U.S. Army Corps of Engineers
Omaha District

Final Technical Project Planning Memorandum
Kingsley Firing Range Annex
FUDS Property No. F10OR0569

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

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July 2007

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Final Technical Project Planning Memorandum

Site Inspection
Kingsley Firing Range Annex
Formerly Used Defense Site
FUDS Property No. F10OR0569

Military Munitions Response Program

Documentation for Technical Project Planning Meeting
Klamath Falls, Oregon
Held on April 16, 2007

Hosted by U.S. Army Corps of Engineers

Prepared by Shaw Environmental, Inc.

July 2007

Concurrences

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USACE Seattle District	_____ William Graney
Oregon Department of Environmental Quality	_____ David Anderson
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ABBREVIATIONS AND ACRONYMS

AOC	area of concern
ASR	Archives Search Report
bgs	below ground surface
CSM	Conceptual Site Model
DoD	U.S. Department of Defense
DQO	Data Quality Objective
EPA	U.S. Environmental Protection Agency
FUDS	Formerly Used Defense Site
HRS	Hazard Ranking System
IEP	Important Ecological Places
MC	munitions constituents
MEC	munitions and explosives of concern
MMRP	Military Munitions Response Program
MRSPP	Munitions Response Site Prioritization Protocol
NBEC	nitrogen-based explosive compound
NDAI	No Department of Defense Action Indicated
ODEQ	Oregon Department of Environmental Quality
PA/SI	Preliminary Assessment/Site Inspection
PETN	pentaerythritol tetranitrate
PRG	Preliminary Remediation Goals
Shaw	Shaw Environmental, Inc.
SI	Site Inspection
SSWP	Site-Specific Work Plan
TAL	Target Analyte List
TPP	Technical Project Planning
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
UTL	upper tolerance limit
UXO	unexploded ordnance

Administrative Information

This Technical Project Planning (TPP) Memorandum is one in a series of documents used during the Site Inspection (SI) process to document the information collected and processes used to evaluate Formerly Used Defense Sites (FUDS) for the possible presence of munitions and explosives of concern (MEC) and/or munitions constituents (MC). TPP Meeting information provided in this Memorandum reflects both the original version of information shared with meeting participants, as well as changes/updates to site-specific information obtained during the TPP Meeting.

The TPP Meeting for the former Kingsley Firing Range Annex FUDS was conducted on April 16, 2007, in Klamath Falls, Oregon. The meeting was held at the Klamath County Fairgrounds and was attended by representatives from the U.S. Army Corps of Engineers (USACE) - Omaha Design Center, the USACE - Seattle District, the Oregon Department of Environmental Quality (ODEQ), and Shaw Environmental, Inc. (Shaw), as well as, a television news reporter from station KOTI-TV. A site tour was not conducted as part of this meeting.

This TPP Memorandum documents discussions for the TPP Meeting and includes the sections described below:

- **Administrative Information:** includes meeting logistics and the list of attendees;
- **Site Inspection Objectives:** provides the goal and objectives of the SI, roles and responsibilities, the SI process, and the TPP process;
- **Background Information:** includes site and project history, area physical setting, a summary of previous environmental work, and an introduction to the areas of concern (AOCs) addressed by the SI;
- **Conceptual Site Model (CSM):** used to identify environmental attributes, potential human and ecological receptors in the area's environment, and the relationships between these factors;
- **Proposed Sampling Scheme:** used to describe the type and quantity of samples to be taken, and the analytical methods to be used for characterizing the AOC;
- **TPP Notes and Data Quality Objectives (DQOs):** used to capture project and site-specific information as discussed during the TPP Meeting to ensure the necessary and appropriate information is shared among meeting participants, and that meeting participants concur with the identified goal, objectives, and approach used to complete the SI process; and
- **Worksheets:** includes the Site Information Worksheet, Draft Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps, and Hazard Ranking System (HRS) Data Gaps.

Technical Project Planning Meeting
Summary of Agreements

The TPP Meeting for the Kingsley Firing Range Annex FUDS was held on April 16, 2007, at the Klamath County Fairgrounds in Klamath Falls, Oregon. In attendance were representatives of the following:

- USACE - Omaha Design Center,
- USACE - Seattle District,
- ODEQ,
- Shaw, and
- Television news reporter from station KOTI-TV.

Shaw reviewed site information and presented a summary of the proposed SI approach for the Kingsley Firing Range Annex, addressing MEC reconnaissance and MC sampling. The CSMs presented characterized the site as consisting of three former AOCs, a former small arms range (Rifle Range), a former Rocket Range, and an ordnance burn/disposal pit (Disposal Range). ODEQ was in general agreement with the approach and the decision rules that were developed. ODEQ may provide further review and comments on the approach and decision rules as documented in this TPP Memorandum and eventually in the Site-Specific Work Plan (SSWP) for the FUDS. Key agreements reached at the meeting included:

Areas of Concern: The AOCs (Rocket Range, Rifle Range, and Disposal Range) as presented in the Archives Search Report. There is an asbestos investigation being conducted by the U.S. Environmental Protection Agency (EPA) at the nearby former Marine Barracks, which was converted to a private residential housing community named North Ridge Estates. A preliminary assessment/site inspection (PA/SI) report was prepared by the EPA in 2004 for the Kingsley Firing Range Annex. ODEQ provided a copy of the PA/SI. The report is summarized in Section 2.9.

Reconnaissance Objectives: The TPP team agreed that the SI would include reconnaissance activity to:

- Confirm site conditions and land usage
- Confirm the CSMs
- Select optimal sample locations (biased toward evidence of small arms munitions activity, practice rockets, and the burn pit, if observed)
- Observe evidence of MEC and munitions history

MC Sampling: The TPP team agreed in principle that sampling for MC is appropriate for the site. Sampling would be conducted at the Rifle Range, Rocket Range, and Disposal Range.

ODEQ agreed that analysis of the samples for explosives and metals was appropriate. The ODEQ was also concerned that there was no historic evidence of what materials were burned in the horseshoe-shaped burn pit at the Disposal Range. Therefore, ODEQ requested that perchlorate be analyzed in the proposed surface soil sample collected from the burn pit and for the proposed groundwater sample.

Background Sampling: The TPP team agreed in principle that background sampling for the site is appropriate.

- ODEQ suggested reviewing the 2004 PA/SI for the North Ridge Estates to determine if any data could be used for background.
- ODEQ suggested evaluating the U.S. Geological Survey (USGS) background soil data for applicability to the site. It was discussed that the analytical methods and method detection limits may not be appropriate for the investigation.
- Ten background surface soil samples and one background groundwater sample would be analyzed for Target Analyte List (TAL) metals. Additionally, one background surface soil sample and the background groundwater sample would be analyzed for perchlorate.

Screening Values: ODEQ indicated that the EPA Region 9 residential soil and tap water Preliminary Remediation Goals (PRGs) for human health screening values have not been updated for a number of years. Therefore, ODEQ has requested that EPA Region 6 PRGs be used for evaluation at the Kingsley Firing Range Annex. U.S. Department of Defense (DoD) policy specifies the action level for perchlorate in groundwater of 24 micrograms per liter. There is no screening value for soils.

With respect to ecological screening, team members initially agreed that no ecological screening was necessary based on a preliminary assessment that no Important Ecological Places (IEP) or ecologically-managed lands were present at the site. However, ODEQ indicated that they will review the IEP checklist and confer with Fish and Wildlife before rendering final approval.

Other Stakeholders: Questions, comments, and concerns of landowners will be addressed through the right-of-entry request process. Landowners will be provided an opportunity to review the TPP Memorandum and other documents pertaining to the site. Landowner-provided information with respect to site history, site conditions, land use, or other information relevant to the SI will be shared with the TPP team.

The USACE - Seattle District indicated that they would contact the landowners and Klamath Indian Tribe regarding the planned investigation.

Site: Kingsley Firing Range Annex
Location: Klamath Falls, Oregon
USACE District: Seattle
TPP #1 Meeting Location: Klamath Falls, Oregon
TPP #1 Meeting Date: April 16, 2007

AGENDA

Monday April 16, 2007

- **Convene**
  - **Introductions**
  - **Review Site Inspection Objectives**
    - **Goals, Objectives, and Roles & Responsibilities**
    - **Site Inspection Process**
    - **Technical Project Planning (TPP) Process**
    - **Review of Background Information**
  - **Technical Project Planning Discussion**
  - **Public Meeting**

Technical Project Planning Meeting Attendees

Name	Organization
Dale Landon	Shaw
Anthony Searls	Shaw
Dick Devlin	USACE-Seattle
David Anderson	Oregon Department of Environmental Quality
William Graney	USACE-Seattle
Lyle Ahrens	KOTI-TV
John Miller	USACE-Omaha

1.0 Site Inspection Objectives

1.1 Goal

- The USACE is conducting SIs of FUDS properties to determine if any MEC or related MC is present on property formerly owned or leased by the DoD.

1.2 Objectives

- Determine if the site requires further response action under the Comprehensive Environmental Response, Compensation, and Liability Act due to the presence of MEC or MC.
- Collect minimum information needed to:
  - Eliminate a site from further consideration if:
    - No evidence of MEC and
    - Concentrations of MC in samples are below background or below risk-based action levels.
  - Determine the potential need for initiation of the Remedial Investigation/Feasibility Study if:
    - Evidence of MEC identified or
    - Concentrations of MC in samples exceed background and risk-based action levels.
  - Determine the potential need for a time-critical removal action or non-time-critical removal action if there is a significant risk to site users from MEC.
  - Provide sufficient data for the EPA to complete the HRS.
  - Evaluate the FUDS using the MRSPP.

1.3 Roles & Responsibilities

- **USACE:** Acts as the executing agency for the DoD with regard to the FUDS program. In this role, the USACE has decision making authority and is responsible for ensuring work is conducted in accordance with applicable USACE and federal guidance. Additionally, USACE coordinates and works with project team members to meet needs expressed by regulatory agencies and stakeholders.
- **Regulatory Agency:** Participates in planning of SI activities to ensure the project meets applicable state standards and requirements.
- **Property Owner(s):** Provides available and pertinent information about the area, provides insight on current and anticipated future land uses for the property, and participates in project team discussions.

- **Shaw:** As a contractor to the USACE, conducts work on behalf of the USACE, provides TPP materials, makes site information available to the project team through a web-based information portal, and conducts and reports SI activities.

1.4 Site Inspection Process

- Data review
- TPP
- Site-Specific Work Plan (SSWP)
- SI field activities – reconnaissance, sampling, and analysis
- SI Report

1.5 Technical Project Planning Process

- Conduct TPP meeting(s)* with key organizations and stakeholders
- Identify stakeholder(s) concerns
- Identify all AOCs for this SI
- Review site information
- Verify current and anticipated future land use
- Develop CSM
- Identify data gaps
- Plan how to address data gaps
- Develop DQOs for meeting SI requirements
- Concur on SI field work approach

* A second TPP meeting will be held after the draft final SI Report has been submitted for review in order to discuss the results and recommendations of the SI.

2.0 Background Information

Historical information (including references to interviews and historical documents) contained in this section was obtained from the *Archives Search Report* (ASR) (USACE, 1995) and the *ASR Supplement* (USACE, 2004) for the former Kingsley Firing Range Annex.

2.1 Site Name and Location

The former Kingsley Firing Range Annex, FUDS identification number F10OR0569, is located approximately 4 miles north of Klamath Falls in Klamath County, Oregon (Figure 1, "Site Location").

2.2 Range Inventory

The Kingsley Firing Range Annex (Federal Facility Identification Number F10OR0569) is included in the Military Munitions Response Program (MMRP) Inventory in the *Defense Environmental Programs Annual Report to Congress Fiscal Year 2006* (DoD, 2006) with range information as follows:

Range Name	Range Identification	Approximate Area (acres)	UTM Coordinates (meters)
Range Complex	F10OR056901R01	87	X: 604412.00 Y: 4679217.00

Coordinates for the ranges are in Universal Transverse Mercator (UTM), Zone 10, NAD83.

There is a discrepancy between the acreage of the range (Range Complex) boundary presented in the table (87 acres) and that presented in Plate No. R01 (1,352 acres) of the MMRP Inventory (Figure 2, "Range Complex No. 1 Site Layout"). It appears that the 87 acres referenced as the Range Complex is actually the Rocket Range, which is one of the three sub-ranges (Figure 3, "Sub-range Layout").

The ASR (USACE, 1995) and ASR Supplement (USACE, 2004) indicate that the total property acreage for the Kingsley Firing Range Annex FUDS consists of 206.34 acres of land. This consists of the acreage for Taxlot Parcels No. 002 and No. 011 (Figure 4, "Taxlot Parcels"). This acreage is only a portion of the original 734.26 acres known as the U.S. Marine Corps Recuperational Hospital (or the Marine Barracks). The ASR Supplement also indicates that the range portion of the Kingsley Firing Range Annex, known as the Range Complex, consists of 87 acres. The origin of the area defined in the MMRP Inventory and ASR Supplement are not documented. The 1993 Findings and Determination of Eligibility reports a FUDS acreage of 206.34 acres; however, there is no documentation for the sub-ranges.

Additionally the ASR (USACE, 1995) and ASR Supplement (USACE, 2004) identify three sub-ranges that are part of the Range Complex, as follows:

Sub-Range Name	Federal Facility Identification	Sub-Range Total Acres	UTM Coordinates (meters)
Rifle Range	F10OR0569-SR01	1259	X: 604306.00 Y: 4679492.00
Rocket Range	F10OR0569-SR02	410	X: 604442.00 Y: 4679191.00
Disposal Range	F10OR0569-SR03	13	X: 604412.00 Y: 4679097.00

Figures 5, 6, and 7 present the layout of each sub-range.

2.3 Property History

The information for the following sections is primarily obtained from the ASR (USACE, 1995) and the ASR Supplement (USACE, 2004).

2.3.1 Historical Military Use

- The former Kingsley Firing Range Annex was part of a larger 734 acre site known as the U.S. Marine Corps Barracks, which was activated in 1944. The 734 acre site was built as a Marine Barracks and medical facility to be used for military personnel who had contracted tropical diseases.
- The site is comprised of approximately 206.34 acres of land that was developed and used for small arms training.
- The U.S Marines and Oregon Army National Guard controlled the land prior to U.S. Air Force use as a range for small arms training. The land was under DoD control from 1944 to 1947.
- The treatment center was closed on October 28, 1947.
- The land was transferred on October 28, 1947, to the Oregon Technical Institute for use as a training institution for returning veterans.
- Due to the high cost of maintaining the facility, the Oregon Technical Institute built a new school and then turned the entire site over to the city of Klamath Falls for use as a park.
- The City could not maintain the area as a park; therefore, the land reverted back to the U.S. Government in 1964.

- With the exception of the Rifle Range, which the U.S. Air Force requested use of, the General Services Administration put the remaining property up for sale.
- The U.S. Air Force maintained control of the Kingsley Firing Range Annex from February 1965 until the active U.S. Air Force mission was assumed by the Oregon Air National Guard through 1975.
- The land was turned over to the Department of Interior who excessed the land and sold it to private individuals in 1976.

2.3.2 Munitions Information

- Due to several types of usage by the military, the Range Complex was subdivided into the following sub-ranges that all share common boundaries:
  - Rifle Range (Figure 5)
    - Range was constructed by the U.S. Air Force in 1965.
    - Historically used for small arms practice from 1965 to 1975.
    - The rocket range firing fan overlaps this range.
    - The firing line was approximately 60 yards wide with an impact berm 200 feet wide and 20 feet high.
    - Range was approximately 500 yards in length, ending abruptly on a sheer mountain side immediately behind the berm.
    - Firing positions were elevated and were at approximately 200 yards, 300 yards, and 500 yards.
    - The length of the range actually funneled into the mountain with each side of the range elevated. This dramatically decreased the rifle range acreage from that of a normal 500 yard range.
    - Portions of the rifle range firing fan fall within the rocket range firing fan.
  - Rocket Range (Figure 6)
    - Used by the Army National Guard for 3.5-inch rocket practice.
    - In use from 1965 to 1975.
    - Historical records suggest only practice warheads were used during the training periods.
    - A discovered rocket had an identifiable lot number and fuze nomenclature M-405, which is the practice version of the 3.5 inch rocket.
    - Interview with a member of the Oregon Army National Guard indicated that the standard range firing fan in Army Regulation 385-63 was used, and only inert warhead type rockets were fired at an old vehicle.
    - According to the ASR (USACE, 1995), the exact firing point of the range was not confirmed, but a most probable location was selected over which the standard range firing fan was overlaid and mapped. However, an interview with Mr. Kenny Hertz of

the Oregon National Guard indicated the firing point was located north of the water tower on the first small arms firing position berm.

    - Historic records indicate that there were no heavy concentrations of rocket parts; however, scattered debris from the rockets started approximately 400 yards downrange from the firing position.
    - The firing fan extends over the Disposal Range and Rifle Range.
    - Approximately 6.45 acres on the extreme southwest edge of the firing fan area is located on non-FUDS property.
  - Disposal Range (Figure 7)
    - It is assumed that this range was in use from 1965 through 1975.
    - The range overlaps the southeastern portion of the Rocket Range and is reportedly located in the northwest corner of parcel 011 and in a straight line from the firing berm for the Rifle Range.
    - The Disposal Range has two burn pits located approximately 200 feet apart. One of the pits is situated on flat ground with no pit or berm. The other area had a 6 foot high, horseshoe-shaped berm around the area.
    - There were reports that one burn pit (the one with the berm) could have been used for small quantities of explosives during Explosive Ordnance Disposal Team training with items such as shape charges.
    - Historical records indicate that burned small arm casings, ejection cartridges for aircraft pylons, ammunition clips, and an empty rear casing of a practice bomb were found in the burn pits. However, no live ordnance was observed in either pit.

2.3.3 Ownership History

- Prior ownership
  - The land was under DoD control from 1944 until 1947.
  - The land was transferred in 1947 to the Oregon Technical Institute for use as a training institution for returning veterans, and then in turn it was transferred to the city of Klamath Falls for use as a park.
  - The City could not maintain the area as a park; therefore, the land reverted back to the U.S. Government in 1964.
  - The U.S. Marines and later the Oregon Army National Guard controlled the land prior to the Air Force taking control in 1965.
- The U.S. Air Force assumed control of the land in February 1965 for the purpose of constructing a rifle range. The U.S. Air Force was in control of the site from 1965 until 1975.
- The land was turned over to the Department of Interior who excessed the land and sold it to private individuals in 1976.
- Current parcel ownership is by individuals or limited partnerships (Figure 4).

2.4 Physical Setting

2.4.1 Topography and Vegetation

- The city of Klamath Falls is located at an elevation of 4,100 feet and is surrounded by the Coastal and Cascade mountain ranges.
- The Kingsley Firing Range Annex is located in the foothills of the Cascade Mountains at an elevation of approximately 5,100 feet.
- Topography is relatively flat and has a rocky terrain with low ground cover, including brush and native grasses, and rock outcroppings in the immediate area.

2.4.2 Surface Water

- The county is located within the Lost River drainage area.
- Drainage from the site follows existing intermittent streams during periods of high precipitation (Figure 8, "Surface Water Drainage").
- No ponds or surface water bodies are found in the immediate vicinity of the Range Complex. The nearest surface water is Swan Lake located approximately 2 miles east of the Range Complex.

2.4.3 Sensitive Environments

- The ASR (USACE, 1995) states that no threatened or endangered species are known to be found in the vicinity of the site (Figure 9, "Sensitive Receptor Locations"). Therefore, Kingsley Firing Range Annex is not considered an IEP. This will be confirmed with the Oregon Department of Fish and Wildlife.
- Table 1 presents the Army checklist for IEPs.
- The site is not managed for ecological purposes.
- According to the ASR (USACE, 1995), no historical or cultural resources were found to be present on the lands, which contained the former Kingsley Firing Range Annex. This will be confirmed with the State Historical Preservation Office.

2.4.4 Climate

- Semi-arid region with warm summers and cool winters.
- The City of Klamath Falls is surrounded by the Cascade and Coastal mountain ranges, which tend to collect the precipitation before it reaches the valley.
- The average annual maximum and minimum temperatures are 61.1 degrees Fahrenheit and 35.4 degrees Fahrenheit, respectively.
- The average total annual precipitation is 13.72 inches.
- The average total annual snowfall is 37.8 inches.

2.5 Geologic and Hydrogeologic Setting

2.5.1 Bedrock Geology

- The area is underlain by Pliocene volcanic rocks. Tuffaceous bedrock typically is present at depths of approximately 25 to 40 inches below ground surface (bgs).

2.5.2 Overburden Soils

- Area shows shallow to very deep, excessively drained and well drained soils in mountainous areas.
- Three types of soil are prevalent on the site.
  - The "Lorella" soils are shallow soils that formed in residual material originating from tuff and basalt.
  - The "Rock Outcrop Nuss" consists of rock outcrops and shallow soils that are formed from tuff.
  - The "Woodcock-Nuss-Royst" consists of shallow to deep soils formed from andesite, basalt, tuff, and ash.

2.5.3 Hydrogeology

- Static water level in the area ranges from approximately 45 feet bgs to 400 feet bgs.

2.6 Population and Land Use

2.6.1 Nearby Population

- Klamath County has a diverse economy consisting of timber, cattle ranching, irrigation farming, and tourism.
- The Kingsley Firing Range Annex is located 4 miles north of Klamath Falls, Oregon.
- Approximately 19,882 residents reside in Klamath Falls per the 2005 Bureau of Census population estimates (www.census.gov).
- The North Ridge Estates housing subdivision is constructed on the west side of Old Fort Road near the Kingsley Firing Range Annex (which is on the east side of Old Fort Road).

2.6.2 Land Use

- The site itself has been used in the past for limited cattle grazing.
- Records indicate the following improvements to the site:
  - A wood-frame administration building,
  - Two concrete ammunition buildings,
  - A small wood-frame range building,
  - A steel shipping container used for storage,
  - Several wooden polls, and

- A water system between the administration building and one firing range (Environmental Data Resources, Inc).

- Currently the land is not inhabited. However, several homes are in the vicinity of the site. The land surrounding the FUDS is zoned for forestry, grazing, and agriculture.
- During the August 1995 site inspection, it was noted that the FUDS property was fenced and there were two locked gates on the access road to the site with signage.
- Land on the west side of Old Fort Road (the FUDS is on the east side of the road) was used for construction of the North Ridge Estates housing subdivision.
  - In 2001, the ODEQ received a complaint of asbestos-containing material at the North Ridge Estates.
  - An inspection of the development revealed several violations of Oregon rules.
  - Subsequently some residents were relocated and the EPA has an ongoing cleanup of this area.

2.6.3 Area Water Supply

- Records indicate one groundwater well located near the North Ridge Estates, no wells are located on the Range Complex. The well was completed in 1963 for domestic use to a depth of 145 feet bgs.
- Figure 10, "Groundwater Wells Within 4-Mile Radius," presents the location of the domestic wells.

2.7 Previous Investigations for MC and MEC

- Figures 2 and 3 present a layout of the Kingsley Firing Range Annex range and sub-ranges.
- The USACE conducted a site survey on June 18, 1992, under the Defense Environmental Restoration Program for FUDS. Local contacts reported no presence of munitions or debris onsite. Evidently the property was cleared of any ordnance prior to termination of the lease. However, one 7.62-millimeter and one 44-millimeter shell casing were observed during the site visit (USACE, 1992).
- A Findings and Determination of Eligibility, dated October 23, 1993, concluded that the subject site was found to be used by the DoD, and was eligible for the Defense Environmental Restoration Program.
- The Inventory Project Report recommended an ordnance and explosives investigation, which is the subject of the ASR for the Former Kingsley Firing Range Annex (USACE, 1995).
- The ASR (USACE, 1995) reported that there was no evidence of MEC at the Rifle Range target berm (other than some small arms), scattered debris from the 3.5-inch rockets was found at the Rocket Range, and no live ordnance was found at the Disposal Range.
- An ASR Supplement was issued (2004) and indicated one range, the Range Complex, and three sub-ranges (Rifle Range, Rocket Range, and Disposal Range).

- The munitions used at the Kingsley Firing Range Annex and the associated MC are shown in Table 2.

2.8 Other Land Uses that May Have Contributed to Contamination

- There have been no other reported land uses that may have contributed to contamination in or around the FUDS. The area of the FUDS was used for grazing activities prior to use of the land by the DoD. Currently, the area is being used for nothing other than potential wildlife habitat.

2.9 Summary of Previous Investigations

- A PA/SI was conducted by Weston Solutions, Inc. for the EPA in 2004. Field sampling (Figure 11, "PA/SI GPS Sample Locations and Proposed Sample Locations") was conducted in July 2004 and the PA/SI report was published in December (EPA, 2004). The following summarizes the PA/SI:
  - Three surface soil samples were collected at the Rifle Range and Rocket Range.
  - Two surface soil samples were collected at the Rifle Range impact berm.
  - Two surface soil samples were collected at the Disposal Range (one at each burn pit).
  - One groundwater sample was collected at a private domestic well.
  - One sediment sample was collected in an unnamed intermittent stream.
  - One surface soil and one sediment background sample were collected.
  - All samples were analyzed for metals and nitrate-based explosive compounds (NBECs). The groundwater sample was also analyzed for perchlorate.
  - Several surface soil samples contained elevated levels of metals. Mainly lead from the impact berm sample and zinc from the horseshoe-shaped burn pit.
  - No samples contained NBECs or perchlorate.

3.0 Conceptual Site Model – Range Complex

3.1 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 site conditions 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).
- 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 and additional investigation.

3.2 Background

The CSM is based on information presented in the ASR (USACE, 1995) and the ASR Supplement (USACE, 2004). The Kingsley Firing Range Annex FUDS is comprised of 206.34 acres of land that was developed and used by the U.S. Air Force as a small arms firing range from 1965 to 1975. The site was used by the U.S. Marine Corps, Oregon Army National Guard, and U.S. Air Force from 1942 until December 1975.

Due to several types of usage by the military, the Range Complex was divided into three sub-ranges (Rifle Range, Rocket Range, and Disposal Range) that all share common boundaries. These three sub-ranges are shown in Figures 5 through 7, respectively.

3.2.1 History of Use

- Rifle Range
  - The Rifle Range was constructed by the U.S. Air Force and was historically used for small arms practice from 1965 to 1975.
  - Portions of the Rifle Range firing fan fall within the Rocket Range firing fan.

- The Rifle Range was approximately 500 yards in length, ending abruptly on a sheer mountain side located immediately behind the impact berm. Elevated firing positions were located at approximately 200 yards, 300 yards, and 500 yards.
- The firing line was approximately 60 yards wide, with an impact berm 200 feet wide and over 20 feet high.
- A 3.5 inch rocket was discovered on a fence post (it is reported in the ASR (USACE, 1995) that this was obviously found by someone somewhere else and placed on the perimeter fence). The rocket had markings indicating it was an M-405 rocket, which is the practice version of the 3.5 inch rocket.
- There was no evidence of MEC, only small arms at this site.

- Rocket Range
  - Used by the Army National Guard from 1965 to 1975 for 3.5-inch rocket practice.
  - Historical records suggest only practice warheads were used during the training periods. A warhead and rocket motor assembly were discovered on a fence post located at the Rifle Range. The lot and model number were readable, including the word "dummy" on the inert M-405 fuze.
  - The Rocket Range firing fan extends over the Disposal Range and Rifle Range.
  - Approximately 6.45 acres of the Rocket Range firing fan area is located on non-FUDS property.
  - Scattered debris from 3.5 inch rockets started approximately 400 yards downrange of the firing point and well within the firing fan.
- Disposal Range
  - The exact dates of use are unknown. However, it is assumed to be comparable to the other ranges (1965 through 1975).
  - The Disposal Range overlaps the southeastern portion of the Rocket Range.
  - Two burn pits, approximately 200 feet apart were identified containing the following:
    - One of the pits was situated on flat ground with no pit or berm. It had ordnance residue in the form of small arms casings and ammunition clips.
    - The second burn pit had a 6 foot high horse-shoe shaped berm. It was reported in the ASR, that this is a possible indication that the range could have been used for small quantities of explosives during Explosive Ordnance Disposal Team training with items such as shape charges. Within the burn pit was burned and melted ejection cartridges, small arms casings, and the empty base of an old style bomb.
  - The ASR (USACE, 1995) reported that the burn pit could have been used for small burn/disposal operations (this was common practice during the time period of use) for Cartridge Actuated Devices/Propellant Actuated Devices and small arms burning.

3.2.2 Munitions and Associated MC

- Table 2 presents the potential MEC and associated MC for the Kingsley Firing Range Annex.

3.2.3 Previous MEC Finds

- During the ASR site inspection, no MEC was found at the Rifle Range.
- During the ASR site inspection, scattered debris from practice 3.5-inch rockets was found at the Rocket Range.
- During the ASR site inspection, burned and melted ejection cartridges; small arms casings; ammunition clips; and the empty base of an old style bomb were found at the Disposal Range.
- No other MEC was reported or detected during the site inspection.

3.2.4 Previous MC Sample Results

- A PA/SI report was completed by the EPA in December 2004 (EPA, 2004). Surface soil and groundwater samples were analyzed for metals and NBECs. No detectable concentrations of NBECs were found. Elevated levels of lead at the impact berm and zinc at the horseshoe-shaped burn pit were found. Additionally the groundwater was analyzed for perchlorate, none was detected.
- No other previous MC sample results were reported.

3.2.5 Current and Future Land Use

- Land is privately owned. Fencing and signage on a portion of the Range Complex (signage existed during 1995 Site Inspection) provides a level of access restrictions to the general public.
- Land is currently not inhabited. The property is infrequently used for hiking and horseback riding and is mainly used for wildlife.
- Future land use is expected to remain the same as current land use.

3.2.6 Ecological Receptors

- This FUDS does not qualify as an IEP because there are no threatened or endangered species located on or near the site, and the site is not managed for ecological purposes.

3.3 MEC Evaluation

- The Rifle Range was historically used for small arms practice from 1965 to 1975.
- The Rocket Range was used for training with practice 3.5-inch rockets.
- No live ordnance was found at the Disposal Range. A portion of the range was supposedly used by for Explosive Ordnance Disposal Team training with items such as shape charges.
- Historical evidence indicates that munitions and small arms debris are found at the site. No MEC has been found on any of the sub-ranges.

- The site is currently privately owned and is not inhabited.
- There is restricted access to portions of the site due to fencing and locked gates.
- A housing development, North Ridge Estates, is within 1 mile of the site.
- The nearest city is Klamath Falls, approximately 4 miles to the south.

3.3.1 MEC Evaluation/Investigation Needed

- A visual field reconnaissance survey of the Range Complex and sub-ranges will be conducted with the objective to visually locate MEC. The reconnaissance will be aided through the use of a handheld magnetometer for safety purposes.

3.4 MC Pathway Evaluation

3.4.1 Overview of Site Characteristics

- Munitions debris from 3.5-inch practice rockets consist primarily of light steel, chromium, copper, iron, lead, and nickel.
- Small arms casings (lead) and rocket propellants consisting of nitrocellulose, nitroglycerin, ethyl centralite, carbon black, and potassium perchlorate.
- Demolition charges C-4 and detonation cord contain explosives hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) and PETN.
- Debris from ejection cartridges contains single-base (nitrocellulose) or double-base (nitrocellulose and nitroglycerin) powder.
- The site is currently privately owned and is uninhabited, except for wildlife.
- There is restricted access to portions of the site due to fencing and locked gates (were present during 1995 site inspection).
- A housing development, North Ridge Estates, is within 1 to 2 miles of the site. It is located across Old Fort Road.
- Figure 10 presents the groundwater wells within a 4-mile radius. Figures 8 and 9 present the surface water drainage within a 15-mile radius and the sensitive receptor locations within a 2-mile radius, respectively.

3.4.2 Overview of Pathways

Affected media and potential pathways for MC include:

- Soil: Soil is the primary medium of concern due to the presence of small arms and munitions debris (i.e., practice rockets, practice bombs, small arms remnants, explosive remnants) and possibly MC in the soil. The soil also serves as a secondary source of air contamination.
- Surface Water: The nearest surface water is Swan Lake located approximately 2 miles east of the Range Complex. Because of the distance and topography there are no streams in the vicinity. Only intermittent streams exist. Therefore, there is no complete surface water pathway.

- Sediment: Because of the distance to the nearest surface water, there is no complete pathway for sediment. However, the PA/SI (EPA, 2004) did collect a sample from an intermittent stream that runs parallel to the site. No metals were detected at elevated concentrations and no NBECs were detected.
- Groundwater: Groundwater is a potentially affected media since the migration of MC directly to the groundwater from the soil is considered to be possible. However, the static water level ranges from approximately 45 feet bgs to 400 feet bgs in this area.
- Air: Air is a possible completed pathway through inhalation of contaminated soil particles. The prevailing wind direction is from the southeast. Blowing dust from the sub-ranges could mobilize soil particles. The pathway is considered to be potentially complete, depending on whether a source of MC is identified in soil.

Exposure media at the Kingsley Firing Range Annex includes soil, groundwater, and air. An analysis of exposure pathways and receptors for each media is provided in Table 3.

Figures 12 through 14 illustrate the conceptual site model for the Rifle Range, Rocket Range, and Disposal Range, respectively, and the potential pathways of MC contamination.

3.4.3 Soil Exposure Pathway

3.4.3.1 Migration Pathway

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

3.4.3.2 Human Receptors

- The most likely current and future human receptors are the landowners.

3.4.3.3 Ecological Assessment

- This site has been determined not to be an IEP since the ASR (USACE, 1995) states that no threatened or endangered species are known to be found in the vicinity of the site and the site is not being managed for ecological purposes.

3.4.4 Groundwater Pathway

3.4.4.1 Migration Pathway

- The potential routes for human exposure to contaminated groundwater include ingestion, dermal contact, and inhalation where groundwater is used as a water supply.
- The potential route of wildlife to direct exposure is incomplete.

3.4.4.2 Human Receptors

- The most likely current and future human receptors are the landowners.

3.4.5 MC Soil, Air, and Groundwater Evaluation/Investigation Needed

- Six soil samples are planned for the Kingsley Firing Range Annex.
  - One soil sample will be collected at the location of each of the three firing positions and one sample will be collected from the front of the impact berm at the Rifle Range. Two samples of the impact berm were previously collected during the PA/SI (EPA, 2004) and analyzed for metals and NBECs. The collected samples would typically be analyzed only for lead because of the small arms. However, since the main portion of the Rifle Range and Rocket Range overlap, the samples will be analyzed for select metals (chromium, copper, iron, lead, and nickel for MC characterization and aluminum and manganese for potential geochemical evaluation) and explosives (including nitroglycerin and PETN).
  - One soil sample will be collected from the Rocket Range in an area with a high concentration of practice rocket fragments. The sample will be analyzed for select metals (chromium, copper, iron, lead, and nickel for MC characterization and aluminum and manganese for potential geochemical evaluation) and explosives (including nitroglycerin and PETN).
  - One soil sample will be collected at a horseshoe-shaped burn pit at the Disposal Range. The sample will be analyzed for select metals (chromium, copper, iron, lead, and nickel for MC characterization and aluminum and manganese for potential geochemical evaluation), explosives (including nitroglycerin and PETN), and perchlorate. One sample of the burn pit was previously collected during the PA/SI (EPA, 2004) and analyzed for NBECs and metals.
- One groundwater sample will be collected from a well near and downgradient of the Range Complex. The sample will be analyzed for select metals (chromium, copper, iron, lead, and nickel for MC characterization and aluminum and manganese for potential geochemical evaluation), explosives (including nitroglycerin and PETN), and perchlorate.
- Ten background surface soil samples and one background groundwater sample will be collected from non-impacted areas of the FUDS. Samples will be analyzed for TAL. One background surface soil sample and the groundwater sample will also be analyzed for perchlorates.
- No air sample will be collected. The results of the soil samples will be used in the evaluation of the air pathway. The air pathway is included in the development of the EPA PRGs.

3.5 CSM Summary/Data Gaps

Evaluation of the CSM indicates the following known conditions or data gaps.

Pathway	Evidence of MEC	Presence of MC	Proposed Inspection Activities
Soil	Scattered debris from practice 3.5 inch rockets was found at the Rocket Range. Burned and melted ejection cartridges; small arms casings; ammunition clips; and the empty base of an old style bomb were found at the Disposal Range.	Unknown	Visual field reconnaissance and soil sampling
Sediment	Unknown	Unknown	Incomplete Pathway
Surface Water	Unknown	Unknown	Incomplete Pathway
Groundwater	Unknown	Unknown	Groundwater sample
Air	None	None	Included in evaluation of soil pathway

4.0 Proposed Field Investigation

The proposed field investigation to be conducted at the former Kingsley Firing Range Annex is detailed below. The investigation approach will be defined in more detail in a SSWP that will be submitted to the ODEQ and other stakeholders for review. The SSWP will reference technical details including sampling and analytical methods that are described in the *Type I Work Plan, Site Inspections at Multiple Sites* (Shaw, 2006).

4.1 Reconnaissance

A visual field reconnaissance survey by a trained, unexploded ordnance (UXO) technician using a hand-held magnetometer will be performed on select portions of the three sub-ranges (Rifle Range, Rocket Range, and Disposal Range) to look for evidence of munitions activity and to assure that personnel avoid any potential MEC. Several meandering transects will be walked during which visual observations and magnetic anomalies will be noted. Transects will be recorded using a global positioning system, and appropriate features influencing the survey will be noted, such as vegetation density and type, topography, etc. If MEC is found, the qualified UXO technician will attempt to make a determination of the hazard, and appropriate notifications will be made as detailed in the *Type I Work Plan, Site Inspections at Multiple Sites* (Shaw, 2006) and SSWP. Digital photographs will be taken to document significant features.

4.2 Sampling

The proposed sampling approach is summarized on Table 4. A judgmental sampling approach will be used to select sample locations in areas determined by the CSM and/or field observations to potentially be impacted by MC. A judgmental sampling approach is appropriate to achieve the SI objective of determining the presence or absence of contamination at levels of concern.

A total of six surface soil samples are proposed (Figure 15, “Proposed Surface Soil Sample Locations”) at the FUDS. Surface soil samples will be collected at a depth of approximately 0 to 6 inches bgs. Surface soil samples will be composite samples (7-point, wheel pattern with a 2-foot radius). No subsurface samples are planned.

The exact location of the samples will be determined in the field based on the reconnaissance survey. The main portion of the Rifle Range and Rocket Range overlap; therefore, samples collected for either range will essentially characterize both ranges. One surface soil sample will be collected at the location of each of the three firing positions and from the front of the impact target berm at the Rifle Range. One surface soil sample will be collected from the Rocket Range in an area with a high concentration of practice rocket fragments. One surface soil sample will be collected at one of the Disposal Range burn pits.

Additionally, one discrete groundwater sample will be collected from a location near the site. No sediment or surface water sampling is planned.

4.3 Analysis

All regular soil and groundwater samples will be analyzed by EPA SW-846 Method 6020A for select metals (chromium, copper, iron, lead, and nickel for MC characterization and aluminum and manganese for potential geochemical evaluation). The background soil and groundwater samples will be analyzed for TAL metals. Soil samples will also be analyzed for explosives by EPA SW-846 Method 8330A and for nitroglycerine and PETN by Method 8330A (Modified). Perchlorate will be analyzed by EPA SW-846 Method 6850. Soil samples will be passed through an ASTM International No. 10 (2-millimeter) wire mesh sieve at the laboratory prior to analysis for metals in order to remove coarser particles and foreign objects, including large metallic fragments from the lead projectiles or practice rockets, which have a low degree of bioavailability (Interstate Technical and Regulatory Council, 2003).

4.4 Background Sampling

Site-specific or regional data regarding background concentrations of metals in soil are not known to be available. Therefore, 10 background soil samples will be collected. The composite soil sample locations will be determined in the field in areas that do not appear to have been impacted by past site operations. The background samples will be analyzed for the TAL metals. The soil background samples will be used to develop a 95th upper tolerance limit (UTL) for comparison of metals soil concentrations from the range samples. If one or more of the range samples exceed the background threshold, the following tests may also be applied:

- A nonparametric comparison of the central tendencies or medians of the site and background distributions, using the Wilcoxon rank sum test (EPA, 1994, 2002, and 2006; U.S. Navy, 2002 and 2003),
- A geochemical evaluation using correlation plots of trace element versus reference element concentrations (EPA, 1995; Myers and Thorbjornsen, 2004), for any element that fails either of the above two statistical tests.

Additionally, one of the background surface soil samples from the Disposal Range will also be analyzed for perchlorate.

Only one background groundwater sample will be collected and analyzed for TAL metals and perchlorate. Since the body of background data is limited (i.e., groundwater), the site-to-background comparison will be conducted according to guidance for SI activities and HRS scoring (EPA, 1992). Background concentrations for analytes are taken to be the maximum values observed in the limited background data set (EPA, 1995). A comparison is then made to

determine if a hazardous substance in the media is “significantly above the background level” according to the HRS criteria (40 CFR Appendix A to Part 300, Table 2-3):

- If the sample measurement is less than or equal to the sample quantitation limit, no observed release is established.
- If the sample measurement is greater than or equal to the sample quantitation limit, then:
  - If the background concentration is not detected, an observed release is established when the sample equals or exceeds the sample quantitation limit.
  - If the background concentration equals or exceeds the detection limit, an observed release is established when the sample is three times or more above the background concentration.

Background threshold levels, for comparison to site data per the above HRS criteria, are three times the maximum detected background concentration. For analytes not detected in background samples, the background threshold is the sample quantitation limit.

5.0 Technical Project Planning and Development of Data Quality Objectives

- The USACE TPP process is a four-phase process:
  - Identify the current project
  - Determine data needs
  - Develop data collection options
  - Finalize data collection program
- The purpose of TPP is to develop DQOs that document how the project makes decisions.
- Data quality objectives are intended to capture project-specific information such as the intended data use(s), data needs, and how these items will be achieved.
- Information captured through DQOs will be used as a benchmark for determining whether identified objectives are met.

5.1 TPP Phases

Phase I: Identify the Current Project

1. Team members identified to date include: USACE – representatives from the Omaha Design Center and the Seattle District, Shaw as a USACE contractor, ODEQ, and the leaseholders.

   Question: Is there any person or organization missing from this Team?

   Yes. EPA Region 10 was notified of meeting but has not been attending the TPP meetings. The USACE will contact the Klamath Tribe and landowners to inform them of the planned activities.

2. The AOCs identified are:

   - Range Complex and three sub-ranges (Rifle Range, Rocket Range, and Disposal Range).

   Question: Are there any other AOCs to be identified?

   None identified.

3. Based on information available about the site and shared through discussions with the USACE, are there concerns about this area that have been expressed by the ODEQ or EPA, as well as by landowners.

   Question: Are there additional concerns or issues from landowners or other stakeholders regarding the Kingsley Firing Range Annex site?

   The EPA has a contractor performing a removal action for removal of asbestos-containing material at the North Ridge Estates. Not a concern for the Kingsley Firing Range Annex but beware of the activities.

Question: Are there any administrative or stakeholder concerns or constraints that would prevent site inspection activities from going forward on the decision path for this site?

No.

Phase II: Determine Data Needs

4. Existing site information includes an ASR and ASR Supplement both prepared by the USACE in 1995 and 2004, respectively. A PA/SI Report was prepared for the EPA in 2004. A copy of the report has been reviewed, and pertinent information has been added to the final TPP Memorandum and may be used for field decisions.

   Question: Are there any other pertinent documents relating to the site available?

   Yes. ODEQ will check on the availability of the reported PA/SI and its applicability to Kingsley Firing Range Annex.

5. The site-specific approach for this SI involves collating and assessing available site information, to include site geology, hydrogeology, groundwater, surface water, ecological information, human use/access, and current and future land uses, as well as considering conduct of site inspection and sampling activities.

   Question: Are there any other site aspects/information that should be considered?

   No.

6. Based on site use, soil is the primary affected medium at the Kingsley Firing Range Annex. Sediment/surface water is not a potential pathway of MC because the closest surface water is approximately 2 miles from the site. Groundwater is a potential pathway since MC could be introduced to the groundwater through the soils. Air is also a potential pathway if soil particles become airborne. Considering current and future land use, primary receptors of any contaminants that may be present would most likely be landowners and animals using the area.

   Question: Do team members concur with the CSM?

   Yes.

7. Technical considerations and/or constraints need to be identified and addressed before conducting any additional sampling, and would depend on the approach and additional data needs decided upon by team members.

Questions:

- **Are any data missing?**

No available background information for the site. Check the 2004 PA/SI for any applicability. ODEQ requested analyzing the surface soil sample from the Disposal Range and the groundwater sample for perchlorate in addition to the other proposed analytes.

- **What is the nature of needed data?**

Background source data for metals and perchlorate. The background soil and groundwater samples will be analyzed for TAL metals. Additionally, one background surface soil sample and the background groundwater sample will be analyzed for perchlorate.

- **What data gaps would additional data meet for making a decision about the site?**

Confirm no perchlorate is in the burn pit soil from munitions or in the groundwater.

- **Are there any considerations/constraints that need to be addressed for collecting additional data?**

No.

Phase III: Develop Data Collection Options

8. Proposed approach:

   a) Conduct surface reconnaissance with magnetometer at the three sub-ranges to look for evidence of MEC and to determine locations for MC sampling.

   b) Find suitable soil background sample locations (10 locations total) and sample. There may be available USGS background data; however, methods and detection limits may not be appropriate. Analyze samples for TAL metals and perchlorate.

   c) Collect composite surface soil samples and analyze for select total metals (aluminum, chromium, copper, iron, lead, manganese, and nickel) and explosives. Additionally analyze the soil sample from the Disposal Range for perchlorate.

   d) Collect discrete groundwater sample from an available well and analyze for dissolved metals (aluminum, chromium, copper, iron, lead, manganese, and nickel), explosives, and perchlorate.

   e) Collect one background groundwater sample and analyze for TAL metals and perchlorate.

Question: Based on the desired decision endpoints and information known to date, what additional information is needed to reach a determination of No Department of Defense Action Indicated (NDAI) or further action?

None Identified.

Question: Are the stakeholders in agreement with the sampling approach program?

Yes.

Question: Are the stakeholders in agreement with the proposed approach for collecting background data?

Yes.

Phase IV: Finalize Data Collection Program

9. **Background data**.
Site sampling results will be compared to background concentrations (95 percent UTL will be calculated for metals samples). Site will be considered NDAI for MC if site results do not exceed background criteria.

Question: What background data will be used for evaluation?

Background data will be collected as part of the field activities. Existing information from the USGS and the PA/SI will be evaluated for applicability.

Are background data sets available from previous site studies?

No.

Are background data sets available from statewide studies?

Possible USGS information; however, detection methods and analytical methods may not be appropriate.

If background data are to be collected as part of the SI, how many samples will be collected and what methods will be used to define the background range and compare to site sample results?

Ten surface soil samples and one groundwater sample.

A comparison of site sample data to background data will be necessary to distinguish a munitions-related release from ambient conditions resulting from naturally occurring or anthropogenic sources. Where the body of background data includes sufficient samples (i.e., soil), a background threshold comparison of site concentrations to the background 95th UTL will be made (EPA, 1989, 1992, 1994, and 2002). Media with limited background data (groundwater) will use "significantly above background" criteria as applied for HRS.

10. **Human health screening level risk assessment**.
Sample results that exceed background will be compared to screening values. Site will be considered NDAI for MC if site results do not exceed screening values (depending also on

ecological evaluation). What concentrations of potential contaminants of concern (metals and explosives) lead to decision end-points for human health?

Note: Table 5, "Human Health Screening Values for Soil/Sediment." Table 6, "Human Health Screening Values for Groundwater." The ODEQ requested that Region 6 PRGs be used in place of Region 9 PRGs.

Question: Are these the correct standards to be applied as screening values for human health risk assessment?

Yes.

11. **Ecological screening level risk assessment.**
The USACE has defined a process for conducting screening level ecological risk assessment. A determination is first made whether the site qualifies as an IEP. A second determination is made whether the site is managed for ecological purposes. If neither criterion is met, then a screening level ecological risk assessment is not required and the process is limited to making observations during the site visit of any acute effects to flora and fauna that may be related to MC. If the site does qualify as an IEP, or is managed for ecological purposes, the site results that exceed background will be compared to ecological screening values. The site will be considered NDAI for MC if site results do not exceed screening values (depending also on human health evaluation).

Questions: Does the site qualify as an IEP?

No. However, ODEQ will review the IEP checklist and make a final decision on IEP qualification.

Is the site managed for ecological purposes?

No.

If the site is an IEP or is managed for ecological purposes, what concentrations of potential contaminants of concern (metals and explosives) lead to decision end-points for ecological risks?

This FUDS has not been identified as containing an IEP

Question: Are these the correct standards to be applied as screening values for ecological risk assessment?

Not Applicable.

12. **Other sampling issues.**

Question: Are there any additional sampling and analysis methodologies needed for all team members to arrive at a decision end-point?

Add TAL metals and perchlorate analysis to the background surface soil and groundwater samples; add perchlorate analysis to the surface soil sample collected at the Disposal Range and to the groundwater sample.

Question: Given the additional sampling and analysis methodologies, are there impacts to the project schedule that need to be accommodated?

No.

6.0 Data Quality Objectives

Upon agreement at the TPP Meeting, the following decision rules will be applied with regard to MC sampling results:

- Below risk-based screening levels equals NDAI
- Above background and risk-based screening levels equals Remedial Investigation/Feasibility Study

The following expanded project objectives 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 – Utilizing trained UXO personnel and handheld magnetometers, a visual search will be conducted searching for physical evidence to indicate the presence of MEC (e.g., MEC on the surface, munitions debris, craters, and soil discoloration indicative of explosives). The visual search will consist of areas within the three sub-ranges. The following decision rules will apply:

- The following reconnaissance results would support a recommendation for further action with respect to MEC:
  - Direct evidence is found of the presence of MEC (from historical records or SI activities), evidence of potential MEC that is inconsistent with the Rifle Range, Rocket Range, and Disposal Range CSMs (e.g., use of munitions containing high explosives).
  - Direct evidence of MEC is not found, but abundant munitions debris is identified suggesting a potential for the presence of MEC.
- The following reconnaissance results would support a recommendation for NDAI with respect to MEC:
  - Direct evidence of MEC is not found; munitions debris is isolated and consistent with the Rifle Range, Rocket Range, and Disposal Range CSMs.
  - No evidence of MEC, munitions debris, or magnetic anomalies is identified.
- If there is indication that site users are exposed to MEC hazards, the site will be recommended for a removal action.

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 #2 – Soil and groundwater samples will be collected and analytical results will be compared to background. Background soil and groundwater samples will be collected to use for comparison purposes. Results from previous investigations (e.g., PA/SI) will also be included in the evaluation provided the analytical data meet data quality requirements developed for the SI. The following decision rules will apply:

- If sample results do not exceed background, the site will be recommended for NDAI relative to MC.
- If sample results that exceed background are less than human health and ecological screening values, the site will be recommended for NDAI relative to MC.
- If sample results exceed both background and human health screening values, the site will be recommended for additional investigation.
- If sample results that exceed background and ecological screening values but not human health screening values, additional evaluation of the data will be conducted in conjunction with the stakeholders to determine if additional investigation is warranted.

Objective 3: Obtain data required for HRS scoring.

Data required for HRS scoring are identified in the HRS Data Gaps worksheet.

Objective 4: Obtain data required for MRSPP ranking.

Data required for MRSPP ranking are identified in the MRSPP worksheet.

Next Steps

- The USACE will obtain necessary rights-of-entry based on the proposed sample locations.
- Shaw will prepare the draft and final TPP Memorandum and distribute for concurrence.
- Shaw will prepare the draft SSWP for review and comment.
- Shaw will publish the final SSWP once comments are resolved and incorporated.
- Shaw will conduct field work.
- Shaw will prepare the draft SI Report and submit for USACE review and comment
- Shaw will prepare the draft final SI Report and submit for stakeholder review and comment.
- The USACE/Shaw will schedule a second TPP Meeting to present findings of the SI.
- Shaw will publish the final SI Report.

7.0 References

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U.S. Environmental Protection Agency (EPA). 2006. *Data Quality Assessment: Statistical Methods for Practitioners*. Office of Environmental Information, EPA/240/B-06/003. February 2006.

Figures

Legend

Kingsley Firing Range Annex FUDS Boundary

NOTES:
1) FUDS boundary was derived from the Kingsley Firing Range Annex ASR Supplement.
2) This property is located within the Lost Watershed.
3) Topo map (Klamath County) obtained from the U.S. Department of Agriculture, Service Center Agencies, 1999.

N

0 2 4 8 Miles

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 1

SITE LOCATION

KINGSLEY FIRING RANGE ANNEX

Shaw Environmental, Inc.

DRAWING NUMBER	DRAWN BY		OFFICE
Kingsley_001_fig1_SiteLocaton_TPP	J. Lillis	3/21/07	CEN

Legend

- Kingsley Firing Range Annex FUDS Boundary
- North Ridge Estates Site Area

NOTES:
1) FUDS boundary and range boundaries were derived from the Kingsley Firing Range Annex ASR Supplement.
2) Aerial photograph (Klamath County) obtained from the U.S. Department of Agriculture, Service Center Agencies; photo is from the USDA-APFO National Agricultural Inventory Project (NAIP), 2005.

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

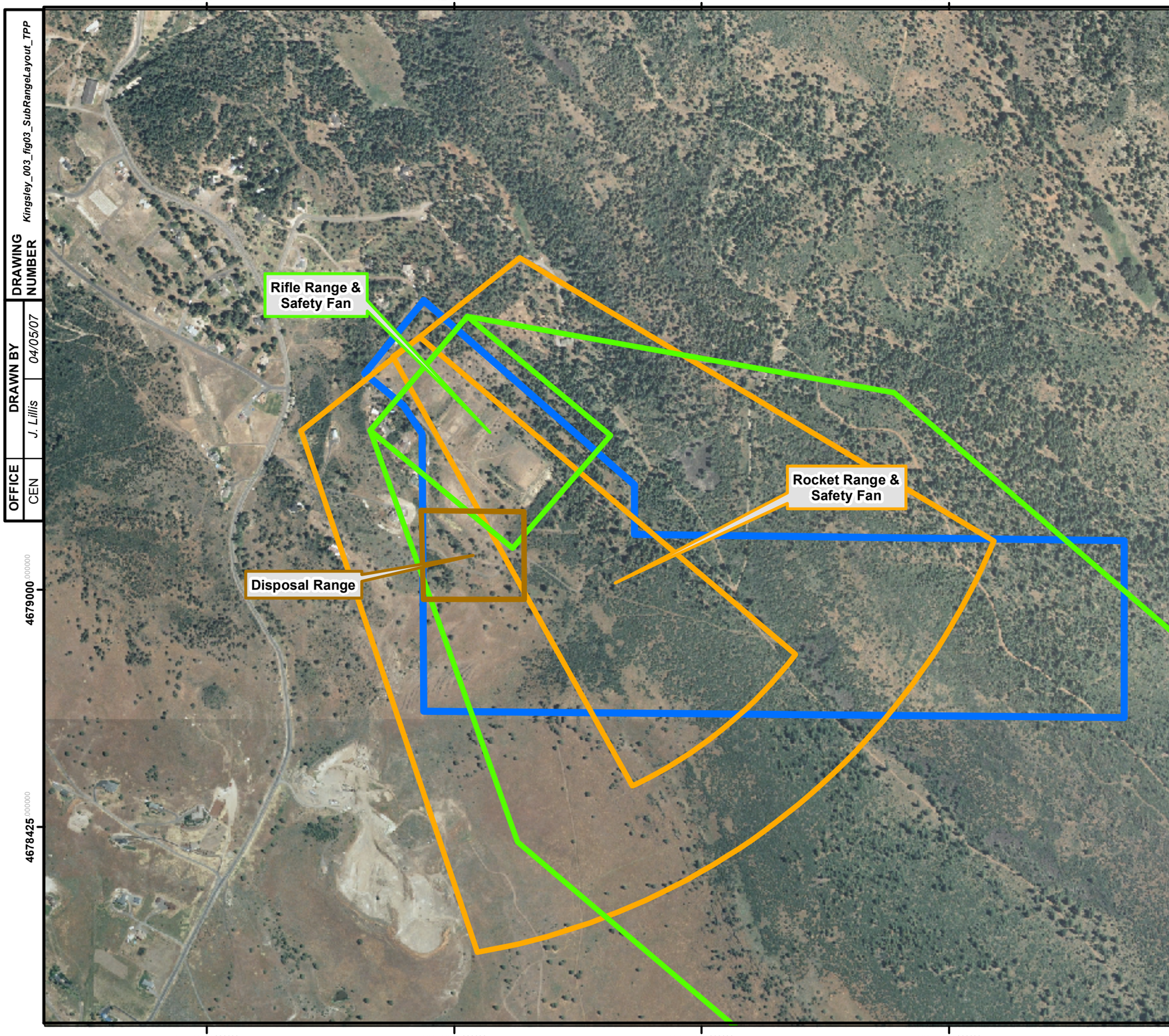
FIGURE 2

RANGE COMPLEX NO. 1
SITE LAYOUT

KINGSLEY FIRING RANGE ANNEX

Shaw Environmental, Inc.

OFFICE	DRAWN BY		DRAWING NUMBER
CEN	J. Lillis	04/05/07	Kingsley_003_fig02_SiteLocaton_TPP



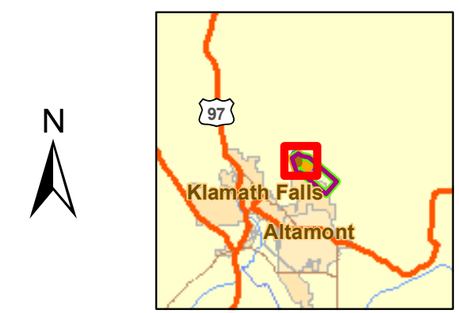
Legend

- Kingsley Firing Range Annex FUDS Boundary

Ranges Included in the MMRP Range Inventory

- Disposal Range
- Rifle Range
- Rocket Range

NOTES:
1) FUDS boundary and range boundaries were derived from the Kingsley Firing Range Annex ASR Supplement.
2) Aerial photograph (Klamath County) obtained from the U.S. Department of Agriculture, Service Center Agencies; photo is from the USDA-APFO National Agricultural Inventory Project (NAIP), 2005.



0 400 800 1,600 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

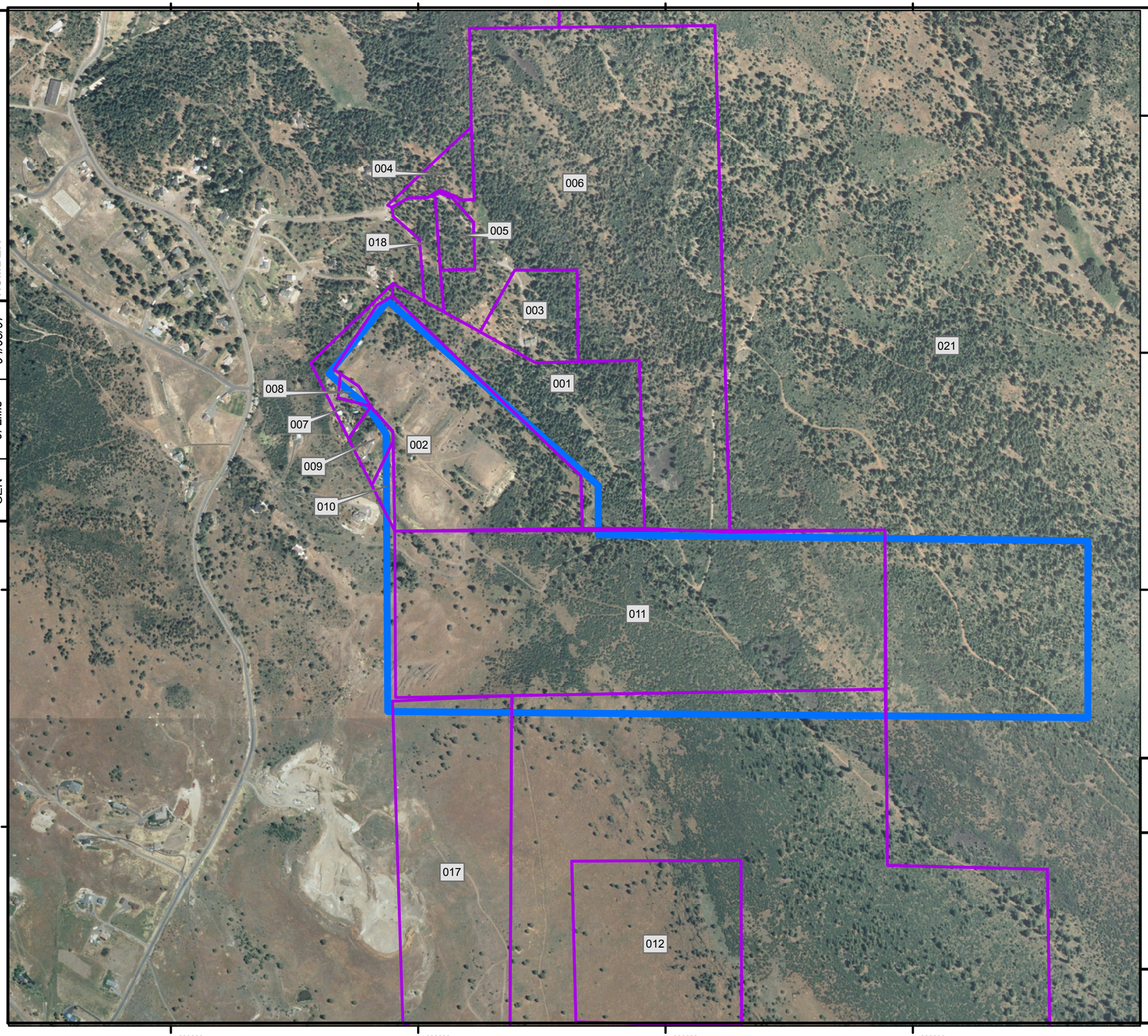
FIGURE 3

SUB-RANGE LAYOUT

KINGSLEY FIRING RANGE ANNEX

Shaw Environmental, Inc.

DRAWING NUMBER	DRAWN BY		OFFICE
Kingsley_003_fig03_SubRangeLayout_TPP	J. Lillis	04/05/07	CEN



Legend

- Kingsley Firing Range Annex FUDS Boundary
- Taxlot Parcel

NOTES:
1) FUDS boundary and range boundaries were derived from the Kingsley Firing Range Annex ASR Supplement.
2) Aerial photograph (Klamath County) obtained from the U.S. Department of Agriculture, Service Center Agencies; photo is from the USDA-APFO National Agricultural Inventory Project (NAIP), 2005.

N

0 400 800 1,600 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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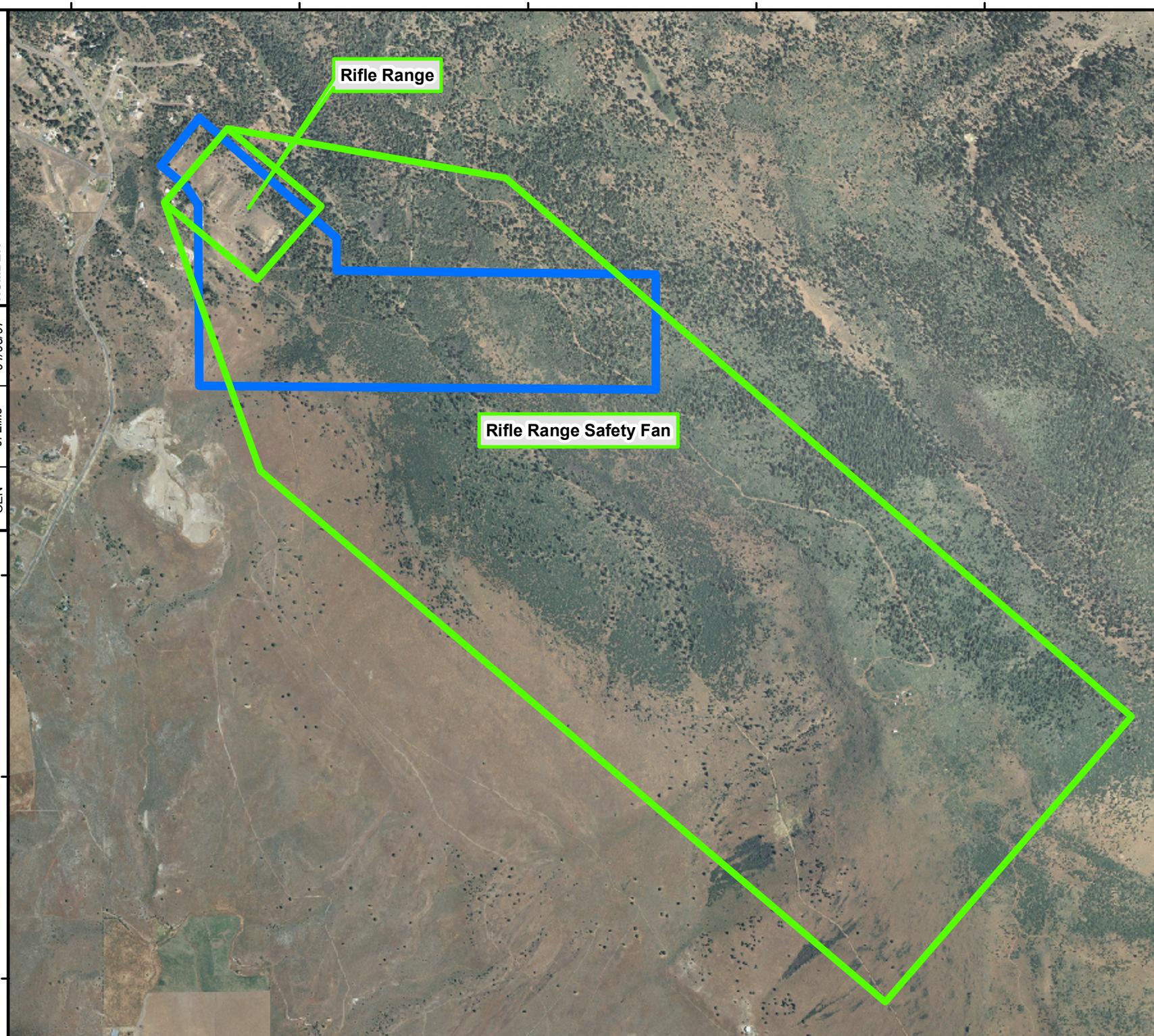
FIGURE 4

Taxlot Parcels

KINGSLEY FIRING RANGE ANNEX

Shaw Environmental, Inc.

DRAWING NUMBER	DRAWN BY		OFFICE
Kingsley_003_fig04_TaxlotParcels_TPP	J. Lillis	04/05/07	CEN



DRAWING NUMBER: Kingsley_004_fig05_AOC_RifleRng_TPP

DRAWN BY: J. Lillis 04/05/07

OFFICE: CEN

Legend

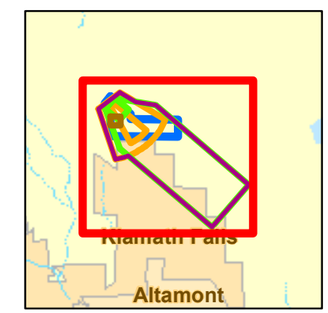
Kingsley Firing Range Annex FUDS Boundary

Ranges Included in the MMRP Range Inventory

Rifle Range

NOTES:
1) FUDS boundary and range boundaries were derived from the Kingsley Firing Range Annex ASR Supplement.
2) Aerial photograph (Klamath County) obtained from the U.S. Department of Agriculture, Service Center Agencies; photo is from the USDA-APFO National Agricultural Inventory Project (NAIP), 2005.

N



0 625 1,250 2,500 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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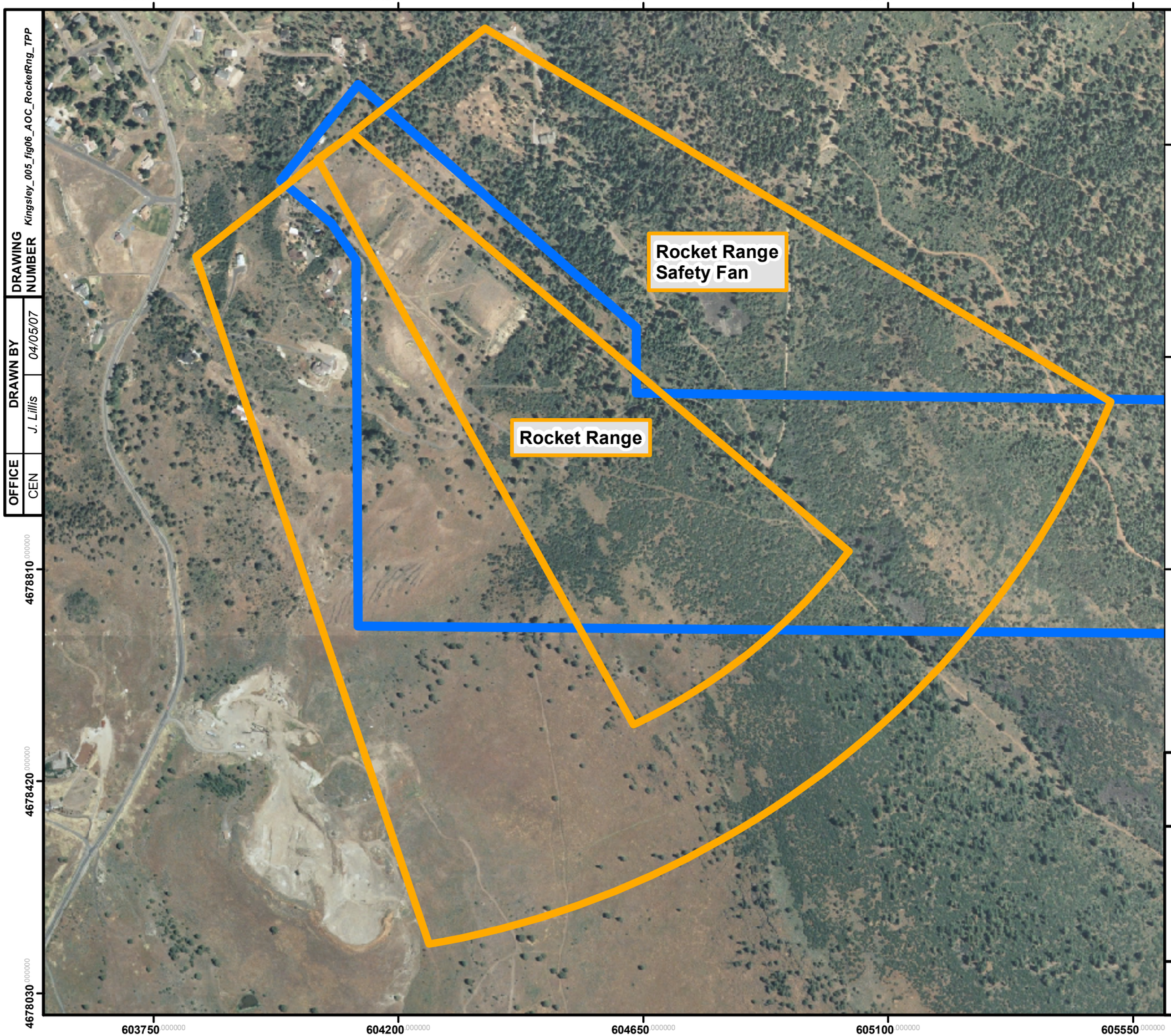
FIGURE 5

RIFLE RANGE

KINGSLEY FIRING RANGE ANNEX

Shaw Environmental, Inc.



DRAWING NUMBER Kingsley_005_fig06_AOC_RocketRng_TPP

DRAWN BY J. Lillis 04/05/07

OFFICE CEN

Legend

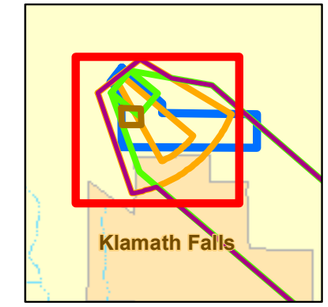
Kingsley Firing Range Annex FUDS Boundary

Ranges Included in the MMRP Range Inventory

Rocket Range

NOTES:
1) FUDS boundary and range boundaries were derived from the Kingsley Firing Range Annex ASR Supplement.
2) Aerial photograph (Klamath County) obtained from the U.S. Department of Agriculture, Service Center Agencies; photo is from the USDA-APFO National Agricultural Inventory Project (NAIP), 2005.

N



0 300 600 1,200 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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FIGURE 6

ROCKET RANGE

KINGSLEY FIRING RANGE ANNEX

Shaw Environmental, Inc.

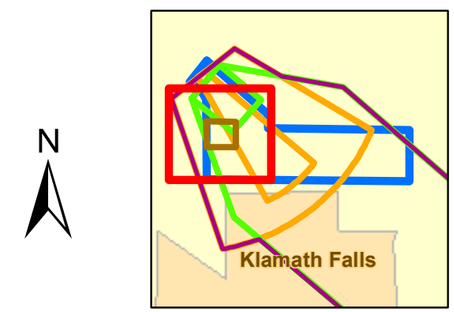
Legend

Kingsley Firing Range Annex FUDS Boundary

Ranges Included in the MMRP Range Inventory

Disposal Range

NOTES:
1) FUDS boundary and range boundaries were derived from the Kingsley Firing Range Annex ASR Supplement.
2) Aerial photograph (Klamath County) obtained from the U.S. Department of Agriculture, Service Center Agencies; photo is from the USDA-APFO National Agricultural Inventory Project (NAIP), 2005.



0 125 250 500 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

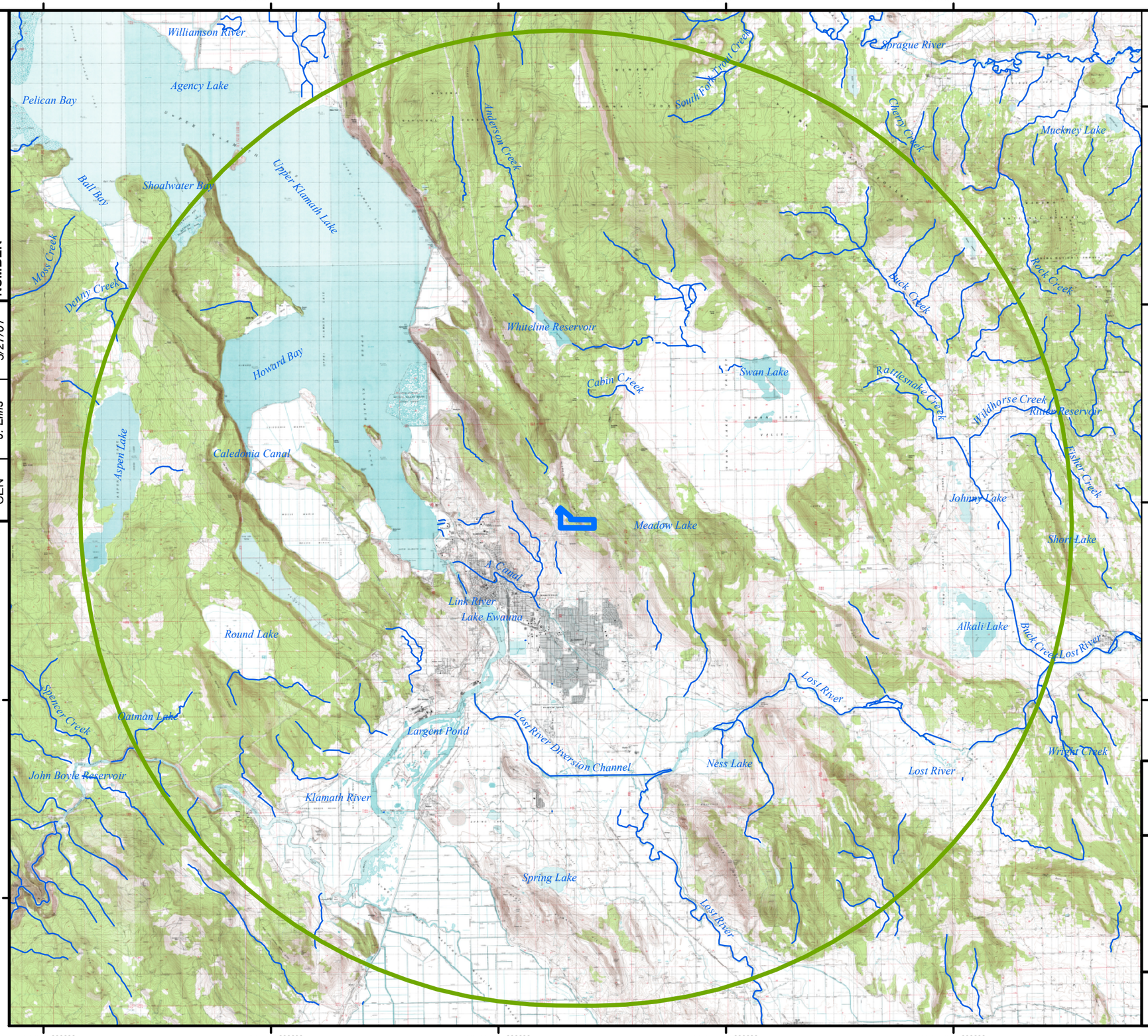
FIGURE 7

DISPOSAL RANGE

KINGSLEY FIRING RANGE ANNEX

Shaw Environmental, Inc.

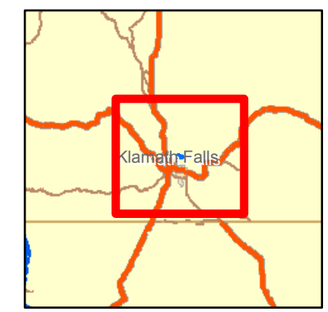
OFFICE	DRAWN BY		DRAWING NUMBER
CEN	J. Lillis	04/05/07	Kingsley_006_fig07_AOC_DisposalRng_TPP



Legend

- Kingsley Firing Range Annex FUDS Boundary
- 15-Mile Radius From Kingsley Firing Range Annex FUDS Boundary

NOTES:
1) FUDS boundary was derived from the Kingsley Firing Range Annex ASR Supplement.
2) Topo map (Klamath County) obtained from the U.S. Department of Agriculture, Service Center Agencies, 1999.



N

0 2 4 8 Miles

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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OMAHA DESIGN CENTER

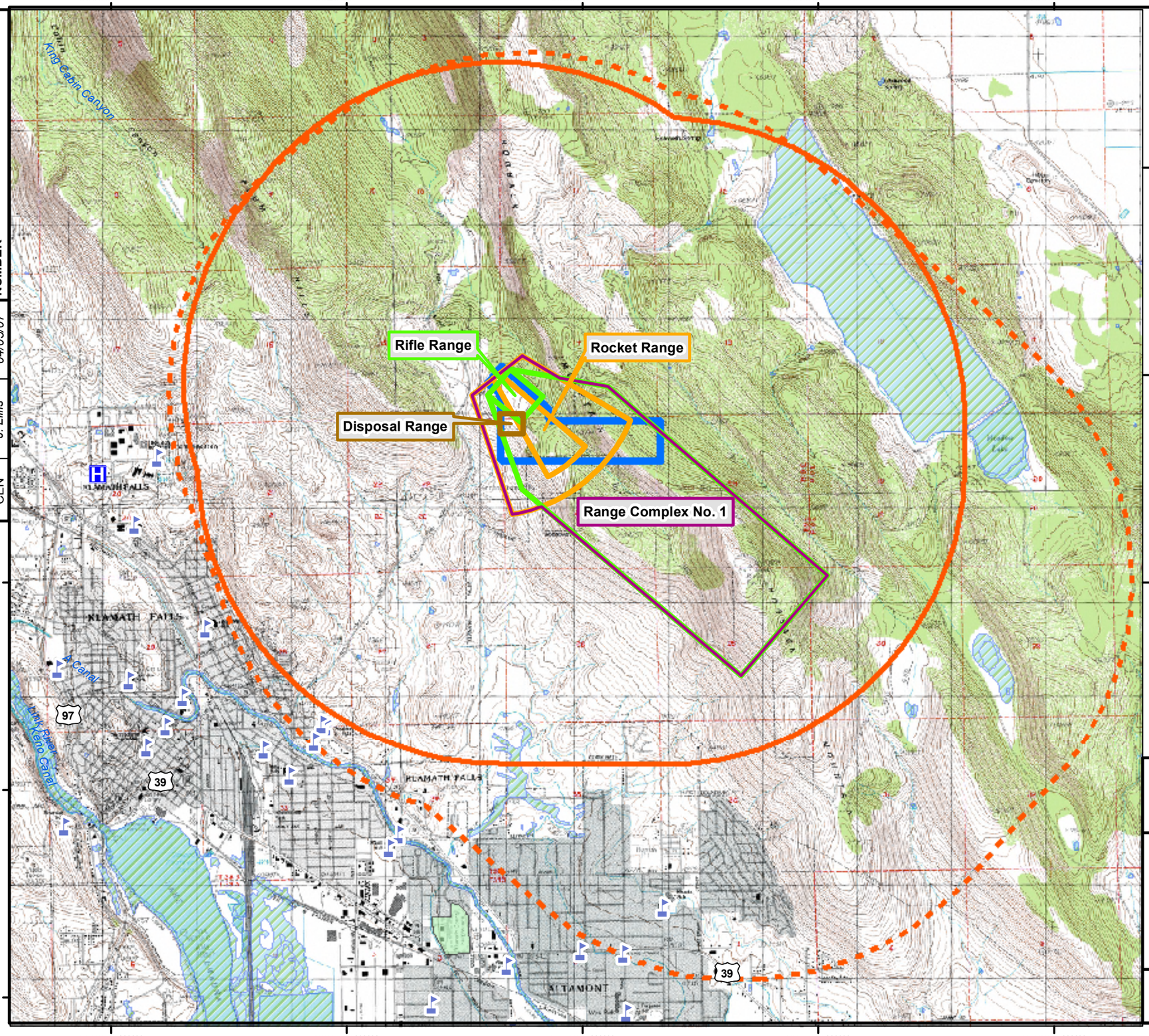
FIGURE 8

SURFACE WATER DRAINAGE

KINGSLEY FIRING RANGE ANNEX

Shaw Environmental, Inc.

DRAWING NUMBER	DRAWN BY		OFFICE
Kingsley_008_fig8_SurfaceWater_TPP	J. Lillis	3/27/07	CEN



Legend

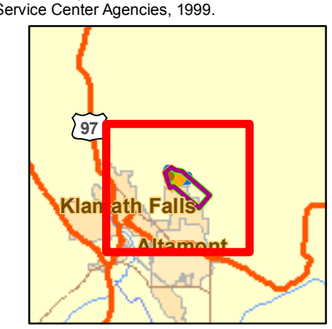
- Kingsley Firing Range Annex FUDS Boundary
- 2-Mile Radius From Kingsley Firing Range Annex FUDS Boundary
- 2-Mile Radius From Ranges Included in the MMRP Range Inventory

Ranges Included in the MMRP Range Inventory

- Range Complex No. 1
- Disposal Range
- Rifle Range
- Rocket Range
- Wetland Area
- Klamath Falls County Fairgrounds
- Hospital
- School

NOTES:
1) FUDS boundary and range boundaries were derived from the Kingsley Firing Range Annex ASR Supplement.
2) Wetlands data obtained from the U.S. Fish and Wildlife Service, 200605, NWIDBA.CONUS_wet_poly: Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, DC. FWS/OBS-79/31., U.S. Fish and Wildlife Service, Branch of Habitat Assessment, Washington, D.C.
3) Topo map (Klamath County) obtained from the U.S. Department of Agriculture, Service Center Agencies, 1999.

N



0 1,750 3,500 7,000 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
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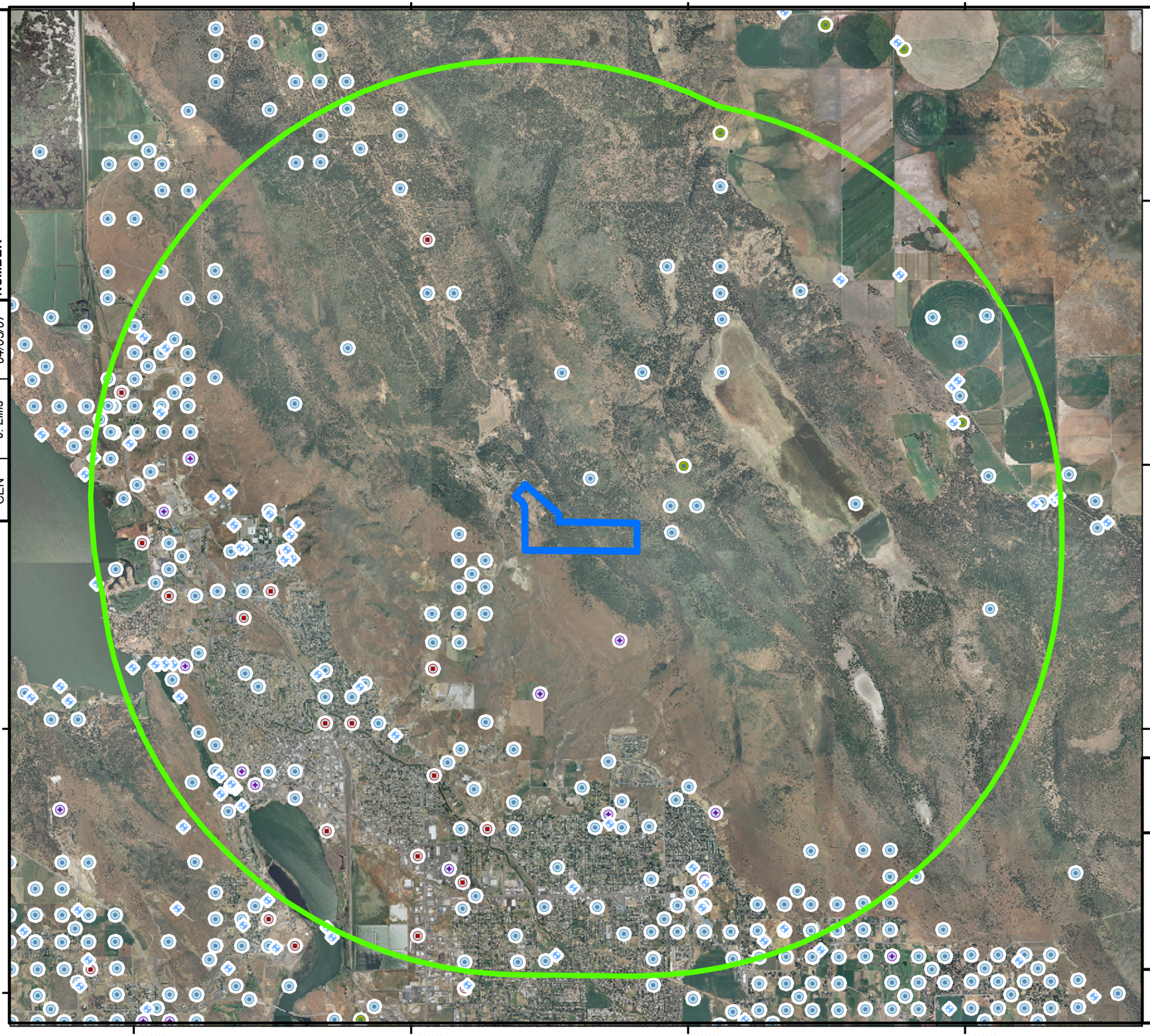
FIGURE 9

SENSITIVE RECEPTOR LOCATIONS

KINGSLEY FIRING RANGE ANNEX

Shaw Environmental, Inc.

OFFICE	DRAWN BY		DRAWING NUMBER
CEN	J. Lillis	04/05/07	Kingsley_007_fig09_SensRec_TPP



Legend

- Kingsley Firing Range Annex FUDS Boundary
- 4-Mile Radius From Kingsley Firing Range Annex FUDS Boundary

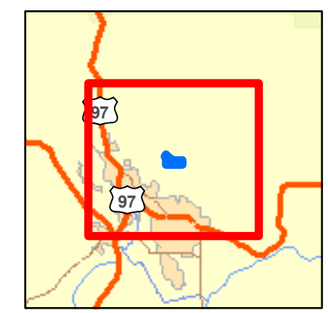
Groundwater Well Type

- Community
- Domestic
- Industrial
- Livestock
- USGS Monitoring Well

NOTES:

1) FUDS boundary and range boundaries were derived from the Kingsley Firing Range Annex ASR Supplement.
2) Groundwater well information obtained from the US Geological Survey.
3) Non-USGS groundwater well information obtained from the State of Oregon, Water Resources Department. Wells are plotted in the center of either the Township/Range/Section, Township/Range/Section/Quarter, or Township/Range/Section/Quarter/Quarter depending on available well data.
4) Aerial photograph (Klamath County) obtained from the U.S. Department of Agriculture, Service Center Agencies; photo is from the USDA-APFO National Agricultural Inventory Project (NAIP), 2005.

N



0 0.5 1 2 Miles

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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OMAHA DESIGN CENTER

FIGURE 10
GROUNDWATER WELLS WITHIN 4-MILE RADIUS

KINGSLEY FIRING RANGE ANNEX

Shaw Environmental, Inc.

DRAWING NUMBER	DRAWN BY		OFFICE
Kingsley_002_fig010_GWWells_TPP	J. Lillis	04/05/07	CEN

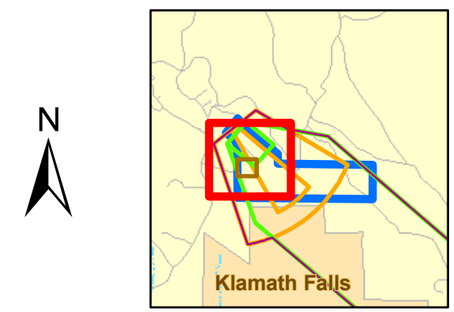
Legend

- Kingsley Firing Range Annex FUDS Boundary
- Proposed Surface Soil Sample Location
- Firing Line
- Impact Berm
- Rocket Debris

PA/SI GPS Sample Locations

- Groundwater Sample
- Sediment Sample
- Surface Soil Sample

NOTES:
1) FUDS boundary and range boundaries were derived from the Kingsley Firing Range Annex ASR Supplement.
2) Aerial photograph (Klamath County) obtained from the U.S. Department of Agriculture, Service Center Agencies; photo is from the USDA-APFO National Agricultural Inventory Project (NAIP), 2005.



0 150 300 600 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 11

PA/SI GPS SAMPLE LOCATIONS AND PROPOSED SAMPLE LOCATIONS

KINGSLEY FIRING RANGE ANNEX

Shaw Environmental, Inc.

OFFICE	DRAWN BY		DRAWING NUMBER
CEN	K.Masterson	5/22/07	Kingsley_012_fig011_GPS_DATA_2004_TPP

OFFICE	DRAWN BY		DRAWING NUMBER
SJ	K. Black	4-5-07	116188SJ-A78

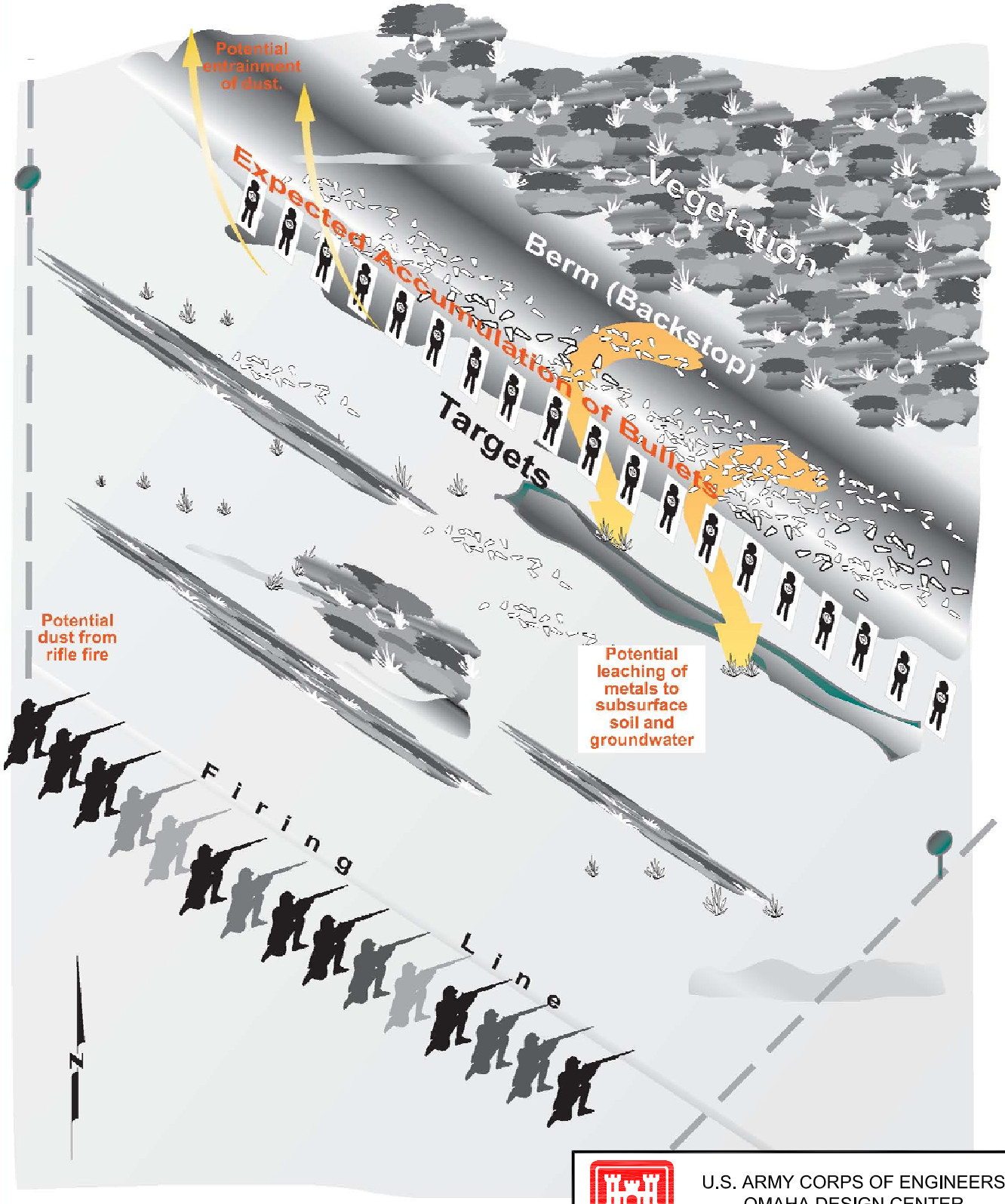


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FIGURE 12

CONCEPTUAL SITE MODEL
RIFLE RANGE

KINGSLEY FIRING RANGE ANNEX

Shaw® Shaw Environmental, Inc.

OFFICE	DRAWN BY		DRAWING NUMBER
SJ	K. Black	4-5-07	116188SJ-A77

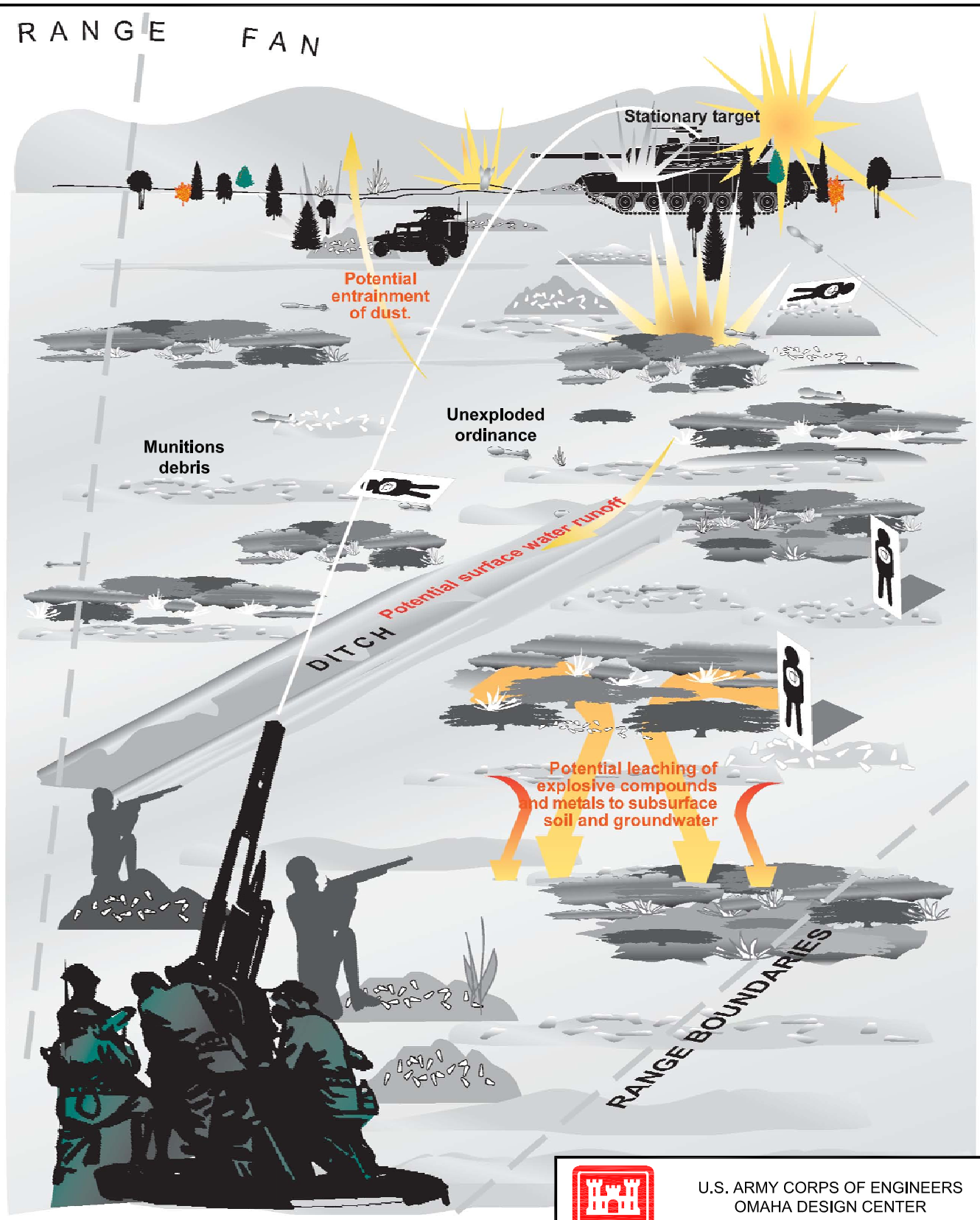

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FIGURE 13

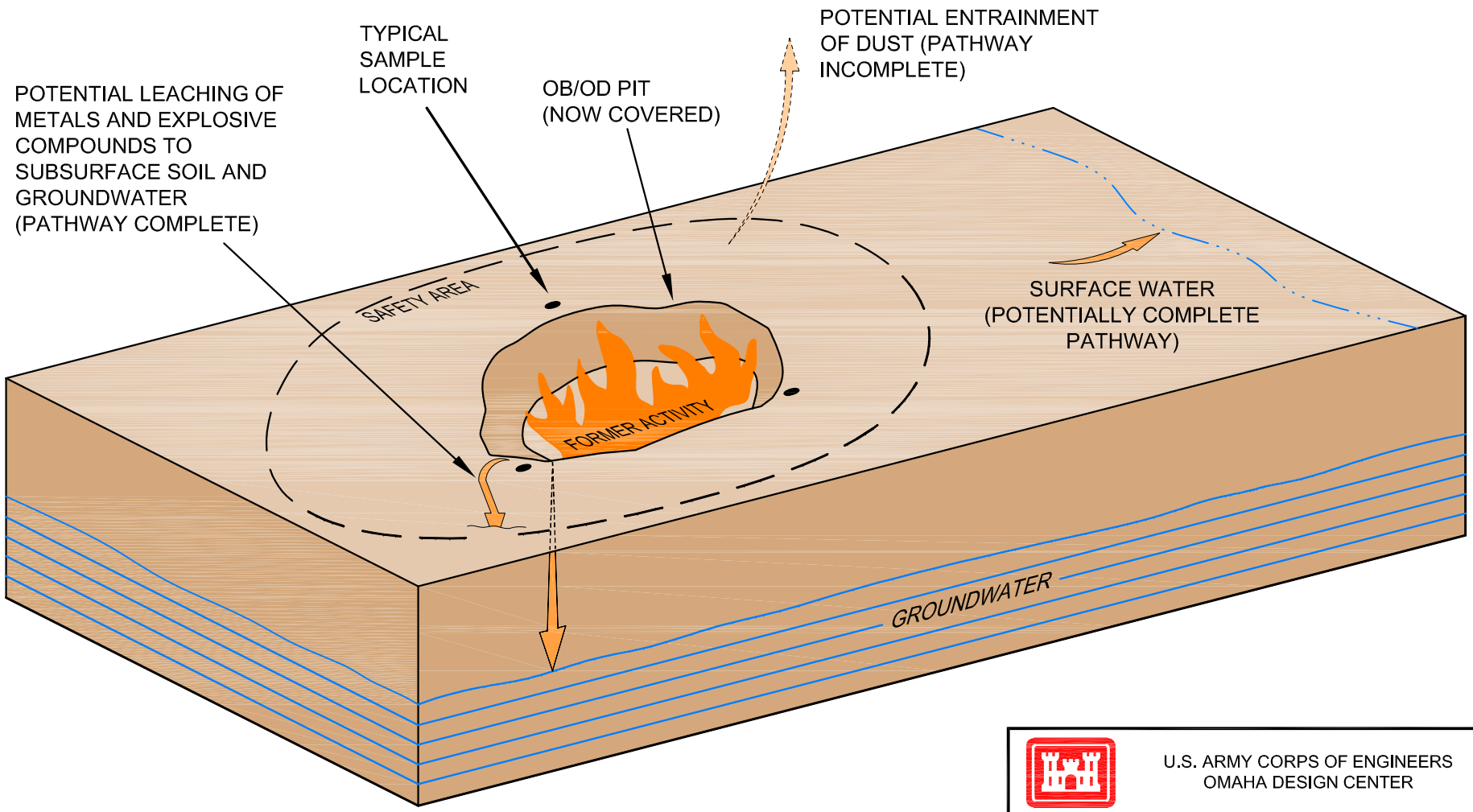
CONCEPTUAL SITE MODEL
ROCKET RANGE

KINGSLEY FIRING RANGE ANNEX

Shaw® Shaw Environmental, Inc.

XREF Files: IMAGE Files:
File: N:\cad\DWG\116188-FUDS\116188SJ-a76.dwg Layout: Layout User: Karen.Black May 23, 2007 - 12:40pm

OFFICE	DRAWN BY		DRAWING NUMBER	116188SJ-A76
SJ	K. Black	4-5-07		



RECEPTORS:

- Landowners
- Biota (wildlife)

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FIGURE 14

CONCEPTUAL SITE MODEL
DISPOSAL RANGE

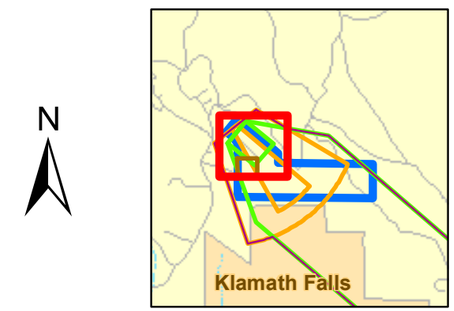
KINGSLEY FIRING RANGE ANNEX

Shaw® Shaw Environmental, Inc.

Legend

- Kingsley Firing Range Annex FUDS Boundary
- Proposed Surface Soil Sample Location
- Firing Line
- Impact Berm
- Rocket Debris

NOTES:
1) FUDS boundary and range boundaries were derived from the Kingsley Firing Range Annex ASR Supplement.
2) Aerial photograph (Klamath County) obtained from the U.S. Department of Agriculture, Service Center Agencies; photo is from the USDA-APFO National Agricultural Inventory Project (NAIP), 2005.



N

0 125 250 500 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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OMAHA DESIGN CENTER

FIGURE 15

PROPOSED SURFACE SOIL SAMPLE LOCATIONS

KINGSLEY FIRING RANGE ANNEX

Shaw Environmental, Inc.

OFFICE	DRAWN BY		DRAWING NUMBER
CEN	M. Mireiter	5/15/07	Kingsley_011_fig015_Prop_Sample_Locs_TPP

Tables

Table 1
Army Checklist for Important Ecological Places [a]
Kingsley Firing Range Annex

		Yes / No	Comments
1	Locally important ecological place identified by the Integrated Natural Resource Management Plan, BRAC Cleanup Plan or Redevelopment Plan, or other official land management plans	☐ / ☒	
2	Critical habitat for Federal designated endangered or threatened species	☐ / ☒	
3	Marine Sanctuary	☐ / ☒	
4	National Park	☐ / ☒	
5	Designated Federal Wilderness Area	☐ / ☒	
6	Areas identified under the Coastal Zone Management Act	☐ / ☒	
7	Sensitive Areas identified under the National Estuary Program or Near Coastal Waters Program	☐ / ☒	
8	Critical areas identified under the Clean Lakes Program	☐ / ☒	
9	National Monument	☐ / ☒	
10	National Seashore Recreational Area	☐ / ☒	
11	National Lakeshore Recreational Area	☐ / ☒	
12	Habitat known to be used by Federal designated or proposed endangered or threatened species	☐ / ☒	ASR states that no T&E species known in the vicinity of the Site.
13	National preserve	☐ / ☒	
14	National or State Wildlife Refuge	☐ / ☒	
15	Unit of Coastal Barrier Resources System	☐ / ☒	
16	Coastal Barrier (undeveloped)	☐ / ☒	
17	Federal land designated for protection of natural ecosystems	☐ / ☒	
18	Administratively Proposed Federal Wilderness Area	☐ / ☒	
19	Spawning areas critical for the maintenance of fish/shellfish species within river, lake, or coastal tidal waters	☐ / ☒	
20	Migratory pathways and feeding areas critical for maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which fish spend extended periods of time	☐ / ☒	
21	Terrestrial areas utilized for breeding by large or dense aggregations of animals	☐ / ☒	

Table 1 (Cont.)
Army Checklist for Important Ecological Places [a]
Kingsley Firing Range Annex

		Yes / No	Comments
22	National river reach designated as Recreational	☐ / ☒	
23	Habitat known to be used by state designated endangered or threatened species	☐ / ☒	ASR states that no T&E species known in the vicinity of the Site.
24	Habitat known to be used by species under review as to its Federal endangered or threatened status	☐ / ☒	ASR states that no T&E species known in the vicinity of the Site.
25	Coastal Barrier (partially developed)	☐ / ☒	
26	Federally designated Scenic or Wild River	☐ / ☒	
27	State land designated for wildlife or game management	☐ / ☒	
28	State-designated Scenic or Wild River	☐ / ☒	
29	State-designated Natural Areas	☐ / ☒	
30	Particular areas, relatively small in size, important to maintenance of unique biotic communities	☐ / ☒	
31	State-designated areas for protection or maintenance of aquatic life	☐ / ☒	
32	Wetlands	☐ / ☒	
33	Fragile landscapes, land sensitive to degradation if vegetative habitat or cover diminishes	☐ / ☒	

a – Based on EPA, 1990, 55 FR 51624, Table 4-23 – Sensitive Environments Rating Values, Dec. 14, 1990; EPA, 1997, ERAGS, Exhibit 1-1 List of Sensitive Environments

Table 2
Potential MEC and MC at Kingsley Firing Range Annex

Range Areas	Munitions ID	Munitions	Associated MC
Range Complex	3.5-inch Rocket	Practice M29A2	Steel
	Fuze	M-405 (dummy)	Perchlorate, stearic acid
	Small Arms	M-2 (.30-caliber) M1911 (.45-caliber)	Lead, copper, zinc, single-base (nitrocellulose) or double-base (nitrocellulose and nitroglycerin) powder
	500-lb-Practice Bomb	Mk 65	Steel, black powder
	Ejection Cartridge	ARD 863-1	Steel, double-base (nitrocellulose and nitroglycerin) powder
	C4 Block Charges	M112 and M5AI	RDX
	Detonating cord, Igniter	M60 Igniter	PETN

Table 3
MEC and MC Exposure Pathway Analysis
Kingsley Firing Range Annex

Range Area & Type	MMRP Concern	Potential Contaminant of Concern (PCOCs)	Affected Media (Potential Contaminant Sources) (Fate and Transport)	Exposure Routes and Potential Receptors			Data Gaps	Activities to Address Data Gaps (i.e., Sampling)
				Site Workers/ Contractor Personnel	Residents/ General Public	Ecological (Biota)		
Range Complex	MEC	MEC in the form of *unexploded* practice rockets may exist on the land surface. MEC in the form of *unexploded* practice bombs may exist on the land surface.	**Surface Soil** • MEC (unexploded practice rockets and bombs) are a hazard. • MEC (practice rocket and bomb debris) reported on surface.	• Potentially complete pathway. Exposure routes: • Vehicle and foot traffic	• Incomplete pathway.	• Potentially complete pathway. Exposure routes: • Foot traffic	• No live projectiles found.	• Historical documents indicate that the Rifle Range was used for firing of small arms; the Rocket Range was used for firing of practice 3.5-inch rockets; and the Disposal Range had two burn pits and was possibly used for explosives detonation. History does not indicate ranges were used for live projectiles. • A field reconnaissance survey by a trained unexploded ordnance (UXO) technician using a hand-held magnetometer will be performed at the sub-ranges assessing the presence or absence of munitions and explosives of concern (MEC) and to document the current site conditions.
			Subsurface Soil • MEC (unexploded projectiles) are a hazard. • MEC (unexploded projectile) reported in subsurface.	• Potentially complete pathway. Exposure routes: • Intrusive activities	• Incomplete pathway.	• Potentially complete pathway. Exposure routes: • Burrowing	• No live projectiles found.	• A field reconnaissance survey by a trained UXO technician using a hand-held magnetometer will be performed at the sub-ranges assess the presence or absence of MEC and to document the current site conditions. • No subsurface investigations will be conducted.
	MC	Black powder, sheet metal (chromium, iron, copper, lead, manganese, and nickel), explosives, RDX, PETN	**Soil** • Directly affected. • Potential metals contamination from munitions used. • Spotting charges do not contain hazardous components. • Fuze does not contain hazardous substances. • Explosives. • Fate & Transport: secondary source of potential sediment, surface water, and air contamination.	• Potentially complete pathway. Exposure routes: • Incidental ingestion • Dermal contact • Inhalation of soil particles	• Incomplete pathway.	• Potentially complete pathway. Exposure routes: • Ingestion • Direct Contact	• Additional metals and explosives data may be needed.	• Six soil samples will be collected, five samples will be within the overlap of the Rifle Range and Rocket Range (3 from the Rifle Range firing positions, 1 from the Rifle Range target berm, and 1 from an area with a reported heavy accumulation of practice bomb fragments) and one sample will be collected at a burn pit at the Disposal Range (if no MEC or munitions debris is located, a soil sample will be collected at a location determined in the field). The samples will be analyzed for explosives (including nitroglycerin and pentaerythritol tetranitrate [PETN]) and select metals (aluminum, chromium, copper, iron, lead, manganese, and nickel). The soil sample from the Disposal Range will also be analyzed for perchlorate. • Additionally, ten background surface soil samples will be collected and analyzed for Target Analyte List metals and perchlorate.
			Sediment/Surface Water • Not affected media. • No nearby surface water.	• Incomplete pathway.	• Incomplete pathway.	• Incomplete pathway.	Not applicable.	• No surface water samples or sediment will be collected.
			Groundwater • Potentially affected media under current land use.	• Potentially complete pathway. Exposure routes: • Incidental ingestion • Dermal contact • Inhalation of water	• Potentially complete pathway. Exposure routes: • Ingestion • Direct Contact	• Incomplete pathway.	• Additional metals and explosives data may be needed.	• One groundwater sample will be collected. • The sample will be analyzed for select metals (aluminum chromium, copper, iron, lead, manganese, and nickel), explosives, (including nitroglycerin and PETN), and perchlorate. • Additionally, one background groundwater sample will be collected and analyzed for Target Analyte List metals and perchlorate.
			Air • Potentially affected media due to blowing soil.	• Potentially complete pathway. Exposure routes: • Inhalation	• Incomplete pathway.	• Potentially complete pathway. Exposure routes: • Inhalation	• Additional metals and explosives data may be needed.	Will use soil analytical data in risk screening

Table 4
Proposed Sampling Approach
Kingsley Firing Range Annex

Area of Concern	Media	Samples	Select Metals	TAL Metals	Perchlorate	Explosives	PETN	Nitroglycerin
Rifle Range	Soil	4	4	0	0	4	4	4
	Sediment	0	0	0	0	0	0	0
	Surface Water	0	0	0	0	0	0	0
	Groundwater	0	0	0	0	0	0	0
Rocket Range	Soil	1	1	0	0	1	1	1
	Sediment	0	0	0	0	0	0	0
	Surface Water	0	0	0	0	0	0	0
	Groundwater	1	0	0	1	1	1	1
Disposal Range	Soil	1	1	0	1	1	1	1
	Sediment	0	0	0	0	0	0	0
	Surface Water	0	0	0	0	0	0	0
	Groundwater	0	0	0	0	0	0	0
Background	Soil	10	0	10	10	0	0	0
	Sediment	0	0	0	0	0	0	0
	Surface Water	0	0	0	0	0	0	0
	Groundwater	1	0	1	1	0	0	0
		Totals	6	11	13	7	7	7

QC Required Samples	Media	Samples	Select Metals	TAL Metals	Perchlorate	Explosives	PETN	Nitroglycerin
Duplicate	Soil	1	1	1	1	1	1	1
	Sediment	0	0	0	0	0	0	0
	Surface Water	0	0	0	0	0	0	0
	Groundwater	1	1	0	1	1	1	1
		Totals	2	1	2	2	2	2
MS/MSD	Soil	1	1	1	1	1	1	1
	Sediment	0	0	0	0	0	0	0
	Surface Water	0	0	0	0	0	0	0
	Groundwater	0	0	0	0	0	0	0
		Totals	1	1	1	1	1	1

Notes:

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

2) Metals by SW-846 6020A. Explosives by SW-846 8330A. PETN and Nitroglycerin by SW-845 8330A (Modified). Perchloratre by liquid chormatography/mass spectrometry

3) Select metals are aluminum, chromium, copper, iron, lead, manganese, and nickel.

MS/MSD - matrix spike/matrix spike duplicate

PETN - pentaerythritol tetranitrate

QC - quality control

TAL - Target Analyte List

Table 5
Human Health Screening Criteria for Soil/Sediment at Oregon Sites[a]
Kingsley Firing Range Annex

Analyte	Abbreviation	CAS No.	EPA Region 6 Human Health Medium-Specific Screening Levels		
			Residential MSSL[b] (mg/kg)	Industrial MSSL[c] (mg/kg)	SSLs[d] DAF=1 (mg/kg)
Nitroglycerin	NG	55-63-0			
Pentaeryltritol tetranitrate	PENT	78-11-5			
Aluminum	Al	7429-90-5	76,000	100,000	
Antimony	Sb	7440-36-0	31	450	0.30
Arsenic	As	7440-38-2	0.39	1.8	1
Barium	Ba	7440-38-2	16,000	100,000	82
Beryllium	Be	7440-41-7	150	2,200	3
Cadmium	Cd	7440-43-9	39	560	0.4
Calcium	Ca	7440-70-2			
Chromium[e]	Cr	7440-47-3	210	500	2
Cobalt	Co	7440-48-4	900	2,100	
Copper	Cu	7440-50-8	2,900	42,000	
Iron	Fe	7439-89-6	55,000	100,000	
Lead	Pb	7439-92-1	400	800	
Manganese	Mn	7439-96-5	3,200	35,000	
Phosphorus (white)	WP or P_4	7723-14-0	1.6	23	
Perchlorate	ClO_4	14797-73-0	55	790	

DAF = Dilution Attenuation Factor
MSSL = Medium-Specific Screening Levels
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

[b] MSSLs from Region 6 MSSL Table dated February 21, 2007 based on residential exposures to single chemical. The background information for these values is presented in *EPA Region 6 Human Health Medium-Specific Screening Levels* (December 2006).

[c] MSSLs from Region 6 MSSL Table dated February 21, 2007 based on industrial outdoor worker exposures to single chemical. The background information for these values is presented in *EPA Region 6 Human Health Medium-Specific Screening Levels* (December 2006).

[d] SSLs from Region 6 MSSL Table dated February 21, 2007. These values have not been generated from the soil-screening calculations. The values have been copied from the August 1998 Region 6 MSSL document and spot-checked using the latest EPA guidance (EPA, December 2006).

[e] Total chromium values used.

Table 6
Human Health Screening Criteria for Groundwater at Oregon Sites [a]
Kingsley Firing Range Annex

Analyte	Abbreviation	CAS No.	Laboratory Method Detection Limit (µg/L)	Region 6 Tap Water MMSL[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	3.7	
2,4-Dinitrotoluene[d]	2,4-DNT	121-14-2	0.3	0.099	
2,6-Dinitrotoluene[d]	2,6-DNT	606-20-2	0.3	0.099	
2-Amino-4,6-dinitrotoluene	2-Am-DNT	35572-78-2	0.2		
2-Nitrotoluene	2-NT	88-72-2	0.4	0.29	
3-Nitrotoluene	3-NT	99-08-1	0.8	120	
4-Amino-2,6-dinitrotoluene	4-Am-DNT	19406-51-0	0.2		
4-Nitrotoluene	4-NT	99-99-0	0.4	4.0	
Nitrobenzene	NB	98-05-3	0.2	3.4	
Nitroglycerin	NG	55-63-0	0.5		
PETN	PETN	78-11-5	1.3		
Chromium[f]	Cr	7440-47-3	2.0	110	100
Copper	Cu	7440-50-8	3.0	1,400	1,000[e] 1,300[g]
Iron	Fe	7439-89-6	5.0	26,000	300[e]
Lead	Pb	7439-92-1	1.0		15[g]
Manganese	Mn	7439-96-5	2.0	1,700	50[e]
Nickel	Ni	7440-02-0	1.0	730	
Perchlorate	ClO_4	14797-73-0	0.3		24[h]

Table 6 (Cont.)
Human Health Screening Criteria for Groundwater at Oregon Sites
Kingsley Firing Range Annex

MCL = Maximum Contaminant Level
MMSL = Medium Specific Screening Level
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 MMSLs from Region 6 MMSL Table dated February 21, 2007 based on residential exposure to tap water for a 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.
d Carcinogenic DNT mixture values used if more conservative than noncarcinogenic isomer-specific values.
e Secondary MCL from the 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004.
f Total chromium values used if available.
g Action level from the 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004.
h Based on memorandum from the Department of Defense entitled “Policy on DoD Required Actions Related to Perchlorate,” dates January 26, 2006.

Worksheets

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Kingsley Firing Range Annex
AOC: Range Complex (Rifle Range, Rocket Range, Disposal Range)
RMIS Range ID: F10OR0569

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	M29A2 3.5 inch practice rockets, Mk 65 500-lb practice bombs with black powder, C4 explosives (RDX, PETN), small arms (.30 caliber and .45 caliber)
	2	Source of Hazard			x	Former small arms range (Rifle Range), practice rocket range (Rocket Range), and OB/OD area (Disposal Range)
	3	Location of Munitions	x			Historical evidence indicates munition debris litters the Rocket Range. Amunitions debis found at Disposal Range. No munitions found at Rifle Range.
	4	Ease of Access	x			Partial barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	< 100 persons per square mile
	7	Population Near Hazard			x	0 inhabited structures w/in 2 miles
	8	Activities/Structures			x	Agricultural - irrigated crops and livestock grazing
	9	Ecological and/or Cultural Resources		confirm State Historical Preservation Office	x	Ecological resources present
	10	EHE Module Score				
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	< 100 persons per square mile
	17	Population Near Hazard			x	0 inhabited structures w/in 2 miles
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources			x	Ecological resources present
	20	CHE Module Score				
Health Hazard Evaluation (HHE)	21	HHE Factor Levels	x	Contaminant hazard evaluation pending analytical results		
	22	HHE Three-Letter Combination Levels	x	Contaminant hazard evaluation pending analytical results		
	23	HHE Module Ratings	x	Contaminant hazard evaluation pending analytical results		
	24	HHE Module Rating	x	Contaminant hazard evaluation pending analytical results		
MRS Priority	25	MRS Priority (Based on Highest Hazard Evaluation Module Rating)	x	Evaluation pending filling of data gaps		

To be completed by USACE once all data gaps are filled.

Site Information Worksheet

Site: Kingsley Firing Range Annex

Project: Kingsley Firing Range Annex

	Site Information Needed[a]	Suggested Means to Obtain Site Information	Potential Source(s) of Site Information	Responsible for Obtaining	Deadline for Obtaining Site Information
1	Schedule for Sampling	Consultation	ODEQ and landowners	Shaw	Prior to field work
2	Access Agreements	Rights of Entry requests	Landowners	USACE	Prior to field work
3	Areas of Cultural Significance within AOC	SHPO	Phone SHPO	Shaw	For inclusion in final TPP Memo

Kingsley Firing Range Annex HRS Data Gaps

Information required to complete the MEC-HRS data collection form:

Item	Number	Comment – Missing Data Element
1	1.8	Confirm the latitude / longitude of potential source(s) and the accuracy of the information (in meters)
2		Source scale (i.e., 1:24,000, etc.)
3	1.12	Site Permits
4	2.3	Confirm no tribal lands within 4 miles or surface water within 15 miles
5	2.4	Confirm if there are other NPL sites within 1 mile of the site
6	2.5	Confirm property owners
7	5.3	Population within 1 mile, within 4 miles
8	6	Water use (GW within 4 miles, SW within 15 miles)
9	6.1	Total drinking water population served
10	6.2	Type of drinking water supply system (GW or SW?)
11	6.3	Other water uses of GW within 4 miles
12	6.4	Depth to aquifer within 4 miles
13	7.1	Confirm existence of sensitive or potentially vulnerable environment