish	
Proportion of Diet	0.2
Bioconcentration Factor	1
COC Concentration (mg/kg)	2.3
Assimilation Factor	0.3
Dose (mg/kg/d)	0.004
Plants	
Proportion of Diet	0.5
Bioconcentration Factor	0.5
COC Concentration (mg/kg)	1.15
Assimilation Factor	0.3
Dose (mg/kg/d)	0.005
Sediment	
Proportion of Diet	0.3
COC Concentration (mg/kg)	2.3
Assimilation Factor	0.3
Dose (mg/kg/d)	0.006
Total Dose (mg/kg/d)	0.014
Species-specific Screening Value (mg/kg/d)	17.5
SSV Source	NAS 1980
Ecotox Quotient	**0.0008**

Assumptions:
Ag SSV=NOAEL in chickens

TABLE B-19
ECOTOX QUOTIENT CALCULATION FOR GREAT BLUE HERON AT JOHNSON CREEK
FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Chemical of Concern	Ag
Great Blue Heron	
Intake (kg/day)	0.4
Body weight (kg)	2.2
Area Use Factor	0.5
Aquatic Macroinvertebrates and Fish	
Proportion of Diet	1
Bioconcentration Factor	1
COC Concentration (mg/kg)	2.3
Assimilation Factor	0.3
Dose (mg/kg/d)	0.063
Plants	
Proportion of Diet	0
Bioconcentration Factor	0
COC Concentration (mg/kg)	0
Assimilation Factor	0
Dose (mg/kg/d)	0.000
Sediment	
Proportion of Diet	0.3
COC Concentration (mg/kg)	2.3
Assimilation Factor	0.3
Dose (mg/kg/d)	0.019
Total Dose (mg/kg/d)	0.082
Species-specific Screening Value (mg/kg/d)	17.5
SSV Source	NAS 1980
Ecotox Quotient	**0.0047**

Assumptions:
Ag SSV=NOAEL in chickens

TABLE B-20
ECOTOX QUOTIENT CALCULATIONS FOR RACCOONS FORAGING AT JOHNSON CREEK, FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Chemical of Concern	Ag
Raccoon	
Intake (kg/day)	0.364
Body weight (kg)	7.6
Area Use Factor	1
Aquatic Macroinvertebrates and Fish	
Proportion of Diet	0.3
Bioconcentration Factor	1
COC Concentration (mg/kg)	2.3
Assimilation Factor	0.3
Dose (mg/kg/d)	0.010
Plants	
Proportion of Diet	0.6
COC Concentration (mg/kg)	0
Dose (mg/kg/d)	0
Sediment	
Proportion of Diet	0.1
COC Concentration (mg/kg)	2.3
Assimilation Factor	0.3
Dose (mg/kg/d)	0.003
Total Dose (mg/kg/d)	0.013
Species-specific Screening Value (mg/kg/d)	16
SSV Source	ASTDR 1990
Ecotox Quotient	**0.0008**

Assumptions:
Ag SSV= TD50 rats water ingestion/10

TABLE B-21
ECOTOX QUOTIENT CALCULATION FOR DUCKS AT SILVER CREEK
FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Chemicals of Concern	Ag	Se	p-Cresol
	Mallard Duck		
Intake (kg/day)	0.066	0.066	0.066
Body weight (kg)	1.2	1.2	1.2
Area Use Factor	0.5	0.5	0.5
	Aquatic Macroinvertebrates and Fish		
Proportion of Diet	0.2	0.2	0.2
Bioconcentration Factor	1	4	1
COC Concentration (mg/kg)	2.3	8.8	2.4
Assimilation Factor	0.3	0.3	1
Dose (mg/kg/d)	0.004	0.015	0.013
	Plants		
Proportion of Diet	0.5	0.5	0.5
Bioconcentration Factor	0.5	3	0.5
COC Concentration (mg/kg)	1.15	6.6	1.2
Assimilation Factor	0.3	0.3	1
Dose (mg/kg/d)	0.005	0.027	0.017
	Sediment		
Proportion of Diet	0.3	0.3	0.3
COC Concentration (mg/kg)	2.3	2.2	2.4
Assimilation Factor	0.3	0.3	1
Dose (mg/kg/d)	0.006	0.005	0.020
Total Dose (mg/kg/d)	0.014	0.047	0.050
Species-specific Screening Value (mg/kg/d)	15.7	0.5	5
SSV Source	NAS 1980	Opresko 1995	ASTDR 1997
Ecotox Quotient	0.0009	0.0944	0.0099
Summed Ecotox Quotients	**0.1052**		

Assumptions:
Se present in reduced form as selenite
Ag SSV= NOEL in chicken
p-Cresol toxicity = o- Cresol
p-Cresol SSV=NOAEL in most sensitive mammal species
COC effects are additive

TABLE B-22
ECOTOX QUOTIENT CALCULATION FOR GREAT BLUE HERON AT SILVER CREEK
FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

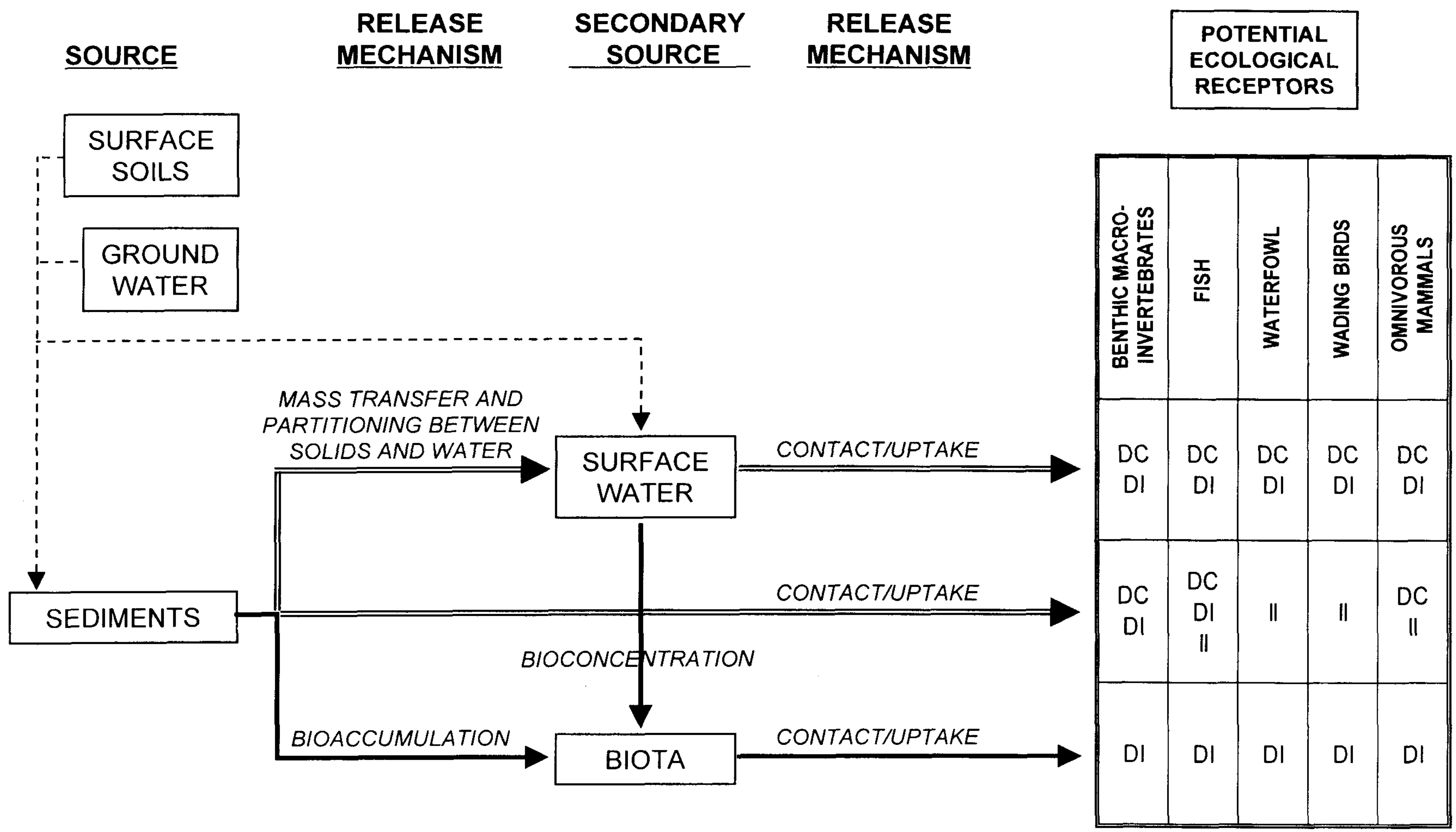
Chemicals of Concern	Ag	Se	p-Cresol
Great Blue Heron			
Intake (kg/day)	0.4	0.4	0.4
Body weight (kg)	2.2	2.2	2.2
Area Use Factor	0.5	0.5	0.5
Aquatic Macroinvertebrates and Fish			
Proportion of Diet	1	1	1
Bioconcentration Factor	1	4	1
COC Concentration (mg/kg)	2.3	8.8	2.4
Assimilation Factor	0.3	0.3	1
Dose (mg/kg/d)	0.063	0.240	0.218
Plants			
Proportion of Diet	0	0	0
Bioconcentration Factor	0	0	0
COC Concentration (mg/kg)	0	0	0
Assimilation Factor	0	0	0
Dose (mg/kg/d)	0.000	0.000	0.000
Sediment			
Proportion of Diet	0.3	0.3	0.3
COC Concentration (mg/kg)	2.3	2.2	2.4
Assimilation Factor	0.3	0.3	1
Dose (mg/kg/d)	0.019	0.018	0.065
Total Dose (mg/kg/d)	0.082	0.258	0.284
Species-specific Screening Value (mg/kg/d)	15.7	0.5	5
SSV Source	NAS 1980	Opresko 1995	ASTDR 1997
Ecotox Quotient	0.0052	0.5160	0.0567
Summed Ecotox Quotients	**0.5779**		

Assumptions:
Se present in reduced form as selenite
Ag SSV= NOEL in chicken
p-Cresol toxicity = o- Cresol
p-Cresol SSV=NOAEL in most sensitive mammal species
COC effects are additive

TABLE B-23
ECOTOX QUOTIENT CALCULATIONS FOR RACCOONS FORAGING AT SILVER CREEK
FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Chemicals of Concern	Ag	Se	p-Cresol
Raccoon			
Intake (kg/day)	0.364	0.364	0.364
Body weight (kg)	7.6	7.6	7.6
Area Use Factor	1	1	1
Aquatic Macroinvertebrates and Fish			
Proportion of Diet	0.3	0.3	0.3
Bioconcentration Factor	1	4	1
COC Concentration (mg/kg)	2.3	8.8	2.4
Assimilation Factor	0.3	0.3	1
Dose (mg/kg/d)	0.010	0.038	0.034
Plants			
Proportion of Diet	0.6	0.6	0.6
COC Concentration (mg/kg)	0	0	0
Dose (mg/kg/d)	0	0	0
Sediment			
Proportion of Diet	0.1	0.1	0.1
COC Concentration (mg/kg)	2.3	2.2	2.4
Assimilation Factor	0.3	0.3	1
Dose (mg/kg/d)	0.003	0.003	0.011
Total Dose (mg/kg/d)	0.013	0.041	0.046
Species-specific Screening Value (mg/kg/d)	16	0.2	219.2
SSV Source	ASTDR 1990	Opresko 1995	Opresko 1995
Ecotox Quotient	0.0008	0.2054	0.0002
Summed Ecotox Quotients	**0.2064**		

Assumptions:
Se present in reduced form as selenite
Se toxicity in raccoons = most sensitive bird species
Ag SSV= TD50 rats water ingestion/10
p-Cresol toxicity = o- Cresol
p-Cresol SSV=NOAEL in mink
COC effects are additive



Notes:
- Double line represents potentially important pathways
- Dashed line represents pathways addressed under OU1and OU2 RI's
- Exposure routes:
  - DI direct ingestion
  - DC direct contact
  - II incidental ingestion

Figure B-1	Ecological Conceptual Site Model Nebraska Ordnance Plant - OU3 BRA Mead, Nebraska
10/20/97	
K9623-4520	Woodward-Clyde

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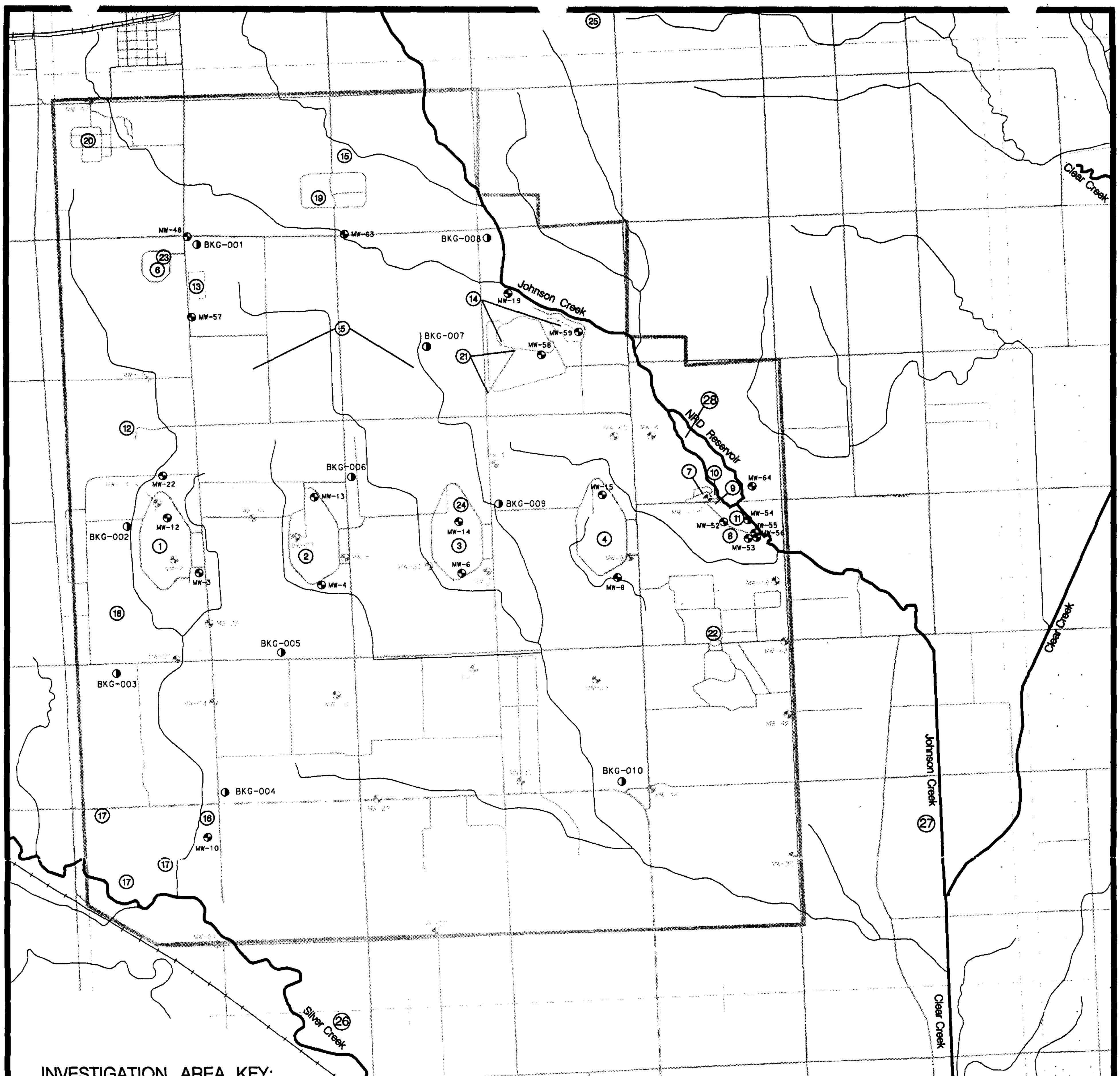
B07NE003703-06254



INVESTIGATION AREA KEY:

1. Load Line 1 Bomb Production Buildings and Paint Operations Areas
2. Load Line 2 Bomb Production Buildings and Paint Operations Areas
3. Load Line 3 Bomb Production Buildings and Paint Operations Areas
4. Load Line 4 Bomb Production Buildings and Paint Operations Areas
5. Raw Products Igloo Storage Areas
6. Former Tetryl Pelleting Area
7. North Burning Ground
8. South Burning Ground
9. Proving Ground
10. Potential Landfill Area North of the Proving Grounds
11. Former NOP Landfill Area
12. Potential Waste Disposal Area North of Nike Maintenance Area
13. Potential Waste Disposal Area Southeast of Bomb Booster Assembly Area
14. Potential Waste Disposal Areas at the Atlas Missile Area
15. Potential Waste Disposal Area North of Ammonium Nitrate Plant
16. Demolition Ground
17. Detonation Craters
18. Bermed Area Southwest of Load Line 1
19. Ammonium Nitrate Plant Operations Area
20. Administration Area UST
21. Atlas Missile Area USTs
22. Former Air Force Global Communications Area UST
23. Bomb Booster Assembly Area UST
24. Geophysical Anomaly at Load Line 3
25. Northeast Boundary Area
26. Silver Creek
27. Johnson Creek
28. NRD Reservoir

MW-10 Groundwater Wells sampled to support OU3

BKG-001 OU3 Background Metals Soil Sampling Location

Other Existing Groundwater Monitoring Well Cluster

N

4000 0 4000 8000

SCALE FEET

Revisions			
Symbol	Descriptions	Date	Approved

URS Greiner Woodward Clyde Federal Services
10975 El Monte, Suite 100
Overland Park, Kansas 66211

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

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Designed by: S.J.F.	U.S. Army Corps of Engineers — ECOLOGICAL RICK ASSESSMENT FOR OPERABLE UNIT 3 FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.
Drawn by: R.A.D.	OPERABLE UNIT 3 INVESTIGATION AREAS
Checked by: L.A.T.	Scale: 1 IN = 4000 FT — Sheet number: 1
Submitted by: RAD	Date: FEB 2000 — Dwg. No.: B-1

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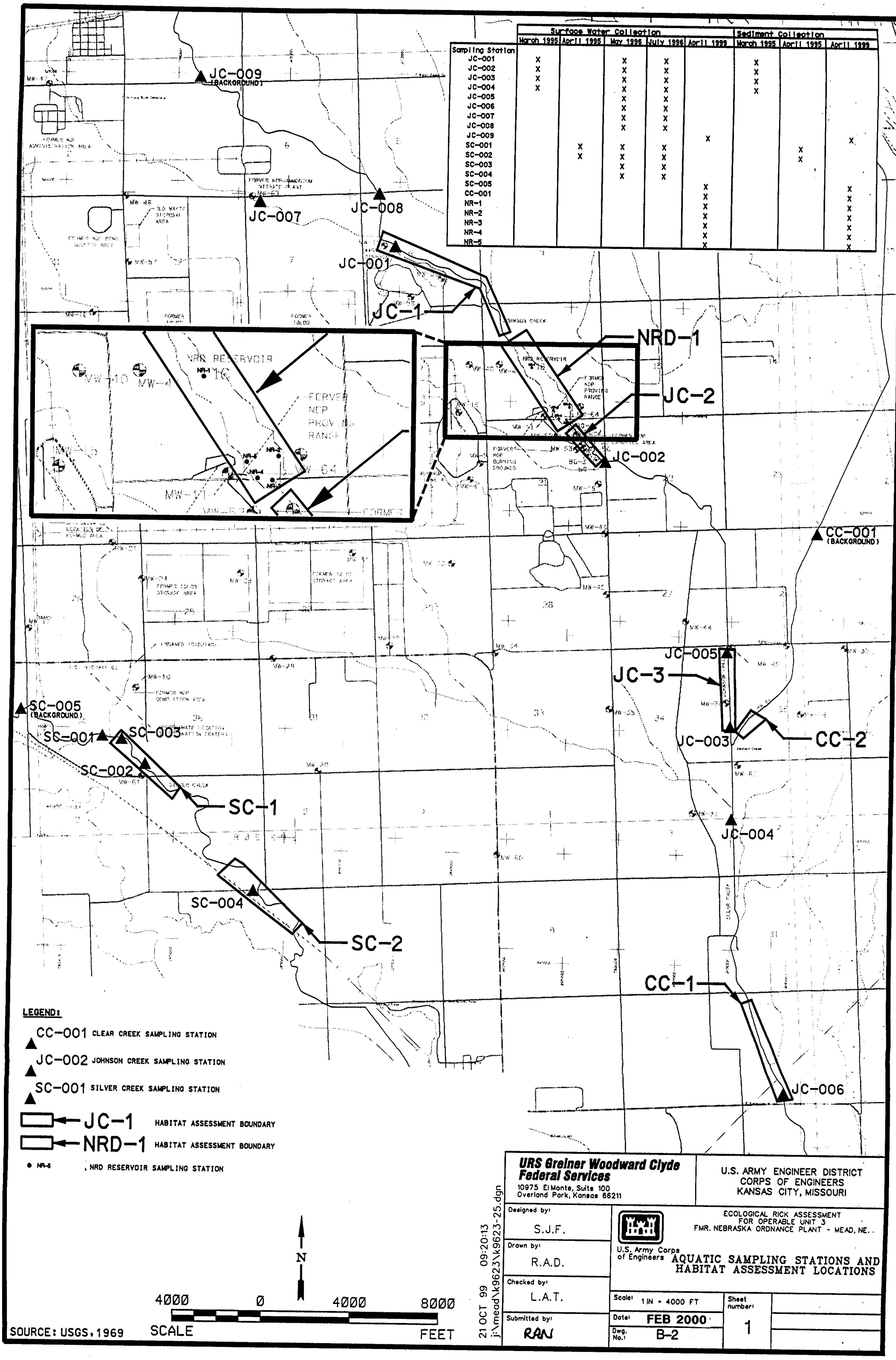

Sampling Station	Surface Water Collection					Sediment Collection		
	March 1995	April 1995	May 1996	July 1996	April 1999	March 1995	April 1995	April 1999
JC-001	X		X	X		X		
JC-002	X		X	X		X		
JC-003	X		X	X		X		
JC-004	X		X	X		X		
JC-005			X	X				
JC-006			X	X				
JC-007			X	X				
JC-008			X	X				
JC-009					X			X
SC-001		X	X	X			X	
SC-002		X	X	X			X	
SC-003			X	X				
SC-004			X	X				
SC-005					X			X
CC-001					X			X
NR-1					X			X
NR-2					X			X
NR-3					X			X
NR-4					X			X
NR-5					X			X

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ECOLOGICAL RISK ASSESSMENT
FOR OPERABLE UNIT 3
FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.

U.S. Army Corps of Engineers

AQUATIC SAMPLING STATIONS AND HABITAT ASSESSMENT LOCATIONS

Designed by: S.J.F.
Drawn by: R.A.D.
Checked by: L.A.T.
Submitted by: RAN

Scale: 1 IN = 4000 FT
Date: FEB 2000
Dwg. No.: B-2
Sheet number: 1

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APPENDIX B-1

OPERABLE UNIT 3 INVESTIGATION AREAS
TERRESTRIAL HABITAT DATA

APPENDIX B-1

LIST OF TABLES

Table No.

APPENDIX B-1

LIST OF DRAWINGS

This appendix provides characterizations or descriptions of OU3 investigation areas terrestrial habitat covertypes based upon a Site reconnaissance of the OU3 investigation areas that was performed by Woodward-Clyde biologists on September 10-11, 1996 and April, 1999, to describe and evaluate the terrestrial habitats. A summary table (**Table B-1-1**) was created which lists the covertype and percent cover for each OU3 investigation area.

Major terrestrial habitats considered in the OU1 BRA which are also present at OU3 investigation areas include the following:

- Cropland (active and abandoned)
- Pasture (active and abandoned)
- Feedlots
- Herbaceous field (mowed and unmowed areas)
- Wildlife planting area
- Fencerow vegetation
- Streambanks
- Research plots

The following OU3 investigation areas are located in areas that are presently cropland:

- Portions of former Raw Products Igloo Storage Areas
- Tetryl Pelleting Area
- South Burning Ground
- Potential Waste Disposal Area Southeast of the former Bomb Booster Assembly Area
- Potential Waste Disposal Area North of former Ammonium Nitrate Plant
- Potential Waste Disposal Area North of the former Nike Maintenance Area
- Detonation Crater No. 3
- Bermed Area southwest of Load Line 1
- Northeast Boundary Area

During the growing season of 1996, all of these areas were planted in corn (*Zea mays*), with the exception of the South Burning Ground which was planted in soybeans (*Glycine max*). The type of crops planted on these areas during subsequent growing seasons may vary from year to year but are expected to include row crops such as corn or soybeans. Many of the wildlife species found within the OU3 investigation areas utilize these agricultural areas as a food source at various times of the year.

The following areas were identified as having very limited habitat attributed such conditions as small available and/or confined surface area, entirely herbaceous field which are routinely maintained and/or landscaped, and others:

- Raw Products Igloo Storage Areas
- Former Ammonium Nitrate Plant
- Detonation Craters Nos. 4 and 5
- Underground storage tank locations
- Geophysical Anomaly at Load Line 3

For those areas with covertype considered to be of higher quality than those previously mentioned, brief habitat descriptions and covertype maps (**Drawings B-1-1** through **B-1-11**) are provided in following paragraphs.

Load Line Areas. The OU3 load line investigative areas consist of the soils immediately adjacent to and beneath the former bomb production buildings and the soils surrounding former paint operations areas. The load lines (Load Lines 1, 2, 3, and 4) are located in a disturbed herbaceous community with some small trees and shrubs scattered throughout the areas (**Drawings B-1-1** through **B-1-4**). Load line areas are elliptical in shape and are approximately three-quarters of a mile long and one-third of a mile across. The buildings for Load Lines 2, 3, and 4 are mostly intact, but the buildings associated with Load Line 1 have been destroyed. Roughly one-half of the land surrounding Load Line 1 is used for pasture, one-fourth is cultivated, and one-fourth is fallow. Approximately 25 percent of the land surrounding Load Line 3 is used for irrigation research, 20 percent is fallow, 25 percent is pasture research, 30 percent is used for plant pathology, and the rest is occupied by facilities. The northern area of Load Line 4 has been converted to swine operations, covered by many small buildings and pens. The southern portion of the area is used for pastures and plant studies with pastures occupying 75 percent of the land, while 10 percent is cultivated, and personnel facilities associated with the swine operations occupy the remaining 15 percent.

The area surrounding portions of the load line buildings consists of herbaceous-scrub/shrub habitat. The dominant herbaceous species include switchgrass, smooth bromegrass, foxtail, goldenrod, sunflower, lambs quarters, and others. Common woody species found in these areas consist of white mulberry, autumn olive, cottonwood, elm, and wild plum. This area provides good habitat for a variety of small birds and mammals. In the area surrounding the Load Line buildings and in some of the buildings, a few larger species (raccoon, coyote [*Canis latrans]*, and great horned owl [*Bubo virginianus])* have been observed or there is sign available. It is likely a variety of other species utilize these areas also.

North Burning Ground. The North Burning Ground, which contained two burn pits, is a disturbed herbaceous community approximately four acres in size (**Drawing B-1-5**). The burn pits were approximately 75 feet long by 75 feet wide. The dominant herbaceous vegetation is smooth brome grass. Autumn olive and cottonwood (*Populus deltoides*) saplings are also found scattered throughout the area. Two native species that can also be found here in limited numbers are Indian grass (*Sorghastrum nutans*) and fragrant sumac (*Rhus aromatica*). Currently, the area is owned by the University of Nebraska and is used as a wildlife planting area for tall grasses and weeds. It is likely that the Autumn olive, Indian grass and sumac were wildlife plantings.

A wildlife planting area, mentioned above, has been established in the vicinity of the burning/proving grounds. Plantings include the following species: wild plum (*Prunus americana*), honeysuckle (*Lonicera* sp.), red cedar (*Juniperius virginiana*), cotoneaster (*Cotoneaster* sp.), Austrian pine (*Pinus nigra*), hackberry (*Celtis occidentalis*), alfalfa, wheatgrass (*Agropyron eristatum*), milo (*Sorghum bicolor*), big bluestem (*Andropogon gerardi*), little bluestem (*Andropogon scoparius*), indian grass, switchgrass (*Panicum virgatum*), and side-oats grama (*Bouteloua curtipendula*). Smooth bromegrass, volunteer trees, and sweet clover (*Melilotus albus*) are invading the plantings in this area (Rust, 1993). This small area does provide some of the higher quality habitat found on-Site.

Proving Grounds. The Proving Grounds area is a highly disturbed herbaceous community and is approximately two acres in size **(Drawing B-1-5)**. The Proving Grounds is owned by the University of Nebraska and is currently graded and used as a wildlife planting area). The dominant vegetation in this area is barnyard grass (*Echinochloa crus-galli*), with some scattered forbs such as smartweed. Historical aerial photographs show two east-to-west trenches which appear to have potential to be partially inundated by the adjacent NRD Reservoir. This disturbed area provides limited habitat for some small bird and mammal species.

Potential Landfill Area north of the Proving Grounds. This area consists of a disturbed herbaceous community and covers approximately two acres **(Drawing B-1-5)**. The area is presently an untilled grassy area with no visual evidence of past disposal activities. The dominant vegetation is smooth brome grass with some scattered smartweed and pigweed throughout the area. This disturbed area provides limited habitat for some small bird and mammal species.

Former Atlas Missile Area. There are two potential waste disposal areas at the former Atlas Missile area **(Drawing B-1-6)**. One of the investigative areas is approximately 15 acres in size and is dominated by smooth brome grass and alfalfa (*Medicago sativa*), which is cut for hay. A portion of this same disposal area is covered with gravel. The other disposal area, approximately 20 acres in size, contains some trees with the dominant species being cottonwood and elm. The understory in this forested area is somewhat open and consists of herbaceous species such as goldenrod (*Solidago* sp.), sunflower (*Helianthus annuus*) and smooth brome grass. This area provides some of the higher quality habitat found on-Site, although it has been highly disturbed.

Demolition Ground. The Demolition Ground is a disturbed herbaceous community which lies west of the cattle feed pens, and is approximately 300 to 400 feet long by 200 feet wide **(Drawing B-1-7)**. The dominant vegetation is smartweed (*Polygonum pensylvanicum* and *P. lapathifolium*), lambs quarters (*Chenopodium album*), pigweed (*Amaranthus retroflexus* and *A. hybridus*) and foxtail (*Setaria faberi*). This area is downgradient of the cattle pens. Runoff from the cattle pens flows across the area and into an retention pond located within the Demolition Ground investigation area. Due to the highly disturbed nature of this area, it provides very limited habitat for the local wildlife.

Detonation Craters. Crater size was likely 25 to 50 feet in diameter. Detonation Craters 1 and 2 appear to be located in a low lying area where a limited amount of water appears to occasionally pond. The craters presently contain a mesic herbaceous vegetation community **(Drawing B-1-8)**. The dominant vegetation in this area consists of reed grass

(*Calamagrostis inexpansa*), sedges (*Carex* sp.), rosinweed (*Silphium integrifolium*), and smartweeds (*Polygonum pensylvanicum* and *P. lapathifolium*). This area appears to have been cleared of trees at one time, which are now piled up adjacent to the area. Cattle graze this area and raccoons (*Procyon lotor*) and a variety of other small mammals appear to inhabit the adjacent brush pile. Again, due to historical agriculture activities, the exact location and size of each crater is not known, but, based on interpretations from aerial photographs, past investigations, and results of surface geophysical surveys, each crater is assumed to have been within the 150 feet by 150 feet study boundary limits of the OU3 remedial investigation.

NRD Reservoir and Johnson, Clear, and Silver Creeks. Complete descriptions of the covertype and associated terrestrial habitat conditions along Johnson and Silver Creeks is provided in Section 2.0 of Appendix B. A covertype map is provided on **Drawing B-1-9**.

Background Reservoir and NRD Reservoir. Complete descriptions of covertypes were not given in this drawing for either reservoir. The background reservoir was chosen because it was in the same watershed, in close proximity, an adequate natural representation of the region, and surrounded by similar covertypes. A covertype map for the NRD Reservoir is provided on **Drawing B-1-9**.

Northeast Boundary Area. The northeast boundary area is 100% cropland. During the Site visit in April 1999, the entire area was plowed over and in the process of being cultivated. The type of crops planted here may vary from year to year but are expected to include row crops such as corn or soybeans.. This area is of limited value to wildlife species for cover and food at various times of the year. A covertype map is provided on **Drawing B-1-11**.

Evaluation of the OU3 investigation areas indicate that these areas contain:

- No sensitive species
- No sensitive habitats not already addressed in the OU1 BRA
- No unique habitats (i.e., same habitats as present in the Site-wide OU1 BRA)

TABLE B-1-1
OU3 INVESTIGATION AREA HABITATS
FORMER NEBRASKA ORDNANCE PLANT ERA
MEAD, NEBRASKA

Code I.D.	OU3 Investigation Area	Area Size[1] (acres)	Covertype	Habitat Quality	Potential Chemicals of Concern (Soil or Sediment)[2]	Included in ERA	Exclusion Rationale [3]	Appendix B-1 Drawings
1	Load Line 1 Bomb Production Buildings and Paint Operations Areas	130	Disturbed (5%) Herbaceous Field (90%) Wooded Area-Natural (5%)	fair	**Explosives:** TNB, TNT, 2-Am-DNT, 4-Am-DNT, RDX, Tetryl, HMX **Metals:** Al, Sb, As, Ba, Be, Cd, Co, Pb, Ni, Zn	No	C	B-1-1
2	Load Line 2 Bomb Production Buildings and Paint Operations Areas	130	Disturbed (20%) Herbaceous Field (60%) Wooded Area-Natural (10%) Research Crops - (10%)	fair	**Explosives:** TNB, TNT, 2-Am-DNT, 4-Am-DNT, RDX, Tetryl, HMX **Metals:** Sb, As, Ba, Cd, Co, Pb, Hg, Ni	No	C	B-1-2
3	Load Line 3 Bomb Production Buildings and Paint Operations Areas	130	Disturbed (5%) Herbaceous Field (90%) Wooded Area-Natural (5%)	fair	**Explosives:** TNB, TNT, 2-Am-DNT, 4-Am-DNT, RDX, HMX **Metals:** Sb, Ba, Cd, Co, Pb, Hg, Ni	No	C	B-1-3
4	Load Line 4 Bomb Production Buildings and Paint Operations Areas	130	Disturbed (5%) Herbaceous Field (90%) Wooded Area-Natural (5%)	fair	**Explosives:** TNT, 2-Am-DNT, 4-Am-DNT, RDX, HMX **Metals:** Sb, As, Cd, Pb, Hg, Ni	No	C	B-1-4
5	Raw Products Igloo Storage Areas	1	Disturbed - (65%) Herbaceous Field - (35%)	poor		No	A,B,D	None

TABLE B-1-1
OU3 INVESTIGATION AREA HABITATS
FORMER NEBRASKA ORDNANCE PLANT ERA
MEAD, NEBRASKA

Code I.D.	OU3 Investigation Area	Area Size[1] (acres)	Covertype	Habitat Quality	Potential Chemicals of Concern (Soil or Sediment)[2]	Included in ERA	Exclusion Rationale[3]	Appendix B-1 Drawings
6	Tetryl Pelleting Building	1	Disturbed (100%)	poor		No	A,B,D	None
7	North Burning Ground	4	Herbaceous Field (95%) Wooded Area-Natural (5%)	fair		No	B,D	B-1-5
8	South Burning Ground	4	Cropland (100%)	poor		No	A,D	None
9	Proving Ground	2	Herbaceous Field (100%)	fair		No	B,D	B-1-5
10	Potential Landfill Area North of Proving Grounds	2	Herbaceous Field (100%)	fair	**SVOCs:** benzo(b)fluoranthene, butylbenzylphthalate, chrysene, di-n-butylphthalate, diethylphthalate, phenol, pyrene, bis(2-ethylhexyl)phthalate **Explosives:** TNT, 2-Am-DNT, 4-Am-DNT, HMX	No	B,C	B-1-5

TABLE B-1-1
OU3 INVESTIGATION AREA HABITATS
FORMER NEBRASKA ORDNANCE PLANT ERA
MEAD, NEBRASKA

Code I.D.	OU3 Investigation Area	Area Size(1) (acres)	Covertype	Habitat Quality	Potential Chemicals of Concern (Soil or Sediment)(2)	Included in ERA	Exclusion Rationale (3)	Appendix B-1 Drawings
11	Former NOP Landfill Area	4	Herbaceous Field (90%) Wooded Area-Natural (10%)	fair		No	D	None
12	West PWDA North of Nike Maintenance Area	4	Cropland (80%) Scrub/Shrub (20%)	fair		No	D	None
12	South PWDA North of Nike Maintenance Area	2	Disturbed (100%) Scrub/Shrub (20%)	poor		No	A,B,C	None
12	East PWDA North of Nike Maintenance Area	19	Cropland (100%)	poor		No	A,C	None
13	PWDA Southwest of Bomb Booster Area	2	Cropland (100%)	poor		No	A,B,C	None

TABLE B-1-1
OU3 INVESTIGATION AREA HABITATS
FORMER NEBRASKA ORDNANCE PLANT ERA
MEAD, NEBRASKA

Code I.D.	OU3 Investigation Area	Area Size[1] (acres)	Covertype	Habitat Quality	Potential Chemicals of Concern (Soil or Sediment)[2]	Included in ERA	Exclusion Rationale [3]	Appendix B-1 Drawings
14	Southwest PWDA at Atlas Missile Area	15	Herbaceous Field (100%)	fair		No	C	None
14	Northeast PWDA at Atlas Missile Area	20	Herbaceous Field (90%) Wooded Area-Natural (10%)	fair		No	C	B-1-6
15	PWDA North of Ammonium Nitrate Plant	2	Cropland (100%)	poor		No	A,B,D	None
16	Demolition Ground	6	Open Water (10%) Herbaceous Field (85%) Wooded Area-Natural (5%)	good		No	D	B-1-7
17	Detonation Craters 1 & 2	2	Wetland (5%) Herbaceous Field (95%)	fair		No	B,D	B-1-8

TABLE B-1-1
OU3 INVESTIGATION AREA HABITATS
FORMER NEBRASKA ORDNANCE PLANT ERA
MEAD, NEBRASKA

Code I.D.	OU3 Investigation Area	Area Size(1) (acres)	Covertype	Habitat Quality	Potential Chemicals of Concern (Soil or Sediment)(2)	Included in ERA	Exclusion Rationale (3)	Appendix B-1 Drawings
17	Detonation Craters 3	1	Cropland (100%)	poor		No	A,B,D	B-1-8
17	Detonation Craters 4 & 5	2	Herbaceous Field (100%)	fair		No	B,D	B-1-8
18	Bermed Area Southwest of Load Line 1	2	Scrub/Shrub (20%) Disturbed (80%)	poor		No	A,B,D	None
20	Administrations Area UST	1	Herbaceous Field (100%)	fair		No	B,D	None
21	Atlas Missile Area USTs	1	Launch Operations Bldg. UST- Herbaceous Field (100%) Gate House - Disturbed (concrete) (100%)	poor		No	A,B,D	None

TABLE B-1-1
OU3 INVESTIGATION AREA HABITATS
FORMER NEBRASKA ORDNANCE PLANT ERA
MEAD, NEBRASKA

Code I.D.	OU3 Investigation Area	Area Size(1) (acres)	Covertype	Habitat Quality	Potential Chemicals of Concern (Soil or Sediment)(2)	Included in ERA	Exclusion Rationale (3)	Appendix B-1 Drawings
22	Former Air Force Communications Area USTs	1	Southern UST - Herbaceous Field (100%) Northern UST - Disturbed (gravel) (100%)	poor		No	A,B,D	None
23	Bomb Booster Area UST	1	Herbaceous Field (100%)	fair		No	B,D	None
24	Geophysical Anomaly at Load Line 3	1	Cropland (100%)	poor		No	A,B,D	None
25	Northeast Boundary Area	1	Cropland (100%)	poor		No	A,B,D	B-1-11
	Johnson Creek	140	Riparian - (90%) Herbaceous Field - (5%) Cropland - (5%)	good	**Metals:** Ag	Yes		B-1-9

TABLE B-1-1
OU3 INVESTIGATION AREA HABITATS
FORMER NEBRASKA ORDNANCE PLANT ERA
MEAD, NEBRASKA

Code I.D.	OU3 Investigation Area	Area Size(1) (acres)	Covertype	Habitat Quality	Potential Chemicals of Concern (Soil or Sediment)(2)	Included in ERA	Exclusion Rationale (3)	Appendix B-1 Drawings
	Silver Creek	60	Riparian - (60%) Herbaceous Field - (40%)	good	**SVOC:** p-Cresol **Metals:** Ag, Se	Yes		B-1-9
	Nebraska Resource District Reservoir	80	Open Water-(80%) Cropland - (15%) Herbaceous Field - (5%)	fair		Yes		B-1-9

Notes:

NOP - Nebraska Ordnance Plant

PWDA - Potential Waste Disposal Area

UST - Underground Storage Tank

(1) -Area acreage is approximate

(2) -Chemical names are abbreviated, full names are found in the ERA report;
sediment samples were anaylized for Johnson Creek, Silver Creek, and the NRD Reservoir

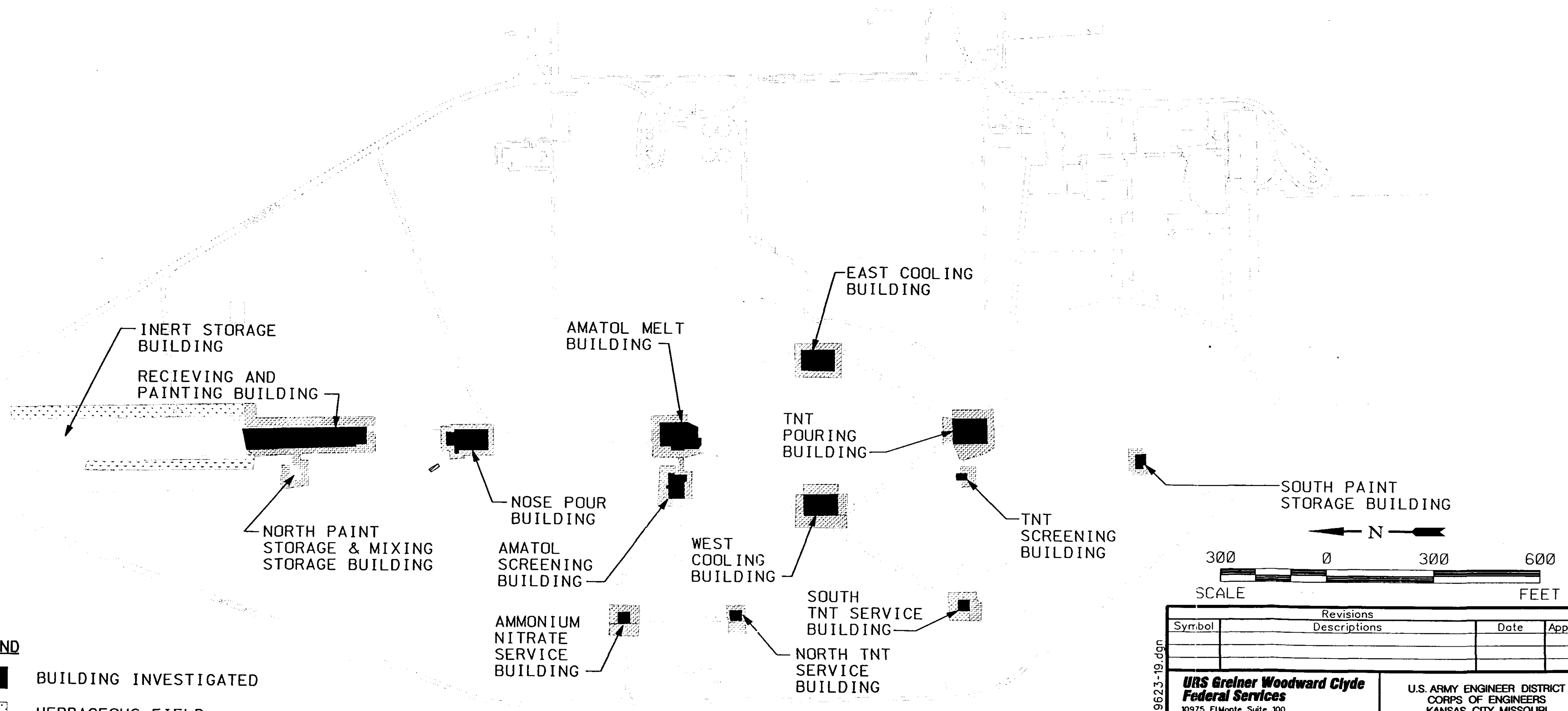
(3) - Reasons for site exclusions in the ERA are listed below

A= Site does not provide significant wildlife habitat

B= Site has limited wildlife habitat available due to size and use

C= Site contamination was not ubiquitous or wide spread and therefore not considered a threat to the environment at either the population or communtiy level

D= no PCOCs were retained for the investigated area



LEGEND

BUILDING INVESTIGATED

HERBACEOUS FIELD

DISTURBED

NOTE:

ALL BUILDINGS, WITH THE EXCEPTION OF THE INERT STORAGE BUILDING, HAVE BEEN DEMOLISHED AT LOAD LINE 1.

SOURCE: DONOHUE, 1992B

Revisions			
Symbol	Descriptions	Date	Apprv'd

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KANSAS CITY, MISSOURI

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Drawn by: R.A.D.
Checked by: L.A.T.
Submitted by: RAN

U.S. Army Corps of Engineers

ECOLOGICAL RISK ASSESSMENT
FOR OPERABLE UNIT 3
FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.

COVERTYPES AT LOAD LINE 1

Scale: 1 IN = 300 FEET
Date: FEB 2000
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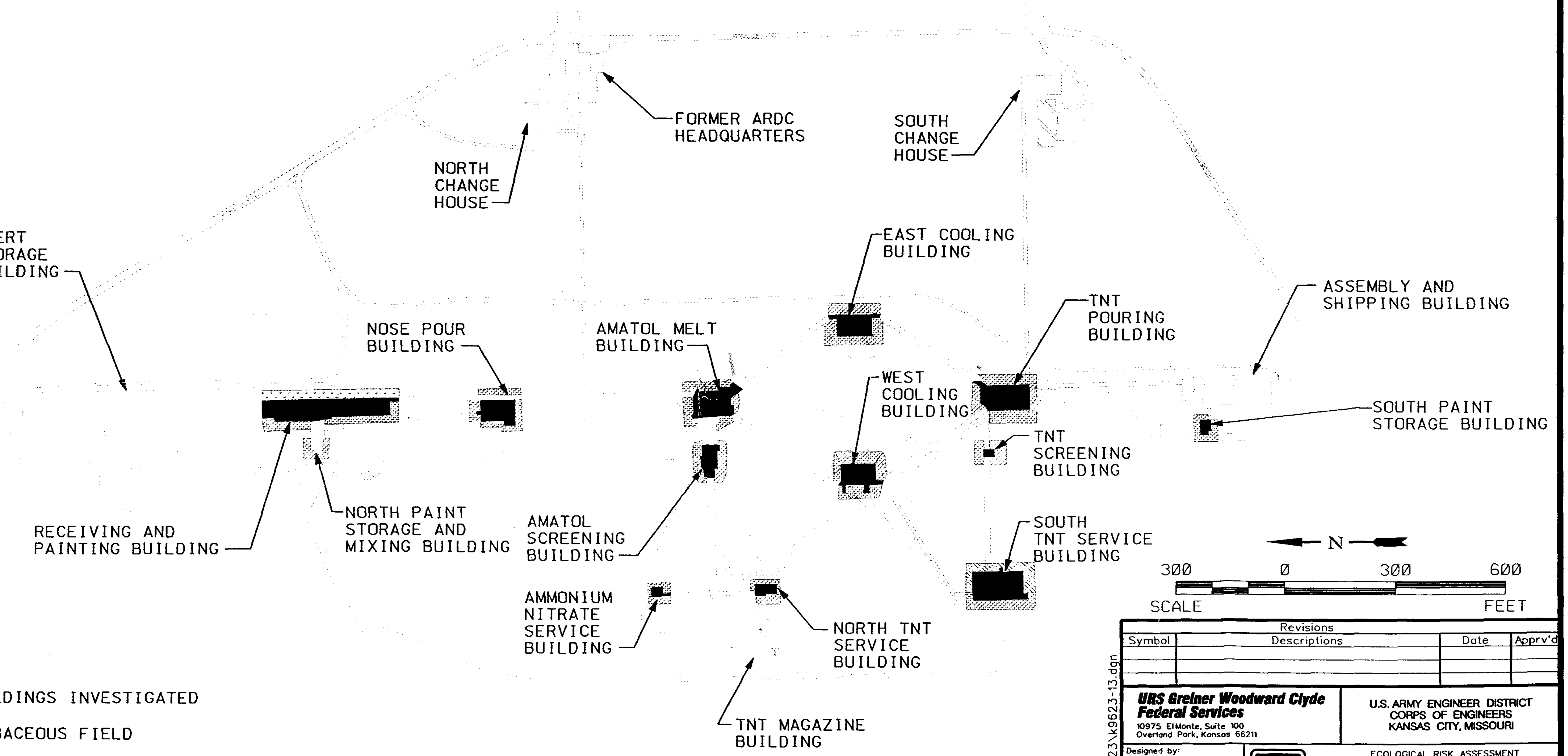

LEGEND

- BUILDINGS INVESTIGATED
- HERBACEOUS FIELD
- RESERCH PLOTS
- DISTURBED

NOTE:

ALL BUILDINGS, WITH THE EXCEPTION OF THE INERT STORAGE, RECEIVING AND PAINTING AND SOUTH TNT SERVICE BUILDING AND THE NORTH AND SOUTH CHANGE HOUSES, HAVE BEEN DEMOLISHED AT LOAD LINE 2.

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ECOLOGICAL RISK ASSESSMENT
FOR OPERABLE UNIT 3
FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.

COVERTYPES AT LOAD LINE 2

Designed by:	S.J.F.
Drawn by:	R.A.D.
Checked by:	L.A.T.
Submitted by:	RAN
Scale:	1 IN = 300 FEET
Date:	FEB 2000
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Sheet number:	1

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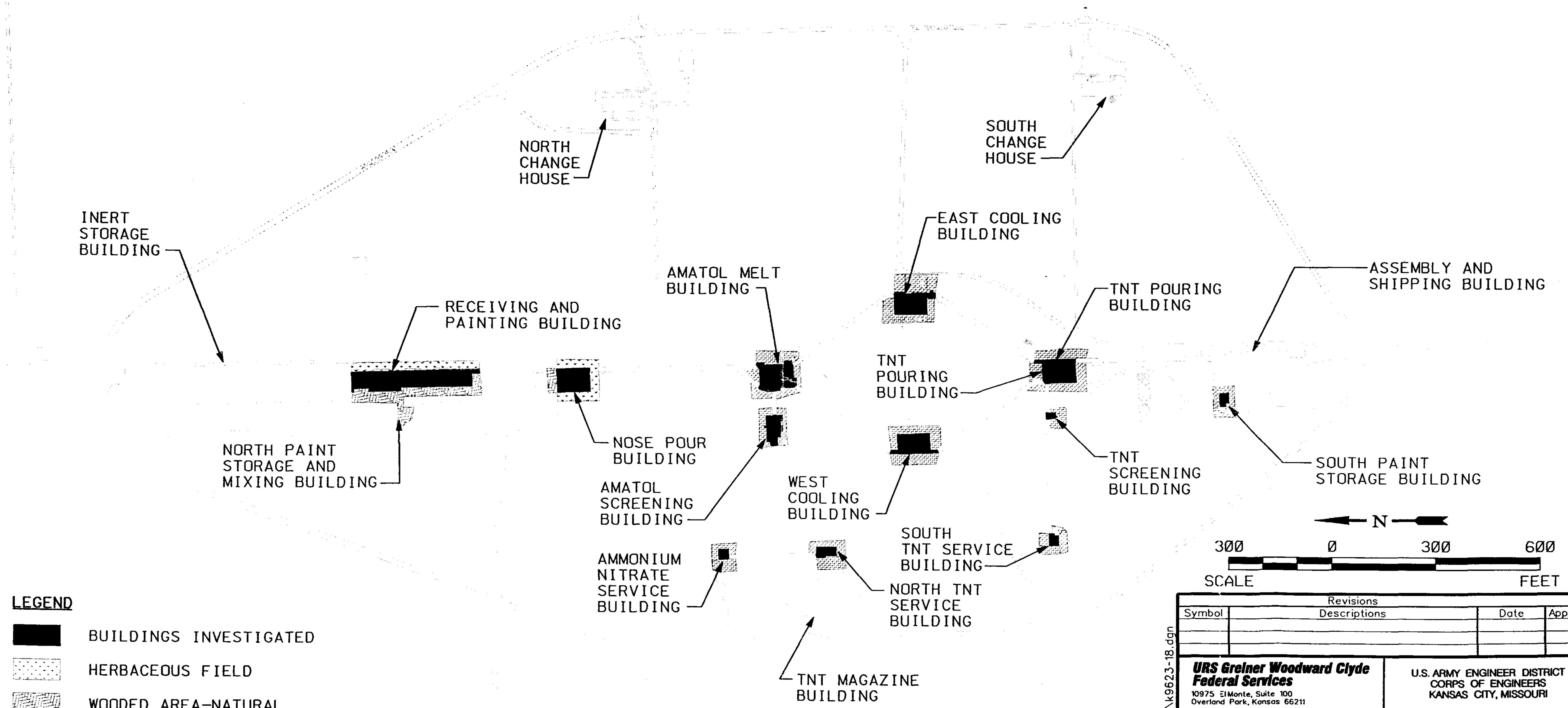

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- BUILDINGS INVESTIGATED
- HERBACEOUS FIELD
- WOODED AREA–NATURAL
- DISTURBED

NOTE:
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U.S. Army Corps of Engineers

ECOLOGICAL RISK ASSESSMENT
FOR OPERABLE UNIT 3
FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.

COVERTYPES AT LOAD LINE 3

Scale: 1 IN = 300 FEET
Date: FEB 2000
Dwg. No.: B-1-3
Sheet number: 1

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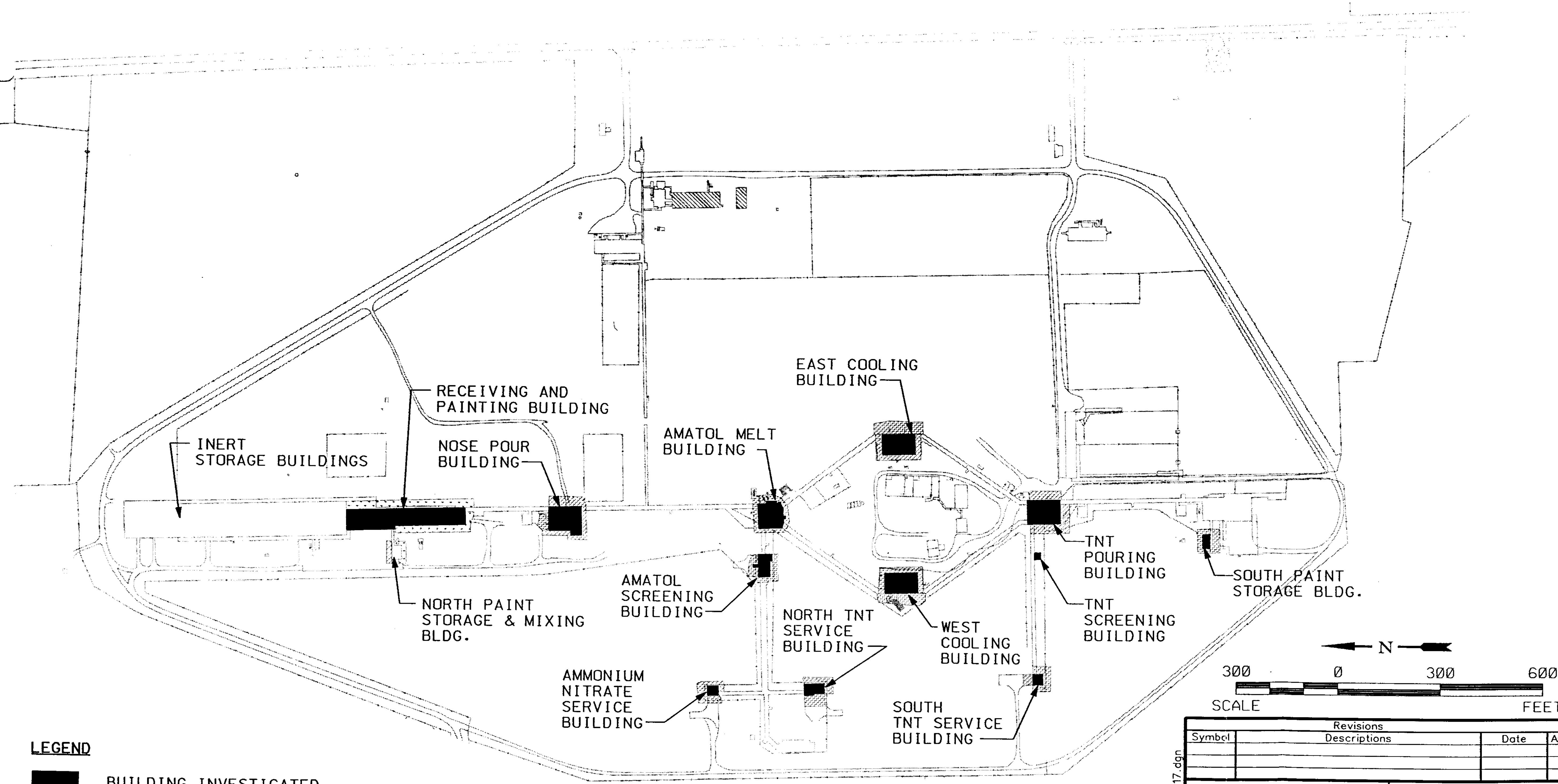

LEGEND

- BUILDING INVESTIGATED
- HERBACEOUS FIELD
- DISTURBED

NOTE:

ALL BUILDINGS, WITH THE EXCEPTION OF THE INERT STORAGE, RECEIVING AND PAINTING BUILDINGS, HAVE BEEN DEMOLISHED AT LOAD LINE 4.

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U.S. Army Corps of Engineers

ECOLOGICAL RISK ASSESSMENT FOR OPERABLE UNIT 3
FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.

COVERTYPES AT LOAD LINE 4

Designed by:	S.J.F.
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Submitted by:	RAN
Scale:	1 IN - 300 FEET
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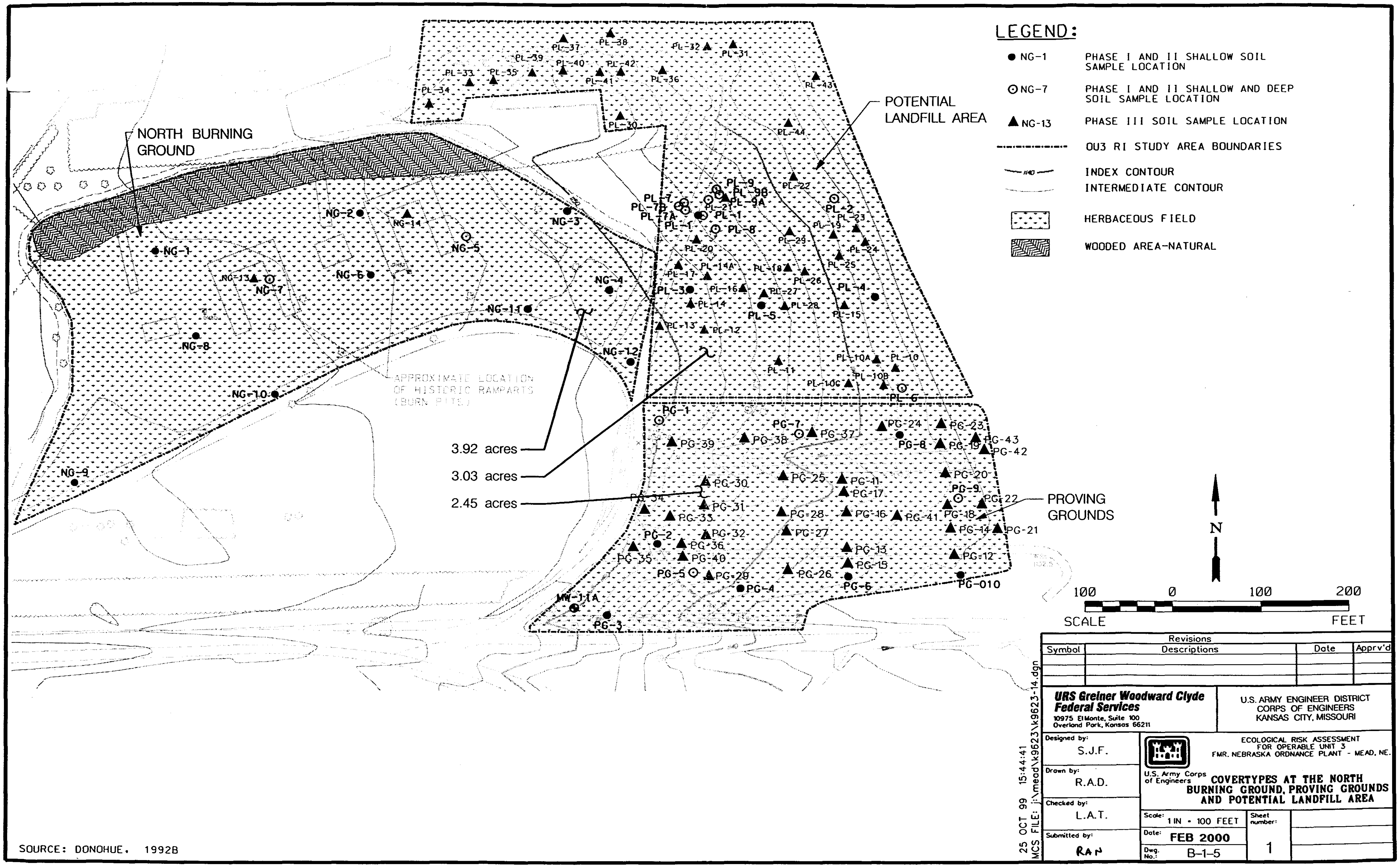
Sheet number:	1



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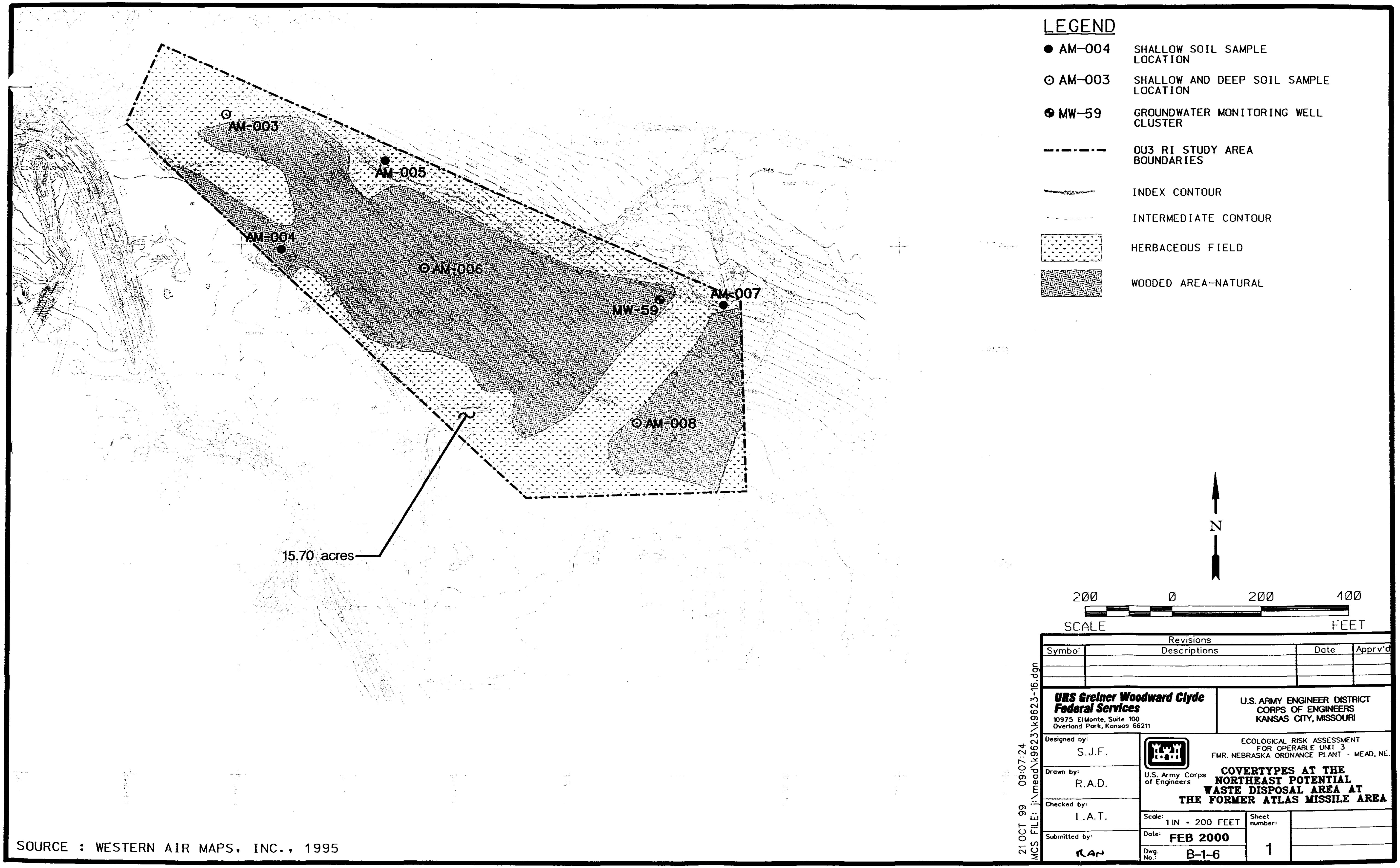
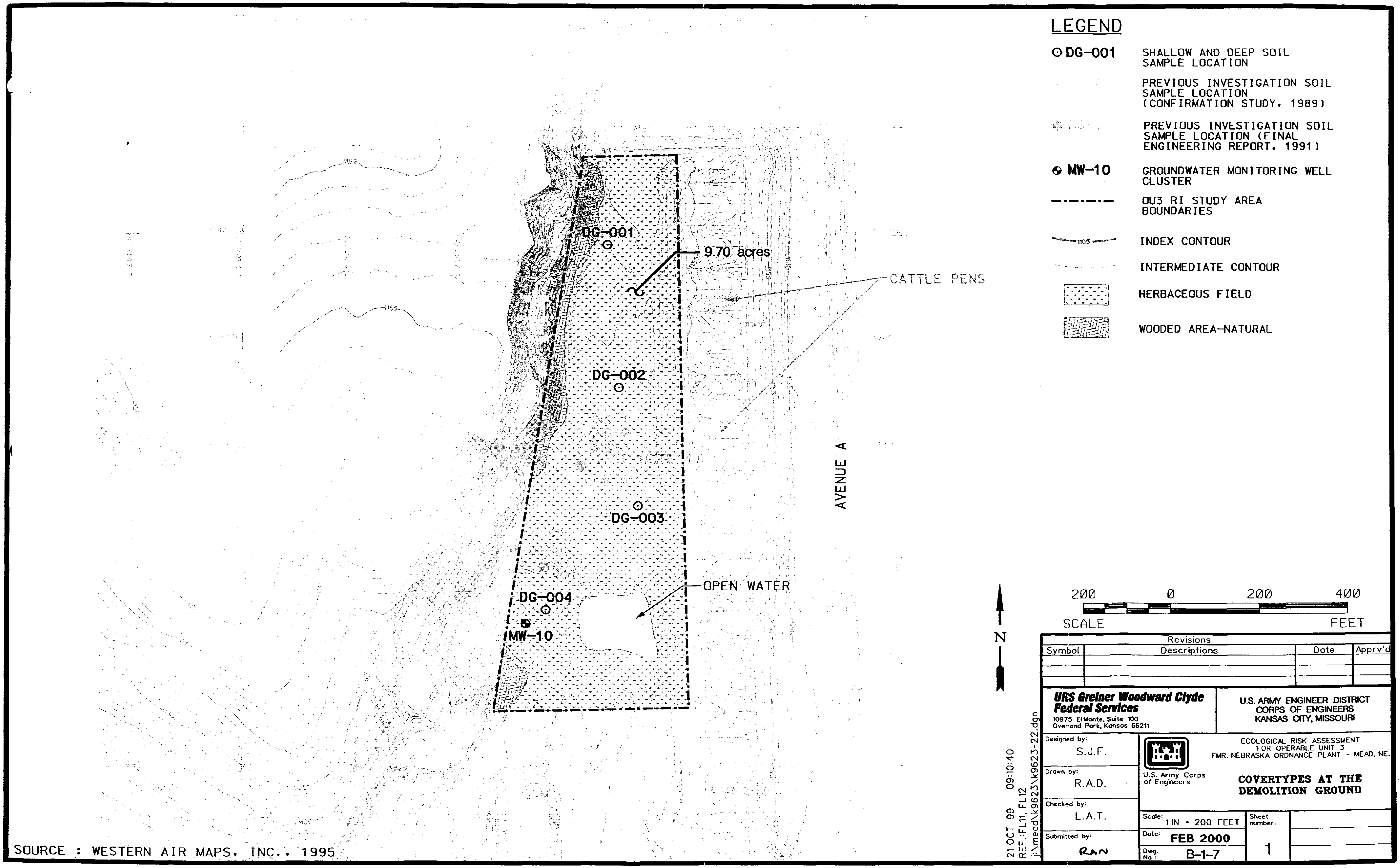
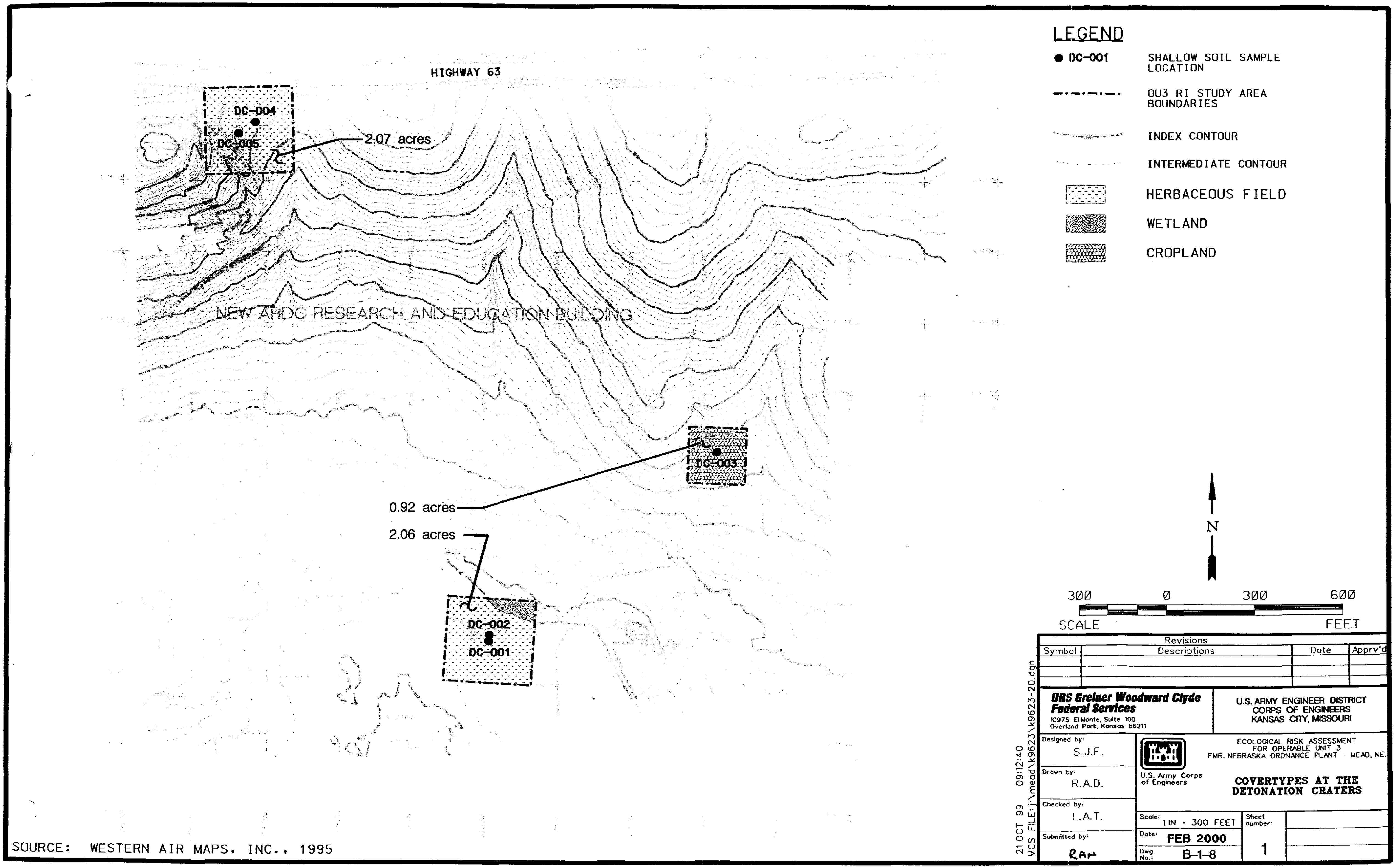

LEGEND
AM-004 SHALLOW SOIL SAMPLE LOCATION
AM-003 SHALLOW AND DEEP SOIL SAMPLE LOCATION
MW-59 GROUNDWATER MONITORING WELL CLUSTER
OU3 RI STUDY AREA BOUNDARIES
INDEX CONTOUR
INTERMEDIATE CONTOUR
HERBACEOUS FIELD
WOODED AREA-NATURAL
AM-003
AM-005
AM-004
AM-006
MW-59
AM-007
AM-008
15.70 acres
N
200 0 200 400
SCALE FEET
SOURCE : WESTERN AIR MAPS, INC., 1995
Revisions
Symbol
Descriptions
Date
Apprv'd
URS Greiner Woodward Clyde Federal Services
10975 El Monte, Suite 100
Overland Park, Kansas 66211
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI
Designed by: S.J.F.
Drawn by: R.A.D.
Checked by: L.A.T.
Submitted by:
U.S. Army Corps of Engineers
ECOLOGICAL RISK ASSESSMENT FOR OPERABLE UNIT 3
FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.
COVERTYPES AT THE NORTHEAST POTENTIAL WASTE DISPOSAL AREA AT THE FORMER ATLAS MISSILE AREA
Scale: 1 IN = 200 FEET
Date: FEB 2000
Dwg. No.: B-1-6
Sheet number: 1
21 OCT 99 09:07:24
MCS FILE: j:\mead\k9623\k9623-16.dgn



B07NE003703-06278



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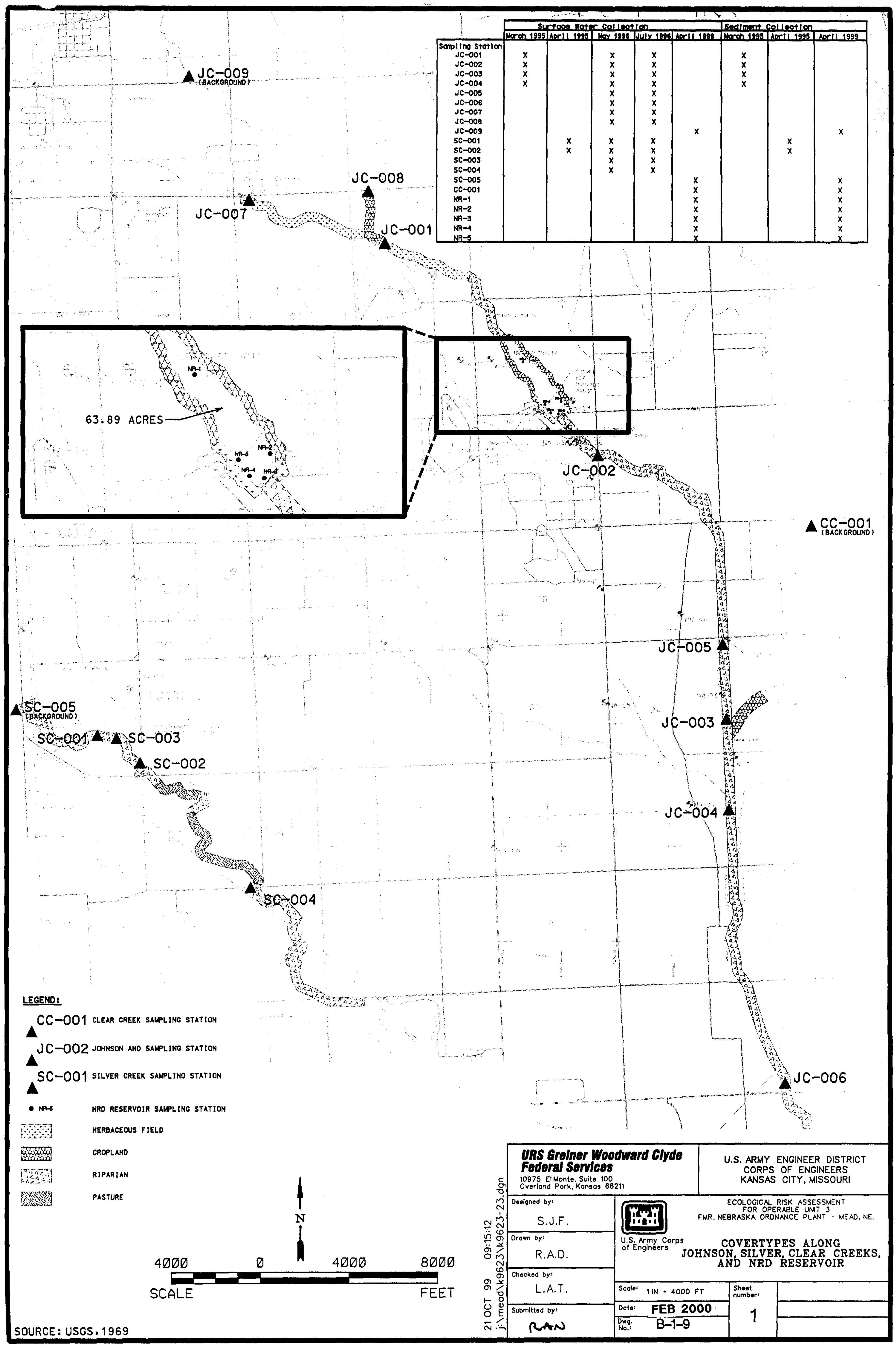


	Surface Water Collection					Sediment Collection		
	March 1995	April 1995	May 1996	July 1996	April 1999	March 1995	April 1995	April 1999
Sampling Station								
JC-001	X		X	X		X		
JC-002	X		X	X		X		
JC-003	X		X	X		X		
JC-004	X		X	X		X		
JC-005			X	X				
JC-006			X	X				
JC-007			X	X				
JC-008			X	X				
JC-009					X			X
SC-001		X	X	X			X	
SC-002		X	X	X			X	
SC-003			X	X				
SC-004			X	X				
SC-005					X			X
CC-001					X			X
NR-1					X			X
NR-2					X			X
NR-3					X			X
NR-4					X			X
NR-5					X			X

URS Greiner Woodward Clyde Federal Services
10975 El Monte, Suite 100
Overland Park, Kansas 66211

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

U.S. Army Corps of Engineers

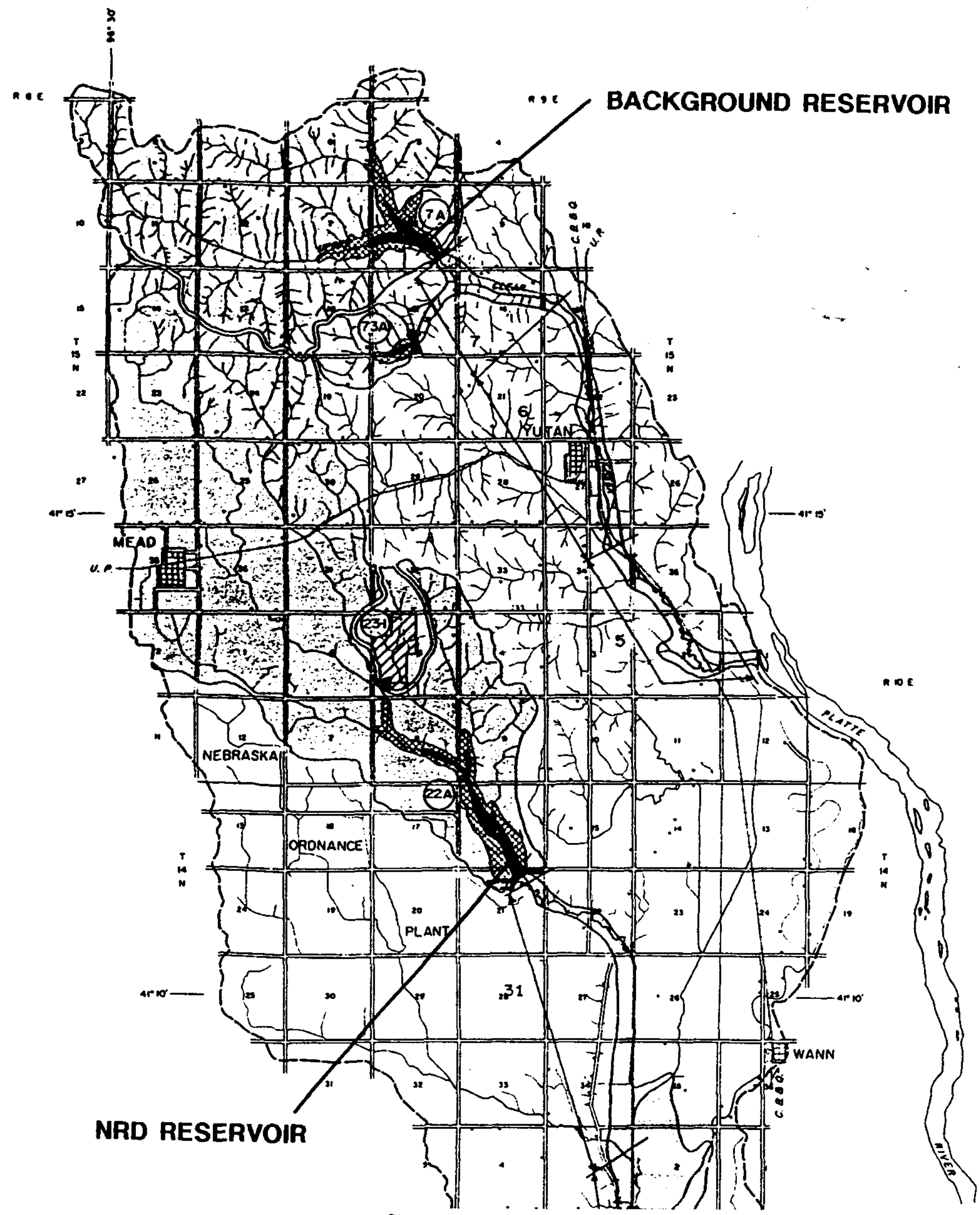
ECOLOGICAL RISK ASSESSMENT
FOR OPERABLE UNIT 3
FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.

COVERTYPES ALONG
JOHNSON, SILVER, CLEAR CREEKS,
AND NRD RESERVOIR

21 OCT 99 09:15:12
j:\mead\k9623\k9623-23.dgn

Designed by: S.J.F.			
Drawn by: R.A.D.			
Checked by: L.A.T.	Scale: 1IN = 4000 FT	Sheet number: 1	
Submitted by: RAN	Date: FEB 2000		
	Dwg. No.: B-1-9		

B07NE003703-06280



14 OCT 99 13:33:30
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Revisions			
Symbol	Descriptions	Date	Apprv'd

URS Greiner Woodward Clyde Federal Services
10975 El Monte, Suite 100
Overland Park, Kansas 66211

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

U.S. Army Corps of Engineers

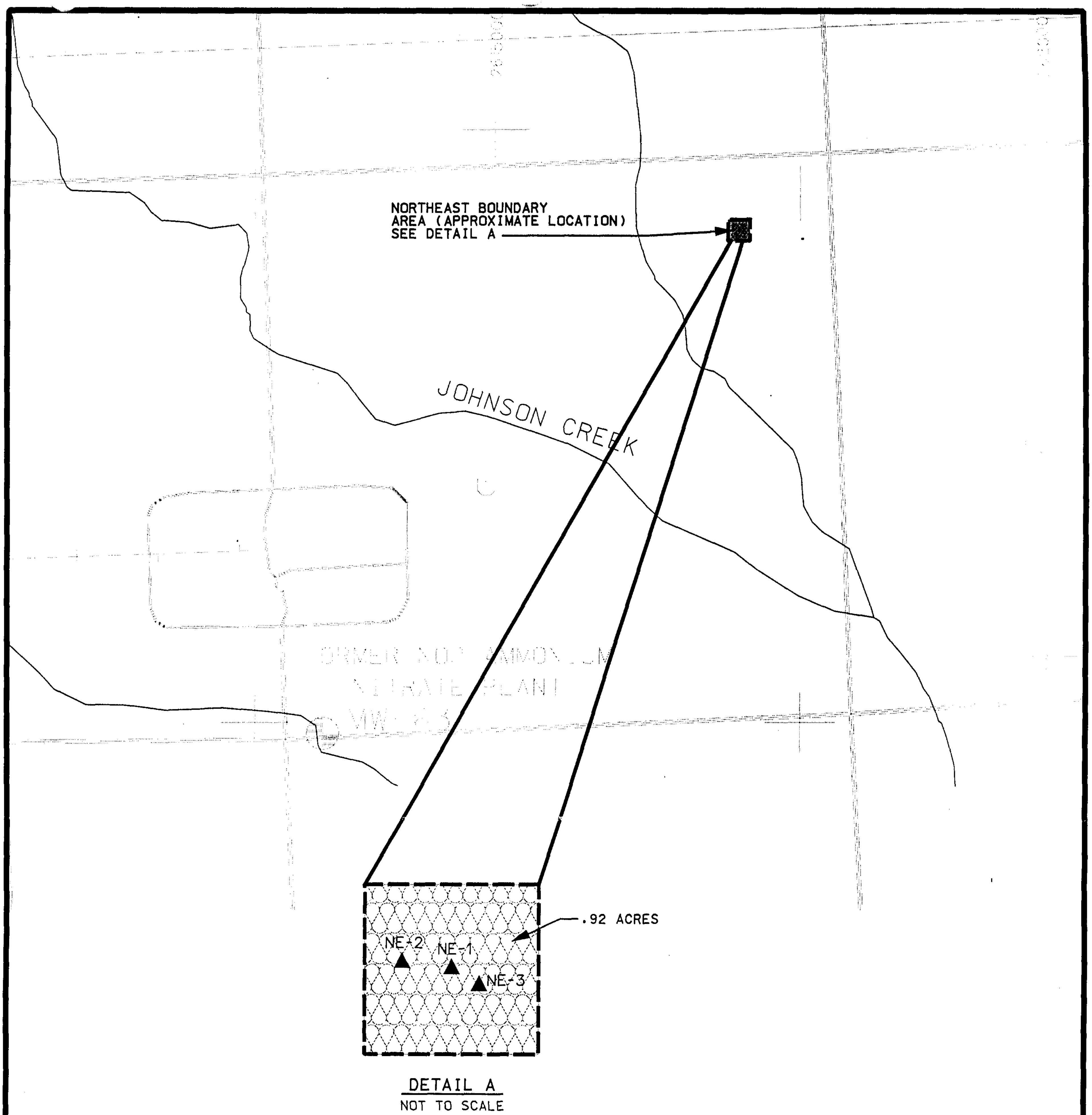
ECOLOGICAL RISK ASSESSMENT
FOR OPERABLE UNIT 3
FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.

LOCATION OF NRD AND BACKGROUND RESERVOIRS

Designed by: L.A.T.
Drawn by: R.A.D.
Checked by: L.A.T.
Submitted by: RAN

Scale: 1 INCH - 1 MILE
Date: FEB 2000
Dwg. No.: B-1-10
Sheet number: 1

B07NE003703-06281

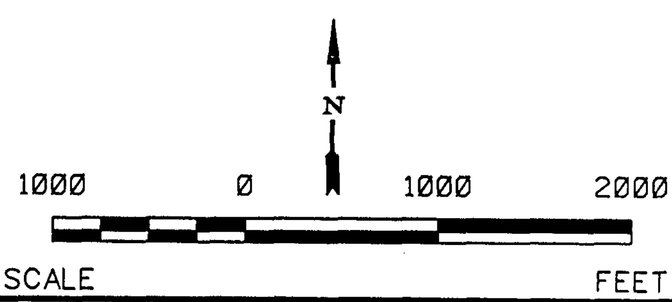


LEGEND:

▲ NE-2 PHASE III SOIL SAMPLING LOCATION

APPROXIMATE BOUNDARY OF NORTHEAST BOUNDARY AREA

CROPLAND



NOTES:

1. SOIL SAMPLES ANALYZED FOR EXPOSURE, METALS, VOCs AND SVOCs.

SOURCE: USGS, 1969

URS Greiner Woodward Clyde Federal Services 10975 El Monte, Suite 100 Overland Park, Kansas 66211	U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI	
Designed by: R.A.N.	ECOLOGICAL RISK ASSESSMENT FOR OPERABLE UNIT 3 FMR. NEBRASKA ORDNANCE PLANT - MEAD, NE.	
Drawn by: T.R.F.	U.S. Army Corps of Engineers COVERTYPES AT THE NORTHEAST BOUNDARY AREA	
Checked by: L.A.T.	Scale: AS NOTED	Sheet number: 1
Submitted by: RAN	Date: FEB 2000 Dwg. No.: B-1-11	

21 OCT 99 09:16:21
MCS FILE: j:\mead\k9623\k9623-26.dgn

B07NE003703-06282

APPENDIX B-2

ENDANGERED AND THREATENED SPECIES IN SAUNDERS COUNTY

Nebraska Game and Parks Commission
2200 N. 33rd St. / P.O. Box 30370 / Lincoln, NE 68503-0370 (402) 471-0641

November 26, 1991

Mike Kangas, Environmental Scientist
Life Systems, Inc.
24755 Highpoint Road
Cleveland, OH 44122

Dear Mr. Kangas,

I'm writing in response to your request for data regarding the rare, threatened, and endangered species and natural communties of Saunders County, Nebraska. I've searched the Nebraska Natural Heritage Database for elements species and natural community occurrences in Saunders County. Element species are those species considered rare in Nebraska by the staff of the Natural Heritage Database. Element species include all Federally and State endangered and threatened species. The enclosed printout of element occurrences in Saunders County includes scientific name (or community name), common name, township/range and section of the occurrence, date the element was last observed at the site, Federal status, and State status.

On the enclosed printout, several species are listed multiple times. This is because the species had multiple occurrences within the County and each listing is a separate occurrence. If two counties are listed for an occurrence, this means that the particular occurrence was in both counties. The majority of these are for terns and plover occurrence for the Platte River which is the dividing line between adjacent counties. Under Federal status: LE = listed endangered, LT = listed threatened, C2 = Candidate species, 3C = former candidate species. Under State status: SEN = listed endangered, STH = listed threatened, SNC = in need of conservation.

This response applies to only <u>known</u> occurrences of State and Federally endangered and threatened species, rare species and natural communities which are contained within our files. A lack of records does not mean a sensitive species does not occur at a site, but merely that the Heritage Database does not contain information for that species at that particular site. The information provided <u>should not be</u> substituted for on-site surveys that may be necessary.

The Nebraska Natural Heritage Database is continually being updated with new records. If this project is still underway in one year we recommend that you update this request.

In regard to your request for publications on animals and plant communities of Saunders County, the only publication I was able to locate is the enclosed article by Gersib and Steinauer.

If you have any questions regarding this response I can reached at (402) 471-5469.

Sincerely,

Gerry Steinauer

Gerry Steinauer
Community Ecologist/Data Manager

enclosure

SAUNDERS COUNTY ⁻NTS FROM NEBRASKA HERITAGE DATABASE

COUNTY	SCIEN. AME	COMMON NAME	T/ʀ	SEC	LAST-OBS	FED STAT	STA STAT
~~Dodge~~			~~017N007E~~	~~13~~	~~1987-07-09~~		
~~Saunders~~							
Saunders	ACCIPITER COOPERII	COOPER'S HAWK	017N007E	21	1978-		
Saunders	BUR OAK WOODLAND	WELL DRAINED WOODLAND/SAVANNA, MIDW	014N005E	20	1990-07-12		
Saunders	CAPRIMULGUS CAROLINENSIS	CHUCK-WILL'S-WIDOW	017N005E	29	1983-		
Saunders	CHARADRIUS MELODUS	PIPING PLOVER	013N010E	06	1990-06-13	LELT	STH
Saunders	CHARADRIUS MELODUS	PIPING PLOVER	013N010E	07	1989-06-20	LELT	STH
Saunders	CHARADRIUS MELODUS	PIPING PLOVER	013N010E	18	1987-06-02	LELT	STH
Saunders	CHARADRIUS MELODUS	PIPING PLOVER	013N010E	18	1989-06-20	LELT	STH
Sarpy							
Saunders	CHARADRIUS MELODUS	PIPING PLOVER	013N010E	19	1990-06-13	LELT	STH
Sarpy							
Sarpy	CHARADRIUS MELODUS	PIPING PLOVER	013N010E	32	1990-06-13	LELT	STH
Saunders							
Cass							
Saunders	CHARADRIUS MELODUS	PIPING PLOVER	014N010E	17	1990-06-13	LELT	STH
Sarpy							
Saunders	CHARADRIUS MELODUS	PIPING PLOVER	014N010E	32	1989-06-13	LELT	STH
Sarpy							
Douglas	CHARADRIUS MELODUS	PIPING PLOVER	015N009E	11	1990-06-13	LELT	STH
Saunders							
Douglas	CHARADRIUS MELODUS	PIPING PLOVER	015N009E	12	1990-06-13	LELT	STH
Saunders							
Douglas	CHARADRIUS MELODUS	PIPING PLOVER	016N009E	06	1989-06-13	LELT	STH
Saunders							
Dodge	CHARADRIUS MELODUS	PIPING PLOVER	017N005E	08	1990-06-12	LELT	STH
Saunders							
Saunders	CHARADRIUS MELODUS	PIPING PLOVER	017N005E	13	1989-06-12	LELT	STH
Dodge							
Dodge	CHARADRIUS MELODUS	PIPING PLOVER	017N006E	16	1989-06-12	LELT	STH
Saunders							
Saunders	CHARADRIUS MELODUS	PIPING PLOVER	017N006E	21	1988-06-15	LELT	STH
Dodge							
Saunders	CHARADRIUS MELODUS	PIPING PLOVER	017N007E	19	1989-06-12	LELT	STH
Dodge							
Saunders	CHARADRIUS MELODUS	PIPING PLOVER	017N007E	20	1988-06-16	LELT	STH
Dodge	CHARADRIUS MELODUS	PIPING PLOVER	017N008E	35	1987-08-07	LELT	STH
Saunders							
Saunders	CISTOTHORUS PLATENSIS	SEDGE WREN	013N007E	33	1991-08-08		

ıUNDERS COUNTY ELEMENTS FROM NEBRASKA HERITAGE DATABASE

ꓘUNTY	SCIENTIFIC NAME	COMMON NAME	T/R	SEC	LAST-OBS	FED STAT	STA STAT
ıunders	CISTOTHORUS PLATENSIS	SEDGE WREN	013N007E	36	1991-08-08		
ıncaster							
ıunders	CULAEA INCONSTANS	BROOK STICKLEBACK	013N009E	11	1977-10		
ıunders	CULAEA INCONSTANS	BROOK STICKLEBACK	014N009E	12	1977-10-02		
ıunders	CULAEA INCONSTANS	BROOK STICKLEBACK	014N009E	35	1972		
ıunders	CYPRIPEDIUM CANDIDUM	SMALL WHITE LADY'S-SLIPPER	017N007E	21	1934-05-14	3C	
ıunders	EASTERN SALINE MARSH	SALINE MARSH, MIDWEST TYPE	012N007E	01	1989-07-01		
ıunders	EASTERN SALINE MARSH	SALINE MARSH, MIDWEST TYPE	013N007E	25	1989-09-25		
ıunders	EASTERN SALINE MARSH	SALINE MARSH, MIDWEST TYPE	013N007E	36	1989-09-25		
ıunders	ERYTHRONIUM MESOCHOREUM	MIDLAND FAWNLILY	013N005E	19	1991-05-23		
ıunders	ETHEOSTOMA NIGRUM	JOHHNY DARTER	016N009E	20	1979-11-18		
ıunders	ETHEOSTOMA NIGRUM	JOHHNY DARTER	016N009E	29	1972		
ıunders	ETHEOSTOMA SPECTABILE	ORANGETHROAT DARTER	014N007E	08	1972		
ıunders	FUNDULUS SCIADICUS	PLAINS TOPMINNOW	014N009E	13	1985-07-30		
ıunders	FUNDULUS SCIADICUS	PLAINS TOPMINNOW	014N009E	23	1985-05-05		
ıunders	FUNDULUS SCIADICUS	PLAINS TOPMINNOW	015N009E	26	1972		
ıunders	FUNDULUS SCIADICUS	PLAINS TOPMINNOW	016N009E	20	1985-05-03		
ıunders	NORTHEASTERN UPLAND FOREST	RICH FOREST, LOWER MIDWEST TYPE	017N007E	22	1988-		
ıunders	REGINA GRAHAMII	GRAHAM'S CRAYFISH SNAKE	013N009E	17	1947-05-13		
ıunders	SPILOGALE PUTORIUS	SPOTTED SKUNK	013N005E	21	1982-06-20		SNC
ıunders	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	013N010E	07	1988-06-09	LE	SEN
ıunders	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	013N010E	18	1990-06-13	LE	SEN
ıunders	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	013N010E	18	1989-06-20	LE	SEN
ırpy							
ıunders	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	013N010E	19	1990-06-13	LE	SEN
ırpy							
ırpy	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	013N010E	32	1990-06-13	LE	SEN
ıunders							
ıss							
ıunders	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	014N010E	17	1990-06-17	LE	SEN
ırpy							
ırpy	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	014N010E	20	1989-06-13	LE	SEN
ıunders							
ıunders	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	014N010E	32	1988-06-17	LE	SEN
ırpy							
ɔuglas	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	015N009E	11	1990-06-13	LE	SEN
ıunders							
ɔuglas	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	015N009E	12	1990-06-13	LE	SEN
ıunders							

SAUNDERS COUNT 'ENTS FROM NEBRASKA HERITAGE DATABASE

COUNTY	SCIEN. _ NAME	COMMON NAME	T/R	SEC	LAST-OBS	FED STAT	STA STAT
Dodge Saunders	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	016N009E	06	1990-:6-12	LE	SEN
Douglas Saunders	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	016N009E	27	1990-06-12	LE	SEN
Dodge Saunders	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	017N005E	08	1990-06-12	LE	SEN
Saunders Dodge	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	017N005E	13	1989-06-12	LE	SEN
Dodge Saunders	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	017N006E	08	1987-07-15	LE	SEN
Dodge Saunders	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	017N006E	16	1990-06-12	LE	SEN
Saunders	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	017N006E	18	1990-06-12	LE	SEN
Saunders Dodge	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	017N006E	21	1988-06-15	LE	SEN
Saunders Dodge	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	017N007E	19	1989-06-12	LE	SEN
Saunders	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	017N007E	20	1988-06-16	LE	SEN
Dodge Saunders	STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	017N008E	35	1990-06-12	LE	SEN
Saunders	STRIX VARIA	BARRED OWL	013N005E	05	1986-04-19		
Saunders	TALLGRASS PRAIRIE	TALLGRASS PRAIRIE, GLACIATED LOWER	013N005E	19	1991-05-23		
Saunders	VIBURNUM LENTAGO		012N010E	06	1889-06		
Saunders	WET-MESIC PRAIRIE	TALLGRASS PRAIRIE, GLACIATED LOWER	015N009E	13	1990-09-10		
Saunders	WET-MESIC PRAIRIE	TALLGRASS PRAIRIE, GLACIATED LOWER	015N009E	24	1988-SPRI		

68 Records Processed

LETTER FROM DAYLAN FIGGS

APPENDIX B-3 NEBRASKA GAME AND PARKS COMMISSION - April 16, 1966

08/2MAY 29 '96 14:50 NEBRASKA DEQ 402+471-2909

Nebraska Game and Parks Commission
2200 N. 33rd St. / P.O. Box 30370 / Lincoln, NE 68503-0370
Phone: 402-471-0641 / Fax: 402-471-5528

FILE COPY
PROJECT NO. ______
FILE NO. ______

April 16, 1996

Kate J. Kachel
Environmental Coordinator
2101 Woolworth Ave.
U.S. Army Reserve Ctr
Omaha, NE 68108

Dear Ms Kachel:

This letter is in response to your request for information on threatened and endangered species potentially affected by the proposed ground water remediation project. I conducted a partial site visit on April 16, 1996 to determine potential impacts on threatened or endangered species. As proposed the project will not effect bald eagles or river otters in the area. However, the potential does exist for impacts to the American burying beetle (*Nicrophorus americanus*) and western prairie fringed orchid (*Platanthera praeclara*).

The American burying beetle recently has been collected in northern Saunders and southern Dodge Counties. Therefore, known populations can be found in the near vicinity. Potential habitat can be found in short segments along Hiway 63. Also, the portion of the project area not accessible by road (southern and eastern boundary of Section 34) may meet this species habitat requirements. Please survey appropriate areas using the pitfall trapping method discussed in the enclosed survey protocol. Please note one change in the suggested survey methodology. Originally, 3 consecutive nights of pit fall trapping was thought to be a sufficient sample in the area. However, new evidence suggests at least 5 nights of consecutive trapping is needed. Also enclosed is information on the American burying beetle's habitat use and life history in Nebraska. If you have any questions regarding sampling techniques, please contact Mike Fritz, (402) 471-5419.

The western prairie fringed orchid is found in close association with tall grass wet meadows to mesic tall grass prairies. Typical habitats are moderate to high quality prairies that have not been subject to large scale disturbance such as plowing, extreme overgrazing, or heavy herbicide use. Potential habitats may have a history of light disturbance such as haying and/or grazing. This species is also known to occur in highway and railroad right-of-ways. This species initiates growth in late spring with flowering occurring in late June to early July. The orchid requires sites with high soil moisture profiles and any action that would cause site contamination or drying of the site such as ditching, draining, or reduction in ground water will have a detrimental impact on the species. Potential habitat may be located in the portion of the project area not accessible by road (southern and eastern boundary of Section 34). All appropriate habitat to be disturbed by the construction activity should be surveyed. Indirect impacts through alterations of

APPENDIX G:	LETTER FROM FIGGS, ENDANGERED SPECIES BIOLOGIST
PROJECT NAME:	PROPOSED LAND TRANSFER FROM U.S. ARMY RESERVE TO U.S. ARMY CORPS OF ENGINEERS AT MEAD, NEBRASKA

the hydrologic regime should be considered when determining areas to be surveyed. Also enclosed is information on the western prairie fringed orchid's habitat use and life history in Nebraska. If you have any questions regarding survey techniques for the western prairie fringed orchid, please contact Gerry Steinauer (402) 471-5469.

If you have any additional questions, please contact me at (402) 471-5444.

Sincerely,

Daylan Figgs

Daylan Figgs
Endangered Species Biologist

VOLUME II OF II
DRAFT FINAL REPORT

REVISED BASELINE RISK ASSESSMENT FOR OPERABLE UNIT NO. 3 FORMER NEBRASKA ORDNANCE PLANT MEAD, NEBRASKA CONTRACT NO. DACA41-96-D-8014 TASK ORDER NO. 0016

Prepared for:

Department of the Army
U.S. Army Engineers District
Kansas City District
Corps of Engineers
Kansas City, Missouri

February 2000

URS Greiner Woodward Clyde Federal Services

URS Greiner Woodward Clyde Federal Services
10975 El Monte, Suite 100
Overland Park, Kansas 66211
(913) 344-1000
Project 49F0K98216.00

Appendix C

APPENDIX C TABLE OF CONTENTS

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TABLE C-1-1

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)$^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.68E-01	50	250	25	1.00E-06	70	9125	25550	1.31E-07	5.00E-05	2.62E-03	4.68E-08		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	50	250	25	1.00E-06	70	9125	25550	4.16E-07	5.00E-04	8.33E-04	1.49E-07	3.00E-02	4.46E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.28E-01	50	250	25	1.00E-06	70	9125	25550	2.10E-07	3.00E-03	6.99E-05	7.49E-08	1.10E-01	8.23E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	4.60E-01	50	250	25	1.00E-06	70	9125	25550	2.25E-07			8.04E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.69E-01	50	250	25	1.00E-06	70	9125	25550	1.32E-07	5.00E-02	2.64E-06	4.71E-08		
Aluminum	1.67E+04	50	250	25	1.00E-06	70	9125	25550	8.17E-03	1.00E+00	8.17E-03	2.92E-03		
Antimony	8.80E-01	50	250	25	1.00E-06	70	9125	25550	4.31E-07	4.00E-04	1.08E-03	1.54E-07		
Arsenic	8.52E+00	50	250	25	1.00E-06	70	9125	25550	4.17E-06	3.00E-04	1.39E-02	1.49E-06	1.50E+00	2.23E-06
Barium	2.81E+02	50	250	25	1.00E-06	70	9125	25550	1.38E-04	7.00E-02	1.96E-03	4.91E-05		
Beryllium	7.82E-01	50	250	25	1.00E-06	70	9125	25550	3.82E-07	5.00E-03	7.65E-05	1.37E-07	4.30E+00	5.87E-07
Cadmium	8.00E-01	50	250	25	1.00E-06	70	9125	25550	3.92E-07	1.00E-03	3.92E-04	1.40E-07		
Cobalt	1.07E+01	50	250	25	1.00E-06	70	9125	25550	5.21E-06	6.00E-02	8.69E-05	1.86E-06		
Nickel	2.48E+01	50	250	25	1.00E-06	70	9125	25550	1.21E-05	2.00E-02	6.05E-04	4.32E-06		
Vanadium	3.73E+01	50	250	25	1.00E-06	70	9125	25550	1.83E-05	7.00E-03	2.61E-03	6.52E-06		
										TOTAL HAZARD INDEX =	3.24E-02		TOTAL CANCER RISK =	2.83E-06

TABLE C-1-2

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: *CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)*
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: *CDI = Chronic Daily Intake*
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.53E-01	10	250	10	1.00E-06	70	3650	25550	2.48E-08	5.00E-05	4.95E-04	3.54E-09		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	10	250	10	1.00E-06	70	3650	25550	8.33E-08	5.00E-04	1.67E-04	1.19E-08	3.00E-02	3.57E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.08E-01	10	250	10	1.00E-06	70	3650	25550	3.99E-08	3.00E-03	1.33E-05	5.70E-09	1.10E-01	6.27E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.31E-01	10	250	10	1.00E-06	70	3650	25550	3.24E-08			4.63E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.42E-01	10	250	10	1.00E-06	70	3650	25550	2.36E-08	5.00E-02	4.73E-07	3.38E-09		
Aluminum	1.59E+04	10	250	10	1.00E-06	70	3650	25550	1.56E-03	1.00E+00	1.56E-03	2.22E-04		
Antimony	8.80E-01	10	250	10	1.00E-06	70	3650	25550	8.61E-08	4.00E-04	2.15E-04	1.23E-08		
Arsenic	8.23E+00	10	250	10	1.00E-06	70	3650	25550	8.05E-07	3.00E-04	2.68E-03	1.15E-07	1.50E+00	1.72E-07
Barium	2.81E+02	10	250	10	1.00E-06	70	3650	25550	2.75E-05	7.00E-02	3.93E-04	3.93E-06		
Beryllium	7.57E-01	10	250	10	1.00E-06	70	3650	25550	7.40E-08	5.00E-03	1.48E-05	1.06E-08	4.30E+00	4.55E-08
Cadmium	7.64E-01	10	250	10	1.00E-06	70	3650	25550	7.48E-08	1.00E-03	7.48E-05	1.07E-08		
Cobalt	1.04E+01	10	250	10	1.00E-06	70	3650	25550	1.01E-06	6.00E-02	1.69E-05	1.45E-07		
Nickel	2.39E+01	10	250	10	1.00E-06	70	3650	25550	2.34E-06	2.00E-02	1.17E-04	3.34E-07		
Vanadium	3.57E+01	10	250	10	1.00E-06	70	3650	25550	3.50E-06	7.00E-03	5.00E-04	5.00E-07		
										TOTAL HAZARD INDEX =	6.25E-03		TOTAL CANCER RISK =	2.19E-07

TABLE C-1-3

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.68E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	1.37E-06	5.00E-05	9.79E-03	4.89E-07		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	4.36E-06	5.00E-04	8.71E-03	1.56E-06	3.00E-02	4.67E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.28E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	2.19E-06	3.00E-03	7.31E-04	7.83E-07	1.10E-01	8.61E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	4.60E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	2.35E-06			8.41E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.69E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	1.38E-06	5.00E-02	2.76E-05	4.92E-07		
Aluminum	1.67E+04	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	8.55E-03	1.00E+00	8.55E-03	3.05E-03		
Antimony	8.80E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	4.50E-07	4.00E-04	1.13E-03	1.61E-07		
Arsenic	8.52E+00	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	4.36E-06	3.00E-04	1.45E-02	1.56E-06	1.50E+00	2.34E-06
Barium	2.81E+02	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.44E-04	7.00E-02	2.05E-03	5.14E-05		
Beryllium	7.82E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	4.00E-07	5.00E-03	8.00E-05	1.43E-07	4.30E+00	6.14E-07
Cadmium	8.00E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	4.10E-07	1.00E-03	4.10E-04	1.46E-07		
Cobalt	1.07E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	5.45E-06	6.00E-02	9.09E-05	1.95E-06		
Nickel	2.48E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.27E-05	2.00E-02	6.33E-04	4.52E-06		
Vanadium	3.73E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.91E-05	7.00E-03	2.73E-03	6.82E-06		

TOTAL HAZARD INDEX = 4.95E-02 TOTAL CANCER RISK = 3.08E-06

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TABLE C-1-4

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals *of Concern*	**Average CS (mg/kg)**	**SA (cm^2)**	**AD (mg/cm^2)**	**AB (unitless)**	**EF (dy/yr)**	**ED (yr)**	**CF (kg/mg)**	**BW (kg)**	**AT1 (dy/yr)**	**AT2 (yr)**	**Non-Carcinogenic CDI (mg/kg-dy)**	**RfD (mg/kg-dy)**	**HAZARD QUOTIENT (unitless)**	**Carcinogenic CDI (mg/kg-dy)**	**SF ($(mg/kg\text{-}day)^{-1}$)**	**CANCER RISK (unitless)**
1,3,5-Trinitrobenzene	2.53E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	1.00E-07	5.00E-05	2.00E-03	1.43E-08		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	3.36E-07	5.00E-04	6.73E-04	4.81E-08	3.00E-02	1.44E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.08E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	1.61E-07	3.00E-03	5.37E-05	2.30E-08	1.10E-01	2.53E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.31E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	1.31E-07			1.87E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.42E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	9.55E-08	5.00E-02	1.91E-06	1.36E-08		
Aluminum	1.59E+04	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	6.29E-04	1.00E+00	6.29E-04	8.99E-05		
Antimony	8.80E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	3.48E-08	4.00E-04	8.70E-05	4.97E-09		
Arsenic	8.23E+00	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	3.25E-07	3.00E-04	1.08E-03	4.65E-08	1.50E+00	6.97E-08
Barium	2.81E+02	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	1.11E-05	7.00E-02	1.59E-04	1.59E-06		
Beryllium	7.57E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	2.99E-08	5.00E-03	5.98E-06	4.27E-09	4.30E+00	1.84E-08
Cadmium	7.64E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	3.02E-08	1.00E-03	3.02E-05	4.32E-09		
Cobalt	1.04E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	4.10E-07	6.00E-02	6.83E-06	5.85E-08		
Nickel	2.39E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	9.45E-07	2.00E-02	4.73E-05	1.35E-07		
Vanadium	3.57E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	1.41E-06	7.00E-03	2.02E-04	2.02E-07		
												TOTAL HAZARD INDEX =	4.98E-03		TOTAL CANCER RISK =	9.20E-08

TABLE C-1-5

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-C[illegible]nogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)$^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.68E-01	100	350	70	1.00E-06	70	25550	25550	3.67E-07	5.00E-05	7.34E-03	3.67E-07		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	100	350	70	1.00E-06	70	25550	25550	1.1[illegible]E-06	5.00E-04	2.33E-03	1.17E-06	3.00E-02	3.50E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.28E-01	100	350	70	1.00E-06	70	25550	25550	5.87E-07	3.00E-03	1.96E-04	5.87E-07	1.10E-01	6.46E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	4.60E-01	100	350	70	1.00E-06	70	25550	25550	6.30E-07			6.30E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.69E-01	100	350	70	1.00E-06	70	25550	25550	3.69E-07	5.00E-02	7.38E-06	3.69E-07		
Aluminum	1.67E+04	100	350	70	1.00E-06	70	25550	25550	2.29E-02	1.00E+00	2.29E-02	2.29E-02		
Antimony	8.80E-01	100	350	70	1.00E-06	70	25550	25550	1.21E-06	4.00E-04	3.01E-03	1.21E-06		
Arsenic	8.52E+00	100	350	70	1.00E-06	70	25550	25550	1.17E-05	3.00E-04	3.89E-02	1.17E-05	1.50E+00	1.75E-05
Barium	2.81E+02	100	350	70	1.00E-06	70	25550	25550	3.85E-04	7.00E-02	5.50E-03	3.85E-04		
Beryllium	7.82E-01	100	350	70	1.00E-06	70	25550	25550	1.07E-06	5.00E-03	2.14E-04	1.07E-06	4.30E+00	4.61E-06
Cadmium	8.00E-01	100	350	70	1.00E-06	70	25550	25550	1.10E-06	1.00E-03	1.10E-03	1.10E-06		
Cobalt	1.07E+01	100	350	70	1.00E-06	70	25550	25550	1.46E-05	6.00E-02	2.43E-04	1.46E-05		
Nickel	2.48E+01	100	350	70	1.00E-06	70	25550	25550	3.39E-05	2.00E-02	1.70E-03	3.39E-05		
Vanadium	3.73E+01	100	350	70	1.00E-06	70	25550	25550	5.11E-05	7.00E-03	7.31E-03	5.11E-05		
										TOTAL HAZARD INDEX =	9.07E-02		TOTAL CANCER RISK =	2.22E-05

TABLE C-1-6

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.53E-01	50	350	9	1.00E-06	70	3285	25550	1.7[illegible]E-07	5.00E-05	3.47E-03	2.23E-08		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	50	350	9	1.00E-06	70	3285	25550	5.83E-07	5.00E-04	1.17E-03	7.49E-08	3.00E-02	2.25E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.08E-01	50	350	9	1.00E-06	70	3285	25550	2.79E-07	3.00E-03	9.31E-05	3.59E-08	1.10E-01	3.95E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.31E-01	50	350	9	1.00E-06	70	3285	25550	2.27E-07			2.92E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.42E-01	50	350	9	1.00E-06	70	3285	25550	1.66E-07	5.00E-02	3.31E-06	2.13E-08		
Aluminum	1.59E+04	50	350	9	1.00E-06	70	3285	25550	1.09E-02	1.00E+00	1.09E-02	1.40E-03		
Antimony	8.80E-01	50	350	9	1.00E-06	70	3285	25550	6.03E-07	4.00E-04	1.51E-03	7.75E-08		
Arsenic	8.23E+00	50	350	9	1.00E-06	70	3285	25550	5.63E-06	3.00E-04	1.88E-02	7.24E-07	1.50E+00	1.09E-06
Barium	2.81E+02	50	350	9	1.00E-06	70	3285	25550	1.93E-04	7.00E-02	2.75E-03	2.48E-05		
Beryllium	7.57E-01	50	350	9	1.00E-06	70	3285	25550	5.18E-07	5.00E-03	1.04E-04	6.66E-08	4.30E+00	2.86E-07
Cadmium	7.64E-01	50	350	9	1.00E-06	70	3285	25550	5.24E-07	1.00E-03	5.24E-04	6.73E-08		
Cobalt	1.04E+01	50	350	9	1.00E-06	70	3285	25550	7.10E-06	6.00E-02	1.18E-04	9.13E-07		
Nickel	2.39E+01	50	350	9	1.00E-06	70	3285	25550	1.64E-05	2.00E-02	8.19E-04	2.11E-06		
Vanadium	3.57E+01	50	350	9	1.00E-06	70	3285	25550	2.45E-05	7.00E-03	3.50E-03	3.15E-06		
										TOTAL HAZARD INDEX =	4.37E-02		TOTAL CANCER RISK =	1.38E-06

TABLE C-1-7

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.68E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.92E-06	5.00E-05	3.84E-02	1.92E-06		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	6.10E-06	5.00E-04	1.22E-02	6.10E-06	3.00E-02	1.83E-07
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.28E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	3.07E-06	3.00E-03	1.02E-03	3.07E-06	1.10E-01	3.38E-07
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	4.60E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	3.30E-06			3.30E-06		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.69E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.93E-06	5.00E-02	3.86E-05	1.93E-06		
Aluminum	1.67E+04	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.20E-02	1.00E+00	1.20E-02	1.20E-02		
Antimony	8.80E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	6.30E-07	4.00E-04	1.58E-03	6.30E-07		
Arsenic	8.52E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	6.10E-06	3.00E-04	2.03E-02	6.10E-06	1.50E+00	9.15E-06
Barium	2.81E+02	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	2.01E-04	7.00E-02	2.88E-03	2.01E-04		
Beryllium	7.82E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	5.60E-07	5.00E-03	1.12E-04	5.60E-07	4.30E+00	2.41E-06
Cadmium	8.00E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	5.73E-07	1.00E-03	5.73E-04	5.73E-07		
Cobalt	1.07E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	7.63E-06	6.00E-02	1.27E-04	7.63E-06		
Nickel	2.48E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.77E-05	2.00E-02	8.87E-04	1.77E-05		
Vanadium	3.73E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	2.67E-05	7.00E-03	3.82E-03	2.67E-05		
												TOTAL HAZARD INDEX =	9.39E-02		TOTAL CANCER RISK =	1.21E-05

TABLE C-1-8

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.53E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.40E-07	5.00E-05	2.80E-03	1.80E-08		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	4.71E-07	5.00E-04	9.42E-04	6.06E-08	3.00E-02	1.70E-06
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.08E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	2.26E-07	3.00E-03	7.52E-05	2.90E-08	1.10E-01	8.12E-07
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.31E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.83E-07			2.36E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.42E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.34E-07	5.00E-02	2.67E-06	1.72E-08		
Aluminum	1.59E+04	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	8.81E-04	1.00E+00	8.81E-04	1.13E-04		
Antimony	8.80E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.87E-08	4.00E-04	1.22E-04	6.26E-09		
Arsenic	8.23E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.55E-07	3.00E-04	1.52E-03	5.85E-08	1.50E+00	1.64E-06
Barium	2.81E+02	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.56E-05	7.00E-02	2.22E-04	2.00E-06		
Beryllium	7.57E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.19E-08	5.00E-03	8.37E-06	5.38E-09	4.30E+00	1.51E-07
Cadmium	7.64E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.23E-08	1.00E-03	4.23E-05	5.44E-09		
Cobalt	1.04E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	5.73E-07	6.00E-02	9.56E-06	7.37E-08		
Nickel	2.39E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.32E-06	2.00E-02	6.62E-05	1.70E-07		
Vanadium	3.57E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.98E-06	7.00E-03	2.83E-04	2.54E-07		
												TOTAL HAZARD INDEX =	6.97E-03		TOTAL CANCER RISK =	4.30E-06

TAbLE C-1-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.68E-01	200	350	6	1.00E-06	15	2190	25550	3.42E-06	5.00E-05	6.85E-02	2.93E-07		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	200	350	6	1.00E-06	15	2190	25550	1.09E-05	5.00E-04	2.18E-02	9.33E-07	3.00E-02	2.80E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.28E-01	200	350	6	1.00E-06	15	2190	25550	5.48E-06	3.00E-03	1.83E-03	4.69E-07	1.10E-01	5.16E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	4.60E-01	200	350	6	1.00E-06	15	2190	25550	5.88E-06			5.04E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.69E-01	200	350	6	1.00E-06	15	2190	25550	3.44E-06	5.00E-02	6.89E-05	2.95E-07		
Aluminum	1.67E+04	200	350	6	1.00E-06	15	2190	25550	2.14E-01	1.00E+00	2.14E-01	1.83E-02		
Antimony	8.80E-01	200	350	6	1.00E-06	15	2190	25550	1.13E-05	4.00E-04	2.81E-02	9.64E-07		
Arsenic	8.52E+00	200	350	6	1.00E-06	15	2190	25550	1.09E-04	3.00E-04	3.63E-01	9.34E-06	1.50E+00	1.40E-05
Barium	2.81E+02	200	350	6	1.00E-06	15	2190	25550	3.59E-03	7.00E-02	5.13E-02	3.08E-04		
Beryllium	7.82E-01	200	350	6	1.00E-06	15	2190	25550	1.00E-05	5.00E-03	2.00E-03	8.57E-07	4.30E+00	3.68E-06
Cadmium	8.00E-01	200	350	6	1.00E-06	15	2190	25550	1.02E-05	1.00E-03	1.02E-02	8.77E-07		
Cobalt	1.07E+01	200	350	6	1.00E-06	15	2190	25550	1.36E-04	6.00E-02	2.27E-03	1.17E-05		
Nickel	2.48E+01	200	350	6	1.00E-06	15	2190	25550	3.16E-04	2.00E-02	1.58E-02	2.71E-05		
Vanadium	3.73E+01	200	350	6	1.00E-06	15	2190	25550	4.77E-04	7.00E-03	6.82E-02	4.09E-05		
										TOTAL HAZARD INDEX =	8.47E-01		TOTAL CANCER RISK =	1.78E-05

TABLE C-1-10

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.53E-01	100	350	6	1.00E-06	15	2190	25550	1.62E-06	5.00E-05	3.24E-02	1.39E-07		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	100	350	6	1.00E-06	15	2190	25550	5.44E-06	5.00E-04	1.09E-02	4.66E-07	3.00E-02	1.40E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.08E-01	100	350	6	1.00E-06	15	2190	25550	2.61E-06	3.00E-03	8.69E-04	2.23E-07	1.10E-01	2.46E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.31E-01	100	350	6	1.00E-06	15	2190	25550	2.12E-06			1.81E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.42E-01	100	350	6	1.00E-06	15	2190	25550	1.54E-06	5.00E-02	3.09E-05	1.32E-07		
Aluminum	1.59E+04	100	350	6	1.00E-06	15	2190	25550	1.02E-01	1.00E+00	1.02E-01	8.72E-03		
Antimony	8.80E-01	100	350	6	1.00E-06	15	2190	25550	5.63E-06	4.00E-04	1.41E-02	4.82E-07		
Arsenic	8.23E+00	100	350	6	1.00E-06	15	2190	25550	5.26E-05	3.00E-04	1.75E-01	4.51E-06	1.50E+00	6.76E-06
Barium	2.81E+02	100	350	6	1.00E-06	15	2190	25550	1.80E-03	7.00E-02	2.57E-02	1.54E-04		
Beryllium	7.57E-01	100	350	6	1.00E-06	15	2190	25550	4.84E-06	5.00E-03	9.67E-04	4.15E-07	4.30E+00	1.78E-06
Cadmium	7.64E-01	100	350	6	1.00E-06	15	2190	25550	4.89E-06	1.00E-03	4.89E-03	4.19E-07		
Cobalt	1.04E+01	100	350	6	1.00E-06	15	2190	25550	6.62E-05	6.00E-02	1.10E-03	5.68E-06		
Nickel	2.39E+01	100	350	6	1.00E-06	15	2190	25550	1.53E-04	2.00E-02	7.64E-03	1.31E-05		
Vanadium	3.57E+01	100	350	6	1.00E-06	15	2190	25550	2.28E-04	7.00E-03	3.26E-02	1.96E-05		
										TOTAL HAZARD INDEX =	4.08E-01		TOTAL CANCER RISK =	8.58E-06

TABLE C-1-11

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)[1]	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.68E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	7.41E-06	5.00E-05	1.48E-01	6.35E-07		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.36E-05	5.00E-04	4.71E-02	2.02E-06	3.00E-02	6.06E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.28E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.19E-05	3.00E-03	3.95E-03	1.02E-06	1.10E-01	1.12E-07
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	4.60E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.27E-05			1.09E-06		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.69E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	7.46E-06	5.00E-02	1.49E-04	6.39E-07		
Aluminum	1.67E+04	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	4.62E-02	1.00E+00	4.62E-02	3.96E-03		
Antimony	8.80E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.44E-06	4.00E-04	6.09E-03	2.09E-07		
Arsenic	8.52E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.36E-05	3.00E-04	7.86E-02	2.02E-06	1.50E+00	3.03E-06
Barium	2.81E+02	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	7.78E-04	7.00E-02	1.11E-02	6.67E-05		
Beryllium	7.82E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.16E-06	5.00E-03	4.33E-04	1.86E-07	4.30E+00	7.98E-07
Cadmium	8.00E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.22E-06	1.00E-03	2.22E-03	1.90E-07		
Cobalt	1.07E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.95E-05	6.00E-02	4.92E-04	2.53E-06		
Nickel	2.48E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	6.85E-05	2.00E-02	3.43E-03	5.87E-06		
Vanadium	3.73E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	1.03E-04	7.00E-03	1.48E-02	8.86E-06		
												TOTAL HAZARD INDEX =	3.63E-01		TOTAL CANCER RISK =	4.00E-06

TABLE C-1-12

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: *CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)*
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.53E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	6.05E-07	5.00E-05	1.21E-02	5.19E-08		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.03E-06	5.00E-04	4.07E-03	1.74E-07	3.00E-02	5.23E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.08E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	9.74E-07	3.00E-03	3.25E-04	8.35E-08	1.10E-01	9.19E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.31E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	7.91E-07			6.78E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.42E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	5.77E-07	5.00E-02	1.15E-05	4.95E-08		
Aluminum	1.59E+04	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	3.80E-03	1.00E+00	3.80E-03	3.26E-04		
Antimony	8.80E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	2.10E-07	4.00E-04	5.26E-04	1.80E-08		
Arsenic	8.23E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.97E-06	3.00E-04	6.55E-03	1.68E-07	1.50E+00	2.53E-07
Barium	2.81E+02	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	6.72E-05	7.00E-02	9.59E-04	5.76E-06		
Beryllium	7.57E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.81E-07	5.00E-03	3.62E-05	1.55E-08	4.30E+00	6.66E-08
Cadmium	7.64E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.83E-07	1.00E-03	1.83E-04	1.57E-08		
Cobalt	1.04E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	2.48E-06	6.00E-02	4.13E-05	2.12E-07		
Nickel	2.39E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	5.71E-06	2.00E-02	2.86E-04	4.90E-07		
Vanadium	3.57E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	8.54E-06	7.00E-03	1.22E-03	7.32E-07		

TOTAL HAZARD INDEX = 3.01E-02

TOTAL CANCER RISK = 3.34E-07

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TABLE C-1-13

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.68E-01	100	24	70	1.00E-06	70	25550	25550	2.52E-08	5.00E-05	5.03E-04	2.52E-08		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	100	24	70	1.00E-06	70	25550	25550	7.99E-08	5.00E-04	1.60E-04	7.99E-08	3.00E-02	2.40E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.28E-01	100	24	70	1.00E-06	70	25550	25550	4.02E-08	3.00E-03	1.34E-05	4.02E-08	1.10E-01	4.43E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	4.60E-01	100	24	70	1.00E-06	70	25550	25550	4.32E-08			4.32E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.69E-01	100	24	70	1.00E-06	70	25550	25550	2.53E-08	5.00E-02	5.06E-07	2.53E-08		
Aluminum	1.67E+04	100	24	70	1.00E-06	70	25550	25550	1.57E-03	1.00E+00	1.57E-03	1.57E-03		
Antimony	8.80E-01	100	24	70	1.00E-06	70	25550	25550	8.27E-08	4.00E-04	2.07E-04	8.27E-08		
Arsenic	8.52E+00	100	24	70	1.00E-06	70	25550	25550	8.00E-07	3.00E-04	2.67E-03	8.00E-07	1.50E+00	1.20E-06
Barium	2.81E+02	100	24	70	1.00E-06	70	25550	25550	2.64E-05	7.00E-02	3.77E-04	2.64E-05		
Beryllium	7.82E-01	100	24	70	1.00E-06	70	25550	25550	7.34E-08	5.00E-03	1.47E-05	7.34E-08	4.30E+00	3.16E-07
Cadmium	8.00E-01	100	24	70	1.00E-06	70	25550	25550	7.52E-08	1.00E-03	7.52E-05	7.52E-08		
Cobalt	1.07E+01	100	24	70	1.00E-06	70	25550	25550	1.00E-06	6.00E-02	1.67E-05	1.00E-06		
Nickel	2.48E+01	100	24	70	1.00E-06	70	25550	25550	2.32E-06	2.00E-02	1.16E-04	2.32E-06		
Vanadium	3.73E+01	100	24	70	1.00E-06	70	25550	25550	3.51E-06	7.00E-03	5.01E-04	3.51E-06		
									TOTAL HAZARD INDEX =		6.22E-03	TOTAL CANCER RISK =		1.52E-06

TABLE C-1-14

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.53E-01	50	12	9	1.00E-06	70	3285	25550	5.95E-09	5.00E-05	1.19E-04	7.64E-10		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	50	12	9	1.00E-06	70	3285	25550	2.00E-08	5.00E-04	4.00E-05	2.57E-09	3.00E-02	7.71E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.08E-01	50	12	9	1.00E-06	70	3285	25550	9.58E-09	3.00E-03	3.19E-06	1.23E-09	1.10E-01	1.35E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.31E-01	50	12	9	1.00E-06	70	3285	25550	7.78E-09			1.00E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.42E-01	50	12	9	1.00E-06	70	3285	25550	5.67E-09	5.00E-02	1.13E-07	7.30E-10		
Aluminum	1.59E+04	50	12	9	1.00E-06	70	3285	25550	3.74E-04	1.00E+00	3.74E-04	4.80E-05		
Antimony	8.80E-01	50	12	9	1.00E-06	70	3285	25550	2.07E-08	4.00E-04	5.17E-05	2.66E-09		
Arsenic	8.23E+00	50	12	9	1.00E-06	70	3285	25550	1.93E-07	3.00E-04	6.44E-04	2.48E-08	1.50E+00	3.73E-08
Barium	2.81E+02	50	12	9	1.00E-06	70	3285	25550	6.60E-06	7.00E-02	9.43E-05	8.49E-07		
Beryllium	7.57E-01	50	12	9	1.00E-06	70	3285	25550	1.78E-08	5.00E-03	3.55E-06	2.28E-09	4.30E+00	9.82E-09
Cadmium	7.64E-01	50	12	9	1.00E-06	70	3285	25550	1.80E-08	1.00E-03	1.80E-05	2.31E-09		
Cobalt	1.04E+01	50	12	9	1.00E-06	70	3285	25550	2.43E-07	6.00E-02	4.06E-06	3.13E-08		
Nickel	2.39E+01	50	12	9	1.00E-06	70	3285	25550	5.61E-07	2.00E-02	2.81E-05	7.22E-08		
Vanadium	3.57E+01	50	12	9	1.00E-06	70	3285	25550	8.39E-07	7.00E-03	1.20E-04	1.08E-07		
										TOTAL HAZARD INDEX =	1.50E-03		TOTAL CANCER RISK =	4.73E-08

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TABLE C-1-15

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.68E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.32E-07	5.00E-05	2.63E-03	1.32E-07		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	4.18E-07	5.00E-04	8.36E-04	4.18E-07	3.00E-02	1.25E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.28E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.10E-07	3.00E-03	7.02E-05	2.10E-07	1.10E-01	2.32E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	4.60E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.26E-07			2.26E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.69E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.32E-07	5.00E-02	2.65E-06	1.32E-07		
Aluminum	1.67E+04	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	8.20E-04	1.00E+00	8.20E-04	8.20E-04		
Antimony	8.80E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	4.32E-08	4.00E-04	1.08E-04	4.32E-08		
Arsenic	8.52E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	4.18E-07	3.00E-04	1.39E-03	4.18E-07	1.50E+00	6.28E-07
Barium	2.81E+02	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.38E-05	7.00E-02	1.97E-04	1.38E-05		
Beryllium	7.82E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	3.84E-08	5.00E-03	7.68E-06	3.84E-08	4.30E+00	1.65E-07
Cadmium	8.00E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	3.93E-08	1.00E-03	3.93E-05	3.93E-08		
Cobalt	1.07E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	5.23E-07	6.00E-02	8.72E-06	5.23E-07		
Nickel	2.48E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.22E-06	2.00E-02	6.08E-05	1.22E-06		
Vanadium	3.73E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.83E-06	7.00E-03	2.62E-04	1.83E-06		
												TOTAL HAZARD INDEX =	6.44E-03		TOTAL CANCER RISK =	8.29E-07

TABLE C-1-16

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.53E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	4.80E-09	5.00E-05	9.61E-05	6.18E-10		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.61E-08	5.00E-04	3.23E-05	2.08E-09	3.00E-02	6.23E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.08E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	7.74E-09	3.00E-03	2.58E-06	9.95E-10	1.10E-01	1.09E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.31E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	6.28E-09			8.08E-10		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.42E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	4.59E-09	5.00E-02	9.17E-08	5.90E-10		
Aluminum	1.59E+04	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	3.02E-05	1.00E+00	3.02E-05	3.88E-06		
Antimony	8.80E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.67E-09	4.00E-04	4.17E-06	2.15E-10		
Arsenic	8.23E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.56E-08	3.00E-04	5.20E-05	2.01E-09	1.50E+00	3.01E-09
Barium	2.81E+02	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	5.33E-07	7.00E-02	7.62E-06	6.86E-08		
Beryllium	7.57E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.44E-09	5.00E-03	2.87E-07	1.85E-10	4.30E+00	7.94E-10
Cadmium	7.64E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.45E-09	1.00E-03	1.45E-06	1.86E-10		
Cobalt	1.04E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.97E-08	6.00E-02	3.28E-07	2.53E-09		
Nickel	2.39E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	4.54E-08	2.00E-02	2.27E-06	5.83E-09		
Vanadium	3.57E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	6.78E-08	7.00E-03	9.69E-06	8.72E-09		
												TOTAL HAZARD INDEX =	2.39E-04		TOTAL CANCER RISK =	3.98E-09

TABLE C-1-17

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.68E-01	100	24	5	1.00E-06	37	1825	25550	4.76E-08	5.00E-05	9.52E-04	3.40E-09		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	100	24	5	1.00E-06	37	1825	25550	1.51E-07	5.00E-04	3.02E-04	1.08E-08	3.00E-02	3.24E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.28E-01	100	24	5	1.00E-06	37	1825	25550	7.61E-08	3.00E-03	2.54E-05	5.44E-09	1.10E-01	5.98E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	4.60E-01	100	24	5	1.00E-06	37	1825	25550	8.17E-08			5.84E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.69E-01	100	24	5	1.00E-06	37	1825	25550	4.79E-08	5.00E-02	9.57E-07	3.42E-09		
Aluminum	1.67E+04	100	24	5	1.00E-06	37	1825	25550	2.97E-03	1.00E+00	2.97E-03	2.12E-04		
Antimony	8.80E-01	100	24	5	1.00E-06	37	1825	25550	1.56E-07	4.00E-04	3.91E-04	1.12E-08		
Arsenic	8.52E+00	100	24	5	1.00E-06	37	1825	25550	1.51E-06	3.00E-04	5.05E-03	1.08E-07	1.50E+00	1.62E-07
Barium	2.81E+02	100	24	5	1.00E-06	37	1825	25550	4.99E-05	7.00E-02	7.14E-04	3.57E-06		
Beryllium	7.82E-01	100	24	5	1.00E-06	37	1825	25550	1.39E-07	5.00E-03	2.78E-05	9.92E-09	4.30E+00	4.27E-08
Cadmium	8.00E-01	100	24	5	1.00E-06	37	1825	25550	1.42E-07	1.00E-03	1.42E-04	1.02E-08		
Cobalt	1.07E+01	100	24	5	1.00E-06	37	1825	25550	1.89E-06	6.00E-02	3.16E-05	1.35E-07		
Nickel	2.48E+01	100	24	5	1.00E-06	37	1825	25550	4.40E-06	2.00E-02	2.20E-04	3.14E-07		
Vanadium	3.73E+01	100	24	5	1.00E-06	37	1825	25550	6.63E-06	7.00E-03	9.48E-04	4.74E-07		
										TOTAL HAZARD INDEX =	1.18E-02		TOTAL CANCER RISK =	2.06E-07

TABLE C-1-18

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.53E-01	50	12	5	1.00E-06	37	1825	25550	1.12E-08	5.00E-05	2.25E-04	8.03E-10		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	50	12	5	1.00E-06	37	1825	25550	3.78E-08	5.00E-04	7.56E-05	2.70E-09	3.00E-02	8.10E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.08E-01	50	12	5	1.00E-06	37	1825	25550	1.81E-08	3.00E-03	6.04E-06	1.29E-09	1.10E-01	1.42E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.31E-01	50	12	5	1.00E-06	37	1825	25550	1.47E-08			1.05E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.42E-01	50	12	5	1.00E-06	37	1825	25550	1.07E-08	5.00E-02	2.15E-07	7.67E-10		
Aluminum	1.59E+04	50	12	5	1.00E-06	37	1825	25550	7.07E-04	1.00E+00	7.07E-04	5.05E-05		
Antimony	8.80E-01	50	12	5	1.00E-06	37	1825	25550	3.91E-08	4.00E-04	9.77E-05	2.79E-09		
Arsenic	8.23E+00	50	12	5	1.00E-06	37	1825	25550	3.65E-07	3.00E-04	1.22E-03	2.61E-08	1.50E+00	3.92E-08
Barium	2.81E+02	50	12	5	1.00E-06	37	1825	25550	1.25E-05	7.00E-02	1.78E-04	8.92E-07		
Beryllium	7.57E-01	50	12	5	1.00E-06	37	1825	25550	3.36E-08	5.00E-03	6.72E-06	2.40E-09	4.30E+00	1.03E-08
Cadmium	7.64E-01	50	12	5	1.00E-06	37	1825	25550	3.40E-08	1.00E-03	3.40E-05	2.43E-09		
Cobalt	1.04E+01	50	12	5	1.00E-06	37	1825	25550	4.60E-07	6.00E-02	7.67E-06	3.29E-08		
Nickel	2.39E+01	50	12	5	1.00E-06	37	1825	25550	1.06E-06	2.00E-02	5.31E-05	7.59E-08		
Vanadium	3.57E+01	50	12	5	1.00E-06	37	1825	25550	1.59E-06	7.00E-03	2.27E-04	1.13E-07		
										TOTAL HAZARD INDEX =	2.84E-03		TOTAL CANCER RISK =	4.97E-08

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TABLE C-1-19

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.68E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.19E-07	5.00E-05	4.38E-03	1.56E-08		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	6.96E-07	5.00E-04	1.39E-03	4.97E-08	3.00E-02	1.49E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.28E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	3.50E-07	3.00E-03	1.17E-04	2.50E-08	1.10E-01	2.75E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	4.60E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	3.76E-07			2.69E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.69E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.20E-07	5.00E-02	4.41E-06	1.57E-08		
Aluminum	1.67E+04	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	1.37E-03	1.00E+00	1.37E-03	9.76E-05		
Antimony	8.80E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	7.20E-08	4.00E-04	1.80E-04	5.14E-09		
Arsenic	8.52E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	6.97E-07	3.00E-04	2.32E-03	4.98E-08	1.50E+00	7.46E-08
Barium	2.81E+02	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.30E-05	7.00E-02	3.28E-04	1.64E-06		
Beryllium	7.82E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	6.39E-08	5.00E-03	1.28E-05	4.57E-09	4.30E+00	1.96E-08
Cadmium	8.00E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	6.55E-08	1.00E-03	6.55E-05	4.68E-09		
Cobalt	1.07E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	8.71E-07	6.00E-02	1.45E-05	6.22E-08		
Nickel	2.48E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.02E-06	2.00E-02	1.01E-04	1.45E-07		
Vanadium	3.73E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	3.05E-06	7.00E-03	4.36E-04	2.18E-07		
												TOTAL HAZARD INDEX =	1.07E-02		TOTAL CANCER RISK =	9.85E-08

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TABLE C-1-20

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.53E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	9.02E-09	5.00E-05	1.80E-04	6.44E-10		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.03E-08	5.00E-04	6.07E-05	2.17E-09	3.00E-02	6.50E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.08E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.45E-08	3.00E-03	4.84E-06	1.04E-09	1.10E-01	1.14E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.31E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.18E-08			8.43E-10		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.42E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	8.61E-09	5.00E-02	1.72E-07	6.15E-10		
Aluminum	1.59E+04	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	5.67E-05	1.00E+00	5.67E-05	4.05E-06		
Antimony	8.80E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	3.14E-09	4.00E-04	7.84E-06	2.24E-10		
Arsenic	8.23E+00	2005	0.2	0.C	12	5	1.00E-06	37	1825	25550	2.93E-08	3.00E-04	9.77E-05	2.09E-09	1.50E+00	3.14E-09
Barium	2.81E+02	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.00E-06	7.00E-02	1.43E-05	7.15E-08		
Beryllium	7.57E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.70E-09	5.00E-03	5.39E-07	1.93E-10	4.30E+00	8.28E-10
Cadmium	7.64E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.72E-09	1.00E-03	2.72E-06	1.95E-10		
Cobalt	1.04E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	3.69E-08	6.00E-02	6.15E-07	2.64E-09		
Nickel	2.39E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	8.52E-08	2.00E-02	4.26E-06	6.09E-09		
Vanadium	3.57E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.27E-07	7.00E-03	1.82E-05	9.09E-09		
												TOTAL HAZARD INDEX =	4.49E-05		TOTAL CANCER RISK =	4.15E-10

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TABLE C-1-21

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetable
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
1,3,5-Trinitrobenzene (TNB)	2.68E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.28E-01	0.20	21%	32%	47%	1.18	0.06	0.09	2.65E-02	0.40	350	70	70	25550	25550	1.45E-04	3.00E-03	4.85E-02	1.45E-04	1.10E-01	1.60E-05
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	4.60E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.69E-01	0.20	21%	32%	47%	0.32	NE	NB	3.62E-03	0.40	350	70	70	25550	25550	1.98E-05	5.00E-02	3.97E-04	1.98E-05		
																	TOTAL HAZARD INDEX =	4.89E-02		TOTAL CANCER RISK =	1.60E-05

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

TABLE C-1-22

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetables Intake Comprised of Leafy Vegetable (unitless)
Frv = Fraction of Total Garden Vegetables Intake Comprised of Root Vegetable (unitless)
Fgf = Fraction of Total Garden Vegetables Intake Comprised of Garden Fruit (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)[1]	CANCER RISK (unitless)
1,3,5-Trinitrobenzene (TNB)	2.53E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.08E-01	0.20	21%	32%	47%	1.18	0.06	0.09	2.53E-02	0.25	350	9	70	3285	25550	8.65E-05	3.00E-03	2.88E-02	1.11E-05	1.10E-01	1.22E-06
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.31E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.42E-01	0.20	21%	32%	47%	0.32	NE	NB	3.25E-03	0.25	350	9	70	3285	25550	1.11E-05	5.00E-02	2.22E-04	1.43E-06		
																TOTAL HAZARD INDEX =		2.91E-02	TOTAL CANCER RISK =		1.22E-06

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)
NE = Not evaluated during the plant uptake study
NB = No measurable bioconcentration found during the plant uptake study

B07NE003703-06339

TABLE C-1-23

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)$^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene (TNB)	2.68E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.28E-01	0.10	10%	45%	45%	1.18	0.06	0.09	7.96E-03	0.40	350	6	15	2190	25550	2.03E-04	3.00E-03	6.78E-02	1.74E-05	1.10E-01	1.92E-06
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	4.60E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.69E-01	0.10	10%	45%	45%	0.32	NE	NB	8.62E-04	0.40	350	6	15	2190	25550	2.20E-05	5.00E-02	4.41E-04	1.89E-06		
																	TOTAL HAZARD INDEX =	6.83E-02		TOTAL CANCER RISK =	1.92E-06

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

TABLE C-1-24

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminants Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)⁻¹	CANCER RISK (unitless)
1,3,5-Trinitrobenzene (TNB)	2.53E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	8.51E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.08E-01	0.10	10%	45%	45%	1.18	0.06	0.09	7.57E-03	0.25	350	6	15	2190	25550	1.21E-04	3.00E-03	4.04E-02	1.04E-05	1.10E-01	1.14E-06
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.31E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.42E-01	0.10	10%	45%	45%	0.32	NE	NB	7.73E-04	0.25	350	6	15	2190	25550	1.24E-05	5.00E-02	2.47E-04	1.06E-06		
																	TOTAL HAZARD INDEX =	4.06E-02		TOTAL CANCER RISK =	1.14E-06

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

TABLE C-2-1

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.66E-01	50	250	25	1.00E-06	70	9125	25550	1.30E-07	5.00E-05	2.60E-03	4.65E-08		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	50	250	25	1.00E-06	70	9125	25550	1.64E-07	5.00E-04	3.29E-04	5.87E-08	3.00E-02	1.76E-09
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.97E-01	50	250	25	1.00E-06	70	9125	25550	2.92E-07	3.00E-03	9.73E-05	1.04E-07	1.10E-01	1.15E-08
Methyl-2,4,6-trinitrophenylnitramine	3.82E-01	50	250	25	1.00E-06	70	9125	25550	1.87E-07			6.67E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.88E-01	50	250	25	1.00E-06	70	9125	25550	1.41E-07	5.00E-02	2.82E-06	5.03E-08		
Antimony	5.39E-01	50	250	25	1.00E-06	70	9125	25550	2.64E-07	4.00E-04	6.59E-04	9.42E-08		
Arsenic	8.35E+00	50	250	25	1.00E-06	70	9125	25550	4.08E-06	3.00E-04	1.36E-02	1.46E-06	1.50E+00	2.19E-06
Barium	2.48E+02	50	250	25	1.00E-06	70	9125	25550	1.21E-04	7.00E-02	1.74E-03	4.34E-05		
Cadmium	1.01E+00	50	250	25	1.00E-06	70	9125	25550	4.96E-07	1.00E-03	4.96E-04	1.77E-07		
Nickel	2.47E+01	50	250	25	1.00E-06	70	9125	25550	1.21E-05	2.00E-02	6.05E-04	4.32E-06		
										TOTAL HAZARD INDEX =	2.01E-02		TOTAL CANCER RISK =	2.20E-06

TABLE C-2-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.50E-01	10	250	10	1.00E-06	70	3650	25550	2.45E-08	5.00E-05	4.90E-04	3.50E-09		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	10	250	10	1.00E-06	70	3650	25550	3.29E-08	5.00E-04	6.57E-05	4.70E-09	3.00E-02	1.41E-10
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.57E-01	10	250	10	1.00E-06	70	3650	25550	5.45E-08	3.00E-03	1.82E-05	7.79E-09	1.10E-01	8.57E-10
Methyl-2,4,6-trinitrophenylnitramine	3.62E-01	10	250	10	1.00E-06	70	3650	25550	3.54E-08			5.05E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.27E-01	10	250	10	1.00E-06	70	3650	25550	2.22E-08	5.00E-02	4.43E-07	3.17E-09		
Antimony	4.95E-01	10	250	10	1.00E-06	70	3650	25550	4.84E-08	4.00E-04	1.21E-04	6.91E-09		
Arsenic	8.02E+00	10	250	10	1.00E-06	70	3650	25550	7.85E-07	3.00E-04	2.62E-03	1.12E-07	1.50E+00	1.68E-07
Barium	2.40E+02	10	250	10	1.00E-06	70	3650	25550	2.35E-05	7.00E-02	3.35E-04	3.35E-06		
Cadmium	8.78E-01	10	250	10	1.00E-06	70	3650	25550	8.59E-08	1.00E-03	8.59E-05	1.23E-08		
Nickel	2.39E+01	10	250	10	1.00E-06	70	3650	25550	2.33E-06	2.00E-02	1.17E-04	3.33E-07		
										TOTAL HAZARD INDEX =	3.85E-03		TOTAL CANCER RISK =	1.69E-07

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TABLE C-2-3

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.66E-01	5230	1.0	0.010	250	25	1.00E-06	70	9125	25550	1.36E-07	5.00E-05	2.72E-03	4.86E-08		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	5230	1.0	0.010	250	25	1.00E-06	70	9125	25550	1.72E-07	5.00E-04	3.44E-04	6.14E-08	3.00E-02	1.84E-09
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.97E-01	5230	1.0	0.010	250	25	1.00E-06	70	9125	25550	3.05E-07	3.00E-03	1.02E-04	1.09E-07	1.10E-01	1.20E-08
Methyl-2,4,6-trinitrophenylnitramine	3.82E-01	5230	1.0	0.010	250	25	1.00E-06	70	9125	25550	1.95E-07			6.97E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.88E-01	5230	1.0	0.010	250	25	1.00E-06	70	9125	25550	1.47E-07	5.00E-02	2.95E-06	5.26E-08		
Antimony	5.39E-01	5230	1.0	0.001	250	25	1.00E-06	70	9125	25550	2.76E-08	4.00E-04	6.90E-05	9.85E-09		
Arsenic	8.35E+00	5230	1.0	0.001	250	25	1.00E-06	70	9125	25550	4.27E-07	3.00E-04	1.42E-03	1.53E-07	1.50E+00	2.29E-07
Barium	2.48E+02	5230	1.0	0.001	250	25	1.00E-06	70	9125	25550	1.27E-05	7.00E-02	1.82E-04	4.54E-06		
Cadmium	1.01E+00	5230	1.0	0.001	250	25	1.00E-06	70	9125	25550	5.19E-08	1.00E-03	5.19E-05	1.85E-08		
Nickel	2.47E+01	5230	1.0	0.001	250	25	1.00E-06	70	9125	25550	1.27E-06	2.00E-02	6.33E-05	4.52E-07		
												TOTAL HAZARD INDEX =	4.96E-03		TOTAL CANCER RISK =	2.43E-07

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TABLE C-2-4

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.50E-01	2020	0.2	0.010	250	10	1.00E-06	70	3650	25550	9.89E-09	5.00E-05	1.98E-04	1.41E-09		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	2020	0.2	0.010	250	10	1.00E-06	70	3650	25550	1.33E-08	5.00E-04	2.66E-05	1.90E-09	3.00E-02	5.69E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.57E-01	2020	0.2	0.010	250	10	1.00E-06	70	3650	25550	2.20E-08	3.00E-03	7.34E-06	3.15E-09	1.10E-01	3.46E-10
Methyl-2,4,6-trinitrophenylnitramine	3.62E-01	2020	0.2	0.010	250	10	1.00E-06	70	3650	25550	1.43E-08			2.04E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.27E-01	2020	0.2	0.010	250	10	1.00E-06	70	3650	25550	8.96E-09	5.00E-02	1.79E-07	1.28E-09		
Antimony	4.95E-01	2020	0.2	0.001	250	10	1.00E-06	70	3650	25550	1.95E-09	4.00E-04	4.89E-06	2.79E-10		
Arsenic	8.02E+00	2020	0.2	0.001	250	10	1.00E-06	70	3650	25550	3.17E-08	3.00E-04	1.06E-04	4.53E-09	1.50E+00	6.80E-09
Barium	2.40E+02	2020	0.2	0.001	250	10	1.00E-06	70	3650	25550	9.48E-07	7.00E-02	1.35E-05	1.35E-07		
Cadmium	8.78E-01	2020	0.2	0.001	250	10	1.00E-06	70	3650	25550	3.47E-09	1.00E-03	3.47E-06	4.96E-10		
Nickel	2.39E+01	2020	0.2	0.001	250	10	1.00E-06	70	3650	25550	9.43E-08	2.00E-02	4.71E-06	1.35E-08		
												TOTAL HAZARD INDEX =	3.64E-04		TOTAL CANCER RISK =	7.20E-09

TABLE C-2-5

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.66E-01	100	350	70	1.00E-06	70	25550	25550	3.65E-07	5.00E-05	7.29E-03	3.65E-07		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	100	350	70	1.00E-06	70	25550	25550	4.60E-07	5.00E-04	9.20E-04	4.60E-07	3.00E-02	1.38E-08
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.97E-01	100	350	70	1.00E-06	70	25550	25550	8.17E-07	3.00E-03	2.72E-04	8.17E-07	1.10E-01	8.99E-08
Methyl-2,4,6-trinitrophenylnitramine	3.82E-01	100	350	70	1.00E-06	70	25550	25550	5.23E-07			5.23E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.88E-01	100	350	70	1.00E-06	70	25550	25550	3.94E-07	5.00E-02	7.88E-06	3.94E-07		
Antimony	5.39E-01	100	350	70	1.00E-06	70	25550	25550	7.38E-07	4.00E-04	1.85E-03	7.38E-07		
Arsenic	8.35E+00	100	350	70	1.00E-06	70	25550	25550	1.14E-05	3.00E-04	3.81E-02	1.14E-05	1.50E+00	1.72E-05
Barium	2.48E+02	100	350	70	1.00E-06	70	25550	25550	3.40E-04	7.00E-02	4.86E-03	3.40E-04		
Cadmium	1.01E+00	100	350	70	1.00E-06	70	25550	25550	1.39E-06	1.00E-03	1.39E 03	1.39E-06		
Nickel	2.47E+01	100	350	70	1.00E-06	70	25550	25550	3.39E-05	2.00E-02	1.69E-03	3.39E-05		
										TOTAL HAZARD INDEX =	5.64E-02		TOTAL CANCER RISK =	1.73E-05

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TABLE C-2-6

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.50E-01	50	350	9	1.00E-06	70	3285	25550	1.71E-07	5.00E-05	3.43E-03	2.20E-08		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	50	350	9	1.00E-06	70	3285	25550	2.30E-07	5.00E-04	4.60E-04	2.96E-08	3.00E-02	8.87E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.57E-01	50	350	9	1.00E-06	70	3285	25550	3.82E-07	3.00E-03	1.27E-04	4.91E-08	1.10E-01	5.40E-09
Methyl-2,4,6-trinitrophenylnitramine	3.62E-01	50	350	9	1.00E-06	70	3285	25550	2.48E-07			3.18E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.27E-01	50	350	9	1.00E-06	70	3285	25550	1.55E-07	5.00E-02	3.10E-06	2.00E-08		
Antimony	4.95E-01	50	350	9	1.00E-06	70	3285	25550	3.39E-07	4.00E-04	8.47E-04	4.35E-08		
Arsenic	8.02E+00	50	350	9	1.00E-06	70	3285	25550	5.49E-06	3.00E-04	1.83E-02	7.06E-07	1.50E+00	1.06E-06
Barium	2.40E+02	50	350	9	1.00E-06	70	3285	25550	1.64E-04	7.00E-02	2.35E-03	2.11E-05		
Cadmium	8.78E-01	50	350	9	1.00E-06	70	3285	25550	6.02E-07	1.00E-03	6.02E-04	7.74E-08		
Nickel	2.39E+01	50	350	9	1.00E-06	70	3285	25550	1.63E-05	2.00E-02	8.17E-04	2.10E-06		
										TOTAL HAZARD INDEX =	2.69E-02		TOTAL CANCER RISK =	1.07E-06

TABLE C-2-7

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.66E-01	5230	1.0	0.010	350	70	1.00E-06	70	25550	25550	1.91E-07	5.00E-05	3.81E-03	1.91E-07		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	5230	1.0	0.010	350	70	1.00E-06	70	25550	25550	2.41E-07	5.00E-04	4.81E-04	2.41E-07	3.00E-02	7.22E-09
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.97E-01	5230	1.0	0.010	350	70	1.00E-06	70	25550	25550	4.27E-07	3.00E-03	1.42E-04	4.27E-07	1.10E-01	4.70E-08
Methyl-2,4,6-trinitrophenylnitramine	3.82E-01	5230	1.0	0.010	350	70	1.00E-06	70	25550	25550	2.73E-07			2.73E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.88E-01	5230	1.0	0.010	350	70	1.00E-06	70	25550	25550	2.06E-07	5.00E-02	4.12E-06	2.06E-07		
Antimony	5.39E-01	5230	1.0	0.001	350	70	1.00E-06	70	25550	25550	3.86E-08	4.00E-04	9.66E-05	3.86E-08		
Arsenic	8.35E+00	5230	1.0	0.001	350	70	1.00E-06	70	25550	25550	5.98E-07	3.00E-04	1.99E-03	5.98E-07	1.50E+00	8.97E-07
Barium	2.48E+02	5230	1.0	0.001	350	70	1.00E-06	70	25550	25550	1.78E-05	7.00E-02	2.54E-04	1.78E-05		
Cadmium	1.01E+00	5230	1.0	0.001	350	70	1.00E-06	70	25550	25550	7.27E-08	1.00E-03	7.27E-05	7.27E-08		
Nickel	2.47E+01	5230	1.0	0.001	350	70	1.00E-06	70	25550	25550	1.77E-06	2.00E-02	8.86E-05	1.77E-06		
												TOTAL HAZARD INDEX =	6.95E-03		TOTAL CANCER RISK =	9.51E-07

TABLE C-2-8

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.50E-01	2020	0.2	0.010	350	9	1.00E-06	70	3285	25550	1.38E-08	5.00E-05	2.77E-04	1.78E-09		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	2020	0.2	0.010	350	9	1.00E-06	70	3285	25550	1.86E-08	5.00E-04	3.72E-05	2.39E-09	3.00E-02	7.17E-11
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.57E-01	2020	0.2	0.010	350	9	1.00E-06	70	3285	25550	3.08E-08	3.00E-03	1.03E-05	3.96E-09	1.10E-01	4.36E-10
Methyl-2,4,6-trinitrophenylnitramine	3.62E-01	2020	0.2	0.010	350	9	1.00E-06	70	3285	25550	2.00E-08			2.57E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.27E-01	2020	0.2	0.010	350	9	1.00E-06	70	3285	25550	1.25E-08	5.00E-02	2.51E-07	1.61E-09		
Antimony	4.95E-01	2020	0.2	0.001	350	9	1.00E-06	70	3285	25550	2.74E-09	4.00E-04	6.84E-06	3.52E-10		
Arsenic	8.02E+00	2020	0.2	0.001	350	9	1.00E-06	70	3285	25550	4.44E-08	3.00E-04	1.48E-04	5.71E-09	1.50E+00	8.56E-09
Barium	2.40E+02	2020	0.2	0.001	350	9	1.00E-06	70	3285	25550	1.33E-06	7.00E-02	1.90E-05	1.71E-07		
Cadmium	8.78E-01	2020	0.2	0.001	350	9	1.00E-06	70	3285	25550	4.86E-09	1.00E-03	4.86E-06	6.25E-10		
Nickel	2.39E+01	2020	0.2	0.001	350	9	1.00E-06	70	3285	25550	1.32E-07	2.00E-02	6.60E-06	1.70E-08		
												TOTAL HAZARD INDEX =	5.10E-04		TOTAL CANCER RISK =	9.07E-09

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TABLE C-2-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.66E-01	200	350	6	1.00E-06	15	2190	25550	3.40E-06	5.00E-05	6.81E-02	2.92E-07		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	200	350	6	1.00E-06	15	2190	25550	4.30E-06	5.00E-04	8.59E-03	3.68E-07	3.00E-02	1.10E-08
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.97E-01	200	350	6	1.00E-06	15	2190	25550	7.63E-06	3.00E-03	2.54E-03	6.54E-07	1.10E-01	7.19E-08
Methyl-2,4,6-trinitrophenylnitramine	3.82E-01	200	350	6	1.00E-06	15	2190	25550	4.88E-06			4.18E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.88E-01	200	350	6	1.00E-06	15	2190	25550	3.68E-06	5.00E-02	7.36E-05	3.15E-07		
Antimony	5.39E-01	200	350	6	1.00E-06	15	2190	25550	6.89E-06	4.00E-04	1.72E-02	5.91E-07		
Arsenic	8.35E+00	200	350	6	1.00E-06	15	2190	25550	1.07E-04	3.00E-04	3.56E-01	9.15E-06	1.50E+00	1.37E-05
Barium	2.48E+02	200	350	6	1.00E-06	15	2190	25550	3.18E-03	7.00E-02	4.54E-02	2.72E-04		
Cadmium	1.01E+00	200	350	6	1.00E-06	15	2190	25550	1.30E-05	1.00E-03	1.30E-02	1.11E-06		
Nickel	2.47E+01	200	350	6	1.00E-06	15	2190	25550	3.16E-04	2.00E-02	1.58E-02	2.71E-05		
										TOTAL HAZARD INDEX =	5.26E-01		TOTAL CANCER RISK =	1.38E-05

TABLE C-2-10

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.50E-01	100	350	6	1.00E-06	15	2190	25550	1.60E-06	5.00E-05	3.20E-02	1.37E-07		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	100	350	6	1.00E-06	15	2190	25550	2.15E-06	5.00E-04	4.30E-03	1.84E-07	3.00E-02	5.52E-09
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.57E-01	100	350	6	1.00E-06	15	2190	25550	3.56E-06	3.00E-03	1.19E-03	3.05E-07	1.10E-01	3.36E-08
Methyl-2,4,6-trinitrophenylnitramine	3.62E-01	100	350	6	1.00E-06	15	2190	25550	2.31E-06			1.98E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.27E-01	100	350	6	1.00E-06	15	2190	25550	1.45E-06	5.00E-02	2.90E-05	1.24E-07		
Antimony	4.95E-01	100	350	6	1.00E-06	15	2190	25550	3.16E-06	4.00E-04	7.90E-03	2.71E-07		
Arsenic	8.02E+00	100	350	6	1.00E-06	15	2190	25550	5.13E-05	3.00E-04	1.71E-01	4.40E-06	1.50E+00	6.59E-06
Barium	2.40E+02	100	350	6	1.00E-06	15	2190	25550	1.53E-03	7.00E-02	2.19E-02	1.31E-04		
Cadmium	8.78E-01	100	350	6	1.00E-06	15	2190	25550	5.62E-06	1.00E-03	5.62E-03	4.81E-07		
Nickel	2.39E+01	100	350	6	1.00E-06	15	2190	25550	1.52E-04	2.00E-02	7.62E-03	1.31E-05		
										TOTAL HAZARD INDEX =	2.51E-01		TOTAL CANCER RISK =	6.63E-06

TABLE C-2-11

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.66E-01	4331	1.0	0.010	350	6	1.00E-06	15	2190	25550	7.37E-07	5.00E-05	1.47E-02	6.32E-08		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	4331	1.0	0.010	350	6	1.00E-06	15	2190	25550	9.30E-07	5.00E-04	1.86E-03	7.97E-08	3.00E-02	2.39E-09
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.97E-01	4331	1.0	0.010	350	6	1.00E-06	15	2190	25550	1.65E-06	3.00E-03	5.51E-04	1.42E-07	1.10E-01	1.56E-08
Methyl-2,4,6-trinitrophenylnitramine	3.82E-01	4331	1.0	0.010	350	6	1.00E-06	15	2190	25550	1.06E-06			9.06E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.88E-01	4331	1.0	0.010	350	6	1.00E-06	15	2190	25550	7.97E-07	5.00E-02	1.59E-05	6.83E-08		
Antimony	5.39E-01	4331	1.0	0.001	350	6	1.00E-06	15	2190	25550	1.49E-07	4.00E-04	3.73E-04	1.28E-08		
Arsenic	8.35E+00	4331	1.0	0.001	350	6	1.00E-06	15	2190	25550	2.31E-06	3.00E-04	7.70E-03	1.98E-07	1.50E+00	2.97E-07
Barium	2.48E+02	4331	1.0	0.001	350	6	1.00E-06	15	2190	25550	6.88E-05	7.00E-02	9.82E-04	5.89E-06		
Cadmium	1.01E+00	4331	1.0	0.001	350	6	1.00E-06	15	2190	25550	2.81E-07	1.00E-03	2.81E-04	2.41E-08		
Nickel	2.47E+01	4331	1.0	0.001	350	6	1.00E-06	15	2190	25550	6.85E-06	2.00E-02	3.42E-04	5.87E-07		
												TOTAL HAZARD INDEX =	2.68E-02		TOTAL CANCER RISK =	3.15E-07

TABLE C-2-12

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.50E-01	1869	0.2	0.010	350	6	1.00E-06	15	2190	25550	5.98E-08	5.00E-05	1.20E-03	5.13E-09		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	1869	0.2	0.010	350	6	1.00E-06	15	2190	25550	8.03E-08	5.00E-04	1.61E-04	6.88E-09	3.00E-02	2.06E-10
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.57E-01	1869	0.2	0.010	350	6	1.00E-06	15	2190	25550	1.33E-07	3.00E-03	4.44E-05	1.14E-08	1.10E-01	1.26E-09
Methyl-2,4,6-trinitrophenylnitramine	3.62E-01	1869	0.2	0.010	350	6	1.00E-06	15	2190	25550	8.64E-08			7.41E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.27E-01	1869	0.2	0.010	350	6	1.00E-06	15	2190	25550	5.41E-08	5.00E-02	1.08E-06	4.64E-09		
Antimony	4.95E-01	1869	0.2	0.001	350	6	1.00E-06	15	2190	25550	1.18E-08	4.00E-04	2.95E-05	1.01E-09		
Arsenic	8.02E+00	1869	0.2	0.001	350	6	1.00E-06	15	2190	25550	1.92E-07	3.00E-04	6.39E-04	1.64E-08	1.50E+00	2.46E-08
Barium	2.40E+02	1869	0.2	0.001	350	6	1.00E-06	15	2190	25550	5.73E-06	7.00E-02	8.18E-05	4.91E-07		
Cadmium	8.78E-01	1869	0.2	0.001	350	6	1.00E-06	15	2190	25550	2.10E-08	1.00E-03	2.10E-05	1.80E-09		
Nickel	2.39E+01	1869	0.2	0.001	350	6	1.00E-06	15	2190	25550	5.70E-07	2.00E-02	2.85E-05	4.89E-08		
												TOTAL HAZARD INDEX =	2.20E-03		TOTAL CANCER RISK =	2.61E-08

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TABLE C-2-13

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.66E-01	100	24	70	1.00E-06	70	25550	25550	2.50E-08	5.00E-05	5.00E-04	2.50E-08		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	100	24	70	1.00E-06	70	25550	25550	3.16E-08	5.00E-04	6.31E-05	3.16E-08	3.00E-02	9.47E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.97E-01	100	24	70	1.00E-06	70	25550	25550	5.60E-08	3.00E-03	1.87E-05	5.60E-08	1.10E-01	6.16E-09
Methyl-2,4,6-trinitrophenylnitramine	3.82E-01	100	24	70	1.00E-06	70	25550	25550	3.58E-08			3.58E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.88E-01	100	24	70	1.00E-06	70	25550	25550	2.70E-08	5.00E-02	5.41E-07	2.70E-08		
Antimony	5.39E-01	100	24	70	1.00E-06	70	25550	25550	5.06E-08	4.00E-04	1.27E-04	5.06E-08		
Arsenic	8.35E+00	100	24	70	1.00E-06	70	25550	25550	7.84E-07	3.00E-04	2.61E-03	7.84E-07	1.50E+00	1.18E-06
Barium	2.48E+02	100	24	70	1.00E-06	70	25550	25550	2.33E-05	7.00E-02	3.33E-04	2.33E-05		
Cadmium	1.01E+00	100	24	70	1.00E-06	70	25550	25550	9.53E-08	1.00E-03	9.53E-05	9.53E-08		
Nickel	2.47E+01	100	24	70	1.00E-06	70	25550	25550	2.32E-06	2.00E-02	1.16E-04	2.32E-06		
										TOTAL HAZARD INDEX =	3.87E-03	TOTAL CANCER RISK =		1.18E-06

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TABLE C-2-14

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.50E-01	50	12	9	1.00E-06	70	3285	25550	5.88E-09	5.00E-05	1.18E-04	7.55E-10		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	50	12	9	1.00E-06	70	3285	25550	7.89E-09	5.00E-04	1.58E-05	1.01E-09	3.00E-02	3.04E-11
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.57E-01	50	12	9	1.00E-06	70	3285	25550	1.31E-08	3.00E-03	4.36E-06	1.68E-09	1.10E-01	1.85E-10
Methyl-2,4,6-trinitrophenylnitramine	3.62E-01	50	12	9	1.00E-06	70	3285	25550	8.49E-09			1.09E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.27E-01	50	12	9	1.00E-06	70	3285	25550	5.32E-09	5.00E-02	1.06E-07	6.84E-10		
Antimony	4.95E-01	50	12	9	1.00E-06	70	3285	25550	1.16E-08	4.00E-04	2.90E-05	1.49E-09		
Arsenic	8.02E+00	50	12	9	1.00E-06	70	3285	25550	1.88E-07	3.00E-04	6.28E-04	2.42E-08	1.50E+00	3.63E-08
Barium	2.40E+02	50	12	9	1.00E-06	70	3285	25550	5.63E-06	7.00E-02	8.04E-05	7.24E-07		
Cadmium	8.78E-01	50	12	9	1.00E-06	70	3285	25550	2.06E-08	1.00E-03	2.06E-05	2.65E-09		
Nickel	2.39E+01	50	12	9	1.00E-06	70	3285	25550	5.60E-07	2.00E-02	2.80E-05	7.20E-08		
										TOTAL HAZARD INDEX =	9.24E-04		TOTAL CANCER RISK =	3.65E-08

TABLE C-2-15

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.66E-01	5230	1.0	0.010	24	70	1.00E-06	70	25550	25550	1.31E-08	5.00E-05	2.62E-04	1.31E-08		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	5230	1.0	0.010	24	70	1.00E-06	70	25550	25550	1.65E-08	5.00E-04	3.30E-05	1.65E-08	3.00E-02	4.95E-10
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.97E-01	5230	1.0	0.010	24	70	1.00E-06	70	25550	25550	2.93E-08	3.00E-03	9.77E-06	2.93E-08	1.10E-01	3.22E-09
Methyl-2,4,6-trinitrophenylnitramine	3.82E-01	5230	1.0	0.010	24	70	1.00E-06	70	25550	25550	1.87E-08			1.87E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.88E-01	5230	1.0	0.010	24	70	1.00E-06	70	25550	25550	1.41E-08	5.00E-02	2.83E-07	1.41E-08		
Antimony	5.39E-01	5230	1.0	0.001	24	70	1.00E-06	70	25550	25550	2.65E-09	4.00E-04	6.62E-06	2.65E-09		
Arsenic	8.35E+00	5230	1.0	0.001	24	70	1.00E-06	70	25550	25550	4.10E-08	3.00E-04	1.37E-04	4.10E-08	1.50E+00	6.15E-08
Barium	2.48E+02	5230	1.0	0.001	24	70	1.00E-06	70	25550	25550	1.22E-06	7.00E-02	1.74E-05	1.22E-06		
Cadmium	1.01E+00	5230	1.0	0.001	24	70	1.00E-06	70	25550	25550	4.98E-09	1.00E-03	4.98E-06	4.98E-09		
Nickel	2.47E+01	5230	1.0	0.001	24	70	1.00E-06	70	25550	25550	1.21E-07	2.00E-02	6.07E-06	1.21E-07		
												TOTAL HAZARD INDEX =	4.76E-04		TOTAL CANCER RISK =	6.52E-08

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TABLE C-2-16

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.50E-01	2020	0.2	0.010	12	9	1.00E-06	70	3285	25550	4.75E-10	5.00E-05	9.50E-06	6.10E-11		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	2020	0.2	0.010	12	9	1.00E-06	70	3285	25550	6.37E-10	5.00E-04	1.27E-06	8.20E-11	3.00E-02	2.46E-12
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.57E-01	2020	0.2	0.010	12	9	1.00E-06	70	3285	25550	1.06E-09	3.00E-03	3.52E-07	1.36E-10	1.10E-01	1.50E-11
Methyl-2,4,6-trinitrophenylnitramine	3.62E-01	2020	0.2	0.010	12	9	1.00E-06	70	3285	25550	6.86E-10			8.82E-11		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.27E-01	2020	0.2	0.010	12	9	1.00E-06	70	3285	25550	4.30E-10	5.00E-02	8.60E-09	5.53E-11		
Antimony	4.95E-01	2020	0.2	0.001	12	9	1.00E-06	70	3285	25550	9.38E-11	4.00E-04	2.35E-07	1.21E-11		
Arsenic	8.02E+00	2020	0.2	0.001	12	9	1.00E-06	70	3285	25550	1.52E-09	3.00E-04	5.07E-06	1.96E-10	1.50E+00	2.94E-10
Barium	2.40E+02	2020	0.2	0.001	12	9	1.00E-06	70	3285	25550	4.55E-08	7.00E-02	6.50E-07	5.85E-09		
Cadmium	8.78E-01	2020	0.2	0.001	12	9	1.00E-06	70	3285	25550	1.67E-10	1.00E-03	1.67E-07	2.14E-11		
Nickel	2.39E+01	2020	0.2	0.001	12	9	1.00E-06	70	3285	25550	4.53E-09	2.00E-02	2.26E-07	5.82E-10		
												TOTAL HAZARD INDEX =	1.75E-05		TOTAL CANCER RISK =	3.11E-10

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TABLE C-2-17

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.66E-01	100	24	5	1.00E-06	37	1825	25550	4.73E-08	5.00E-05	9.46E-04	3.38E-09		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	100	24	5	1.00E-06	37	1825	25550	5.97E-08	5.00E-04	1.19E-04	4.26E-09	3.00E-02	1.28E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.97E-01	100	24	5	1.00E-06	37	1825	25550	1.06E-07	3.00E-03	3.53E-05	7.57E-09	1.10E-01	8.33E-10
Methyl-2,4,6-trinitrophenylnitramine	3.82E-01	100	24	5	1.00E-06	37	1825	25550	6.78E-08			4.84E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.88E-01	100	24	5	1.00E-06	37	1825	25550	5.11E-08	5.00E-02	1.02E-06	3.65E-09		
Antimony	5.39E-01	100	24	5	1.00E-06	37	1825	25550	9.58E-08	4.00E-04	2.39E-04	6.84E-09		
Arsenic	8.35E+00	100	24	5	1.00E-06	37	1825	25550	1.48E-06	3.00E-04	4.94E-03	1.06E-07	1.50E+00	1.59E-07
Barium	2.48E+02	100	24	5	1.00E-06	37	1825	25550	4.41E-05	7.00E-02	6.30E-04	3.15E-06		
Cadmium	1.01E+00	100	24	5	1.00E-06	37	1825	25550	1.80E-07	1.00E-03	1.80E-04	1.29E-08		
Nickel	2.47E+01	100	24	5	1.00E-06	37	1825	25550	4.39E-06	2.00E-02	2.20E-04	3.14E-07		
										TOTAL HAZARD INDEX =	7.32E-03		TOTAL CANCER RISK =	1.60E-07

TABLE C-2-18

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.50E-01	50	12	5	1.00E-06	37	1825	25550	1.11E-08	5.00E-05	2.22E-04	7.94E-10		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	50	12	5	1.00E-06	37	1825	25550	1.49E-08	5.00E-04	2.98E-05	1.07E-09	3.00E-02	3.20E-11
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.57E-01	50	12	5	1.00E-06	37	1825	25550	2.48E-08	3.00E-03	8.25E-06	1.77E-09	1.10E-01	1.94E-10
Methyl-2,4,6-trinitrophenylnitramine	3.62E-01	50	12	5	1.00E-06	37	1825	25550	1.61E-08			1.15E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.27E-01	50	12	5	1.00E-06	37	1825	25550	1.01E-08	5.00E-02	2.01E-07	7.19E-10		
Antimony	4.95E-01	50	12	5	1.00E-06	37	1825	25550	2.20E-08	4.00E-04	5.49E-05	1.57E-09		
Arsenic	8.02E+00	50	12	5	1.00E-06	37	1825	25550	3.56E-07	3.00E-04	1.19E-03	2.55E-08	1.50E+00	3.82E-08
Barium	2.40E+02	50	12	5	1.00E-06	37	1825	25550	1.06E-05	7.00E-02	1.52E-04	7.61E-07		
Cadmium	8.78E-01	50	12	5	1.00E-06	37	1825	25550	3.90E-08	1.00E-03	3.90E-05	2.79E-09		
Nickel	2.39E+01	50	12	5	1.00E-06	37	1825	25550	1.06E-06	2.00E-02	5.30E-05	7.57E-08		
										TOTAL HAZARD INDEX =	1.75E-03		TOTAL CANCER RISK =	3.84E-08

TABLE C-2-19

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.66E-01	4602	1.0	0.010	24	5	1.00E-06	37	1825	25550	2.18E-08	5.00E-05	4.35E-04	1.55E-09		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	4602	1.0	0.010	24	5	1.00E-06	37	1825	25550	2.75E-08	5.00E-04	5.49E-05	1.96E-09	3.00E-02	5.89E-11
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.97E-01	4602	1.0	0.010	24	5	1.00E-06	37	1825	25550	4.88E-08	3.00E-03	1.63E-05	3.48E-09	1.10E-01	3.83E-10
Methyl-2,4,6-trinitrophenylnitramine	3.82E-01	4602	1.0	0.010	24	5	1.00E-06	37	1825	25550	3.12E-08			2.23E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.88E-01	4602	1.0	0.010	24	5	1.00E-06	37	1825	25550	2.35E-08	5.00E-02	4.71E-07	1.68E-09		
Antimony	5.39E-01	4602	1.0	0.001	24	5	1.00E-06	37	1825	25550	4.41E-09	4.00E-04	1.10E-05	3.15E-10		
Arsenic	8.35E+00	4602	1.0	0.001	24	5	1.00E-06	37	1825	25550	6.83E-08	3.00E-04	2.28E-04	4.88E-09	1.50E+00	7.31E-09
Barium	2.48E+02	4602	1.0	0.001	24	5	1.00E-06	37	1825	25550	2.03E-06	7.00E-02	2.90E-05	1.45E-07		
Cadmium	1.01E+00	4602	1.0	0.001	24	5	1.00E-06	37	1825	25550	8.30E-09	1.00E-03	8.30E-06	5.93E-10		
Nickel	2.47E+01	4602	1.0	0.001	24	5	1.00E-06	37	1825	25550	2.02E-07	2.00E-02	1.01E-05	1.44E-08		
												TOTAL HAZARD INDEX =	7.93E-04		TOTAL CANCER RISK =	7.76E-09

TABLE C-2-20

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.50E-01	2005	0.2	0.010	12	5	1.00E-06	37	1825	25550	8.92E-10	5.00E-05	1.78E-05	6.37E-11		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	2005	0.2	0.010	12	5	1.00E-06	37	1825	25550	1.20E-09	5.00E-04	2.39E-06	8.55E-11	3.00E-02	2.56E-12
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.57E-01	2005	0.2	0.010	12	5	1.00E-06	37	1825	25550	1.99E-09	3.00E-03	6.62E-07	1.42E-10	1.10E-01	1.56E-11
Methyl-2,4,6-trinitrophenylnitramine	3.62E-01	2005	0.2	0.010	12	5	1.00E-06	37	1825	25550	1.29E-09			9.20E-11		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.27E-01	2005	0.2	0.010	12	5	1.00E-06	37	1825	25550	8.07E-10	5.00E-02	1.61E-08	5.77E-11		
Antimony	4.95E-01	2005	0.2	0.001	12	5	1.00E-06	37	1825	25550	1.76E-10	4.00E-04	4.41E-07	1.26E-11		
Arsenic	8.02E+00	2005	0.2	0.001	12	5	1.00E-06	37	1825	25550	2.86E-09	3.00E-04	9.53E-06	2.04E-10	1.50E+00	3.06E-10
Barium	2.40E+02	2005	0.2	0.001	12	5	1.00E-06	37	1825	25550	8.54E-08	7.00E-02	1.22E-06	6.10E-09		
Cadmium	8.78E-01	2005	0.2	0.001	12	5	1.00E-06	37	1825	25550	3.13E-10	1.00E-03	3.13E-07	2.24E-11		
Nickel	2.39E+01	2005	0.2	0.001	12	5	1.00E-06	37	1825	25550	8.50E-09	2.00E-02	4.25E-07	6.07E-10		
												TOTAL HAZARD INDEX =	3.28E-05		TOTAL CANCER RISK =	3.24E-10

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TABLE C-2-21

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene (TNB)	2.66E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1.3.,5-trinitro-1,3,5-triazine (RDX)	5.97E-01	0.20	21%	32%	47%	1.18	0.06	0.09	3.70E-02	0.40	350	70	70	25550	25550	2.03E-04	3.00E-03	6.75E-02	2.03E-04	1.10E-01	2.23E-05
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.82E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.88E-01	0.20	21%	32%	47%	0.32	NE	NB	3.87E-03	0.40	350	70	70	25550	25550	2.12E-05	5.00E-02	4.24E-04	2.12E-05		
																TOTAL HAZARD INDEX =		6.79E-02	TOTAL CANCER RISK =		2.23E-05

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991).
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997).
NE = Not evaluated in the plant uptake study
NB = No measurable bioconcentration

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.ABLE C-2-22

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(Flv x BCFlv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetable
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
Flv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFlv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	Flv	Frv	Fgf	BCFlv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)$^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene (TNB)	2.50E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.57E-01	0.20	21%	32%	47%	1.18	0.06	0.09	3.45E-02	0.25	350	9	70	3285	25550	1.18E-04	3.00E-03	3.94E-02	1.52E-05	1.10E-01	1.67E-06
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.62E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.27E-01	0.20	21%	32%	47%	0.32	NE	NB	3.05E-03	0.25	350	9	70	3285	25550	1.04E-05	5.00E-02	2.09E-04	1.34E-06		
																TOTAL HAZARD INDEX =		3.96E-02	TOTAL CANCER RISK =		1.67E-06

Note
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991).
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997).
NE = Not evaluated in the plant uptake study
NB = No measurable bioconcentration

.\BLE C-2-23

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NE'RASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RES'DENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(Flv x BCFlv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetable
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
Flv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFlv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	Flv	Frv	Fgf	BCFlv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)$^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene (TNB)	2.66E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.97E-01	0.10	10%	45%	45%	1.18	0.06	0.09	1.11E-02	0.40	350	6	15	2190	25550	2.83E-04	3.00E-03	9.44E-02	2.43E-05	1.10E-01	2.67E-06
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.82E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.88E-01	0.10	10%	45%	45%	0.32	N	NB	9.21E-04	0.40	350	6	15	2190	25550	2.35E-05	5.00E-02	4.71E-04	2.02E-06		
																	TOTAL HAZARD INDEX =	9.49E-02		TOTAL CANCER RISK =	2.67E-06

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991).

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997).

NE = Not evaluated in the plant uptake study

NB = No measurable bioconcentration

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.ABLE C-2-24

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(Flv x BCFlv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetable
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
Flv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFlv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	Flv	Frv	Fgf	BCFlv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene (TNB)	2.50E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	3.36E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3.,5-trinitro-1,3,5-triazine (RDX)	5.57E-01	0.10	10%	45%	45%	1.18	0.06	0.09	1.03E-02	0.25	350	6	15	2190	25550	1.65E-04	3.00E-03	5.51E-02	1.42E-05	1.10E-01	1.56E-06
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.62E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.27E-01	0.10	10%	45%	45%	0.32	NE	NB	7.25E-04	0.25	350	6	15	2190	25550	1.16E-05	5.00E-02	2.32E-04	9.93E-07		
																	TOTAL HAZARD INDEX =	5.54E-02		TOTAL CANCER RISK =	1.56E-06

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991).
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997).
NE = Not evaluated in the plant uptake study
NB = No measurable bioconcentration

TABLE C-3-1

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	50	250	25	1.00E-06	70	9125	25550	1.25E-07	5.00E-05	2.51E-03	4.48E-08		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	50	250	25	1.00E-06	70	9125	25550	2.47E-07	5.00E-04	4.95E-04	8.84E-08	3.00E-02	2.65E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.91E-01	50	250	25	1.00E-06	70	9125	25550	2.89E-07	3.00E-03	9.64E-05	1.03E-07	1.10E-01	1.14E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	3.02E-01	50	250	25	1.00E-06	70	9125	25550	1.48E-07	5.00E-02	2.95E-06	5.27E-08		
Antimony	3.25E-01	50	250	25	1.00E-06	70	9125	25550	1.59E-07	4.00E-04	3.97E-04	5.67E-08		
Barium	2.59E+02	50	250	25	1.00E-06	70	9125	25550	1.27E-04	7.00E-02	1.81E-03	4.52E-05		
Cadmium	6.09E-01	50	250	25	1.00E-06	70	9125	25550	2.98E-07	1.00E-03	2.98E-04	1.06E-07		
Mercury	9.51E-02	50	250	25	1.00E-06	70	9125	25550	4.65E-08	3.00E-04	1.55E-04	1.66E-08		
Nickel	2.57E+01	50	250	25	1.00E-06	70	9125	25550	1.26E-05	2.00E-02	6.29E-04	4.50E-06		
										TOTAL HAZARD INDEX =	6.39E-03		TOTAL CANCER RISK =	1.40E-08

TABLE C-3-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.40E-01	10	250	10	1.00E-06	70	3650	25550	2.35E-08	5.00E-05	4.70E-04	3.36E-09		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	10	250	10	1.00E-06	70	3650	25550	4.95E-08	5.00E-04	9.90E-05	7.07E-09	3.00E-02	2.12E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.84E-01	10	250	10	1.00E-06	70	3650	25550	5.71E-08	3.00E-03	1.90E-05	8.16E-09	1.10E-01	8.98E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	10	250	10	1.00E-06	70	3650	25550	2.72E-08	5.00E-02	5.43E-07	3.88E-09		
Antimony	3.11E-01	10	250	10	1.00E-06	70	3650	25550	3.05E-08	4.00E-04	7.62E-05	4.35E-09		
Barium	2.52E+02	10	250	10	1.00E-06	70	3650	25550	2.46E-05	7.00E-02	3.52E-04	3.52E-06		
Cadmium	5.13E-01	10	250	10	1.00E-06	70	3650	25550	5.02E-08	1.00E-03	5.02E-05	7.16E-09		
Mercury	9.14E-02	10	250	10	1.00E-06	70	3650	25550	8.94E-09	3.00E-04	2.98E-05	1.28E-09		
Nickel	2.46E+01	10	250	10	1.00E-06	70	3650	25550	2.41E-06	2.00E-02	1.20E-04	3.44E-07		
										TOTAL HAZARD INDEX =	1.22E-03		TOTAL CANCER RISK =	1.11E-09

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TABLE C-3-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	1.31E-06	5.00E-05	2.62E-02	4.68E-07		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	2.59E-06	5.00E-04	5.18E-03	9.25E-07	3.00E-02	2.77E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.91E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	3.03E-06	3.00E-03	1.01E-03	1.08E-06	1.10E-01	1.19E-07
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	3.02E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	1.54E-06	5.00E-02	3.09E-05	5.52E-07		
Antimony	3.25E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.66E-07	4.00E-04	4.15E-04	5.93E-08		
Barium	2.59E+02	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.33E-04	7.00E-02	1.89E-03	4.73E-05		
Cadmium	6.09E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	3.12E-07	1.00E-03	3.12E-04	1.11E-07		
Mercury	9.51E-02	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	4.87E-07	3.00E-04	1.62E-03	1.74E-07		
Nickel	2.57E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.32E-05	2.00E-02	6.58E-04	4.70E-06		
												TOTAL HAZARD INDEX =	3.73E-02		TOTAL CANCER RISK =	1.47E-07

TABLE C-3-4

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.40E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	9.50E-08	5.00E-05	1.90E-03	1.36E-08		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	2.00E-07	5.00E-04	4.00E-04	2.86E-08	3.00E-02	8.57E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.84E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	2.31E-07	3.00E-03	7.70E-05	3.30E-08	1.10E-01	3.63E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	1.10E-07	5.00E-02	2.19E-06	1.57E-08		
Antimony	3.11E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	1.23E-08	4.00E-04	3.08E-05	1.76E-09		
Barium	2.52E+02	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	9.95E-06	7.00E-02	1.42E-04	1.42E-06		
Cadmium	5.13E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	2.03E-08	1.00E-03	2.03E-05	2.89E-09		
Mercury	9.14E-02	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	3.61E-08	3.00E-04	1.20E-04	5.16E-09		
Nickel	2.46E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	9.72E-07	2.00E-02	4.86E-05	1.39E-07		
												TOTAL HAZARD INDEX =	2.74E-03		TOTAL CANCER RISK =	4.49E-09

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TABLE C-3-5

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	100	350	70	1.00E-06	70	25550	25550	3.51E-07	5.00E-05	7.02E-03	3.51E-07		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	100	350	70	1.00E-06	70	25550	25550	6.93E-07	5.00E-04	1.39E-03	6.93E-07	3.00E-02	2.08E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.91E-01	100	350	70	1.00E-06	70	25550	25550	8.10E-07	3.00E-03	2.70E-04	8.10E-07	1.10E-01	8.91E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	3.02E-01	100	350	70	1.00E-06	70	25550	25550	4.13E-07	5.00E-02	8.27E-06	4.13E-07		
Antimony	3.25E-01	100	350	70	1.00E-06	70	25550	25550	4.45E-07	4.00E-04	1.11E-03	4.45E-07		
Barium	2.59E+02	100	350	70	1.00E-06	70	25550	25550	3.55E-04	7.00E-02	5.07E-03	3.55E-04		
Cadmium	6.09E-01	100	350	70	1.00E-06	70	25550	25550	8.34E-07	1.00E-03	8.34E-04	8.34E-07		
Mercury	9.51E-02	100	350	70	1.00E-06	70	25550	25550	1.30E-07	3.00E-04	4.34E-04	1.30E-07		
Nickel	2.57E+01	100	350	70	1.00E-06	70	25550	25550	3.52E-05	2.00E-02	1.76E-03	3.52E-05		
										TOTAL HAZARD INDEX =	1.79E-02		TOTAL CANCER RISK =	1.10E-07

TABLE C-3-6

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.40E-01	50	350	9	1.00E-06	70	3285	25550	1.65E-07	5.00E-05	3.29E-03	2.12E-08		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	50	350	9	1.00E-06	70	3285	25550	3.46E-07	5.00E-04	6.93E-04	4.45E-08	3.00E-02	1.34E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.84E-01	50	350	9	1.00E-06	70	3285	25550	4.00E-07	3.00E-03	1.33E-04	5.14E-08	1.10E-01	5.66E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	50	350	9	1.00E-06	70	3285	25550	1.90E-07	5.00E-02	3.80E-06	2.44E-08		
Antimony	3.11E-01	50	350	9	1.00E-06	70	3285	25550	2.13E-07	4.00E-04	5.33E-04	2.74E-08		
Barium	2.52E+02	50	350	9	1.00E-06	70	3285	25550	1.72E-04	7.00E-02	2.46E-03	2.22E-05		
Cadmium	5.13E-01	50	350	9	1.00E-06	70	3285	25550	3.51E-07	1.00E-03	3.51E-04	4.51E-08		
Mercury	9.14E-02	50	350	9	1.00E-06	70	3285	25550	6.26E-08	3.00E-04	2.09E-04	8.04E-09		
Nickel	2.46E+01	50	350	9	1.00E-06	70	3285	25550	1.68E-05	2.00E-02	8.42E-04	2.17E-06		
										TOTAL HAZARD INDEX =	5.23E-03		TOTAL CANCER RISK =	6.99E-09

TABLE C-3-7

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.84E-06	5.00E-05	3.67E-02	1.84E-06		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	3.62E-06	5.00E-04	7.25E-03	3.62E-07	3.00E-02	1.09E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.91E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	4.24E-06	3.00E-03	1.41E-03	4.24E-07	1.10E-01	4.66E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	3.02E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	2.16E-06	5.00E-02	4.32E-05	2.16E-07		
Antimony	3.25E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	2.32E-07	4.00E-04	5.81E-04	2.32E-08		
Barium	2.59E+02	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.86E-04	7.00E-02	2.65E-03	1.86E-05		
Cadmium	6.09E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	4.36E-07	1.00E-03	4.36E-04	4.36E-08		
Mercury	9.51E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	6.81E-07	3.00E-04	2.27E-03	6.81E-09		
Nickel	2.57E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.84E-05	2.00E-02	9.22E-04	1.84E-06		
												TOTAL HAZARD INDEX =	5.23E-02		TOTAL CANCER RISK =	5.75E-08

TAb__ C-3-8

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Noncarcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.40E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.33E-07	5.00E-05	2.66E-03	1.71E-08		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	2.80E-07	5.00E-04	5.60E-04	3.60E-08	3.00E-02	1.08E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.84E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	3.23E-07	3.00E-03	1.08E-04	4.16E-08	1.10E-01	4.57E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.54E-07	5.00E-02	3.07E-06	1.97E-08		
Antimony	3.11E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.72E-08	4.00E-04	4.31E-05	2.22E-09		
Barium	2.52E+02	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.39E-05	7.00E-02	1.99E-04	1.79E-06		
Cadmium	5.13E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	2.84E-08	1.00E-03	2.84E-05	3.65E-09		
Mercury	9.14E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	5.06E-08	3.00E-04	1.69E-04	6.50E-09		
Nickel	2.46E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.36E-06	2.00E-02	6.81E-05	1.75E-07		
												TOTAL HAZARD INDEX =	3.84E-03		TOTAL CANCER RISK =	5.65E-09

TABLE C-3-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	200	350	6	1.00E-06	15	2190	25550	3.27E-06	5.00E-05	6.55E-02	2.81E-07		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	200	350	6	1.00E-06	15	2190	25550	6.47E-06	5.00E-04	1.29E-02	5.54E-07	3.00E-02	1.66E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.91E-01	200	350	6	1.00E-06	15	2190	25550	7.56E-06	3.00E-03	2.52E-03	6.48E-07	1.10E-01	7.13E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	3.02E-01	200	350	6	1.00E-06	15	2190	25550	3.86E-06	5.00E-02	7.72E-05	3.31E-07		
Antimony	3.25E-01	200	350	6	1.00E-06	15	2190	25550	4.15E-06	4.00E-04	1.04E-02	3.56E-07		
Barium	2.59E+02	200	350	6	1.00E-06	15	2190	25550	3.31E-03	7.00E-02	4.73E-02	2.84E-04		
Cadmium	6.09E-01	200	350	6	1.00E-06	15	2190	25550	7.79E-06	1.00E-03	7.79E-03	6.67E-07		
Mercury	9.51E-02	200	350	6	1.00E-06	15	2190	25550	1.22E-06	3.00E-04	4.05E-03	1.04E-07		
Nickel	2.57E+01	200	350	6	1.00E-06	15	2190	25550	3.29E-04	2.00E-02	1.64E-02	2.82E-05		
										TOTAL HAZARD INDEX =	1.01E-01		TOTAL CANCER RISK =	8.79E-08

TABLE C-3-10

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.40E-01	100	350	6	1.00E-06	15	2190	25550	1.54E-06	5.00E-05	3.07E-02	1.32E-07		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	100	350	6	1.00E-06	15	2190	25550	3.23E-06	5.00E-04	6.47E-03	2.77E-07	3.00E-02	8.32E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.84E-01	100	350	6	1.00E-06	15	2190	25550	3.73E-06	3.00E-03	1.24E-03	3.20E-07	1.10E-01	3.52E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	100	350	6	1.00E-06	15	2190	25550	1.77E-06	5.00E-02	3.55E-05	1.52E-07		
Antimony	3.11E-01	100	350	6	1.00E-06	15	2190	25550	1.99E-06	4.00E-04	4.98E-03	1.71E-07		
Barium	2.52E+02	100	350	6	1.00E-06	15	2190	25550	1.61E-03	7.00E-02	2.30E-02	1.38E-04		
Cadmium	5.13E-01	100	350	6	1.00E-06	15	2190	25550	3.28E-06	1.00E-03	3.28E-03	2.81E-07		
Mercury	9.14E-02	100	350	6	1.00E-06	15	2190	25550	5.84E-07	3.00E-04	1.95E-03	5.01E-08		
Nickel	2.46E+01	100	350	6	1.00E-06	15	2190	25550	1.57E-04	2.00E-02	7.86E-03	1.35E-05		
										TOTAL HAZARD INDEX =	4.88E-02		TOTAL CANCER RISK =	4.35E-08

TABLE C-3-11

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	7.09E-06	5.00E-05	1.42E-01	6.08E-07		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.40E-05	5.00E-04	2.80E-02	1.20E-06	3.00E-02	3.60E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.91E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.64E-05	3.00E-03	5.46E-03	1.40E-06	1.10E-01	1.54E-07
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	3.02E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	8.36E-06	5.00E-02	1.67E-04	7.16E-07		
Antimony	3.25E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	8.98E-07	4.00E-04	2.25E-03	7.70E-08		
Barium	2.59E+02	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	7.17E-04	7.00E-02	1.02E-02	6.15E-05		
Cadmium	6.09E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	1.69E-06	1.00E-03	1.69E-03	1.45E-07		
Mercury	9.51E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.63E-06	3.00E-04	8.78E-03	2.26E-07		
Nickel	2.57E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	7.12E-05	2.00E-02	3.56E-03	6.11E-06		
												TOTAL HAZARD INDEX =	2.02E-01		TOTAL CANCER RISK =	1.90E-07

TABLE C-3-12

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.40E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	5.74E-07	5.00E-05	1.15E-02	4.92E-08		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.21E-06	5.00E-04	2.42E-03	1.04E-07	3.00E-02	3.11E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.84E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.40E-06	3.00E-03	4.65E-04	1.20E-07	1.10E-01	1.32E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	6.63E-07	5.00E-02	1.33E-05	5.68E-08		
Antimony	3.11E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	7.44E-08	4.00E-04	1.86E-04	6.38E-09		
Barium	2.52E+02	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	6.02E-05	7.00E-02	8.59E-04	5.16E-06		
Cadmium	5.13E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.22E-07	1.00E-03	1.22E-04	1.05E-08		
Mercury	9.14E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.18E-07	3.00E-04	7.28E-04	1.87E-08		
Nickel	2.46E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	5.88E-06	2.00E-02	2.94E-04	5.04E-07		
												TOTAL HAZARD INDEX =	4.43E-04		TOTAL CANCER RISK =	1.63E-09

TABLE C-3-13

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	100	24	70	1.00E-06	70	25550	25550	2.41E-08	5.00E-05	4.81E-04	2.41E-08		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	100	24	70	1.00E-06	70	25550	25550	4.75E-08	5.00E-04	9.50E-05	4.75E-08	3.00E-02	1.43E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.91E-01	100	24	70	1.00E-06	70	25550	25550	5.55E-08	3.00E-03	1.85E-05	5.55E-08	1.10E-01	6.11E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	3.02E-01	100	24	70	1.00E-06	70	25550	25550	2.84E-08	5.00E-02	5.67E-07	2.84E-08		
Antimony	3.25E-01	100	24	70	1.00E-06	70	25550	25550	3.05E-08	4.00E-04	7.62E-05	3.05E-08		
Barium	2.59E+02	100	24	70	1.00E-06	70	25550	25550	2.43E-05	7.00E-02	3.47E-04	2.43E-05		
Cadmium	6.09E-01	100	24	70	1.00E-06	70	25550	25550	5.72E-08	1.00E-03	5.72E-05	5.72E-08		
Mercury	9.51E-02	100	24	70	1.00E-06	70	25550	25550	8.93E-09	3.00E-04	2.98E-05	8.93E-09		
Nickel	2.57E+01	100	24	70	1.00E-06	70	25550	25550	2.42E-06	2.00E-02	1.21E-04	2.42E-06		
										TOTAL HAZARD INDEX =	1.23E-03		TOTAL CANCER RISK =	7.53E-09

TABLE C-3-14

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.40E-01	50	12	9	1.00E-06	70	3285	25550	5.64E-09	5.00E-05	1.13E-04	7.25E-10		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	50	12	9	1.00E-06	70	3285	25550	1.19E-08	5.00E-04	2.38E-05	1.53E-09	3.00E-02	4.58E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.84E-01	50	12	9	1.00E-06	70	3285	25550	1.37E-08	3.00E-03	4.57E-06	1.76E-09	1.10E-01	1.94E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	50	12	9	1.00E-06	70	3285	25550	6.52E-09	5.00E-02	1.30E-07	8.38E-10		
Antimony	3.11E-01	50	12	9	1.00E-06	70	3285	25550	7.31E-09	4.00E-04	1.83E-05	9.40E-10		
Barium	2.52E+02	50	12	9	1.00E-06	70	3285	25550	5.91E-06	7.00E-02	8.45E-05	7.60E-07		
Cadmium	5.13E-01	50	12	9	1.00E-06	70	3285	25550	1.20E-08	1.00E-03	1.20E-05	1.55E-09		
Mercury	9.14E-02	50	12	9	1.00E-06	70	3285	25550	2.15E-09	3.00E-04	7.15E-06	2.76E-10		
Nickel	2.46E+01	50	12	9	1.00E-06	70	3285	25550	5.78E-07	2.00E-02	2.89E-05	7.43E-08		
										TOTAL HAZARD INDEX =	1.79E-04		TOTAL CANCER RISK =	2.40E-10

TABLE C-3-15

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.26E-07	5.00E-05	2.52E-03	1.26E-07		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.49E-07	5.00E-04	4.97E-04	2.49E-07	3.00E-02	7.46E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.91E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.90E-07	3.00E-03	9.68E-05	2.90E-07	1.10E-01	3.19E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	3.02E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.48E-07	5.00E-02	2.97E-06	1.48E-07		
Antimony	3.25E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.59E-08	4.00E-04	3.99E-05	1.59E-08		
Barium	2.59E+02	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.27E-05	7.00E-02	1.82E-04	1.27E-05		
Cadmium	6.09E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	2.99E-08	1.00E-03	2.99E-05	2.99E-08		
Mercury	9.51E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	4.67E-08	3.00E-04	1.56E-04	4.67E-08		
Nickel	2.57E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.26E-06	2.00E-02	6.32E-05	1.26E-06		
												TOTAL HAZARD INDEX =	3.58E-03		TOTAL CANCER RISK =	3.94E-08

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TAB[illegible]-3-16

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-[illegible]cinogenic [illegible]DI (mg/[illegible]g dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.40E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	4.56E-09	5.00E-05	9.12E-05	5.86E-10		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	9 60E-09	5.00E-04	1.92E-05	1.23E-09	3.00E-02	3.70E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.84E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	[illegible].11E-08	3.00E-03	3.69E-06	1.42E-09	1.10E-01	1.57E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	5.27E-09	5.00E-02	1.05E-07	6.77E-10		
Antimony	3.11E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	5.91E-10	4.00E-04	1.48E-06	7.60E-11		
Barium	2.52E+02	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	4.78E-07	7.00E-02	6.82E-06	6.14E-08		
Cadmium	5.13E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	9.73E-10	1.00E-03	9.73E-07	1.25E-10		
Mercury	9.14E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.73E-09	3.00E-04	5.78E-06	2.23E-10		
Nickel	2.46E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	4.67E-08	2.00E-02	2.33E-06	6.00E-09		
												TOTAL HAZARD INDEX =	1.32E-04		TOTAL CANCER RISK =	1.94E-10

TABLE C-3-17

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	100	24	5	1.00E-06	37	1825	25550	4.55E-08	5.00E-05	9.10E-04	3.25E-09		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	100	24	5	1.00E-06	37	1825	25550	8.99E-08	5.00E-04	1.80E-04	6.42E-09	3.00E-02	1.93E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.91E-01	100	24	5	1.00E-06	37	1825	25550	1.05E-07	3.00E-03	3.50E-05	7.50E-09	1.10E-01	8.25E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	3.02E-01	100	24	5	1.00E-06	37	1825	25550	5.36E-08	5.00E-02	1.07E-06	3.83E-09		
Antimony	3.25E-01	100	24	5	1.00E-06	37	1825	25550	5.77E-08	4.00E-04	1.44E-04	4.12E-09		
Barium	2.59E+02	100	24	5	1.00E-06	37	1825	25550	4.60E-05	7.00E-02	6.57E-04	3.29E-06		
Cadmium	6.09E-01	100	24	5	1.00E-06	37	1825	25550	1.08E-07	1.00E-03	1.08E-04	7.73E-09		
Mercury	9.51E-02	100	24	5	1.00E-06	37	1825	25550	1.69E-08	3.00E-04	5.63E-05	1.21E-09		
Nickel	2.57E+01	100	24	5	1.00E-06	37	1825	25550	4.57E-06	2.00E-02	2.29E-04	3.27E-07		
										TOTAL HAZARD INDEX =	1.41E-03		TOTAL CANCER RISK =	1.02E-09

TABLE C-3-18

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.40E-01	50	12	5	1.00E-06	37	1825	25550	1.07E-08	5.00E-05	2.13E-04	7.62E-10		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	50	12	5	1.00E-06	37	1825	25550	2.25E-08	5.00E-04	4.50E-05	1.61E-09	3.00E-02	4.82E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.84E-01	50	12	5	1.00E-06	37	1825	25550	2.59E-08	3.00E-03	8.65E-06	1.85E-09	1.10E-01	2.04E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	50	12	5	1.00E-06	37	1825	25550	1.23E-08	5.00E-02	2.47E-07	8.81E-10		
Antimony	3.11E-01	50	12	5	1.00E-06	37	1825	25550	1.38E-08	4.00E-04	3.46E-05	9.88E-10		
Barium	2.52E+02	50	12	5	1.00E-06	37	1825	25550	1.12E-05	7.00E-02	1.60E-04	7.99E-07		
Cadmium	5.13E-01	50	12	5	1.00E-06	37	1825	25550	2.28E-08	1.00E-03	2.28E-05	1.63E-09		
Mercury	9.14E-02	50	12	5	1.00E-06	37	1825	25550	4.06E-09	3.00E-04	1.35E-05	2.90E-10		
Nickel	2.46E+01	50	12	5	1.00E-06	37	1825	25550	1.09E-06	2.00E-02	5.46E-05	7.81E-08		
										TOTAL HAZARD INDEX =	3.39E-04		TOTAL CANCER RISK =	2.52E-10

TABLE C-3-19

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.09E-07	5.00E-05	4.19E-03	1.50E-08		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	4.14E-07	5.00E-04	8.27E-04	2.96E-08	3.00E-02	8.87E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.91E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	4.83E-07	3.00E-03	1.61E-04	3.45E-08	1.10E-01	3.80E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	3.02E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.47E-07	5.00E-02	4.94E-06	1.76E-08		
Antimony	3.25E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.65E-08	4.00E-04	6.63E-05	1.90E-09		
Barium	2.59E+02	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.12E-05	7.00E-02	3.03E-04	1.51E-06		
Cadmium	6.09E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	4.98E-08	1.00E-03	4.98E-05	3.56E-09		
Mercury	9.51E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	7.78E-08	3.00E-04	2.59E-04	5.56E-09		
Nickel	2.57E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.10E-06	2.00E-02	1.05E-04	1.50E-07		
												TOTAL HAZARD INDEX =	5.97E-03		TOTAL CANCER RISK =	4.69E-09

TABLE C-3-20

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Contaminants of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.40E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	8.56E-09	5.00E-05	1.71E-04	6.11E-10		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.80E-08	5.00E-04	3.61E-05	1.29E-09	3.00E-02	3.86E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.84E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.08E-08	3.00E-03	6.94E-06	1.49E-09	1.10E-01	1.64E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	9.89E-09	5.00E-02	1.98E-07	7.06E-10		
Antimony	3.11E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.11E-09	4.00E-04	2.77E-06	7.93E-11		
Barium	2.52E+02	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	8.97E-07	7.00E-02	1.28E-05	6.41E-08		
Cadmium	5.13E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.83E-09	1.00E-03	1.83E-06	1.30E-10		
Mercury	9.14E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.26E-09	3.00E-04	1.09E-05	2.33E-10		
Nickel	2.46E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	8.76E-08	2.00E-02	4.38E-06	6.26E-09		
												TOTAL HAZARD INDEX =	2.47E-04		TOTAL CANCER RISK =	2.02E-10

ıABLE C-3-21

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene (TNB)	2.56E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.91E-01	0.20	21%	32%	47%	1.18	0.06	0.09	3.66E-02	0.40	350	70	70	25550	25550	2.01E-04	3.00E-03	6.69E-02	2.01E-04	1.10E-01	2.21E-05
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	3.02E-01	0.20	21%	32%	47%	0.32	NE	NB	4.06E-03	0.40	350	70	70	25550	25550	2.22E-05	5.00E-02	4.45E-04	2.22E-05		
																	TOTAL HAZARD INDEX =	6.73E-02		TOTAL CANCER RISK =	2.21E-05

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)
NE = Not Evaluated in the plant uptake study
NB - No measurable bioconcentration

‹ABLE C-3-22

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFlv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFlv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFlv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)$^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene (TNB)	2.40E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.84E-01	0.20	21%	32%	47%	1.18	0.06	0.09	3.62E-02	0.25	350	9	70	3285	25550	1.24E-04	3.00E-03	4.13E-02	1.59E-05	1.10E-01	1.75E-06
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	0.20	21%	32%	47%	0.32	NE	NB	3.73E-03	0.25	350	9	70	3285	25550	1.28E-05	5.00E-02	2.55E-04	1.64E-06		
																	TOTAL HAZARD INDEX =	4.16E-02		TOTAL CANCER RISK =	1.75E-06

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)
NE = Not Evaluated in the plant uptake study
NB = No measurable bioconcentration

,ABLE C-3-23

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene (TNB)	2.56E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.91E-01	0.10	10%	45%	45%	1.18	0.06	0.09	1.10E-02	0.40	350	6	15	2190	25550	2.81E-04	3.00E-03	9.36E-02	2.41E-05	1.10E-01	2.65E-06
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	3.02E-01	0.10	10%	45%	45%	0.32	NE	NB	9.66E-04	0.40	350	6	15	2190	25550	2.47E-05	5.00E-02	4.94E-04	2.12E-06		
																	TOTAL HAZARD INDEX =	9.41E-02		TOTAL CANCER RISK =	2.65E-06

Note

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE - Not Evaluated in the plant uptake study

NB - No measurable bioconcentration

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.ABLE C-3-24

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT' or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)$^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene (TNB)	2.40E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	5.06E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.84E-01	0.10	10%	45%	45%	1.18	0.06	0.09	1.08E-02	0.25	350	6	15	2190	25550	1.73E-04	3.00E-03	5.78E-02	1.49E-05	1.10E-01	1.63E-06
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	0.10	10%	45%	45%	0.32	NE	NB	8.88E-04	0.25	350	6	15	2190	25550	1.42E-05	5.00E-02	2.84E-04	1.22E-06		
																	TOTAL HAZARD INDEX =	5.81E-02		TOTAL CANCER RISK =	1.63E-06

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)
NE = Not Evaluated in the plant uptake study
NB = No measurable bioconcentration

TAbLE C-4-1

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0-2 FEET)

ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.94E-01	50	250	25	1.00E-06	70	9125	25550	1.44E-07	5.00E-04	2.88E-04	5.13E-08	3.00E-02	1.54E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.79E-01	50	250	25	1.00E-06	70	9125	25550	2.35E-07	3.00E-03	7.82E-05	8.38E-08	1.10E-01	9.22E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.93E-01	50	250	25	1.00E-06	70	9125	25550	1.43E-07	5.00E-02	2.87E-06	5.12E-08		
Antimony	3.49E-01	50	250	25	1.00E-06	70	9125	25550	1.71E-07	4.00E-04	4.27E-04	6.10E-08		
Arsenic	8.07E+00	50	250	25	1.00E-06	70	9125	25550	3.95E-06	3.00E-04	1.32E-02	1.41E-06	1.50E+00	2.12E-06
Cadmium	6.88E-01	50	250	25	1.00E-06	70	9125	25550	3.36E-07	1.00E-03	3.36E-04	1.20E-07		
Mercury	1.02E-01	50	250	25	1.00E-06	70	9125	25550	4.97E-08	3.00E-04	1.66E-04	1.78E-08		
Nickel	2.43E+01	50	250	25	1.00E-06	70	9125	25550	1.19E-05	2.00E-02	5.94E-04	4.24E-06		
										TOTAL HAZARD INDEX =	1.51E-02		TOTAL CANCER RISK =	2.13E-06

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TABLE C-4-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.75E-01	10	250	10	1.00E-06	70	3650	25550	2.69E-08	5.00E-04	5.39E-05	3.85E-09	3.00E-02	1.15E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.34E-01	10	250	10	1.00E-06	70	3650	25550	4.25E-08	3.00E-03	1.42E-05	6.07E-09	1.10E-01	6.68E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.75E-01	10	250	10	1.00E-06	70	3650	25550	2.69E-08	5.00E-02	5.38E-07	3.84E-09		
Antimony	3.30E-01	10	250	10	1.00E-06	70	3650	25550	3.23E-08	4.00E-04	8.08E-05	4.62E-09		
Arsenic	7.67E+00	10	250	10	1.00E-06	70	3650	25550	7.50E-07	3.00E-04	2.50E-03	1.07E-07	1.50E+00	1.61E-07
Cadmium	6.27E-01	10	250	10	1.00E-06	70	3650	25550	6.14E-08	1.00E-03	6.14E-05	8.77E-09		
Mercury	9.51E-02	10	250	10	1.00E-06	70	3650	25550	9.31E-09	3.00E-04	3.10E-05	1.33E-09		
Nickel	2.33E+01	10	250	10	1.00E-06	70	3650	25550	2.28E-06	2.00E-02	1.14E-04	3.26E-07		
										TOTAL HAZARD INDEX =	2.86E-03		TOTAL CANCER RISK =	1.62E-07

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TABLE C-4-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.94E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	1.50E-06	5.00E-04	3.01E-03	5.37E-07	3.00E-02	1.61E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.79E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	2.45E-06	3.00E-03	8.18E-04	8.76E-07	1.10E-01	9.64E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.93E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	1.50E-06	5.00E-02	3.00E-05	5.35E-07		
Antimony	3.49E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.79E-07	4.00E-04	4.46E-04	6.38E-08		
Arsenic	8.07E+00	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	4.13E-06	3.00E-04	1.38E-02	1.48E-06	1.50E+00	2.21E-06
Cadmium	6.88E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	3.52E-07	1.00E-03	3.52E-04	1.26E-07		
Mercury	1.02E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	5.20E-07	3.00E-04	1.73E-03	1.86E-07		
Nickel	2.43E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.24E-05	2.00E-02	6.21E-04	4.44E-06		
												TOTAL HAZARD INDEX =	2.08E-02		TOTAL CANCER RISK =	2.33E-06

TA... C-4-4

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.75E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	1.09E-07	5.00E-04	2.18E-04	1.56E-08	3.00E-02	4.67E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.34E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	1.72E-07	3.00E-03	5.72E-05	2.45E-08	1.10E-01	2.70E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.75E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	1.09E-07	5.00E-02	2.17E-06	1.55E-08		
Antimony	3.30E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	1.31E-08	4.00E-04	3.27E-05	1.87E-09		
Arsenic	7.67E+00	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	3.03E-07	3.00E-04	1.01E-03	4.33E-08	1.50E+00	6.49E-08
Cadmium	6.27E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	2.48E-08	1.00E-03	2.48E-05	3.54E-09		
Mercury	9.51E-02	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	3.76E-08	3.00E-04	1.25E-04	5.37E-09		
Nickel	2.33E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	9.22E-07	2.00E-02	4.61E-05	1.32E-07		

TOTAL HAZARD INDEX = 1.52E-03 TOTAL CANCER RISK = 6.81E-08

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Table C-4-5

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.94E-01	100	350	70	1.00E-06	70	25550	25550	4.03E-07	5.00E-04	8.05E-04	4.03E-07	3.00E-02	1.21E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.79E-01	100	350	70	1.00E-06	70	25550	25550	6.57E-07	3.00E-03	2.19E-04	6.57E-07	1.10E-01	7.23E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.93E-01	100	350	70	1.00E-06	70	25550	25550	4.01E-07	5.00E-02	8.03E-06	4.01E-07		
Antimony	3.49E-01	100	350	70	1.00E-06	70	25550	25550	4.78E-07	4.00E-04	1.19E-03	4.78E-07		
Arsenic	8.07E+00	100	350	70	1.00E-06	70	25550	25550	1.11E-05	3.00E-04	3.69E-02	1.11E-05	1.50E+00	1.66E-05
Cadmium	6.88E-01	100	350	70	1.00E-06	70	25550	25550	9.42E-07	1.00E-03	9.42E-04	9.42E-07		
Mercury	1.02E-01	100	350	70	1.00E-06	70	25550	25550	1.39E-07	3.00E-04	4.64E-04	1.39E-07		
Nickel	2.43E+01	100	350	70	1.00E-06	70	25550	25550	3.33E-05	2.00E-02	1.66E-03	3.33E-05		
										TOTAL HAZARD INDEX =	4.22E-02		TOTAL CANCER RISK =	1.67E-05

TABLE C-4-6

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.75E-01	50	350	9	1.00E-06	70	3285	25550	1.89E-07	5.00E-04	3.77E-04	2.43E-08	3.00E-02	7.28E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.34E-01	50	350	9	1.00E-06	70	3285	25550	2.97E-07	3.00E-03	9.91E-05	3.82E-08	1.10E-01	4.21E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.75E-01	50	350	9	1.00E-06	70	3285	25550	1.88E-07	5.00E-02	3.76E-06	2.42E-08		
Antimony	3.30E-01	50	350	9	1.00E-06	70	3285	25550	2.26E-07	4.00E-04	5.66E-04	2.91E-08		
Arsenic	7.67E+00	50	350	9	1.00E-06	70	3285	25550	5.25E-06	3.00E-04	1.75E-02	6.75E-07	1.50E+00	1.01E-06
Cadmium	6.27E-01	50	350	9	1.00E-06	70	3285	25550	4.30E-07	1.00E-03	4.30E-04	5.52E-08		
Mercury	9.51E-02	50	350	9	1.00E-06	70	3285	25550	6.51E-08	3.00E-04	2.17E-04	8.38E-09		
Nickel	2.33E+01	50	350	9	1.00E-06	70	3285	25550	1.60E-05	2.00E-02	7.99E-04	2.05E-06		
										TOTAL HAZARD INDEX =	2.00E-02		TOTAL CANCER RISK =	1.02E-06

TABLE C-4-7

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.94E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	2.11E-06	5.00E-04	4.21E-03	2.11E-06	3.00E-02	6.32E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.79E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	3.44E-06	3.00E-03	1.15E-03	3.44E-06	1.10E-01	3.78E-07
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.93E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	2.10E-06	5.00E-02	4.20E-05	2.10E-06		
Antimony	3.49E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	2.50E-07	4.00E-04	6.25E-04	2.50E-07		
Arsenic	8.07E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	5.78E-06	3.00E-04	1.93E-02	5.78E-06	1.50E+00	8.67E-06
Cadmium	6.88E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	4.93E-07	1.00E-03	4.93E-04	4.93E-07		
Mercury	1.02E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	7.28E-07	3.00E-04	2.43E-03	7.28E-07		
Nickel	2.43E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.74E-05	2.00E-02	8.70E-04	1.74E-05		
												TOTAL HAZARD INDEX =	2.91E-02		TOTAL CANCER RISK =	9.12E-06

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MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.75E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.52E-07	5.00E-04	3.05E-04	1.96E-08	3.00E-02	5.88E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.34E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	2.40E-07	3.00E-03	8.01E-05	3.09E-08	1.10E-01	3.40E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.75E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.52E-07	5.00E-02	3.04E-06	1.96E-08		
Antimony	3.30E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.83E-08	4.00E-04	4.57E-05	2.35E-09		
Arsenic	7.67E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.24E-07	3.00E-04	1.41E-03	5.45E-08	1.50E+00	8.18E-08
Cadmium	6.27E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	3.47E-08	1.00E-03	3.47E-05	4.46E-09		
Mercury	9.51E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	5.26E-08	3.00E-04	1.75E-04	6.77E-09		
Nickel	2.33E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.29E-06	2.00E-02	6.45E-05	1.66E-07		
												TOTAL HAZARD INDEX =	2.12E-03		TOTAL CANCER RISK =	8.58E-08

TABLE C-4-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.94E-01	200	350	6	1.00E-06	15	2190	25550	3.76E-06	5.00E-04	7.51E-03	3.22E-07	3.00E-02	9.66E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.79E-01	200	350	6	1.00E-06	15	2190	25550	6.13E-06	3.00E-03	2.04E-03	5.25E-07	1.10E-01	5.78E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.93E-01	200	350	6	1.00E-06	15	2190	25550	3.75E-06	5.00E-02	7.49E-05	3.21E-07		
Antimony	3.49E-01	200	350	6	1.00E-06	15	2190	25550	4.46E-06	4.00E-04	1.12E-02	3.82E-07		
Arsenic	8.07E+00	200	350	6	1.00E-06	15	2190	25550	1.03E-04	3.00E-04	3.44E-01	8.85E-06	1.50E+00	1.33E-05
Cadmium	6.88E-01	200	350	6	1.00E-06	15	2190	25550	8.79E-06	1.00E-03	8.79E-03	7.54E-07		
Mercury	1.02E-01	200	350	6	1.00E-06	15	2190	25550	1.30E-06	3.00E-04	4.33E-03	1.11E-07		
Nickel	2.43E+01	200	350	6	1.00E-06	15	2190	25550	3.10E-04	2.00E-02	1.55E-02	2.66E-05		
										TOTAL HAZARD INDEX =	3.93E-01		TOTAL CANCER RISK =	1.33E-05

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TABLE C-4-10

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.75E-01	100	350	6	1.00E-06	15	2190	25550	1.76E-06	5.00E-04	3.52E-03	1.51E-07	3.00E-02	4.53E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.34E-01	100	350	6	1.00E-06	15	2190	25550	2.78E-06	3.00E-03	9.25E-04	2.38E-07	1.10E-01	2.62E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.75E-01	100	350	6	1.00E-06	15	2190	25550	1.76E-06	5.00E-02	3.51E-05	1.51E-07		
Antimony	3.30E-01	100	350	6	1.00E-06	15	2190	25550	2.11E-06	4.00E-04	5.28E-03	1.81E-07		
Arsenic	7.67E+00	100	350	6	1.00E-06	15	2190	25550	4.90E-05	3.00E-04	1.63E-01	4.20E-06	1.50E+00	6.30E-06
Cadmium	6.27E-01	100	350	6	1.00E-06	15	2190	25550	4.01E-06	1.00E-03	4.01E-03	3.44E-07		
Mercury	9.51E-02	100	350	6	1.00E-06	15	2190	25550	6.08E-07	3.00E-04	2.03E-03	5.21E-08		
Nickel	2.33E+01	100	350	6	1.00E-06	15	2190	25550	1.49E-04	2.00E-02	7.45E-03	1.28E-05		
										TOTAL HAZARD INDEX =	1.87E-01		TOTAL CANCER RISK =	6.33E-06

TABLE C-4-11

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.94E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	8.14E-06	5.00E-04	1.63E-02	6.97E-07	3.00E-02	2.09E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.79E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.33E-05	3.00E-03	4.43E-03	1.14E-06	1.10E-01	1.25E-07
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.93E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	8.11E-06	5.00E-02	1.62E-04	6.95E-07		
Antimony	3.49E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	9.66E-07	4.00E-04	2.42E-03	8.28E-08		
Arsenic	8.07E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.23E-05	3.00E-04	7.45E-02	1.92E-06	1.50E+00	2.87E-06
Cadmium	6.88E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	1.90E-06	1.00E-03	1.90E-03	1.63E-07		
Mercury	1.02E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.81E-06	3.00E-04	9.38E-03	2.41E-07		
Nickel	2.43E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	6.72E-05	2.00E-02	3.36E-03	5.76E-06		
												TOTAL HAZARD INDEX =	1.12E-01		TOTAL CANCER RISK =	3.02E-06

TABLE C-4-12

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.75E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	6.58E-07	5.00E-04	1.32E-03	5.64E-08	3.00E-02	1.69E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.34E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.04E-06	3.00E-03	3.46E-04	8.89E-08	1.10E-01	9.78E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.75E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	6.57E-07	5.00E-02	1.31E-05	5.63E-08		
Antimony	3.30E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	7.90E-08	4.00E-04	1.97E-04	6.77E-09		
Arsenic	7.67E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.83E-06	3.00E-04	6.11E-03	1.57E-07	1.50E+00	2.36E-07
Cadmium	6.27E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.50E-07	1.00E-03	1.50E-04	1.28E-08		
Mercury	9.51E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.27E-07	3.00E-04	7.58E-04	1.95E-08		
Nickel	2.33E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	5.57E-06	2.00E-02	2.79E-04	4.78E-07		
												TOTAL HAZARD INDEX =	9.16E-03		TOTAL CANCER RISK =	2.47E-07

TABLE C-4-13

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.94E-01	100	24	70	1.00E-06	70	25550	25550	2.76E-08	5.00E-04	5.52E-05	2.76E-08	3.00E-02	8.28E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.79E-01	100	24	70	1.00E-06	70	25550	25550	4.50E-08	3.00E-03	1.50E-05	4.50E-08	1.10E-01	4.95E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.93E-01	100	24	70	1.00E-06	70	25550	25550	2.75E-08	5.00E-02	5.50E-07	2.75E-08		
Antimony	3.49E-01	100	24	70	1.00E-06	70	25550	25550	3.28E-08	4.00E-04	8.19E-05	3.28E-08		
Arsenic	8.07E+00	100	24	70	1.00E-06	70	25550	25550	7.58E-07	3.00E-04	2.53E-03	7.58E-07	1.50E+00	1.14E-06
Cadmium	6.88E-01	100	24	70	1.00E-06	70	25550	25550	6.46E-08	1.00E-03	6.46E-05	6.46E-08		
Mercury	1.02E-01	100	24	70	1.00E-06	70	25550	25550	9.54E-09	3.00E-04	3.18E-05	9.54E-09		
Nickel	2.43E+01	100	24	70	1.00E-06	70	25550	25550	2.28E-06	2.00E-02	1.14E-04	2.28E-06		
										TOTAL HAZARD INDEX =	2.89E-03		TOTAL CANCER RISK =	1.14E-06

TABLE C-4-14

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.75E-01	50	12	9	1.00E-06	70	3285	25550	6.47E-09	5.00E-04	1.29E-05	8.31E-10	3.00E-02	2.49E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.34E-01	50	12	9	1.00E-06	70	3285	25550	1.02E-08	3.00E-03	3.40E-06	1.31E-09	1.10E-01	1.44E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.75E-01	50	12	9	1.00E-06	70	3285	25550	6.45E-09	5.00E-02	1.29E-07	8.30E-10		
Antimony	3.30E-01	50	12	9	1.00E-06	70	3285	25550	7.76E-09	4.00E-04	1.94E-05	9.98E-10		
Arsenic	7.67E+00	50	12	9	1.00E-06	70	3285	25550	1.80E-07	3.00E-04	6.00E-04	2.31E-08	1.50E+00	3.47E-08
Cadmium	6.27E-01	50	12	9	1.00E-06	70	3285	25550	1.47E-08	1.00E-03	1.47E-05	1.89E-09		
Mercury	9.51E-02	50	12	9	1.00E-06	70	3285	25550	2.23E-09	3.00E-04	7.45E-06	2.87E-10		
Nickel	2.33E+01	50	12	9	1.00E-06	70	3285	25550	5.48E-07	2.00E-02	2.74E-05	7.04E-08		
										TOTAL HAZARD INDEX =	6.85E-04		TOTAL CANCER RISK =	3.49E-08

TABLE C-4-15

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.94E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.44E-07	5.00E-04	2.89E-04	1.44E-07	3.00E-02	4.33E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.79E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.36E-07	3.00E-03	7.85E-05	2.36E-07	1.10E-01	2.59E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.93E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.44E-07	5.00E-02	2.88E-06	1.44E-07		
Antimony	3.49E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.71E-08	4.00E-04	4.29E-05	1.71E-08		
Arsenic	8.07E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	3.97E-07	3.00E-04	1.32E-03	3.97E-07	1.50E+00	5.95E-07
Cadmium	6.88E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	3.38E-08	1.00E-03	3.38E-05	3.38E-08		
Mercury	1.02E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	4.99E-08	3.00E-04	1.66E-04	4.99E-08		
Nickel	2.43E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.19E-06	2.00E-02	5.96E-05	1.19E-06		
												TOTAL HAZARD INDEX =	1.99E-03		TOTAL CANCER RISK =	6.25E-07

TABLE C-4-16

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.75E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	5.23E-09	5.00E-04	1.05E-05	6.72E-10	3.00E-02	2.02E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.34E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	8.24E-09	3.00E-03	2.75E-06	1.06E-09	1.10E-01	1.16E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.75E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	5.21E-09	5.00E-02	1.04E-07	6.70E-10		
Antimony	3.30E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	6.27E-10	4.00E-04	1.57E-06	8.06E-11		
Arsenic	7.67E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.45E-08	3.00E-04	4.85E-05	1.87E-09	1.50E+00	2.81E-09
Cadmium	6.27E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.19E-09	1.00E-03	1.19E-06	1.53E-10		
Mercury	9.51E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.80E-09	3.00E-04	6.02E-06	2.32E-10		
Nickel	2.33E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	4.43E-08	2.00E-02	2.21E-06	5.69E-09		
												TOTAL HAZARD INDEX =	6.74E-06		TOTAL CANCER RISK =	2.94E-10

TABLE C-4-17

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.94E-01	100	24	5	1.00E-06	37	1825	25550	5.22E-08	5.00E-04	1.04E-04	3.73E-09	3.00E-02	1.12E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.79E-01	100	24	5	1.00E-06	37	1825	25550	8.52E-08	3.00E-03	2.84E-05	6.09E-09	1.10E-01	6.70E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.93E-01	100	24	5	1.00E-06	37	1825	25550	5.21E-08	5.00E-02	1.04E-06	3.72E-09		
Antimony	3.49E-01	100	24	5	1.00E-06	37	1825	25550	6.20E-08	4.00E-04	1.55E-04	4.43E-09		
Arsenic	8.07E+00	100	24	5	1.00E-06	37	1825	25550	1.43E-06	3.00E-04	4.78E-03	1.02E-07	1.50E+00	1.54E-07
Cadmium	6.88E-01	100	24	5	1.00E-06	37	1825	25550	1.22E-07	1.00E-03	1.22E-04	8.73E-09		
Mercury	1.02E-01	100	24	5	1.00E-06	37	1825	25550	1.81E-08	3.00E-04	6.02E-05	1.29E-09		
Nickel	2.43E+01	100	24	5	1.00E-06	37	1825	25550	4.31E-06	2.00E-02	2.16E-04	3.08E-07		
										TOTAL HAZARD INDEX =	5.47E-03		TOTAL CANCER RISK =	1.54E-07

TABLE C-4-18

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.75E-01	50	12	5	1.00E-06	37	1825	25550	1.22E-08	5.00E-04	2.45E-05	8.74E-10	3.00E-02	2.62E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.34E-01	50	12	5	1.00E-06	37	1825	25550	1.93E-08	3.00E-03	6.43E-06	1.38E-09	1.10E-01	1.52E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.75E-01	50	12	5	1.00E-06	37	1825	25550	1.22E-08	5.00E-02	2.44E-07	8.72E-10		
Antimony	3.30E-01	50	12	5	1.00E-06	37	1825	25550	1.47E-08	4.00E-04	3.67E-05	1.05E-09		
Arsenic	7.67E+00	50	12	5	1.00E-06	37	1825	25550	3.41E-07	3.00E-04	1.14E-03	2.43E-08	1.50E+00	3.65E-08
Cadmium	6.27E-01	50	12	5	1.00E-06	37	1825	25550	2.79E-08	1.00E-03	2.79E-05	1.99E-09		
Mercury	9.51E-02	50	12	5	1.00E-06	37	1825	25550	4.23E-09	3.00E-04	1.41E-05	3.02E-10		
Nickel	2.33E+01	50	12	5	1.00E-06	37	1825	25550	1.04E-06	2.00E-02	5.18E-05	7.40E-08		
										TOTAL HAZARD INDEX =	1.30E-03		TOTAL CANCER RISK =	3.67E-08

TABLE C-4-19

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.94E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.40E-07	5.00E-04	4.81E-04	1.72E-08	3.00E-02	5.15E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.79E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	3.92E-07	3.00E-03	1.31E-04	2.80E-08	1.10E-01	3.08E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.93E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.40E-07	5.00E-02	4.79E-06	1.71E-08		
Antimony	3.49E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.85E-08	4.00E-04	7.13E-05	2.04E-09		
Arsenic	8.07E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	6.60E-07	3.00E-04	2.20E-03	4.72E-08	1.50E+00	7.07E-08
Cadmium	6.88E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	5.62E-08	1.00E-03	5.62E-05	4.02E-09		
Mercury	1.02E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	8.31E-08	3.00E-04	2.77E-04	5.94E-09		
Nickel	2.43E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	1.99E-06	2.00E-02	9.93E-05	1.42E-07		
												TOTAL HAZARD INDEX =	3.32E-03		TOTAL CANCER RISK =	7.43E-08

TABLE C-4-20

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.75E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	9.81E-09	5.00E-04	1.96E-05	7.01E-10	3.00E-02	2.10E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.34E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.55E-08	3.00E-03	5.16E-06	1.10E-09	1.10E-01	1.22E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.75E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	9.79E-09	5.00E-02	1.96E-07	6.99E-10		
Antimony	3.30E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.18E-09	4.00E-04	2.94E-06	8.41E-11		
Arsenic	7.67E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.73E-08	3.00E-04	9.10E-05	1.95E-09	1.50E+00	2.93E-09
Cadmium	6.27E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.24E-09	1.00E-03	2.24E-06	1.60E-10		
Mercury	9.51E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.39E-09	3.00E-04	1.13E-05	2.42E-10		
Nickel	2.33E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	8.31E-08	2.00E-02	4.15E-06	5.94E-09		
												TOTAL HAZARD INDEX =	1.26E-05		TOTAL CANCER RISK =	3.07E-10

TABLE C-4-21

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.94E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.79E-01	0.20	21%	32%	47%	1.18	0.06	0.09	2.97E-02	0.40	350	70	70	25550	25550	1.63E-04	3.00E-03	5.43E-02	1.63E-04	1.10E-01	1.79E-05
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.93E-01	0.20	21%	32%	47%	0.32	NE	NB	3.94E-03	0.40	350	70	70	25550	25550	2.16E-05	5.00E-02	4.31E-04	2.16E-05		
																	TOTAL HAZARD INDEX =	5.47E-02		TOTAL CANCER RISK =	1.79E-05

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study by the Waterways Experiment Station (USACE, 1997)

NE = Not Evaluated during the plant uptake study

NB = No measurable bioconcentration

,ABLE C-4-22

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	A. . (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)$^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.75E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.34E-01	0.20	21%	32%	47%	1.18	0.06	0.09	2.69E-02	0.25	350	9	70	3285	25550	9.21E-05	3.00E-03	3.07E-02	1.18E-05	1.10E-01	1.30E-06
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.75E-01	0.20	21%	32%	47%	0.32	NE	NB	3.69E-03	0.25	350	9	70	3285	25550	1.26E-05	5.00E-02	2.53E-04	1.63E-06		
																	TOTAL HAZARD INDEX =	3.10E-02		TOTAL CANCER RISK =	1.30E-06

Note
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study by the Waterways Experiment Station (USACE, 1997)
NE = Not Evaluated during the plant uptake study
NB = No measurable bioconcentration

ıABLE C-4-23

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)$^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.94E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.79E-01	0.10	10%	45%	45%	1.18	0.06	0.09	8.91E-03	0.40	350	6	15	2190	25550	2.28E-04	3.00E-03	7.59E-02	1.95E-05	1.10E-01	2.15E-06
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.93E-01	0.10	10%	45%	45%	0.32	NE	NB	9.37E-04	0.40	350	6	15	2190	25550	2.40E-05	5.00E-02	4.79E-04	2.05E-06		
																	TOTAL HAZARD INDEX =	7.64E-02		TOTAL CANCER RISK =	2.15E-06

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study by the Waterways Experiment Station (USACE, 1997)
NE = Not Evaluated during the plant uptake study
NB = No measurable bioconcentration

TABLE C-4-24

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	2.75E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.34E-01	0.10	10%	45%	45%	1.18	0.06	0.09	8.06E-03	0.25	350	6	15	2190	25550	1.29E-04	3.00E-03	4.30E-02	1.10E-05	1.10E-01	1.22E-06
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.75E-01	0.10	10%	45%	45%	0.32	NE	NB	8.79E-04	0.25	350	6	15	2190	25550	1.41E-05	5.00E-02	2.81E-04	1.20E-06		
																	TOTAL HAZARD INDEX =	4.32E-02		TOTAL CANCER RISK =	1.22E-06

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study by the Waterways Experiment Station (USACE, 1997)
NE = Not Evaluated during the plant uptake study
NB = No measurable bioconcentration

Table C-5-1

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Workers - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	50	250	25	1.00E-06	70	9125	25550	1.74E-06	4.00E-04	4.36E-03	6.23E-07		
Cadmium	7.24E-01	50	250	25	1.00E-06	70	9125	25550	3.54E-07	1.00E-03	3.54E-04	1.26E-07		
Nickel	2.32E+01	50	250	25	1.00E-06	70	9125	25550	1.13E-05	2.00E-02	5.67E-04	4.05E-06		
										TOTAL HAZARD INDEX =	5.28E-03		TOTAL CANCER RISK =	0.00E+00

Table C-5-2

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Workers - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	10	250	10	1.00E-06	70	3650	25550	3.49E-07	4.00E-04	8.72E-04	4.98E-08		
Cadmium	7.24E-01	10	250	10	1.00E-06	70	3650	25550	7.08E-08	1.00E-03	7.08E-05	1.01E-08		
Nickel	2.19E+01	10	250	10	1.00E-06	70	3650	25550	2.14E-06	2.00E-02	1.07E-04	3.05E-07		
										TOTAL HAZARD INDEX =	1.05E-03	TOTAL CANCER RISK =		0.00E+00

Table C-5-3

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Workers - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.82E-06	4.00E-04	4.56E-03	6.51E-07		
Cadmium	7.24E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	3.70E-07	1.00E-03	3.70E-04	1.32E-07		
Nickel	2.32E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.19E-05	2.00E-02	5.93E-04	4.24E-06		
												TOTAL HAZARD INDEX =	5.52E-03		TOTAL CANCER RISK =	0.00E+00

Table C-5-4

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Workers - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	1.41E-07	4.00E-04	3.52E-04	2.01E-08		
Cadmium	7.24E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	2.86E-08	1.00E-03	2.86E-05	4.09E-09		
Nickel	2.19E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	8.64E-07	2.00E-02	4.32E-05	1.23E-07		
												TOTAL HAZARD INDEX =	4.24E-04		TOTAL CANCER RISK =	0.00E+00

Table C-5-5

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Adult Resident - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	100	350	70	1.00E-06	70	25550	25550	4.88E-06	4.00E-04	1.22E-02	4.88E-06		
Cadmium	7.24E-01	100	350	70	1.00E-06	70	25550	25550	9.92E-07	1.00E-03	9.92E-04	9.92E-07		
Nickel	2.32E+01	100	350	70	1.00E-06	70	25550	25550	3.17E-05	2.00E-02	1.59E-03	3.17E-05		
										TOTAL HAZARD INDEX =	1.48E-02		TOTAL CANCER RISK =	0.00E+00

Table C-5-6

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Adult Resident - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	50	350	9	1.00E-06	70	3285	25550	2.44E-06	4.00E-04	6.10E-03	3.14E-07		
Cadmium	7.24E-01	50	350	9	1.00E-06	70	3285	25550	4.96E-07	1.00E-03	4.96E-04	6.37E-08		
Nickel	2.19E+01	50	350	9	1.00E-06	70	3285	25550	1.50E-05	2.00E-02	7.48E-04	1.92E-06		
										TOTAL HAZARD INDEX =	7.35E-03		TOTAL CANCER RISK =	0.00E+00

Table C-5-7

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Adult Resident - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	2.55E-06	4.00E-04	6.38E-03	2.55E-06		
Cadmium	7.24E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	5.19E-07	1.00E-03	5.19E-04	5.19E-07		
Nickel	2.32E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.66E-05	2.00E-02	8.30E-04	1.66E-05		
												TOTAL HAZARD INDEX =	7.73E-03		TOTAL CANCER RISK =	0.00E+00

Table C-5-8

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Adult Resident - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.97E-07	4.00E-04	4.93E-04	2.54E-08		
Cadmium	7.24E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.01E-08	1.00E-03	4.01E-05	5.15E-09		
Nickel	2.19E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.21E-06	2.00E-02	6.05E-05	1.55E-07		
												TOTAL HAZARD INDEX =	5.94E-04		TOTAL CANCER RISK =	0.00E+00

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Table C-5-9

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site 0-6 Year Old Child Resident - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	200	350	6	1.00E-06	15	2190	25550	4.56E-05	4.00E-04	1.14E-01	3.91E-06		
Cadmium	7.24E-01	200	350	6	1.00E-06	15	2190	25550	9.26E-06	1.00E-03	9.26E-03	7.93E-07		
Nickel	2.32E+01	200	350	6	1.00E-06	15	2190	25550	2.96E-04	2.00E-02	1.48E-02	2.54E-05		
										TOTAL HAZARD INDEX =	1.38E-01		TOTAL CANCER RISK =	0.00E+00

Table C-5-10

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site 0-6 Year Old Child Resident - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	100	350	6	1.00E-06	15	2190	25550	2.28E-05	4.00E-04	5.70E-02	1.95E-06		
Cadmium	7.24E-01	100	350	6	1.00E-06	15	2190	25550	4.63E-06	1.00E-03	4.63E-03	3.97E-07		
Nickel	2.19E+01	100	350	6	1.00E-06	15	2190	25550	1.40E-04	2.00E-02	6.99E-03	1.20E-05		
										TOTAL HAZARD INDEX =	6.86E-02		TOTAL CANCER RISK =	0.00E+00

Table C-5-11

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site 0-6 Year Old Child Resident - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	9.87E-06	4.00E-04	2.47E-02	8.46E-07		
Cadmium	7.24E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.00E-06	1.00E-03	2.00E-03	1.72E-07		
Nickel	2.32E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	6.42E-05	2.00E-02	3.21E-03	5.50E-06		
												TOTAL HAZARD INDEX =	2.99E-02		TOTAL CANCER RISK =	0.00E+00

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Table C-5-12

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site 0-6 Year Old Child Resident - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	8.52E-07	4.00E-04	2.13E-03	7.30E-08		
Cadmium	7.24E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.73E-07	1.00E-03	1.73E-04	1.48E-08		
Nickel	2.19E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	5.22E-06	2.00E-02	2.61E-04	4.48E-07		
												TOTAL HAZARD INDEX =	2.56E-03		TOTAL CANCER RISK =	0.00E+00

Table C-5-13

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Trespasser/Visitor - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	100	24	70	1.00E-06	70	25550	25550	3.35E-07	4.00E-04	8.37E-04	3.35E-07		
Cadmium	7.24E-01	100	24	70	1.00E-06	70	25550	25550	6.80E-08	1.00E-03	6.80E-05	6.80E-08		
Nickel	2.32E+01	100	24	70	1.00E-06	70	25550	25550	2.18E-06	2.00E-02	1.09E-04	2.18E-06		
									TOTAL HAZARD INDEX =		1.01E-03	TOTAL CANCER RISK =		0.00E+00

Table C-5-14

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Trespasser/Visitor - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	50	12	9	1.00E-06	70	3285	25550	8.37E-08	4.00E-04	2.09E-04	1.08E-08		
Cadmium	7.24E-01	50	12	9	1.00E-06	70	3285	25550	1.70E-08	1.00E-03	1.70E-05	2.19E-09		
Nickel	2.19E+01	50	12	9	1.00E-06	70	3285	25550	5.13E-07	2.00E-02	2.57E-05	6.60E-08		
										TOTAL HAZARD INDEX =	2.52E-04		TOTAL CANCER RISK =	0.00E+00

Table C-5-15

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Trespasser/Visitor - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Antimony	3.5€E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.75E-07	4.00E-04	4.38E-04	1.75E-07		
Cadmium	7.24E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	3.56E-08	1.00E-03	3.56E-05	3.56E-08		
Nickel	2.32E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.14E-06	2.00E-02	5.69E-05	1.14E-06		
												TOTAL HAZARD INDEX =	5.30E-04		TOTAL CANCER RISK =	0.00E+00

Table C-5-16

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Trespasser/Visitor - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	6.76E-09	4.00E-04	1.69E-05	8.70E-10		
Cadmium	7.24E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.37E-09	1.00E-03	1.37E-06	1.77E-10		
Nickel	2.19E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	4.15E-08	2.00E-02	2.07E-06	5.33E-09		
												TOTAL HAZARD INDEX =	2.04E-05		TOTAL CANCER RISK =	0.00E+00

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Table ∪-5-17

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical 8-13 Year Old Juvenile Trespasser/Visitor - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	100	24	5	1.00E-06	37	1825	25550	6.33E-07	4.00E-04	1.58E-03	4.52E-08		
Cadmium	7.24E-01	100	24	5	1.00E-06	37	1825	25550	1.29E-07	1.00E-03	1.29E-04	9.19E-09		
Nickel	2.32E+01	100	24	5	1.00E-06	37	1825	25550	4.12E-06	2.00E-02	2.06E-04	2.94E-07		
										TOTAL HAZARD INDEX =	1.92E-03		TOTAL CANCER RISK =	0.00E+00

Table C-5-18

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical 8-13 Year Old Juvenile Trespasser/Visitor - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	50	12	5	1.00E-06	37	1825	25550	1.58E-07	4.00E-04	3.96E-04	1.13E-08		
Cadmium	7.24E-01	50	12	5	1.00E-06	37	1825	25550	3.22E-08	1.00E-03	3.22E-05	2.30E-09		
Nickel	2.19E+01	50	12	5	1.00E-06	37	1825	25550	9.71E-07	2.00E-02	4.85E-05	6.94E-08		
										TOTAL HAZARD INDEX =	4.77E-04		TOTAL CANCER RISK =	0.00E+00

Tabie C-5-19

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical 8-13 Year Old Juvenile Trespasser/Visitor - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.92E-07	4.00E-04	7.29E-04	2.08E-08		
Cadmium	7.24E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	5.92E-08	1.00E-03	5.92E-05	4.23E-10		
Nickel	2.32E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	1.90E-06	2.00E-02	9.48E-05	1.35E-08		
												TOTAL HAZARD INDEX =	8.83E-04		TOTAL CANCER RISK =	0.00E+00

Table C-5-20

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 1 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical 8-13 Year Old Juvenile Trespasser/Visitor - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Antimony	3.56E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.27E-08	4.00E-04	3.18E-05	9.07E-10		
Cadmium	7.24E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.58E-09	1.00E-03	2.58E-06	1.84E-10		
Nickel	2.19E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	7.79E-08	2.00E-02	3.89E-06	5.56E-09		
												TOTAL HAZARD INDEX =	3.82E-05		TOTAL CANCER RISK =	0.00E+00

Table C-6-1

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Workers - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.60E+01	50	250	25	1.00E-06	70	9125	25550	7.85E-06	4.00E-04	1.96E-02	2.80E-06		
Arsenic	9.21E+00	50	250	25	1.00E-06	70	9125	25550	4.51E-06	3.00E-04	1.50E-02	1.61E-06	1.50E+00	2.41E-06
Cadmium	7.03E-01	50	250	25	1.00E-06	70	9125	25550	3.44E-07	1.00E-03	3.44E-04	1.23E-07		
Cobalt	1.11E+01	50	250	25	1.00E-06	70	9125	25550	5.44E-06	6.00E-02	9.06E-05	1.94E-06		
Mercury	8.31E-02	50	250	25	1.00E-06	70	9125	25550	4.07E-08	3.00E-04	1.36E-04	1.45E-08		
Nickel	2.56E+01	50	250	25	1.00E-06	70	9125	25550	1.25E-05	2.00E-02	6.27E-04	4.48E-06		
										TOTAL HAZARD INDEX =	3.58E-02		TOTAL CANCER RISK =	2.41E-06

Table C-6-2

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Workers - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	10	250	10	1.00E-06	70	3650	25550	1.51E-06	4.00E-04	3.78E-03	2.16E-07		
Arsenic	8.67E+00	10	250	10	1.00E-06	70	3650	25550	8.48E-07	3.00E-04	2.83E-03	1.21E-07	1.50E+00	1.82E-07
Cadmium	6.77E-01	10	250	10	1.00E-06	70	3650	25550	6.62E-08	1.00E-03	6.62E-05	9.46E-09		
Cobalt	1.06E+01	10	250	10	1.00E-06	70	3650	25550	1.04E-06	6.00E-02	1.73E-05	1.48E-07		
Mercury	8.31E-02	10	250	10	1.00E-06	70	3650	25550	8.13E-09	3.00E-04	2.71E-05	1.16E-09		
Nickel	2.43E+01	10	250	10	1.00E-06	70	3650	25550	2.38E-06	2.00E-02	1.19E-04	3.40E-07		
										TOTAL HAZARD INDEX =	6.84E-03		TOTAL CANCER RISK =	1.82E-07

Table C-6-3

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Workers - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.60E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	8.21E-06	4.00E-04	2.05E-02	2.93E-06		
Arsenic	9.21E+00	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	4.71E-06	3.00E-04	1.57E-02	1.68E-06	1.50E+00	2.53E-06
Cadmium	7.03E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	3.60E-07	1.00E-03	3.60E-04	1.29E-07		
Cobalt	1.11E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	5.69E-06	6.00E-02	9.48E-05	2.03E-06		
Mercury	8.31E-02	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	4.25E-07	3.00E-04	1.42E-03	1.52E-07		
Nickel	2.56E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.31E-05	2.00E-02	6.56E-04	4.68E-06		
												TOTAL HAZARD INDEX =	3.88E-02		TOTAL CANCER RISK =	2.53E-06

Table C-6-4

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Workers - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	6.11E-07	4.00E-04	1.53E-03	8.73E-08		
Arsenic	8.67E+00	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	3.43E-07	3.00E-04	1.14E-03	4.89E-08	1.50E+00	7.34E-08
Cadmium	6.77E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	2.68E-08	1.00E-03	2.68E-05	3.82E-09		
Cobalt	1.06E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	4.20E-07	6.00E-02	7.00E-06	6.00E-08		
Mercury	8.31E-02	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	3.29E-08	3.00E-04	1.10E-04	4.69E-09		
Nickel	2.43E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	9.61E-07	2.00E-02	4.80E-05	1.37E-07		
												TOTAL HAZARD INDEX =	2.86E 03		TOTAL CANCER RISK =	7.34E-08

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Table C-6-5

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Adult Resident - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.60E+01	100	350	70	1.00E-06	70	25550	25550	2.20E-05	4.00E-04	5.49E-02	2.20E-05		
Arsenic	9.21E+00	100	350	70	1.00E-06	70	25550	25550	1.26E-05	3.00E-04	4.21E-02	1.26E-05	1.50E+00	1.89E-05
Cadmium	7.03E-01	100	350	70	1.00E-06	70	25550	25550	9.64E-07	1.00E-03	9.64E-04	9.64E-07		
Cobalt	1.11E+01	100	350	70	1.00E-06	70	25550	25550	1.52E-05	6.00E-02	2.54E-04	1.52E-05		
Mercury	8.31E-02	100	350	70	1.00E-06	70	25550	25550	1.14E-07	3.00E-04	3.80E-04	1.14E-07		
Nickel	2.56E+01	100	350	70	1.00E-06	70	25550	25550	3.51E-05	2.00E-02	1.76E-03	3.51E-05		
										TOTAL HAZARD INDEX =	1.00E-01		TOTAL CANCER RISK =	1.89E-05

Table C-6-6

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Adult Resident - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	50	350	9	1.00E-06	70	3285	25550	1.06E-05	4.00E-04	2.65E-02	1.36E-06		
Arsenic	8.67E+00	50	350	9	1.00E-06	70	3285	25550	5.94E-06	3.00E-04	1.98E-02	7.63E-07	1.50E+00	1.14E-06
Cadmium	6.77E-01	50	350	9	1.00E-06	70	3285	25550	4.64E-07	1.00E-03	4.64E-04	5.96E-08		
Cobalt	1.06E+01	50	350	9	1.00E-06	70	3285	25550	7.27E-06	6.00E-02	1.21E-04	9.35E-07		
Mercury	8.31E-02	50	350	9	1.00E-06	70	3285	25550	5.69E-08	3.00E-04	1.90E-04	7.32E-09		
Nickel	2.43E+01	50	350	9	1.00E-06	70	3285	25550	1.66E-05	2.00E-02	8.32E-04	2.14E-06		
										TOTAL HAZARD INDEX =	4.79E-02		TOTAL CANCER RISK =	1.14E-06

Table C-6-7

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Adult Resident - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.60E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.15E-05	4.00E-04	2.87E-02	1.15E-05		
Arsenic	9.21E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	6.60E-06	3.00E-04	2.20E-02	6.60E-06	1.50E+00	9.90E-06
Cadmium	7.03E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	5.04E-07	1.00E-03	5.04E-04	5.04E-07		
Cobalt	1.11E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	7.96E-06	6.00E-02	1.33E-04	7.96E-06		
Mercury	8.31E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	5.96E-07	3.00E-04	1.99E-03	5.96E-07		
Nickel	2.56E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.84E-05	2.00E-02	9.18E-04	1.84E-05		
												TOTAL HAZARD INDEX =	5.43E-02		TOTAL CANCER RISK =	9.90E-06

Table C-6-8

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Adult Resident - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	8.56E-07	4.00E-04	2.14E-03	1.10E-07		
Arsenic	8.67E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.80E-07	3.00E-04	1.60E-03	6.17E-08	1.50E+00	9.25E-08
Cadmium	6.77E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	3.75E-08	1.00E-03	3.75E-05	4.82E-09		
Cobalt	1.06E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	5.88E-07	6.00E-02	9.79E-06	7.56E-08		
Mercury	8.31E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	4.60E-08	3.00E-04	1.53E-04	5.91E-09		
Nickel	2.43E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.34E-06	2.00E-02	6.72E-05	1.73E-07		
												TOTAL HAZARD INDEX =	4.01E-03		TOTAL CANCER RISK =	9.25E-08

Table C-6-9

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site 0-6 Year Old Child Resident - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Antimony	1.60E+01	200	350	6	1.00E-06	15	2190	25550	2.05E-04	4.00E-04	5.13E-01	1.76E-05		
Arsenic	9.21E+00	200	350	6	1.00E-06	15	2190	25550	1.18E-04	3.00E-04	3.93E-01	1.01E-05	1.50E+00	1.51E-05
Cadmium	7.03E-01	200	350	6	1.00E-06	15	2190	25550	8.99E-06	1.00E-03	8.99E-03	7.71E-07		
Cobalt	1.11E+01	200	350	6	1.00E-06	15	2190	25550	1.42E-04	6.00E-02	2.37E-03	1.22E-05		
Mercury	8.31E-02	200	350	6	1.00E-06	15	2190	25550	1.06E-06	3.00E-04	3.54E-03	9.11E-08		
Nickel	2.56E+01	200	350	6	1.00E-06	15	2190	25550	3.28E-04	2.00E-02	1.64E-02	2.81E-05		
										TOTAL HAZARD INDEX =	9.37E-01		TOTAL CANCER RISK =	1.51E-05

Table C-6-10

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site 0-6 Year Old Child Resident - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	100	350	6	1.00E-06	15	2190	25550	9.89E-05	4.00E-04	2.47E-01	8.47E-06		
Arsenic	8.67E+00	100	350	6	1.00E-06	15	2190	25550	5.54E-05	3.00E-04	1.85E-01	4.75E-06	1.50E+00	7.12E-06
Cadmium	6.77E-01	100	350	6	1.00E-06	15	2190	25550	4.33E-06	1.00E-03	4.33E-03	3.71E-07		
Cobalt	1.06E+01	100	350	6	1.00E-06	15	2190	25550	6.79E-05	6.00E-02	1.13E-03	5.82E-06		
Mercury	8.31E-02	100	350	6	1.00E-06	15	2190	25550	5.31E-07	3.00E-04	1.77E-03	4.55E-08		
Nickel	2.43E+01	100	350	6	1.00E-06	15	2190	25550	1.55E-04	2.00E-02	7.77E-03	1.33E-05		
										TOTAL HAZARD INDEX =	4.47E-01		TOTAL CANCER RISK =	7.12E-06

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Table C-6-11

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site 0-6 Year Old Child Resident - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.60E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	4.44E-05	4.00E-04	1.11E-01	3.81E-06		
Arsenic	9.21E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.55E-05	3.00E-04	8.50E-02	2.19E-06	1.50E+00	3.28E-06
Cadmium	7.03E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	1.95E-06	1.00E-03	1.95E-03	1.67E-07		
Cobalt	1.11E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	3.08E-05	6.00E-02	5.13E-04	2.64E-06		
Mercury	8.31E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.30E-06	3.00E-04	7.67E-03	1.97E-07		
Nickel	2.56E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	7.10E-05	2.00E-02	3.55E-03	6.08E-06		
												TOTAL HAZARD INDEX =	2.10E-01		TOTAL CANCER RISK =	3.28E-06

Table ~-6-12

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site 0-6 Year Old Child Resident - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	3.70E-06	4.00E-04	9.24E-03	3.17E-07		
Arsenic	8.67E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	2.07E-06	3.00E-04	6.90E-03	1.78E-07	1.50E+00	2.66E-07
Cadmium	6.77E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.62E-07	1.00E-03	1.62E-04	1.39E-08		
Cobalt	1.06E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	2.54E-06	6.00E-02	4.23E-05	2.17E-07		
Mercury	8.31E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.99E-07	3.00E-04	6.62E-04	1.70E-08		
Nickel	2.43E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	5.81E-06	2.00E-02	2.90E-04	4.98E-07		
												TOTAL HAZARD INDEX =	1.73E-02		TOTAL CANCER RISK =	2.66E-07

Table C-6-13

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Trespasser/Visitor - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.60E+01	100	24	70	1.00E-06	70	25550	25550	1.51E-06	4.00E-04	3.77E-03	1.51E-06		
Arsenic	9.21E+00	100	24	70	1.00E-06	70	25550	25550	8.65E-07	3.00E-04	2.88E-03	8.65E-07	1.50E+00	1.30E-06
Cadmium	7.03E-01	100	24	70	1.00E-06	70	25550	25550	6.61E-08	1.00E-03	6.61E-05	6.61E-08		
Cobalt	1.11E+01	100	24	70	1.00E-06	70	25550	25550	1.04E-06	6.00E-02	1.74E-05	1.04E-06		
Mercury	8.31E-02	100	24	70	1.00E-06	70	25550	25550	7.81E-09	3.00E-04	2.60E-05	7.81E-09		
Nickel	2.56E+01	100	24	70	1.00E-06	70	25550	25550	2.41E-06	2.00E-02	1.20E-04	2.41E-06		
									TOTAL HAZARD INDEX =		6.88E-03	TOTAL CANCER RISK =		1.30E-06

Table C-6-14

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Trespasser/Visitor - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
Antimony	1.55E+01	50	12	9	1.00E-06	70	3285	25550	3.63E-07	4.00E-04	9.08E-04	4.67E-08		
Arsenic	8.67E+00	50	12	9	1.00E-06	70	3285	25550	2.04E-07	3.00E-04	6.79E-04	2.62E-08	1.50E+00	3.93E-08
Cadmium	6.77E-01	50	12	9	1.00E-06	70	3285	25550	1.59E-08	1.00E-03	1.59E-05	2.04E-09		
Cobalt	1.06E+01	50	12	9	1.00E-06	70	3285	25550	2.49E-07	6.00E-02	4.16E-06	3.21E-08		
Mercury	8.31E-02	50	12	9	1.00E-06	70	3285	25550	1.95E-09	3.00E-04	6.51E-06	2.51E-10		
Nickel	2.43E+01	50	12	9	1.00E-06	70	3285	25550	5.71E-07	2.00E-02	2.85E-05	7.34E-08		
										TOTAL HAZARD INDEX =	1.64E-03		TOTAL CANCER RISK =	3.93E-08

Table C-6-15

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Trespasser/Visitor - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.60E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	7.88E-07	4.00E-04	1.97E-03	7.88E-07		
Arsenic	9.21E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	4.53E-07	3.00E-04	1.51E-03	4.53E-07	1.50E+00	6.79E-07
Cadmium	7.03E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	3.46E-08	1.00E-03	3.46E-05	3.46E-08		
Cobalt	1.11E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	5.46E-07	6.00E-02	9.10E-06	5.46E-07		
Mercury	8.31E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	4.08E-08	3.00E-04	1.36E-04	4.08E-08		
Nickel	2.56E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.26E-06	2.00E-02	6.30E-05	1.26E-06		
												TOTAL HAZARD INDEX =	3.72E-03		TOTAL CANCER RISK =	6.79E-07

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Tabie C-6-16

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Trespasser/Visitor - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	2.93E-08	4.00E-04	7.34E-05	3.77E-09		
Arsenic	8.67E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.64E-08	3.00E-04	5.48E-05	2.11E-09	1.50E+00	3.17E-09
Cadmium	6.77E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.28E-09	1.00E-03	1.28E-06	1.65E-10		
Cobalt	1.06E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	2.01E-08	6.00E-02	3.36E-07	2.59E-09		
Mercury	8.31E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.58E-09	3.00E-04	5.26E-06	2.03E-10		
Nickel	2.43E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	4.61E-08	2.00E-02	2.31E-06	5.93E-09		
												TOTAL HAZARD INDEX =	1.37E-04		TOTAL CANCER RISK =	3.17E-09

Table C-6-17

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical 8-13 Year Old Juvenile Trespasser/Visitor - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.60E+01	100	24	5	1.00E-06	37	1825	25550	2.85E-06	4.00E-04	7.13E-03	2.04E-07		
Arsenic	9.21E+00	100	24	5	1.00E-06	37	1825	25550	1.64E-06	3.00E-04	5.46E-03	1.17E-07	1.50E+00	1.75E-07
Cadmium	7.03E-01	100	24	5	1.00E-06	37	1825	25550	1.25E-07	1.00E-03	1.25E-04	8.93E-09		
Cobalt	1.11E+01	100	24	5	1.00E-06	37	1825	25550	1.97E-06	6.00E-02	3.29E-05	1.41E-07		
Mercury	8.31E-02	100	24	5	1.00E-06	37	1825	25550	1.48E-08	3.00E-04	4.92E-05	1.06E-09		
Nickel	2.56E+01	100	24	5	1.00E-06	37	1825	25550	4.55E-06	2.00E-02	2.28E-04	3.25E-07		

TOTAL HAZARD INDEX = 1.30E-02   TOTAL CANCER RISK = 1.75E-07

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Table C-6-18

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical 8-13 Year Old Juvenile Trespasser/Visitor - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	50	12	5	1.00E-06	37	1825	25550	6.87E-07	4.00E-04	1.72E-03	4.91E-08		
Arsenic	8.67E+00	50	12	5	1.00E-06	37	1825	25550	3.85E-07	3.00E-04	1.28E-03	2.75E-08	1.50E+00	4.13E-08
Cadmium	6.77E-01	50	12	5	1.00E-06	37	1825	25550	3.01E-08	1.00E-03	3.01E-05	2.15E-09		
Cobalt	1.06E+01	50	12	5	1.00E-06	37	1825	25550	4.72E-07	6.00E-02	7.86E-06	3.37E-08		
Mercury	8.31E-02	50	12	5	1.00E-06	37	1825	25550	3.69E-09	3.00E-04	1.23E-05	2.64E-10		
Nickel	2.43E+01	50	12	5	1.00E-06	37	1825	25550	1.08E-06	2.00E-02	5.40E-05	7.71E-08		
										TOTAL HAZARD INDEX =	3.11E-03		TOTAL CANCER RISK =	4.13E-08

Table C-6-19

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical 8-13 Year Old Juvenile Trespasser/Visitor - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.60E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	1.31E-06	4.00E-04	3.28E-03	9.37E-08		
Arsenic	9.21E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	7.53E-07	3.00E-04	2.51E-03	5.38E-08	1.50E+00	8.07E-08
Cadmium	7.03E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	5.75E-08	1.00E-03	5.75E-05	4.11E-09		
Cobalt	1.11E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	9.09E-07	6.00E-02	1.51E-05	6.49E-08		
Mercury	8.31E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	6.80E-08	3.00E-04	2.27E-04	4.86E-09		
Nickel	2.56E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.10E-06	2.00E-02	1.05E-04	1.50E-07		
												TOTAL HAZARD INDEX =	6.19E-03		TOTAL CANCER RISK =	8.07E-08

Table C-6-20

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 2 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical 8-13 Year Old Juvenile Trespasser/Visitor - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	5.51E-08	4.00E-04	1.38E-04	3.94E-09		
Arsenic	8.67E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	3.09E-08	3.00E-04	1.03E-04	2.21E-09	1.50E+00	3.31E-09
Cadmium	6.77E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.41E-09	1.00E-03	2.41E-06	1.72E-10		
Cobalt	1.06E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	3.78E-08	6.00E-02	6.31E-07	2.70E-09		
Mercury	8.31E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.96E-09	3.00E-04	9.87E-06	2.12E-10		
Nickel	2.43E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	8.66E-08	2.00E-02	4.33E-06	6.18E-09		
												TOTAL HAZARD INDEX =	2.58E-04		TOTAL CANCER RISK =	3.31E-09

Table C-7-1

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Workers - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	7.41E+00	50	250	25	1.00E-06	70	9125	25550	3.62E-06	4.00E-04	9.06E-03	1.29E-06		
Barium	2.52E+02	50	250	25	1.00E-06	70	9125	25550	1.23E-04	7.00E-02	1.76E-03	4.41E-05		
Cadmium	5.56E-01	50	250	25	1.00E-06	70	9125	25550	2.72E-07	1.00E-03	2.72E-04	9.71E-08		
Cobalt	1.07E+01	50	250	25	1.00E-06	70	9125	25550	5.24E-06	6.00E-02	8.74E-05	1.87E-06		
Mercury	1.19E-01	50	250	25	1.00E-06	70	9125	25550	5.84E-08	3.00E-04	1.95E-04	2.08E-08		
Nickel	2.85E+01	50	250	25	1.00E-06	70	9125	25550	1.39E-05	2.00E-02	6.97E-04	4.98E-06		
										TOTAL HAZARD INDEX =	1.21E-02		TOTAL CANCER RISK =	0.00E+00

Table C-7-2

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Workers - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	4.07E+00	10	250	10	1.00E-06	70	3650	25550	3.98E-07	4.00E-04	9.95E-04	5.69E-08		
Barium	2.37E+02	10	250	10	1.00E-06	70	3650	25550	2.32E-05	7.00E-02	3.31E-04	3.31E-06		
Cadmium	5.09E-01	10	250	10	1.00E-06	70	3650	25550	4.98E-08	1.00E-03	4.98E-05	7.12E-09		
Cobalt	1.01E+01	10	250	10	1.00E-06	70	3650	25550	9.91E-07	6.00E-02	1.65E-05	1.42E-07		
Mercury	1.08E-01	10	250	10	1.00E-06	70	3650	25550	1.06E-08	3.00E-04	3.52E-05	1.51E-09		
Nickel	2.77E+01	10	250	10	1.00E-06	70	3650	25550	2.71E-06	2.00E-02	1.35E-04	3.87E-07		
										TOTAL HAZARD INDEX =	1.56E-03		TOTAL CANCER RISK =	0.00E+00

Table C-7-3

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Workers - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	7.41E+00	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	3.79E-06	4.00E-04	9.47E-03	1.35E-06		
Barium	2.52E+02	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.29E-04	7.00E-02	1.85E-03	4.61E-05		
Cadmium	5.56E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	2.85E-07	1.00E-03	2.85E-04	1.02E-07		
Cobalt	1.07E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	5.48E-06	6.00E-02	9.14E-05	1.96E-06		
Mercury	1.19E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	6.10E-07	3.00E-04	2.03E-03	2.18E-07		
Nickel	2.85E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.46E-05	2.00E-02	7.29E-04	5.20E-06		
												TOTAL HAZARD INDEX =	1.45E-02		TOTAL CANCER RISK =	0.00E+00

Table C-7-4

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Workers - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	4.07E+00	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	1.61E-07	4.00E-04	4.02E-04	2.30E-08		
Barium	2.37E+02	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	9.37E-06	7.00E-02	1.34E-04	1.34E-06		
Cadmium	5.09E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	2.01E-08	1.00E-03	2.01E-05	2.88E-09		
Cobalt	1.01E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	4.01E-07	6.00E-02	6.68E-06	5.72E-08		
Mercury	1.08E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	4.27E-08	3.00E-04	1.42E-04	6.10E-09		
Nickel	2.77E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	1.09E-06	2.00E-02	5.47E-05	1.56E-07		
												TOTAL HAZARD INDEX =	7.60E-04		TOTAL CANCER RISK =	0.00E+00

Table C-7-5

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Adult Resident - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	7.41E+00	100	350	70	1.00E-06	70	25550	25550	1.01E-05	4.00E-04	2.54E-02	1.01E-05		
Barium	2.52E+02	100	350	70	1.00E-06	70	25550	25550	3.46E-04	7.00E-02	4.94E-03	3.46E-04		
Cadmium	5.56E-01	100	350	70	1.00E-06	70	25550	25550	7.62E-07	1.00E-03	7.62E-04	7.62E-07		
Cobalt	1.07E+01	100	350	70	1.00E-06	70	25550	25550	1.47E-05	6.00E-02	2.45E-04	1.47E-05		
Mercury	1.19E-01	100	350	70	1.00E-06	70	25550	25550	1.63E-07	3.00E-04	5.45E-04	1.63E-07		
Nickel	2.85E+01	100	350	70	1.00E-06	70	25550	25550	3.90E-05	2.00E-02	1.95E-03	3.90E-05		
										TOTAL HAZARD INDEX =	3.38E-02		TOTAL CANCER RISK =	0.00E+00

Table C-7-6

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Adult Resident - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	4.07E+00	50	350	9	1.00E-06	70	3285	25550	2.79E-06	4.00E-04	6.97E-03	3.58E-07		
Barium	2.37E+02	50	350	9	1.00E-06	70	3285	25550	1.62E-04	7.00E-02	2.32E-03	2.09E-05		
Cadmium	5.09E-01	50	350	9	1.00E-06	70	3285	25550	3.49E-07	1.00E-03	3.49E-04	4.49E-08		
Cobalt	1.01E+01	50	350	9	1.00E-06	70	3285	25550	6.94E-06	6.00E-02	1.16E-04	8.92E-07		
Mercury	1.08E-01	50	350	9	1.00E-06	70	3285	25550	7.40E-08	3.00E-04	2.47E-04	9.51E-09		
Nickel	2.77E+01	50	350	9	1.00E-06	70	3285	25550	1.89E-05	2.00E-02	9.47E-04	2.44E-06		
										TOTAL HAZARD INDEX =	1.09E-02		TOTAL CANCER RISK =	0.00E+00

Table C-7-7

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Adult Resident - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	7.41E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	5.31E-06	4.00E-04	1.33E-02	5.31E-06		
Barium	2.52E+02	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.81E-04	7.00E-02	2.58E-03	1.81E-04		
Cadmium	5.56E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	3.98E-07	1.00E-03	3.98E-04	3.98E-07		
Cobalt	1.07E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	7.68E-06	6.00E-02	1.28E-04	7.68E-06		
Mercury	1.19E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	8.55E-07	3.00E-04	2.85E-03	8.55E-07		
Nickel	2.85E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	2.04E-05	2.00E-02	1.02E-03	2.04E-05		
												TOTAL HAZARD INDEX =	2.02E-02		TOTAL CANCER RISK =	0.00E+00

Table C-7-8

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Adult Resident - Average Exposure)

Equation: *CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)*
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = *Percent Chemical Absorption Across Skin (unitless)*
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	4.07E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	2.25E-07	4.00E-04	5.63E-04	2.89E-08		
Barium	2.37E+02	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.31E-05	7.00E-02	1.87E-04	1.69E-06		
Cadmium	5.09E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	2.82E-08	1.00E-03	2.82E-05	3.62E-09		
Cobalt	1.01E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	5.61E-07	6.00E-02	9.35E-06	7.21E-08		
Mercury	1.08E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	5.98E-08	3.00E-04	1.99E-04	7.69E-09		
Nickel	2.77E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.53E-06	2.00E-02	7.66E-05	1.97E-07		
												TOTAL HAZARD INDEX =	1.06E-03		TOTAL CANCER RISK =	0.00E+00

Table C-7-9

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site 0-6 Year Old Child Resident - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	7.41E+00	200	350	6	1.00E-06	15	2190	25550	9.47E-05	4.00E-04	2.37E-01	8.12E-06		
Barium	2.52E+02	200	350	6	1.00E-06	15	2190	25550	3.23E-03	7.00E-02	4.61E-02	2.77E-04		
Cadmium	5.56E-01	200	350	6	1.00E-06	15	2190	25550	7.11E-06	1.00E-03	7.11E-03	6.09E-07		
Cobalt	1.07E+01	200	350	6	1.00E-06	15	2190	25550	1.37E-04	6.00E-02	2.28E-03	1.17E-05		
Mercury	1.19E-01	200	350	6	1.00E-06	15	2190	25550	1.53E-06	3.00E-04	5.08E-03	1.31E-07		
Nickel	2.85E+01	200	350	6	1.00E-06	15	2190	25550	3.64E-04	2.00E-02	1.82E-02	3.12E-05		
										TOTAL HAZARD INDEX =	3.15E-01		TOTAL CANCER RISK =	0.00E+00

Table C-7-10

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site 0-6 Year Old Child Resident - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	4.07E+00	100	350	6	1.00E-06	15	2190	25550	2.60E-05	4.00E-04	6.50E-02	2.23E-06		
Barium	2.37E+02	100	350	6	1.00E-06	15	2190	25550	1.51E-03	7.00E-02	2.16E-02	1.30E-04		
Cadmium	5.09E-01	100	350	6	1.00E-06	15	2190	25550	3.26E-06	1.00E-03	3.26E-03	2.79E-07		
Cobalt	1.01E+01	100	350	6	1.00E-06	15	2190	25550	6.48E-05	6.00E-02	1.08E-03	5.55E-06		
Mercury	1.08E-01	100	350	6	1.00E-06	15	2190	25550	6.91E-07	3.00E-04	2.30E-03	5.92E-08		
Nickel	2.77E+01	100	350	6	1.00E-06	15	2190	25550	1.77E-04	2.00E-02	8.84E-03	1.52E-05		
										TOTAL HAZARD INDEX =	1.02E-01		TOTAL CANCER RISK =	0.00E+00

Table C-7-11

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site 0-6 Year Old Child Resident - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = *Soil Adherence to Skin* (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	7.41E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.05E-05	4.00E-04	5.13E-02	1.76E-06		
Barium	2.52E+02	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	6.99E-04	7.00E-02	9.98E-03	5.99E-05		
Cadmium	5.56E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	1.54E-06	1.00E-03	1.54E-03	1.32E-07		
Cobalt	1.07E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.97E-05	6.00E-02	4.94E-04	2.54E-06		
Mercury	1.19E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	3.30E-06	3.00E-04	1.10E-02	2.83E-07		
Nickel	2.85E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	7.88E-05	2.00E-02	3.94E-03	6.76E-06		
												TOTAL HAZARD INDEX =	7.82E-02		TOTAL CANCER RISK =	0.00E+00

Table C-7-12

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site 0-6 Year Old Child Resident - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	4.07E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	9.72E-07	4.00E-04	2.43E-03	8.33E-08		
Barium	2.37E+02	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	5.66E-05	7.00E-02	8.09E-04	4.85E-06		
Cadmium	5.09E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.22E-07	1.00E-03	1.22E-04	1.04E-08		
Cobalt	1.01E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	2.42E-06	6.00E-02	4.04E-05	2.08E-07		
Mercury	1.08E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.58E-07	3.00E-04	8.61E-04	2.21E-08		
Nickel	2.77E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	6.61E-06	2.00E-02	3.31E-04	5.67E-07		
												TOTAL HAZARD INDEX =	4.59E-03		TOTAL CANCER RISK =	0.00E+00

Table C-7-13

Mead OU3
Ingestion of Chemicals In Surface Soil (0- 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Trespasser/Visitor - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
Antimony	7.41E+00	100	24	70	1.00E-06	70	25550	25550	6.96E-07	4.00E-04	1.74E-03	6.96E-07		
Barium	2.52E+02	100	24	70	1.00E-06	70	25550	25550	2.37E-05	7.00E-02	3.39E-04	2.37E-05		
Cadmium	5.56E-01	100	24	70	1.00E-06	70	25550	25550	5.22E-08	1.00E-03	5.22E-05	5.22E-08		
Cobalt	1.07E+01	100	24	70	1.00E-06	70	25550	25550	1.01E-06	6.00E-02	1.68E-05	1.01E-06		
Mercury	1.19E-01	100	24	70	1.00E-06	70	25550	25550	1.12E-08	3.00E-04	3.73E-05	1.12E-08		
Nickel	2.85E+01	100	24	70	1.00E-06	70	25550	25550	2.67E-06	2.00E-02	1.34E-04	2.67E-06		
									TOTAL HAZARD INDEX =		2.32E-03	TOTAL CANCER RISK =		0.00E+00

Table C-7-14

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Trespasser/Visitor - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Antimony	4.07E+00	50	12	9	1.00E-06	70	3285	25550	9.55E-08	4.00E-04	2.39E-04	1.23E-08		
Barium	2.37E+02	50	12	9	1.00E-06	70	3285	25550	5.56E-06	7.00E-02	7.95E-05	7.15E-07		
Cadmium	5.09E-01	50	12	9	1.00E-06	70	3285	25550	1.20E-08	1.00E-03	1.20E-05	1.54E-09		
Cobalt	1.01E+01	50	12	9	1.00E-06	70	3285	25550	2.38E-07	6.00E-02	3.97E-06	3.06E-08		
Mercury	1.08E-01	50	12	9	1.00E-06	70	3285	25550	2.54E-09	3.00E-04	8.46E-06	3.26E-10		
Nickel	2.77E+01	50	12	9	1.00E-06	70	3285	25550	6.50E-07	2.00E-02	3.25E-05	8.35E-08		
										TOTAL HAZARD INDEX =	3.75E-04		TOTAL CANCER RISK =	0.00E+00

Table C-7-15

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Trespasser/Visitor - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	7.41E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	3.64E-07	4.00E-04	9.09E-04	3.64E-07		
Barium	2.52E+02	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.24E-05	7.00E-02	1.77E-04	1.24E-05		
Cadmium	5.56E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	2.73E-08	1.00E-03	2.73E-05	2.73E-08		
Cobalt	1.07E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	5.26E-07	6.00E-02	8.77E-06	5.26E-07		
Mercury	1.19E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	5.86E-08	3.00E-04	1.95E-04	5.86E-08		
Nickel	2.85E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.40E-06	2.00E-02	6.99E-05	1.40E-06		
												TOTAL HAZARD INDEX =	1.39E-03		TOTAL CANCER RISK =	0.00E+00

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Table C-7-16

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Trespasser/Visitor - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	4.07E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	7.72E-09	4.00E-04	1.93E-05	9.92E-10		
Barium	2.37E+02	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	4.50E-07	7.00E-02	6.42E-06	5.78E-08		
Cadmium	5.09E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	9.66E-10	1.00E-03	9.66E-07	1.24E-10		
Cobalt	1.01E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.92E-08	6.00E-02	3.20E-07	2.47E-09		
Mercury	1.08E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	2.05E-09	3.00E-04	6.83E-06	2.64E-10		
Nickel	2.77E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	5.25E-08	2.00E-02	2.62E-06	6.75E-09		
												TOTAL HAZARD INDEX =	3.65E-05		TOTAL CANCER RISK =	0.00E+00

Table C-7-17

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical 8-13 Year Old Juvenile Trespasser/Visitor - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	7.41E+00	100	24	5	1.00E-06	37	1825	25550	1.32E-06	4.00E-04	3.29E-03	9.40E-08		
Barium	2.52E+02	100	24	5	1.00E-06	37	1825	25550	4.49E-05	7.00E-02	6.41E-04	3.20E-06		
Cadmium	5.56E-01	100	24	5	1.00E-06	37	1825	25550	9.88E-08	1.00E-03	9.88E-05	7.06E-09		
Cobalt	1.07E+01	100	24	5	1.00E-06	37	1825	25550	1.90E-06	6.00E-02	3.17E-05	1.36E-07		
Mercury	1.19E-01	100	24	5	1.00E-06	37	1825	25550	2.12E-08	3.00E-04	7.07E-05	1.51E-09		
Nickel	2.85E+01	100	24	5	1.00E-06	37	1825	25550	5.06E-06	2.00E-02	2.53E-04	3.61E-07		
										TOTAL HAZARD INDEX =	4.38E-03		TOTAL CANCER RISK =	0.00E+00

Table C-7-18

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical 8-13 Year Old Juvenile Trespasser/Visitor - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	4.07E+00	50	12	5	1.00E-06	37	1825	25550	1.81E-07	4.00E-04	4.52E-04	1.29E-08		
Barium	2.37E+02	50	12	5	1.00E-06	37	1825	25550	1.05E-05	7.00E-02	1.50E-04	7.52E-07		
Cadmium	5.09E-01	50	12	5	1.00E-06	37	1825	25550	2.26E-08	1.00E-03	2.26E-05	1.62E-09		
Cobalt	1.01E+01	50	12	5	1.00E-06	37	1825	25550	4.50E-07	6.00E-02	7.50E-06	3.22E-08		
Mercury	1.08E-01	50	12	5	1.00E-06	37	1825	25550	4.80E-09	3.00E-04	1.60E-05	3.43E-10		
Nickel	2.77E+01	50	12	5	1.00E-06	37	1825	25550	1.23E-06	2.00E-02	6.15E-05	8.78E-08		
										TOTAL HAZARD INDEX =	7.10E-04		TOTAL CANCER RISK =	0.00E+00

Table C-7-19

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical 8-13 Year Old Juvenile Trespasser/Visitor - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	7.41E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	6.06E-07	4.00E-04	1.51E-03	4.33E-08		
Barium	2.52E+02	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.06E-05	7.00E-02	2.95E-04	1.47E-06		
Cadmium	5.56E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	4.55E-08	1.00E-03	4.55E-05	3.25E-09		
Cobalt	1.07E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	8.76E-07	6.00E-02	1.46E-05	6.26E-08		
Mercury	1.19E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	9.75E-08	3.00E-04	3.25E-04	6.97E-09		
Nickel	2.85E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.33E-06	2.00E-02	1.16E-04	1.66E-07		
												TOTAL HAZARD INDEX =	2.31E-03		TOTAL CANCER RISK =	0.00E+00

Table C-7-20

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 3 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical 8-13 Year Old Juvenile Trespasser/Visitor - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	4.07E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.45E-08	4.00E-04	3.62E-05	1.04E-09		
Barium	2.37E+02	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	8.44E-07	7.00E-02	1.21E-05	6.03E-08		
Cadmium	5.09E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.81E-09	1.00E-03	1.81E-06	1.30E-10		
Cobalt	1.01E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	3.61E-08	6.00E-02	6.02E-07	2.58E-09		
Mercury	1.08E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.85E-09	3.00E-04	1.28E-05	2.75E-10		
Nickel	2.77E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	9.86E-08	2.00E-02	4.93E-06	7.04E-09		
												TOTAL HAZARD INDEX =	6.85E-05		TOTAL CANCER RISK =	0.00E+00

Table C-8-1

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Workers - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days,

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Antimony	1.62E+01	50	250	25	1.00E-06	70	9125	25550	7.95E-06	4.00E-04	1.99E-02	2.84E-06		
Cadmium	8.37E-01	50	250	25	1.00E-06	70	9125	25550	4.09E-07	1.00E-03	4.09E-04	1.46E-07		
										TOTAL HAZARD INDEX =	2.03E-02		TOTAL CANCER RISK =	0.00E+00

Table C-8-2

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Workers - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	8.94E+00	10	250	10	1.00E-06	70	3650	25550	8.75E-07	4.00E-04	2.19E-03	1.25E-07		
Cadmium	8.18E-01	10	250	10	1.00E-06	70	3650	25550	8.00E-08	1.00E-03	8.00E-05	1.14E-08		
										TOTAL HAZARD INDEX =	2.27E-03		TOTAL CANCER RISK =	0.00E+00

Table C-8-3

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Workers - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.62E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	8.31E-06	4.00E-04	2.08E-02	2.97E-06		
Cadmium	8.37E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	4.28E-07	1.00E-03	4.28E-04	1.53E-07		
												TOTAL HAZARD INDEX =	2.12E-02		TOTAL CANCER RISK =	0.00E+00

Table C-8-4

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Workers - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	8.94E+00	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	3.53E-07	4.00E-04	8.83E-04	5.05E-08		
Cadmium	8.18E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	3.23E-08	1.00E-03	3.23E-05	4.62E-09		
												TOTAL HAZARD INDEX =	9.16E-04		TOTAL CANCER RISK =	0.00E+00

Table C-8-5

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Adult Resident - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.62E+01	100	350	70	1.00E-06	70	25550	25550	2.23E-05	4.00E-04	5.56E-02	2.23E-05		
Cadmium	8.37E-01	100	350	70	1.00E-06	70	25550	25550	1.15E-06	1.00E-03	1.15E-03	1.15E-06		
										TOTAL HAZARD INDEX =	5.68E-02		TOTAL CANCER RISK =	0.00E+00

Table C-8-6

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Adult Resident - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	8.94E+00	50	350	9	1.00E-06	70	3285	25550	6.12E-06	4.00E-04	1.53E-02	7.87E-07		
Cadmium	8.18E-01	50	350	9	1.00E-06	70	3285	25550	5.60E-07	1.00E-03	5.60E-04	7.20E-08		
										TOTAL HAZARD INDEX =	1.59E-02		TOTAL CANCER RISK =	0.00E+00

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Table C-8-7

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Adult Resident - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.62E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.16E-05	4.00E-04	2.91E-02	1.16E-05		
Cadmium	8.37E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	5.99E-07	1.00E-03	5.99E-04	5.99E-07		
												TOTAL HAZARD INDEX =	2.97E-02		TOTAL CANCER RISK =	0.00E+00

Table C-8-8

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site Adult Resident - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	8.94E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.95E-07	4.00E-04	1.24E-03	6.36E-08		
Cadmium	8.18E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.52E-08	1.00E-03	4.52E-05	5.82E-09		
												TOTAL HAZARD INDEX =	1.28E-03		TOTAL CANCER RISK =	0.00E+00

Table C-8-9

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site 0-6 Year Old Child Resident - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.62E+01	200	350	6	1.00E-06	15	2190	25550	2.08E-04	4.00E-04	5.19E-01	1.78E-05		
Cadmium	8.37E-01	200	350	6	1.00E-06	15	2190	25550	1.07E-05	1.00E-03	1.07E-02	9.17E-07		
										TOTAL HAZARD INDEX =	5.30E-01		TOTAL CANCER RISK =	0.00E+00

Table C-8-10

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site 0-6 Year Old Child Resident - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemcials of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	8.94E+00	100	350	6	1.00E-06	15	2190	25550	5.71E-05	4.00E-04	1.43E-01	4.90E-06		
Cadmium	8.18E-01	100	350	6	1.00E-06	15	2190	25550	5.23E-06	1.00E-03	5.23E-03	4.48E-07		
										TOTAL HAZARD INDEX =	1.48E-01		TOTAL CANCER RISK =	0.00E+00

Table C-8-11

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site 0-6 Year Old Child Resident - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.62E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	4.50E-05	4.00E-04	1.12E-01	3.86E-06		
Cadmium	8.37E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.32E-06	1.00E-03	2.32E-03	1.99E-07		
												TOTAL HAZARD INDEX =	1.15E-01		TOTAL CANCER RISK =	0.00E+00

Table ᴗ-8-12

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical On-Site 0-6 Year Old Child Resident - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	8.94E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	2.14E-06	4.00E-04	5.34E-03	1.83E-07		
Cadmium	8.18E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.95E-07	1.00E-03	1.95E-04	1.67E-08		
												TOTAL HAZARD INDEX =	5.54E-03		TOTAL CANCER RISK =	0.00E+00

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Table C-8-13

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Trespasser/Visitor - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.62E+01	100	24	70	1.00E-06	70	25550	25550	1.53E-06	4.00E-04	3.82E-03	1.53E-06		
Cadmium	8.37E-01	100	24	70	1.00E-06	70	25550	25550	7.86E-08	1.00E-03	7.86E-05	7.86E-08		
									TOTAL HAZARD INDEX =		3.89E-03	TOTAL CANCER RISK =		0.00E+00

Table C-8-14

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Trespasser/Visitor - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	8.94E+00	50	12	9	1.00E-06	70	3285	25550	2.10E-07	4.00E-04	5.25E-04	2.70E-08		
Cadmium	8.18E-01	50	12	9	1.00E-06	70	3285	25550	1.92E-08	1.00E-03	1.92E-05	2.47E-09		
										TOTAL HAZARD INDEX =	5.44E-04		TOTAL CANCER RISK =	0.00E+00

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Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Trespasser/Visitor - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = *Percent Chemical Absorption Across Skin (unitless)*
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.62E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	7.98E-07	4.00E-04	2.00E-03	7.98E-07		
Cadmium	8.37E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	4.11E-08	1.00E-03	4.11E-05	4.11E-08		
												TOTAL HAZARD INDEX =	2.04E-03		TOTAL CANCER RISK =	0.00E+00

Table C-8-16

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Trespasser/Visitor - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	8.94E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.70E-08	4.00E-04	4.24E-05	2.18E-09		
Cadmium	8.18E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.55E-09	1.00E-03	1.55E-06	1.99E-10		
											TOTAL HAZARD INDEX =		4.40E-05	TOTAL CANCER RISK =		0.00E+00

Table C-8-17

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical 8-13 Year Old Juvenile Trespasser/Visitor - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.62E+01	100	24	5	1.00E-06	37	1825	25550	2.89E-06	4.00E-04	7.22E-03	2.06E-07		
Cadmium	8.37E-01	100	24	5	1.00E-06	37	1825	25550	1.49E-07	1.00E-03	1.49E-04	1.06E-08		
										TOTAL HAZARD INDEX =	7.37E-03		TOTAL CANCER RISK =	0.00E+00

Table C-8-18

Mead OU3
Ingestion of Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical 8-13 Year Old Juvenile Trespasser/Visitor - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	8.94E+00	50	12	5	1.00E-06	37	1825	25550	3.97E-07	4.00E-04	9.93E-04	2.84E-08		
Cadmium	8.18E-01	50	12	5	1.00E-06	37	1825	25550	3.63E-08	1.00E-03	3.63E-05	2.59E-09		
										TOTAL HAZARD INDEX =	1.03E-03		TOTAL CANCER RISK =	0.00E+00

Table C-8-19

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical 8-13 Year Old Juvenile Trespasser/Visitor - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.62E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	1.33E-06	4.00E-04	3.32E-03	9.49E-08		
Cadmium	8.37E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	6.84E-08	1.00E-03	6.84E-05	4.89E-09		
												TOTAL HAZARD INDEX =	3.39E-03		TOTAL CANCER RISK =	0.00E+00

Table C-8-20

Mead OU3
Dermal Exposure To Chemicals In Surface Soil (0 - 2 Feet)
Around Load Line 4 Paint Operations Area
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical 8-13 Year Old Juvenile Trespasser/Visitor - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Antimony	8.94E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	3.18E-08	4.00E-04	7.96E-05	2.27E-09		
Cadmium	8.18E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.91E-09	1.00E-03	2.91E-06	2.08E-10		
												TOTAL HAZARD INDEX =	8.25E-05		TOTAL CANCER RISK =	0.00E+00

TAbLE C-9-1

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT POTENTIAL LANDFILL AREA NORTH OF PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	8.00E-02	100	24	70	1.00E-06	70	25550	25550	7.51E-09	5.00E-05	1.50E-04	7.51E-09		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	100	24	70	1.00E-06	70	25550	25550	9.02E-08	5.00E-04	1.80E-04	9.02E-08	3.00E-02	2.71E-09
2,4-Dinitrotoluene	5.70E-02	100	24	70	1.00E-06	70	25550	25550	5.35E-09	2.00E-03	2.68E-06	5.35E-09	6.80E-01	3.64E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	7.10E-01	100	24	70	1.00E-06	70	25550	25550	6.67E-08	3.00E-03	2.22E-05	6.67E-08	1.10E-01	7.34E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.70E-02	100	24	70	1.00E-06	70	25550	25550	9.11E-09			9.11E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.30E+00	100	24	70	1.00E-06	70	25550	25550	1.22E-07	5.00E-02	2.44E-06	1.22E-07		
Antimony	5.00E+01	100	24	70	1.00E-06	70	25550	25550	4.70E-06	4.00E-04	1.17E-02	4.70E-06		
Cadmium	8.90E-01	100	24	70	1.00E-06	70	25550	25550	8.36E-08	1.00E-03	8.36E-05	8.36E-08		
Cobalt	1.20E+01	100	24	70	1.00E-06	70	25550	25550	1.13E-06	6.00E-02	1.88E-05	1.13E-06		
Silver	2.80E+00	100	24	70	1.00E-06	70	25550	25550	2.63E-07	5.00E-03	5.26E-05	2.63E-07		
Thallium	8.30E-01	100	24	70	1.00E-06	70	25550	25550	7.80E-08	8.00E-05	9.75E-04	7.80E-08		
Benzo(b)fluoranthene	7.70E-02	100	24	70	1.00E-06	70	25550	25550	7.23E-09			7.23E-09	7.30E-01	5.28E-09
bis(2-Ethylhexyl)phthalate (DEHP)	3.00E-01	100	24	70	1.00E-06	70	25550	25550	2.82E-08	2.00E-02	1.41E-06	2.82E-08	1.40E-02	3.95E-10
Butylbenzylphthalate	3.80E-01	100	24	70	1.00E-06	70	25550	25550	3.57E-08	2.00E-01	1.78E-07	3.57E-08		
Chrysene	2.70E-02	100	24	70	1.00E-06	70	25550	25550	2.54E-09			2.54E-09	7.30E-03	1.85E-11
Diethylphthalate	7.20E-02	100	24	70	1.00E-06	70	25550	25550	6.76E-09	8.00E-01	8.45E-09	6.76E-09		
Di-n-butylphthalate	2.40E+00	100	24	70	1.00E-06	70	25550	25550	2.25E-07	1.00E-01		2.25E-07		
Phenol	4.80E-02	100	24	70	1.00E-06	70	25550	25550	4.51E-09	6.00E-01		4.51E-09		
Pyrene	8.90E-02	100	24	70	1.00E-06	70	25550	25550	8.36E-09	3.00E-02	2.79E-07	8.36E-09		
										TOTAL HAZARD INDEX =	1.32E-02		TOTAL CANCER RISK =	1.94E-08

TABLE C-9-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT POTENTIAL LANDFILL AREA NORTH OF PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	7.90E-02	50	12	9	1.00E-06	70	3285	25550	1.86E-09	5.00E-05	3.71E-05	2.39E-10		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	50	12	9	1.00E-06	70	3285	25550	2.25E-08	5.00E-04	4.51E-05	2.90E-09	3.00E-02	8.70E-11
2,4-Dinitrotoluene	5.70E-02	50	12	9	1.00E-06	70	3285	25550	1.34E-09	2.00E-03	6.69E-07	1.72E-10	6.80E-01	1.17E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.10E-01	50	12	9	1.00E-06	70	3285	25550	1.43E-08	3.00E-03	4.77E-06	1.84E-09	1.10E-01	2.03E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.00E-02	50	12	9	1.00E-06	70	3285	25550	2.11E-09			2.72E-10		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	9.60E-01	50	12	9	1.00E-06	70	3285	25550	2.25E-08	5.00E-02	4.51E-07	2.90E-09		
Antimony	8.20E+00	50	12	9	1.00E-06	70	3285	25550	1.93E-07	4.00E-04	4.81E-04	2.48E-08		
Cadmium	7.00E-01	50	12	9	1.00E-06	70	3285	25550	1.64E-08	1.00E-03	1.64E-05	2.11E-09		
Cobalt	9.40E+00	50	12	9	1.00E-06	70	3285	25550	2.21E-07	6.00E-02	3.68E-06	2.84E-08		
Silver	7.20E-01	50	12	9	1.00E-06	70	3285	25550	1.69E-08	5.00E-03	3.38E-06	2.17E-09		
Thallium	7.40E-01	50	12	9	1.00E-06	70	3285	25550	1.74E-08	8.00E-05	2.17E-04	2.23E-09		
Benzo(b)fluoranthene	7.70E-02	50	12	9	1.00E-06	70	3285	25550	1.81E-09			2.32E-10	7.30E-01	1.70E-10
bis(2-Ethylhexyl)phthalate (DEHP)	2.40E-01	50	12	9	1.00E-06	70	3285	25550	5.64E-09	2.00E-02	2.82E-07	7.25E-10	1.40E-02	1.01E-11
Butylbenzylphthalate	2.90E-01	50	12	9	1.00E-06	70	3285	25550	6.81E-09	2.00E-01	3.41E-08	8.76E-10		
Chrysene	2.70E-02	50	12	9	1.00E-06	70	3285	25550	6.34E-10			8.15E-11	7.30E-03	5.95E-13
Diethylphthalate	7.20E-02	50	12	9	1.00E-06	70	3285	25550	1.69E-09	8.00E-01	2.11E-09	2.17E-10		
Di-n-butylphthalate	8.60E-01	50	12	9	1.00E-06	70	3285	25550	2.02E-08	1.00E-01	2.02E-07	2.60E-09		
Phenol	4.80E-02	50	12	9	1.00E-06	70	3285	25550	1.13E-09	6.00E-01	1.88E-09	1.45E-10		
Pyrene	8.90E-02	50	12	9	1.00E-06	70	3285	25550	2.09E-09	3.00E-02	6.97E-08	2.69E-10		
										TOTAL HAZARD INDEX =	8.11E-04		TOTAL CANCER RISK =	5.87E-10

TABLE C-9-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT POTENTIAL LANDFILL AREA NORTH OF PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	8.00E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	3.93E-08	5.00E-05	7.86E-04	3.93E-08		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	4.72E-07	5.00E-04	9.43E-04	4.72E-07	3.00E-02	1.41E-08
2,4-Dinitrotoluene	5.70E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.80E-08	2.00E-03	1.40E-05	2.80E-08	6.80E-01	1.90E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	7.10E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	3.49E-07	3.00E-03	1.16E-04	3.49E-07	1.10E-01	3.84E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.70E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	4.77E-08			4.77E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.30E+00	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	6.39E-07	5.00E-02	1.28E-05	6.39E-07		
Antimony	5.00E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	2.46E-06	4.00E-04	6.14E-03	2.46E-06		
Cadmium	8.90E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	4.37E-08	1.00E-03	4.37E-05	4.37E-08		
Cobalt	1.20E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	5.90E-07	6.00E-02	9.83E-06	5.90E-07		
Silver	2.80E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.38E-07	5.00E-03	2.75E-05	1.38E-07		
Thallium	8.30E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	4.08E-08	8.00E-05	5.10E-04	4.08E-08		
Benzo(b)fluoranthene	7.70E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	3.78E-08			3.78E-08	7.30E-01	2.76E-08
bis(2-Ethylhexyl)phthalate (DEHP)	3.00E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.47E-07	2.00E-02	7.37E-06	1.47E-07	1.40E-02	2.06E-09
Butylbenzylphthalate	3.80E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.87E-07	2.00E-01	9.33E-07	1.87E-07		
Chrysene	2.70E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.33E-08			1.33E-08	7.30E-03	9.68E-11
Diethylphthalate	7.20E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	3.54E-08	8.00E-01	4.42E-08	3.54E-08		
Di-n-butylphthalate	2.40E+00	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.18E-06	1.00E-01	1.18E-05	1.18E-06		
Phenol	4.80E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.36E-08	6.00E-01	3.93E-08	2.36E-08		
Pyrene	8.90E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	4.37E-08	3.00E-02	1.46E-06	4.37E-08		
												TOTAL HAZARD INDEX =	8.63E-03		TOTAL CANCER RISK =	1.01E-07

TABLE C-9-4

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT POTENTIAL LANDFILL AREA NORTH OF PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	7.90E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.50E-09	5.00E-05	3.00E-05	1.93E-10		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.82E-08	5.00E-04	3.64E-05	2.34E-09	3.00E-02	7.03E-11
2,4-Dinitrotoluene	5.70E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.08E-09	2.00E-03	5.41E-07	1.39E-10	6.80E-01	9.46E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.10E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.16E-08	3.00E-03	3.86E-06	1.49E-09	1.10E-01	1.64E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.00E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.71E-09			2.20E-10		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	9.60E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.82E-08	5.00E-02	3.64E-07	2.34E-09		
Antimony	8.20E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.56E-08	4.00E-04	3.89E-05	2.00E-09		
Cadmium	7.00E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.33E-09	1.00E-03	1.33E-06	1.71E-10		
Cobalt	9.40E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.78E-08	6.00E-02	2.97E-07	2.29E-09		
Silver	7.20E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.37E-09	5.00E-03	2.73E-07	1.76E-10		
Thallium	7.40E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.40E-09	8.00E-05	1.76E-05	1.81E-10		
Benzo(b)fluoranthene	7.70E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.46E-09			1.88E-10	7.30E-01	1.37E-10
bis(2-Ethylhexyl)phthalate (DEHP)	2.40E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	4.55E-09	2.00E-02	2.28E-07	5.86E-10	1.40E-02	8.20E-12
Butylbenzylphthalate	2.90E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	5.50E-09	2.00E-01	2.75E-08	7.07E-10		
Chrysene	2.70E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	5.12E-10			6.59E-11	7.30E-03	4.81E-13
Diethylphthalate	7.20E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.37E-09	8.00E-01	1.71E-09	1.76E-10		
Di-n-butylphthalate	8.60E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.63E-08	1.00E-01	1.63E-07	2.10E-09		
Phenol	4.80E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	9.11E-10	6.00E-01	1.52E-09	1.17E-10		
Pyrene	8.90E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.69E-09	3.00E-02	5.63E-08	2.17E-10		
												TOTAL HAZARD INDEX =	1.30E-04		TOTAL CANCER RISK =	4.74E-10

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TABLE C-9-5

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

AT POTENTIAL LANDFILL AREA NORTH OF PROVING GROUNDS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	8.00E-02	100	24	5	1.00E-06	37	1825	25550	1.42E-08	5.00E-05	2.84E-04	1.02E-09		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	100	24	5	1.00E-06	37	1825	25550	1.71E-07	5.00E-04	3.41E-04	1.22E-08	3.00E-02	3.66E-10
2,4-Dinitrotoluene	5.70E-02	100	24	5	1.00E-06	37	1825	25550	1.01E-08	2.00E-03	5.06E-06	7.24E-10	6.80E-01	4.92E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	7.10E-01	100	24	5	1.00E-06	37	1825	25550	1.26E-07	3.00E-03	4.21E-05	9.01E-09	1.10E-01	9.91E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.70E-02	100	24	5	1.00E-06	37	1825	25550	1.72E-08			1.23E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.30E+00	100	24	5	1.00E-06	37	1825	25550	2.31E-07	5.00E-02	4.62E-06	1.65E-08		
Antimony	5.00E+01	100	24	5	1.00E-06	37	1825	25550	8.89E-06	4.00E-04	2.22E-02	6.35E-07		
Cadmium	8.90E-01	100	24	5	1.00E-06	37	1825	25550	1.58E-07	1.00E-03	1.58E-04	1.13E-08		
Cobalt	1.20E+01	100	24	5	1.00E-06	37	1825	25550	2.13E-06	6.00E-02	3.55E-05	1.52E-07		
Silver	2.80E+00	100	24	5	1.00E-06	37	1825	25550	4.98E-07	5.00E-03	9.95E-05	3.55E-08		
Thallium	8.30E-01	100	24	5	1.00E-06	37	1825	25550	1.48E-07	8.00E-05	1.84E-03	1.05E-08		
Benzo(b)fluoranthene	7.70E-02	100	24	5	1.00E-06	37	1825	25550	1.37E-08			9.77E-10	7.30E-01	7.14E-10
bis(2-Ethylhexyl)phthalate (DEHP)	3.00E-01	100	24	5	1.00E-06	37	1825	25550	5.33E-08	2.00E-02	2.67E-06	3.81E-09	1.40E-02	5.33E-11
Butylbenzylphthalate	3.80E-01	100	24	5	1.00E-06	37	1825	25550	6.75E-08	2.00E-01	3.38E-07	4.82E-09		
Chrysene	2.70E-02	100	24	5	1.00E-06	37	1825	25550	4.80E-09			3.43E-10	7.30E-03	2.50E-12
Diethylphthalate	7.20E-02	100	24	5	1.00E-06	37	1825	25550	1.28E-08	8.00E-01	1.60E-08	9.14E-10		
Di-n-butylphthalate	2.40E+00	100	24	5	1.00E-06	37	1825	25550	4.27E-07	1.00E-01	4.27E-06	3.05E-08		
Phenol	4.80E-02	100	24	5	1.00E-06	37	1825	25550	8.53E-09	6.00E-01	1.42E-08	6.09E-10		
Pyrene	8.90E-02	100	24	5	1.00E-06	37	1825	25550	1.58E-08	3.00E-02	5.27E-07	1.13E-09		
										TOTAL HAZARD INDEX =	2.50E-02		TOTAL CANCER RISK =	2.62E-09

TABLE C-9-6

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT POTENTIAL LANDFILL AREA NORTH OF PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	7.90E-02	50	12	5	1.00E-06	37	1825	25550	3.51E-09	5.00E-05	7.02E-05	2.51E-10		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	50	12	5	1.00E-06	37	1825	25550	4.27E-08	5.00E-04	8.53E-05	3.05E-09	3.00E-02	9.14E-11
2,4-Dinitrotoluene	5.70E-02	50	12	5	1.00E-06	37	1825	25550	2.53E-09	2.00E-03	1.27E-06	1.81E-10	6.80E-01	1.23E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.10E-01	50	12	5	1.00E-06	37	1825	25550	2.71E-08	3.00E-03	9.03E-06	1.94E-09	1.10E-01	2.13E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.00E-02	50	12	5	1.00E-06	37	1825	25550	4.00E-09			2.86E-10		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	9.60E-01	50	12	5	1.00E-06	37	1825	25550	4.27E-08	5.00E-02	8.53E-07	3.05E-09		
Antimony	8.20E+00	50	12	5	1.00E-06	37	1825	25550	3.64E-07	4.00E-04	9.11E-04	2.60E-08		
Cadmium	7.00E-01	50	12	5	1.00E-06	37	1825	25550	3.11E-08	1.00E-03	3.11E-05	2.22E-09		
Cobalt	9.40E+00	50	12	5	1.00E-06	37	1825	25550	4.18E-07	6.00E-02	6.96E-06	2.98E-08		
Silver	7.20E-01	50	12	5	1.00E-06	37	1825	25550	3.20E-08	5.00E-03	6.40E-06	2.28E-09		
Thallium	7.40E-01	50	12	5	1.00E-06	37	1825	25550	3.29E-08	8.00E-05	4.11E-04	2.35E-09		
Benzo(b)fluoranthene	7.70E-02	50	12	5	1.00E-06	37	1825	25550	3.42E-09			2.44E-10	7.30E-01	1.78E-10
bis(2-Ethylhexyl)phthalate (DEHP)	2.40E-01	50	12	5	1.00E-06	37	1825	25550	1.07E-08	2.00E-02	5.33E-07	7.62E-10	1.40E-02	1.07E-11
Butylbenzylphthalate	2.90E-01	50	12	5	1.00E-06	37	1825	25550	1.29E-08	2.00E-01	6.44E-08	9.20E-10		
Chrysene	2.70E-02	50	12	5	1.00E-06	37	1825	25550	1.20E-09			8.57E-11	7.30E-03	6.25E-13
Diethylphthalate	7.20E-02	50	12	5	1.00E-06	37	1825	25550	3.20E-09	8.00E-01	4.00E-09	2.28E-10		
Di-n-butylphthalate	8.60E-01	50	12	5	1.00E-06	37	1825	25550	3.82E-08	1.00E-01	3.82E-07	2.73E-09		
Phenol	4.80E-02	50	12	5	1.00E-06	37	1825	25550	2.13E-09	6.00E-01	3.55E-09	1.52E-10		
Pyrene	8.90E-02	50	12	5	1.00E-06	37	1825	25550	3.95E-09	3.00E-02	1.32E-07	2.82E-10		
										TOTAL HAZARD INDEX =	1.53E-03		TOTAL CANCER RISK =	6.17E-10

TABLE C-9-7

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT POTENTIAL LANDFILL AREA NORTH OF PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	8.00E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	6.54E-08	5.00E-05	1.31E-03	4.67E-09		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	7.85E-07	5.00E-04	1.57E-03	5.61E-08	3.00E-02	1.68E-09
2,4-Dinitrotoluene	5.70E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	4.66E-08	2.00E-03	2.33E-05	3.33E-09	6.80E-01	2.26E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	7.10E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	5.81E-07	3.00E-03	1.94E-04	4.15E-08	1.10E-01	4.56E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.70E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	7.93E-08			5.67E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.30E+00	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	1.06E-06	5.00E-02	2.13E-05	7.59E-08		
Antimony	5.00E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	4.09E-06	4.00E-04	1.02E-02	2.92E-07		
Cadmium	8.90E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	7.28E-08	1.00E-03	7.28E-05	5.20E-09		
Cobalt	1.20E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	9.81E-07	6.00E-02	1.64E-05	7.01E-08		
Silver	2.80E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.29E-07	5.00E-03	4.58E-05	1.64E-08		
Thallium	8.30E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	6.79E-08	8.00E-05	8.48E-04	4.85E-09		
Benzo(b)fluoranthene	7.70E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	6.30E-08			4.50E-09	7.30E-01	3.28E-09
bis(2-Ethylhexyl)phthalate (DEHP)	3.00E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.45E-07	2.00E-02	1.23E-05	1.75E-08	1.40E-02	2.45E-10
Butylbenzylphthalate	3.80E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	3.11E-07	2.00E-01	1.55E-06	2.22E-08		
Chrysene	2.70E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.21E-08			1.58E-09	7.30E-03	1.15E-11
Diethylphthalate	7.20E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	5.89E-08	8.00E-01	7.36E-08	4.21E-09		
Di-n-butylphthalate	2.40E+00	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	1.96E-06	1.00E-01	1.96E-05	1.40E-07		
Phenol	4.80E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	3.93E-08	6.00E-01	6.54E-08	2.80E-09		
Pyrene	8.90E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	7.28E-08	3.00E-02	2.43E-06	5.20E-09		
												TOTAL HAZARD INDEX =	1.44E-02		TOTAL CANCER RISK =	1.20E-08

TABLE C-9-8

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT POTENTIAL LANDFILL AREA NORTH OF PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	7.90E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.81E-09	5.00E-05	5.63E-05	2.01E-10		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.42E-08	5.00E-04	6.84E-05	2.44E-09	3.00E-02	7.33E-11
2,4-Dinitrotoluene	5.70E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.03E-09	2.00E-03	1.02E-06	1.45E-10	6.80E-01	9.86E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.10E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.17E-08	3.00E-03	7.25E-06	1.55E-09	1.10E-01	1.71E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.00E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.21E-09			2.29E-10		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	9.60E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.42E-08	5.00E-02	6.84E-07	2.44E-09		
Antimony	8.20E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.92E-08	4.00E-04	7.30E-05	2.09E-09		
Cadmium	7.00E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.49E-09	1.00E-03	2.49E-06	1.78E-10		
Cobalt	9.40E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	3.35E-08	6.00E-02	5.58E-07	2.39E-09		
Silver	7.20E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.57E-09	5.00E-03	5.13E-07	1.83E-10		
Thallium	7.40E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.64E-09	8.00E-05	3.30E-05	1.88E-10		
Benzo(b)fluoranthene	7.70E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.74E-09			1.96E-10	7.30E-01	1.43E-10
bis(2-Ethylhexyl)phthalate (DEHP)	2.40E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	8.55E-09	2.00E-02	4.28E-07	6.11E-10	1.40E-02	8.55E-12
Butylbenzylphthalate	2.90E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.03E-08	2.00E-01	5.17E-08	7.38E-10		
Chrysene	2.70E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	9.62E-10			6.87E-11	7.30E-03	5.02E-13
Diethylphthalate	7.20E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.57E-09	8.00E-01	3.21E-09	1.83E-10		
Di-n-butylphthalate	8.60E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.06E-08	1.00E-01	3.06E-07	2.19E-09		
Phenol	4.80E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.71E-09	6.00E-01	2.85E-09	1.22E-10		
Pyrene	8.90E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.17E-09	3.00E-02	1.06E-07	2.27E-10		
												TOTAL HAZARD INDEX =	2.44E-04		TOTAL CANCER RISK =	4.95E-10

TABLE C-9-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT POTENTIAL LANDFILL AREA NORTH OF PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	8.00E-02	100	350	70	1.00E-06	70	25550	25550	1.10E-07	5.00E-05	2.19E-03	1.10E-07		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	100	350	70	1.00E-06	70	25550	25550	1.32E-06	5.00E-04	2.63E-03	1.32E-06	3.00E-02	3.95E-08
2,4-Dinitrotoluene	5.70E-02	100	350	70	1.00E-06	70	25550	25550	7.81E-08	2.00E-03	3.90E-05	7.81E-08	6.80E-01	5.31E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	7.10E-01	100	350	70	1.00E-06	70	25550	25550	9.73E-07	3.00E-03	3.24E-04	9.73E-07	1.10E-01	1.07E-07
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.70E-02	100	350	70	1.00E-06	70	25550	25550	1.33E-07			1.33E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.30E+00	100	350	70	1.00E-06	70	25550	25550	1.78E-06	5.00E-02	3.56E-05	1.78E-06		
Antimony	5.00E+01	100	350	70	1.00E-06	70	25550	25550	6.85E-05	4.00E-04	1.71E-01	6.85E-05		
Cadmium	8.90E-01	100	350	70	1.00E-06	70	25550	25550	1.22E-06	1.00E-03	1.22E-03	1.22E-06		
Cobalt	1.20E+01	100	350	70	1.00E-06	70	25550	25550	1.64E-05	6.00E-02	2.74E-04	1.64E-05		
Silver	2.80E+00	100	350	70	1.00E-06	70	25550	25550	3.84E-06	5.00E-03	7.67E-04	3.84E-06		
Thallium	8.30E-01	100	350	70	1.00E-06	70	25550	25550	1.14E-06	8.00E-05	1.42E-02	1.14E-06		
Benzo(b)fluoranthene	7.70E-02	100	350	70	1.00E-06	70	25550	25550	1.05E-07			1.05E-07	7.30E-01	7.70E-08
bis(2-Ethylhexyl)phthalate (DEHP)	3.00E-01	100	350	70	1.00E-06	70	25550	25550	4.11E-07	2.00E-02	2.05E-05	4.11E-07	1.40E-02	5.75E-09
Butylbenzylphthalate	3.80E-01	100	350	70	1.00E-06	70	25550	25550	5.21E-07	2.00E-01	2.60E-06	5.21E-07		
Chrysene	2.70E-02	100	350	70	1.00E-06	70	25550	25550	3.70E-08			3.70E-08	7.30E-03	2.70E-10
Diethylphthalate	7.20E-02	100	350	70	1.00E-06	70	25550	25550	9.86E-08	8.00E-01	1.23E-07	9.86E-08		
Di-n-butylphthalate	2.40E+00	100	350	70	1.00E-06	70	25550	25550	3.29E-06	1.00E-01	3.29E-05	3.29E-06		
Phenol	4.80E-02	100	350	70	1.00E-06	70	25550	25550	6.58E-08	6.00E-01	1.10E-07	6.58E-08		
Pyrene	8.90E-02	100	350	70	1.00E-06	70	25550	25550	1.22E-07	3.00E-02	4.06E-06	1.22E-07		
										TOTAL HAZARD INDEX =	1.93E-01		TOTAL CANCER RISK =	2.83E-07

TABLE C-9-10

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT POTENTIAL LANDFILL AREA NORTH OF PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	7.90E-02	50	350	9	1.00E-06	70	3285	25550	5.41E-08	5.00E-05	1.08E-03	6.96E-09		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	50	350	9	1.00E-06	70	3285	25550	6.58E-07	5.00E-04	1.32E-03	8.45E-08	3.00E-02	2.54E-09
2,4-Dinitrotoluene	5.70E-02	50	350	9	1.00E-06	70	3285	25550	3.90E-08	2.00E-03	1.95E-05	5.02E-09	6.80E-01	3.41E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.10E-01	50	350	9	1.00E-06	70	3285	25550	4.18E-07	3.00E-03	1.39E-04	5.37E-08	1.10E-01	5.91E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.00E-02	50	350	9	1.00E-06	70	3285	25550	6.16E-08			7.93E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	9.60E-01	50	350	9	1.00E-06	70	3285	25550	6.58E-07	5.00E-02	1.32E-05	8.45E-08		
Antimony	8.20E+00	50	350	9	1.00E-06	70	3285	25550	5.62E-06	4.00E-04	1.40E-02	7.22E-07		
Cadmium	7.00E-01	50	350	9	1.00E-06	70	3285	25550	4.79E-07	1.00E-03	4.79E-04	6.16E-08		
Cobalt	9.40E+00	50	350	9	1.00E-06	70	3285	25550	6.44E-06	6.00E-02	1.07E-04	8.28E-07		
Silver	7.20E-01	50	350	9	1.00E-06	70	3285	25550	4.93E-07	5.00E-03	9.86E-05	6.34E-08		
Thallium	7.40E-01	50	350	9	1.00E-06	70	3285	25550	5.07E-07	8.00E-05	6.34E-03	6.52E-08		
Benzo(b)fluoranthene	7.70E-02	50	350	9	1.00E-06	70	3285	25550	5.27E-08			6.78E-09	7.30E-01	4.95E-09
bis(2-Ethylhexyl)phthalate (DEHP)	2.40E-01	50	350	9	1.00E-06	70	3285	25550	1.64E-07	2.00E-02	8.22E-06	2.11E-08	1.40E-02	2.96E-10
Butylbenzylphthalate	2.90E-01	50	350	9	1.00E-06	70	3285	25550	1.99E-07	2.00E-01	9.93E-07	2.55E-08		
Chrysene	2.70E-02	50	350	9	1.00E-06	70	3285	25550	1.85E-08			2.38E-09	7.30E-03	1.74E-11
Diethylphthalate	7.20E-02	50	350	9	1.00E-06	70	3285	25550	4.93E-08	8.00E-01	6.16E-08	6.34E-09		
Di-n-butylphthalate	8.60E-01	50	350	9	1.00E-06	70	3285	25550	5.89E-07	1.00E-01	5.89E-06	7.57E-08		
Phenol	4.80E-02	50	350	9	1.00E-06	70	3285	25550	3.29E-08	6.00E-01	5.48E-08	4.23E-09		
Pyrene	8.90E-02	50	350	9	1.00E-06	70	3285	25550	6.10E-08	3.00E-02	2.03E-06	7.84E-09		
										TOTAL HAZARD INDEX =	2.36E-02		TOTAL CANCER RISK =	1.71E-08

TABLE C-9-11

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT POTENTIAL LANDFILL AREA NORTH OF PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	8.00E-02	5230	1.0	0.100	350	70	1.00E-06	70	25550	25550	5.73E-07	5.00E-05	1.15E-02	5.73E-07		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	5230	1.0	0.100	350	70	1.00E-06	70	25550	25550	6.88E-06	5.00E-04	1.38E-02	6.88E-06	3.00E-02	2.06E-07
2,4-Dinitrotoluene	5.70E-02	5230	1.0	0.100	350	70	1.00E-06	70	25550	25550	4.08E-07	2.00E-03	2.04E-04	4.08E-07	6.80E-01	2.78E-07
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	7.10E-01	5230	1.0	0.100	350	70	1.00E-06	70	25550	25550	5.09E-06	3.00E-03	1.70E-03	5.09E-06	1.10E-01	5.60E-07
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.70E-02	5230	1.0	0.100	350	70	1.00E-06	70	25550	25550	6.95E-07			6.95E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.30E+00	5230	1.0	0.100	350	70	1.00E-06	70	25550	25550	9.31E-06	5.00E-02	1.86E-04	9.31E-06		
Antimony	5.00E+01	5230	1.0	0.010	350	70	1.00E-06	70	25550	25550	3.58E-05	4.00E-04	8.96E-02	3.58E-05		
Cadmium	8.90E-01	5230	1.0	0.010	350	70	1.00E-06	70	25550	25550	6.38E-07	1.00E-03	6.38E-04	6.38E-07		
Cobalt	1.20E+01	5230	1.0	0.010	350	70	1.00E-06	70	25550	25550	8.60E-06	6.00E-02	1.43E-04	8.60E-06		
Silver	2.80E+00	5230	1.0	0.010	350	70	1.00E-06	70	25550	25550	2.01E-06	5.00E-03	4.01E-04	2.01E-06		
Thallium	8.30E-01	5230	1.0	0.010	350	70	1.00E-06	70	25550	25550	5.95E-07	8.00E-05	7.43E-03	5.95E-07		
Benzo(b)fluoranthene	7.70E-02	5230	1.0	0.100	350	70	1.00E-06	70	25550	25550	5.52E-07			5.52E-07	7.30E-01	4.03E-07
bis(2-Ethylhexyl)phthalate (DEHP)	3.00E-01	5230	1.0	0.100	350	70	1.00E-06	70	25550	25550	2.15E-06	2.00E-02	1.07E-04	2.15E-06	1.40E-02	3.01E-08
Butylbenzylphthalate	3.80E-01	5230	1.0	0.100	350	70	1.00E-06	70	25550	25550	2.72E-06	2.00E-01	1.36E-05	2.72E-06		
Chrysene	2.70E-02	5230	1.0	0.100	350	70	1.00E-06	70	25550	25550	1.93E-07			1.93E-07	7.30E-03	1.41E-09
Diethylphthalate	7.20E-02	5230	1.0	0.100	350	70	1.00E-06	70	25550	25550	5.16E-07	8.00E-01	6.45E-07	5.16E-07		
Di-n-butylphthalate	2.40E+00	5230	1.0	0.100	350	70	1.00E-06	70	25550	25550	1.72E-05	1.00E-01	1.72E-04	1.72E-05		
Phenol	4.80E-02	5230	1.0	0.100	350	70	1.00E-06	70	25550	25550	3.44E-07	6.00E-01	5.73E-07	3.44E-07		
Pyrene	8.90E-02	5230	1.0	0.100	350	70	1.00E-06	70	25550	25550	6.38E-07	3.00E-02	2.13E-05	6.38E-07		
												TOTAL HAZARD INDEX =	1.26E-01		TOTAL CANCER RISK =	1.48E-06

TABLE C-9-12

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT POTENTIAL LANDFILL AREA NORTH OF PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	7.90E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	4.37E-08	5.00E-05	8.74E-04	5.62E-09		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	5.31E-07	5.00E-04	1.06E-03	6.83E-08	3.00E-02	2.05E-09
2,4-Dinitrotoluene	5.70E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	3.15E-08	2.00E-03	1.58E-05	4.06E-09	6.80E-01	2.76E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.10E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	3.38E-07	3.00E-03	1.13E-04	4.34E-08	1.10E-01	4.77E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.00E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	4.98E-08			6.40E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	9.60E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	5.31E-07	5.00E-02	1.06E-05	6.83E-08		
Antimony	8.20E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.54E-07	4.00E-04	1.13E-03	5.83E-08		
Cadmium	7.00E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	3.87E-08	1.00E-03	3.87E-05	4.98E-09		
Cobalt	9.40E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	5.20E-07	6.00E-02	8.67E-06	6.69E-08		
Silver	7.20E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	3.98E-08	5.00E-03	7.97E-06	5.12E-09		
Thallium	7.40E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.10E-08	8.00E-05	5.12E-04	5.27E-09		
Benzo(b)fluoranthene	7.70E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	4.26E-08			5.48E-09	7.30E-01	4.00E-09
bis(2-Ethylhexyl)phthalate (DEHP)	2.40E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.33E-07	2.00E-02	6.64E-06	1.71E-08	1.40E-02	2.39E-10
Butylbenzylphthalate	2.90E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.60E-07	2.00E-01	8.02E-07	2.06E-08		
Chrysene	2.70E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.49E-08			1.92E-09	7.30E-03	1.40E-11
Diethylphthalate	7.20E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	3.98E-08	8.00E-01	4.98E-08	5.12E-09		
Di-n-butylphthalate	8.60E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	4.76E-07	1.00E-01	4.76E-06	6.12E-08		
Phenol	4.80E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	2.66E-08	6.00E-01	4.43E-08	3.42E-09		
Pyrene	8.90E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	4.93E-08	3.00E-02	1.64E-06	6.33E-09		
												TOTAL HAZARD INDEX =	3.79E-03		TOTAL CANCER RISK =	1.38E-08

TABLE C-9-13

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT POTENTIAL LANDFILL AREA NORTH OF PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0 - 6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)$^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	8.00E-02	200	350	6	1.00E-06	15	2190	25550	1.02E-06	5.00E-05	2.05E-02	8.77E-08		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	200	350	6	1.00E-06	15	2190	25550	1.23E-05	5.00E-04	2.45E-02	1.05E-06	3.00E-02	3.16E-08
2,4-Dinitrotoluene	5.70E-02	200	350	6	1.00E-06	15	2190	25550	7.29E-07	2.00E-03	3.64E-04	6.25E-08	6.80E-01	4.25E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	7.10E-01	200	350	6	1.00E-06	15	2190	25550	9.08E-06	3.00E-03	3.03E-03	7.78E-07	1.10E-01	8.56E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.70E-02	200	350	6	1.00E-06	15	2190	25550	1.24E-06			1.06E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.30E+00	200	350	6	1.00E-06	15	2190	25550	1.66E-05	5.00E-02	3.32E-04	1.42E-06		
Antimony	5.00E+01	200	350	6	1.00E-06	15	2190	25550	6.39E-04	4.00E-04	1.60E+00	5.48E-05		
Cadmium	8.90E-01	200	350	6	1.00E-06	15	2190	25550	1.14E-05	1.00E-03	1.14E-02	9.75E-07		
Cobalt	1.20E+01	200	350	6	1.00E-06	15	2190	25550	1.53E-04	6.00E-02	2.56E-03	1.32E-05		
Silver	2.80E+00	200	350	6	1.00E-06	15	2190	25550	3.58E-05	5.00E-03	7.16E-03	3.07E-06		
Thallium	8.30E-01	200	350	6	1.00E-06	15	2190	25550	1.06E-05	8.00E-05	1.33E-01	9.10E-07		
Benzo(b)fluoranthene	7.70E-02	200	350	6	1.00E-06	15	2190	25550	9.84E-07			8.44E-08	7.30E-01	6.16E-08
bis(2-Ethylhexyl)phthalate (DEHP)	3.00E-01	200	350	6	1.00E-06	15	2190	25550	3.84E-06	2.00E-02	1.92E-04	3.29E-07	1.40E-02	4.60E-09
Butylbenzylphthalate	3.80E-01	200	350	6	1.00E-06	15	2190	25550	4.86E-06	2.00E-01	2.43E-05	4.16E-07		
Chrysene	2.70E-02	200	350	6	1.00E-06	15	2190	25550	3.45E-07			2.96E-08	7.30E-03	2.16E-10
Diethylphthalate	7.20E-02	200	350	6	1.00E-06	15	2190	25550	9.21E-07	8.00E-01	1.15E-06	7.89E-08		
Di-n-butylphthalate	2.40E+00	200	350	6	1.00E-06	15	2190	25550	3.07E-05	1.00E-01	3.07E-04	2.63E-06		
Phenol	4.80E-02	200	350	6	1.00E-06	15	2190	25550	6.14E-07	6.00E-01	1.02E-06	5.26E-08		
Pyrene	8.90E-02	200	350	6	1.00E-06	15	2190	25550	1.14E-06	3.00E-02	3.79E-05	9.75E-08		
										TOTAL HAZARD INDEX =	1.80E+00		TOTAL CANCER RISK =	2.26E-07

Dermal .49
2.29

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TABLE C-9-14

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT POTENTIAL LANDFILL AREA NORTH OF PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0 - 6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	7.90E-02	100	350	6	1.00E-06	15	2190	25550	5.05E-07	5.00E-05	1.01E-02	4.33E-08		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	100	350	6	1.00E-06	15	2190	25550	6.14E-06	5.00E-04	1.23E-02	5.26E-07	3.00E-02	1.58E-08
2,4-Dinitrotoluene	5.70E-02	100	350	6	1.00E-06	15	2190	25550	3.64E-07	2.00E-03	1.82E-04	3.12E-08	6.80E-01	2.12E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.10E-01	100	350	6	1.00E-06	15	2190	25550	3.90E-06	3.00E-03	1.30E-03	3.34E-07	1.10E-01	3.68E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.00E-02	100	350	6	1.00E-06	15	2190	25550	5.75E-07			4.93E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	9.60E-01	100	350	6	1.00E-06	15	2190	25550	6.14E-06	5.00E-02	1.23E-04	5.26E-07		
Antimony	8.20E+00	100	350	6	1.00E-06	15	2190	25550	5.24E-05	4.00E-04	1.31E-01	4.49E-06		
Cadmium	7.00E-01	100	350	6	1.00E-06	15	2190	25550	4.47E-06	1.00E-03	4.47E-03	3.84E-07		
Cobalt	9.40E+00	100	350	6	1.00E-06	15	2190	25550	6.01E-05	6.00E-02	1.00E-03	5.15E-06		
Silver	7.20E-01	100	350	6	1.00E-06	15	2190	25550	4.60E-06	5.00E-03	9.21E-04	3.95E-07		
Thallium	7.40E-01	100	350	6	1.00E-06	15	2190	25550	4.73E-06	8.00E-05	5.91E-02	4.05E-07		
Benzo(b)fluoranthene	7.70E-02	100	350	6	1.00E-06	15	2190	25550	4.92E-07			4.22E-08	7.30E-01	3.08E-08
bis(2-Ethylhexyl)phthalate (DEHP)	2.40E-01	100	350	6	1.00E-06	15	2190	25550	1.53E-06	2.00E-02	7.67E-05	1.32E-07	1.40E-02	1.84E-09
Butylbenzylphthalate	2.90E-01	100	350	6	1.00E-06	15	2190	25550	1.85E-06	2.00E-01	9.27E-06	1.59E-07		
Chrysene	2.70E-02	100	350	6	1.00E-06	15	2190	25550	1.73E-07			1.48E-08	7.30E-03	1.08E-10
Diethylphthalate	7.20E-02	100	350	6	1.00E-06	15	2190	25550	4.60E-07	8.00E-01	5.75E-07	3.95E-08		
Di-n-butylphthalate	8.60E-01	100	350	6	1.00E-06	15	2190	25550	5.50E-06	1.00E-01	5.50E-05	4.71E-07		
Phenol	4.80E-02	100	350	6	1.00E-06	15	2190	25550	3.07E-07	6.00E-01	5.11E-07	2.63E-08		
Pyrene	8.90E-02	100	350	6	1.00E-06	15	2190	25550	5.69E-07	3.00E-02	1.90E-05	4.88E-08		
										TOTAL HAZARD INDEX =	2.21E-01		TOTAL CANCER RISK =	1.07E-07

TABLE C-9-15

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT POTENTIAL LANDFILL AREA NORTH OF PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0 - 6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemcials of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	8.00E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.21E-06	5.00E-05	4.43E-02	1.90E-07		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.66E-05	5.00E-04	5.32E-02	2.28E-06	3.00E-02	6.83E-08
2,4-Dinitrotoluene	5.70E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.58E-06	2.00E-03	7.89E-04	1.35E-07	6.80E-01	9.20E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	7.10E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.97E-05	3.00E-03	6.55E-03	1.68E-06	1.10E-01	1.85E-07
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.70E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.69E-06			2.30E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.30E+00	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	3.60E-05	5.00E-02	7.20E-04	3.09E-06		
Antimony	5.00E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	1.38E-04	4.00E-04	3.46E-01	1.19E-05		
Cadmium	8.90E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.46E-06	1.00E-03	2.46E-03	2.11E-07		
Cobalt	1.20E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	3.32E-05	6.00E-02	5.54E-04	2.85E-06		
Silver	2.80E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	7.75E-06	5.00E-03	1.55E-03	6.64E-07		
Thallium	8.30E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.30E-06	8.00E-05	2.87E-02	1.97E-07		
Benzo(b)fluoranthene	7.70E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.13E-06			1.83E-07	7.30E-01	1.33E-07
bis(2-Ethylhexyl)phthalate (DEHP)	3.00E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	8.31E-06	2.00E-02	4.15E-04	7.12E-07	1.40E-02	9.97E-09
Butylbenzylphthalate	3.80E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.05E-05	2.00E-01	5.26E-05	9.02E-07		
Chrysene	2.70E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	7.48E-07			6.41E-08	7.30E-03	4.68E-10
Diethylphthalate	7.20E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.99E-06	8.00E-01	2.49E-06	1.71E-07		
Di-n-butylphthalate	2.40E+00	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	6.64E-05	1.00E-01	6.64E-04	5.70E-06		
Phenol	4.80E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.33E-06	6.00E-01	2.21E-06	1.14E-07		
Pyrene	8.90E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.46E-06	3.00E-02	8.21E-05	2.11E-07		
												TOTAL HAZARD INDEX =	4.86E-01		TOTAL CANCER RISK =	4.90E-07

TABLE C-9-16

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT POTENTIAL LANDFILL AREA NORTH OF PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0 - 6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	7.90E-02	1869	0.2	0.100	350	6	1.00E-06	15	2190	25550	1.89E-07	5.00E-05	3.78E-03	1.62E-08		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	1869	0.2	0.100	350	6	1.00E-06	15	2190	25550	2.29E-06	5.00E-04	4.59E-03	1.97E-07	3.00E-02	5.90E-09
2,4-Dinitrotoluene	5.70E-02	1869	0.2	0.100	350	6	1.00E-06	15	2190	25550	1.36E-07	2.00E-03	6.81E-05	1.17E-08	6.80E-01	7.94E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.10E-01	1869	0.2	0.100	350	6	1.00E-06	15	2190	25550	1.46E-06	3.00E-03	4.86E-04	1.25E-07	1.10E-01	1.37E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.00E-02	1869	0.2	0.100	350	6	1.00E-06	15	2190	25550	2.15E-07			1.84E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	9.60E-01	1869	0.2	0.100	350	6	1.00E-06	15	2190	25550	2.29E-06	5.00E-02	4.59E-05	1.97E-07		
Antimony	8.20E+00	1869	0.2	0.010	350	6	1.00E-06	15	2190	25550	1.96E-06	4.00E-04	4.90E-03	1.68E-07		
Cadmium	7.00E-01	1869	0.2	0.010	350	6	1.00E-06	15	2190	25550	1.67E-07	1.00E-03	1.67E-04	1.43E-08		
Cobalt	9.40E+00	1869	0.2	0.010	350	6	1.00E-06	15	2190	25550	2.25E-06	6.00E-02	3.74E-05	1.93E-07		
Silver	7.20E-01	1869	0.2	0.010	350	6	1.00E-06	15	2190	25550	1.72E-07	5.00E-03	3.44E-05	1.47E-08		
Thallium	7.40E-01	1869	0.2	0.010	350	6	1.00E-06	15	2190	25550	1.77E-07	8.00E-05	2.21E-03	1.52E-08		
Benzo(b)fluoranthene	7.70E-02	1869	0.2	0.100	350	6	1.00E-06	15	2190	25550	1.84E-07			1.58E-08	7.30E-01	1.15E-08
bis(2-Ethylhexyl)phthalate (DEHP)	2.40E-01	1869.0	0.2	0.100	350	6	1.00E-06	15	2190	25550	5.74E-07	2.00E-02	2.87E-05	4.92E-08	1.40E-02	6.88E-10
Butylbenzylphthalate	2.90E-01	1869.0	0.2	0.100	350	6	1.00E-06	15	2190	25550	6.93E-07	2.00E-01	3.46E-06	5.94E-08		
Chrysene	2.70E-02	1869.0	0.2	0.100	350	6	1.00E-06	15	2190	25550	6.45E-08			5.53E-09	7.30E-03	4.04E-11
Diethylphthalate	7.20E-02	1869.0	0.2	0.100	350	6	1.00E-06	15	2190	25550	1.72E-07	8.00E-01	2.15E-07	1.47E-08		
Di-n-butylphthalate	8.60E-01	1869.0	0.2	0.100	350	6	1.00E-06	15	2190	25550	2.06E-06	1.00E-01	2.06E-05	1.76E-07		
Phenol	4.80E-02	1869.0	0.2	0.100	350	6	1.00E-06	15	2190	25550	1.15E-07	6.00E-01	1.91E-07	9.83E-09		
Pyrene	8.90E-02	1869.0	0.2	0.100	350	6	1.00E-06	15	2190	25550	2.13E-07	3.00E-02	7.09E-06	1.82E-08		
												TOTAL HAZARD INDEX =	1.64E-02		TOTAL CANCER RISK =	3.98E-08

ıABLE C-9-17

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
AT THE POTENTIAL LANDFILL AREA NORTH OF PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	8.00E-02	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
2,4-Dinitrotoluene	5.70E-02	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	2.00E-03	0.00E+00	0.00E+00	6.80E-01	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	7.10E-01	0.20	21%	32%	47%	1.18	0.06	0.09	4.40E-02	0.40	350	70	70	25550	25550	2.41E-04	3.00E-03	8.04E-02	2.41E-04	1.10E-01	2.65E-05
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.70E-02	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.30E+00	0.20	21%	32%	47%	0.32	NE	NB	1.75E-02	0.40	350	70	70	25550	25550	9.57E-05	5.00E-02	1.91E-03	9.57E-05		
																	TOTAL HAZARD INDEX =	8.23E-02		TOTAL CANCER RISK =	2.65E-05

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)
NE = Not Evaluated during the plant uptake study
NB = No measurable bioconcentration

TABLE C-9-18

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
AT THE POTENTIAL LANDFILL AREA NORTH OF PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFlv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFlv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	AVG CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFlv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	7.90E-02	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
2,4-Dinitrotoluene	5.70E-02	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	2.00E-03	0.00E+00	0.00E+00	6.80E-01	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.10E-01	0.20	21%	32%	47%	1.18	0.06	0.09	3.78E-02	0.25	350	9	70	3285	25550	1.29E-04	3.00E-03	4.31E-02	1.66E-05	1.10E-01	1.83E-06
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.00E-02	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	9.60E-01	0.20	21%	32%	47%	0.32	NE	NB	1.29E-02	0.25	350	9	70	3285	25550	4.42E-05	5.00E-02	8.84E-04	5.68E-06		
																	TOTAL HAZARD INDEX =	4.40E-02		TOTAL CANCER RISK =	1.83E-06

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)
NE = Not Evaluated during the plant uptake study
NB = No measurable bioconcentration

ıABLE C-9-19

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
AT THE POTENTIAL LANDFILL AREA NORTH OF PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(Flv x BCFlv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
Flv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFlv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	Flv	Frv	Fgf	BCFlv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	8.00E-02	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
2,4-Dinitrotoluene	5.70E-02	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	2.00E-03	0.00E+00	0.00E+00	6.80E-01	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	7.10E-01	0.10	10%	45%	45%	1.18	0.06	0.09	1.32E-02	0.40	350	6	15	2190	25550	3.37E-04	3.00E-03	1.12E-01	2.89E-05	1.10E-01	3.18E-06
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.70E-02	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.30E+00	0.10	10%	45%	45%	0.32	NE	NB	4.16E-03	0.40	350	6	15	2190	25550	1.06E-04	5.00E-02	2.13E-03	9.12E-06		
																	TOTAL HAZARD INDEX =	1.15E-01		TOTAL CANCER RISK =	3.18E-06

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)
NE = Not Evaluated during the plant uptake study
NB = No measurable bioconcentration

B07NE003703-06512

ιABLE C-9-20

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINA⁻ ⁼D SOILS (0 - 2 FEET)
AT THE POTENTIAL LANDFILL AREA NORTH OF PROVIN·G GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, ιEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	7.90E-02	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	9.60E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
2,4-Dinitrotoluene	5.70E-02	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	2.00E-03	0.00E+00	0.00E+00	6.80E-01	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.10E-01	0.10	10%	45%	45%	1.18	0.06	0.09	1.13E-02	0.25	350	6	15	2190	25550	1.81E-04	3.00E-03	6.04E-02	1.55E-05	1.10E-01	1.71E-06
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	9.00E-02	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	9.60E-01	0.10	10%	45%	45%	0.3[illegible]	NE	NB	3.07E-03	0.25	350	6	15	2190	25550	4.91E-05	5.00E-02	9.82E-04	4.21E-06		
																	TOTAL HAZARD INDEX =	6.13E-02		TOTAL CANCER RISK =	1.71E-06

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)
NE = Not Evaluated during the plant uptake study
NB = No measurable bioconcentration

B07NE003703-06513

Table C-10-1

Mead OU3
Ingestion of Chemicals In Subsurface Soil[a]
At Potential Landfill Area North Of Proving Grounds
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Future Construction Workers - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	1.60E-01	480	130	1	1.00E-06	70	183	25550	7.8[illegible]E-07	5.00E-04	1.56E-03	5.58E-09		
2,4,6-Trinitrotoluene (TNT)	2.50E+00	480	130	1	1.00E-06	70	183	25550	1.22E-05	5.00E-04	2.44E-02	8.72E-08		
2,4-Dinitrotoluene	6.80E-02	480	130	1	1.00E-06	70	183	25550	3.32E-07	2.00E-03	1.66E-04	2.37E-09	6.80E-01	1.61E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.30E+00	480	130	1	1.00E-06	70	183	25550	1.12E-05	3.00E-03	3.74E-03	8.02E-08	1.10E-01	8.83E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	2.50E-01	480	130	1	1.00E-06	70	183	25550	1.22E-06			8.72E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.50E+00	480	130	1	1.00E-06	70	183	25550	7.33E-06	5.00E-02	1.47E-04	5.23E-08		
Antimony	2.90E+01	480	130	1	1.00E-06	70	183	25550	1.42E-04	4.00E-04	3.54E-01	1.01E-06		
Cadmium	1.10E+00	480	130	1	1.00E-06	70	183	25550	5.37E-06	1.00E-03	5.37E-03	3.84E-08		
Benzo(b)fluoranthene	7.70E-02	480	130	1	1.00E-06	70	183	25550	3.76E-07			2.69E-09	7.30E-01	1.96E-09
bis(2-Ethylhexyl)phthalate (DEHP)	2.70E-01	480	130	1	1.00E-06	70	183	25550	1.32E-06	2.00E-02	6.59E-05	9.42E-09	1.40E-02	1.32E-10
Butylbenzylphthalate	3.80E-01	480	130	1	1.00E-06	70	183	25550	1.86E-06	2.00E-01	9.28E-06	1.33E-08		
Chrysene	2.70E-02	480	130	1	1.00E-06	70	183	25550	1.32E-07			9.42E-10	7.30E-03	6.88E-12
Diethylphthalate	7.20E-02	480	130	1	1.00E-06	70	183	25550	3.52E-07	8.00E+00	4.40E-08	2.51E-09		
Di-n-butylphthalate	2.00E+00	480	130	1	1.00E-06	70	183	25550	9.77E-06	1.00E+00	9.77E-06	6.98E-08		
Phenol	4.80E-02	480	130	1	1.00E-06	70	183	25550	2.34E-07	6.00E-01	3.91E-07	1.67E-09		
Pyrene	8.90E-02	480	130	1	1.00E-06	70	183	25550	4.35E-07	3.00E-01	1.45E-06	3.11E-09		
										TOTAL HAZARD INDEX =	3.90E-01		TOTAL CANCER RISK =	1.25E-08

Note: (a) Both surface soil (≤ 2 feet bgs) and subsurface soil (>2 feet bgs) are included.

Table C-10-2

Mead OU3
Ingestion of Chemicals In Subsurface Soil[a]
At Potential Landfill Area North Of Proving Grounds
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Future Construction Workers - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	1.60E-01	10	65	1	1.00E-06	70	91	25550	1.63E-08	5.00E-04	3.26E-05	5.81E-11		
2,4,6-Trinitrotoluene (TNT)	2.50E+00	10	65	1	1.00E-06	70	91	25550	2.54E-07	5.00E-04	5.09E-04	9.09E-10		
2,4-Dinitrotoluene	6.80E-02	10	65	1	1.00E-06	70	91	25550	6.92E-09	2.00E-03	3.46E-06	2.47E-11	6.80E-01	1.68E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.30E+00	10	65	1	1.00E-06	70	91	25550	2.34E-07	3.00E-03	7.80E-05	8.36E-10	1.10E-01	9.19E-11
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	2.50E-01	10	65	1	1.00E-06	70	91	25550	2.54E-08			9.09E-11		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.50E+00	10	65	1	1.00E-06	70	91	25550	1.53E-07	5.00E-02	3.05E-06	5.45E-10		
Antimony	7.20E+00	10	65	1	1.00E-06	70	91	25550	7.33E-07	4.00E-04	1.83E-03	2.62E-09		
Cadmium	6.60E-01	10	65	1	1.00E-06	70	91	25550	6.72E-08	1.00E-03	6.72E-05	2.40E-10		
Benzo(b)fluoranthene	7.70E-02	10	65	1	1.00E-06	70	91	25550	7.84E-09			2.80E-11	7.30E-01	2.04E-11
bis(2-Ethylhexyl)phthalate (DEHP)	2.20E-01	10	65	1	1.00E-06	70	91	25550	2.24E-08	2.00E-02	1.12E-06	8.00E-11	1.40E-02	1.12E-12
Butylbenzylphthalate	3.00E-01	10	65	1	1.00E-06	70	91	25550	3.05E-08	2.00E-01	1.53E-07	1.09E-10		
Chrysene	2.70E-02	10	65	1	1.00E-06	70	91	25550	2.75E-09			9.81E-12	7.30E-03	7.16E-14
Diethylphthalate	7.20E-02	10	65	1	1.00E-06	70	91	25550	7.33E-09	8.00E+00	9.16E-10	2.62E-11		
Di-n-butylphthalate	8.60E-01	10	65	1	1.00E-06	70	91	25550	8.75E-08	1.00E+00	8.75E-08	3.13E-10		
Phenol	4.80E-02	10	65	1	1.00E-06	70	91	25550	4.88E-09	6.00E-01	8.14E-09	1.74E-11		
Pyrene	8.90E-02	10	65	1	1.00E-06	70	91	25550	9.06E-09	3.00E-01	3.02E-08	3.23E-11		
										TOTAL HAZARD INDEX =	2.53E-03		TOTAL CANCER RISK =	1.30E-10

Note: (a) Both surface soil (≤ 2 feet bgs) and subsurface soil (>2 feet bgs) are included.

Ta... -10-3

Mead OU3
Dermal Exposure To Chemicals In Subsurface Soil[a]
At Potential Landfill Area North Of Proving Grounds
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Future Construction Workers - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	1.60E-01	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	8.52E-07	5.00E-04	1.70E-03	6.08E-09		
2,4,6-Trinitrotoluene (TNT)	2.50E+00	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	1.33E-05	5.00E-04	2.66E-02	9.50E-08		
2,4-Dinitrotoluene	6.80E-02	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	3.62E-07	2.00E-03	1.81E-04	2.59E-09	6.80E-01	1.76E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.30E+00	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	1.22E-05	3.00E-03	4.08E-03	8.74E-08	1.10E-01	9.62E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	2.50E-01	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	1.33E-06			9.50E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.50E+00	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	7.98E-06	5.00E-02	1.60E-04	5.70E-08		
Antimony	2.90E+01	5230	1.0	0.01	130	1	1.00E-06	70	182.5	25550	1.54E-05	4.00E-04	3.86E-02	1.10E-07		
Cadmium	1.10E+00	5230	1.0	0.01	130	1	1.00E-06	70	182.5	25550	5.85E-07	1.00E-03	5.85E-04	4.18E-09		
Benzo(b)fluoranthene	7.70E-02	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	4.10E-07			2.93E-09	7.30E-01	2.14E-09
bis(2-Ethylhexyl)phthalate (DEHP)	2.70E-01	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	1.44E-06	2.00E-02	7.18E-05	1.03E-08	1.40E-02	1.44E-10
Butylbenzylphthalate	3.80E-01	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	2.02E-06	2.00E-01	1.01E-05	1.44E-08		
Chrysene	2.70E-02	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	1.44E-07			1.03E-09	7.30E-03	7.49E-12
Diethylphthalate	7.20E-02	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	3.83E-07	8.00E+00	4.79E-08	2.74E-09		
Di-n-butylphthalate	2.00E+00	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	1.06E-05	1.00E+00	1.06E-05	7.60E-08		
Phenol	4.80E-02	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	2.55E-07	6.00E-01	4.26E-07	1.82E-09		
Pyrene	8.90E-02	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	4.74E-07	3.00E-01	1.58E-06	3.38E-09		
												TOTAL HAZARD INDEX =	7.20E-02		TOTAL CANCER RISK =	1.37E-08

Note: (a) Both surface soil (≤ 2 feet bgs) and subsurface soil (>2 feet bgs) are included.

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Table C-10-4

Mead OU3
Dermal Exposure To Chemicals In Subsurface Soil[a]
At Potential Landfill Area North Of Proving Grounds
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Future Construction Workers - Average Exposure)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	1.60E-01	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	6.58E-08	5.00E-04	1.32E-04	2.35E-10		
2,4,6-Trinitrotoluene (TNT)	2.50E+00	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	1.03E-06	5.00E-04	2.06E-03	3.67E-09		
2,4-Dinitrotoluene	6.80E-02	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	2.80E-08	2.00E-03	1.40E-05	9.98E-11	6.80E-01	6.79E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.30E+00	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	9.46E-07	3.00E-03	3.15E-04	3.38E-09	1.10E-01	3.71E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	2.50E-01	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	1.03E-07			3.67E-10		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.50E+00	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	6.17E-07	5.00E-02	1.23E-05	2.20E-09		
Antimony	7.20E+00	2020	0.2	0.01	65	1	1.00E-06	70	91	25550	2.96E-07	4.00E-04	7.40E-04	1.06E-09		
Cadmium	6.60E-01	2020	0.2	0.01	65	1	1.00E-06	70	91	25550	2.71E-08	1.00E-03	2.71E-05	9.69E-11		
Benzo(b)fluoranthene	7.70E-02	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	3.17E-08			1.13E-10	7.30E-01	8.25E-11
bis(2-Ethylhexyl)phthalate (DEHP)	2.20E-01	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	9.04E-08	2.00E-02	4.52E-06	3.23E-10	1.40E-02	4.52E-12
Butylbenzylphthalate	3.00E-01	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	1.23E-07	2.00F 01	6.17E-07	4.40E-10		
Chrysene	2.70E-02	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	1.11E-08			3.96E-11	7.30E-03	2.89E-13
Diethylphthalate	7.20E-02	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	2.96E-08	8.00E+00	3.70E-09	1.06E-10		
Di-n-butylphthalate	8.60E-01	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	3.54E-07	1.00E+00	3.54E-07	1.26E-09		
Phenol	4.80E-02	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	1.97E-08	6.00E-01	3.29E-08	7.05E-11		
Pyrene	8.90E-02	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	3.66E-08	3.00E-01	1.22E-07	1.31E-10		
												TOTAL HAZARD INDEX =	3.30E-03		TOTAL CANCER RISK =	5.27E-10

Note: (a) Both surface soil (≤ 2 feet bgs) and subsurface soil (>2 feet bgs) are included.

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TABLE C-11-1

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.70E-01	50	250	25	1.00E-06	70	9125	25550	1.32E-07	5.00E-05	2.64E-03	4.72E-08		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	50	250	25	1.00E-06	70	9125	25550	5.87E-07	5.00E-04	1.17E-03	2.10E-07	3.00E-02	6.29E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.40E-01	50	250	25	1.00E-06	70	9125	25550	2.15E-07	3.00E-03	7.18E-05	7.69E-08	1.10E-01	8.46E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.60E-01	50	250	25	1.00E-06	70	9125	25550	1.76E-07			6.29E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.60E-01	50	250	25	1.00E-06	70	9125	25550	1.27E-07	5.00E-02	2.54E-06	4.54E-08		
Antimony	8.80E-01	50	250	25	1.00E-06	70	9125	25550	4.31E-07	4.00E-04	1.08E-03	1.54E-07		
Barium	2.50E+02	50	250	25	1.00E-06	70	9125	25550	1.22E-04	7.00E-02	1.75E-03	4.37E-05		
Cadmium	1.10E+00	50	250	25	1.00E-06	70	9125	25550	5.38E-07	1.00E-03	5.38E-04	1.92E-07		
										TOTAL HAZARD INDEX =	7.25E-03		TOTAL CANCER RISK =	1.47E-08

TABLE C-11-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.60E-01	10	250	10	1.00E-06	70	3650	25550	2.54E-08	5.00E-05	5.09E-04	3.63E-09		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	10	250	10	1.00E-06	70	3650	25550	1.17E-07	5.00E-04	2.35E-04	1.68E-08	3.00E-02	5.03E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.10E-01	10	250	10	1.00E-06	70	3650	25550	4.01E-08	3.00E-03	1.34E-05	5.73E-09	1.10E-01	6.30E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.40E-01	10	250	10	1.00E-06	70	3650	25550	3.33E-08			4.75E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.30E-01	10	250	10	1.00E-06	70	3650	25550	2.25E-08	5.00E-02	4.50E-07	3.21E-09		
Antimony	8.80E-01	10	250	10	1.00E-06	70	3650	25550	8.61E-08	4.00E-04	2.15E-04	1.23E-08		
Barium	2.50E+02	10	250	10	1.00E-06	70	3650	25550	2.45E-05	7.00E-02	3.49E-04	3.49E-06		
Cadmium	1.10E+00	10	250	10	1.00E-06	70	3650	25550	1.08E-07	1.00E-03	1.08E-04	1.54E-08		
										TOTAL HAZARD INDEX =	1.43E-03		TOTAL CANCER RISK =	1.13E-09

TABLE C-11-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.70E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	1.38E-06	5.00E-05	2.76E-02	4.93E-07		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	6.14E-06	5.00E-04	1.23E-02	2.19E-06	3.00E-02	6.58E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.40E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	2.25E-06	3.00E-03	7.51E-04	8.04E-07	1.10E-01	8.85E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.60E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	1.84E-06			6.58E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.60E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	1.33E-06	5.00E-02	2.66E-05	4.75E-07		
Antimony	8.80E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	4.50E-07	4.00E-04	1.13E-03	1.61E-07		
Barium	2.50E+02	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.28E-04	7.00E-02	1.83E-03	4.57E-05		
Cadmium	1.10E+00	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	5.63E-07	1.00E-03	5.63E-04	2.01E-07		
												TOTAL HAZARD INDEX =	4.42E-02		TOTAL CANCER RISK =	1.54E-07

TABLE C-11-4

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.60E-01	2020	0.2	0.10	250	10	0.000001	70	3650	25550	1.03E-07	5.00E-05	2.06E-03	1.47E-08		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	2020	0.2	0.10	250	10	0.000001	70	3650	25550	4.74E-07	5.00E-04	9.49E-04	6.78E-08	3.00E-02	2.03E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.10E-01	2020	0.2	0.10	250	10	0.000001	70	3650	25550	1.62E-07	3.00E-03	5.40E-05	2.32E-08	1.10E-01	2.55E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.40E-01	2020	0.2	0.10	250	10	0.000001	70	3650	25550	1.34E-07			1.92E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.30E-01	2020	0.2	0.10	250	10	0.000001	70	3650	25550	9.09E-08	5.00E-02	1.82E-06	1.30E-08		
Antimony	8.80E-01	2020	0.2	0.01	250	10	0.000001	70	3650	25550	3.48E-08	4.00E-04	8.70E-05	4.97E-09		
Barium	2.50E+02	2020	0.2	0.01	250	10	0.000001	70	3650	25550	9.88E-06	7.00E-02	1.41E-04	1.41E-06		
Cadmium	1.10E+00	2020	0.2	0.01	250	10	0.000001	70	3650	25550	4.35E-08	1.00E-03	4.35E-05	6.21E-09		
												TOTAL HAZARD INDEX =	3.33E-03		TOTAL CANCER RISK =	4.58E-09

TABLE C-11-5

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.70E-01	100	350	70	1.00E-06	70	25550	25550	3.70E-07	5.00E-05	7.40E-03	3.70E-07		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	100	350	70	1.00E-06	70	25550	25550	1.64E-06	5.00E-04	3.29E-03	1.64E-06	3.00E-02	4.93E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.40E-01	100	350	70	1.00E-06	70	25550	25550	6.03E-07	3.00E-03	2.01E-04	6.03E-07	1.10E-01	6.63E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.60E-01	100	350	70	1.00E-06	70	25550	25550	4.93E-07			4.93E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.60E-01	100	350	70	1.00E-06	70	25550	25550	3.56E-07	5.00E-02	7.12E-06	3.56E-07		
Antimony	8.80E-01	100	350	70	1.00E-06	70	25550	25550	1.21E-06	4.00E-04	3.01E-03	1.21E-06		
Barium	2.50E+02	100	350	70	1.00E-06	70	25550	25550	3.42E-04	7.00E-02	4.89E-03	3.42E-04		
Cadmium	1.10E+00	100	350	70	1.00E-06	70	25550	25550	1.51E-06	1.00E-03	1.51E-03	1.51E-06		
										TOTAL HAZARD INDEX =	2.03E-02		TOTAL CANCER RISK =	1.16E-07

TABLE C-11-6

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.60E-01	50	350	9	1.00E-06	70	3285	25550	1.78E-07	5.00E-05	3.56E-03	2.29E-08		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	50	350	9	1.00E-06	70	3285	25550	8.22E-07	5.00E-04	1.64E-03	1.06E-07	3.00E-02	3.17E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.10E-01	50	350	9	1.00E-06	70	3285	25550	2.81E-07	3.00E-03	9.36E-05	3.61E-08	1.10E-01	3.97E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.40E-01	50	350	9	1.00E-06	70	3285	25550	2.33E-07			2.99E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.30E-01	50	350	9	1.00E-06	70	3285	25550	1.58E-07	5.00E-02	3.15E-06	2.03E-08		
Antimony	8.80E-01	50	350	9	1.00E-06	70	3285	25550	6.03E-07	4.00E-04	1.51E-03	7.75E-08		
Barium	2.50E+02	50	350	9	1.00E-06	70	3285	25550	1.71E-04	7.00E-02	2.45E-03	2.20E-05		
Cadmium	1.10E+00	50	350	9	1.00E-06	70	3285	25550	7.53E-07	1.00E-03	7.53E-04	9.69E-08		
										TOTAL HAZARD INDEX =	1.00E-02		TOTAL CANCER RISK =	7.14E-09

TABLE C-11-7

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.70E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.93E-06	5.00E-05	3.87E-02	1.93E-06		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	8.60E-06	5.00E-04	1.72E-02	8.60E-06	3.00E-02	2.58E-07
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.40E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	3.15E-06	3.00E-03	1.05E-03	3.15E-06	1.10E-01	3.47E-07
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.60E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	2.58E-06			2.58E-06		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.60E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.86E-06	5.00E-02	3.73E-05	1.86E-06		
Antimony	8.80E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	6.30E-07	4.00E-04	1.58E-03	6.30E-07		
Barium	2.50E+02	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.79E-04	7.00E-02	2.56E-03	1.79E-04		
Cadmium	1.10E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	7.88E-07	1.00E-03	7.88E-04	7.88E-07		
												TOTAL HAZARD INDEX =	6.19E-02		TOTAL CANCER RISK =	6.05E-07

TABLE C-11-8

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.60E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.44E-07	5.00E-05	2.88E-03	1.85E-08		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	6.64E-07	5.00E-04	1.33E-03	8.54E-08	3.00E-02	2.56E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.10E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	2.27E-07	3.00E-03	7.56E-05	2.92E-08	1.10E-01	3.21E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.40E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.88E-07			2.42E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.30E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.27E-07	5.00E-02	2.55E-06	1.64E-08		
Antimony	8.80E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.87E-08	4.00E-04	1.22E-04	6.26E-09		
Barium	2.50E+02	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.38E-05	7.00E-02	1.98E-04	1.78E-06		
Cadmium	1.10E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	6.09E-08	1.00E-03	6.09E-05	7.83E-09		
												TOTAL HAZARD INDEX =	4.66E-03		TOTAL CANCER RISK =	5.77E-09

TABLE C-11-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.70E-01	200	350	6	1.00E-06	15	2190	25550	3.45E-06	5.00E-05	6.90E-02	2.96E-07		
2,4,6-*Trinitrotoluene* (TNT)	1.20E+00	200	350	6	1.00E-06	15	2190	25550	1.53E-05	5.00E-04	3.07E-02	1.32E-06	3.00E-02	3.95E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.40E-01	200	350	6	1.00E-06	15	2190	25550	5.63E-06	3.00E-03	1.88E-03	4.82E-07	1.10E-01	5.30E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.60E-01	200	350	6	1.00E-06	15	2190	25550	4.60E-06			3.95E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.60E-01	200	350	6	1.00E-06	15	2190	25550	3.32E-06	5.00E-02	6.65E-05	2.85E-07		
Antimony	8.80E-01	200	350	6	1.00E-06	15	2190	25550	1.13E-05	4.00E-04	2.81E-02	9.64E-07		
Barium	2.50E+02	200	350	6	1.00E-06	15	2190	25550	3.20E-03	7.00E-02	4.57E-02	2.74E-04		
Cadmium	1.10E+00	200	350	6	1.00E-06	15	2190	25550	1.41E-05	1.00E-03	1.41E-02	1.21E-06		
										TOTAL HAZARD INDEX =	1.90E-01		TOTAL CANCER RISK =	9.25E-08

TABLE C-11-10

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.60E-01	100	350	6	1.00E-06	15	2190	25550	1.66E-06	5.00E-05	3.32E-02	1.42E-07		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	100	350	6	1.00E-06	15	2190	25550	7.67E-06	5.00E-04	1.53E-02	6.58E-07	3.00E-02	1.97E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.10E-01	100	350	6	1.00E-06	15	2190	25550	2.62E-06	3.00E-03	8.74E-04	2.25E-07	1.10E-01	2.47E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.40E-01	100	350	6	1.00E-06	15	2190	25550	2.17E-06			1.86E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.30E-01	100	350	6	1.00E-06	15	2190	25550	1.47E-06	5.00E-02	2.94E-05	1.26E-07		
Antimony	8.80E-01	100	350	6	1.00E-06	15	2190	25550	5.63E-06	4.00E-04	1.41E-02	4.82E-07		
Barium	2.50E+02	100	350	6	1.00E-06	15	2190	25550	1.60E-03	7.00E-02	2.28E-02	1.37E-04		
Cadmium	1.10E+00	100	350	6	1.00E-06	15	2190	25550	7.03E-06	1.00E-03	7.03E-03	6.03E-07		
										TOTAL HAZARD INDEX =	9.34E-02		TOTAL CANCER RISK =	4.44E-08

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TAB[illegible]-11-11

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.70E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	7.48E-06	5.00E-05	1.50E-01	6.41E-07		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	3.32E-05	5.00E-04	6.64E-02	2.85E-06	3.00E-02	8.54E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.40E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.22E-05	3.00E-03	4.06E-03	1.04E-06	1.10E-01	1.15E-07
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.60E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	9.97E-06			8.54E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.60E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	7.20E-06	5.00E-02	1.44E-04	6.17E-07		
Antimony	8.80E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.44E-06	4.00E-04	6.09E-03	2.09E-07		
Barium	2.50E+02	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	6.92E-04	7.00E-02	9.89E-03	5.93E-05		
Cadmium	1.10E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	3.05E-06	1.00E-03	3.05E-03	2.61E-07		
												TOTAL HAZARD INDEX =	2.39E-01		TOTAL CANCER RISK =	2.00E-07

TABLE [illegible]-11-12

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - [illegible] INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.60E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	6.21E-07	5.00E-05	1.24E-02	5.33E-08		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.87E-06	5.00E-04	5.74E-03	2.46E-07	3.00E-02	7.37E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.10E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	9.80E-07	3.00E-03	3.27E-04	8.40E-08	1.10E-01	9.24E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.40E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	8.12E-07			6.96E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.30E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	5.50E-07	5.00E-02	1.10E-05	4.71E-08		
Antimony	8.80E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	2.10E-07	4.00E-04	5.26E-04	1.80E-08		
Barium	2.50E+02	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	5.97E-05	7.00E-02	8.53E-04	5.12E-06		
Cadmium	1.10E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	2.63E-07	1.00E-03	2.[illegible]3E-04	2.25E-08		
												TOTAL HAZARD INDEX =	2.01E-02		TOTAL CANCER RISK =	1.66E-08

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TABLE C-11-13

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.70E-01	100	24	70	1.00E-06	70	25550	25550	2.54E-08	5.00E-05	5.07E-04	2.54E-08		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	100	24	70	1.00E-06	70	25550	25550	1.13E-07	5.00E-04	2.25E-04	1.13E-07	3.00E-02	3.38E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.40E-01	100	24	70	1.00E-06	70	25550	25550	4.13E-08	3.00E-03	1.38E-05	4.13E-08	1.10E-01	4.55E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.60E-01	100	24	70	1.00E-06	70	25550	25550	3.38E-08			3.38E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.60E-01	100	24	70	1.00E-06	70	25550	25550	2.44E-08	5.00E-02	4.88E-07	2.44E-08		
Antimony	8.80E-01	100	24	70	1.00E-06	70	25550	25550	8.27E-08	4.00E-04	2.07E-04	8.27E-08		
Barium	2.50E+02	100	24	70	1.00E-06	70	25550	25550	2.35E-05	7.00E-02	3.35E-04	2.35E-05		
Cadmium	1.10E+00	100	24	70	1.00E-06	70	25550	25550	1.03E-07	1.00E-03	1.03E-04	1.03E-07		
									TOTAL HAZARD INDEX =		1.39E-03	TOTAL CANCER RISK =		7.93E-09

TABLE [illegible]-11-14

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-uy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.60E-01	50	12	9	1.00E-06	70	3285	25550	6.11E-09	5.00E-05	1.22E-04	7.85E-10		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	50	12	9	1.00E-06	70	3285	25550	2.82E-08	5.00E-04	5.64E-05	3.62E-09	3.00E-02	1.09E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.10E-01	50	12	9	1.00E-06	70	3285	25550	9.63E-09	3.00E-03	3.21E-06	1.24E-09	1.10E-01	1.36E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.40E-01	50	12	9	1.00E-06	70	3285	25550	7.98E-09			1.03E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.30E-01	50	12	9	1.00E-06	70	3285	25550	5.40E-09	5.00E-02	1.08E-07	6.94E-10		
Antimony	8.80E-01	50	12	9	1.00E-06	70	3285	25550	2.07E-08	4.00E-04	5.17E-05	2.66E-09		
Barium	2.50E+02	50	12	9	1.00E-06	70	3285	25550	5.87E-06	7.00E-02	8.39E-05	7.55E-07		
Cadmium	1.10E+00	50	12	9	1.00E-06	70	3285	25550	2.58E-08	1.00E-03	2.58E-05	3.32E-09		
										TOTAL HAZARD INDEX =	3.43E-04		TOTAL CANCER RISK =	2.45E-10

TABLE C-11-15

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL(0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.70E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.33E-07	5.00E-05	2.65E-03	1.33E-07		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	5.90E-07	5.00E-04	1.18E-03	5.90E-07	3.00E-02	1.77E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.40E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.16E-07	3.00E-03	7.21E-05	2.16E-07	1.10E-01	2.38E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.60E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.77E-07			1.77E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.60E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.28E-07	5.00E-02	2.55E-06	1.28E-07		
Antimony	8.80E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	4.32E-08	4.00E-04	1.08E-04	4.32E-08		
Barium	2.50E+02	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.23E-05	7.00E-02	1.75E-04	1.23E-05		
Cadmium	1.10E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	5.40E-08	1.00E-03	5.40E-05	5.40E-08		
												TOTAL HAZARD INDEX =	4.24E-03		TOTAL CANCER RISK =	4.15E-08

TABLE C-11-16

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.60E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	4.93E-09	5.00E-05	9.87E-05	6.34E-10		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	2.28E-08	5.00E-04	4.55E-05	2.93E-09	3.00E-02	8.78E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.10E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	7.78E-09	3.00E-03	2.59E-06	1.00E-09	1.10E-01	1.10E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.40E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	6.45E-09			8.29E-10		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.30E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	4.36E-09	5.00E-02	8.73E-08	5.61E-10		
Antimony	8.80E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.67E-09	4.00E-04	4.17E-06	2.15E-10		
Barium	2.50E+02	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	4.74E-07	7.00E-02	6.78E-06	6.10E-08		
Cadmium	1.10E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	2.09E-09	1.00E-03	2.09E-06	2.68E-10		
												TOTAL HAZARD INDEX =	1.60E-04		TOTAL CANCER RISK =	1.98E-10

TABLE C-11-17

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.70E-01	100	24	5	1.00E-06	37	1825	25550	4.80E-08	5.00E-05	9.60E-04	3.43E-09		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	100	24	5	1.00E-06	37	1825	25550	2.13E-07	5.00E-04	4.27E-04	1.52E-08	3.00E-02	4.57E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.40E-01	100	24	5	1.00E-06	37	1825	25550	7.82E-08	3.00E-03	2.61E-05	5.59E-09	1.10E-01	6.14E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.60E-01	100	24	5	1.00E-06	37	1825	25550	6.40E-08			4.57E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.60E-01	100	24	5	1.00E-06	37	1825	25550	4.62E-08	5.00E-02	9.24E-07	3.30E-09		
Antimony	8.80E-01	100	24	5	1.00E-06	37	1825	25550	1.56E-07	4.00E-04	3.91E-04	1.12E-08		
Barium	2.50E+02	100	24	5	1.00E-06	37	1825	25550	4.44E-05	7.00E-02	6.35E-04	3.17E-06		
Cadmium	1.10E+00	100	24	5	1.00E-06	37	1825	25550	1.95E-07	1.00E-03	1.95E-04	1.40E-08		
										TOTAL HAZARD INDEX =	2.63E-03		TOTAL CANCER RISK =	1.07E-09

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TABLE C-11-18

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.60E-01	50	12	5	1.00E-06	37	1825	25550	1.16E-08	5.00E-05	2.31E-04	8.25E-10		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	50	12	5	1.00E-06	37	1825	25550	5.33E-08	5.00E-04	1.07E-04	3.81E-09	3.00E-02	1.14E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.10E-01	50	12	5	1.00E-06	37	1825	25550	1.82E-08	3.00E-03	6.07E-06	1.30E-09	1.10E-01	1.43E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.40E-01	50	12	5	1.00E-06	37	1825	25550	1.51E-08			1.08E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.30E-01	50	12	5	1.00E-06	37	1825	25550	1.02E-08	5.00E-02	2.04E-07	7.30E-10		
Antimony	8.80E-01	50	12	5	1.00E-06	37	1825	25550	3.91E-08	4.00E-04	9.77E-05	2.79E-09		
Barium	2.50E+02	50	12	5	1.00E-06	37	1825	25550	1.11E-05	7.00E-02	1.59E-04	7.93E-07		
Cadmium	1.10E+00	50	12	5	1.00E-06	37	1825	25550	4.89E-08	1.00E-03	4.89E-05	3.49E-09		
										TOTAL HAZARD INDEX =	6.49E-04		TOTAL CANCER RISK =	2.57E-10

TABLE C-11-19

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.70E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.21E-07	5.00E-05	4.42E-03	1.58E-08		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	9.81E-07	5.00E-04	1.96E-03	7.01E-08	3.00E-02	2.10E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.40E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	3.60E-07	3.00E-03	1.20E-04	2.57E-08	1.10E-01	2.83E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.60E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.94E-07			2.10E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.60E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.13E-07	5.00E-02	4.25E-06	1.52E-08		
Antimony	8.80E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	7.20E-08	4.00E-04	1.80E-04	5.14E-09		
Barium	2.50E+02	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.04E-05	7.00E-02	2.92E-04	1.46E-06		
Cadmium	1.10E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	9.00E-08	1.00E-03	9.00E-05	6.43E-09		
												TOTAL HAZARD INDEX =	7.07E-03		TOTAL CANCER RISK =	4.93E-09

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TABLE C-11-20

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.60E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	9.26E-09	5.00E-05	1.85E-04	6.62E-10		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	4.28E-08	5.00E-04	8.55E-05	3.05E-09	3.00E-02	9.16E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.10E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.46E-08	3.00E-03	4.87E-06	1.04E-09	1.10E-01	1.15E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.40E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.21E-08			8.65E-10		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.30E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	8.20E-09	5.00E-02	1.64E-07	5.85E-10		
Antimony	8.80E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	3.14E-09	4.00E-04	7.84E-06	2.24E-10		
Barium	2.50E+02	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	8.91E-07	7.00E-02	1.27E-05	6.36E-08		
Cadmium	1.10E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	3.92E-09	1.00E-03	3.92E-06	2.80E-10		
												TOTAL HAZARD INDEX =	3.00E-04		TOTAL CANCER RISK =	2.06E-10

TABLE C-11-21

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)^-1	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.70E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.40E-01	0.20	21%	32%	47%	1.18	0.06	0.09	2.73E-02	0.40	350	70	70	25550	25550	1.49E-04	3.00E-03	4.98E-02	1.49E-04	1.10E-01	1.64E-05
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.60E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.60E-01	0.20	21%	32%	47%	0.32	NE	NB	3.49E-03	0.40	350	70	70	25550	25550	1.91E-05	5.00E-02	3.83E-04	1.91E-05		
																	TOTAL HAZARD INDEX =	5.02E-02		TOTAL CANCER RISK =	1.64E-05

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

TABLE C-11-22

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SIOLS (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)$^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.60E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.10E-01	0.20	21%	32%	47%	1.18	0.06	0.09	2.54E-02	0.25	350	9	70	3285	25550	8.70E-05	3.00E-03	2.90E-02	1.12E-05	1.10E-01	1.23E-06
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.40E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.30E-01	0.20	21%	32%	47%	0.32	NE	NB	3.09E-03	0.25	350	9	70	3285	25550	1.06E-05	5.00E-02	2.12E-04	1.36E-06		
																	TOTAL HAZARD INDEX =	2.92E-02		TOTAL CANCER RISK =	1.23E-06

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

.ABLE C-11-23

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.70E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.40E-01	0.10	10%	45%	45%	1.18	0.06	0.09	8.17E-03	0.40	350	6	15	2190	25550	2.09E-04	3.00E-03	6.97E-02	1.79E-05	1.10E-01	1.97E-06
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.60E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.60E-01	0.10	10%	45%	45%	0.32	NE	NB	8.32E-04	0.40	350	6	15	2190	25550	2.13E-05	5.00E-02	4.25E-04	1.82E-06		
																	TOTAL HAZARD INDEX =	7.01E-02		TOTAL CANCER PISK =	1.97E-06

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

..ƅLE C-11-24

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
ADJACENT TO LOAD LINE 1 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.60E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	1.20E+00	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.10E-01	0.10	10%	45%	45%	1.18	0.06	0.09	7.62E-03	0.25	350	6	15	2190	25550	1.22E-04	3.00E-03	4.06E-02	1.04E-05	1.10E-01	1.15E-06
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.40E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.30E-01	0.10	10%	45%	45%	0.32	NE	NB	7.36E-04	0.25	350	6	15	2190	25550	1.18E-05	5.00E-02	2.35E-04	1.01E-06		
																	TOTAL HAZARD INDEX =	4.08E-02		TOTAL CANCER RISK =	1.15E-06

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

TABLE C-12-1

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.71E-01	50	250	25	1.00E-06	70	9125	25550	1.33E-07	5.00E-05	2.65E-03	4.74E-08		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	50	250	25	1.00E-06	70	9125	25550	2.04E-07	5.00E-04	4.08E-04	7.28E-08	3.00E-02	2.18E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.01E-01	50	250	25	1.00E-06	70	9125	25550	2.94E-07	3.00E-03	9.80E-05	1.05E-07	1.10E-01	1.15E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.86E-01	50	250	25	1.00E-06	70	9125	25550	1.89E-07			6.75E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.63E-01	50	250	25	1.00E-06	70	9125	25550	1.29E-07	5.00E-02	2.57E-06	4.59E-08		
Antimony	7.78E-01	50	250	25	1.00E-06	70	9125	25550	3.81E-07	4.00E-04	9.51E-04	1.36E-07		
Arsenic	7.73E+00	50	250	25	1.00E-06	70	9125	25550	3.78E-06	3.00E-04	1.26E-02	1.35E-06	1.50E+00	2.02E-06
Barium	2.35E+02	50	250	25	1.00E-06	70	9125	25550	1.15E-04	7.00E-02	1.64E-03	4.10E-05		
Cadmium	1.55E+00	50	250	25	1.00E-06	70	9125	25550	7.56E-07	1.00E-03	7.56E-04	2.70E-07		
Nickel	2.41E+01	50	250	25	1.00E-06	70	9125	25550	1.18E-05	2.00E-02	5.90E-04	4.21E-06		
										TOTAL HAZARD INDEX =	1.97E-02		TOTAL CANCER RISK =	2.04E-06

TABLE C-12-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	10	250	10	1.00E-06	70	3650	25550	2.50E-08	5.00E-05	5.00E-04	3.57E-09		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	10	250	10	1.00E-06	70	3650	25550	4.08E-08	5.00E-04	8.15E-05	5.82E-09	3.00E-02	1.75E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.62E-01	10	250	10	1.00E-06	70	3650	25550	5.50E-08	3.00E-03	1.83E-05	7.86E-09	1.10E-01	8.64E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.68E-01	10	250	10	1.00E-06	70	3650	25550	3.60E-08			5.14E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.12E-01	10	250	10	1.00E-06	70	3650	25550	2.07E-08	5.00E-02	4.15E-07	2.96E-09		
Antimony	6.18E-01	10	250	10	1.00E-06	70	3650	25550	6.05E-08	4.00E-04	1.51E-04	8.64E-09		
Arsenic	7.39E+00	10	250	10	1.00E-06	70	3650	25550	7.23E-07	3.00E-04	2.41E-03	1.03E-07	1.50E+00	1.55E-07
Barium	2.26E+02	10	250	10	1.00E-06	70	3650	25550	2.21E-05	7.00E-02	3.16E-04	3.16E-06		
Cadmium	1.25E+00	10	250	10	1.00E-06	70	3650	25550	1.22E-07	1.00E-03	1.22E-04	1.75E-08		
Nickel	2.31E+01	10	250	10	1.00E-06	70	3650	25550	2.26E-06	2.00E-02	1.13E-04	3.23E-07		
										TOTAL HAZARD INDEX =	3.71E-03		TOTAL CANCER RISK =	1.56E-07

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TABLE C-12-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.71E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	1.39E-06	5.00E-05	2.77E-02	4.96E-07		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	2.13E-06	5.00E-04	4.26E-03	7.61E-07	3.00E-02	2.28E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.01E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	3.07E-06	3.00E-03	1.02E-03	1.10E-06	1.10E-01	1.21E-07
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.86E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	1.98E-06			7.06E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.63E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	1.34E-06	5.00E-02	2.69E-05	4.80E-07		
Antimony	7.78E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	3.98E-07	4.00E-04	9.95E-04	1.42E-07		
Arsenic	7.73E+00	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	3.95E-06	3.00E-04	1.32E-02	1.41E-06	1.50E+00	2.12E-06
Barium	2.35E+02	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.20E-04	7.00E-02	1.72E-03	4.29E-05		
Cadmium	1.55E+00	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	7.91E-07	1.00E-03	7.91E-04	2.82E-07		
Nickel	2.41E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.23E-05	2.00E-02	6.17E-04	4.41E-06		
												TOTAL HAZARD INDEX =	5.04E-02		TOTAL CANCER RISK =	2.26E-06

TAB... -12-4

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)
1,3,5-Trinitrobenzene	2.56E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550
2,4,6-Trinitrotoluene (TNT)	4.16E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.62E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.68E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.12E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550
Antimony	6.18E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550
Arsenic	7.39E+00	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550
Barium	2.26E+02	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550
Cadmium	1.25E+00	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550
Nickel	2.31E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550

Potential Chemicals of Concern	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	1.01E-07	5.00E-05	2.02E-03	1.44E-08		
2,4,6-Trinitrotoluene (TNT)	1.65E-07	5.00E-04	3.29E-04	2.35E-08	3.00E-02	7.06E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.22E-07	3.00E-03	7.41E-05	3.17E-08	1.10E-01	3.49E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.45E-07			2.08E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	8.38E-08	5.00E-02	1.68E-06	1.20E-08		
Antimony	2.44E-08	4.00E-04	6.11E-05	3.49E-09		
Arsenic	2.92E-07	3.00E-04	9.74E-04	4.17E-08	1.50E+00	6.26E-08
Barium	8.92E-06	7.00E-02	1.27E-04	1.27E-06		
Cadmium	4.94E-08	1.00E-03	4.94E-05	7.06E-09		
Nickel	9.14E-07	2.00E-02	4.57E-05	1.31E-07		
		TOTAL HAZARD INDEX =	3.68E-03		TOTAL CANCER RISK =	6.68E-08

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TABLE [illegible]-12-5

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.71E-01	100	350	70	1.00E-06	70	25550	25550	3.71E-07	5.00E-05	7.43E-03	3.71E-07		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	100	350	70	1.00E-06	70	25550	25550	5.71E-07	5.00E-04	1.14E-03	5.71E-07	3.00E-02	1.71E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.01E-01	100	350	70	1.00E-06	70	25550	25550	8.23E-07	3.00E-03	2.74E-04	8.23E-07	1.10E-01	9.05E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.86E-01	100	350	70	1.00E-06	70	25550	25550	5.29E-07			5.29E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.63E-01	100	350	70	1.00E-06	70	25550	25550	3.60E-07	5.00E-02	7.20E-06	3.60E-07		
Antimony	7.78E-01	100	350	70	1.00E-06	70	25550	25550	1.07E-06	4.00E-04	2.66E-03	1.07E-06		
Arsenic	7.73E+00	100	350	70	1.00E-06	70	25550	25550	1.06E-05	3.00E-04	3.53E-02	1.06E-05	1.50E+00	1.59E-05
Barium	2.35E+02	100	350	70	1.00E-06	70	25550	25550	3.22E-04	7.00E-02	4.59E-03	3.22E-04		
Cadmium	1.55E+00	100	350	70	1.00E-06	70	25550	25550	2.12E-06	1.00E-03	2.12E-03	2.12E-06		
Nickel	2.41E+01	100	350	70	1.00E-06	70	25550	25550	3.30E-05	2.00E-02	1.65E-03	3.30E-05		
										TOTAL HAZARD INDEX =	5.52E-02		TOTAL CANCER RISK =	1.60E-05

TABLE C-12-6

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	50	350	9	1.00E-06	70	3285	25550	1.75E-07	5.00E-05	3.50E-03	2.25E-08		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	50	350	9	1.00E-06	70	3285	25550	2.85E-07	5.00E-04	5.71E-04	3.67E-08	3.00E-02	1.10E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.62E-01	50	350	9	1.00E-06	70	3285	25550	3.85E-07	3.00E-03	1.28E-04	4.95E-08	1.10E-01	5.44E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.68E-01	50	350	9	1.00E-06	70	3285	25550	2.52E-07			3.24E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.12E-01	50	350	9	1.00E-06	70	3285	25550	1.45E-07	5.00E-02	2.90E-06	1.87E-08		
Antimony	6.18E-01	50	350	9	1.00E-06	70	3285	25550	4.24E-07	4.00E-04	1.06E-03	5.45E-08		
Arsenic	7.39E+00	50	350	9	1.00E-06	70	3285	25550	5.06E-06	3.00E-04	1.69E-02	6.51E-07	1.50E+00	9.76E-07
Barium	2.26E+02	50	350	9	1.00E-06	70	3285	25550	1.55E-04	7.00E-02	2.21E-03	1.99E-05		
Cadmium	1.25E+00	50	350	9	1.00E-06	70	3285	25550	8.57E-07	1.00E-03	8.57E-04	1.10E-07		
Nickel	2.31E+01	50	350	9	1.00E-06	70	3285	25550	1.58E-05	2.00E-02	7.92E-04	2.04E-06		
										TOTAL HAZARD INDEX =	2.60E-02		TOTAL CANCER RISK =	9.83E-07

TABLE C-12-7

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.71E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.94E-06	5.00E-05	3.88E-02	1.94E-06		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	2.98E-06	5.00E-04	5.97E-03	2.98E-06	3.00E-02	8.95E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.01E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	4.30E-06	3.00E-03	1.43E-03	4.30E-06	1.10E-01	4.73E-07
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.86E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	2.77E-06			2.77E-06		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.63E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.88E-06	5.00E-02	3.77E-05	1.88E-06		
Antimony	7.78E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	5.57E-07	4.00E-04	1.39E-03	5.57E-07		
Arsenic	7.73E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	5.54E-06	3.00E-04	1.85E-02	5.54E-06	1.50E+00	8.30E-06
Barium	2.35E+02	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.68E-04	7.00E-02	2.40E-03	1.68E-04		
Cadmium	1.55E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.11E-06	1.00E-03	1.11E-03	1.11E-06		
Nickel	2.41E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.73E-05	2.00E-02	8.64E-04	1.73E-05		
												TOTAL HAZARD INDEX =	7.05E-02		TOTAL CANCER RISK =	8.87E-06

TABLE C-12-8

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.41E-07	5.00E-05	2.83E-03	1.82E-08		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	2.30E-07	5.00E-04	4.61E-04	2.96E-08	3.00E-02	8.89E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.62E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	3.11E-07	3.00E-03	1.04E-04	4.00E-08	1.10E-01	4.40E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.68E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	2.04E-07			2.62E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.12E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.17E-07	5.00E-02	2.35E-06	1.51E-08		
Antimony	6.18E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	3.42E-08	4.00E-04	8.56E-05	4.40E-09		
Arsenic	7.39E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.09E-07	3.00E-04	1.36E-03	5.26E-08	1.50E+00	7.89E-08
Barium	2.26E+02	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.25E-05	7.00E-02	1.78E-04	1.61E-06		
Cadmium	1.25E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	6.92E-08	1.00E-03	6.92E-05	8.90E-09		
Nickel	2.31E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.28E-06	2.00E-02	6.40E-05	1.65E-07		
												TOTAL HAZARD INDEX =	5.16E-03		TOTAL CANCER RISK =	8.42E-08

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TABLE C-12-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.71E-01	200	350	6	1.00E-06	15	2190	25550	3.47E-06	5.00E-05	6.93E-02	2.97E-07		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	200	350	6	1.00E-06	15	2190	25550	5.32E-06	5.00E-04	1.06E-02	4.56E-07	3.00E-02	1.37E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.01E-01	200	350	6	1.00E-06	15	2190	25550	7.68E-06	3.00E-03	2.56E-03	6.58E-07	1.10E-01	7.24E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.86E-01	200	350	6	1.00E-06	15	2190	25550	4.94E-06			4.23E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.63E-01	200	350	6	1.00E-06	15	2190	25550	3.36E-06	5.00E-02	6.72E-05	2.88E-07		
Antimony	7.78E-01	200	350	6	1.00E-06	15	2190	25550	9.95E-06	4.00E-04	2.49E-02	8.52E-07		
Arsenic	7.73E+00	200	350	6	1.00E-06	15	2190	25550	9.88E-05	3.00E-04	3.29E-01	8.47E-06	1.50E+00	1.27E-05
Barium	2.35E+02	200	350	6	1.00E-06	15	2190	25550	3.00E-03	7.00E-02	4.29E-02	2.57E-04		
Cadmium	1.55E+00	200	350	6	1.00E-06	15	2190	25550	1.98E-05	1.00E-03	1.98E-02	1.69E-06		
Nickel	2.41E+01	200	350	6	1.00E-06	15	2190	25550	3.08E-04	2.00E-02	1.54E-02	2.64E-05		
										TOTAL HAZARD INDEX =	5.15E-01		TOTAL CANCER RISK =	1.28E-05

TABLE C-12-10

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	100	350	6	1.00E-06	15	2190	25550	1.63E-06	5.00E-05	3.27E-02	1.40E-07		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	100	350	6	1.00E-06	15	2190	25550	2.66E-06	5.00E-04	5.32E-03	2.28E-07	3.00E-02	6.85E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.62E-01	100	350	6	1.00E-06	15	2190	25550	3.59E-06	3.00E-03	1.20E-03	3.08E-07	1.10E-01	3.39E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.68E-01	100	350	6	1.00E-06	15	2190	25550	2.35E-06			2.02E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.12E-01	100	350	6	1.00E-06	15	2190	25550	1.35E-06	5.00E-02	2.71E-05	1.16E-07		
Antimony	6.18E-01	100	350	6	1.00E-06	15	2190	25550	3.95E-06	4.00E-04	9.88E-03	3.39E-07		
Arsenic	7.39E+00	100	350	6	1.00E-06	15	2190	25550	4.72E-05	3.00E-04	1.57E-01	4.05E-06	1.50E+00	6.07E-06
Barium	2.26E+02	100	350	6	1.00E-06	15	2190	25550	1.44E-03	7.00E-02	2.06E-02	1.24E-04		
Cadmium	1.25E+00	100	350	6	1.00E-06	15	2190	25550	7.99E-06	1.00E-03	7.99E-03	6.85E-07		
Nickel	2.31E+01	100	350	6	1.00E-06	15	2190	25550	1.48E-04	2.00E-02	7.39E-03	1.27E-05		
										TOTAL HAZARD INDEX =	2.43E-01		TOTAL CANCER RISK =	6.11E-06

TABLE C-12-11

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.71E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	7.51E-06	5.00E-05	1.50E-01	6.43E-07		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.15E-05	5.00E-04	2.31E-02	9.88E-07	3.00E-02	2.97E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.01E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.66E-05	3.00E-03	5.54E-03	1.43E-06	1.10E-01	1.57E-07
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.86E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.07E-05			9.17E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.63E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	7.28E-06	5.00E-02	1.46E-04	6.24E-07		
Antimony	7.78E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.15E-06	4.00E-04	5.38E-03	1.85E-07		
Arsenic	7.73E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.14E-05	3.00E-04	7.13E-02	1.83E-06	1.50E+00	2.75E-06
Barium	2.35E+02	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	6.50E-04	7.00E-02	9.29E-03	5.57E-05		
Cadmium	1.55E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	4.28E-06	1.00E-03	4.28E-03	3.67E-07		
Nickel	2.41E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	6.68E-05	2.00E-02	3.34E-03	5.72E-06		
												TOTAL HAZARD INDEX =	2.72E-01		TOTAL CANCER RISK =	2.94E-06

TABLE C-12-12

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	6.11E-07	5.00E-05	1.22E-02	5.23E-08		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	9.95E-07	5.00E-04	1.99E-03	8.53E-08	3.00E-02	2.56E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.62E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.34E-06	3.00E-03	4.48E-04	1.15E-07	1.10E-01	1.27E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.68E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	8.80E-07			7.54E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.12E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	5.06E-07	5.00E-02	1.01E-05	4.34E-08		
Antimony	6.18E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.48E-07	4.00E-04	3.69E-04	1.27E-08		
Arsenic	7.39E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.77E-06	3.00E-04	5.89E-03	1.51E-07	1.50E+00	2.27E-07
Barium	2.26E+02	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	5.39E-05	7.00E-02	7.71E-04	4.62E-06		
Cadmium	1.25E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	2.99E-07	1.00E-03	2.99E-04	2.56E-08		
Nickel	2.31E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	5.52E-06	2.00E-02	2.76E-04	4.74E-07		
												TOTAL HAZARD INDEX =	2.23E-02		TOTAL CANCER RISK =	2.42E-07

TABLE C-12-13

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.71E-01	100	24	70	1.00E-06	70	25550	25550	2.55E-08	5.00E-05	5.09E-04	2.55E-08		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	100	24	70	1.00E-06	70	25550	25550	3.91E-08	5.00E-04	7.82E-05	3.91E-08	3.00E-02	1.17E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.01E-01	100	24	70	1.00E-06	70	25550	25550	5.64E-08	3.00E-03	1.88E-05	5.64E-08	1.10E-01	6.21E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.86E-01	100	24	70	1.00E-06	70	25550	25550	3.63E-08			3.63E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.63E-01	100	24	70	1.00E-06	70	25550	25550	2.47E-08	5.00E-02	4.94E-07	2.47E-08		
Antimony	7.78E-01	100	24	70	1.00E-06	70	25550	25550	7.31E-08	4.00E-04	1.83E-04	7.31E-08		
Arsenic	7.73E+00	100	24	70	1.00E-06	70	25550	25550	7.26E-07	3.00E-04	2.42E-03	7.26E-07	1.50E+00	1.09E-06
Barium	2.35E+02	100	24	70	1.00E-06	70	25550	25550	2.21E-05	7.00E-02	3.15E-04	2.21E-05		
Cadmium	1.55E+00	100	24	70	1.00E-06	70	25550	25550	1.45E-07	1.00E-03	1.45E-04	1.45E-07		
Nickel	2.41E+01	100	24	70	1.00E-06	70	25550	25550	2.26E-06	2.00E-02	1.13E-04	2.26E-06		
										TOTAL HAZARD INDEX =	3.78E-03		TOTAL CANCER RISK =	1.10E-06

TABLE C-12-14

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	50	12	9	1.00E-06	70	3285	25550	6.00E-09	5.00E-05	1.20E-04	7.71E-10		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	50	12	9	1.00E-06	70	3285	25550	9.78E-09	5.00E-04	1.96E-05	1.26E-09	3.00E-02	3.77E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.62E-01	50	12	9	1.00E-06	70	3285	25550	1.32E-08	3.00E-03	4.40E-06	1.70E-09	1.10E-01	1.87E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.68E-01	50	12	9	1.00E-06	70	3285	25550	8.64E-09			1.11E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.12E-01	50	12	9	1.00E-06	70	3285	25550	4.98E-09	5.00E-02	9.95E-08	6.40E-10		
Antimony	6.18E-01	50	12	9	1.00E-06	70	3285	25550	1.45E-08	4.00E-04	3.63E-05	1.87E-09		
Arsenic	7.39E+00	50	12	9	1.00E-06	70	3285	25550	1.74E-07	3.00E-04	5.78E-04	2.23E-08	1.50E+00	3.35E-08
Barium	2.26E+02	50	12	9	1.00E-06	70	3285	25550	5.30E-06	7.00E-02	7.57E-05	6.82E-07		
Cadmium	1.25E+00	50	12	9	1.00E-06	70	3285	25550	2.94E-08	1.00E-03	2.94E-05	3.78E-09		
Nickel	2.31E+01	50	12	9	1.00E-06	70	3285	25550	5.43E-07	2.00E-02	2.71E-05	6.98E-08		
										TOTAL HAZARD INDEX =	8.91E-04		TOTAL CANCER RISK =	3.37E-08

TABL_ _-12-15

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.71E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.33E-07	5.00E-05	2.66E-03	1.33E-07		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.05E-07	5.00E-04	4.09E-04	2.05E-07	3.00E-02	6.14E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.01E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.95E-07	3.00E-03	9.84E-05	2.95E-07	1.10E-01	3.25E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.86E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.90E-07			1.90E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.63E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.29E-07	5.00E-02	2.58E-06	1.29E-07		
Antimony	7.78E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	3.82E-08	4.00E-04	9.55E-05	3.82E-08		
Arsenic	7.73E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	3.80E-07	3.00E-04	1.27E-03	3.80E-07	1.50E+00	5.69E-07
Barium	2.35E+02	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.15E-05	7.00E-02	1.65E-04	1.15E-05		
Cadmium	1.55E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	7.59E-08	1.00E-03	7.59E-05	7.59E-08		
Nickel	2.41E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.18E-06	2.00E-02	5.92E-05	1.18E-06		
												TOTAL HAZARD INDEX =	4.83E-03		TOTAL CANCER RISK =	6.08E-07

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TABLE 6-12-16

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	4331	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.04E-08	5.00E-05	2.08E-04	1.34E-09		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	4331	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.69E-08	5.00E-04	3.39E-05	2.18E-09	3.00E-02	6.54E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.62E-01	4331	0.2	0.10	12	9	1.00E-06	70	3285	25550	2.29E-08	3.00E-03	7.62E-06	2.94E-09	1.10E-01	3.23E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.68E-01	4331	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.50E-08			1.93E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.12E-01	4331	0.2	0.10	12	9	1.00E-06	70	3285	25550	8.62E-09	5.00E-02	1.72E-07	1.11E-09		
Antimony	6.18E-01	4331	0.2	0.01	12	9	1.00E-06	70	3285	25550	2.52E-09	4.00E-04	6.29E-06	3.23E-10		
Arsenic	7.39E+00	4331	0.2	0.01	12	9	1.00E-06	70	3285	25550	3.01E-08	3.00E-04	1.00E-04	3.87E-09	1.50E+00	5.80E-09
Barium	2.26E+02	4331	0.2	0.01	12	9	1.00E-06	70	3285	25550	9.18E-07	7.00E-02	1.31E-05	1.18E-07		
Cadmium	1.25E+00	4331	0.2	0.01	12	9	1.00E-06	70	3285	25550	5.09E-09	1.00E-03	5.09E-06	6.54E-10		
Nickel	2.31E+01	4331	0.2	0.01	12	9	1.00E-06	70	3285	25550	9.41E-08	2.00E-02	4.70E-06	1.21E-08		
												TOTAL HAZARD INDEX =	3.79E-04		TOTAL CANCER RISK =	6.19E-09

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TABLE C-12-17

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.71E-01	100	24	5	1.00E-06	37	1825	25550	4.82E-08	5.00E-05	9.64E-04	3.44E-09		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	100	24	5	1.00E-06	37	1825	25550	7.40E-08	5.00E-04	1.48E-04	5.29E-09	3.00E-02	1.59E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.01E-01	100	24	5	1.00E-06	37	1825	25550	1.07E-07	3.00E-03	3.56E-05	7.63E-09	1.10E-01	8.39E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.86E-01	100	24	5	1.00E-06	37	1825	25550	6.86E-08			4.90E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.63E-01	100	24	5	1.00E-06	37	1825	25550	4.67E-08	5.00E-02	9.34E-07	3.34E-09		
Antimony	7.78E-01	100	24	5	1.00E-06	37	1825	25550	1.38E-07	4.00E-04	3.46E-04	9.87E-09		
Arsenic	7.73E+00	100	24	5	1.00E-06	37	1825	25550	1.37E-06	3.00E-04	4.58E-03	9.81E-08	1.50E+00	1.47E-07
Barium	2.35E+02	100	24	5	1.00E-06	37	1825	25550	4.17E-05	7.00E-02	5.96E-04	2.98E-06		
Cadmium	1.55E+00	100	24	5	1.00E-06	37	1825	25550	2.75E-07	1.00E-03	2.75E-04	1.96E-08		
Nickel	2.41E+01	100	24	5	1.00E-06	37	1825	25550	4.28E-06	2.00E-02	2.14E-04	3.06E-07		
										TOTAL HAZARD INDEX =	7.16E-03		TOTAL CANCER RISK =	1.48E-07

TABLE C-12-18

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	50	12	5	1.00E-06	37	1825	25550	1.14E-08	5.00E-05	2.27E-04	8.11E-10		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	50	12	5	1.00E-06	37	1825	25550	1.85E-08	5.00E-04	3.70E-05	1.32E-09	3.00E-02	3.97E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.62E-01	50	12	5	1.00E-06	37	1825	25550	2.50E-08	3.00E-03	8.32E-06	1.78E-09	1.10E-01	1.96E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.68E-01	50	12	5	1.00E-06	37	1825	25550	1.64E-08			1.17E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.12E-01	50	12	5	1.00E-06	37	1825	25550	9.41E-09	5.00E-02	1.88E-07	6.72E-10		
Antimony	6.18E-01	50	12	5	1.00E-06	37	1825	25550	2.75E-08	4.00E-04	6.87E-05	1.96E-09		
Arsenic	7.39E+00	50	12	5	1.00E-06	37	1825	25550	3.28E-07	3.00E-04	1.09E-03	2.35E-08	1.50E+00	3.52E-08
Barium	2.26E+02	50	12	5	1.00E-06	37	1825	25550	1.00E-05	7.00E-02	1.43E-04	7.16E-07		
Cadmium	1.25E+00	50	12	5	1.00E-06	37	1825	25550	5.56E-08	1.00E-03	5.56E-05	3.97E-09		
Nickel	2.31E+01	50	12	5	1.00E-06	37	1825	25550	1.03E-06	2.00E-02	5.14E-05	7.34E-08		
										TOTAL HAZARD INDEX =	1.69E-03		TOTAL CANCER RISK =	3.54E-08

TAB[illegible]-12-19

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.71E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.22E-07	5.00E-05	4.43E-03	1.58E-08		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	3.41E-07	5.00E-04	6.81E-04	2.43E-08	3.00E-02	7.30E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.01E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	4.91E-07	3.00E-03	1.64E-04	3.51E-08	1.10E-01	3.86E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.86E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	3.16E-07			2.26E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.63E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.15E-07	5.00E-02	4.30E-06	1.54E-08		
Antimony	7.78E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	6.36E-08	4.00E-04	1.59E-04	4.54E-09		
Arsenic	7.73E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	6.32E-07	3.00E-04	2.11E-03	4.51E-08	1.50E+00	6.77E-08
Barium	2.35E+02	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	1.92E-05	7.00E-02	2.74E-04	1.37E-06		
Cadmium	1.55E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	1.26E-07	1.00E-03	1.26E-04	9.03E-09		
Nickel	2.41E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	1.97E-06	2.00E-02	9.86E-05	1.41E-07		
												TOTAL HAZARD INDEX =	8.05E-03		TOTAL CANCER RISK =	7.23E-08

TABLE [illegible]-12-20

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	9.10E-09	5.00E-05	1.82E-04	6.50E-10		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.48E-08	5.00E-04	2.97E-05	1.06E-09	3.00E-02	3.18E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.62E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.00E-08	3.00E-03	6.68E-06	1.43E-09	1.10E-01	1.57E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.68E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.31E-08			9.37E-10		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.12E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	7.55E-09	5.00E-02	1.51E-07	5.39E-10		
Antimony	6.18E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.20E-09	4.00E-04	5.51E-06	1.57E-10		
Arsenic	7.39E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.63E-08	3.00E-04	8.78E-05	1.88E-09	1.50E+00	2.82E-09
Barium	2.26E+02	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	8.04E-07	7.00E-02	1.15E-05	5.75E-08		
Cadmium	1.25E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	4.46E-09	1.00E-03	4.46E-06	3.18E-10		
Nickel	2.31E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	8.24E-08	2.00E-02	4.12E-06	5.88E-09		
												TOTAL HAZARD INDEX =	3.32E-04		TOTAL CANCER RISK =	3.01E-09

ABLE C-12-21

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.71E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.01E-01	0.20	21%	32%	47%	1.18	0.06	0.09	3.72E-02	0.40	350	70	70	25550	25550	2.04E-04	3.00E-03	6.80E-02	2.04E-04	1.10E-01	2.24E-05
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.86E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.63E-01	0.20	21%	32%	47%	0.32	NE	NB	3.53E-03	0.40	350	70	70	25550	25550	1.94E-05	5.00E-02	3.87E-04	1.94E-05		
																	TOTAL HAZARD INDEX =	6.84E-02		TOTAL CANCER RISK =	2.24E-05

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

B07NE003703-06562

.ABLE C-12-22

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)⁻¹	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.62E-01	0.20	21%	32%	47%	1.18	0.06	0.09	3.48E-02	0.25	350	9	70	3285	25550	1.19E-04	3.00E-03	3.98E-02	1.53E-05	1.10E-01	1.69E-06
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.68E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.12E-01	0.20	21%	32%	47%	0.32	NE	NB	2.85E-03	0.25	350	9	70	3285	25550	9.75E-06	5.00E-02	1.95E-04	1.25E-06		
																	TOTAL HAZARD INDEX =	4.00E-02		TOTAL CANCER RISK =	1.69E-06

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

..ABLE C-12-23

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATEL SOILS (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(Flv x BCFlv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
Flv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFlv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	Flv	Frv	Fgf	BCFlv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)^-1	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.71E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	6.01E-01	0.10	10%	45%	45%	1.18	0.06	0.09	1.12E-02	0.40	350	6	15	2190	25550	2.85E-04	3.00E-03	9.51E-02	2.45E-05	1.10E-01	2.69E-06
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.86E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.63E-01	0.10	10%	45%	45%	0.32	NE	NB	8.41E-04	0.40	350	6	15	2190	25550	2.15E-05	5.00E-02	4.30E-04	1.84E-06		
																	TOTAL HAZARD INDEX =	9.56E-02		TOTAL CANCER RISK =	2.69E-06

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

..ABLE C-12-24

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
ADJACENT TO LOAD LINE 2 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)^-1	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.56E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	4.16E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.62E-01	0.10	10%	45%	45%	1.18	0.06	0.09	1.04E-02	0.25	350	6	15	2190	25550	1.67E-04	3.00E-03	5.56E-02	1.43E-05	1.10E-01	1.57E-06
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	3.68E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.12E-01	0.10	10%	45%	45%	0.32	NE	NB	6.78E-04	0.25	350	6	15	2190	25550	1.08E-05	5.00E-02	2.17E-04	9.29E-07		
																	TOTAL HAZARD INDEX =	5.58E-02		TOTAL CANCER RISK =	1.57E-06

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

TABLE C-13-1

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.58E-01	50	250	25	1.00E-06	70	9125	25550	1.26E-07	5.00E-05	2.52E-03	4.51E-08		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	50	250	25	1.00E-06	70	9125	25550	3.84E-07	5.00E-04	7.68E-04	1.37E-07	3.00E-02	4.11E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.72E-01	50	250	25	1.00E-06	70	9125	25550	2.80E-07	3.00E-03	9.34E-05	1.00E-07	1.10E-01	1.10E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.85E-01	50	250	25	1.00E-06	70	9125	25550	1.40E-07	5.00E-02	2.79E-06	4.98E-08		
Antimony	4.20E-01	50	250	25	1.00E-06	70	9125	25550	2.06E-07	4.00E-04	5.14E-04	7.34E-08		
Barium	2.59E+02	50	250	25	1.00E-06	70	9125	25550	1.27E-04	7.00E-02	1.81E-03	4.53E-05		
Cadmium	8.68E-01	50	250	25	1.00E-06	70	9125	25550	4.25E-07	1.00E-03	4.25E-04	1.52E-07		
Mercury	1.08E-01	50	250	25	1.00E-06	70	9125	25550	5.27E-08	3.00E-04	1.76E-04	1.88E-08		
Nickel	2.60E+01	50	250	25	1.00E-06	70	9125	25550	1.27E-05	2.00E-02	6.35E-04	4.54E-06		
										TOTAL HAZARD INDEX =	6.95E-03		TOTAL CANCER RISK =	1.51E-08

TABLE C-13-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.44E-01	10	250	10	1.00E-06	70	3650	25550	2.39E-08	5.00E-05	4.78E-04	3.41E-09		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	10	250	10	1.00E-06	70	3650	25550	7.68E-08	5.00E-04	1.54E-04	1.10E-08	3.00E-02	3.29E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.68E-01	10	250	10	1.00E-06	70	3650	25550	5.55E-08	3.00E-03	1.85E-05	7.93E-09	1.10E-01	8.73E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.62E-01	10	250	10	1.00E-06	70	3650	25550	2.56E-08	5.00E-02	5.13E-07	3.66E-09		
Antimony	3.74E-01	10	250	10	1.00E-06	70	3650	25550	3.66E-08	4.00E-04	9.15E-05	5.23E-09		
Barium	2.54E+02	10	250	10	1.00E-06	70	3650	25550	2.49E-05	7.00E-02	3.55E-04	3.55E-06		
Cadmium	7.43E-01	10	250	10	1.00E-06	70	3650	25550	7.27E-08	1.00E-03	7.27E-05	1.04E-08		
Mercury	1.03E-01	10	250	10	1.00E-06	70	3650	25550	1.01E-08	3.00E-04	3.36E-05	1.44E-09		
Nickel	2.44E+01	10	250	10	1.00E-06	70	3650	25550	2.38E-06	2.00E-02	1.19E-04	3.41E-07		
										TOTAL HAZARD INDEX =	1.32E-03		TOTAL CANCER RISK =	1.20E-09

TABLE C-13-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.58E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	1.32E-06	5.00E-05	2.64E-02	4.72E-07		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	4.02E-06	5.00E-04	8.03E-03	1.43E-06	3.00E-02	4.30E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.72E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	2.93E-06	3.00E-03	9.77E-04	1.05E-06	1.10E-01	1.15E-07
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.85E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	1.46E-06	5.00E-02	2.92E-05	5.21E-07		
Antimony	4.20E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	2.15E-07	4.00E-04	5.38E-04	7.68E-08		
Barium	2.59E+02	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.33E-04	7.00E-02	1.89E-03	4.74E-05		
Cadmium	8.68E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	4.44E-07	1.00E-03	4.44E-04	1.59E-07		
Mercury	1.08E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	5.52E-07	3.00E-04	1.84E-03	1.97E-07		
Nickel	2.60E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.33E-05	2.00E-02	6.64E-04	4.74E-06		
												TOTAL HAZARD INDEX =	4.08E-02		TOTAL CANCER RISK =	1.58E-07

TABLE C-13-4

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.44E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	9.66E-08	5.00E-05	1.93E-03	1.38E-08		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	3.10E-07	5.00E-04	6.21E-04	4.43E-08	3.00E-02	1.33E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.68E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	2.24E-07	3.00E-03	7.48E-05	3.21E-08	1.10E-01	3.53E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.62E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	1.04E-07	5.00E-02	2.07E-06	1.48E-08		
Antimony	3.74E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	1.48E-08	4.00E-04	3.69E-05	2.11E-09		
Barium	2.54E+02	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	1.00E-05	7.00E-02	1.43E-04	1.43E-06		
Cadmium	7.43E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	2.94E-08	1.00E-03	2.94E-05	4.20E-09		
Mercury	1.03E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	4.07E-08	3.00E-04		5.81E-09		
Nickel	2.44E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	9.63E-07	2.00E-02	4.82E-05	1.38E-07		
												TOTAL HAZARD INDEX =	2.89E-03		TOTAL CANCER RISK =	4.86E-09

TABLE C-13-5

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 inches)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.58E-01	100	350	70	1.00E-06	70	25550	25550	3.53E-07	5.00E-05	7.07E-03	3.53E-07		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	100	350	70	1.00E-06	70	25550	25550	1.08E-06	5.00E-04	2.15E-03	1.08E-06	3.00E-02	3.23E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.72E-01	100	350	70	1.00E-06	70	25550	25550	7.84E-07	3.00E-03	2.61E-04	7.84E-07	1.10E-01	8.63E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.85E-01	100	350	70	1.00E-06	70	25550	25550	3.91E-07	5.00E-02	7.81E-06	3.91E-07		
Antimony	4.20E-01	100	350	70	1.00E-06	70	25550	25550	5.76E-07	4.00E-04	1.44E-03	5.76E-07		
Barium	2.59E+02	100	350	70	1.00E-06	70	25550	25550	3.55E-04	7.00E-02	5.07E-03	3.55E-04		
Cadmium	8.68E-01	100	350	70	1.00E-06	70	25550	25550	1.19E-06	1.00E-03	1.19E-03	1.19E-06		
Mercury	1.08E-01	100	350	70	1.00E-06	70	25550	25550	1.48E-07	3.00E-04	4.92E-04	1.48E-07		
Nickel	2.60E+01	100	350	70	1.00E-06	70	25550	25550	3.56E-05	2.00E-02	1.78E-03	3.56E-05		
										TOTAL HAZARD INDEX =	1.95E-02		TOTAL CANCER RISK =	1.19E-07

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TABLE C-13-6

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.44E-01	50	350	9	1.00E-06	70	3285	25550	1.67E-07	5.00E-05	3.35E-03	2.15E-08		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	50	350	9	1.00E-06	70	3285	25550	5.38E-07	5.00E-04	1.08E-03	6.91E-08	3.00E-02	2.07E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.68E-01	50	350	9	1.00E-06	70	3285	25550	3.89E-07	3.00E-03	1.30E-04	5.00E-08	1.10E-01	5.50E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.62E-01	50	350	9	1.00E-06	70	3285	25550	1.79E-07	5.00E-02	3.59E-06	2.31E-08		
Antimony	3.74E-01	50	350	9	1.00E-06	70	3285	25550	2.56E-07	4.00E-04	6.40E-04	3.29E-08		
Barium	2.54E+02	50	350	9	1.00E-06	70	3285	25550	1.74E-04	7.00E-02	2.49E-03	2.24E-05		
Cadmium	7.43E-01	50	350	9	1.00E-06	70	3285	25550	5.09E-07	1.00E-03	5.09E-04	6.54E-08		
Mercury	1.03E-01	50	350	9	1.00E-06	70	3285	25550	7.05E-08	3.00E-04	2.35E-04	9.06E-09		
Nickel	2.44E+01	50	350	9	1.00E-06	70	3285	25550	1.67E-05	2.00E-02	8.35E-04	2.15E-06		
										TOTAL HAZARD INDEX =	5.91E-03		TOTAL CANCER RISK =	7.57E-09

TABLE C-13-7

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.58E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.85E-06	5.00E-05	3.70E-02	1.85E-06		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	5.62E-06	5.00E-04	1.12E-02	5.62E-06	3.00E-02	1.69E-07
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.72E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	4.10E-06	3.00E-03	1.37E-03	4.10E-06	1.10E-01	4.51E-07
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.85E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	2.04E-06	5.00E-02	4.09E-05	2.04E-06		
Antimony	4.20E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	3.01E-07	4.00E-04	7.53E-04	3.01E-07		
Barium	2.59E+02	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.86E-04	7.00E-02	2.65E-03	1.86E-04		
Cadmium	8.68E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	6.22E-07	1.00E-03	6.22E-04	6.22E-07		
Mercury	1.08E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	7.72E-07	3.00E-04	2.57E-03	7.72E-07		
Nickel	2.60E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.86E-05	2.00E-02	9.30E-04	1.86E-05		
												TOTAL HAZARD INDEX =	2.02E-02		TOTAL CANCER RISK =	6.20E-07

TABLE C-13-8

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.44E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.35E-07	5.00E-05	2.70E-03	1.74E-08		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	4.34E-07	5.00E-04	8.69E-04	5.58E-08	3.00E-02	1.68E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.68E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	3.14E-07	3.00E-03	1.05E-04	4.04E-08	1.10E-01	4.44E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.62E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.45E-07	5.00E-02	2.90E-06	1.86E-08		
Antimony	3.74E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	2.07E-08	4.00E-04	5.17E-05	2.66E-09		
Barium	2.54E+02	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.41E-05	7.00E-02	2.01E-04	1.81E-06		
Cadmium	7.43E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.11E-08	1.00E-03	4.11E-05	5.29E-09		
Mercury	1.03E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	5.69E-08	3.00E-04	1.90E-04	7.32E-09		
Nickel	2.44E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.35E-06	2.00E-02	6.74E-05	1.73E-07		
												TOTAL HAZARD INDEX =	1.53E-03		TOTAL CANCER RISK =	6.12E-09

TABLE C-13-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.58E-01	200	350	6	1.00E-06	15	2190	25550	3.30E-06	5.00E-05	6.60E-02	2.83E-07		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	200	350	6	1.00E-06	15	2190	25550	1.00E-05	5.00E-04	2.01E-02	8.60E-07	3.00E-02	2.58E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.72E-01	200	350	6	1.00E-06	15	2190	25550	7.32E-06	3.00E-03	2.44E-03	6.27E-07	1.10E-01	6.90E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.85E-01	200	350	6	1.00E-06	15	2190	25550	3.65E-06	5.00E-02	7.29E-05	3.13E-07		
Antimony	4.20E-01	200	350	6	1.00E-06	15	2190	25550	5.37E-06	4.00E-04	1.34E-02	4.60E-07		
Barium	2.59E+02	200	350	6	1.00E-06	15	2190	25550	3.31E-03	7.00E-02	4.73E-02	2.84E-04		
Cadmium	8.68E-01	200	350	6	1.00E-06	15	2190	25550	1.11E-05	1.00E-03	1.11E-02	9.51E-07		
Mercury	1.08E-01	200	350	6	1.00E-06	15	2190	25550	1.38E-06	3.00E-04	4.59E-03	1.18E-07		
Nickel	2.60E+01	200	350	6	1.00E-06	15	2190	25550	3.32E-04	2.00E-02	1.66E-02	2.84E-05		
										TOTAL HAZARD INDEX =	1.16E-01		TOTAL CANCER RISK =	9.48E-08

TABLE C-13-10

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.44E-01	100	350	6	1.00E-06	15	2190	25550	1.56E-06	5.00E-05	3.12E-02	1.34E-07		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	100	350	6	1.00E-06	15	2190	25550	5.02E-06	5.00E-04	1.00E-02	4.30E-07	3.00E-02	1.29E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.68E-01	100	350	6	1.00E-06	15	2190	25550	3.63E-06	3.00E-03	1.21E-03	3.11E-07	1.10E-01	3.42E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.62E-01	100	350	6	1.00E-06	15	2190	25550	1.67E-06	5.00E-02	3.35E-05	1.44E-07		
Antimony	3.74E-01	100	350	6	1.00E-06	15	2190	25550	2.39E-06	4.00E-04	5.98E-03	2.05E-07		
Barium	2.54E+02	100	350	6	1.00E-06	15	2190	25550	1.62E-03	7.00E-02	2.32E-02	1.39E-04		
Cadmium	7.43E-01	100	350	6	1.00E-06	15	2190	25550	4.75E-06	1.00E-03	4.75E-03	4.07E-07		
Mercury	1.03E-01	100	350	6	1.00E-06	15	2190	25550	6.58E-07	3.00E-04	2.19E-03	5.64E-08		
Nickel	2.44E+01	100	350	6	1.00E-06	15	2190	25550	1.56E-04	2.00E-02	7.79E-03	1.34E-05		
										TOTAL HAZARD INDEX =	5.52E-02		TOTAL CANCER RISK =	4.71E-08

TABLE J-13-11

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.58E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	7.14E-06	5.00E-05	1.43E-01	6.12E-07		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.17E-05	5.00E-04	4.35E-02	1.86E-06	3.00E-02	5.59E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.72E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.59E-05	3.00E-03	5.28E-03	1.36E-06	1.10E-01	1.49E-07
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.85E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	7.90E-06	5.00E-02	1.58E-04	6.77E-07		
Antimony	4.20E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	1.16E-06	4.00E-04	2.91E-03	9.97E-08		
Barium	2.59E+02	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	7.17E-04	7.00E-02	1.02E-02	6.15E-05		
Cadmium	8.68E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.40E-06	1.00E-03	2.40E-03	2.06E-07		
Mercury	1.08E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.98E-06	3.00E-04	9.95E-03	2.56E-07		
Nickel	2.60E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	7.19E-05	2.00E-02	3.59E-03	6.16E-06		
												TOTAL HAZARD INDEX =	7.80E-02		TOTAL CANCER RISK =	2.05E-07

TABLE [illegible]-13-12

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1 3,5-Trinitrobenzene	2.44E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	5.84E-07	5.00E-05	1.17E-02	5.00E-08		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.88E-06	5.00E-04	3.75E-03	1.61E-07	3.00E-02	4.82E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.68E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.36E-06	3.00E-03	4.52E-04	1.16E-07	1.10E-01	1.28E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.62E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	6.26E-07	5.00E-02	1.25E-05	5.37E-08		
Antimony	3.74E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	8.93E-08	4.00E-04	2.23E-04	7.66E-09		
Barium	2.54E+02	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	6.07E-05	7.00E-02	8.67E-04	5.20E-06		
Cadmium	7.43E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.78E-07	1.00E-03	1.78E-04	1.52E-08		
Mercury	1.03E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.46E-07	3.00E-04	8.19E-04	2.11E-08		
Nickel	2.44E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	5.82E-06	2.00E-02	2.91E-04	4.99E-07		
												TOTAL HAZARD INDEX =	6.59E-03		TOTAL CANCER RISK =	1.76E-08

TABLE C-13-13

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.58E-01	100	24	70	1.00E-06	70	25550	25550	2.42E-08	5.00E-05	4.85E-04	2.42E-08		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	100	24	70	1.00E-06	70	25550	25550	7.37E-08	5.00E-04	1.47E-04	7.37E-08	3.00E-02	2.21E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.72E-01	100	24	70	1.00E-06	70	25550	25550	5.38E-08	3.00E-03	1.79E-05	5.38E-08	1.10E-01	5.92E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.85E-01	100	24	70	1.00E-06	70	25550	25550	2.68E-08	5.00E-02	5.36E-07	2.68E-08		
Antimony	4.20E-01	100	24	70	1.00E-06	70	25550	25550	3.95E-08	4.00E-04	9.87E-05	3.95E-08		
Barium	2.59E+02	100	24	70	1.00E-06	70	25550	25550	2.43E-05	7.00E-02	3.48E-04	2.43E-05		
Cadmium	8.68E-01	100	24	70	1.00E-06	70	25550	25550	8.15E-08	1.00E-03	8.15E-05	8.15E-08		
Mercury	1.08E-01	100	24	70	1.00E-06	70	25550	25550	1.01E-08	3.00E-04	3.38E-05	1.01E-08		
Nickel	2.60E+01	100	24	70	1.00E-06	70	25550	25550	2.44E-06	2.00E-02	1.22E-04	2.44E-06		
										TOTAL HAZARD INDEX =	1.33E-03		TOTAL CANCER RISK =	8.13E-09

TABLE C-13-14

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.44E-01	50	12	9	1.00E-06	70	3285	25550	5.74E-09	5.00E-05	1.15E-04	7.37E-10		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	50	12	9	1.00E-06	70	3285	25550	1.84E-08	5.00E-04	3.69E-05	2.37E-09	3.00E-02	7.11E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.68E-01	50	12	9	1.00E-06	70	3285	25550	1.33E-08	3.00E-03	4.44E-06	1.71E-09	1.10E-01	1.89E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.62E-01	50	12	9	1.00E-06	70	3285	25550	6.15E-09	5.00E-02	1.23E-07	7.91E-10		
Antimony	3.74E-01	50	12	9	1.00E-06	70	3285	25550	8.78E-09	4.00E-04	2.20E-05	1.13E-09		
Barium	2.54E+02	50	12	9	1.00E-06	70	3285	25550	5.97E-06	7.00E-02	8.52E-05	7.67E-07		
Cadmium	7.43E-01	50	12	9	1.00E-06	70	3285	25550	1.74E-08	1.00E-03	1.74E-05	2.24E-09		
Mercury	1.03E-01	50	12	9	1.00E-06	70	3285	25550	2.42E-09	3.00E-04	8.05E-06	3.11E-10		
Nickel	2.44E+01	50	12	9	1.00E-06	70	3285	25550	5.72E-07	2.00E-02	2.86E-05	7.36E-08		
										TOTAL HAZARD INDEX =	2.03E-04		TOTAL CANCER RISK =	2.60E-10

TABLE C-13-15

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.58E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.27E-07	5.00E-05	2.54E-03	1.27E-07		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	3.86E-07	5.00E-04	7.71E-04	3.86E-07	3.00E-02	1.16E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.72E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.81E-07	3.00E-03	9.38E-05	2.81E-07	1.10E-01	3.09E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.85E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.40E-07	5.00E-02	2.80E-06	1.40E-07		
Antimony	4.20E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	2.06E-08	4.00E-04	5.16E-05	2.06E-08		
Barium	2.59E+02	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.27E-05	7.00E-02	1.82E-04	1.27E-05		
Cadmium	8.68E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	4.26E-08	1.00E-03	4.26E-05	4.26E-08		
Mercury	1.08E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	5.30E-08	3.00E-04	1.77E-04	5.30E-08		
Nickel	2.60E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.28E-06	2.00E-02	6.38E-05	1.28E-06		
												TOTAL HAZARD INDEX =	1.38E-03		TOTAL CANCER RISK =	4.25E-08

TABLE C-13-16

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.44E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	4.63E-09	5.00E-05	9.27E-05	5.96E-10		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.49E-08	5.00E-04	2.98E-05	1.91E-09	3.00E-02	5.74E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.68E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.08E-08	3.00E-03	3.59E-06	1.38E-09	1.10E-01	1.52E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.62E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	4.97E-09	5.00E-02	9.94E-08	6.39E-10		
Antimony	3.74E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	7.09E-10	4.00E-04	1.77E-06	9.12E-11		
Barium	2.54E+02	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	4.82E-07	7.00E-02	6.89E-06	6.20E-08		
Cadmium	7.43E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.41E-09	1.00E-03	1.41E-06	1.81E-10		
Mercury	1.03E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.95E-09	3.00E-04	6.51E-06	2.51E-10		
Nickel	2.44E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	4.62E-08	2.00E-02	2.31E-06	5.95E-09		
												TOTAL HAZARD INDEX =	5.24E-05		TOTAL CANCER RISK =	2.10E-10

TABLE C-13-17

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.58E-01	100	24	5	1.00E-06	37	1825	25550	4.59E-08	5.00E-05	9.17E-04	3.28E-09		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	100	24	5	1.00E-06	37	1825	25550	1.39E-07	5.00E-04	2.79E-04	9.96E-09	3.00E-02	2.99E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.72E-01	100	24	5	1.00E-06	37	1825	25550	1.02E-07	3.00E-03	3.39E-05	7.27E-09	1.10E-01	7.99E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.85E-01	100	24	5	1.00E-06	37	1825	25550	5.07E-08	5.00E-02	1.01E-06	3.62E-09		
Antimony	4.20E-01	100	24	5	1.00E-06	37	1825	25550	7.47E-08	4.00E-04	1.87E-04	5.33E-09		
Barium	2.59E+02	100	24	5	1.00E-06	37	1825	25550	4.60E-05	7.00E-02	6.58E-04	3.29E-06		
Cadmium	8.68E-01	100	24	5	1.00E-06	37	1825	25550	1.54E-07	1.00E-03	1.54E-04	1.10E-08		
Mercury	1.08E-01	100	24	5	1.00E-06	37	1825	25550	1.92E-08	3.00E-04	6.39E-05	1.37E-09		
Nickel	2.60E+01	100	24	5	1.00E-06	37	1825	25550	4.61E-06	2.00E-02	2.31E-04	3.29E-07		
										TOTAL HAZARD INDEX =	1.61E-03		TOTAL CANCER RISK =	1.10E-09

TABLE C-13-18

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.44E-01	50	12	5	1.00E-06	37	1825	25550	1.09E-08	5.00E-05	2.17E-04	7.75E-10		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	50	12	5	1.00E-06	37	1825	25550	3.49E-08	5.00E-04	6.97E-05	2.49E-09	3.00E-02	7.47E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.68E-01	50	12	5	1.00E-06	37	1825	25550	2.52E-08	3.00E-03	8.41E-06	1.80E-09	1.10E-01	1.98E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.62E-01	50	12	5	1.00E-06	37	1825	25550	1.16E-08	5.00E-02	2.33E-07	8.31E-10		
Antimony	3.74E-01	50	12	5	1.00E-06	37	1825	25550	1.66E-08	4.00E-04	4.15E-05	1.19E-09		
Barium	2.54E+02	50	12	5	1.00E-06	37	1825	25550	1.13E-05	7.00E-02	1.61E-04	8.06E-07		
Cadmium	7.43E-01	50	12	5	1.00E-06	37	1825	25550	3.30E-08	1.00E-03	3.30E-05	2.36E-09		
Mercury	1.03E-01	50	12	5	1.00E-06	37	1825	25550	4.57E-09	3.00E-04	1.52E-05	3.26E-10		
Nickel	2.44E+01	50	12	5	1.00E-06	37	1825	25550	1.08E-06	2.00E-02	5.41E-05	7.73E-08		
										TOTAL HAZARD INDEX =	3.84E-04		TOTAL CANCER RISK =	2.73E-10

TABLE [illegible]-13-19

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.58E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.11E-07	5.00E-05	4.22E-03	1.51E-08		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	6.42E-07	5.00E-04	1.28E-03	4.59E-08	3.00E-02	1.38E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.72E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	4.68E-07	3.00E-03	1.56E-04	3.34E-08	1.10E-01	3.68E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.85E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.33E-07	5.00E-02	4.66E-06	1.67E-08		
Antimony	4.20E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	3.44E-08	4.00E-04	8.59E-05	2.45E-09		
Barium	2.59E+02	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.12E-05	7.00E-02	3.03E-04	1.51E-06		
Cadmium	8.68E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	7.10E-08	1.00E-03	7.10E-05	5.07E-09		
Mercury	1.08E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	8.82E-08	3.00E-04	2.94E-04	6.30E-09		
Nickel	2.60E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.12E-06	2.00E-02	1.06E-04	1.52E-07		
												TOTAL HAZARD INDEX =	2.30E-03		TOTAL CANCER RISK =	5.05E-09

TABLE [illegible]-13-20

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.44E-01	1869	0.2	0.10	12	5	1.00E-06	37	1825	25550	8.11E-09	5.00E-05	1.62E-04	5.80E-10		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	1869	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.61E-08	5.00E-04	5.21E-05	1.86E-09	3.00E-02	5.59E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.68E-01	1869	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.89E-08	3.00E-03	6.28E-06	1.35E-09	1.10E-01	1.48E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.62E-01	1869	0.2	0.10	12	5	1.00E-06	37	1825	25550	8.70E-09	5.00E-02	1.74E-07	6.21E-10		
Antimony	3.74E-01	1869	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.24E-09	4.00E-04	3.10E-06	8.87E-11		
Barium	2.54E+02	1869	0.2	0.01	12	5	1.00E-06	37	1825	25550	8.44E-07	7.00E-02	1.21E-05	6.03E-08		
Cadmium	7.43E-01	1869	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.47E-09	1.00E-03	2.47E-06	1.76E-10		
Mercury	1.03E-01	1869	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.42E-09	3.00E-04	1.14E-05	2.44E-10		
Nickel	2.44E+01	1869	0.2	0.01	12	5	1.00E-06	37	1825	25550	8.10E-08	2.00E-02	4.05E-06	5.78E-09		
												TOTAL HAZARD INDEX =	9.17E-05		TOTAL CANCER RISK =	2.04E-10

TABLE C-13-21

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.58E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.72E-01	0.20	21%	32%	47%	1.18	0.06	0.09	3.55E-02	0.40	350	70	70	25550	25550	1.94E-04	3.00E-03	6.48E-02	1.94E-04	1.10E-01	2.14E-05
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.85E-01	0.20	21%	32%	47%	0.32	NE	NB	3.83E-03	0.40	350	70	70	25550	25550	2.10E-05	5.00E-02	4.20E-04	2.10E-05		
																	TOTAL HAZARD INDEX =	6.52E-02		TOTAL CANCER RISK =	2.14E-05

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

TABLE C-13-22

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0- 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.44E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.68E-01	0.20	21%	32%	47%	1.18	0.06	0.09	3.52E-02	0.25	350	9	70	3285	25550	1.20E-04	3.00E-03	4.01E-02	1.55E-05	1.10E-01	1.70E-06
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.62E-01	0.20	21%	32%	47%	0.32	NE	NB	3.52E-03	0.25	350	9	70	3285	25550	1.21E-05	5.00E-02	2.41E-04	1.55E-06		
																	TOTAL HAZARD INDEX =	4.04E-02		TOTAL CANCER RISK =	1.70E-06

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

TABLE C-13-23

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.58E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.72E-01	0.10	10%	45%	45%	1.18	0.06	0.09	1.06E-02	0.40	350	6	15	2190	25550	2.72E-04	3.00E-03	9.06E-02	2.33E-05	1.10E-01	2.56E-06
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.85E-01	0.10	10%	45%	45%	0.32	NE	NB	9.13E-04	0.40	350	6	15	2190	25550	2.33E-05	5.00E-02	4.67E-04	2.00E-06		
																	TOTAL HAZARD INDEX =	9.11E-02		TOTAL CANCER RISK =	2.56E-06

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)
NE = Not evaluated during the plant uptake study
NB = No measurable bioconcentration found during the plant uptake study

TABLE C-13-24

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
ADJACENT TO LOAD LINE 3 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.44E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00		
2,4,6-Trinitrotoluene (TNT)	7.85E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.68E-01	0.10	10%	45%	45%	1.18	0.06	0.09	1.05E-02	0.25	350	6	15	2190	25550	1.68E-04	3.00E-03	5.62E-02	1.44E-05	1.10E-01	1.59E-06
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.62E-01	0.10	10%	45%	45%	0.32	NE	NB	8.38E-04	0.25	350	6	15	2190	25550	1.34E-05	5.00E-02	2.68E-04	1.15E-06		
																	TOTAL HAZARD INDEX =	5.64E-02		TOTAL CANCER RISK =	1.59E-06

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

TABLE C-14-1

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL 0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.14E-01	50	250	25	1.00E-06	70	9125	25550	1.54E-07	5.00E-04	3.07E-04	5.49E-08	3.00E-02	1.65E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.23E-01	50	250	25	1.00E-06	70	9125	25550	2.56E-07	3.00E-03	8.53E-05	9.14E-08	1.10E-01	1.00E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	50	250	25	1.00E-06	70	9125	25550	1.36E-07	5.00E-02	2.72E-06	4.85E-08		
Antimony	4.42E-01	50	250	25	1.00E-06	70	9125	25550	2.16E-07	4.00E-04	5.40E-04	7.72E-08		
Arsenic	7.76E+00	50	250	25	1.00E-06	70	9125	25550	3.80E-06	3.00E-04	1.27E-02	1.36E-06	1.50E+00	2.03E-06
Cadmium	9.93E-01	50	250	25	1.00E-06	70	9125	25550	4.86E-07	1.00E-03	4.86E-04	1.74E-07		
Mercury	1.04E-01	50	250	25	1.00E-06	70	9125	25550	5.07E-08	3.00E-04	1.69E-04	1.81E-08		
Nickel	2.42E+01	50	250	25	1.00E-06	70	9125	25550	1.18E-05	2.00E-02	5.91E-04	4.22E-06		
										TOTAL HAZARD INDEX =	1.48E-02		TOTAL CANCER RISK =	2.05E-06

TABLE C-14-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.00E-01	10	250	10	1.00E-06	70	3650	25550	2.94E-08	5.00E-04	5.88E-05	4.20E-09	3.00E-02	1.26E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.81E-01	10	250	10	1.00E-06	70	3650	25550	4.71E-08	3.00E-03	1.57E-05	6.72E-09	1.10E-01	7.39E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.61E-01	10	250	10	1.00E-06	70	3650	25550	2.55E-08	5.00E-02	5.10E-07	3.64E-09		
Antimony	3.86E-01	10	250	10	1.00E-06	70	3650	25550	3.78E-08	4.00E-04	9.45E-05	5.40E-09		
Arsenic	7.31E+00	10	250	10	1.00E-06	70	3650	25550	7.15E-07	3.00E-04	2.38E-03	1.02E-07	1.50E+00	1.53E-07
Cadmium	9.44E-01	10	250	10	1.00E-06	70	3650	25550	9.23E-08	1.00E-03	9.23E-05	1.32E-08		
Mercury	9.67E-02	10	250	10	1.00E-06	70	3650	25550	9.46E-09	3.00E-04	3.15E-05	1.35E-09		
Nickel	2.31E+01	10	250	10	1.00E-06	70	3650	25550	2.26E-06	2.00E-02	1.13E-04	3.23E-07		
										TOTAL HAZARD INDEX =	2.79E-03		TOTAL CANCER RISK =	1.54E-07

TABLE C-14-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.14E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	1.61E-06	5.00E-04	3.21E-03	5.74E-07	3.00E-02	1.72E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.23E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	2.68E-06	3.00E-03	8.92E-04	9.56E-07	1.10E-01	1.05E-07
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	1.42E-06	5.00E-02	2.84E-05	5.08E-07		
Antimony	4.42E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	2.26E-07	4.00E-04	5.65E-04	8.07E-08		
Arsenic	7.76E+00	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	3.97E-06	3.00E-04	1.32E-02	1.42E-06	1.50E+00	2.13E-06
Cadmium	9.93E-01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	5.08E-07	1.00E-03	5.08E-04	1.82E-07		
Mercury	1.04E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	5.30E-07	3.00E-04	1.77E-03	1.89E-07		
Nickel	2.42E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.24E-05	2.00E-02	6.18E-04	4.42E-06		
												TOTAL HAZARD INDEX =	2.08E-02	TOTAL CANCER RISK =		2.25E-06

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TABLE C-14-4

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.00E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	1.19E-07	5.00E-04	2.38E-04	1.70E-08	3.00E-02	5.09E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.81E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	1.90E-07	3.00E-03	6.34E-05	2.72E-08	1.10E-01	2.99E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.61E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	1.03E-07	5.00E-02	2.06E-06	1.47E-08		
Antimony	3.86E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	1.53E-08	4.00E-04	3.82E-05	2.18E-09		
Arsenic	7.31E+00	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	2.89E-07	3.00E-04	9.63E-04	4.13E-08	1.50E+00	6.19E-08
Cadmium	9.44E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	3.73E-08	1.00E-03	3.73E-05	5.33E-09		
Mercury	9.67E-02	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	3.82E-08	3.00E-04	1.27E-04	5.46E-09		
Nickel	2.31E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	9.12E-07	2.00E-02	4.56E-05	1.30E-07		
												TOTAL HAZARD INDEX =	1.51E-03		TOTAL CANCER RISK =	6.54E-08

TABLE C-14-5

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.14E-01	100	350	70	1.00E-06	70	25550	25550	4.30E-07	5.00E-04	8.60E-04	4.30E-07	3.00E-02	1.29E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.23E-01	100	350	70	1.00E-06	70	25550	25550	7.16E-07	3.00E-03	2.39E-04	7.16E-07	1.10E-01	7.88E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	100	350	70	1.00E-06	70	25550	25550	3.80E-07	5.00E-02	7.61E-06	3.80E-07		
Antimony	4.42E-01	100	350	70	1.00E-06	70	25550	25550	6.05E-07	4.00E-04	1.51E-03	6.05E-07		
Arsenic	7.76E+00	100	350	70	1.00E-06	70	25550	25550	1.06E-05	3.00E-04	3.54E-02	1.06E-05	1.50E+00	1.59E-05
Cadmium	9.93E-01	100	350	70	1.00E-06	70	25550	25550	1.36E-06	1.00E-03	1.36E-03	1.36E-06		
Mercury	1.04E-01	100	350	70	1.00E-06	70	25550	25550	1.42E-07	3.00E-04	4.73E-04	1.42E-07		
Nickel	2.42E+01	100	350	70	1.00E-06	70	25550	25550	3.31E-05	2.00E-02	1.66E-03	3.31E-05		
										TOTAL HAZARD INDEX =	4.15E-02		TOTAL CANCER RISK =	1.60E-05

TABLE C-14-6

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.00E-01	50	350	9	1.00E-06	70	3285	25550	2.06E-07	5.00E-04	4.12E-04	2.65E-08	3.00E-02	7.94E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.81E-01	50	350	9	1.00E-06	70	3285	25550	3.29E-07	3.00E-03	1.10E-04	4.24E-08	1.10E-01	4.66E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.61E-01	50	350	9	1.00E-06	70	3285	25550	1.79E-07	5.00E-02	3.57E-06	2.30E-08		
Antimony	3.86E-01	50	350	9	1.00E-06	70	3285	25550	2.65E-07	4.00E-04	6.62E-04	3.40E-08		
Arsenic	7.31E+00	50	350	9	1.00E-06	70	3285	25550	5.01E-06	3.00E-04	1.67E-02	6.44E-07	1.50E+00	9.65E-07
Cadmium	9.44E-01	50	350	9	1.00E-06	70	3285	25550	6.46E-07	1.00E-03	6.46E-04	8.31E-08		
Mercury	9.67E-02	50	350	9	1.00E-06	70	3285	25550	6.62E-08	3.00E-04	2.21E-04	8.52E-09		
Nickel	2.31E+01	50	350	9	1.00E-06	70	3285	25550	1.58E-05	2.00E-02	7.90E-04	2.03E-06		
										TOTAL HAZARD INDEX =	1.95E-02		TOTAL CANCER RISK =	9.71E-07

TABLE C-14-7

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.14E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	2.25E-06	5.00E-04	4.50E-03	2.25E-06	3.00E-02	6.75E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.23E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	3.75E-06	3.00E-03	1.25E-03	3.75E-06	1.10E-01	4.12E-07
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.99E-06	5.00E-02	3.98E-05	1.99E-06		
Antimony	4.42E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	3.16E-07	4.00E-04	7.91E-04	3.16E-07		
Arsenic	7.76E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	5.56E-06	3.00E-04	1.85E-02	5.56E-06	1.50E+00	8.34E-06
Cadmium	9.93E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	7.12E-07	1.00E-03	7.12E-04	7.12E-07		
Mercury	1.04E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	7.42E-07	3.00E-04	2.47E-03	7.42E-07		
Nickel	2.42E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.73E-05	2.00E-02	8.66E-04	1.73E-05		
												TOTAL HAZARD INDEX =	2.92E-02		TOTAL CANCER RISK =	8.82E-06

TABLE C-14-8

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.00E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.66E-07	5.00E-04	3.33E-04	2.14E-08	3.00E-02	6.41E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.81E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	2.66E-07	3.00E-03	8.87E-05	3.42E-08	1.10E-01	3.76E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.61E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.44E-07	5.00E-02	2.89E-06	1.86E-08		
Antimony	3.86E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	2.14E-08	4.00E-04	5.35E-05	2.75E-09		
Arsenic	7.31E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.04E-07	3.00E-04	1.35E-03	5.20E-08	1.50E+00	7.80E-08
Cadmium	9.44E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	5.22E-08	1.00E-03	5.22E-05	6.72E-09		
Mercury	9.67E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	5.35E-08	3.00E-04	1.78E-04	6.88E-09		
Nickel	2.31E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.28E-06	2.00E-02	6.39E-05	1.64E-07		
												TOTAL HAZARD INDEX =	2.12E-03		TOTAL CANCER RISK =	8.24E-08

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TABLE C-14-9

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.14E-01	200	350	6	1.00E-06	15	2190	25550	4.02E-06	5.00E-04	8.03E-03	3.44E-07	3.00E-02	1.03E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.23E-01	200	350	6	1.00E-06	15	2190	25550	6.68E-06	3.00E-03	2.23E-03	5.73E-07	1.10E-01	6.30E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	200	350	6	1.00E-06	15	2190	25550	3.55E-06	5.00E-02	7.10E-05	3.04E-07		
Antimony	4.42E-01	200	350	6	1.00E-06	15	2190	25550	5.65E-06	4.00E-04	1.41E-02	4.84E-07		
Arsenic	7.76E+00	200	350	6	1.00E-06	15	2190	25550	9.92E-05	3.00E-04	3.31E-01	8.50E-06	1.50E+00	1.28E-05
Cadmium	9.93E-01	200	350	6	1.00E-06	15	2190	25550	1.27E-05	1.00E-03	1.27E-02	1.09E-06		
Mercury	1.04E-01	200	350	6	1.00E-06	15	2190	25550	1.32E-06	3.00E-04	4.42E-03	1.14E-07		
Nickel	2.42E+01	200	350	6	1.00E-06	15	2190	25550	3.09E-04	2.00E-02	1.54E-02	2.65E-05		
										TOTAL HAZARD INDEX =	3.88E-01		TOTAL CANCER RISK =	1.28E-05

TABLE C-14-10

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.00E-01	100	350	6	1.00E-06	15	2190	25550	1.92E-06	5.00E-04	3.84E-03	1.65E-07	3.00E-02	4.94E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.81E-01	100	350	6	1.00E-06	15	2190	25550	3.07E-06	3.00E-03	1.02E-03	2.64E-07	1.10E-01	2.90E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.61E-01	100	350	6	1.00E-06	15	2190	25550	1.67E-06	5.00E-02	3.33E-05	1.43E-07		
Antimony	3.86E-01	100	350	6	1.00E-06	15	2190	25550	2.47E-06	4.00E-04	6.18E-03	2.12E-07		
Arsenic	7.31E+00	100	350	6	1.00E-06	15	2190	25550	4.67E-05	3.00E-04	1.56E-01	4.00E-06	1.50E+00	6.01E-06
Cadmium	9.44E-01	100	350	6	1.00E-06	15	2190	25550	6.03E-06	1.00E-03	6.03E-03	5.17E-07		
Mercury	9.67E-02	100	350	6	1.00E-06	15	2190	25550	6.18E-07	3.00E-04	2.06E-03	5.30E-08		
Nickel	2.31E+01	100	350	6	1.00E-06	15	2190	25550	1.48E-04	2.00E-02	7.38E-03	1.26E-05		
										TOTAL HAZARD INDEX =	1.82E-01		TOTAL CANCER RISK =	6.04E-06

TABLE C-14-11

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = *Conversion Factor (kg/mg)*
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.14E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	8.69E-06	5.00E-04	1.74E-02	7.45E-07	3.00E-02	2.24E-08
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.23E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.45E-05	3.00E-03	4.83E-03	1.24E-06	1.10E-01	1.36E-07
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	7.69E-06	5.00E-02	1.54E-04	6.59E-07		
Antimony	4.42E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	1.22E-06	4.00E-04	3.06E-03	1.05E-07		
Arsenic	7.76E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.15E-05	3.00E-04	7.16E-02	1.84E-06	1.50E+00	2.76E-06
Cadmium	9.93E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.75E-06	1.00E-03	2.75E-03	2.36E-07		
Mercury	1.04E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.87E-06	3.00E-04	9.56E-03	2.46E-07		
Nickel	2.42E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	6.69E-05	2.00E-02	3.34E-03	5.73E-06		
												TOTAL HAZARD INDEX =	1.13E-01		TOTAL CANCER RISK =	2.92E-06

TABLE C-14-12

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =*Averaging Time for Non-carcinogenic Effects (days)*
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.00E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	7.18E-07	5.00E-04	1.44E-03	6.15E-08	3.00E-02	1.85E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.81E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.15E-06	3.00E-03	3.83E-04	9.85E-08	1.10E-01	1.08E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.61E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	6.23E-07	5.00E-02	1.25E-05	5.34E-08		
Antimony	3.86E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	9.23E-08	4.00E-04	2.31E-04	7.91E-09		
Arsenic	7.31E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.75E-06	3.00E-04	5.82E-03	1.50E-07	1.50E+00	2.25E-07
Cadmium	9.44E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	2.26E-07	1.00E-03	2.26E-04	1.93E-08		
Mercury	9.67E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.31E-07	3.00E-04	7.70E-04	1.98E-08		
Nickel	2.31E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	5.52E-06	2.00E-02	2.76E-04	4.73E-07		
												TOTAL HAZARD INDEX =	9.15E-03		TOTAL CANCER RISK =	2.37E-07

TABLE C-14-13

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.14E-01	100	24	70	1.00E-06	70	25550	25550	2.95E-08	5.00E-04	5.90E-05	2.95E-08	3.00E-02	8.85E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.23E-01	100	24	70	1.00E-06	70	25550	25550	4.91E-08	3.00E-03	1.64E-05	4.91E-08	1.10E-01	5.40E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	100	24	70	1.00E-06	70	25550	25550	2.61E-08	5.00E-02	5.22E-07	2.61E-08		
Antimony	4.42E-01	100	24	70	1.00E-06	70	25550	25550	4.15E-08	4.00E-04	1.04E-04	4.15E-08		
Arsenic	7.76E+00	100	24	70	1.00E-06	70	25550	25550	7.29E-07	3.00E-04	2.43E-03	7.29E-07	1.50E+00	1.09E-06
Cadmium	9.93E-01	100	24	70	1.00E-06	70	25550	25550	9.33E-08	1.00E-03	9.33E-05	9.33E-08		
Mercury	1.04E-01	100	24	70	1.00E-06	70	25550	25550	9.73E-09	3.00E-04	3.24E-05	9.73E-09		
Nickel	2.42E+01	100	24	70	1.00E-06	70	25550	25550	2.27E-06	2.00E-02	1.13E-04	2.27E-06		
										TOTAL HAZARD INDEX =	2.85E-03		TOTAL CANCER RISK =	1.10E-06

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TABLE C-14-14

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.00E-01	50	12	9	1.00E-06	70	3285	25550	7.06E-09	5.00E-04	1.41E-05	9.07E-10	3.00E-02	2.72E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.81E-01	50	12	9	1.00E-06	70	3285	25550	1.13E-08	3.00E-03	3.76E-06	1.45E-09	1.10E-01	1.60E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.61E-01	50	12	9	1.00E-06	70	3285	25550	6.12E-09	5.00E-02	1.22E-07	7.87E-10		
Antimony	3.86E-01	50	12	9	1.00E-06	70	3285	25550	9.07E-09	4.00E-04	2.27E-05	1.17E-09		
Arsenic	7.31E+00	50	12	9	1.00E-06	70	3285	25550	1.72E-07	3.00E-04	5.72E-04	2.21E-08	1.50E+00	3.31E-08
Cadmium	9.44E-01	50	12	9	1.00E-06	70	3285	25550	2.22E-08	1.00E-03	2.22E-05	2.85E-09		
Mercury	9.67E-02	50	12	9	1.00E-06	70	3285	25550	2.27E-09	3.00E-04	7.57E-06	2.92E-10		
Nickel	2.31E+01	50	12	9	1.00E-06	70	3285	25550	5.42E-07	2.00E-02	2.71E-05	6.97E-08		
										TOTAL HAZARD INDEX =	6.70E-04		TOTAL CANCER RISK =	3.33E-08

TABLE C-14-15

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.14E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.54E-07	5.00E-04	3.09E-04	1.54E-07	3.00E-02	4.63E-09
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.23E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.57E-07	3.00E-03	8.56E-05	2.57E-07	1.10E-01	2.83E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.36E-07	5.00E-02	2.73E-06	1.36E-07		
Antimony	4.42E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	2.17E-08	4.00E-04	5.43E-05	2.17E-08		
Arsenic	7.76E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	3.81E-07	3.00E-04	1.27E-03	3.81E-07	1.50E+00	5.72E-07
Cadmium	9.93E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	4.88E-08	1.00E-03	4.88E-05	4.88E-08		
Mercury	1.04E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	5.09E-08	3.00E-04	1.70E-04	5.09E-08		
Nickel	2.42E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.19E-06	2.00E-02	5.94E-05	1.19E-06		
												TOTAL HAZARD INDEX =	2.00E-03		TOTAL CANCER RISK =	6.05E-07

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TABLE C-14-16

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.00E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	5.70E-09	5.00E-04	1.14E-05	7.33E-10	3.00E-02	2.20E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.81E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	9.13E-09	3.00E-03	3.04E-06	1.17E-09	1.10E-01	1.29E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.61E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	4.95E-09	5.00E-02	9.90E-08	6.36E-10		
Antimony	3.86E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	7.33E-10	4.00E-04	1.83E-06	9.43E-11		
Arsenic	7.31E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.39E-08	3.00E-04	4.62E-05	1.78E-09	1.50E+00	2.67E-09
Cadmium	9.44E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.79E-09	1.00E-03	1.79E-06	2.30E-10		
Mercury	9.67E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.84E-09	3.00E-04	6.12E-06	2.36E-10		
Nickel	2.31E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	4.38E-08	2.00E-02	2.19E-06	5.63E-09		
												TOTAL HAZARD INDEX =	7.27E-05		TOTAL CANCER RISK =	2.83E-09

TABLE C-14-17

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.14E-01	100	24	5	1.00E-06	37	1825	25550	5.58E-08	5.00E-04	1.12E-04	3.99E-09	3.00E-02	1.20E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.23E-01	100	24	5	1.00E-06	37	1825	25550	9.29E-08	3.00E-03	3.10E-05	6.64E-09	1.10E-01	7.30E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	100	24	5	1.00E-06	37	1825	25550	4.94E-08	5.00E-02	9.87E-07	3.53E-09		
Antimony	4.42E-01	100	24	5	1.00E-06	37	1825	25550	7.85E-08	4.00E-04	1.96E-04	5.61E-09		
Arsenic	7.76E+00	100	24	5	1.00E-06	37	1825	25550	1.38E-06	3.00E-04	4.60E-03	9.85E-08	1.50E+00	1.48E-07
Cadmium	9.93E-01	100	24	5	1.00E-06	37	1825	25550	1.77E-07	1.00E-03	1.77E-04	1.26E-08		
Mercury	1.04E-01	100	24	5	1.00E-06	37	1825	25550	1.84E-08	3.00E-04	6.14E-05	1.32E-09		
Nickel	2.42E+01	100	24	5	1.00E-06	37	1825	25550	4.29E-06	2.00E-02	2.15E-04	3.07E-07		
										TOTAL HAZARD INDEX =	5.39E-03	TOTAL CANCER RISK =		1.49E-07

TABLE C-14-18

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.00E-01	50	12	5	1.00E-06	37	1825	25550	1.33E-08	5.00E-04	2.67E-05	9.53E-10	3.00E-02	2.86E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.81E-01	50	12	5	1.00E-06	37	1825	25550	2.14E-08	3.00E-03	7.12E-06	1.53E-09	1.10E-01	1.68E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.61E-01	50	12	5	1.00E-06	37	1825	25550	1.16E-08	5.00E-02	2.32E-07	8.27E-10		
Antimony	3.86E-01	50	12	5	1.00E-06	37	1825	25550	1.72E-08	4.00E-04	4.29E-05	1.23E-09		
Arsenic	7.31E+00	50	12	5	1.00E-06	37	1825	25550	3.25E-07	3.00E-04	1.08E-03	2.32E-08	1.50E+00	3.48E-08
Cadmium	9.44E-01	50	12	5	1.00E-06	37	1825	25550	4.19E-08	1.00E-03	4.19E-05	2.99E-09		
Mercury	9.67E-02	50	12	5	1.00E-06	37	1825	25550	4.30E-09	3.00E-04	1.43E-05	3.07E-10		
Nickel	2.31E+01	50	12	5	1.00E-06	37	1825	25550	1.03E-06	2.00E-02	5.13E-05	7.32E-08		
										TOTAL HAZARD INDEX =	1.27E-03		TOTAL CANCER RISK =	3.50E-08

TABLE C-14-19

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.14E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.57E-07	5.00E-04	5.14E-04	1.83E-08	3.00E-02	5.50E-10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.23E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	4.28E-07	3.00E-03	1.43E-04	3.05E-08	1.10E-01	3.36E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.27E-07	5.00E-02	4.54E-06	1.62E-08		
Antimony	4.42E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	3.61E-08	4.00E-04	9.03E-05	2.58E-09		
Arsenic	7.76E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	6.34E-07	3.00E-04	2.11E-03	4.53E-08	1.50E+00	6.80E-08
Cadmium	9.93E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	8.12E-08	1.00E-03	8.12E-05	5.80E-09		
Mercury	1.04E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	8.47E-08	3.00E-04	2.82E-04	6.05E-09		
Nickel	2.42E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	1.98E-06	2.00E-02	9.88E-05	1.41E-07		
												TOTAL HAZARD INDEX =	3.33E-03		TOTAL CANCER RISK =	7.19E-08

TABLE C-14-20

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.00E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.07E-08	5.00E-04	2.14E-05	7.65E-10	3.00E-02	2.29E-11
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.81E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.71E-08	3.00E-03	5.71E-06	1.22E-09	1.10E-01	1.35E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.61E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	9.29E-09	5.00E-02	1.86E-07	6.64E-10		
Antimony	3.86E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.38E-09	4.00E-04	3.44E-06	9.83E-11		
Arsenic	7.31E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.60E-08	3.00E-04	8.68E-05	1.86E-09	1.50E+00	2.79E-09
Cadmium	9.44E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	3.36E-09	1.00E-03	3.36E-06	2.40E-10		
Mercury	9.67E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.45E-09	3.00E-04	1.15E-05	2.46E-10		
Nickel	2.31E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	8.22E-08	2.00E-02	4.11E-06	5.87E-09		
												TOTAL HAZARD INDEX =	1.37E-04		TOTAL CANCER RISK =	2.95E-09

TABLE C-14-21

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.14E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.23E-01	0.20	21%	32%	47%	1.18	0.06	0.09	3.24E-02	0.40	350	70	70	25550	25550	1.78E-04	3.00E-03	5.92E-02	1.78E-04	1.10E-01	1.95E-05
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	0.20	21%	32%	47%	0.32	NE	NB	3.73E-03	0.40	350	70	70	25550	25550	2.05E-05	5.00E-02	4.09E-04	2.05E-05		
																TOTAL HAZARD INDEX =		5.96E-02		TOTAL CANCER RISK =	1.95E-05

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

TABLE C-14-22

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.00E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.81E-01	0.20	21%	32%	47%	1.18	0.06	0.09	2.98E-02	0.25	350	9	70	3285	25550	1.02E-04	3.00E-03	3.40E-02	1.31E-05	1.10E-01	1.44E-06
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.61E-01	0.20	21%	32%	47%	0.32	NE	NB	3.50E-03	0.25	350	9	70	3285	25550	1.20E-05	5.00E-02	2.40E-04	1.54E-06		
																TOTAL HAZARD INDEX =		3.43E-02	TOTAL CANCER RISK =		1.44E-06

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)
NE = Not evaluated during the plant uptake study
NB = No measurable bioconcentration found during the plant uptake study

TABLE C-14-23

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: *CDI = Chronic Daily Intake*
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.14E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5.23E-01	0.10	10%	45%	45%	1.18	0.06	0.09	9.71E-03	0.40	350	6	15	2190	25550	2.48E-04	3.00E-03	8.28E-02	2.13E-05	1.10E-01	2.34E-06
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.78E-01	0.10	10%	45%	45%	0.32	NE	NB	8.89E-04	0.40	350	6	15	2190	25550	2.27E-05	5.00E-02	4.55E-04	1.95E-06		
																	TOTAL HAZARD INDEX =	8.32E-02		TOTAL CANCER RISK =	2.34E-06

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)
NE = Not evaluated during the plant uptake study
NB = No measurable bioconcentration found during the plant uptake study

TABLE C-14-24

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
ADJACENT TO LOAD LINE 4 BOMB PRODUCTION BUILDINGS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFlv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFlv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFlv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	3.00E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	4.81E-01	0.10	10%	45%	45%	1.18	0.06	0.09	8.93E-03	0.25	350	6	15	2190	25550	1.43E-04	3.00E-03	4.76E-02	1.22E-05	1.10E-01	1.35E-06
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.61E-01	0.10	10%	45%	45%	0.32	NE	NB	8.34E-04	0.25	350	6	15	2190	25550	1.33E-05	5.00E-02	2.67E-04	1.14E-06		
																	TOTAL HAZARD INDEX =	4.79E-02		TOTAL CANCER RISK =	1.35E-06

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)
NE = Not evaluated during the plant uptake study
NB = No measurable bioconcentration found during the plant uptake study

TABLE C-15-1

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.84E+01	50	250	25	1.00E-06	70	9125	25550	9.01E-06	4.00E-04	2.25E-02	3.22E-06		
Cadmium	2.66E+00	50	250	25	1.00E-06	70	9125	25550	1.30E-06	1.00E-03	1.30E-03	4.65E-07		
Mercury	7.50E-02	50	250	25	1.00E-06	70	9125	25550	3.67E-08	3.00E-04	1.22E-04	1.31E-08		
Nickel	2.40E+01	50	250	25	1.00E-06	70	9125	25550	1.17E-05	2.00E-02	5.87E-04	4.20E-06		
										TOTAL HAZARD INDEX =	2.45E-02		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	6.42E+00	10	250	10	1.00E-06	70	3650	25550	6.28E-07	4.00E-04	1.57E-03	8.97E-08		
Cadmium	2.66E+00	10	250	10	1.00E-06	70	3650	25550	2.61E-07	1.00E-03	2.61E-04	3.72E-08		
Mercury	6.90E-02	10	250	10	1.00E-06	70	3650	25550	6.75E-09	3.00E-04	2.25E-05	9.64E-10		
Nickel	2.11E+01	10	250	10	1.00E-06	70	3650	25550	2.07E-06	2.00E-02	1.03E-04	2.95E-07		
										TOTAL HAZARD INDEX =	1.96E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: *CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)*
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.84E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	9.42E-06	4.00E-04	2.36E-02	3.36E-06		
Cadmium	2.66E+00	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.36E-06	1.00E-03	1.36E-03	4.87E-07		
Mercury	7.50E-02	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	3.84E-07	3.00E-04	1.28E-03	1.37E-07		
Nickel	2.40E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.23E-05	2.00E-02	6.14E-04	4.39E-06		
												TOTAL HAZARD INDEX =	2.68E-02		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-4

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	6.42E+00	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	2.54E-07	4.00E-04	6.34E-04	3.62E-08		
Cadmium	2.66E+00	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	1.05E-07	1.00E-03	1.05E-04	1.50E-08		
Mercury	6.90E-02	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	2.73E-08	3.00E-04	9.09E-05	3.90E-09		
Nickel	2.11E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	8.34E-07	2.00E-02	4.17E-05	1.19E-07		
												TOTAL HAZARD INDEX =	8.72E-04		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-5

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.84E+01	100	350	70	1.00E-06	70	25550	25550	2.52E-05	4.00E-04	6.30E-02	2.52E-05		
Cadmium	2.66E+00	100	350	70	1.00E-06	70	25550	25550	3.65E-06	1.00E-03	3.65E-03	3.65E-06		
Mercury	7.50E-02	100	350	70	1.00E-06	70	25550	25550	1.03E-07	3.00E-04	3.42E-04	1.03E-07		
Nickel	2.40E+01	100	350	70	1.00E-06	70	25550	25550	3.29E-05	2.00E-02	1.64E-03	3.29E-05		
										TOTAL HAZARD INDEX =	6.87E-02		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-6

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	6.42E+00	50	350	9	1.00E-06	70	3285	25550	4.40E-06	4.00E-04	1.10E-02	5.65E-07		
Cadmium	2.66E+00	50	350	9	1.00E-06	70	3285	25550	1.82E-06	1.00E-03	1.82E-03	2.34E-07		
Mercury	6.90E-02	50	350	9	1.00E-06	70	3285	25550	4.73E-08	3.00E-04	1.58E-04	6.08E-09		
Nickel	2.11E+01	50	350	9	1.00E-06	70	3285	25550	1.45E-05	2.00E-02	7.23E-04	1.86E-06		
										TOTAL HAZARD INDEX =	1.37E-02		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-7

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.84E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.32E-05	4.00E-04	3.30E-02	1.32E-05		
Cadmium	2.66E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.91E-06	1.00E-03	1.91E-03	1.91E-06		
Mercury	7.50E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	5.37E-07	3.00E-04	1.79E-03	5.37E-07		
Nickel	2.40E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.72E-05	2.00E-02	8.60E-04	1.72E-05		
												TOTAL HAZARD INDEX =	3.75E-02		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-8

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: *CDI = Chronic Daily Intake*
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	6.42E+00	5230	0.2	0.01	350	9	1.00E-06	70	3285	25550	9.19E-07	4.00E-04	2.30E-03	1.18E-07		
Cadmium	2.66E+00	5230	0.2	0.01	350	9	1.00E-06	70	3285	25550	3.82E-07	1.00E-03	3.82E-04	4.91E-08		
Mercury	6.90E-02	5230	0.2	0.10	350	9	1.00E-06	70	3285	25550	9.89E-08	3.00E-04	3.30E-04	1.27E-08		
Nickel	2.11E+01	5230	0.2	0.01	350	9	1.00E-06	70	3285	25550	3.02E-06	2.00E-02	1.51E-04	3.89E-07		
												TOTAL HAZARD INDEX =	3.16E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Antimony	1.34E+01	200	350	6	1.00E-06	15	2190	25550	2.35E-04	4.00E-04	5.88E-01	2.02E-05		
Cadmium	2.66E+00	200	350	6	1.00E-06	15	2190	25550	3.40E-05	1.00E-03	3.40E-02	2.92E-06		
Mercury	7.50E-02	200	350	6	1.00E-06	15	2190	25550	9.59E-07	3.00E-04	3.20E-03	8.22E-08		
Nickel	2.40E+01	200	350	6	1.00E-06	15	2190	25550	3.07E-04	2.00E-02	1.54E-02	2.63E-05		
										TOTAL HAZARD INDEX =	6.41E-01		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-10

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	6.42E+00	100	350	6	1.00E-06	15	2190	25550	4.10E-05	4.00E-04	1.03E-01	3.52E-06		
Cadmium	2.66E+00	100	350	6	1.00E-06	15	2190	25550	1.70E-05	1.00E-03	1.70E-02	1.46E-06		
Mercury	6.90E-02	100	350	6	1.00E-06	15	2190	25550	4.41E-07	3.00E-04	1.47E-03	3.78E-08		
Nickel	2.11E+01	100	350	6	1.00E-06	15	2190	25550	1.35E-04	2.00E-02	6.75E-03	1.16E-05		
										TOTAL HAZARD INDEX =	1.28E-01		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-11

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.84E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	5.10E-05	4.00E-04	1.27E-01	4.37E-06		
Cadmium	2.66E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	7.37E-06	1.00E-03	7.37E-03	6.32E-07		
Mercury	7.50E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.08E-06	3.00E-04	6.92E-03	1.78E-07		
Nickel	2.40E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	6.65E-05	2.00E-02	3.32E-03	5.70E-06		
												TOTAL HAZARD INDEX =	1.45E-01		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-12

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	6.42E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.53E-06	4.00E-04	3.83E-03	1.31E-07		
Cadmium	2.66E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	6.36E-07	1.00E-03	6.36E-04	5.45E-08		
Mercury	6.90E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.65E-07	3.00E-04	5.50E-04	1.41E-08		
Nickel	2.11E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	5.04E-06	2.00E-02	2.52E-04	4.32E-07		
												TOTAL HAZARD INDEX =	5.27E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-13

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.84E+01	100	24	70	1.00E-06	70	25550	25550	1.73E-06	4.00E-04	4.32E-03	1.73E-06		
Cadmium	2.66E+00	100	24	70	1.00E-06	70	25550	25550	2.50E-07	1.00E-03	2.50E-04	2.50E-07		
Mercury	7.50E-02	100	24	70	1.00E-06	70	25550	25550	7.05E-09	3.00E-04	2.35E-05	7.05E-09		
Nickel	2.40E+01	100	24	70	1.00E-06	70	25550	25550	2.26E-06	2.00E-02	1.13E-04	2.26E-06		
									TOTAL HAZARD INDEX =		4.71E-03	TOTAL CANCER RISK =		0.00E+00

TABLE C-15-14

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	6.42E+00	50	12	9	1.00E-06	70	3285	25550	1.51E-07	4.00E-04	3.77E-04	1.94E-08		
Cadmium	2.66E+00	50	12	9	1.00E-06	70	3285	25550	6.25E-08	1.00E-03	6.25E-05	8.04E-09		
Mercury	6.90E-02	50	12	9	1.00E-06	70	3285	25550	1.62E-09	3.00E-04	5.40E-06	2.08E-10		
Nickel	2.11E+01	50	12	9	1.00E-06	70	3285	25550	4.96E-07	2.00E-02	2.48E-05	6.37E-08		
										TOTAL HAZARD INDEX =	4.69E-04		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-15

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.84E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	9.04E-07	4.00E-04	2.26E-03	9.04E-07		
Cadmium	2.66E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.31E-07	1.00E-03	1.31E-04	1.31E-07		
Mercury	7.50E-02	5230	1.0	0.10	24	70	1 00E-06	70	25550	25550	3.68E-08	3.00E-04	1.23E-04	3.68E-08		
Nickel	2.40E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.18E-06	2.00E-02	5.90E-05	1.18E-06		
												TOTAL HAZARD INDEX =	2.57E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-16

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	6.42E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.22E-08	4.00E-04	3.04E-05	1.57E-09		
Cadmium	2.66E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	5.05E-09	1.00E-03	5.05E-06	6.50E-10		
Mercury	6.90E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.31E-09	3.00E-04	4.36E-06	1.68E-10		
Nickel	2.11E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	4.01E-08	2.00E-02	2.00E-06	5.15E-09		
												TOTAL HAZARD INDEX =	4.19E-05		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-17

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.84E+01	100	24	5	1.00E-06	37	1825	25550	3.27E-06	4.00E-04	8.18E-03	2.34E-07		
Cadmium	2.66E+00	100	24	5	1.00E-06	37	1825	25550	4.73E-07	1.00E-03	4.73E-04	3.38E-08		
Mercury	7.50E-02	100	24	5	1.00E-06	37	1825	25550	1.33E-08	3.00E-04	4.44E-05	9.52E-10		
Nickel	2.40E+01	100	24	5	1.00E-06	37	1825	25550	4.27E-06	2.00E-02	2.13E-04	3.05E-07		
										TOTAL HAZARD INDEX =	8.91E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-18

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = *Slope Factor x CDI*

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	6.42E+00	50	12	5	1.00E-06	37	1825	25550	2.85E-07	4.00E-04	7.13E-04	2.04E-08		
Cadmium	2.66E+00	50	12	5	1.00E-06	37	1825	25550	1.18E-07	1.00E-03	1.18E-04	8.45E-09		
Mercury	6.90E-02	50	12	5	1.00E-06	37	1825	25550	3.07E-09	3.00E-04	1.02E-05	2.19E-10		
Nickel	2.11E+01	50	12	5	1.00E-06	37	1825	25550	9.38E-07	2.00E-02	4.69E-05	6.70E-08		
										TOTAL HAZARD INDEX =	8.88E-04		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-19

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.84E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	1.51E-06	4.00E-04	3.76E-03	1.08E-07		
Cadmium	2.66E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.18E-07	1.00E-03	2.18E-04	1.56E-08		
Mercury	7.50E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	6.13E-08	3.00E-04	2.04E-04	4.38E-09		
Nickel	2.40E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	1.96E-06	2.00E-02	9.82E-05	1.40E-07		
												TOTAL HAZARD INDEX =	4.28E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-15-20

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 1 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	6.42E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.29E-08	4.00E-04	5.72E-05	1.63E-09		
Cadmium	2.66E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	9.49E-09	1.00E-03	9.49E-06	6.78E-10		
Mercury	6.90E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.46E-09	3.00E-04	8.20E-06	1.76E-10		
Nickel	2.11E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	7.52E-08	2.00E-02	3.76E-06	5.37E-09		
												TOTAL HAZARD INDEX =	7.86E-05		TOTAL CANCER RISK =	0.00E+00

TABLE C-16-1

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.23E+02	50	250	25	1.00E-06	70	9125	25550	1.09E-04	4.00E-04	2.73E-01	3.90E-05		
Arsenic	9.21E+00	50	250	25	1.00E-06	70	9125	25550	4.51E-06	3.00E-04	1.50E-02	1.61E-06	1.50E+00	2.41E-06
Cadmium	1.15E+00	50	250	25	1.00E-06	70	9125	25550	5.61E-07	1.00E-03	5.61E-04	2.00E-07		
Cobalt	1.22E+01	50	250	25	1.00E-06	70	9125	25550	5.99E-06	6.00E-02	9.99E-05	2.14E-06		
Mercury	1.06E-01	50	250	25	1.00E-06	70	9125	25550	5.20E-08	3.00E-04	1.73E-04	1.86E-08		
Nickel	2.71E+01	50	250	25	1.00E-06	70	9125	25550	1.33E-05	2.00E-02	6.64E-04	4.74E-06		
										TOTAL HAZARD INDEX =	2.89E-01		TOTAL CANCER RISK =	2.41E-06

TABLE C-16-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.90E+01	10	250	10	1.00E-06	70	3650	25550	2.84E-06	4.00E-04	7.10E-03	4.05E-07		
Arsenic	7.95E+00	10	250	10	1.00E-06	70	3650	25550	7.78E-07	3.00E-04	2.59E-03	1.11E-07	1.50E+00	1.67E-07
Cadmium	9.41E-01	10	250	10	1.00E-06	70	3650	25550	9.20E-08	1.00E-03	9.20E-05	1.31E-08		
Cobalt	1.07E+01	10	250	10	1.00E-06	70	3650	25550	1.05E-06	6.00E-02	1.74E-05	1.49E-07		
Mercury	9.64E-02	10	250	10	1.00E-06	70	3650	25550	9.44E-09	3.00E-04	3.15E-05	1.35E-09		
Nickel	2.36E+01	10	250	10	1.00E-06	70	3650	25550	2.31E-06	2.00E-02	1.15E-04	3.30E-07		
										TOTAL HAZARD INDEX =	9.95E-03		TOTAL CANCER RISK =	1.67E-07

TAB[illegible]-16-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.23E+02	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.14E-04	4.00E-04	2.85E-01	4.08E-05		
Arsenic	9.21E+00	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	4.71E-06	3.00E-04	1.57E-02	1.68E-06	1.50E+00	2.53E-06
Cadmium	1.15E+00	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	5.87E-07	1.00E-03	5.87E-04	2.10E-07		
Cobalt	1.22E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	6.27E-06	6.00E-02	1.04E-04	2.24E-06		
Mercury	1.06E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	5.44E-07	3.00E-04	1.81E-03	1.94E-07		
Nickel	2.71E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.39E-05	2.00E-02	6.94E-04	4.96E-06		
												TOTAL HAZARD INDEX =	3.04E-01		TOTAL CANCER RISK =	2.53E-06

TABLE C-16-4

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL(0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.90E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	1.15E-06	4.00E-04	2.87E-03	1.64E-07		
Arsenic	7.95E+00	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	3.14E-07	3.00E-04	1.05E-03	4.49E-08	1.50E+00	6.73E-08
Cadmium	9.41E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	3.72E-08	1.00E-03	3.72E-05	5.31E-09		
Cobalt	1.07E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	4.23E-07	6.00E-02	7.04E-06	6.04E-08		
Mercury	9.64E-02	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	3.81E-08	3.00E-04	1.27E-04	5.45E-09		
Nickel	2.36E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	9.33E-07	2.00E-02	4.66E-05	1.33E-07		
												TOTAL HAZARD INDEX =	4.13E-03		TOTAL CANCER RISK =	6.73E-08

TABLE C-16-5

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.23E+02	100	350	70	1.00E-06	70	25550	25550	3.06E-04	4.00E-04	7.64E-01	3.06E-04		
Arsenic	9.21E+00	100	350	70	1.00E-06	70	25550	25550	1.26E-05	3.00E-04	4.21E-02	1.26E-05	1.50E+00	1.89E-05
Cadmium	1.15E+00	100	350	70	1.00E-06	70	25550	25550	1.57E-06	1.00E-03	1.57E-03	1.57E-06		
Cobalt	1.22E+01	100	350	70	1.00E-06	70	25550	25550	1.68E-05	6.00E-02	2.80E-04	1.68E-05		
Mercury	1.06E-01	100	350	70	1.00E-06	70	25550	25550	1.46E-07	3.00E-04	4.86E-04	1.46E-07		
Nickel	2.71E+01	100	350	70	1.00E-06	70	25550	25550	3.72E-05	2.00E-02	1.86E-03	3.72E-05		
										TOTAL HAZARD INDEX =	8.10E-01		TOTAL CANCER RISK =	1.89E-05

TABLE C-16-6

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.90E+01	50	350	9	1.00E-06	70	3285	25550	1.99E-05	4.00E-04	4.97E-02	2.55E-06		
Arsenic	7.95E+00	50	350	9	1.00E-06	70	3285	25550	5.45E-06	3.00E-04	1.82E-02	7.00E-07	1.50E+00	1.05E-06
Cadmium	9.41E-01	50	350	9	1.00E-06	70	3285	25550	6.44E-07	1.00E-03	6.44E-04	8.28E-08		
Cobalt	1.07E+01	50	350	9	1.00E-06	70	3285	25550	7.32E-06	6.00E-02	1.22E-04	9.42E-07		
Mercury	9.64E-02	50	350	9	1.00E-06	70	3285	25550	6.60E-08	3.00E-04	2.20E-04	8.49E-09		
Nickel	2.36E+01	50	350	9	1.00E-06	70	3285	25550	1.62E-05	2.00E-02	8.08E-04	2.08E-06		
										TOTAL HAZARD INDEX =	6.96E-02		TOTAL CANCER RISK =	1.05E-06

TABLE C-16-7

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.23E+02	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.60E-04	4.00E-04	4.00E-01	1.60E-04		
Arsenic	9.21E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	6.60E-06	3.00E-04	2.20E-02	6.60E-06	1.50E+00	9.90E-06
Cadmium	1.15E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	8.22E-07	1.00E-03	8.22E-04	8.22E-07		
Cobalt	1.22E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	8.77E-06	6.00E-02	1.46E-04	8.77E-06		
Mercury	1.06E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	7.62E-07	3.00E-04	2.54E-03	7.62E-07		
Nickel	2.71E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.94E-05	2.00E-02	9.72E-04	1.94E-05		
												TOTAL HAZARD INDEX =	4.26E-01		TOTAL CANCER RISK =	9.90E-06

TABLE C-16-8

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.90E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.61E-06	4.00E-04	4.01E-03	2.06E-07		
Arsenic	7.95E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.40E-07	3.00E-04	1.47E-03	5.66E-08	1.50E+00	8.49E-08
Cadmium	9.41E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	5.21E-08	1.00E-03	5.21E-05	6.69E-09		
Cobalt	1.07E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	5.92E-07	6.00E-02	9.86E-06	7.61E-08		
Mercury	9.64E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	5.34E-08	3.00E-04	1.78E-04	6.86E-09		
Nickel	2.36E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.31E-06	2.00E-02	6.53E-05	1.68E-07		
												TOTAL HAZARD INDEX =	5.79E-03	TOTAL CANCER RISK =		8.49E-08

TABLE C-16-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.23E+02	200	350	6	1.00E-06	15	2190	25550	2.85E-03	4.00E-04	7.13E+00	2.44E-04		
Arsenic	9.21E+00	200	350	6	1.00E-06	15	2190	25550	1.18E-04	3.00E-04	3.93E-01	1.01E-05	1.50E+00	1.51E-05
Cadmium	1.15E+00	200	350	6	1.00E-06	15	2190	25550	1.47E-05	1.00E-03	1.47E-02	1.26E-06		
Cobalt	1.22E+01	200	350	6	1.00E-06	15	2190	25550	1.57E-04	6.00E-02	2.61E-03	1.34E-05		
Mercury	1.06E-01	200	350	6	1.00E-06	15	2190	25550	1.36E-06	3.00E-04	4.53E-03	1.17E-07		
Nickel	2.71E+01	200	350	6	1.00E-06	15	2190	25550	3.47E-04	2.00E-02	1.73E-02	2.97E-05		

TOTAL HAZARD INDEX = 7.56E+00 TOTAL CANCER RISK = 1.51E-05

Dermal 1.65
9.21

TABLE C-16-10

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.90E+01	100	350	6	1.00E-06	15	2190	25550	1.85E-04	4.00E-04	4.64E-01	1.59E-05		
Arsenic	7.95E+00	100	350	6	1.00E-06	15	2190	25550	5.08E-05	3.00E-04	1.69E-01	4.36E-06	1.50E+00	6.53E-06
Cadmium	9.41E-01	100	350	6	1.00E-06	15	2190	25550	6.01E-06	1.00E-03	6.01E-03	5.15E-07		
Cobalt	1.07E+01	100	350	6	1.00E-06	15	2190	25550	6.84E-05	6.00E-02	1.14E-03	5.86E-06		
Mercury	9.64E-02	100	350	6	1.00E-06	15	2190	25550	6.16E-07	3.00E-04	2.05E-03	5.28E-08		
Nickel	2.36E+01	100	350	6	1.00E-06	15	2190	25550	1.51E-04	2.00E-02	7.54E-03	1.29E-05		
										TOTAL HAZARD INDEX =	6.50E-01		TOTAL CANCER RISK =	6.53E-06

TABLE C-16-11

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.23E+02	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	6.18E-04	4.00E-04	1.54E+00	5.29E-05		
Arsenic	9.21E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.55E-05	3.00E-04	8.50E-02	2.19E-06	1.50E+00	3.28E-06
Cadmium	1.15E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	3.18E-06	1.00E-03	3.18E-03	2.72E-07		
Cobalt	1.22E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	3.39E-05	6.00E-02	5.65E-04	2.91E-06		
Mercury	1.06E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.95E-06	3.00E-04	9.82E-03	2.52E-07		
Nickel	2.71E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	7.51E-05	2.00E-02	3.76E-03	6.44E-06		
												TOTAL HAZARD INDEX =	1.65E+00		TOTAL CANCER RISK =	3.28E-06

TABLE C-16-12

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.90E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	6.93E-06	4.00E-04	1.73E-02	5.94E-07		
Arsenic	7.95E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.90E-06	3.00E-04	6.33E-03	1.63E-07	1.50E+00	2.44E-07
Cadmium	9.41E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	2.25E-07	1.00E-03	2.25E-04	1.93E-08		
Cobalt	1.07E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	2.56E-06	6.00E-02	4.26E-05	2.19E-07		
Mercury	9.64E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.30E-07	3.00E-04	7.68E-04	1.98E-08		
Nickel	2.36E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	5.64E-06	2.00E-02	2.82E-04	4.83E-07		
												TOTAL HAZARD INDEX =	2.50E-02		TOTAL CANCER RISK =	2.44E-07

TABLE C-16-13

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.23E+02	100	24	70	1.00E-06	70	25550	25550	2.10E-05	4.00E-04	5.24E-02	2.10E-05		
Arsenic	9.21E+00	100	24	70	1.00E-06	70	25550	25550	8.65E-07	3.00E-04	2.88E-03	8.65E-07	1.50E+00	1.30E-06
Cadmium	1.15E+00	100	24	70	1.00E-06	70	25550	25550	1.08E-07	1.00E-03	1.08E-04	1.08E-07		
Cobalt	1.22E+01	100	24	70	1.00E-06	70	25550	25550	1.15E-06	6.00E-02	1.92E-05	1.15E-06		
Mercury	1.06E-01	100	24	70	1.00E-06	70	25550	25550	9.99E-09	3.00E-04	3.33E-05	9.99E-09		
Nickel	2.71E+01	100	24	70	1.00E-06	70	25550	25550	2.55E-06	2.00E-02	1.27E-04	2.55E-06		
									TOTAL HAZARD INDEX =		5.56E-02	TOTAL CANCER RISK =		1.30E-06

TABLE C-16-14

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.90E+01	50	12	9	1.00E-06	70	3285	25550	6.81E-07	4.00E-04	1.70E-03	8.76E-08		
Arsenic	7.95E+00	50	12	9	1.00E-06	70	3285	25550	1.87E-07	3.00E-04	6.22E-04	2.40E-08	1.50E+00	3.60E-08
Cadmium	9.41E-01	50	12	9	1.00E-06	70	3285	25550	2.21E-08	1.00E-03	2.21E-05	2.84E-09		
Cobalt	1.07E+01	50	12	9	1.00E-06	70	3285	25550	2.51E-07	6.00E-02	4.19E-06	3.23E-08		
Mercury	9.64E-02	50	12	9	1.00E-06	70	3285	25550	2.26E-09	3.00E-04	7.55E-06	2.91E-10		
Nickel	2.36E+01	50	12	9	1.00E-06	70	3285	25550	5.54E-07	2.00E-02	2.77E-05	7.12E-08		
										TOTAL HAZARD INDEX =	2.39E-03		TOTAL CANCER RISK =	3.60E-08

TABLE C-16-15

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.23E+02	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.10E-05	4.00E-04	2.74E-02	1.10E-05		
Arsenic	9.21E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	4.53E-07	3.00E-04	1.51E-03	4.53E-07	1.50E+00	6.79E-07
Cadmium	1.15E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	5.64E-08	1.00E-03	5.64E-05	5.64E-08		
Cobalt	1.22E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	6.02E-07	6.00E-02	1.00E-05	6.02E-07		
Mercury	1.06E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	5.23E-08	3.00E-04	1.74E-04	5.23E-08		
Nickel	2.71E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.33E-06	2.00E-02	6.67E-05	1.33E-06		
												TOTAL HAZARD INDEX =	2.92E-02		TOTAL CANCER RISK =	6.79E-07

TABLE C-16-16

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.90E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	5.50E-08	4.00E-04	1.38E-04	7.08E-09		
Arsenic	7.95E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.51E-08	3.00E-04	5.03E-05	1.94E-09	1.50E+00	2.91E-09
Cadmium	9.41E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.78E-09	1.00E-03	1.78E-06	2.29E-10		
Cobalt	1.07E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	2.03E-08	6.00E-02	3.38E-07	2.61E-09		
Mercury	9.64E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.83E-09	3.00E-04	6.10E-06	2.35E-10		
Nickel	2.36E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	4.48E-08	2.00E-02	2.24E-06	5.76E-09		
												TOTAL HAZARD INDEX =	1.98E-04		TOTAL CANCER RISK =	2.91E-09

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TABLE C-16-17

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.23E+02	100	24	5	1.00E-06	37	1825	25550	3.96E-05	4.00E-04	9.91E-02	2.83E-06		
Arsenic	9.21E+00	100	24	5	1.00E-06	37	1825	25550	1.64E-06	3.00E-04	5.46E-03	1.17E-07	1.50E+00	1.75E-07
Cadmium	1.15E+00	100	24	5	1.00E-06	37	1825	25550	2.04E-07	1.00E-03	2.04E-04	1.46E-08		
Cobalt	1.22E+01	100	24	5	1.00E-06	37	1825	25550	2.18E-06	6.00E-02	3.63E-05	1.55E-07		
Mercury	1.06E-01	100	24	5	1.00E-06	37	1825	25550	1.89E-08	3.00E-04	6.30E-05	1.35E-09		
Nickel	2.71E+01	100	24	5	1.00E-06	37	1825	25550	4.82E-06	2.00E-02	2.41E-04	3.45E-07		
										TOTAL HAZARD INDEX =	1.05E-01	TOTAL CANCER RISK =		1.75E-07

TABLE C-16-18

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.90E+01	50	12	5	1.00E-06	37	1825	25550	1.29E-06	4.00E-04	3.22E-03	9.21E-08		
Arsenic	7.95E+00	50	12	5	1.00E-06	37	1825	25550	3.53E-07	3.00E-04	1.18E-03	2.52E-08	1.50E+00	3.78E-08
Cadmium	9.41E-01	50	12	5	1.00E-06	37	1825	25550	4.18E-08	1.00E-03	4.18E-05	2.99E-09		
Cobalt	1.07E+01	50	12	5	1.00E-06	37	1825	25550	4.75E-07	6.00E-02	7.92E-06	3.39E-08		
Mercury	9.64E-02	50	12	5	1.00E-06	37	1825	25550	4.28E-09	3.00E-04	1.43E-05	3.06E-10		
Nickel	2.36E+01	50	12	5	1.00E-06	37	1825	25550	1.05E-06	2.00E-02	5.24E-05	7.49E-08		
										TOTAL HAZARD INDEX =	4.52E-03		TOTAL CANCER RISK =	3.78E-08

TABLE C-16-19

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.23E+02	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	1.82E-05	4.00E-04	4.56E-02	1.30E-06		
Arsenic	9.21E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	7.53E-07	3.00E-04	2.51E-03	5.38E-08	1.50E+00	8.07E-08
Cadmium	1.15E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	9.38E-08	1.00E-03	9.38E-05	6.70E-09		
Cobalt	1.22E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	1.00E-06	6.00E-02	1.67E-05	7.15E-08		
Mercury	1.06E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	8.70E-08	3.00E-04	2.90E-04	6.21E-09		
Nickel	2.71E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.22E-06	2.00E-02	1.11E-04	1.59E-07		
												TOTAL HAZARD INDEX =	4.86E-02		TOTAL CANCER RISK =	8.07E-08

TABLE C-16-20

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 2 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	2.90E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.03E-07	4.00E-04	2.58E-04	7.38E-09		
Arsenic	7.95E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.83E-08	3.00E-04	9.44E-05	2.02E-09	1.50E+00	3.04E-09
Cadmium	9.41E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	3.35E-09	1.00E-03	3.35E-06	2.39E-10		
Cobalt	1.07E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	3.81E-08	6.00E-02	6.35E-07	2.72E-09		
Mercury	9.64E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.44E-09	3.00E-04	1.15E-05	2.45E-10		
Nickel	2.36E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	8.41E-08	2.00E-02	4.20E-06	6.00E-09		
												TOTAL HAZARD INDEX =	3.72E-04		TOTAL CANCER RISK =	3.04E-09

TABLE C-17-1

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	50	250	25	1.00E-06	70	9125	25550	7.59E-06	4.00E-04	1.90E-02	2.71E-06		
Barium	2.61E+02	50	250	25	1.00E-06	70	9125	25550	1.28E-04	7.00E-02	1.83E-03	4.57E-05		
Cadmium	1.19E+00	50	250	25	1.00E-06	70	9125	25550	5.82E-07	1.00E-03	5.82E-04	2.08E-07		
Cobalt	1.14E+01	50	250	25	1.00E-06	70	9125	25550	5.59E-06	6.00E-02	9.32E-05	2.00E-06		
Mercury	1.43E-01	50	250	25	1.00E-06	70	9125	25550	6.99E-08	3.00E-04	2.33E-04	2.49E-08		
Nickel	3.50E+01	50	250	25	1.00E-06	70	9125	25550	1.71E-05	2.00E-02	8.56E-04	6.11E-06		
										TOTAL HAZARD INDEX =	2.26E-02		TOTAL CANCER RISK =	0.00E+00

TABLE C-17-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	5.44E+00	10	250	10	1.00E-06	70	3650	25550	5.32E-07	4.00E-04	1.33E-03	7.60E-08		
Barium	2.24E+02	10	250	10	1.00E-06	70	3650	25550	2.19E-05	7.00E-02	3.13E-04	3.13E-06		
Cadmium	7.47E-01	10	250	10	1.00E-06	70	3650	25550	7.31E-08	1.00E-03	7.31E-05	1.04E-08		
Cobalt	9.83E+00	10	250	10	1.00E-06	70	3650	25550	9.62E-07	6.00E-02	1.60E-05	1.37E-07		
Mercury	1.13E-01	10	250	10	1.00E-06	70	3650	25550	1.10E-08	3.00E-04	3.67E-05	1.57E-09		
Nickel	3.03E+01	10	250	10	1.00E-06	70	3650	25550	2.96E-06	2.00E-02	1.48E-04	4.23E-07		
										TOTAL HAZARD INDEX =	1.92E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C17-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	7.94E-06	4.00E-04	1.98E-02	2.83E-06		
Barium	2.61E+02	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.34E-04	7.00E-02	1.91E-03	4.78E-05		
Cadmium	1.19E+00	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	6.09E-07	1.00E-03	6.09E-04	2.18E-07		
Cobalt	1.14E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	5.85E-06	6.00E-02	9.75E-05	2.09E-06		
Mercury	1.43E-01	5230	1.0	0.10	250	25	1.00E-06	70	9125	25550	7.31E-07	3.00E-04	2.44E-03	2.61E-07		
Nickel	3.50E+01	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.79E-05	2.00E-02	8.95E-04	6.39E-06		
												TOTAL HAZARD INDEX =	2.58E-02		TOTAL CANCER RISK =	0.00E+00

TABL⌐ ᴗ-17-4

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	5.44E+00	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	2.15E-07	4.00E-04	5.38E-04	3.07E-08		
Barium	2.24E+02	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	8.85E-06	7.00E-02	1.26E-04	1.26E-06		
Cadmium	7.47E-01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	2.95E-08	1.00E-03	2.95E-05	4.22E-09		
Cobalt	9.83E+00	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	3.89E-07	6.00E-02	6.48E-06	5.55E-08		
Mercury	1.13E-01	2020	0.2	0.10	250	10	1.00E-06	70	3650	25550	4.45E-08	3.00E-04	1.48E-04	6.35E-09		
Nickel	3.03E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	1.20E-06	2.00E-02	5.98E-05	1.71E-07		
												TOTAL HAZARD INDEX =	9.08E-04		TOTAL CANCER RISK =	0.00E+00

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TABLE C-17-5

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	100	350	70	1.00E-06	70	25550	25550	2.12E-05	4.00E-04	5.31E-02	2.12E-05		
Barium	2.61E+02	100	350	70	1.00E-06	70	25550	25550	3.58E-04	7.00E-02	5.11E-03	3.58E-04		
Cadmium	1.19E+00	100	350	70	1.00E-06	70	25550	25550	1.63E-06	1.00E-03	1.63E-03	1.63E-06		
Cobalt	1.14E+01	100	350	70	1.00E-06	70	25550	25550	1.57E-05	6.00E-02	2.61E-04	1.57E-05		
Mercury	1.43E-01	100	350	70	1.00E-06	70	25550	25550	1.96E-07	3.00E-04	6.52E-04	1.96E-07		
Nickel	3.50E+01	100	350	70	1.00E-06	70	25550	25550	4.79E-05	2.00E-02	2.40E-03	4.79E-05		
										TOTAL HAZARD INDEX =	6.32E-02		TOTAL CANCER RISK =	0.00E+00

TABLE C-17-6

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	5.44E+00	50	350	9	1.00E-06	70	3285	25550	3.73E-06	4.00E-04	9.31E-03	4.79E-07		
Barium	2.24E+02	50	350	9	1.00E-06	70	3285	25550	1.53E-04	7.00E-02	2.19E-03	1.97E-05		
Cadmium	7.47E-01	50	350	9	1.00E-06	70	3285	25550	5.12E-07	1.00E-03	5.12E-04	6.58E-08		
Cobalt	9.83E+00	50	350	9	1.00E-06	70	3285	25550	6.73E-06	6.00E-02	1.12E-04	8.66E-07		
Mercury	1.13E-01	50	350	9	1.00E-06	70	3285	25550	7.71E-08	3.00E-04	2.57E-04	9.91E-09		
Nickel	3.03E+01	50	350	9	1.00E-06	70	3285	25550	2.07E-05	2.00E-02	1.04E-03	2.66E-06		
										TOTAL HAZARD INDEX =	1.34E-02		TOTAL CANCER RISK =	0.00E+00

TABLE C-17-7

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.11E-05	4.00E-04	2.78E-02	1.11E-05		
Barium	2.61E+02	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.87E-04	7.00E-02	2.68E-03	1.87E-04		
Cadmium	1.19E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	8.53E-07	1.00E-03	8.53E-04	8.53E-07		
Cobalt	1.14E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	8.19E-06	6.00E-02	1.37E-04	8.19E-06		
Mercury	1.43E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.02E-06	3.00E-04	3.41E-03	1.02E-06		
Nickel	3.50E+01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	2.51E-05	2.00E-02	1.25E-03	2.51E-05		
												TOTAL HAZARD INDEX =	3.61E-02		TOTAL CANCER RISK =	0.00E+00

TABLE C-17-8

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	5.44E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	3.01E-07	4.00E-04	7.53E-04	3.87E-08		
Barium	2.24E+02	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.24E-05	7.00E-02	1.77E-04	1.59E-06		
Cadmium	7.47E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.14E-08	1.00E-03	4.14E-05	5.32E-09		
Cobalt	9.83E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	5.44E-07	6.00E-02	9.07E-06	7.00E-08		
Mercury	1.13E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	6.23E-08	3.00E-04	2.08E-04	8.00E-09		
Nickel	3.03E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.67E-06	2.00E-02	8.37E-05	2.15E-07		
												TOTAL HAZARD INDEX =	1.27E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-17-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	200	350	6	1.00E-06	15	2190	25550	1.98E-04	4.00E-04	4.96E-01	1.70E-05		
Barium	2.61E+02	200	350	6	1.00E-06	15	2190	25550	3.34E-03	7.00E-02	4.77E-02	2.86E-04		
Cadmium	1.19E+00	200	350	6	1.00E-06	15	2190	25550	1.52E-05	1.00E-03	1.52E-02	1.30E-06		
Cobalt	1.14E+01	200	350	6	1.00E-06	15	2190	25550	1.46E-04	6.00E-02	2.44E-03	1.25E-05		
Mercury	1.43E-01	200	350	6	1.00E-06	15	2190	25550	1.83E-06	3.00E-04	6.09E-03	1.56E-07		
Nickel	3.50E+01	200	350	6	1.00E-06	15	2190	25550	4.47E-04	2.00E-02	2.24E-02	3.83E-05		
										TOTAL HAZARD INDEX =	5.90E-01		TOTAL CANCER RISK =	0.00E+00

TABLE C-17-10

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Antimony	5.44E+00	100	350	6	1.00E-06	15	2190	25550	3.48E-05	4.00E-04	8.69E-02	2.98E-06		
Barium	2.24E+02	100	350	6	1.00E-06	15	2190	25550	1.43E-03	7.00E-02	2.04E-02	1.23E-04		
Cadmium	7.47E-01	100	350	6	1.00E-06	15	2190	25550	4.78E-06	1.00E-03	4.78E-03	4.09E-07		
Cobalt	9.83E+00	100	350	6	1.00E-06	15	2190	25550	6.29E-05	6.00E-02	1.05E-03	5.39E-06		
Mercury	1.13E-01	100	350	6	1.00E-06	15	2190	25550	7.19E-07	3.00E-04	2.40E-03	6.16E-08		
Nickel	3.03E+01	100	350	6	1.00E-06	15	2190	25550	1.93E-04	2.00E-02	9.67E-03	1.66E-05		
										TOTAL HAZARD INDEX =	1.25E-01		TOTAL CANCER RISK =	0.00E+00

TABLE C-17-11

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	4.29E-05	4.00E-04	1.07E-01	3.68E-06		
Barium	2.61E+02	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	7.24E-04	7.00E-02	1.03E-02	6.20E-05		
Cadmium	1.19E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	3.30E-06	1.00E-03	3.30E-03	2.82E-07		
Cobalt	1.14E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	3.17E-05	6.00E-02	5.28E-04	2.71E-06		
Mercury	1.43E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	3.95E-06	3.00E-04	1.32E-02	3.39E-07		
Nickel	3.50E+01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	9.69E-05	2.00E-02	4.84E-03	8.30E-06		
												TOTAL HAZARD INDEX =	1.40E-01		TOTAL CANCER RISK =	0.00E+00

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TABLE C-17-12

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	5.44E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.30E-06	4.00E-04	3.25E-03	1.11E-07		
Barium	2.24E+02	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	5.35E-05	7.00E-02	7.64E-04	4.58E-06		
Cadmium	7.47E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.79E-07	1.00E-03	1.79E-04	1.53E-08		
Cobalt	9.83E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	2.35E-06	6.00E-02	3.92E-05	2.01E-07		
Mercury	1.13E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.69E-07	3.00E-04	8.96E-04	2.30E-08		
Nickel	3.03E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	7.23E-06	2.00E-02	3.62E-04	6.20E-07		
												TOTAL HAZARD INDEX =	5.49E-03		TOTAL CANCER RISK =	0.00E+00

TABLE ‿-17-13

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	100	24	70	1.00E-06	70	25550	25550	1.46E-06	4.00E-04	3.64E-03	1.46E-06		
Barium	2.61E+02	100	24	70	1.00E-06	70	25550	25550	2.46E-05	7.00E-02	3.51E-04	2.46E-05		
Cadmium	1.19E+00	100	24	70	1.00E-06	70	25550	25550	1.12E-07	1.00E-03	1.12E-04	1.12E-07		
Cobalt	1.14E+01	100	24	70	1.00E-06	70	25550	25550	1.07E-06	6.00E-02	1.79E-05	1.07E-06		
Mercury	1.43E-01	100	24	70	1.00E-06	70	25550	25550	1.34E-08	3.00E-04	4.47E-05	1.34E-08		
Nickel	3.50E+01	100	24	70	1.00E-06	70	25550	25550	3.29E-06	2.00E-02	1.64E-04	3.29E-06		
									TOTAL HAZARD INDEX =		4.33E-03	TOTAL CANCER RISK =		0.00E+00

TABLE C-17-14

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	5.44E+00	50	12	9	1.00E-06	70	3285	25550	1.28E-07	4.00E-04	3.19E-04	1.64E-08		
Barium	2.24E+02	50	12	9	1.00E-06	70	3285	25550	5.26E-06	7.00E-02	7.51E-05	6.76E-07		
Cadmium	7.47E-01	50	12	9	1.00E-06	70	3285	25550	1.75E-08	1.00E-03	1.75E-05	2.26E-09		
Cobalt	9.83E+00	50	12	9	1.00E-06	70	3285	25550	2.31E-07	6.00E-02	3.85E-06	2.97E-08		
Mercury	1.13E-01	50	12	9	1.00E-06	70	3285	25550	2.64E-09	3.00E-04	8.81E-06	3.40E-10		
Nickel	3.03E+01	50	12	9	1.00E-06	70	3285	25550	7.11E-07	2.00E-02	3.55E-05	9.14E-08		
										TOTAL HAZARD INDEX =	4.60E-04		TOTAL CANCER RISK =	0.00E+00

TABLE C-17-15

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	7.62E-07	4.00E-04	1.90E-03	7.62E-07		
Barium	2.61E+02	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.28E-05	7.00E-02	1.83E-04	1.28E-05		
Cadmium	1.19E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	5.85E-08	1.00E-03	5.85E-05	5.85E-08		
Cobalt	1.14E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	5.62E-07	6.00E-02	9.36E-06	5.62E-07		
Mercury	1.43E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	7.01E-08	3.00E-04	2.34E-04	7.01E-08		
Nickel	3.50E+01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.72E-06	2.00E-02	8.59E-05	1.72E-06		
												TOTAL HAZARD INDEX =	2.48E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-17-16

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	5.44E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.03E-08	4.00E-04	2.58E-05	1.33E-09		
Barium	2.24E+02	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	4.25E-07	7.00E-02	6.07E-06	5.46E-08		
Cadmium	7.47E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.42E-09	1.00E-03	1.42E-06	1.82E-10		
Cobalt	9.83E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.87E-08	6.00E-02	3.11E-07	2.40E-09		
Mercury	1.13E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	2.13E-09	3.00E-04	7.12E-06	2.74E-10		
Nickel	3.03E+01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	5.74E-08	2.00E-02	2.87E-06	7.38E-09		
												TOTAL HAZARD INDEX =	4.36E-05		TOTAL CANCER RISK =	0.00E+00

TABLE C-17-17

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	100	24	5	1.00E-06	37	1825	25550	2.76E-06	4.00E-04	6.89E-03	1.97E-07		
Barium	2.61E+02	100	24	5	1.00E-06	37	1825	25550	4.64E-05	7.00E-02	6.64E-04	3.32E-06		
Cadmium	1.19E+00	100	24	5	1.00E-06	37	1825	25550	2.12E-07	1.00E-03	2.12E-04	1.51E-08		
Cobalt	1.14E+01	100	24	5	1.00E-06	37	1825	25550	2.03E-06	6.00E-02	3.39E-05	1.45E-07		
Mercury	1.43E-01	100	24	5	1.00E-06	37	1825	25550	2.54E-08	3.00E-04	8.46E-05	1.81E-09		
Nickel	3.50E+01	100	24	5	1.00E-06	37	1825	25550	6.22E-06	2.00E-02	3.11E-04	4.44E-07		
										TOTAL HAZARD INDEX =	8.19E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-17-18

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	5.44E+00	50	12	5	1.00E-06	37	1825	25550	2.42E-07	4.00E-04	6.04E-04	1.73E-08		
Barium	2.24E+02	50	12	5	1.00E-06	37	1825	25550	9.94E-06	7.00E-02	1.42E-04	7.10E-07		
Cadmium	7.47E-01	50	12	5	1.00E-06	37	1825	25550	3.32E-08	1.00E-03	3.32E-05	2.37E-09		
Cobalt	9.83E+00	50	12	5	1.00E-06	37	1825	25550	4.37E-07	6.00E-02	7.28E-06	3.12E-08		
Mercury	1.13E-01	50	12	5	1.00E-06	37	1825	25550	5.00E-09	3.00E-04	1.67E-05	3.57E-10		
Nickel	3.03E+01	50	12	5	1.00E-06	37	1825	25550	1.34E-06	2.00E-02	6.72E-05	9.60E-08		
										TOTAL HAZARD INDEX =	8.71E-04		TOTAL CANCER RISK =	0.00E+00

TABLE C-17-19

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.55E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	1.27E-06	4.00E-04	3.17E-03	9.06E-08		
Barium	2.61E+02	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.14E-05	7.00E-02	3.05E-04	1.53E-06		
Cadmium	1.19E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	9.73E-08	1.00E-03	9.73E-05	6.95E-09		
Cobalt	1.14E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	9.35E-07	6.00E-02	1.56E-05	6.68E-08		
Mercury	1.43E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	1.17E-07	3.00E-04	3.89E-04	8.34E-09		
Nickel	3.50E+01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.86E-06	2.00E-02	1.43E-04	2.04E-07		
												TOTAL HAZARD INDEX =	4.12E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-17-20

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 3 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	5.44E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.94E-08	4.00E-04	4.85E-05	1.38E-09		
Barium	2.24E+02	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	7.98E-07	7.00E-02	1.14E-05	5.70E-08		
Cadmium	7.47E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.66E-09	1.00E-03	2.66E-06	1.90E-10		
Cobalt	9.83E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	3.50E-08	6.00E-02	5.84E-07	2.50E-09		
Mercury	1.13E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	4.01E-09	3.00E-04	1.34E-05	2.86E-10		
Nickel	3.03E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.08E-07	2.00E-02	5.39E-06	7.70E-09		
												TOTAL HAZARD INDEX =	8.18E-05		TOTAL CANCER RISK =	0.00E+00

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TABLE C-18-1

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.06E+02	50	250	25	1.00E-06	70	9125	25550	5.21E-05	4.00E-04	1.30E-01	1.86E-05		
Cadmium	3.24E+00	50	250	25	1.00E-06	70	9125	25550	1.58E-06	1.00E-03	1.58E-03	5.65E-07		
										TOTAL HAZARD INDEX =	1.32E-01		TOTAL CANCER RISK =	0.00E+00

TABLE C-18-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.46E+01	10	250	10	1.00E-06	70	3650	25550	1.43E-06	4.00E-04	3.56E-03	2.04E-07		
Cadmium	1.42E+00	10	250	10	1.00E-06	70	3650	25550	1.39E-07	1.00E-03	1.39E-04	1.99E-08		
										TOTAL HAZARD INDEX =	3.70E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-18-3

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

AROUND LOAD LINE 4 PAINT OPERATIONS AREA

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE WORKERS - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.06E+02	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	5.45E-05	4.00E-04	1.36E-01	1.95E-05		
Cadmium	3.24E+00	5230	1.0	0.01	250	25	1.00E-06	70	9125	25550	1.66E-06	1.00E-03	1.66E-03	5.91E-07		
												TOTAL HAZARD INDEX =	1.38E-01		TOTAL CANCER RISK =	0.00E+00

TABLE C-18-4

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE WORKERS - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.46E+01	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	5.76E-07	4.00E-04	1.44E-03	8.23E-08		
Cadmium	1.42E+00	2020	0.2	0.01	250	10	1.00E-06	70	3650	25550	5.62E-08	1.00E-03	5.62E-05	8.03E-09		
												TOTAL HAZARD INDEX =	1.50E-03	TOTAL CANCER RISK =		0.00E+00

TABLE C-18-5

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potenial Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.06E+02	100	350	70	1.00E-06	70	25550	25550	1.46E-04	4.00E-04	3.64E-01	1.46E-04		
Cadmium	3.24E+00	100	350	70	1.00E-06	70	25550	25550	4.43E-06	1.00E-03	4.43E-03	4.43E-06		
										TOTAL HAZARD INDEX =	3.69E-01		TOTAL CANCER RISK =	0.00E+00

TABLE C-18-6

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.46E+01	50	350	9	1.00E-06	70	3285	25550	9.98E-06	4.00E-04	2.50E-02	1.28E-06		
Cadmium	1.42E+00	50	350	9	1.00E-06	70	3285	25550	9.74E-07	1.00E-03	9.74E-04	1.25E-07		
										TOTAL HAZARD INDEX =	2.59E-02		TOTAL CANCER RISK =	0.00E+00

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TABLE C-18-7

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0-6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.06E+02	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	7.63E-05	4.00E-04	1.91E-01	7.63E-05		
Cadmium	3.24E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	2.32E-06	1.00E-03	2.32E-03	2.32E-06		
												TOTAL HAZARD INDEX =	1.93E-01		TOTAL CANCER RISK =	0.00E+00

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TABLE ~-18-8

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.46E+01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	8.06E-07	4.00E-04	2.02E-03	1.04E-07		
Cadmium	1.42E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	7.87E-08	1.00E-03	7.87E-05	1.01E-08		
												TOTAL HAZARD INDEX =	2.09E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-18-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Antimony	1.06E+02	200	350	6	1.00E-06	15	2190	25550	1.36E-03	4.00E-04	3.40E+00	1.17E-04		
Cadmium	3.24E+00	200	350	6	1.00E-06	15	2190	25550	4.14E-05	1.00E-03	4.14E-02	3.55E-06		
										TOTAL HAZARD INDEX =	3.44E+00		TOTAL CANCER RISK =	0.00E+00
										Dermal	.75			
											4.19			

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TABLE ⌄-18-10

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.46E+01	100	350	6	1.00E-06	15	2190	25550	9.31E-05	4.00E-04	2.33E-01	7.98E-06		
Cadmium	1.42E+00	100	350	6	1.00E-06	15	2190	25550	9.09E-06	1.00E-03	9.09E-03	7.79E-07		
										TOTAL HAZARD INDEX =	2.42E-01		TOTAL CANCER RISK =	0.00E+00

TABLE C-18-11

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.06E+02	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.95E-04	4.00E-04	7.37E-01	2.53E-05		
Cadmium	3.24E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	8.96E-06	1.00E-03	8.96E-03	7.68E-07		
												TOTAL HAZARD INDEX =	7.46E-01		TOTAL CANCER RISK =	0.00E+00

TABLE C-18-12

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.46E+01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	3.48E-06	4.00E-04	8.70E-03	2.98E-07		
Cadmium	1.42E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	3.40E-07	1.00E-03	3.40E-04	2.91E-08		
												TOTAL HAZARD INDEX =	9.04E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-18-13

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.06E+02	100	24	70	1.00E-06	70	25550	25550	1.00E-05	4.00E-04	2.50E-02	1.00E-05		
Cadmium	3.24E+00	100	24	70	1.00E-06	70	25550	25550	3.04E-07	1.00E-03	3.04E-04	3.04E-07		
									TOTAL HAZARD INDEX =		2.53E-02	TOTAL CANCER RISK =		0.00E+00

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TABLE C-18-14

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.46E+01	50	12	9	1.00E-06	70	3285	25550	3.42E-07	4.00E-04	8.55E-04	4.40E-08		
Cadmium	1.42E+00	50	12	9	1.00E-06	70	3285	25550	3.34E-08	1.00E-03	3.34E-05	4.29E-09		
										TOTAL HAZARD INDEX =	8.89E-04		TOTAL CANCER RISK =	0.00E+00

TABLE ᴗ-18-15

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.06E+02	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	5.23E-06	4.00E-04	1.31E-02	5.23E-06		
Cadmium	3.24E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.59E-07	1.00E-03	1.59E-04	1.59E-07		
												TOTAL HAZARD INDEX =	1.32E-02		TOTAL CANCER RISK =	0.00E+00

TABLE C-18-16

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.46E+01	2020	0.2	0.010	12	9	1.00E-06	70	3285	25550	2.76E-08	4.00E-04	6.91E-05	3.55E-09		
Cadmium	1.42E+00	2020	0.2	0.010	12	9	1.00E-06	70	3285	25550	2.70E-09	1.00E-03	2.70E-06	3.47E-10		
												TOTAL HAZARD INDEX =	7.18E-05		TOTAL CANCER RISK =	0.00E+00

TABLE C-18-17

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.06E+02	100	24	5	1.00E-06	37	1825	25550	1.89E-05	4.00E-04	4.73E-02	1.35E-06		
Cadmium	3.24E+00	100	24	5	1.00E-06	37	1825	25550	5.75E-07	1.00E-03	5.75E-04	4.11E-08		
										TOTAL HAZARD INDEX =	4.79E-02		TOTAL CANCER RISK =	0.00E+00

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TABLE C-18-18

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Antimony	1.46E+01	50	12	5	1.00E-06	37	1825	25550	6.47E-07	4.00E-04	1.62E-03	4.62E-08		
Cadmium	1.42E+00	50	12	5	1.00E-06	37	1825	25550	6.32E-08	1.00E-03	6.32E-05	4.51E-09		
										TOTAL HAZARD INDEX =	1.68E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-18-19

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Antimony	1.06E+02	4602	1.0	0.010	24	5	1.00E-06	37	1825	25550	8.70E-06	4.00E-04	2.18E-02	6.22E-07		
Cadmium	3.24E+00	4602	1.0	0.010	24	5	1.00E-06	37	1825	25550	2.65E-07	1.00E-03	2.65E-04	1.89E-08		
												TOTAL HAZARD INDEX =	2.20E-02		TOTAL CANCER RISK =	0.00E+00

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TABLE C-18-20

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AROUND LOAD LINE 4 PAINT OPERATIONS AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Antimony	1.46E+01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	5.19E-08	4.00E-04	1.30E-04	3.71E-09		
Cadmium	1.42E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	5.06E-09	1.00E-03	5.06E-06	3.62E-10		
												TOTAL HAZARD INDEX =	1.35E-04		TOTAL CANCER RISK =	0.00E+00

TABLE C-19-1

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = *Contaminant Concentration in Soil (mg/kg soil)*
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	100	24	70	1.00E-06	70	25550	25550	1.88E-09	5.00E-05	3.76E-05	1.88E-09		
2,4,6-Trinitrotoluene (TNT)	3.30E-01	100	24	70	1.00E-06	70	25550	25550	3.10E-08	5.00E-04	6.20E-05	3.10E-08		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	100	24	70	1.00E-06	70	25550	25550	1.97E-08	3.00E-03	6.58E-06	1.97E-08	1.10E-01	2.17E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	100	24	70	1.00E-06	70	25550	25550	1.03E-08			1.03E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.00E+00	100	24	70	1.00E-06	70	25550	25550	9.39E-08	5.00E-02	1.88E-06	9.39E-08		
Antimony	9.10E+00	100	24	70	1.00E-06	70	25550	25550	8.55E-07	4.00E-04	2.14E-03	8.55E-07		
Cadmium	9.30E-01	100	24	70	1.00E-06	70	25550	25550	8.74E-08	1.00E-03	8.74E-05	8.74E-08		
Silver	6.00E+00	100	24	70	1.00E-06	70	25550	25550	5.64E-07	5.00E-03	1.13E-04	5.64E-07		
Benzo(b)fluoranthene	7.70E-02	100	24	70	1.00E-06	70	25550	25550	7.23E-09			7.23E-09	7.30E-01	5.28E-09
Chrysene	2.70E-02	100	24	70	1.00E-06	70	25550	25550	2.54E-09			2.54E-09	7.30E-03	1.85E-11
Di-n-butylphthalate	2.80E+00	100	24	70	1.00E-06	70	25550	25550	2.63E-07	1.00E-01	2.63E-06	2.63E-07		
Phenol	4.80E-02	100	24	70	1.00E-06	70	25550	25550	4.51E-09	6.00E-01	7.51E-09	4.51E-09		
Pyrene	8.90E-02	100	24	70	1.00E-06	70	25550	25550	8.36E-09	3.00E-02	2.79E-07	8.36E-09		
										TOTAL HAZARD INDEX =	2.45E-03		TOTAL CANCER RISK =	7.47E-09

TABLE [illegible]-19-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	50	12	9	1.00E-06	70	3285	25550	4.70E-10	5.00E-05	9.39E-06	6.04E-11		
2,4,6-Trinitrotoluene (TNT)	3.30E-01	50	12	9	1.00E-06	70	3285	25550	7.7[illegible]E-09	5.00E-04	1.55E-05	9.96E-10		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	50	12	9	1.00E-06	70	3285	25550	4.93E-09	3.00E-03	1.64E-06	6.34E-10	1.10E-01	6.97E-11
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	50	12	9	1.00E-06	70	3285	25550	2.58E-09			3.32E-10		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	8.20E-01	50	12	9	1.00E-06	70	3285	25550	1.93E-08	5.00E-02	3.85E-07	2.48E-09		
Antimony	3.90E+00	50	12	9	1.00E-06	70	3285	25550	9.16E-08	4.00E-04	2.29E-04	1.18E-08		
Cadmium	7.50E-01	50	12	9	1.00E-06	70	3285	25550	1.76E-08	1.00E-03	1.76E-05	2.26E-09		
Silver	9.90E-01	50	12	9	1.00E-06	70	3285	25550	2.32E-08	5.00E-03	4.65E-06	2.99E-09		
Benzo(b)fluoranthene	7.70E-02	50	12	9	1.00E-06	70	3285	25550	1.81E-09			2.32E-10	7.30E-01	1.70E-10
Chrysene	2.70E-02	50	12	9	1.00E-06	70	3285	25550	6.34E-10			8.15E-11	7.30E-03	5.95E-13
Di-n-butylphthalate	6.40E-01	50	12	9	1.00E-06	70	3285	25550	1.50E-08	1.00E-01	1.50E-07	1.93E-09		
Phenol	4.80E-02	50	12	9	1.00E-06	70	3285	25550	1.13E-09	6.00E-01	1.88E-09	1.45E-10		
Pyrene	8.90E-02	50	12	9	1.00E-06	70	3285	25550	2.09E-09	3.00E-02	6.97E-08	2.69E-10		
										TOTAL HAZARD INDEX =	2.78E-04		TOTAL CANCER RISK =	2.40E-10

TABLE [illegible]-19-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: *CDI = Chronic Daily Intake*
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	9.83E-09	5.00E-05	1.97E-04	9.83E-09		
2,4,6-Trinitrotoluene (TNT)	3.30E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.62E-07	5.00E-04	3.24E-04	1.62E-07		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.03E-07	3.00E-03	3.44E-05	1.03E-07	1.10E-01	1.13E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	5.40E-08			5.40E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.00E+00	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	4.91E-07	5.00E-02	9.83E-06	4.91E-07		
Antimony	9.10E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	4.47E-07	4.00E-04	1.12E-03	4.47E-07		
Cadmium	9.30E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	4.57E-08	1.00E-03	4.57E-05	4.57E-08		
Silver	6.00E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	2.95E-07	5.00E-03	5.90E-05	2.95E-07		
Benzo(b)fluoranthene	7.70E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	3.78E-08			3.78E-08	7.30E-01	2.76E-08
Chrysene	2.70E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.33E-08			1.33E-08	7.30E-03	9.68E-11
Di-n-butylphthalate	2.80E+00	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.38E-06	1.00E-01	1.38E-05	1.38E-06		
Phenol	4.80E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.36E-08	6.00E-01	3.93E-08	2.36E-08		
Pyrene	8.90E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	4.37E-08	3.00E-02	1.46E-06	4.37E-08		
												TOTAL HAZARD INDEX =	1.80E-03		TOTAL CANCER RISK =	3.91E-08

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TABLE G-19-4

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	3.79E-10	5.00E-05	7.59E-06	4.88E-11		
2,4,6-Trinitrotoluene (TNT)	3.30E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	6.26E-09	5.00E-04	1.25E-05	8.05E-10		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	3.98E-09	3.00E-03	1.33E-06	5.12E-10	1.10E-01	5.64E-11
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	2.09E-09			2.68E-10		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	8.20E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.56E-08	5.00E-02	3.11E-07	2.00E-09		
Antimony	3.90E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	7.40E-09	4.00E-04	1.85E-05	9.51E-10		
Cadmium	7.50E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.42E-09	1.00E-03	1.42E-06	1.83E-10		
Silver	9.90E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.88E-09	5.00E-03	3.76E-07	2.42E-10		
Benzo(b)fluoranthene	7.70E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.46E-09			1.88E-10	7.30E-01	1.37E-10
Chrysene	2.70E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	5.12E-10			6.59E-11	7.30E-03	4.81E-13
Di-n-butylphthalate	6.40E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.21E-08	1.00E-01	1.21E-07	1.56E-09		
Phenol	4.80E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	9.11E-10	6.00E-01	1.52E-09	1.17E-10		
Pyrene	8.90E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.69E-09	3.00E-02	5.63E-08	2.17E-10		
												TOTAL HAZARD INDEX =	4.22E-05		TOTAL CANCER RISK =	1.94E-10

TABLE [illegible]-19-5

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	100	24	5	1.00E-06	37	1825	25550	3.55E-09	5.00E-05	7.11E-05	2.54E-10		
2,4,6-Trinitrotoluene (TNT)	3.30E-01	100	24	5	1.00E-06	37	1825	25550	5.86E-08	5.00E-04	1.17E-04	4.19E-09		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	100	24	5	1.00E-06	37	1825	25550	3.73E-08	3.00E-03	1.24E-05	2.67E-09	1.10E-01	2.93E-10
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	100	24	5	1.00E-06	37	1825	25550	1.95E-08			1.40E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.00E+00	100	24	5	1.00E-06	37	1825	25550	1.78E-07	5.00E-02	3.55E-06	1.27E-08		
Antimony	9.10E+00	100	24	5	1.00E-06	37	1825	25550	1.62E-06	4.00E-04	4.04E-03	1.16E-07		
Cadmium	9.30E-01	100	24	5	1.00E-06	37	1825	25550	1.65E-07	1.00E-03	1.65E-04	1.18E-08		
Silver	6.00E+00	100	24	5	1.00E-06	37	1825	25550	1.07E-06	5.00E-03	2.13E-04	7.62E-08		
Benzo(b)fluoranthene	7.70E-02	100	24	5	1.00E-06	37	1825	25550	1.37E-08			9.77E-10	7.30E-01	7.14E-10
Chrysene	2.70E-02	100	24	5	1.00E-06	37	1825	25550	4.80E-09			3.43E-10	7.30E-03	2.50E-12
Di-n-butylphthalate	2.80E+00	100	24	5	1.00E-06	37	1825	25550	4.98E-07	1.00E-01	4.98E-06	3.55E-08		
Phenol	4.80E-02	100	24	5	1.00E-06	37	1825	25550	8.53E-09	6.00E-01	1.42E-08	6.09E-10		
Pyrene	8.90E-02	100	24	5	1.00E-06	37	1825	25550	1.58E-08	3.00E-02	5.27E-07	1.13E-09		
										TOTAL HAZARD INDEX =	4.63E-03		TOTAL CANCER RISK =	1.01E-09

TABLE C-19-6

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	50	12	5	1.00E-06	37	1825	25550	8.89E-10	5.00E-05	1.78E-05	6.35E-11		
2,4,6-Trinitrotoluene (TNT)	3.30E-01	50	12	5	1.00E-06	37	1825	25550	1.47E-08	5.00E-04	2.93E-05	1.05E-09		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	50	12	5	1.00E-06	37	1825	25550	9.33E-09	3.00E-03	3.11E-06	6.66E-10	1.10E-01	7.33E-11
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	50	12	5	1.00E-06	37	1825	25550	4.89E-09			3.49E-10		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	8.20E-01	50	12	5	1.00E-06	37	1825	25550	3.64E-08	5.00E-02	7.29E-07	2.60E-09		
Antimony	3.90E+00	50	12	5	1.00E-06	37	1825	25550	1.73E-07	4.00E-04	4.33E-04	1.24E-08		
Cadmium	7.50E-01	50	12	5	1.00E-06	37	1825	25550	3.33E-08	1.00E-03	3.33E-05	2.38E-09		
Silver	9.90E-01	50	12	5	1.00E-06	37	1825	25550	4.40E-08	5.00E-03	8.80E-06	3.14E-09		
Benzo(b)fluoranthene	7.70E-02	50	12	5	1.00E-06	37	1825	25550	3.42E-09			2.44E-10	7.30E-01	1.78E-10
Chrysene	2.70E-02	50	12	5	1.00E-06	37	1825	25550	1.20E-09			8.57E-11	7.30E-03	6.25E-13
Di-n-butylphthalate	6.40E-01	50	12	5	1.00E-06	37	1825	25550	2.84E-08	1.00E-01	2.84E-07	2.03E-09		
Phenol	4.80E-02	50	12	5	1.00E-06	37	1825	25550	2.13E-09	6.00E-01	3.55E-09	1.52E-10		
Pyrene	8.90E-02	50	12	5	1.00E-06	37	1825	25550	3.95E-09	3.00E-02	1.32E-07	2.82E-10		
										TOTAL HAZARD INDEX =	5.27E-04		TOTAL CANCER RISK =	2.52E-10

TABL[illegible]-19-7

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	1.64E-08	5.00E-05	3.27E-04	1.17E-09		
2,4,6-Trinitrotoluene (TNT)	3.30E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.70E-07	5.00E-04	5.40E-04	1.93E-08		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	1.72E-07	3.00E-03	5.72E-05	1.23E-08	1.10E-01	1.35E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	9.00E-08			6.43E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.00E+00	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	8.18E-07	5.00E-02	1.64E-05	5.84E-08		
Antimony	9.10E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	7.44E-07	4.00E-04	1.86E-03	5.32E-08		
Cadmium	9.30E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	7.61E-08	1.00E-03	7.61E-05	5.43E-09		
Silver	6.00E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	4.91E-07	5.00E-03	9.81E-05	3.50E-08		
Benzo(b)fluoranthene	7.70E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	6.30E-08			4.50E-09	7.30E-01	3.28E-09
Chrysene	2.70E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.21E-08			1.58E-09	7.30E-03	1.15E-11
Di-n-butylphthalate	2.80E+00	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.29E-06	1.00E-01	2.29E-05	1.64E-07		
Phenol	4.80E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	3.93E-08	6.00E-01	6.54E-08	2.80E-09		
Pyrene	8.90E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	7.28E-08	3.00E-02	2.43E-06	5.20E-09		
												TOTAL HAZARD INDEX =	3.00E-03		TOTAL CANCER RISK =	4.64E-09

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TABLE [illegible]-19-8

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	7.13E-10	5.00E-05	1.43E-05	5.09E-11		
2,4,6-Trinitrotoluene (TNT)	3.30E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.18E-08	5.00E-04	2.35E-05	8.40E-10		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	7.48E-09	3.00E-03	2.49E-06	5.34E-10	1.10E-01	5.88E-11
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.92E-09			2.80E-10		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	8.20E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.92E-08	5.00E-02	5.84E-07	2.09E-09		
Antimony	3.90E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.39E-08	4.00E-04	3.47E-05	9.93E-10		
Cadmium	7.50E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.67E-09	1.00E-03	2.67E-06	1.91E-10		
Silver	9.90E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	3.53E-09	5.00E-03	7.05E-07	2.52E-10		
Benzo(b)fluoranthene	7.70E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.74E-09			1.96E-10	7.30E-01	1.43E-10
Chrysene	2.70E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	9.62E-10			6.87E-11	7.30E-03	5.02E-13
Di-n-butylphthalate	6.40E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.28E-08	1.00E-01	2.28E-07	1.63E-09		
Phenol	4.80E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.71E-09	6.00E-01	2.85E-09	1.22E-10		
Pyrene	8.90E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.17E-09	3.00E-02	1.06E-07	2.27E-10		
												TOTAL HAZARD INDEX =	7.93E-05		TOTAL CANCER RISK =	2.02E-10

TABLE C-19-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	100	350	70	1.00E-06	70	25550	25550	2.74E-08	5.00E-05	5.48E-04	2.74E-08		
2,4,6-Trinitrotoluene (TNT)	3.30E-01	100	350	70	1.00E-06	70	25550	25550	4.52E-07	5.00E-04	9.04E-04	4.52E-07		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	100	350	70	1.00E-06	70	25550	25550	2.88E-07	3.00E-03	9.59E-05	2.88E-07	1.10E-01	3.16E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	100	350	70	1.00E-06	70	25550	25550	1.51E-07			1.51E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.00E+00	100	350	70	1.00E-06	70	25550	25550	1.37E-06	5.00E-02	2.74E-05	1.37E-06		
Antimony	9.10E+00	100	350	70	1.00E-06	70	25550	25550	1.25E-05	4.00E-04	3.12E-02	1.25E-05		
Cadmium	9.30E-01	100	350	70	1.00E-06	70	25550	25550	1.27E-06	1.00E-03	1.27E-03	1.27E-06		
Silver	6.00E+00	100	350	70	1.00E-06	70	25550	25550	8.22E-06	5.00E-03	1.64E-03	8.22E-06		
Benzo(b)fluoranthene	7.70E-02	100	350	70	1.00E-06	70	25550	25550	1.05E-07			1.05E-07	7.30E-01	7.70E-08
Chrysene	2.70E-02	100	350	70	1.00E-06	70	25550	25550	3.70E-08			3.70E-08	7.30E-03	2.70E-10
Di-n-butylphthalate	2.80E+00	100	350	70	1.00E-06	70	25550	25550	3.84E-06	1.00E-01	3.84E-05	3.84E-06		
Phenol	4.80E-02	100	350	70	1.00E-06	70	25550	25550	6.58E-08	6.00E-01	1.10E-07	6.58E-08		
Pyrene	8.90E-02	100	350	70	1.00E-06	70	25550	25550	1.22E-07	3.00E-02	4.06E-06	1.22E-07		
										TOTAL HAZARD INDEX =	3.57E-02		TOTAL CANCER RISK =	1.09E-07

TABLE C-19-10

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	50	350	9	1.00E-06	70	3285	25550	1.37E-08	5.00E-05	2.74E-04	1.76E-09		
2,4,6-Trinitrotoluene (TNT)	3.30E-01	50	350	9	1.00E-06	70	3285	25550	2.26E-07	5.00E-04	4.52E-04	2.91E-08		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	50	350	9	1.00E-06	70	3285	25550	1.44E-07	3.00E-03	4.79E-05	1.85E-08	1.10E-01	2.03E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	50	350	9	1.00E-06	70	3285	25550	7.53E-08			9.69E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	8.20E-01	50	350	9	1.00E-06	70	3285	25550	5.62E-07	5.00E-02	1.12E-05	7.22E-08		
Antimony	3.90E+00	50	350	9	1.00E-06	70	3285	25550	2.67E-06	4.00E-04	6.68E-03	3.43E-07		
Cadmium	7.50E-01	50	350	9	1.00E-06	70	3285	25550	5.14E-07	1.00E-03	5.14E-04	6.60E-08		
Silver	9.90E-01	50	350	9	1.00E-06	70	3285	25550	6.78E-07	5.00E-03	1.36E-04	8.72E-08		
Benzo(b)fluoranthene	7.70E-02	50	350	9	1.00E-06	70	3285	25550	5.27E-08			6.78E-09	7.30E-01	4.95E-09
Chrysene	2.70E-02	50	350	9	1.00E-06	70	3285	25550	1.85E-08			2.38E-09	7.30E-03	1.74E-11
Di-n-butylphthalate	6.40E-01	50	350	9	1.00E-06	70	3285	25550	4.38E-07	1.00E-01	4.38E-06	5.64E-08		
Phenol	4.80E-02	50	350	9	1.00E-06	70	3285	25550	3.29E-08	6.00E-01	5.48E-08	4.23E-09		
Pyrene	8.90E-02	50	350	9	1.00E-06	70	3285	25550	6.10E-08	3.00E-02	2.03E-06	7.84E-09		
										TOTAL HAZARD INDEX =	8.12E-03		TOTAL CANCER RISK =	7.00E-09

TABLE J-19-11

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)$^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.43E-07	5.00E-05	2.87E-03	1.43E-07		
2,4,6-Trinitrotoluene (TNT)	3.30E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	2.36E-06	5.00E-04	4.73E-03	2.36E-06		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.50E-06	3.00E-03	5.02E-04	1.50E-06	1.10E-01	1.65E-07
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	7.88E-07			7.88E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.00E+00	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	7.16E-06	5.00E-02	1.43E-04	7.16E-06		
Antimony	9.10E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	6.52E-06	4.00E-04	1.63E-02	6.52E-06		
Cadmium	9.30E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	6.66E-07	1.00E-03	6.66E-04	6.66E-07		
Silver	6.00E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	4.30E-06	5.00E-03	8.60E-04	4.30E-06		
Benzo(b)fluoranthene	7.70E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	5.52E-07			5.52E-07	7.30E-01	4.03E-07
Chrysene	2.70E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.93E-07			1.93E-07	7.30E-03	1.41E-09
Di-n-butylphthalate	2.80E+00	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	2.01E-05	1.00E-01	2.01E-04	2.01E-05		
Phenol	4.80E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	3.44E-07	6.00E-01	5.73E-07	3.44E-07		
Pyrene	8.90E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	6.38E-07	3.00E-02	2.13E-05	6.38E-07		
												TOTAL HAZARD INDEX =	2.63E-02		TOTAL CANCER RISK =	5.70E-07

TABLE [illegible]-19-12

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.11E-08	5.00E-05	2.21E-04	1.42E-09		
2,4,6-Trinitrotoluene (TNT)	3.30E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.83E-07	5.00E-04	3.65E-04	2.35E-08		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.16E-07	3.00E-03	3.87E-05	1.49E-08	1.10E-01	1.64E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	6.09E-08			7.83E-09		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	8.20E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	4.54E-07	5.00E-02	9.08E-06	5.83E-08		
Antimony	3.90E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	2.16E-07	4.00E-04	5.40E-04	2.78E-08		
Cadmium	7.50E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	4.15E-08	1.00E-03	4.15E-05	5.34E-09		
Silver	9.90E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	5.48E-08	5.00E-03	1.10E-05	7.04E-09		
Benzo(b)fluoranthene	7.70E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	4.26E-08			5.48E-09	7.30E-01	4.00E-09
Chrysene	2.70E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.49E-08			1.92E-09	7.30E-03	1.40E-11
Di-n-butylphthalate	6.40E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	3.54E-07	1.00E-01	3.54E-06	4.55E-08		
Phenol	4.80E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	2.66E-08	6.00E-01	4.43E-08	3.42E-09		
Pyrene	8.90E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	4.93E-08	3.00E-02	1.64E-06	6.33E-09		
												TOTAL HAZARD INDEX =	1.23E-03		TOTAL CANCER RISK =	5.66E-09

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TABLE C-19-13

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	200	350	6	1.00E-06	15	2190	25550	2.56E-07	5.00E-05	5.11E-03	2.19E-08		
2,4,6-Trinitrotoluene (TNT)	3.30E-01	200	350	6	1.00E-06	15	2190	25550	4.22E-06	5.00E-04	8.44E-03	3.62E-07		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	200	350	6	1.00E-06	15	2190	25550	2.68E-06	3.00E-03	8.95E-04	2.30E-07	1.10E-01	2.53E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	200	350	6	1.00E-06	15	2190	25550	1.41E-06			1.21E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.00E+00	200	350	6	1.00E-06	15	2190	25550	1.28E-05	5.00E-02	2.56E-04	1.10E-06		
Antimony	9.10E+00	200	350	6	1.00E-06	15	2190	25550	1.16E-04	4.00E-04	2.91E-01	9.97E-06		
Cadmium	9.30E-01	200	350	6	1.00E-06	15	2190	25550	1.19E-05	1.00E-03	1.19E-02	1.02E-06		
Silver	6.00E+00	200	350	6	1.00E-06	15	2190	25550	7.67E-05	5.00E-03	1.53E-02	6.58E-06		
Benzo(b)fluoranthene	7.70E-02	200	350	6	1.00E-06	15	2190	25550	9.84E-07			8.44E-08	7.30E-01	6.16E-08
Chrysene	2.70E-02	200	350	6	1.00E-06	15	2190	25550	3.45E-07			2.96E-08	7.30E-03	2.16E-10
Di-n-butylphthalate	2.80E+00	200	350	6	1.00E-06	15	2190	25550	3.58E-05	1.00E-01	3.58E-04	3.07E-06		
Phenol	4.80E-02	200	350	6	1.00E-06	15	2190	25550	6.14E-07	6.00E-01	1.02E-06	5.26E-08		
Pyrene	8.90E-02	200	350	6	1.00E-06	15	2190	25550	1.14E-06	3.00E-02	3.79E-05	9.75E-08		
										TOTAL HAZARD INDEX =	3.33E-01		TOTAL CANCER RISK =	8.71E-08

TABLE C-19-14

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	100	350	6	1.00E-06	15	2190	25550	1.28E-07	5.00E-05	2.56E-03	1.10E-08		
2,4,6-Trinitrotoluene (TNT)	3.30E-01	100	350	6	1.00E-06	15	2190	25550	2.11E-06	5.00E-04	4.22E-03	1.81E-07		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	100	350	6	1.00E-06	15	2190	25550	1.34E-06	3.00E-03	4.47E-04	1.15E-07	1.10E-01	1.27E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	100	350	6	1.00E-06	15	2190	25550	7.03E-07			6.03E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	8.20E-01	100	350	6	1.00E-06	15	2190	25550	5.24E-06	5.00E-02	1.05E-04	4.49E-07		
Antimony	3.90E+00	100	350	6	1.00E-06	15	2190	25550	2.49E-05	4.00E-04	6.23E-02	2.14E-06		
Cadmium	7.50E-01	100	350	6	1.00E-06	15	2190	25550	4.79E-06	1.00E-03	4.79E-03	4.11E-07		
Silver	9.90E-01	100	350	6	1.00E-06	15	2190	25550	6.33E-06	5.00E-03	1.27E-03	5.42E-07		
Benzo(b)fluoranthene	7.70E-02	100	350	6	1.00E-06	15	2190	25550	4.92E-07			4.22E-08	7.30E-01	3.08E-08
Chrysene	2.70E-02	100	350	6	1.00E-06	15	2190	25550	1.73E-07			1.48E-08	7.30E-03	1.08E-10
Di-n-butylphthalate	6.40E-01	100	350	6	1.00E-06	15	2190	25550	4.09E-06	1.00E-01	4.09E-05	3.51E-07		
Phenol	4.80E-02	100	350	6	1.00E-06	15	2190	25550	3.07E-07	6.00E-01	5.11E-07	2.63E-08		
Pyrene	8.90E-02	100	350	6	1.00E-06	15	2190	25550	5.69E-07	3.00E-02	1.90E-05	4.88E-08		
										TOTAL HAZARD INDEX =	7.58E-02		TOTAL CANCER RISK =	4.36E-08

TABLE [illegible]-19-15

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	5.54E-07	5.00E-05	1.11E-02	4.75E-08		
2,4,6-Trinitrotoluene (TNT)	3.30E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	9.14E-06	5.00E-04	1.83E-02	7.83E-07		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	5.81E-06	3.00E-03	1.94E-03	4.98E-07	1.10E-01	5.48E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	3.05E-06			2.61E-07		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.00E+00	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.77E-05	5.00E-02	5.54E-04	2.37E-06		
Antimony	9.10E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.52E-05	4.00E-04	6.30E-02	2.16E-06		
Cadmium	9.30E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.57E-06	1.00E-03	2.57E-03	2.21E-07		
Silver	6.00E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	1.66E-05	5.00E-03	3.32E-03	1.42E-06		
Benzo(b)fluoranthene	7.70E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.13E-06			1.83E-07	7.30E-01	1.33E-07
Chrysene	2.70E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	7.48E-07			6.41E-08	7.30E-03	4.68E-10
Di-n-butylphthalate	2.80E+00	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	7.75E-05	1.00E-01	7.75E-04	6.64E-06		
Phenol	4.80E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.33E-06	6.00E-01	2.21E-06	1.14E-07		
Pyrene	8.90E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.46E-06	3.00E-02	8.21E-05	2.11E-07		
												TOTAL HAZARD INDEX =	1.02E-01		TOTAL CANCER RISK =	1.89E-07

TABL_ _-19-16

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE POTENTIAL LANDFILL AREA NORTH OF THE PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	4.78E-08	5.00E-05	9.56E-04	4.10E-09		
2,4,6-Trinitrotoluene (TNT)	3.30E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	7.89E-07	5.00E-04	1.58E-03	6.76E-08		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	5.02E-07	3.00E-03	1.67E-04	4.30E-08	1.10E-01	4.73E-09
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.63E-07			2.25E-08		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	8.20E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.96E-06	5.00E-02	3.92E-05	1.68E-07		
Antimony	3.90E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	9.32E-07	4.00E-04	2.33E-03	7.99E-08		
Cadmium	7.50E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.79E-07	1.00E-03	1.79E-04	1.54E-08		
Silver	9.90E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	2.37E-07	5.00E-03	4.73E-05	2.03E-08		
Benzo(b)fluoranthene	7.70E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.84E-07			1.58E-08	7.30E-01	1.15E-08
Chrysene	2.70E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	6.45E-08			5.53E-09	7.30E-03	4.04E-11
Di-n-butylphthalate	6.40E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.53E-06	1.00E-01	1.53E-05	1.31E-07		
Phenol	4.80E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.15E-07	6.00E-01	1.91E-07	9.83E-09		
Pyrene	8.90E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.13E-07	3.00E-02	7.09E-06	1.82E-08		
												TOTAL HAZARD INDEX =	5.32E-03		TOTAL CANCER RISK =	1.63E-08

TABLE C-19-17

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
POTENTIAL LANDFILL AREA NORTH OF PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)$^{-1}$	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00	5.00E-05	0.00E+00
2,4,6-Trinitrotoluene (TNT)	3.30E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	5.00E-04	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	0.20	21%	32%	47%	1.18	0.06	0.09	1.30E-02	0.40	350	70	70	25550	25550	7.13E-05	3.00E-03	2.38E-02	7.13E-05	3.00E-03	2.14E-07
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.00E+00	0.20	21%	32%	47%	0.32	NE	NB	1.34E-02	0.40	350	70	70	25550	25550	7.36E-05	5.00E-02	1.47E-03	7.36E-05	5.00E-02	3.68E-06
																	TOTAL HAZARD INDEX =	2.52E-02		TOTAL CANCER RISK =	3.90E-06

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

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TABLE C-19-18

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
POTENTIAL LANDFILL AREA NORTH OF PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(Flv x BCFlv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
Flv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFlv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	Flv	Frv	Fgf	BCFlv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)^{1}	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00	5.00E-05	0.00E+00
2,4,6-Trinitrotoluene (TNT)	3.30E-01	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	5.00E-04	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	0.20	21%	32%	47%	1.18	0.06	0.09	1.30E-02	0.25	350	9	70	3285	25550	4.46E-05	3.00E-03	1.49E-02	5.73E-06	3.00E-03	1.72E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	8.20E-01	0.20	21%	32%	47%	0.32	NE	NB	1.10E-02	0.25	350	9	70	3285	25550	3.77E-05	5.00E-02	7.55E-04	4.85E-06	5.00E-02	2.43E-07
																	TOTAL HAZARD INDEX =	1.56E-02		TOTAL CANCER RISK =	2.60E-07

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
POTENTIAL LANDFILL AREA NORTH OF PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00	5.00E-05	0.00E+00
2,4,6-Trinitrotoluene (TNT)	3.30E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	5.00E-04	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	0.10	10%	45%	45%	1.18	0.06	0.09	3.90E-03	0.40	350	6	15	2190	25550	9.97E-05	3.00E-03	3.32E-02	8.55E-06	3.00E-03	
Methyl-2,4,6-trinitrophen, nitramine (Tetryl)	1.10E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.00E+00	0.10	10%	45%	45%	0.32	NE	NB	3.20E-03	0.40	350	6	15	2190	25550	8.18E-05	5.00E-02	1.64E-03	7.01E-06	5.00E-02	3.51E-07
																	TOTAL HAZARD INDEX =	3.49E-02		TOTAL CANCER RISK =	3.51E-07

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
POTENTIAL LANDFILL AREA NORTH OF PROVING GROUND
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)[1]	CANCER RISK (unitless)
1,3,5-Trinitrobenzene	2.00E-02	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-05	0.00E+00	0.00E+00	5.00E-05	0.00E+00
2,4,6-Trinitrotoluene (TNT)	3.30E-01	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	5.00E-04	0.00E+00
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.10E-01	0.10	10%	45%	45%	1.18	0.06	0.09	3.90E-03	0.25	350	6	15	2190	25550	6.23E-05	3.00E-03	2.08E-02	5.34E-06	3.00E-03	1.60E-08
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.10E-01	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00			0.00E+00		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	8.20E-01	0.10	10%	45%	45%	0.32	NE	NB	2.62E-03	0.25	350	6	15	2190	25550	4.19E-05	5.00E-02	8.39E-04	3.59E-06	5.00E-02	1.80E-07
																	TOTAL HAZARD INDEX =	2.16E-02		TOTAL CANCER RISK =	1.96E-07

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)
NE = Not evaluated during the plant uptake study
NB = No measurable bioconcentration found during the plant uptake study

TABLE C-20-1

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

AT THE PROVING GROUNDS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	100	24	70	1.00E-06	70	25550	25550	5.45E-09	5.00E-04	1.09E-05	5.45E-09	3.00E-02	1.63E-10
4-Nitrotoluene	3.40E-02	100	24	70	1.00E-06	70	25550	25550	3.19E-09			3.19E-09		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	100	24	70	1.00E-06	70	25550	25550	8.36E-09	3.00E-03	2.79E-06	8.36E-09	1.10E-01	9.20E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	100	24	70	1.00E-06	70	25550	25550	5.92E-09	5.00E-02	1.18E-07	5.92E-09		
Antimony	4.10E+00	100	24	70	1.00E-06	70	25550	25550	3.85E-07	4.00E-04	9.63E-04	3.85E-07		
Cadmium	7.80E-01	100	24	70	1.00E-06	70	25550	25550	7.33E-08	1.00E-03	7.33E-05	7.33E-08		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	100	24	70	1.00E-06	70	25550	25550	4.60E-09	2.00E-02	2.30E-07	4.60E-09	1.40E-02	6.44E-11
Butylbenzylphthalate	2.20E-01	100	24	70	1.00E-06	70	25550	25550	2.07E-08	2.00E-01	1.03E-07	2.07E-08		
Di-n-butylphthalate	1.70E+00	100	24	70	1.00E-06	70	25550	25550	1.60E-07	1.00E-01	1.60E-06	1.60E-07		
Pyrene	1.50E-01	100	24	70	1.00E-06	70	25550	25550	1.41E-08	3.00E-02	4.70E-07	1.41E-08		
2-Hexanone	1.00E-03	100	24	70	1.00E-06	70	25550	25550	9.39E-11			9.39E-11		
Acetone	8.80E-03	100	24	70	1.00E-06	70	25550	25550	8.27E-10	1.00E-01	8.27E-09	8.27E-10		
Methylene Chloride	1.50E-02	100	24	70	1.00E-06	70	25550	25550	1.41E-09			1.41E-09		
Toluene	4.00E-03	100	24	70	1.00E-06	70	25550	25550	3.76E-10	2.00E-01	1.88E-09	3.76E-10		
Trichloroethene	1.00E-03	100	24	70	1.00E-06	70	25550	25550	9.39E-11	6.00E-03	1.57E-08	9.39E-11	1.10E-02	1.03E-12
									TOTAL HAZARD INDEX =		1.05E-03	TOTAL CANCER RISK =		1.15E-09

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TABLE C-20-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	50	12	9	1.00E-06	70	3285	25550	1.36E-09	5.00E-04	2.72E-06	1.75E-10	3.00E-02	5.25E-12
4-Nitrotoluene	3.40E-02	50	12	9	1.00E-06	70	3285	25550	7.98E-10			1.03E-10		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	50	12	9	1.00E-06	70	3285	25550	2.09E-09	3.00E-03	6.97E-07	2.69E-10	1.10E-01	2.96E-11
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	50	12	9	1.00E-06	70	3285	25550	1.48E-09	5.00E-02	2.96E-08	1.90E-10		
Antimony	3.00E+00	50	12	9	1.00E-06	70	3285	25550	7.05E-08	4.00E-04	1.76E-04	9.06E-09		
Cadmium	6.00E-01	50	12	9	1.00E-06	70	3285	25550	1.41E-08	1.00E-03	1.41E-05	1.81E-09		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	50	12	9	1.00E-06	70	3285	25550	1.15E-09	2.00E-02	5.75E-08	1.48E-10	1.40E-02	2.07E-12
Butylbenzylphthalate	2.10E-01	50	12	9	1.00E-06	70	3285	25550	4.93E-09	2.00E-01	2.47E-08	6.34E-10		
Di-n-butylphthalate	8.60E-01	50	12	9	1.00E-06	70	3285	25550	2.02E-08	1.00E-01	2.02E-07	2.60E-09		
Pyrene	1.50E-01	50	12	9	1.00E-06	70	3285	25550	3.52E-09	3.00E-02	1.17E-07	4.53E-10		
2-Hexanone	1.00E-03	50	12	9	1.00E-06	70	3285	25550	2.35E-11			3.02E-12		
Acetone	7.00E-03	50	12	9	1.00E-06	70	3285	25550	1.64E-10	1.00E-01	1.64E-09	2.11E-11		
Methylene Chloride	6.70E-03	50	12	9	1.00E-06	70	3285	25550	1.57E-10			2.02E-11		
Toluene	4.00E-03	50	12	9	1.00E-06	70	3285	25550	9.39E-11	2.00E-01	4.70E-10	1.21E-11		
Trichloroethene	1.00E-03	50	12	9	1.00E-06	70	3285	25550	2.35E-11	6.00E-03	3.91E-09	3.02E-12	1.10E-02	3.32E-14
										TOTAL HAZARD INDEX =	1.94E-04		TOTAL CANCER RISK =	3.69E-11

TABLE C-20-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.8[illegible]08	5.00E-04	5.70E-05	2.85E-08	3.00E-02	8.55E-10
4-Nitrotoluene	3.40E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.67E-08			1.67E-08		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	4.37E-08	3.00E-03	1.46E-05	4.37E-08	1.10E-01	4.81E-09
Octahydro 1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	3.10E-08	5.00E-02	6.19E-07	3.10E-08		
Antimony	4.10E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	2.01E-07	4.00E-04	5.04E-04	2.01E-07		
Cadmium	7.80E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	3.83E-08	1.00E-03	3.83E-05	3.83E-08		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.41E-08	2.00E-02	1.20E-06	2.41E-08	1.40E-02	3.37E-10
Butylbenzylphthalate	2.20E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.08E-07	2.00E-01	5.40E-07	1.08E-07		
Di-n-butylphthalate	1.70E+00	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	8.35E-07	1.00E-01	8.35E-06	8.35E-07		
Pyrene	1.50E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	7.37E-08	3.00E-02	2.46E-06	7.37E-08		
2-Hexanone	1.00E-03	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	4.91E-10			4.91E-10		
Acetone	8.80E-03	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	4.32E-09	1.00E-01	4.32E-08	4.32E-09		
Methylene Chloride	1.50E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	7.37E-09			7.37E-09		
Toluene	4.00E-03	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.97E-09	2.00E-01	9.83E-09	1.97E-09		
Trichloroethene	1.00E-03	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	4.91E-10	6.00E-03	8.19E-08	4.91E-10	1.10E-02	5.40E-12
												TOTAL HAZARD INDEX =	6.27E-04		TOTAL CANCER RISK =	6.01E-09

TABLE C-20-4

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

AT THE PROVING GROUNDS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)[1]	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.10E-09	5.00E-04	2.20E-06	1.41E-10	3.00E-02	4.24E-12
4-Nitrotoluene	3.40E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	6.45E-10			8.29E-11		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.69E-09	3.00E-03	5.63E-07	2.17E-10	1.10E-01	2.39E-11
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.20E-09	5.00E-02	2.39E-08	1.54E-10		
Antimony	3.00E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	5.69E-09	4.00E-04	1.42E-05	7.32E-10		
Cadmium	6.00E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.14E-09	1.00E-03	1.14E-06	1.46E-10		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	9.30E-10	2.00E-02	4.65E-08	1.20E-10	1.40E-02	1.67E-12
Butylbenzylphthalate	2.10E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	3.98E-09	2.00E-01	1.99E-08	5.12E-10		
Di-n-butylphthalate	8.60E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.63E-08	1.00E-01	1.63E-07	2.10E-09		
Pyrene	1.50E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	2.85E-09	3.00E-02	9.49E-08	3.66E-10		
2-Hexanone	1.00E-03	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.90E-11			2.44E-12		
Acetone	7.00E-03	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.33E-10	1.00E-01	1.33E-09	1.71E-11		
Methylene Chloride	6.70E-03	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.27E-10			1.63E-11		
Toluene	4.00E-03	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	7.59E-11	2.00E-01	3.79E-10	9.76E-12		
Trichloroethene	1.00E-03	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.90E-11	6.00E-03	3.16E-09	2.44E-12	1.10E-02	2.68E-14
												TOTAL HAZARD INDEX =	1.85E-05		TOTAL CANCER RISK =	2.98E-11

TABLE [illegible]-20-5

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

AT THE PROVING GROUNDS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	100	24	5	1.00E-06	37	1825	25550	1.03E-08	5.00E-04	2.06E-05	7.36E-10	3.00E-02	2.21E-11
4-Nitrotoluene	3.40E-02	100	24	5	1.00E-06	37	1825	25550	6.04E-09			4.32E-10		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	100	24	5	1.00E-06	37	1825	25550	1.58E-08	3.00E-03	5.27E-06	1.13E-09	1.10E-01	1.24E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	100	24	5	1.00E-06	37	1825	25550	1.12E-08	5.00E-02	2.24E-07	8.00E-10		
Antimony	4.10E+00	100	24	5	1.00E-06	37	1825	25550	7.29E-07	4.00E-04	1.82E-03	5.20E-08		
Cadmium	7.80E-01	100	24	5	1.00E-06	37	1825	25550	1.39E-07	1.00E-03	1.39E-04	9.90E-09		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	100	24	5	1.00E-06	37	1825	25550	8.71E-09	2.00E-02	4.35E-07	6.22E-10	1.40E-02	8.71E-12
Butylbenzylphthalate	2.20E-01	100	24	5	1.00E-06	37	1825	25550	3.91E-08	2.00E-01	1.95E-07	2.79E-09		
Di-n-butylphthalate	1.70E+00	100	24	5	1.00E-06	37	1825	25550	3.02E-07	1.00E-01	3.02E-06	2.16E-08		
Pyrene	1.50E-01	100	24	5	1.00E-06	37	1825	25550	2.67E-08	3.00E-02	8.89E-07	1.90E-09		
2-Hexanone	1.00E-03	100	24	5	1.00E-06	37	1825	25550	1.78E-10			1.27E-11		
Acetone	8.80E-03	100	24	5	1.00E-06	37	1825	25550	1.56E-09	1.00E-01	1.56E-08	1.12E-10		
Methylene Chloride	1.50E-02	100	24	5	1.00E-06	37	1825	25550	2.67E-09			1.90E-10		
Toluene	4.00E-03	100	24	5	1.00E-06	37	1825	25550	7.11E-10	2.00E-01	3.55E-09	5.08E-11		
Trichloroethene	1.00E-03	100	24	5	1.00E-06	37	1825	25550	1.78E-10	6.00E-03	2.96E-08	1.27E-11	1.10E-02	1.40E-13
										TOTAL HAZARD INDEX =	1.99E-03		TOTAL CANCER RISK =	1.55E-10

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TABLE C-20-6

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	50	12	5	1.00E-06	37	1825	25550	2.58E-09	5.00E-04	5.15E-06	1.84E-10	3.00E-02	5.52E-12
4-Nitrotoluene	3.40E-02	50	12	5	1.00E-06	37	1825	25550	1.51E-09			1.08E-10		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	50	12	5	1.00E-06	37	1825	25550	3.95E-09	3.00E-03	1.32E-06	2.82E-10	1.10E-01	3.11E-11
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	50	12	5	1.00E-06	37	1825	25550	2.80E-09	5.00E-02	5.60E-08	2.00E-10		
Antimony	3.00E+00	50	12	5	1.00E-06	37	1825	25550	1.33E-07	4.00E-04	3.33E-04	9.52E-09		
Cadmium	6.00E-01	50	12	5	1.00E-06	37	1825	25550	2.67E-08	1.00E-03	2.67E-05	1.90E-09		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	50	12	5	1.00E-06	37	1825	25550	2.18E-09	2.00E-02	1.09E-07	1.55E-10	1.40E-02	2.18E-12
Butylbenzylphthalate	2.10E-01	50	12	5	1.00E-06	37	1825	25550	9.33E-09	2.00E-01	4.66E-08	6.66E-10		
Di-n-butylphthalate	8.60E-01	50	12	5	1.00E-06	37	1825	25550	3.82E-08	1.00E-01	3.82E-07	2.73E-09		
Pyrene	1.50E-01	50	12	5	1.00E-06	37	1825	25550	6.66E-09	3.00E-02	2.22E-07	4.76E-10		
2-Hexanone	1.00E-03	50	12	5	1.00E-06	37	1825	25550	4.44E-11			3.17E-12		
Acetone	7.00E-03	50	12	5	1.00E-06	37	1825	25550	3.11E-10	1.00E-01	3.11E-09	2.22E-11		
Methylene Chloride	6.70E-03	50	12	5	1.00E-06	37	1825	25550	2.98E-10			2.13E-11		
Toluene	4.00E-03	50	12	5	1.00E-06	37	1825	25550	1.78E-10	2.00E-01	8.89E-10	1.27E-11		
Trichloroethene	1.00E-03	50	12	5	1.00E-06	37	1825	25550	4.44E-11	6.00E-03	7.40E-09	3.17E-12	1.10E-02	3.49E-14
										TOTAL HAZARD INDEX =	3.67E-04		TOTAL CANCER RISK =	3.88E-11

TABLE C-20-7

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

AT THE PROVING GROUNDS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	4.74E-08	5.00E-04	9.49E-05	3.39E-09	3.00E-02	1.02E-10
4-Nitrotoluene	3.40E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.78E-08			1.99E-09		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	7.28E-08	3.00E-03	2.43E-05	5.20E-09	1.10E-01	5.72E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	5.15E-08	5.00E-02	1.03E-06	3.68E-09		
Antimony	4.10E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	3.35E-07	4.00E-04	8.38E-04	2.40E-08		
Cadmium	7.80E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	6.38E-08	1.00E-03	6.38E-05	4.56E-09		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	4.01E-08	2.00E-02	2.00E-06	2.86E-09	1.40E-02	4.01E-11
Butylbenzylphthalate	2.20E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	1.80E-07	2.00E-01	9.00E-07	1.29E-08		
Di-n-butylphthalate	1.70E+00	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	1.39E-06	1.00E-01	1.39E-05	9.93E-08		
Pyrene	1.50E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	1.23E-07	3.00E-02	4.09E-06	8.76E-09		
2-Hexanone	1.00E-03	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	8.18E-10			5.84E-11		
Acetone	8.80E-03	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	7.20E-09	1.00E-01	7.20E-08	5.14E-10		
Methylene Chloride	1.50E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	1.23E-08			8.76E-10		
Toluene	4.00E-03	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	3.27E-09	2.00E-01	1.64E-08	2.34E-10		
Trichloroethene	1.00E-03	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	8.18E-10	6.00E-03	1.36E-07	5.84E-11	1.10E-02	6.43E-13
												TOTAL HAZARD INDEX =	1.04E-03		TOTAL CANCER RISK =	7.14E-10

TABLE C-20-8

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

AT THE PROVING GROUNDS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.07E-09	5.00E-04	4.13E-06	1.48E-10	3.00E-02	4.43E-12
4-Nitrotoluene	3.40E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.21E-09			8.65E-11		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.17E-09	3.00E-03	1.06E-06	2.27E-10	1.10E-01	2.49E-11
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.24E-09	5.00E-02	4.49E-08	1.60E-10		
Antimony	3.00E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.07E-08	4.00E-04	2.67E-05	7.64E-10		
Cadmium	6.00E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.14E-09	1.00E-03	2.14E-06	1.53E-10		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.75E-09	2.00E-02	8.73E-08	1.25E-10	1.40E-02	1.75E-12
Butylbenzylphthalate	2.10E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	7.48E-09	2.00E-01	3.74E-08	5.34E-10		
Di-n-butylphthalate	8.60E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.06E-08	1.00E-01	3.06E-07	2.19E-09		
Pyrene	1.50E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	5.34E-09	3.00E-02	1.78E-07	3.82E-10		
2-Hexanone	1.00E-03	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.56E-11			2.55E-12		
Acetone	7.00E-03	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.49E-10	1.00E-01	2.49E-09	1.78E-11		
Methylene Chloride	6.70E-03	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.39E-10			1.71E-11		
Toluene	4.00E-03	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.43E-10	2.00E-01	7.13E-10	1.02E-11		
Trichloroethene	1.00E-03	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.56E-11	6.00E-03	5.94E-09	2.55E-12	1.10E-02	2.80E-14
												TOTAL HAZARD INDEX =	3.47E-05		TOTAL CANCER RISK =	3.11E-11

TABLE C-20-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	100	350	70	1.00E-06	70	25550	25550	7.95E-08	5.00E-04	1.59E-04	7.95E-08	3.00E-02	2.38E-09
4-Nitrotoluene	3.40E-02	100	350	70	1.00E-06	70	25550	25550	4.66E-08			4.66E-08		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	100	350	70	1.00E-06	70	25550	25550	1.22E-07	3.00E-03	4.06E-05	1.22E-07	1.10E-01	1.34E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	100	350	70	1.00E-06	70	25550	25550	8.63E-08	5.00E-02	1.73E-06	8.63E-08		
Antimony	4.10E+00	100	350	70	1.00E-06	70	25550	25550	5.62E-06	4.00E-04	1.40E-02	5.62E-06		
Cadmium	7.80E-01	100	350	70	1.00E-06	70	25550	25550	1.07E-06	1.00E-03	1.07E-03	1.07E-06		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	100	350	70	1.00E-06	70	25550	25550	6.71E-08	2.00E-02	3.36E-06	6.71E-08	1.40E-02	9.40E-10
Butylbenzylphthalate	2.20E-01	100	350	70	1.00E-06	70	25550	25550	3.01E-07	2.00E-01	1.51E-06	3.01E-07		
Di-n-butylphthalate	1.70E+00	100	350	70	1.00E-06	70	25550	25550	2.33E-06	1.00E-01	2.33E-05	2.33E-06		
Pyrene	1.50E-01	100	350	70	1.00E-06	70	25550	25550	2.05E-07	3.00E-02	6.85E-06	2.05E-07		
2-Hexanone	1.00E-03	100	350	70	1.00E-06	70	25550	25550	1.37E-09			1.37E-09		
Acetone	8.80E-03	100	350	70	1.00E-06	70	25550	25550	1.21E-08	1.00E-01	1.21E-07	1.21E-08		
Methylene Chloride	1.50E-02	100	350	70	1.00E-06	70	25550	25550	2.05E-08			2.05E-08		
Toluene	4.00E-03	100	350	70	1.00E-06	70	25550	25550	5.48E-09	2.00E-01	2.74E-08	5.48E-09		
Trichloroethene	1.00E-03	100	350	70	1.00E-06	70	25550	25550	1.37E-09	6.00E-03	2.28E-07	1.37E-09	1.10E-02	1.51E-11
										TOTAL HAZARD INDEX =	1.53E-02		TOTAL CANCER RISK =	1.67E-08

TABLE C-20-10

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	50	350	9	1.00E-06	70	3285	25550	3.97E-08	5.00E-04	7.95E-05	5.11E-09	3.00E-02	1.53E-10
4-Nitrotoluene	3.40E-02	50	350	9	1.00E-06	70	3285	25550	2.33E-08			2.99E-09		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	50	350	9	1.00E-06	70	3285	25550	6.10E-08	3.00E-03	2.03E-05	7.84E-09	1.10E-01	8.62E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	50	350	9	1.00E-06	70	3285	25550	4.32E-08	5.00E-02	8.63E-07	5.55E-09		
Antimony	3.00E+00	50	350	9	1.00E-06	70	3285	25550	2.05E-06	4.00E-04	5.14E-03	2.64E-07		
Cadmium	6.00E-01	50	350	9	1.00E-06	70	3285	25550	4.11E-07	1.00E-03	4.11E-04	5.28E-08		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	50	350	9	1.00E-06	70	3285	25550	3.36E-08	2.00E-02	1.68E-06	4.32E-09	1.40E-02	6.04E-11
Butylbenzylphthalate	2.10E-01	50	350	9	1.00E-06	70	3285	25550	1.44E-07	2.00E-01	7.19E-07	1.85E-08		
Di-n-butylphthalate	8.60E-01	50	350	9	1.00E-06	70	3285	25550	5.89E-07	1.00E-01	5.89E-06	7.57E-08		
Pyrene	1.50E-01	50	350	9	1.00E-06	70	3285	25550	1.03E-07	3.00E-02	3.42E-06	1.32E-08		
2-Hexanone	1.00E-03	50	350	9	1.00E-06	70	3285	25550	6.85E-10			8.81E-11		
Acetone	7.00E-03	50	350	9	1.00E-06	70	3285	25550	4.79E-09	1.00E-01	4.79E-08	6.16E-10		
Methylene Chloride	6.70E-03	50	350	9	1.00E-06	70	3285	25550	4.59E-09			5.90E-10		
Toluene	4.00E-03	50	350	9	1.00E-06	70	3285	25550	2.74E-09	2.00E-01	1.37E-08	3.52E-10		
Trichloroethene	1.00E-03	50	350	9	1.00E-06	70	3285	25550	6.85E-10	6.00E-03	1.14E-07	8.81E-11	1.10E-02	9.69E-13
										TOTAL HAZARD INDEX =	5.66E-03		TOTAL CANCER RISK =	1.08E-09

TABLE C-20-11

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	4.16E-07	5.00E-04	8.31E-04	4.16E-07	3.00E-02	1.25E-08
4-Nitrotoluene	3.40E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	2.44E-07			2.44E-07		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	6.38E-07	3.00E-03	2.13E-04	6.38E-07	1.10E-01	7.01E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	4.51E-07	5.00E-02	9.03E-06	4.51E-07		
Antimony	4.10E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	2.94E-06	4.00E-04	7.34E-03	2.94E-06		
Cadmium	7.80E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	5.59E-07	1.00E-03	5.59E-04	5.59E-07		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	3.51E-07	2.00E-02	1.76E-05	3.51E-07	1.40E-02	4.91E-09
Butylbenzylphthalate	2.20E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.58E-06	2.00E-01	7.88E-06	1.58E-06		
Di-n-butylphthalate	1.70E+00	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.22E-05	1.00E-01	1.22E-04	1.22E-05		
Pyrene	1.50E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.07E-06	3.00E-02	3.58E-05	1.07E-06		
2-Hexanone	1.00E-03	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	7.16E-09			7.16E-09		
Acetone	8.80E-03	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	6.30E-08	1.00E-01	6.30E-07	6.30E-08		
Methylene Chloride	1.50E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.07E-07			1.07E-07		
Toluene	4.00E-03	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	2.87E-08	2.00E-01	1.43E-07	2.87E-08		
Trichloroethene	1.00E-03	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	7.16E-09	6.00E-03	1.19E-06	7.16E-09	1.10E-02	7.88E-11
												TOTAL HAZARD INDEX =	9.14E-03		TOTAL CANCER RISK =	8.76E-08

TABLE C-20-12

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	3.21E-08	5.00E-04	6.42E-05	4.13E-09	3.00E-02	1.24E-10
4-Nitrotoluene	3.40E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.88E-08			2.42E-09		
Hexahydro-1,3,5-trinitro-1 3,5-triazine (RDX)	8.90E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	4.93E-08	3.00E-03	1.64E-05	6.33E-09	1.10E-01	6.97E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	3.49E-08	5.00E-02	6.97E-07	4.48E-09		
Antimony	3.00E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.66E-07	4.00E-04	4.15E-04	2.13E-08		
Cadmium	6.00E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	3.32E-08	1.00E-03	3.32E-05	4.27E-09		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	2.71E-08	2.00E-02	1.36E-06	3.49E-09	1.40E-02	4.88E-11
Butylbenzylphthalate	2.10E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.16E-07	2.00E-01	5.81E-07	1.49E-08		
Di-n-butylphthalate	8.60E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	4.76E-07	1.00E-01	4.76E-06	6.12E-08		
Pyrene	1.50E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	8.30E-08	3.00E-02	2.77E-06	1.07E-08		
2-Hexanone	1.00E-03	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	5.53E-10			7.12E-11		
Acetone	7.00E-03	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	3.87E-09	1.00E-01	3.87E-08	4.98E-10		
Methylene Chloride	6.70E-03	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	3.71E-09			4.77E-10		
Toluene	4.00E-03	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	2.21E-09	2.00E-01	1.11E-08	2.85E-10		
Trichloroethene	1.00E-03	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	5.53E-10	6.00E-03	9.22E-08	7.12E-11	1.10E-02	7.83E-13
												TOTAL HAZARD INDEX =	5.39E-04		TOTAL CANCER RISK =	8.70E-10

TABLE C-20-13

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

AT THE PROVING GROUNDS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	200	350	6	1.00E-06	15	2190	25550	7.42E-07	5.00E-04	1.48E-03	6.36E-08	3.00E-02	1.91E-09
4-Nitrotoluene	3.40E-02	200	350	6	1.00E-06	15	2190	25550	4.35E-07			3.73E-08		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	200	350	6	1.00E-06	15	2190	25550	1.14E-06	3.00E-03	3.79E-04	9.75E-08	1.10E-01	1.07E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	200	350	6	1.00E-06	15	2190	25550	8.05E-07	5.00E-02	1.61E-05	6.90E-08		
Antimony	4.10E+00	200	350	6	1.00E-06	15	2190	25550	5.24E-05	4.00E-04	1.31E-01	4.49E-06		
Cadmium	7.80E-01	200	350	6	1.00E-06	15	2190	25550	9.97E-06	1.00E-03	9.97E-03	8.55E-07		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	200	350	6	1.00E-06	15	2190	25550	6.26E-07	2.00E-02	3.13E-05	5.37E-08	1.40E-02	7.52E-10
Butylbenzylphthalate	2.20E-01	200	350	6	1.00E-06	15	2190	25550	2.81E-06	2.00E-01	1.41E-05	2.41E-07		
Di-n-butylphthalate	1.70E+00	200	350	6	1.00E-06	15	2190	25550	2.17E-05	1.00E-01	2.17E-04	1.86E-06		
Pyrene	1.50E-01	200	350	6	1.00E-06	15	2190	25550	1.92E-06	3.00E-02	6.39E-05	1.64E-07		
2-Hexanone	1.00E-03	200	350	6	1.00E-06	15	2190	25550	1.28E-08			1.10E-09		
Acetone	8.80E-03	200	350	6	1.00E-06	15	2190	25550	1.13E-07	1.00E-01	1.13E-06	9.64E-09		
Methylene Chloride	1.50E-02	200	350	6	1.00E-06	15	2190	25550	1.92E-07			1.64E-08		
Toluene	4.00E-03	200	350	6	1.00E-06	15	2190	25550	5.11E-08	2.00E-01	2.56E-07	4.38E-09		
Trichloroethene	1.00E-03	200	350	6	1.00E-06	15	2190	25550	1.28E-08	6.00E-03	2.13E-06	1.10E-09	1.10E-02	1.21E-11
										TOTAL HAZARD INDEX =	1.43E-01		TOTAL CANCER RISK =	1.34E-08

TABLE C-20-14

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	100	350	6	1.00E-06	15	2190	25550	3.71E-07	5.00E-04	7.42E-04	3.18E-08	3.00E-02	9.53E-10
4-Nitrotoluene	3.40E-02	100	350	6	1.00E-06	15	2190	25550	2.17E-07			1.86E-08		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	100	350	6	1.00E-06	15	2190	25550	5.69E-07	3.00E-03	1.90E-04	4.88E-08	1.10E-01	5.36E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	100	350	6	1.00E-06	15	2190	25550	4.03E-07	5.00E-02	8.05E-06	3.45E-08		
Antimony	3.00E+00	100	350	6	1.00E-06	15	2190	25550	1.92E-05	4.00E-04	4.79E-02	1.64E-06		
Cadmium	6.00E-01	100	350	6	1.00E-06	15	2190	25550	3.84E-06	1.00E-03	3.84E-03	3.29E-07		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	100	350	6	1.00E-06	15	2190	25550	3.13E-07	2.00E-02	1.57E-05	2.68E-08	1.40E-02	3.76E-10
Butylbenzylphthalate	2.10E-01	100	350	6	1.00E-06	15	2190	25550	1.34E-06	2.00E-01	6.71E-06	1.15E-07		
Di-n-butylphthalate	8.60E-01	100	350	6	1.00E-06	15	2190	25550	5.50E-06	1.00E-01	5.50E-05	4.71E-07		
Pyrene	1.50E-01	100	350	6	1.00E-06	15	2190	25550	9.59E-07	3.00E-02	3.20E-05	8.22E-08		
2-Hexanone	1.00E-03	100	350	6	1.00E-06	15	2190	25550	6.39E-09			5.48E-10		
Acetone	7.00E-03	100	350	6	1.00E-06	15	2190	25550	4.47E-08	1.00E-01	4.47E-07	3.84E-09		
Methylene Chloride	6.70E-03	100	350	6	1.00E-06	15	2190	25550	4.28E-08			3.67E-09		
Toluene	4.00E-03	100	350	6	1.00E-06	15	2190	25550	2.56E-08	2.00E-01	1.28E-07	2.19E-09		
Trichloroethene	1.00E-03	100	350	6	1.00E-06	15	2190	25550	6.39E-09	6.00E-03	1.07E-06	5.48E-10	1.10E-02	6.03E-12
										TOTAL HAZARD INDEX =	5.28E-02		TOTAL CANCER RISK =	6.70E-09

TABLE C-20-15

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

AT THE PROVING GROUNDS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.61E-06	5.00E-04	3.21E-03	1.38E-07	3.00E-02	4.13E-09
4-Nitrotoluene	3.40E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	9.41E-07			8.07E-08		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.46E-06	3.00E-03	8.21E-04	2.11E-07	1.10E-01	2.32E-08
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.74E-06	5.00E-02	3.49E-05	1.50E-07		
Antimony	4.10E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	1.14E-05	4.00E-04	2.84E-02	9.73E-07		
Cadmium	7.80E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.16E-06	1.00E-03	2.16E-03	1.85E-07		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.36E-06	2.00E-02	6.78E-05	1.16E-07	1.40E-02	1.63E-09
Butylbenzylphthalate	2.20E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	6.09E-06	2.00E-01	3.05E-05	5.22E-07		
Di-n-butylphthalate	1.70E+00	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	4.71E-05	1.00E-01	4.71E-04	4.03E-06		
Pyrene	1.50E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	4.15E-06	3.00E-02	1.38E-04	3.56E-07		
2-Hexanone	1.00E-03	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.77E-08			2.37E-09		
Acetone	8.80E-03	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.44E-07	1.00E-01	2.44E-06	2.09E-08		
Methylene Chloride	1.50E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	4.15E-07			3.56E-08		
Toluene	4.00E-03	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.11E-07	2.00E-01	5.54E-07	9.49E-09		
Trichloroethene	1.00E-03	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	2.77E-08	6.00E-03	4.61E-06	2.37E-09	1.10E-02	2.61E-11
												TOTAL HAZARD INDEX =	3.53E-02		TOTAL CANCER RISK =	2.90E-08

TABLE C-20-16

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.39E-07	5.00E-04	2.77E-04	1.19E-08	3.00E-02	3.56E-10
4-Nitrotoluene	3.40E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	8.12E-08			6.96E-09		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.13E-07	3.00E-03	7.09E-05	1.82E-08	1.10E-01	2.01E-09
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.51E-07	5.00E-02	3.01E-06	1.29E-08		
Antimony	3.00E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	7.17E-07	4.00E-04	1.79E-03	6.14E-08		
Cadmium	6.00E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.43E-07	1.00E-03	1.43E-04	1.23E-08		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.17E-07	2.00E-02	5.85E-06	1.00E-08	1.40E-02	1.41E-10
Butylbenzylphthalate	2.10E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	5.02E-07	2.00E-01	2.51E-06	4.30E-08		
Di-n-butylphthalate	8.60E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.06E-06	1.00E-01	2.06E-05	1.76E-07		
Pyrene	1.50E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	3.58E-07	3.00E-02	1.19E-05	3.07E-08		
2-Hexanone	1.00E-03	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.39E-09			2.05E-10		
Acetone	7.00E-03	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.67E-08	1.00E-01	1.67E-07	1.43E-09		
Methylene Chloride	6.70E-03	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.60E-08			1.37E-09		
Toluene	4.00E-03	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	9.56E-09	2.00E-01	4.78E-08	8.19E-10		
Trichloroethene	1.00E-03	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.39E-09	6.00E-03	3.98E-07	2.05E-10	1.10E-02	2.25E-12
												TOTAL HAZARD INDEX =	2.33E-03		TOTAL CANCER RISK =	2.50E-09

TABLE C-20-17

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetable
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
4-Nitrotoluene	3.40E-02	0.20	21%	32%	47%	NE	NF	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00			0.00E+00		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	0.20	21%	32%	47%	1.18	0.06	0.09	5.51E-03	0.40	350	70	70	25550	25550	3.02E-05	3.00E-03	1.01E-02	3.02E-05	1.10E-01	3.32E-06
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	0.20	21%	32%	47%	0.32	NE	NB	8.47E-04	0.40	350	70	70	25550	25550	4.64E-06	5.00E-02	9.28E-05	4.64E-06		
																	TOTAL HAZARD INDEX =	1.02E-02		TOTAL CANCER RISK =	3.32E-06

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

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MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetables Intake Comprised of Leafy Vegetable (unitless)
Frv = Fraction of Total Garden Vegetables Intake Comprised of Root Vegetable (unitless)
Fgf = Fraction of Total Garden Vegetables Intake Comprised of Garden Fruit (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	AVG CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)$^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
4-Nitrotoluene	3.40E-02	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00			0.00E+00		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	0.20	21%	32%	47%	1.18	0.06	0.09	5.51E-03	0.25	350	9	70	3285	25550	1.89E-05	3.00E-03	6.30E-03	2.43E-06	1.10E-01	2.67E-07
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	0.20	21%	32%	47%	0.32	NE	NB	8.47E-04	0.25	350	9	70	3285	25550	2.90E-06	5.00E-02	5.80E-05	3.73E-07		
																	TOTAL HAZARD INDEX =	6.35E-03		TOTAL CANCER RISK =	2.67E-07

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

TABLE C-20-19

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(Flv x BCFlv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
Flv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFlv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	Flv	Frv	Fgf	BCFlv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)⁻¹	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
4-Nitrotoluene	3.40E-02	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00			0.00E+00		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	0.10	10%	45%	45%	1.18	0.06	0.09	1.65E-03	0.40	350	6	15	2190	25550	4.23E-05	3.00E-03	1.41E-02	3.62E-06	1.10E-01	3.99E-07
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	0.10	10%	45%	45%	0.32	NE	NB	2.02E-04	0.40	350	6	15	2190	25550	5.16E-06	5.00E-02	1.03E-04	4.42E-07		
																	TOTAL HAZARD INDEX =	1.42E-02		TOTAL CANCER RISK =	3.99E-07

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

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MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 2 FEET)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminants Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)$^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.80E-02	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
4-Nitrotoluene	3.40E-02	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00			0.00E+00		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8.90E-02	0.10	10%	45%	45%	1.18	0.06	0.09	1.65E-03	0.25	350	6	15	2190	25550	2.64E-05	3.00E-03	8.81E-03	2.26E-06	1.10E-01	2.49E-07
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.30E-02	0.10	10%	45%	45%	0.32	NE	NB	2.02E-04	0.25	350	6	15	2190	25550	3.22E-06	5.00E-02	6.44E-05	2.76E-07		
																	TOTAL HAZARD INDEX =	8.87E-03		TOTAL CANCER RISK =	2.49E-07

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

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TABLE C-21-1

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	6.00E-02	100	24	70	1.00E-06	70	25550	25550	5.64E-09	5.00E-04	1.13E-05	5.64E-09	3.00E-02	1.69E-10
4-Nitrotoluene	3.40E-02	100	24	70	1.00E-06	70	25550	25550	3.19E-09	1.00E-02	3.19E-07	3.19E-09		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.50E-02	100	24	70	1.00E-06	70	25550	25550	3.29E-09	3.00E-03	1.10E-06	3.29E-09	1.10E-01	3.62E-10
Antimony	1.40E+00	100	24	70	1.00E-06	70	25550	25550	1.32E-07	4.00E-04	3.29E-04	1.32E-07		
Cadmium	7.50E-01	100	24	70	1.00E-06	70	25550	25550	7.05E-08	1.00E-03	7.05E-05	7.05E-08		
bis(2-Ethylhexyl)phthalate (DEHP)	4.60E-02	100	24	70	1.00E-06	70	25550	25550	4.32E-09	2.00E-02	2.16E-07	4.32E-09	1.40E-02	6.05E-11
Butylbenzylphthalate	2.50E-01	100	24	70	1.00E-06	70	25550	25550	2.35E-08	2.00E-01	1.17E-07	2.35E-08		
Di-n-butylphthalate	3.50E+00	100	24	70	1.00E-06	70	25550	25550	3.29E-07	1.00E-01	3.29E-06	3.29E-07		
Pyrene	1.50E-01	100	24	70	1.00E-06	70	25550	25550	1.41E-08	3.00E-02	4.70E-07	1.41E-08		
									TOTAL HAZARD INDEX =		4.16E-04	TOTAL CANCER RISK =		5.91E-10

TABLE C-21-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.70E-02	50	12	9	1.00E-06	70	3285	25550	1.34E-09	5.00E-04	2.68E-06	1.72E-10	3.00E-02	5.16E-12
4-Nitrotoluene	3.40E-02	50	12	9	1.00E-06	70	3285	25550	7.98E-10	1.00E-02	7.98E-08	1.03E-10		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.20E-02	50	12	9	1.00E-06	70	3285	25550	7.51E-10	3.00E-03	2.50E-07	9.66E-11	1.10E-01	1.06E-11
Antimony	1.40E+00	50	12	9	1.00E-06	70	3285	25550	3.29E-08	4.00E-04	8.22E-05	4.23E-09		
Cadmium	6.10E-01	50	12	9	1.00E-06	70	3285	25550	1.43E-08	1.00E-03	1.43E-05	1.84E-09		
bis(2-Ethylhexyl)phthalate (DEHP)	4.60E-02	50	12	9	1.00E-06	70	3285	25550	1.08E-09	2.00E-02	5.40E-08	1.39E-10	1.40E-02	1.94E-12
Butylbenzylphthalate	2.20E-01	50	12	9	1.00E-06	70	3285	25550	5.17E-09	2.00E-01	2.58E-08	6.64E-10		
Di-n-butylphthalate	1.00E+00	50	12	9	1.00E-06	70	3285	25550	2.35E-08	1.00E-01	2.35E-07	3.02E-09		
Pyrene	1.50E-01	50	12	9	1.00E-06	70	3285	25550	3.52E-09	3.00E-02	1.17E-07	4.53E-10		
										TOTAL HAZARD INDEX =	1.00E-04		TOTAL CANCER RISK =	1.77E-11

TABLE C-21-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	6.00E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.95E-08	5.00E-04	5.90E-05	2.95E-08	3.00E-02	8.84E-10
4-Nitrotoluene	3.40E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.67E-08	1.00E-02	1.67E-06	1.67E-08		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.50E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.72E-08	3.00E-03	5.73E-06	1.72E-08	1.10E-01	1.89E-09
Antimony	1.40E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	6.88E-08	4.00E-04	1.72E-04	6.88E-08		
Cadmium	7.50E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	3.68E-08	1.00E-03	3.68E-05	3.68E-08		
bis(2-Ethylhexyl)phthalate (DEHP)	4.60E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	2.26E-08	2.00E-02	1.13E-06	2.26E-08	1.40E-02	3.16E-10
Butylbenzylphthalate	2.50E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.23E-07	2.00E-01	6.14E-07	1.23E-07		
Di-n-butylphthalate	3.50E+00	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.72E-06	1.00E-01	1.72E-05	1.72E-06		
Pyrene	1.50E-01	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	7.37E-08	3.00E-02	2.46E-06	7.37E-08		
												TOTAL HAZARD INDEX =	2.97E-04		TOTAL CANCER RISK =	3.09E-09

TABLE C-21-4

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.70E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.08E-09	5.00E-04	2.16E-06	1.39E-10	3.00E-02	4.17E-12
4-Nitrotoluene	3.40E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	6.45E-10	1.00E-02	6.45E-08	8.29E-11		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.20E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	6.07E-10	3.00E-03	2.02E-07	7.81E-11	1.10E-01	8.59E-12
Antimony	1.40E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	2.66E-09	4.00E-04	6.64E-06	3.42E-10		
Cadmium	6.10E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	1.16E-09	1.00E-03	1.16E-06	1.49E-10		
bis(2-Ethylhexyl)phthalate (DEHP)	4.60E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	8.73E-10	2.00E-02	4.36E-08	1.12E-10	1.40E-02	1.57E-12
Butylbenzylphthalate	2.20E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	4.17E-09	2.00E-01	2.09E-08	5.37E-10		
Di-n-butylphthalate	1.00E+00	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.90E-08	1.00E-01	1.90E-07	2.44E-09		
Pyrene	1.50E-01	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	2.85E-09	3.00E-02	9.49E-08	3.66E-10		
												TOTAL HAZARD INDEX =	1.06E-05		TOTAL CANCER RISK =	1.43E-11

TABLE C-21-5

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	6.00E-02	100	24	5	1.00E-06	37	1825	25550	1.07E-08	5.00E-04	2.13E-05	7.62E-10	3.00E-02	2.28E-11
4-Nitrotoluene	3.40E-02	100	24	5	1.00E-06	37	1825	25550	6.04E-09	1.00E-02	6.04E-07	4.32E-10		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.50E-02	100	24	5	1.00E-06	37	1825	25550	6.22E-09	3.00E-03	2.07E-06	4.44E-10	1.10E-01	4.89E-11
Antimony	1.40E+00	100	24	5	1.00E-06	37	1825	25550	2.49E-07	4.00E-04	6.22E-04	1.78E-08		
Cadmium	7.50E-01	100	24	5	1.00E-06	37	1825	25550	1.33E-07	1.00E-03	1.33E-04	9.52E-09		
bis(2-Ethylhexyl)phthalate (DEHP)	4.60E-02	100	24	5	1.00E-06	37	1825	25550	8.17E-09	2.00E-02	4.09E-07	5.84E-10	1.40E-02	8.17E-12
Butylbenzylphthalate	2.50E-01	100	24	5	1.00E-06	37	1825	25550	4.44E-08	2.00E-01	2.22E-07	3.17E-09		
Di-n-butylphthalate	3.50E+00	100	24	5	1.00E-06	37	1825	25550	6.22E-07	1.00E-01	6.22E-06	4.44E-08		
Pyrene	1.50E-01	100	24	5	1.00E-06	37	1825	25550	2.67E-08	3.00E-02	8.89E-07	1.90E-09		
										TOTAL HAZARD INDEX =	7.87E-04		TOTAL CANCER RISK =	7.99E-11

TABLE C-21-6

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.70E-02	50	12	5	1.00E-06	37	1825	25550	2.53E-09	5.00E-04	5.06E-06	1.81E-10	3.00E-02	5.43E-12
4-Nitrotoluene	3.40E-02	50	12	5	1.00E-06	37	1825	25550	1.51E-09	1.00E-02	1.51E-07	1.08E-10		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.20E-02	50	12	5	1.00E-06	37	1825	25550	1.42E-09	3.00E-03	4.74E-07	1.02E-10	1.10E-01	1.12E-11
Antimony	1.40E+00	50	12	5	1.00E-06	37	1825	25550	6.22E-08	4.00E-04	1.55E-04	4.44E-09		
Cadmium	6.10E-01	50	12	5	1.00E-06	37	1825	25550	2.71E-08	1.00E-03	2.71E-05	1.94E-09		
bis(2-Ethylhexyl)phthalate (DEHP)	4.60E-02	50	12	5	1.00E-06	37	1825	25550	2.04E-09	2.00E-02	1.02E-07	1.46E-10	1.40E-02	2.04E-12
Butylbenzylphthalate	2.20E-01	50	12	5	1.00E-06	37	1825	25550	9.77E-09	2.00E-01	4.89E-08	6.98E-10		
Di-n-butylphthalate	1.00E+00	50	12	5	1.00E-06	37	1825	25550	4.44E-08	1.00E-01	4.44E-07	3.17E-09		
Pyrene	1.50E-01	50	12	5	1.00E-06	37	1825	25550	6.66E-09	3.00E-02	2.22E-07	4.76E-10		
										TOTAL HAZARD INDEX =	1.89E-04		TOTAL CANCER RISK =	1.86E-11

TABLE C-21-7

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

AT THE PROVING GROUNDS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	6.00E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	4.91E-08	5.00E-04	9.81E-05	3.50E-09	3.00E-02	1.05E-10
4-Nitrotoluene	3.40E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.78E-08	1.00E-02	2.78E-06	1.99E-09		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.50E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.86E-08	3.00E-03	9.54E-06	2.04E-09	1.10E-01	2.25E-10
Antimony	1.40E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	1.14E-07	4.00E-04	2.86E-04	8.18E-09		
Cadmium	7.50E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	6.13E-08	1.00E-03	6.13E-05	4.38E-09		
bis(2-Ethylhexyl)phthalate (DEHP)	4.60E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	3.76E-08	2.00E-02	1.88E-06	2.69E-09	1.40E-02	3.76E-11
Butylbenzylphthalate	2.50E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.04E-07	2.00E-01	1.02E-06	1.46E-08		
Di-n-butylphthalate	3.50E+00	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.86E-06	1.00E-01	2.86E-05	2.04E-07		
Pyrene	1.50E-01	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	1.23E-07	3.00E-02	4.09E-06	8.76E-09		
												TOTAL HAZARD INDEX =	4.94E-04		TOTAL CANCER RISK =	3.68E-10

TABLE C-21-8

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.70E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.03E-09	5.00E-04	4.06E-06	1.45E-10	3.00E-02	4.35E-12
4-Nitrotoluene	3.40E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.21E-09	1.00E-02	1.21E-07	8.65E-11		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.20E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.14E-09	3.00E-03	3.80E-07	8.14E-11	1.10E-01	8.96E-12
Antimony	1.40E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	4.99E-09	4.00E-04	1.25E-05	3.56E-10		
Cadmium	6.10E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	2.17E-09	1.00E-03	2.17E-06	1.55E-10		
bis(2-Ethylhexyl)phthalate (DEHP)	4.60E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	1.64E-09	2.00E-02	8.20E-08	1.17E-10	1.40E-02	1.64E-12
Butylbenzylphthalate	2.20E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	7.84E-09	2.00E-01	3.92E-08	5.60E-10		
Di-n-butylphthalate	1.00E+00	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.56E-08	1.00E-01	3.56E-07	2.55E-09		
Pyrene	1.50E-01	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	5.34E-09	3.00E-02	1.78E-07	3.82E-10		
												TOTAL HAZARD INDEX =	1.99E-05		TOTAL CANCER RISK =	1.49E-11

TABLE C-21-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	6.00E-02	100	350	70	1.00E-06	70	25550	25550	8.22E-08	5.00E-04	1.64E-04	8.22E-08	3.00E-02	2.47E-09
4-Nitrotoluene	3.40E-02	100	350	70	1.00E-06	70	25550	25550	4.66E-08	1.00E-02	4.66E-06	4.66E-08		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.50E-02	100	350	70	1.00E-06	70	25550	25550	4.79E-08	3.00E-03	1.60E-05	4.79E-08	1.10E-01	5.27E-09
Antimony	1.40E+00	100	350	70	1.00E-06	70	25550	25550	1.92E-06	4.00E-04	4.79E-03	1.92E-06		
Cadmium	7.50E-01	100	350	70	1.00E-06	70	25550	25550	1.03E-06	1.00E-03	1.03E-03	1.03E-06		
bis(2-Ethylhexyl)phthalate (DEHP)	4.60E-02	100	350	70	1.00E-06	70	25550	25550	6.30E-08	2.00E-02	3.15E-06	6.30E-08	1.40E-02	8.82E-10
Butylbenzylphthalate	2.50E-01	100	350	70	1.00E-06	70	25550	25550	3.42E-07	2.00E-01	1.71E-06	3.42E-07		
Di-n-butylphthalate	3.50E+00	100	350	70	1.00E-06	70	25550	25550	4.79E-06	1.00E-01	4.79E-05	4.79E-06		
Pyrene	1.50E-01	100	350	70	1.00E-06	70	25550	25550	2.05E-07	3.00E-02	6.85E-06	2.05E-07		

TOTAL HAZARD INDEX = 6.07E-03

TOTAL CANCER RISK = 8.62E-09

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TABLE C-21-10

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

AT THE PROVING GROUNDS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.70E-02	50	350	9	1.00E-06	70	3285	25550	3.90E-08	5.00E-04	7.81E-05	5.02E-09	3.00E-02	1.51E-10
4-Nitrotoluene	3.40E-02	50	350	9	1.00E-06	70	3285	25550	2.33E-08	1.00E-02	2.33E-06	2.99E-09		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.20E-02	50	350	9	1.00E-06	70	3285	25550	2.19E-08	3.00E-03	7.31E-06	2.82E-09	1.10E-01	3.10E-10
Antimony	1.40E+00	50	350	9	1.00E-06	70	3285	25550	9.59E-07	4.00E-04	2.40E-03	1.23E-07		
Cadmium	6.10E-01	50	350	9	1.00E-06	70	3285	25550	4.18E-07	1.00E-03	4.18E-04	5.37E-08		
bis(2-Ethylhexyl)phthalate (DEHP)	4.60E-02	50	350	9	1.00E-06	70	3285	25550	3.15E-08	2.00E-02	1.58E-06	4.05E-09	1.40E-02	5.67E-11
Butylbenzylphthalate	2.20E-01	50	350	9	1.00E-06	70	3285	25550	1.51E-07	2.00E-01	7.53E-07	1.94E-08		
Di-n-butylphthalate	1.00E+00	50	350	9	1.00E-06	70	3285	25550	6.85E-07	1.00E-01	6.85E-06	8.81E-08		
Pyrene	1.50E-01	50	350	9	1.00E-06	70	3285	25550	1.03E-07	3.00E-02	3.42E-06	1.32E-08		
										TOTAL HAZARD INDEX =	2.92E-03		TOTAL CANCER RISK =	5.17E-10

TABLE C-21-11

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	6.00E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	4.30E-07	5.00E-04	8.60E-04	4.30E-07	3.00E-02	1.29E-08
4-Nitrotoluene	3.40E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	2.44E-07	1.00E-02	2.44E-05	2.44E-07		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.50E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	2.51E-07	3.00E-03	8.36E-05	2.51E-07	1.10E-01	2.76E-08
Antimony	1.40E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.00E-06	4.00E-04	2.51E-03	1.00E-06		
Cadmium	7.50E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	5.37E-07	1.00E-03	5.37E-04	5.37E-07		
bis(2-Ethylhexyl)phthalate (DEHP)	4.60E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	3.30E-07	2.00E-02	1.65E-05	3.30E-07	1.40E-02	4.61E-09
Butylbenzylphthalate	2.50E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.79E-06	2.00E-01	8.96E-06	1.79E-06		
Di-n-butylphthalate	3.50E+00	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	2.51E-05	1.00E-01	2.51E-04	2.51E-05		
Pyrene	1.50E-01	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.07E-06	3.00E-02	3.58E-05	1.07E-06		
												TOTAL HAZARD INDEX =	4.32E-03		TOTAL CANCER RISK =	4.51E-08

TABLE C-21-12

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.70E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	3.15E-08	5.00E-04	6.31E-05	4.06E-09	3.00E-02	1.22E-10
4-Nitrotoluene	3.40E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.88E-08	1.00E-02	1.88E-06	2.42E-09		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.20E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.77E-08	3.00E-03	5.90E-06	2.28E-09	1.10E-01	2.50E-10
Antimony	1.40E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	7.75E-08	4.00E-04	1.94E-04	9.96E-09		
Cadmium	6.10E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	3.38E-08	1.00E-03	3.38E-05	4.34E-09		
bis(2-Ethylhexyl)phthalate (DEHP)	4.60E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	2.55E-08	2.00E-02	1.27E-06	3.27E-09	1.40E-02	4.58E-11
Butylbenzylphthalate	2.20E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.22E-07	2.00E-01	6.09E-07	1.57E-08		
Di-n-butylphthalate	1.00E+00	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	5.53E-07	1.00E-01	5.53E-06	7.12E-08		
Pyrene	1.50E-01	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	8.30E-08	3.00E-02	2.77E-06	1.07E-08		

TOTAL HAZARD INDEX = 3.09E-04 TOTAL CANCER RISK = 4.18E-10

TABLE C-21-13

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

AT THE PROVING GROUNDS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	6.00E-02	200	350	6	1.00E-06	15	2190	25550	7.67E-07	5.00E-04	1.53E-03	6.58E-08	3.00E-02	1.97E-09
4-Nitrotoluene	3.40E-02	200	350	6	1.00E-06	15	2190	25550	4.35E-07	1.00E-02	4.35E-05	3.73E-08		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.50E-02	200	350	6	1.00E-06	15	2190	25550	4.47E-07	3.00E-03	1.49E-04	3.84E-08	1.10E-01	4.22E-09
Antimony	1.40E+00	200	350	6	1.00E-06	15	2190	25550	1.79E-05	4.00E-04	4.47E-02	1.53E-06		
Cadmium	7.50E-01	200	350	6	1.00E-06	15	2190	25550	9.59E-06	1.00E-03	9.59E-03	8.22E-07		
bis(2-Ethylhexyl)phthalate (DEHP)	4.60E-02	200	350	6	1.00E-06	15	2190	25550	5.88E-07	2.00E-02	2.94E-05	5.04E-08	1.40E-02	7.06E-10
Butylbenzylphthalate	2.50E-01	200	350	6	1.00E-06	15	2190	25550	3.20E-06	2.00E-01	1.60E-05	2.74E-07		
Di-n-butylphthalate	3.50E+00	200	350	6	1.00E-06	15	2190	25550	4.47E-05	1.00E-01	4.47E-04	3.84E-06		
Pyrene	1.50E-01	200	350	6	1.00E-06	15	2190	25550	1.92E-06	3.00E-02	6.39E-05	1.64E-07		
										TOTAL HAZARD INDEX =	5.66E-02		TOTAL CANCER RISK =	6.90E-09

TABLE C-21-14

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

AT THE PROVING GROUNDS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifet (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.70E-02	100	350	6	1.00E-06	15	2190	25550	3.64E-07	5.00E-04	7.29E-04	3.12E-08	3.00E-02	9.37E-10
4-Nitrotoluene	3.40E-02	100	350	6	1.00E-06	15	2190	25550	2.17E-07	1.00E-02	2.17E-05	1.86E-08		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.20E-02	100	350	6	1.00E-06	15	2190	25550	2.05E-07	3.00E-03	6.82E-05	1.75E-08	1.10E-01	1.93E-09
Antimony	1.40E+00	100	350	6	1.00E-06	15	2190	25550	8.95E-06	4.00E-04	2.24E-02	7.67E-07		
Cadmium	6.10E-01	100	350	6	1.00E-06	15	2190	25550	3.90E-06	1.00E-03	3.90E-03	3.34E-07		
bis(2-Ethylhexyl)phthalate (DEHP)	4.60E-02	100	350	6	1.00E-06	15	2190	25550	2.94E-07	2.00E-02	1.47E-05	2.52E-08	1.40E-02	3.53E-10
Butylbenzylphthalate	2.20E-01	100	350	6	1.00E-06	15	2190	25550	1.41E-06	2.00E-01	7.03E-06	1.21E-07		
Di-n-butylphthalate	1.00E+00	100	350	6	1.00E-06	15	2190	25550	6.39E-06	1.00E-01	6.39E-05	5.48E-07		
Pyrene	1.50E-01	100	350	6	1.00E-06	15	2190	25550	9.59E-07	3.00E-02	3.20E-05	8.22E-08		
										TOTAL HAZARD INDEX =	2.72E-02		TOTAL CANCER RISK =	3.22E-09

TABLE C-21-15

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

AT THE PROVING GROUNDS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	6.00E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.66E-06	5.00E-04	3.32E-03	1.42E-07	3.00E-02	4.27E-09
4-Nitrotoluene	3.40E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	9.41E-07	1.00E-02	9.41E-05	8.07E-08		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.50E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	9.69E-07	3.00E-03	3.23E-04	8.31E-08	1.10E-01	9.14E-09
Antimony	1.40E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	3.88E-06	4.00E-04	9.69E-03	3.32E-07		
Cadmium	7.50E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.08E-06	1.00E-03	2.08E-03	1.78E-07		
bis(2-Ethylhexyl)phthalate (DEHP)	4.60E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	1.27E-06	2.00E-02	6.37E-05	1.09E-07	1.40E-02	1.53E-09
Butylbenzylphthalate	2.50E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	6.92E-06	2.00E-01	3.46E-05	5.93E-07		
Di-n-butylphthalate	3.50E+00	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	9.69E-05	1.00E-01	9.69E-04	8.31E-06		
Pyrene	1.50E-01	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	4.15E-06	3.00E-02	1.38E-04	3.56E-07		
												TOTAL HAZARD INDEX =	1.67E-02		TOTAL CANCER RISK =	1.49E-08

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TABLE C-21-16

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

AT THE PROVING GROUNDS

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.70E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.36E-07	5.00E-04	2.72E-04	1.17E-08	3.00E-02	3.50E-10
4-Nitrotoluene	3.40E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	8.12E-08	1.00E-02	8.12E-06	6.96E-09		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.20E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	7.65E-08	3.00E-03	2.55E-05	6.55E-09	1.10E-01	7.21E-10
Antimony	1.40E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	3.35E-07	4.00E-04	8.36E-04	2.87E-08		
Cadmium	6.10E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.46E-07	1.00E-03	1.46E-04	1.25E-08		
bis(2-Ethylhexyl)phthalate (DEHP)	4.60E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.10E-07	2.00E-02	5.50E-06	9.42E-09	1.40E-02	1.32E-10
Butylbenzylphthalate	2.20E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	5.26E-07	2.00E-01	2.63E-06	4.51E-08		
Di-n-butylphthalate	1.00E+00	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.39E-06	1.00E-01	2.39E-05	2.05E-07		
Pyrene	1.50E-01	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	3.58E-07	3.00E-02	1.19E-05	3.07E-08		
												TOTAL HAZARD INDEX =	1.33E-03		TOTAL CANCER RISK =	1.20E-09

.ABLE C-21-17

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetable
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	6.00E-02	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
4-Nitrotoluene	3.40E-02	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.40	350	70	70	25550	25550	0.00E+00	1.00E-02	0.00E+00	0.00E+00		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.50E-02	0.20	21%	32%	47%	1.18252	0.06	0.09	2.17E-03	0.40	350	70	70	25550	25550	1.19E-05	3.00E-03	3.96E-03	1.19E-05	1.10E-01	1.31E-06
																	TOTAL HAZARD INDEX =	3.96E-03		TOTAL CANCER RISK =	1.31E-06

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)
NE = Not evaluated during the plant uptake study
NB = No measurable bioconcentration found during the plant uptake study

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MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetables Intake Comprised of Leafy Vegetable (unitless)
Frv = Fraction of Total Garden Vegetables Intake Comprised of Root Vegetable (unitless)
Fgf = Fraction of Total Garden Vegetables Intake Comprised of Garden Fruit (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	AVG CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)^-1	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.70E-02	0.20	21%	32%	47%	NB	NE	NB	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
4-Nitrotoluene	3.40E-02	0.20	21%	32%	47%	NE	NE	NE	0.00E+00	0.25	350	9	70	3285	25550	0.00E+00	1.00E-02	0.00E+00	0.00E+00		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.20E-02	0.20	21%	32%	47%	1.18252	0.06	0.09	1.98E-03	0.25	350	9	70	3285	25550	6.79E-06	3.00E-03	2.26E-03	8.73E-07	1.10E-01	9.60E-08
																	TOTAL HAZARD INDEX =	2.26E-03		TOTAL CANCER RISK =	9.60E-08

Note:
Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)
BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)
NE = Not evaluated during the plant uptake study
NB = No measurable bioconcentration found during the plant uptake study

TABLE C-21-19

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminant Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	6.00E-02	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
4-Nitrotoluene	3.40E-02	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.40	350	6	15	2190	25550	0.00E+00	1.00E-02	0.00E+00	0.00E+00		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.50E-02	0.10	10%	45%	45%	1.18252	0.06	0.09	6.50E-04	0.40	350	6	15	2190	25550	1.66E-05	3.00E-03	5.54E-03	1.42E-06	1.10E-01	1.57E-07
																	TOTAL HAZARD INDEX =	5.54E-03		TOTAL CANCER RISK =	1.57E-07

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

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,ABLE C-21-20

MEAD OU3
INGESTION OF VEGETABLES FROM EXPLOSIVES-CONTAMINATED SOILS (0 - 6 INCHES)
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (DIv x FI x EF x ED)/(BW x AT1 or AT2)
DIv = CS x HIv x [(FIv x BCFIv)+(Frv x BCFrv)+(Fgf x BCFgf)]
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
DIv = Contaminants Daily Intake from Garden Vegetables
CS = Contaminant Concentration in Soil (mg/kg soil)
HIv = Total Daily Intake of Garden Vegetables (kg/day)
FIv = Fraction of Total Garden Vegetable Intake Comprised of Leafy Vegetables (unitless)
Frv = Fraction of Total Garden Vegetable Intake Comprised of Root Vegetables (unitless)
Fgf = Fraction of Total Garden Vegetable Intake Comprised of Garden Fruits (unitless)
BCFIv = Bioconcentration Factor for Leafy Vegetables (unitless)
BCFrv = Bioconcentration Factor for Root Vegetables (unitless)
BCFgf = Bioconcentration Factor for Garden Fruits (unitless)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	HIv (kg/dy)	FIv	Frv	Fgf	BCFIv	BCFrv	BCFgf	DIv	FI	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)[1]	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	5.70E-02	0.10	10%	45%	45%	NB	NE	NB	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	5.00E-04	0.00E+00	0.00E+00	3.00E-02	0.00E+00
4-Nitrotoluene	3.40E-02	0.10	10%	45%	45%	NE	NE	NE	0.00E+00	0.25	350	6	15	2190	25550	0.00E+00	1.00E-02	0.00E+00	0.00E+00		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	3.20E-02	0.10	10%	45%	45%	1.18252	0.06	0.09	5.94E-04	0.25	350	6	15	2190	25550	9.50E-06	3.00E-03	3.17E-03	8.14E-07	1.10E-01	8.96E-08
																	TOTAL HAZARD INDEX =	3.17E-03		TOTAL CANCER RISK =	8.96E-08

Note:

Intake assumptions are taken from the OU1 Baseline Risk Assessment (Donohue, 1991)

BCF values are based upon the results of the plant uptake study conducted by the Waterways Experiment Station (USACE, 1997)

NE = Not evaluated during the plant uptake study

NB = No measurable bioconcentration found during the plant uptake study

TABLE C-22-1

MEAD OU3
INGESTION OF CHEMICALS IN SUBSURFACE SOIL
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL FUTURE CONSTRUCTION WORKER - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	1.30E-01	480	130	1	1.00E-06	70	183	25550	6.33E-07	5.00E-04	1.27E-03	4.54E-09	3.00E-02	1.36E-10
4-Nitrotoluene	3.40E-02	480	130	1	1.00E-06	70	25550	25550	1.19E-09	1.00E-02	1.19E-07	1.19E-09		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	9.00E-02	480	130	1	1.00E-06	70	25550	25550	3.14E-09	3.00E-03	1.05E-06	3.14E-09	1.10E-01	3.45E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.20E-02	480	130	1	1.00E-06	70	25550	25550	2.16E-09	5.00E-02	4.33E-08	2.16E-09		
Antimony	4.10E+00	480	130	1	1.00E-06	70	25550	25550	1.43E-07	4.00E-04	3.58E-04	1.43E-07		
Cadmium	8.50E-01	480	130	1	1.00E-06	70	25550	25550	2.97E-08	1.00E-03	2.97E-05	2.97E-08		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	480	130	1	1.00E-06	70	25550	25550	1.71E-09	2.00E-02	8.55E-08	1.71E-09	1.40E-02	2.39E-11
Butylbenzylphthalate	2.10E-01	480	130	1	1.00E-06	70	25550	25550	7.33E-09	2.00E-01	3.66E-08	7.33E-09		
Di-n-butylphthalate	1.20E+00	480	130	1	1.00E-06	70	25550	25550	4.19E-08	1.00E+00	4.19E-08	4.19E-08		
Pyrene	2.40E-01	480	130	1	1.00E-06	70	25550	25550	8.37E-09	3.00E-01	2.79E-08	8.37E-09		
2-Hexanone	1.00E-03	480	130	1	1.00E-06	70	25550	25550	3.49E-11	4.00E-02	8.72E-10	3.49E-11		
Acetone	8.90E-03	480	130	1	1.00E-06	70	25550	25550	3.11E-10	1.00E-01	3.11E-09	3.11E-10		
Methylene Chloride	8.30E-03	480	130	1	1.00E-06	70	25550	25550	2.90E-10	6.00E-02	4.83E-09	2.90E-10	7.50E-03	2.17E-12
Toluene	4.00E-03	480	130	1	1.00E-06	70	25550	25550	1.40E-10	2.00E-01	6.98E-10	1.40E-10		
Trichloroethene	1.00E-03	480	130	1	1.00E-06	70	25550	25550	3.49E-11	6.00E-03	5.81E-09	3.49E-11	1.10E-02	3.84E-13
									TOTAL HAZARD INDEX =		1.66E-03	TOTAL CANCER RISK =		5.08E-10

TABLE C-22-2

MEAD OU3
INGESTION OF CHEMICALS IN SUBSURFACE SOIL[a]
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL FUTURE CONSTRUCTION WORKER - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	1.30E-01	10	65	1	1.00E-06	70	91	25550	1.33E-08	5.00E-04	2.65E-05	4.72E-11	3.00E-02	1.42E-12
4-Nitrotoluene	3.40E-02	10	65	1	1.00E-06	70	91	25550	3.47E-09	1.00E-02	3.47E-07	1.24E-11		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	9.00E-02	10	65	1	1.00E-06	70	91	25550	9.18E-09	3.00E-03	3.06E-06	3.27E-11	1.10E-01	3.60E-12
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.20E-02	10	65	1	1.00E-06	70	91	25550	6.33E-09	5.00E-02	1.27E-07	2.25E-11		
Antimony	2.90E+00	10	65	1	1.00E-06	70	91	25550	2.96E-07	4.00E-04	7.40E-04	1.05E-09		
Cadmium	6.10E-01	10	65	1	1.00E-06	70	91	25550	6.22E-08	1.00E-03	6.22E-05	2.22E-10		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	10	65	1	1.00E-06	70	91	25550	5.00E-09	2.00E-02	2.50E-07	1.78E-11	1.40E-02	2.49E-13
Butylbenzylphthalate	2.00E-01	10	65	1	1.00E-06	70	91	25550	2.04E-08	2.00E-01	1.02E-07	7.27E-11		
Di-n-butylphthalate	7.00E-01	10	65	1	1.00E-06	70	91	25550	7.[illegible]E-08	1.00E+00	7.14E-08	2.54E-10		
Pyrene	1.90E-01	10	65	1	1.00E-06	70	91	25550	1.94E-08	3.00E-01	6.46E-08	6.91E-11		
2-Hexanone	1.00E-03	10	65	1	1.00E-06	70	91	25550	1.02E-10	4.00E-02	2.55E-09	3.63E-13		
Acetone	7.40E-03	10	65	1	1.00E-06	70	91	25550	7.55E-10	1.00E-01	7.55E-09	2.69E-12		
Methylene Chloride	5.60E-03	10	65	1	1.00E-06	70	91	25550	5.71E-10	6.00E-02	9.52E-09	2.04E-12	7.50E-03	1.53E-14
Toluene	4.00E-03	10	65	1	1.00E-06	70	91	25550	4.08E-10	2.00E-01	2.04E-09	1.45E-12		
Trichloroethene	1.00E-03	10	65	1	1.00E-06	70	91	25550	1.02E-10	6.00E-03	1.70E-08	3.63E-13	1.10E-02	4.00E-15
										TOTAL HAZARD INDEX =	8.33E-04		TOTAL CANCER RISK =	5.28E-12

TABLE C-22-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SUBSURFACE SOIL[a]
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL FUTURE CONSTRUCTION WORKER - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	1.30E-01	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	6.92E-07	5.00E-04	1.38E-03	4.94E-09	3.00E-02	1.48E-10
4-Nitrotoluene	3.40E-02	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	1.81E-07	1.00E-02	1.81E-05	1.29E-09		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	9.00E-02	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	4.79E-07	3.00E-03	1.60E-04	3.42E-09	1.10E-01	3.76E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.20E-02	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	3.30E-07	5.00E-02	6.60E-06	2.36E-09		
Antimony	4.10E+00	5230	1.0	0.01	130	1	1.00E-06	70	182.5	25550	2.18E-06	4.00E-04	5.46E-03	1.56E-08		
Cadmium	8.50E-01	5230	1.0	0.01	130	1	1.00E-06	70	182.5	25550	4.52E-07	1.00E-03	4.52E-04	3.23E-09		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	2.61E-07	2.00E-02	1.30E-05	1.86E-09	1.40E-02	2.61E-11
Butylbenzylphthalate	2.10E-01	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	1.12E-06	2.00E-01	5.59E-06	7.98E-09		
Di-n-butylphthalate	1.20E+00	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	6.39E-06	1.00E+00	6.39E-06	4.56E-08		
Pyrene	2.40E-01	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	1.28E-06	3.00E-01	4.26E-06	9.12E-09		
2-Hexanone	1.00E-03	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	5.32E-09	4.00E-02	1.33E-07	3.80E-11		
Acetone	8.90E-03	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	4.74E-08	1.00E-01	4.74E-07	3.38E-10		
Methylene Chloride	8.30E-03	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	4.42E-08	6.00E-02	7.36E-07	3.16E-10	7.50E-03	2.37E-12
Toluene	4.00E-03	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	2.13E-08	2.00E-01	1.06E-07	1.52E-10		
Trichloroethene	1.00E-03	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	5.32E-09	6.00E-03	8.87E-07	3.80E-11	1.10E-02	4.18E-13
												TOTAL HAZARD INDEX =	7.51E-03		TOTAL CANCER RISK =	5.53E-10

TABLE C-22-4

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SUBSURFACE SOIL[a]
AT THE PROVING GROUNDS
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL FUTURE CONSTRUCTION WORKER - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
2,4,6-Trinitrotoluene (TNT)	1.30E-01	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	5.36E-08	5.00E-04	1.07E-04	1.91E-10	3.00E-02	5.73E-12
4-Nitrotoluene	3.40E-02	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	1.40E-08	1.00E-02	1.40E-06	4.99E-11		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	9.00E-02	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	3.71E-08	3.00E-03	1.24E-05	1.32E-10	1.10E-01	1.45E-11
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	6.20E-02	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	2.56E-08	5.00E-02	5.11E-07	9.10E-11		
Antimony	2.90E+00	2020	0.2	0.01	65	1	1.00E-06	70	91	25550	1.20E-07	4.00E-04	2.99E-04	4.26E-10		
Cadmium	6.10E-01	2020	0.2	0.01	65	1	1.00E-06	70	91	25550	2.51E-08	1.00E-03	2.51E-05	8.96E-11		
bis(2-Ethylhexyl)phthalate (DEHP)	4.90E-02	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	2.02E-08	2.00E-02	1.01E-06	7.19E-11	1.40E-02	1.01E-12
Butylbenzylphthalate	2.00E-01	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	8.24E-08	2.00E-01	4.12E-07	2.94E-10		
Di-n-butylphthalate	7.00E-01	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	2.89E-07	1.00E+00	2.89E-07	1.03E-09		
Pyrene	1.90E-01	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	7.83E-08	3.00E-01	2.61E-07	2.79E-10		
2-Hexanone	1.00E-03	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	4.12E-10	4.00E-02	1.03E-08	1.47E-12		
Acetone	7.40E-03	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	3.05E-09	1.00E-01	3.05E-08	1.09E-11		
Methylene Chloride	5.60E-03	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	2.31E-09	6.00E-02	3.85E-08	8.22E-12	7.50E-03	6.17E-14
Toluene	4.00E-03	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	1.65E-09	2.00E-01	8.24E-09	5.87E-12		
Trichloroethene	1.00E-03	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	4.12E-10	6.00E-03	6.87E-08	1.47E-12	1.10E-02	1.62E-14
												TOTAL HAZARD INDEX =	4.48E-04		TOTAL CANCER RISK =	2.13E-11

B07NE003703-06757

TABLE C-23-1

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	3.10E+04	100	24	70	1.00E-06	70	25550	25550	2.91E-03	1.00E+00	2.91E-03	2.91E-03		
Cadmium	6.60E-01	100	24	70	1.00E-06	70	25550	25550	6.20E-08	1.00E-03	6.20E-05	6.20E-08		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	100	24	70	1.00E-06	70	25550	25550	2.63E-09	1.00E-03	2.63E-06	2.63E-09		
Fluoranthene	1.60E-02	100	24	70	1.00E-06	70	25550	25550	1.50E-09	4.00E-02	3.76E-08	1.50E-09		
Pyrene	1.20E-02	100	24	70	1.00E-06	70	25550	25550	1.13E-09	3.00E-02	3.76E-08	1.13E-09		
									TOTAL HAZARD INDEX =		2.98E-03	TOTAL CANCER RISK =		0.00E+00

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TABLE C-23-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	2.40E+04	50	12	9	1.00E-06	70	3285	25550	5.64E-04	1.00E+00	5.64E-04	7.25E-05		
Cadmium	4.00E-01	50	12	9	1.00E-06	70	3285	25550	9.39E-09	1.00E-03	9.39E-06	1.21E-09		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	50	12	9	1.00E-06	70	3285	25550	6.58E-10	1.00E-03	6.58E-07	8.45E-11		
Fluoranthene	8.30E-03	50	12	9	1.00E-06	70	3285	25550	1.95E-10	4.00E-02	4.87E-09	2.51E-11		
Pyrene	7.50E-03	50	12	9	1.00E-06	70	3285	25550	1.76E-10	3.00E-02	5.87E-09	2.26E-11		
										TOTAL HAZARD INDEX =	5.74E-04		TOTAL CANCER RISK =	0.00E+00

TABLE C-23-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	3.10E+04	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	1.52E-03	1.00E+00	1.52E-03	1.52E-03		
Cadmium	6.60E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	3.24E-08	1.00E-03	3.24E-05	3.24E-08		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.38E-08	1.00E-03	1.38E-05	1.38E-08		
Fluoranthene	1.60E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	7.86E-09	4.00E-02	1.97E-07	7.86E-09		
Pyrene	1.20E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	5.90E-09	3.00E-02	1.97E-07	5.90E-09		
												TOTAL HAZARD INDEX =	1.57E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-23-4

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

AT THE NORTHEAST BOUNDARY AREA

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	2.40E+04	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	4.55E-05	1.00E+00	4.55E-05	5.86E-06		
Cadmium	4.00E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	7.59E-10	1.00E-03	7.59E-07	9.76E-11		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	5.31E-10	1.00E-03	5.31E-07	6.83E-11		
Fluoranthene	8.30E-03	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.57E-10	4.00E-02	3.94E-09	2.02E-11		
Pyrene	7.50E-03	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.42E-10	3.00E-02	4.74E-09	1.83E-11		
												TOTAL HAZARD INDEX =	4.68E-05		TOTAL CANCER RISK =	0.00E+00

TABLE C-23-5

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	3.10E+04	100	24	5	1.00E-06	37	1825	25550	5.51E-03	1.00E+00	5.51E-03	3.94E-04		
Cadmium	6.60E-01	100	24	5	1.00E-06	37	1825	25550	1.17E-07	1.00E-03	1.17E-04	8.38E-09		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	100	24	5	1.00E-06	37	1825	25550	4.98E-09	1.00E-03	4.98E-06	3.55E-10		
Fluoranthene	1.60E-02	100	24	5	1.00E-06	37	1825	25550	2.84E-09	4.00E-02	7.11E-08	2.03E-10		
Pyrene	1.20E-02	100	24	5	1.00E-06	37	1825	25550	2.13E-09	3.00E-02	7.11E-08	1.52E-10		
										TOTAL HAZARD INDEX =	5.63E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-23-6

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	2.40E+04	50	12	5	1.00E-06	37	1825	25550	1.07E-03	1.00E+00	1.07E-03	7.62E-05		
Cadmium	4.00E-01	50	12	5	1.00E-06	37	1825	25550	1.78E-08	1.00E-03	1.78E-05	1.27E-09		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	50	12	5	1.00E-06	37	1825	25550	1.24E-09	1.00E-03	1.24E-06	8.89E-11		
Fluoranthene	8.30E-03	50	12	5	1.00E-06	37	1825	25550	3.69E-10	4.00E-02	9.22E-09	2.63E-11		
Pyrene	7.50E-03	50	12	5	1.00E-06	37	1825	25550	3.33E-10	3.00E-02	1.11E-08	2.38E-11		
										TOTAL HAZARD INDEX =	1.09E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-23-7

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	3.10E+04	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	2.54E-03	1.00E+00	2.54E-03	1.81E-04		
Cadmium	6.60E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	5.40E-08	1.00E-03	5.40E-05	3.86E-09		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.29E-08	1.00E-03	2.29E-05	1.64E-09		
Fluoranthene	1.60E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	1.31E-08	4.00E-02	3.27E-07	9.35E-10		
Pyrene	1.20E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	9.81E-09	3.00E-02	3.27E-07	7.01E-10		
												TOTAL HAZARD INDEX =	2.61E-03		TOTAL CANCER RISK =	0.00E+00

TABL_ _-23-8

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

AT THE NORTHEAST BOUNDARY AREA

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	2.40E+04	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	8.55E-05	1.00E+00	8.55E-05	6.11E-06		
Cadmium	4.00E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.43E-09	1.00E-03	1.43E-06	1.02E-10		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	9.98E-10	1.00E-03	9.98E-07	7.13E-11		
Fluoranthene	8.30E-03	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.96E-10	4.00E-02	7.39E-09	2.11E-11		
Pyrene	7.50E-03	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	2.67E-10	3.00E-02	8.91E-09	1.91E-11		
												TOTAL HAZARD INDEX =	8.80E-05		TOTAL CANCER RISK =	0.00E+00

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TABLE C-23-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Aluminum	3.10E+04	100	350	70	1.00E-06	70	25550	25550	4.25E-02	1.00E+00	4.25E-02	4.25E-02		
Cadmium	6.60E-01	100	350	70	1.00E-06	70	25550	25550	9.04E-07	1.00E-03	9.04E-04	9.04E-07		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	100	350	70	1.00E-06	70	25550	25550	3.84E-08	1.00E-03	3.84E-05	3.84E-08		
Fluoranthene	1.60E-02	100	350	70	1.00E-06	70	25550	25550	2.19E-08	4.00E-02	5.48E-07	2.19E-08		
Pyrene	1.20E-02	100	350	70	1.00E-06	70	25550	25550	1.64E-08	3.00E-02	5.48E-07	1.64E-08		
										TOTAL HAZARD INDEX =	4.34E-02		TOTAL CANCER RISK =	0.00E+00

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TABLE C-23-10

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	2.40E+04	50	350	9	1.00E-06	70	3285	25550	1.64E-02	1.00E+00	1.64E-02	2.11E-03		
Cadmium	4.00E-01	50	350	9	1.00E-06	70	3285	25550	2.74E-07	1.00E-03	2.74E-04	3.52E-08		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	50	350	9	1.00E-06	70	3285	25550	1.92E-08	1.00E-03	1.92E-05	2.47E-09		
Fluoranthene	8.30E-03	50	350	9	1.00E-06	70	3285	25550	5.68E-09	4.00E-02	1.42E-07	7.31E-10		
Pyrene	7.50E-03	50	350	9	1.00E-06	70	3285	25550	5.14E-09	3.00E-02	1.71E-07	6.60E-10		
										TOTAL HAZARD INDEX =	1.67E-02		TOTAL CANCER RISK =	0.00E+00

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TABLE C-23-11

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	3.10E+04	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	2.22E-02	1.00E+00	2.22E-02	2.22E-02		
Cadmium	6.60E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	4.73E-07	1.00E-03	4.73E-04	4.73E-07		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	2.01E-07	1.00E-03	2.01E-04	2.01E-07		
Fluoranthene	1.60E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.15E-07	4.00E-02	2.87E-06	1.15E-07		
Pyrene	1.20E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	8.60E-08	3.00E-02	2.87E-06	8.60E-08		
												TOTAL HAZARD INDEX =	2.29E-02		TOTAL CANCER RISK =	0.00E+00

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	2.40E+04	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	1.33E-03	1.00E+00	1.33E-03	1.71E-04		
Cadmium	4.00E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	2.21E-08	1.00E-03	2.21E-05	2.85E-09		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.55E-08	1.00E-03	1.55E-05	1.99E-09		
Fluoranthene	8.30E-03	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	4.59E-09	4.00E-02	1.15E-07	5.91E-10		
Pyrene	7.50E-03	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	4.15E-09	3.00E-02	1.38E-07	5.34E-10		
												TOTAL HAZARD INDEX =	1.37E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-23-13

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	3.10E+04	200	350	6	1.00E-06	15	2190	25550	3.96E-01	1.00E+00	3.96E-01	3.40E-02		
Cadmium	6.60E-01	200	350	6	1.00E-06	15	2190	25550	8.44E-06	1.00E-03	8.44E-03	7.23E-07		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	200	350	6	1.00E-06	15	2190	25550	3.58E-07	1.00E-03	3.58E-04	3.07E-08		
Fluoranthene	1.60E-02	200	350	6	1.00E-06	15	2190	25550	2.05E-07	4.00E-02	5.11E-06	1.75E-08		
Pyrene	1.20E-02	200	350	6	1.00E-06	15	2190	25550	1.53E-07	3.00E-02	5.11E-06	1.32E-08		
										TOTAL HAZARD INDEX =	4.05E-01		TOTAL CANCER RISK =	0.00E+00

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TABLE C-23-14

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	2.40E+04	100	350	6	1.00E-06	15	2190	25550	1.53E-01	1.00E+00	1.53E-01	1.32E-02		
Cadmium	4.00E-01	100	350	6	1.00E-06	15	2190	25550	2.56E-06	1.00E-03	2.56E-03	2.19E-07		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	100	350	6	1.00E-06	15	2190	25550	1.79E-07	1.00E-03	1.79E-04	1.53E-08		
Fluoranthene	8.30E-03	100	350	6	1.00E-06	15	2190	25550	5.31E-08	4.00E-02	1.33E-06	4.55E-09		
Pyrene	7.50E-03	100	350	6	1.00E-06	15	2190	25550	4.79E-08	3.00E-02	1.60E-06	4.11E-09		
										TOTAL HAZARD INDEX =	1.56E-01		TOTAL CANCER RISK =	0.00E+00

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TABLE C-23-15

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	3.10E+04	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	8.58E-02	1.00E+00	8.58E-02	7.36E-03		
Cadmium	6.60E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	1.83E-06	1.00E-03	1.83E-03	1.57E-07		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	7.75E-07	1.00E-03	7.75E-04	6.64E-08		
Fluoranthene	1.60E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	4.43E-07	4.00E-02	1.11E-05	3.80E-08		
Pyrene	1.20E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	3.32E-07	3.00E-02	1.11E-05	2.85E-08		
												TOTAL HAZARD INDEX =	8.85E-02		TOTAL CANCER RISK =	0.00E+00

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TABLE C-23-16

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 2 FEET)

AT THE NORTHEAST BOUNDARY AREA

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	2.40E+04	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	5.74E-03	1.00E+00	5.74E-03	4.92E-04		
Cadmium	4.00E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	9.56E-08	1.00E-03	9.56E-05	8.19E-09		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	6.69E-08	1.00E-03	6.69E-05	5.74E-09		
Fluoranthene	8.30E-03	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.98E-08	4.00E-02	4.96E-07	1.70E-09		
Pyrene	7.50E-03	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	1.79E-08	3.00E-02	5.97E-07	1.54E-09		
												TOTAL HAZARD INDEX =	5.90E-03		TOTAL CANCER RISK =	0.00E+00

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TABLE C-24-1

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Cadmium	9.00E-01	100	24	70	1.00E-06	70	25550	25550	8.45E-08	1.00E-03	8.45E-05	8.45E-08		
2,6-Dinitrotoluene (2,6-DNT)	2.50E-02	100	24	70	1.00E-06	70	25550	25550	2.35E-09	1.00E-03	2.35E-06	2.35E-09		
Fluoranthene	2.10E-02	100	24	70	1.00E-06	70	25550	25550	1.97E-09	4.00E-02	4.93E-08	1.97E-09		
Pyrene	1.60E-02	100	24	70	1.00E-06	70	25550	25550	1.50E-09	3.00E-02	5.01E-08	1.50E-09		
Selenium	1.80E+00	100	24	70	1.00E-06	70	25550	25550	1.69E-07	5.00E-03	3.38E-05	1.69E-07		
									TOTAL HAZARD INDEX =		1.21E-04	TOTAL CANCER RISK =		0.00E+00

TABLE C-24-2

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Cadmium	5.00E-01	50	12	9	1.00E-06	70	3285	25550	1.17E-08	1.00E-03	1.17E-05	1.51E-09		
2,6-Dinitrotoluene (2,6-DNT)	2.50E-02	50	12	9	1.00E-06	70	3285	25550	5.87E-10	1.00E-03	5.87E-07	7.55E-11		
Fluoranthene	1.00E-02	50	12	9	1.00E-06	70	3285	25550	2.35E-10	4.00E-02	5.87E-09	3.02E-11		
Pyrene	8.80E-03	50	12	9	1.00E-06	70	3285	25550	2.07E-10	3.00E-02	6.89E-09	2.66E-11		
Selenium	1.20E+00	50	12	9	1.00E-06	70	3285	25550	2.82E-08	5.00E-03	5.64E-06	3.62E-09		
										TOTAL HAZARD INDEX =	1.80E-05		TOTAL CANCER RISK =	0.00E+00

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TABLE C-24-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ADULT TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Cadmium	9.00E-01	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	4.42E-08	1.00E-03	4.42E-05	4.42E-08		
2,6-Dinitrotoluene (2,6-DNT)	2.50E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.23E-08	1.00E-03	1.23E-05	1.23E-08		
Fluoranthene	2.10E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	1.03E-08	4.00E-02	2.58E-07	1.03E-08		
Pyrene	1.60E-02	5230	1.0	0.10	24	70	1.00E-06	70	25550	25550	7.86E-09	3.00E-02	2.62E-07	7.86E-09		
Selenium	1.80E+00	5230	1.0	0.01	24	70	1.00E-06	70	25550	25550	8.84E-08	5.00E-03	1.77E-05	8.84E-08		
												TOTAL HAZARD INDEX =	7.47E-05		TOTAL CANCER RISK =	0.00E+00

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TABLE C-24-4

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

AT THE NORTHEAST BOUNDARY AREA

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ADULT TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Cadmium	5.00E-01	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	9.49E-10	1.00E-03	9.49E-07	1.22E-10		
2,6-Dinitrotoluene (2,6-DNT)	2.50E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	4.74E-10	1.00E-03	4.74E-07	6.10E-11		
Fluoranthene	1.00E-02	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.90E-10	4.00E-02	4.74E-09	2.44E-11		
Pyrene	8.80E-03	2020	0.2	0.10	12	9	1.00E-06	70	3285	25550	1.67E-10	3.00E-02	5.57E-09	2.15E-11		
Selenium	1.20E+00	2020	0.2	0.01	12	9	1.00E-06	70	3285	25550	2.28E-09	5.00E-03	4.55E-07	2.93E-10		
												TOTAL HAZARD INDEX =	1.89E-06		TOTAL CANCER RISK =	0.00E+00

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TABLE C-24-5

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

AT THE NORTHEAST BOUNDARY AREA

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Cadmium	9.00E-01	100	24	5	1.00E-06	37	1825	25550	1.60E-07	1.00E-03	1.60E-04	1.14E-08		
2,6-Dinitrotoluene (2,6-DNT)	2.50E-02	100	24	5	1.00E-06	37	1825	25550	4.44E-09	1.00E-03	4.44E-06	3.17E-10		
Fluoranthene	2.10E-02	100	24	5	1.00E-06	37	1825	25550	3.73E-09	4.00E-02	9.33E-08	2.67E-10		
Pyrene	1.60E-02	100	24	5	1.00E-06	37	1825	25550	2.84E-09	3.00E-02	9.48E-08	2.03E-10		
Selenium	1.80E+00	100	24	5	1.00E-06	37	1825	25550	3.20E-07	5.00E-03	6.40E-05	2.28E-08		
										TOTAL HAZARD INDEX =	2.29E-04		TOTAL CANCER RISK =	0.00E+00

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TABLE C-24-6

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Cadmium	5.00E-01	50	12	5	1.00E-06	37	1825	25550	2.2[illegible]E-08	1.00E-03	2.22E-05	1.59E-09		
2,6-Dinitrotoluene (2,6-DNT)	2.50E-02	50	12	5	1.00E-06	37	1825	25550	1.11E-09	1.00E-03	1.11E-06	7.93E-11		
Fluoranthene	1.00E-02	50	12	5	1.00E-06	37	1825	25550	4.44E-10	4.00E-02	1.11E-08	3.17E-11		
Pyrene	8.80E-03	50	12	5	1.00E-06	37	1825	25550	3.91E-10	3.00E-02	1.30E-08	2.79E-11		
Selenium	1.20E+00	50	12	5	1.00E-06	37	1825	25550	5.33E-08	5.00E-03	1.07E-05	3.81E-09		
										TOTAL HAZARD INDEX =	3.40E-05		TOTAL CANCER RISK =	0.00E+00

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TABLE C-24-7

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Cadmium	9.00E-01	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	7.36E-08	1.00E-03	7.36E-05	5.26E-09		
2,6-Dinitrotoluene (2,6-DNT)	2.50E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	2.04E-08	1.00E-03	2.04E-05	1.46E-09		
Fluoranthene	2.10E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	1.72E-08	4.00E-02	4.29E-07	1.23E-09		
Pyrene	1.60E-02	4602	1.0	0.10	24	5	1.00E-06	37	1825	25550	1.31E-08	3.00E-02	4.36E-07	9.35E-10		
Selenium	1.80E+00	4602	1.0	0.01	24	5	1.00E-06	37	1825	25550	1.47E-07	5.00E-03	2.94E-05	1.05E-08		
												TOTAL HAZARD INDEX =	1.24E-04		TOTAL CANCER RISK =	0.00E+00

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TABLE C-24-8

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL 8-13 YEAR OLD JUVENILE TRESPASSER/VISITOR - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Cadmium	5.00E-01	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	1.78E-09	1.00E-03	1.78E-06	1.27E-10		
2,6-Dinitrotoluene (2,6-DNT)	2.50E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	8.91E-10	1.00E-03	8.91E-07	6.36E-11		
Fluoranthene	1.00E-02	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.56E-10	4.00E-02	8.91E-09	2.55E-11		
Pyrene	8.80E-03	2005	0.2	0.10	12	5	1.00E-06	37	1825	25550	3.14E-10	3.00E-02	1.05E-08	2.24E-11		
Selenium	1.20E+00	2005	0.2	0.01	12	5	1.00E-06	37	1825	25550	4.28E-09	5.00E-03	8.55E-07	3.05E-10		
												TOTAL HAZARD INDEX =	3.55E-06		TOTAL CANCER RISK =	0.00E+00

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TABLE C-24-9

MEAD OU3
INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Cadmium	9.00E-01	100	350	70	1.00E-06	70	25550	25550	1.23E-06	1.00E-03	1.23E-03	1.23E-06		
2,6-Dinitrotoluene (2,6-DNT)	2.50E-02	100	350	70	1.00E-06	70	25550	25550	3.42E-08	1.00E-03	3.42E-05	3.42E-08		
Fluoranthene	2.10E-02	100	350	70	1.00E-06	70	25550	25550	2.88E-08	4.00E-02	7.19E-07	2.88E-08		
Pyrene	1.60E-02	100	350	70	1.00E-06	70	25550	25550	2.19E-08	3.00E-02	7.31E-07	2.19E-08		
Selenium	1.80E+00	100	350	70	1.00E-06	70	25550	25550	2.47E-06	5.00E-03	4.93E-04	2.47E-06		
										TOTAL HAZARD INDEX =	1.76E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-24-10

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

AT THE NORTHEAST BOUNDARY AREA

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Cadmium	5.00E-01	50	350	9	1.00E-06	70	3285	25550	3.42E-07	1.00E-03	3.42E-04	4.40E-08		
2,6-Dinitrotoluene (2,6-DNT)	2.50E-02	50	350	9	1.00E-06	70	3285	25550	1.71E-08	1.00E-03	1.71E-05	2.20E-09		
Fluoranthene	1.00E-02	50	350	9	1.00E-06	70	3285	25550	6.85E-09	4.00E-02	1.71E-07	8.81E-10		
Pyrene	8.80E-03	50	350	9	1.00E-06	70	3285	25550	6.03E-09	3.00E-02	2.01E-07	7.75E-10		
Selenium	1.20E+00	50	350	9	1.00E-06	70	3285	25550	8.22E-07	5.00E-03	1.64E-04	1.06E-07		
										TOTAL HAZARD INDEX =	5.24E-04		TOTAL CANCER RISK =	0.00E+00

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TABLE C-24-11

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

AT THE NORTHEAST BOUNDARY AREA

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE ADULT RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Cadmium	9.00E-01	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	6.45E-07	1.00E-03	6.45E-04	6.45E-07		
2,6-Dinitrotoluene (2,6-DNT)	2.50E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.79E-07	1.00E-03	1.79E-04	1.79E-07		
Fluoranthene	2.10E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.50E-07	4.00E-02	3.76E-06	1.50E-07		
Pyrene	1.60E-02	5230	1.0	0.10	350	70	1.00E-06	70	25550	25550	1.15E-07	3.00E-02	3.82E-06	1.15E-07		
Selenium	1.80E+00	5230	1.0	0.01	350	70	1.00E-06	70	25550	25550	1.29E-06	5.00E-03	2.58E-04	1.29E-06		
												TOTAL HAZARD INDEX =	1.09E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-24-12

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

AT THE NORTHEAST BOUNDARY AREA

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE ADULT RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Cadmium	5.00E-01	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	2.77E-08	1.00E-03	2.77E-05	3.56E-09		
2,6-Dinitrotoluene (2,6-DNT)	2.50E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	1.38E-08	1.00E-03	1.38E-05	1.78E-09		
Fluoranthene	1.00E-02	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	5.53E-09	4.00E-02	1.38E-07	7.12E-10		
Pyrene	8.80E-03	2020	0.2	0.10	350	9	1.00E-06	70	3285	25550	4.87E-09	3.00E-02	1.62E-07	6.26E-10		
Selenium	1.20E+00	2020	0.2	0.01	350	9	1.00E-06	70	3285	25550	6.64E-08	5.00E-03	1.33E-05	8.54E-09		
												TOTAL HAZARD INDEX =	5.51E-05		TOTAL CANCER RISK =	0.00E+00

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TABLE C-24-13

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

AT THE NORTHEAST BOUNDARY AREA

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Cadmium	9.00E-01	200	350	6	1.00E-06	15	2190	25550	1.15E-05	1.00E-03	1.15E-02	9.86E-07		
2,6-Dinitrotoluene (2,6-DNT)	2.50E-02	200	350	6	1.00E-06	15	2190	25550	3.20E-07	1.00E-03	3.20E-04	2.74E-08		
Fluoranthene	2.10E-02	200	350	6	1.00E-06	15	2190	25550	2.68E-07	4.00E-02	6.71E-06	2.30E-08		
Pyrene	1.60E-02	200	350	6	1.00E-06	15	2190	25550	2.05E-07	3.00E-02	6.82E-06	1.75E-08		
Selenium	1.80E+00	200	350	6	1.00E-06	15	2190	25550	2.30E-05	5.00E-03	4.60E-03	1.97E-06		
										TOTAL HAZARD INDEX =	1.64E-02		TOTAL CANCER RISK =	0.00E+00

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TABLE C-24-14

MEAD OU3

INGESTION OF CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

AT THE NORTHEAST BOUNDARY AREA

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Cadmium	5.00E-01	100	350	6	1.00E-06	15	2190	25550	3.20E-06	1.00E-03	3.20E-03	2.74E-07		
2,6-Dinitrotoluene (2,6-DNT)	2.50E-02	100	350	6	1.00E-06	15	2190	25550	1.60E-07	1.00E-03	1.60E-04	1.37E-08		
Fluoranthene	1.00E-02	100	350	6	1.00E-06	15	2190	25550	6.39E-08	4.00E-02	1.60E-06	5.48E-09		
Pyrene	8.80E-03	100	350	6	1.00E-06	15	2190	25550	5.63E-08	3.00E-02	1.88E-06	4.82E-09		
Selenium	1.20E+00	100	350	6	1.00E-06	15	2190	25550	7.67E-06	5.00E-03	1.53E-03	6.58E-07		
										TOTAL HAZARD INDEX =	4.89E-03		TOTAL CANCER RISK =	0.00E+00

TABLE C-24-15

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)[1]	CANCER RISK (unitless)
Cadmium	9.00E-01	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	2.49E-06	1.00E-03	2.49E-03	2.14E-07		
2,6-Dinitrotoluene (2,6-DNT)	2.50E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	6.92E-07	1.00E-03	6.92E-04	5.93E-08		
Fluoranthene	2.10E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	5.81E-07	4.00E-02	1.45E-05	4.98E-08		
Pyrene	1.60E-02	4331	1.0	0.10	350	6	1.00E-06	15	2190	25550	4.43E-07	3.00E-02	1.48E-05	3.80E-08		
Selenium	1.80E+00	4331	1.0	0.01	350	6	1.00E-06	15	2190	25550	4.98E-06	5.00E-03	9.97E-04	4.27E-07		
												TOTAL HAZARD INDEX =	4.21E-03		TOTAL CANCER RISK =	0.00E+00

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TABLE C-24-16

MEAD OU3

DERMAL EXPOSURE TO CHEMICALS IN SURFACE SOIL (0 - 6 INCHES)

AT THE NORTHEAST BOUNDARY AREA

FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA

(HYPOTHETICAL ON-SITE 0-6 YEAR OLD CHILD RESIDENT - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy/yr)	AT2 (yr)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)[1]	CANCER RISK (unitless)
Cadmium	5.00E-01	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	1.19E-07	1.00E-03	1.19E-04	1.02E-08		
2,6-Dinitrotoluene (2,6-DNT)	2.50E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	5.97E-08	1.00E-03	5.97E-05	5.12E-09		
Fluoranthene	1.00E-02	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.39E-08	4.00E-02	5.97E-07	2.05E-09		
Pyrene	8.80E-03	1869	0.2	0.10	350	6	1.00E-06	15	2190	25550	2.10E-08	3.00E-02	7.01E-07	1.80E-09		
Selenium	1.20E+00	1869	0.2	0.01	350	6	1.00E-06	15	2190	25550	2.87E-07	5.00E-03	5.74E-05	2.46E-08		

TOTAL HAZARD INDEX = 2.38E-04 TOTAL CANCER RISK = 0.00E+00

TABLE C-25-1

MEAD OU3
INGESTION OF CHEMICALS IN SUBSURFACE SOIL[a]
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL FUTURE CONSTRUCTION WORKER - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
Aluminum	2.90E+04	480	130	1	1.00E-06	70	183	25550	1.41E-01	1.00E+00	1.41E-01	1.01E-03		
Cadmium	4.80E-01	480	130	1	1.00E-06	70	25550	25550	1.67E-08	1.00E-03	1.67E-05	1.67E-08		
Cobalt	1.50E+01	480	130	1	1.00E-06	70	25550	25550	5.23E-07	6.00E-02	8.72E-06	5.23E-07		
Vanadium	6.40E+01	480	130	1	1.00E-06	70	25550	25550	2.23E-06	7.00E-03	3.19E-04	2.23E-06		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	480	130	1	1.00E-06	70	25550	25550	9.77E-10	1.00E-02	9.77E-08	9.77E-10		
Benzo(g,h,i)perylene	8.30E-03	480	130	1	1.00E-06	70	25550	25550	2.90E-10			2.90E-10		
Fluoranthene	1.00E-02	480	130	1	1.00E-06	70	25550	25550	3.49E-10	4.00E-02	8.72E-09	3.49E-10		
Pyrene	8.90E-03	480	130	1	1.00E-06	70	25550	25550	3.11E-10	3.00E-01	1.04E-09	3.11E-10		
									TOTAL HAZARD INDEX =		1.42E-01	TOTAL CANCER RISK =		0.00E+00

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TABLE C-25-2

MEAD OU3
INGESTION OF CHEMICALS IN SUBSURFACE SOIL[a]
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL FUTURE CONSTRUCTION WORKER - AVERAGE EXPOSURE)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg/day soil)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg-day)^{-1}$	CANCER RISK (unitless)
Aluminum	2.40E+04	10	65	1	1.00E-06	70	91	25550	2.45E-03	1.00E+00	2.45E-03	8.72E-06		
Cadmium	3.60E-01	10	65	1	1.00E-06	70	91	25550	3.67E-08	1.00E-03	3.67E-05	1.31E-10		
Cobalt	1.30E+01	10	65	1	1.00E-06	70	91	25550	1.33E-06	6.00E-02	2.21E-05	4.72E-09		
Vanadium	5.50E+01	10	65	1	1.00E-06	70	91	25550	5.61E-06	7.00E-03	8.02E-04	2.00E-08		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	10	65	1	1.00E-06	70	91	25550	2.86E-09	1.00E-02	2.86E-07	1.02E-11		
Benzo(g,h,i)perylene	6.50E-03	10	65	1	1.00E-06	70	91	25550	6.63E-10			2.36E-12		
Fluoranthene	7.40E-03	10	65	1	1.00E-06	70	91	25550	7.55E-10	4.00E-02	1.89E-08	2.69E-12		
Pyrene	6.90E-03	10	65	1	1.00E-06	70	91	25550	7.04E-10	3.00E-01	2.35E-09	2.51E-12		
										TOTAL HAZARD INDEX =	3.31E-03		TOTAL CANCER RISK =	0.00E+00

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TAB[illegible] -25-3

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SUBSURFACE S[illegible]IL[a]
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL FUTURE CONSTRUCTION WORKER - RME)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	RME CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	2.90E+04	5230	1.0	0.01	130	1	1.00E-06	70	182.5	25550	1.54E-02	1.00E+00	1.54E-02	1.10E-04		
Cadmium	4.80E-01	5230	1.0	0.01	130	1	1.00E-06	70	182.5	25550	2.55E-07	1.00E-03	2.55E-04	1.82E-09		
Cobalt	1.50E+01	5230	1.0	0.01	130	1	1.00E-06	70	182.5	25550	7.98E-06	6.00E-02	1.33E-04	5.70E-08		
Vanadium	6.40E+01	5230	1.0	0.01	130	1	1.00E-06	70	182.5	25550	3.41E-05	7.00E-03	4.87E-03	2.43E-07		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	1.49E-07	1.00E-02	1.49E-05	1.06E-09		
Benzo(g,h,i)perylene	8.30E-03	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	4.42E-08			3.16E-10		
Fluoranthene	1.00E-02	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	5.32E-08	4.00E-02	1.33E-06	3.80E-10		
Pyrene	8.90E-03	5230	1.0	0.10	130	1	1.00E-06	70	182.5	25550	4.74E-08	3.00E-01	1.58E-07	3.38E-10		
												TOTAL HAZARD INDEX =	2.07E-02		TOTAL CANCER RISK =	0.00E+00

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TABLE C-25-4

MEAD OU3
DERMAL EXPOSURE TO CHEMICALS IN SUBSURFACE SOIL[a]
AT THE NORTHEAST BOUNDARY AREA
FORMER NEBRASKA ORDNANCE PLANT, MEAD, NEBRASKA
(HYPOTHETICAL FUTURE CONSTRUCTION WORKER - AVERAGE EXPOSURE)

Equation: CDI = (CS x SA x AD x AB x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Soil (mg/kg soil)
SA = Exposed Body Surface Area (cm^2)
AD = Soil Adherence to Skin (mg/cm^2)
AB = Percent Chemical Absorption Across Skin (unitless)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 =Averaging Time for Non-carcinogenic Effects (days)
AT2 =Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Average CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	2.40E+04	2020	0.2	0.01	65	1	1.00E-06	70	91	25550	9.89E-04	1.00E+00	9.89E-04	3.52E-06		
Cadmium	3.60E-01	2020	0.2	0.01	65	1	1.00E-06	70	91	25550	1.48E-08	1.00E-03	1.48E-05	5.29E-11		
Cobalt	1.30E+01	2020	0.2	0.01	65	1	1.00E-06	70	91	25550	5.36E-07	6.00E-02	8.93E-06	1.91E-09		
Vanadium	5.50E+01	2020	0.2	0.01	65	1	1.00E-06	70	91	25550	2.27E-06	7.00E-03	3.24E-04	8.08E-09		
2,6-Dinitrotoluene (2,6-DNT)	2.80E-02	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	1.15E-08	1.00E-02	1.15E-06	4.11E-11		
Benzo(g,h,i)perylene	6.50E-03	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	2.68E-09			9.54E-12		
Fluoranthene	7.40E-03	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	3.05E-09	4.00E-02	7.63E-08	1.09E-11		
Pyrene	6.90E-03	2020	0.2	0.10	65	1	1.00E-06	70	91	25550	2.84E-09	3.00E-01	9.48E-09	1.01E-11		
												TOTAL HAZARD INDEX =	1.34E-03		TOTAL CANCER RISK =	0.00E+00

Table C-26-1

Mead OU3
Ingestion of Chemicals In The Sediment From Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Sediment (mg/kg)
IR = Ingestion Rate (mg/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)⁻¹	CANCER RISK (unitless)
4-Methylphenol	1 54E-01	100	17	70	1 00E-06	70	25550	25550	1 02E-08	5 00E-03	2 05E-06	1 02E-08		
Di-n-butylphthalate	7 39E-01	100	17	70	1 00E-06	70	25550	25550	4 92E-08	1 00E-01	4 92E-07	4 92E-08		
Phenol	1 24E-01	100	17	70	1 00E-06	70	25550	25550	8 25E-09	6 00E-01	1 38E-08	8 25E-09		
bis(2-Ethylhexyl)phthalate (DEHP)	3 20E-02	100	17	70	1 00E-06	70	25550	25550	2 13E-09	2 00E-02	1 06E-07	2 13E-09	1 40E-02	2 98E-11
Octahydro-1 3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1 40E-02	100	17	70	1 00E-06	70	25550	25550	9 32E-10	5 00E-02	1 86E-08	9 32E-10		
Silver	2 70E+00	100	17	70	1 00E-06	70	25550	25550	1 80E-07	5 00E-03	3 59E-05	1 80E-07		
										TOTAL HAZARD INDEX =	3.86E-05		TOTAL CANCER RISK =	2.98E-11

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Table C-26-2

Mead OU3
Ingestion of Chemicals In The Sediment From Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Sediment (mg/kg)
IR = Ingestion Rate (mg/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
4-Methylphenol	1 54E-01	10	4	9	1 00E-06	70	3285	25550	2 41E-10	5 00E-03	4 82E-08	3 10E-11		
Di-n-butylphthalate	7 39E-01	10	4	9	1 00E-06	70	3285	25550	1 16E-09	1 00E-01	1 16E-08	1 49E-10		
Phenol	1 24E-01	10	4	9	1 00E-06	70	3285	25550	1 94E-10	6 00E-01	3 24E-10	2 50E-11		
bis(2-Ethylhexyl)phthalate (DEHP)	3 20E-02	10	4	9	1 00E-06	70	3285	25550	5 01E-11	2 00E-02	2 50E-09	6 44E-12	1 40E-02	9 02E-14
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1 40E-02	10	4	9	1 00E-06	70	3285	25550	2 19E-11	5 00E-02	4 38E-10	2 82E-12		
Silver	2 70E+00	10	4	9	1 00E-06	70	3285	25550	4 23E-09	5 00E-03	8 45E-07	5 43E-10		
										TOTAL HAZARD INDEX =	9 08E-07		TOTAL CANCER RISK =	9 02E-14

Table C-26-3

Mead OU3
Dermal Exposure To Chemicals In The Sediment From Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - RME)

Equation: CDI = (CS x SA x AF x ABS x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact
AD = Dermal Soil Adherence Factor
AB = Absorption Factor = 1 0% for organics and 0 1% for inorganics
EF = Exposure Frequency
ED = Exposure Duration
BW = Body Weight
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
4-Methylphenol	1 54E-01	8,620	1.00	0 10	17	70	1 00E-06	70	25,550	25,550	8 83E-08	5 00E-03	1 77E-05	8 83E-08		
Di-n-butylphthalate	7 39E-01	8 620	1 00	0 10	17	70	1 00E-06	70	25550	25,550	4 24E-07	1 00E-01	4 24E-06	4 24E-07		
Phenol	1.24E-01	8 620	1 00	0 10	17	70	1 00E-06	70	25550	25 550	7 11E-08	6 00E-01	1 19E-07	7 11E-08		
bis(2-Ethylhexyl)phthalate (DEHP)	3 20E-02	8 620	1 00	0 10	17	70	1 00E-06	70	25550	25 550	1 84E-08	2 00E-02	9 18E-07	1 84E-08	1 40E-02	2 57E-10
Octahydro-1 3 5 7-tetranitro-1 3,5,7-tetrazocine (HMX)	1.40E-02	8 620	1 00	0 10	17	70	1 00E-06	70	25550	25,550	8.03E-09	5 00E-02	1 61E-07	8.03E-09		
Silver	2 70E+00	8 620	1 00	0 01	17	70	1 00E-06	70	25550	25 550	1 55E-07	5 00E-03	3.10E-05	1.55E-07		
												HAZARD INDEX =	5 41E-05	TOTAL CANCER RISK =		2 57E-10

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Table C-26-4

Mead OU3
Dermal Exposure To Chemicals In The Sediment From Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - Average Exposure)

Equation: CDI = (CS x SA x AF x ABS x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact
AD = Dermal Soil Adherence Factor
AB = Absorption Factor = 1.0% for organics and 0.1% for inorganics
EF = Exposure Frequency
ED = Exposure Duration
BW = Body Weight
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
4-Methylphenol	1.54E-01	2,800	0.20	0.10	4	9	1.00E-06	70	3,285	25,550	1.35E-09	5.00E-03	2.70E-07	1.74E-10		
Di-n-butylphthalate	7.39E-01	2,800	0.20	0.10	4	9	1.00E-06	70	3285	25,550	6.48E-09	1.00E-01	6.48E-08	8.33E-10		
Phenol	1.24E-01	2,800	0.20	0.10	4	9	1.00E-06	70	3285	25,550	1.09E-09	6.00E-01	1.81E-09	1.40E-10		
bis(2-Ethylhexyl)phthalate (DEHP)	3.20E-02	2,800	0.20	0.10	4	9	1.00E-06	70	3285	25,550	2.81E-10	2.00E-02	1.40E-08	3.61E-11	1.40E-02	5.05E-13
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.40E-02	2,800	0.20	0.10	4	9	1.00E-06	70	3285	25,550	1.23E-10	5.00E-02	2.45E-09	1.58E-11		
Silver	2.70E+00	2,800	0.20	0.01	4	9	1.00E-06	70	3285	25,550	2.37E-09	5.00E-03	4.73E-07	3.04E-10		
												HAZARD INDEX =	8.27E-07		TOTAL CANCER RISK =	5.05E-13

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Table C-26-5

Mead OU3
Ingestion of Chemicals In The Water From Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - RME)

Equation: CDI = (CW x CR x ET x EF x ED)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
CR = Contact Rate (liters/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects. Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	CR (l/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Hexahydro-1 2 3-trinitro-1 2 3-triazine (RDX)	1 80E-03	5 00E-03	2	17	70	70	25,550	25,550	1 20E-08	3 00E-03	3 99E-06	1 20E-08	0 11	1 32E-09
Octahydro-1 3 5 7-tetranitro-1,3,5,7-tetrazocine (HMX)	5 40E-04	5 00E-03	2	17	70	70	25550	25,550	3 59E-09	5 00E-02	7 19E-08	3 59E-09		
Aluminum	2 10E+01	5 00E-03	2	17	70	70	25550	25,550	1 40E-04	1 00E+00	1 40E-04	1 40E-04		
Arsenic	1 12E-02	5 00E-03	2	17	70	70	25550	25,550	7 45E-08	3 00E-04	2 48E-04	7 45E-08	1 50E+00	1 12E-07
Barium	4 60E-01	5 00E-03	2	17	70	70	25550	25,550	3 06E-06	7 00E-02	4 37E-05	3 06E-06		
Beryllium	1 30E-03	5 00E-03	2	17	70	70	25550	25,550	8 65E-09	5 00E-03	1 73E-06	8 65E-09	4 30E+00	3 72E-08
Cobalt	1 10E-02	5 00E-03	2	17	70	70	25550	25,550	7 32E-08	6 00E-02	1 22E-06	7 32E-08		
Iron	1 80E+01	5 00E-03	2	17	70	70	25550	25,550	1 20E-04			1 20E-04		
Mercury	8 80E-04	5 00E-03	2	17	70	70	25550	25,550	5 86E-09	3 00E-04	1 95E-05	5 86E-09		
Nickel	1 29E-01	5 00E-03	2	17	70	70	25550	25,550	8 58E-07	2 00E-02	4 29E-05	8 58E-07		
Thallium	1 67E-02	5 00E-03	2	17	70	70	25550	25,550	1 11E-07	8 00E-05	1 39E-03	1 11E-07		
Vanadium	4 30E-02	5 00E-03	2	17	70	70	25550	25,550	2 86E-07	7 00E-03	4 09E-05	2 86E-07		
Toluene	1 30E-03	5 00E-03	2	17	70	70	25550	25,550	8 65E-09	2 00E-01	4 32E-08	8 65E-09		
Trichloroethene (TCE)	6 92E-03	5 00E-03	2	17	70	70	25550	25,550	4 60E-08	6 00E-03	7 67E-06	4 60E-08	1 10E-02	5 06E-10
										HAZARD INDEX =	1 94E-03		TOTAL CANCER RISK =	1 51E-07

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Table C-26-6

Mead OU3
Ingestion of Chemicals In The Water From Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - Average Exposure)

Equation: CDI = (CW x CR x ET x EF x ED)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
CR = Contact Rate (liters/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	CR (l/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Hexahydro-1 2 3-trinitro-1,2,3-triazine (RDX)	1.80E-03	2 50E-03	1	4	9	70	3,285	25,550	7 05E-10	3.00E-03	2 35E-07	9.06E-11	0 11	9 96E-12
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	5.40E-04	2.50E-03	1	4	9	70	3285	25,550	2 11E-10	5.00E-02	4 23E-09	2 72E-11		
Aluminum	2 10E+01	2.50E-03	1	4	9	70	3285	25.550	8 22E-06	1 00E+00	8 22E-06	1 06E-06		
Arsenic	1 12E-02	2 50E-03	1	4	9	70	3285	25 550	4 38E-09	3 00E-04	1 46E-05	5 64E-10	1 50E+00	8 45E-10
Barium	4 60E-01	2 50E-03	1	4	9	70	3285	25.550	1 80E-07	7 00E-02	2 57E-06	2 31E-08		
Beryllium	1 30E-03	2 50E-03	1	4	9	70	3285	25,550	5 09E-10	5 00E-03	1 02E-07	6 54E-11	4 30E+00	2 81E-10
Cobalt	1 10E-02	2 50E-03	1	4	9	70	3285	25 550	4 31E-09	6 00E-02	7 18E-08	5 54E-10		
Iron	1 80E+01	2.50E-03	1	4	9	70	3285	25,550	7.05E-06			9.06E-07		
Mercury	8 80E-04	2.50E-03	1	4	9	70	3285	25,550	3.44E-10	3 00E-04	1 15E-06	4.43E-11		
Nickel	1.29E-01	2.50E-03	1	4	9	70	3285	25,550	5 05E-08	2 00E-02	2 52E-06	6 49E-09		
Thallium	1.67E-02	2 50E-03	1	4	9	70	3285	25,550	6 54E-09	8 00E-05	8 17E-05	8 40E-10		
Vanadium	4.30E-02	2 50E-03	1	4	9	70	3285	25,550	1 68E-08	7 00E-03	2 40E-06	2 16E-09		
Toluene	1 30E-03	2 50E-03	1	4	9	70	3285	25.550	5 09E-10	2.00E-01	2 54E-09	6 54E-11		
Trichloroethene (TCE)	6 92E-03	2 50E-03	1	4	9	70	3285	25 550	2 71E-09	6 00E-03	4 51E-07	3 48E-10	1 10E-02	3 83E-12
										HAZARD INDEX =	1 14E-04		TOTAL CANCER RISK =	1 14E-09

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Table C-26-7

Mead OU3
Dermal Exposure To Chemicals In The Water From Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - RME)

Equation: CDI = (CW x SA x PC x ET x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Chemical-specific Dermal Permeability Constant (cm/hr)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	SA (cm^2)	PC (cm/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	CF (l/cm^3)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (ng/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Hexahydro-1 2 3-trinitro-1,2,3-triazine (RDX)	1 80E-03	8,620	3 50E-04	2	17	70	1 00E-03	70	25,550	25,550	7 23E-09	3 00E-03	2 41E-06	7 23E-09	0 11	7 95E-10
Octahydro-1 3,5,7-tetranitro-1 3,5,7-tetrazocine (HMX)	5.40E-04	8,620	3 48E-04	2	17	70	1 00E-03	70	25550	25,550	2 16E-09	5 00E-02	4 31E-08	2 16E-09		
Aluminum	2 10E+01	8,620	1 00E-03	2	17	70	1 00E-03	70	25550	25,550	2 41E-04	1 00E+00	2 41E-04	2 41E-04		
Arsenic	1.12E-02	8,620	1 00E-03	2	17	70	1 00E-03	70	25550	25,550	1 28E-07	3 00E-04	4 28E-04	1 28E-07	1 50E+00	1 93E-07
Barium	4 60E-01	8 620	1 00E-03	2	17	70	1 00E-03	70	25550	25,550	5 28E-06	7 00E-02	7 54E-05	5 28E-06		
Beryllium	1 30E-03	8 620	1 00E-03	2	17	70	1 00E-03	70	25550	25 550	1 49E-08	5 00E-03	2 98E-06	1 49E-08	4 30E+00	6 41E-08
Cobalt	1 10E-02	8,620	1 00E-03	2	17	70	1 00E-03	70	25550	25,550	1 26E-07	6 00E-02	2 10E-06	1 26E-07		
Iron	1 80E+01	8,620	1 00E-03	2	17	70	1 00E-03	70	25550	25,550	2 06E-04			2 06E-04		
Mercury	8 80E-04	8 620	1 00E-03	2	17	70	1 00E-03	70	25550	25 550	1 01E-08	3 00E-04	3 36E-05	1 01E-08		
Nickel	1 29E-01	8,620	1 00E-03	2	17	70	1 00E-03	70	25550	25,550	1 48E-06	2 00E-02	7 40E-05	1 48E-06		
Thallium	1 67E-02	8,620	1 00E-03	2	17	70	1 00E-03	70	25550	25,550	1 92E-07	8 00E-05	2 39E-03	1 92E-07		
Vanadium	4 30E-02	8,620	1 00E-03	2	17	70	1 00E-03	70	25550	25,550	4 93E-07	7 00E-03	7 05E-05	4 93E-07		
Toluene	1 30E-03	8,620	1 60E-02	2	17	70	1 00E-03	70	25550	25,550	2 39E-07	2 00E-01	1 19E-06	2 39E-07		
Trichloroethene (TCE)	6 92E-03	8 620	1 60E-02	2	17	70	1 00E-03	70	25550	25 550	1 27E-06	6 00E-03	2 12E-04	1 27E-06	1 10E-02	1 40E-08
												HAZARD INDEX =	3 54E-03		TOTAL CANCER RISK =	2 72E-07

Table C-26-8

Mead OU3
Dermal Exposure To Chemicals In The Water From Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - Average Exposure)

Equation: CDI = (CW x SA x PC x ET x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Chemical-specific Dermal Permeability Constant (cm/hr)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	SA (cm^2)	PC (cm/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	CF (l/cm3)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Hexahydro-1,2,3-trinitro-1,2,3-triazine (RDX)	1.80E-03	2,800	3.50E-04	1	4	9	1.00E-03	70	3,285	25,550	2.76E-10	3.00E-03	9.21E-08	3.55E-11	1.10E-01	3.91E-12
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	5.40E-04	2,800	3.48E-04	1	4	9	1.00E-03	70	3285	25,550	8.24E-11	5.00E-02	1.65E-09	1.06E-11		
Aluminum	2.10E+01	2,800	1.00E-03	1	4	9	1.00E-03	70	3285	25,550	9.21E-06	1.00E+00	9.21E-06	1.18E-06		
Arsenic	1.12E-02	2,800	1.00E-03	1	4	9	1.00E-03	70	3285	25,550	4.91E-09	3.00E-04	1.64E-05	6.31E-10	1.50E+00	9.47E-10
Barium	4.60E-01	2,800	1.00E-03	1	4	9	1.00E-03	70	3285	25,550	2.02E-07	7.00E-02	2.88E-06	2.59E-08		
Beryllium	1.30E-03	2,800	1.00E-03	1	4	9	1.00E-03	70	3285	25,550	5.70E-10	5.00E-03	1.14E-07	7.33E-11	4.30E+00	3.15E-10
Cobalt	1.10E-02	2,800	1.00E-03	1	4	9	1.00E-03	70	3285	25,550	4.82E-09	6.00E-02	8.04E-08	6.20E-10		
Iron	1.80E+01	2,800	1.00E-03	1	4	9	1.00E-03	70	3285	25,550	7.89E-06			1.01E-06		
Mercury	8.80E-04	2,800	1.00E-03	1	4	9	1.00E-03	70	3285	25,550	3.86E-10	3.00E-04	1.29E-06	4.96E-11		
Nickel	1.29E-01	2,800	1.00E-03	1	4	9	1.00E-03	70	3285	25,550	5.65E-08	2.00E-02	2.83E-06	7.27E-09		
Thallium	1.67E-02	2,800	1.00E-03	1	4	9	1.00E-03	70	3285	25,550	7.32E-09	8.00E-05	9.15E-05	9.41E-10		
Vanadium	4.30E-02	2,800	1.00E-03	1	4	9	1.00E-03	70	3285	25,550	1.88E-08	7.00E-03	2.69E-06	2.42E-09		
Toluene	1.30E-03	2,800	1.60E-02	1	4	9	1.00E-03	70	3285	25,550	9.12E-09	2.00E-01	4.56E-08	1.17E-09		
Trichloroethene (TCE)	6.92E-03	2,800	1.60E-02	1	4	9	1.00E-03	70	3285	25,550	4.85E-08	6.00E-03	8.09E-06	6.24E-09	1.10E-02	6.86E-11
												HAZARD INDEX =	1.35E-04		TOTAL CANCER RISK =	1.33E-09

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Table C-26-9

Mead OU3
Ingestion of Fish Caught At Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - RME)

Equation: CDI =(CF x IR x FI x EF x ED)/(BW x AT)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chemical Daily Intake (mg/kg-day)
CF = Chemical Concentration in Fish Tissue (mg/kg)
IR = Ingestion Rate (kg/day)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Estimated CF (mg/kg)	IR (kg/dy)	FI (unitless)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Hexahydro-1,2,3-trinitro-1,2,3-triazine (RDX)	1.19E-04	0.025	0.2	365	70	70	25,550	25,550	8.49E-09	3.00E-03	2.83E-06	8.49E-09	1.10E-01	9.33E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.16E-05	0.025	0.2	365	70	70	25,550	25,550	8.32E-10	5.00E-02	1.66E-08	8.32E-10		
Aluminum	9.24E+02	0.025	0.2	365	70	70	25,550	25,550	6.60E-02	1.00E+00	6.60E-02	6.60E-02		
Arsenic	4.93E-01	0.025	0.2	365	70	70	25,550	25,550	3.52E-05	3.00E-04	1.17E-01	3.52E-05	1.50E+00	5.28E-05
Barium	2.02E+01	0.025	0.2	365	70	70	25,550	25,550	1.45E-03	7.00E-02	2.07E-02	1.45E-03		
Beryllium	5.72E-02	0.025	0.2	365	70	70	25,550	25,550	4.09E-06	5.00E-03	8.17E-04	4.09E-06	4.30E+00	1.76E-05
Cobalt	4.84E-01	0.025	0.2	365	70	70	25,550	25,550	3.46E-05	6.00E-02	5.76E-04	3.46E-05		
Iron	7.92E+02	0.025	0.2	365	70	70	25,550	25,550	5.66E-02			5.66E-02		
Mercury	4.84E+00	0.025	0.2	365	70	70	25,550	25,550	3.46E-04	3.00E-04	1.15E+00	3.46E-04		
Nickel	5.68E+00	0.025	0.2	365	70	70	25,550	25,550	4.05E-04	2.00E-02	2.03E-02	4.05E-04		
Thallium	7.35E-01	0.025	0.2	365	70	70	25,550	25,550	5.25E-05	8.00E-05	6.56E-01	5.25E-05		
Vanadium	1.89E+00	0.025	0.2	365	70	70	25,550	25,550	1.35E-04	7.00E-03	1.93E-02	1.35E-04		
Toluene	4.54E-02	0.025	0.2	365	70	70	25,550	25,550	3.24E-06	2.00E-01	1.62E-05	3.24E-06		
Trichloroethene (TCE)	1.25E-03	0.025	0.2	365	70	70	25,550	25,550	8.96E-08	6.00E-03	1.49E-05	8.96E-08	0.011	9.86E-10
										HAZARD INDEX =	2.05E+00		TOTAL CANCER RISK =	7.04E-05

Table C-26-10

Mead OU3
Ingestion of Fish Caught At Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - Average Exposure)

Equation: CDI =(CF x IR x FI x EF x ED)/(BW x AT)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chemical Daily Intake (mg/kg-day)
CF = Chemical Concentration in Fish Tissue (mg/kg)
IR = Ingestion Rate (kg/day)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Estimated CF (mg/kg)	IR (kg/dy)	FI (unitless)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)$^{-1}$	CANCER RISK (unitless)
Hexahydro-1,2,3-trinitro-1,2,3-triazine (RDX)	1.19E-04	0.008	0.1	365	9	70	3,285	25,550	1.36E-09	3.00E-03	4.53E-07	1.75E-10	1.10E-01	1.92E-11
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.16E-05	0.008	0.1	365	9	70	3,285	25,550	1.33E-10	5.00E-02	2.66E-09	1.71E-11		
Aluminum	9.24E+02	0.008	0.1	365	9	70	3,285	25,550	1.06E-02	1.00E+00	1.06E-02	1.36E-03		
Arsenic	4.93E-01	0.008	0.1	365	9	70	3,285	25,550	5.63E-06	3.00E-04	1.88E-02	7.24E-07	1.50E+00	1.09E-06
Barium	2.02E+01	0.008	0.1	365	9	70	3,285	25,550	2.31E-04	7.00E-02	3.30E-03	2.97E-05		
Beryllium	5.72E-02	0.008	0.1	365	9	70	3,285	25,550	6.54E-07	5.00E-03	1.31E-04	8.40E-08	4.30E+00	3.61E-07
Cobalt	4.84E-01	0.008	0.1	365	9	70	3,285	25,550	5.53E-06	6.00E-02	9.22E-05	7.11E-07		
Iron	7.92E+02	0.008	0.1	365	9	70	3,285	25,550	9.05E-03			1.16E-03		
Mercury	4.84E+00	0.008	0.1	365	9	70	3,285	25,550	5.53E-05	3.00E-04	1.84E-01	7.11E-06		
Nickel	5.68E+00	0.008	0.1	365	9	70	3,285	25,550	6.49E-05	2.00E-02	3.24E-03	8.34E-06		
Thallium	7.35E-01	0.008	0.1	365	9	70	3,285	25,550	8.40E-06	8.00E-05	1.05E-01	1.08E-06		
Vanadium	1.89E+00	0.008	0.1	365	9	70	3,285	25,550	2.16E-05	7.00E-03	3.09E-03	2.78E-06		
Toluene	4.54E-02	0.008	0.1	365	9	70	3,285	25,550	5.18E-07	2.00E-01	2.59E-06	6.67E-08		
Trichloroethene (TCE)	1.25E-03	0.008	0.1	365	9	70	3,285	25,550	1.43E-08	6.00E-03	2.39E-06	1.84E-09	0.011	2.03E-11
										HAZARD INDEX =	3.29E-01	TOTAL CANCER RISK =		1.45E-06

Table C-26-11

Mead OU3
Ingestion of Chemicals In The Sediment From Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Sediment (mg/kg)
IR = Ingestion Rate (mg/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
4-Methylphenol	1.54E-01	200	17	6	1.00E-06	15	2190	25550	9.56E-08	5.00E-03	1.91E-05	8.20E-09		
Di-n-butylphthalate	7.39E-01	200	17	6	1.00E-06	15	2190	25550	4.59E-07	1.00E-01	4.59E-06	3.93E-08		
Phenol	1.24E-01	200	17	6	1.00E-06	15	2190	25550	7.70E-08	6.00E-01	1.28E-07	6.60E-09		
bis(2-Ethylhexyl)phthalate (DEHP)	3.20E-02	200	17	6	1.00E-06	15	2190	25550	1.99E-08	2.00E-02	9.94E-07	1.70E-09	1.40E-02	2.38E-11
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.40E-02	200	17	6	1.00E-06	15	2190	25550	8.69E-09	5.00E-02	1.74E-07	7.45E-10		
Silver	2.70E+00	200	17	6	1.00E-06	15	2190	25550	1.68E-06	5.00E-03	3.35E-04	1.44E-07		
										TOTAL HAZARD INDEX =	3.60E-04		TOTAL CANCER RISK =	2.38E-11

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Table C-26-12

Mead OU3
Ingestion of Chemicals In The Sediment From Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Sediment (mg/kg)
IR = Ingestion Rate (mg/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
4-Methylphenol	1 54E-01	100	4	6	1 00E-06	15	2190	25550	1 13E-08	5 00E-03	2 25E-06	9 64E-10		
Di-n-butylphthalate	7 39E-01	100	4	6	1 00E-06	15	2190	25550	5 40E-08	1 00E-01	5 40E-07	4 63E-09		
Phenol	1 24E-01	100	4	6	1 00E-06	15	2190	25550	9 06E-09	6 00E-01	1 51E-08	7 77E-10		
bis(2-Ethylhexyl)phthalate (DEHP)	3 20E-02	100	4	6	1 00E-06	15	2190	25550	2 34E-09	2 00E-02	1 17E-07	2 00E-10	1 40E-02	2 81E-12
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1 40E-02	100	4	6	1 00E-06	15	2190	25550	1 02E-09	5 00E-02	2 05E-08	8 77E-11		
Silver	2 70E+00	100	4	6	1 00E-06	15	2190	25550	1 97E-07	5 00E-03	3 95E-05	1 69E-08		
										TOTAL HAZARD INDEX =	4 24E-05		TOTAL CANCER RISK =	2 81E-12

Table C-26-13

Mead OU3
Dermal Exposure To Chemicals In The Sediment From Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - RME)

Equation: CDI = (CS x SA x AF x ABS x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact
AD = Dermal Soil Adherence Factor
AB = Absorption Factor = 1.0% for organics and 0.1% for inorganics
EF = Exposure Frequency
ED = Exposure Duration
BW = Body Weight
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
4-Methylphenol	1.54E-01	6,500	1.00	0.10	17	6	1.00E-06	15	2,190	25,550	3.11E-07	5.00E-03	6.22E-05	2.66E-08		
Di-n-butylphthalate	7.39E-01	6,500	1.00	0.10	17	6	1.00E-06	15	2190	25,550	1.49E-06	1.00E-01	1.49E-05	1.28E-07		
Phenol	1.24E-01	6,500	1.00	0.10	17	6	1.00E-06	15	2190	25,550	2.50E-07	6.00E-01	4.17E-07	2.15E-08		
bis(2-Ethylhexyl)phthalate (DEHP)	3.20E-02	6,500	1.00	0.10	17	6	1.00E-06	15	2190	25,550	6.46E-08	2.00E-02	3.23E-06	5.54E-09	1.40E-02	7.75E-11
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.40E-02	6,500	1.00	0.10	17	6	1.00E-06	15	2190	25,550	2.83E-08	5.00E-02	5.65E-07	2.42E-09		
Silver	2.70E+00	6,500	1.00	0.01	17	6	1.00E-06	15	2190	25,550	5.45E-07	5.00E-03	1.09E-04	4.67E-08		
												HAZARD INDEX =	1.90E-04		TOTAL CANCER RISK =	7.75E-11

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Table C-26-14

Mead OU3
Dermal Exposure To Chemicals In The Sediment From Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - Average Exposure)

Equation CDI = (CS x SA x AF x ABS x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact
AD = Dermal Soil Adherence Factor
AB = Absorption Factor = 1.0% for organics and 0.1% for inorganics
EF = Exposure Frequency
ED = Exposure Duration
BW = Body Weight
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects. Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
4-Methylphenol	1.54E-01	1,800	0.20	0.10	4	6	1.00E-06	15	2,190	25,550	4.05E-09	5.00E-03	8.10E-07	3.47E-10		
Di-n-butylphthalate	7.39E-01	1,800	0.20	0.10	4	6	1.00E-06	15	2190	25,550	1.94E-08	1.00E-01	1.94E-07	1.67E-09		
Phenol	1.24E-01	1,800	0.20	0.10	4	6	1.00E-06	15	2190	25,550	3.26E-09	6.00E-01	5.44E-09	2.80E-10		
bis(2-Ethylhexyl)phthalate (DEHP)	3.20E-02	1,800	0.20	0.10	4	6	1.00E-06	15	2190	25,550	8.42E-10	2.00E-02	4.21E-08	7.21E-11	1.40E-02	1.01E-12
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.40E-02	1,800	0.20	0.10	4	6	1.00E-06	15	2190	25,550	3.68E-10	5.00E-02	7.36E-09	3.16E-11		
Silver	2.70E+00	1,800	0.20	0.01	4	6	1.00E-06	15	2190	25,550	7.10E-09	5.00E-03	1.42E-06	6.09E-10		
												HAZARD INDEX =	2.48E-06		TOTAL CANCER RISK =	1.01E-12

Table C-26-15

Mead OU3
Ingestion of Chemicals In The Water From Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - RME)

Equation: CDI = (CW x CR x ET x EF x ED)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
CR = Contact Rate (liters/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	CR (l/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Hexahydro-1 2 3-trinitro-1 2 3-triazine (RDX)	1.80E-03	5.00E-03	6	17	6	15	2,190	25,550	1.68E-07	3.00E-03	5.59E-05	1.44E-08	0.11	1.58E-09
Octahydro-1 3 5 7-tetranitro-1 3 5 7-tetrazocine (HMX)	5.40E-04	5.00E-03	6	17	6	15	2190	25,550	5.03E-08	5.00E-02	1.01E-06	4.31E-09		
Aluminum	2.10E+01	5.00E-03	6	17	6	15	2190	25,550	1.96E-03	1.00E+00	1.96E-03	1.68E-04		
Arsenic	1.12E-02	5.00E-03	6	17	6	15	2190	25,550	1.04E-06	3.00E-04	3.48E-03	8.94E-08	1.50E+00	1.34E-07
Barium	4.60E-01	5.00E-03	6	17	6	15	2190	25,550	4.28E-05	7.00E-02	6.12E-04	3.67E-06		
Beryllium	1.30E-03	5.00E-03	6	17	6	15	2190	25,550	1.21E-07	5.00E-03	2.42E-05	1.04E-08	4.30E+00	4.46E-08
Cobalt	1.10E-02	5.00E-03	6	17	6	15	2190	25,550	1.02E-06	6.00E-02	1.71E-05	8.78E-08		
Iron	1.80E+01	5.00E-03	6	17	6	15	2190	25,550	1.68E-03			1.44E-04		
Mercury	8.80E-04	5.00E-03	6	17	6	15	2190	25,550	8.20E-08	3.00E-04	2.73E-04	7.03E-09		
Nickel	1.29E-01	5.00E-03	6	17	6	15	2190	25,550	1.20E-05	2.00E-02	6.01E-04	1.03E-06		
Thallium	1.67E-02	5.00E-03	6	17	6	15	2190	25,550	1.56E-06	8.00E-05	1.94E-02	1.33E-07		
Vanadium	4.30E-02	5.00E-03	6	17	6	15	2190	25,550	4.01E-06	7.00E-03	5.72E-04	3.43E-07		
Toluene	1.30E-03	5.00E-03	6	17	6	15	2190	25,550	1.21E-07	2.00E-01	6.05E-07	1.04E-08		
Trichloroethene (TCE)	6.92E-03	5.00E-03	6	17	6	15	2190	25,550	6.45E-07	6.00E-03	1.07E-04	5.53E-08	1.10E-02	6.08E-10
										HAZARD INDEX =	2.71E-02		TOTAL CANCER RISK =	1.81E-07

Table C-26-16

Mead OU3
Ingestion of Chemicals In The Water From Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - Average Exposure)

Equation: CDI = (CW x CR x ET x EF x ED)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
CR = Contact Rate (liters/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	CR (l/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Hexahydro-1,2,3-trinitro-1,2,3-triazine (RDX)	1 80E-03	2 50E-03	3	4	6	15	2,190	25,550	9 86E-09	3 00E-03	3 29E-06	8 45E-10	0 11	9 30E-11
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	5 40E-04	2 50E-03	3	4	6	15	2190	25,550	2 96E-09	5 00E-02	5 92E-08	2 54E-10		
Aluminum	2 10E+01	2 50E-03	3	4	6	15	2190	25,550	1 15E-04	1 00E+00	1 15E-04	9 86E-06		
Arsenic	1 12E-02	2 50E-03	3	4	6	15	2190	25,550	6 14E 08	3 00E-04	2 05E-04	5 26E-09	1 50E+00	7 89E-09
Barium	4 60E-01	2 50E-03	3	4	6	15	2190	25,550	2 52E 06	7 00E-02	3 60E-05	2 16E-07		
Beryllium	1 30E-03	2 50E-03	3	4	6	15	2190	25,550	7 12E 09	5 00E-03	1 42E-06	6 11E-10	4 30E+00	2 63E-09
Cobalt	1 10E-02	2 50E-03	3	4	6	15	2190	25,550	6 03E 08	6 00E-02	1 00E-06	5 17E-09		
Iron	1 80E+01	2 50E-03	3	4	6	15	2190	25,550	9 86E 05			8 45E-06		
Mercury	8 80E-04	2 50E-03	3	4	6	15	2190	25,550	4 82E-09	3 00E-04	1 61E-05	4 13E-10		
Nickel	1 29E-01	2 50E-03	3	4	6	15	2190	25,550	7 07E-07	2 00E-02	3 53E-05	6 06E-08		
Thallium	1 67E-02	2 50E-03	3	4	6	15	2190	25,550	9 15E-08	8 00E-05	1 14E-03	7 84E-09		
Vanadium	4 30E-02	2 50E-03	3	4	6	15	2190	25,550	2 36E-07	7 00E-03	3 37E-05	2 02E-08		
Toluene	1 30E-03	2 50E-03	3	4	6	15	2190	25,550	7 12E-09	2 00E-01	3 56E-08	6 11E-10		
Trichloroethene (TCE)	6 92E-03	2 50E-03	3	4	6	15	2190	25,550	3 79E 08	6 00E-03	6 32E-06	3 25E-09	1 10E-02	3 58E-11
										HAZARD INDEX =	1 60E-03		TOTAL CANCER RISK =	1 06E-08

Table C-26-17

Mead OU3
Dermal Exposure To Chemicals In The Water From Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - RME)

Equation: CDI = (CW x SA x PC x ET x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where
CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Chemical-specific Dermal Permeability Constant (cm/hr)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	SA (cm^2)	PC (cm/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	CF (l/cm3)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)[1]	CANCER RISK (unitless)
Hexahydro-1 2 3-trinitro-1,2,3-triazine (RDX)	1 80E-03	6,500	3 50E-04	6	17	6	1 00E-03	15	2,190	25,550	7 63E-08	3 00E-03	2 54E-05	6 54E-09	0 11	7 19E-10
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	5 40E-04	6,500	3.48E-04	6	17	6	1 00E-03	15	2190	25,550	2 28E-08	5 00E-02	4 55E-07	1.95E-09		
Aluminum	2.10E+01	6,500	1 00E-03	6	17	6	1 00E-03	15	2190	25,550	2 54E-03	1 00E+00	2 54E-03	2 18E-04		
Arsenic	1 12E-02	6 500	1 00E-03	6	17	6	1 00E-03	15	2190	25,550	1 36E-06	3 00E-04	4 52E-03	1.16E-07	1 50E+00	1 74E-07
Barium	4 60E-01	6,500	1 00E-03	6	17	6	1 00E-03	15	2190	25,550	5 57E-05	7 00E-02	7 96E-04	4 77E-06		
Beryllium	1 30E-03	6 500	1 00E-03	6	17	6	1 00E-03	15	2190	25,550	1 57E-07	5 00E-03	3 15E-05	1 35E-08	4 30E+00	5 80E-08
Cobalt	1 10E-02	6 500	1.00E-03	6	17	6	1 00E-03	15	2190	25,550	1 33E-06	6 00E-02	2 22E-05	1 14E-07		
Iron	1 80E+01	6,500	1.00E-03	6	17	6	1 00E-03	15	2190	25,550	2 18E-03			1 87E-04		
Lead	1 60E-02	6,500	1 00E-03	6	17	6	1 00E-03	15	2190	25,550	1 94E-06			1 66E-07		
Mercury	8 80E-04	6,500	1 00E-03	6	17	6	1 00E-03	15	2190	25,550	1 07E-07	3 00E-04	3 55E-04	9 13E-09		
Nickel	1 29E-01	6,500	1 00E-03	6	17	6	1 00E-03	15	2190	25,550	1 56E-05	2 00E-02	7 81E-04	1 34E-06		
Thallium	1 67E-02	6 500	1 00E-03	6	17	6	1 00E-03	15	2190	25 550	2 02E-06	8 00E-05	2 53E-02	1 73E-07		
Vanadium	4 30E-02	6 500	1 00E-03	6	17	6	1 00E-03	15	2190	25 550	5 21E-06	7 00E-03	7 44E-04	4 46E-07		
Toluene	1 30E-03	6 500	1 60E-02	6	17	6	1 00E-03	15	2190	25,550	2 52E-06	2 00E-01	1 26E-05	2.16E-07		
Trichloroethene (TCE)	6 92E-03	6 500	1 60E-02	6	17	6	1 00E-03	15	2190	25,550	1 34E-05	6 00E-03	2 23E-03	1 15E-06	1 10E-02	1 26E-08
												HAZARD INDEX =	3 73E-02		TOTAL CANCER RISK =	2 46E-07

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Table C-26-18

Mead OU3
Dermal Exposure To Chemicals In The Water From Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - Average Exposure)

Equation: CDI = (CW x SA x PC x ET x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Chemical-specific Dermal Permeability Constant (cm/hr)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	SA (cm^2)	PC (cm/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	CF (l/cm^3)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
Hexahydro-1 2 3-trinitro-1 2 3-triazine (RDX)	1 80E-03	1,800	3 50E-04	3	4	6	1 00E-03	15	2,190	25,550	2 49E-09	3 00E-03	8 28E-07	2 13E-10	1 10E-01	2 34E-11
Octahydro-1 3 5 7-tetranitro-1 3 5 7-tetrazocine (HMX)	5 40E-04	1,800	3 48E-04	3	4	6	1 00E-03	15	2190	25,550	7 41E-10	5 00E-02	1 48E-08	6 35E-11		
Aluminum	2 10E+01	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25,550	8 28E-05	1 00E+00	8 28E-05	7 10E-06		
Arsenic	1 12E-02	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25 550	4 42E-08	3 00E-04	1 47E-04	3 79E-09	1 50E+00	5 68E-09
Barium	4 60E-01	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25 550	1 81E-06	7 00E-02	2 59E-05	1 56E-07		
Beryllium	1 30E-03	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25 550	5 13E-09	5 00E-03	1 03E-06	4 40E-10	4 30E+00	1 89E-09
Cobalt	1 10E-02	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25 550	4 34E-08	6 00E-02	7 23E-07	3 72E-09		
Iron	1 80E+01	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25,550	7 10E-05			6 09E-06		
Lead	1 60E-02	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25,550	6 31E-08			5 41E-09		
Mercury	8 80E-04	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25,550	3 47E-09	3 00E-04	1 16E-05	2 98E-10		
Nickel	1 29E-01	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25 550	5 09E-07	2 00E-02	2 54E-05	4 36E-08		
Thallium	1 67E-02	1 800	1 00E-03	3	4	6	1 00E-03	15	2190	25,550	6 59E-08	8 00E-05	8 24E-04	5 65E-09		
Vanadium	4 30E-02	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25,550	1 70E-07	7 00E-03	2 42E-05	1 45E-08		
Toluene	1 30E-03	1,800	1 60E-02	3	4	6	1 00E-03	15	2190	25 550	8 21E-08	2 00E-01	4 10E-07	7 03E-09		
Trichloroethene (TCE)	6 92E-03	1,800	1 60E-02	3	4	6	1 00E-03	15	2190	25,550	4 37E-07	6 00E-03	7 28E-05	3 74E-08	1 10E-02	4 12E-10
												HAZARD INDEX =	1 22E-03		TOTAL CANCER RISK =	8 01E-09

Table C-26-19

Mead OU3
Ingestion of Fish Caught At Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - RME)

Equation: CDI =(CF x IR x FI x EF x ED)/(BW x AT)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chemical Daily Intake (mg/kg-day)
CF = Chemical Concentration in Fish Tissue (mg/kg)
IR = Ingestion Rate (kg/day)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Estimated CF (mg/kg)	IR (kg/dy)	FI (unitless)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day) [1]	CANCER RISK (unitless)
Hexahydro-1,2,3-trinitro-1,2,3-triazine (RDX)	1 19E-04	0 0125	0 2	365	6	15	2,190	25,550	1 98E-08	3 00E-03	6 60E-06	1 70E-09	1 10E-01	1 87E-10
Octahydro-1,3,5,7-tetranitro-1,3 5,7-tetrazocine (HMX)	1 16E-05	0 0125	0 2	365	6	15	2,190	25,550	1 94E-09	5 00E-02	3 88E-08	1 66E-10		
Aluminum	9 24E+02	0 0125	0 2	365	6	15	2,190	25,550	1 54E-01	1 00E+00	1 54E-01	1 32E-02		
Arsenic	4 93E-01	0 0125	0 2	365	6	15	2,190	25,550	8 21E-05	3 00E-04	2 74E-01	7 04E-06	1 50E+00	1 06E-05
Barium	2 02E+01	0 0125	0 2	365	6	15	2,190	25,550	3 37E-03	7 00E-02	4 82E-02	2 89E-04		
Beryllium	5 72E-02	0 0125	0 2	365	6	15	2,190	25,550	9 53E-06	5 00E-03	1 91E-03	8 17E-07	4 30E+00	3 51E-06
Cobalt	4 84E-01	0 0125	0 2	365	6	15	2,190	25,550	8 07E-05	6 00E-02	1 34E-03	6 91E-06		
Iron	7 92E+02	0 0125	0 2	365	6	15	2,190	25,550	1 32E-01			1 13E-02		
Mercury	4 84E+00	0 0125	0 2	365	6	15	2,190	25,550	8 07E-04	3 00E-04	2 69E+00	6 91E-05		
Nickel	5 68E+00	0 0125	0 2	365	6	15	2,190	25,550	9 46E-04	2 00E-02	4 73E-02	8 11E-05		
Thallium	7 35E-01	0 0125	0 2	365	6	15	2,190	25,550	1 22E-04	8 00E-05	1 53E+00	1 05E-05		
Vanadium	1 89E+00	0 0125	0 2	365	6	15	2,190	25,550	3 15E-04	7 00E-03	4 50E-02	2 70E-05		
Toluene	4 54E-02	0 0125	0 2	365	6	15	2,190	25,550	7 56E-06	2 00E-01	3 78E-05	6 48E-07		
Trichloroethene (TCE)	1 25E-03	0 0125	0 2	365	6	15	2,190	25,550	2 09E-07	6 00E-03	3 48E-05	1 79E-08	0 011	1 97E-10
										HAZARD INDEX =	4 79E+00		TOTAL CANCER RISK =	1 41E-05

Table C-26-20

Mead OU3
Ingestion of Fish Caught At Johnson/Clear Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - Average Exposure)

Equation: CDI =(CF x IR x FI x EF x ED)/(BW x AT)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chemical Daily Intake (mg/kg-day)
CF = Chemical Concentration in Fish Tissue (mg/kg)
IR = Ingestion Rate (kg/day)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Estimated CF (mg/kg)	IR (kg/dy)	FI (unitless)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Hexahydro-1,2,3-trinitro-1,2,3-triazine (RDX)	1.19E-04	0.004	0.1	365	6	15	2,190	25,550	3.17E-09	3.00E-03	1.06E-06	2.72E-10	1.10E-01	2.99E-11
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.16E-05	0.004	0.1	365	6	15	2,190	25,550	3.10E-10	5.00E-02	6.21E-09	2.66E-11		
Aluminum	9.24E+02	0.004	0.1	365	6	15	2,190	25,550	2.46E-02	1.00E+00	2.46E-02	2.11E-03		
Arsenic	4.93E-01	0.004	0.1	365	6	15	2,190	25,550	1.31E-05	3.00E-04	4.38E-02	1.13E-06	1.50E+00	1.69E-06
Barium	2.02E+01	0.004	0.1	365	6	15	2,190	25,550	5.40E-04	7.00E-02	7.71E-03	4.63E-05		
Beryllium	5.72E-02	0.004	0.1	365	6	15	2,190	25,550	1.53E-06	5.00E-03	3.05E-04	1.31E-07	4.30E+00	5.62E-07
Cobalt	4.84E-01	0.004	0.1	365	6	15	2,190	25,550	1.29E-05	6.00E-02	2.15E-04	1.11E-06		
Iron	7.92E+02	0.004	0.1	365	6	15	2,190	25,550	2.11E-02			1.81E-03		
Mercury	4.84E+00	0.004	0.1	365	6	15	2,190	25,550	1.29E-04	3.00E-04	4.30E-01	1.11E-05		
Nickel	5.68E+00	0.004	0.1	365	6	15	2,190	25,550	1.51E-04	2.00E-02	7.57E-03	1.30E-05		
Thallium	7.35E-01	0.004	0.1	365	6	15	2,190	25,550	1.96E-05	8.00E-05	2.45E-01	1.68E-06		
Vanadium	1.89E+00	0.004	0.1	365	6	15	2,190	25,550	5.05E-05	7.00E-03	7.21E-03	4.32E-06		
Toluene	4.54E-02	0.004	0.1	365	6	15	2,190	25,550	1.21E-06	2.00E-01	6.05E-06	1.04E-07		
Trichloroethene (TCE)	1.25E-03	0.004	0.1	365	6	15	2,190	25,550	3.35E-08	6.00E-03	5.58E-06	2.87E-09	0.011	3.15E-11
										HAZARD INDEX =	7.67E-01		TOTAL CANCER RISK =	2.25E-06

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Table C-27-1

Mead OU3
Ingestion of Chemicals In The Sediment From Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Sediment (mg/kg)
IR = Ingestion Rate (mg/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
4-Methylphenol	2 44E+00	100	17	70	1 00E-06	70	25550	25550	1 63E-07	5 00E-03	3 25E-05	1 63E-07		
Di-n-butylphthalate	5 75E-01	100	17	70	1 00E-06	70	25550	25550	3 83E-08	1 00E-01	3 83E-07	3 83E-08		
Pyrene	1 07E-01	100	17	70	1 00E-06	70	25550	25550	7 12E-09	3 00E-02	2 37E-07	7 12E-09		
Acetone	2 30E+00	100	17	70	1 00E-06	70	25550	25550	1 53E-07	1 00E-01	1 53E-06	1 53E-07		
Toluene	4 30E-02	100	17	70	1 00E-06	70	25550	25550	2 86E-09	2 00E-01	1 43E-08	2 86E-09		
Silver	2 46E-01	100	17	70	1 00E-06	70	25550	25550	1 64E-08	5 00E-03	3 27E-06	1 64E-08		
									TOTAL HAZARD INDEX =		3.80E-05	TOTAL CANCER RISK =		0.00E+00

Table C-27-2

Mead OU3
Ingestion of Chemicals In The Sediment From Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Sediment (mg/kg)
IR = Ingestion Rate (mg/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)[1]	CANCER RISK (unitless)
4-Methylphenol	2 44E+00	10	4	9	1 00E-06	70	3285	25550	3 83E-09	5 00E-03	7 65E-07	4 92E-10		
Di-n-butylphthalate	5 75E-01	10	4	9	1 00E-06	70	3285	25550	9 00E-10	1 00E-01	9 00E-09	1 16E-10		
Pyrene	1 07E-01	10	4	9	1 00E-06	70	3285	25550	1 68E-10	3 00E-02	5 58E-09	2 15E-11		
Acetone	2 30E+00	10	4	9	1 00E-06	70	3285	25550	3 60E-09	1 00E-01	3 60E-08	4 63E-10		
Toluene	4 30E-02	10	4	9	1 00E-06	70	3285	25550	6 73E-11	2 00E-01	3 37E-10	8 66E-12		
Silver	2 46E-01	10	4	9	1 00E-06	70	3285	25550	3 85E-10	5 00E-03	7 70E-08	4 95E-11		
										TOTAL HAZARD INDEX =	8 93E-07		TOTAL CANCER RISK =	0 00E+00

Table C-27-3

Mead OU3
Dermal Exposure To Chemicals In The Sediment From Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - RME)

Equation: CDI = (CS x SA x AF x ABS x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg) .
SA = Skin Surface Area Available for Contact
AD = Dermal Soil Adherence Factor
AB = Absorption Factor = 1 0% for organics and 0 1% for inorganics
EF = Exposure Frequency
ED = Exposure Duration
BW = Body Weight
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
4-Methylphenol	2 44E+00	8,620	1 00	0 10	17	70	1 00E-06	70	25,550	25,550	1 40E-06	5 00E-03	2 80E-04	1 40E-06		
Di-n-butylphthalate	5 75E-01	8 620	1 00	0 10	17	70	1 00E-06	70	25550	25,550	3 30E-07	1 00E-01	3 30E-06	3 30E-07		
Pyrene	1 07E-01	8 620	1 00	0 10	17	70	1 00E-06	70	25550	25,550	6 14E-08	3 00E-02	2 05E-06	6 14E-08		
Acetone	2 30E+00	8 620	1 00	0 10	17	70	1 00E-06	70	25550	25,550	1 32E-06	1 00E-01	1 32E-05	1 32E-06		
Toluene	4 30E-02	8,620	1 00	0 10	17	70	1 00E-06	70	25550	25,550	2 47E-08	2 00E-01	1 23E-07	2 47E-08		
Silver	2 46E-01	8,620	1 00	0 01	17	70	1 00E-06	70	25550	25,550	1 41E-08	5 00E-03	2 82E-06	1 41E-08		
												HAZARD INDEX =	3 02E-04		TOTAL CANCER RISK =	0 00E+00

Table C-27-4

Mead OU3
Dermal Exposure To Chemicals In The Sediment From Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - Average Exposure)

Equation: CDI = (CS x SA x AF x ABS x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact
AD = Dermal Soil Adherence Factor
AB = Absorption Factor = 1 0% for organics and 0 1% for inorganics
EF = Exposure Frequency
ED = Exposure Duration
BW = Body Weight
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)^{1}	CANCER RISK (unitless)
4-Methylphenol	2 44E+00	2,800	0 20	0 10	4	9	1 00E-06	70	3,285	25,550	2 14E-08	5 00E-03	4 29E-06	2 75E-09		
Di-n-butylphthalate	5 75E-01	2,800	0 20	0 10	4	9	1 00E-06	70	3285	25,550	5 04E-09	1 00E-01	5 04E-08	6 48E-10		
Pyrene	1 07E-01	2,800	0 20	0 10	4	9	1 00E-06	70	3285	25,550	9 38E-10	3 00E-02	3 13E-08	1 21E-10		
Acetone	2 30E+00	2,800	0 20	0 10	4	9	1 00E-06	70	3285	25,550	2 02E-08	1 00E-01	2 02E-07	2 59E-09		
Toluene	4 30E-02	2,800	0 20	0 10	4	9	1 00E-06	70	3285	25,550	3 77E-10	2 00E-01	1 88E-09	4 85E-11		
Silver	2 46E-01	2,800	0 20	0 01	4	9	1 00E-06	70	3285	25,550	2 16E-10	5 00E-03	4 31E-08	2 77E-11		
												HAZARD INDEX =	4 61E-06		TOTAL CANCER RISK =	0 00E+00

Table C-27-5

Mead OU3
Ingestion of Chemicals In The Water From Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - RME)

Equation: CDI = (CW x CR x ET x EF x ED)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
CR = Contact Rate (liters/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects. Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	CR (l/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	5 96E-01	5 00E-03	2	17	70	70	25550	25,550	3.97E-06	1 00E+00	3.97E-06	3 97E-06		
Barium	1 74E-01	5 00E-03	2	17	70	70	25550	25,550	1 16E-06	7 00E-02	1 65E-05	1 16E-06		
Beryllium	1 30E-03	5 00E-03	2	17	70	70	25550	25,550	8 65E-09	5 00E-03	1 73E-06	8 65E-09	4 30E+00	3 72E-08
Cobalt	1 20E-02	5 00E-03	2	17	70	70	25550	25,550	7.98E-08	6 00E-02	1.33E-06	7 98E-08		
Iron	8 03E-01	5 00E-03	2	17	70	70	25550	25,550	5 34E-06			5 34E-06		
Nickel	2 70E-02	5 00E-03	2	17	70	70	25550	25,550	1.80E-07	2 00E-02	8 98E-06	1 80E-07		
Thallium	1 00E-04	5 00E-03	2	17	70	70	25550	25,550	6 65E-10	8 00E-05	8 32E-06	6 65E-10		
Vanadium	7 10E-03	5 00E-03	2	17	70	70	25550	25,550	4 72E-08	7 00E-03	6 75E-06	4 72E-08		
Methylene chloride	4 60E-04	5 00E-03	2	17	70	70	25550	25,550	3 06E-09			3 06E-09		
Toluene	1 10E-04	5 00E-03	2	17	70	70	25550	25,550	7 32E-10	2 00E-01	3 66E-09	7 32E-10		
										HAZARD INDEX =	4 76E-05		TOTAL CANCER RISK =	3 72E-08

Table C-27-6

Mead OU3
Ingestion of Chemicals In The Water From Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - Average Exposure)

Equation CDI = (CW x CR x ET x EF x ED)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where
CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
CR = Contact Rate (liters/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	CR (l/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	5.96E-01	2.50E-03	1	4	9	70	3285	25,550	2.33E-07	1.00E+00	2.33E-07	3.00E-08		
Barium	1.74E-01	2.50E-03	1	4	9	70	3285	25,550	6.81E-08	7.00E-02	9.73E-07	8.76E-09		
Beryllium	1.30E-03	2.50E-03	1	4	9	70	3285	25,550	5.09E-10	5.00E-03	1.02E-07	6.54E-11	4.30E+00	2.81E-10
Cobalt	1.20E-02	2.50E-03	1	4	9	70	3285	25,550	4.70E-09	6.00E-02	7.83E-08	6.04E-10		
Iron	8.03E-01	2.50E-03	1	4	9	70	3285	25,550	3.14E-07			4.04E-08		
Nickel	2.70E-02	2.50E-03	1	4	9	70	3285	25,550	1.06E-08	2.00E-02	5.28E-07	1.36E-09		
Thallium	1.00E-04	2.50E-03	1	4	9	70	3285	25,550	3.91E-11	8.00E-05	4.89E-07	5.03E-12		
Vanadium	7.10E-03	2.50E-03	1	4	9	70	3285	25,550	2.78E-09	7.00E-03	3.97E-07	3.57E-10		
Methylene chloride	4.60E-04	2.50E-03	1	4	9	70	3285	25,550	1.80E-10			2.31E-11		
Toluene	1.10E-04	2.50E-03	1	4	9	70	3285	25,550	4.31E-11	2.00E-01	2.15E-10	5.54E-12		
										HAZARD INDEX =	2.80E-06		TOTAL CANCER RISK =	2.81E-10

Table C-27-7

Mead OU3
Dermal Exposure To Chemicals In The Water From Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - RME)

Equation: CDI = (CW x SA x PC x ET x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Chemical-specific Dermal Permeability Constant (cm/hr)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	SA (cm^2)	PC (cm/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	CF (l/cm^3)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	5 96E-01	8 620	1 00E-03	2	17	70	1 00E-03	70	25550	25,550	6 84E-06	1 00E+00	6 84E-06	6 84E-06		
Barium	1 74E-01	8 620	1 00E-03	2	17	70	1 00E-03	70	25550	25,550	2 00E-06	7 00E-02	2 85E-05	2 00E-06		
Beryllium	1 30E-03	8 620	1 00E-03	2	17	70	1 00E-03	70	25550	25,550	1 49E-08	5 00E-03	2 98E-06	1 49E-08	4.30E+00	6 41E-08
Cobalt	1 20E-02	8 620	1 00E-03	2	17	70	1 00E-03	70	25550	25,550	1 38E-07	6 00E-02	2 29E-06	1 38E-07		
Iron	8 03E-01	8 620	1 00E-03	2	17	70	1 00E-03	70	25550	25,550	9 21E-06			9 21E-06		
Nickel	2 70E-02	8 620	1 00E-03	2	17	70	1 00E-03	70	25550	25,550	3 10E-07	2 00E-02	1 55E-05	3 10E-07		
Thallium	1 00E-04	8 620	1 00E-03	2	17	70	1 00E-03	70	25550	25,550	1 15E-09	8 00E-05	1 43E-05	1.15E-09		
Vanadium	7 10E-03	8 620	1.00E-03	2	17	70	1 00E-03	70	25550	25,550	8 14E-08	7 00E-03	1 16E-05	8 14E-08		
Methylene chloride	4 60E-04	8 620	1.60E-02	2	17	70	1.00E-03	70	25550	25,550	8 44E-08			8 44E-08		
Toluene	1 10E-04	8 620	1 60E-02	2	17	70	1 00E-03	70	25550	25,550	2 02E-08	2 00E-01	1 01E-07	2 02E-08		
												HAZARD INDE.. =	8 22E-05		TOTAL CANCER RISK =	6 41E-08

Table C-27-8

Mead OU3
Dermal Exposure To Chemicals In The Water From Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - Average Exposure)

Equation: CDI = (CW x SA x PC x ET x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where
CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Chemical-specific Dermal Permeability Constant (cm/hr)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	SA (cm^2)	PC (cm/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	CF (l/cm3)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	5 96E-01	2,800	1.00E-03	1	4	9	1 00E-03	70	3285	25,550	2 61E-07	1 00E+00	2 61E-07	3 36E-08		
Barium	1 74E-01	2,800	1 00E-03	1	4	9	1 00E-03	70	3285	25,550	7 63E-08	7 00E-02	1 09E-06	9 81E-09		
Beryllium	1 30E-03	2 800	1.00E-03	1	4	9	1 00E-03	70	3285	25,550	5 70E-10	5 00E-03	1 14E-07	7 33E-11	4 30E+00	3 15E-10
Cobalt	1 20E-02	2 800	1 00E-03	1	4	9	1 00E-03	70	3285	25,550	5 26E-09	6 00E-02	8 77E-08	6 76E-10		
Iron	8 03E-01	2 800	1.00E-03	1	4	9	1 00E-03	70	3285	25,550	3 52E-07			4 53E-08		
Nickel	2 70E-02	2 800	1 00E-03	1	4	9	1 00E-03	70	3285	25,550	1 18E-08	2 00E-02	5 92E-07	1 52E-09		
Thallium	1 00E-04	2 800	1.00E-03	1	4	9	1 00E-03	70	3285	25,550	4 38E-11	8 00E-05	5 48E-07	5 64E-12		
Vanadium	7 10E-03	2,800	1 00E-03	1	4	9	1 00E-03	70	3285	25,550	3 11E-09	7 00E-03	4 45E-07	4 00E-10		
Methylene chloride	4 60E-04	2,800	1 60E-02	1	4	9	1 00E-03	70	3285	25,550	3 23E-09			4 15E-10		
Toluene	1 10E-04	2 800	1 60E-02	1	4	9	1 00E-03	70	3285	25,550	7 72E-10	2 00E-01	3 86E-09	9 92E-11		
												HAZARD INDEX =	3 14E-06		TOTAL CANCER RISK =	3 15E-10

B07NE003703-06821

Table C-27-9

Mead OU3
Ingestion of Fish Caught At Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - RME)

Equation: CDI = (CF x IR x FI x EF x ED)/(BW x AT)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
- CDI = Chemical Daily Intake (mg/kg-day)
- CF = Chemical Concentration in Fish Tissue (mg/kg)
- IR = Ingestion Rate (kg/day)
- FI = Fraction Ingested from Contaminated Source (unitless)
- EF = Exposure Frequency (days/years)
- ED = Exposure Duration (years)
- BW = Body Weight (kg)
- AT1 = Averaging Time for Non-carcinogenic Effects (days)
- AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Estimated CF (mg/kg)	IR (kg/dy)	FI (unitless	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	3.43E+02	0.025	0.2	365	70	70	25,550	25,550	2.45E-02	1.00E+00	2.45E-02	2.45E-02		
Barium	2.90E+01	0.025	0.2	365	70	70	25,550	25,550	2.07E-03	7.00E-02	2.96E-02	2.07E-03		
Beryllium	5.72E-02	0.025	0.2	365	70	70	25,550	25,550	4.09E-06	5.00E-03	8.17E-04	4.09E-06	4.30E+00	1.76E-05
Cobalt	5.28E-01	0.025	0.2	365	70	70	25,550	25,550	3.77E-05	6.00E-02	6.29E-04	3.77E-05		
Iron	3.56E+02	0.025	0.2	365	70	70	25,550	25,550	2.55E-02			2.55E-02		
Nickel	1.19E+00	0.025	0.2	365	70	70	25,550	25,550	8.49E-05	2.00E-02	4.24E-03	8.49E-05		
Thallium	4.40E-03	0.025	0.2	365	70	70	25,550	25,550	3.14E-07	8.00E-05	3.93E-03	3.14E-07		
Vanadium	1.98E+00	0.025	0.2	365	70	70	25,550	25,550	1.41E-04	7.00E-03	2.02E-02	1.41E-04		
Methylene chloride	1.03E-03	0.025	0.2	365	70	70	25,550	25,550	7.36E-08			7.36E-08		
Toluene	5.78E-04	0.025	0.2	365	70	70	25,550	25,550	4.13E-08	2.00E-01	2.06E-07	4.13E-08		
										HAZARD INDEX =	8.40E-02		TOTAL CANCER RISK =	1.76E-05

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Table C-27-10

Mead OU3
Ingestion of Fish Caught At Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - Average Exposure)

Equation: CDI = (CF x IR x FI x EF x ED)/(BW x AT)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chemical Daily Intake (mg/kg-day)
CF = Chemical Concentration in Fish Tissue (mg/kg)
IR = Ingestion Rate (kg/day)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Estimated CF (mg/kg)	IR (kg/dy)	FI (unitless	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	3 43E+02	0 0080	0 1	365	9	70	3,285	25,550	3 92E-03	1 00E+00	3 92E-03	5 04E-04		
Barium	2 90E+01	0 0080	0 1	365	9	70	3,285	25,550	3 32E-04	7 00E-02	4 74E-03	4 27E-05		
Beryllium	5 72E-02	0 0080	0 1	365	9	70	3,285	25,550	6 54E-07	5 00E-03	1 31E-04	8 40E-08	4 30E+00	3 61E-07
Cobalt	5 28E-01	0 0080	0 1	365	9	70	3,285	25,550	6 03E-06	6 00E-02	1 01E-04	7 76E-07		
Iron	3 56E+02	0 0080	0 1	365	9	70	3,285	25,550	4 07E-03			5 24E-04		
Nickel	1 19E+00	0 0080	0 1	365	9	70	3,285	25,550	1 36E-05	2 00E-02	6 79E-04	1 75E-06		
Thallium	4 40E-03	0 0080	0 1	365	9	70	3,285	25,550	5 03E-08	8 00E-05	6 29E-04	6 47E-09		
Vanadium	1 98E+00	0 0080	0 1	365	9	70	3,285	25,550	2 26E-05	7 00E-03	3 23E-03	2 91E-06		
Methylene chloride	1 03E-03	0 0080	0 1	365	9	70	3,285	25,550	1 18E-08			1 51E-09		
Toluene	5 78E-04	0 0080	0 1	365	9	70	3,285	25,550	6 60E-09	2 00E-01	3 30E-08	8 49E-10		
										HAZARD INDEX =	1 34E-02		TOTAL CANCER RISK =	3 61E-07

Table C-27-11

Mead OU3
Ingestion of Chemicals In The Sediment From Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Sediment (mg/kg)
IR = Ingestion Rate (mg/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
4-Methylphenol	2.44E+00	200	17	6	1.00E-06	15	2190	25550	1.52E-06	5.00E-03	3.04E-04	1.30E-07		
Di-n-butylphthalate	5.75E-01	200	17	6	1.00E-06	15	2190	25550	3.57E-07	1.00E-01	3.57E-06	3.06E-08		
Pyrene	1.07E-01	200	17	6	1.00E-06	15	2190	25550	6.64E-08	3.00E-02	2.21E-06	5.70E-09		
Acetone	2.30E+00	200	17	6	1.00E-06	15	2190	25550	1.43E-06	1.00E-01	1.43E-05	1.22E-07		
Toluene	4.30E-02	200	17	6	1.00E-06	15	2190	25550	2.67E-08	2.00E-01	1.34E-07	2.29E-09		
Silver	2.46E-01	200	17	6	1.00E-06	15	2190	25550	1.53E-07	5.00E-03	3.06E-05	1.31E-08		
										TOTAL HAZARD INDEX =	3.54E-04		TOTAL CANCER RISK =	0.00E+00

Table C-27-12

Mead OU3
Ingestion of Chemicals In The Sediment From Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Sediment (mg/kg)
IR = Ingestion Rate (mg/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
4-Methylphenol	2.44E+00	100	4	6	1.00E-06	15	2190	25550	1.79E-07	5.00E-03	3.57E-05	1.53E-08		
Di-n-butylphthalate	5.75E-01	100	4	6	1.00E-06	15	2190	25550	4.20E-08	1.00E-01	4.20E-07	3.60E-09		
Pyrene	1.07E-01	100	4	6	1.00E-06	15	2190	25550	7.82E-09	3.00E-02	2.61E-07	6.70E-10		
Acetone	2.30E+00	100	4	6	1.00E-06	15	2190	25550	1.68E-07	1.00E-01	1.68E-06	1.44E-08		
Toluene	4.30E-02	100	4	6	1.00E-06	15	2190	25550	3.14E-09	2.00E-01	1.57E-08	2.69E-10		
Silver	2.46E-01	100	4	6	1.00E-06	15	2190	25550	1.80E-08	5.00E-03	3.59E-06	1.54E-09		
										TOTAL HAZARD INDEX =	4.17E-05		TOTAL CANCER RISK =	0.00E+00

Table C-27-13

Mead OU3
Dermal Exposure To Chemicals In The Sediment From Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - RME)

Equation: CDI = (CS x SA x AF x ABS x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact
AD = Dermal Soil Adherence Factor
AB = Absorption Factor = 1.0% for organics and 0 1% for inorganics
EF = Exposure Frequency
ED = Exposure Duration
BW = Body Weight
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Car :nogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
4-Methylphenol	2 44E+00	6,500	1 00	0 10	17	6	1 00E-06	15	2,190	25,550	4 93E-06	5 00E-03	9 87E-04	4 23E-07		
Di-n-butylphthalate	5 75E-01	6 500	1 00	0 10	17	6	1 00E-06	15	2190	25,550	1 16E-06	1 00E-01	1 16E-05	9 95E-08		
Pyrene	1 07E-01	6,500	1 00	0 10	17	6	1 00E-06	15	2190	25,550	2 16E-07	3 00E-02	7 20E-06	1 85E-08		
Acetone	2 30E+00	6 500	1 00	0 10	17	6	1 00E-06	15	2190	25,550	4 64E-06	1 00E-01	4 64E-05	3 98E-07		
Toluene	4 30E-02	6,500	1 00	0 10	17	6	1 00E-06	15	2190	25,550	8 68E-08	2 00E-01	4 34E-07	7 44E-09		
Silver	2 46E-01	6,500	1 00	0 01	17	6	1 00E-06	15	2190	25,550	4 96E-08	5 00E-03	9 93E-06	4 26E-09		
												HAZARD INDEX =	1 06E-03		TOTAL CANCER RISK =	0 00E+00

Table C-27-14

Mead OU3
Dermal Exposure To Chemicals In The Sediment From Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - Average Exposure)

Equation: CDI = (CS x SA x AF x ABS x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact
AD = Dermal Soil Adherence Factor
AB = Absorption Factor = 1.0% for organics and 0.1% for inorganics
EF = Exposure Frequency
ED = Exposure Duration
BW = Body Weight
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
4-Methylphenol	2 44E+00	1,800	0 20	0 10	4	6	1 00E-06	15	2,190	25,550	6 43E-08	5 00E-03	1 29E-05	5 51E-09		
Di-n-butylphthalate	5.75E-01	1,800	0 20	0 10	4	6	1 00E-06	15	2190	25,550	1 51E-08	1 00E-01	1 51E-07	1 30E-09		
Pyrene	1 07E-01	1,800	0 20	0 10	4	6	1 00E-06	15	2190	25,550	2 81E-09	3 00E-02	9 38E-08	2 41E-10		
Acetone	2 30E+00	1,800	0 20	0 10	4	6	1 00E-06	15	2190	25,550	6 05E-08	1 00E-01	6 05E-07	5 19E-09		
Toluene	4 30E-02	1,800	0 20	0 10	4	6	1 00E-06	15	2190	25,550	1 13E-09	2 00E-01	5 65E-09	9 69E-11		
Silver	2 46E-01	1,800	0 20	0 01	4	6	1 00E-06	15	2190	25 550	6 47E-10	5 00E-03	1 29E-07	5 55E-11		
												HAZARD INDEX =	1 38E-05		TOTAL CANCER RISK =	0 00E+00

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Table C-27-15

Mead OU3
Ingestion of Chemicals In The Water From Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - RME)

Equation: CDI = (CW x CR x ET x EF x ED)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
CR = Contact Rate (liters/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	CR (l/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	5 96E-01	5 00E-03	6	17	6	15	2190	25,550	5 55E-05	1 00E+00	5 55E-05	4 76E-06		
Barium	1 74E-01	5 00E-03	6	17	6	15	2190	25,550	1 62E-05	7 00E-02	2 32E-04	1 39E-06		
Beryllium	1 30E-03	5 00E-03	6	17	6	15	2190	25,550	1 21E-07	5 00E-03	2 42E-05	1 04E-08	4 30E+00	4 46E-08
Cobalt	1 20E-02	5 00E-03	6	17	6	15	2190	25,550	1.12E-06	6 00E-02	1 86E-05	9 58E-08		
Iron	8 03E-01	5 00E-03	6	17	6	15	2190	25,550	7 48E-05			6 41E-06		
Nickel	2 70E-02	5 00E-03	6	17	6	15	2190	25,550	2 52E-06	2 00E-02	1 26E-04	2 16E-07		
Thallium	1 00E-04	5 00E-03	6	17	6	15	2190	25,550	9 32E-09	8 00E-05	1 16E-04	7 98E-10		
Vanadium	7 10E-03	5 00E-03	6	17	6	15	2190	25,550	6 61E-07	7 00E-03	9 45E-05	5 67E-08		
Methylene chloride	4 60E-04	5 00E-03	6	17	6	15	2190	25,550	4 28E-08			3 67E-09		
Toluene	1 10E-04	5 00E-03	6	17	6	15	2190	25,550	1.02E-08	2 00E-01	5 12E-08	8 78E-10		
										HAZARD INDEX =	6 67E-04		TOTAL CANCER RISK =	4 46E-08

Table C-27-16

Mead OU3
Ingestion of Chemicals In The Water From Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - Average Exposure)

Equation CDI = (CW x CR x ET x EF x ED)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
CR = Contact Rate (liters/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	CR (l/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
Aluminum	5 96E-01	2 50E-03	3	4	6	15	2190	25,550	3 27E-06	1 00E+00	3 27E-06	2 80E-07		
Barium	1 74E-01	2 50E-03	3	4	6	15	2190	25,550	9 53E-07	7 00E-02	1 36E-05	8 17E-08		
Beryllium	1 30E-03	2 50E-03	3	4	6	15	2190	25,550	7 12E-09	5 00E-03	1 42E-06	6 11E-10	4 30E+00	2 63E-09
Cobalt	1 20E-02	2 50E-03	3	4	6	15	2190	25,550	6 58E-08	6 00E-02	1 10E-06	5 64E-09		
Iron	8 03E-01	2 50E-03	3	4	6	15	2190	25,550	4 40E-06			3 77E-07		
Nickel	2 70E-02	2 50E-03	3	4	6	15	2190	25,550	1 48E-07	2 00E-02	7 40E-06	1 27E-08		
Thallium	1 00E-04	2 50E-03	3	4	6	15	2190	25,550	5 48E-10	8 00E-05	6 85E-06	4 70E-11		
Vanadium	7 10E-03	2 50E-03	3	4	6	15	2190	25,550	3 89E-08	7 00E-03	5 56E-06	3 33E-09		
Methylene chloride	4 60E-04	2 50E-03	3	4	6	15	2190	25,550	2 52E-09			2 16E-10		
Toluene	1 10E-04	2 50E-03	3	4	6	15	2190	25,550	6.03E-10	2 00E-01	3 01E-09	5 17E-11		
										HAZARD INDEX =	3 92E-05		TOTAL CANCER RISK =	2 63E-09

Table C-27-17

Mead OU3
Dermal Exposure To Chemicals In The Water From Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - RME)

Equation CDI = (CW x SA x PC x ET x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Chemical-specific Dermal Permeability Constant (cm/hr)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects. Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	SA (cm^2)	PC (cm/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	CF (l/cm3)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	5.96E-01	6,500	1.00E-03	6	17	6	1.00E-03	15	2190	25,550	7.22E-05	1.00E+00	7.22E-05	6.19E-06		
Barium	1.74E-01	6,500	1.00E-03	6	17	6	1.00E-03	15	2190	25,550	2.11E-05	7.00E-02	3.01E-04	1.81E-06		
Beryllium	1.30E-03	6,500	1.00E-03	6	17	6	1.00E-03	15	2190	25,550	1.57E-07	5.00E-03	3.15E-05	1.35E-08	4.30E+00	5.80E-08
Cobalt	1.20E-02	6,500	1.00E-03	6	17	6	1.00E-03	15	2190	25,550	1.45E-06	6.00E-02	2.42E-05	1.25E-07		
Iron	8.03E-01	6,500	1.00E-03	6	17	6	1.00E-03	15	2190	25,550	9.72E-05			8.33E-06		
Nickel	2.70E-02	6,500	1.00E-03	6	17	6	1.00E-03	15	2190	25,550	3.27E-06	2.00E-02	1.63E-04	2.80E-07		
Thallium	1.00E-04	6,500	1.00E-03	6	17	6	1.00E-03	15	2190	25,550	1.21E-08	8.00E-05	1.51E-04	1.04E-09		
Vanadium	7.10E-03	6,500	1.00E-03	6	17	6	1.00E-03	15	2190	25,550	8.60E-07	7.00E-03	1.23E-04	7.37E-08		
Methylene chloride	4.60E-04	6,500	1.60E-02	6	17	6	1.00E-03	15	2190	25,550	8.91E-07			7.64E-08		
Toluene	1.10E-04	6,500	1.60E-02	6	17	6	1.00E-03	15	2190	25,550	2.13E-07	2.00E-01	1.07E-06	1.83E-08		
												HAZARD INDEX =	8.68E-04		TOTAL CANCER RISK =	5.80E-08

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Table C-27-18

Mead OU3
Dermal Exposure To Chemicals In The Water From Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - Average Exposure)

Equation : CDI = (CW x SA x PC x ET x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Chemical-specific Dermal Permeability Constant (cm/hr)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects. Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	SA (cm^2)	PC (cm/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	CF (l/cm^3)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	5 96E-01	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25,550	2 35E-06	1 00E+00	2 35E-06	2 02E-07		
Barium	1 74E-01	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25,550	6 86E-07	7 00E-02	9 81E-06	5 88E-08		
Beryllium	1 30E-03	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25 550	5 13E-09	5 00E-03	1 03E-06	4 40E-10	4 30E+00	1 89E-09
Cobalt	1 20E-02	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25 550	4 73E-08	6 00E-02	7 89E-07	4 06E-09		
Iron	8 03E-01	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25 550	3 17E-06			2 72E-07		
Nickel	2 70E-02	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25 550	1 07E-07	2 00E-02	5 33E-06	9 13E-09		
Thallium	1 00E-04	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25 550	3 95E-10	8 00E-05	4 93E-06	3 38E-11		
Vanadium	7 10E-03	1 800	1 00E-03	3	4	6	1 00E-03	15	2190	25 550	2 80E-08	7 00E-03	4 00E-06	2 40E-09		
Methylene chloride	4 60E-04	1,800	1 60E-02	3	4	6	1 00E-03	15	2190	25 550	2 90E-08			2 49E-09		
Toluene	1 10E-04	1,800	1 60E-02	3	4	6	1 00E-03	15	2190	25 550	6 94E-09	2 00E-01	3 47E-08	5 95E-10		
												HAZARD INDEX =	2 83E-05	TOTAL CANCER RISK =		1 89E-09

Table C-27-19

Mead OU3
Ingestion of Fish Caught At Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - RME)

Equation CDI = (CF x IR x FI x EF x ED)/(BW x AT)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chemical Daily Intake (mg/kg-day)
CF = Chemical Concentration in Fish Tissue (mg/kg)
IR = Ingestion Rate (kg/day)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Estimated CF (mg/kg)	IR (kg/dy)	FI (unitless	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	3.43E+02	0.0125	0.2	365	6	15	2,190	25,550	5.72E-02	1.00E+00	5.72E-02	4.90E-03		
Barium	2.90E+01	0.0125	0.2	365	6	15	2,190	25,550	4.84E-03	7.00E-02	6.91E-02	4.15E-04		
Beryllium	5.72E-02	0.0125	0.2	365	6	15	2,190	25,550	9.53E-06	5.00E-03	1.91E-03	8.17E-07	4.30E+00	3.51E-06
Cobalt	5.28E-01	0.0125	0.2	365	6	15	2,190	25,550	8.80E-05	6.00E-02	1.47E-03	7.54E-06		
Iron	3.56E+02	0.0125	0.2	365	6	15	2,190	25,550	5.94E-02			5.09E-03		
Nickel	1.19E+00	0.0125	0.2	365	6	15	2,190	25,550	1.98E-04	2.00E-02	9.90E-03	1.70E-05		
Thallium	4.40E-03	0.0125	0.2	365	6	15	2,190	25,550	7.33E-07	8.00E-05	9.17E-03	6.29E-08		
Vanadium	1.98E+00	0.0125	0.2	365	6	15	2,190	25,550	3.30E-04	7.00E-03	4.71E-02	2.83E-05		
Methylene chloride	1.03E-03	0.0125	0.2	365	6	15	2,190	25,550	1.72E-07			1.47E-08		
Toluene	5.78E-04	0.0125	0.2	365	6	15	2,190	25,550	9.63E-08	2.00E-01	4.82E-07	8.26E-09		
										HAZARD INDEX =	1.96E-01		TOTAL CANCER RISK =	3.51E-06

Table C-27-20

Mead OU3
Ingestion of Fish Caught At Silver Creek
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - Average Exposure)

Equation CDI = (CF x IR x FI x EF x ED)/(BW x AT)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chemical Daily Intake (mg/kg-day)
CF = Chemical Concentration in Fish Tissue (mg/kg)
IR = Ingestion Rate (kg/day)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Estimated CF (mg/kg)	IR (kg/dy)	FI (unitless)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	3 43E+02	0 0040	0 1	365	6	15	2,190	25,550	9 15E-03	1 00E+00	[illegible] 15E-03	7 84E-04		
Barium	2 90E+01	0 0040	0 1	365	6	15	2,190	25,550	7.74E-04	7 00E-02	1 11E-02	6 64E-05		
Beryllium	5 72E-02	0 0040	0 1	365	6	15	2,190	25,550	1 53E-06	5 00E-03	3 05E-04	1 31E-07	4 30E+00	5 62E-07
Cobalt	5 28E-01	0 0040	0 1	365	6	15	2,190	25,550	1 41E-05	6 00E-02	2 35E-04	1 21E-06		
Iron	3 56E+02	0 0040	0 1	365	6	15	2,190	25,550	9 50E-03			8 15E-04		
Nickel	1 19E+00	0 0040	0 1	365	6	15	2,190	25,550	3 17E-05	2 00E-02	1 58E-03	2 72E-06		
Thallium	4 40E-03	0 0040	0 1	365	6	15	2,190	25,550	1 17E-07	8 00E-05	1 47E-03	1 01E-08		
Vanadium	1 98E+00	0 0040	0 1	365	6	15	2,190	25,550	5 28E-05	7 00E-03	7 54E-03	4 53E-06		
Methylene chloride	1 03E-03	0 0040	0 1	365	6	15	2,190	25,550	2 75E-08			2 35E-09		
Toluene	5 78E-04	0 004	0 1	365	6	15	2,190	25,550	1 54E-08	2 00E-01	7 71E-08	1 32E-09		
										HAZARD INDEX =	3 13E-02		TOTAL CANCER RISK =	5 62E-07

Table C-28-1

Mead OU3
Ingestion of Chemicals In The Sediment From NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Sediment (mg/kg)
IR = Ingestion Rate (mg/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day) [1]	CANCER RISK (unitless)
Nitrobenzene	7 40E-02	100	17	70	1 00E-06	70	25550	25550	4 92E-09	5 00E-03	9 85E-07	4 92E-09		
Aluminum	4 70E+04	100	17	70	1 00E-06	70	25550	25550	3 13E-03	1 00E-01	3 13E-02	3 13E-03		
Arsenic	1 20E+01	100	17	70	1 00E-06	70	25550	25550	7 98E-07	3 00E-02	2 66E-05	7 98E-07		
Barium	4 50E+02	100	17	70	1 00E-06	70	25550	25550	2 99E-05	1 00E-01	2 99E-04	2 99E-05		
Beryllium	1 90E+00	100	17	70	1 00E-06	70	25550	25550	1 26E-07	2 00E-01	6 32E-07	1 26E-07		
Cadmium	6 10E-01	100	17	70	1 00E-06	70	25550	25550	4 06E-08			4 06E-08		
Nickel	4 20E+01	100	17	70	1 00E-06	70	25550	25550	2 79E-06			2 79E-06		
Thallium	5 70E-01	100	17	70	1 00E-06	70	25550	25550	3 79E-08	5 00E-03	7 59E-06	3 79E-08		
									TOTAL HAZARD INDEX =		3.16E-02	TOTAL CANCER RISK =		0.00E+00

Table C-28-2

Mead OU3
Ingestion of Chemicals In The Sediment From NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Sediment (mg/kg)
IR = Ingestion Rate (mg/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)[1]	CANCER RISK (unitless)
Nitrobenzene	7.40E-02	10	4	9	1.00E-06	70	3285	25550	1.16E-10	5.00E-03	2.32E-08	1.49E-11		
Aluminum	4.70E+04	10	4	9	1.00E-06	70	3285	25550	7.36E-05	1.00E-01	7.36E-04	9.46E-06		
Arsenic	1.20E+01	10	4	9	1.00E-06	70	3285	25550	1.88E-08	3.00E-02	6.26E-07	2.42E-09		
Barium	4.50E+02	10	4	9	1.00E-06	70	3285	25550	7.05E-07	1.00E-01	7.05E-06	9.06E-08		
Beryllium	1.90E+00	10	4	9	1.00E-06	70	3285	25550	2.97E-09	2.00E-01	1.49E-08	3.82E-10		
Cadmium	6.10E-01	10	4	9	1.00E-06	70	3285	25550	9.55E-10			1.23E-10		
Nickel	4.20E+01	10	4	9	1.00E-06	70	3285	25550	6.58E-08			8.45E-09		
Thallium	5.70E-01	10	4	9	1.00E-06	70	3285	25550	8.92E-10	5.00E-03	1.78E-07	1.15E-10		
										TOTAL HAZARD INDEX =	7.44E-04		TOTAL CANCER RISK =	0.00E+00

Table C-28-3

Mead OU3
Dermal Exposure To Chemicals In The Sediment From NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - RME)

Equation : CDI = (CS x SA x AF x ABS x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact
AD = Dermal Soil Adherence Factor
AB = Absorption Factor = 1 0% for organics and 0 1% for inorganics
EF = Exposure Frequency
ED = Exposure Duration
BW = Body Weight
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dys)	AT2 (dys)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Nitrobenzene	7 40E-02	8,620	1 00	0.10	17	70	1 00E-06	70	25,550	25,550	4 24E-08	5 00E-03	8 49E-06	4 24E-08		
Aluminum	4 70E+04	8,620	1 00	0.01	17	70	1 00E-06	70	25550	25,550	2 70E-03	1 00E-01	2 70E-02	2 70E-03		
Arsenic	1 20E+01	8,620	1 00	0 01	17	70	1 00E-06	70	25550	25,550	6 88E-07	3 00E-02	2 29E-05	6 88E-07		
Barium	4 50E+02	8,620	1 00	0.01	17	70	1 00E-06	70	25550	25,550	2 58E-05	1 00E-01	2 58E-04	2 58E-05		
Beryllium	1 90E+00	8 620	1 00	0 01	17	70	1 00E-06	70	25550	25,550	1 09E-07	2 00E-01	5 45E-07	1 09E-07		
Cadmium	6 10E-01	8 620	1 00	0.01	17	70	1 00E-06	70	25550	25,550	3 50E-08			3 50E-08		
Nickel	4 20E+01	8,620	1 00	0 01	17	70	1 00E-06	70	25550	25,550	2 41E-06			2 41E-06		
Thallium	5 70E-01	8,620	1 00	0 01	17	70	1 00E-06	70	25550	25,550	3 27E-08	5 00E-03	6 54E-06	3 27E-08		
												HAZARD INDEX =	2 73E-02		TOTAL CANCER RISK =	0 00E+00

Table C-28-4

Mead OU3
Dermal Exposure To Chemicals In The Sediment From NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - Average Exposure)

Equation : CDI = (CS x SA x AF x ABS x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact
AD = Dermal Soil Adherence Factor
AB = Absorption Factor = 1.0% for organics and 0.1% for inorganics
EF = Exposure Frequency
ED = Exposure Duration
BW = Body Weight
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{1}$	CANCER RISK (unitless)
Nitrobenzene	7.40E-02	2,800	0.20	0.10	4	9	1.00E-06	70	3,285	25,550	6.49E-10	5.00E-03	1.30E-07	8.34E-11		
Aluminum	4.70E+04	2,800	0.20	0.01	4	9	1.00E-06	70	3285	25,550	4.12E-05	1.00E-01	4.12E-04	5.30E-06		
Arsenic	1.20E+01	2,800	0.20	0.01	4	9	1.00E-06	70	3285	25,550	1.05E-08	3.00E-02	3.51E-07	1.35E-09		
Barium	4.50E+02	2,800	0.20	0.01	4	9	1.00E-06	70	3285	25,550	3.95E-07	1.00E-01	3.95E-06	5.07E-08		
Beryllium	1.90E+00	2,800	0.20	0.01	4	9	1.00E-06	70	3285	25,550	1.67E-09	2.00E-01	8.33E-09	2.14E-10		
Cadmium	6.10E-01	2,800	0.20	0.01	4	9	1.00E-06	70	3285	25,550	5.35E-10			6.88E-11		
Nickel	4.20E+01	2,800	0.20	0.01	4	9	1.00E-06	70	3285	25,550	3.68E-08			4.73E-09		
Thallium	5.70E-01	2,800	0.20	0.01	4	9	1.00E-06	70	3285	25,550	5.00E-10	5.00E-03	9.99E-08	6.43E-11		
												HAZARD INDEX =	4.17E-04		TOTAL CANCER RISK =	0.00E+00

Table C-28-5

Mead OU3
Ingestion of Chemicals In The Water From NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - RME)

Equation : CDI = (CW x CR x ET x EF x ED)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
CR = Contact Rate (liters/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	CR (l/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Mercury	2 60E-04	5 00E-03	2	17	70	70	25550	25,550	1.73E-09	3 00E-04	5 77E-06	1 73E-09		
										HAZARD INDEX =	5 77E-06		TOTAL CANCER RISK =	0 00E+00

Table C-28-6

Mead OU3
Ingestion of Chemicals In The Water From NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - Average Exposure)

Equation: CDI = (CW x CR x ET x EF x ED)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
CR = Contact Rate (liters/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	CR (l/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Mercury	2.60E-04	2.50E-03	1	4	9	70	3285	25,550	1.02E-10	3.00E-04	3.39E-07	1.31E-11		
										HAZARD INDEX =	3.39E-07		TOTAL CANCER RISK =	0.00E+00

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Table C-28-7

Mead OU3
Dermal Exposure To Chemicals In The Water From NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - RME)

Equation: CDI = (CW x SA x PC x ET x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where
CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Chemical-specific Dermal Permeability Constant (cm/hr)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	SA (cm^2)	PC (cm/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	CF (l/cm^3)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Mercury	2 60E-04	8 620	1 00E-03	2	17	70	1 00E-03	70	25550	25,550	2 98E-09	3 00E-04	9 94E-06	2 98E-09		
												HAZARD INDEX =	9 94E-06		TOTAL CANCER RISK =	0 00E+00

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Table C-28-8

Mead OU3
Dermal Exposure To Chemicals In The Water From NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - Average Exposure)

Equation : CDI = (CW x SA x PC x ET x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Chemical-specific Dermal Permeability Constant (cm/hr)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifet ıe (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	SA (cm^2)	PC (cm/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	CF (l/cm3)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Mercury	2 60E-04	2,800	1 00E-03	1	4	9	1 00E-03	70	3285	25,550	1 14E-10	3 00E-04	3 80E-07	1 47E-11		
												HAZARD INDEX =	3 80E-07		TOTAL CANCER RISK =	0 00E+00

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Table C-28-9

Mead OU3
Ingestion of Fish Caught At NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - RME)

Equation: CDI = (CF x IR x FI x EF x ED)/(BW x AT)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chemical Daily Intake (mg/kg-day)
CF = Chemical Concentration in Fish Tissue (mg/kg)
IR = Ingestion Rate (kg/day)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Estimated CF (mg/kg)	IR (kg/dy)	FI (unitless	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	1.13E+01	0.025	1	365	70	70	25,550	25,550	4.04E-03	1.00E+00	4.04E-03	4.04E-03		
Barium	3.30E+00	0.025	1	365	70	70	25,550	25,550	1.18E-03	7.00E-02	1.68E [illegible]	1.18E-03		
Cadmium	1.00E-01	0.025	1	365	70	70	25,550	25,550	3.57E-05	1.00E-03	3.57E-02	3.57E-05		
Copper	4.40E+00	0.025	1	365	70	70	25,550	25,550	1.57E-03	4.00E-02	3.93E-02	1.57E-03		
Nickel	8.10E-01	0.025	1	365	70	70	25,550	25,550	2.89E-04	2.00E-02	1.45E-02	2.89E-04		
Selenium	2.80E+00	0.025	1	365	70	70	25,550	25,550	1.00E-03	5.00E-03	2.00E-01	1.00E-03		
Silver	6.20E-01	0.025	1	365	70	70	25,550	25,550	2.21E-04	5.00E-03	4.43E-02	2.21E-04		
										HAZARD INDEX =	3.55E-01		TOTAL CANCER RISK =	0.00E+00

Table C-28-10

Mead OU3
Ingestion of Fish Caught At NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Adult Recreational Fisherman - Average Exposure)

Equation: CDI = (CF x IR x FI x EF x ED)/(BW x AT)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chemical Daily Intake (mg/kg-day)
CF = Chemical Concentration in Fish Tissue (mg/kg)
IR = Ingestion Rate (kg/day)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Estimated CF (mg/kg)	IR (kg/dy)	FI (unitless	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Aluminum	1.13E+01	0 008	0 5	365	9	70	3,285	25,550	6 46E-04	1.00E+00	6 46E-04	8 30E-05		
Barium	3.30E+00	0 008	0 5	365	9	70	3,285	25,550	1.89E-04	7.00E-02	2 69E-03	2 42E-05		
Cadmium	1.00E-01	0 008	0 5	365	9	70	3,285	25,550	5.71E-06	1 00E-03	5.71E-03	7 35E-07		
Copper	4.40E+00	0 008	0 5	365	9	70	3,285	25,550	2 51E-04	4 00E-02	6 29E 03	3 23E-05		
Nickel	8 10E-01	0 008	0 5	365	9	70	3,285	25,550	4 63E-05	2 00E-02	2 31E 03	5 95E-06		
Selenium	2 80E+00	0 008	0 5	365	9	70	3,285	25,550	1.60E-04	5 00E-03	3 20E 02	2 06E-05		
Silver	6 20E-01	0 008	0 5	365	9	70	3,285	25,550	3.54E-05	5.00E-03	7 09E 03	4 56E-06		
										HAZARD INDEX =	5.67E 02		TOTAL CANCER RISK =	0 00E+00

Table C-28-11

Mead OU3
Ingestion of Chemicals In The Sediment From NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - RME)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = *Contaminant Concentration in Sediment (mg/kg)*
IR = Ingestion Rate (mg/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = *Averaging Time for Carcinogenic Effects, Based on Lifetime (days)*

Potential Chemicals of Concern	Maximum CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
Nitrobenzene	7 40E-02	200	17	6	1 00E-06	15	2190	25550	4 60E-08	5 00E-03	9 19E-06	3 94E-09		
Aluminum	4 70E+04	200	17	6	1 00E-06	15	2190	25550	2 92E-02	1 00E-01	2 92E-01	2 50E-03		
Arsenic	1 20E+01	200	17	6	1 00E-06	15	2190	25550	7 45E-06	3 00E-02	2 48E-04	6 39E-07		
Barium	4 50E+02	200	17	6	1 00E-06	15	2190	25550	2 79E-04	1 00E-01	2 79E-03	2 40E-05		
Beryllium	1 90E+00	200	17	6	1 00E-06	15	2190	25550	1 18E-06	2 00E-01	5 90E-06	1 01E-07		
Cadmium	6 10E-01	200	17	6	1 00E-06	15	2190	25550	3 79E-07			3 25E-08		
Nickel	4 20E+01	200	17	6	1 00E-06	15	2190	25550	2 61E-05			2 24E-06		
Thallium	5 70E-01	200	17	6	1 00E-06	15	2190	25550	3 54E-07	5 00E-03	7 08E-05	3 03E-08		
										TOTAL HAZARD INDEX =	2 95E-01		TOTAL CANCER RISK =	0 00E+00

Table C-28-12

Mead OU3
Ingestion of Chemicals In The Sediment From NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - Average Exposure)

Equation: CDI = (CS x IR x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = Slope Factor x CDI

Where: CDI = Chronic Daily Intake
CS = Contaminant Concentration in Sediment (mg/kg)
IR = Ingestion Rate (mg/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum CS (mg/kg)	IR (mg/dy)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Nitrobenzene	7 40E-02	100	4	6	1 00E-06	15	2190	25550	5 41E-09	5 00E-03	1 08E-06	4 63E-10		
Aluminum	4 70E+04	100	4	6	1 00E-06	15	2190	25550	3 43E-03	1 00E-01	3 43E-02	2 94E-04		
Arsenic	1 20E+01	100	4	6	1 00E-06	15	2190	25550	8 77E-07	3 00E-02	2 92E-05	7 51E-08		
Barium	4 50E+02	100	4	6	1 00E-06	15	2190	25550	3 29E-05	1 00E-01	3 29E-04	2 82E-06		
Beryllium	1 90E+00	100	4	6	1 00E-06	15	2190	25550	1 39E-07	2 00E-01	6 94E-07	1 19E-08		
Cadmium	6 10E-01	100	4	6	1 00E-06	15	2190	25550	4 46E-08			3 82E-09		
Nickel	4 20E+01	100	4	6	1 00E-06	15	2190	25550	3 07E-06			2 63E-07		
Thallium	5 70E-01	100	4	6	1 00E-06	15	2190	25550	4 16E-08	5 00E-03	8 33E-06	3 57E-09		
										TOTAL HAZARD INDEX =	3 47E-02		TOTAL CANCER RISK =	0 00E+00

Table C-28-13

Mead OU3
Dermal Exposure To Chemicals In The Sediment From NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - RME)

Equation : CDI = (CS x SA x AF x ABS x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact
AD = Dermal Soil Adherence Factor
AB = Absorption Factor = 1 0% for organics and 0 1% for inorganics
EF = Exposure Frequency
ED = Exposure Duration
BW = Body Weight
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Nitrobenzene	7 40E-02	6,500	1 00	0 10	17	6	1.00E-06	15	2,190	25,550	1 49E-07	5 00E-03	2 99E-05	1 28E-08		
Aluminum	4 70E+04	6,500	1 00	0 01	17	6	1 00E-06	15	2190	25,550	9 49E-03	1 00E-01	9 49E-02	8 13E-04		
Arsenic	1 20E+01	6,500	1 00	0 01	17	6	1 00E-06	15	2190	25,550	2 42E-06	3 00E-02	8 07E-05	2 08E-07		
Barium	4 50E+02	6,500	1 00	0 01	17	6	1 00E-06	15	2190	25,550	9 08E 05	1 00E-01	9 08E-04	7 78E-06		
Beryllium	1 90E+00	6,500	1 00	0 01	17	6	1 00E-06	15	2190	25,550	3 83E 07	2 00E-01	1 92E-06	3 29E-08		
Cadmium	6 10E-01	6 500	1 00	0 01	17	6	1 00E-06	15	2190	25.550	1 23E 07			1 06E-08		
Nickel	4 20E+01	6,500	1 00	0 01	17	6	1 00E-06	15	2190	25 550	8 48E 06			7 27E-07		
Thallium	5 70E-01	6,500	1 00	0 01	17	6	1 00E-06	15	2190	25 550	1 15E 07	5 00E-03	2 30E-05	9 86E-09		
												HAZARD INDEX =	9 59E-02		TOTAL CANCER RISK =	0 00E+00

Table C-28-14

Mead OU3
Dermal Exposure To Chemicals In The Sediment From NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - Average Exposure)

Equation: CDI = (CS x SA x AF x ABS x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact
AD = Dermal Soil Adherence Factor
AB = Absorption Factor = 1 0% for organics and 0 1% for inorganics
EF = Exposure Frequency
ED = Exposure Duration
BW = Body Weight
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CS (mg/kg)	SA (cm^2)	AD (mg/cm^2)	AB (unitless)	EF (dy/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Nitrobenzene	7 40E-02	1,800	0 20	0 10	4	6	1.00E-06	15	2,190	25,550	1 95E-09	5 00E-03	3 89E-07	1 67E-10		
Aluminum	4 70E+04	1,800	0 20	0 01	4	6	1 00E-06	15	2190	25,550	1 24E 04	1 00E-01	1 24E-03	1 06E-05		
Arsenic	1 20E+01	1,800	0 20	0 01	4	6	1 00E-06	15	2190	25,550	3 16E 08	3 00E-02	1 05E-06	2 71E-09		
Barium	4 50E+02	1,800	0 20	0 01	4	6	1.00E-06	15	2190	25,550	1 18E 06	1 00E-01	1 18E-05	1 01E-07		
Beryllium	1 90E+00	1,800	0 20	0 01	4	6	1 00E-06	15	2190	25,550	5 00E 09	2 00E-01	2 50E-08	4 28E-10		
Cadmium	6 10E-01	1,800	0 20	0 01	4	6	1 00E-06	15	2190	25 550	1 60E 09			1 38E-10		
Nickel	4 20E+01	1,800	0 20	0 01	4	6	1 00E-06	15	2190	25,550	1 10E 07			9 47E-09		
Thallium	5 70E-01	1,800	0 20	0 01	4	6	1 00E-06	15	2190	25 550	1 50E 09	5 00E-03	3 00E-07	1 29E-10		
												HAZARD INDEX =	1 25E-03		TOTAL CANCER RISK =	0 00E+00

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Table C-28-15

Mead OU3
Ingestion of Chemicals In The Water From NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - RME)

Equation: CDI = (CW x CR x ET x EF x ED)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
CR = Contact Rate (liters/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	CR (l/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Mercury	2 60E-04	5 00E-03	6	17	6	15	2190	25,550	2 42E-08	3 00E-04	8 07E-05	2 08E-09		
										HAZARD INDEX =	8 07E-05		TOTAL CANCER RISK =	0 00E+00

Table C-28-16

Mead OU3
Ingestion of Chemicals In The Water From NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - Average Exposure)

Equation: CDI = (CW x CR x ET x EF x ED)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
CR = Contact Rate (liters/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	CR (l/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
Mercury	2.60E-04	2.50E-03	3	4	6	15	2190	25,550	1.42E-09	3.00E-04	4.75E-06	1.22E-10		
										HAZARD INDEX =	4.75E-06		TOTAL CANCER RISK =	0.00E+00

Table C-28-17

Mead OU3
Dermal Exposure To Chemicals In The Water From NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - RME)

Equation CDI = (CW x SA x PC x ET x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where
CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Chemical-specific Dermal Permeability Constant (cm/hr)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	SA (cm^2)	PC (cm/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	CF (l/cm3)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Mercury	2 60E-04	6,500	1 00E-03	6	17	6	1 00E-03	15	2190	25,550	3 15E-08	3 00E-04	1 05E-04	2 70E-09		
												HAZARD INDEX =	1 05E-04		TOTAL CANCER RISK =	0 00E+00

Table C-28-18

Mead OU3
Dermal Exposure To Chemicals In The Water From NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - Average Exposure)

Equation CDI = (CW x SA x PC x ET x EF x ED x CF)/(BW x AT1 or AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where
CDI = Chronic Daily Intake
CW = Concentration in Water (mg/liter)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Chemical-specific Dermal Permeability Constant (cm/hr)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Detected CW (mg/l)	SA (cm^2)	PC (cm/hr)	ET (hr/dy)	EF (dy/yr)	ED (yr)	CF (l/cm^3)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF $(mg/kg\text{-}day)^{-1}$	CANCER RISK (unitless)
Mercury	2 60E-04	1,800	1 00E-03	3	4	6	1 00E-03	15	2190	25,550	1 03E-09	3 00E-04	3 42E-06	8 79E-11		
												HAZARD INDEX =	3 42E-06		TOTAL CANCER RISK =	0 00E+00

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Table C-28-19

Mead OU3
Ingestion of Fish Caught At NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - RME)

Equation: CDI = (CF x IR x FI x EF x ED)/(BW x AT)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chemical Daily Intake (mg/kg-day)
CF = Chemical Concentration in Fish Tissue (mg/kg)
IR = Ingestion Rate (kg/day)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT1 = Averaging Time for Non-carcinogenic Effects (days)
AT2 = Averaging Time for Carcinogenic Effects, Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Estimated CF (mg/kg)	IR (kg/dy)	FI (unitless	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)-1	CANCER RISK (unitless)
Aluminum	1 13E+01	0 0125	1	365	6	15	2,190	25,550	9.42E-03	1 00E+00	9 42E-03	8 07E-04		
Barium	3 30E+00	0 0125	1	365	6	15	2,190	25,550	2 75E-03	7 00E-02	3 93E 02	2.36E-04		
Cadmium	1 00E-01	0 0125	1	365	6	15	2,190	25,550	8 33E-05	1.00E-03	8.33E-02	7 14E-06		
Copper	4 40E+00	0 0125	1	365	6	15	2.190	25,550	3.67E-03	4.00E-02	9.17E 02	3.14E-04		
Nickel	8 10E-01	0.0125	1	365	6	15	2,190	25,550	6.75E-04	2 00E-02	3 38E 02	5 79E-05		
Selenium	2 80E+00	0 0125	1	365	6	15	2,190	25.550	2.33E-03	5.00E-03	4 67E 01	2 00E-04		
Silver	6 20E-01	0 0125	1	365	6	15	2,190	25.550	5 17E-04	5.00E-03	1 03E 01	4 43E-05		
										HAZARD INDEX =	8 27E 01		TOTAL CANCER RISK =	0 00E+00

Table C-28-20

Mead OU3
Ingestion of Fish Caught At NRD Resevoir
Former Nebraska Ordnance Plant, Mead, Nebraska
(Hypothetical Child Recreational Fisherman - Average Exposure)

Equation: CDI = (CF x IR x FI x EF x ED)/(BW x AT)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI - Chemical Daily Intake (mg/kg-day)
CF - Chemical Concentration in Fish Tissue (mg/kg)
IR - Ingestion Rate (kg/day)
FI = Fraction Ingested from Contaminated Source (unitless)
EF - Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW - Body Weight (kg)
AT1 - Averaging Time for Non carcinogenic Effects (days)
AT2 - Averaging Time for Carcinogenic Effects Based on Lifetime (days)

Potential Chemicals of Concern	Maximum Estimated CF (mg/kg)	IR (kg/dy)	FI (unitless	EF (dy/yr)	ED (yr)	BW (kg)	AT1 (dy)	AT2 (dy)	Non-Carcinogenic CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	Carcinogenic CDI (mg/kg-dy)	SF (mg/kg-day)[1]	CANCER RISK (unitless)
Aluminum	1.13E+01	0.004	0.5	365	6	15	2,190	25,550	1.51E-03	1.00E+00	1.51E-03	1.29E-04		
Barium	3.3[illegible]E+00	0.004	0.5	365	6	15	2,190	25,550	4.4[illegible]E-04	7.00E-02	6.29E-03	3.77E-05		
Cadmium	1.[illegible]E-01	0.004	0.5	365	6	15	2,190	25,550	1.3[illegible]E-05	1.00E-03	1.33E-02	1.14E-06		
Copper	4.4[illegible]E+00	0.004	0.5	365	6	15	2,190	25,550	5.8[illegible]E-04	4.00E-02	1.47E-02	5.03E-05		
[illegible]	8.1[illegible]E-01	0.004	0.5	365	6	15	2,190	25,550	1.0[illegible]E-04	2.00E-02	5.40E-03	9.25E-06		
[illegible]	2.8[illegible]E+00	0.004	0.5	365	6	15	2,190	25,550	3.[illegible]E-04	5.00E-03	7.47E-02	3.20E-05		
[illegible]	6.[illegible]E-01	0.004	0.5	365	6	15	2,190	25,550	8.2[illegible]E-05	5.00E-03	1.65E-02	7.09E-06		
										HAZARD INDEX =	1.32E-01	TOTAL CANCER RISK		0.00E+00

B07NE003703-06853

Appendix D

Technical Report EL-97-11
July 1997

Plant Uptake of Explosives From Contaminated Soil and Irrigation Water at the Former Nebraska Ordnance Plant, Mead, Nebraska

by Richard A. Price, Judith C. Pennington, Steven L. Larson

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Final report

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Contents

List of Figures

Preface

The report herein was prepared for the U.S. Army Engineer District, Kansas City, Kansas City, MO, by the Environmental Laboratory (EL) of the U.S. Army Engineer Waterways Experiment Station (WES), Vicksburg, MS, in association with Mississippi College, Clinton, MS, and AScI Corporation, McLean, VA. The research was conducted in support of the former Nebraska Ordnance Plant Operable Unit 3 Remedial Investigation. The Principal Investigators were Dr. Judith C. Pennington, Ecosystem Processes and Effects Branch (EPEB), Environmental Processes and Effects Division (EPED), EL, WES, and Mr. Richard A. Price, Fate and Effects Branch (FEB), EPED. Analytical chemistry was performed by Dr. Steve Larson, Environmental Chemistry Branch, Environmental Engineering Division, EL. Project monitors were Mr. Garth Anderson, Mrs. Natalie Tillman, and Mr. Ed Louis, Kansas City District.

Authors of this report are Mr. Price, Dr. Pennington, and Dr. Larson, WES; Mr. David Neumann, Mississippi College; and Ms. Charolett Hayes, AscI Corporation. The report was reviewed by Drs. James M. Brannon, EL, and Elly Best, AScI Corporation. The study was conducted under the direct supervision of Dr. Richard E. Price, Chief, EPEB, and Dr. Bobby L. Folsom, Jr., Chief, FEB, and under the general supervision of Dr. Richard E. Price, Chief, EPED, and Dr. John Harrison, Director, EL.

At the time of publication of this report, Director of WES was Dr. Robert W. Whalin. Commander was COL Bruce K. Howard, EN.

This report should be cited as follows:

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1 Introduction

Background

The former Nebraska Ordnance Plant (NOP) is a Superfund site in Saunders County, Nebraska. Explosives were loaded, assembled, and packed into bombs, boosters, and shells at the site during World War II and the Korean Conflict. The ordnance were loaded with 2,4,6-trinitrotoluene (TNT), amatol (TNT and ammonium nitrate), tritonal (TNT and aluminum), and Composition B [TNT and hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)]. Process wastewaters were discharged into sumps and bomb wash pits and their associated drainage ditch systems. In 1956 the NOP was placed on standby and declared excess in 1959. Currently, the property is owned by the University of Nebraska, the National Guard and Army Reserves, the Department of Commerce, and private individuals. Since explosives and volatile organic compounds were detected in soils and groundwater at the site, three operable units (OUs) were defined to address remediation, OU I, OU II, and OU III. This project falls under OU III, which includes possible waste disposal sites. Preliminary remediation goals (RGs) for the site are 2 μg RDX per liter in groundwater and 5.8 and 17.2 mg kg^{-1} for RDX and TNT in soils, respectively (Rust Environmental Infrastructure 1995).

Objectives

To prepare the Operable Unit III Risk Assessment addressing the potential hazards associated with future uses of the site, data describing plant uptake of explosives, especially RDX, were needed. Greenhouse studies were conducted using selected agronomic species, corn, tomato, lettuce, and radish, to measure plant uptake of explosives from contaminated soil and uptake of RDX from irrigation water. A reference plant was included in all greenhouse studies to develop a database from which future studies could predict uptake by growing the reference plant and extrapolating to the database for other crops. In addition to the greenhouse studies, a mass balance study with two species, tomato and radish, was conducted to determine the distribution of radiolabeled carbon from [^{14}C]RDX in each compartment of the test: soil, plant, and air. Since trichloroethene (TCE) was detected in 28 of 128 groundwater wells at the site kg during the 60-day test, while leaves, stems, pods and roots accumulated up to 8.98, 23.99, 0.59, and 104.04 mg kg^{-1}, respectively. Uptake was affected by soil properties, with greatest uptake from soils lowest in percent clay and organic matter.

A more recent study of effects of TNT and 4-ADNT on germination and early seedling development by tall fescue (*Festuca arundinacea*) indicated that germination decreased linearly as TNT concentration increased, but was not significantly affected by 4-ADNT at the same concentrations (Peterson et al. 1996). Concentrations <30 mg TNT per liter or 7.5 mg 4-ADNT per liter had little effect upon seedling growth and development. Use of tall fescue as a phytoremediation tool was suggested due to the high water use and extensive fibrous root systems of the species.

A survey of plant species at Joliet Army Ammunition Plant examined TNT concentrations in native vegetation. Results indicated no explosives in aboveground plant tissues. However, TNT, 2-ADNT, and 4-ADNT were found in some root samples of false boneset (*Kuhnia eupatorioides*), teasel (*Dipsacus sylvestris*), and bromegrass (*B. inermis*) (Schneider et al. 1994).

Results of several recent studies for development of plant species for phytoremediation of explosives in groundwater or surface water or in constructed wetlands are in preparation or in review (Best, Miller and Larson in ; Best, Miller, Zappi et al., in preparation; Best, Sprecher, Larson et al., in preparation; Hughes et al. 1997; and Thompson and Schnoor, in preparation). Thompson and Schnoor (in preparation) used poplar tree cuttings (*Populus deltoides x nigra*) to assess plant uptake of TNT and RDX. Mass balance results after 20 days exposure to ^{14}C-labeled TNT indicated greater uptake of radioactivity from hydroponic solution (86 percent of added radioactivity) than from amended soils (12 percent of added radioactivity). The activity was concentrated in the roots (57 percent and 10 percent for hydroponic and soil treatments, respectively) as opposed to leaves (19 and 0.7 percent, respectively) or stems (22 and 2 percent, respectively). After only 2 days of exposure to ^{14}C-labeled RDX in hydroponic cultures, significant activity was found in plant leaves (26 percent of added radioactivity). Uptake of RDX from soils was not studied.

In a series of phytoremediation studies by the Corps of Engineers for three Army ammunition plants, plant uptake of explosives by aquatic and wetland plants was explored. Results of a study using TNT-contaminated water from Volunteer Army Ammunition Plant in a flow-through system indicated that elodea *(Elodea canadensis)*, coontail *(Ceratophyllum demersum)*, and pondweed *(Potamogeton nodosus)* could not survive in the explosives-contaminated site water (Best, Miller, and Larson, in preparation). Narrow-leaved cattail *(Typha angustifolia)* survived. No TNT was found in cattail nor in dead plants, but 2ADNT and 4ADNT were detected in both; 24DNT was detected in dying plants only. In similar flow-through system studies performed with groundwater from Iowa Army Ammunition Plant, lethal concentrations for the following species were defined: coontail *(Ceratophyllum demersum)*, pondweed *(Potamogeton nodosus)*, and common arrowhead *(Sagittaria latifolia)* (Best, Miller, Zappi et

2 Site Characterization

Background

Soils

The NOP is located in Saunders County, Nebraska, near the town of Mead in an area referred to as Todd Valley. A description and distribution of soils in the area were determined from the Soil Survey of Saunders County, Nebraska (U.S. Department of Agriculture and University of Nebraska Conservation and Survey Division 1965). The soils in this area are of the Sharpsburg-Fillmore soil association, comprised of mostly Sharpsburg silty clay loam soil on well-drained sites. The Fillmore silty clay loam soils are primarily found in low, poorly drained areas. Butler silty clay loam soils typically form terraces along drainage areas. Some small areas of sandy Ortello soils are also present in the area. When drained, these silty clay soils are well suited to agriculture. Sharpsburg soils comprise most of the land area currently in row crop and pasture agricultural activity at the NOP site.

Site usage

In characterizing the NOP site, past and present land use activities were important in selecting areas from which to collect soils necessary to conduct laboratory tests. Soils contaminated with explosives occur predominantly near the actual former ordnance loading sites (Load Lines 1 through 4). However, "clean" (reference) soils of the same type, in this case the Sharpsburg soil, were also required. Most of the site is occupied by former manufacturing and storage facilities or current activities such as feedlots, pasture, row crops, etc. Any site close to facilities of the NOP or associated with agricultural chemicals or irrigation water were considered unlikely to contain "clean" soils. Except for a few scattered woodland sites, little evidence of historically undisturbed areas on the former NOP exists. Some of these wooded sites were used for collecting reference soil for the laboratory tests.

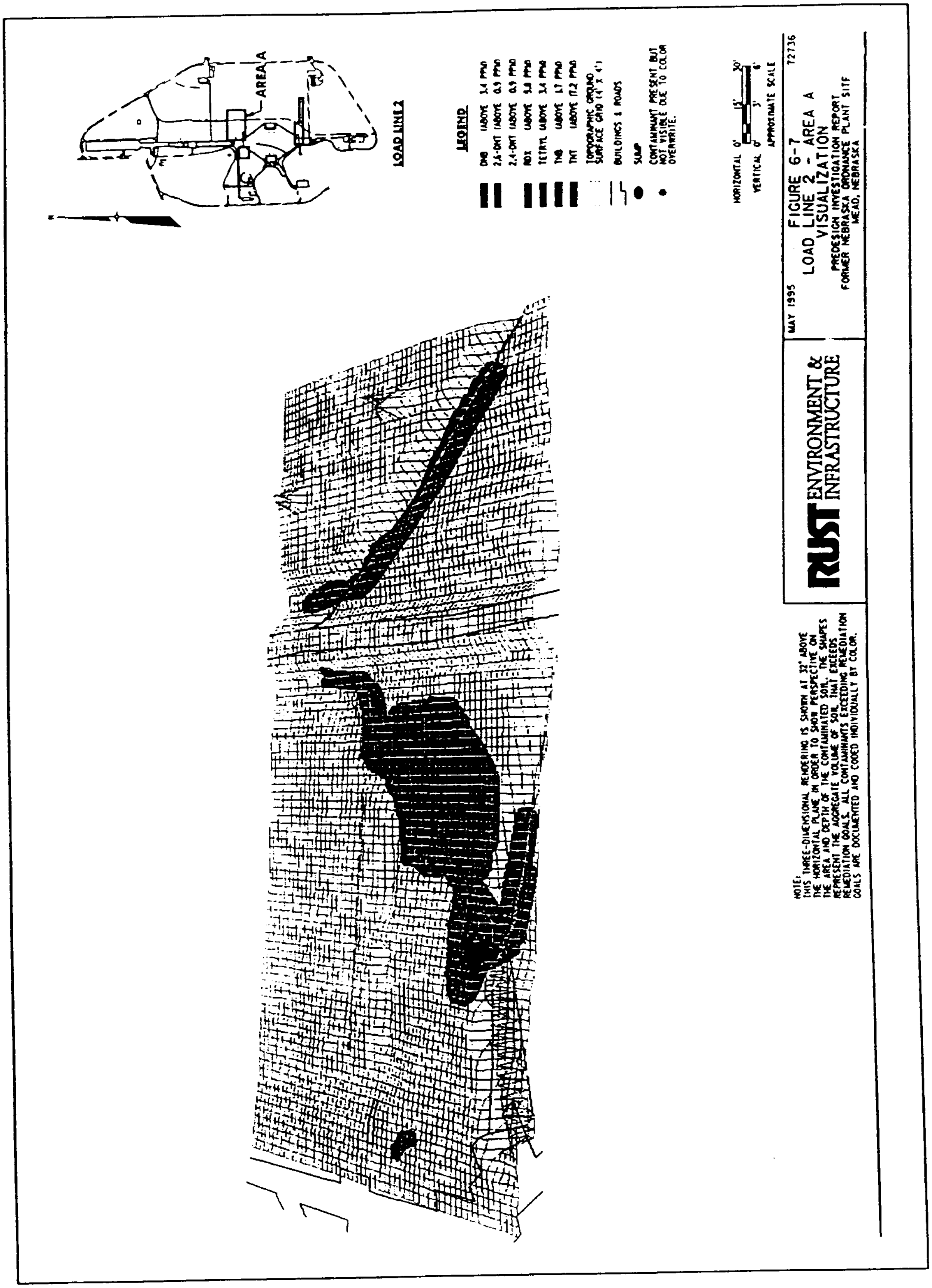

Figure 1. Location of Load Line 2 Area A (Rust Environment and Infrastructure)

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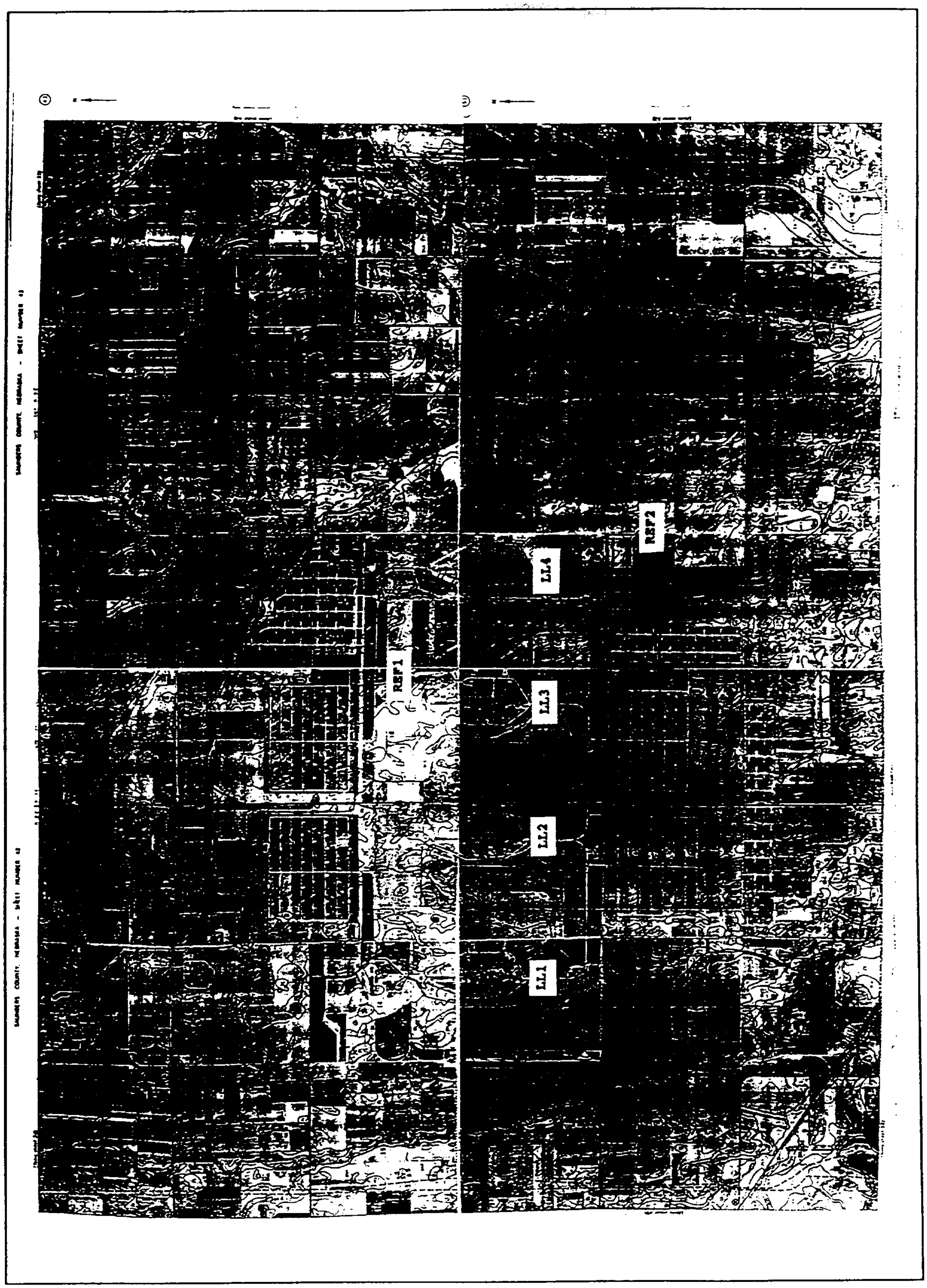

Figure 3. Reference soil locations

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Table 1
Soil Explosives Concentrations From Load Line Area A and Reference Soil Sites, mg kg^{-1}

LL2A Sample	HMX	RDX	TNB	DNB	Tetryl	TNT	4A-DNT	2A-DNT	2,6-DNT	2,4-DNT
T-1	0.210	0.346	<0.250	<0.250	<0.650	0.060	0.077	0.077	<0.260	<0.250
T-2	135	743	53.4	<2.5	<6.5	305	3.10	4.88	<0.260	1.42J
T-3	374	4,460	178	<2.50	<6.50	3,610	1.85J[1]	2.41J	<2.60	3.25
T-4	394	378	11.0	<2.50	<6.50	90.5	4.80	4.44	<2.60	<2.50
T-5	0.100J	1.08	<0.250	<0.250	<0.650	0.580	0.122J	0.067J	<0.260	<0.250
C-1	73.6	348	15.7	<2.50	<6.50	69.7	3.45	5.20	<2.60	0.892J
C-2	115	567	3.84	<2.50	<6.50	232	10.6	12.2	<2.60	1.10J
C-3	227	1,680	76.8	<2.50	<6.50	960	11.0	16.7	<2.60	2.18J
C-4	138	995	64.6	0.337J	<6.50	884	2.33J	3.03	<2.60	0.159J
C-5	0.250J	0.979J	0.678	<0.250	<0.650	1.47	0.148J	0.115J	<0.260	0.014J
B-1	17.6	209	149	1.66J	<6.50	2,690	5.35	8.66	<2.60	5.00
B-2	62.0	48.3	25.6	0.394J	<6.50	1,510	7.49	8.58	<2.60	1.94J
B-3	33.8	167	7.02	0.473J	<6.50	1,170	9.25	20.5	<2.60	3.61
B-4	58.9	251	4.40	<2.50	<6.50	12.5	2.31J	2.00J	<2.60	0.281J
B-5	0.693J	1.12	0.812	0.013J	<0.650	1.94	0.540	0.428	<0.260	0.056J
Reference Samples										
REF1-1	<2.20	0.059J	<0.250	<0.250	<0.650	<0.250	<0.250	<0.250	<0.260	<0.250
REF1-2	<2.20	<1.00	<0.250	<0.250	<0.650	<0.250	<0.250	<0.250	<0.260	<0.250
REF1-3	<2.20	<1.00	<0.250	<0.250	<0.650	<0.250	<0.250	<0.250	<0.260	<0.250
REF1-4	<2.20	<1.00	<0.250	<0.250	<0.650	<0.250	<0.250	<0.250	<0.260	<0.250
REF1-5	<2.20	0.053J	<0.250	<0.250	<0.650	0.015J	<0.250	<0.250	<0.260	<0.250
REF2-1	<2.20	<1.00	<0.250	<0.250	<0.650	<0.250	<0.250	<0.250	<0.260	<0.250
REF2-2	<2.20	<1.00	<0.250	<0.250	<0.650	<0.250	<0.250	<0.250	<0.260	<0.250
REF2-3	<2.20	<1.00	<0.250	<0.250	<0.650	<0.250	<0.250	<0.250	<0.260	<0.250
REF2-4	<2.20	<1.00	<0.250	<0.250	<0.650	<0.250	<0.250	<0.250	<0.260	<0.250
REF2-5	<2.20	<1.00	<0.250	<0.250	<0.650	<0.250	<0.250	<0.250	<0.260	<0.250

[1] J values are detected concentrations below method detection limits.

3 Collection of Soil and Irrigation Water

Methods and Materials

Collection of soils for greenhouse tests

Based on data resulting from the site characterization, contaminated soil was collected from three locations in Load Line 2 Area A. Two, six, and two drums were collected from areas B1, C2/C3, and T3, respectively (Figure 5). (These samples were subsequently designated NOPB, NOPC, and NOPT, respectively.) A backhoe was used to excavate the soil down to 0.3 m after first removing the majority of surface vegetation, where present (Figure 6). The soil was placed into new 208-L steel drums and transferred to a refrigerated truck. Twenty drums of uncontaminated soil were also collected from a reference site in the same manner (Figure 7).

Collection of groundwater for greenhouse tests

Based on data provided by Woodward-Clyde, groundwater was collected from one contaminated and one clean monitoring well, MW05 and MW48, respectively (Figure 8). Field support for groundwater collection was provided by Woodward-Clyde, including pumping equipment. Water was pumped from the well allowing for sufficient purging and optimization of flow prior to collection. Water was then transferred to 208-L closed-top drums. Five drums were collected from Well MW05, and 15 drums were collected from Well MW48. The drums were transferred to a refrigerated truck. Drums of water and soil were transported at 4 °C to WES.

Soil mixing and analysis

Upon reaching WES, the drums of soil from LL2A were segregated by location and then mixed in a soil lysimeter with a small rotary tiller (Figure 9).

Figure 7. Collecting soil from reference site

Figure 8. Collecting groundwater from monitoring well (MW5-B)

samples were placed into amber jars and analyzed for explosives using the methods of EPA SW846 Method 8330 (EPA 1992).

Results and Discussion

Soil analysis

Concentration of RDX in the NOPB soil was significantly lower than concentrations at locations NOPC and NOPT, while concentrations of TNT at the three locations did not differ significantly (Table 3). Elevated levels of HMX and TNB were also found in LL2A soils. Due to the high concentrations of RDX and TNT, detection limits for the remaining compounds were high, resulting in no detectable concentrations except for 2-amino-4,6-dinitrotoluene (2A-DNT) in the NOPB and NOPC soils. The "J" indicates a value of a measurable peak that falls below the method detection limit (MDL) for that particular sample. Although previous core samples collected from the NOP reference site did not show any detectable concentrations of explosives, the NOPREF composite did contain trace concentrations of TNT. However, since trace levels of TNT were not expected to interfere significantly with plant uptake experiments, the soil was used as the reference soil. Phosphorus, potassium, and magnesium concentrations were considered more than adequate for plant growth, while calcium concentrations were considered low (Table 4).

Table 3
Mean (standard error) Explosives Concentrations of LL2A and Reference Soil Composites, mg kg^{-1}

Analyte	NOPB	NOPC	NOPT	NOPREF
RDX	283.33 (64.09)	1,810 (102.14)	2,683 (707.02)	<1.0 (0.0)
TNT	2,270 (1,010.36)	1,620 (208.17)	3,302 (96.10)	0.04 (0.01)
HMX	55.0 (9.45)	214 (10.58)	271 (66.88)	<2.2 (0.0)
TNB	84.67 (13.67)	151.33 (26.67)	128 (25.66)	<0.25 (0.0)
DNB	<25 (0.0)	<25 (0.0)	<25 (0.0)	<0.25 (0.0)
TETRYL	<65 (0.0)	<65 (0.0)	<65 (0.0)	<65 (0.0)
4A-DNT	<25 (0.0)	<25 (0.0)	<25 (0.0)	<0.25 (0.0)
2A-DNT	7.0 (2.75)	5.67 (1.36)	<25 (0.0)	<0.25 (0.0)
2,6-DNT	<26 (0.0)	<26 (0.0)	<26 (0.0)	<0.26 (0.0)
2,4-DNT	<25 (0.0)	<25 (0.0)	<25 (0.0)	<0.25 (0.0)

4 Greenhouse Tests

Objectives

Phase 1: Plant uptake at remedial cleanup goals for soils

The objective of Phase 1 was to quantify the uptake of explosives into usable (edible) plant tissues when plants were grown in contaminated soil and/or irrigated with contaminated groundwater. Soil RDX and TNT concentrations were of the same concentrations as the remedial cleanup goals (RG) of 5.8 and 17.2 mg kg^{-1} of RDX and TNT, respectively. The concentration of RDX in irrigation water was 100 $\mu g\ L^{-1}$. The highest concentration of RDX detected in groundwater from the NOP site was 98 $\mu g\ L^{-1}$ (Woodward-Clyde 1993) from BMW-005-082. Although the action level for RDX in groundwater at the NOP site is 2 $\mu g\ L^{-1}$, accumulation of enough RDX at this level to be detectable in plant tissues was considered very unlikely. If significant levels of RDX accumulated in plant tissues when plants are irrigated with groundwater containing 100 μg RDX per liter, then lower concentrations of RDX in groundwater could be addressed in Phase 2. Corn, tomato, radish, and lettuce represent field and garden crops likely to be grown in the NOP area. Yellow nutsedge (*Cyperus esculentus*) served as an index plant for explosives uptake in agricultural crops. Yellow nutsedge has been used successfully to predict heavy metal accumulations in agricultural plants (Folsom and Price 1989; Van Driel et al. 1983)) and has promise of predictive capabilities for explosives. A zero RDX concentration for soil and water was added as a control, and each experimental treatment was replicated five times. A description of treatment levels for Phase 1 is shown in Table 6.

Phase 2: Effects of explosives concentrations in soil and irrigation water on plant uptake

The objective in Phase 2 was to quantify the effects of concentrations of RDX and TNT in soils on plant uptake. Three agricultural crops, lettuce, tomato, and corn, and the reference plant, yellow nutsedge, were used in this experiment. Four soil RDX and TNT concentrations were tested including the 5.8- and 17.2-mg kg^{-1} soil concentration for RDX and TNT, respectively (Table 7). Two

Table 8
Phase 3 Soil Treatments

Label	Soil, Clay Content	Cow Manure, % by weight	RDX, mg kg^{-1}	TNT, mg kg^{-1}
S0FC	Clean, high clay soil	30	0.0	0.0
S0FS	Clean, low clay soil	30	0.0	0.0
S1UC	RG high clay	0	5.8	17.2
S1FC	RG high clay	30	5.8	17.2
S1US	RG low clay soil	0	5.8	17.2
S1FS	RG low clay soil	30	5.8	17.2
S1UN	RG medium clay (NOP)	0	5.8	17.2
S1FN	RG medium clay (NOP)	30	5.8	17.2

Methods and Materials

Soil preparation

Since the objective of this study was to simulate site conditions of the NOP, site soils were used, where available, for the greenhouse tests. Concentrations in the range of remedial cleanup goals (RG) of 5.8 and 17.2 mg kg^{-1}, for RDX and TNT, respectively, were used. To accomplish this, contaminated soils from LL2A were mixed with reference soil (NOPREF) and in Phase 3 with soils collected from Vicksburg, MS. Two soils from LL2A (NOPB and NOPC) were mixed in a soil lysimeter by a weight ratio of 2.5 to 1. This was done to create a contaminated soil with an RDX to TNT ratio of 1 to 3, or the same ratio as the 5.8 to 17.2 RG. NOP reference soil was weighed and placed into a small laboratory soil mixer (Figure 10). The mixed NOPB and NOPC (NOPBC) was then added to the NOP reference soil and mixed for 5 min. For the different crops, soil weight and pot size were adjusted to provide for optimum plant growth (Table 9). Once mixed, soils were placed into appropriately sized pots (Figure 11) (Folsom and Price 1989).

Preparation of irrigation water

Irrigation water was prepared by adding RDX in an RO water solution to a polyethylene tank containing 189 L of MW5-B groundwater while stirring with an electric stirrer. The tank was wrapped in black plastic sheeting to protect the water from light during storage in the greenhouse. Water for irrigation was collected from a valve in the bottom of the tank while stirring with an electric stirrer. Phase 1 irrigation water was prepared for a target concentration of 100 µg L^{-1}. For Phase 2 irrigation water, only the 1,000-ug L^{-1} concentration was prepared in the tank. Irrigation water for the 500-µg L^{-1} treatment was collected

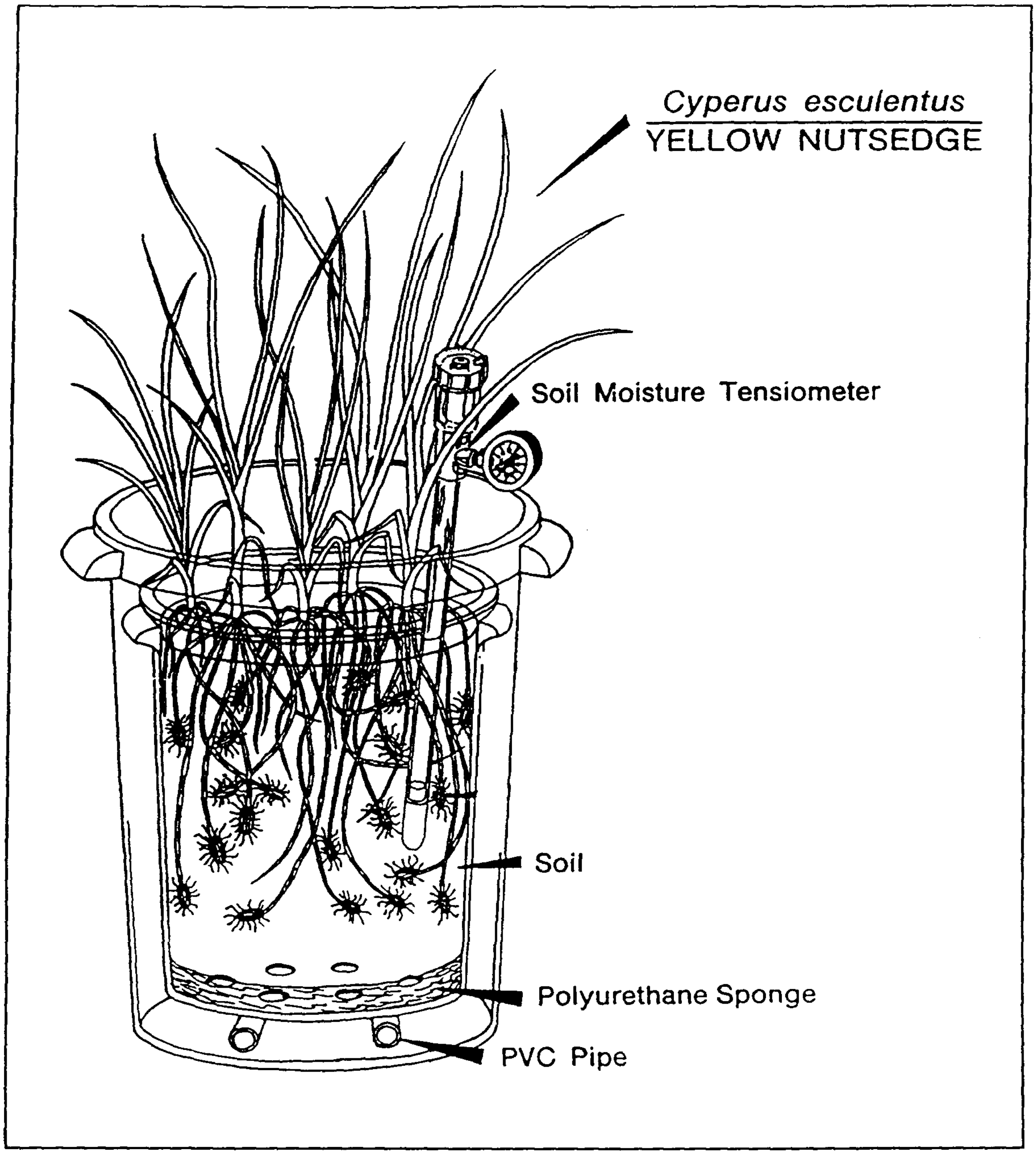

Figure 11. Schematic diagram of experimental unit for plant uptake test

Planting techniques

The pots were planted with seeds or seedlings of radish, lettuce, tomato, corn, and yellow nutsedge (Table 10). Variety, or cultivar, of each agronomic crop was those recommended by the University of Nebraska Cooperative Extension Service as suitable for use in Nebraska (Publication NF92-69, 1992). Seeds of pot until the soil profile was completely moistened, and then water from the outer pot was removed.

Greenhouse Operation and Plant Growing Techniques

The five replicates of each treatment were randomly arranged in the greenhouse. Day length was maintained with an alternating pattern of high pressure sodium and high pressure multivapor halide lamps. The alternating lamps provide an even photosynthetic active radiation distribution pattern of 1,200 $\mu E\ m^{-2}s^{-1}$. The pots were placed at a height to allow maximum potential growth of each crop without heat damage from the light fixtures. Day length for the warm season crops (corn, tomato, and yellow nutsedge) was 16 hr and 12 hr for the cool season crops (lettuce and radish). Temperature was maintained for a summer environment of 32.2 °C (maximum) daytime and 21.1 °C (minimum) nighttime. Cool season crops, lettuce and radish, were subject to a 23.8 °C maximum day temperature and a 16.7 °C minimum night temperature. Relative humidity was maintained as close to 50 percent as possible. Soluble fertilizers, calcium nitrate ($CaNO_3$) and Miracle Grow, were added to ensure optimum plant growth. Foliar applied fungicides and insecticides were also used when necessary to control damaging insects and diseases. All treatment units received surface-applied irrigation water equivalent to 2.54×10^5 l ha^{-1}, or one acre-inch for each application. Each crop was irrigated up to three times weekly or less, depending upon water requirements of the crop. Moisture content of the soil was monitored using soil tensiometers to between 30 and 60 megapascals (Mpa) (field capacity is normally 30 Mpa). Any additional water requirements in excess of three weekly applications were supplemented with RO water by filling the outer container to the top of the inner container, allowing water movement through holes in the bottom of the inner container. Water was siphoned from the outer container when the tensiometer read less than 40 Mpa.

Plant Harvesting and Tissue Preparations

Forty-five days after planting, lettuce, radish, and yellow nutsedge were harvested in preparation for tissue analysis for explosives (Figures 13 through 15). Stainless steel scissors were used to cut the aboveground portion of lettuce and yellow nutsedge 5 cm above the soil surface. The tissue was weighed and washed in RO water to remove dust or soil particles. The aboveground as well as below-ground portion (root) of radish was harvested and weighed; however, only the edible root was analyzed. A small scrub brush was used to clean the radish root of soil to the extent that a home gardener would, noting that some soil particles may remain in pits and crevices of the root surface. Corn was harvested when the edible portions of the plants (kernels) were physically mature (76-80 days). (Figure 16 shows early growth). All of the aboveground portions of the corn plants were harvested after the kernels were removed from the plant and prepared for analysis. Corn kernels were removed from the cob to represent corn

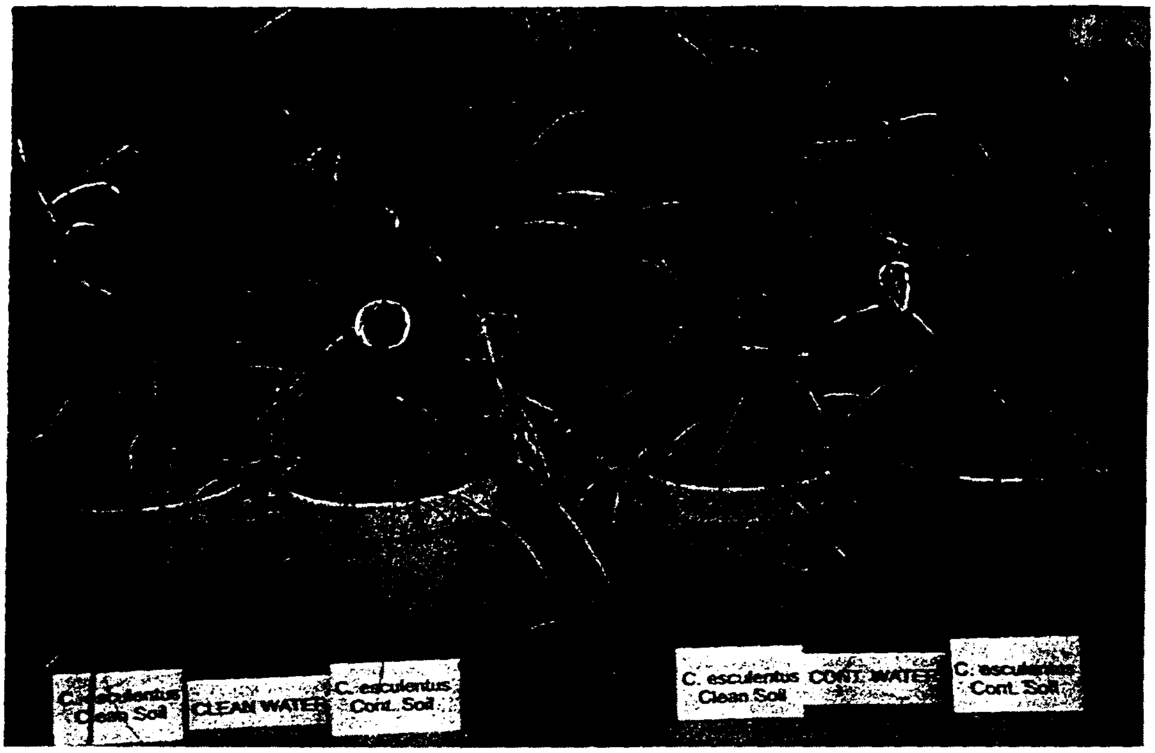

Figure 15. Yellow nutsedge in the four treatments

for human consumption. The cob was placed with the remainder of the plant (stalk, leaves, and shucks) to analyze as corn stover. Tomato fruit was harvested as it ripened, beginning as early as 50 days and ending on Day 85 (Figure 17). Both the fruit and vine of tomato plants were harvested and weighed; however, only the fruit was prepared for analysis of explosives. After collecting, weighing, and washing were completed, tissues was placed into plastic Ziploc bags and immediately frozen at -10 °C. In preparation for chemical extraction for explosives analysis, the tissues were ground in a green plant grinder then freeze-dried according to the methods in Appendix A. Subsamples were used to determine percent solids as freeze-dried weight. To determine explosives in plant tissues, modifications to Method 8330 for soils (EPA 1992) were used (Appendix A).

Statistical Analysis

All data were statistically evaluated using SAS software (SAS Institute, Inc., Cary, NC). Analysis of variance procedures were performed to determine significant differences between treatments, and the Waller-Duncan K-ratio test was performed to separate differences (Steel and Torrie 1980).

Figure 17. Tomatoes in greenhouse at maturity

Results and Discussion

Phase 1: Plant uptake at remedial cleanup goals for soils

The Phase 1 test was designed to address the effects of explosives in soil at the RG levels of 5.8 and 17.2 for RDX and TNT, respectively. Although the preplant RDX and TNT concentrations in the test soil were below the RG (Table 11), concentrations were within the range required and as close to the RG as can be expected when achieving concentration by mixing site soils. Four 190-L containers of site groundwater were spiked with RDX with a goal of achieving 100 $\mu g\ L^{-1}$. Extraction and analysis of the four containers showed the water to have a mean concentration of 134 ($\pm$11.18 standard deviation) $\mu g\ L^{-1}$. No other explosive compounds or their degradation products were detected. Since each crop has different water requirements and growth periods, the total amount of added irrigation water varied (Figure 12). Water requirements for the different crops were in the order of tomato > corn > nutsedge > lettuce = radish.

No significant differences in biomass due to treatment were evident except for corn ears and tomato vine (Table 12). Tomato vine weight was significantly higher in the contaminated soil receiving contaminated water than in other treatments. Corn ear weight was significantly higher in contaminated than in clean soil and when contaminated irrigation water was added to both clean and contaminated soil.

Table 13
Phase 1 Mean (standard error) Plant Tissue RDX Concentrations, mg kg^{-1}

Treatment	Radish	Lettuce	Nutsedge	Tomato	Corn Kernel	Corn Stover
S0W0	<1.6 b (0.0)	<1.6 c (0.0)	<1.6 b (0.0)	<1.6 a (0.0)	<1.6 a (0.0)	<1.6 b (0.0)
S0W1	<1.6 b (0.0)	0.82J[1] c (0.02)	0.96J[1] b (0.16)	<1.6 a (0.0)	<1.6 a (0.0)	0.94J[1] b (0.14)
S1W0	1.99 a (0.28)	9.62 b (1.19)	10.34 a (3.09)	0.61J a (0.15)	<1.6 a (0.0)	1.66 a (0.2)
S1W1	2.33 a (0.12)	13.64 a (1.64)	14.48 a (2.88)	0.49J a (0.18)	<1.6 a (0.0)	1.95 a (0.26)

Note: Means in a column with the same letter are not significantly different at the alpha = 0.05 level. [1] = Number of replicates with detectable RDX; J = All detected values below method detection limits (MDL).

Table 14
Phase 2 Mean (standard error) Preplant Soil Explosives Concentrations, mg kg^{-1}

Treatment	HMX	RDX	TNB	DNB	TNT	4A-DNT	2A-DNT	2,4-DNT
S2W0	0.255 (0.007)	0.673 (0.223)	0.085 (0.021)	<0.100 (0.00)	1.670 (0.212)	<0.100 (0.00)	<0.100 (0.00)	<0.100 (0.00)
S1W0	1.010 (0.127)	7.675 (0.177)	0.713 (0.004)	<0.100 (0.00)	17.05 (4.45)	0.603 (0.194)	0.570 (0.184)	0.118 (0.046)
S3W0	8.63 (2.93)	50.3 (6.93)	9.20 (2.26)	0.148 (0.032)	213 (91.9)	1.68 (2.31)	2.64 (0.403)	0.773 (0.131)
S4W0	93.3 (31.1)	667 (137.2)	80.25 (1.48)	1.105 (0.134)	1,700 (127.3)	<0.100 (0.00)	16.0 (2.97)	7.37 (0.205)

Table 15
Explosives Concentrations in Each High Concentration (1,000 µg L^{-1}) Batch Prior to Dilution for Greenhouse Irrigation Water, µg L^{-1}

Irrigation Water	RDX	HMX
Batch 1: Initial	834	45.4
Batch 1: Final	812	44.8
Batch 2: Initial	843	60.8
Batch 2: Final	812	56.7
Batch 3: Initial	803	75.8
Batch 3: Final	792	79.5

Table 16
Phase 2 Plant Tissue Biomass, g fresh weight mean (standard error)

Treatment	Lettuce	Nutsedge	Tomato Vine	Tomato Fruit	Corn Ears[1]	Corn Stover
S0W0	55.12 cd (6.19)	68.72 b (5.67)	624.24 c (16.32)	76.7 a (28.4)	32.32 ab (4.99)	339.54 b (19.5)
S0W2	73.68 bc (16.03)	75.06 ab (3.10)	731.98 ab (18.60)	41.14 abc (12.12)	36.98 a (8.90)	352 b (6.85)
S0W3	126.64 ab (26.53)	83.78 a (3.87)	815.44 a (25.24)	67.46 ab (18.56)	43.84 a (8.35)	392.46 a (8.99)
S2W0	133.74 a (28.59)	66.44 b (4.05)	758.68 ab (32.41)	73.20 a (20.75)	32.5 ab (6.45)	301.48 c (11.39)
S1W0	160.5 a (29.41)	75.06 ab (3.91)	722.72 b (34.03)	22.56 bc (8.70)	19.48 bc (2.47)	284.26 c (7.43)
S3W0	2.02 de (0.54)	10.44 c (1.27)	19.62 d (2.87)	2.80 c[2] (0.0)	6.68 cd (1.97)	20.7 d (2.66)
S4W0	PD[3] e	PD d	PD d	PD c	PD d	PD d

Note: Means in a column with the same letter are not significantly different at the alpha = 0.05 level.
[1] Includes kernels and cob.
[2] Weight of one green tomato.
[3] PD = Plants died.

concentrations are reduced. Since this study evaluated the effects of both RDX and TNT in combination, the effects of RDX alone cannot be determined. TNT alone has been shown to decrease plant growth in some soil conditions. Skogerboe et al. (unpublished)[1] found plant growth limited to 50 percent at TNT concentrations of 300 mg kg^{-1}. Folsom et al. (1988) reported significant reductions in plant yields when TNT concentration in soil reached 200 mg kg^{-1} and plant death at 400 mg kg^{-1}. These tests were conducted in a soil low in clay contents. Yields decreased in TNT-contaminated soils as pH of the soil increased. However, plant yields were unaffected by TNT in clay soil containing TNT up to 400 mg kg^{-1}.

Contaminated irrigation water contributed to elevated levels of RDX uptake by lettuce, yellow nutsedge, and corn stover in both contaminated water treatments (S0W2 and S0W3) (Table 17). However, differences were not significant. Tomato fruit and corn kernels did not accumulate detectable concentrations of RDX. The data from Phases 1 and 2 are combined to illustrate the effects of RDX concentration in irrigation water on plant uptake of RDX (Figure 19). The concentration of RDX in these irrigation water treatments was roughly 65 to 400 times the RG concentration of 2 µg L^{-1} for site groundwater. Therefore, RDX concentrations in water near the RG concentration were not

[1] Skogerboe, J. G., Lee, C. R., Simmers, J. W., Brandon, D. L., and Karr, L. A. "Biotechnical slope stabilization and erosion control, SUBASE Bangor," U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, and Naval Civil Engineering Laboratory, Port Hueneme, CA.

Increasing concentrations of RDX in soils contributed to plant uptake of RDX to the point of plant death (Table 17). Greatest uptake was by lettuce, yellow nutsedge, and corn stover. Corn kernels did not accumulate detectable concentrations of RDX until soil concentrations of RDX reached 58 mg kg^{-1}. Tomato fruit accumulated RDX at the 5.8- and 58-mg kg^{-1} soil level. Lettuce had the highest concentration of RDX, followed by yellow nutsedge, corn stover, tomato, and corn kernel. Other explosives compounds were also detectable in plant tissues from some treatments in Phase 2 (Table 18).

Table 18
Concentrations (mg kg^{-1}) of Analytes Other Than RDX in Plant Tissues of Phase 2 Experiments

Treatment	Crop	Replicate	HMX	TNT	2A-DNT	4A-DNT	MNX
S1W0	Lettuce	R1	3.76	<1.60	<1.60	<1.60	<1.60
S1W0	Lettuce	R2	4.32	<1.60	<1.60	<1.60	1.60
S1W0	Lettuce	R3	6.40	<1.60	<1.60	<1.60	3.68
S1W0	Lettuce	R4	6.00	<1.60	<1.60	<1.60	2.24
S1W0	Lettuce	R5	4.08	<1.60	<1.60	<1.60	1.60
S3W0	Lettuce	R1	37.2	<1.60	<1.60	<1.60	<1.60
S3W0	Lettuce	R2	34.4	<1.60	<1.60	<1.60	<1.60
S3W0	Lettuce	R3	49.1	<1.60	<1.60	<1.60	<1.60
S3W0	Lettuce	R4	42.2	<1.60	<1.60	<1.60	4.08
S3W0	Lettuce	R5	52.6	<1.60	<1.60	<1.60	2.48
S1W0	Nutsedge	R5	3.68	<1.60	<1.60	<1.60	<1.60
S3W0	Nutsedge	R1	5.04	<1.60	<1.60	<1.60	<1.60
S3W0	Nutsedge	R2	6.24	<1.60	<1.60	<1.60	<1.60
S3W0	Nutsedge	R3	5.60	<1.60	<1.60	<1.60	<1.60
S3W0	Nutsedge	R4	8.40	<1.60	<1.60	<1.60	<1.60
S3W0	Nutsedge	R5	4.96	<1.60	<1.60	<1.60	<1.60
S3W0	Corn kernel	R3	<0.80	<1.60	<0.80	<0.80	<0.80
S1W0	Corn stover	R4	<0.80	3.92	<0.80	<0.80	<0.80
S3W0	Corn stover	R2	4.24	<1.60	<0.80	<0.80	<0.80
S3W0	Corn stover	R3	3.44	1.44	<0.80	<0.80	3.98
S3W0	Corn stover	R4	4.80	<1.60	<0.80	<0.80	1.71
S3W0	Corn stover	R5	8.96	<1.60	<0.80	<0.80	4.72
S1W0	Tomato	R2	<1.60	<1.60	<1.60	<1.60	<1.60

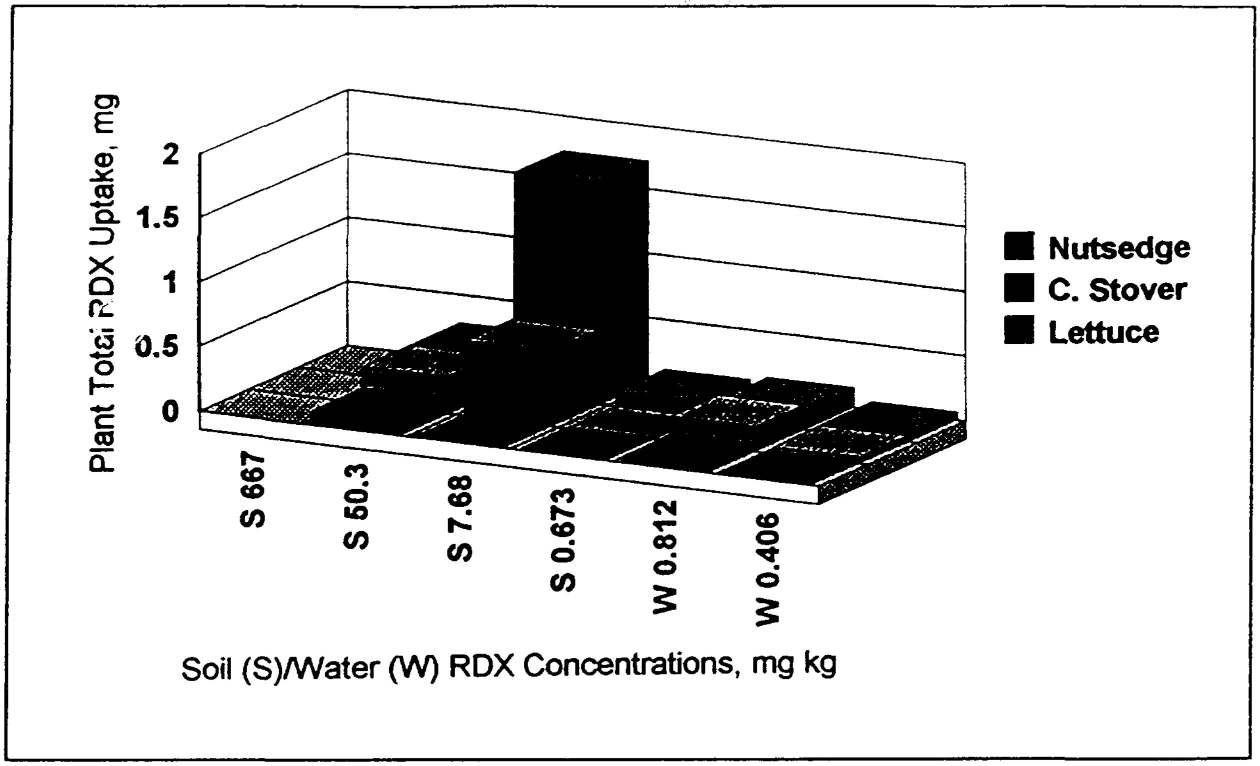

Figure 21. Effect of soil and water RDX concentration on total plant uptake of RDX

treatment (S3W0), the greatest total RDX uptake occurred when the soil RDX/TNT was at the RG concentration (S1W0), (Figure 21). These values may have important ramifications for human consumption of contaminant in crops.

Phase 3: Effects of soil properties on plant uptake

Unamended soils (S1UC, S1UN, and S1US) exhibited a wide range of clay content: 50.8-, 21.9-, and 9.9-percent clay, respectively (Table 20). Total organic matter of the same soils was 8.84, 5.14, and 3.20 percent, respectively. After the addition of composted cow manure, the amended soils (S1FC, S1FN, and S1FS) had a total organic matter content of 11.56, 11.04, and 9.30 percent, respectively, and particle size distribution changed slightly due to the bulking agents in the composted manure. Overall, the target RDX and TNT concentrations of 5.8 and 17.2 mg kg^{-1}, respectively, were achieved except in the amended and unamended NOP soil (S1UN and S1FN), where TNT concentrations were higher than the target concentration in the other soils (Table 21).

Growth of lettuce and yellow nutsedge increased as clay content of the soil increased or remained the same (Table 22). The addition of composted cow manure increased the growth of lettuce in the low-clay soils (S0FS and S1FS), while growth of yellow nutsedge benefited from the cow manure addition only in the uncontaminated high-clay soil (S0FC). This can be attributed to the natural differences in nutrient levels of the three soils and different nutrient requirements

Table 22
Phase 3 Plant Tissue Biomass, g fresh weight mean (standard deviation)

Treatment	Lettuce	Yellow Nutsedge
S0US: Low Clay[1]	35.7 (3.98) e	46.44 (3.06) de
S0UC: High Clay[1]	258.58 (33.42) bc	135.96 (13.11) a
S0FS: Low Clay + Manure[1]	185.88 (29.74) d	25.04 (4.46) e
S0FC: High Clay + Manure[1]	321.48 (47.36) ab	78.9 (15.35) bc
S1US: Low Clay	71.68 (19.24) e	25.48 (6.21) e
S1FS: Low Clay + Manure	207.74 (16.65) cd	23.48 (3.85) e
S1UC: High Clay	340.78 (16.91) a	89.64 (12.02) b
S1FC: High Clay + Manure	315 (19.10) ab	74.42 (12.6) bc
S1UN: Medium Clay	259.98 (35.05) bc	42.95 (8.75) de
S1FN: Medium Clay + Manure	211.48 (11.24) cd	54.45 (12.71) cd

[1] Uncontaminated controls.

Table 23
Phase 3 Mean (standard deviation) Plant Tissue RDX Concentrations, mg kg^{-1} (All soil explosives concentrations were at the RG approximations (Table 21))

Treatment	Lettuce	Yellow Nutsedge
S1US (unfertilized, low clay)	405.2 (74.13) a	318.4 (49.28) a
S1FS (fertilized, low clay)	62.74 (20.42) b	10.88 (4.36) b
S1UC (unfertilized, high clay)	62.48 (16.02) b	70.22 (9.68) b
S1FC (fertilized, high clay)	117.96 (41.55) b	65.24 (10.89) b
S1UN (unfertilized, NOP mod. clay)	154.58 (51.92) b	NA
S1FC (fertilized, NOP mod. Clay)	117.75 (6.66) b	NA

Note: Means in a column with the same letter are not significantly different at the alpha = 0.05 level.

NA = Not analyzed.

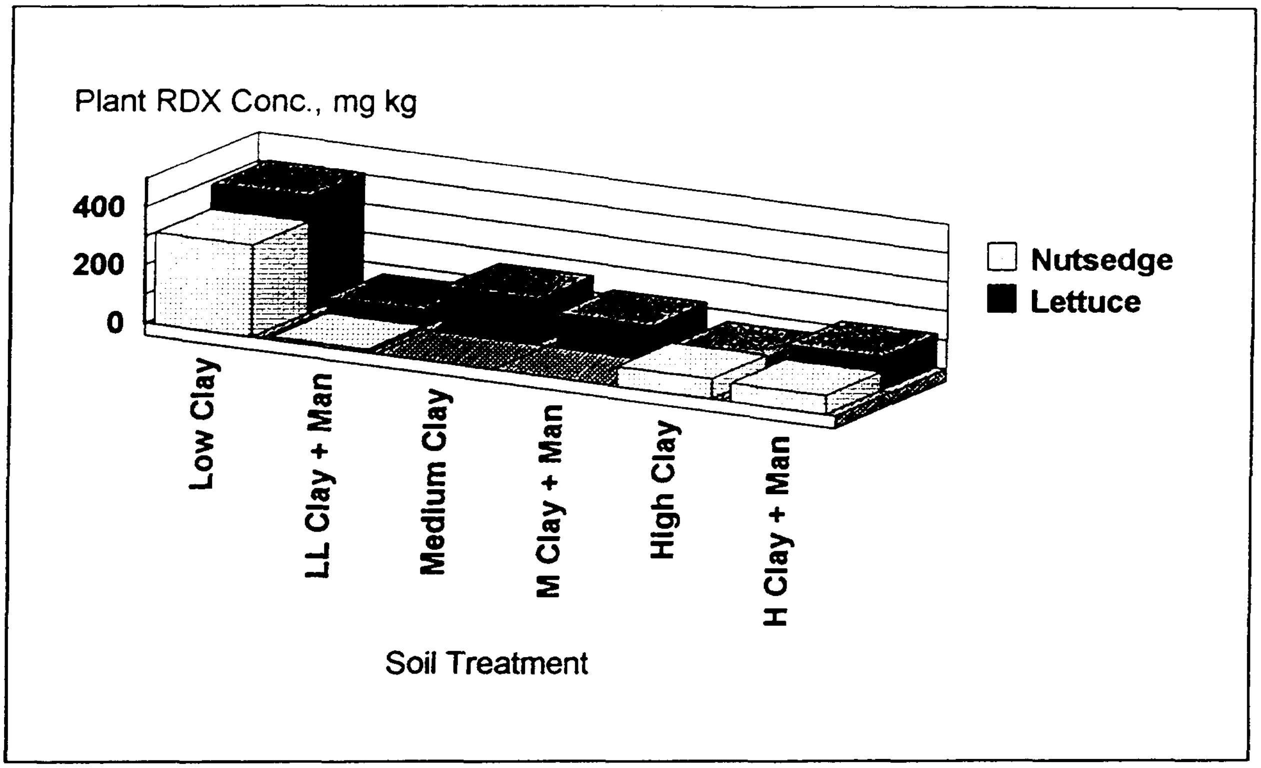

Figure 23. Effect of composted manure amendments to different soils on plant uptake of RDX

Conclusions

The results of this study demonstrate that leafy plant tissues accumulate RDX from both contaminated soils and irrigation water. Tomato fruit and corn kernels did not contain any detectable concentrations of RDX when irrigated with water containing up to 812 $\mu g\ L^{-1}$ for the duration of one growing season. Since the RG level is 2 $\mu g\ L^{-1}$ and previous groundwater data indicate concentrations below 100 $\mu g\ L^{-1}$, irrigation water will not likely contribute to short-term accumulation of RDX by tomato fruit and corn kernels. However, the long-term effects of contaminated irrigation water on loading of soils with RDX and subsequent accumulation by plants was not addressed. Leafy tissues of corn, lettuce, and yellow nutsedge accumulated increasingly higher concentrations of RDX as irrigation water RDX concentrations increased. When RDX in irrigation water was at the 100-$\mu g\ L^{-1}$ level, only one of five replicates of corn, lettuce, and yellow nutsedge had detectable concentrations of RDX. Therefore, RDX concentrations near the RG level would not be expected to contribute to detectable accumulation of RDX by leafy tissues.

Leafy tissues of corn, lettuce, yellow nutsedge, radish roots, and tomato fruit accumulated significant levels of RDX when grown on NOP soil contaminated with RDX and TNT at the RG concentrations of 5.8 and 17.2 mg kg^{-1},

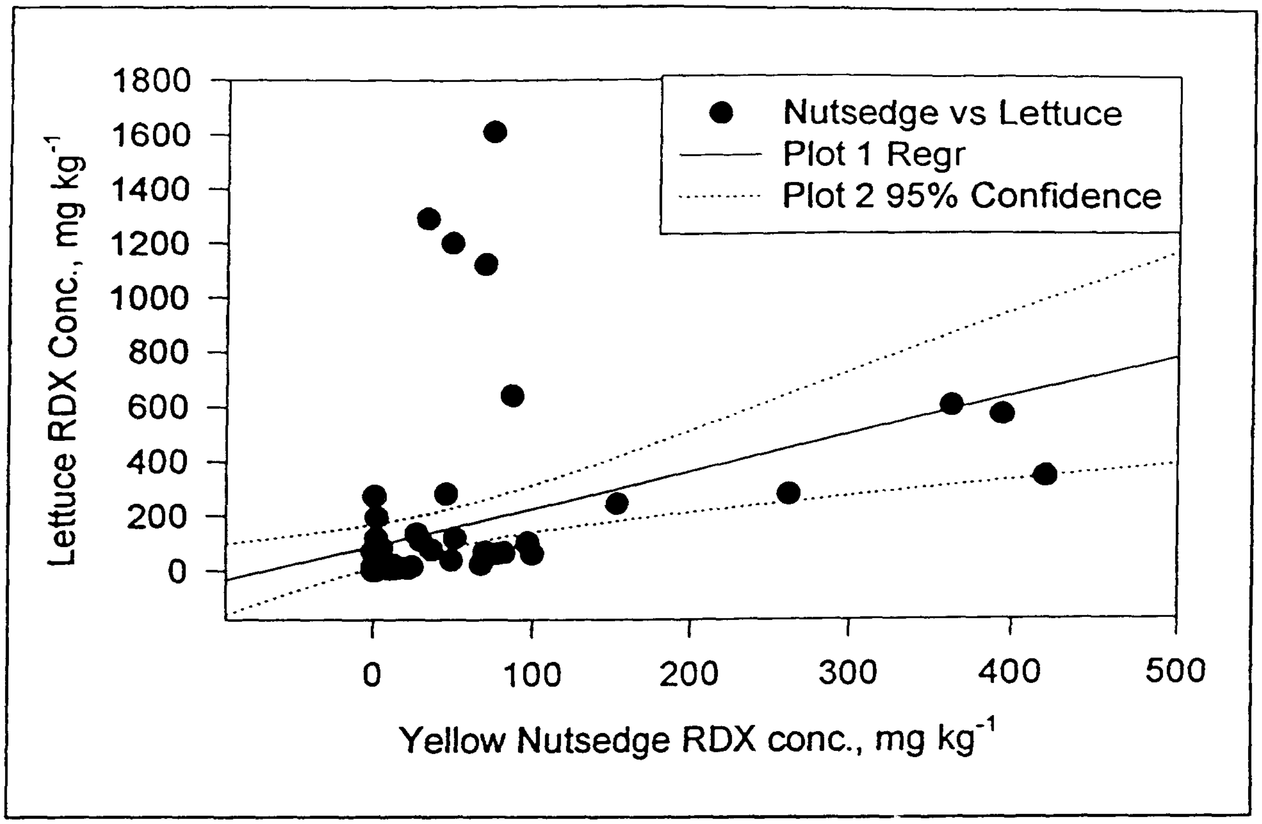

Figure 25. Comparison of RDX uptake by yellow nutsedge and lettuce

with the reference plant alone, eliminating the need for growing each plant in question.

Concentrations of RDX less than 100 µg L^{-1} in irrigation water are not expected to contribute to detectable RDX concentrations in plant tissues. However, this study demonstrated mobility of RDX into all plant tissues except corn kernels when soil RDX concentrations were above 58 mg kg^{-1}. These results suggest that human health hazards from ingestion of vegetables growing in soils contaminated at the RG be carefully evaluated and/or that the current RG be revised.

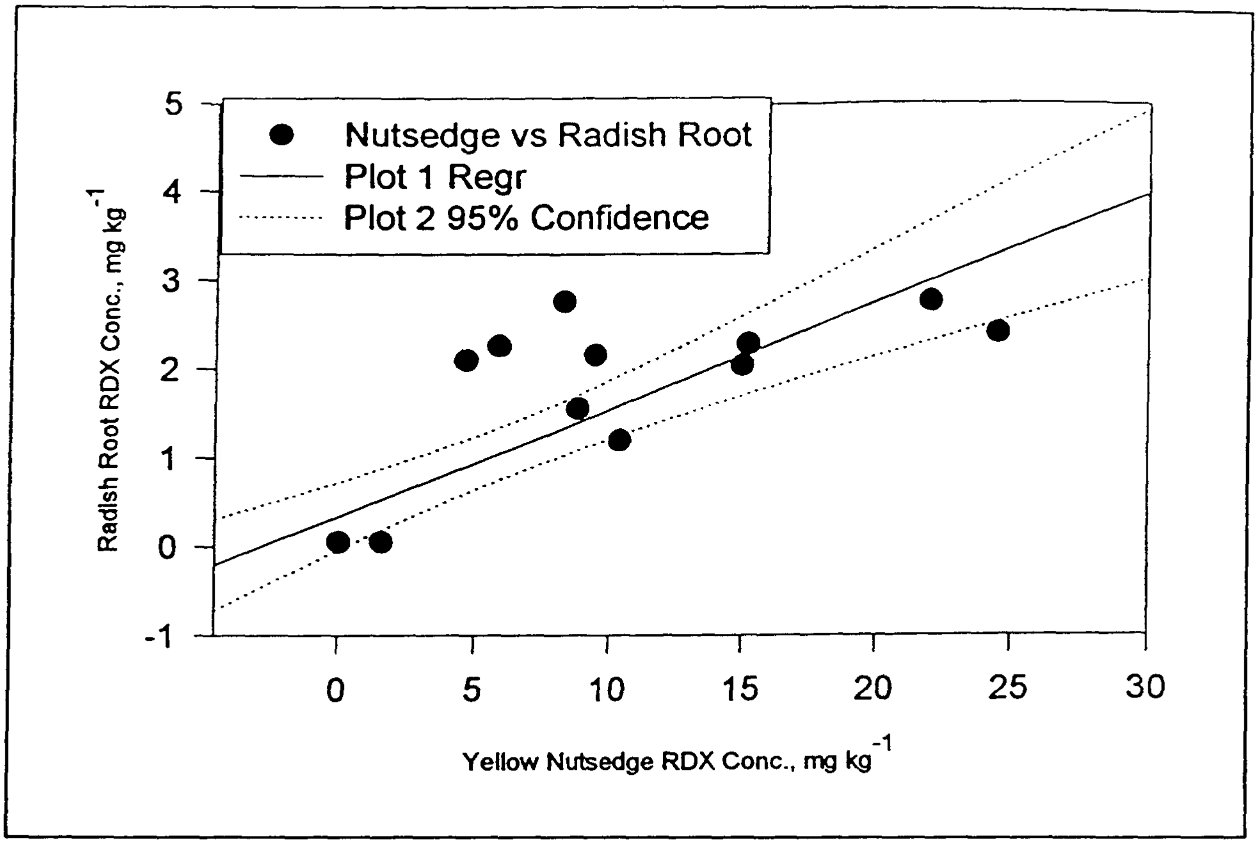

Figure 27. Comparison of RDX uptake by yellow nutsedge and radish root

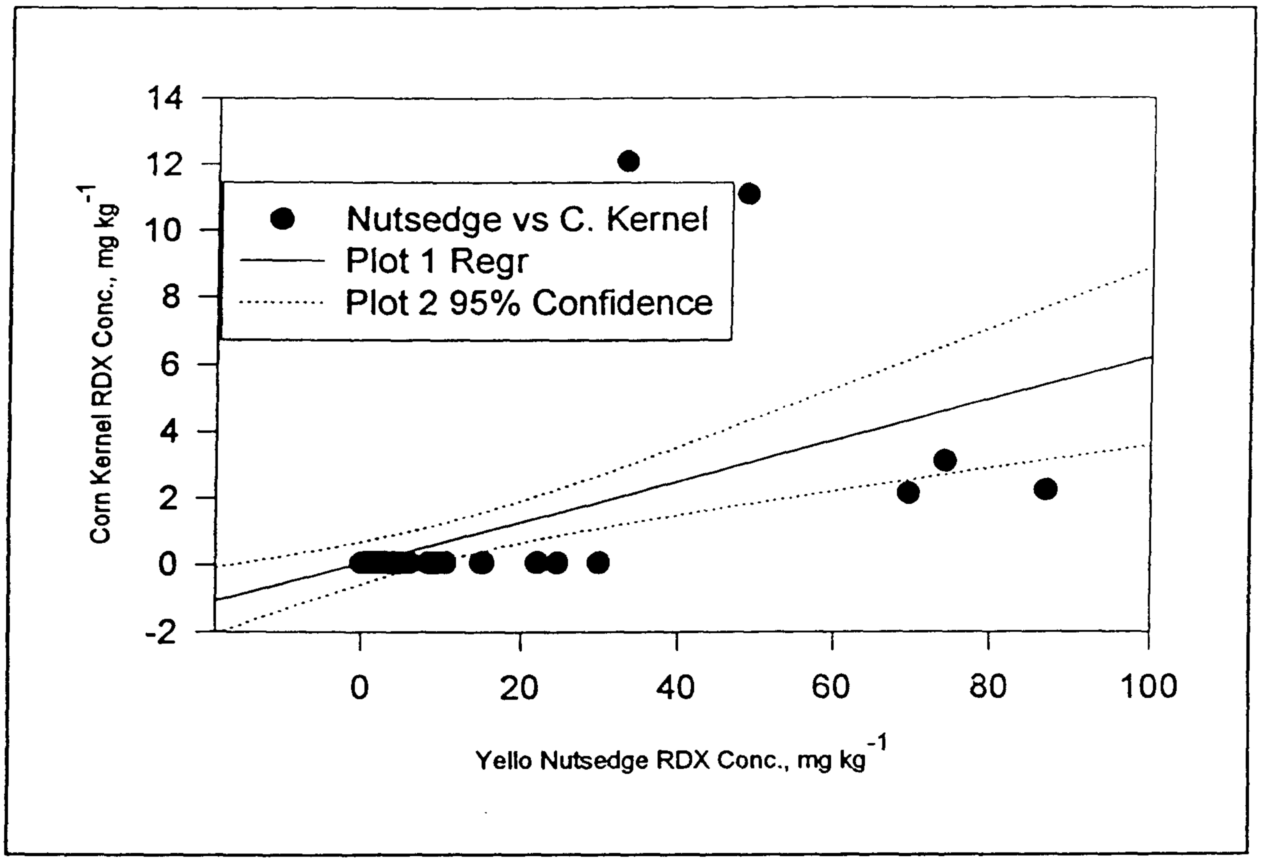

Figure 29. Comparison of RDX uptake by yellow nutsedge and corn kernels

5 Mass Balance

Experimental Design

Three of the plant species studied in the greenhouse experiments (tomato, radish, and lettuce) were subjected to mass balance studies using ^{14}C labeled RDX. Use of radiolabeled RDX in irrigation water or in soil allowed determination of mass balance of the radiolabeled carbon in all compartments of the test, i.e., soil, plants, and volatiles including carbon dioxide. The experimental design consisted of two treatments for each plant species: one treatment with contaminated soil and clean irrigation water, and the other with contaminated irrigation water and clean soil. Each treatment was replicated three times. Each replicate (chamber) contained one pot with two to three plants. One control (in two replicates) consisted of plants growing in clean soil and receiving clean irrigation water. This control was included to verify that all conditions for healthy plant growth were met in the execution of the experiment. Two additional controls (one replicate of each) received no plants. One of these contained contaminated soil and received clean irrigation water; the other contained clean soil and received contaminated irrigation water. These controls provided quantitative data on the fate of RDX independently of the plants.

Materials and Methods

Chambers

Rectangular growth chambers were constructed of 0.635-cm (0.25-in.) Plexiglas. The tomato chambers were 71.12 cm (28 in.) high by 60.96 cm (24 in.) wide by 60.96 cm long. The radish chambers were 44.45 cm high (17.5 in.) by 40.64 cm (16 in.) wide by 40.64 cm long. Each chamber was equipped with an air inlet, air outlet, and a port through which plants could be watered. Air was taken into the chambers by pulling a vacuum on the system at 10-12 mm Hg. The air inlet was fitted with a check value that would automatically shut off air flow in the event of a power failure. This safety precaution ensured that no radioactivity was lost to the room due to positive back pressure. Air exiting the system passed through a trap of activated charcoal to capture any volatile organic compounds and then a 1-L trap of 5N potassium hydroxide (KOH) to collect CO_2.

approximately 11 weeks for tomato and approximately 6 weeks for radish. At the end of the test period, charcoal traps for volatile organic compounds were extracted with 5-ml methanol in sealed containers, sonicated for 12 hr, and 1 ml of the extracts was counted by LS. Aboveground plant tissues and tomato fruits and roots of radish plants were harvested, weighed, and homogenized for analysis. Subsamples were subjected to complete combustion (Model 307 Sample Oxidizer, Packard Instruments, Meriden, CT) followed by LS counting of the radiolabeled CO_2 trapped in Carbo-Sorb and Premafluor Liquid Scintillation Cocktail. Subsamples were also freeze-dried and analyzed by high performance liquid chromatography (HPLC) (See Appendix A for method). Soils were thoroughly mixed and also subjected to combustion and LS counting as well as HPLC analysis.

Total plant yields of tomatoes, radish, and lettuce were compared across treatments using a one-way analysis of variance. Differences between means were separated using an all pairwise multiple comparison procedure, the Student-Newman-Keuls Method available in Sigma Stat (Jandel Corp., San Rafael, CA).

Result and Discussion

Plant yields

Total dry weights of plants indicate the yield in grams of plant material produced in each test. Comparisons between yields for controls receiving no contamination and treatments receiving RDX in soil or irrigation water indicate the general health of plants under test conditions and impacts of contamination on plant growth (Table 24). Results indicated no significant difference between the health of treatments and clean controls of tomato and lettuce. However, treatment with RDX in soil and in irrigation water significantly reduced plant biomass in radish. These results are consistent with results of Phases 1 and 2 greenhouse studies.

Tomatoes

Mass balance for tomatoes growing in contaminated soil was 56 percent, and with contaminated irrigation water 70 percent (Table 25). Therefore, treatments exhibited a relatively high error term. Conducting mass balance studies with plants as large as tomatoes is difficult due to the necessity of confining the plants. In these experiments, moisture from the plants condensed in significant quantities onto the walls of the chambers throughout the study period. Tests at the end of the experiment when the chambers were disassembled indicated significant radioactivity in this condensate. Obtaining an accurate measure of the total volume of the condensate was not possible, but the volume is estimated to be about 3 L per chamber. Therefore, the condensate may be a significant contributor to the experimental error. The source of this radioactivity may be $^{14}CO_2$ dissolved in the condensate.

Table 25
Percent Recoveries of Radioactivity From Various Compartments of Mass Balance Tests (Standard deviations of means of three replicates (except for single replicate controls without plants and two replicates for uncontaminated controls) are given in parentheses)

Treatment	Compartments				Total
	Soil	Foliage	Fruit	CO_2	
Tomato					
Uncontaminated controls	<0.002	<0.020	<0.002	<0.002	<d.l.
Contaminated water; No plants	77.47	na	na	33.39	110.86
Contaminated soil; No plants	88.79	na	na	7.60	96.39
Contaminated water	50.87 (4.27)	6.73 (0.95)	0.53 (0.06)	11.85 (2.40)	69.98
Contaminated soil	41.50 (1.68)	6.98 (3.16)	0.34 (0.22)	7.46 (0.56)	56.28
Radish					
Uncontaminated controls	<0.002	<0.020	<0.002	<0.002	<d.l.
Contaminated water; No plants	82.89	na	na	6.97	89.86
Contaminated soil; No plants	86.56	na	na	3.76	90.32
Contamianted water	69.73 (9.88)	6.22 (1.97)	1.46 (0.28)	6.48 (0.83)	83.89
Contaminated soil	67.57 (6.83)	14.40 (2.94)	0.52 (0.15)	3.88 (0.33)	85.58
Lettuce					
Uncontaminated controls	<0.002	<0.020	<0.002	<0.002	<d.l.
Contaminated water; No plants	73.22 (11.28)	na	na	12.83	86.05
Contamianted soil; No plants	97.06 (6.20)	na	na	2.91	99.97
Contaminated water	72.85 (7.97)	9.11 (0.81)	na	3.54 (0.21)	85.50
Contaminated soil	75.78 (8.46)	15.72 (2.13)	na	4.23 (0.86)	95.73

Note: d.1. indicates detectin limit; na indicates not applicable; <values are detection limits.

Results of HPLC analyses of the various test compartments (Table 26) indicate bioaccumulation of RDX in tomato fruit and foliage of contaminated soil treatments. Concentrations exceed the concentration of RDX detected in the soil (2.12 mg kg^{-1} by 3.5 and 7 times in fruit and foliage, respectively). Bioaccumulation was not observed in plants receiving contaminated irrigation water. These results are consistent with results of greenhouse studies.

The nitroso transformation product of RDX, MNX, was detected in soil from the RDX-contaminated soil treatment (0.140 mg kg^{-1}). The TNX was detected in soil from the RDX-contaminated control without plants (0.107 mg kg^{-1}). Both of these values are only slightly above the detection limit (0.100 mg kg^{-1}). No other analytes except RDX were detected by HPLC in any compartment of the tomato study.

The most important conclusion illustrated by the tomato data is bioaccumulation of significant quantities of RDX in tomato fruit (7.5 mg kg^{-1} from soil containing 2.12 mg kg^{-1}). Mass balance results showed that uptake of RDX or any degradation products of RDX containing carbon into tomato fruit when plants were growing in contaminated soil or when plants were irrigated with contaminated water was small (less than 1 percent of added radioactivity) relative to the total RDX available. Most of the added radioactivity remained in the soil of both treatments. A significant amount of [^{14}C]RDX was mineralized in both treatments. Results for controls suggest that the mineralization occurs in the soil rather than in the plants.

Radish

Mass balance results for radish treatments and controls were relatively good. The average mass balance result for treatments receiving contaminated irrigation water was 84 percent; the control without plants was 90 percent. The average mass balance result for treatments growing in contaminated soils was 86 percent; the control without plants was 90 percent. The smaller plant biomass resulted in less condensation in radish tests than in tomato tests. This probably explains the greater recoveries in radish. An average of 6 percent of the radioactivity added to contaminated irrigation water was recovered in the radish leaf tissue; only 1.5 percent was recovered in the edible roots. None of this radioactivity was detected as RDX, MNX, or TNX in HPLC analyses (see below). This is likely due to the significant difference in detection limits of the two methods. When radishes were grown in contaminated soils, 14 percent of the added radioactivity was recovered in the leaf tissue, while only 0.5 percent was found in the roots.

Comparisons of treatments with controls containing no plants for both treatments suggest that mineralization was occurring in the soil rather than in the plant as was demonstrated for tomato. Treatments receiving contaminated irrigation water produced greater mineralization rates than treatments growing in contaminated soils. This result may be explained by the increased microbial degradation of the contaminant from water than from soil as explained for tomato.

Results of HPLC analyses of the various test compartments (Table 26) indicated bioaccumulation of RDX in radish root and foliage of contaminated soil treatments only. Concentrations in radish roots (12.69 mg kg^{-1}) were more than three times concentrations in the soil (3.43 mg kg^{-1}). Furthermore, concentrations in the foliage (159 mg kg^{-1}) greatly exceeded concentrations in the soil. Bioaccumulation was not observed using HPLC in plants receiving contaminated irrigation water.

The nitroso transformation product of RDX, MNX, was detected in the soil from the contaminated soil treatment (0.199 mg kg^{-1}). No other analytes except RDX were detected in any compartment of the radish study.

6 Effects of TCE on Solubility of RDX

Materials and Methods

To determine the effects of TCE concentration at a presumed postremediation concentration of 20 µg L^{-1} on the aqueous phase concentration of RDX, batch partitioning tests were conducted in 40-ml Eagle Picher EPA vials (Eagle Picher, Miami, OK) without headspace. Three RDX concentrations, 0, 5, and 100 mg kg-1, and five TCE concentrations, 0, 5, 10, 15, and 20 µg L^{-1}, were selected for testing. Soils were clean plus contaminated site soils that were mixed to approximate the desired concentrations of RDX. Actual RDX concentrations achieved by mixing clean soil with soil containing 545 mg kg^{-1} RDX were 0, 3.73, and 101 mg kg^{-1}. Tests were conducted in three replicates for each treatment by placing soils, water, and appropriate concentrations of TCE into vials and shaking on a rotary tumbler for 2 hr. After partitioning, vials were centrifuged at 1,149 rcf for 10 min at 5 °C. TCE was analyzed in the solution phase according to EPA Method 8260 (EPA 1992). The solution phase was also analyzed for RDX by EPA Method 8330 (EPA 1992). Solution phase RDX concentrations for each TCE treatment were compared using a one-way analysis of variance available in Sigma Stat (Jandel Corp., San Rafael, CA).

TCE Results

When no RDX was present in the soils, the TCE partitioned in a linear fashion with the soil exhibiting a partition coefficient of 0.51 $\pm$ .02 (Table 27). TCE concentrations up to 20 µg L^{-1} did not increase the solubility of RDX from soils (Table 28). These concentrations of TCE are probably too small to exert a significant effect upon partitioning of RDX. However, these concentrations of TCE represent what may be expected in site waters. When RDX was present in the tests, TCE concentrations were significantly reduced in the aqueous phase. These results suggest either an interaction between TCE and RDX or interference in the analysis of such low TCE concentrations when RDX concentrations are relatively high.

7 Conclusions

The results of this study demonstrated that at least some tissues of corn, lettuce, radish, tomato, and yellow nutsedge accumulated RDX from contaminated soil at the concentration of the remediation goal for NOP (5.8 mg kg^{-1}). Maximum plant concentrations were observed when the concentration of RDX in the soil was 58 mg kg^{-1}. Plants contained the following (mg kg^{-1}): tomato fruit, 7.2; corn kernel, 6.14; corn stover, 55.82; lettuce, 1,172; yellow nutsedge, 62.46. At soil concentrations of 580 mg kg^{-1}, the plants died; however, the concentration of TNT in the soil was high (1,720 mg kg^{-1}) and may be responsible for the lethal effects. None of the agronomic species accumulated RDX from contaminated irrigation water at the concentration of the remediation goal (2 $\mu g\ L^{-1}$). Neither tomato fruit nor corn kernels accumulated RDX when irrigation water contained up to 812-µg RDX per liter. However, long-term effects of contaminated irrigation water on loading of soils with RDX and subsequent accumulation by plants was not addressed. TNT was not detected in plants except in corn stover grown in contaminated soil.

Increasing soil RDX and TNT concentrations up to 50.3 and 213 mg kg^{-1}, respectively, reduced plant yields and increased RDX uptake in lettuce, corn stover, and yellow nutsedge. High organic matter content (composted cow manure amendment) and high soil clay content significantly reduced plant uptake.

Results of mass balance studies of tomato, radish, and lettuce, which were conducted with radiolabeled RDX ([^{14}C]RDX), indicated that most of the added radioactivity (typically about 75 percent) remained in the soil. However, significant amounts were accumulated in edible tissues. Accumulation of radioactivity in edible portions of plants grown in contaminated soil was as follows (percent of added radioactivity): tomato fruit, 0.34; radish root, 0.52; lettuce foliage, 15.72. Accumulation of radioactivity in edible portions of plants grown with contaminated irrigation water was as follows (percent of added radioactivity): tomato fruit, 0.53; radish root, 1.46; lettuce foliage, 9.11. When HPLC analyses were preformed on these tissues (lettuce was not analyzed), the following concentratins of RDX (mg kg^{-1} dry weight) were detected in plants grown in contaminated soil: tomato fruit, 7.50; radish root, 12.69. No contaminants were found in plants grown in contaminated irrigation water. Mineralization of [^{14}C]RDX to $^{14}C_2$ was significant (3 to more than 12 percent);

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Appendix A
Analysis of Explosives in Plant Tissues: Modifications to EPA 846 Method 8330 for Soils

will result in inadequate removal of the polar, plant-based compounds. During this procedure, reproducible losses of the more polar analytes can be expected.

Processing of sample material for removal of interferences inevitably results in some degree of analyte loss. For example, analyte recoveries are adversely affected by several factors: improper sample collection, extended sample storage time, exposure to electromagnetic and thermal radiation, as well as drying (EPA 1992; Beelen and Burris 1995; Comfort et al. 1995; Crawford 1993). Therefore, low recoveries are often tolerated to achieve reliable, reproducible analyses. Based on the results of a previous study of analysis of RDX in plant tissues (Larson, Escalon, and Parker 1997) in which inadequate removal of water from plant tissues was demonstrated to make determinations impossible, lyophilization was chosen. Lyophilization resulted in a reproducible loss in recovery that was offset by increased reliability and reproducibility of the analysis. This made possible the comparative experimental design used in this study.

The determination of explosives and explosives degradation products in complex matrices such as plant tissues requires careful attention to sample handling. Sample handing includes sample collection, storage, and transport; sample preparation; homogenization; drying; extraction; cleanup; and analysis. The determination of the concentrations of explosives and explosives degradation products is not made until the last step in the process. Therefore, consideration of the possible changes that can occur to analytes during the process is essential, so that analytical biases can be avoided or minimized. Recently, several researchers have examined the impact of freeze-drying on sample integrity and analyte recovery. Dao and Friedman (1996) recently published a comparison of gycoalkaloid content of fresh and freeze-dried potato leaves by reverse phase HPLC analysis. Because of the similarity of the molecular properties (polarity, reactivity, and molecular structure) of glycoalkaloids and explosives, this analytical problem is similar to that posed by sample preparation for determination of explosives in plant tissues. They concluded that freeze-drying was superior to analyzing fresh samples with recoveries between the two methods being similar and reproducibility greater for analyses of extracts from freeze-dried samples. A comparison study employing plant tissues containing RDX indicated that freeze-drying was superior to either fresh extraction or extraction following a nitrogen-drying procedure (Larson, Escalon, and Parker 1997). Zimmerman, Kramer, and Schnable (1996) published results concerning the use of lyophilization for improved handling of *Vicia faba* leaves prior to bioassay. Their results indicated nominal loss in activity during freeze-drying. Dewanji and Matai (1996) successfully used lyophilization as a sample preparation technique when evaluating leaf proteins in aquatic plants. Once again, a reproducible loss in recovery was offset by increased reliability and reproducibility.

In summary, the following advantages are gained by freeze-drying plant samples prior to analysis:

a. Removal of water further lyses cells, decreases particle size, and increases surface area for extraction of explosives.

After homogenizing, the sample was poured into a freeze-drier flask, covered with parafilm, and frozen (approximately 3-4 hr). The sample was freeze-dried until no water crystals were left (approximately 2 days).

After determining the freeze-dried weight, 0.25 g of freeze-dried sample was weighed into a 20-ml amber vial. A matrix spike was prepared by adding 0.100 ml of an acetonitrile solution containing 100 mg HMX, RDX, TNB, TNT, 4-A-DNT, and 2,4-DNT per liter to each vial. Acetonitrile (10.0 ml) was added volumetrically. The sample was mixed by vortex for 1 min and placed in a cooled (<30 °C) ultrasonic bath for 18 hr.

After sonication, the sample was centrifuged and allowed to sit for approximately 1 hr. Supernatant (5 ml) was transferred to a 20-ml vial. Filter columns were prepared by the following procedure:

a. Place a small piece of glass wool into a 14.60-cm glass disposable pipette.

b. Place 0.5 g of florisil into the pipette.

c. Place 0.5 g of alumina on top of florisil.

d. Rinse the filter column with 5 ml of acetonitrile. Discard the rinsate.

The supernatant (5 ml) was passed through, followed by an additional 5 ml of acetonitrile. The combined eluents were vortexed for 1 min. A 2-ml subsample of the supernatant was transferred along with 2 ml Milli-Q water to a 20-ml vial. The extract was filtered, the first 1 ml was discarded, and the remainder was retained in a 10-ml glass Teflon-capped vial for HPLC analysis.

Table A2
Plant Species and Quantities

Species	Fresh Weight, g
Yellow nutsedge	5.00
Lettuce	5.00
Radish	5.00
Corn Kernels	10.0
Corn Silage	10.0
Tomato	20.0

Method detection limits

Method detection limits (MDL) were determined for the plant species corn, corn silage, tomato, yellow nutsedge, and radish in an analogous manner to the MDL determination for soil analysis by EPA Method 8330. Frozen plant tissue

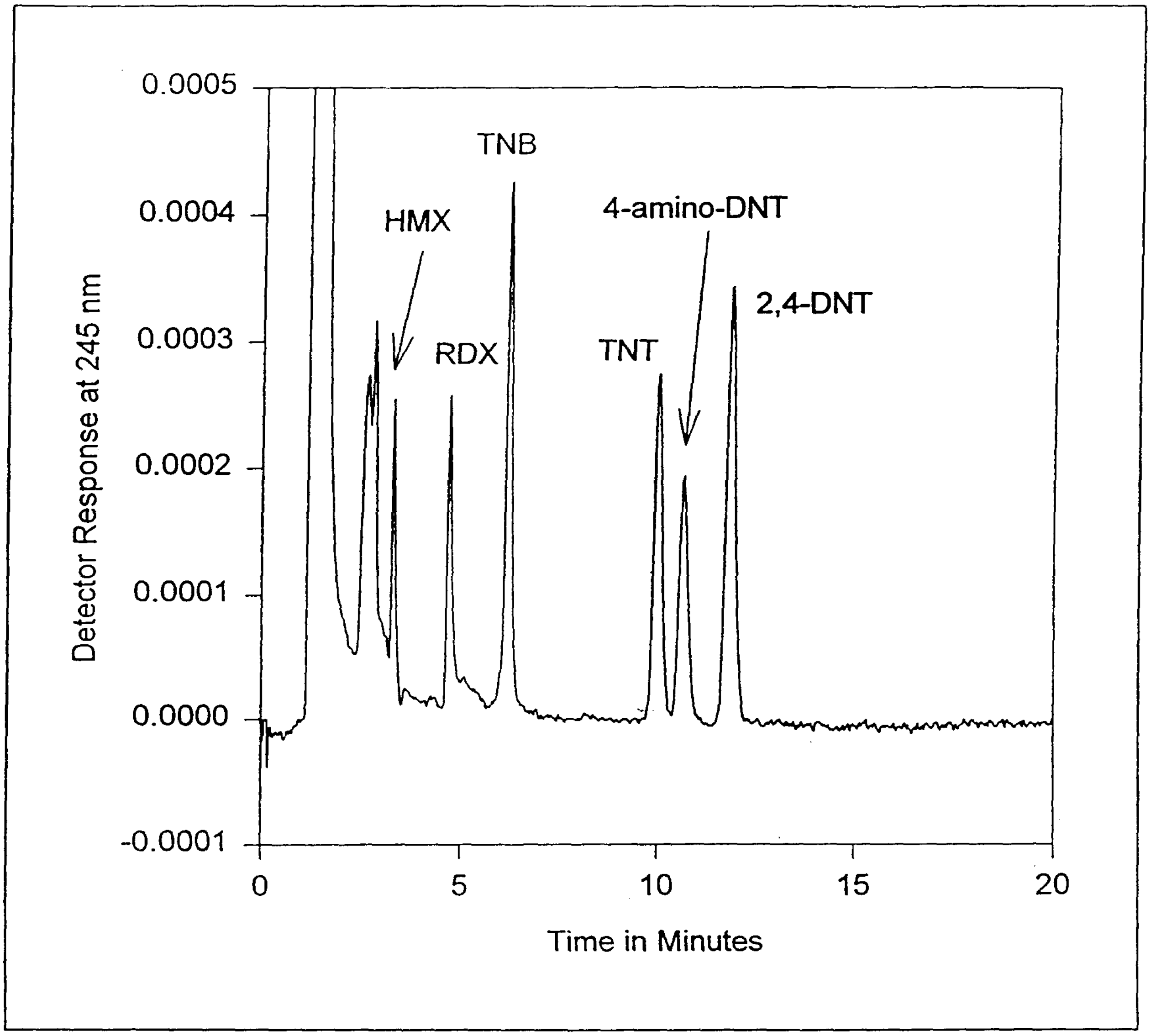

Figure A1. Corn extract spiked with explosives standards (at 1 ppm)

presented in Table A3. Table A4 provides a detailed description of MDL for RDX for various plant matrixes. As can be seen, large variations in detection limits were observed for different plant matrixes.

Figure A2 provides an example of a chromatogram showing the separation and determination of RDX on a C18 analytical column in several plant tissues that were exposed to RDX-contaminated irrigation water (0.100 mg kg^{-1}) and soil (5.8 mg kg^{-1}). Several peaks are present that are not attributed to explosives contamination. Samples that are known not to have been exposed to explosives can be used to help eliminate irrelevant peaks. No standard reference material is currently available for this purpose. Therefore, a representative blank matrix

Table A3 (Continued)

Compound		Conc mg L^{-1}	MDL-1	MDL-2	MDL-3	MDL-4	MDL-5	MDL-6	MDL-7	Avg mg L^{-1}	Std Dev	MDL mg L^{-1}	% Rec	LRL mg L^{-1}
Corn Fruit (continued)														
C18	TETRYL	0.125	0.122	0.132	0.141	0.139	0.138	0.136	0.130	0.134	0.007	0.020	107.20	0.066
CN		0.125	0.133	0.129	0.113	0.119	0.142	0.141	0.135	0.130	0.011	0.033	104.23	0.109
Corn Silage														
C18	HMX	0.125	0.122	0.123	0.126	0.121	0.134	0.126	0.122	0.125	0.004	0.013	99.89	0.045
CN		0.125	0.106	0.100	0.102	0.105	0.106	0.100	0.100	0.103	0.003	0.009	82.17	0.029
C18	RDX	0.125	0.113	0.113	0.117	0.119	0.113	0.114	0.113	0.115	0.002	0.007	91.66	0.024
CN		0.125	0.119	0.119	0.126	0.123	0.123	0.119	0.125	0.122	0.003	0.009	97.60	0.030
C18	TNB	0.125	0.112	0.113	0.120	0.123	0.115	0.116	0.112	0.116	0.004	0.013	92.69	0.042
CN														
C18	4A-DNT													
CN		0.125	0.122	0.127	0.123	0.126	0.128	0.125	0.123	0.125	0.002	0.007	99.89	0.023
C18	24-DNT	0.125	0.114	0.114	0.121	0.115	0.122	0.116	0.114	0.117	0.003	0.010	93.26	0.035
CN		0.125	0.127	0.121	0.124	0.129	0.125	0.121	0.127	0.125	0.003	0.009	99.89	0.031
C18	TNT	0.125	0.110	0.111	0.118	0.108	0.111	0.114	0.114	0.112	0.003	0.010	89.83	0.033
CN		0.125	0.116	0.124	0.118	0.120	0.122	0.120	0.120	0.120	0.003	0.008	96.00	0.026
C18	26-DNT	0.125	0.085	0.083	0.101	0.085	0.084	0.095	0.084	0.088	0.007	0.021	70.51	0.070
CN		0.125	0.085	0.087	0.085	0.103	0.086	0.101	0.086	0.090	0.008	0.024	72.34	0.080
C18	NB	0.125	0.091	0.090	0.108	0.090	0.091	0.101	0.090	0.094	0.007	0.022	75.54	0.072
CN		0.125	0.091	0.093	0.092	0.111	0.093	0.110	0.096	0.098	0.009	0.026	78.40	0.087

(Sheet 2 of 6)

Table A3 (Continued)

Compound		Conc $mg\ L^{-1}$	MDL-1	MDL-2	MDL-3	MDL-4	MDL-5	MDL-6	MDL-7	Avg $mg\ L^{-1}$	Std Dev	MDL $mg\ L^{-1}$	% Rec	LRL $mg\ L^{-1}$
Yellow Nutsedge (continued)														
C18	NB	0.125	0.107	0.108	0.113	0.113	0.111	0.106	0.109	0.110	0.003	0.008	87.66	0.028
CN		0.125	0.108	0.111	0.112	0.109	0.109	0.107	0.111	0.110	0.002	0.005	87.66	0.018
C18	DNA	0.125	0.105	0.107	0.111	0.110	0.109	0.105	0.107	0.108	0.002	0.007	86.17	0.024
CN		0.125	0.104	0.106	0.106	0.107	0.105	0.104	0.102	0.105	0.002	0.005	83.89	0.017
C18	TETRYL	0.125	0.067	0.033	0.038	0.040	0.044	0.045	0.045	0.045	0.011	0.032	35.66	0.108
CN		0.125	0.051	0.030	0.036	0.035	0.036	0.042	0.054	0.041	0.009	0.027	32.46	0.089
Lettuce														
C18	HMX	0.125	0.085	0.081	0.073	0.086	0.081	0.077	0.067	0.079	0.007	0.020	62.86	0.068
CN		0.125	0.079	0.062	0.066	0.061	0.063	0.064	0.057	0.065	0.007	0.021	51.66	0.069
C18	RDX	0.125	0.112	0.118	0.113	0.118	0.119	0.118	0.111	0.0146	0.003	0.010	92.46	0.034
CN		0.125	0.126	0.122	0.124	0.120	0.122	0.123	0.118	0.122	0.003	0.008	97.71	0.026
C18	TNB	0.125	0.109	0.117	0.118	0.115	0.117	0.118	0.111	0.115	0.004	0.011	92.00	0.036
CN														
C18	4A-DNT													
CN		0.125	0.122	0.124	0.126	0.125	0.126	0.126	0.123	0.125	0.002	0.005	99.66	0.016
C18	24-DNT	0.125	0.117	0.120	0.122	0.119	0.121	0.120	0.116	0.119	0.002	0.006	95.43	0.021
CN		0.125	0.125	0.126	0.130	0.126	0.124	0.131	0.122	0.126	0.003	0.010	101.03	0.032
C18	TNT	0.125	0.110	0.117	0.106	0.114	0.362	0.368	0.414	0.227	0.145	0.435	181.83	1.451
CN		0.125	0.114	0.119	0.110	0.117	0.352	0.351	0.393	0.222	0.135	0.403	177.83	1.346

(Sheet 4 of 6)

Table A3 (Continued)

Compound		Conc mg L^{-1}	MDL-1	MDL-2	MDL-3	MDL-4	MDL-5	MDL-6	MDL-7	Avg mg L^{-1}	Std Dev	MDL mg L^{-1}	% Rec	LRL mg L^{-1}
Tomato (continued)														
C18	24-DNT	0.125	0.123	0.121	0.123	0.121	0.126	0.123	0.122	0.123	0.002	0.005	98.17	0.017
CN		0.125	0.120	0.118	0.118	0.118	0.120	0.120	0.118	0.119	0.001	0.003	95.09	0.011
C18	26-DNT	0.125	0.099	0.101	0.102	0.099	0.103	0.102	0.102	0.101	0.002	0.005	80.91	0.016
CN		0.125	0.103	0.101	0.102	0.100	0.102	0.100	0.102	0.101	0.001	0.003	81.14	0.011
C18	NB	0.125	0.101	0.103	0.101	0.104	0.104	0.101	0.107	0.103	0.002	0.006	82.34	0.021
CN		0.125	0.107	0.107	0.103	0.105	0.104	0.103	0.107	0.105	0.002	0.006	84.11	0.019
C18	DNA	0.125	0.096	0.098	0.096	0.099	0.098	0.096	0.101	0.098	0.002	0.006	78.17	0.019
CN		0.125	0.103	0.101	0.099	0.102	0.102	0.101	0.104	0.102	0.002	0.005	81.37	0.016
C18	TETRYL	0.125	0.115	0.148	0.125	0.150	0.117	0.178	0.161	0.142	0.023	0.070	113.37	0.233
CN		0.125	0.137	0.178	0.156	0.175	0.177	0.173	0.127	0.160	0.021	0.062	128.11	0.207

(Sheet 6 of 6)

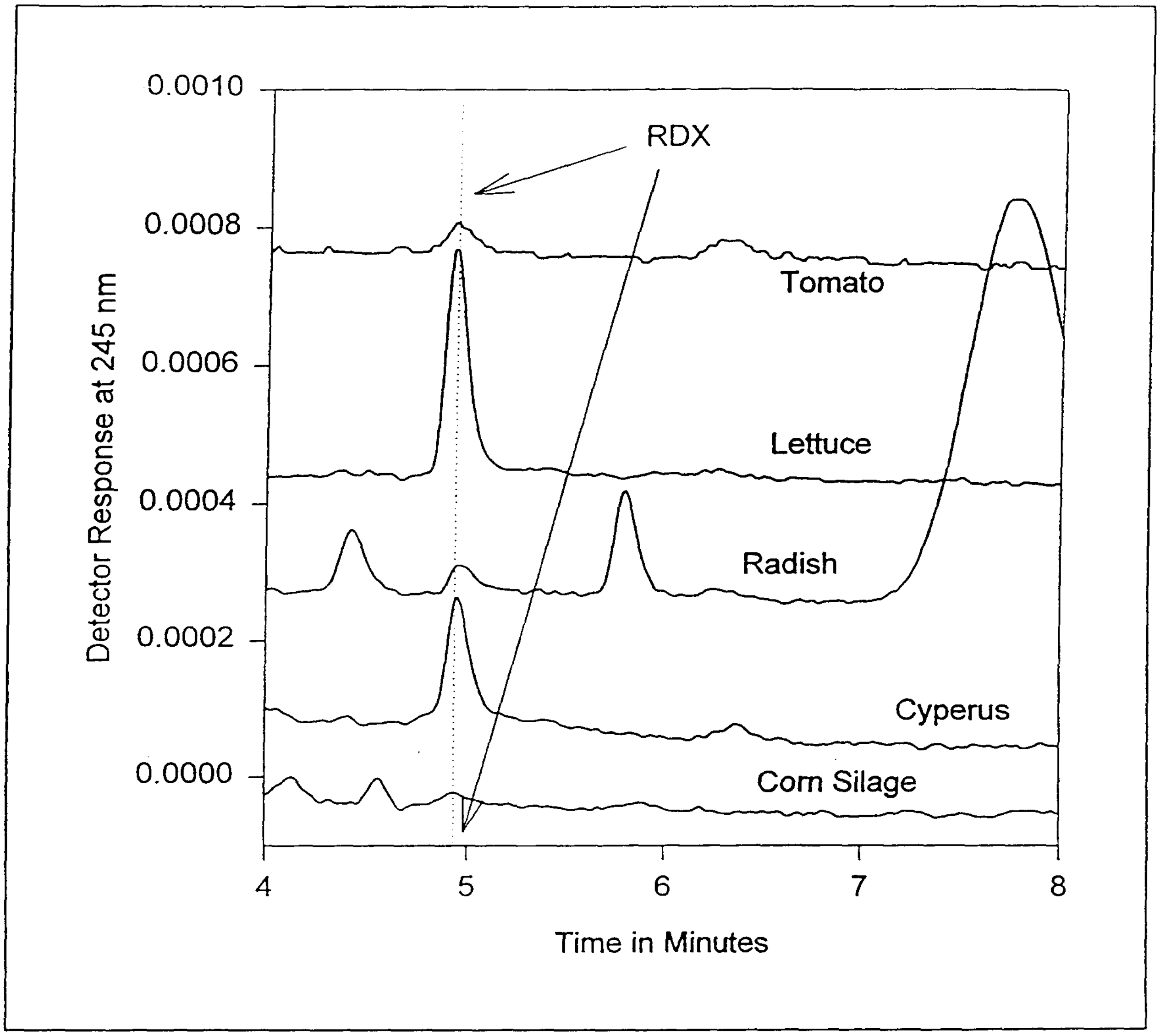

Figure A2. RDX detected in garden crops

Conclusions

A means of separation and quantitation of explosives in plant tissues has been developed. The plant tissues analyzed using this method in this study were yellow nutsedge (*Cyperus esculentus*), lettuce, radish, corn kernels, corn silage, and tomato fruit. Analyte recoveries were determined to range from 20 to 65 percent when examined through the entire method (including sample preparation, cleanup, and analysis). The method yields reproducible results for the tissues studied (i.e., corn fruit showed a 4-percent relative standard deviation over seven replicates). Dry weight detection limits for RDX were comparable with those from Method 8330 for explosives in soils: yellow nutsedge - 0.24 mg kg^{-1}, lettuce - 0.24 mg kg^{-1}, corn kernels - 1.12 mg kg^{-1}, corn silage - 0.72 mg kg^{-1}, and tomato fruit - 0.40 mg kg^{-1}.

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Process wastes from ordnance loading (TNT, Amatol, Tritonal, and Composition B) have created groundwater and soil contamination at the Former Nebraska Ordnance Plant, Sauders County, Nebraska. Concern over hazards associated with future use of the site for vegetable gardening after remediation to low-level residual contamination prompted this study. The objective of the study was to quantify plant uptake of explosives, especially RDX, from contaminated soil or irrigation waters. Greenhouse studies were conducted using selected agronomic species, corn, tomato, lettuce, and radish, to measure plant uptake of explosives (RDX and TNT) from contaminated soil and uptake of RDX from irrigation water. A reference plant was included in all greenhouse studies to initiate development of a database from which future studies could predict uptake by growing the reference plant and extrapolating to the database for other crops. In addition to the greenhouse studies, a mass balance study with two species, tomato and radish, was conducted to determine the distribution of radiolabeled carbon from [^{14}C]RDX in each compartment of the test. At the preliminary remediation goal (RG) of 2 μg RDX per liter of groundwater, accumulation of RDX by plants was not detectable. However, all crops accumulated RDX from soils contaminated at the RG of 5.8 mg RDX per kilogram of soil and 17.2 mg TNT per kilogram of soil. All edible plant tissues accumulated RDX from soil except corn kernels. Bioaccumulation results from [^{14}C]RDX mass balance studies were consistent with results of greenhouse studies. These results suggest that human health hazards from ingestion of vegetables growing in soils contaminated at the RG be carefully evaluated and/or that the RG be revised.

14 SUBJECT TERMS

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Appendix E

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Polycyclic or polynuclear aromatic hydrocarbons (PAHs) are a broad class of related compounds characterized by the presence of two or more fused aromatic rings. Some PAHs occur naturally in coal, tar, crude oil, or shale, but the main source of PAHs in the environment is from the heating or burning of fossil fuels, wood, or other organic materials. Major sources of direct human exposure are cigarette smoking and eating charcoal-broiled or smoked food (USEPA 1982). Background levels of PAHs in the environment can be significant. Since automobile exhaust contains PAHs, soils near roads can have large concentrations of PAHs. PAHs also occur in the environment as the product of natural processes such as forest fires. There are three PAHs identified as PCOCs at the site: benzo(b)fluoranthene, chrysene, and pyrene.

Individual PAHs vary considerably in their chemical structure, and differences in toxicity or potency exist between different compounds. In general, PAHs pose little risk of acute or chronic non-cancer health effects. USEPA has developed RfDs for six PAHs (acenaphthene, anthracene, fluoranthene, fluorene, naphthalene, and pyrene). Aside from a limited potential for dermal effects following direct contact with high concentrations, there are no reports of PAH-related non-cancer health effects in humans (ATSDR 1990). In animals, ingestion of relatively high doses of PAHs (specifically benzo(a)pyrene) has been found to have adverse effects on body tissues that normally have a high rate of cell division (the hematopoietic system, the gonads, the epithelium, the immune system, and the developing fetus), but such effects have been noted only at doses of 30 mg/Kg/day or higher (ATSDR 1990).

There is substantial evidence from animal and human studies that many PAHs are carcinogenic. Human data are derived mainly from studies of workers exposed to coke-oven emissions, which contain a mixture of PAHs. The main exposure route in these workers is inhalation, and the main effect is increased incidence of lung cancer. This is supported by several studies in animals, where increased incidence of respiratory tract tumors occurred following chronic inhalation exposure to benzo(a)pyrene or mixtures of PAHs (ATSDR 1990).

Cancer has not been reported in humans following oral exposure to PAHs, but a number of studies in animals indicate that ingestion of benzo(a)pyrene or other PAHs can lead to tumors of the stomach (Neal and Rigdon 1967). There are also a number of animal studies which show that repeated dermal contact with benzo(a)pyrene or other PAHs leads to increased incidence of skin tumors (ATSDR 1990).

Based on these studies, it appears that the greatest risk of carcinogenic effect from PAHs is at the point of contact, i.e., lung cancer following inhalation exposure, stomach cancer following oral exposure, and skin cancer following dermal exposure. This is probably because the PAHs are readily metabolized at the point of contact and that metabolic intermediates are responsible for the carcinogenic response (ATSDR 1990).

It is important to stress, however, that not all PAHs have been found to be carcinogenic. Based on cancer weight-of-evidence categories assigned by USEPA (1984), only two PAHs identified as PCOCs at this site, benzo(b)fluoranthene and chrysene, have sufficient evidence of carcinogenic potential to be considered probable or possible human carcinogens. The other PAH detected at this site, pyrene, has not been established as a potential carcinogen, and it is ranked by USEPA as a Group D compound (cannot be classified).

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Pure phenol is a colorless to white solid, but the commonly used commercial products usually are liquid solutions. The major use of phenol is in the production of phenolic resins (Thurman, 1982). Phenol is also an intermediate in the manufacture of many other organic materials, including 2,4-D, adipic acid, salicylic acid, phenolphthalein, pentachlorophenol, picric acid, germicidal paints, pharmaceuticals, dyes, and indicators (Hawley, 1981). Phenol is a slimicide and has been used as a general disinfectant in solution or mixed with slaked lime for toilets, stables, cesspools, floors, drains and other areas (Hawley, 1981; Windholz et al., 1983). Phenol is also used in medicinal preparations including ointments, ear and nose drops, cold sore lotions, mouthwashes, gargles, toothache drops, analgesic rubs (Douglas, 1972), throat lozenges (USEPA, 1980), and antiseptic lotions (Musto et al., 1977).

Phenol is released primarily to the air and water as result of its manufacture, use, and because of woodburning and auto exhaust. Phenol mainly enters the water from industrial effluent discharges. Phenol disappears rapidly in air by gas-phase hydroxyl radical reaction, with an estimated half-life of 14.6 hours (Hendry and Kenley, 1979), but may persist in water for a somewhat longer period. Half-lives for biodegradation range from less than 1 day in samples of lake water to 9 days in estuarine water. A typical half-life for photooxidation by photochemically produced peroxyl radicals is approximately 19 hours (Mill and Mabey, 1985). In soil, phenol will generally biodegrade rapidly; however, biodegradation of phenol in water or soil may be hindered or precluded by the presence of high, toxic concentrations of phenol or other chemicals, or by other factors such as a lack of nutrients or microorganisms that can degrade phenol (Baker and Mayfield, 1980). Absorption of phenol may occur via ingestion, inhalation, or dermal exposure.

The acute toxic effects of phenol exposure have been reported in many animal and human case studies. Acute high dose exposure to phenol solution can be fatal. Griffiths (1973) described a situation in which death occurred within 10 minutes after about 25% of the individual's body surface was exposed to liquid phenol. In another case, an individual died after painting himself with a brush that had been soaked in a solution of phenol (Lewin and Cleary, 1982). The lethality associated with dermal exposure to phenol is greatly influenced by the surface area exposed, the length of time skin contact, and the concentration of the applied solution. Conning and Hayes (1970) reported 0.625 ml/kg of molten phenol liquid as a dermal LD_{50} in the rat; however, application of 0.5 ml phenol/kg as a 66% solution in water resulted in 100% lethality. These results indicate that pure phenol may be less absorbable than concentrated aqueous solution.

Acute oral exposure to high concentrations of phenol have been reported in numerous suicide attempts. Bruce et al. (1987) summarized human oral lethality data from numerous case reports, and estimated 140 mg/kg to be the minimal dose at which death occurred. The oral LD_{50} has been determined in rats treated by gavage with phenol in water; the LD_{50} was found to decrease with increasing concentration of phenol in the gavage fluid. The LD_{50} was reported as 340 mg/kg in rats gavaged with a solution of 200,000 ppm phenol and 530 mg/kg in rats gavaged with a solution of 20,000 ppm phenol (Deichmann and Witherup 1944). The oral LD_{50} of phenol has been estimated as 300 mg/kg in mice (Von Oettingen and Sharpless 1946) and 400-600 mg/kg in rabbits (Deichmann and Witherup 1944). Regardless of route of exposure, the sequence of events leading to death appeared to be similar in a variety of animal species: muscle weakness, tremors, loss of coordination, paralysis, convulsions, coma, and respiratory arrest.

These symptoms implicate central or peripheral nervous system toxicity as a major cause of death.

In humans, systemic effects attributed to phenol include gastrointestinal irritation (Baker et al. 1978), dermal necrosis, and cardiac arrhythmias (Truppman and Ellenby 1979). An epidemiological study indicated gastrointestinal symptoms, including mouth sores and diarrhea, are associated with drinking water contaminated with phenol (Baker et al, 1978). Application of phenol solution (> 5%) to the skin results in inflammation and necrosis at the site of application (Truppman and Ellenby, 1979). Cardiac arrhythmias have been reported for human dermal exposure to concentrated (>50%) phenol. Cardiac arrhythmias have also been demonstrated in rabbits dermally exposed to 300 mg/kg (Waxler et al., 1984). One case report described elevated liver enzymes in serum, suggesting the possibility of liver injury (Merliss 1972). Other effects on the heart, kidney, liver, and lung have been demonstrated in animals exposed to relatively high doses or concentrations of phenol, and are of questionable relevance to humans exposed to environmental levels of phenol.

No studies were located regarding reproductive effects in humans following oral exposure to phenol. Heller and Pursell (1938) reported the results of multigeneration phenol exposure in rats. No evidence of impaired reproduction was found in animals exposed to phenol at levels in drinking water » 5000 ppm (estimated 686 mg/kg/day) for 3 generations or levels » 1000 ppm (estimated 137 mg/kg/day) for 5 generations.

No studies were located regarding genotoxic effects in humans following exposure to phenol. In pregnant mice that received 265 mg/kg phenol by gavage, Ciranni et al. (1988) found no evidence of fetal cellular toxicity, as measured by a reduction in the polychromatic erythrocyte/normochromatic erythrocyte ratio (PCE/NCE), or micronuclei induction in the fetus. In the dams, however, there was a 1- to 3-fold increase over control values for micronuclei induction and a 30-60% reduction in the PCE/NCE ratio.

In a multigeneration study, Bulsiewicz (1977) indicate that phenol ingestion may cause chromosomal aberration in some male reproductive cells (spermatogonia and primary spermatocytes). The number of chromosomal aberrations increased in successive generations. In some mice, there was an absence of primary and secondary spermatocytes, spermatids, and spermatozoa. This study focused on chromosome aberrations and testicular histology; no information on the reproductive success, teratogenicity, or any other health effects in the exposed mice was reported.

The carcinogenicity of orally administered phenol was examined in rats and mice in a study reported by the National Cancer Institute (NCI, 1980). Rats and mice received 0, 2500, 5000 ppm in drinking water for 103 weeks. Since cancer occurred only in males of one of the two species tested and a positive dose-response relationship could not be established, these results are inconclusive regarding the carcinogenic potential of orally administered phenol. Phenol may be a cancer promoter and possibly a complete carcinogen (i.e., promoter and initiator) in mice when applied to the skin (Boutwell and Bosch, 1959; Salaman and Glendenning, 1957). The USEPA classifies phenol as a class D non-carcinogen.

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Butylbenzylphthalate, bis(2-ethylhexyl)phthalate (DEHP), Di-n-butyl phthalate (DBP), and Diethyl phthalate (DEP) are closely related compounds that are known collectively as phthalate diesters. Phthalate diesters are commonly used as plasticizers to impart flexibility in consumer products and medical devices, such as polyvinylchloride bags. The phthalate diesters have also been used in cosmetic products and as defoaming agents in paper manufacturing (Austian, 1973). The wide production of phthalate diesters and their different use have resulted in their widespread prevalence in the environment (Lawrence, 1978), where they are now considered ubiquitous contaminants. Phthalate diesters can be absorbed via inhalation, ingestion, and direct skin contact (Albro, 1989; Elsisi et al., 1989).

The acute toxicity of the most commonly encountered phthalates is relatively low. In subchronic and chronic studies, phthalate diesters have been shown to induce both morphological and biochemical changes in the liver. These include inhibition of electron transport and energy production, liver necrosis, inflammatory cell infiltration to the liver, peroxisome proliferation, and liver cancer (Seth, 1982; Melvick and Schiller, 1982, Kevy and Jacobson, 1982; Warren et al., 1982; Gangolli, 1982). For example, guinea pigs were fed diets containing 0.04% or 0.13% DEHP for one year (Carpenter, et al. 1953, as cited in NRC 1986). Liver weights were significantly increased in females at both doses. In contrast, the same investigators reported that after two years of dietary administration of DEHP to rats at doses of 0.04%, 0.13%, and 0.4%, there were no treatment-related effects. In a much more extensive study, rats were fed DEHP in the diet at levels of 50, 200, or 1,000 mg/kg/day (Mitchell et al. 1985) and sacrificed at various times up to 9 months. Early compound-related effects included morphologic changes in the bile canaliculi, periportal fat accumulation, induction of peroxisomal enzymes, and induction of the P-450 isoenzyme. Later changes included hepatocyte hypertrophy, centrilobular glycogen loss, and decreased serum glucose-6-phosphatase activity.

Reproductive toxicity of phthalate diesters has been extensively studied. Some phthalate diesters have been shown to cause testicular atrophy in rodents at high doses (Albro, 1987). Specifically, testicular atrophy has been shown to result from the administration of dibutyl, dipentyl, dihexyl, and diethylhexyl phthalate to rats, whereas phthalate diesters of shorter and longer alkyl chain length (e.g., diethyl, diheptyl, and dioctyl phthalate) do not affect reproduction in vivo (Foster et al., 1980; Gray and Butterworth, 1980; Gangolli, 1982; Oishi and Hiraga, 1980; Gray et al., 1982; Creasy et al, 1987; Lindstrom et al., 1988). Similar results are reported in mouse studies (Lamb, et al., 1987; Heindel, et al, 1989). The most prominent effects are decreased testicle weight, tubular atrophy, and histological changes in the seminiferous tubules (NRC 1986).

There are significant species differences in the testicular toxicity of the phthalate diesters (Gray et al., 1982). Rats and guinea pigs develop severe atrophy after treatment with DBP (2 g/kg/day for 7 or 9 days), while mice developed only focal atrophy, and hamsters are not affected. Adverse effects are not observed after DEP exposure in rats (Foster et al., 1980). Further, the sensitivity of the testis to these effects seems to be age-dependent, with developing males more susceptible to the effects of DEHP than mature males (Gray and Butterworth 1980). In addition to testicular effects, female rodent fertility appears to be inhibited by some phthalate diesters as well (Lamb, et al., 1987; Heindel, et al, 1989). When DEHP was fed to both male and female mice, the lysosomal enzyme activity was significantly elevated in testes and ovaries compared to control animals (Agarwal, et al., 1989).

The developmental toxicity of phthalate diesters has been extensively studied. Both DBP and DEHP caused adverse effects on fetal development and increased resorption when given in the diet of pregnant mice and caused an increase in the incidence of external abnormalities in the offspring (Shiota and Nishimura, 1982).

Numerous critical reviews of the extensive in vitro and in vivo mutagenicity test data for DEHP have concluded that this compound and its metabolites are not mutagenic (Butterworth and Slaga, 1987; Griesemer, et al., 1985; Turnbull and Rodricks, 1985). However, some phthalates have been shown to be carcinogenic, possibly as a result of liver toxicity. USEPA has classified DEHP as a B2 compound (probable human carcinogen) based on the results of laboratory animal data. In a National Toxicology Program study (NTP 1982), male and female Fisher rats were fed diets containing 6,000 or 12,000 ppm DEHP for 103 weeks. Mice (B6C3F1) were fed DEHP in the diet at 3,000 or 6,000 ppm. There was a significant dose-related increase in hepatocellular carcinomas in female rats and mice of both sexes. It has been suggested that DEHP-induced liver carcinogenesis is due to peroxisome proliferation (NRC 1986; Warren, et al, 1982).

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The compound 2,6-dinitrotoluene (2,6-DNT) is an isomer of dinitrotoluene (DNT). Common uses include as an intermediate in the production of polyurethane foam for beds and furniture and in the manufacture of dyes. It is also used in the production of explosives, as a gelatinizing and waterproofing agent (Roberts and Hartley, 1992). There are no natural sources of DNT. While it is usually produced by mixing toluene with nitric acid, small amounts of the two isomers may also occur as a by-product in the production of trinitrotoluene. The isomers of DNT can be found in soils, surface waters, and groundwater in association with munition wastes. Although dinitrotoluene does not readily volatilize, it does not persist in the environment, being readily degraded by sunlight and microbial action (Roberts and Hartley, 1992).

Absorption of 2,6-DNT can occur via ingestion and inhalation. While no studies have evaluated dermal absorption of 2,6-DNT, technical grade DNT can be absorbed via dermal contact (Roberts and Hartley, 1992).

The acute oral LD_{50} of 2,6-DNT is 177 mg/kg in rats and 1,000 mg/kg in mice (ACGIH, 1986). Lee et al. (1975) reported that the oral LD_{50} in male and female rats was 535 and 795 mg/kg, respectively, and 621 and 807 mg/kg in male and female mice, respectively.

Rickert et al. (1984) reported degeneration of testes and depression of spermatogenesis after feeding 2,6-DNT to dogs or rats for 13 weeks at doses of 100 to 155 mg/kg/day. In Swiss mice, marked aspermatogenesis was observed at a dose of 289 mg/kg/day.

In a one-year feeding study using male Fischer 344 rats, 85 percent and 100 percent of the animals fed 2,6-DNT at 7 and 14 mg/kg/day, respectively, developed hepatocellular carcinomas. Neoplastic nodules and cholangiocarcinomas were also observed in these animals (Popp and Leonard, 1983). In a 30-week bioassay performed by Schut et al., (1983), total intraperitoneal doses up to 3,000 mg/kg, or total oral doses up to 6,000 mg/kg 2,6-DNT did not produce an increase in lung adenomas in strain A mice.

Bacterial mutagenicity assays indicate that 2,6-DNT is weakly mutagenic (Rickert et al., 1984; Ellis et al., 1978). Increased numbers of tetraploid chromosomes were reported in kidney cultures and chromatid breaks and gaps were observed in lymphocyte cultures in CD rats fed 2,6-DNT for 13 weeks (Rickert et al., 1984). A positive response was reported in the in vivo-in vitro hepatocyte DNA repair assay at 20 mg/kg (Rickert et al., 1984).

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Amino dinitrotoluenes (Am-DNTs), including both 2-amino-4,6-dinitrotoluene (2-Am-DNT) and 4-amino-2,6-dinitrotoluene (4-Am-DNT), are found in effluents from TNT manufacturing plants and from munitions load, assembly, and pack facilities. Both of these chemicals are found as metabolites in mammals exposed to TNT (USEPA, 1989). Human exposure can occur directly during manufacture of munitions, or secondarily through contact with contaminated wastewater.

In the environment, Am-DNTs are readily photodegraded. Liu et al. (1983) demonstrated that at a concentration of 1.8 mg/L of synthetic wastewater, 4-Am-DNT was readily and completely degraded by light. In the same study, the concentration of 2-Am-DNT dropped from 0.05 mg/L of synthetic wastewater to 0.018 mg/L following photodegradation.

Acute toxicity studies have shown Am-DNTs to be relatively non-toxic via oral exposure. Oral LD_{50} values for rats and mice were identified by Ellis et al. (1980). For 2-Am-DNT, the oral LD_{50} ranged from 1,394 mg/kg for female rats to 1,722 mg/kg for male mice. For 4-Am-DNT, the oral LD_{50} ranged from 959 mg/kg for female rats to 1,495 mg/kg for female mice.

Neither 2-Am-DNT nor 4-Am-DNT are skin irritants. In a primary dermal and eye irritation study, Ellis et al.. (1980) demonstrated that Am-DNTs were not irritating to the skin and eyes of rabbits, and did not induce skin sensitization in guinea pigs.

Toxicokinetic study results in CD albino rats (Ellis et al., 1980) indicate that 4-Am-DNT is readily absorbed and eliminated. Within 24 hours after exposure to a dose about one tenth of the LD_{50}, about 40% was recovered in the urine, 41 % was found in the gastrointestinal tract, and about 13% was found in the biliary excretion. Concentrations of 10^{-12} to 10^{-6} M 4-Am-DNT will not affect the synthesis of protein (globin) in cell-free extracts of reticulocytes from New Zealand White rabbits (Fornier and Parsons, 1980). In the presence of liver microsomes from male Walter Reed rats, at concentrations up to 10^{-3} M, 4-Am-DNT had no effects on the activities of two heme synthesis enzymes, δ–aminolevulinic acid and ferrochelatase (Johnson et al., 1985).

While available information indicates that both 2-Am-DNT and 4-Am-DNT are relatively non-toxic, no information is available concerning the chronic, developmental and reproductive toxicity in humans or animals. Likewise, no cancer bioassays or epidemiological studies are available to assess the potential carcinogenicity of Am-DNTs.

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Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) is an eight-member heterocyclic crystalline solid used as a solid-fuel rocket propellant, in military munitions and in plastic-bonded explosives. It is also used to implode fissionable material in nuclear devices. Human exposure can occur directly during manufacture, or during formulation and loading of HMX into munitions, or secondarily through contact with contaminated wastewater.

Adverse effects to humans after oral exposure to HMX have not been documented. HMX was poorly absorbed, did not accumulate in the tissues, was poorly metabolized and was excreted primarily in the feces after being fed in the diet to rats (Cameron, 1986 cited in USEPA, 1988). Following acute to subchronic exposure, the central nervous system appears to be a primary target organ since convulsions and behavioral changes were observed in rats, mice and rabbits. Oral LD_{50} values for rats and mice are 6250 mg/kg and 2300 mg/kg, respectively (Cuthbert et al., 1985 cited in USEPA, 1988). The dermal LD_{50} for rabbits is 982 mg/kg (Cuthbert et al., 1985 cited in USEPA, 1988). A sex-specific toxicity was observed in rats following subchronic exposure. Dietary supplementation with HMX for 13 weeks produced centrilobular hepatocellular hypertrophy in male rats, and focal areas of renal atrophy and tubular dilation in females rats (Everett et al., 1985 cited in USEPA, 1988). On the basis of these effects, a no-observed-adverse-effect-level (NOAEL) of 115 mg/kg/day for female rats and a NOAEL of 50 mg/kg/day for male rats were derived. Based on the observed effects to male rats, a reference dose (RfD) of 50 mg/kg/day was calculated. Data are presently insufficient to derive a reference concentration (RfC) for HMX.

No information is available concerning the developmental or reproductive toxicity of HMX to humans or animals. No cancer bioassays or epidemiological studies are available to assess the carcinogenicity of HMX. Therefore, U.S. EPA (1990) has placed HMX in weight-of-evidence group D, not classifiable to human carcinogenicity.

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RDX is the common name used for Hexahydro-1,3,5-trinitro-1,3,5-triazine, an explosive polynitroamine. RDX is a white crystalline solid which has been used extensively as a high-impact explosive in military munitions formulation since World War II. RDX has also been used as a rat poison (ACGIH, 1990). RDX can be released to the environment from various wastewater streams generated at sites where it is produced or through leaching from contaminated soil.

Repeated exposure to RDX via the inhalation, ingestion, or dermal routes causes illness in humans (Kaplan et al., 1965), including insomnia, restlessness, irritability, temporary amnesia, disorientation and followed by convulsions and unconsciousness (Ryon et al., 1984). Complete recovery has been found to occur upon removal from exposure.

The acute oral LD_{50} values of RDX in mice and rats is reported to range from 59 to 97 mg/kg and from 71 to 300 mg/kg, respectively (McLellan et al., 1992). The acute oral LD_{50} depends on the physical form and the methods used to suspend or dissolve the compound Oral administration of a single 100 mg/kg dose of a coarse granular preparation of RDX did not induce convulsions in Sprague-Dawley rats. However, when 10 rats received a 50 mg/kg dose of finely powdered RDX in a stable saline slurry by gavage, all 10 rats experienced convulsions (Schneider et al. 1977).

The U.S. Department of Defense (U.S. DOD, 1983) commissioned a study to evaluate the chronic effects of RDX in groups of 85 male and female Fischer 344 rats fed doses of 0, 0.3, 1.5, 8.0, or 40.0 mg/kg/day for 24 months. Mortality was increased in high-dose males and females throughout the study, and tremors and convulsions were frequently observed prior to deaths. Behavioral hypersensitivity to stimuli, production of cataracts, hepatotoxicity (evidenced by hepatomegaly), hypocholesteremia, hypotriglyceridemia, reduced serum albumin/total protein levels, and increased lactate dehydrogenase (LDH) levels were all correlated to RDX exposure. Compound-induced toxicity was found primarily in high-dose males. In males receiving 1.5, 8.0, and 40.0 mg/kg/day, there was increased pigment in the spleen and suppurative inflammation of the prostate, while the only significant ($p<0.05$) histologic change in females was an increase in lenticular cataracts. Based on suppurative inflammation of the prostate of males receiving 1.5 mg/kg/day and above, the LOAEL was 1.5 mg/kg/day and the NOEL was 0.3 mg/kg/day. Studies using other measurable toxic endpoints have reported LOAEL values ranging from 3.1 to 160 mg/kg/day and NOAEL values ranging from 1 to 80 mg/kg/day (U.S. DOD, 1974, 1976, 1980a, 1984; Levine et al., 1981; Von Oettingon et al., 1949; Angerhofer et al., 1986).

Developmental toxicity studies were conducted with Fischer 344 rats and New Zealand rabbits (U.S. DOD, 1980a). In the study with rats, groups of 24 or 25 rats received 0, 0.2, 2, or 20 mg/kg/day RDX by gavage on days 6 through 19 of gestation. Teratogenicity was not demonstrated at any of the dose levels tested, although embryotoxicity and maternal toxicity were seen at 20 mg/kg/day. Rabbits, dosed with 0, 0.2, 2, or 20 mg/kg/day RDX by gavage on days 7 through 29 of gestation also demonstrated maternal toxicity at 20 mg/kg/day.

The carcinogenic potential of RDX has been evaluated in Fischer 344 rats (U.S. DOD, 1983), Sprague-Dawley rats (Hart, 1976) and B6C3F1 mice (U.S. DOD, 1984). RDX was not found to be carcinogenic when fed to either strain of rats, but produced significant increases in the combined hepatocellular adenomas/carcinomas in B6C3F1 female mice.

The mutagenic potential of RDX was evaluated in two studies using the Salmonella/microsomal preincubation assay (U.S. DOD, 1980b; Whong et al., 1980). The assays were conducted with and without the addition of hepatic homogenates. In both studies, RDX was not mutagenic. In addition, RDX gave negative results in an unscheduled DNA synthesis (UDS) assay using WI-38 (human fibroblasts) when tested at a maximum concentration of 4000 g/ml, with or without the addition of hepatic homogenates (U.S. DOD, 1978).

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Trinitrophenylmethylnitramine (tetryl) is a monoclinic crystalline solid. This chemical is colorless when freshly prepared, but it rapidly acquires a yellow color when exposed to light. It is odorless but causes a sharp burning sensation in the nasal mucosa. Tetryl is an explosive and is more sensitive to impact, friction, and initiation by lead azide or mercury fulminate than trinitrotoluene (TNT). Therefore, tetryl is commonly used as a intermediary detonating agent for less sensitive high explosives and as a booster charge in certain military munitions.

Tetryl can be released to the environment from various wastewater streams generated at sites where it is produced or through leaching from contaminated soil. If released to water, tetryl may be degraded by hydrolysis and photolysis. The hydrolysis half-life at 20°C and pH 6.8 has been estimated to be 305 days; however, the hydrolysis rate is expected to increase in more alkaline water (Kayser et al., 1984). In seawater at 25°C (pH 8.1), the hydrolysis half life is about 33 days (Hoffsommer and Rosen, 1973). Under ambient lighting conditions and pH 6, the photolysis rate has been observed to be at least an order magnitude faster than hydrolysis. If released to soil, tetryl is expected to be susceptible to slow hydrolysis in acidic and neutral soils; however, in highly alkaline soils, hydrolysis may be relatively rapid (Kayser et al., 1984). Moderate leaching can be expected to occur in soil (Kayser et al., 1984). Insufficient data are available to predict the relative importance of biodegradation in soil or water. Absorption of tetryl may occur via ingestion, inhalation and dermal exposure.

Acute toxic effects of subcutaneous exposure to tetryl have been studied in dogs and rabbits. Attempts to study oral toxicity at high doses failed, as animals vomited soon after ingestion (Wells, 1920). In this study animals exposed subcutaneously to high doses died soon after injection. Autopsy results indicated that the animals had inflammation at the site of injection, swelling and degeneration of the renal tubes and glomeruli, and occasional edema of the lungs. Some dogs had necrosis and fatty changes of the liver. The spleen was essentially normal in all of the specimens. The subcutaneous lowest lethal dose, LD_{L0}, for dogs was reported to be 5000 mg/kg.

Direct dermal contact with tetryl causes a reversible bright yellow discoloration, most often seen on the palm, face, and neck, and in the hair (Bergman, 1952). Tetryl is an irritant and can cause contact and sensitization dermatitis. Typical tetryl dermatitis appears as early as the first week of exposure to the chemical, with itching of and around the eyes. There is a progression to erythema and edema occurring most often on the nasal folds, cheeks, and neck; papules and vesicles may develop. The remainder of the body is rarely affected (Bergman, 1952). The severest forms show massive generalized edema with partial obstruction of the trachea, owing to swelling of the tongue, and require hospitalization; exfoliation usually occurs after edema subsides (Bergman, 1952). Some evidence indicates that tetryl dermatitis is a sensitization phenomenon rather than as a result of local irritation (Gell, 1944).

Tetryl can also affect the upper respiratory tract. The effects are variously localized from the nostrils to the bronchi and include burning, itching, sneezing, coryza, and cough. These symptoms may begin at the first day of exposure or as late as the third month. Upon removal from exposure, the symptoms regress over 2 to 4 weeks (Bergman, 1952). Hatch and Probst (1945) screened 4,000 exposed workers and found no evidence of lung disease. They concluded that the great majority of tetryl particles are larger than the maximum diameter of particles which can pass into the alveolar ducts to cause parenchymal disease. It has been noticed that reexposure causes recurrence of symptoms in a small group of industrial workers (Bergman, 1952). Gell (1944) exposed guinea pigs to tetryl by different methods. One of the animal sensitized by inhalation exhibited an anaphylactic death after being reexposed to tetryl dust. These studies suggest that the sensitization phenomenon may also be related to the respiratory toxic effects of tetryl.

Other effects reported in tetryl workers include irritability, fatigue, malaise, headache, lassitude, insomnia, abdominal pain, nausea, diarrhea and vomiting (Witkowski et al, 1942; Hardy and Maloof, 1950; Bergman, 1952). Anemia, of either the bone marrow depression or deficiency type, has been observed among tetryl workers (Bergman, 1952). There is evidence that heavy exposures to tetryl may cause liver and kidney damage (Witkowski et al, 1942; Hamilton and Hardy, 1974).

There were no studies located regarding the reproductive, teratogenic, genotoxic, or carcinogenic effects of tetryl.

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The compound 1,3,5-trinitrobenzene (1,3,5-TNB) is a nitroaromatic compound closely related to the explosive 2,4,6-trinitrotoluene (TNT). This compound is commonly found in wastewater streams originating from munitions facilities where TNT is manufactured, or from TNT waste disposal sites, and has been shown to be a photochemical transformation product of TNT in the environment. Relatively little information is available on the absorption, metabolism or excretion of this compound, although animal studies indicate that 1,3,5-TNB may be absorbed via oral or dermal exposure (Fogleman et al., 1955; HSDB, 1992). Calculations based on the log octanol/water partition coefficient indicate that 1,3,5-TNB could potentially bioconcentrate to a slight degree in plant and animal tissues (estimated bioconcentration factors of 5 to 23; HSDB, 1992).

Very few studies were located on the acute toxicity of 1,3,5-TNB. Aquatic testing has shown this compound to elicit behavioral effects in fish at concentrations as low as 100 ug/L. Effects include irritability/excitability and respiratory distress. Higher concentrations (1000-10,000 ug/L) are reported to elicit violent reactions in swimming behavior (HSDB, 1992). Dermal exposure has been reported to cause contact irritation/inflammation in mice, and an oral LD_{50} of 450 mg/kg has been reported for rats (McGregor, 1983).

Studies in mice, rats and guinea pigs have shown that chronic exposure to 1,3,5-TNB can induce methemaglobinemia (Fogleman, 1955), as well as a number of unspecified effects on the liver and central nervous system (Korolev et al., 1977). Human data are quite limited, and are based on studies among munitions workers who have been exposed to numerous compounds in addition to 1,3,5-TNB. Common symptoms of chronic exposure to munitions compounds in humans include optic neuritis and amblyopia, and yellowing of the conjunctiva or sclera (HSDB, 1992), although it is not known whether these effects are related to 1,3,5-TNB. Because of the lack of detailed toxicity information on this compound, the USEPA (IRIS, 1992) has derived a reference dose for 1,3,5-TNB based on analogy to the structurally-related compound, 1,3-dinitrobenzene (1,3-DNB), for which detailed toxicity data are available. However, it is important to note that 1,3-DNB is more toxic than 1,3,5-TNB (i.e., the LD_{50} for 1,3-DNB is 83 mg/kg vs 450 mg/kg for 1,3,5-TNB). Chronic exposure to 1,3-DNB in drinking water is reported to cause a number of toxic effects in rats. Concentrations of 20 ppm cause decreased weight gain, decreased hemoglobin levels, testicular atrophy, and spleen enlargement with hemosideric deposits. Lower concentrations (8 ppm) have been correlated to increased spleen weight, while 3 ppm causes behavioral changes (Cody et al., 1981).

There is no information available on the potential carcinogenicity of 1,3,5-TNB, although it has been shown to be mutagenic <u>in vitro</u> in a bacterial assay (<u>Salmonella typhimurium</u> assay; McGregor et al., 1980). The USEPA has classified 1,3,5-TNB as a class D compound, not classifiable as to human carcinogenicity based on lack of data..

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In humans, exposure to 2,4,6-trinitrotoluene (TNT) has been reported to produce relatively mild effects such as respiratory irritation, skin lesions, and gastrointestinal disorders and progressing to more severe symptoms such as methemoglobinemia, jaundice, aplastic anemia, cataract formation, menstrual disorders, neurological dysfunction, and nephrotoxicity (Zakhari and Villaume, 1978). Of these disorders, the most consistently observed are hepatitis and aplastic anemia (Zakhari and Villaume, 1978).

Acute oral LD_{50} values ranging from 500 to 1,850 mg/kg have been reported in several animal species. Toxic signs following acute administration include lassitude, cyanosis, occasional muscular twitching, convulsions, and discolored urine. When applied to the skin of rabbits, TNT produced mild dermal irritation (NIOSH, 1988).

In animals, significant and consistent findings following oral administration of TNT include hemolytic anemia with compensatory responses such as reticulocytosis, methemoglobinemia, and increased spleen weight usually associated with hemosiderosis. In lifetime studies, the most consistent signs are congestion and extramedullary hematopoiesis, increased liver weight associated with hyperplasia, and hepatocytomegaly (Dilley et al., 1978; Levine, et al., 1981, 1983; Furedi et al., 1984a, b). Testicular atrophy and hyperplasia have been observed in rats fed with 160 mg/kg/day of TNT for up to 13 weeks (Dilley et al., 1978) and similar effects were seen in rats fed 125 to 300 mg/kg/day (Levine et al., 1981).

Trinitrotoluene is mutagenic to Salmonella typhimurium strains TA-98, TA-1538, and TA-1537, indicating it is a frameshift mutagen (Ellis et al., 1980). Similar results were reported by Dilley et al. (1978) in Salmonella strains TA-1537, TA-1538, and TA-100.

The carcinogenic potential of TNT was evaluated in 24-month studies in Fischer 344 rats and in hybrid B6C3Fl mice (Furedi et al., 1984a, b). In the rat study, the animals were administered 0.0, 0.4, 2.0, 10.0 or 50.0 mg/kg/day of TNT in the diet. In females, treatment produced an increase in the incidence and severity of hyperplastic, preneoplastic, and neoplastic lesions of the mucosal epithelium of the urinary bladder. In the mouse study, the animals were administered 0.0, 1.5, 10.0 or 70.0 mg/kg/day of TNT. Microscopic examination of the spleens revealed a statistically significant increase in the incidence of leukemia and malignant lymphoma in the high dose females. The lesions were described as systemic reticuloendothelial neoplasias involving the adrenals, bone marrow, brain, GI tract, eyes, kidneys, liver, lungs, and the lymph nodes. The USEPA classifies lead as a C possible human carcinogen based on limited evidence from animal studies.

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Aluminum is the third most abundant element on earth, comprising 8% of the earth's crust. It is used to make such items as soda cans and cookware. Various aluminum compounds are used as antacids, antiperspirants, and medicine. Absorption of aluminum can be through inhalation of aluminum dust or through injection of aluminum containing drugs. Oral and dermal absorption is poor (Seiler et al. 1988).

There does not appear to be much of a risk of acute toxicity to aluminum in humans. Many of the health problems seen after inhaling aluminum dust, such as pulmonary problems, seem to be related to the particulate nature of the aluminum. Many sources list aluminum dust as a nontoxic dust (Sorenson et al. 1974; Krueger et al. 1984). The LD_{50} for oral ingestion cannot be determined because, due to the low absorption, the animal dies of intestinal blockage before a lethal dose is reached. There also appears to be low toxicity to chronic exposure to aluminum. Many studies have concluded that workers exposed to aluminum are not at increased occupational risk (DeHamel 1983).

In healthy humans, there does not appear to be any accumulation of aluminum in the body at normal daily exposure rates. Rat studies have shown that an oral intake of 125 mg/kg-day is required to start accumulating aluminum in the body; in humans this dose appears to be 1 g/day. The average ingestion from the environment for humans is 5 mg/day (Ganrot 1986; Greger and Baier., 1983).

Studies have not shown a correlation between cancer and aluminum. A special situation is found in patients with renal failure who require dialysis. The kidney plays an important role in elimination of aluminum. Aluminum containing drugs are used in large amounts to bind phosphorous which builds up in the blood of these patients. Because the aluminum is put directly in the bloodstream and the elimination system is compromised, large amounts of aluminum build up in the blood. Dementia, brittle bones, and several blood disorders have been correlated with the high blood level of aluminum. Dementia is seen is patients with aluminum concentrations of 407 μg/L or higher (Ladurner et al. 1982). This is 100 times greater than the aluminum concentration of the general population (Seiler et al. 1988).

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Antimony (CAS NO. 7440-36-0, Sb) is a silver-white, lustrous, hard, brittle metal with scale-like crystalline structure with a molecular weight of 121.75 (Merck, 1989). Besides the stable metal there are two allotropes: yellow crystalline and amorphous black forms (Sax, 1986). Its density is 6.684 at 25 C and it is insoluble in hot and cold water (Weast, 1988-89). Antimony reacts with hot concentrated hydrochloric acid, and when melted forms a volatile oxide (Stokinger, 1981).

Antimony exists in a variety of chemical forms and valence states. Stibnite (Sb_2S), is the most common naturally occurring antimony compound. Antimony may also be found in the environment as the native metal, as antimonides of heavy metals, and as antimony oxides. Antimony exists in natural waters as a soluble oxide or antimonite salt. Sorption onto clay and other minerals is the primary mechanism for removal from surface waters. Antimonite salts may also react with other heavy metals in solution to form insoluble compounds that may precipitate. In bed sediments, which often provide a reducing environment, a volatile water-soluble gas known as stibine (SbH_3) is formed (Amdur et al., 1991). This gas is oxidized to SbO_3 in aerobic waters or in air. This process results in the mobilization of antimony compounds from sediments. Bioaccumulation is not an important fate process for antimony.

Antimony is often used in association with lead and arsenic in industry. The major uses of this metal include the manufacture of lead alloys, storage batteries, pewter, rubber, matches, ceramics, enamels, paints, lacquers, and textiles (Goyer 1986). Antimony forms a volatile oxide in reaction with steam, nitric acid, or strongly oxidizing salts. When heated, antimony reacts with halogens (e.g., chlorine or bromine). Oxides, sulfides, and chlorides of antimony are the most common forms found in industry.

Most antimony exposures occur via ingestion or inhalation. Antimony compounds may also be irritating to the skin upon direct contact (Sax 1986). Because antimony is usually found in association with lead and arsenic, it is difficult to assess the toxicity of antimony alone, particularly in humans (Sax 1986). Humans exposed to high levels of antimony dusts may experience gastrointestinal problems and inflammation of the mucous membranes of the nose and throat. In addition, antimony inhalation may result in effects on the nervous system such as irritability, sleeplessness, fatigue, dizziness, and muscular and neurological pain. Animals exposed to the fumes of antimony oxide have developed pneumonitis, fatty degeneration of the liver, a decreased white blood cell count, and damage to the heart muscle.

Antimony and its compounds have been reported to cause dermatitis, keratitis, conjunctivitis, and nasal septal ulceration by contact with fumes or dust (Merck 1989). Antimony enters the body through inhalation and can be transported to blood and tissues (Carson et al., 1986). Antimony poisoning among smelter workers occurred at atmospheric concentrations of 4.69-11.81 mg/m^3; symptoms included dermatitis, rhinitis, inflammation of the upper and lower respiratory tract, and pneumonitis (Stokinger, 1981). The exposure to antimony by dermal contact causes pustular skin eruptions known as "antimony spots", which is a rash consisting of papules and pustules around sweat and sebaceous glands (Stokinger, 1981). Oral ingestion of antimony, as antimony trioxide, may cause burning stomach pains, colic, nausea, and vomiting (Amdur et al., 1991).

Studies suggest that chronic occupational exposure to antimony compounds results in deleterious nervous system effects. These effects are very difficult to attribute to antimony alone because of the uncertainties noted above. Nonetheless, myocardial effects following chronic exposure to antimony among factory workers have been conclusively documented. Individuals exposed to antimony trisulfide at concentrations ranging from 0.58 to 5.5 mg/m^3 exhibited ECG changes and elevated blood pressure (Carson 1986).

Stokinger (1981) reported that female workers exposed to antimony experienced a higher than normal incidence of spontaneous abortions late in the pregnancy, premature births, and depressed infant weight gain. Animal studies failed to reproduce these findings (Stokinger 1981).

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Arsenic is a ubiquitous metal found throughout the environment. There are a number of medicinal, agricultural, and industrial uses for arsenic compounds.

Acute effects of arsenic exposure have been reported for both oral and respiratory routes of exposure. Irritant and vesicant arsenicals such as arsenic trioxide and arsenic trichloride can cause severe damage to the respiratory system, as well as cough, dyspnea, and chest pains (Ishinishi et al., 1986). Numerous acute incidences of poisoning (accidental and suicidal) via arsenic ingestion have been reported. One very large incident involved 12,131 Japanese infants who were exposed to infant formula tainted with pentavalent inorganic arsenic (1.3 to 3.6 mg/day). Among the exposed population, 130 infants (approximately 1 percent) died of acute poisoning, and the majority of the survivors exhibited one or more symptoms, including fever, insomnia, anorexia, liver swelling, melanosis and disturbed heart function (World Health Organization, 1981). Accidental ingestion has also been reported in adults exposed for 2 to 3 weeks to tainted soy sauce. Symptoms included facial edema, anorexia, skin lesions, and liver swelling (Mizuta et al., 1956).

Individuals recovering from poisoning with inorganic arsenic exhibit disturbances of the peripheral nervous system with some wallerian degeneration of the axons (World Health Organization, 1981). The toxicity of arsenic compounds is generally related to solubility. The relatively soluble arsenic trioxide has a reported fatal dose of 70 to 180 mg (Vallee et al., 1960). Arsine gas (hydrogen arsenide) is a powerful hemolytic poison, and its toxic effects are quite different than other arsenicals. Arsine poisoning is characterized by nausea, abdominal colic, vomiting, backache, and shortness of breath, followed by dark blood urine and jaundice (Kipling and Fothergill, 1964). Arsine fatalities are usually due to renal failure cause by hemoglobin casts in the renal tubules (Fowler and Weissberg, 1974). The lethal dose for arsine is reported to be 250 mg/m^3 over several hours (Henderson and Haggard, 1943).

Chronic exposure to arsenic has been reported in a number of epidemiological studies based on inhalation (i.e., industrial) exposure and ground water ingestion. Kurtasone (1972) reported that populations neighboring on an arsenic trioxide refinery exhibited skin lesions and peripheral neuropathy, with some increases in chronic respiratory disease, although a causal relationship with arsenic was never established. Several studies have described the effects of ingesting water from regions with high naturally occurring (background) levels of arsenic. Hyperkeratotic skin lesions were seen in populations in Chile (Borgano et al., 1977) and Taiwan (Tseng, 1977). In addition, a condition known as blackfoot disease, characterized by gangrene of the lower extremities, has been reported in the Taiwanese population. Skin lesions, which occur primarily on the palm of the hand and the sole of the foot, have been reported to occur from occupational exposure (Hamada and Horiguchi, 1976) and from therapeutic administration of Fowler's solution (Fierz, 1965), as well as from drinking water. Other chronic effects include melanosis on the eyelids, around the temples, nipples, and folds of the axillae and the formulation of Mee's Lines (white striae of the fingernails). Arsenic tends to accumulate in the skin, probably because of high concentrations of proteins containing sulfhydryl groups to which arsenic binds. Arsenic dust has been reported to cause perforation of the nasal septum (e.g. the cartilaginous portion) (Ishinishi et al., 1986), and an association of aplastic anemia has been reported among users of arsenical drugs (Westhoff et al., 1975).

The USEPA has classified arsenic as a Class A potential carcinogen, based on human studies. Skin cancer, in the form of epithelioma, has been seen at the sites of arsenic-induced keratoses (Borgano et al., 1977; Tseng et al., 1977). An increased incidence of lung cancer has been reported among smelter workers (Ishinishi et al., 1986), although it should be noted that these workers were also exposed to sulfur dioxide and other metals. No relationship of arsenic exposure to any other form of cancer has been established (IARC, 1980). Chromosomal abnormalities have been observed among lymphocytes of workers and patients exposed to arsenic (Beckman et al., 1977; Petres et al., 1977). In vitro studies have shown that trivalent arsenic compounds can induce sister chromatic exchanges (SCEs), but pentavalent forms do not. The relevance of SCE studies is questionable, since lymphocytes from chronically exposed individuals suffering from blackfoot disease showed no differences in SCE patterns from control populations (Wen et al., 1981). Mutagenicity tests for both trivalent and pentavalent arsenic compounds were negative in Salmonella, E. coli and Chinese hamster V9 assays, but positive in Bacillus subtiles (Ishinishi et al., 1986).

Arsenic-induced terata have been produced in hamsters exposed to high doses of sodium arsenate (6 to 10 mg/kg) on day 8 of pregnancy. Defects included anencephaly, renal agenesis and rib malformations. An increase in fetal resorption was also noted (Ferm, 1977). An epidemiological study among female workers at a copper smelter showed a birth defect rate 5 times that of the control population, but no conclusion about the role of arsenic could be drawn because of the simultaneous exposure be other metals and sulfur dioxide (Nordstrom et al., 1979). It should be noted that co-administration of sodium selenite has been reported to prevent arsenic-induced teratogenesis in animals (Holmberg and Ferm, 1969).

Arsenic has been used extensively in medicine (Fowler's Solution) for the treatment of leukemia, psoriasis, asthma, and as a tonic, and has also been used in the formulation of anti-parasitic drugs. Medicinal dosages were frequently as high as 3 mg/day. In recent years, with the development of less toxic drugs, the medicinal use of arsenic has declined (Ishinishi et al., 1986).

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Barium is a relatively non-toxic metal with numerous industrial agricultural, and medicinal uses. Barium sulfate, when combined with zinc sulfide, is frequently used as a paint pigment known as lithophone. Barium sulfate is a chemically stable, highly insoluble compound with little potential for migration. It should be noted that barium sulfate is also used medicinally as an x-ray contrast material in the both the lower and upper gastrointestinal tract.

Barium toxicity is related to its solubility. Soluble barium salts such as barium chloride can be absorbed in the gut and are toxicants, while the more common insoluble forms such as barium sulfate are very poorly absorbed and are essentially non-toxic. Cuddihy and Ozog (1973) have reported that 11 to 32 percent of the highly soluble barium chloride is absorbed in the GI tract of hamsters. Absorption in the GI tract can be minimized by the prompt administration of soluble sulfate (e.g. Glauber's salt), which causes precipitation of barium sulfate. Absorbed barium partitions to the bone surface, pigmented parts of the eye, and the submaxillary gland. Accumulation usually occurs in proportion to the calcium content of the tissue. The majority of absorbed barium (75 percent) is excreted within 3 days (Reeves, 1986).

Most reported cases of acute barium toxicity have involved suicide attempts or accidental poisonings with medicinals containing barium. One epidemiological study was performed in Szechuan, China where a condition resembling familiar periodic paralysis was thought to be due to food poisoning caused by high barium content in the salt from the region (Allen, 1943). Poisonings in occupational settings are essentially unknown, despite the widespread use of barium compounds. Acute toxicity is related to the action of barium as a muscle poison, causing muscle stimulation followed by paralysis. Symptoms of poisoning include gastroenteritis, decreased pulse rate, ventricular fibrillation, extra systoles, salivation, and diarrhea. Lethal doses are also associated with the loss of tendon reflexes, heart fibrillation, and general and respiratory muscle paralysis leading to death (Reeves, 1986). Animal studies have demonstrated highly variable LD_{50} values for different species, ranging from 7 to 29 mg/kg in mice to 800 to 1,200 mg/kg in horses. It is believed that these variations may be related to differences in the degree of sulfate precipitation in the gut between different species. The threshold dose for toxicity in humans is 0.2 to 0.5 grams (absorbed dose) and the lethal dose is 3 to 4 grams. It is believed that barium toxicity is due to a potassium deficiency. Nielsen (1981) reports that barium acts by blocking the potassium channel of the sodium-potassium pump in cells. Potassium infusion relieves the symptoms of poisoning.

Few cases of chronic barium intoxication have been reported. Chronic inhalation of insoluble forms (barium sulfate and barium carbonate) may induce a benign pneumoconiosis (baritosis). This ailment is not incapacitating and is usually reversible on termination of exposure (Klaassen et al., 1986). Studies on chronic inhalation of barium sulfate in rats indicates that baritosis is not associated with fibrosis, and appears to be due to the accumulation of alveolar macrophages and reversible hyperplasia of the bronchial epithelium (Holusa et al., 1973).

Barium has not been linked to carcinogenesis, mutagenesis, teratogenesis, or any reproductive effects. Medicinally, barium sulfate is commonly used as an x-ray contrast material in both the lower and upper GI tract because of its very low toxicity (Reeves, 1986).

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Beryllium (CAS NO. 7440-41-7, Be) is a naturally occurring grayish-white hard metal. Beryllium is the smallest of the group II metals. The small ionic radius and the resultant large surface charge-density are dominant influences on the chemistry of beryllium. Most mined beryllium is used to make alloys for electronic and structural applications (Stokinger, 1981).

The most common route of beryllium exposure is via inhalation. Absorption in the lung is rather slow and contributes to the long biological half-life of beryllium. Gastrointestinal absorption of beryllium is approximately 0.006 percent of ingested beryllium. Beryllium is transported in the plasma bound to alpha-globulin, transiently deposited in the liver, kidneys, and lungs, and ultimately stored in bone. Excretion is extremely slow and occurs via the urine. Toxic effects associated with beryllium exposure are typically manifested in the skin, eyes, respiratory system, liver, spleen, and heart. Dermal effects, which generally occur two weeks following exposure, may include contact dermatitis as well as skin sensitization. Acute systemic effects following inhalation occur primarily in the respiratory tract. Symptoms include coughing, chest pain, and shortness of breath. Exposure to high levels may result in severe chemical pneumonitis with pulmonary edema (Amdur et al., 1991).

Intoxication due to chronic inhalation is referred to as chronic beryllium disease or berylliosis and is characterized by the development of granulomatous lesions in the lungs. This disease progresses in stages ranging from an asymptomatic, non-disabling phase to a severely disabling phase characterized by significant pulmonary pathology and heart failure. Chronic beryllium disease usually has a delayed onset (5 to 10 years) and is of long duration with exacerbations and remissions. Apparently, berylliosis can occur even following exposure to relatively low concentrations in air (e.g., <2 mg/m^3). As of 1983, the U.S. Beryllium Case Registry had on record only 900 cases of beryllium disease nationwide (ATSDR 1987). Granulomatosis and chemical pneumonitis have also been attributed to beryllium exposure, but dose-response data were unavailable (Carson et al., 1986).

Inhalation of a variety of beryllium compounds in experimental animals has been associated with the development of pulmonary tumors. Rats chronically exposed to the beryllium ore, beryl, developed lung tumors. Other studies in which rats were exposed to beryllium compounds for periods ranging from 6 to 18 months generally indicate that beryllium is a lung carcinogen (ATSDR 1987). Beryllium is classified by the USEPA as a potential human carcinogen (B2). The basis for this classification includes evidence of carcinogenicity in three animal species by two routes of exposure.

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Cadmium is a metal commonly used in the production of yellow, orange, and red paint pigments. Representative pigments include cadmium selenite, cadmium sulfoselenide, and cadmium sulfide. As is the case with other paint pigments, these are highly stable, insoluble compounds with limited bioavailability.

Cadmium is a relatively toxic metal. Acute inhalation of cadmium fumes (e.g. welding) causes a chemical pneumonitis with occasional associated pulmonary edema. Symptoms may require 24 hours to appear. Inhalation of concentrations of 5 mg/m^3 for over 8 hours has been reported to be fatal, and sensitive individuals may show some symptoms at concentrations of 1 mg/m^3 for 8 hours. Symptoms include shortness of breath, general weakness, fever, and in severe cases respiratory insufficiency followed by shock and death (Elinder, 1985). Ingestion of toxic amounts of cadmium can produce nausea, vomiting, abdominal cramps, and headache, with diarrhea and shock in severe cases. Onset of symptoms usually occur within minutes of ingestion. Concentrations as low as 15 mg/l are sufficient to induce vomiting, while higher concentrations are required in protein-containing foods to produce the same symptoms (Friberg et al., 1986). Injection of soluble cadmium salts (1 to 3 mg/kg) in animals demonstrates that cadmium can cause testicular damage (Barlow and Sullivan, 1982). However, testicular damage is not seen in human populations, probably because of the protective effects of metallothionein (Nordberg, 1972).

Toxicity related to chronic ingestion of cadmium is very rare. Ingestion of food and water from cadmium-contaminated regions of Japan has been shown to produce a disease known as itai-itai. This disease is characterized by severe renal tubular damage, osteomalacia and osteoporosis, and leg and back pain. It appears that deficiencies in calcium and vitamin D in the diet of affected populations contributes to the disease (Friberg et al., 1986).

Most cases of chronic exposure to cadmium occur among industrial workers exposed via inhalation. Concentrations of cadmium in the workplace can be as high as 4 to 5 mg/m^3, although typically less than 2 mg/m^3. Respiratory absorption of cadmium is approximately 15 to 30 percent (Klaassen et al., 1986). Chronic inhalation produces a number of effects. The kidney is probably the primary target organ in man. Kidney damage is characterized by renal tubule damage and associated tubular proteinuria (e.g. excretion of low molecular weight proteins). In cases of severe exposure, glomerular damage may occur. Physiological disturbance in the handling of calcium and phosphorus may cause mineral resorption from the bone, leading to osteomalacia and kidney stone formation. Tubular damage persists and may even increase after exposure had stopped, and is probably related to cadmium bound to metallothionein in the tubular cells (Elinder, 1985). Chronic cadmium exposure may also produce lung damage that leads to emphysema. Reversible anemia has also been reported, and is probably due to hemolysis (Bernard et al., 1979). Animal studies have indicated that hypertension may occur in some species, although epidemiology studies suggest that this effect does not occur in humans (Elinder, 1985). Liver is the major cadmium storage organ, and some animal studies have shown liver damage. Only slight changes in liver function have been reported in man, however (Friberg, 1986). Chronic inhalation exposure has also been shown to cause increases in excretion of calcium and phosphorus in animals which may lead to bone effects similar to itai-itai. Although epidemiological studies indicate that osteomalacia may occur among workers (Nicaud et al., 1942), in general bone effects are usually not seen among workers with high occupational exposure (Friberg, 1986).

Epidemiological studies by Elinder (1985) suggest a possible link of cadmium to prostate and lung cancer, and animal studies have demonstrated increased lung cancer in rats exposed for 18 months to cadmium chloride aerosols (12.5 to 50 mg/m^3). Cadmium has been classified by the USEPA as a class B2 potential human carcinogen, based on animal studies.

Teratogenesis has been induced in rats and hamsters injected with high doses of cadmium (3 mg/kg or more). Defects included cleft lips, palates, and limb defects (Friberg et al., 1975). Ferm and Hanlon (1983) demonstrated that maternal pretreatment with cadmium minimized the incidence of terata. Epidemiological studies among industrially exposed women do not show increases in terata (Cvetkova, 1970). It should be noted that the enzyme metallothionein offers a protective effect against cadmium toxicity in most organs (with the exception of the kidney) by binding free cadmium. Pretreatment with cadmium, zinc, or mercury induces metallothionein synthesis, which in turn can bind greater concentrations of cadmium. It has been suggested that cadmium toxicity in the kidney may be related to cadmium saturation of metallothionein (Friberg et al., 1986). There is also some information that co-administration of selenium with cadmium minimizes toxicity.

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Cobalt is a naturally occurring element that is commonly found in rocks, soils and water throughout the United States. While cobalt is not normally a major environmental contaminant, elevated levels of this metal are occasionally seen in sewage sludges. In addition to its presence in the environment, cobalt is found in most plant and animal tissues, and is an essential element at low concentrations, being a component of the Vitamin B12 complex. Common commercial uses for cobalt include as a component of metal alloys, as a paint additive, in the manufacture of porcelain, and as a nutritional supplement to animal feeds. In the 1950s and 1960s cobalt was also used as an anti-foaming agent in the production of beer. However, because of the toxicity associated with chronic exposure, this use was discontinued.

Cobalt can be readily absorbed into the body by either inhalation or ingestion, but as with most metals, dermal absorption is thought to be minor. Once absorbed into the body, cobalt is rapidly distributed, with the majority partitioning to the liver. Excretion of cobalt occurs primarily in the feces, although a significant amount is also excreted in urine.

Acute exposure to cobalt has been linked to a number of toxic effects, including injury to the heart, lungs, liver and kidneys. The respiratory tract is a primary target organ. Studies with rats indicate that acute exposure to concentrations ranging from 26-236 mg/m^3 can cause congestion, edema and hemorrhage of the lung (Palmes et al., 1959). Ingestion studies in animals indicate that the LD_{50} values range from 91-190 mg/kg for various cobalt compounds. The cause of death in these studies was not determined, but damage was seen in the liver, kidneys and heart (Speijers et al., 1982; Domingo et al., 1984). Dermal exposure to cobalt compounds has been reported to cause an allergic reaction in man which results in a severe dermatitis (Alomar et al., 1985).

The effects of chronic exposure to cobalt have been well documented in man and animals. A number of deaths have been reported as a result of long-term ingestion of beer containing cobalt (Morin et al., 1971) or via industrial exposure (Barborik and Dusek, 1972). Death appears to be due to cardiovascular effects, including cardiomyopathy and heart enlargement (Horowitz et al., 1988). Other effects include stimulation of red blood cell production (Palmes et al., 1959), kidney congestion (Barborik and Dusek, 1972) and liver injury, characterized by centrolobular necrosis and increased serum liver enzyme levels (Morin et al., 1971). Animal studies have also shown kidney effects, including renal tubular degeneration (Murdock, 1959). Chronic exposure to airborne cobalt has been shown to cause decreased ventilatory function, alveolar lesions, inflammation and fibrosis in both humans and animals (Palmes et al., 1959).

Cobalt has been reported to be a reproductive toxicant in rats, causing atrophy and degeneration of the testes (Pedigo et al., 1988). No such changes have been seen among humans who have died from chronic cobalt exposure.

There is no evidence to suggest that cobalt is a developmental toxicant in humans. While cobalt has been used medicinally in the past to increase red blood cell levels among pregnant women, there are no reported cases of developmental defects associated with this use (Holly, 1955). Chronic cobalt exposure in animals has been reported to cause minor developmental effects, including decreases in litter weight and stunted fetal growth (Domingo et al., 1985).

Divalent cobalt (Cobalt II) does not appear to be mutagenic in bacterial systems, although the trivalent form (Cobalt III) is a weak mutagen (Schultz et al., 1982). Cobalt has been shown to induce Sister Chromatid Exchanges (SCEs) in human lymphocytes (Andersen, 1983) and to induce transformation in hamster cells (Costa et al., 1982).

Evidence regarding the potential carcinogenicity of cobalt is weak or lacking. Cobalt is reported to induce tumors (fibrosarcomas) in rats which have been treated via intramuscular injection (Gilman and Ruckerbauer, 1962), although there is no evidence to suggest that cobalt is carcinogenic to humans. The USEPA has classified cobalt as a class D compound, not classifiable as to human carcinogenicity.

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Lead is a metal with numerous industrial applications. Use of lead in paint pigments was widespread in the past, but has been curtailed in recent years. Typical lead-based paint pigments include lead chromate, dibasic lead phosphite, and various lead oxides.

Lead toxicity is related to absorption, which is age-dependent. Gastro-intestinal absorption has been reported to be 5 to 15 percent in adults, with less than 5 percent being retained, and approximately 42 percent in children, with approximately 32 percent being retained. Respiratory absorption is even greater, with approximately 90 percent of respirable particles (0.5 um or smaller) being absorbed. Lead is not an essential element, and the primary target organ system in lead exposure is the nervous system. Absorbed lead tends to distribute in two pools in the body, the skeleton and soft tissue. Lead in the skeleton is released very slowly, with a biologic half-life of approximately five years. Lead in the soft tissue has a much shorter half-life, approximately 3 to 4 weeks. (Schulz et al., 1981). The extent of lead absorption in the GI tract has been linked to a number of dietary factors. Absorption is enhanced by milk products, low calcium and vitamin D levels, fasting, or iron deficiencies. Generally, 90 percent of ingested lead is excreted in the feces, while most of the absorbed lead is excreted in the urine (Tsuchiya, 1986). The major targets for lead toxicity are the central nervous system, hematopoietic system, GI tract, and renal system.

Gastrointestinal colic is the most common effect of acute lead ingestion. The initial stages of lead intoxication include anorexia, dyspepsia, and constipation, followed by colic characterized by a diffuse paroxysmal abdominal pain. The skin is pale and blood pressure may increase, reflecting sporadic contraction of the smooth muscle.

Lead encephalopathy has also been reported. Although it is rare in adults, numerous cases have been reported in children exhibiting pica. The encephalopathy may be characterized by a sudden onset with seizures and delirium, with commonly associated papilledema. In severe cases, coma and cardiorespiratory arrest may occur. In some cases, the encephalopathy syndrome in children is characterized by vomiting, apathy, drowsiness, stupor, ataxia, hyperactivity, and other neurological symptoms. Blood lead levels typically associated with lead encephalopathy range from 80 to 300 ug/100 ml (Tsuchiya, 1986). Most studies report lead intoxication as a function of blood lead levels rather than lead intake.

Anemia is a common symptom among workers chronically exposed to lead. The anemia is probably due to both an inhibition of hemoglobin synthesis and a shortened lifespan of the erythrocytes. The decreased hemoglobin synthesis is apparently due to inhibition of several key enzymes (Wada et al., 1972). Chronic exposure also affects the central and peripheral nervous systems, particularly in children. Effects include mental deterioration, hyperkinetic or aggressive behavior, sleeping difficulties, and vomiting. Subclinical effects have also been noted in children with moderately elevated blood lead levels (40 to 80 ug/100 ml). Recent work by Bellinger et al., (1987) suggests that fetal blood levels as low as 10 ug/100 ml (compared to background levels of 6 to 7 ug/100 ml) may cause significant deficiencies in learning ability during the first two years of life. Neural effects have also been reported in chronically exposed workers, and include impairment of memory, attention, concentration, and psychomotor performance (Arnvig et al., 1980). Peripheral neuropathy is characterized clinically by wrist and foot drop, and subclinically by reduced peripheral nerve conduction. Chronic GI effects may include loss of appetite, upset stomach, diarrhea, or constipation. Degenerative changes have been noted in the proximal tubular lining cells of the kidney, and are associated with swelling of the mitochondria. Long-term exposure produces a characteristic type of nuclear inclusion body in the tubular cells of the kidney. These bodies are composed of a lead-protein complex, and apparently function as a protective mechanism for other organelles. Long-term exposure is also associated with intense, interstitial fibrosis, tubular atrophy and dilation. There is glomerular involvement at the late stages of chronic exposure (Emmerson, 1968). There is little evidence for either hepatic or cardiovascular effects of chronic lead exposure.

The U.S. Environmental Protection Agency (USEPA) classifies lead as a B2 potential human carcinogen based on animal studies. Lead has been shown to induce cancer in the kidneys of rodents under conditions of high exposure (Moore and Meredith, 1979). There is no evidence of renal carcinogenicity in man, nor does lead appear to produce chromosomal anomalies in humans.

Animal studies suggest that lead may be a teratogen. Ferm and Carpenter (1967) showed that lead salts can cause skeletal anomalies in hamsters, and may also influence litter size, weight, survival rate, and behavior. Lead and cadmium produce a synergistic teratogenic effect (Ferm, 1969), while zinc is an antagonist to lead (Willoughby et al., 1972).

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Mercury is the only metal which is in liquid state at room temperature. In addition to its metallic state, mercury occurs in compounds as monovalent mercurous mercury and divalent mercuric mercury. Mercury is found throughout the earth's crust, primarily as various sulfides. The main ore is cinnabar (-HgS). The major uses are in electrical equipment and in the chlor-alkali industry. Other uses include as a catalyst in polyurethane foams, industrial uses include medicinal preparations, felting (for beaver hats, etc.), gold refining, and as an agricultural and industrial pesticide (Stokinger 1981).

From the toxicological point of view, it is convenient to divide the mercury compounds into inorganic compounds (including elemental mercury) and organic compounds. Elemental mercury is well absorbed by inhalation, but poorly absorbed after ingestion. Inorganic mercury compounds are absorbed after ingestion and, in part, after dermal application. Organomercurials (especially short-chain alkyls) are well absorbed by all routes (Berlin 1977; USEPA 1980). Once absorbed, mercury is generally distributed about the body, binding to the sulfhydryl groups of many proteins (Berlin 1977; USEPA 1980). Kidney and brain are major depots after Hg vapor exposure; kidney, after exposure to inorganic salts (Lauwerys 1983). Metallic mercury and organomercurials are biotransformed to divalent mercury in the mammalian body (Berlin 1977; USEPA 1980). Short-chain alkyl compounds are resistant to biotransformation, but aryl and aryloxyalkyl derivatives liberate inorganic mercury (Lauwerys 1983). Mercury is excreted in the urine and feces. Small quantities go into the hair and other routes, including the exhalation of some elemental mercury (Berlin 1977; USEPA 1980).

Metallic mercury is rather volatile. A saturated atmosphere of mercury vapors contains approximately 18 mg Hg/m^3 at 24°C. Acute inhalation to high levels of mercury vapor are extremely irritating to the lung and cause erosive bronchitis and bronchiolitis with interstitial pneumonia (Berlin 1977; Gerstner and Huff 1977).

Acute oral mercury poisoning is usually caused by the soluble inorganic salts. Early signs and symptoms include pharyngitis, dysphagia, abdominal pain, nausea and vomiting, bloody diarrhea, and shock. Later swelling of the salivary glands, stomatitis, loosening of the teeth, nephritis, anuria, and hepatitis occur. Death results from the effects on the gastrointestinal tract (ulcerations, bleeding, shock) and/or kidney (Berlin 1977; Stokinger 1981).

Upon long-term exposure to toxic levels of mercury vapor, the CNS is the critical organ. Mercurialism, chronic intoxication by elemental mercury vapor or mercury salts, is much more frequently seen than acute toxicity, due to its cumulative nature. The classic syndrome begins with psychic and emotional disturbances: the victim becomes excitable and irascible, especially when criticized. The patient can no longer concentrate mentally, and becomes depressed. The symptoms may include headache, fatigue, weakness, loss of memory, drowsiness, or insomnia. Fine muscular tremor, usually beginning in the hands, soon interferes with hand writing and other precision work. These are "intention" tremors, absent during sleep, most pronounced when under stress. The victim may develop paresthesias and neuralgia. Gingivitis, stomatitis (sometimes severe), digestive disturbances, and ocular lesions are seen (Gerstner and Huff 1977; Stokinger 1981).

Methylmercury (and other alkylmercury compounds) produce "Minamata Disease," which has the clinical appearance of encephalitis. The earliest signs are gradual decreases in the senses of touch, vision, hearing, and taste. The skin becomes less and less sensitive; numbness in the fingers, toes, lips, and tongue interferes with normal activities, including walking, working, speaking, eating, and drinking. Tunnel vision occurs and may lead to complete blindness. Hearing loss is over the entire frequency range. The motor system is affected by progressive loss of balance, tremors, and incoordination. Mood changes like those observed in mercurialism occur. Prenatal intoxication occurs; symptoms are often more obvious in the child than in the mother (Gerstner and Huff 1977; USEPA 1980). Persons chronically exposed to alkylmercury exhibit paresthesia and sensory disturbances as the earliest poisoning signs. These occur at blood and hair levels > 200 ug/L and 50 ug/g, respectively (Lauwerys 1983).

There is a nearly linear relation between methylmercury intake (40 to 230 ug/day) and blood Hg concentration. At equilibrium, for each 1 ug methylmercury ingested per day, the blood Hg concentration increases 0.8 ug/kg (Sherlock et al., 1984).

The affinity of mercury for sulfur and sulfhydryl groups is a major factor underlying the biochemical properties of mercury and mercury compounds. Mercury apparently acts by reaction with sulfhydryl groups in proteins in membranes and enzymes, thereby interfering membrane structure and function, and with enzyme activity. The mercury salts are almost general-purpose enzyme inhibitors (USEPA 1980; Berlin 1977).

As described above, the main organs affected by mercury are the brain and kidney. In both, mercury produces destruction of ultrastructural elements and, eventually, degeneration of cells and tissues. Metallic mercury and organomercurials affect the brain more, especially the cerebellum and some parts of the cerebral cortex. Inorganic mercury salts affect the kidney more, especially the tubules (Berlin 1977; USEPA 1980).

Brain damage with abnormal cytoarchitecture of the brain was the primary developmental defect reported in infants prenatally exposed to methylmercury. In the 1955 mercury poisoning outbreak in Minamata, Japan, severe brain damage was described in 22 infants whose mothers had ingested methylmercury contaminated fish during pregnancy (Choi et al., 1978). Several large scale poisonings have also occurred when flour from grain treated with an alkylmercury compound, as an antifungal agent, was ingested by pregnant women (Bakir et al., 1973; Amin-Zaki et al., 1974; McKeown-Eyssen et al., 1983). Delayed development and mild neurological abnormalities were observed at low maternal exposure (Marsh et al. ,1981; McKeown-Eyssen et al., 1983). These effects were noted with mercury concentrations in maternal hair as low as 6 μg/g (McKeown-Eyssen et al., 1983).

No studies were located regarding developmental effects in humans following exposure to inorganic mercury. In an animal study, Gale (1974) exposed pregnant hamsters to single gavage doses of 4 to 100 mg/kg $HgCl_2$. At 35 mg/kg he observed an increased percentage of fetal resorptions compared with unexposed controls.

Methylmercury may cause chromosome aberrations (USEPA 1980). A positive correlation between blood mercury levels and increased frequencies of chromosome aberrations and aneuploidy has been reported in the lymphocytes of humans consuming mercury contaminated fish (Skerfving et al., 1974). Similar results have been reported in humans exposed to mercury-contaminated seal meat (Wulf et al., 1986). Cats exposed to methylmercury in the diet were observed to have significant increased frequency of chromosome abnormalities in bone marrow cells (Miller et al., 1979).

There were no reliable studies indicating that either organic or inorganic mercury are carcinogenic. Janicki et al. (1987) reported a significant association between the use of mercury-containing fungicides and leukemia in farmers, between high hair levels of mercury in the same farmers and the occurrence of acute leukemia, and between the use of mercury containing seed dressings and the occurrence of leukemia in cattle. However, because the investigators did not report most of the methodologies used to conduct this study, the results are inconclusive.

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Nickel is a silver-white elemental metal capable of forming a wide variety of compounds. Nickel is used in the manufacture of batteries, electrodes, metal alloys such as stainless steel and brass, and in electroplating. It is also used to make fuel and to hydrogenate vegetable oils.

Nickel and nickel compounds can be grouped according to their solubility in water. Examples of soluble nickel compounds include nickel chlorides, sulfate and nitrate hexahydrates, and acetates. Metallic nickel, nickel subsulfide, nickel carbonyl, and nickel oxide are relatively insoluble in water. Soluble nickel compounds generally have a higher degree of bioavailability (i.e., exhibit greater potential for uptake in living tissue) than the insoluble forms (NAS, 1975). Nonetheless, some insoluble nickel compounds are considered human carcinogens, possibly due to their refractory nature within the body.

The general population is exposed to nickel primarily through the ambient air and drinking water and from other natural sources. Nutritional studies indicate that it is an essential trace metal. Anthropogenic sources such as the burning of fuel oil and sewage waste, the use of nickel-containing fertilizers, and land application of sewage sludge contribute to overall nickel exposure. A majority of nickel exposure, however, probably occurs through the diet and from exposure to certain nickel-containing consumer products. Individuals predisposed to ischemic myocardial injury, stroke victims, and pregnant women may be particularly sensitive to nickel toxicity.

Ingested nickel is poorly absorbed through the gastrointestinal tract. It is transported in the plasma bound to albumin or other carrier proteins. Nickel deposition is greater in the lungs, with lesser concentrations in the kidneys, liver, and brain. Nickel is excreted in the urine, and elimination of the majority of absorbed nickel occurs in approximately four to five days following exposure.

Nickel dermatitis is a prevalent adverse effect associated with exposure to nickel and nickel-containing compounds. Contact dermatitis (inflammation of the skin) and other dermatological effects of nickel exposure have been reported in refinery workers and in the general population.

The majority of toxicological information concerning nickel exposure in humans is based on occupational exposures during mining and smelting operations. The lung is the target organ of nickel toxicity in these industries. Acute inhalation of nickel fumes may result in irritation of the mucous membranes and respiratory tract, with the potential for both delayed-onset pneumonitis and pulmonary edema.

Chronic exposure to nickel fumes may result in anosmia (loss of the sense of smell) and severe nasal injury (e.g., nasal perforation). Chronic ingestion and inhalation of nickel compounds may adversely affect the immune system, the kidneys, and the hematological (blood) and hematopoietic (blood forming) systems (USEPA, 1986).

Studies regarding the teratogenicity, fetotoxicity, or reproductive toxicity of nickel in humans are unavailable. However, nickel has been reported to cross the placental barrier (IRIS, 1992). Statistically significant effects on fetal development and birth rates have been observed following ingestion of nickel salts in pregnant experimental animals.

The association of occupational inhalation of nickel refinery dust with the development of lung and nasal cancers is well-documented (Magnus et al., 1984; Chovil et al., 1981; Enterline and Marsh, 1982). Experimental studies indicate that some nickel refinery dusts are carcinogenic when introduced via inhalation or intramuscular injection in rats (IRIS, 1992). The carcinogenic potency of nickel refinery dust has been attributed to constituent nickel subsulfide and other insoluble nickel salts. There are no data supporting the carcinogenicity of soluble nickel salts. Since nickel refinery dust is a mixture of several nickel compounds, the actual carcinogenic species remains to be determined. Nickel carbonyl is a suspected human carcinogen, although environmental exposures to this compound are considered unlikely due to its instability in air (the half-life for nickel carbonyl is approximately 100 seconds). The available data regarding the carcinogenicity of ingested nickel are inconclusive (USEPA, 1986; IRIS, 1992).

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Metallic silver (Ag) is a naturally occurring element with which people make jewelry, silverware, electronic equipment, and dental fillings. Silver may also occur in the environment in the salt form. The principle industrial use of silver is as silver halide in the manufacture of photographic plates. Silver nitrate is used for making indelible inks and for medicinal purposes, and a number of silver salts are used as germicides, antiseptic agents, or astringents. Silver compounds can be absorbed from the lungs when inhalation of silver dust occurs, or from the gastrointestinal tract when soluble silver compounds, such as silver acetate, are ingested. Silver compounds are absorbed poorly by the dermal route.

Silver compounds are relatively non-toxic. No case report was located regarding death in human exposure. The characteristic effect of chronic silver toxicity in humans is argyria, a condition involving silver impregnation and blue-gray discoloration of mucous membranes, skin, or eyes. Argyria produces no constitutional symptoms, but is irreversible (Browning et al., 1969; Luckey, et al., 1975).

Occupational exposure to dust containing relatively high levels of silver compounds may cause respiratory problems. Sneezing, stuffiness, running nose, burning eyes, or sore throat are common symptoms among workers chronically exposed to silver nitrate or silver oxide in the chemical manufacturing industry (Rosenman et al., 1979). In one case, an individual developed severe breathing problems shortly after working with molten silver (Forycki et al., 1983). Chronic bronchitis has also been reported to result from medicinal use of colloidal silver (Browning et al., 1969; Luckey et al., 1975), and abdominal pain has been reported among some workers exposed to silver compounds (Rosenman et al., 1979). Some occupational studies suggest that silver compounds may cause kidney problems (Rosenman et al., 1987), although the results are not conclusive.

Chronic animal studies offer supporting evidence that silver is relatively non-toxic. One study found that mice exposed to silver nitrate in drinking water (95 ppm) for 125 days were less active than mice in an unexposed control group (Rungby and Danscher, 1984). Another animal study found that long-term exposure to moderately high levels of silver nitrate or silver chloride in drinking water led to an enlargement of the heart (Olcott, 1950).

No direct studies were located regarding the developmental effects after exposure to silver or silver compounds. However, silver compounds have been shown to cross the placenta and enter the fetuses of rodents following an intraperitoneal injection of silver lactate to the mothers (Rungby and Danscher, 1983), and Robinkin et al. (1973) found elevated silver concentrations in the livers of a number of deformed human fetuses.

Silver is not mutagenic to bacteria (Demerec et al., 1951; Kanematsu et al., 1980; and Rossman and Molina, 1986), but it may be genotoxic. In in vitro studies, silver has been shown to bind with DNA and cause DNA strand breaks (Goff and Powers, 1975; Loeb et al., 1977; Robinson, et al., 1982; Scicchitano and Pegg, 1987).

No evidence of cancer has been reported in either animals or humans, despite the frequent use of silver as a pharmacological agent. The USEPA does not classify silver as a potential human carcinogen.

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Vanadium is a naturally occurring element that is widely distributed throughout the environment, although usually at very low concentrations. Elevated levels may be found in certain metal ores or in some crude petroleum deposits. The primary use of vanadium is as an alloy in steel, where it is particularly useful in the production of jet engine parts. Other uses include as a catalyst for the chemical industry, as a drying agent in paints and varnishes, as a corrosion inhibitor, in the production of photographic developers, and as a coloring agent for glass. Because of the ubiquitous nature of this element in the environment, vanadium is commonly found at low levels in most foods.

Experimental evidence suggests that soluble forms of vanadium such as vanadium chloride can be readily absorbed via inhalation, with near 100 percent absorption within the first few hours of exposure. Under most circumstances ingestion appears to be a minor uptake route. Studies in rats suggest that insoluble forms such as vanadium pentoxide are poorly absorbed, with less than 3 percent being absorbed after 3 days exposure (Conklin et al;., 1982). Absorption is higher in young animals, presumably because of increased intestinal permeability (Edel et al., 1984). Absorbed vanadium is distributed to adipose tissue, with some deposition occurring in the bone and teeth (Carson et al., 1986). As with most metals, vanadium exhibits very poor dermal absorption. Vanadium is excreted in the urine.

Vanadium is a relatively non-toxic chemical, and there are no reported cases of deaths in humans as a result of vanadium exposure. Animal studies have shown that most lethal responses require exposure to high doses. Inhalation of airborne concentrations of 60 mg/m^3 are required to cause death in rabbits, and the oral LD_{50} in rats is reported to be 41 mg/kg. The LD_{50} for intraperitoneal exposure is substantially less (0.11-0.13 mg/kg), but this exposure route is not relevant to human exposure (Chanh, 1965). Acute exposure to vanadium is reported to cause few target organ effects. The primary target is the respiratory system, and inhalation of dust containing vanadium pentoxide may produce moderate respiratory distress and mucosal irritation. The respiratory effects appear to be due to damage to the alveolar macrophages during clearance of dust particles from the alveoli (Castronova et al., 1984). Minor eye irritation may also occur as a result of exposure to vanadium dust.

Few adverse health effects have been reported for chronic exposure to vanadium. Animal studies have shown that vanadium may accumulate in the kidney, and that minor effects such as increased lipid peroxidation and decreased tubular resorption may occur as a result of chronic ingestion (Donaldson et al., 1985; Westenfelder et al., 1981). None of these effects have been seen among workers occupationally exposed to vanadium (Kiviluoto et al., 1981). Other chronic effects seen in animals include slight weight loss (Mountain et al., 1953) and a slight inhibition of immunologic function (Cohen et al., 1986). Schroeder and Balassa (1967) reported that chronic ingestion does not produce any histopathologic effects in rats.

Vanadium exposure has been reported to cause minor developmental effects in animals, but not man. Developmental effects include fetal hemorrhage, alterations in collagen metabolism in the lung, and minor skeletal anomalies (Paternain et al., 1987; Wide, 1984). Reproductive studies in rats indicate that vanadium has no negative effects on either fertility or reproduction (Domingo et al., 1986).

Vanadium has been reported to be potentially genotoxic in several in vitro studies, and reported effects include induction of gene mutation, unscheduled DNA synthesis and DNA strand breaks (Birnboim, 1988). There is no evidence to suggest that vanadium is carcinogenic in either animals or humans. The USEPA has classified vanadium as a class D compound, not classifiable as to human carcinogenicity.

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