



**FINAL
SITE INSPECTION REPORT**

**FORMER SCHILLING AIR FORCE BASE
SALINE COUNTY, KANSAS
FUDS PROJECT NO. B07KS025607**

CHEMICAL WARFARE MATERIEL SITE INSPECTIONS

prepared for:

**U.S. ARMY CORPS OF ENGINEERS, KANSAS CITY DISTRICT
and
U.S. ARMY ENGINEERING AND SUPPORT CENTER HUNTSVILLE**

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
ABP	agent breakdown product
AFB	Air Force Base
amsl	above mean sea level
ASR	Archives Search Report
bgs	below ground surface
CA	chemical agent
CAIS	chemical agent identification set(s)
CARA	CBRNE Analytical and Remediation Activity
CBRNE	Chemical, Biological, Radiological, Nuclear and High-Yield Explosives (Command)
CENWK	U.S. Army Corps of Engineers, Kansas City District
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	<i>Code of Federal Regulations</i>
CSEM	conceptual site exposure model
CSM	conceptual site model
CVAA	2-chlorovinyl arsenious acid
CVAO	2-chlorovinyl arsenious oxide
CWM	chemical warfare materiel
DERP	Defense Environmental Restoration Program
DGM	digital geophysical mapping
DoD	Department of Defense
DQO	data quality objective
ER	engineer regulation
FUDS	Formerly Used Defense Sites
GEOMET	GEOMET Technologies, LLC
GPS	global positioning system
H	mustard (blister agent)

LIST OF ACRONYMS (CONTINUED)

HRS	Hazard Ranking System
HTRW	hazardous, toxic, and radiological waste
INPR	Inventory Project Report
KDHE	Kansas Department of Health and Environment
L	Lewisite
MC	munitions constituent
MEC	munitions and explosives of concern
MMRP	Military Munitions Response Program
MRS	munitions response site
MRSPP	munitions response site prioritization protocol
NCP	National Contingency Plan
NDAI	No Department of Defense Action Indicated
NHA	National Heritage Areas
NHL	National Historic Landmarks
NRHD	National Register Historic District
NRHP	National Register of Historic Places
NRIS	National Register Information System
NWI	National Wetlands Inventory
OSE	One Stop Environmental, LLC
Parsons	Parsons Infrastructure and Technology Group
PRP	potentially responsible party
PSAP	Programmatic Sampling and Analysis Plan
PWP	Programmatic Work Plan
RAC	risk assessment code
RI/FS	Remedial Investigation and Feasibility Study
RTK	real-time kinematic
SAA	Salina Airport Authority
SI	site inspection

LIST OF ACRONYMS (CONTINUED)

SLRA/SLERA	Screening Level Risk Assessment and Screening Level Ecological Risk Assessment
SS-WP	Site-Specific Work Plan
T&E	threatened and endangered (species)
TPP	technical project planning
USACE	U.S. Army Corps of Engineers
USC	<i>United States Code</i>
USAESCH	U.S. Army Engineering and Support Center, Huntsville
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UXO	unexploded ordnance

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GLOSSARY

Archives Search Report (ASR)

A detailed investigation to report on past military munitions activities conducted on an installation. The principal purpose of the archives search is to assemble historical records and available field data, assess potential ordnance presence, and recommend follow-up actions at a DERP-FUDS. There are four general steps in an archives search: records search phase, site safety and health plan, site survey, and archives search report including risk assessment.

Chemical Agent

A chemical compound (to include experimental compounds) that through its chemical properties produces lethal or other damaging effects on human beings and is intended for use in military operations to kill, seriously injure, or incapacitate persons through its physiological effects. Excluded are research, development, testing, and evaluation (RDT&E) solutions; riot control agents; chemical defoliants and herbicides; smoke and other obscuration materials; flame and incendiary materials; and industrial chemicals. (32 CFR 179.3).

Chemical Warfare Materiel (CWM)

An item configured as a munition containing a chemical that is intended to kill, seriously injure, or incapacitate a person through its physiological effects. The term includes V- and G- series nerve agents or H-series (mustard) and L-series (Lewisite) blister agents in other-than-munition configurations; and certain industrial chemicals (e.g. hydrogen cyanide [AC], cyanogen chloride [CK], or carbonyl chloride [called phosgene or CG] configured as a military munition. Due to their hazards, prevalence, and military-unique application, some chemical agent identification sets (CAIS), such as the K941/K942 CAIS which contain neat agent and the K945 CAIS which contain nerve agent, are also considered CWM. CWM does not include: riot control devices; chemical defoliants and herbicides; industrial chemicals (e.g. AC, CK, or CG) not configured as a munition; smoke and other obscuration-producing items; flame and incendiary-producing items; or soil, water, debris, or other media contaminated with low concentrations of chemical agents where no CA hazards exist. (32 CFR 179.3)

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)

CERCLA authorizes federal action to respond to the release or threatened release of hazardous substances into the environment or a release or threat of release of a pollutant or contaminant into the environment that may present an imminent or substantial danger to public health or welfare. CERCLA was amended by the Superfund Amendments and Reauthorization Act (SARA) on October 17, 1986.

Defense Environmental Restoration Program (DERP)

Program that addresses hazardous substances, pollutants, contaminants, and, in some cases, military munitions remaining from past operations at military installations and formerly used defense sites. DERP was established by Section 211 of the Superfund Amendments and Reauthorization Act (SARA) of 1986. (10 USC 2702-2706 and USC 2810-2811)

Depot Area Air Monitoring System (DAAMS)

A portable air-sampling unit, designed to draw a controlled volume of air through a glass tube filled with a collection material. After a specified length of time and flow rate, the tube is removed and sent to a chemical laboratory for analysis (approximately 1 hour process time) to determine the presence, type, and quantity of agent collected in the samples. This technique will sample down to the WPL and provides low-level detection capability for GA, GB, HD, L, and VX.

Discarded Military Munitions (DMM)

Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include UXO, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental law and regulations. (10 USC 2710(e)(2))

Formerly Used Defense Sites (FUDS)

A facility or site (property) that was under the jurisdiction of the Secretary of Defense and owned by, leased to, or otherwise possessed by the United State at the time of actions leading to contamination by hazardous substances. By the DERP policy, the FUDS program is limited to those real properties that were transferred from DoD control prior to October 17, 1986. FUDS properties can be located within the 50 States, District of Columbia, Territories, Commonwealths, and possessions of the United States. (U.S. Army Engineer Regulation 200-3-1 FUDS Program Policy).

Headspace

Headspace is done using a closed, sealed container, where items suspected of being CWM related are placed for testing. The items are placed in the container and the container is either heated from an outside source or allowed to heat by solar conduction. The vapors inside the box are monitored through a sampling port for indications of chemical agent.

Military Munitions

All ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the DoD, Coast Guard, Department of Energy, and National Guard. The term includes confined gaseous, liquid, and solid propellants; explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives and chemical warfare agents; chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small-arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges; and devices and components of any item thereof. The term does not include

wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, and nuclear components, other than non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 USC 2011 et seq.) have been completed. (10 USC 101(e)(4))

Military Munitions Response Program (MMRP)

Formerly known as the OE Cleanup Program, which is part of the DERP, the MMRP is the program under which DoD carries out environmental restoration activities. The MMRP is a category under the DERP that requires Components to identify munitions response sites requiring action. (10 USC 2710)

Miniature Chemical Agent Monitoring System (MINICAMS)

An automatic air monitoring system that collects compounds on a solid sorbent trap, thermally desorbs them into a capillary gas chromatography column for separation, and detects the compounds with a Flame Photometric Detector or Halogen Specific Detector. It is a lightweight; portable, low-level detector designed to respond in less than fifteen minutes with alarm capability.

Munitions Constituents (MC)

Any materials originating from unexploded ordnance (UXO), discarded military munitions (DMM), or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions. (10 U.S.C. 2710(e)(3)).

Munitions Debris

Remnants of munitions (e.g., penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.

Munitions and Explosives of Concern (MEC)

Specific categories of military munitions that may pose unique explosives safety risks, such as UXO, as defined in 10 U.S.C. 101(e)(5); discarded military munitions (DMM), as defined in 10 U.S.C. 2710(e)(2); or munitions constituents (e.g., TNT, RDX), as defined in 10 U.S.C. 2710(e)(3), present in high enough concentrations to pose explosive hazard. (32 CFR 179.3).

Munitions Response

Response actions, including investigation, removal actions, and remedial actions, to address the explosive safety, human health, or environmental risks presented by UXO, DMM, or MC, or to support a determination that no removal or remedial action is required. (32 CFR 179.3)

Munitions Response Site

A discrete location within a munitions response area that is known to require a munitions response. (32 CFR 179.3)

Photo-Ionization Detector (PID)

A portable instrument used to detect, measure, and provide a direct reading of the concentration of a variety of trace gases based on the principle of photo-ionization. The process involves the absorption of ultraviolet light by a gas molecule leading to ionization.

Stakeholder

Federal, state, and local officials, community organizations, property owners, and others having a personal interest or involvement, or having a monetary or commercial involvement in the real property which is to undergo an OE response action.

Unexploded Ordnance (UXO)

Military munitions that (1) have been primed, fuzed, armed, or otherwise prepared for action; (2) have been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material; and (3) remain unexploded either by malfunction, design, or any other cause. (10 USC 101(e)(5))

EXECUTIVE SUMMARY

ES.1 The primary objective of the Military Munitions Response Program Site Inspection (SI) for the Formerly Used Defense Site, the former Schilling Air Force Base (AFB), is to determine whether a munitions response site (MRS) warrants further evaluation under the Comprehensive Environmental Response, Compensation and Liability Act beyond the SI stage. The recommendation for an MRS could include further evaluation as part of a remedial investigation and feasibility study, a removal action (time-critical removal action or non-time-critical removal action), or no Department of Defense action indicated. The focus of this SI is the Gas Instruction Area MRS. This MRS includes a former gas instruction building and decontamination area.

ES.2 The U.S. Government constructed the Smoky Hill Army Air Base in 1942; it was renamed the Smoky Hill AFB in 1946 and renamed Schilling AFB in 1957. The former Schilling AFB consisted of 4,134.72 acres approximately 2 miles southwest of Salina, Kansas. During World War II, Schilling AFB supported the training of pilots for bombing missions. The base was deactivated in 1949 and reactivated in 1951 to support the Korean conflict. At that time, Schilling AFB was the second-largest base in the Strategic Air Command and had the mission of flying nuclear strike attacks with rapid deployment capability. In 1961, the facility became the support base for the 550th Strategic Missile Squadron for the Atlas F intercontinental ballistic missile and Nike missiles. During its operational existence, Schilling AFB housed numerous special weapons and conventional ordnance igloos, a gas instruction building, gas chambers, skeet ranges, an aircraft target butt, an aircraft burning/training area, and a missile maintenance building. The base was permanently closed in 1967 and the U.S. General Services Administration conveyed the majority of the base to the City of Salina for use as a municipal airport.

ES.3 The investigation of the Schilling AFB was performed to evaluate the evidence for the presence of chemical warfare materiel (CWM), chemical agent identification sets (CAIS), chemical agents, and agent breakdown products within this site. To accomplish this objective, digital geophysical mapping and munitions constituent sampling were performed in June 2010.

ES.4 The SI technical approach was established at the October 20, 2009, technical project planning (TPP) meeting by the Project Delivery Team and other stakeholders. The team concurred with the technical approach presented in the Final TPP Memorandum issued on December 15, 2009, which was subsequently documented in the Site-Specific Work Plan.

ES.5 The SI included performing approximately 6.42 acres of digital geophysical mapping and collecting 20 soil samples (plus two duplicates). Soil sample were collected in the most biased location to determine the presence of CA/ABPs. Ten soil samples were collected within a grid-based pattern positioned over the location of the former Gas Instruction building. Ten additional samples were placed within the vicinity of the Gas

Instruction Area MRS. Samples were collected from 12 to 16 inches below the ground surface. All samples collected at the former Schilling AFB were analyzed for chemical agents and agent breakdown products—mustard, mustard breakdown products (1,4-dithiane and 1,4-thioxane), and Lewisite (inclusive of 2-chlorovinyl arsenious acid and 2-chlorovinyl arsenious oxide).

ES.6 The analytical results of the samples were evaluated to determine if there is an observed release of munitions constituents (MC) in the surface soil. The results of the MC evaluation show that there were no releases of CA/ABP to the Gas Instruction Area MRS. These results exhibit no potential for unacceptable risks to human health and the environment resulting from exposure to munitions constituents in soil within this investigation area.

ES.7 Nineteen anomalies were identified during the geophysical survey (Figure ES.1). Nine of these were consistent with the expected size and shape expected for a single, buried CAIS steel shipping container. The remaining ten anomalies were much larger than that expected for a single CAIS container but could be indicative of a burial pit containing multiple CAIS containers or CAIS buried with other debris. The anomalies were not intrusively investigated as part of this SI, and no MD were observed on the ground surface during field activities.

ES.8 A large, high-anomaly-density area on the southern end of the geophysical survey area extends to the location of the former radio transmitter building. The former radio transmitter building was demolished in April 2010. Although the former radio transmitter building was removed, the project geophysicist noted debris (e.g., rebar) on the ground surface on the southern end of the geophysical survey area. It is assumed that buried debris is the cause of the large anomalous area. No targets were selected from these anomalies.

ES.9 Two varieties of CAIS potentially existed at the former Schilling AFB—that of the K951/K952 which is currently classified as HTRW, and that of the K941 variety, which is classified as CWM due to the presence of neat mustard agent. If K941 CAIS exist onsite, a MEC hazard potentially exists since CWM is a subset of MEC. Given the current activities at the site, ***an immediate removal action is not warranted at this time.***

ES.10 CAIS are not confirmed but possible based on DGM results, resulting in an ***RI/FS recommendation for the MRS.***

ES.11 In addition to the recommendation for an RI/FS (Table ES.1), an adjustment to the MRS boundary is also recommended. Based on the ASR results and the CWM SI field results, it is recommended that the boundary for the MRS, currently identified as 137.8 acres, be reduced to 8.8 acres as shown on Figure ES.2.

**Table ES.1
 Recommendation Summary
 Gas Instruction Area MRS
 former Schilling AFB, Saline County, Kansas**

Munitions Response Site / Area of Interest	Acreage	CAIS	Munitions and Explosives of Concern and/or Munitions Debris Assessment ⁽²⁾	Munitions Constituent Assessment ⁽³⁾	Recommendation
Gas Instruction Area MRS	8.8	Possible ⁽¹⁾	No	No	RI/FS

- 1) – CAIS are not confirmed but possible based on DGM results, resulting in an RI/FS recommendation for the MRS.
- 2) - "Yes" in this column indicates confirmed MEC or MD presence indicative of potential MEC presence.
- 3) - "Yes" in this column indicates confirmed MC presence at levels indicating a potential elevated risk to human health.

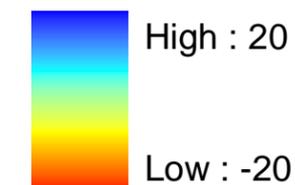
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Figure ES.1

Geophysical Investigation Results
 Schilling Air Force Base
 FUDS Project # B07KS0256
 Salina, Kansas

Legend

G858 - Response (nT)



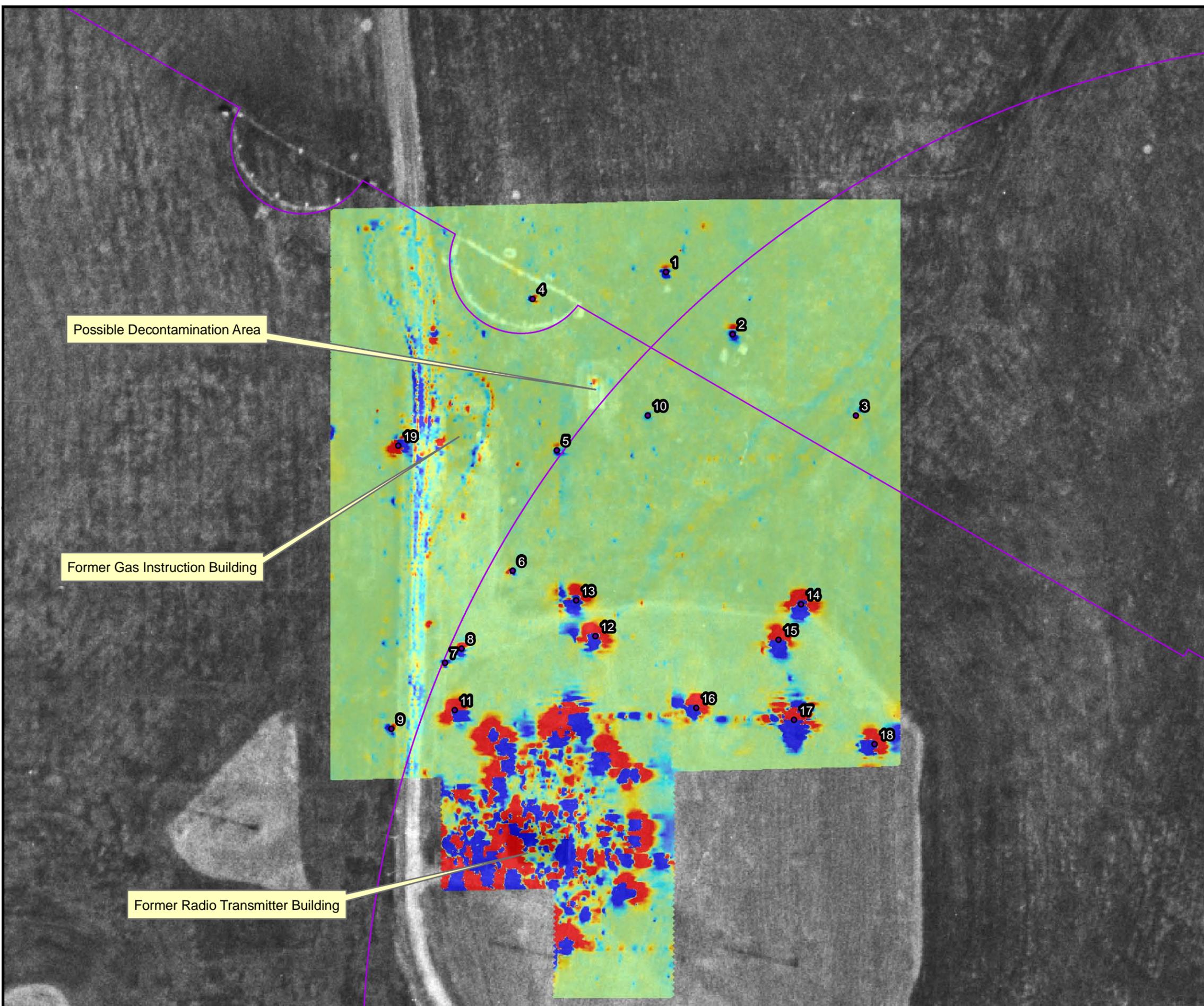
Skeet Range Boundaries

Selected Anomaly Location

Note:
 Locations 1 - 10 are possible CAIS shipping container
 Locations 11 - 19 are possible burial pits



Image Source: 1954 Aerial
 Projection: NAD 83 UTM Zone 14N



PARSONS

U.S. ARMY ENGINEERING
 & SUPPORT CENTER
 HUNTSVILLE, ALABAMA

DESIGNED BY: CR	Schilling Air Force Base	
DRAWN BY: CAtB		
CHECKED BY: JC	SCALE: As Shown	PROJECT NUMBER: 745080
SUBMITTED BY: CAtB	DATE: September 2010	PAGE NUMBER:
	FILE: S:\ES\Shared\CWM SI Program\Schilling\GIS	

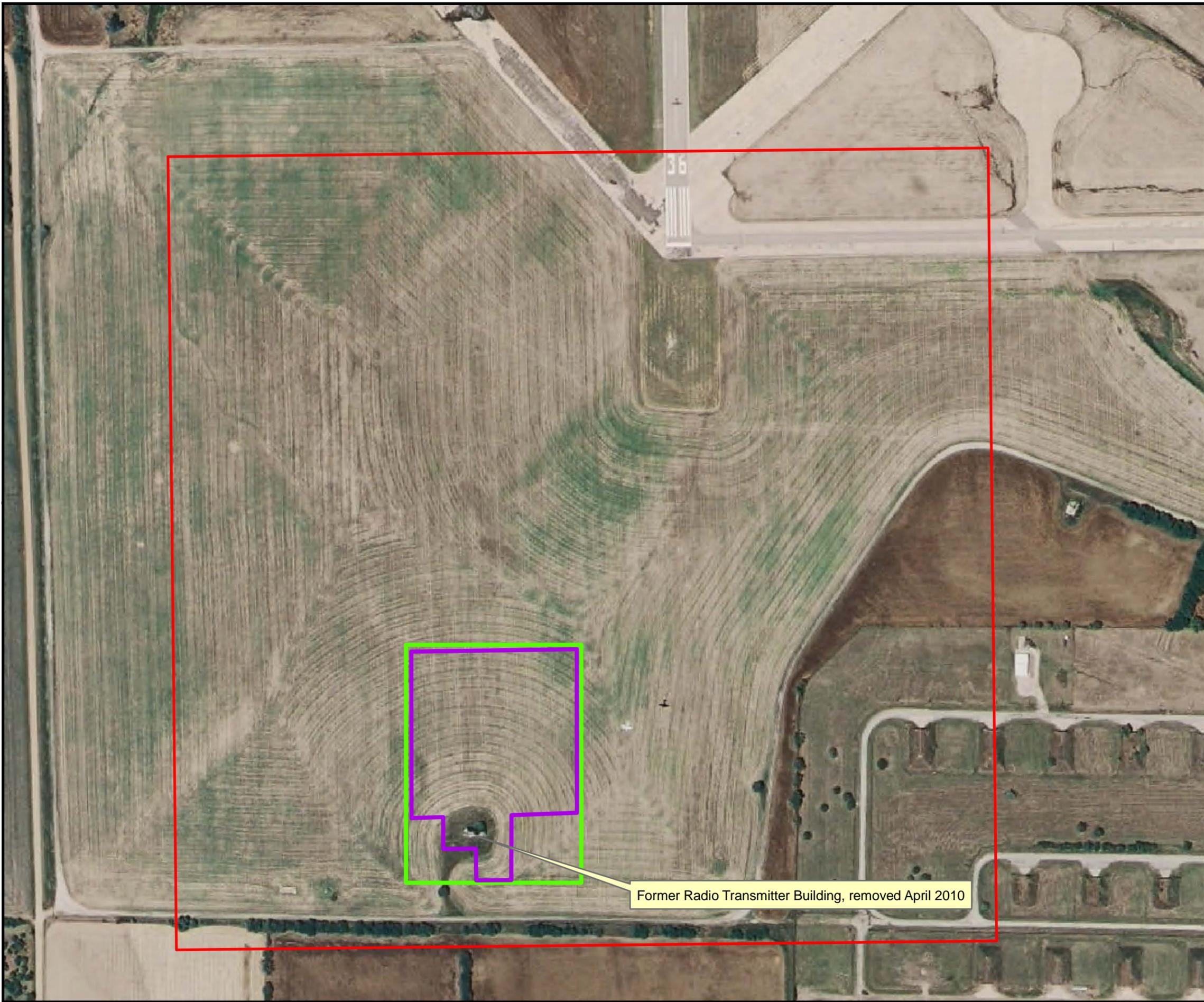


Figure ES.2

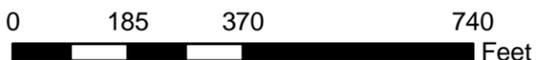
Recommended MRS Boundary
 Schilling Air Force Base
 FUDS Project # B07KS0256
 Salina, Kansas

Legend

- GEO Investigation Area
- Recommended MRS Boundary (8.8 acres)
- Gas Instruction Area MRS (137.8 acres)



Image Source: 2006 Aerial
 Projection: NAD 83 UTM Zone 14N



PARSONS		U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA	
DESIGNED BY: CR	Schilling Air Force Base		
DRAWN BY: CatB			
CHECKED BY: JC	SCALE: As Shown	PROJECT NUMBER: 745080	
SUBMITTED BY: CatB	DATE: December 2010	PAGE NUMBER:	
	FILE: S:\ES\shared\CWM SI Program Schilling\GIS		

SECTION 1

INTRODUCTION

1.1 PROJECT AUTHORIZATION

1.1.1 Parsons Infrastructure and Technology Group (Parsons) received Contract No. W912DY-04-D-0005, Task Order No. 11, from the U.S. Army Engineering and Support Center, Huntsville (USAESCH) to perform a Site Inspection (SI) at the former Schilling Air Force Base (AFB), approximately 2 miles southwest of Salina, Kansas, with the center approximately at latitude N38° 46' 42" longitude W97° 39' 50". The location of the former Schilling AFB is presented on Figure 1.1.

1.1.2 The Department of Defense (DoD) has established the Military Munitions Response Program (MMRP) to address DoD sites suspected of containing munitions and explosives of concern (MEC) or munitions constituents (MC). The MMRP also includes assessment of Chemical Warfare Materiel (CWM) and Chemical Agent (CA) at sites, such as the former Schilling AFB. CWM is considered a subset of MEC, and CA is a subset of MC; however, due to monitoring and analytical requirements, CWM and CA are frequently discussed separately throughout this document. Under the MMRP, the USACE is conducting environmental response activities at formerly used defense sites (FUDS) for the Army, the DoD's executive agent for the FUDS program.

1.1.3 Pursuant to the Engineer Regulation (ER) 200-3-1 (U.S. Army Corps of Engineers [USACE], May 10, 2004) and the *Management Guidance for the Defense Environmental Restoration Program* (DERP) (Office of the Deputy Under Secretary of Defense [Installations and Environment], September 2001), USACE is conducting FUDS response activities in accordance with the DERP statute (10 *United States Code* [USC] 2701 *et seq.*), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 USC §9620 *et seq.*), Executive Orders 12580 and 13016, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 *Code of Federal Regulations* [CFR] Part 300). Therefore, USACE is conducting SIs, as set forth in the NCP, to evaluate hazardous substance releases or threatened releases from eligible FUDS.

1.1.4 While not all MEC or MC constitute CERCLA hazardous substances, pollutants, or contaminants, the DERP statute provides the DoD with the authority to respond to releases of MEC/MC. DoD policy states that such responses shall be conducted in accordance with CERCLA and the NCP.

1.2 PROJECT OBJECTIVE

The primary objective of the MMRP SI is to determine whether a FUDS project warrants further response action under CERCLA relevant to MEC, CWM, MC, and CA.

The SI collects the information necessary to make this determination, as well as it 1) determines the potential need for a TCRA or removal action; 2) collects or develops additional data, as appropriate, for Hazard Ranking System (HRS) scoring by the U.S. Environmental Protection Agency (USEPA); and 3) collects data, as appropriate, to recommend NDAI, removal action, remedial investigation and feasibility study (RI/FS) or initiation of a potentially responsible party (PRP) project. An additional objective of the MMRP SI is to collect the additional data necessary to complete the Munitions Response Site Prioritization Protocol (MRSPP).

1.3 PROJECT SCOPE

1.3.1 The primary project planning documents used to perform the SI include the Site-Specific Work Plan (SS-WP) for the former Schilling AFB (Parsons, 2010), the Programmatic Work Plan (PWP), Chemical Warfare Materiel Site Inspections (Parsons, 2006), and the Technical Project Planning (TPP) Memorandum (Parsons, 2009) and Associated Documentation. The performance work statement for this project is found in Appendix A.

1.3.2 The USACE Kansas City District (CENWK) facilitated a TPP meeting on October 20, 2009, that included representatives of the USACE Huntsville and Kansas City Districts, Kansas Department of Health and Environment (KDHE), Salina Airport Authority (SAA), One-Stop Environmental, LLC (OSE), GEOMET Technologies, LLC (GEOMET), and Parsons. An initial technical approach was developed using the collaborative experience of Parsons and USACE technical experts with available site information, including the 1991 Inventory Project Report (INPR), 2003 Archives Search Report (ASR), and other pertinent documents. The TPP Team discussed and refined the initial technical approach during the course of the TPP meeting, yielding a final technical approach for implementation at the former Schilling AFB.

1.3.3 This report summarizes the work performed during the CWM SI. The SI is limited to CAIS contamination issues and considers related CWM and hazardous, toxic, and radiological waste (HTRW) concerns directed from the TPP Team. Per ER 200-3-1 guidance for conducting an SI, “The SI is not intended as a full-scale study of the nature and extent of contamination or explosive hazards” and requires the collection of a sufficient and appropriate amount of information.

CHAPTER 2

PROPERTY DESCRIPTION AND HISTORY

2.1 SITE DESCRIPTION

When closed in 1967, the former Schilling AFB was conveyed to the city of Salina for use as a municipal airport. The airport has continued operation as a municipal airport to the present. Property in the southern and eastern portions of the former site were adapted to agricultural uses, while those areas in the eastern portion of the former site transitioned to residential or industrial uses. The boundaries of the former Schilling AFB are presented on Figure 2.1.

2.2 SITE LOCATION AND SETTING

2.2.1 Topography

The majority of the Schilling AFB area is largely flat to gently rolling. The elevation at the site ranges from approximately 1,200 feet to 1,320 feet above mean sea level (amsl) (USACE, 2009).

2.2.2 Geology and Soils

2.2.2.1 The former Schilling AFB is in the Smoky Hills physiographic province. The Permian Wellington Formation bedrock underlies the alluvium at an approximate depth of 40 feet to 50 feet below ground surface (bgs). The Wellington Formation consists of shale with minor amounts of limestone, dolomite, siltstone, gypsum, and anhydrite.

2.2.2.2 Surface sediment along the site consists of a silty loam. The Crete silt loam is generally nearly level (0 percent to 2 percent slopes). Silty loam is moderately well drained, resulting in slow surface runoff and a high capacity of available water (USACE, 2009).

2.2.3 Climate

Warm periods during the summer months and cold winters are common in the former Schilling AFB area. The normal daily minimum temperature ranges from 19 degrees Fahrenheit (°F) in January to 69°F in July. The normal daily maximum temperature ranges from 39°F in January to 93°F in July (City-Data.com). Rainfall is heaviest in late spring, with average monthly rainfalls of approximately four inches during the season. On average, approximately 32 inches of rain falls annually.

2.2.4 Demographics and Surrounding Land Use

2.2.4.1 The former Schilling AFB is within Saline County, Kansas. According to the United States Census Bureau, the county has a total area of 719.61 square miles (mi²). The population for Saline County in 2000 was 53,597 persons, with 21,436 occupied housing units, for an average 2.5 people per household. The population density in 2000 was 74.5 persons/mi². The Census Bureau's 2009 population estimate for the county was 54,364, representing a population increase of approximately 1.4% since April 1, 2000 (U.S. Census Bureau, 2009). Table 2.1 presents the population data from the immediate vicinity of the former Schilling AFB.

TABLE 2.1
APPROXIMATE POPULATION INFORMATION IN THE VICINITY OF THE
FORMER SCHILLING AIR FORCE BASE
GAS INSTRUCTION AREA MRS
FORMER SCHILLING AFB, SALINE COUNTY, KANSAS

On Site	0 to 0.25 mile	0.25 to 0.5 mile	0.5 to 1 mile	1 to 2 miles	2 to 3 miles	3 to 4 miles	Total
2,333	321	3,180	7,583	18,937	9,697	4,647	46,698

Source: U.S. Census 2000 data.

2.2.4.2 The land surrounding the FUDS property consists of commercial, residential, and agricultural areas. The population within the FUDS-eligible property boundary is determined using a conservative approach to calculate the population of an area by including the total number of people for any census block that falls within or overlaps the FUDS-eligible property boundary.

2.2.5 Current and Future Land Use

The central and western portions of the former Schilling AFB are occupied by the Salina Municipal Airport. The gas instruction area is used for farming, alternating sorghum and wheat crops. The projected land use of the gas instruction area is not anticipated to change and will likely remain as farmland.

2.3 SITE OWNERSHIP AND HISTORY

2.3.1 The U.S. Government constructed the Smoky Hill Army Air Base in 1942; it was renamed the Smoky Hill AFB in 1946 and renamed Schilling AFB in 1957. The former Schilling AFB consisted of 4,134.72 acres approximately 2 miles southwest of Salina, Kansas. During World War II, Schilling AFB supported the training of pilots for bombing missions.

2.3.2 The base was deactivated in 1949 and reactivated in 1951 to support the Korean conflict. At that time, Schilling AFB was the second largest base in the Strategic Air Command and had the mission of flying nuclear strike attacks with rapid deployment capability. In 1961, the facility became the support base for the 550th Strategic Missile Squadron for the Atlas F intercontinental ballistic missile and Nike missiles. During its operational existence, Schilling AFB housed numerous special weapons and conventional

ordnance igloos, a gas instruction building, gas chambers, skeet ranges, an aircraft target butt, an aircraft burning/training area, and a missile maintenance building. The base was permanently closed in 1967, and the U.S. General Services Administration conveyed the majority of the base to the City of Salina for use as a municipal airport. The City of Salina is not considered a PRP and the project is not identified as a PRP site.

2.4 SITE OPERATIONS AND WASTE CHARACTERISTICS

2.4.1 MRS-Specific Descriptions and Areas of Interest

2.4.1.1 Gas Instruction Area MRS

The Gas Instruction Area munitions response site (MRS) is a 5-acre site in the southwestern portion of the former Schilling AFB within the fence line of the Salina Municipal Airport. The Gas Instruction Area MRS incorporates the former locations of the gas instruction building and the decontamination area. Historic records indicate that an approximately 100-square-yard area was used for decontamination exercises involving liquid mustard on both the ground and a building. These records indicate that it is presumed that the building was the gas instruction building itself, since the only other building in the area was a radio transmission building that was not erected until five years after this directive was issued. The gas instruction building no longer exists (USACE, 2003), while the radio transmission building remained standing during the TPP site visit (USACE, 2009) and was demolished in April 2010. Figure 2.2 presents an aerial photograph taken in 1954 showing the location of the radio transmission building, gas instruction building, and areas cleared of vegetation that may be the areas used for decontamination exercises.

2.4.2 CWM and MEC Hazards

2.4.2.1 CWM and MEC are safety hazards and as such may constitute an imminent and substantial endangerment to the public, site personnel, and the environment. Prior to the SI, there were no records of unexploded ordnance (UXO) or CWM being found at the former Schilling AFB. Historical data suggests that no MEC were used at the Gas Instruction Area MRS (USACE, 2003).

2.4.2.2 The 2003 ASR noted that documentation existed showing that chemical agent identification sets (CAIS) were onsite, but final disposition was not noted. Given the timeframe of this training and experience from investigations at other training areas, some of the CAIS are thought to be K951/952, also known as M1 Detonating Gas Identification Sets. The CAIS contained glass ampoules used by the troops to hold exercises in noting the physical properties of chemical agents, including dispersion patterns, and odors. Each CAIS stored at this site would have contained four each of the following ampoules:

- Lewisite – 2 ml (5%) in 38 ml chloroform
- Mustard – 2 ml (5%) in 38 ml chloroform
- Chloropicrin – 10 ml (50%) in 10 ml chloroform
- Phosgene gas – 40 ml

2.4.2.3 In addition to the CAIS, the 2003 ASR also indicated that live liquid mustard may have been spread over an approximately 100-square-yard section of land for decontamination training. If used, the source of the neat agent is most likely from K941, which contained 4-ounce bottles of neat mustard agent. Since K941 contains neat agent, it falls within the category of CWM.

2.4.3 Regulatory Compliance

The USACE conducted the SI at the former Schilling AFB as part of FUDS response activities pursuant to and in accordance with the guidance, regulations, and legislation listed in Chapter 1.

2.5 PREVIOUS INVESTIGATIONS AND STUDIES

This section provides information on previous investigations conducted by USACE concerning MEC and CWM associated with the former Schilling AFB.

2.5.1 Inventory Project Report, 1991

An INPR was prepared in July 1991 by the USACE. The INPR only addressed the use and/or storage of small arms, flare, signals, simulators, and screening smoke (other than white phosphorus) contamination remaining at the site from the previous military use.

2.5.2 Archives Search Report, 2003

2.5.2.1 An ASR completed by USACE in May 2003 included a site visit to the former Schilling AFB on October 23 and 24, 2002, to evaluate site conditions in preparation of an ASR. The ASR noted that documents show that CAIS were on site, but final disposition was not noted. The ASR also indicated that live liquid mustard may have been spread over an approximately 100-square-yard section of land for decontamination training. The location of the possible mustard ground decontamination training area is unknown. The gas instruction building was also presumably used for decontamination practice. The site visit team noted that only the former radio transmitter building remained standing, while the gas instruction building (not the gas chamber building) – which once stood 100 yards to the north – no longer existed.

2.5.2.2 The ASR separated the former training areas at Schilling AFB into different areas. Area C was the designation for the area which contained the Gas Instruction Building, West Skeet Range, and South Skeet Range. The ASR designated a risk assessment code (RAC) of 1 for Area C (recommending further action as appropriate), based on the historical documentation of the presence of CAIS and decontamination exercises.

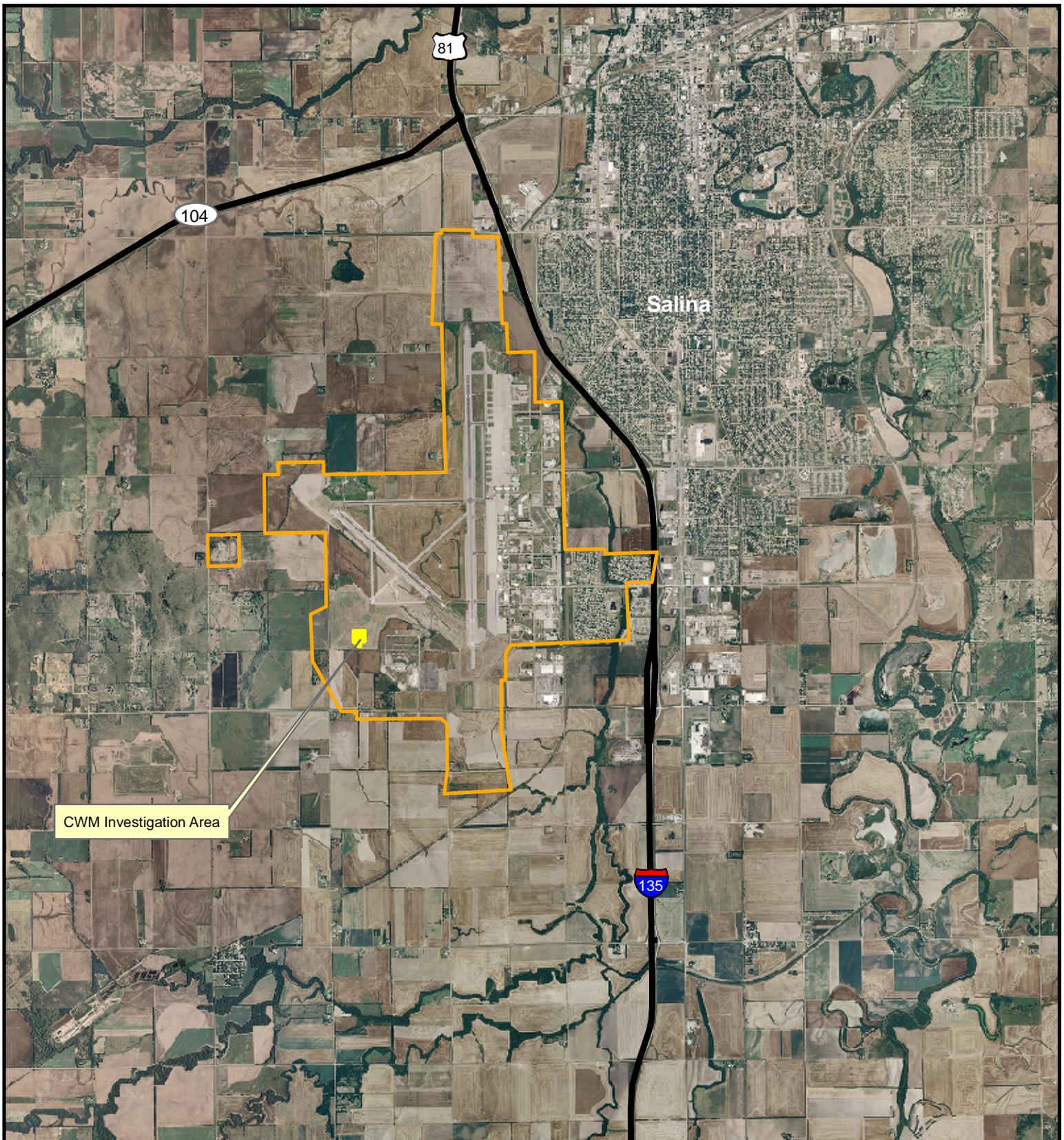
2.5.3 Archives Search Report Supplement, 2004

An ASR Supplement was prepared in November 2004. The ASR Supplement renamed Area C as Range Complex No. 1 and included sub-ranges: Gas Instruction Area, Skeet Range No. 3, and Skeet Range No. 1 (USACE, 2004).

2.5.4 Conventional MEC Site Inspection Report, 2008

The SI was conducted in December 2008 and addressed MEC contamination at the skeet ranges as well as other areas within the former Schilling AFB. Based on the results of the SI, a recommendation of no Department of Defense action indicated (NDAI) was made for these areas of the site (USACE, 2009).

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Legend

-  FUDS Property Boundary
-  CWM Investigation Area

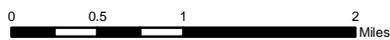


Image Source: 2006 Aerial
Projection: NAD 83 UTM Zone 14N



Figure 2.1

Site Setting
Schilling Air Force Base
FUDS Project # B07KS0256
Salina, Kansas

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Figure 2.2

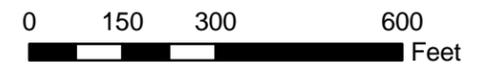
Gas Instruction Area MRS
 Schilling Air Force Base
 FUDS Project # B07KS0256
 Salina, Kansas

Legend

 Gas Instruction Area MRS



Image Source: 1954 Aerial
 Projection: NAD 83 UTM Zone 14N



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CHAPTER 3 SITE INSPECTION TASKS

3.1 HISTORICAL RECORD REVIEW

The existing body of information pertinent to the former Schilling AFB and available at that time was thoroughly reviewed in advance of the TPP meetings conducted on October 20, 2009, and summarized to the TPP Team as part of the development and concurrence of the selected Technical Approach for the site. Digital geophysical mapping (DGM) and sampling locations, as presented in the Site-Specific Work Plan (SS-WP) Addendum, were the direct result of this preliminary review process.

3.2 TECHNICAL PROJECT PLANNING SUMMARY

The former Schilling AFB falls under the purview of CENWK. A TPP meeting was held at the Salina Airport Terminal conference hall, in Salina, Kansas on October 20, 2009. This meeting was attended by members from the USACE Huntsville and Kansas City Districts, KDHE, Salina Airport Authority, One-Stop Environmental, LLC, GEOMET, and Parsons. The TPP meetings were held in accordance with Engineering Manual 200-1-2 (USACE, 1998). The TPP Team reviewed the preliminary CSM and identified DQO's including media to be sampled (soil) and health based environmental screening values. The DQO's were met during the field activities performed at former Schilling AFB. The TPP Team concurred with the Technical Approach presented in the Final TPP Memorandum (see Appendix B) issued on December 15, 2009 (Parsons, 2009). Key TPP facts and decisions (and any changes that occurred after the TPP meetings), are presented as they appeared in the Final SS-WP Addendum (Parsons, 2010), and are summarized below in italics:

- *The TPP Team concurred with the Technical Approach as presented/ revised at the TPP meeting on October 20, 2009 inclusive of number, type, and location of samples, as well as sampling methodology and laboratory analyses. The team agreed that 10 soil samples will be collected from pre-determined locations, plus 10 discretionary locations to be identified by the sampling team. Soil sampling will be conducted to assess the presence of CA/ABPs resulting from historic training and decontamination activities.*
- *The TPP Team agreed that soil samples would be collected from 12 to 18-inches below ground surface (bgs) since the typical till depth in this area is no deeper than 12-inches.*
- *The TPP Team agreed that DGM would be conducted to identify potential subsurface CAIS burial/disposal.*

- *The team agreed to wait until June to begin field work to accommodate the harvest of the winter wheat. The SAA team agreed to work with the farmer to communicate specific harvesting times to the team.*
- *The team agreed that, if—during field activities—an item (e.g., CAIS vial) is found, the Salina Airport Authority will be notified, but assessment and removal of the item will not be conducted under the CWM SI program.*

3.3 NONMEASUREMENT DATA COLLECTION

3.3.1 The following sources were consulted for identifying environmental and cultural resources at the former Schilling AFB:

- Topographic Map – U.S. Geological Survey (USGS)
- Wetlands Online Mapper – National Wetlands Inventory (NWI), United States Federal Wildlife Service (USFWS)
- Threatened and Endangered Species System– Endangered Species Program, USFWS
- National Wildlife Refuge System – USFWS
- Kansas Department of Wildlife and Parks – Saline County
- National Park Service
- U.S. Department of Agriculture - National Forest Service
- Kansas State Parks System
- National Resource Conservation Service – Saline County
- National Register of Historic Places (NRHP) – Saline County
- National Historic Landmarks (NHL) – National Historic Landmarks Program (Saline County, Kansas)
- National Heritage Areas (NHA) – National Heritage Areas Program (Kansas)
- May 2003 ASR Conclusions and Recommendations Schilling AFB
- August 2009 Draft Final Site Inspection Report, Schilling AFB

3.3.2 According to the NHL, NHA, and NRHP federal website databases and the Kansas SHPO databases for Saline County, there are no known archaeological or cultural areas located within the Chemical Demonstration MRS at the former Schilling AFB. Cultural issues were not addressed in the ASR. Archaeological and cultural resources were not observed during the 2010 SI field effort.

3.4 SITE-SPECIFIC WORK PLAN

3.4.1 The Final SS-WP Addendum (Parsons, 2010) serves to augment the Programmatic Work Plan (PWP) (Parsons, 2006), the PSAP (USACE, 2005), and the PSAP Addendum (Appendix C of the PWP) and, as warranted, by presenting pertinent site-specific information and procedural adjustments that could not be readily captured in the programmatic documents. The SS-WP Addendum also reflects TPP Team agreements that required modification of the preliminary SI Technical Approach.

3.4.2 The PWP, PSAP, and PSAP Addendum are intended to be umbrella documents that set overall programmatic objectives and approaches, whereas the SS-WP Addendum provides site-specific details and action plans. The PWP, PSAP, PSAP Addendum and SS-WP Addendum accompanied the team during SI field activities.

3.4.3 The SS-WP includes a project description, Technical Management Plan, Field Investigation Plan, Environmental Protection Plan, Health and Safety Plan (Site-Specific Addendum to the Accident Prevention Plan), Sample Analysis Plan, and Air Monitoring and Sample Analysis plans – all of which are specific to the SI at the former Schilling AFB. The Field Investigation Plan developed an area-specific technical approach to guide geophysical surveys and sample collection to ensure that the results were sufficient to determine whether additional investigations or implementation of a remedy are necessary for the MRS located within the former Schilling AFB. Key elements of the Technical Approach include the conceptual site model (CSM) to help determine types of samples and their locations and Data Quality Objectives (DQOs) to help ensure that the data acquired is sufficient to characterize MC.

3.4.4 The Site-Specific Sampling and Analysis Plan and discusses the specific scope and objectives of the sampling event at the former Schilling AFB; analytical methods and screening levels specific to the matrix and types of analyses; procedures for sample acquisition from locations biased toward the highest potential for MC contamination; sample documentation; and sample packaging and shipment to GEOMET for chemical agent sample analyses.

3.4.5 An Air Monitoring Plan and Sampling Plan for chemical agent samples and specific to CARA's internal operating procedures was included as an appendix to the SS-WP. The Air Monitoring Plan discussed the procedures for setting up the air monitoring equipment during intrusive operations as well as the chemicals of concern. The sample analysis plan discussed CARA's procedures for analyzing the different media for chemical agents and their breakdown products.

3.5 DEPARTURES FROM PLANNING DOCUMENTS

During the SI field investigation, several departures from the SS-WP Addendum occurred; none of which are believed to have any impact on the recommendations. These departures include the following:

- During the DGM task, officials from the SAA requested no broadcasting of any type of radio signal should take place on airport property during operational hours. This affected the team's use of the RTK GPS to establish grid corners, and a non-RTK GPS was used to locate the southwest corner of the survey area. To ensure that the intended survey area was covered, the field crew added 20 feet to the length of each side of the proposed grid to account for possible offsets due to the use of the non-RTK GPS, resulting in a 500' by 500' survey area. The four corners of the revised survey area were later located using RTK GPS during off hours at the airport.
- Additionally, three 100' by 100' grids were added to the south side of the survey area at the USACE's request to further resolve a large anomaly that extended to the south of the original survey area. Following the additions, the

area surveyed included 6.42 acres rather than the 5 acres proposed in the SS-WP Addendum. The proposed and actual GEO survey areas are presented in Figure 3.1.

- On June 15, 2010 the technical escort reported that their initial MINICAMS calibration had failed, and operations could not proceed. USAESCH was notified and it was determined that operations could continue once MINICAMS re-calibrated properly. The work plan indicates a recalibration lasting 4 days. The following day calibrations were met (Appendix D) and field operations resumed.



Figure 3.1

Geophysical Investigation Area
 Schilling Air Force Base
 FUDS Project # B07KS0256
 Salina, Kansas

Legend

- Proposed DGM Investigation Area
- Actual DGM Investigation Area



Image Source: 1954 Aerial
 Projection: NAD 83 UTM Zone 14N



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CHAPTER 4

CAIS/MEC/MC FINDINGS

4.1 GENERAL INFORMATION

Based on historical records a review, previous studies, and no evidence of munitions debris or MEC being previously found at the Gas Instruction Area MRS, the TPP Team determined that there was no potential risk for MEC at this site. Furthermore, the Project Delivery Team agreed that an intrusive investigation of anomalies would not be conducted to determine the source of the anomalies. Sampling activities were conducted to determine the presence of MC (CA/ABPs) at the site. This chapter details the overall DQOs for the former Schilling AFB.

4.1.1 Data Quality Objectives

4.1.1.1 Introduction

4.1.1.1.1 DQOs are qualitative and quantitative statements that clarify study objectives and specify the type and quality of the data necessary to support decisions. The development of DQOs for a specific site or MRS takes into account factors that determine whether the quality and quantity of data are adequate for project needs, such as data collection, uses, types, and needs. While developing these DQOs in accordance with the process presented in Chapter 3, paragraph 3.1.3 of the PWP (Parsons, 2006), Parsons followed the *Guidance on Systematic Planning Using the Data Quality Objectives Process*, EPA QA/G-4, EPA/240/B-06/001 (USEPA, 2006).

4.1.1.1.2 The goal of the TPP process is to achieve stakeholder, USACE, and applicable state and federal regulatory concurrence with the DQOs for a given site. The TPP Team approved the former Schilling AFB DQOs at the TPP meeting on October 20, 2009.

4.1.1.1.3 As stated in Chapter 1 of this SI Report, data must be sufficient to do the following: 1) characterize sites in accordance with ER 200-3-1 SI requirements; 2) enable HRS scoring by USEPA, if they choose to do so; 3) determine whether individual project sites warrant further response action (e.g., RI/FS, TCRA, or NTCRA); and 4) complete the (MRSPP) for designated MRSs.

4.1.1.2 Digital Geophysical Mapping DQO

The DGM DQO *was achieved* by collecting geophysical data at the MRS in accordance with the TPP Team agreements. The DGM was conducted over the area prescribed by the SS-WP on June 6 through June 10, 2010. Although only 5-acres were prescribed by the SS-WP, the team collected 6.42 acres following the extension of the survey area due to the team's inability to use an RTK GPS to locate the grid corners and

the addition of three grids to the south of the original survey area at the request of the USACE. No surface MD were noted during the DGM investigation.

4.1.2.3 Environmental Sampling DQO

4.1.2.3.1 The Environmental Sampling DQO *was achieved* by evaluating potential presence of MC at specific locations within the MRS. The TPP Team agreed that samples would be collected at 10 prescribed locations (based on a grid-pattern placed at the site) and also at ten discretionary locations determined by the field team. The field team placed discretionary samples at four locations where the DGM team identified anomalies consistent with that expected from a CAIS shipping container, and at six locations where subsurface anomalies were discovered using a Schonstedt magnetic locator. All sample locations were offset from the anomalies in an effort to practice anomaly avoidance. All samples were headspaced onsite for mustard (H) and Lewisite (L), then signed over to OSE who shipped the samples to GEOMET for low level CA/ABPs analyses. Section 5.3 presents the results of the MC sampling.

4.1.2.3.2 Sampling was conducted consistent with the work plan procedures and DQOs established for the project. Although arsenic can be identified as a breakdown product for Lewisite, background samples were not collected because screening levels were established for Lewisite and other associated breakdown products

4.1.2.4 Munitions Response Site Prioritization Protocol DQO

The MRSPP DQO *was achieved* by obtaining sufficient information to complete the MRSPP scoring sheets for the Gas Instruction Area MRS. Specific data were collected and the three modules for the MRSPP were populated as part of the SI. The scoring sheets for the MRSPP are included in Appendix K.

4.1.2.5 Hazard Ranking System DQO

The HRS DQO *was achieved* by including the information in the SI report necessary for the USEPA to populate the HRS score sheets, if they choose to do so. Source documents for the HRS information include the INPR, ASR, ASR Supplement, MC sampling results reported in Chapter 5 and information from local and state agencies regarding population, groundwater well users, and drinking water well use.

4.2 GAS INSTRUCTION AREA MRS

4.2.1 Historical Munitions and Explosives of Concern Information

The Gas Instruction Area MRS was used for CA identification and decontamination training. This area overlaps a former skeet range which was investigated under a separate SI and recommended for NDAI. Although historical documents show no evidence of MEC at this MRS, CWM in the form of K941 CAIS containing neat mustard agent may be present on the site. CA-contaminated soil may be present at the site due to decontamination training which took place at the site. Additionally, CAIS in the form of K951/K952 were present on site according to past inventory documents, however, they are not considered CWM.

4.2.2 Inspection Activities

4.2.2.1 The SI field effort for the Gas Instruction Area MRS consisted of DGM and soil sampling. DGM was conducted over 6.42 acres at the site (Figure 4.1). A specially designed cart was used to tow two G858 sensors across the survey area. The sensors were spaced at a horizontal distance of 5 feet and were set at a height of 1-foot above the ground surface. Geophysical data were collected by walking parallel lines at 10-foot intervals. The data were processed and the results of the survey were used to identify targets for potential intrusive investigation (Appendix I). Anomalies were selected based on the results of testing conducted during the former Walker AAF geophysical investigation, which included the collection of DGM data over a test item designed to represent a CAIS shipping container, and on the judgment of the project geophysicist with regard to larger anomalies that might be representative of burial pits.

4.2.2.2 Nineteen anomalies were selected from the DGM data and are presented on Figure 4.1. Ten were approximately the size and shape expected for a single buried CAIS container based on the results of the Walker AAF test data; the other 9 were larger anomalies potentially indicative of burial pits. Although possibly caused by burial pits, other potential sources include buried supports for the former radio tower, building foundations, or structures related to current agricultural operations. The largest anomaly area evident in the DGM data is in the southern portion of the survey area in the vicinity of the former radio transmitter building. During the SI, cultural debris such as wires and wood pieces were evident on the ground surface in the southern portion of the survey area. Due to presence of cultural debris no anomalies were selected within this anomalous area.

4.2.2.3 Other anomalies not selected included linear features likely representative of buried pipes or utilities and the long linear feature paralleling the western side of the survey area that follows the location of the former road. Other than the cultural debris near the former radio transmitter building, there were no surface indications of anomaly sources anywhere in the survey area. Additional detail regarding the DGM investigation and the anomalies selected in the DGM data are contained in Appendix I.

4.2.2.4 Soil sampling was conducted at twenty locations—ten locations as prescribed in the SS-WP and at ten discretionary locations (Figure 4.2). The ten prescribed locations were placed based on a grid pattern. No stressed vegetation or other indicators of CA contamination were noted by the field team, 10 discretionary samples were collected as shown on Figure 4.2. Four of the six discretionary samples were collected at locations where DGM detected anomalies consistent with that of a CAIS shipping container. No intrusive investigation of anomalies were conducted as directed by the TPP team.

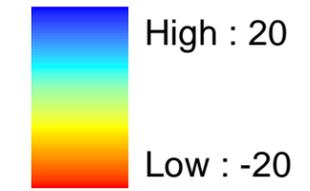
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Figure 4.1

Geophysical Investigation Results
 Schilling Air Force Base
 FUDS Project # B07KS0256
 Salina, Kansas

Legend

G858 - Response (nT)



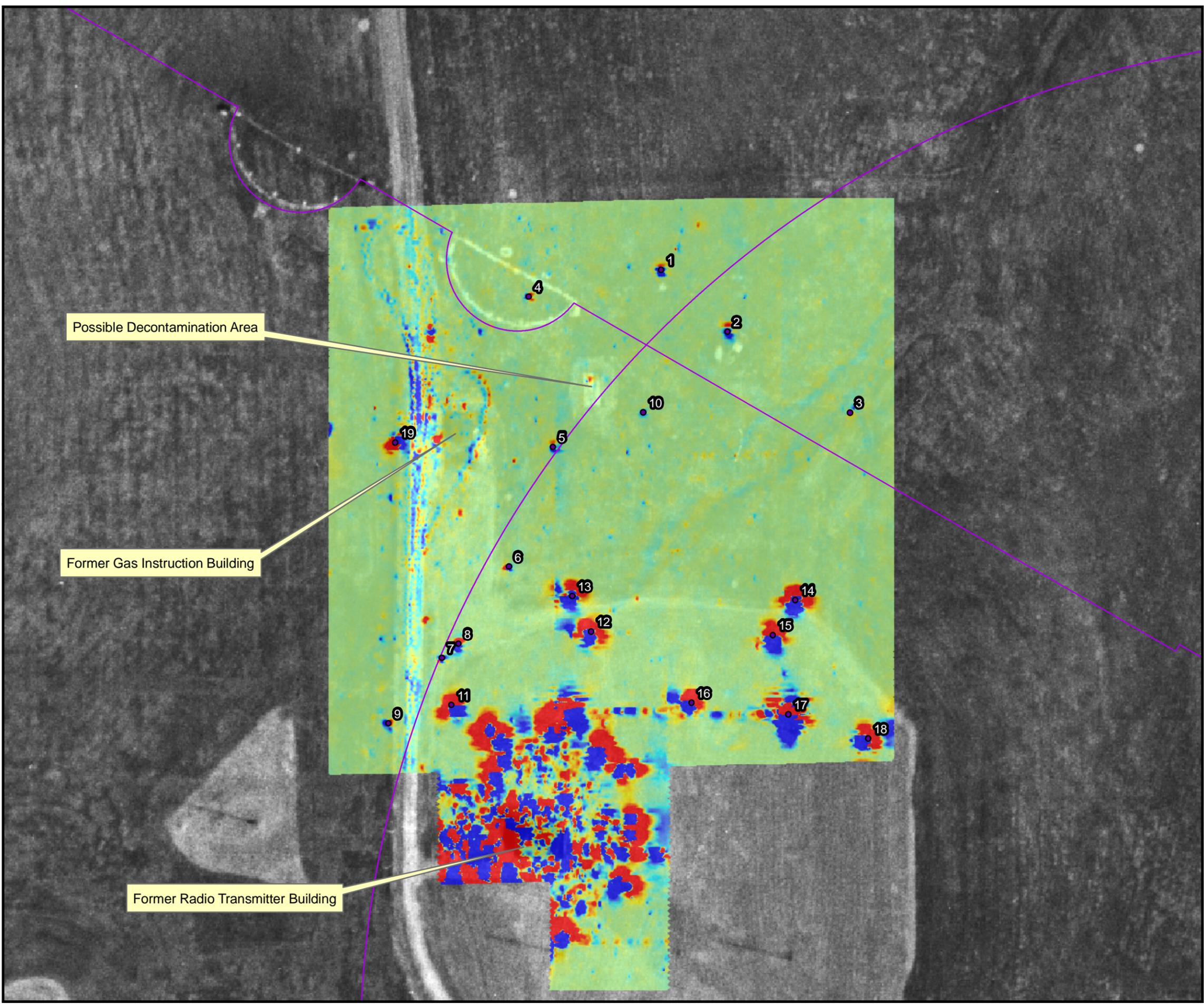
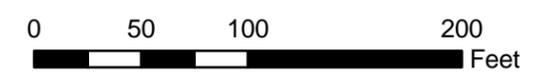
Skeet Range Boundaries

Selected Anomaly Location

Note:
 Locations 1 - 10 are possible CAIS shipping container
 Locations 11 - 19 are possible burial pits



Image Source: 1954 Aerial
 Projection: NAD 83 UTM Zone 14N



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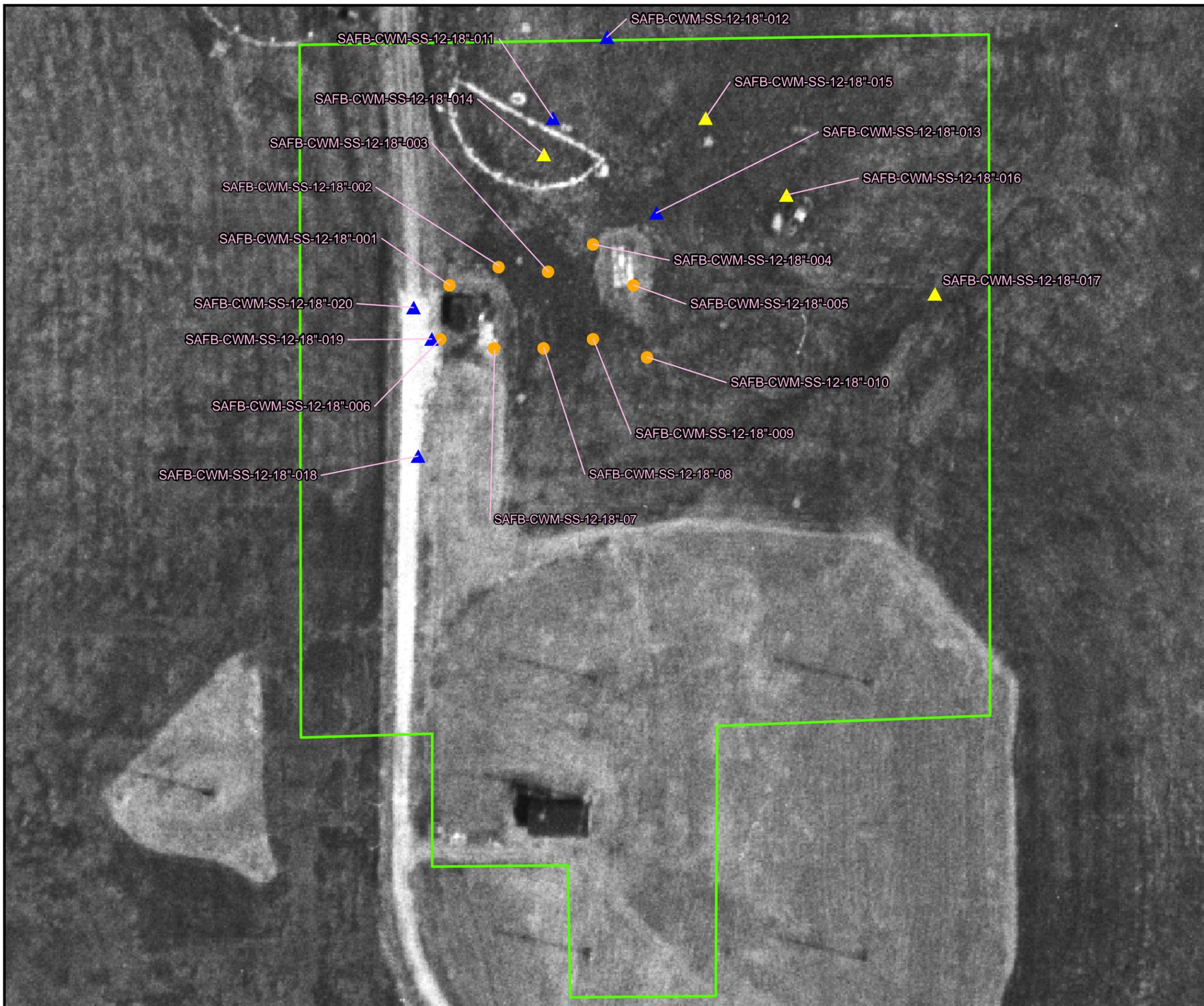


Figure 4.2

Sample Locations
 Schilling Air Force Base
 FUDS Project # B07KS0256
 Salina, Kansas

Legend

- Geophysical Investigation Area
- Predetermined Sample Locations (10)
- Discretionary Locations**
- ▲ Potential CAIS-burial Location (4)*
- ▲ Random (6)

*Locations identified through DGM

Image Source: 1954 Aerial
 Projection: NAD 83 UTM Zone 14N



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CHAPTER 5

EXPOSURE PATHWAYS AND RECEPTORS

5.1 INTRODUCTION

5.1.1 This chapter describes the evaluation of the potential for release of MC to the environment based on site-specific conditions. It is necessary to evaluate site-specific conditions and land use to evaluate risks posed to potential receptors under current and future land use scenarios. This chapter evaluates exposure pathways for groundwater, surface water, sediment, soil, and air. The conceptual site exposure model (CSEM) for the former Schilling AFB (Appendix J) summarize which potential receptor exposure pathways are (or may be) complete and which are (and are likely to remain) incomplete. An exposure pathway is not considered to be complete unless *all* four of the following elements are present (USEPA, 1989). An example of a hypothetical groundwater pathway is included:

- *A source and mechanism for contaminant release.* For example, a site has known MEC from which MC have leached and contaminated surface soil.
- *An environmental transport and/or exposure medium.* In the example, the MC in soil are mobile and can contaminate groundwater.
- *A point of exposure at which the contaminant can interact with a receptor.* A drinking water well drawing from the contaminated aquifer is at the MRS.
- *A receptor and a likely route of exposure at the exposure point.* A resident uses groundwater as a source of drinking water.

5.1.2 In the hypothetical example above, all four elements are present. Therefore, the groundwater exposure pathway is complete. If any single factor was absent (for example, MC contamination was not present in soil, or the resident obtained drinking water from another source), the pathway would be incomplete.

5.2 GENERAL INFORMATION

5.2.1 Regional Geologic Setting

5.2.1.1 The former Schilling AFB is in the Smoky Hills physiographic province. The Permian Wellington Formation bedrock underlies the alluvium at an approximate depth of 40 feet to 50 feet bgs. The Wellington Formation consists of shale with minor amounts of limestone, dolomite, siltstone, gypsum, and anhydrite.

5.2.1.2 Surface sediment along the site consists of a silty loam. The Crete silt loam is generally found to be nearly level (0 percent to 2 percent slopes). Silty loam is

moderately well drained, resulting in slow surface runoff and a high capacity of available water (USACE, 2009).

5.2.2 Regional Groundwater Use

5.2.2.1 There are 1,612 documented water wells of various types within a 4-mile radius of the Gas Instruction Area MRS. Table 5.1 lists active wells within a 4-mile radius of the MRS (also see Figure 5.1). There are no wells reported within the MRS. The depth to water in these wells is unknown. There are no current well head protection plans in place for the area covering the MRS.

TABLE 5.1
ACTIVE GROUNDWATER WELLS WITHIN A 4-MILE RADIUS OF
THE FORMER SCHILLING AFB FUDS
GAS INSTRUCTION AREA MRS
FORMER SCHILLING AFB, SALINE COUNTY, KANSAS

	Domestic Wells	Public Water Supply	Irrigation	Feedlot/ Livestock/ Windmill	Monitoring/ Observation/ Piezometer	Industrial	Total
Within FUDS	3	0	1	0	125	0	129
FUDS to ¼ mile	7	0	0	0	44	1	52
¼ –½ mile	8	0	1	0	15	0	24
½–1 mile	29	0	16	1	137	5	188
1–2 miles	124	5	5	1	282	9	426
2–3 miles	91	1	29	1	376	6	504
3–4 miles	119	4	8	1	150	7	289
Total	381	10	60	4	1129	28	1612

5.2.2.2 Information regarding the specific number of individuals using each of the water wells was not available. Therefore, using available population information based on U.S. census data for the year 2000 (Table 5.2 and Figure 5.2), the SI assumes that the 46,698 people living within a 4-mile buffer get their water from sources within the same 4-mile buffer. Population information was determined by using a conservative approach that includes the total number of people indicated in the census data blocks for any blocks that fall partially or completely within the 4-mile buffer zone around the site.

TABLE 5.2
APPROXIMATE POPULATION INFORMATION IN THE VICINITY OF THE
FORMER SCHILLING AIR FORCE BASE
GAS INSTRUCTION AREA MRS
FORMER SCHILLING AFB, SALINE COUNTY, KANSAS

On Site	0 to 0.25 mile	0.25 to 0.5 mile	0.5 to 1 mile	1 to 2 miles	2 to 3 miles	3 to 4 miles	Total
2,333	321	3,180	7,583	18,937	9,697	4,647	46,698

Source: U.S. Census 2000 data. The population within the FUDS-eligible property boundary is determined using a conservative approach to calculate the population of an area by including the total number of people for any census block that falls within or overlaps the FUDS-eligible property boundary.

5.2.3 Hydrologic Setting

5.2.3.1 Saline County and the former Schilling AFB site drain into the Smoky Hill River and its tributaries, which flow north and east across the county. Many upland areas do not have an adequate water supply for domestic and livestock uses. Rural water districts help to distribute water to these areas. The water supply generally is better in valleys along the major streams. Some of the soils in these valleys are irrigated. The irrigation water is drawn from wells, local streams, or surface water impounded by dams (USACE, 2003). Figure 5.3 shows the surface water within a 15-mile distance from the FUDS. No wetlands are near the FUDS.

5.2.3.2 The Schilling AFB site is underlain by the Western Interior Plains aquifer system, which consists of water-yielding dolomite, limestone, and sandstone. Regional groundwater movement in the Western Interior Plains aquifer system is southeastward to eastward and is thought to be very slow. Little water is withdrawn from the aquifer system because the system is deeply buried and contains highly mineralized water (USACE, 2009).

5.2.4 Establishing an Observed Release

5.2.4.1 As explained in Subchapter 5.1, an exposure pathway is not considered to be complete unless MC contamination is present. For an analyte to be considered contamination caused by a release from munitions-related activities at the site, it is necessary for the following conditions to be true:

- The analyte is detected in the sample medium, and
- The analyte is a potential constituent of the munitions formerly used at the site, and
- The analyte is present above the established screening criteria.

5.2.4.2 Each MC analyzed was evaluated against these criteria to determine whether potential MC contamination is present at the MRS. Only detections of analytes that meet the conditions noted above are evaluated further in the SLRA in Chapter 6. Any detection of CA/ABPs is considered to be MC contamination and is evaluated in the SLRA in Chapter 6.

5.2.4.3 The above method is consistent with the process described in Chapter 5 (“Observed Release”) of the HRS Guidance Manual (USEPA, 1992). The HRS Guidance Manual process for establishing an observed release “requires documenting that the concentration of at least one hazardous substance in a release sample is significantly increased above its background level, and that the substance in the release can be attributed to the site” (USEPA, 1992). Since CA/ABPs are anthropogenic and therefore would not be detected in background concentrations, the constituent must be present above the established regulatory criteria. The method described above both confirms whether a chemical is present above criteria and whether that chemical is a potential constituent of the munitions formerly used at the site, meeting both criteria defined in the guidance.

5.3 GAS INSTRUCTION AREA MRS

This subchapter of the SI Report describes the evaluation of exposure pathways for the Gas Instruction Area MRS. The analysis of each pathway is based on the analytical results for each medium of concern and the current and future land use information presented in Subchapter 2.2.5. The CSEM for the Gas Instruction Area MRS is provided in Appendix J.

5.3.1 Historical Munitions Constituent Information

Historical information suggests that the Gas Instruction Area MRS was used primarily for CA identification and decontamination training and that no ordnance was used in this area.

5.3.2 Groundwater Exposure Pathway

Groundwater can serve as a contaminant transport mechanism that may affect surface water bodies, sediment, drinking water supplies, vegetation, and sensitive environmental areas such as wetlands. The likelihood of exposure is influenced by such factors as the volume and concentration of contaminated soil at the ground surface that can be transported to the groundwater, site-specific geology, climate, and the expected future land use.

5.3.2.1 Geologic and Hydrogeologic Setting

There are no known differences between the geologic and hydrogeologic setting at Gas Instruction Area MRS and the setting described in sections 5.2.1 and 5.2.3.

5.3.2.2 Releases and Potential Releases to Groundwater

5.3.2.2.1 There are no historically documented releases of MC to groundwater within the MRS. Depth to groundwater in the project area is unknown. Groundwater would not have been directly affected by activities at the site. However, if MC were present in the soil as a result of munitions-related activities, it is possible that MC could leach to groundwater at the site.

5.3.2.2.2 Twenty soil samples were collected from surface soils (12 to 18 inches bgs) within the Gas Instruction Area MRS. All samples were analyzed for CA/ABPs.

5.3.2.3 Groundwater Exposure Pathway and Receptors

As noted in Table 5.1, 129 water wells of various uses are within the FUDS boundary. Exposure via the groundwater pathway could occur via dermal contact, incidental ingestion, or, since the wells are present, ingestion of groundwater (only if wells were used as drinking water). Based on the known current and future use of the land at this MRS, the potential receptors would include commercial/industrial workers (agricultural workers and airport personnel). No ecologically important places exist within this MRS.

5.3.2.4 Groundwater Sample Locations and Methods

No groundwater samples were collected during the 2010 SI. Groundwater sampling for MC has not been performed in the past within this MRS.

5.3.2.5 Groundwater Exposure Pathway Analytical Results

No groundwater samples were collected at this MRS during the SI.

5.3.2.6 Groundwater Exposure Pathway Conclusions

No drinking groundwater wells are known to exist at or near this MRS, and no MC were detected in soil samples collected within the MRS. Since no source exists, the groundwater exposure pathway is not considered complete.

5.3.3 Surface Water and Sediment Exposure Pathway

Surface water and sediment can serve as a contaminant transport mechanism that may affect surface water bodies, drinking water supplies, vegetation, and sensitive environmental areas such as wetlands. The likelihood of exposure is influenced by such factors as the volume and concentration of contaminated soil at the ground surface that can be transported to the surface water and sediment through runoff and erosion.

5.3.3.1 Hydrologic Setting

There are no known differences between the geologic and hydrologic setting at the Gas Instruction Area MRS and the setting described for the overall site in Section 5.2.

5.3.3.2 Releases and Potential Releases to Surface Water and Sediment

There are no surface water bodies within the immediate vicinity of this MRS. The closest surface water body is a small residential pond approximately 1,600 feet to the southwest.

5.3.3.3 Surface Water Exposure Pathway and Receptors

Since the nearest surface water bodies lie a considerable distance from the potential source, it is improbable that contamination in soil will leach to surface water or sediment via runoff or erosion. If MC contamination were present and surface water bodies were affected, exposure would be through incidental ingestion and dermal contact with the affected medium.

5.3.3.4 Surface Water and Sediment Sample Locations and Methods

No surface water or sediment samples were collected at this MRS during this SI.

5.3.3.5 Surface Water and Sediment Exposure Pathway Analytical Results

Surface water and sediment samples were not collected at this MRS during the SI field effort.

5.3.3.6 Surface Water and Sediment Exposure Pathway Conclusions

No surface water bodies exist within the immediate area of the MRS. No MC were detected in the soil samples collected at this MRS. Given the distance to the surface water body, as well as the lack of source, the surface water and sediment migration pathway is considered incomplete for all receptors at the Gas Instruction Area MRS.

5.3.4 Soil Exposure Pathway

Potential soil exposure pathways include incidental ingestion, dermal contact, and inhalation of resuspended particulates by human receptors. MC in soil can leach to groundwater and be transferred to surface water and sediment via runoff and erosion. Subchapters 5.3.2 and 5.3.3 discuss the groundwater and surface water/sediment exposure pathways.

5.3.4.1 Physical Source Access Conditions

The Gas Instruction Area MRS is within an agricultural area within the former Schilling AFB. This location is secured within the outer fence of the Salina Municipal Airport property. Access to the site is restricted but not monitored.

5.3.4.2 Actual or Potential Contamination Areas

Although the location of the former Gas Instruction Building is known, the approximate location of the 100-square-yard area used for decontamination exercises was determined based on a 1954 aerial photograph. Soil samples were collected in the most biased locations to determine the presence of CA/ABPs.

5.3.4.3 Soil Exposure Pathways and Receptors

The soil exposure pathway accounts for the potential for receptors at or near the MRS to come into contact with potentially MC contaminated soil. Based on the known current and future uses of the land, the potential receptors at this MRS include commercial/industrial workers (agricultural workers and airport personnel) receptors. The soil exposure routes likely to be present at this MRS are incidental ingestion, dermal contact, and inhalation of particulates present in fugitive dust. Inhalation of fugitive dust is addressed in Subchapter 5.3.5.

5.3.4.4 Soil Sample Locations and Methods

5.3.4.4.1 Twenty biased surface soil samples were collected from 12 to 18 inches bgs. Ten samples were collected from predetermined locations based on a grid system placed at the former location of the gas instruction building. Ten additional soil samples were collected from four locations determined through DGM to contain anomalies consistent with the signature of a CAIS shipping container and from six locations where subsurface anomalies were detected through use of a Schonstedt magnetic locator. All locations were selected to represent areas with the highest likelihood for the presence of MC contamination. The 10 predetermined locations were marked using a Trimble RTK GPS, while the locations of the 10 discretionary samples were recorded using a handheld

Garmin Rhino GPS. Appendix D includes the field notes and field forms for the SI field effort at the former Schilling AFB; soil sample locations are shown on Figure 4.2.

5.3.4.4.2 At each sample location, a UXO technician III used a Schonstedt GA-92XTi magnetometer to screen and approve each sample location prior to final location selection and sample collection. Per the PWP, the UXO technician III checked the magnetometer against a known piece of metal and performed battery checks each day to confirm that it was working properly.

5.3.4.4.3 All samples were headspaced onsite for H and L and were subsequently released to One Stop Environmental for packaging and shipment to GEOMET for low-level CA/ABPs analyses. Analytical results are provided in Table 5.3.

TABLE 5.3
SUMMARY OF ANALYTICAL RESULTS
GAS INSTRUCTION AREA MRS
FORMER SCHILLING AFB, SALINE COUNTY, KANSAS

Sample ID:	Date	Mustard	1,4-dithiane	1,4-thioxane	Lewisite*
SAFB-CWM-SS-12-18"-001	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-901**	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-002	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-003	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-004	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-005	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-006	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-007	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-008	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-009	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-010	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-011	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-911**	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-012	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-013	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-014	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-015	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-016	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-017	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-018	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-019	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
SAFB-CWM-SS-12-18"-020	6/16/2010	10 µg/kg U	100 µg/kg U	100 µg/kg U	100 µg/kg U
Laboratory PQLs =		10 µg/kg	100 µg/kg	100 µg/kg	100 µg/kg
Screening Levels =		10 µg/kg ^A	610,000 µg/kg ^B	610,000 µg/kg ^B	300 µg/kg ^A

Notes: A – Health-Based Environmental Screening Levels for Chemical Warfare Agents, USACHPPM/ORNL Technical Report, March 1999

B – USEPA Regional Screening Levels, Residential Soil, May 2010

U – Analyte was analyzed, but not detected above laboratory PQLs

* Lewisite analysis suite includes CVAA and CVAO

**Duplicate of sample above

5.3.4.5 Soil Exposure Analytical Results

The analytical results for the soil samples collected from the Gas Instruction Area MRS are presented in Appendix F – Laboratory Data. The results for all samples collected were evaluated using the criteria described in Subchapter 5.2.4. No CA/ABPs were detected in any of the samples collected.

5.3.4.6 Soil Exposure Pathway Conclusions

No CA/ABPs were detected in any of the samples collected. Based on these data, there are no observed releases of MC at the Gas Instruction Area MRS. Therefore, MC contamination is not present at this MRS, and the soil exposure pathway is incomplete for all receptors at the MRS.

5.3.5 Air Exposure Pathway

The air exposure pathway accounts for hazardous substance exposure in gaseous or particulate form through the air. Airborne transport of contaminants can result in exposure of people and sensitive environments.

5.3.5.1 Climate

The climate for the former Schilling AFB is described in Subchapter 2.2.3.

5.3.5.2 Releases and Potential Releases to Air

There are no known direct releases of MC to the air at this MRS. However, it is possible that dust at this MRS might be suspended by the wind, which would potentially result in a release to air if MC were present in the soil. Vapors from agent are also a potential release mechanism that could result in a release to air.

5.3.5.3 Air Exposure Pathway and Receptors

Based on the known current and future uses of the land, the potential air migration pathway receptors at the MRS include commercial/industrial workers (agricultural workers and airport personnel). These receptors could be exposed to surface soil through inhalation of vapors or re-suspended particulate matter through the air exposure pathway. The CSEM is presented in Appendix J.

5.3.5.4 Sample/Monitoring Locations and Methods

Air sampling is not known to have previously been performed at the MRS. In accordance with the work plan, air monitoring was performed in support of soil sampling activities. MINICAMS were used for air monitoring at sampling locations and headspacing of soil samples. MINICAMS were used to detect suspect chemicals; H, HS, HD, L, CG, CHCl₃ and PS. DAAMS sampling tubes were set at designated locations to establish perimeter monitoring of the work space. DAAMS were used to detect suspect chemicals; H and L. A PID was used to monitor VOCs in the breathing zone at each sampling location.

5.3.5.5 Air Exposure Pathway Analytical Results

Air monitoring results did not indicate the presence of suspect chemicals. Results were below AELs. MINICAMS, DAAMS and PID results are provided in Appendix D.

5.3.5.6 Air Exposure Pathway Conclusions

Air monitoring did not detect CAIS-related constituents (i.e., H, HS, HD, L, CG, CHCl₃ and PS) or gross VOCs during sampling activities. In addition, no CA/ABPs were detected in soil samples. Since no source exists, the air migration pathway is considered incomplete for all current and future human receptors at this MRS.

Figure 5.1

Groundwater Well Locations
Schilling Air Force Base
FUDS Project # B07KS0256
Salina, Kansas

Legend

Groundwater Well Type

-  Domestic
-  Feedlot/Livestock/Windmill
-  Industrial
-  Irrigation
-  Monitoring well/observation/piezometer
-  Public Water Supply
-  Schilling Air Force Base FUDS Boundary
-  MRS Boundary

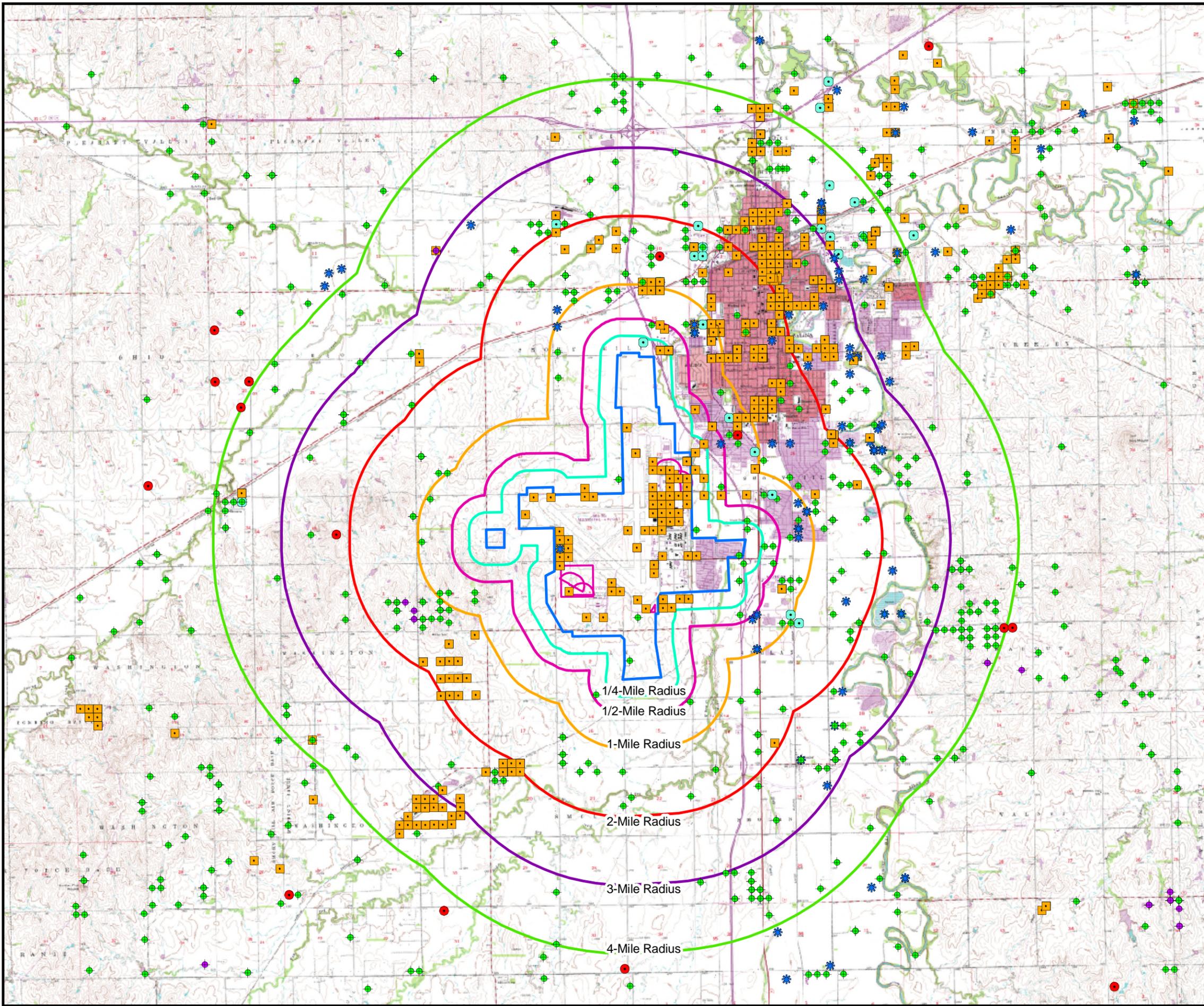


Image Source: 1999 Saline County Topo
Projection: NAD 83 UTM Zone 14N



PARSONS		U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA	
DESIGNED BY: CR	Schilling Air Force Base		
DRAWN BY: DS			
CHECKED BY: DS	SCALE: As Shown	PROJECT NUMBER: 745080	
SUBMITTED BY: CATB	DATE: August 2010	PAGE NUMBER:	
FILE: S:\ES\shared\CWM SI Program\Schilling\GIS\SGW Well Locations.mxd			

Figure 5.2

Census Data Within a
Four Mile Radius
Schilling Air Force Base
FUDS Project # B07KS0256
Salina, Kansas

Legend

- Schilling Air Force Boundary FUDS Boundary
- Census Block Centroid Unit
- 10.5 Number of people per square mile within census block group

2005 Census Block Group Population

- 500 - 850
- 851 - 1700
- 1701 - 2550
- 2551 - 3400

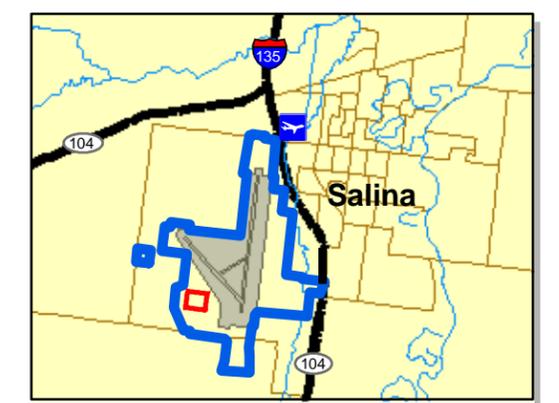
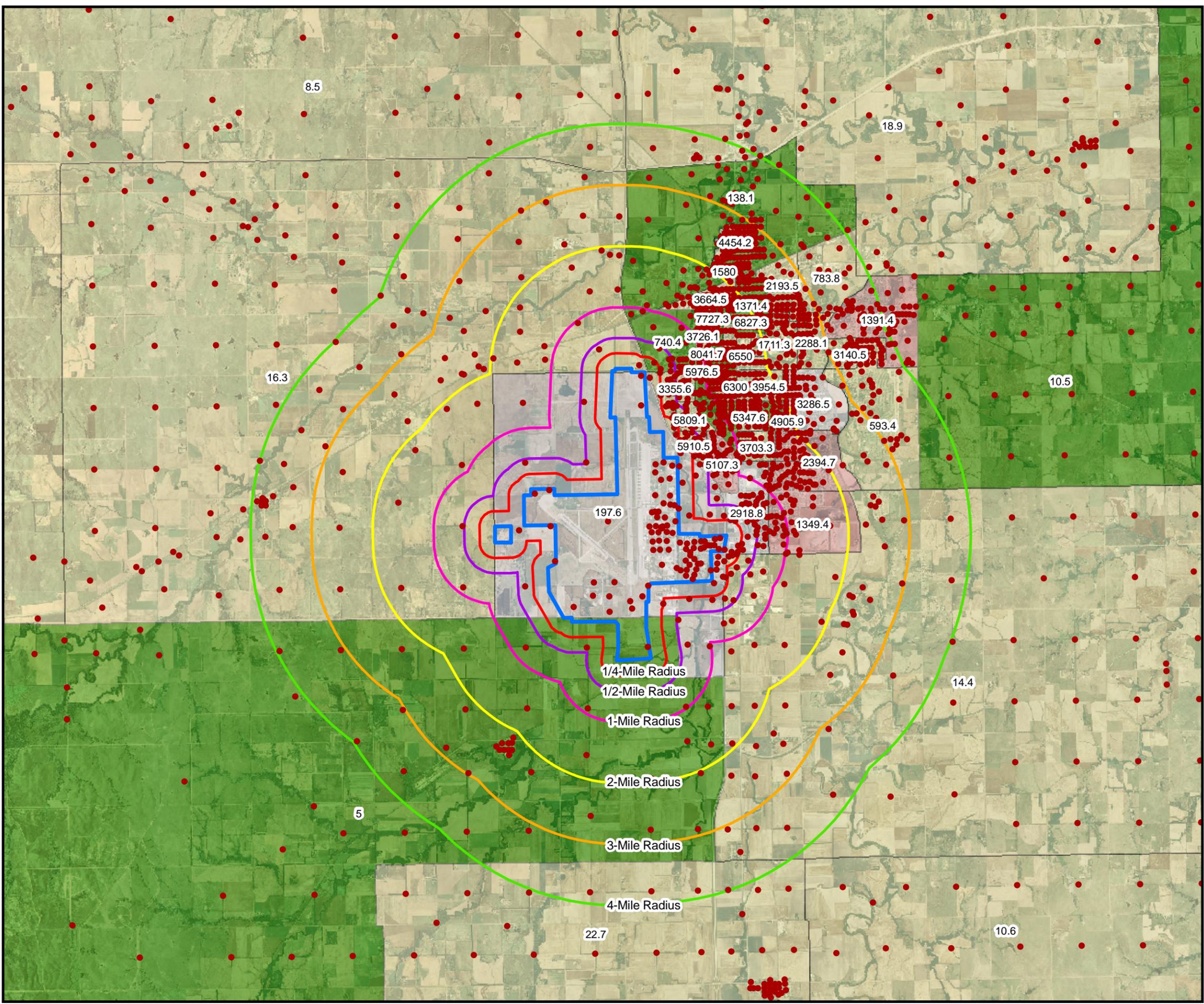
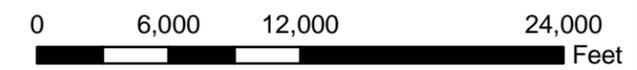


Image Source: 2006 Aerial
Projection: NAD 83 UTM Zone 14N



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Figure 5.3

15-Mile Surface
Water Target Distance
Schilling Air Force Base
FUDS Project # B07KS0256
Salina, Kansas

Legend

-  Schilling Air Force Boundary FUDS Boundary
-  15 Mile Radius

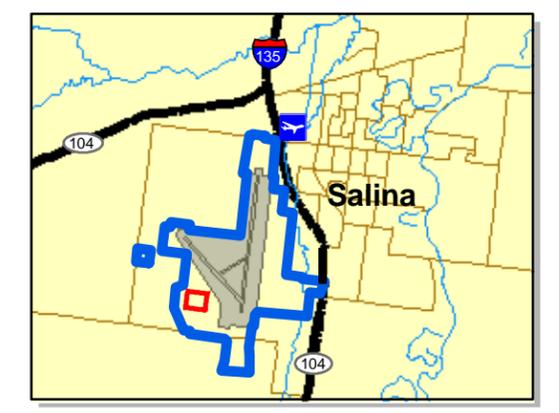
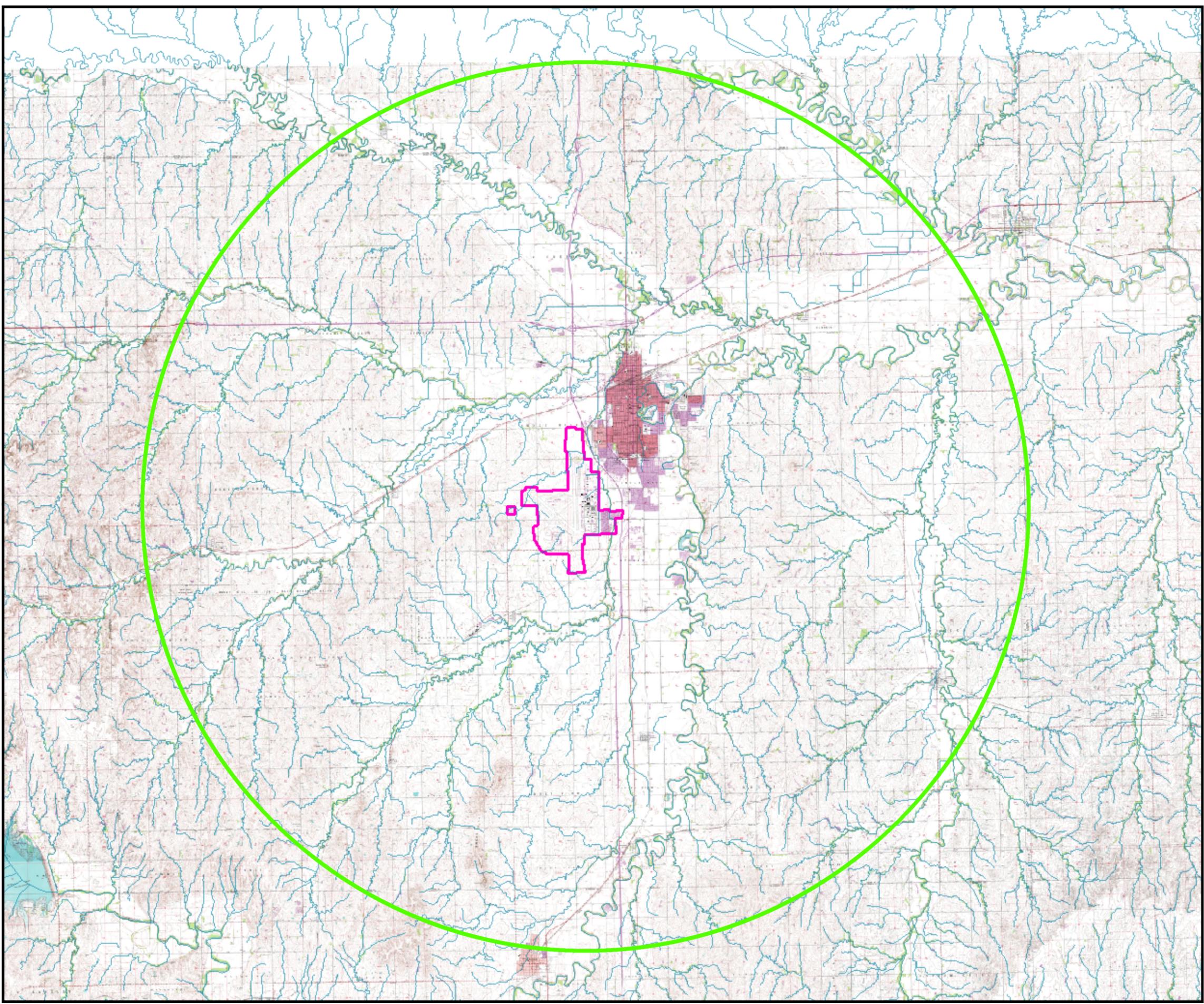


Image Source: 2006 Aerial
Projection: NAD 83 UTM Zone 14N



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CHAPTER 6

SCREENING LEVEL RISK ASSESSMENT

6.1 MUNITIONS AND EXPLOSIVES OF CONCERN SCREENING LEVEL RISK ASSESSMENT

6.1.1 Conceptual Site Model

The CSM for the former Schilling AFB is included in Appendix J. Historic documents suggest that the Gas Instruction Area MRS was used only for CA training and that no munitions were disposed or used in the area. No munitions or military-related debris were observed on the surface during the DGM and sampling conducted at the site. The MRS is within the restricted area of the Salina Municipal Airport property, and access is limited to airport employees and contractors.

6.1.2 Hazards Assessment

6.1.2.1 Site activities did not identify any MEC concerns and historical documents suggest that MEC were not used or disposed of at this site; therefore, a MEC SLRA is not warranted.

6.1.2.2 The ASR noted that live liquid mustard may have been spread over an approximate 100-square yard section of land for the purpose of decontamination training. The location of the possible mustard ground decontamination training area is unknown. According to the ASR, the gas instruction building was also presumably used for decontamination practice. Exercises such as this typically included the use of CAIS of the K941 variety which contained 24 4-ounce bottles of neat mustard. Since the K941 contains neat agent, it is regarded as CWM.

6.1.2.3 Other CAIS most likely involved are of the K951/K952 variety which contains mustard, chloropicrin, and Lewisite in a diluted solution with chloroform, and phosgene. CAIS in this form do not fit the definition of CWM, but rather as hazardous, toxic, or radiological waste (HTRW).

6.1.2.4 Both CAIS varieties were packaged in steel shipping containers commonly known as “pigs”. Due to the limitations of the available technologies involved, investigations regarding the burial of CAIS typically rely on the presence of the steel shipping container, as the glass ampoules in the K951/K952 and the small bottles of the K941 do not typically contain enough associated metal (i.e. metal caps) to obtain an accurate geophysical signature.

6.1.2.5 During the 2010 SI, DGM was conducted at the site to determine whether there were signatures consistent with that of a buried CAIS shipping container. After collecting DGM data over 6.42 acres and processing the data, the project geophysicist

identified 19 anomalies potentially representative of either single buried CAIS shipping containers or larger burial pits possibly containing multiple containers or containers buried with other debris. These anomalies were not intrusively investigated as part of this SI, and there was nothing immediately evident on the ground surface to suggest a possible source. Although possibly related to CAIS containers, other potential sources of the anomalies include building foundations, supports for the former radio tower, and structures or debris related to current agricultural activities at the site.

6.2 MUNITIONS CONSTITUENT HUMAN HEALTH SCREENING LEVEL RISK ASSESSMENT

6.2.1 Conceptual Site Model

As described in Subchapter 2.2.4, the land surrounding the FUDS property consists of commercial, residential, and agricultural areas. The land surrounding the Gas Instruction Area MRS is used for agricultural purposes—rotating crops from winter wheat to sorghum. Future land use is expected to remain the same. The MRS is located within the restricted area of the Salina Municipal Airport property in which access is limited to airport employees and contractors. Potential exposure routes for possible MC contaminants in the surface and subsurface soil include incidental ingestion, dermal contact, and inhalation of re-suspended particulates. The MC CSEM identifies affected media, transport mechanism, exposure routes, and potential receptors. A CSEM has been developed for the former Schilling AFB; this is included in Appendix J.

6.2.2 Affected Media

6.2.2.1 Direct release of MC from CA training activities within the MRS would have been to surface soil (0-24 inches). Since site closure, however, the upper 12 inches of soil has been grossly disturbed by crop farming (till depth of soil within the site is a maximum of 12 inches). Due to tilling, MC, if present, would be more likely in soil depths ranging from 12 – 18 inches. This does not rule out the potential presence of MC to the top 12 inches of surface soil, but does make it less plausible.

6.2.2.2 Surface water and sediment are not present at this MRS. If there were releases of MC to surface/subsurface soil as a result of the training activities, MC could leach to groundwater, but because of the distance is unlikely to migrate to surface water and sediment through runoff and erosion. MC in the surface soil can also become airborne in fugitive dust.

6.2.3 Human Health Screening Levels

The risk-based soil screening values selected by the TPP Team for this SI were the *Health-Based Environmental Screening Levels for Chemical Warfare Agents (USACHPPM/ORNL Technical Report, March 1999)* for H, L (including CVAA and CVAO), and USEPA Regional Screening Levels for the mustard breakdown products (1,4-dithiane and 1,4-thioxane).

6.2.4 Risk Characterization for Soil

Laboratory results from the soil samples collected during the 2010 SI show no detectable concentrations of CA/ABPs. Since no analytes were detected, there are no possible health concerns related to MC at the site.

6.2.5 Discussion

Soil samples collected during the 2010 SI were analyzed for mustard, mustard breakdown products (1,4-dithiane and 1,4-thioxane) and Lewisite (inclusive of CVAA and CVAO). Laboratory analyses of the samples resulted in no detectable concentrations of analytes. Analytical tables for the samples collected in the Gas Instruction Area MRS can be found in Appendix F. Following the exposure pathway formula presented in section 5.1.1, a source of contamination is not present at the Gas Instruction Area MRS. Given the lack of source, there cannot be an exposure medium nor can it act with a receptor. Given this incomplete pathway, no unacceptable risk to human receptors resulting from MC exists at the Gas Instruction Area MRS.

6.3 MUNITIONS CONSTITUENTS SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT

6.3.1 The State of Kansas supports 16 federally listed T&E species consisting of 13 animals and 3 plants (USFWS, 2009). According to the KDWP state database for Saline County, five federally listed species are known to occur within the county. These species include 3 birds, 1 fish, and 1 insect. No T&E species were observed during the field activities. Based on a review of the Army Checklist for Important Ecological Places (USACE, 2006), the Gas Instruction Area MRS does not contain areas defined by this list as “important ecological places”. Given that “important ecological places” do not exist within this MRS, a screening-level ecological risk assessment is not required.

6.3.2 No source of contamination related to past decontamination activities were detected at the Gas Instruction Area MRS. As noted in the CSM, ecological receptors are not anticipated to be present in subsurface soil; therefore, although geophysical data identified potential CAIS burial locations, no risks to ecological receptors are known to be associated with this MRS at this time.

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CHAPTER 7

SUMMARY AND CONCLUSIONS

7.1 SUMMARY

7.1.1 One MRS at the former Schilling AFB was identified and evaluated to determine its potential to cause significant contamination to the environment or to adversely affect human receptors.

7.1.2 On June 6, 2010 a field team mobilized and conducted DGM over 6.42-acres of the site. The DGM data were processed and sent to USAECH's geophysicists for validation and QC.

7.1.3 Subsequent to the DGM a field sampling team mobilized on 13 June, 2010 to collect soil samples from ten pre-determined and ten discretionary locations at the MRS. Ten soil samples (and a duplicate) were collected from ten pre-determined locations based on a grid placed over the areas of the former gas instruction building and a nearby groundscar feature identified on a 1954 aerial photograph. Likewise, ten additional discretionary soil samples (plus a duplicate) were collected from locations determined in the field. Four of the discretionary samples were collected from locations where suspect anomalies were identified during the DGM, and six from locations where the field team discovered subsurface anomalies using a hand-held magnetic locator. The soil samples were collected from 12 to 18-inches bgs, headspaced on site for CA, and sent to an off-site laboratory for low level CA/ABPs analyses.

7.1.4 Samples collected at the Gas Instruction Area MRS did not exhibit any concentrations of CA/ABPs. In order for a risk to human health and the environment to exist, the three criteria mentioned below must be met to conduct a Screening Level Risk Assessment and Screening Level Ecological Risk Assessment (SLRA/SLERA). Given that no MC were detected, a SLRA/SLERA was not performed. These three criteria are:

- The analyte is detected in the sample medium, AND
- The analyte is present above the established regulatory criteria, AND
- The analyte is a potential constituent of the munitions formerly used at the Gas Instruction Area MRS.

7.2 CONCLUSIONS REGARDING POTENTIAL MUNITIONS AND EXPLOSIVES OF CONCERN

7.2.1 Historic documents suggest that the Gas Instruction Area MRS was used only for CA training and that no munitions were disposed or used in the area, and that MEC were not used or disposed of within the Gas Instruction Area MRS; therefore, a MEC

SLRA was not performed. No munitions or military-related debris were observed during the DGM conducted at the site.

7.2.2 Historical documents suggest that CAIS were present at the former Schilling AFB based upon past inventory records. Two types of CAIS are believed to have been present, CAIS of the K951/952 variety and that of K941. The K951/952 were used for chemical identification training, and contain dilute chemical agents and industrial solvents and are therefore categorized as HTRW. Although shipping documents suggest CAIS K951/K952 were shipped to the site, their disposition were not recorded. Current SI guidelines suggest that, given the lack of recorded disposal, the assumption has to be made that the CAIS were expended during training. However, if future additional information is obtained confirming the burial of CAIS, USACE will re-evaluate the MRS to determine if additional response is required. Historical documents also reported the use of mustard for ground and building decontamination exercises, which is believed to have been conducted using neat mustard from the K941 CAIS—this variety of CAIS is regarded as CWM due to the presence of neat mustard.

7.2.3 During the 2010 SI field effort, DGM data were collected over 6.42 acres at the site. After processing the data collected, nineteen anomalies potentially representative of either single buried CAIS shipping containers or larger burial pits possibly containing multiple containers or containers buried with other debris were identified. However, none of these were intrusively investigated.

7.3 CONCLUSIONS REGARDING POTENTIAL MUNITIONS CONSTITUENTS EXPOSURE PATHWAYS

7.3.1 An exposure pathway is not considered to be completed unless all four of the following elements are present (USEPA, 1989);

- A source and mechanism for contaminant release, AND
- An environmental transport/exposure medium, AND
- A point of exposure at which the contaminant can interact with a receptor, AND
- A receptor and a likely route of exposure at the exposure point.

7.3.2 Based on the results of the SLRA, there are no unacceptable risks to human health resulting from exposure to MC in the surface soil at the Gas Instruction Area MRS.

7.3.3 Given that “important ecological places” do not exist within the Gas Instruction Area MRS, a screening-level ecological risk assessment is not required. Furthermore, no source of contamination related to past decontamination and burial activities were detected at the Gas Instruction Area MRS during this SI; therefore, no risks to ecological receptors are known to be associated with this site at this time.

CHAPTER 8

RECOMMENDATIONS

8.1 Based on the findings during the 2010 SI field effort, the analysis results, and the historical record review, a RI/FS is recommended for the Gas Instruction Area MRS.

8.2 During the 2010 SI at the Gas Instruction Area MRS, DGM data were collected over 6.42 acres at the site. The project geophysicist identified 19 anomalies potentially representative of either single buried CAIS shipping containers or larger burial pits possibly containing multiple containers or containers buried with other debris. The SI field effort did not include the investigation of these anomalies, thus it is unclear as to the source of the anomalies.

8.3 A large, high-anomaly-density area on the southern end of the geophysical survey area extends to the location of the former radio transmitter building. The former radio transmitter building was demolished and removed in April 2010. Although the former radio transmitter building was removed, the project geophysicist noted debris (e.g., rebar) on the ground surface on the southern end of the geophysical survey area. It is assumed that buried debris is the cause of the large anomalous area. No targets were selected from these anomalies.

8.4 Two varieties of CAIS potentially existed at the former Schilling AFB—that of the K951/K952 which is currently classified as HTRW, and that of the K941 variety, which is classified as CWM due to the presence of neat mustard agent. If K941 CAIS exist onsite, a MEC hazard potentially exists since CWM is a subset of MEC. Given the current activities at the site, ***an immediate removal action is not warranted at this time.***

8.5 CAIS are not confirmed but possible based on DGM results, resulting in an ***RI/FS recommendation for the MRS.***

8.6 In addition to the recommendation for an RI/FS (Table 8.1), an adjustment to the MRS boundary is also recommended. Based on the ASR results and the CWM SI field results, it is recommended that the boundary for the MRS, currently identified as 137.8 acres, be reduced to 8.8 acres as shown on Figure 8.1.

**Table 8.1
 Recommendation Summary
 Gas Instruction Area MRS
 former Schilling AFB, Saline County, Kansas**

Munitions Response Site / Area of Interest	Acreage	CAIS	Munitions and Explosives of Concern and/or Munitions Debris Assessment ⁽²⁾	Munitions Constituent Assessment ⁽³⁾	Recommendation
Gas Instruction Area MRS	8.8	Possible ⁽¹⁾	No	No	RI/FS

- 1) – CAIS are not confirmed but possible based on DGM results, resulting in an RI/FS recommendation for the MRS.
- 2) - "Yes" in this column indicates confirmed MEC or MD presence indicative of potential MEC presence.
- 3) - "Yes" in this column indicates confirmed MC presence at levels indicating a potential elevated risk to human health.

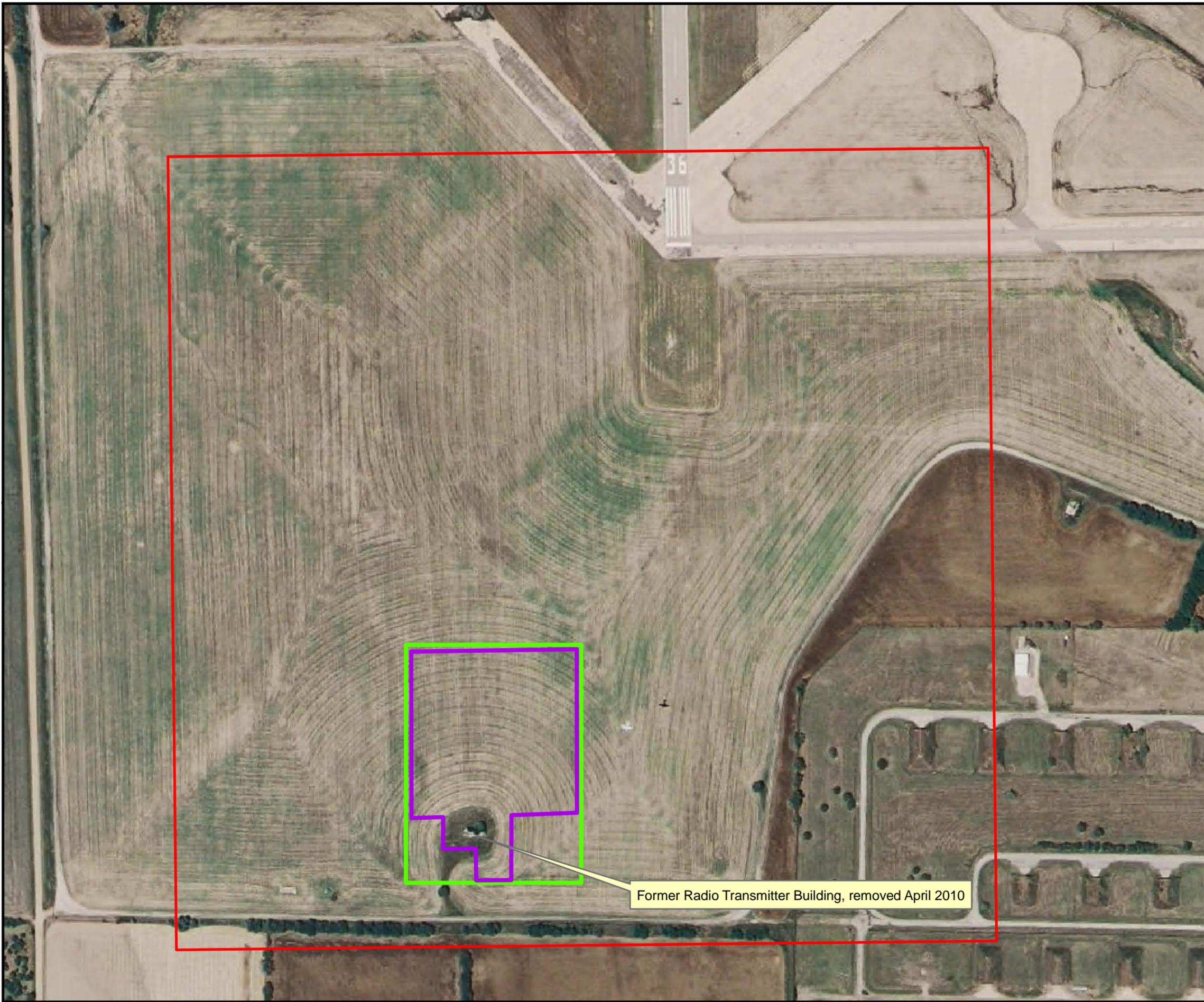


Figure 8.1

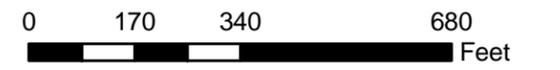
Recommended MRS Boundary
 Schilling Air Force Base
 FUDS Project # B07KS0256
 Salina, Kansas

Legend

- GEO Investigation Area
- Recommended MRS Boundary (8.8 acres)
- Gas Instruction Area MRS (137.8 acres)



Image Source: 2006 Aerial
 Projection: NAD 83 UTM Zone 14N



PARSONS		U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA	
DESIGNED BY: CR		Schilling Air Force Base	
DRAWN BY: CatB		SCALE: As Shown	PROJECT NUMBER: 745080
CHECKED BY: JC		DATE: December 2010	PAGE NUMBER:
SUBMITTED BY: CatB		FILE: S:\ES\shared\CWM SI Program Schilling\GIS	

CHAPTER 9

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