U.S. Army Corps of Engineers

Omaha District

Final Site-Specific Work Plan
Camp Adair/Adair Air Force Station
FUDS ID F10OR0029

Site Inspections at Multiple Sites, NWO Region Formerly Used Defense Sites, Military Munitions Response Program

Contract No. W912DY-04-D-0010
Delivery Order No. 003

August 17, 2006

Shaw Environmental, Inc.

9201 East Dry Creek Road
Centennial, CO 80112

TABLE OF CONTENTS

Page

ABBREVIATIONS AND ACRONYMS iii

1.0 INTRODUCTION 1
- **1.1 Project Authorization 1**
- **1.2 Site Name and Location 1**
- **1.3 Scope and Objectives 1**
- **1.4 Site Inspection Process 2**
- **1.5 TPP Summary 2**
- **1.6 Decision Rules 2**
- **1.7 MEC Technical Approach 4**
- **1.8 SSWP Organization 4**

2.0 SITE INFORMATION 5
- **2.1 Installation History 5**
- **2.2 Physical Setting 6**
  - **2.2.1 Access and Land Use 6**
  - **2.2.2 Topography, Geology, and Climate 6**
  - **2.2.3 Groundwater 6**
- **2.3 Previous Investigations 7**
  - **2.3.1 Historical Records Searches 7**
  - **2.3.2 Previous Site Work 7**

3.0 PRE-FIELD ACTIVITIES 8
- **3.1 Coordination with State Historic Preservation Office 8**
- **3.2 Coordination Regarding Natural Resources 8**
- **3.3 Review of Historical Aerial Photographs 8**
- **3.4 Coordination of Rights of Entry 9**

4.0 SITE INSPECTION ACTIVITIES 9
- **4.1 Key Personnel 9**
- **4.2 Field Reconnaissance 10**
- **4.3 Sampling 10**
  - **4.3.1 Soil 11**
  - **4.3.2 Sediment 14**
  - **4.3.3 Groundwater 15**
  - **4.3.4 Analytical Program 16**
  - **4.3.5 Quality Assurance/Quality Control Samples 17**
  - **4.3.6 Sample Preservation, Packaging, and Shipping 17**

5.0 INVESTIGATION-DERIVED WASTE 17

6.0 PROPOSED SCHEDULE 18

7.0 REFERENCES 19

List of Figures

Figure 1	Site Layout
Figure 2	Small Arms Ranges, Range Complex No. 4
Figure 2A	Small Arms Ranges, Range Complex No. 4 – North
Figure 2B	Small Arms Ranges, Range Complex No. 4 – South
Figure 3	Small Arms Ranges, Range Complex No. 5
Figure 4	Small Arms Ranges, Range Complex No. 6
Figure 5	Small Arms Ranges, Skeet Range No. 580
Figure 6	Explosive Munitions Ranges, Range Complexes No. 1 and No. 2, and Bombing Target No. 1
Figure 6A	Explosive Munitions Ranges, Range Complexes No. 1 and 2 (Northeast)
Figure 6B	Explosive Munitions Ranges, Range Complexes No. 1 and 2 (Southeast)
Figure 6C	Explosive Munitions Ranges, Range Complex No. 2 (Southwest)
Figure 6D	Explosive Munitions Ranges, Range Complex No. 2 (Northwest)
Figure 7	Explosive Munitions Ranges, Range Complex No. 3
Figure 8	Explosive Munitions Ranges, Mortar Range
Figure 9	Explosive Munitions Ranges, Moving Target Range No. 75
Figure 10	East Live Hand Grenade Court
Figure 11	West Live Hand Grenade Court
Figure 12	Live Hand Grenade Court No. 129
Figure 13	Small Arms Ranges, Infiltration Range No. 143
Figure 14	Practice Hand Grenade Courts Nos. 125, 126, and 127

List of Tables

Table 1	Munitions Information
Table 2	Proposed Sampling Approach
Table 3	Sample Location Rationale
Table 4	Sample Decision Matrix
Table 5	Sample Designations and Analyses
Table 6	Soil Laboratory Method Quantitation Limits and Human Health Screening Values
Table 7	Groundwater Laboratory Method Quantitation Limits and Human Health Screening Values
Table 8	Laboratory Method Quantitation Limits and Ecological Screening Values for the State of Oregon Sites

List of Appendices

Appendix A	Conceptual Site Model
Appendix B	USACE Interim Guidance Document 06-05 and Safety Advisory 06-2
Appendix C	Site Safety and Health Plan Addendum

ABBREVIATIONS AND ACRONYMS

AOC	area of concern
ASR	Archives Search Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSM	Conceptual Site Model
CWM	chemical warfare materiel
DERP	Defense Environmental Restoration Program
DMM	discarded military munitions
DoD	Department of Defense
DQO	data quality objective
ºF	degrees Fahrenheit
ft	feet
FUDS	Formerly Used Defense Site
GPS	global positioning system
HRS	Hazard Ranking System
IDW	investigation-derived waste
lb	pound
mm	millimeter
MC	munitions constituents
MEC	munitions and explosives of concern
MMRP	Military Munitions Response Program
MRSPP	Munitions Response Site Prioritization Protocol
NCP	National Contingency Plan
NDAI	No Department of Defense Action Indicated
NWO	U.S. Army Corps of Engineers, Omaha District Military Munitions Design Center
OB/OD	ordnance burial/ordnance disposal
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
PA	Preliminary Assessment
PAH	polycyclic aromatic hydrocarbon
PSAP	Programmatic Sampling and Analysis Plan
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RAC	Risk Assessment Code
ROE	Right of Entry
SAP	Sampling and Analysis Plan
Shaw	Shaw Environmental, Inc.
SHPO	State Historic Preservation Office
SI	Site Inspection
SOP	Standard Operating Procedure
SSHP	Site Safety and Health Plan
SSI	Screening Site Inspection
SSWP	Site-Specific Work Plan
TCRA	time-critical removal action
TNT	trinitrotoluene
TPP	Technical Project Planning
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
UXO	unexploded ordnance
VSP	Visual Sampling Plan
Work Plan	*Final Type I Work Plan, Site Inspections at Multiple Sites*

1.0 INTRODUCTION

This Site-Specific Work Plan (SSWP) presents the information necessary to conduct field activities associated with a Site Inspection (SI) conducted at the former Camp Adair/Adair Air Force Station (referred to in this document as Camp Adair except when specifically referring to non-Army use).

1.1 Project Authorization

The U.S. Army Corps of Engineers (USACE) is conducting environmental response activities at Formerly Used Defense Sites (FUDS) in accordance with Engineer Regulation 200-3-1 (USACE, 2004a) and U.S. Department of Defense (DoD) management guidance for the Defense Environmental Restoration Program (DERP). USACE is conducting these activities under provision of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (U.S. Environmental Protection Agency [USEPA], 1992), Executive Orders 12580 and 13016, and the National Contingency Plan (NCP). As such, USACE is required to conduct Preliminary Assessments (PA) and SIs (USEPA, 2005a & b and 1992) to evaluate hazardous substance releases or threatened releases from eligible FUDS.

USACE is evaluating FUDS historically used for military training and testing under the DERP's Military Munitions Response Program (MMRP). Based on historical records, these FUDS may contain munitions and explosives of concern (MEC) or munitions constituents (MC). MEC are military munitions that may pose unique explosives safety risks, such as unexploded ordnance (UXO), discarded military munitions (DMM), or MC present in high enough concentrations to pose an explosive hazard. MC means any materials originating from UXO, DMM, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions (U.S. Department of Army, 2005, and DoD, 2003).

Shaw Environmental, Inc. (Shaw) has prepared this SSWP for the USACE, under USACE Contract No. W912DY-04-D-0010, as a supplement to the *Final Type I Work Plan, Site Inspections at Multiple Sites, NWO Region, Formerly Used Defense Sites, Military Munitions Response Program* (Work Plan) (Shaw, 2006a). Shaw is responsible for conducting SIs at FUDS in the Northwest Region (Omaha District Military Munitions Design Center [NWO]).

1.2 Site Name and Location

Camp Adair, identification number F10OR0029, is located approximately 9 miles north of Corvallis, Oregon, in Polk, Benton, and Linn Counties (Figure 1).

1.3 Scope and Objectives

The scope of the SI is restricted to evaluation of the presence of MEC or MC related to historical use of the FUDS prior to transfer of the property to non-DoD owners. Potential releases of hazardous, toxic, or radioactive wastes are not addressed within this scope. The intent of the SI is to confirm the presence or absence of contamination from MEC and/or MC. The general approach for each SI is to conduct a records review and site reconnaissance to evaluate the presence or absence of MEC, and to collect samples at locations where MC might be expected based on the conceptual site model (CSM) (Appendix A).

The primary objective of the MMRP SI is to determine whether the FUDS property warrants further response action pursuant to CERCLA and the NCP. The SI will collect the minimum amount of information necessary to (i) eliminate from further consideration those releases that pose no significant threat to public health or the environment; (ii) determine the potential need for removal action; (iii) collect or develop additional data, as appropriate, for Hazard Ranking System (HRS) scoring by the USEPA (USEPA, 1990); and (iv) collect data, as appropriate, to characterize the release for effective and rapid initiation of the remedial investigation and feasibility study process. A secondary objective of the SI is to collect the appropriate data to complete the Munitions Response Site Prioritization Protocol (MRSPP) evaluation modules (DoD, 2005).

1.4 Site Inspection Process

The steps involved in conducting an SI include:

- Review existing data;
- Participate in the Technical Project Planning (TPP) process;
- Prepare the SSWP;
- Conduct the SI field activities (site reconnaissance, media sampling, and analysis); and
- Prepare the SI Report.

The TPP process is one through which project objectives and data collection processes are identified, and site stakeholders are brought together to discuss goals and objectives. This process includes the following phases: identification of the current project area, determination of data needs, development of data collection options, and finalization of the data collection program. A multi-disciplinary team of key stakeholders attends a TPP meeting(s) in order to participate in the process so SI activities can be conducted in a timely and efficient manner.

For purposes of the MRSPP, an area of concern (AOC) may be identified as a munitions response site or several AOCs may comprise a munitions response area. This determination will be made based on the results of the SI and will be addressed in the SI Report.

1.5 TPP Summary

The TPP meeting for the Camp Adair was conducted on April 5, 2006 at the Holiday Inn Express, located at Corvallis, Oregon. This meeting included representatives from: USACE – Omaha Military Munitions Design Center, Hazardous, Toxic, and Radioactive Waste Center of Expertise, and Seattle District; Shaw; Oregon Department of Environmental Quality (ODEQ); Oregon National Guard; U.S. Forest Service; Benton County; Oregon Department of Fish and Wildlife; Polk County; Oregon State University Forestry Department; and Allied Waste.

In the TPP meeting, historical information was discussed and historical aerial photographs were reviewed. Soil, surface water, and groundwater warrant inspection to evaluate the potential presence of MEC and MC. Specific details of the TPP meeting are contained in the Final TPP Memorandum (Shaw, 2006b).

1.6 Decision Rules

The overall objective of the SI is to determine if the FUDS can be recommended for:

- No DoD Action Indicated (NDAI); or

- Additional investigation is required based on the presence of MEC or MC above risk-based screening levels.

The following project-specific data quality objectives (DQOs) and decision rules have been developed.

Objective 1: Determine if the site requires additional investigation or can be recommended for NDAI based on the presence or absence of MEC.

DQO #1 – At AOCs where MEC has not been reported in the past, trained UXO personnel will conduct a visual search of the AOCs using handheld magnetometers, searching for evidence of the presence of MEC (e.g., craters and ground scars indicative of ordnance burial/ordnance disposal (OB/OD) activities, MEC on the surface, munitions debris indicative of OB/OD activities, and soil discoloration indicative of explosives). The visual search will consist of a meandering path survey along trails and in accessible areas. The following decision rules will apply:

- If no evidence of MEC is found, the AOCs will be recommended for NDAI relative to MEC.
- If evidence of MEC is confirmed, the AOCs will be recommended for additional investigation.
- If there is indication of an imminent MEC hazard, the site may be recommended for a time-critical removal action (TCRA).

DQO #2 – At AOCs where MEC has been reported in the past (explosive munitions ranges and live hand grenade courts), the following decision rules will apply:

- The presence of MEC is confirmed on the basis of past finds, and these areas will be recommended for additional investigation following the SI.
- If, in the course of reconnaissance for sample targets and/or UXO avoidance, there is indication of an imminent MEC hazard, the site may be recommended for a TCRA.

Objective 2: Determine if the site requires additional investigation or can be recommended for NDAI based on the presence or absence of MC above screening values.

DQO#3 – Soil, sediment, and groundwater samples will be collected and analyzed. Analytical results will be compared to screening values for human health and ecological risk assessment, and to background values for naturally occurring substances. The following decision rules will apply:

- If sample results are less than human health and ecological screening values, the AOCs will be recommended for NDAI relative to MC.
- If sample results exceed both human health screening values and background values, the AOCs will be recommended for additional investigation.
- If sample results do not exceed human health screening values but do exceed both ecological screening values and background values, additional evaluation of the data will

be conducted in conjunction with the stakeholders to determine if additional investigation is warranted.

1.7 MEC Technical Approach

The technical approach is based on the Work Plan (Shaw, 2006a) and the *Formerly Used Defense Sites, Military Munitions Response Program Site Inspections, Program Management Plan* (USACE, 2005).

If MEC is found during SI field activities, the following procedures will be followed, excerpted from Interim Guidance Document 06-05 (see Appendix B for complete document):

> "a. (1) The property owner or individual granting rights of entry to the property will be notified of the hazard and advised to call the local emergency response authority (i.e., police, sheriff, or fire department). The individual will also be informed that if they do not call the local response authority within 1 hour, the individual who identified the UXO item will notify the local emergency response authority.
>
> b. (2) The local response authority will decide how to respond to the reported incident, including deciding not to respond (e.g., if the local response authority is already aware of the hazards on the property). If the local response authority decides to respond, the individual who identified the item or his designee will mark the location of the item and provide accurate location information to the emergency response authority. The individual who identified the item or his designee will generally remain in the area until the local response authority arrives, unless specifically indicated by the appropriate response authority that the individual may leave the area."
>
> "(c) Neither the U.S. Army Corps of Engineers personnel, nor their contractors have the authority to call EOD to respond to an explosive hazard. This call is the responsibility of the local emergency response authority for FUDS properties and it must come through the proper chain of command on installations."

For Camp Adair, the local response authority for landowners to report MEC finds is the Oregon State Police – the Dispatch Center phone number is 1-800-452-7888 or 503-375-3555. Property owners who discover MEC are to contact the Oregon State Police Dispatch Center, who will coordinate with other emergency responders if necessary.

1.8 SSWP Organization

This SSWP supplements the Work Plan (Shaw, 2006a), which includes an Accident Prevention Plan and Site Safety and Health Plan (SSHP, Appendix D), and a Sampling and Analysis Plan (SAP, Appendix E). The Work Plan, as amended by this SSWP, governs work that will be implemented during the SI at Camp Adair. This SSWP provides additional information not available in the Work Plan (Shaw, 2006a), including site information (background information, summary of historical documents evaluated, and resulting data needs), a discussion of activities to be conducted prior to mobilizing to the field, a presentation of field data to be collected, and appendices with supporting documents. Specifically, this SSWP includes the following sections:

- Section 1.0 Introduction
- Section 2.0 Site Information,
- Section 3.0 Pre-Field Activities,

- Section 4.0 Site Inspection Activities,
- Section 5.0 Investigation-Derived Waste,
- Section 6.0 Proposed Schedule,
- Section 7.0 References,
- Figures,
- Tables,
- Appendix A Conceptual Site Model,
- Appendix B USACE Interim Guidance Document 06-05 and Safety Advisory 06-2, and
- Appendix C Site Safety and Health Plan Addendum.

2.0 SITE INFORMATION

The following historical and physical setting information is summarized from the *Archives Search Report* (ASR) (USACE, 2001) and ASR Supplement (USACE, 2004b) for the FUDS property.

2.1 Installation History

Camp Adair was used for training of triangular (three-regiment) infantry divisions between 1942 and 1945. Training activities for four army infantry divisions included use of small arms, explosives, mortars, artillery, antiaircraft and antitank guns, and support by tanks and Army Air Forces aircraft. Other uses of the camp from 1944 to 1946 included bombing and gunnery practice for Navy/Marine pilots, a storage facility, a prisoner of war camp, and a Navy hospital. Camp Adair included a cantonment area east of Highway 99 and a live fire and maneuver area to the west. Camp Adair was declared surplus and assigned for disposition in April 1946.

During the last 2 years of training, an estimated 265,000 rounds of high explosive ammunition (37-millimeter [mm] or larger) were fired. Table 1 contains a list of the munitions and associated MC reportedly used at the AOCs.

After several years of military inactivity, the cantonment area was used as Adair Air Force Station between 1958 and 1969. Related munitions training activity was limited to use of Skeet Range No. 580 in the cantonment area (between 1955 and 1964). In 1970, the Adair Air Force Station lands were determined excess and reported to the General Services Administration for transfer.

The Oregon National Guard has used a former Army range, the Known Distance Rifle Range No. 4, over the period from 1946 to the present. This is part of a 527-acre facility in which the National Guard conducts weapons qualification and field exercises.

Over the years (and as recently as 2001), UXO has been found at the former Camp Adair, including 2.36-inch anti-tank rockets, and 60-mm, 81-mm, 105-mm, and 155-mm rounds. Locations of some of these UXO finds are plotted on Figure 1 and other AOC-specific figures.

2.2 Physical Setting

2.2.1 Access and Land Use

Camp Adair is accessed by taking Highway 99W north from Corvallis Oregon and driving approximately 9 miles.

As of 2006, property ownership of the Camp Adair area is shared by over 1,000 property owners. These owners include federal agencies (U.S. Forest Service), Oregon State agencies (Oregon State University, Parks and Recreation Department, Oregon National Guard), private industry, and private citizens. There is no controlled access to the FUDS.

2.2.2 Topography, Geology, and Climate

Topography in the area of Camp Adair is relatively flat to mountainous, variously vegetated with crops, grasses, shrubs, and trees. Elevation varies from between 200 ft to over 2,000 ft above mean sea level.

The site is located in the Oregon Coast Range section of the Pacific Border physiographic province. Soils at the site are silty, sandy clays with varying gravel content. Potential for soil erosion is severe in some areas. Potential frost depths extend to 24 inches. Bedrock consists of Tertiary submarine lavas and marine sediments. Alluvial deposits of silts and pebbly sands with lenses of gravel overlie bedrock in the valleys of the Luckiamute River and tributary streams.

Camp Adair is in the Willamette Valley, with the Coast Range on the west and the Cascade Range on the east. The annual rainfall of the area averages 35 to 40 inches. Most of the precipitation occurs during November to March. In the immediate area, there are only 3 or 4 days a year with measurable amounts of snow. The mean average daily temperature is 61 degrees Fahrenheit (ºF) in the summer and 42 ºF in the winter.

2.2.3 Groundwater

Shallow groundwater within the site is generally within one of two hydrogeologic units: the basement confining unit (bedrock) in upland areas, characterized by low permeability, porosity, and well yield; and the Willamette silt unit, characterized by high porosity but low permeability and well yield, although it may be a significant source of recharge to underlying units (Conlon et al., 2005). In lowland areas, groundwater discharges to streams. During wet winter months, this may be a relatively small component of the total stream flow, but in dry summers groundwater is the main component of stream flow (Conlon et al., 2005). Domestic water supply wells located throughout the site typically tap the basement confining unit (bedrock). Depths range from 50 feet (ft) or less to several hundred feet. In many cases, well records indicate that the well bores are uncased through most of the bedrock interval. Static water levels are generally from 10 to 40 ft below ground surface.

2.2.4 Surface Water

The site is located within the Upper Willamette watershed and is drained in a generally eastern direction by tributaries of the Willamette River. The Luckiamute River, which is the largest surface water feature flowing through the area of the former Camp Adair, is characterized by relatively high flows in winter months (generally 500 to 2000 cubic feet per second), with low

summer flows. A hydrogeologic map and cross sections of the area were provided in the TPP Memorandum (Shaw, 2006b). Surface water and groundwater are the primary sources of water for various public water systems in the area. The Adair Village water system uses surface water from the Willamette River; the Monmouth water system uses groundwater.

2.3 Previous Investigations

2.3.1 Historical Records Searches

Historical documents reviewed for information about Camp Adair include:

- ASR, USACE, 2001;
- ASR Supplement, USACE, 2004; and
- Screening Site Inspection of Camp Adair, Corvallis Oregon, URS Consultants, 1996.

2.3.2 Previous Site Work

In 1992, USACE completed an Inventory Project Report for Camp Adair, identifying a potential hazard from ordnance at the FUDS.

In 1996, a Screening Site Inspection (SSI) for Camp Adair was completed for the USEPA by URS Consultants (URS, 1996). The SSI focused on the sediment pathway. The SSI concluded that there were no impacts to sediments from Camp Adair activities. The data contained in the SSI report were reviewed for use in this SI. The data were collected in April 1996 and may not meet the contract required detection limits. In addition, the data have limited value without additional data backup. The analytical reports provided in the appendix that contain the complete analytical results do not use the same sample numbers as reported in the main text of the document. No cross reference key provided in the report to equate the different sample numbers.

USACE issued an ASR in 2001, which compiled available information for Camp Adair with emphasis on types, quantities, and areas of ordnance use and disposal.

An ASR Supplement, completed in 2004, identified specific AOCs.

A Risk Assessment Code (RAC) scoring was conducted by USACE in 2004. Possible scores range from 5 (no risk) to 1 (high risk). The following table summarizes the RAC determinations for the AOCs and indications of whether MEC has been found at these AOCs since the end of Army training:

AOC	RAC Score	MEC Found
Skeet Range No. 580	5	No
Practice Grenade Court No. 120	4	No
Practice Grenade Court No. 121	4	No
Practice Grenade Court No. 122	4	No
Practice Grenade Court No. 125	4	No
Practice Grenade Court No. 126	4	No
Practice Grenade Court No. 127	4	No
Infiltration Range No. 143	2	No
Chemical Identification Area No. 182	1	No
East Live Hand Grenade Court	3	Yes
West Live Hand Grenade Court	3	No
Live Hand Grenade Court No. 129	3	Yes
Bombing Target No. 1	3	No
Mortar Range	2	Yes
Moving Target Range No. 75	3	Yes
Range Complex No. 1	2	Yes
Range Complex No. 2	1	Yes
Range Complex No. 3	3	No
Range Complex No. 4	5	No
Range Complex No. 5	5	No
Range Complex No. 6	5	No

3.0 PRE-FIELD ACTIVITIES

3.1 Coordination with State Historic Preservation Office

The State Historic Preservation Office (SHPO) was contacted to determine if any areas of cultural or archaeological significance have been identified in or in proximity to the AOCs at Camp Adair. The OR SHPO identified several areas within the project area where some archaeological sites were identified and other cultural resources may be present. In order to protect any sensitive resources that may be present within the AOCs, an archaeological consultant will accompany the field team.

3.2 Coordination Regarding Natural Resources

The Oregon Department of Natural Resources, as well as the Oregon Department of Fish and Wildlife (ODFW), was contacted to identify any potentially impacted threatened or endangered species in the area. The ODFW indicated there was no impact to threatened or endangered wildlife species in the area (ODFW, 2006). The Oregon Department of Agriculture is currently determining whether there are any threatened or endangered plant species in the area.

3.3 Review of Historical Aerial Photographs

The historical aerial photographs of Camp Adair have been reviewed and interpreted prior to field mobilization to aid in site reconnaissance and to refine proposed sampling point locations.

3.4 Coordination of Rights of Entry

The USACE Seattle is the geographic USACE District office responsible for Camp Adair and for obtaining the Rights of Entry (ROEs) for properties where SI activities will be performed. Access to identified property is necessary for conducting field activities. ROEs have been obtained for nearly all properties identified for sampling. It is anticipated that the remaining ROEs will be obtained prior to commencement of field work. If the remaining ROEs cannot be obtained, then nearby alternate sampling locations will be identified.

4.0 SITE INSPECTION ACTIVITIES

SI field activities to be conducted at Camp Adair include:

- Site reconnaissance;
- Soil sampling;
- Sediment sampling;
- Groundwater sampling;
- Sampling and site information recording (using a hand-held global positioning system [GPS] unit); and
- Photo documentation.

SI field activities will be conducted in accordance with the SSHP Addendum (Appendix C). The SSHP Addendum is an addendum to the program-wide Accident Prevention Plan and SSHP contained in the Work Plan (Shaw, 2006a). SI field activities will be documented in the field log book.

4.1 Key Personnel

This section identifies key project personnel and their specific roles and responsibilities for the SI conducted at Camp Adair. Additionally, this section defines the responsibilities, authority, and the interrelationships of personnel who manage, perform, and verify activities affecting quality, particularly for personnel who need the organizational freedom and authority to:

- Initiate action to prevent the occurrence of non-conformance,
- Identify and record quality problems,
- Initiate, recommend, or provide solutions through designated channels,
- Verify the implementation of solutions, and
- Control further processing, delivery, or installation of non-conforming items until the deficiency or unsatisfactory condition has been corrected.

Project Manager – The Shaw Project Manager will have overall responsibility, authority, and accountability for the project. Mr. Peter Kelsall is the Project Manager. He will provide management or technical support when needed and will serve as the final reviewer on all technical documents produced for the project.

Chemical Quality Control Officer– The Shaw Chemical Quality Control Officer shall ensure that chemistry-related objectives, including responsibilities for data quality objective definitions, sampling and analysis, project requirements for data documentation and validation, and final project reports are attained. Mr. Tim Roth will serve as the Chemical Quality Control Officer for this project.

Health and Safety Manager – The Shaw Health and Safety Manager is responsible for the development and implementation of the SSHP Addendum for this SI. Ms. Pamela Moore will serve as the Health and Safety Manager for this project.

Technical Lead – The Shaw Technical Lead will oversee the technical aspects of the inspection activities. Mr. Dale Landon will serve as the Technical Lead for this site.

Field Team Leader – The Shaw Field Team Leader will be responsible for the management and execution of all field project activities in accordance with the approved Work Plan, and federal, state, and local laws and regulations. The Field Team Leader is Mr. Garrick Anderson . During field work, the Field Team Leader will function as the primary point of contact for the stakeholders and field personnel. He will advise the Technical Lead of technical progress, needs, potential problems, and recommended solutions.

UXO Technician – The UXO technician will be responsible for the UXO avoidance measures to be implemented during field activities. Mr. Braden Livingstone, USACE database number 1227, will serve as the UXO technician on this site.

4.2 Field Reconnaissance

A visual reconnaissance of the Camp Adair AOCs shown on Figures 2 through 12 will be conducted to identify evidence of MEC, range activities, and/or clearance for soil sampling. The reconnaissance team will locate and stake the proposed sampling locations.

The following conditions at each planned sampling location will be documented/recorded in the field log book and/or by digital photographs:

- Presence or absence of MEC/lead shot or munitions debris;
- Ground conditions, especially features that may be indicative of munitions activities;
- Coordinates of staked sampling locations (using a hand-held GPS unit);
- Access limitations;
- Vegetative cover;
- Soil conditions;
- Presence or absence of water for sediment and surface water samples; and
- Other conditions encountered that impact sample collection.

The path walked during the visual reconnaissance will be recorded using a hand-held GPS unit. If GPS recordings are not possible due to interference from trees or topography, the survey route will be hand plotted on a map during the survey. Reconnaissance will be supplemented by the use of hand-held magnetometers, but not to include detailed mapping.

Shaw will document any MEC found, and proceed with MC sampling as described in the following sections.

4.3 Sampling

This SSWP details sampling to be conducted, by media, at Camp Adair as agreed upon during the April 2006 TPP meeting and amended in response to comments received on the Draft TPP Memorandum. Table 2 shows the proposed sampling and Table 3 provides a summary of the sampling location rationale.

If site reconnaissance indicates the need for additional samples to be taken, the total number of samples can be increased in order to determine MC present in an area. If site conditions preclude locating or collecting samples as described in the following sections, the decision matrix presented in Table 4 will be used.

Background samples will be collected at the locations shown on Figures 2 through 14. Background samples will be collected for soil (10 samples), sediment (3 samples), and groundwater (3 samples). The selection of the soil background locations was aided by Visual Sampling Plan (VSP). VSP is a computer software program that allows for an independent sampling location selection across a designated area. The area provided to the VSP software was all areas not included in a known AOC. After VSP identified potential sampling locations, the locations were adjusted by hand to place the background sample location on a property that the USACE has a signed ROE. Background sediment sampling locations are selected from locations within stream channels upstream of sediment sampling locations. Background groundwater sampling locations are from groundwater wells interpreted to be upgradient of source areas.

4.3.1 Soil

Surface soil sample locations identified for this SI (Table 5) are designed to identify the presence of MC associated with past military activities. The soil samples will be collected from the upper 6 inches of soil following removal of the vegetative cover, or deeper if site conditions indicate material has been deposited since the area was used for military activities. Surface soil samples will be 7-point composite samples, collected in accordance with the Shaw Standard Operating Procedure (SOP) T-FS-101, and the procedure described in Section 6.1.3 of Appendix E in the Work Plan. Each soil sample to be analyzed for lead only will be sieved by the laboratory with a #10 sieve prior to analysis and the number of lead fragments counted and recorded. Sample designations and quality assurance/quality control (QA/QC) sample requirements are summarized in Table 5.

The general rationale for collection of soil samples at the Camp Adair AOCs are presented below:

- **Small Arms Ranges (Range Complex Nos. 4, 5, and 6 and Skeet Range No. 580) (Figures 2 through 5)** – Soil samples will be collected from the ground surface to assess the presence of lead related to small arms bullet fragments and shot from skeet loads and skeet targets from the skeet range.
    - **Range Complex No. 4 (Figures 2, 2A, and 2B):** Soil samples will be collected from Known Distance Rifle Ranges Nos. 1, 2, and 3, Close Combat Course No. 170, Thompson Sub MG Range No. 50A, Anti-aircraft Range No. 70, Field Combat Range No. 81, and Transition Course No. 160. The soil sample to address the Known Distance Rifle Range No. 1 will be collected southwest of Tampico Road to assess impacts of over shoots during rifle training. Soil samples to address Known Distance Rifle Ranges Nos. 2 and 3 will be collected near the location of the target backstop berm (the berm soil may have been spread out over ground surface during development of the area for residences) where lead bullets (if present) may be found to address accumulation of former target backstop berm. Soil samples associated with the Close Combat Course No. 170 Skeet Ranges (Figure 2A) will be collected from hillside along the back of the course to assess lead contamination. The soil

sample to be collected from the Thompson Sub MG Range No. 50A will be collected based on visual reconnaissance of the suspected target areas to lead accumulation near the target areas. The soil sample collected from the Anti-Aircraft Range No. 70 will be collected approximately 6,000 – 7,000 ft down range from the firing position. This distance is within the maximum range of the .30- and .50-caliber ammunition used on this range. The soil sample collected from Field Combat Range No. 81 will be located approximately 7,000 ft down range to assess lead accumulation. The sample collected from Transition Course No. 160 will assess the accumulation of lead in the areas of targets located between 450 and 1,500 ft down range of the firing positions.

- **Range Complex No. 5 (Figure 3):** Four soil samples will be collected from five ranges: 1,000-inch MG Range No. 20, 21, 22, and 23; 1,000-inch Anti Tank Range No. 45 and 46; 1,000-inch Anti Tank Range No. 40 and 41; 1,000-inch Pistol Range No. 15; and 1,000-inch Landscape Range No. 35, 36, and 37. Four samples will be collected from approximately 1,000 inches (83.3 ft) from the firing lines for these ranges. Prior to choosing sampling locations, a visual reconnaissance will be completed to locate the target areas. A sample from the 1,000-inch Pistol Range No. 15 cannot be collected due to ROE refusal by the property owner. All samples will be collected to assess the accumulation of lead at the target areas.
- **Range Complex No. 6 (Figure 4):** Four soil samples will be collected from four ranges: 1,000-inch Landscape Range No. 11; 1,000-inch Landscape Range No. 30, 31, and 32; 1,000-inch Landscape Range No. 33; and 1,000-inch Landscape Range No. 34; Soil samples will be collected from approximately 1,000 inches from the firing line. Prior to choosing sampling locations a visual reconnaissance will be completed to locate the target areas. All samples will be collected to assess the accumulation of lead at the target areas.
- **Skeet Range No. 580 (Figure 5):** Three soil samples will be collected from the Skeet Range used by the Air Force. One sample will be collected from directly in front of the firing point at approximately 100 ft. The remaining two samples will be collected at approximately 500 ft down range. Samples will be collected to assess lead shot and polyaromatic hydrocarbons (PAHs, from clay targets) in the soil.

- **Explosive Munitions Ranges (Range Complex Nos. 1, 2, and 3, Bombing Target No. 1, Mortar Range, and Moving Target Range No. 75) (Figures 6 through 9)** – Soil sampling will be collected from the ground surface to assess the presence of explosives and metals related to explosive munitions
  - **Range Complex No. 1 (Figures 6A and 6B):** Two soil samples each will be collected from the Fortified Training Area No. 76 and Bombing Target No. 2. One of the soil samples collected from the Fortified Training Area No. 76 will be located near the fortified bunkers in the ASR Supplement. The second sample will be located in or near a crater that was also referenced in the ASR Supplement. The two samples collected from the Bombing Target No. 2 will be located south of the target location. Samples from the target location cannot be collected do to ROE refusal by the property owner. Samples will be used to assess explosives and metals in soils.

- **Range Complex No. 2 (Figures 6, 6A, 6B, 6C, and 6D):** Seven soil samples will be collected from Range Complex No. 2 at sub-ranges Moving Target Range Nos. 79A and 79B, and Field Combat Range Nos. 84A, 86, 87, 88, and 89B. Soil samples will be collected to assess MC impacts from explosives and metals. Soil samples will be located based on field visual reconnaissance to locate craters, targets, or other evidence of training activity.
- **Bombing Target No. 1 (Figures 6 and 6A):** One soil sample will be collected from Bombing Target No. 1 to assess explosive and metals MC impacts. The soil sample will be located based on field visual reconnaissance to locate craters, targets, or debris indicative of bombing activity. Note that this soil sample also addresses a data gap for Field Combat Range No. 88 discussed above.
- **Range Complex No. 3 (Figure 7):** Two soil samples will be collected from Field Combat Range No. 89 and one soil sample each will be collected from Field Combat Ranges Nos. 89A and 89C. Soil samples will be collected to assess MC impacts from explosives and metals. Soil samples will be located based on field visual reconnaissance to locate craters, targets, or other evidence of training activity.
- **Mortar Range (Figure 8):** Two soil samples will be collected from the Mortar Range to assess MC impacts from explosives and metals. Soil samples will be located based on field visual reconnaissance to locate craters, targets, or other evidence of training activity.
- **Moving Target Range No. 75 (Figure 9):** Two soil samples will be collected from the Moving Target Range No. 75 to assess MC impacts from explosives and metals. Soil samples will be collected near the 1,000- and 1,500-yard down range target rail locations.

- **Live Hand Grenade Courts (Figures 10, 11, and 12):** (East Live Hand Grenade Court, West Live Hand Grenade Court, and Live Hand Grenade Court). Soil sampling will be collected from the ground surface to assess the presence of explosives and metals related to explosive munitions. One soil sample will be collected from each live hand grenade court. Samples will be analyzed for explosives and metals.
- **Background Soil Samples (Figures 2 through 14):** Ten background soil samples will be collected from property within the Camp Adair FUDS that is not within an identified AOC. The locations were selected using VSP and hand adjusted to locations within properties having a signed ROE. Background soil samples will be analyzed for total metals.

In accordance with the TPP Memorandum, no samples will be collected from the Practice Grenade Courts or the Chemical Identification Area No. 182.

Soil samples will be collected using clean, new disposable sampling equipment (spoon or scoop and bowl). Non-disposable tools, such as a spade, shovel, or trowel, may be used to remove vegetation and roots prior to collection of soil or sediment samples.

4.3.2 Sediment

Sediment samples will be collected in accordance with Section 5.1.2 or 5.1.3 of the *USACE Programmatic Sampling and Analysis Plan* (PSAP) (USACE, 2005). Section 5.1.2 pertains to dry sediment sampling and Section 5.1.3 describes wet sediment sampling procedures. Sediments will be sampled from the upper 2 inches of exposed sediments. Sediment samples will be collected at locations shown on Figures 2 through 12. Sample designations and QA/QC sample requirements are summarized in Table 5.

The general rationale for collection of sediment samples at the Camp Adair AOCs are:

- **Small Arms Ranges (Range Complex Nos. 4, 5, and 6 and Skeet Range No. 580) (Figures 2, and 2A)** – Sediment samples will be collected from the stream bottom to assess the presence of lead related to small arms bullet fragments. One sediment sample will be collected from Range Complex No. 4 (the largest small arms range complex). The sample will be collected along Berry Creek near the northeast boundary of Range Complex No. 4. The sample will be analyzed for lead only to assess impacts from small arms use in Range Complex No. 4.
- **Explosive Munitions Ranges (Range Complex Nos. 1, 2, and 3, Bombing Target No. 1, Mortar Range, and Moving Target Range No. 75) (Figures 6 through 9)** – Eight sediment samples will be collected from stream bottoms to assess the presence of explosive and metal MC in stream bottoms.
    - **Range Complex No. 1 (Figures 6 and 6B):** One sediment sample each will be collected from the Fortified Training Area No. 76 and Bombing Target No. 2. The sample collected form the Fortified Training Area No. 76 will be collected along an intermittent stream located south of Simpson Road. This intermittent stream drains a large portion of the training area. The sediment sample collected within Bombing Target No. 1, will be collected from a stream that drains the target area. Both samples will be analyzed for explosives and metals.
    - **Range Complex No. 2 (Figures 6, 6A, 6B, 6C, and 6D):** Two sediment samples will be collected from this range complex. One sample will be collected from Luckiamute River located within Field Combat Range Nos. 84A, 87A, and 87B. The second sediment sample from this range complex will be collected from the Luckiamute River within Hemlick State Park. This sample is a downstream sampling location that will assess impacts from all ranges within the Luckiamute River drainage. This includes Range Complex Nos. 1, 2, and 3. Samples will be analyzed for explosives and metals.
    - **Bombing Target No. 1 (Figures 6 and 6A):** One sediment sample will be collected from Bombing Target No. 1 to assess explosive and metals MC impacts. The sediment sample will be located along an intermittent stream near where it crosses Elkins Road. This location will monitor stream sediments originating from the primary target area for Bombing Target No. 1. The sample will be analyzed for explosives and metals.
    - **Range Complex No. 3 (Figure 7):** One sediment sample will be collected from Range Complex No. 3 to assess explosive and metals MC impacts. The sediment sample will be located along an intermittent stream within Field Combat Range

No. 89. This location will monitor stream sediments originating from this field combat range. The sample will be analyzed for explosives and metals.

- **Mortar Range (Figure 8):** One sediment sample will be collected from the Mortar Range to assess MC impacts from explosives and metals. The sediment sample will be collected along Soap Creek near the northern boundary (downstream) of the Mortar Range. The sample will be analyzed for explosives and metals.
- **Moving Target Range No. 75 (Figure 9):** One sediment sample will be collected from this range to assess MC impacts from explosives and metals. The sediment sample will be collected along Staats Creek near the northern boundary (downstream) of the range. Samples will be analyzed for explosives and metals.

- **Live Hand Grenade Courts (Figure 10):** (East Live Hand Grenade Court, West Live Hand Grenade Court, and Live Hand Grenade Court). One sediment sample will be collected from the intermittent stream that flows through the northeastern portion of the East Live Hand Grenade Court. The sample will assess MC impacts from explosives and metals.
- **Background Sediment Samples (Figures 2, 2A, 6, and 6D):** Three background sediment samples will be collected to assess sediment conditions in streams not impacted by FUDS activities. One background sample will be collected from the Little Luckiamute River upstream from Field Combat Range No. 89B. One sample will be collected from the Luckiamute River near Minnie Ritner Reuter State Park (location is west of Camp Adair and not shown on figure). The third sediment background sample will be collected from the upper reaches of Berry Creek within state forest land. All three locations are upstream from known FUDS AOCs. All three samples will be analyzed for metals only.

In accordance with the TPP Memorandum, no samples will be collected from the Practice Grenade Courts or the Chemical Identification Area No. 182.

Sediment samples will be collected using clean, new disposable sampling equipment (spoon or scoop and bowl). Non-disposable tools, such as a spade, shovel, or trowel, may be used to remove vegetation and roots prior to collection of soil or sediment sample.

4.3.3 Groundwater

Groundwater samples will be collected in accordance with Section 5.3.4 of the PSAP. Other general procedures described in the Work Plan and identified SOPs regarding activities such as field documentation, chain-of-custody, sample labeling, shipping, and packaging, and equipment decontamination will be followed as applicable. Groundwater samples will be collected from wells shown on Figures 2 through 12. Sample designations and quality assurance/quality control (QA/QC) sample requirements are summarized in Table 5.

The general rationale for collection of groundwater samples at the Camp Adair AOCs are:

- **Small Arms Ranges (Range Complex Nos. 4, 5, and 6 and Skeet Range No. 580) (Figures 2, 2A, 2B, 3, and 4):** Groundwater samples will be collected from one well

each in Range Complex Nos. 4, 5, and 6. No groundwater samples will be collected from the skeet range. Groundwater samples will be collected from domestic wells screened in the uppermost water bearing zone and located downgradient of the AOC. Selection of wells to be sampled will be completed once well records and ROEs have been reviewed. Groundwater samples collected from the small arms ranges will be analyzed for lead. Some munitions used at Range Complex Nos. 4 and 5 contained perchlorate-containing fillers (.50-caliber tracer rounds) and perchlorate analysis will be included in the laboratory analysis.

- **Explosive Munitions Ranges (Range Complex Nos. 1, 2, and 3, Bombing Target No. 1, Mortar Range, and Moving Target Range No. 75) (Figures 6 through 9):** One groundwater sample will be collected from each of the AOCs except for Range Complex No. 2 where two groundwater samples will be collected. Groundwater samples will be collected from domestic wells screened in the uppermost water bearing zone and located downgradient of the AOC. Selection of wells to be sampled will be completed once well records and ROEs have been reviewed. Groundwater samples collected from the Explosive Munitions Ranges will be analyzed for explosives, metals, and perchlorate. Some munitions used at the explosive munitions ranges contained perchlorate containing fillers (e.g., .50-caliber tracer rounds, 2.36-inch rockets) and perchlorate analysis will be included in the laboratory analysis.
- **Background Groundwater Samples:** Three background groundwater samples will be collected to assess general groundwater conditions not impacted by FUDS activities. Selection of wells to be sampled will be completed once well records and ROEs have been reviewed. All three locations will be upgradient from known FUDS AOCs. All three samples will be analyzed for dissolved metals and perchlorate.

In accordance with the TPP Memorandum, no groundwater samples will be collected from the Live Hand Grenade Courts, Practice Grenade Courts, or the Chemical Identification Area No. 182. Groundwater within the Camp Adair FUDS will be evaluated using 10 groundwater samples collected from domestic wells located throughout the FUDS. While the groundwater within each AOC is not sampled, the samples to be collected provide adequate coverage to address groundwater data gaps for Camp Adair.

Groundwater samples will be collected using clean, new disposable sampling equipment (e.g., tubing).

4.3.4 Analytical Program

Samples will be analyzed using EPA SW-846 methodology as presented in Section 5.0 of the NWO FUDS Quality Assurance Project Plan (QAPP).

Definitive target analyses include the following:

- Aluminum, antimony, barium, cadmium, chromium, copper, iron, lead, magnesium, manganese, molybdenum, nickel, strontium, titanium, and zinc by EPA SW-846 Method 6020A;
- Mercury by EPA Method SW-846 7470A/7471A;
- Aqueous Explosives by EPA SW-846 Method 8330A;

- Soil Explosives by EPA SW-846 Method 8330A;
- PAHs by EPA SW-846 Method 8270C Low Level; and
- Perchlorate by EPA SW-846 Method 8321A (Modified).

Tables 6 through 8 compares laboratory target analyte method quantitation limits to screening levels. Chemical data will be reported via a hard-copy data package and electronic format following the requirements referenced in Section 7.1 and 7.2 of the NWO FUDS QAPP. These data deliverables will be validated in accordance to the requirements referenced in Section 8.2 of the NWO FUDS QAPP.

4.3.5 Quality Assurance/Quality Control Samples

In accordance with the USACE Programmatic SAP, QA/QC samples will be collected. The locations planned for the collection of QA/QC samples are shown on Table 5.

The QC samples to be collected include four field duplicate samples and three matrix spike/ matrix spike duplicate samples. The Omaha Design Center has directed that QA field split samples will not be collected for this site.

4.3.6 Sample Preservation, Packaging, and Shipping

Sample preservation, and packaging are provided in Table 4-1 and Table 4-2 of the NWO FUDS QAPP (USACE, 2005). Sample shipment will follow the procedures specified in Section 4.0 of the NWO FUDS QAPP. Completed analysis request/chain of custody records per Section 7.1.3 of the NWO FUDS SAP (USACE, 2005) will be secured and included with each shipment of coolers to GPL Laboratories, LLC.

All samples will be shipped to the following:

GPL Laboratories, LLC

7210A Corporate Court
Frederick, MD 21703
Phone: 301.694.5310
Fax: 301.620.0731
Attention: Sample Receiving/Virginia Zusman

5.0 INVESTIGATION-DERIVED WASTE

Investigation-derived waste (IDW) will be managed in accordance with the Work Plan (Section 3.7, and Appendix E, SAP Section 9.0). All IDW is presumed non-hazardous unless field observations indicate otherwise. The following types of IDW will be managed as specified in the Work Plan, Appendix E, USACE Field Sampling Plan:

- Personal protective equipment and disposable equipment (i.e., disposable sampling scoop): Bagged and routed to a municipal landfill;
- Excess surface soil and sediment material: Returned to source (i.e., ground surface);
- Subsurface soil: Returned to source (i.e., borehole and/or ground surface); and
- Groundwater, surface water, and decontamination fluid: Poured onto ground surface.

6.0 PROPOSED SCHEDULE

The proposed schedule for field activities and reporting is provided below. The timing of the field activities assumes there will be no delays because of inclement weather.

July 21 – Submittal of Draft SSWP;

August 2006 – Review of SSWP by USACE and ODEQ (30 days);

August 2006 – Submittal of Final SSWP;

August 2006 – Field activities;

November 2006 – Submittal of Draft SI Report;

December 2006 – Review of Draft SI Report;

January 2007 – Submittal of Draft Final SI Report;

January 2007 – Review of Draft Final SI Report; and

January 2007 – Submittal of Final SI Report.

7.0 REFERENCES

Department of Defense (DoD). 2003. *Definitions Related to Munitions Response Actions*, Memorandum, Philip W. Grone. December 18, 2003.

DoD. 2005. *Munitions Response Site Prioritization Protocol, Final Rule*, 32 CFR Part 179, 70 FR 192. October 5, 2005.

Oregon Department of Fish and Wildlife (ODFW). 2006. Email correspondence from C. Bruce (ODFW) to D. Landon (Shaw). Subject: Impacts on T&E Species at former Camp Adair. August 11, 2006.

Shaw Environmental, Inc. (Shaw). 2006a. *Final Type I Work Plan, Site Inspections at Multiple Sites, NWO Region*. Prepared for U.S. Army Corps of Engineers. February 2006.

Shaw. 2006b. *Final Technical Project Planning Memorandum, Camp Adair/Adair Air Force Station, F10OR0029*. Prepared for U.S. Army Corps of Engineers. July 2006.

URS Consultants, Inc. (URS). 1996. *Screening Site Inspection for Camp Adair, Corvallis, Oregon, CERCIS ID No. OR0001097161*. Prepared for USEPA, Region 10. August 26, 1996.

U.S. Army Corps of Engineers (USACE) - St. Louis District. 2001. *Archives Search Report, Findings, Camp Adair/Camp Adair Air Force Station, Polk, Benton, and Linn Counties, Oregon*. September 2001.

USACE. 2004a. *Environmental Quality Formerly Used Defense Sites (FUDS) Program Policy*, Engineer Regulation (ER) 200-3-1. 10 May 2004.

USACE - St. Louis District. 2004b. *ASR Supplement*. November 2004.

USACE. 2005. *Formerly Used Defense Sites (FUDS) Military Munitions Response Program (MMRP) Site Inspections, Program Management Plan.* February 2005.

U.S. Department of Army. 2005. *Munitions Response Terminology*, Memorandum, Raymond J. Fatz. April 21, 2005.

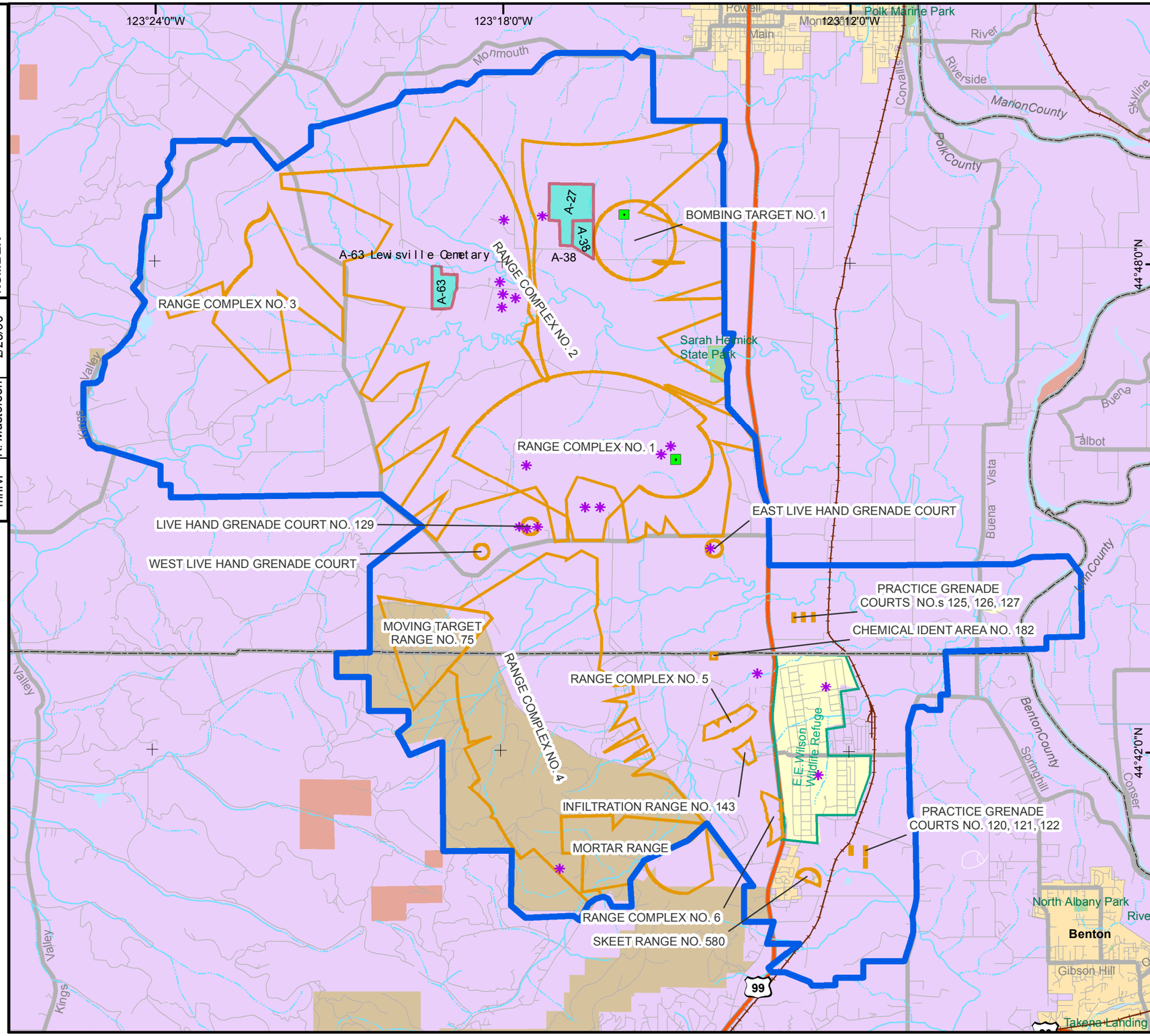
U.S. Environmental Protection Agency (USEPA). 1990. *Appendix A to Part 300 – The Hazard Ranking System*, Title 40 CFR Part 300, 55 FR 51583. 14 December 1990.

USEPA. 1992. *Guidance for Performing Site Inspections Under CERCLA, Interim Final*, EPA540-R-92-021. Directive 9345.1-05. September 1992.

USEPA. 2005a. *Federal Facilities Remedial Preliminary Assessment Summary Guide*. July 21, 2005.

USEPA. 2005b. *Federal Facilities Remedial Site Inspection Summary Guide*. July 21, 2005.

FIGURES



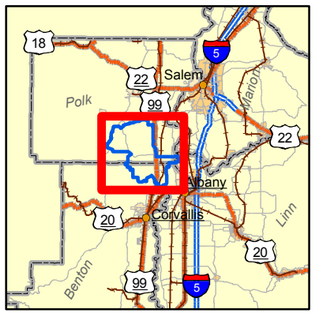
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Impact Areas
- State
- Privately Owned Land
- Bureau of Land Management
- Reported MEC Find
- Target Center

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

N

0 0.5 1 2 Miles



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 1

SITE LAYOUT

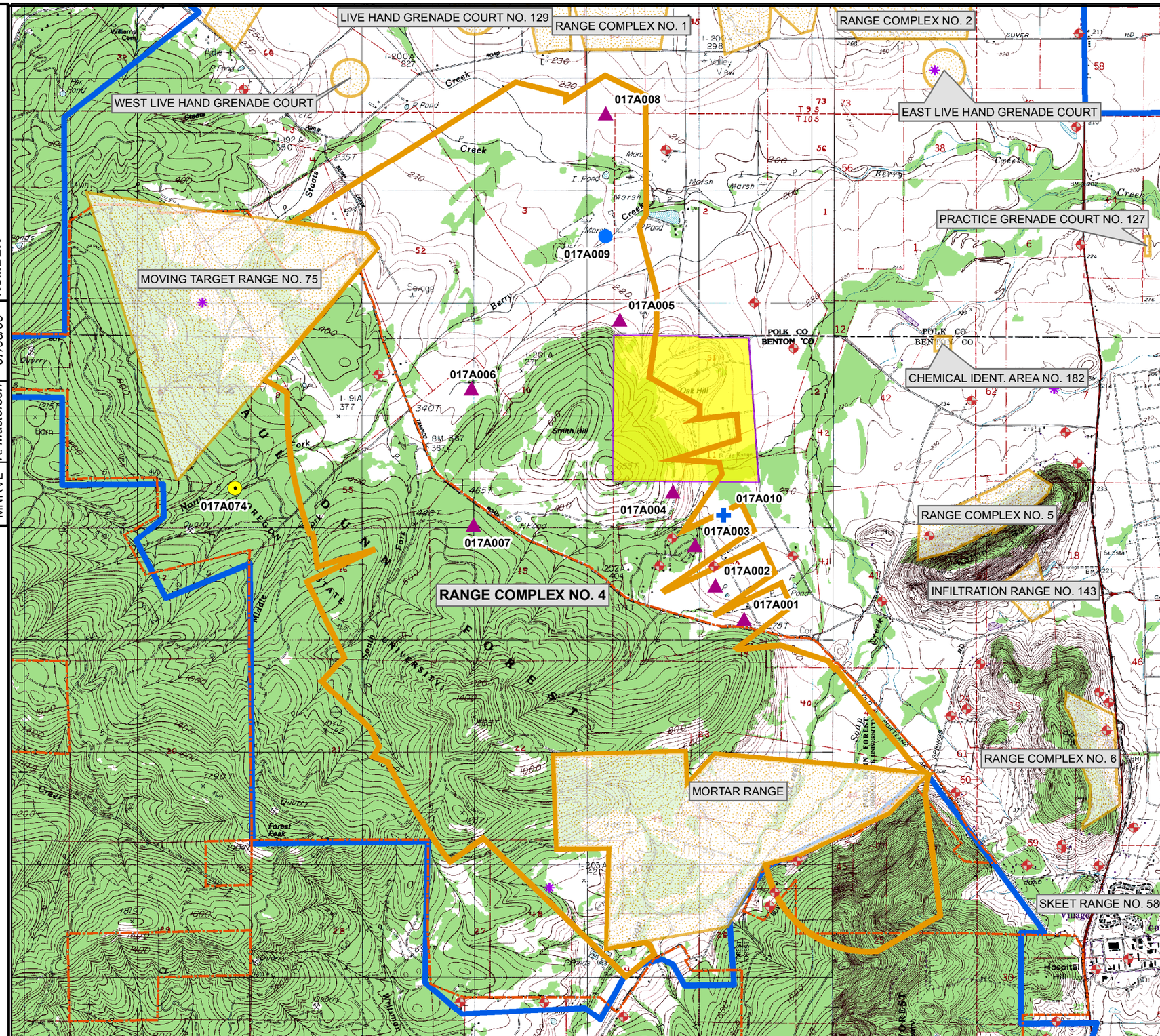
CAMP ADAIR

Shaw Environmental, Inc.

200-1e

E10OR002908_01.14_0500_a

OFFICE	DRAWN BY		DRAWING NUMBER
mnrvl	K. Masterson	2/28/06	CampAdair_001_fig01_siteLayout



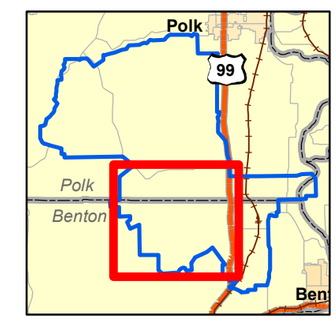
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Public Land (2003)
- National Guard Facility
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location
- Proposed Groundwater Sample Location
- Proposed Background Sediment Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

N

0 3,000 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

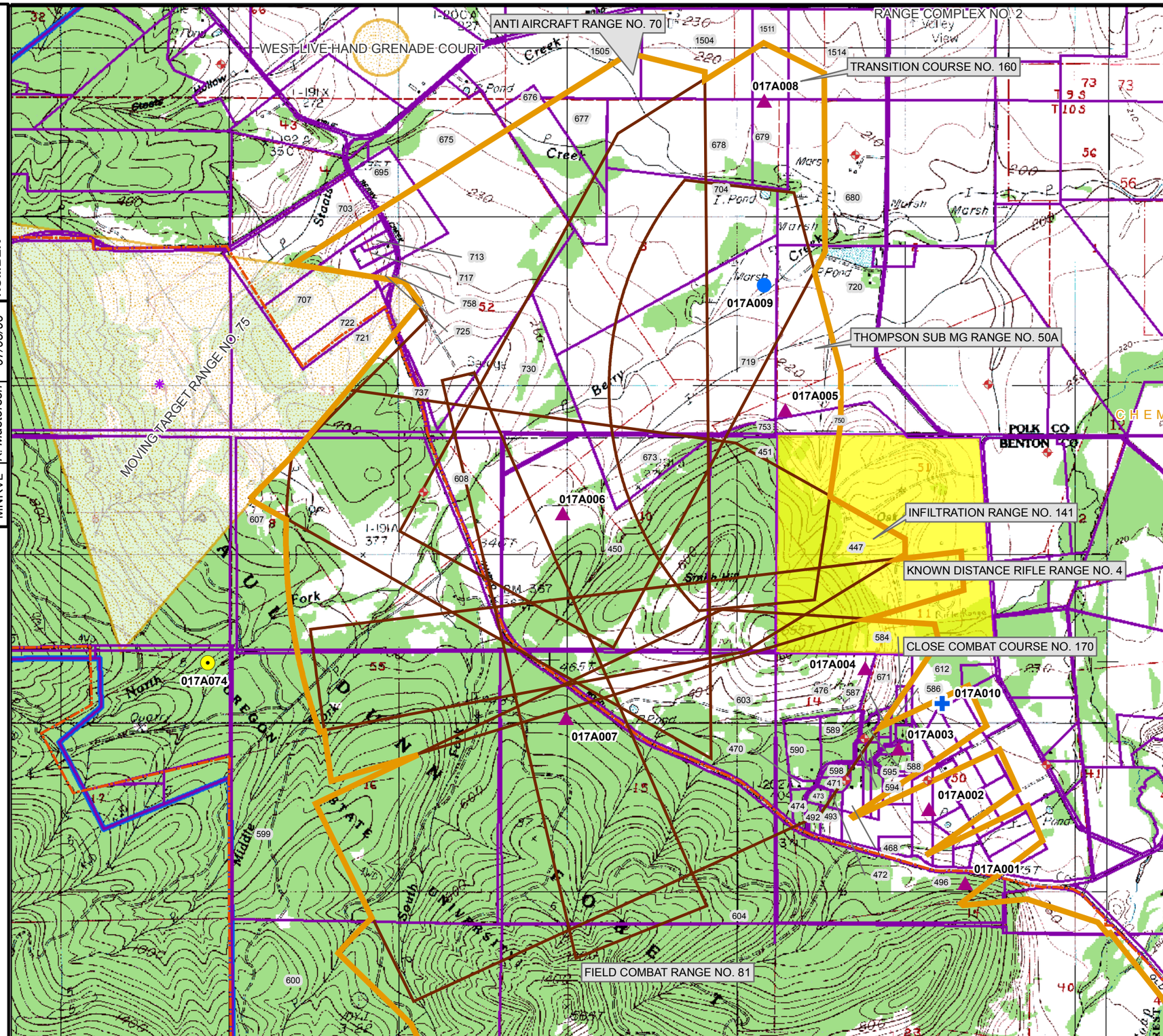
U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 2
SMALL ARMS RANGES
RANGE COMPLEX NO. 4
CAMP ADAIR

Shaw® Shaw Environmental, Inc.

200-1e
F10OR002908_01.14_0500_a

OFFICE	DRAWN BY	DRAWING NUMBER
MNRVL	K. Masterson 07/05/06	CampAdair_047_RC4_SSWP

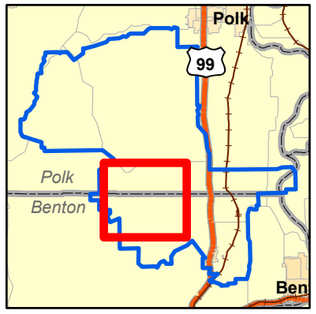


Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Parcel
- National Guard Facility
- Public Land (2003)
- Target Center (1944 Air Photo)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location
- Proposed Groundwater Sample Location
- Proposed Background Sediment Sample Location

NOTES:
1) AOC Boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

0 2,000 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

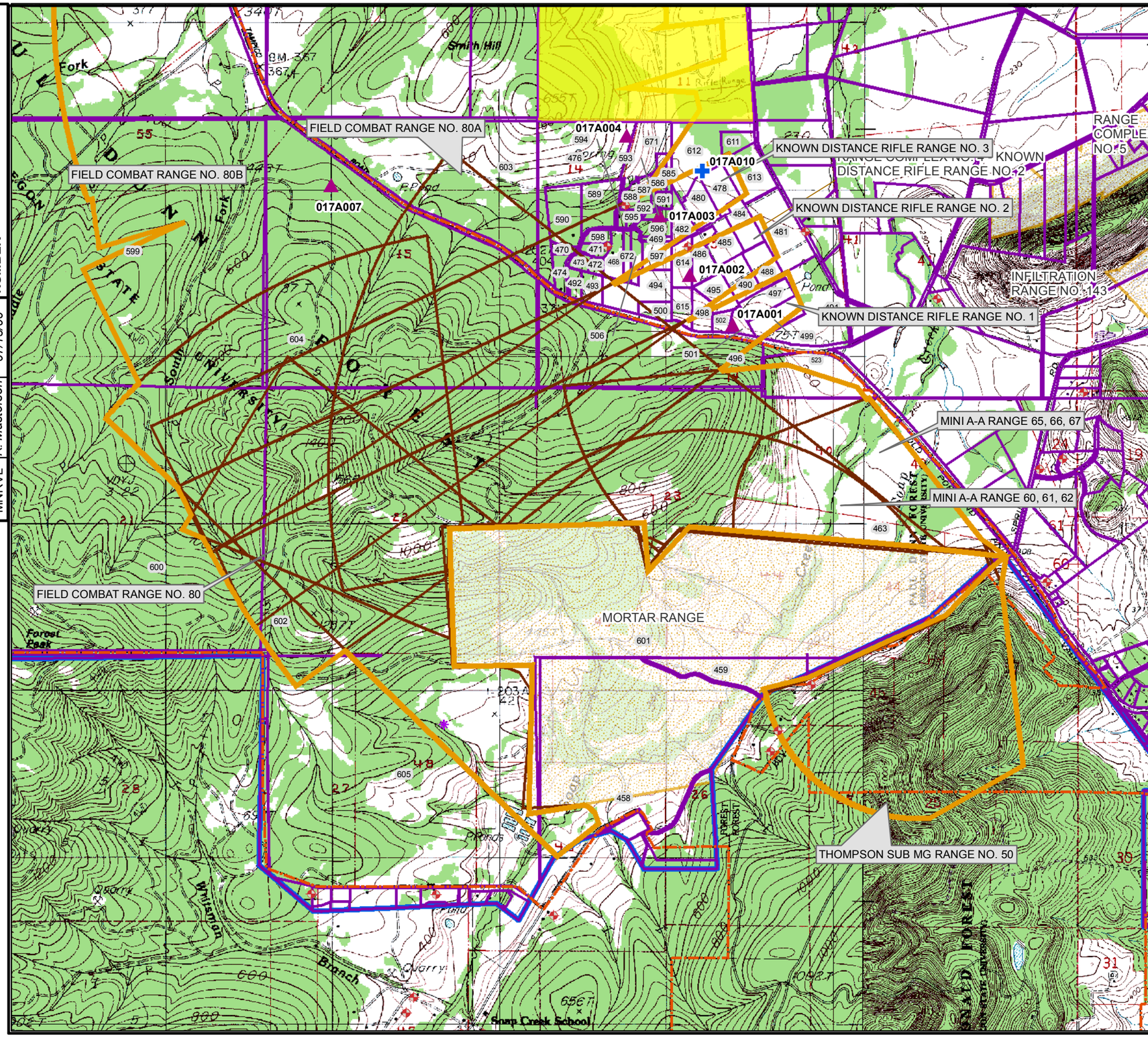
FIGURE 2A
SMALL ARMS RANGES
RANGE COMPLEX NO. 4 - NORTH

CAMP ADAIR

Shaw Environmental Inc.

200-1e
F10OR002908_01.14_0500_a

OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	07/05/06	CampAdair_048_RC4n_SSWP



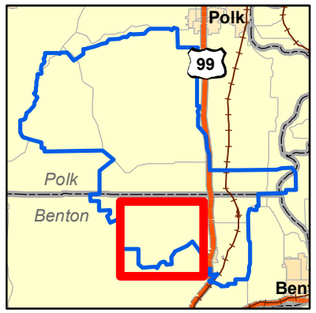
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Public Land (2003)
- Parcel
- National Guard Facility
- Reported MEC Find
- Well (Source: USGS)
- Proposed Groundwater Sample Location
- Proposed Sediment Sample Location
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

N

0 2,000 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

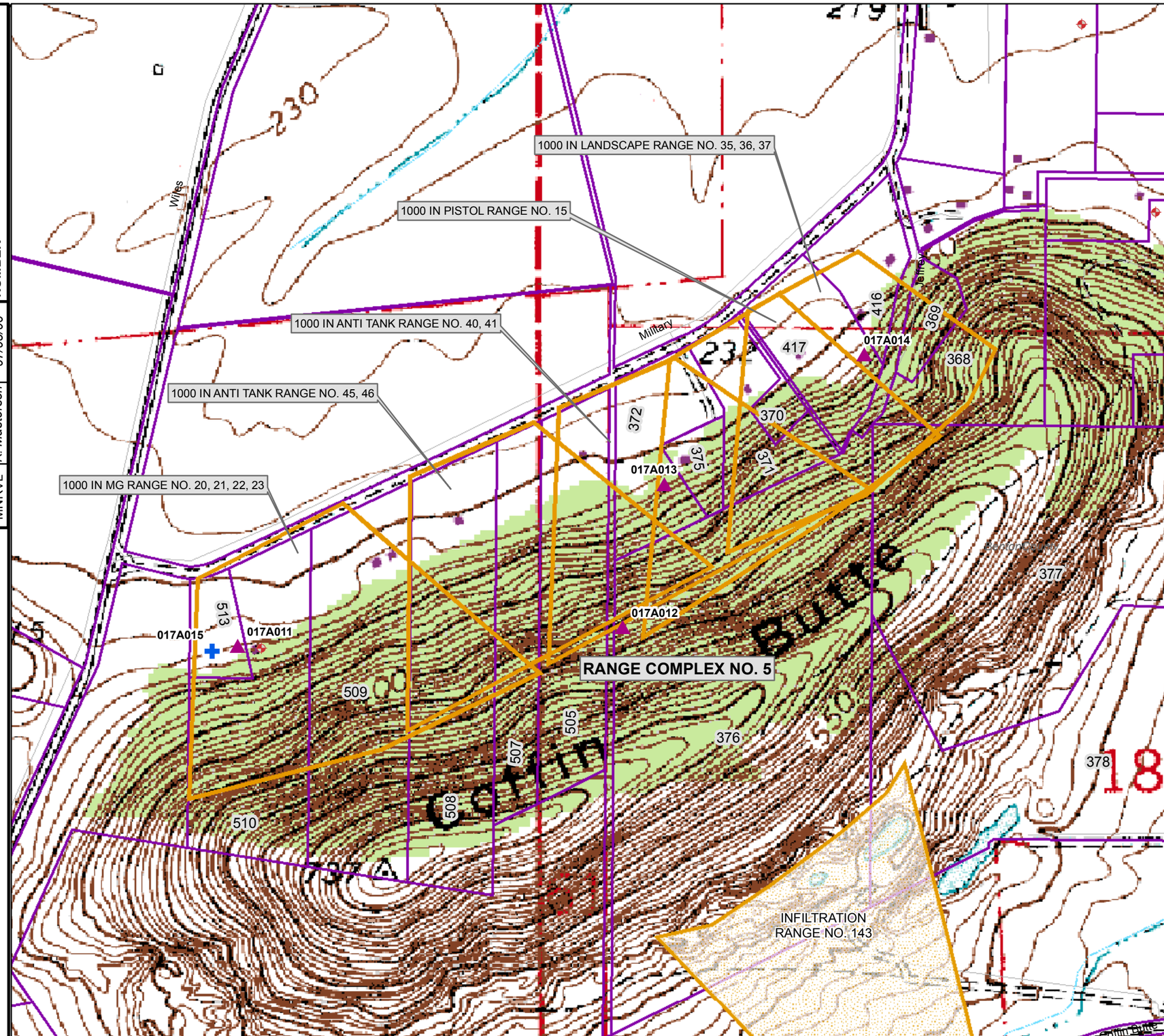
U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 2B
SMALL ARMS RANGES
RANGE COMPLEX NO. 4 - SOUTH
CAMP ADAIR

Shaw Environmental, Inc.

200-1e
F10OR002908_01.14_0500_a

OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	07/13/06	CampAdair_049_RC4s_SSWP



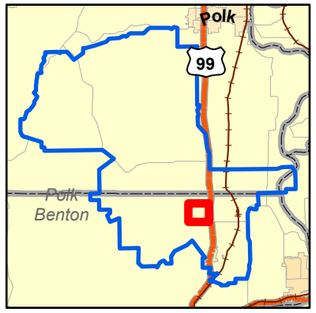
Legend

- Camp Adair AOCs
- Camp Adair Installation Area
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location
- Proposed Groundwater Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

N

0 500 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

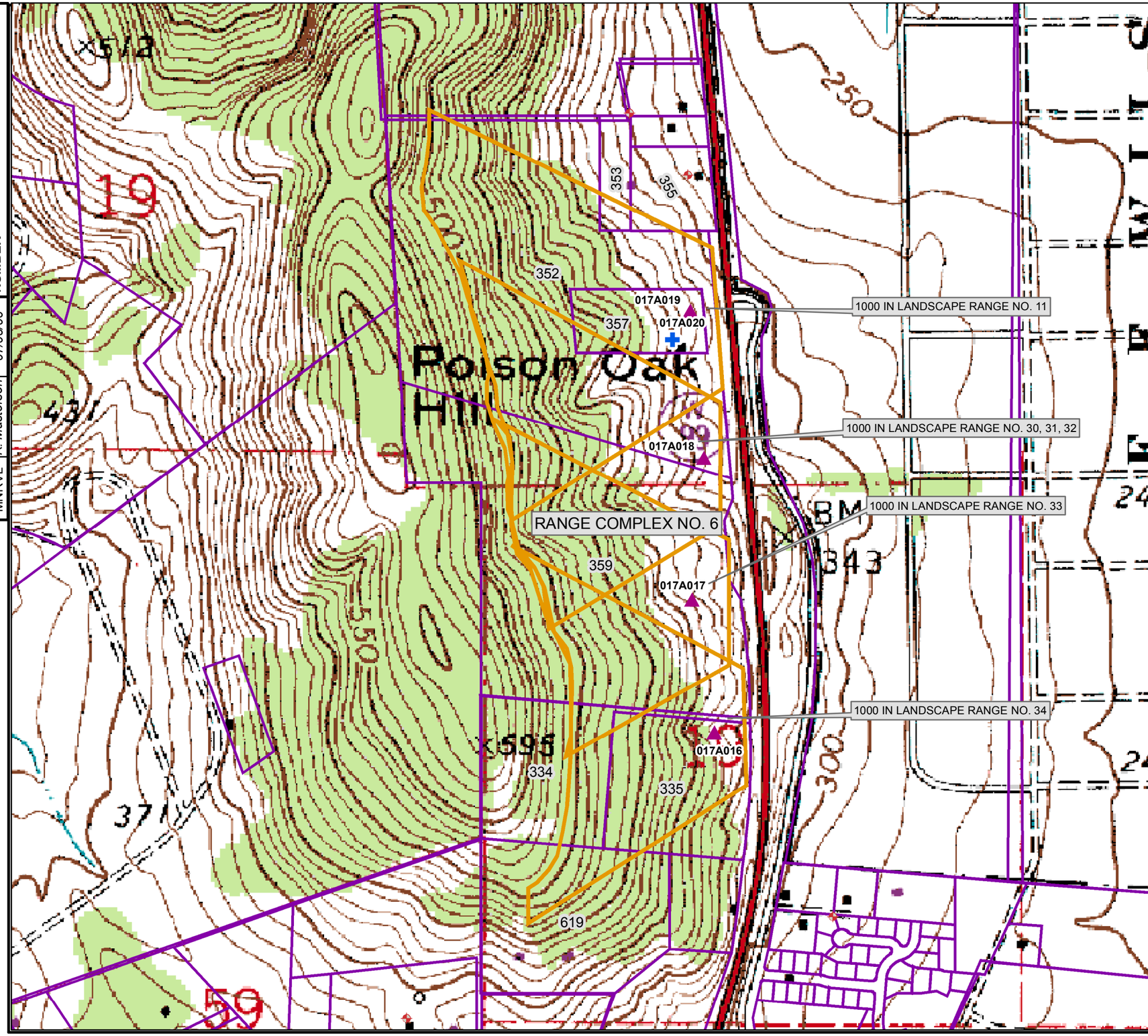
U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 3
SMALL ARMS RANGES
RANGE COMPLEX NO. 5

CAMP ADAIR

Shaw Environmental, Inc. 200-1e
F10OR002908_01.14_0500_a

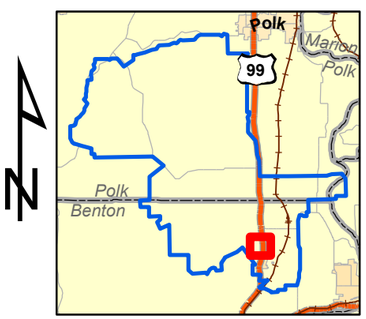
OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	07/05/06	CampAdair_050_RC5_SWPP



Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Soil Sample Location
- Proposed Groundwater Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.



N

0 500 Feet

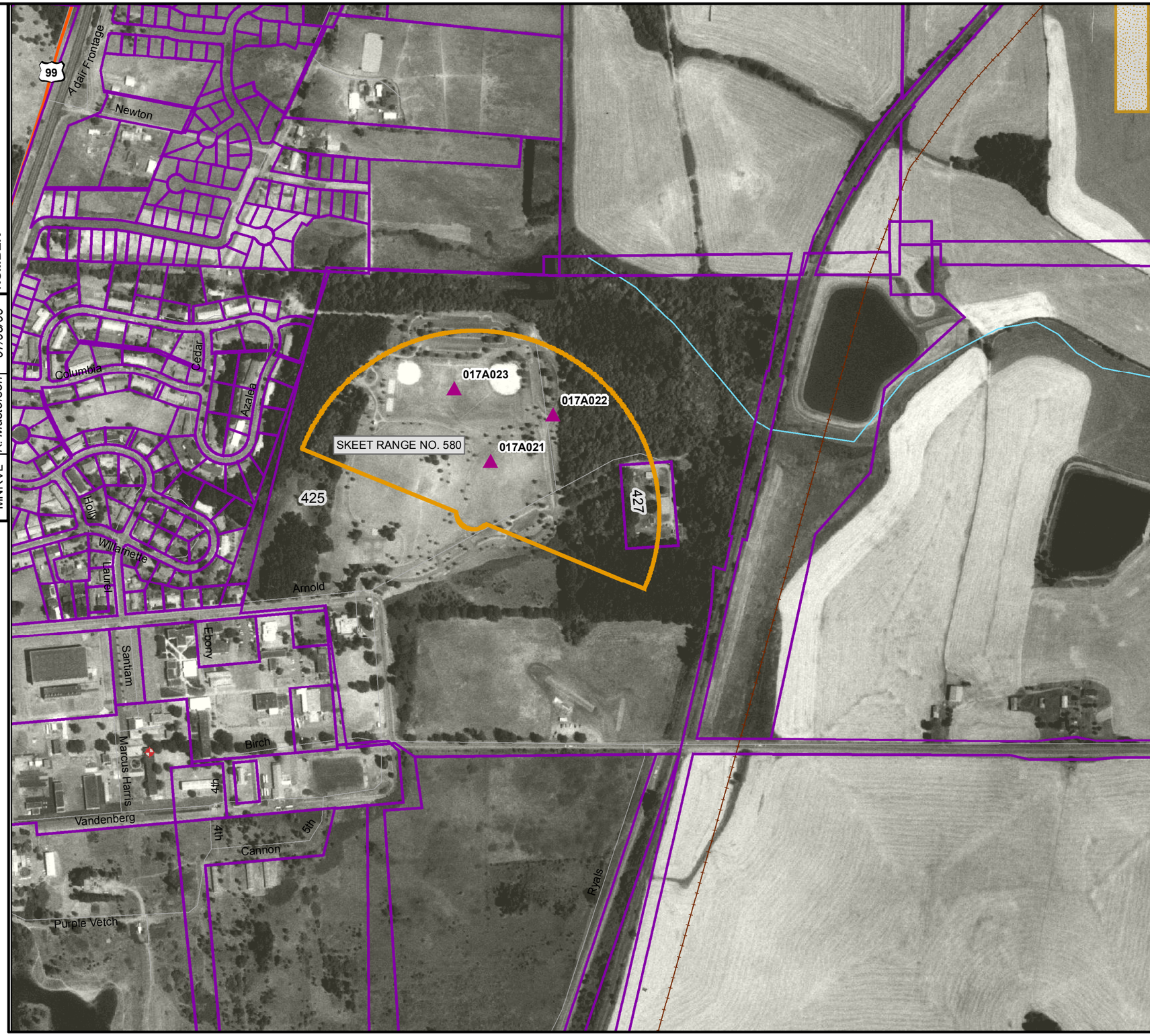
REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 4
SMALL ARMS RANGES
RANGE COMPLEX NO. 6
CAMP ADAIR

Shaw Environmental, Inc. 200-1e
F10OR002908_01.14_0500_a

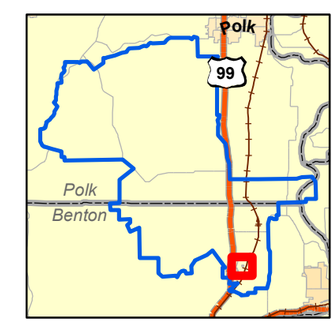
OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	07/05/06	CampAdair_051_RC6_SSWP



Legend

- Camp Adair Installation Area
- Camp Adair AOC
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) Aerial photo from TerraServer, dated July 30, 2000.



N

0 500 Feet

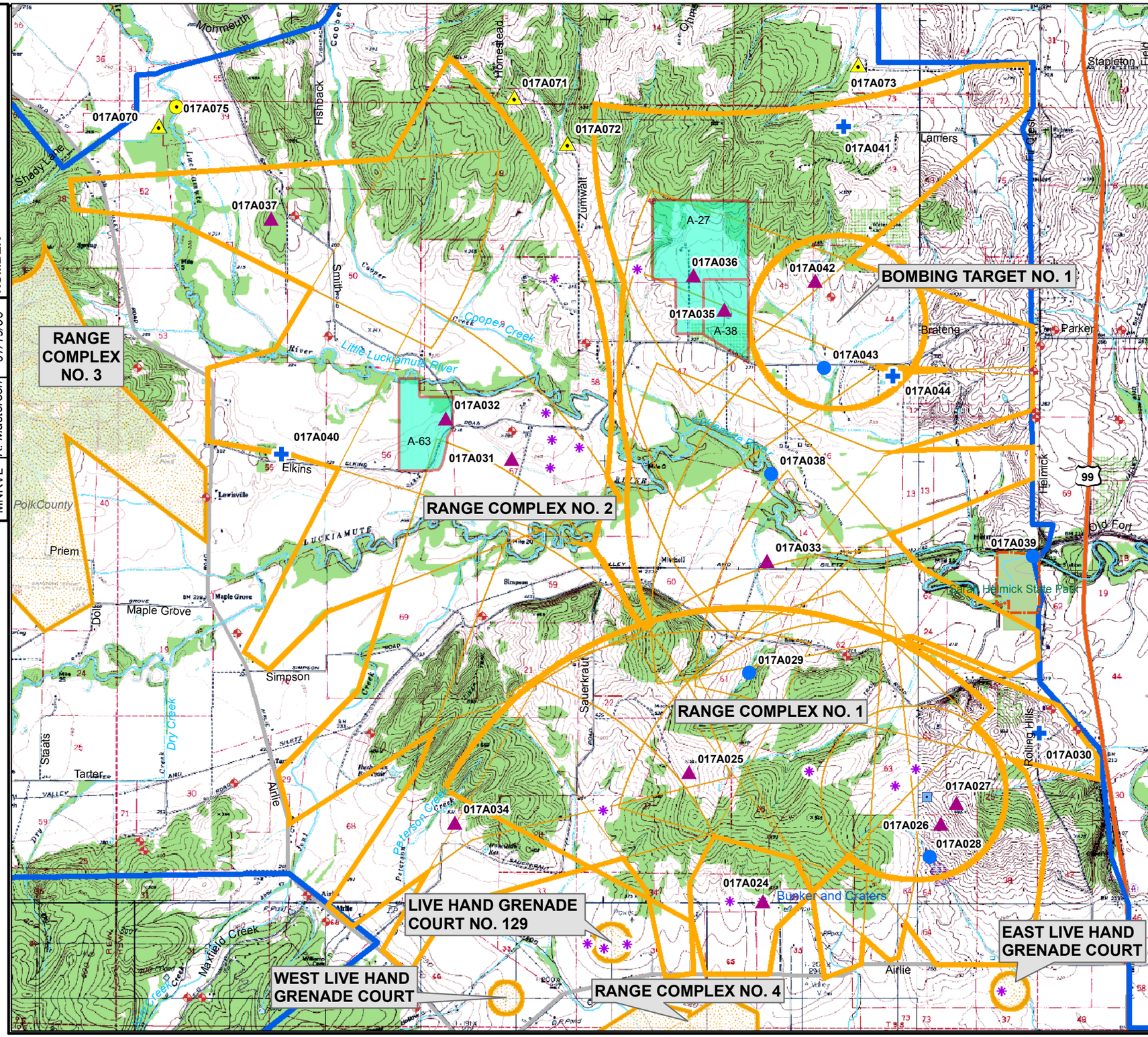
REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 5
SMALL ARMS RANGES
SKEET RANGE NO. 580
CAMP ADAIR

Shaw Environmental, Inc. 200-1e
F10OR002908 01.14 0500 a

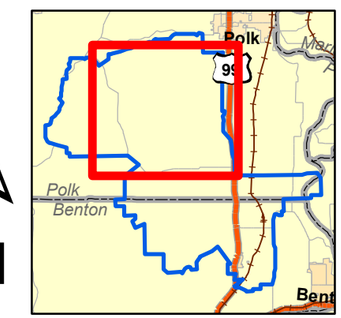
OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	07/05/06	CampAdair_052_SK580_SSWP



Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Impact Areas
- Public Land (2003)
- Target Center
- Reported MEC Find
- Well (Source: USGS)
- Proposed Background Soil
- Proposed Background Sediment
- Proposed Sediment Sample Location
- Proposed Soil Sample Location
- Proposed Groundwater Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.



0 3,500 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 6

EXPLOSIVE MUNITION RANGES
RANGE COMPLEXES NO. 1 and NO. 2
AND BOMBING TARGET NO. 1

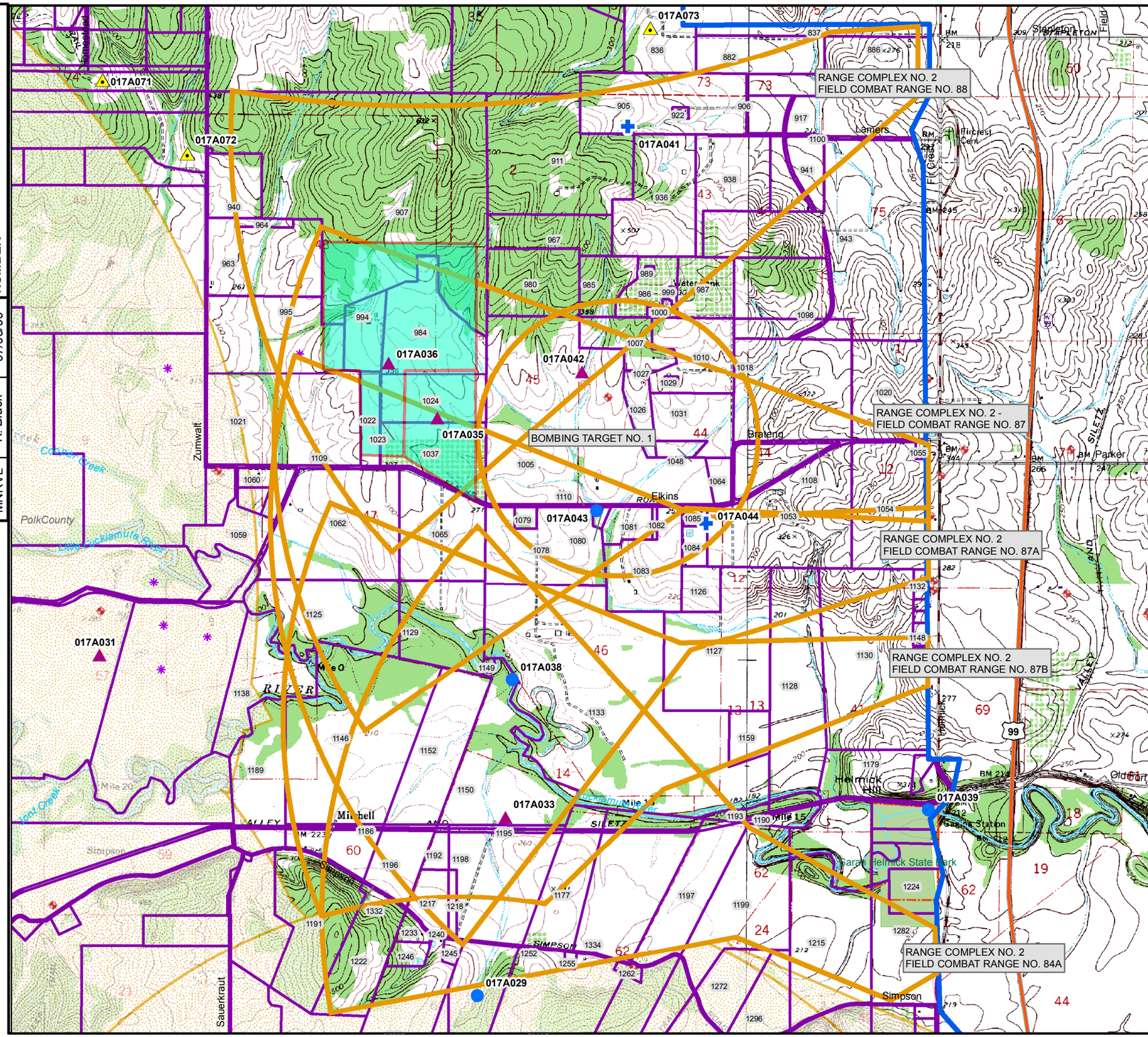
CAMP ADAIR

Shaw Environmental, Inc.

200-1e
F10OR002908_01.14_0500_a

OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	07/19/06	CampAdair_053_RC1_RC2_bt1_SSWP

OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Black	07/05/06	CampAdair_054_RC1ne_SSWP



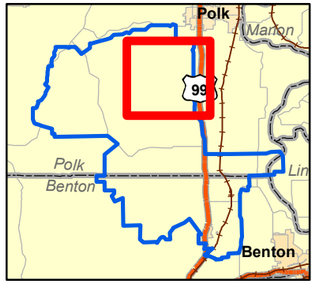
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Impact Areas
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location
- Proposed Groundwater Sample Location
- Proposed Background Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

N

0 2,200 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

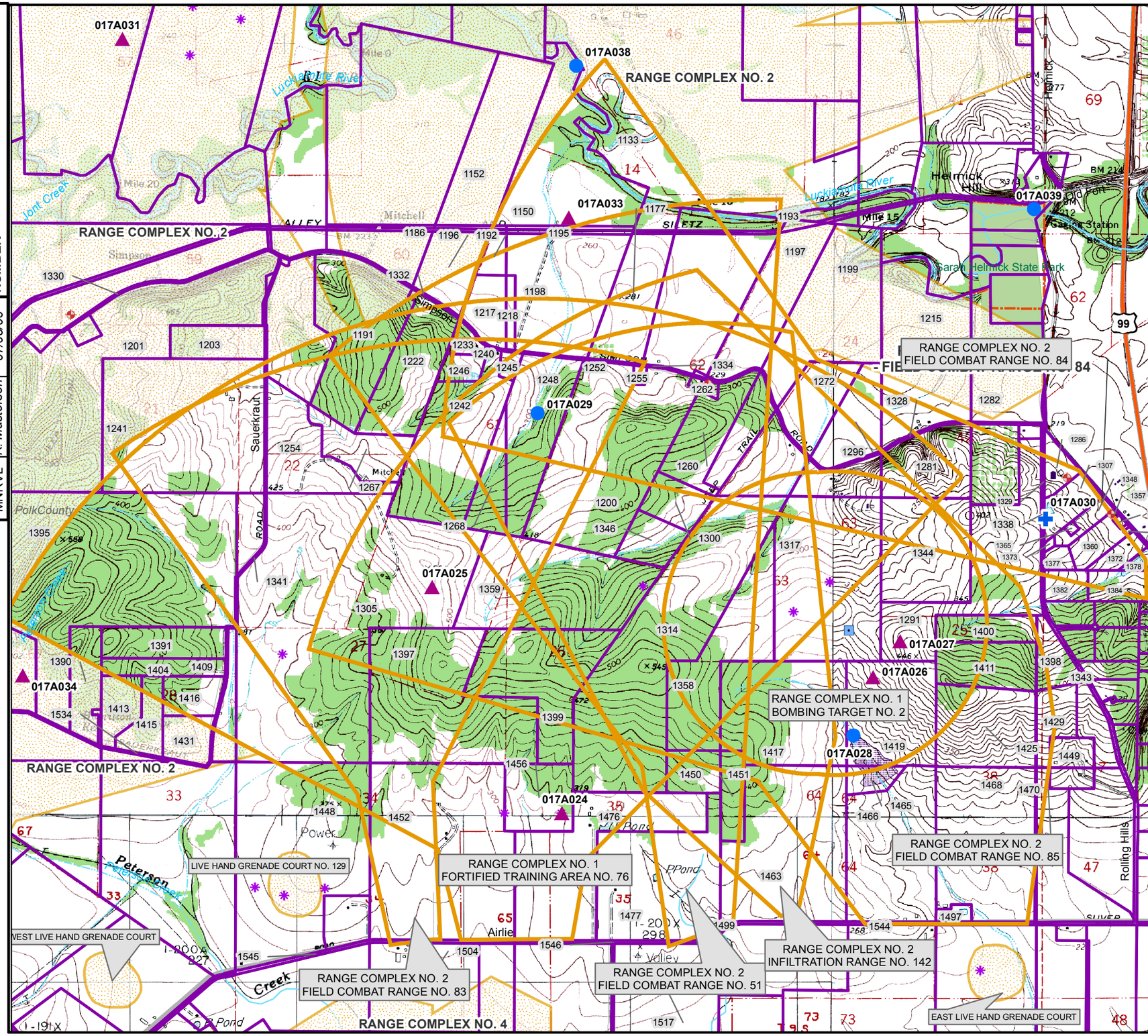
U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 6A

EXPLOSIVE MUNITIONS RANGES
RANGE COMPLEXES NO. 1 and 2 (NORTHEAST)

CAMP ADAIR

Shaw Environmental, Inc. 200-1e
F10OR002908_01.14.0500_a



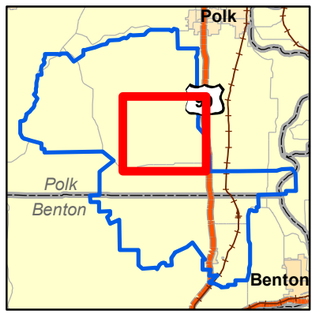
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Public Land (2003)
- Target Center
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location
- Proposed Groundwater Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

N

0 2,000 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

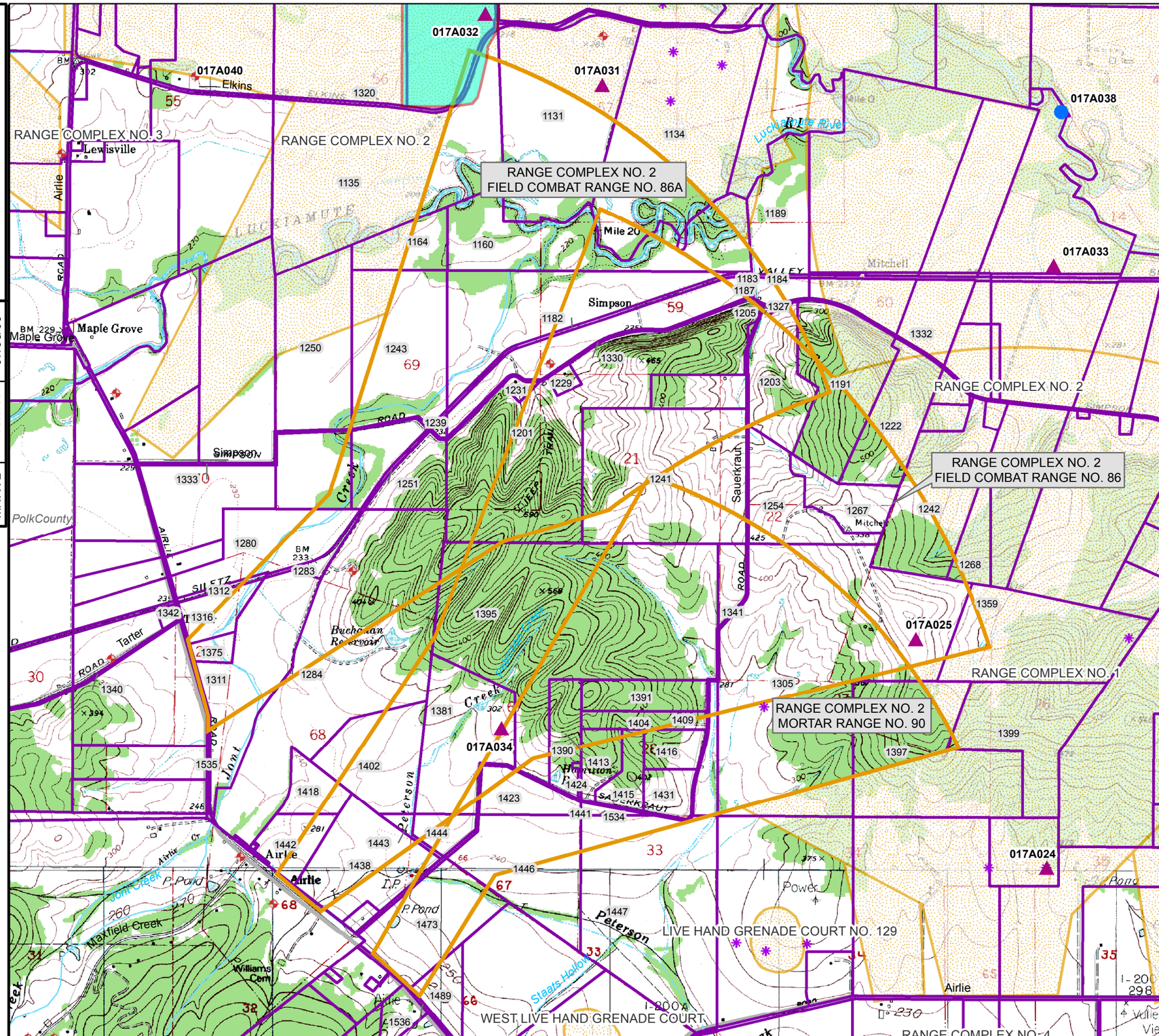
FIGURE 6B

EXPLOSIVE MUNITION RANGES
RANGE COMPLEXES NO. 1 and 2 (SOUTHEAST)

CAMP ADAIR

Shaw® Shaw Environmental, Inc. 200-1e
F10OR002908_01.14.0500_a

OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	07/05/06	CampAdair_055_RC2se_SSWP



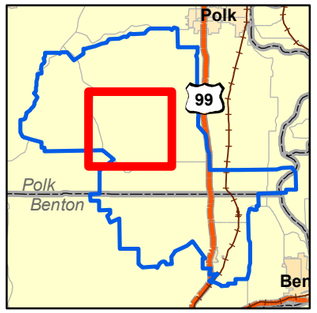
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Impact Areas
- Taxlot Parcel
- Public Land (2003)
- Dudded Impact Point
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

N

0 2,000 Feet



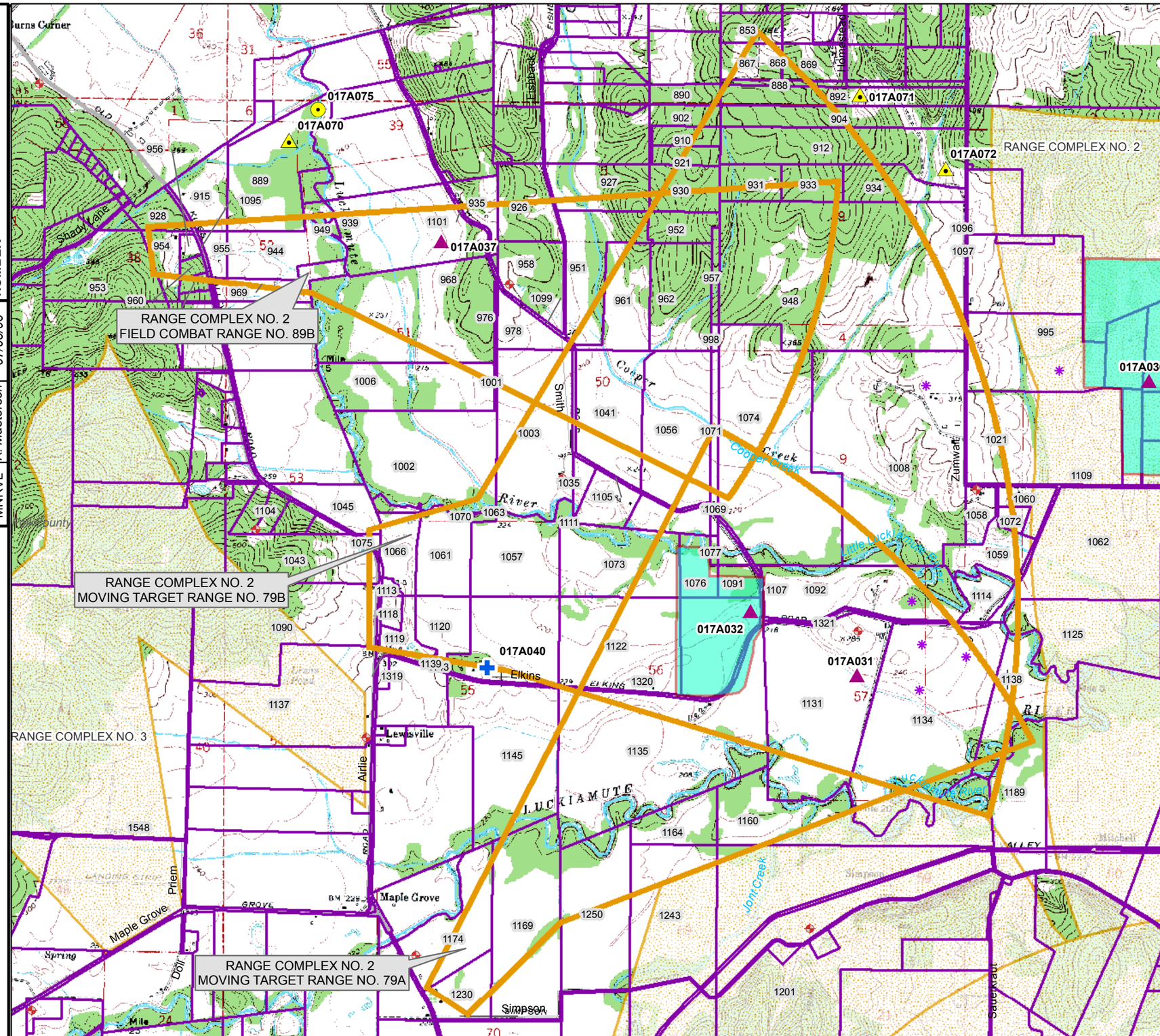
REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 6C
EXPLOSIVE MUNTION RANGES
RANGE COMPLEX NO. 2 (SOUTHWEST)
CAMP ADAIR

Shaw Environmental, Inc. 200-1e
F10OR002908_01.14_0500_a

OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	07/05/06	CampAdair_056_RC2sw_SSWP



DRAWING NUMBER	CampAdair_057_RC2nw_SSWP
DRAWN BY	K. Masterson 07/05/06
OFFICE	MNRVL

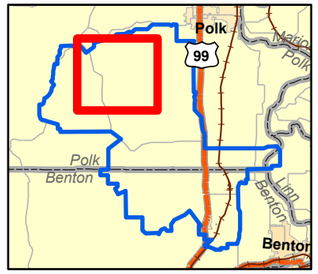
Legend

- Camp Adair Installation Area
- Camp Adair AOC
- Impact Areas
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Soil Sample Location
- Proposed Groundwater Sample Location
- Proposed Background Soil Sample Location
- Proposed Background Sediment Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

N

0 2,200 Feet

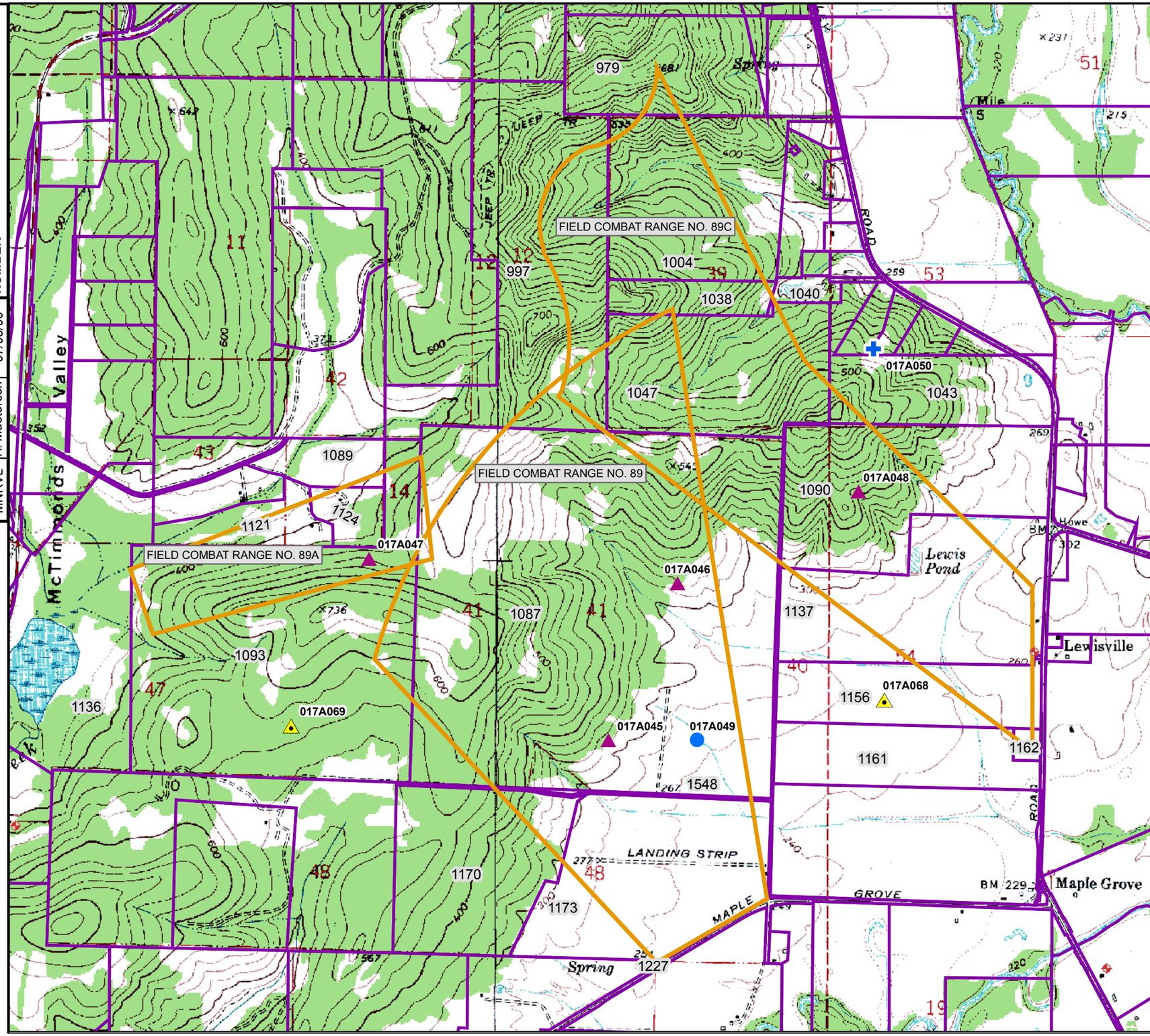


REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 6D
EXPLOSIVE MUNTION RANGES
RANGE COMPLEX NO. 2 (NORTHWEST)
CAMP ADAIR

Shaw Environmental, Inc. 200-1e
F10OR002908_01.14_0500_a



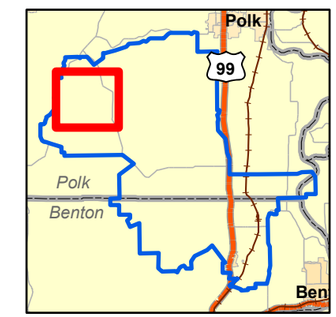
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location
- Proposed Groundwater Sample Location
- Proposed Background Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

N

0 1,500 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

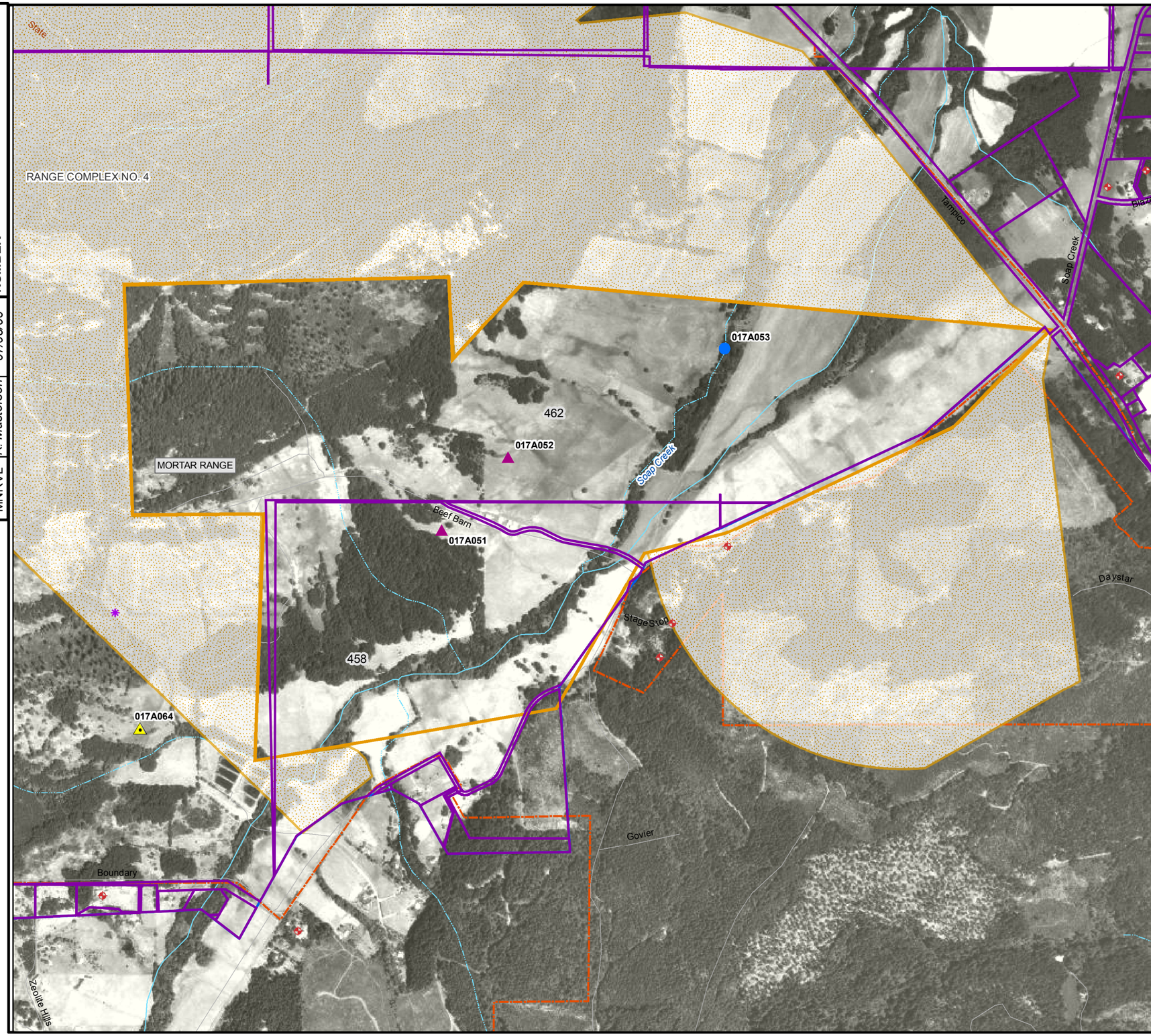
U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 7
EXPLOSIVE MUNTION RANGES
RANGE COMPLEX NO. 3

CAMP ADAIR

Shaw Environmental, Inc. 200-1e
F10OR002908_01.14_0500_a

OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	07/05/06	CampAdair_058_RC3_SSWP



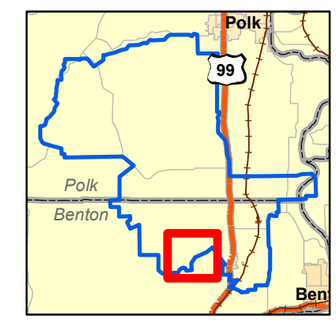
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Public Land (2003)
- Taxlot Parcel
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location
- Proposed Background Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) Aerial photo from TerraServer, dated July 30, 2000.

N

0 1,200 Feet



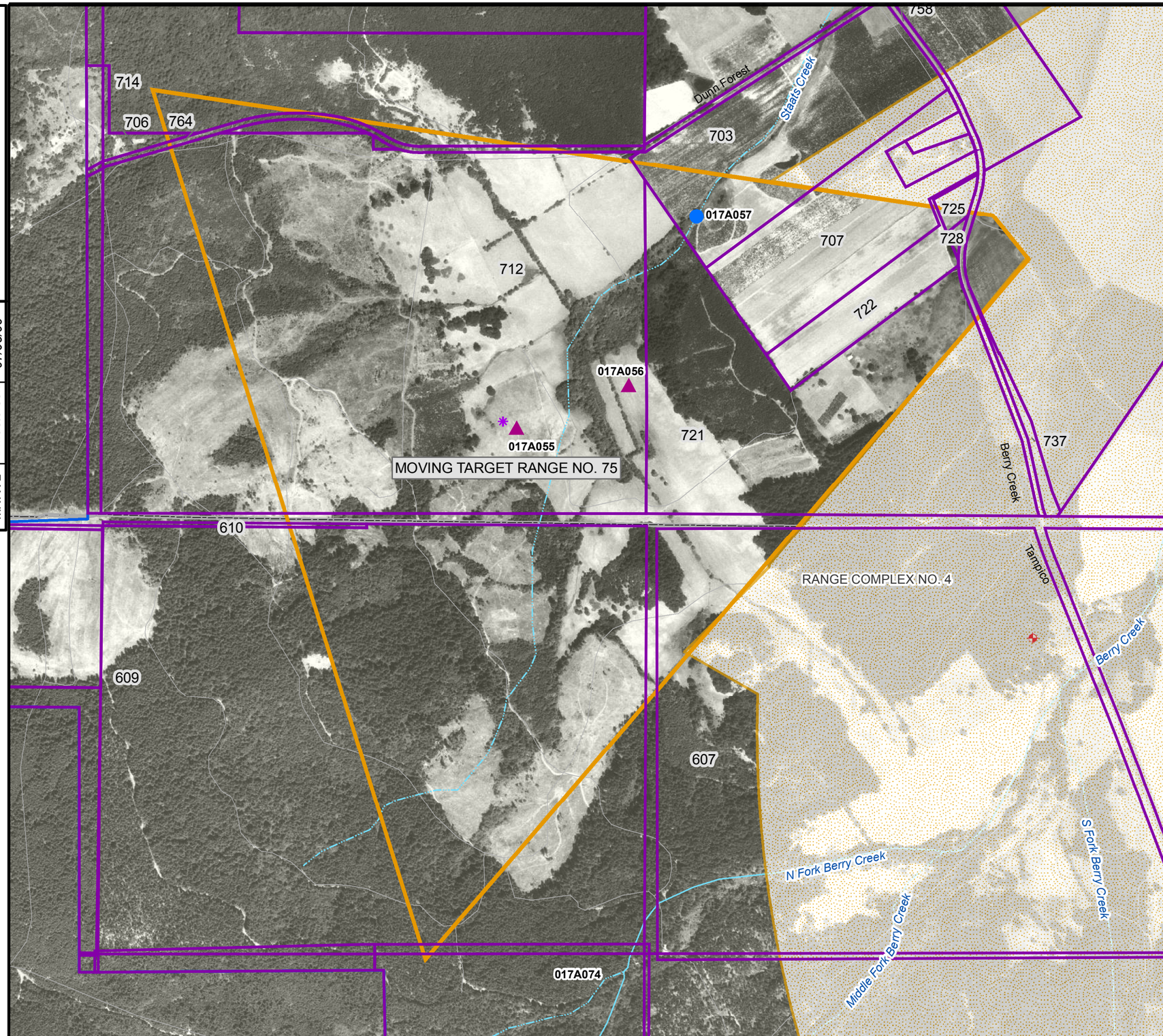
REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 8
EXPLOSIVE MUNITION RANGES
MORTAR RANGE
CAMP ADAIR

Shaw Environmental, Inc. 200-1e
F10OR002908_01.14_0500_a

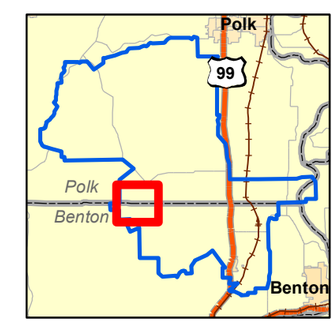
OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	07/05/06	CampAdair_059_MR_SSWP



Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) Aerial photo from TerraServer, dated July 30, 2000.



0 1,000 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

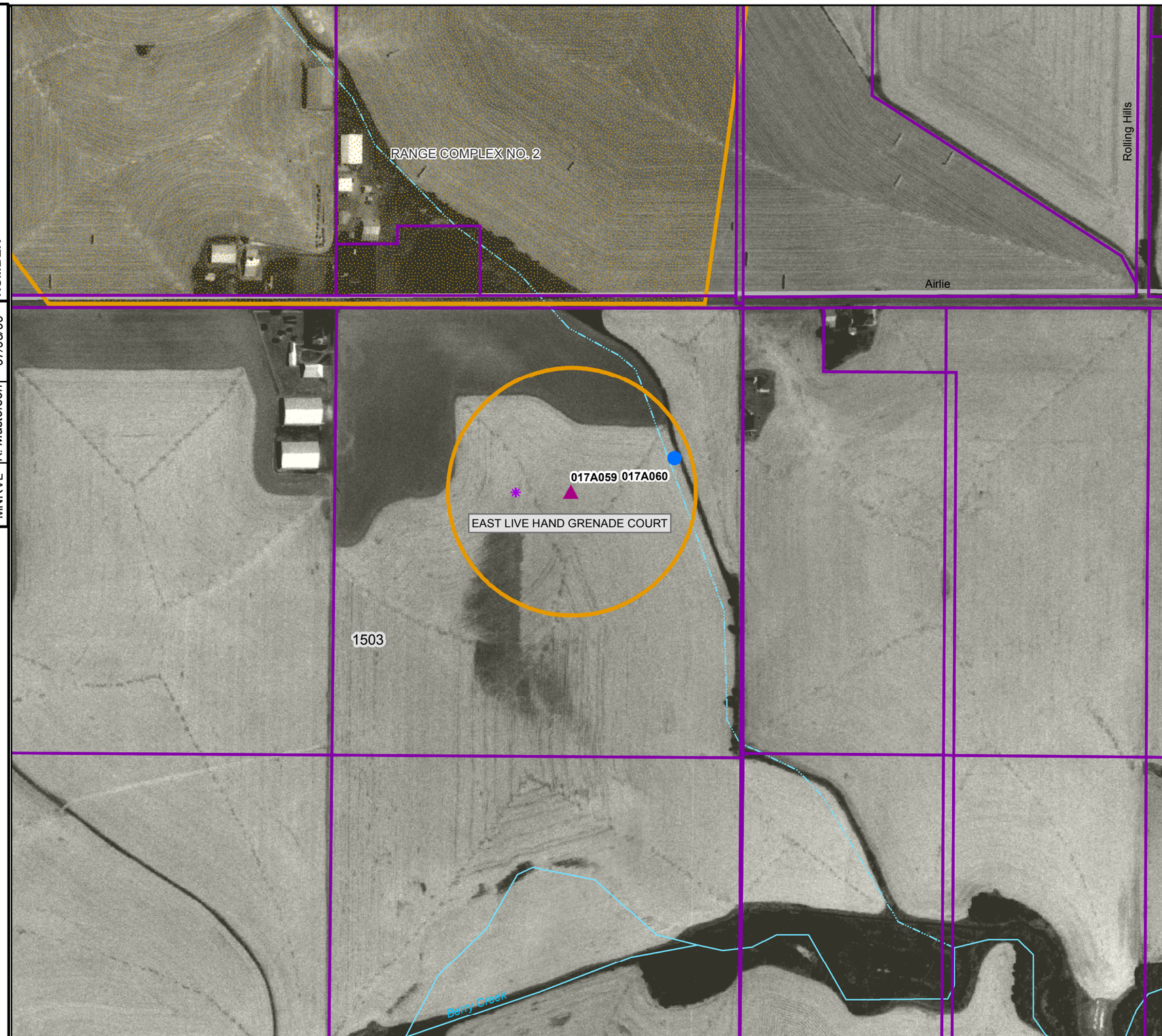
FIGURE 9
EXPLOSIVE MUNITION RANGES
MOVING TARGET RANGE NO. 75
CAMP ADAIR

Shaw® Shaw Environmental, Inc.

OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	07/05/06	CampAdair_060_MTR75_SSWP

200-1e

OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	07/05/06	CampAdair_061_ELHG_SSWP



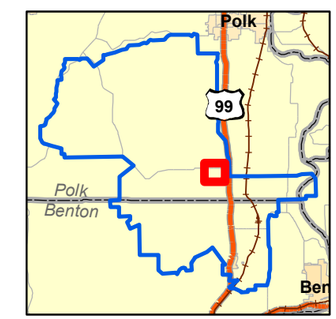
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Public Land (2003)
- Taxlot Parcel
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) Aerial photo from TerraServer, dated July 30, 2000.

N

0 500 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

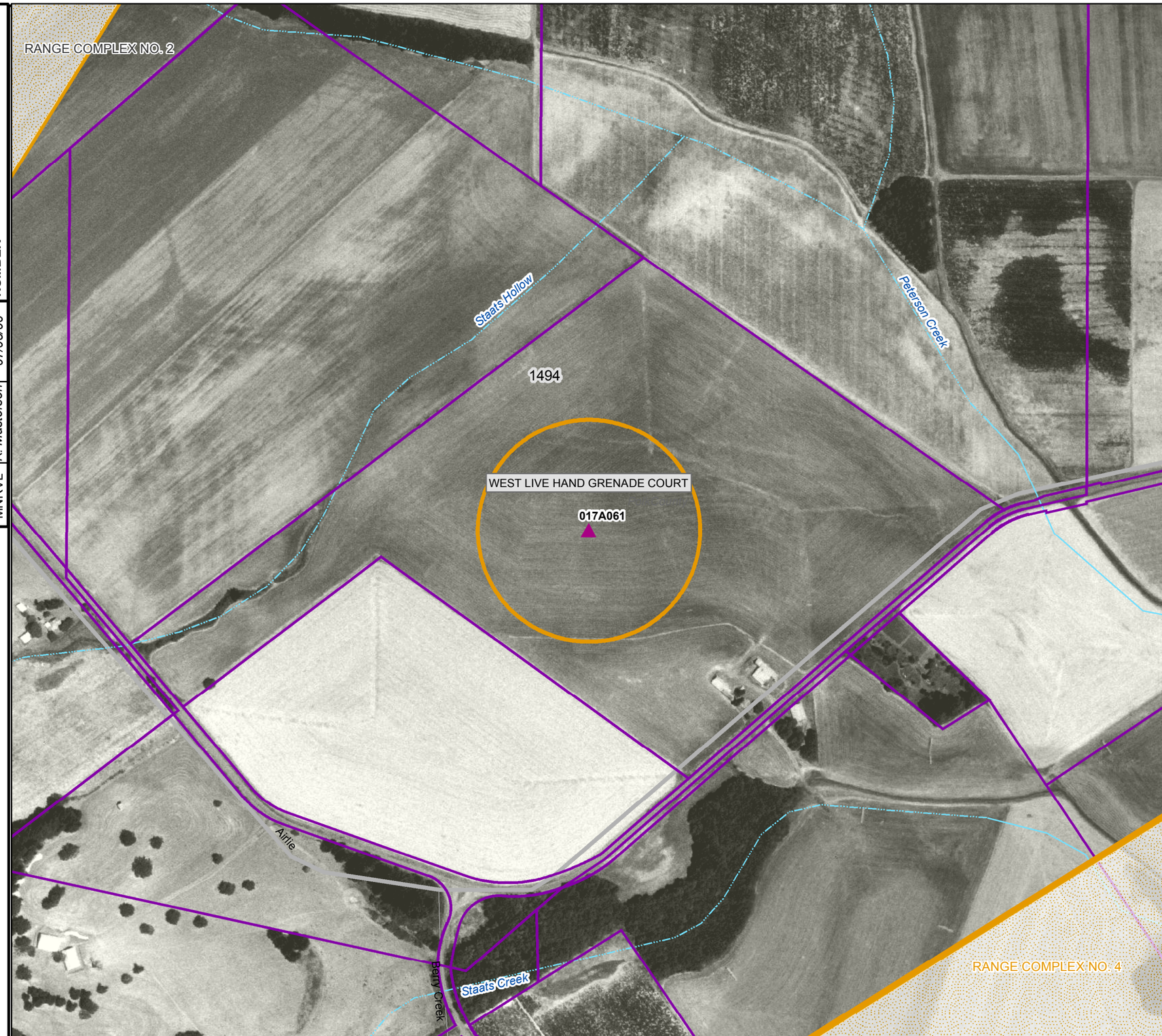
U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 10

EAST LIVE HAND GRENADE COURT

CAMP ADAIR

Shaw Environmental, Inc. 200-1e
F10OR002908_01-14_0500_a



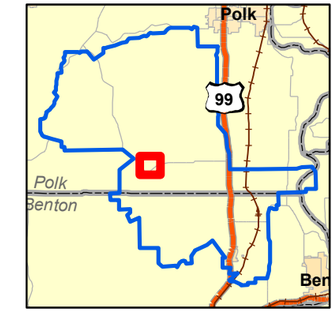
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Soil Sample Location

NOTES:
1) AOC Boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) Aerial photo from TerraServer, dated July 30, 2000.

N

0 500 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 11

WEST LIVE HAND GRENADE COURT

CAMP ADAIR

Shaw Environmental, Inc. 200-1e
F10OR002908_01.14_0500_a

OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	07/05/06	CampAdair_062_WLHG_SSWP

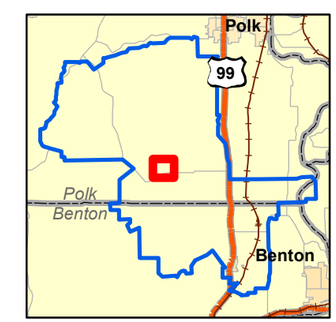
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) Aerial photo from TerraServer, dated July 30, 2000.

N

0 500 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

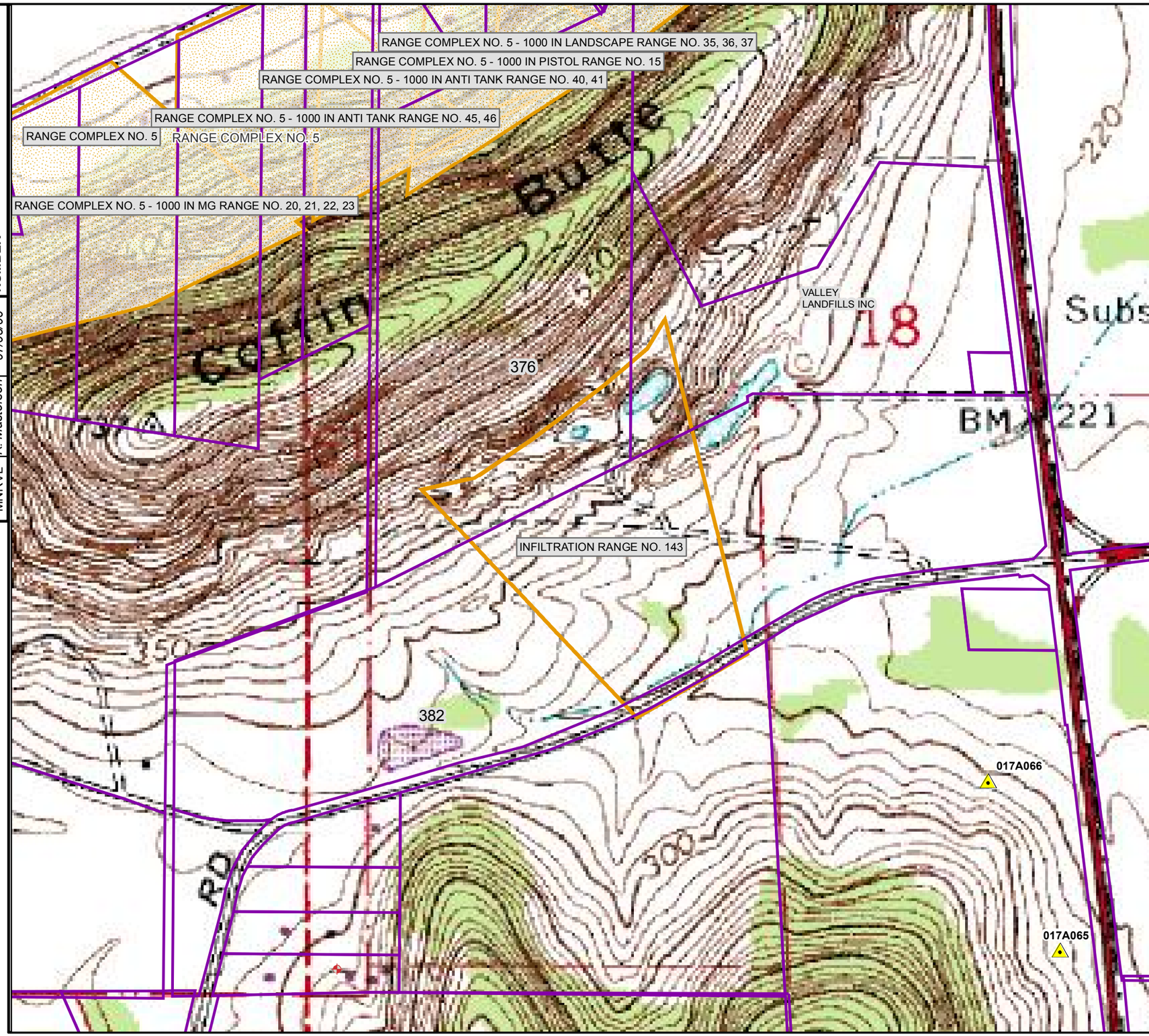
FIGURE 12

LIVE HAND GRENADE COURT NO. 129

CAMP ADAIR

Shaw Environmental, Inc. 200-1e
F10OR002908_01.14_0500_a

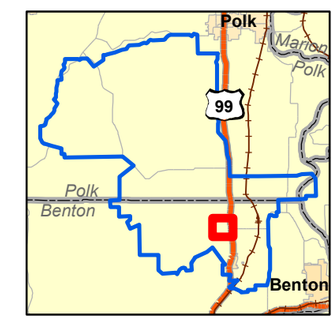
OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	07/05/06	CampAdair_063_HG129_SSWP



Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Reported MEC Find
- Well (Source: USGS)
- Proposed Background Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.



0 500 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 13
SMALL ARMS RANGES
INFILTRATION RANGE NO. 143
CAMP ADAIR

Shaw Environmental, Inc.

200-1e
F10OR002908_01.14_0500_a

OFFICE	DRAWN BY	DRAWING NUMBER
MNRVL	K. Masterson 07/05/06	CampAdair_046_IR143_SSWP

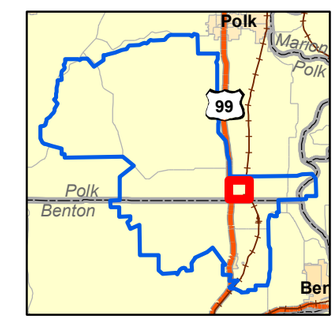
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Background Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) Aerial photo from TerraServer, dated July 30, 2000.

N

0 500 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 14
PRACTICE HAND GRENADE COURTS
NOs. 125, 126 AND 127

CAMP ADAIR

Shaw Environmental, Inc.

200-1e
F10OR002908_01.14_0500_a

OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	07/05/06	CampAdair_065_pg125_127_SSWP

TABLES

Table 1
Munitions Information
Camp Adair/Adair Air Force Station

AOC	Munitions	Munitions Constituents
Range Complex No. 4	50-caliber Machine Gun	Lead, Single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant, Perchlorate
	Small Arms General	Lead, Single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant
Range Complex No. 5	50-caliber Machine Gun	Lead, Single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant, Perchlorate
	Small Arms General	Lead, Single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant
Range Complex No. 6	Small Arms General	Lead, Single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant
Skeet Range No. 580	Small Arms General	Lead, Single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant; PAH (from targets)
Infiltration Range No. 143	Small Arms General	Lead, Single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant
	Explosives Dynamite Commercial	Nitroglycerin (NG)
	Blasting Caps Electrical and Nonelectrical M6 & M7	Sensitive explosive
Range Complex No.	50-caliber Machine Gun	Lead, Single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant, Perchlorate
	Small Arms General	Lead, Single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant
	Mk II Hand Grenade Frag	TNT, flaked or granular, older models used E.C. Blankfire smokeless powder (nitrocellulose, potassium nitrate, barium nitrate, starch, diphenylalamine), M204 (fuze), Perchlorate
	M21 Practice Hand Grenade	Black powder (potassium nitrate, sulfur, charcoal), Perchlorate
	100-lb Bomb, GP Mk 1	TNT

Table 1 (Cont.)
Munitions Information
Camp Adair/Adair Air Force Station

AOC	Munitions	Munitions Constituents
	500-lb Bomb, GP, Mk 12	TNT, Amatol (TNT and ammonium nitrate), and Tritonal (TNT and aluminum powder)
	AN-M30 General Purpose Bomb, 100-lb	TNT
	AN-Mk5, AN-Mk 23, AN-Mk43, Prac	Black powder (potassium nitrate, sulfur, charcoal), red phosphorus
	M38A2, Practice bomb, 100-lb	3-lb Spotting charge (black powder), Single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant
	Signal, Practice Bomb Mk 4	Nitrocellulose, Red phosphorus
	Spotting Charge, M1A1	Black powder (potassium nitrate, sulfur, and charcoal)
	M6A1 Rocket HEAT 2.36-inch	Pentolite (pentaerythritol tetranitrate [PETN) and TNT), Ballistite (nitrocellulose and nitroglycerin), M400 (fuze)
	M6A3 Rocket HEAT 2.36-inch	Pentolite (PETN and TNT), Ballistite (nitroglycerin and nitrocellulose), M400 (fuze)
	M7A1 Practice Rocket 2.36-inch	5 sticks of Ballistite (nitrocellulose and nitroglycerin), Perchlorate
	M7A3 Practice Rocket 2.36-inch	5 sticks of Ballistite (nitrocellulose and nitroglycerin)
	105-mm HE M1	Black powder (potassium nitrate, sulfur, charcoal)
	155-mm HE M107	TNT and Composition B (TNT and RDX)
	37-mm HE M54	FNH powder (nitrocellulose)
	57-mm APC-T M86	FNH powder (nitrocellulose)
	Large Caliber (37-mm and Larger) (Incendiary Smoke)	FNH powder (nitrocellulose) (propelling charge), No data sheet provided
	60-mm HE M49	TNT, Ballistite (nitrocellulose and nitroglycerin)
	81-mm HE M43	TNT, Ballistite (nitrocellulose and nitroglycerin)
	Mortars (incendiary, illumination, smoke)	No data sheets provided
	Explosives TNT	TNT
	Blasting Caps Electrical and Nonelectrical M6 & M7	Sensitive explosive
Range Complex No. 2	50-caliber Machine Gun	Lead, Single(nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant, Perchlorate

Table 1 (Cont.)
Munitions Information
Camp Adair/Adair Air Force Station

AOC	Munitions	Munitions Constituents
Range Complex No. 2	Small Arms General	Lead, Single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant
	105-mm HE M1	TNT and Composition B (TNT and RDX)
	105-mm HEAT-T M622	Composition B (TNT and RTX)
	155-mm HE M107	TNT and Composition B (TNT and RDX)
	37-mm HE M54	FNH powder (nitrocellulose)
	57-mm APC-T M86	FNH powder (nitrocellulose)
	60-mm HE M49	TNT, Ballistite (nitrocellulose and nitroglycerin)
	81-mm HE M43	TNT, Ballistite (nitrocellulose and nitroglycerin)
	60-mm Illuminating M721	No data sheets provided
	60-mm Practice M50A2	Inert with Black powder (potassium nitrate, sulfur, charcoal)
	81-mm TP M43A1	Inert with Black powder (potassium nitrate, sulfur, charcoal)
	Explosives-Commercial Dynamite	Nitroglycerin
	Blasting Caps Electrical and Nonelectrical M6 & M7	Sensitive explosive
Bombing Target No. 1	AN-M30 General Purpose Bomb, 100-lb	TNT
	100-lb Bomb, GP, Mk 1	TNT
	500-lb Bomb, GP, Mk 12	TNT, Amatol (TNT and ammonium nitrate), and Tritonal (TNT and aluminum powder)
	AN-Mk5, AN-Mk 23, AN-Mk43, Practice Bombs	Black powder (potassium nitrate, sulfur, charcoal), Red phosphorus
	M38A2, Practice bomb, 100-lb	3-lb Spotting charge (black powder), Single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant
	105-mm, Fixed HE M38	Black powder (potassium nitrate, sulfur, charcoal)
	155-mm HE MkI	TNT
Range Complex No. 3	50-caliber Machine Gun	Lead, Single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant, Perchlorate
	Small Arms General	Lead, Single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant;
	105-mm HE M1	TNT and Composition B (TNT and RDX)

Table 1 (Cont.)
Munitions Information
Camp Adair/Adair Air Force Station

AOC	Munitions	Munitions Constituents
Range Complex No. 3	155-mm HE M107	TNT and Composition B (TNT and RDX)
	37-mm HE M54	FNH powder (nitrocellulose)
	57-mm APC-T M86	FNH powder (nitrocellulose)
	60-mm HE M49	TNT, Ballistite (nitrocellulose and nitroglycerin)
	81-mm HE M43	TNT, Ballistite (nitrocellulose and nitroglycerin)
	60-mm Practice M50A2	Inert with Black powder (potassium nitrate, sulfur, charcoal)
	81-mm TP M43A1	Inert with Black powder (potassium nitrate, sulfur, charcoal)
Mortar Range	Small Arms General	Lead, Single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin)
	60-mm HE M49	TNT, Ballistite (nitrocellulose and nitroglycerin)
Moving Target Range No. 75	75-mm Gun HE M48	TNT, FNH (nitrocellulose) powder
	37-mm AP M74	FNH (nitrocellulose) powder
East Live Hand Grenade Court	Mk II Hand Grenade Frag	TNT, flaked or granular, older models used E.C. Blankfire smokeless powder, M204 (fuze), Perchlorate
	M21 Practice Hand Grenade	Black powder (potassium nitrate, sulfur, charcoal), Perchlorate
West Live Hand Grenade Court	Mk II Hand Grenade Frag	TNT, flaked or granular, older models used E.C. Blankfire smokeless powder, M204 (Fuze), Perchlorate
	M21 Practice Hand Grenade	Black powder (potassium nitrate, sulfur, charcoal), Perchlorate
Live Hand Grenade Court No. 129	Mk II Hand Grenade Frag	TNT, flaked or granular, older models used E.C. Blankfire smokeless powder, Perchlorate
	M21 Practice Hand Grenade	Black powder (potassium nitrate, sulfur, charcoal), Perchlorate
Practice Grenade Court No. 120	M21 Practice Hand Grenade	Black powder (potassium nitrate, sulfur, charcoal), Perchlorate
	Mk 1A1 Practice Hand Grenade	Inert
Practice Grenade Court No. 121	M21 Practice Hand Grenade	Black powder (potassium nitrate, sulfur, charcoal), Perchlorate
	Mk 1A1 Training Hand Grenade	Inert
Practice Grenade Court No. 122	M21 Practice Hand Grenade	Black powder (potassium nitrate, sulfur, charcoal), Perchlorate
	Mk 1A1 Practice Hand Grenade	Inert
Practice Grenade Court No. 125	M21 Practice Hand Grenade	Black powder (potassium nitrate, sulfur, charcoal), Perchlorate
	Mk 1A1 Practice Hand Grenade	Inert

Table 1 (Cont.)
Munitions Information
Camp Adair/Adair Air Force Station

AOC	Munitions	Munitions Constituents
Practice Grenade Court No. 126	M21 Practice Hand Grenade	Black Powder (potassium nitrate, sulfur, charcoal), Perchlorate
	Mk 1A1 Training Hand Grenade	Inert
Practice Grenade Court No. 127	M21 Practice Hand Grenade	Black Powder (potassium nitrate, sulfur, charcoal), Perchlorate
	Mk 1A1 Training Hand Grenade	Inert
Chemical Identification Area No. 182	Pot Tear Gas M1	Chloracetophenone mixture
	Capsule Riot Control CS	
	Chemical ID Set, Instructional M1	Mustard, Chlorpicrin, Lewisite, Adamsite, Chloracetophenone, Triphosgene
	Chemical ID Set, Detonation M1	Mustard, Lewisite, Chlorpicrin, and Phosgene
	Chemical ID, Toxic Gas Set M1	24 bottles of 32 ounces of Mustard or Distilled Mustard
	Toxic Chemical Munitions	No data sheets provided

Table 2
Proposed Sampling Approach - Camp Adair/Adair Air Force Station

AOC	Sample Type	Media to be Sampled			Contaminants of Concern											Survey for MEC	Comments
		Surface Soil	Sediment	Ground-water	Lead*			Selected Metals***			Explosives			Perchlorate	PAH		
					Soil	Sediment	Water	Soil	Sediment	Water**	Soil	Sediment	Water	Water	Soil		
Range Complex No. 4	Composite	8			8											Yes	Samples collected from Known Distance Rifle Ranges 1,2, and 3, Close Combat Course No. 170, Thompson Sub MG Range No. 50A, Anti-Aircraft Range No. 70, Field Combat Range No. 81, and Transition Course No. 160.
	Discrete		1	1		1	1							1			One sediment sample will be collected from Range Complex No. 4 (the largest small arms range complex). The sample will be collected along Berry Creek near the northeast boundary of Range Complex No. 4. One groundwater sample will be collected from Range Complex No. 4 near the Known Distance Rifle Range No. 3.
Range Complex No. 5	Composite	4			4											Yes	Four samples collected from 1000-inch MG Range No. 20, 21, 22, and 23; 1,000-inch Anti Tank Range No. 45 and 46; 1,000-inch Anti Tank Range No. 40 and 41; 1,000-inch Pistol Range No. 15; and 1,000-inch Landscape Range No. 35, 36, and 37.
	Discrete			1			1							1			One groundwater sample will be collected from Range Complex No. 5, within the 1000-inch Machine Gun Range No. 20, 21, 22, 23.
Range Complex No. 6	Composite	4			4											Yes	Four soil samples will be collected from four ranges: 1,000-inch Landscape Range No. 11; 1,000-inch Landscape Range No. 30, 31, and 32; 1,000-inch Landscape Range No. 33; and 1,000-inch Landscape Range No. 34.
	Discrete			1			1										No perchlorate containing small arms munitions used at AOC.
Skeet Range No. 580	Composite	3			3										3	No	No MEC risk associated with skeet range based on history of range use. Three samples to be collected for lead and PAH analysis.
	Discrete																No sediment at site. No groundwater well near site for sampling.
Infiltration Range No. 143	Composite															No	No samples will be collected. AOC is not accessible due to municipal waste landfill.
	Discrete																No samples will be collected. AOC is not accessible due to municipal waste landfill.
Range Complex No. 1	Composite	4						4			4					No	Two soil samples each will be collected from the Fortified Training Area No. 76 and Bombing Target No. 2.
	Discrete		2	1					2	1		2	1	1			One sediment sample each will be collected from the Fortified Training Area No. 76 and Bombing Target No. 2. The sample collected form the Fortified Training Area No. 76 will be collected along an intermittent stream located. south of Simpson Road. One groundwater sample will be collected from a well located near the downgradient end of the AOC.
Range Complex No. 2	Composite	7						7			7					No	Seven soil samples will be collected from Range Complex No. 2 at sub-ranges Moving Target Range No. 79A and 79B, Field Combat Range No. 84A, 86, 87, 88, and 89B.
	Discrete		2	2					2	2		2	2	2			One sample will be collected from Luckiamute River located within Field Combat Ranges 84A, 87A, and 87B. The second sediment sample from this range complex will be collected from the Luckiamute River within Hemlick State Park. Two groundwater samples to be collected from wells located within and near downgradient end of AOC.
Bombing Target No. 1	Composite	1						1			1					No	One soil sample will be collected from Bombing Target No. 1.
	Discrete		1	1					1	1		1	1	1			The sediment sample will be located along an intermittent stream near where it crosses Elkins Road. Groundwater sample will be collected from well located south of bomb target.
Range Complex No. 3	Composite	4						4			4					No	Two soil samples will be collected from Field Combat Range No. 89 and one soil sample each will be collected from Field Combat Ranges No. 89A and 89C.
	Discrete		1	1					1	1		1	1	1			The sediment sample will be located along an intermittent stream within Field Combat Range No. 89C. Groundwater sample will be collected from a well located near the downgradient end of the AOC.

Table 2 (Cont.)
Proposed Sampling Approach - Camp Adair/Adair Air Force Station

AOC	Sample Type	Media to be Sampled			Contaminants of Concern											Survey for MEC	Comments
		Surface Soil	Sediment	Ground-water	Lead*			Selected Metals***			Explosives			Perchlorate	PAH		
					Soil	Sediment	Water	Soil	Sediment	Water**	Soil	Sediment	Water	Water	Soil		
Mortar Range	Composite	2						2			2					No	
	Discrete		1	1					1	1		1	1	1			The sediment sample will be collected along Soap Creek near the northern boundary (downstream) of the Mortar Range. Groundwater sample will be collected from a well located near the downgradient end of the AOC.
Moving Target Range No. 75	Composite	2						2			2					No	Soil samples will be collected near the 1,000 and 1,500 yard down range target rail locations.
	Discrete		1	1					1	1		1	1	1			The sediment sample will be collected along Staats Creek near the northern boundary (downstream) of the range. Groundwater sample will be collected from a well located near the downgradient end of the AOC.
East Live Grenade Court	Composite	1						1			1					No	One soil sample to be collected within court area.
	Discrete		1						1			1					One sediment sample will be collected from the intermittent stream that flows through the northeastern portion of the East Live Hand Grenade Court.
West Live Hand Grenade Court	Composite	1						1			1					No	One soil sample to be collected within court area.
	Discrete																
Live Hand Grenade Court No. 129	Composite	1						1			1					No	One soil sample to be collected within court area.
	Discrete																
Practice Grenade Court No. 120	NA															No	No field investigation required.
Practice Grenade Court No. 121	NA															No	No field investigation required.
Practice Grenade Court No. 122	NA															No	No field investigation required.
Practice Grenade Court No. 125	NA															No	No field investigation required.
Practice Grenade Court No. 126	NA															No	No field investigation required.
Practice Grenade Court No. 127	NA															No	No field investigation required.
Chemical Identification Area No. 182	NA															No	No field investigation required.
Background Samples	Composite	**10**						**10**									
	Discrete		**3**	**3**					**3**	**3**				**3**			Background samples to be analyzed for metals only.
Total Field Samples		**52**	**13**	**13**	**19**	**1**	**3**	**33**	**12**	**10**	**23**	**9**	**7**	**12**	**3**		
Field Duplicate					2	1	1	4	2	1	3	1	1	1	1		Minimum 10% goal.
Field Split					0	0	0	0	0	0	0	0	0	0	0		Minimum 10% goal.

Table 2 (Cont.)
Proposed Sampling Approach - Camp Adair/Adair Air Force Station

AOC	Sample Type	Media to be Sampled			Contaminants of Concern											Survey for MEC	Comments
		Surface Soil	Sediment	Ground-water	Lead*			Selected Metals***			Explosives			Perchlorate	PAH		
					Soil	Sediment	Water	Soil	Sediment	Water**	Soil	Sediment	Water	Water	Soil		
Matrix Spike (MS)					1	1	1	2	1	1	2	1	1	1	1		Minimum 5% goal (solids & water).
MS Duplicate					1	1	1	2	1	1	2	1	1	1	1		Minimum 5% goal, (solids & water).
Equipment Blank					0	0	0	0	0	0	0	0	0	0	0		To be determined per sampling methods.
Material Blank					0	0	0	0	0	0	0	0	0	0	0		No reagents.
Quality Control Samples					4	3	3	8	4	3	7	3	3	3	3		
Total Samples To be Analyzed					23	4	6	41	16	13	30	12	10	15	6		

CSM = Conceptual Site Model EOD = explosives ordnance demolition PAHs = polycyclic aromatic hydrocarbons TAL = Target Analyte List

Surface soil samples are composite samples (7-point, wheel pattern with 2-foot radius). All other samples are discrete grab samples.

In addition to the QC samples shown above, temperature blanks will be submitted with samples; one blank per cooler.

Lead and metals by SW-846 6020A. Mercury by SW-846 7470A/7471A. Explosives by SW-846 8330A/Modified 8330A. Perchlorate by SW-846 8321A (Modified). PAHs by SW-846 8270C.

* Analyses for lead will be performed on soil or sediment that has been passed through an ASTM No. 10 (2-mm) wire mesh sieve at the laboratory.

** Water samples for lead or metals analysis will be shipped to the laboratory without preservative; laboratory will filter the sample for analysis of dissolved metals.

*** Selected metals are aluminum, antimony, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, magnesium, molybdenum, mercury, nickel, strontium, titanium, and zinc

Table 3
Sample Location Rationale
Camp Adair/Adair Air Force Station

AOC	Sample Location	Sample Media	Sample Location Rationale
Range Complex No. 4	017A001	S	The soil sample in Known Distance Rifle Range No. 1 to be collected southwest of Tampico Road to assess impacts of over shoots during rifle training. Soil samples to address Known Distance Rifle Ranges 2 and 3 will be collected on or near the target backstop berm (the berm soil may have been spread out over ground surface) to address lead accumulation. Soil samples at the Close Combat Course No. 170 will be collected from hillside along the back of the course to assess lead contamination. The soil sample from the Thompson Sub MG Range No. 50A will be collected based on visual reconnaissance of the suspected target areas to assess lead accumulation near the target areas. The soil sample from the Anti-Aircraft Range No. 70 will be collected approximately 6,000 – 7,000 ft down range from the firing position. This distance is within the maximum range of the .30- and .50-caliber ammunition used on this range. The soil sample from Field Combat Range No. 81 will be located approximately 7,000 ft down range to assess lead accumulation. The soil sample from Transition Course No. 160 will assess the accumulation of lead in the areas of targets located between 450 and 1,500 ft down range of the firing positions. Samples to be analyzed for lead.
	017A002	S	
	017A003	S	
	017A004	S	
	017A005	S	
	017A006	S	
	017A007	S	
	017A008	S	
	017A009	SD	The sample will be collected along Berry Creek near the northeast boundary of Range Complex No. 4. Sample to be analyzed for lead.
	017A010	GW	Groundwater sample to be collected from well located within and near downgradient end of AOC. Sample to be analyzed for total lead and perchlorate.
Range Complex No. 5	017A011	S	Four soil samples will be collected from five ranges: 1,000-inch MG Range No. 20, 21, 22, and 23; 1,000-inch Anti Tank Range No. 45 and 46; 1,000-inch Anti Tank Range No. 40 and 41; 1,000-inch Pistol Range No. 15; and 1,000-inch Landscape Range No. 35, 36, and 37. Samples will be collected from approximately 1,000 inches (83.3 ft) from the firing lines for these ranges. Prior to choosing sampling locations, a visual reconnaissance will be completed to locate the target areas. Samples to be analyzed for lead.
	017A012	S	
	017A013	S	
	017A014	S	

Table 3 (Cont.)
Sample Location Rationale
Camp Adair/Adair Air Force Station

AOC	Sample Location	Sample Media	Sample Location Rationale
Range Complex No. 5	017A015	GW	Groundwater sample to be collected from well located within and near downgradient end of AOC. Sample to be analyzed for total lead and perchlorate.
Range Complex No. 6	017A016	S	Four soil samples will be collected from four ranges: 1,000-inch Landscape Range No. 11; 1,000-inch Landscape Range No. 30, 31, and 32; 1,000-inch Landscape Range No. 33; and 1,000-inch Landscape Range No. 34; Soil samples will be collected from approximately 1,000 inches (83.3 ft) from the firing line. Prior to choosing sampling locations, a visual reconnaissance will be completed to locate the target areas. Sample to be analyzed for lead.
	017A017	S	
	017A018	S	
	017A019	S	
	017A020	GW	Groundwater sample to be collected from well located within and near downgradient end of AOC. Sample to be analyzed for total lead and perchlorate.
Skeet Range No. 580	017A021	S	Three soil samples will be collected from the skeet Range used by the Air Force. One sample will be collected from directly in front of the firing point at approximately 100 ft. the remaining two samples will be collected at approximately 500 ft down range. Samples will be collected to assess lead shot and polyaromatic hydrocarbons (clay targets) in the soil.
	017A022	S	
	017A023	S	
Infiltration Range No. 143	Not Applicable	Not Applicable	Not Applicable
Range Complex No. 1	017A024	S	Two soil samples each will be collected from the Fortified Training Area No. 76 and Bombing Target No. 2. One of the soil samples collected from the Fortified Training Area No. 76 will be located near the fortified bunkers. The second sample will be located in or near a crater that was noted in the ASR Supplement. The two samples collected from the Bombing Target No. 2 will be located south of the target location. Samples from the target location cannot be collected do to ROE refusal by the property owner. Samples to be analyzed for explosives and metals.
	017A025	S	
	017A026	S	
	017A027	S	
	017A028	SD	One sediment sample each will be collected from the Fortified Training Area No. 76 and Bombing Target No. 2. The sample collected form the Fortified Training Area No. 76 will be collected along an intermittent stream located south of Simpson Road. The sediment sample collected within Bombing Target No. 1 will be collected from a stream that drains the target area. Both samples to be analyzed for explosives and metals.
	017A029	SD	

Table 3 (Cont.)
Sample Location Rationale
Camp Adair/Adair Air Force Station

AOC	Sample Location	Sample Media	Sample Location Rationale
Range Complex No. 1	017A030	GW	Groundwater sample to be collected from well located within and near downgradient end of AOC. Sample to be analyzed for explosives, total metals, and perchlorate.
Range Complex No. 2	017A031	S	Seven soil samples will be collected from Range Complex No. 2 at sub-ranges Moving Target Range No. 79A and 79B, Field Combat Range No. 84A, 86, 87, 88, and 89B. Soil samples will be collected to assess MC impacts from explosives and metals. Soil samples will be located based on field visual reconnaissance to locate craters, targets, or other evidence of training activity.
	017A032	S	
	017A033	S	
	017A034	S	
	017A035	S	
	017A036	S	
	017A037	S	
	017A038	SD	One sample will be collected from Luckiamute River located within Field Combat Ranges 84A, 87A, and 87B. The second sediment sample from this range complex will be collected from the Luckiamute River within Hemlick State Park. This sample is a downstream sampling location that will assess impacts from all ranges within the Luckiamute River drainage. This includes Range Complex Nos. 1, 2, and 3. Samples to be analyzed for explosives and metals.
	017A039	SD	
	017A040	GW	Groundwater sample to be collected from wells located within and near downgradient end of AOC. Samples to be analyzed for explosives, total metals, and perchlorate.
	017A041	GW	
Bombing Target No. 1	017A042	S	Sample will be located based on field visual reconnaissance to locate craters, targets, or debris indicative of bombing activity. Sample to be analyzed for explosives and metals.
	017A043	SD	Sample will be located along an intermittent stream near where it crosses Elkins Road. Samples to be analyzed for explosives and metals.
	017A044	GW	Groundwater sample to be collected from well located within and near downgradient end of AOC. Sample to be analyzed for explosives, total metals, and perchlorate.
Range Complex No. 3	017A045	S	Two soil samples will be collected from Field Combat Range No. 89 and one soil sample each will be collected from Field Combat Ranges No. 89A and 89C. Soil samples will be located based on field visual reconnaissance to locate craters, targets, or other evidence of training activity. Samples to be analyzed for explosives and metals
	017A046	S	
	017A047	S	
	017A048	S	

Table 3 (Cont.)
Sample Location Rationale
Camp Adair/Adair Air Force Station

AOC	Sample Location	Sample Media	Sample Location Rationale
Range Complex No. 3	017A049	SD	The sediment sample will be located along an intermittent stream within Field Combat Range No. 89. Samples to be analyzed for explosives and metals.
	017A050	GW	Groundwater sample to be collected from well located within and near downgradient end of AOC. Sample to be analyzed for explosives, total metals, and perchlorate.
Mortar Range	017A051	S	Soil samples will be located based on field visual reconnaissance to locate craters, targets, or other evidence of training activity. Samples to be analyzed for explosives and metals.
	017A052	S	
	017A053	SD	The sediment sample will be collected along Soap Creek near the northern boundary (downstream) of the Mortar Range. Samples to be analyzed for explosives and metals.
	017A054	GW	Groundwater sample to be collected from well located within and near downgradient end of AOC. Sample to be analyzed for explosives, total metals, and perchlorate.
Moving Target Range No. 75	017A055	S	Soil samples will be collected near the 1,000 and 1,500 yard down range target rail locations. Samples to be analyzed for explosives and metals.
	017A056	S	
	017A057	SD	The sediment sample will be collected along Staats Creek near the northern boundary (downstream) of the range. Samples to be analyzed for explosives and metals
	017A058	GW	Groundwater sample to be collected from well located within and near downgradient end of AOC. Sample to be analyzed for explosives, total metals, and perchlorate.
East Live Hand Grenade Court	017A059	S	One soil sample will be collected from the live hand grenade court. Sample to be analyzed for explosives and metals.
	017A060	SD	One sediment sample will be collected from the intermittent stream that flows through the northeastern portion of the East Live Hand Grenade Court. Sample to be analyzed for explosives and metals.
West Live Hand Grenade Court	017A061	S	One soil sample will be collected from the live hand grenade court. Sample to be analyzed for explosives and metals.

Table 3 (Cont.)
Sample Location Rationale
Camp Adair/Adair Air Force Station

AOC	Sample Location	Sample Media	Sample Location Rationale
Live Hand Grenade Court No. 129	017A062	S	One soil sample will be collected from the live hand grenade court. Sample to be analyzed for explosives and metals.
Practice Hand Grenade Court No. 120	NA	NA	NA
Practice Hand Grenade Court No. 121	NA	NA	NA
Practice Hand Grenade Court No. 122	NA	NA	NA
Practice Hand Grenade Court No. 125	NA	NA	NA
Practice Hand Grenade Court No. 126	NA	NA	NA
Practice Hand Grenade Court No. 127	NA	NA	NA
Chemical Identification Area No. 182	NA	NA	NA

AOC = Area of Concern
GW = Groundwater

NA = Not Applicable
S = Soil
SD = Sediment

Table 4
Sample Decision Matrix
Camp Adair/Adair Air Force Station

Planned Field Action	Condition Encountered	Alternative Action
Soil Sampling	Sample material cannot be collected at a planned sampling location.	Offset to a sample location 10 ft to the north of the planned sampling location (if necessary offset to the east, west, or south to find suitable material). Document the location in the field log book and collect GPS coordinates of the actual sample location.
Sediment Sampling	Sample material cannot be collected at a planned sampling location.	Offset to a sample location 10 ft up or downstream of the planned sampling location. Document the location in the field log book and collect GPS coordinates of the actual sample location.
Surface Water Sampling	Not applicable	Not applicable.
Groundwater Sampling	Well is not accessible	Select a nearby well located within the upper water bearing zone. Document the location in the field log book and collect GPS coordinates of the actual sample location.

Table 5
Sample Designations and Analyses
Camp Adair/Adair Air Force Station

Area of Concern	Sample Location	Sample Type	Sample Number	Sample Media	QA/QC Samples		EPA Method
					Field Duplicate	MS/MSD	
Range Complex No. 4	017A001	Composite	NWO-017-0001	Soil			* Lead only by SW846 6020A.
	017A002	Composite	NWO-017-0002	Soil			
	017A003	Composite	NWO-017-0003	Soil			
	017A004	Composite	NWO-017-0004	Soil			
	017A005	Composite	NWO-017-0005	Soil			
	017A006	Composite	NWO-017-0006	Soil	NWO-017-0007		
	017A007	Composite	NWO-017-0008	Soil			
	017A008	Composite	NWO-017-0009	Soil			
	017A009	Discrete	NWO-017-1001	Sediment			
	017A010	Discrete	NWO-017-3001	Groundwater			Lead only by SW-846 6020A. Perchlorate by SW-846 8321A (Modified).
Range Complex No. 5	017A011	Composite	NWO-017-0010	Soil		NWO-017-0010MS/MSD	* Lead only by SW-846 6020A.
	017A012	Composite	NWO-017-0011	Soil			
	017A013	Composite	NWO-017-0012	Soil			
	017A014	Composite	NWO-017-0013	Soil	NWO-017-0014		
	017A015	Discrete	NWO-017-3002	Groundwater			Lead only by SW-846 6020A. Perchlorate by SW-846 8321A (Modified).
Range Complex No. 6	017A016	Composite	NWO-017-0015	Soil			* Lead only by SW-846 6020A.
	017A017	Composite	NWO-017-0016	Soil			
	017A018	Composite	NWO-017-0017	Soil			
	017A019	Composite	NWO-017-0018	Soil			
	017A020	Discrete	NWO-017-3003	Groundwater	NWO-017-3004		
Skeet Range No. 580	017A021	Composite	NWO-017-0019	Soil			* Lead only by SW-846 6020A. PAHs by SW-846 8270C Low Level.
	017A022	Composite	NWO-017-0020	Soil			

Table 5 (Cont.)
Sample Designations and Analyses
Camp Adair/Adair Air Force Station

Area of Concern	Sample Location	Sample Type	Sample Number	Sample Media	QA/QC Samples		EPA Method
					Field Duplicate	MS/MSD	
Range Complex No.	017A024	Composite	NWO-017-0022	Soil			Selected Metals** by SW-846 6020/7471A. Explosives by SW-846 8330A. NG and PETN by SW-846 8330A (Modified).
	017A025	Composite	NWO-017-0023	Soil			
	017A026	Composite	NWO-017-0024	Soil			
	017A027	Composite	NWO-017-0025	Soil	NWO-017-0026		
	017A028	Discrete	NWO-017-1002	Sediment			
	017A029	Discrete	NWO-017-1003	Sediment			
	017A030	Discrete	NWO-017-3005	Groundwater		NWO-017-3005MS/MSD	Selected Metals** by SW-846 6020/7470A. Explosives by SW-846 8330A. NG and PETN by SW-846 8330A (Modified). Perchlorate by SW-846 8321A (Modified).
Range Complex No. 2	017A031	Composite	NWO-017-0027	Soil			Selected Metals** by SW-846 6020/7471A. Explosives by SW-846 8330A. NG and PETN by SW-846 8330A (Modified).
	017A032	Composite	NWO-017-0028	Soil			
	017A033	Composite	NWO-017-0029	Soil			
	017A034	Composite	NWO-017-0030	Soil			
	017A035	Composite	NWO-017-0031	Soil			
	017A036	Composite	NWO-017-0032	Soil			
	017A037	Composite	NW0-017-0033	Soil			
	017A038	Discrete	NWO-017-1004	Sediment			
	017A039	Discrete	NWO-017-1005	Sediment	NWO-017-1006		
	017A040	Discrete	NWO-017-3006	Groundwater			Selected Metals** by SW-846 6020/7470A. Explosives by SW-846 8330A. NG and PETN by SW-846 8330A (Modified). Perchlorate by SW-846 8321A (Modified).
	017A041	Discrete	NWO-017-3007	Groundwater			

Table 5 (Cont.)
Sample Designations and Analyses
Camp Adair/Adair Air Force Station

Area of Concern	Sample Location	Sample Type	Sample Number	Sample Media	QA/QC Samples		EPA Method
					Field Duplicate	MS/MSD	
Bombing Target No. 1	017A042	Composite	NWO-017-0034	Soil			Selected Metals** by SW-846 6020/7471A. Explosives by SW-846 8330A NG and PETN by SW-846 8330A (Modified).
	017A043	Discrete	NWO-017-1007	Sediment			
	017A044	Discrete	NWO-017-3008	Groundwater			Selected Metals** by SW-846 6020/7470A. Explosives by SW-846 8330A. NG and PETN by SW-846 8330A (Modified). Perchlorate by SW-846 8321A (Modified).
Range Complex No. 3	017A045	Composite	NWO-017-0035	Soil			Selected Metals** by SW-846 6020/7471A. Explosives by SW-846 8330A. NG and PETN by SW-846 8330A (Modified).
	017A046	Composite	NWO-017-0036	Soil			
	017A047	Composite	NWO-017-0037	Soil			
	017A048	Composite	NWO-017-0038	Soil			
	017A049	Discrete	NWO-017-1008	Sediment		NWO-017-1008MS/MSD	
	017A050	Discrete	NWO-017-3009	Groundwater			Selected Metals** by SW-846 6020/7470A. Explosives by SW-846 8330A. NG and PETN by SW-846 8330A (Modified). Perchlorate by SW-846 8321A (Modified).
Mortar Range	017A051	Composite	NWO-017-0039	Soil			Selected Metals** by SW-846 6020/7471A. Explosives by SW-846 8330A. NG and PETN by SW-846 8330A (Modified).
	017A052	Composite	NWO-017-0040	Soil			
	017A053	Discrete	NWO-017-1009	Sediment			
	017A054	Discrete	NWO-017-3010	Groundwater			Selected Metals** by SW-846 6020/7470A. Explosives by SW-846 8330A. NG and PETN by SW-846 8330A (Modified). Perchlorate by SW-846 8321A (Modified).

Table 5 (Cont.)
Sample Designations and Analyses
Camp Adair/Adair Air Force Station

Area of Concern	Sample Location	Sample Type	Sample Number	Sample Media	QA/QC Samples		EPA Method
					Field Duplicate	MS/MSD	
Moving Target Range No. 75	017A055	Composite	NWO-017-0041	Soil			Selected Metals** by SW-846 6020/7471A. Explosives by SW-846 8330A. NG and PETN by SW-846 8330A (Modified).
	017A056	Composite	NWO-017-0042	Soil	NWO-017-0043		
	017A057	Discrete	NWO-017-1010	Sediment			
	017A058	Discrete	NWO-017-3011	Groundwater			Selected Metals** by SW-846 6020/7470A. Explosives by SW-846 8330A. NG and PETN by SW-846 8330A (Modified). Perchlorate by SW-846 8321A (Modified).
East Live Grenade Court	017A059	Composite	NWO-017-0044	Soil			Selected Metals** by SW-846 6020/7471A. Explosives by SW-846 8330A. NG and PETN by SW-846 8330A (Modified).
	017A060	Discrete	NWO-017-1011	Sediment			
West Live Hand Grenade Court	017A061	Composite	NWO-017-0045	Soil			Selected Metals** by SW-846 6020/7471A. Explosives by SW-846 8330A. NG and PETN by SW-846 8330A (Modified).
Live Hand Grenade Court No. 129	017A062	Composite	NWO-017-0046	Soil			Selected Metals** by SW-846 6020/7471A. Explosives by SW-846 8330A. NG and PETN by SW-846 8330A (Modified).
	017A063	Discrete	NWO-017-1012	Sediment	NWO-017-1013		

Table 5 (Cont.)
Sample Designations and Analyses
Camp Adair/Adair Air Force Station

Area of Concern	Sample Location	Sample Type	Sample Number	Sample Media	QA/QC Samples		EPA Method
					Field Duplicate	MS/MSD	
Background Samples	017A064	Composite	NWO-017-5001	Soil		NWO-017-5001MS/MSD	TAL List Metals plus Strontium and Titanium by SW-846 6020/7471A.
	017A065	Composite	NWO-017-5002	Soil			
	017A066	Composite	NWO-017-5003	Soil			
	017A067	Composite	NWO-017-5004	Soil			
	017A068	Composite	NWO-017-5005	Soil			
	017A069	Composite	NWO-017-5006	Soil			
	017A070	Composite	NWO-017-5007	Soil			
	017A071	Composite	NWO-017-5008	Soil			
	017A072	Composite	NWO-017-5009	Soil			
	017A073	Composite	NWO-017-5010	Soil	NWO-017-5011		
	017A074	Discrete	NWO-017-5012	Sediment			
	017A075	Discrete	NWO-017-5013	Sediment			
	017A076	Discrete	NWO-017-5014	Sediment			
	017A077	Discrete	NWO-017-6001	Groundwater			TAL List Metals plus Strontium and Titanium by SW-846 6020/7470A. Perchlorate by SW-846 8321A (Modified).
	017A078	Discrete	NWO-017-6002	Groundwater			
	017A079	Discrete	NWO-017-6003	Groundwater	NWO-017-6004		

Notes:
AOC – area of concern
MS/MSD – matrix spike/matrix spike duplicate
EPA – Environmental Protection Agency
PAHs - polycyclic aromatic hydrocarbons
NG – Nitroglycerine
PETN - pentaerythritol tetranitrate
TAL – target analyte list

* Analyses for lead only will be performed on soil or sediment that has been passed through an ASTM No. 10 (2-mm) wire mesh sieve at the laboratory.
** Selected metals are aluminum, antimony, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, magnesium, molybdenum, mercury, nickel, strontium, titanium, and zinc

Table 6
Soil Laboratory Method Quantitation Limits and
Human Health Screening Values (State of Oregon Standards Based on USEPA Region 9 [a])

Analyte	Abbreviation	CAS No.	Laboratory Method Detection Limit (mg/kg)	Region 9 Human Health Screening Values		
				Residential PRG[b] (mg/kg)[b]	SSLs[c] DAF=1 (mg/kg)	SSLs[c] DAF=20 (mg/kg)
Hexahydro-1,3,5-trinitro-1,3,5-triazine	RDX	121-82-4	0.075	4.4		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	HMX	2691-41-0	0.050	3,100		
2,4,6-Trinitrotoluene	2,4,6-TNT	118-96-7	0.040	16		
1,3,5-Trinitrobenzene	1,3,5-TNB	99-35-4	0.020	1,800		
1,3-Dinitrobenzene	1,3-DNB	99-65-0	0.020	6.1		
2,4-Dinitrotoluene[g]	2,4-DNT	121-14-2	0.040	0.72	0.00004	0.0008
2,6-Dinitrotoluene[g]	2,6-DNT	606-20-2	0.040	0.72	0.00004	0.0008
2-Amino-4,6-dinitrotoluene	2-Am-DNT	35572-78-2	0.040	12		
2-Nitrotoluene	2-NT	88-72-2	0.075	0.88		
3-Nitrotoluene	3-NT	99-08-1	0.050	730		
4-Amino-2,6-dinitrotoluene	4-Am-DNT	19406-51-0	0.040	12		
4-Nitrotoluene	4-NT	99-99-0	0.040	12		
Nitrobenzene	NB	98-05-3	0.020	20	0.007	0.1
Methyl-2,4,6-trinitrophenylnitramine	Tetryl	479-45-8	0.065	610		
Pentaerythritol tetranitrate	PETN	78-11-5	0.50	NVA	NVA	NVA
Nitroglycerin	NG	55-63-0	10	35		
Aluminum	Al	7429-90-5	20.0	76,000		
Antimony	Sb	7440-36-0	0.5	31	0.30	5
Barium	Ba	7440-38-2	0.5	5,400	82	1,600
Cadmium	Cd	7440-43-9	0.5	37	0.4	8
Chromium[h]	Cr	7440-47-3	1.0	210	2	38
Cobalt	Co	7440-48-4	0.5	900		
Copper	Cu	7440-50-8	1.0	3,100		
Iron	Fe	7439-89-6	15.0	23,000		
Lead	Pb	7439-92-1	1.0	400		
Magnesium	Mg	7439-95-4	25.0			

Table 6 (Cont.)
Soil Laboratory Method Quantitation Limits and
Human Health Screening Values (State of Oregon Standards Based on USEPA Region 9 [a])

Analyte	Abbreviation	CAS No.	Laboratory Method Detection Limit (mg/kg)	Region 9 Human Health Screening Values		
				Residential PRG[b] (mg/kg)[b]	SSLs[c] DAF=1 (mg/kg)	SSLs[c] DAF=20 (mg/kg)
Manganese	Mn	7439-96-5	0.5	1,800		
Molybdenum	Mo	7439-98-7	0.5	390		
Mercury	Hg	7439-97-6	0.06	23		
Nickel	Ni	7440-02-0	1.0	1,600	7	130
Strontium	Sr	7440-24-6		47,000		
Titanium	Ti	7440-32-6		100,000		
Zinc	Zn	7440-66-6	2.0	23,000	620	12,000
Perchlorate	$C1O_4$	14797-73-0	3.0	7.8		
Acenaphthene		83-32-0	0.015	3,700	29	570
Acenaphthylene[i]		120-12-7	0.015	2,300		
Anthracene		120-12-7	0.015	22,000	590	12,000
Benzo(a)anthracene		56-55-3	0.015	0.62	0.08	2
Benzo(b)fluoranthene		205-99-2	0.015	0.62	0.2	5
Benzo(k)fluoranthene		207-08-9	0.015	6.2	2	49
Benzo(g,h,i)perylene[i]			0.015	2,300		
Benzo(a)pyrene		50-32-8	0.015	0.062	0.4	8
Chrysene		218-01-9	0.015	62	8	160
Dibenz(a)anthracene		53-70-3	0.015	0.062	0.08	2
Fluoranthene		206-40-0	0.015	2,300	210	4,300
Fluorene		86-73-7	0.015	2,700	28	560
Indeno(1,2,3-cd)pyrene		139-39-5	0.015	0.62	0.7	14
Naphthalene		91-20-3	0.015	56	4	84
Phenanthrene[i]			0.015	2,300		
Pyrene		129-00-0	0.015	2,300	210	4,200

DAF = Dilution Attenuation Factor
PRG = Preliminary Remediation Goal
SSL = Soil Screening Level
mg/kg = milligrams per kilogram.

[a] If laboratory cannot meet any of the preferred QLs with routine SW 846 methodology (as supported by MDLs that are no greater than 1/3 QL), laboratory's QL must be identified in laboratory submittal as failing to meet the QL. Some screening values cannot be obtained with routine methodology to the QL. In those cases, the QL achievable with a routine SW 846 methodology would be accepted.

[b] PRGs from Region 9 PRG Table dated October 2004 and addendum dated 28 December 2004, based on single chemical.

[c] SSLs from Region 9 PRG Table dated October 2004 and revision note dated 28 December 2004.

[g] Carcinogenic DNT mixture values used if more conservative than noncarcinogenic isomer-specific values.

[h] Total chromium values used.

[i] Based on PRG for pyrene as a surrogate value.

Table 7
Groundwater Laboratory Method Quantitation Limits and Human Health Screening Values (State of Oregon Standards Based on USEPA Region 9 [a])

Analyte	Abbreviation	CAS No.	Laboratory Method Detection Limit (µg/L)	Region 9 Tap Water PRG[b] (µg/L)	Federal Drinking Water Criteria MCLs[c] (µg/L)
Hexahydro-1,3,5-trinitro-1,3,5-triazine	RDX	121-82-4	0.8	0.61	
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	HMX	2691-41-0	0.4	1,800	
2,4,6-Trinitrotoluene	2,4,6-TNT	118-96-7	0.3	2.2	
1,3,5-Trinitrobenzene	1,3,5-TNB	99-35-4	0.2	1,100	
1,3-Dinitrobenzene	1,3-DNB	99-65-0	0.2	3.6	
2,4-Dinitrotoluene[e]	2,4-DNT	121-14-2	0.3	0.099	
2,6-Dinitrotoluene[e]	2,6-DNT	606-20-2	0.3	0.099	
2-Amino-4,6-dinitrotoluene	2-Am-DNT	35572-78-2	0.2	7.3	
2-Nitrotoluene	2-NT	88-72-2	0.4	0.049	
3-Nitrotoluene	3-NT	99-08-1	0.8	120	
4-Amino-2,6-dinitrotoluene	4-Am-DNT	19406-51-0	0.2	7.3	
4-Nitrotoluene	4-NT	99-99-0	0.4	0.66	
Nitrobenzene	NB	98-05-3	0.2	3.4	
Methyl-2,4,6-trinitrophenylnitramine	Tetryl	479-45-8	0.75	360	
Pentaerythritol tetranitrate	PETN	78-11-5	1.3		
Nitroglycerin	NG	55-63-0	0.5	4.8	
Aluminum	Al	7429-90-5	6.0E-02	36,000	50[f]
Antimony	Sb	7440-36-0	1.0E-03		
Barium	Ba	7440-38-2	5.0E-03	2,600	2,000
Cadmium	Cd	7440-43-9	5.0E-04	18	5
Chromium[f]	Cr	7440-47-3	2.0E-03	110	100
Cobalt	Co	7440-48-4	1.0E-03	730	
Copper	Cu	7440-50-8	3.0E-03	1,500	1,000[f] 1,300[h]
Iron	Fe	7439-89-6	5.0E-02	11,000	300[f]

Table 7 (Cont.)
Groundwater Laboratory Method Quantitation Limits and
Human Health Screening Values (State of Oregon Standards Based on USEPA Region 9 [a])

Analyte	Abbreviation	CAS No.	Laboratory Method Detection Limit (µg/L)	Region 9 Tap Water PRG[b] (µg/L)	Federal Drinking Water Criteria MCLs[c] (µg/L)
Lead	Pb	7439-92-1	1.0E-03		15[h]
Magnesium	Mg	7439-95-4	1.0E-01		
Manganese	Mn	7439-96-5	2.0E-03	880	50[f]
Mercury	Hg	7439-97-6	3.0E-04	11	2
Molybdenum	Mo	7439-98-7	5.0E-03	180	
Nickel	Ni	7440-02-0	1.0E-03	730	
Strontium	Sr	7440-24-6		22,000	
Titanium	Ti	7440-32-6		150,000	
Zinc	Zn	7440-66-6	1.0E-02	11,000	5,000[f]
Perchlorate	$C1O_4$	7601-90-3		3.6	

MCL = Maximum Contaminant Level
PRG = Preliminary Remediation Goal
µg/L = micrograms per liter

[a] If laboratory cannot meet these QLs with routine SW 846 methodology (as supported by MDLs that are no greater than 1/3 QL), laboratory's QL must be identified in laboratory submittal as failing to meet the QL. Some screening values cannot be obtained with routine methodology to the QL. Note that no surface water samples are planned at this time. If surface water is collected, additional human health screening criteria will be compiled.
[b] Region 9 PRG Table dated October 2004 and revision note dated 28 December 2004, based on single chemical.
[c] Primary MCL from the 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004, is listed unless otherwise indicated.
[e] Carcinogenic DNT mixture values used if more conservative than noncarcinogenic isomer-specific values.
[f] Secondary MCL from the 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004.
[g] Total chromium values used if available.
[h] Action level from the 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004.
[j] Value from the 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004, Drinking Water Advisory Table.

Table 8
Laboratory Method Quantitation Limits and Ecological Screening Values for the State of Oregon Sites

Analyte	CAS #	Laboratory Method Quantitation Limit (mg/kg)	Ecological Screening Values[a]	
			Sediment Ecological Screening Levels (µg/L)	Soil Ecological Screening Levels (µg/kg)
Explosives				
(RDX) Hexahydro-1,3,5-trinitro-1,3,5-triazine	121-82-4	0.075	0.13	7.5
(HMX) Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	2691-41-0	0.050	0.0047	27
(2,4,6-TNT) 2,4,6-Trinitrotoluene (4)	118-96-7	0.040	0.92	6.4
(1,3,5-TNB) 1,3,5-Trinitrobenzene	99-35-4	0.020	0.024	0.376
(1,3-DNB) 1,3-Dinitrobenzene	99-65-0	0.020	0.067	0.655
(2,4-DNT) 2,4-Dinitrotoluene (1)	121-14-2	0.040	0.290	1.28
(2,6-DNT) 2,6-Dinitrotoluene (1)	606-20-2	0.040	1.9	0.0328
(2-Am-DNT) 2-Amino-4,6-dinitrotoluene	35572-78-2	0.040	7	2.1
(2-NT) 2-Nitrotoluene	88-72-2	0.075	5.6	2.0
(3-NT) 3-Nitrotoluene	99-08-1	0.050	4.9	2.4
(4-Am-DNT) 4-Amino-2,6-dinitrotoluene	19406-51-0	0.040	1.9	0.73
(4-NT) 4-Nitrotoluene	99-99-0	0.040	1.0	4.4
(NB) Nitrobenzene	98-95-3	0.020	32	8
(NG) Nitroglycerin	55-63-0	10	1,700	71
(Tetryl) Methyl-2,4,6-trinitrophenylnitramine	479-45-8	0.065	100	0.99
(PENT) Pentaerythritol Tetranitrate	78-11-5	0.50	120,000	0.5
Metals				
Aluminum	7429-90-5	20.0	2.80E+02	50
Antimony	7440-36-0	0.5	3.00E+00	5
Barium	7440-38-2	0.5	4.80E+01	85
Cadmium	7440-43-9	0.5	3.00E-03	4
Chromium[h]	7440-47-3	1.0	3.70E+01	0.4
Cobalt	7440-48-4	0.5	2.30E+02	20
Copper	7440-50-8	1.0	1.00E+01	50
Iron	7439-89-6	15.0	2.00E+01	10
Lead	7439-92-1	1.0	3.50E+01	16
Magnesium	7439-95-4	25.0	NVA	NVA/Nutrient
Manganese	7439-96-5	0.5	1.10E+03	100
Molybdenum	7439-98-7	0.5	2.00E-01	0.1
Mercury	7439-97-6	0.06	NVA	2
Nickel	7440-02-0	1.0	1.80E+01	30
Strontium	7440-24-6		NVA	NVA

Table 8 (Cont.)
Laboratory Method Quantitation Limits and
Ecological Screening Values for the State of Oregon Sites

Analyte	CAS #	Laboratory Method Quantitation Limit (mg/kg)	Ecological Screening Values[a]	
			Sediment Ecological Screening Levels (µg/L)	Soil Ecological Screening Levels (µg/kg)
Titanium	7440-32-6		1.70E+03	NVA
Zinc	7440-66-6	2.0	9.80E+01	32875
PAHs				
Acenaphthene	83-32-9	0.015	2.90E+02	20
Acenaphthylene	208-96-8	0.015	1.60E+02	682
Anthracene	120-12-7	0.015	5.70E+01	0.1
Benzo(a)anthracene	56-55-3	0.015	3.20E+01	5.21
Benzo(b)fluoranthene	205-99-2	0.015	3.20E+01	125
Benzo(k)fluoranthene	207-08-9	0.015	4.00E+00	59.8
Benzo(g,h,i)perylene	191-24-2	0.015	2.70E+01	148
Benzo(a)pyrene	50-32-8	0.015	3.00E+02	119
Chrysene	218-01-9	0.015	5.70E+01	4.73
Dibenz(a,h)anthracene	53-70-3	0.015	3.30E+01	18.4
Fluoranthene	206-44-0	0.015	5.10E+03	0.002
Fluorene	86-73-7	0.015	1.11E+02	0.1
Indeno(1,2,3-cd)pyrene	193-39-5	0.015	7.70E+01	30
Naphthalene	91-20-3	0.015	1.70E+01	109
Phenanthrene	85-01-8	0.015	1.76E+02	10
Pyrene	129-00-0	0.015	4.20E+01	0.1

Ecological Screening Levels (ESL), US EPA Region 5, August 2003.
Note: The laboratory MQL values in bold exceed the EPA Region 5 ESL standards. The state regulator will be contacted to discuss a variance.

NVA = No Value Available

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

[a] Final Screening Value selected using the following hierarchy:

1. State Value (Oregon)
2. USEPA Region State is located in (USEPA Region 10)
3. Lower of Talmage et al. [TAL] (1999) or LANL (2005) values.

APPENDIX A

CONCEPTUAL SITE MODEL

Overview

A site-specific CSM summarizes available site information and identifies relationships between exposure pathways and associated receptors. A CSM is used to determine the data types necessary to describe site conditions and quantify receptor exposure, and discusses the following information:

- Current and future land use;
- Potential contaminant sources (e.g., lead projectiles in an impact berm);
- Affected media;
- Governing fate and transport processes (e.g., surface water runoff and/or groundwater migration);
- Exposure media (i.e., media through which receptors could contact site-related contamination);
- Routes of exposure (e.g., inhalation, incidental ingestion, and dermal contact); and
- Potential human and/or representative ecological receptors at the exposure point. Receptors likely to be exposed to site contaminants are identified based on current and expected future land uses.

The CSM is evaluated for completeness and further developed as needed through TPP meetings. Based on similar historical use, MEC/MC, and environmental conditions, the following types of AOCs are identified within Camp Adair:

- Small Arms Ranges (5),
- Explosive Munitions Ranges (6),
- Live Hand Grenade Courts (3),
- Practice Grenade Courts (6), and
- Chemical Identification Area (1)

In the section that follows a CSM is presented for each AOC group. and MEC and MC are analyzed.

The ASR and/or ASR Supplement indicate that MEC (duds) have been found in a number of the explosive ranges. In addition, MEC has been found in and immediately surrounding the former cantonment area. One anti-tank rocket was found on the Camp Adair Parade Ground and a mortar round was found while excavating for two ponds in the south central portion of the cantonment area. A third MEC was reported just west of Highway 99 and the northwest corner of the cantonment area. These finds have not been related to any known AOC.

Conceptual Site Model – Small Arms Ranges

There are five small arms range AOCs and sub-ranges at Camp Adair as follows::

- Infiltration Range No. 143
- Range Complex No. 4
  - Known Distance Rifle Range No. 1
  - Known Distance Rifle Range No. 2
  - Known Distance Rifle Range No. 3
  - Known Distance Rifle Range No. 4
  - Thompson Sub Machine Gun Range No. 50
  - Thompson Sub Machine Gun Range No. 50A
  - Mini A-A Range No. 60, 61, 62
  - Mini A-A Range No. 65, 66, 67
  - Anti Aircraft Range No. 70
  - Field Combat Range No. 80
  - Field Combat Range No. 80A
  - Field Combat Range No. 80B
  - Field Combat Range No. 81
  - Infiltration Range No. 141
  - Transition Course No. 160
  - Close Combat Course No. 170
- Range Complex No. 5
  - 1000-inch Machine Gun Range No. 20, 21, 22, 23
  - 1000-inch Anti-Tank Range No. 45, 46
  - 1000-inch Anti-Tank Range No. 40, 41
  - 1000-inch Pistol Range No. 15
  - 1000-inch Landscape Range No. 35, 36, 37
- Range Complex No. 6
  - 1000-inch Landscape Range No. 11
  - 1000-inch Landscape Range 30, 31, 32
  - 1000-inch Landscape Range No. 33
  - 1000-inch Landscape Range No. 34
- Skeet Range No. 580

Current and Future Land Use

- A large portion of the small arms range AOCs are currently residential properties.
- Other uses include a county park adjacent to residential areas (Skeet Range No. 580), landfill (Infiltration Range No. 143), state forest, and an active National Guard small arms range and maneuver area (portions of Range Complex No. 4).
- Portions of Range Complex No. 4 currently being used by the Oregon National Guard will not be included in this SI due to active training activities at the site.
- Infiltration Range No. 143 is not accessible for purposes of this SI. The range area is now used as a landfill and has been heavily excavated and covered with municipal waste.
- Future land use is anticipated to remain consistent with current uses.

Former Range Use

- The ranges were used by the Army between 1942 and 1945, with the exception of the skeet range, which was used between 1955 and 1964 as part of the Adair Air Force Station facility.
- Weapons used at these ranges were limited to small arms (.22- to .50-caliber).
- Known use of explosives at these ranges was limited to static charges of dynamite or trinitrotoluene (TNT) (detonated with blasting caps) in craters at Infiltration Range No. 141 (Range Complex No. 4) and Infiltration Range No. 143.
- At some ranges, small arms fire would tend to be concentrated in backstops; i.e., manmade berms or natural hillsides (Figure 20 of the *Final TPP Memorandum*). Berms are still evident at Known Distance Rifle Ranges No. 1 through 4 (Range Complex No. 4).
- At other ranges, small arms fire would tend to be dispersed over a wide area; e.g., the anti-aircraft ranges and the skeet range (Figure 21 of the *Final TPP Memorandum*).

MEC Evaluation

Types of MEC

- The munitions used at these AOCs were limited to small arms rounds, which do not pose a significant explosive hazard.
- Limited use of explosives (dynamite, TNT, and blasting caps) on two infiltration ranges was more highly controlled than typical use of explosive munitions. Static charges were detonated in craters within the courses to simulate combat conditions. The potential for unexploded ordnance to be present at these locations is low, although there is some potential for unknown explosive munitions.
- Based on non-infantry use of the skeet range by the Air Force, the Skeet Range No. 580 AOC is considered to pose no significant risk from MEC.

Surface Exposure Pathway

- Slight MEC risk is associated with potential for unknown use of explosive MEC at the small arms ranges.

Subsurface Exposure Pathway

- Slight MEC risk is associated with potential for unknown use of explosive MEC at the small arms ranges.

An analysis of the exposure pathways and receptors for MEC are provided in Table 2 of the *Final TPP Memorandum*.

MEC Evaluation/Investigation Needed

- Visual reconnaissance and localized magnetometer sweeps will be conducted to assess the presence of MEC within the Small Arms Ranges.

<u>MC Evaluation</u>

Types of MC

- The anticipated MC at the small arms ranges is lead from the munitions debris.
- A relatively small quantity of copper and antimony are present in military bullets. Because lead accounts for more than 96 percent of the bullet mass, analysis for lead alone will be adequate as an indicator of MC contamination.
- The only known potential use of explosives at the small arms ranges was limited to infiltration courses, which typically used reduced charges of explosives placed in craters to simulate combat conditions. Two infiltration courses have been identified: Infiltration Range No. 141 (within Range Complex No. 4), and Infiltration Range No. 143. Neither of these locations is accessible for purposes of the site inspection. Infiltration Range No. 141 is located in the active National Guard facility. The area of Infiltration Range No. 143 is now a landfill; the range area is no longer accessible and has been heavily excavated and covered with municipal waste (statement by Brian Stone of Allied Waste during TPP meeting).
- Perchlorate may have been present in tracer rounds where .50-caliber machine guns were used (Range Complex Nos. 4 and 5).
- Polycyclic aromatic hydrocarbons (PAH) may be present from targets used at Skeet Range No. 580.

Overview of Pathways

Affected media and potential pathways for MC include:

- Soil: Soil is the primary medium of concern because of possible MC in the soil from training activities. The soil also serves as a source of potential air, surface water, or groundwater contamination.
- Surface Water/Sediment: Surface water may act as a migration pathway from potential sources of contamination in soil. Accumulation of lead and explosives may occur in

sediment along surface water migration pathways through mass transport of soil into streams and leaching of contamination into surface water. Sediment will be the primary sample medium to assess surface water pathways.

- Groundwater: Groundwater is considered a potentially affected media because it is generally present within 40 ft of ground surface. Groundwater may also serve as a migration path to downgradient surface water.
- Air: Inhalation of MC in vapor form is not a pathway of concern for non-volatile MC under normal environmental conditions. Potential inhalation of soil particles is included in the development of health-based screening values for soil.

Potential exposure media at the small arms ranges include soil, surface water/sediment, and groundwater. A pathway evaluation for these media is discussed below and provided in Table 2 of the *Final TPP Memorandum*.

Soil Exposure Pathway

Exposure Routes

- The potential routes of human exposure to contaminated soils include incidental ingestion of and dermal contact with contaminated media, as well as inhalation of soil particulates during intrusive work.
- The potential routes of livestock and wildlife exposure to contaminated soils include ingestion of and direct contact with contaminated media. Plants may uptake MC and then subsequently be eaten by livestock and wildlife. Burrowing animals may ingest MC-contaminated soil and subsequently be eaten by predators.

Receptors

- Residents.
- Workers (farmers, foresters, etc).
- Recreational users.
- Livestock and wildlife.

Soil MC Evaluation/Investigation Needed

- Soil samples to be collected at locations within the AOCs (primarily impact areas).
- Samples to be analyzed for lead.
- Samples from the Skeet Range No. 580 will be analyzed for lead and PAHs.
- No samples from Infiltration Range No. 143 course area will be collected. The site is being used as a landfill and has been heavily reworked and excavated and is covered with municipal waste.
- No sampling will be conducted within ranges currently used by the Oregon National Guard. The property is being used for active training exercises.

Surface Water/Sediment Exposure Pathway

Exposure Routes

- The potential routes of human exposure to contaminated surface water and sediment include ingestion, dermal contact, and inhalation.
- The potential routes of livestock and wildlife (including aquatic organisms) exposure to contaminated surface water include ingestion and direct contact.

Receptors

- Residents.
- Workers (Farmers, foresters, etc).
- Recreational users.
- Livestock and wildlife.

Surface Water/Sediment MC Evaluation/Investigation Needed

- Sampling of potential source soils provides information regarding potential impact to surface water pathways.
- One sediment sample will be collected at the largest small arms range complex, where range activity indicates less concentrated accumulation of lead from bullets may be expected.
- Sample to be analyzed for lead.

Groundwater Exposure Pathway

Exposure Routes

- The potential routes of human exposure to contaminated groundwater include ingestion and dermal contact where groundwater is used as a water supply.
- Direct exposure of wildlife to groundwater is not a concern. The potential routes of livestock exposure include ingestion and dermal contact where groundwater is used as a water supply.

Receptors

- Residents.
- Workers (farmers, foresters, etc).
- Recreational users.
- Livestock.

Groundwater MC Evaluation/Investigation Needed

- Groundwater samples at or near some of the major ranges will be collected from existing wells—specific locations to be determined.

- To the extent practicable, well selection will favor the following criteria: location within or near a potential source area, wells open or unsealed within 30 ft of ground surface, total depth of 100 ft or less, and wells listed in the USGS monitoring database.

- One groundwater sample will be collected in the vicinity of each of the three small arms range complexes. The samples will be analyzed for total lead (also perchlorate at Range Complex Nos. 4 and 5 where a potential perchlorate source is indicated by use of .50-caliber machine guns).

Conceptual Site Model – Explosive Munitions Ranges

There are six explosive munitions range AOCs and sub-ranges at Camp Adair as follows:

- Range Complex No. 1
  - Fortified Training Area No. 76
  - Bombing Target No. 2
- Range Complex No. 2
  - Field Combat Range No. 51
  - Moving Target Range No. 79A
  - Moving Target Range No. 79B
  - Field Combat Range No. 83
  - Field Combat Range No. 84
  - Field Combat Range No. 84A
  - Field Combat Range No. 85
  - Field Combat Range No. 86
  - Field Combat Range No. 86A
  - Field Combat Range No. 87
  - Field Combat Range No. 87A
  - Field Combat Range No. 87B
  - Field Combat Range No. 88
  - Field Combat Range No. 89B
  - Mortar Range No. 90
  - Infiltration Range No. 142
- Bombing Target No. 1
- Range Complex No. 3
  - Field Combat Range No. 89
  - Field Combat Range No. 89A
  - Field Combat Range No. 89C
- Mortar Range
- Moving Target Range No. 75

Current and Future Land Use

- A large portion of the explosive munitions range AOCs are located in the north half of the FUDS on private land. Land use is largely agricultural and forestry related, with a relatively low number of residences (less than 300).
- Two ranges in the south half of the FUDS are principally located on state forest land.
- Future land use is anticipated to remain consistent with current uses.

Former Range Use

- The ranges were used by the Army between 1942 and 1945.
- Navy and Marine Corps pilots also conducted bombing and gunnery operations in the north area of the FUDS sometimes referred to as the artillery range (principally Range Complex Nos. 1 and 2 and Bombing Target No. 1).
- Munitions used varied from range to range but at Range Complex Nos. 1 and 2 all infantry and crew-served conventional weapons were authorized for use. Weapons used included the .30-caliber rifle, automatic rifle, .30-caliber light and heavy machine guns, .50-caliber machine gun, anti-tank guns, 105-mm and 155-mm howitzers, mortars, and 2.36-inch anti-tank and practice rockets.
- Exercises included support by tank and aircraft (the latter using 100-pound (lb), 300-lb, and 500-lb general-purpose and practice bombs).
- Explosives, blasting caps, and incendiary, illumination, and smoke devices were also used.
- The range complexes included many overlapping safety fans and supported multiple activities that simulated combat conditions (Figure 22 of the *Final TPP Memorandum*).
- Much of the explosive munitions fire was directed toward specific targets, creating impact areas. A 1947 Certificate of Clearance included a recommendation that three land tracts be restricted to grazing or timbering activity due to a high concentration of shell firing.
- Craters caused by explosive munitions were visible during and shortly after the use of these ranges, but these areas have generally been regraded for agricultural or other purposes.

MEC Evaluation

Types of MEC

- The munitions used in Range Complex Nos. 1 and 2 included the full range of infantry munitions described above.
- Munitions at Range Complex No. 3 included general small arms, .50-caliber machine gun, large caliber high explosive projectiles (105-mm HE M1, 155-mm HE M107, 37-mm HE M54, 57-mm APC-T M86, and mortars (60-mm HE M49, 81-mm HE M43, 60-mm practice M50A2, 81-mm TP M43A1).

- Munitions at the Mortar Range included general small arms and mortars (60-mm HE M49, 81-mm HE M43, 60-mm Training M69, 60-mm Training M50A2, 81-mm Training M68, and 81-mm Training M43A1).
- Munitions at the Moving Target Range No. 75 included large caliber projectiles (75-mm HE M48, 37-mm AP M74).
- A listing of munitions used on the explosive munitions ranges is provided on Table 1.
- The ASR and/or ASR Supplement indicate that MEC ("duds") have been found at the following explosive munitions ranges (locations of reported MEC finds are plotted on the figures of each AOC):
    - Range Complex No. 1
    - Range Complex No. 2
    - Mortar Range
    - Moving Target Range No. 75
- The potential hazard from MEC is significant, as indicated by reported encounters of explosive MEC since the late 1940's and as recently as 2001.

Surface Exposure Pathway

- The potential route of human exposure to MEC or munitions debris includes direct contact by vehicles, foot traffic, or handling. Human exposure would potentially include residents, workers, and recreational users.
- The potential route of livestock and wildlife exposure to MEC or munitions debris would be by direct contact.

Subsurface Exposure Pathway

- The potential routes of human exposure to MEC or munitions debris would be through intrusive activity, agricultural tilling, or geologic instability (erosion, freeze-thaw, etc.).
- The potential route of livestock and wildlife exposure to MEC or munitions debris would be by burrowing activities or geologic instability.

An analysis of the exposure pathways and receptors for MEC are provided in Table 2 of the *Final TPP Memorandum*.

MEC Evaluation/Investigation Needed

- The presence of MEC has been established for the Explosive Munitions Ranges and no visual reconnaissance or magnetometer sweeps will be conducted to assess the presence of MEC. Visual reconnaissance with the aid of a magnetometer of selected portions of the AOCs will be completed with the objective of locating suitable sampling locations and MEC avoidance for safety.

MC Evaluation

Types of MC

- The anticipated MC at the explosive munitions ranges is primarily residual explosive compounds from munitions that underwent high-order (normal) or low-order detonation, or from undetonated munitions.
- To a lesser degree, there is a potential for the presence of elevated concentrations of metals. Sources would primarily include the metallic content of the projectiles and other munitions components. Small quantities of metals were also used in tracers, incendiary mixtures, and in primary explosives.
- Perchlorate may have been present as a component of some munitions, i.e., in tracer rounds where .50-caliber machine guns were used (Range Complex Nos. 1, 2, and 3, and Mortar Range) and 2.36-inch rockets.

Overview of Pathways

Affected media and potential pathways for MC include:

- Soil: Soil is the primary medium of concern because of possible MC in the soil from training activities. The soil also serves as a source of potential air, surface water, or groundwater contamination.
- Surface Water/Sediment: Surface water may act as a migration pathway from potential sources of contamination in soil. Accumulation of explosives and metals may occur in sediment along surface water migration pathways through mass transport of soil into streams and the leaching of contaminants into surface water. Sediment will be the primary sample medium to assess surface water pathways.
- Groundwater: Groundwater is considered a potentially affected media because it is generally present within 40 ft of ground surface. Groundwater may also serve as a migration path to downgradient surface water.
- Air: Inhalation of MC in vapor form is not a pathway of concern for non-volatile MC under normal environmental conditions. Potential inhalation of soil particles is included in the development of health-based screening values for soil.

Potential exposure media at the explosive munitions ranges include soil, surface water/sediment, and groundwater. A pathway evaluation for these media is discussed below and provided in Table 2 of the *Final TPP Memorandum*.

Soil Exposure Pathway

Exposure Routes

- The potential routes of human exposure to contaminated soils include incidental ingestion of and dermal contact with contaminated media, as well as inhalation of soil particulates during intrusive work.
- The potential routes of livestock and wildlife exposure to contaminated soils include ingestion of and direct contact with contaminated media. Plants may uptake MC and

then subsequently be eaten by livestock and wildlife. Burrowing animals may ingest MC-contaminated soil and subsequently be eaten by predators.

Receptors

- Residents.
- Workers (farmers, foresters, etc).
- Recreational users.
- Livestock and wildlife.

Soil MC Evaluation/Investigation Needed

- Soil samples to be collected at locations within the AOCs (1 to 7 samples per AOC, primarily at impact areas).
- Samples to be analyzed for explosives and selected metals (aluminum, antimony, barium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, strontium, titanium, and zinc).

Surface Water/Sediment Exposure Pathway

Exposure Routes

- The potential routes of human exposure to contaminated surface water and sediment include ingestion, dermal contact, and inhalation of water.
- The potential routes of livestock and wildlife (including aquatic organisms) exposure to contaminated surface water include ingestion and direct contact.

Receptors

- Residents.
- Workers (farmers, foresters, etc).
- Recreational users.
- Livestock and wildlife.

Surface Water/Sediment MC Evaluation/Investigation Needed

- Sampling of potential source sediments provides information regarding potential impact to surface water pathways.
- Sediment samples will be collected at locations within or downslope of the AOCs (1 to 2 samples per AOC).
- Samples to be analyzed for explosives and selected metals (aluminum, antimony, barium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, strontium, titanium, and zinc).

Groundwater Exposure Pathway

Exposure Routes

- The potential routes of human exposure to contaminated groundwater include ingestion and dermal contact where groundwater is used as a water supply.

- Direct exposure of wildlife to groundwater is not a concern. The potential routes of livestock exposure include ingestion and dermal contact where groundwater is used as a water supply.

Receptors

- Residents.
- Workers (farmers, foresters, etc).
- Recreational users.
- Livestock.

Groundwater MC Evaluation/Investigation Needed

- One groundwater sample will be collected at each AOC (two samples at Range Complex No. 2).
- To the extent practicable, well selection will favor the following criteria: location within or near a potential source area, wells open or unsealed within 30 ft of ground surface, total depth of 100 ft or less, and wells listed in the USGS monitoring database.
- Samples to be analyzed for explosives, selected total metals (aluminum, antimony, barium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, strontium, titanium, and zinc), and perchlorate.

Conceptual Site Model – Live Hand Grenade Courts

There are three live hand grenade court AOCs at Camp Adair as follows:

- East Live Hand Grenade Courts
- West Live Hand Grenade Courts
- Live Hand Grenade Court No. 129

Current and Future Land Use

- These AOCs are currently used for agriculture and tree farming.
- Agricultural buildings and/or residences are located near each AOC.
- Future land use is anticipated to remain consistent with current uses.

Former Range Use

- The ranges were used by the Army between 1942 and 1945.
- The courts were used for training in the use of live (explosive) and/or training hand grenades.
- Grenades were thrown from individual throwing bays constructed from sandbags or concrete, or from a trench.
- Grenades were thrown toward targets in an impact area approximately 25 yards from the throwing line (see Figure 23 of the *Final TPP Memorandum*).
- A danger area of approximately 600 ft would have been established around each court.

MEC Evaluation

Types of MEC

- The munitions used included the Mk II fragmentation hand grenade.
- M21 Practice grenades, which contained only small spotting charges of black powder, may also have been used.
- The potential hazard from MEC is significant, as indicated by reported encounters with hand grenades by local residents in the vicinity of at least two of the courts.

Surface Exposure Pathway

- The potential route of human exposure to MEC or munitions debris includes direct contact by vehicles, foot traffic, or handling. Human exposure would potentially include residents, workers, and recreational users.
- The potential route of livestock and wildlife exposure to MEC or munitions debris would be by direct contact.

Subsurface Exposure Pathway

- The potential routes of human exposure to MEC or munitions debris would be through intrusive activity, agricultural tilling, or geologic instability (erosion, freeze-thaw, etc.).

- The potential route of livestock and wildlife exposure to MEC or munitions debris would be by burrowing activities or geologic instability.

An analysis of the exposure pathways and receptors for MEC are provided in Table 2 of the *Final TPP Memorandum*.

MEC Evaluation/Investigation Needed

- The presence of MEC has been established for the Live Hand Grenade Courts and no visual reconnaissance or magnetometer sweeps will be conducted to assess the presence of MEC. Visual reconnaissance with the aid of a magnetometer of selected portions of the AOCs will be completed with the objective of locating suitable sampling locations and MEC avoidance for safety.

MC Evaluation

Types of MC

- The anticipated MC at the explosive munitions ranges is primarily residual explosive compounds from grenades that underwent high-order (normal) or low-order detonation, or from undetonated munitions. The explosive charges used in the Mk II grenades were 2 ounces of TNT (or E.C. Blankfire smokeless powder, consisting largely of nitrocellulose, in older models).
- To a lesser degree, there is a potential for the presence of elevated concentrations of metals from the grenade housing and components which are made primarily from cast iron and steel.

Overview of Pathways

Affected media and potential pathways for MC include:

- Soil: Soil is the primary medium of concern because of possible MC in the soil from training activities. The soil also serves as a source of potential air, surface water, or groundwater contamination.
- Surface Water/Sediment: Surface water may act as a migration pathway from potential sources of contamination in soil (sediment). Accumulation of explosives and metals may occur in sediment along surface water migration pathways through mass transport of soil into streams and the leaching of contaminants into surface water.
- Groundwater: Groundwater is considered a potentially affected media because it is generally present within 40 ft of ground surface. Groundwater may also serve as a migration path to downgradient surface water.
- Air: Inhalation of MC in vapor form is not a pathway of concern for non-volatile MC under normal environmental conditions. Potential inhalation of soil particles is included in the development of health-based screening values for soil.

Potential exposure media at the explosive munitions ranges include soil, surface water/sediment, and groundwater. A pathway evaluation for these media is discussed below and provided in Table 2 of the *Final TPP Memorandum*.

Soil Exposure Pathway

Exposure Routes

- The potential routes of human exposure to contaminated soils include incidental ingestion of and dermal contact with contaminated media, as well as inhalation of soil particulates during intrusive work.
- The potential routes of livestock and wildlife exposure to contaminated soils include ingestion of and direct contact with contaminated media. Plants may uptake MC and then subsequently be eaten by livestock and wildlife. Burrowing animals may ingest MC-contaminated soil and subsequently be eaten by predators.

Receptors

- Residents.
- Workers (farmers, foresters, etc).
- Recreational users.
- Livestock and wildlife.

Soil MC Evaluation/Investigation Needed

- One soil sample will be collected from each AOC.
- Samples to be analyzed for explosives and selected total metals (aluminum, antimony, barium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, strontium, titanium, and zinc).

Surface Water/Sediment Exposure Pathway

Exposure Routes

- The relatively flat location of these AOCs would tend to limit the mobility of MC from the grenade court areas via the surface water/sediment pathway.
- The potential routes of human exposure to contaminated surface water and sediment include ingestion, dermal contact, and inhalation.
- The potential routes of livestock and wildlife (including aquatic organisms) exposure to contaminated surface water include ingestion and direct contact.

Receptors

- Residents.
- Workers (farmers, foresters, etc).
- Recreational users.
- Livestock and wildlife.

Surface Water/Sediment MC Evaluation/Investigation Needed

- These AOCs are of small aerial extent and direct sampling of surface water or sediment is not planned.

Groundwater Exposure Pathway

Exposure Routes

- The potential routes of human exposure to contaminated groundwater include ingestion and dermal contact where groundwater is used as a water supply.
- Direct exposure of wildlife to groundwater is not a concern. The potential routes of livestock exposure include ingestion or dermal contact where groundwater is used as a water supply.

Receptors

- Residents.
- Workers (farmers, foresters, etc).
- Recreational users.
- Livestock.

Groundwater MC Evaluation/Investigation Needed

- A groundwater sample will be collected from a well located near one of the three grenade courts.
- To the extent practicable, well selection will favor the following criteria: location within or near a potential source area, wells open or unsealed within 30 ft of ground surface, total depth of 100 ft or less, and wells listed in the USGS monitoring database.
- Samples to be analyzed for explosives and selected metals (aluminum, antimony, barium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, strontium, titanium, and zinc).

Conceptual Site Model – Practice Grenade Courts

There are six practice grenade court AOCs at Camp Adair as follows:

- Practice Grenade Court No. 120
- Practice Grenade Court No. 121
- Practice Grenade Court No. 122
- Practice Grenade Court No. 125
- Practice Grenade Court No. 126
- Practice Grenade Court No. 127

Current and Future Land Use

- These AOCs are located on privately owned land and air photos suggest they are being used for agricultural purposes.
- The AOCs are located near the E.E. Wilson Wildlife Refuge. The ASR Supplement states that they are located in a wildlife reserve, "part of the Wilson Game Management Area."
- The closest residence appears to be more than 1000 ft from three of the courts (No. 125, 126, and 127).
- Residences are not located within several thousand feet of courts No. 120, 121, and 122.
- Future land use is anticipated to remain consistent with current uses.

Former Range Use

- The ranges were used by the Army between 1942 and 1945.
- The courts were used to allow men to throw training or practice grenades prior to throwing a live grenade (see Figure 24 of the *Final TPP Memorandum*).
- A typical practice court consisted of a number of individual courts designed to allow men to throw under a variety of conditions.

MEC Evaluation

Types of MEC

- The munitions used at the practice courts would have included the Mk 1A1 training grenade, an inert device made of cast iron with the approximate shape, size, and weight of an actual hand grenade.
- The munitions used at the practice courts may also have included the M21 practice grenades, reusable devices which contained only small charges of black powder to simulate the detonation of a live grenade.
- There is not a significant hazard from MEC associated with the practice courts, based on the training devices used, as indicated in Table 1.

MEC Evaluation/Investigation Needed

- No visual reconnaissance or magnetometer sweeps will be conducted to assess the presence of MEC at the Practice Grenade Courts. There is not a significant hazard from MEC at these AOCs.

<u>MC Evaluation</u>

Types of MC

- The small quantity of black powder (consisting of potassium nitrate, sulfur, and charcoal) associated with training grenades does not pose a significant risk of environmental contamination, as indicated in Table 1.

MC Evaluation/Investigation Needed

- No field investigation is required for the practice grenade courts.

Conceptual Site Model – Chemical Identification Area No. 182

There is one chemical identification area at Camp Adair as follows:

- Chemical Identification Area No. 182

Current and Future Land Use

- This AOC is located on privately owned land and air photos suggest it is being used for agricultural purposes
- The closest residences appear to be between 1000 ft and 2000 ft from the area.
- Future land use is anticipated to remain consistent with current uses.

Former Range Use

- The area was used by the Army between 1942 and 1945.
- According to a Camp Adair Training Aids General Layout map dated January 1944, Range No. 182 was used for chemical warfare materiel (CWM) recognition and decontamination exercises. Another map lists the area as a gas chamber.
- CWM recognition training was likely to have included the use of "sniff sets" and/or detonation sets.
- "Sniff sets" were several bottles containing small quantities of CWM gases or solids; bottles were opened so that trainees could experience the smell of the specific CWM.
- Detonation sets were several containers holding larger quantities of CWM agents, which were detonated, creating an agent cloud. Trainees would then try to identify the agent based on its odor and other characteristics.
- Decontamination exercises, as documented in historical photos from the camp, involved small sections of wooden floors and walls contaminated by vesicant gas (mustard and lewisite) being treated with a decontaminant solution such as "chloride of lime."
- Other CWM activities documented at Camp Adair, but no specific location has been identified, may have been conducted at the Chemical Identification Area No. 182 include:
    - Decontamination of mustard-contaminated vehicles,
    - Neutralization of chemical land mines, possibly containing mustard filling,
    - Field simulation of a CWM battlefield, in which troops traverse an area, contaminated with a mustard mixture, applying their training skills.
    - Gas mask training using tear gas in gas chambers.

MEC Evaluation

Types of MEC

- The limited quantities of explosive MEC, e.g., blasting caps or detonating cord that may have been used at these locations do not pose a significant risk, as indicated in Table 2 of the *Final TPP Memorandum*.

- The potential for encountering CWM is low. However, if encountered the health risk is high.

MEC Evaluation/Investigation Needed

- No visual reconnaissance or magnetometer sweeps will be conducted to assess the presence of MEC at the Chemical Identification Area No. 182. There is no significant risk from MEC at this AOC.

<u>MC Evaluation</u>

Types of MC

- The small quantity of explosive material that may have been used in this area does not pose a significant risk of environmental contamination, as indicated in Table 2 of the *Final TPP Memorandum*.
- Any CWM agents that may have been released in this area would not be expected to have persisted and/or have been released in quantities that would pose a significant risk of environmental contamination.

MC Evaluation/Investigation Needed

- No field investigation is required for the Chemical Identification Area no. 182.

Data Gaps

MEC

- In general, the presence of MEC at Camp Adair is established by past encounters, which are known to have occurred as recently as 2001.
- MEC has not been found within any small arms range AOCs, except Range Complex No. 4 which overlaps the explosive munitions Mortar Range AOC). There is a slight MEC risk associated with the potential for unknown use of explosive MEC at the small arms ranges. Based on past use and the lack of encounters with MEC since closure of Camp Adair, limited reconnaissance surveys could support an SI determination of whether MEC is present or absent.
- MEC has been found at five of six explosive munitions range AOCs. The sixth AOC, Bombing Target No. 1, overlaps Range Complex No. 2, where MEC has been found. If reconnaissance surveys were conducted under this SI, they would not provide a degree of certainty sufficient to demonstrate the absence of MEC. Conservatively, the presence of MEC is considered to be established at all explosive munitions range AOCs.
- MEC has been found at two of three live hand grenade court AOCs. Reconnaissance surveys consistent with the scope of this SI could not definitively demonstrate the absence of MEC at these AOCs. Based on similar histories, the presence of MEC is considered to be established at all three live hand grenade court AOCs.
- MEC has not been found at any practice grenade court AOC. The use of the practice grenade courts was controlled and only munitions containing small amounts of black powder were used. The absence of MEC is considered to be established without the need for reconnaissance.
- MEC in the Chemical Identification Area No. 182 has not been found and the likelihood of finding MEC is considered low, based on controlled used of CWM.

MC

- Analytical data that would demonstrate the presence or absence of MC are lacking at all AOCs. However, at the practice grenade court AOC MC would be limited to rusting metal from grenade bodies and residue from black powder (potassium nitrate, sulfur, and charcoal). At Chemical Identification Area No. 182 release of CWM to the environment would not be expected to persist. Sampling of one or more potentially affected media in all AOCs, except the practice grenade courts and the Chemical Identification Area No. 182 will be completed.
- Existing analytical data collected during the USEPA's SSI is not usable for this SI, due to sample numbering differences between the SSI report text and supporting appendices.

Results of the current status of data requirements with respect to MEC and MC for the AOCs located at the former Camp Adair are summarized below:

AOC	Presence or Absence of MEC	Presence or Absence of MC	Proposed Inspection Activities
Small Arms Ranges			
Infiltration Range No. 143	Unknown	Unknown	None – site has been heavily excavated and covered with municipal waste.
Range Complex No. 4	Unknown	Unknown	Reconnaissance for MEC and sample targets. Soil and sediment sampling.
Range Complex No. 5	Unknown	Unknown	Reconnaissance for MEC and sample targets. Soil and groundwater sampling.
Range Complex No. 6	Unknown	Unknown	Reconnaissance for MEC and sample targets. Soil and groundwater sampling.
Skeet Range No. 580	Absent	Unknown	Reconnaissance for sample targets. Soil sampling.
Explosive Munitions Ranges			
Range Complex No. 1	Present	Unknown	Reconnaissance for sample targets. Sample soil, sediment, and groundwater.
Range Complex No. 2	Present	Unknown	Reconnaissance for sample targets. Sample soil, sediment, and groundwater.
Bombing Target No. 1	Present	Unknown	Reconnaissance for sample targets. Sample soil, sediment, and groundwater.
Range Complex No. 3	Present	Unknown	Reconnaissance for sample targets. Sample soil, sediment, and groundwater.
Mortar Range	Present	Unknown	Reconnaissance for sample targets. Sample soil, sediment, and groundwater.
Moving Target Range No. 75	Present	Unknown	Reconnaissance for sample targets. Sample soil, sediment, and groundwater.
Live Hand Grenade Courts			
East Live Hand Grenade Court	Present	Unknown	Reconnaissance for sample targets. Sample soil. Sample groundwater near one of three live hand grenade courts.
West Live Hand Grenade Court	Present	Unknown	Reconnaissance for sample targets. Sample soil. Sample groundwater near one of three live hand grenade courts.

AOC	Presence or Absence of MEC	Presence or Absence of MC	Proposed Inspection Activities
Live Hand Grenade Court No. 129	Present	Unknown	Reconnaissance for sample targets. Sample soil. Sample groundwater near one of three live hand grenade courts.
Practice Grenade Courts			
Practice Grenade Court No. 120	Absent	Absent	Reconnaissance and sampling are not required.
Practice Grenade Court No. 121	Absent	Absent	Reconnaissance and sampling are not required.
Practice Grenade Court No. 122	Absent	Absent	Reconnaissance and sampling are not required.
Practice Grenade Court No. 125	Absent	Absent	Reconnaissance and sampling are not required.
Practice Grenade Court No. 126	Absent	Absent	Reconnaissance and sampling are not required.
Practice Grenade Court No. 127	Absent	Absent	Reconnaissance and sampling are not required.
Chemical Identification Area			
Chemical Identification Area No. 182	Absent	Absent	Reconnaissance and sampling are not required.

APPENDIX B

USACE INTERIM GUIDANCE DOCUMENT 06-05 AND SAFETY ADVISORY 06-2

DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF:

MAR 1 6 2006

CEHNC-OE-CX

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Procedure for Preliminary Assessment (PA) and Site Inspection (SI) Teams that Encounter Unexploded Ordnance (UXO) While Gathering Non-UXO Field Data, Military Munitions Center of Expertise (MM CX) Interim Guidance Document (IGD) 06-05

1. PURPOSE: This procedure describes the responsibilities of project teams during the preliminary assessment and site investigation phases should unexploded ordnance (UXO) be discovered.

2. APPLICABILITY: This guidance is applicable to the geographic military Districts, Military Munitions Response Program (MMRP) Design Centers, Major Subordinate Commands (MSCs), and designated Remedial Action Districts performing MMRP response actions.

3. REQUIREMENTS AND PROCEDURES:

a. During site visits to formerly used defense site (FUDS) properties to gather PA or SI information, in the rare instance that a UXO-qualified individual identifies an item that is an explosive hazard, the following actions will occur:

(1) The property owner or individual granting rights of entry to the property will be notified of the hazard and advised to call the local emergency response authority (i.e., police, sheriff, or fire department). The individual will also be informed that if they do not call the local response authority within 1 hour, the individual who identified the UXO item will notify the local emergency response authority.

(2) The local response authority will decide how to respond to the reported incident, including deciding not to respond (e.g., if the local response authority is already aware of the hazards on the property). If the local response authority decides to respond, the individual who identified the item or his designee will mark the location of the item and provide accurate location information to the emergency response authority. The individual who identified the item or his designee will generally remain in the area until the local response authority arrives, unless specifically indicated by the appropriate response authority that the individual may leave the area.

(3) During the SI, the state regulator may also be notified at their request.

MAR 1 6 2006

CEHNC-OE-CX
SUBJECT: Procedure for Preliminary Assessment (PA) and Site Inspection (SI) Teams that Encounter Unexploded Ordnance (UXO) While Gathering Non-UXO Field Data, Military Munitions Center of Expertise (MM CX) Interim Guidance Document (IGD) 06-05

b. During site visits to active installations or Base Realignment and Closure (BRAC) sites to gather PA or SI information, in the rare instance that a UXO-qualified individual identifies an item that is an explosive hazard, the following actions will occur:

(1) The installation point of contact (POC) or the BRAC coordinator will be notified of the hazard and requested to notify explosive ordnance disposal (EOD) through their channels.

(2) The installation/EOD will make the determination if they are going to respond to the incident. The installation/EOD may be aware of the hazards at the site and make the decision not to respond. If the installation/EOD decides to respond, the individual who identified the item or his designee will mark the location and provide accurate location information to the installation/EOD unit and will remain in the area unless the installation/EOD unit requests otherwise.

c. Neither the US Army Corps of Engineers personnel, nor their contractors have the authority to call EOD to respond to an explosive hazard. This call is the responsibility of the local emergency response authority for FUDS properties and it must come through the proper chain of command on installations.

d. AR 75-14 and AR 75-15 contain the information on how EOD responds to explosives hazards.

4. EFFECTIVE DATES: The requirements and procedures set forth in this interim guidance are effective immediately. They will remain in effect indefinitely, unless superseded by other policy or regulation.

5. POINT OF CONTACT: If you need additional information, please contact Mr. Brad McCowan at 256-895-1174.

Carol A. Youkey

CAROL A. YOUKEY, P.E.
Chief, Center of Expertise for Ordnance
and Explosives Directorate

200-1e
F10OR002908_01.14_0500_a

DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

May 23, 2006

REPLY TO
ATTENTION OF:

OE Safety Division for Ordnance
and Explosives Directorate

Shaw Environmental
4171 Essen Lane
Baton Rouge, Louisiana 70809

Dear Sir/Madam:

This is Safety Advisory 06-2 – Munitions and Explosives of Concern (MEC) Safety During Site Inspections (SI), Pre-Work Plan Visits, Archive Search Reports (ASR) Investigations and Other Site Visits of a Non-Intrusive Nature.

Reference EP 75-1-1, EP 385-1-95a, and Interim Guidance Document (IGD), March 15, 2006.

The following procedures will be followed if an item is found that has an explosive hazard during the activities identified in the subject line:

a. MEC items are not to be moved or disturbed during the above subject SI, Pre-Work Plan visits, ASR Investigations and other site visits of a non-intrusive nature.

b. The locations of any discovered explosive hazardous items should be marked for accurate relocating purposes and the information provided to the designated Point of Contact (POC) and any emergency response authorities as may be required.

c. During site visits to active Installations and/or Base Realignment and Closure (BRAC) sites the identified Installation POC or the BRAC coordinator should be notified of discovered MEC hazards. They then will request any appropriate emergency response action as deemed necessary through their channels if required.

d. When a site visit is on a Formerly Utilized Defense Site, the property owner shall be notified in the event of finding any found explosive hazards along with the location of the explosive item(s) found, the property owner should then in turn notify their local emergency response authorities.

e. During these site visits all required MEC security requirements should be implemented as necessary and required. All team members are to be instructed in and made aware of any MEC security requirements.

f. All team members will be briefed on these procedures prior to any site investigations being performed and daily before any work begins.

This Safety Advisory is intended to serve as an explosives safety reminder.

Comments or questions about this Safety Advisory can be directed to the undersigned at (256) 895-1598/82.

Sincerely,

Wayne H. Galloway
Chief, OE Safety Division for
Ordnance and Explosives Directorate

APPENDIX C

SITE SAFETY AND HEALTH PLAN ADDENDUM

ADDENDUM OR-1 TO SITE SAFETY AND HEALTH PLAN (SSHP) **REVIEWS AND APPROVAL** US Army Corps of Engineers, Omaha District	This SSHP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.

Reviewer	Date	Signatures
Authored by: Pamela Moore	8/15/06	**Signature:** K. Stoppel-Hall for P. Moore
Peer Review by: Dale Landon	8/17/06	**Signature:**
Quality Control Review (QCR) by: Paul Sadowski	8/15/06	**Signature:** Paul W Sadowski
Project Manager Reviewed by: Peter Kelsall	8/17/06	**Signature:** for P. Kelsall

USACE Omaha District MM DC OE Safety Specialist Review:		**Signature:**
USACE Omaha District MM DC Project Manager Approval: John Miller		**Signature:**

ADDENDUM OR-1 TO SITE SAFETY AND HEALTH PLAN (SSHP) **TITLE PAGE** US Army Corps of Engineers, Omaha District	This SSHP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.

PROJECT NAME: FUDS SI – CAMP ADAIR/ADAIR AIR FORCE STATION

PURPOSE OF ADDENDUM:

This Addendum provides details specific to activities at this FUDS that were not provided in the approved Accident Prevention Plan and Site Safety and Health Plan included in the "Final Type I Work Plan, Site Inspections at Multiple Sites, NWO Region" (Shaw, 2006).

DESCRIBE THE CHANGES EFFECTED BY THIS ADDENDUM:

Add site-specific supplemental information.

SITE SAFETY AND HEALTH PLAN ADDENDUM

FOR

Site Name:	Camp Adair/Adair Air Force Station
Site Location:	Camp Adair is located approximately 9 miles north of Corvallis, Oregon in Polk and Benton Counties.
Purpose of Visit:	Site Inspection of the FUDS for MEC reconnaissance and MC sampling.
Date(s) of Site Visit:	Approximately August 2006

Office:	Shaw Environmental, Inc. Richland Washington office
Address:	1045 Jadwin Ave, Suite C Richland, Washington 99352
Telephone:	(509) 943-6728

Date Prepared: 5 July 2006

Site inspection work at this FUDS will be conducted in accordance with the approved Accident Prevention Plan and Site Safety and Health Plan (SSHP) included in the "Final Type I Work Plan, Site Inspections at Multiple Sites, NWO Region" (Shaw, 2006). This Addendum provides details specific to activities at this FUDS that were not provided in the SSHP.

I. SITE DESCRIPTION AND PREVIOUS INVESTIGATIONS

(For complete background, see text and figures of Site-Specific Work Plan included with this document. A brief summary follows.)

A. SITE DESCRIPTION:

- Size: Multiple AOCs covering approximately 56,815 acres.
- Present Usage (Check all that apply)

☒ Military	☒ Recreational	☒ Agricultural
☒ Residential	☐ Commercial	☒ Landfill
☒ Natural Area	☐ Industrial	
☐ Other Specify		

☐ Secured	☐ Active	☐ Unknown
☒ Unsecured	☒ Inactive	

B. PAST USES:

Camp Adair was operated between 1942 to 1945 as an infantry training post. During the last two years of training, an estimated 265,000 rounds of high explosive ammunition (37 mm or larger) were fired. Between 1944 and 1946, the Navy and Marines used a portion of the FUDS for bombing and gunnery practice. Between 1958 and 1969, the FUDS was used as the Adair Air Force Station. The only munitions related activity during the Air Force occupation of the site was a skeet range.

C. SURROUNDING POPULATION:

☒ Rural	☒ Residential	☐ Commercial
☐ Urban	☐ Industrial	
☐ Other Specify		

D. PREVIOUS SAMPLING/INVESTIGATION RESULTS:

Numerous MEC finds have been reported (ASR, ASR Supplement, private citizens) throughout the FUDS. USEPA completed a Screening Site Inspection in 1996 that evaluated munitions impacts to the sediment pathway. The data in the report did not show any adverse impacts related to activities at Camp Adair.

(1) MEC ENCOUNTERED: See SSWP figures for specific locations of MEC finds.

Location:		Description:
Near 1,000-inch Anti-Tank Range Nos. 40 and 41		2.36-inch rocket dud
Moving Target Range No. 79A and 79B		Several 105 mm duds
Field Combat Range No. 88		105 mm dud
Mortar Range No 90		60 mm dud
Mortar Range No 91		60 mm dud
Live Hand Grenade Court No 129		Duds
Parade Field in former cantonment area		2.36-inch rocket
Explosive munitions ranges		Not specified

(2) SAMPLES: (Air, Water, Soil, and Vegetation): Sediment samples previously collected indicated no impacts.

Chemical	Concentration	Media	Location
None	None	None	None

II. DESCRIPTION OF ON-SITE ACTIVITIES:

☒ Walk Through	☒ Drive Through	☐ Fly Over
☒ On-Road	☐ Off-Road	☒ On-Path
☒ Off-Path		
☐ Other Specify		

Activities/Tasks to be Performed:

A visual reconnaissance of selected portions of the AOCs will be performed. The inspection will be conducted by a qualified unexploded ordnance (UXO) technician, with the aid of a hand-held magnetometer, to look for evidence of munitions activity and to assure that personnel avoid any potential MEC. Reconnaissance will follow a meandering survey path within the AOCs, including areas of reported MEC finds, but also including selected outlying portions of the AOCs, during which visual observations and magnetic anomalies will be noted. Special attention will be given to physical features such as depressions, craters, or pits that could be present at impact locations of munitions. A global positioning system (GPS) will be used to record the survey path and the location of any MEC, munitions debris, or other significant features (such as remnant evidence of targets or other range-related structures) observed.

Soil, sediment, and groundwater sampling will be performed at locations that have been cleared by the UXO technician. Sampling locations will be recorded using GPS. Sampling protocols

will be as specified in the SSWP and the Type 1 Work Plan. Soil, sediment, and groundwater samples will be collected of determine MC impacts.

III. SITE PERSONNEL AND RESPONSIBILITIES:

Name/Responsibility	Training					
	HAZWOPER 40-hour	8-Hour HAZWOPER Refresher	Hazardous Waste Site Supervisor	First Aid	Cardiopulmonary Resuscitation	UXO Specialist
Gerrick Anderson Field Team Leader/SSHO	X	X	X	X	X	
Braden Livingstone (1227) UXO Technician	X	X				X

IV. HAZARD ANALYSIS:

A. SAFETY AND HEALTH HAZARDS ANTICIPATED:

☒ Heat Stress	☒ Cold Stress	☒ Tripping Hazard
☐ Noise	☐ Electrical	☐ Falling Objects
☒ Foot Hazard	☒ Biological	☐ Overhead Hazard
☐ Radiological	☐ Confined Space	☐ Water
☒ Explosive	☒ Climbing	☐ Flammable
☐ Other Specify		

B. OVERALL HAZARD EVALUATION:

☐ High	☐ Moderate	☒ Low	☐ Unknown

JUSTIFICATION: (Provide a brief justification supporting the overall evaluation.)

Munitions debris has been documented or observed near the AOCs.

V. SITE INSTRUCTIONS FOR MEC AVOIDANCE

See Section 4.3 of the SSHP for full scope of MEC avoidance requirements.

a. DO NOT touch or move any ordnance items regardless of the marking or apparent condition.
b. DO NOT visit an ordnance site if an electrical storm is occurring or approaching. If a storm approaches during a site visit, leave the site immediately and seek shelter.
c. DO NOT use radio or cellular phones in the vicinity of suspect ordnance items.
d. DO NOT walk across an area where the ground cannot be seen. If dead vegetation or dead animals are observed, leave the area immediately due to potential chemical agent contamination.
e. DO NOT drive vehicles into suspected MEC areas; use clearly marked lanes.
f. DO NOT carry matches, lighted cigarettes, lighters or other flame producing devices into a MEC site.

g. DO NOT rely on color codes for positive identification of ordnance items or their contents.
h. Only the on-site UXO Specialist is allowed to approach suspected ordnance items to take photographs, and prepare a full description (take notes of the markings or any other identifiers/features).
i. The location of any ordnance items found during the site investigation should be clearly marked so it can be easily located and avoided.
j. Always assume ordnance items contain a live charge until it can be determined otherwise.

Section 4.3 of the SSHP defines on-site MEC avoidance requirements for FUDS properties. In general, the purpose of MEC or anomaly avoidance during SI activities is to avoid any potential surface or subsurface anomalies. Intrusive anomaly investigation is not authorized during MEC avoidance operations. The reconnaissance and sampling field work shall include a minimum of two people, one of whom shall be a UXO technician. This team will be on-site during all sampling activities. Sampling personnel must be escorted at all times in areas potentially containing MEC until the UXO team has completed the access surveys and the cleared areas are marked. If anomalies or MEC are detected, the UXO team will halt escorted personnel in place, select a course around the item, and instruct escorted personnel to follow. If MEC is encountered, Shaw will stop work in the vicinity and make notifications as outlined in the Work Plan. Shaw is not to conduct further investigation or removal of any MEC.

VI. SITE CONTROL AND COMMUNICATIONS:

A. SITE WORK ZONES: Rigid demarcation of work zones, e.g., using barricades or caution tape, will generally not be required for this project. The Field Team Leader/SSHO, in consultation with the UXO Technician, will determine the boundary of an Exclusion Zone (EZ) to be established around a specific area of activity, appropriate to the potential hazards. The boundaries may be described by physical features, e.g., fences, tree lines, or topographic features, or may be defined by a radius around the center of activity. The EZ boundary will be verbally communicated to team members, who will maintain a watch to assure that only field team members are within the work zone. If a bystander or intruder approaches the EZ, the field team will cease work and ask the person to remain outside the area. A Contamination Reduction Zone (CRZ) will generally not be required because personnel decontamination is not anticipated. If required, a CRZ will be established in a manner similar to that described for the EZ. The support zone will consist of all portions of the site not defined as an EZ or CRZ.

B. COMMUNICATIONS:

(1) ON-SITE: Verbal communications will be used among team members to communicate to each other on-site. If this communication is not possible, the following hand signals will be used.

GRIP PARTNER'S WRIST OR BOTH HAND AROUND WAIST – Leave the area immediately.

HAND GRIPPING NOSE – Unusual smell detected.

THUMBS UP – OK, I am alright or I understand.

THUMBS DOWN – No, negative.

(2) OFF-SITE: Off-site communications will be established at the site and may be include an on-site cellular phone or the nearest public phone or private phone that may be readily accessed.

☒ Cellular Phone: To be Determined

☐ Public/Private phone

TELEPHONE NUMBERS:

1. MEDICAL FACILITY (Emergency Care): Good Samaritan Regional Medical Center	(541) 768-5111
2. MEDICAL FACILITY (Non-Emergency Care Shaw-Approved Occupational Health Clinic): Samaritan Occupational Medicine	(541) 768-6777
3. FIRE DEPARTMENT: Adair Rural Fire and Rescue Polk County Fire District # 1	 (541) 745-7212 or 911 (541) 838-1510 or 911
4. Oregon State Police Dispatch Center for MEC Notification:	1-800-452-7888 (503) 375-3555
5. POLICE DEPARTMENT: Benton County Polk County	 (541) 766-6858 or 911 (541) 723-9251 or 911
6. POISON CONTROL CENTER:	(800) 222-1222
7. USACE MM DC PROJECT MANAGER: John Miller	 (402) 221-7720
8. USACE PROJECT MANAGER: Bill Graney Mike Nelson	 (206) 764-3494 (206) 764-3458
9. USACE OE SAFETY: Glenn Marks	(402) 221-7683 (Office) (402) 740-4954 (Cell)
10. SHAW PROJECT MANAGER: Peter Kelsall	(303) 793-5252 (Office) (303) 981-8435 (Cell)
11. SHAW TECHNICAL LEAD: Dale Landon	(509) 946-2069 (Office) (509) 521-1437 (Cell)
12. SHAW FIELD TEAM LEADER: Gerrick Anderson	 (510) 206-1373 (Cell)
13. SHAW OE SAFETY: Brian Hamilton	(303) 690-3117 (Office) (303) 809-0416 (Cell)
14. SHAW UXO TECHNICIAN: Braden Livingstone	 (303) 741-7700 (Office)

(3) EMERGENCY SIGNALS: In the case of small groups, a verbal signal for emergencies shall suffice. The emergency signal for large groups should be incorporated at the discretion of the UXO Technician.

☒ Verbal

☐ Nonverbal (Specify)

VII. EMERGENCY RESPONSE

(1) ACCIDENTS: Safety-related incidents and accidents will be immediately reported to the Shaw Project Manager and the USACE MM DC Project Manager. Additional notifications within the USACE organization will be coordinated by the USACE MM DC Project Manager. Additional accident reporting responsibilities of Shaw personnel are described in Section 1.9 of the Accident Prevention Plan.

(2) DIRECTIONS TO THE NEAREST HOSPITAL/MEDICAL FACILITY:

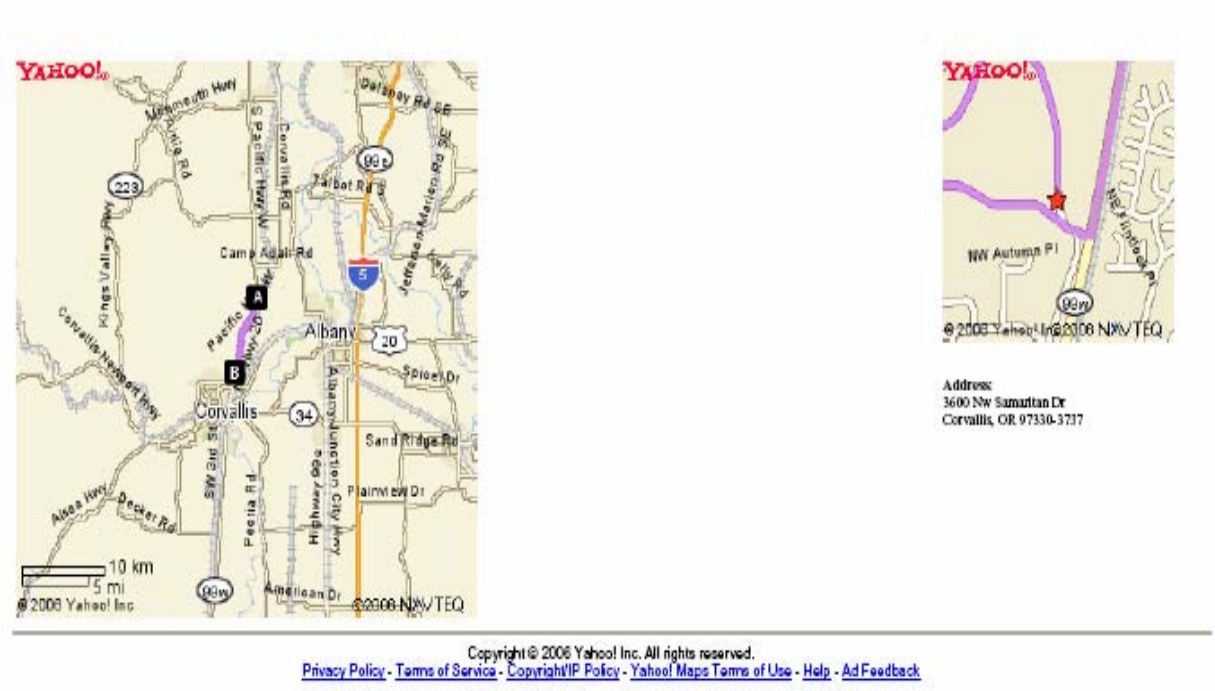
Emergency Facility:

Good Samaritan Regional Medical Center
3600 NW Samaritan Drive
Corvallis, Oregon 97330
541-768-5111

Directions:

1. Starting in **ADAIR VILLAGE, OR** on **4TH ST** - go < **0.1** mi
2. Turn L on **VANDENBURG AVE** - go **0.3** mi
3. Turn L on **PACIFIC HWY W** - go **5.1** mi
4. Turn R on **NW ELKS DR** - go **0.4** mi
5. Make a Hard R Turn on **NW SAMARITAN DR** - go **0.6** mi
6. Arrive at **3600 NW SAMARITAN DR, CORVALLIS,** on the R

Figure 1: Directions to Good Samaritan Regional Medical Center from Adair Village (Camp Adair)



Non-Emergency Facility:

Samaritan Occupational Medicine
3640 NW Samaritan Drive, Room 103
Corvallis, Oregon 97330
541-768-6777

Directions:

1. Starting in **ADAIR VILLAGE, OR** on **4TH ST** - go < **0.1** mi
2. Turn L on **VANDENBURG AVE** - go **0.3** mi
3. Turn L on **PACIFIC HWY W** - go **5.1** mi
4. Turn R on **NW ELKS DR** - go **0.4** mi
5. Make a Hard R Turn on **NW SAMARITAN DR** - go **0.6** mi
6. Arrive at **3600 NW SAMARITAN DR, CORVALLIS,** on the R

VIII. PERSONAL PROTECTIVE EQUIPMENT:

For field work to be performed at this site, Level D is required. Level D Protection requirements are defined in section 5.1.5 of the SSHP. In general, the use of hard hats is required on all

USACE work sites, except on MEC-contaminated sites. Hard hats will only be worn during drilling operations during which an overhead hazard exists. When hard hats are worn, they will be securely fastened to the wearers head (i.e., by use of chin strap).

Contingency: Evacuate site if higher level of protection is needed.

IX. DECONTAMINATION PROCEDURES:

Decontamination procedures are not anticipated as Level D PPE is being used. If decontamination is deemed necessary, procedures defined in Section 7.0 of the SSHP of the Work Plan will be followed. Team members are cautioned not to walk, kneel, or sit on any surface with potential leaks, spills, or contamination.

X. TRAINING:

All site personnel and visitors will have completed the minimum training required by EM 385-1-1 and 29 CFR 1910.120(e). The Shaw Field Team Leader will verify that all on-site personnel and visitors have completed the appropriate training prior to admitting the individuals on site. Additionally, the UXO Technician assigned to this field reconnaissance will inform personnel before entering, of any potential site specific hazards and MEC safety procedures.

XI. GENERAL:

Site Visitors

The number of persons visiting the site will be held to a minimum. The UXO Technician can supervise no more than six non-UXO qualified persons while on MEC sites performing intrusive or non-intrusive work.

Modifications to SSHP Addendum

The Field Team Leader may modify this SSHP Addendum if site conditions warrant. All changes to the SSHP Addendum require USACE review and concurrence before new procedures can be applied in the field.

Severe Weather Contingency Plan

Sudden changes in the weather, extreme weather conditions, and natural disasters can create a number of subsequent hazards. Inclement weather may cause poor working conditions including slip, trip and fall hazards to exist. Natural disasters can create many secondary hazards such as release of hazardous materials to the environment, structure failure, and fires.

Weather conditions will be monitored throughout the day by all field team members. Additionally, field personnel should be aware of/informed of daily weather forecasts. Local weather broadcasts and information from a severe weather alert radio will be monitored by the Field Team Leader, SSHO, or designee when the likelihood for severe weather exists. The

location of Tornado Shelters that may be located in the general area where field work is being performed will be identified. Severe weather may include:

- Tornadoes,
- Thunderstorms (lightning, rain, flash flooding),
- Hail, and
- High wind.

Generally, cellular telephone communication will be used to alert crews to threatening weather. The necessary precautions or response, as directed by the Field Team Leader, to implement the Severe Weather Contingency Plan include:

- Drilling and sampling operations will be suspended when the potential for lightning occurs. Operations may resume 30 minutes after the last observed lightning strike.
- For most types of severe weather, personnel should take refuge in vehicles or inside a designated office.
- In the event of a tornado, personnel should take cover in a basement, ditch, culvert, open "igloo," or interior room of a strong building. Personnel should be aware that ditches and culverts may fill up with water quickly and should only use these as shelters as a last resort.
- The Field Team Leader must decide what operations, if any, are safe to perform based on existing conditions and anticipated conditions.

Additional information will be developed and communicated to personnel before commencing new tasks or activities. It may be necessary to halt certain hazardous operations or stop work altogether to allow the weather situation to pass.

Routinely monitoring weather conditions and reports may help reduce the impact of severe weather and natural disasters. The best protection against most severe weather episodes and natural disasters is to avoid them. This means seeking shelter before the storm hits. If lightning is a threat, stay away from pipes and electrical equipment and watch for damage caused by nearby lightning strikes.

SAFETY BRIEFING CHECKLIST
(Check subjects discussed)

SITE NAME: Camp Adair/Adair Air Force Station	DATE/TIME: /

GENERAL INFORMATION

☐ PURPOSE OF VISIT

☐ IDENTIFY KEY SITE PERSONNEL

☐ TRAINING AND MEDICAL REQUIREMENTS

SPECIFIC INFORMATION

☐ SITE DESCRIPTION/PAST USES

☐ RESULTS OF PREVIOUS STUDIES

☐ POTENTIAL SITE HAZARDS

☐ MEC SAFETY PROCEDURES

☐ SITE SOPs

☐ SITE CONTROL AND COMMUNICATIONS

☐ EMERGENCY RESPONSE

- ☐ LOCATION OF FIRST AID KIT
- ☐ EMERGENCY PHONE NUMBERS & LOCATION
- ☐ LOCATION AND MAP TO NEAREST MEDICAL FACILITY
- ☐ PPE AND DECONTAMINATION

Stress the following during the briefing: If hazardous conditions arise, stop work, evacuate the area, and notify the SSHO and Shaw PM immediately.

PLAN ACCEPTANCE FORM

SITE SAFETY AND HEALTH PLAN ADDENDUM

FOR

Site Name: Camp Adair/Adair Air Force Station
Location: Benton and Polk Counties, Oregon

I have read and agree to abide by the contents of the Site Safety and Health Plan and this Addendum and I have attended the Safety Briefing for the aforementioned site.

NAME (PRINTED)	OFFICE	SIGNATURE	DATE

Person presenting the safety briefing:

_____ _____
SIGNATURE DATE