

**FIFTH FIVE-YEAR REVIEW REPORT
FOR
UMATILLA CHEMICAL DEPOT SUPERFUND SITE
EPA ID: OR6213820917
MORROW AND UMATILLA COUNTIES,
HERMISTON, OREGON**



April 2023

LEAD AGENCY SIGNATURE

This signature sheet documents the United States Army acceptance of the Fifth Five-Year Review for the Umatilla Chemical Depot, Hermiston, Oregon.

30 April 2023

Joshua S. Davis

Col, EN PMP

Chief, Army Environmental Division (DAIN-ISE)

Office of the Deputy Chief of Staff,

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Date

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Executive Summary:

This is the Fifth Five-Year Review Report (FYR) for the Umatilla Chemical Depot (UMCD) Superfund Site (Site). The purpose of this FYR is to evaluate the implementation and performance of the remedy in order to determine whether the remedy is, and will continue to be, protective of human health and the environment.

The UMCD is located east of Hermiston, in Morrow and Umatilla counties, Oregon. It was established in 1941 on 17,148.7 acres and closed in August 2012. Due to its large size, the number of sites, and the variety of potential contaminants, the installation was divided into eight Operable Units (OUs). Two are active remediation sites under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The OUs currently being remediated are the Explosives Washout Lagoons (EWL) Groundwater OU and the Ammunition Demolition Area (ADA) OU, which have not met unlimited use/unrestricted exposure (UU/UE). This FYR will also address three sites that have completed remediation, but do not have UU/UE. Those sites are the Deactivation Furnace, the Quality Assurance (QA) Function Range, and the Active Landfill (now closed). Upon transfer out of Army control, these sites will have land use controls (LUCs) documented in deed restrictions and an easement and equitable servitude (EES).

Site Summary:

The **EWL Groundwater** OU addresses groundwater impacted from the munitions explosive washout plant that discharged wash water contaminated with explosives into two unlined man-made lagoons. The principal contaminants at the EWL Groundwater OU are: 2,4,6-trinitrotoluene (TNT), 1,3,5-trinitro-1,3,5-triazine (RDX), octahydro-1,3,4,7-tetranitro-1,3,5,7-tetrazocine (HMX), and 2,4,6-trinitrophenyl-n-methylnitramine (tetryl). A groundwater extraction and treatment system was installed in 1997 and continues to operate. Hazardous substances remain on-site above levels that allow UU/UE.

The **ADA** OU occupies 1,750 acres and was used from 1945 to 1992 to dispose of ordnance through burning, detonation, dumping, and burial. These activities at the ADA led to contamination with munitions and explosives of concern (MEC). MEC discovered at the ADA includes assorted fuses, primers, boosters, rockets, mortars, grenades, mines, bombs, other high explosive rounds ranging from 20-millimeter (mm) to 100 mm high explosive fragmentation bombs, and sub-munitions. Remediation includes removal of MEC and cleanup of contaminated soil. The principal contaminants at the ADA OU are antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, thallium, RDX, trinitrobenzene (TNB), TNT, and 2,4-dinitrotoluene (DNT). Cleanup operations include geophysical mapping and munitions clearing consistent with the future land use. Hazardous substances remain on-site above levels that allow UU/UE.

The **Active Landfill** OU addresses a former solid waste landfill that was capped and closed in 1997, in accordance with Oregon Department of Environmental Quality (ODEQ) Solid Waste Regulations. From 1950 until 1968 the Landfill operated as a quarry. In 1968 the Installation began using it for solid waste. Groundwater monitoring of the landfill occurred from 2004

until 2010. The ODEQ terminated the landfill Permit, No. 320, in 2011 and transferred the site to the Environmental Cleanup Program. This OU has no active treatment and relies on land use restrictions to protect the cap from disturbance.

The **Deactivation Furnace OU** ROD specified a lead clean-up level of 500 milligrams per kilogram (mg/kg) as acceptable for the residential land use. Cleanup of the Deactivation Furnace OU soils was implemented accordingly. That clean-up level is now considered protective of industrial, but not residential, use. Therefore, hazardous substances remain on-site above levels that allow UU/UE. An Explanation of Significant Differences (ESD) has been written to show that the lead cleanup level in the ROD will be protective of industrial, but not residential, use. As a result, remediation of the Deactivation Furnace OU to cleanup levels required by the ROD will remain protective of the environment and human health if land use is restricted to industrial activities. LUCs which prohibit residential use will be used to achieve that restriction. The LUCs will include deed notifications and the recording of an EES with ODEQ as the enforceable entity.

The **QA Function Range OU** 2005 ROD requires land use restrictions if the property is to leave Army control. The Army wrote a Memorandum for Administrative Record (MFR) to document LUCs that will be implemented when the property is transferred. The LUCs will include deed notifications and the recording of an EES.

Remedies:

The remedies at the **EWL Groundwater OU** and **Active Landfill OU** remain protective of human health and the environment. The areal extent of the plume has decreased significantly since the last FYR. The landfill is capped, access to the landfill is limited, and groundwater concentrations are not indicative of landfill leachate contamination.

The remedy at **ADA OU** is expected to be protective human health and the environment upon completion. The portion of the ADA that is under control of the Oregon Army National Guard (ORARNG) encompasses the firing range surface danger zone (SDZ). It is fenced and access is controlled. The 60-foot strip west of the firing range fence is not fenced. The adjacent property owner has been notified of the risk of MEC and been directed not to trespass. Additionally, the two companies that have communication fiber in this area have been notified not to access it until remediation is complete. The Army has notified the private property owner that there is also a risk of MEC on their property. The Army has a 2021 contract to remediate it to UU/UE.

The **Deactivation Furnace** is protective of human health and the environment. Current ownership by the Army ensures the site will not be used for residential. Upon transfer out of Army control LUCs will include deed notifications and the recording of an EES.

The **QA function Range** is protective of human health and the environment. Current ownership by the Army ensures the site will not be used for residential purposes. Upon transfer out of Army control LUCs will include deed notifications and the recording of an EES.

The next FYR is due in September 2024.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Umatilla Chemical Depot		
EPA ID: OR6213820917		
Region: 10	State: OR	City/County: Hermiston/Umatilla and Morrow
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	Has the site achieved construction completion? No	
REVIEW STATUS		
Lead agency: Other Federal Agency If “Other Federal Agency” was selected above, enter Agency name: U.S. Army		
Author name (Federal or State Project Manager): Michele Lanigan		
Author affiliation: U.S. Army		
Review period: October 2019 – March 2020		
Date of site inspection: November 21, 2019		
Type of review: Statutory		
Review number: 5		
Triggering action date: September 2014		
Due date (<i>five years after triggering action date</i>): September 2019		

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List of Abbreviations

2,4-DNT	2,4-dinitrotoluene
2,6-DNT	2,6-dinitrotoluene
ADA	Ammunition Demolition Area
ARAR	Applicable or Relevant and Appropriate Requirement
BEC	BRAC Environmental Coordinator
BRAC	Base and Realignment and Closure
CDA	Columbia Development Authority
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CGA	Critical Groundwater Area
COC	Contaminant of Concern
CWM	Chemical Warfare Material
DGM	digital geophysical mapping
DNB	1,3-dinitrobenzene
DNT	2,4-dinitrotoluene
EDC	Economic Development Conveyance
EES	Easement and Equitable Servitude
EPA	Environmental Protection Agency
ESD	Explanation of Significant Differences
EWL	Explosives Washout Lagoons
FFA	Federal Facility Agreement
FS	Feasibility Study
FS/FFS	Feasibility Study/Focused Feasibility Study
FYR	Five-Year Review
GAC	granular activated carbon
GB	Nerve agent sarin
GETS	groundwater extraction and treatment system
gpm	gallons per minute
HD	Blister agent mustard
HDA	High Density Area
HDPE	High Density Polyethylene
HMX	octahydro-1,3,4,7-tetranitro-1,3,5,7-tetrazocine
I-RACR	Interim-Remedial Action Completion Report
ICM	Improved conventional munitions
ID	Identification
LAPP	Lagoon Amendment Pilot Project
LUC	land use control
LUCIP	Land Use Control Implementation Plan
MCL	maximum contaminant level
MDAS	Material Documented as Safe
MEC	munitions and explosives of concern
MFR	Memorandum for the Record
mg/kg	milligrams per kilogram
mm	Millimeters
msl	Mean Sea Level

NB	nitrobenzene
N/C	No Change
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDAA	National Defense Authorization Act
NGB	National Guard Bureau
NOV	Notice of Violation
NPL	National Priorities List
O&M	Operations and Maintenance
OAR	Oregon Administrative Rules
OB/OD	Open Burn/Open Detonation
ODEQ	Oregon Department of Environmental Quality
OMD	Oregon Military Department
OR	Oregon
ORARNG	Oregon Army National Guard
OU	Operable Unit
OWRD	Oregon Water Resources Department
PFAS	Per- and Polyfluoroalkyl Substances
PQL	Practical Quantitation Limit
QA	Quality Assurance (Function Range)
RA	Remedial Action
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
RDX	1,3,5-trinitro-1,3,5-triazine
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Level
SDZ	Surface Danger Zone
TBC	To Be Considered
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
tetryl	2,4,6-trinitrophenyl-N-methylnitramine
TNB	1,3,5-trinitrobenzene
TNT	2,4,6-trinitrotoluene
UFP-QAPP	Uniform Federal Program for Quality Assurance Project Plan
µg/L	micrograms per liter
UMADRA	Umatilla Army Depot Reuse Authority
UMCD	Umatilla Chemical Depot
UMCDF	Umatilla Chemical Agent Disposal Facility
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	United States Code
UU/UE	unlimited use/unrestricted exposure
UXO	unexploded ordnance
VOC	volatile organic compound
VX	Chemical nerve agent

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1. Introduction

This is the fifth Five-Year Review (FYR) for the Umatilla Chemical Depot (UCMD) Superfund Site (U.S. Environmental Protection Agency (EPA) ID: OR6213820917). Pursuant to CERCLA §121(d) the start of construction of the Washout Lagoons Soils OU (June 20, 1994) triggered periodic FYRs. The first FYR was completed September 30, 1999. Subsequent reviews are required every five years from the date of the first review. The completion and due dates of subsequent reviews are:

Second FYR: Due September 2004; completed October, 2004

Third FYR: Due September, 2009; completed March, 2010

Fourth FYR: Due September, 2014; December, 2018

Fifth FYR (current): Due September, 2019

Sixth FYR (next): Due September, 2024

1.1. Purpose

The purpose of this FYR is to evaluate the implementation and performance of the remedy in order to determine whether the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

1.2. Authority

The U.S. Army (Army) is preparing this FYR pursuant to §121 of the CERCLA and consistent with 40 CFR §300.430 of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP):

The Army is the lead agency for UMCD in accordance with the CERCLA, 42 U.S.C. §§ 9600 et seq., the Defense Environmental Restoration Program (10 U.S.C. §2701), and Executive Order 12580. With regulatory oversight from the EPA Region 10 Remedial Project Manager, the United States Army Corps of Engineers (USACE) Seattle District, on behalf of Base Realignment and Closure (BRAC) Office as lead agency for UMCD, conducted the FYR of the remedies implemented at UMCD located in Hermiston, Oregon. This report documents the results of the review conducted since the last FYR, which was based on information from 2009 to 2014.

2. Site Chronology

A chronology of significant activities associated with UMCD OUs included in this FYR are listed below in Table 1.

Table 1
Chronology of Site Events

Event	Date
Initial discovery of problem or contamination	May 1980
Resource Conservation and Recovery Act (RCRA) Facility Assessment and Initial Remedial Investigation	December 1982
National Priorities List (NPL) Listing	August 1987
Federal Facility Agreement signature	October 1989
Expanded Remedial Investigation/Feasibility Study started	1990
Active Landfill ROD signed	December 1992
Expanded Remedial Investigation/Feasibility Study completed	1993
Lagoon Groundwater and ADA ROD signed	July 1994
Lagoon Groundwater, and ADA Sites Remedial Design Started	September 1994
Lagoon Groundwater Remedial Design Completed	July 1995
Lagoon Groundwater Remedial Action Started	December 1995
Lagoon Groundwater Construction Date (start/finish)	January 1996/December 1996
First Five-Year Review Report	September 1999
Second Five-Year Review Report	October 2004
Active Landfill Oregon Department of Environmental Quality (ODEQ) Cleanup Program Remedial Action Recommendation Report	March 2005 (Draft version)
Lagoon groundwater pulse-pumping optimization evaluation (start/finish)	February 2009/August 2009
Third Five-Year Review Report	March 2010
Active Landfill termination of landfill permit and groundwater monitoring	April 2011
Lagoon groundwater bioremediation pilot study start	February 2010
Lagoon groundwater draft focused feasibility study for revised remedy	December 2011
Lagoon groundwater extraction and treatment expansion construction (start/ finish)	January 2013/ August 2013
Munitions and explosives of concern (MEC) clearance of ADA (start)	March 2014
Lagoon groundwater, Operating Properly, and Successfully Memorandum	September 2016
Property Transfer to Oregon Army National Guard	December 2017
QA Function Range Memorandum for the Record for land use controls	July 29, 2021
Active Landfill Explanation of Significant Difference for land use controls	January 8, 2021
Deactivation Furnace Explanation of Significant Difference for land use controls	January 8, 2021
Munitions and explosives of concern (MEC) clearance of ADA (start)(temporarily suspended for funding constraints)	On-going; an Interim-Remedial Action Completion Report (I-RACR) was completed in May 2021

3. Background

UMCD is a military facility located in northeastern Oregon, six miles west of Hermiston. It was established as an Army ordnance depot in 1941. Originally known as the Umatilla Army Ordnance Depot, the facility initially stored a variety of military items, from blankets to conventional munitions, in support of the United States entry into World War II. Over the

years, the facility name transitioned to Army Depot, then Umatilla Depot Activity, and finally the Umatilla Chemical Depot. Activities at UMCD have included the disassembly, analysis, modification, reassembly, repacking, and storage of conventional munitions, and the storage and disposal of chemical agent-filled munitions and containerized chemical agents.

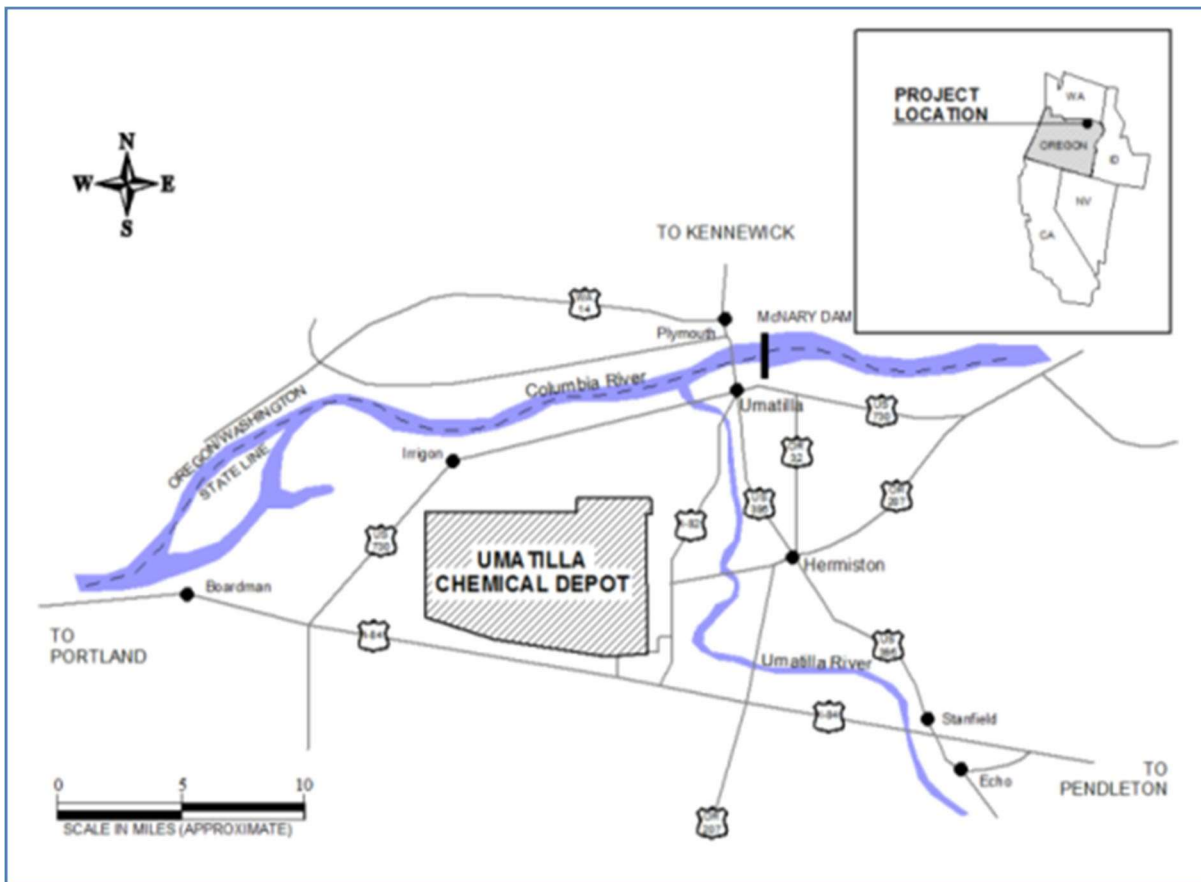
The EWL OU was placed on the NPL (FR Vol. 52, No. 140, p 27620- 27642) on July 22, 1987. The BRAC Commission listed the facility for realignment in 1988. From 1990 to 1994, the facility reorganized in preparation for eventual closure, shipping all conventional ammunition and supplies to other installations.

The Umatilla Chemical Agent Disposal Facility (UMCDF) was a RCRA permitted facility constructed and operated for the sole purpose of destroying the chemical agents stored at UMCD. The facility was constructed in 2001 and incineration of chemical agents began in 2004 and was completed in 2011. UMCDF destroyed 220,604 munitions and containers containing 3,717 tons of GB, HD and VX via high-temperature incineration, representing 12 percent of the Nation's stockpile. The UMCDF has completed RCRA closure and the applicable land use controls have been incorporated into the UMCD RCRA permit, which is in the closure process. On 1 August 2012, Umatilla Chemical Depot was closed and transferred to inactive operational status in accordance with the Defense BRAC Act of 1990, Public Law 101-510, as amended, and the National Defense Authorization Act (NDAA) for Fiscal Year 2012, Public Law 112-81. As of 1 August 2012, UMCD was reassigned to the U.S. Army G-9, BRAC for management. In 2017 the Army Installation Management transferred 7,500 acres to the National Guard Bureau (NGB) and a subsequent license was issued to the ORARNG for use as a training facility.

3.1. Physical Characteristics

UMCD is located in northeastern Oregon approximately six miles west of Hermiston, (population of approximately 19,000) and three miles south of the Columbia River (Figure 1). The installation is located in all or parts of Sections 1-28 in T4N, R27E, W.M.; Sections 31- 36 in T5N, R27E, W.M.; Section 36 in T5N, R26E, W.M.; and Sections 1, 12, 13, and 24 in T4N, R26E, W.M., in Morrow and Umatilla counties, Oregon, containing 17,148.7 acres. The surrounding land use is primarily for agricultural, resulting in a low population density around the Installation.

Figure 1
UMCD Location Map



UMCD lies within the Umatilla Lowlands of the Columbia Plateau. The lowlands are bordered on the west by hills adjacent to the Cascade Range. The Horse Heaven Plateau borders the lowlands on the north while the Pendleton Plains mark the eastern boundary. Coyote Coulee is the most prominent site surface feature, cutting across the UMCD in a northeast trend. Average land surface elevation is 450 feet above mean sea level (msl). No surface water bodies are present at the UMCD. The regional climate is characterized as a semi-arid cold desert. Average annual precipitation is 8.85 inches, 60 percent of which occurs between November and March. The average temperature is 75°F during the summer and 35°F in winter.

3.1.1 Geology and Hydrology

Basaltic lava flows of the Columbia River Group, Miocene, and Pliocene in age, and approximately 10,000 feet thick, underlie all of the lowlands areas and form the down-warped bedrock surface of The Dalles-Umatilla Syncline. The three uppermost basalt flows and interbeds are part of the Saddle Mountains Formation and include, from youngest to oldest, the Elephant Mountain Member, the Rattlesnake Ridge Interbed, the Pomona Member, the Selah Interbed, the Umatilla Member, and the Mabton Interbed (U.S. Army, 1994c). UMCD is near the base of the south flanks of this broad syncline. The underlying basalt is composed of layers of separate basaltic lava flows, each of which is as much as 100 feet thick. Dense, hard olivine

basalt at the base of each layer grades upward to softer, vesicular, and scoriaceous zones at the top. Some interlayers of clay, or clay and tuffaceous sand, up to 100 feet thick, are present in the group.

Below the 751-foot elevation, which includes the entire UMCD, the basaltic bedrock is generally covered with as much as 200 feet of Pleistocene alluvial deposits. These surface deposits are generally permeable silts, sands, and gravels, with some cobbles to the west of Coyote Coulee. Much coarser permeable deposits containing considerable quantities of boulders occur along the east wall of the Coulee and toward the east side of the installation.

Soils at UMCD consist of sandy loam and coarse sand developed primarily from the alluvial deposits. The soils have been modified by wind action. The upper eight inches of soil consist of a noncalcareous, loose, fine to medium-loamy sand. The 8 to 32-inch depths consists of fine-to medium sand, which overlies eight inches of sand containing no organic matter. Below 40 inches, the soil consists of gravel and gravelly sand with varying amounts of cobbles.

There are no surface water bodies on the installation; all waters infiltrate into the desert soils before running off onto lower surrounding lands. The closest surface water sources are the Columbia River, located three miles north of the Site, and the Umatilla River, located approximately two miles to the east.

Groundwater occurs beneath the UMCD in a number of distinct hydrogeologic settings, in a series of relatively deep confined basalt aquifers and in a highly productive permeable unconfined aquifer to the south of UMCD (extending off-post) (Grondin et al., 1995). The unconfined aquifer at UMCD consists of the alluvial deposits and the weathered surface of the Elephant Mountain Member basalt and is overlain by approximately 20 to 125 feet of unsaturated alluvial sand and gravel. Due to variations in topographic elevations depth to groundwater ranges from approximately 60 to 110 feet below ground surface. Three municipal water systems – Hermiston, Umatilla, and Irrigon – draw from groundwater within a 4-mile radius of UMCD. Approximately 1,500 wells were identified within this 4-mile radius, the majority of which are used for domestic and irrigation water. The Columbia River is a major source of potable and irrigation water in the region, and is used for recreation, fishing, and the generation of hydroelectric power. The Umatilla River is a tributary to the Columbia River, and its principal use is for irrigation.

In the mid-1970s the Oregon Water Resources Department (OWRD) has designated four aquifers within the Umatilla Basin as Critical Groundwater Areas (CGAs) due to their documented overdraft (Grondin et al., 1995). A significant portion of the UMCD, including that of the EWL Groundwater OU and the closed Active Landfill OU, lies within one of those CGAs known as the Ordinance Gravel aquifer. A number of projects are underway to manage water availability in the CGAs. Evaluation of water diversions from the Columbia and Umatilla rivers during high winter and spring flow periods and storage in the Ordinance Gravel aquifer for later use for irrigation as well as environmental benefits has been completed. Smaller-scale diversions on the order of 6,000 to 12,000 acre-feet have occurred in the first three years of project execution, with initial recharge raising site groundwater elevations an average of 4.06 feet since 2014 with the current elevation just under 500 feet msl.

In 2010, the implementation of the Umatilla Basin Aquifer Restoration Project was completed to

address basin wide ground water needs. Stage I of the Umatilla Basin Aquifer Restoration Project was completed in March 2011 allowing for a higher use by local farmers with composite water sources.

3.1.2 *Flora and Fauna*

Vegetation is typical of a cold desert. In general, the UMCD site supports large communities of shrub lands, dominated by sagebrush and bitterbrush, with an understory of annual grasses and forbs; and grasslands, dominated by a mixture of native and exotic species such as Sandberg's bluegrass, cheat-grass (downy brome grass), and crested wheatgrass. UMCD probably contains the largest remnants of bitterbrush habitat in the Columbia Basin, as well as high quality needle-and-thread sandy grasslands.

There are no threatened or endangered species currently recorded on UMCD grounds. Based on the habitat available at UMCD, Laurence's milk-vetch is the only U.S. Fish and Wildlife Service listed plant species of concern that is likely to occur on the installation. State-listed candidates that may occur within the UMCD area include Laurence's milk-vetch and Douglas' milk-vetch.

In general, faunal species are consistent with what one would expect in Columbia Basin native shrub-steppe and grassland habitats: coyote, American badger, jackrabbits and cottontail rabbits, Swainson's and redtail hawks, western burrowing owl, long-billed curlew, and many other species common to this habitat. The lack of surface water at UMCD precludes the occurrence of fish species.

3.2. *Land and Resource Use*

Chemical munitions destruction at the Installation began in 2004 and was completed in late 2011. Thereafter, as required by §125 of the Consolidated Appropriations Act of 2012 (Public Law 112-74), UMCD was closed and transferred to inactive status on 1 August 2012. Section 125(d) of the Consolidated Appropriations Act of 2012 also authorizes the Secretary of the Army to "retain minimum essential ranges, facilities, and training enclave for the reserve components of the Armed Forces to permit the conduct of individual and annual training." In 2017 real property accountability for these acres transferred to the NGB with a subsequent license to the ORARNG for military training. The ORARNG property includes the ADA OU and EWL OU TNT and RDX contaminant plume. In addition, the Army intends to use an Economic Development Conveyance (EDC) to convey 9,539.45 acres to the Columbia Development Authority (CDA). Per the 2010 Base Redevelopment Plan written by the Umatilla Army Depot Reuse Authority (UMADRA). The EWL plume, Active Landfill, and QA Function Range OUs are in an area that will be designated as a wildlife refuge.

Groundwater extraction for potable use is restricted. After transfer, groundwater use will be restricted by an EES that will be recorded at the time of transfer and is enforceable by ODEQ. The Deactivation Furnace OU is in an area slated for industrial use.

The majority of the area surrounding UMCD is rural, irrigated agricultural cropland, and pastures. Land use for the areas immediately adjacent to the installation is zoned agricultural (Umatilla and Morrow counties). A railroad yard is located on the south UMCD boundary. In recent years, local farmers and businesses have diversified the land use to include food processing. Important agricultural products include wheat, potatoes, corn, onions,

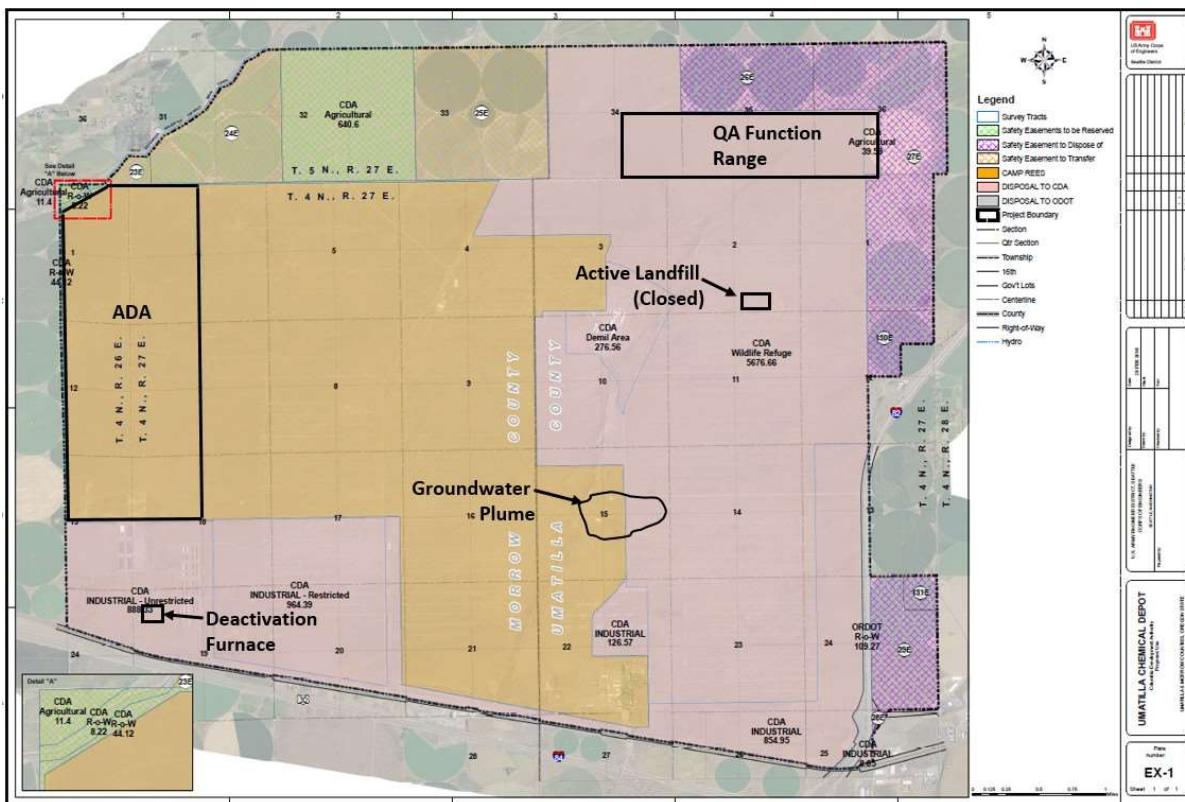
watermelon, hay, and cattle.

3.3. *History of Contamination*

There are eight OUs at the UMCD. Two are still in active remediation under CERCLA. These are the EWL Groundwater OU and the ADA OU. Three other sites have completed remediation but have not achieved UU/UE and will have LUCs. Those sites are the Deactivation Furnace, the QA Function Range, and the closed Active Landfill OU. The OU locations are shown in Figure 2 below. The OUs that have completed remediation are the Explosives Washout Lagoons Soils OU, Inactive Landfill OU, Explosives Washout Plant OU, and Miscellaneous Sites OU. These sites do not require FYRs because these were closed to achieve UU/UE risk standards. Contamination at these OUs occurred due to activities related to munitions maintenance and installation management. Further details of these sites are in the past FYRs.

Activities at the UMCD were associated with the disassembly, analysis, modification, reassembly, and repacking of conventional munitions, and the storage of the chemical munitions nerve agents VX and GB (Sarin) and the blister agent, HD (mustard). Specific disposal operations included release of wastewater from the Explosives Washout Plant into two leaching beds, and various deactivation, demolition, burning, or burial of sewage treatment sludge, munitions, and scrap. The UMCD was listed on the NPL in 1987. The UMCDF was a RCRA permitted hazardous waste disposal facility for the destruction of the chemical agents. The facility began operations in 2003 with project completion in 2012.

Figure 2
UCMD Operable Unit Location Map

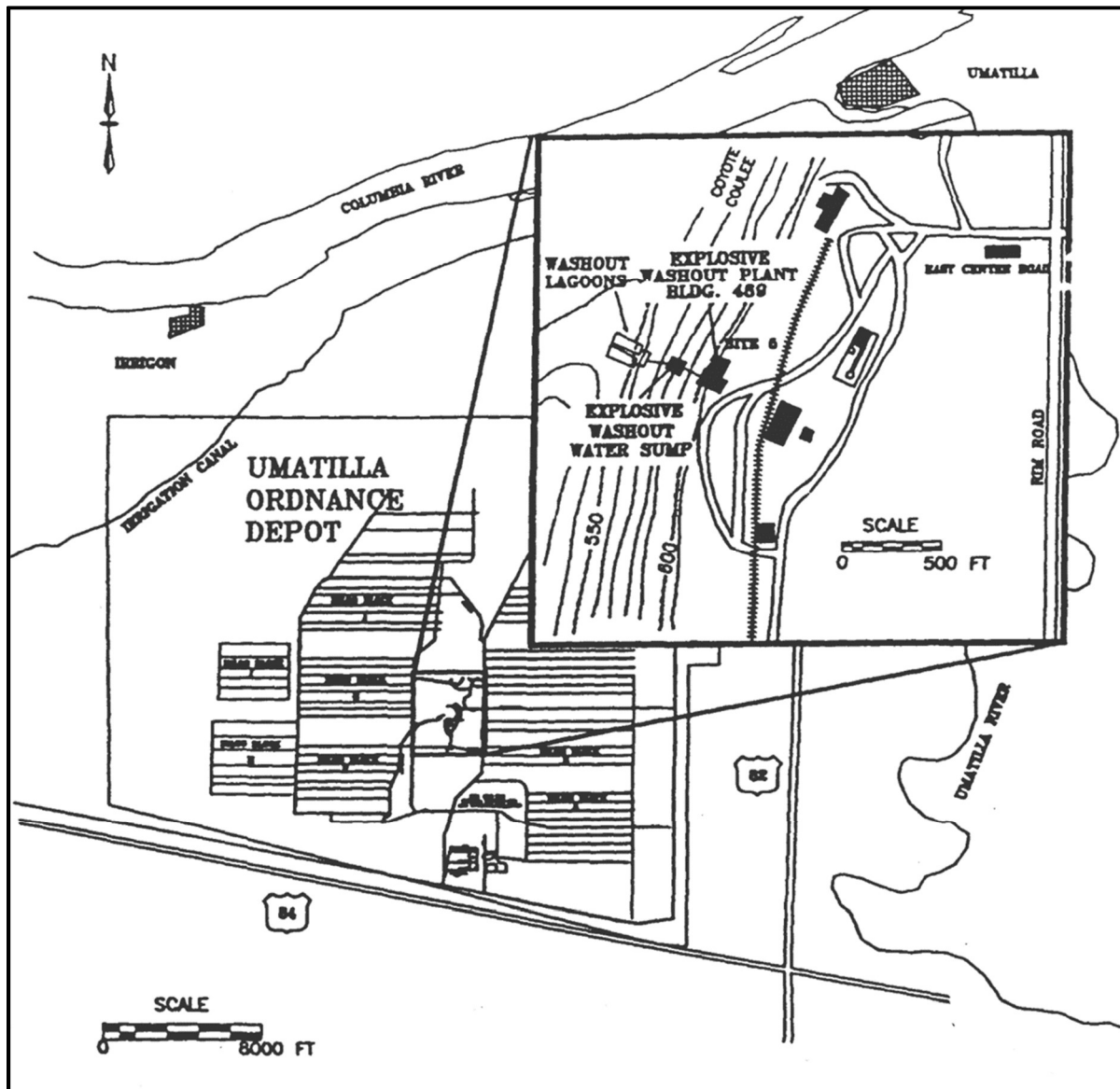


3.3.1 History of OUs Discussed in this FYR:

Explosives Washout Lagoons (EWL) Groundwater OU:

The EWL Groundwater OU addresses contamination in groundwater caused by past waste disposal from the Explosive Washout Plant into the lagoons, plus in-situ flushing of subsurface soils beneath the lagoons for an estimated period of one year. Once the explosive constituents reached groundwater, they formed dissolved-phase contaminant plumes originating beneath the lagoons and dispersing laterally and vertically within the unconfined, alluvial aquifer, primarily due to the advective and dispersive forces acting on groundwater. The RDX plume is estimated as 350 acres, or 15.2 million square feet bounded by an RDX concentration of 1 part per billion. Contaminants of Concern (COCs) identified in groundwater were TNT, TNB, DNB, nitrobenzene (NB), 2,4- dinitrotoluene (2,4-DNT), 2,6-dinitrotoluene (2,6-DNT), 2,4,6-trinitrophenyl-n- methylnitramine (teteryl), RDX, and octahydro-1,3,4,7-tetranitro- 1,3,5,7-tetrazocine (HMX). The most common contaminant was RDX, with concentrations ranging from below detection limit ($< 0.556 \mu\text{g/L}$) along the plume perimeter to $6,816 \mu\text{g/L}$. RDX, the most mobile contaminant, had the largest plume at approximately 350 acres, all of it contained within the UMCD facility boundary (Figure 3). TNT, being more soluble than RDX but having a lower tendency to desorb from soil, had the second largest plume. The EWL groundwater cleanup levels are identified in Table 4 and EWL Groundwater OU Cleanup Levels are further discussed in paragraph 4.2.

Figure 3
EWL Washout Plant and Lagoons



Ammunition Demolition Area (ADA) OU:

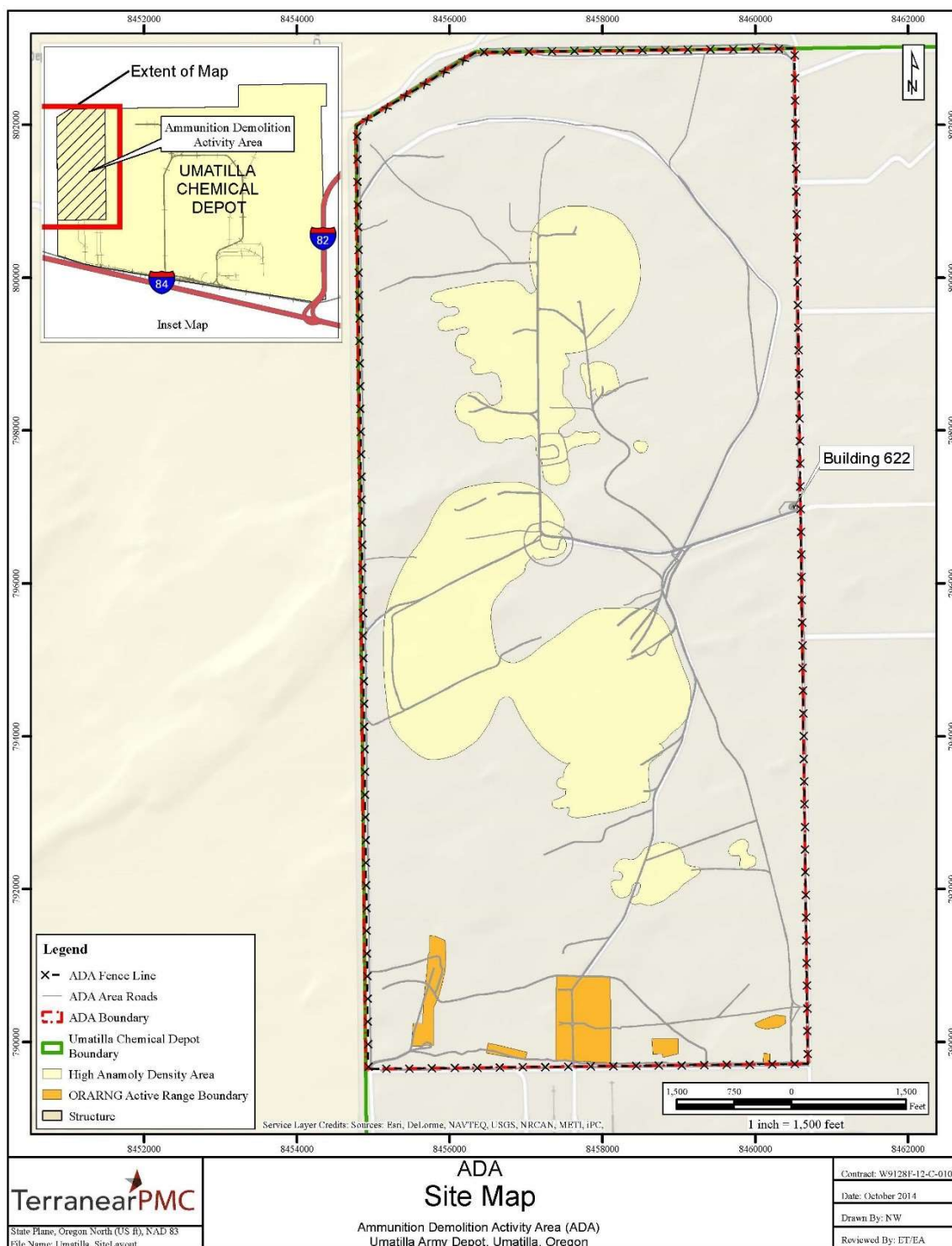
The ADA OU is a 1,750-acre area located in the northwestern part of UMCD (Figure 4) and consists of MEC contamination and soils contaminated with metals and explosives. From 1945 to 1992, the ADA was used by the Army to dispose of ordnance by burning, detonation, or burial. In 1982 the open burn/open detonation (OB/OD) sites 16 and 32 (I and II; also called A and B) were included in the Installation RCRA permit application, which was in interim status. In 1995, the Army and ODEQ agreed that the OB/OD sites would be removed from the RCRA permit application, but the Army was allowed to continue utilizing the OB/OD sites to facilitate cleanup of the ADA in accordance with the 1989 Federal Facilities Agreement (FFA).

MEC discovered at the ADA during investigations includes assorted fuses, primers, boosters,

rockets, mortars, grenades, mines, small-arm rounds, and various other rounds ranging from 20mm high explosives to 90mm projectiles. The larger MEC items and their components that have also been detected at the ADA are 2.75-inch rocket warheads, 81mm mortars, and M1A1 mines. Improved conventional munitions (ICM)/submunitions have been recovered in the past from the ADA; therefore, the ADA is considered an ICM site. The ADA is not a suspected chemical warfare material (CWM) site.

During a 2020 remediation effort, the Army conducted a digital geophysical mapping (DGM) survey of 84 acres on private property adjacent to the 60-foot strip along the west edge of the ADA. There were over 19,000 single point anomalies and 10 acres of concentrated areas identified in the survey. Since MEC is in adjacent Army property, it is assumed that many of these anomalies may be MEC. It was not possible to investigate these anomalies at that time. The Army intends to investigate and clear the adjacent private property pending contracting actions and permission from the property owner.

Figure 4
ADA with High Density Area - 2014



Active Landfill OU:

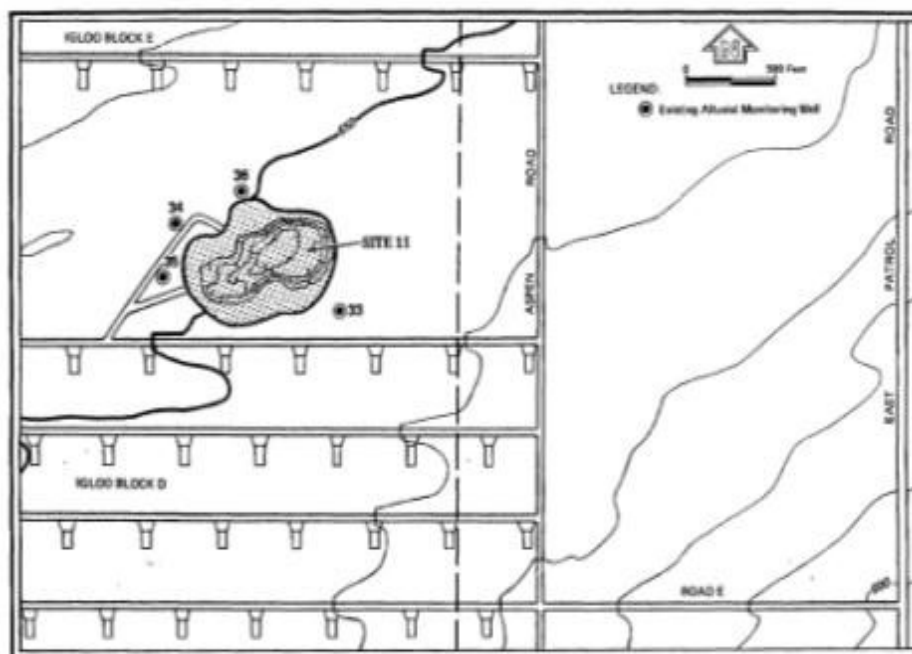
The 17.5-acre Active Landfill OU is located in the northeastern portion of the UMCD, near the eastern border, between UMCD igloo storage blocks D and E-Block (see Figure 5 map). It occupies a former quarry that was operable from 1950 to 1968 when the Installation began using

it for solidwaste. Although known as the Active Landfill (to distinguish it from other disposal areas), this landfill was closed in 1997. The landfill was closed and capped in accordance with RCRA requirements, and a closure permit was issued by the State of Oregon in August 2000. The installed remedy for the site was a cap constructed from bottom to top with the following layers: a general fill of sandy gravel, subgrade preparation (more than four-foot soil to achieve 4 percent slope), a 40-mil High Density Polyethylene (HDPE) geomembrane liner (geotextile layers placed immediately below and above the geomembrane), and a one foot thick layer of vegetative soil placed on top of the geomembrane. This material consists of silty fine sand, containing organic material, from areas immediately adjacent to the landfill, and revegetation (hydro seed, local grasses). The Active Landfill OU closure LUCs included restricted entry and signage placed at the site in 2014, as well as inspections to ensure cap integrity and access restrictions. This OU contained a variety of contamination sources including, but not limited to, explosives sludge and possible ash from the deactivation furnace.

Groundwater monitoring of the landfill was initiated in October 1996 and continued until 2010. The monitoring was to determine if leaching from the landfill was evident and could impact groundwater quality. Monitoring was conducted in accordance with the Environmental Monitoring Plan approved by ODEQ in July 1997 (Army 1997a) and updated and approved in February 2007. With the exception of selenium, the results from the sampling were compared to the Table 1, 2, and 3 values from the Oregon Administrative Rules, Department of Environmental Quality 340 Groundwater Quality Protection (OAR 340-040). For selenium, the results were compared to a risk-based level of 50 ug/L established by the ODEQ Cleanup Department in January 2003 (ODEQ 2003). Selenium exceeded 50 ug/L historically at three wells (11-1, 11-2, MW-34); however, all three of these wells are considered hydraulically side-gradient and not the result of contaminants leaching from the landfill.

The Army sent a letter to ODEQ on March 24, 2011 requesting termination of the solid waste permit no. 320. Attached to it was March 3, 2011 memorandum providing technical argument to terminate the permit consistent with 40 CFR 258.50 (b)(2). ODEQ terminated the Solid Waste Permit No. 320 in an April 12, 2011 letter, at which time groundwater monitoring was terminated. The letter notified the Army that the site was transferred to the ODEQ Environmental Cleanup Program and any outstanding issues at the landfill would be dealt with as part of the overall base closure.

Figure 5
Active Landfill OU Showing Gravel Pit Contours and Monitoring Well Locations



Deactivation Furnace OU:

The Deactivation Furnace OU is located in the southwest corner of the UMCD installation. This OU consisted of two buildings associated with the Deactivation Furnace and the surrounding 8-acre area of soil deemed contaminated due to the settling of air pollution that resulted from operation of the Deactivation Furnace. The Deactivation Furnace operated from the 1950s to November 1988. It was used for the routine incineration of unserviceable or obsolete conventional munitions up to 50 caliber, comprising of Class A and B explosives (reactive wastes such as detonators) and Class C Explosives (non-reactive wastes such as small arms ammunition). During its operation, these munitions were fed into the retort through a conveyor belt system with operating temperatures between 1,200 to 1,500 degrees Fahrenheit. During the first 10 years of operation, exhaust gases were uncontrolled. In 1960, a cyclone and baghouse airpollution control system was installed. This system was then replaced sometime between 1975 and 1980 and was used until the furnace was deactivated in 1988. The residual ash from the baghouse was temporarily stored on site in a RCRA permitted hazardous waste storage facility, and then disposed of offsite at a RCRA permitted hazardous waste disposal facility.

Quality Assurance (QA) Function Range OU:

The QA Function Range is a 640-acre rectangular parcel of land located outside the northern security fence of UMCD. The Army acquired the site for use as a QA function range for various types of conventional weapons. Munitions were function tested from the late 1940s to the mid-1970s. The Army operated a rifle and pistol range (small arms testing area) in the western portion of the site. The Army function-tested munitions in the vicinity of the rifle and pistol range, although specific dates of use are not available. No chemical munitions were tested at the QA function range. The Army determined that MEC potentially existed on approximately 176 acres of the 640-acre site. A release or substantial threat of release of MEC that was possibly present at the site presented a potential for imminent and substantial endangerment to human health, safety,

and welfare, and/or to the environment.

3.4. Initial Response

The Army completed the Initial Installation Assessment in 1980. The EPA RCRA Facility Assessment was later completed in 1987, which led to the NPL Listing in August 1987. Response actions did not occur until after the FFA was signed in October 1989. The OU response actions followed completion of Remedial Investigation/Feasibility Study (RI/FS) reports and ROD signatures in September 1992 through July 1994 (see Table 1, Chronology of Site Events).

3.5. Basis for Taking Remedial Action

Due to historical military-related activities on the site, environmental investigations were conducted in order to identify areas of concern, characterize site conditions, and to define the nature and extent of contamination. The basis for remedial action at this site is CERCLA, the NCP, and EPA policy and guidance, and the process by which UMCD achieves environmental compliance is by the terms of the FFA, signed by the Army, EPA and ODEQ.

The hazardous substances that have been released at UMCD and detected above background levels in each media where background levels are known, based on past investigations, include:

Table 2
Hazardous Substances Detected in Soil at UMCD

Type of Substance	Substance
Metals	Aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, silver, thallium, zinc
Other inorganics	Nitrate/nitrite
Volatile Organic Compounds (VOCs)	Xylenes
Chlorinated VOCs	Trichloroethylene
Explosives	1,3,5-TNB, 2,4,6-TNT, 2,4-DNT, 2,6-DNT, RDX, Tetryl, HMX, nitrobenzene
Pesticides	DDD, DDE, DDT, Dieldrin, Endrin
Other	Cyanide, MEC material

Table 3
Hazardous Substances Detected in Groundwater at UMCD.

Type of Substance	Substance
Metals	Arsenic
Other inorganics	Nitrate
Explosives	TNB, DNB, NB, TNT, 2,4-DNT, 2,6-DNT, HMX, RDX, Tetryl

Elevated levels of selenium have been detected in soil and groundwater, however, there is no evidence to suggest this metal has been released to the environment at UMCD. Elevated selenium concentrations are considered regionally elevated and are not associated with any UMCD landfill release. Selenium has been omitted from inclusion into Tables 2 and/or 3 because its sources are unknown. Additionally, perchlorate has been detected in groundwater at UMCD; however, it is also present regionally. Perchlorate was discussed in detail in the third FYR that addressed why perchlorate was not a COC at UMCD. The status of perchlorate has not changed and therefore will not be discussed in this FYR.

4. Remedial Action

4.1 Regulatory Actions

The CERCLA remedial activities at the UMCD were divided into eight OUs because of the variety of potential contaminants, the types of media contaminated, and the number of discrete sites (Army 1992a). These OUs and their respective ROD dates are listed below. ***Bold italics*** indicate the OUs are discussed in this FYR.

<u>OPERABLE UNIT</u>	<u>ROD DATE</u>
Explosives Washout Lagoons Soils	September 1992
<i>Deactivation Furnace</i>	<i>December 1992</i>
<i>Active Landfill</i>	<i>August 1993</i>
Inactive Landfill	August 1993
<i>Explosives Washout Lagoons Groundwater</i>	<i>July 1994</i>
Explosives Washout Plant	July 1994
<i>ADA</i>	<i>June 1994</i>
Miscellaneous Sites (Except QA Function Range)	July 1994
<i><u>QA Function Range (sub-component of Misc. Sites)</u></i>	<i><u>May 2005</u></i>

4.2 Remedial Action Objectives

The following sections discuss the remedial action objectives at the current active OUs: the EWL Groundwater OU, the ADA OU, and the Active Landfill OU.

Explosives Washout Lagoons Groundwater OU

The objective of the EWL Groundwater OU remediation is to restore the unconfined aquifer to its beneficial use by reducing the concentrations of COCs to the cleanup levels specified in the ROD within 10 to 30 years. Of the explosive compounds found, RDX has the largest plume footprint. The remaining explosives-related contaminants are much less mobile than RDX and have smaller, more localized plumes.

The final ROD for the EWL Groundwater OU was completed in July 1994. The selected remedy was to clean up groundwater contamination using on-site Granular Activated Carbon (GAC) treatment followed by infiltration of the treated groundwater. The Remedial Action Objectives (RAOs) for the EWL Groundwater OU included:

- Eliminate or minimize the potential threat to human health and the environment by preventing exposure to groundwater contaminants.
- Prevent further migration of groundwater contamination beyond its current boundary.
- Restore contaminated groundwater to a level that is protective of human health and the environment, as soon as practicable.
- The EWL Groundwater OU ROD requires cleanup to a level of beneficial use, which may include drinking water or non-domestic uses. The remedial action criteria from the ROD are presented in Table 4.

Table 4
EWL Groundwater OU Cleanup Levels

Contaminant of Concern	Cleanup Level (< g/L)	Basis for Cleanup Level
Trinitrobenzene (TNB)	1.8	Risk-Based
Dinitrobenzene (DNB)	4.0	Risk-Based
Trinitrotoluene (TNT)	2.8	Risk-Based
2,4-dinitrotoluene (DNT)	0.6	PQL
2,6-DNT	1.2	PQL
HMX	350	Health Advisory
RDX	2.1	PQL

PQL – practical quantitation limit. The PQL is the minimum concentration of an analyte (substance) that can be measured with a high degree of confidence that the analyte is present at or above that concentration.

ADA OU

The selected remedy for the ADA OU in the June 1994 ROD addressed soil contamination and MEC clearance. The ROD identified the following remedial actions:

- Clean up chemically contaminated soils
- Remove unexploded ordnance (UXO) items from the ground surface
- Detect and quantify UXO below the ground surface
- Conduct retrieval and treatment of buried UXO to a depth that will allow for the selected land use under BRAC

The remedy for soil contamination was excavation, on-site solidification/ stabilization treatment, and on-site disposal of the treated soils in the UMCD landfill. Soil remediation criteria for the specific metals and explosives contaminants established in the ROD are shown in Table 5.

Table 5
ADA OU Soil Cleanup Levels (ROD and ESD)

Contaminant of Concern	ADA 1994 ROD Cleanup Level (mg/kg)	Basis for Cleanup Level	ADA 2002 ESD Cleanup Level, Site 19E/F(mg/kg)	Basis for Cleanup Level
1,3,5-Trinitrobenzene (TNB)	2.3	Risk-based	25 (a)	Risk-based
TNT	23	Risk-based	49 (b)	Risk-based
2,4-DNT	1.9	Risk-based	2.7 (b)	Risk-based
RDX	52	Risk-based	19 (b)	Risk-based
Antimony	820	Risk-based	N/C	N/C
Arsenic	15	Background	N/C	N/C
Barium	860	Risk-based	3,300 (a)	Risk-based
Beryllium	8.1	Risk-based	N/C	N/C
Cadmium	28	Risk-based	213 (b)	Risk-based

Chromium	40	Background	N/C	N/C
Cobalt	25	Risk-based	N/C	N/C
Lead	500	-	N/C	N/C
Thallium	160	Risk-based	N/C	N/C

N/C: no change

(a) Ecological cleanup goal from the Ecological Risk Assessment

(b) Human Health cleanup goal from the ESD

In 2002 an ESD was completed to revise the defined remedy. The ESD incorporated updated information that revised the contaminants and cleanup levels and changed the treatment/disposal location for Site 19E/F to off-site disposal. A detailed description of the changes brought about by the ESD are as follows:

- Applies to additional quantities of soil (beyond the amounts included in the ROD) from a portion of Site 19 only.
- Specifies excavation of the additional soils from Site 19E/F, off-post treatment by solidification/stabilization, and disposal in an off-post landfill.
- Provides revised cleanup levels to:
 - Incorporate improved future land use knowledge.
 - Reduce the amount of soil going off post.
 - Account for updated risk assessment methodology.
- Update treatment-specific performance requirements for leachate.

Based on historical chemical results from Site 19E/F, the number of contaminants requiring analytical confirmation was reduced from 13 to 6 by removing contaminant not previously detected above the ROD cleanup levels by remedial screening or confirmation sampling.

In addition, site-specific treatment standards from the previous remedial action are incorporated as a leachability performance criterion for Site 19E/F. Table 6 lists the leachability goals for the treated soil from Site 19E/F. Excavated soil meeting the leachability goals did not require treatment and went directly to the appropriate landfill as these leachability goals are less than the corresponding Land Disposal Restrictions for Alternative Soil Treatment Standards (40 CFR 268.49)(Table 7).

Table 6
ESD Leachability Goals for Site 19E/F, ADA OU

Contaminant of Concern	TCLP Leachate Criteria (mg/L)
Barium	100
Cadmium	1
1,3,5-Trinitrobenzene (TNB)	0.18
2,4-Dinitrotoluene (DNT)	0.13
Cyclo-1,3,5-Trimethylene- 2,4,6-	0.2
2,4,6-Trinitrotoluene (TNT)	0.2

After the ESD was finalized, soil remediation was conducted, which included grid establishment and excavation, field screening, and confirmation sampling. Contaminated soil was stockpiled on site for characterization. This soil was subsequently transported off site where it was treated by stabilization/solidification and then disposed at an off-site treatment, storage, and disposal

facility. The final inspection for the completed soils remedial action was completed in October 2002.

Table 7
Treated Soil Remediation Criteria for Landfill Disposal, ADA OU

Contaminant of Concern	TCLP Leachate Criteria (mg/L)
Antimony	1.0
Arsenic	5
Barium	100
Beryllium	0.1
Cadmium	1
Chromium	100
Copper	140
Lead	5
Nickel	10
Silver	5
Zinc	1100
TNB	0.18
2,4-DNT	0.13
RDX	0.2
TNT	0.2
HMX	40

4.3 Remedy Implementation

The following sections discuss the remedy implementation activities at the current active OUs.

Explosives Washout Lagoons Groundwater OU:

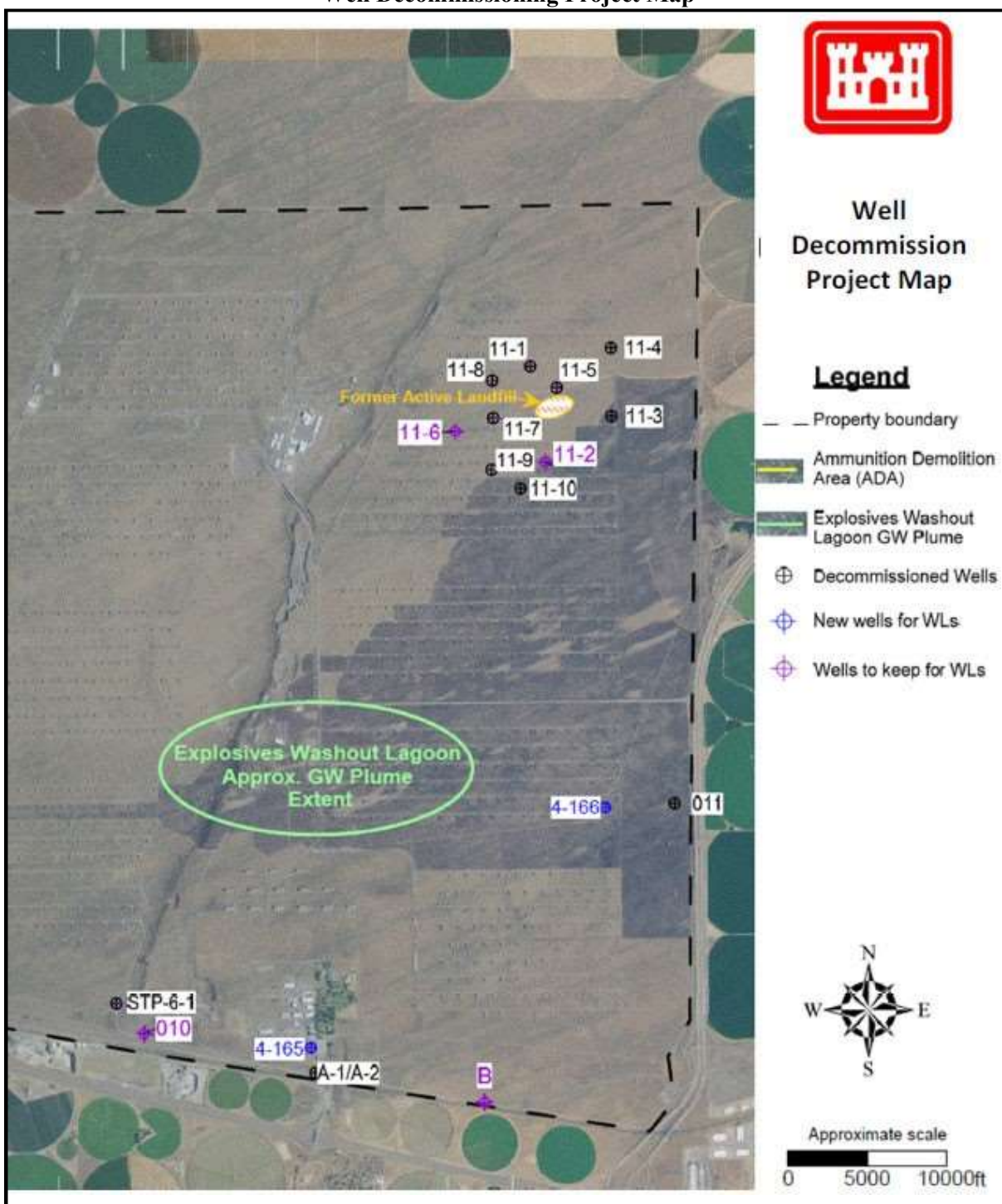
Beginning in 1995, the extraction and treatment system was constructed consisting of three extraction wells with a combined flow of 1,300 gpm, a treatment plant with four 20,000-pound GAC filters, three infiltration fields in addition to the original EWL and ancillary piping. Initial start-up of the system occurred in 1996 and full-time operation began in January 1997. Initially, all treated groundwater was absorbed onto the unsaturated soil underlying the EWL. The soil flushing component of the remedy was completed in 2000. Since that time, all treated groundwater has been discharged to two active down-gradient infiltration fields (IF-2 and IF-3) that reintroduce the treated water back into the aquifer. Spent GAC has been periodically sent off-site for thermal regeneration once it has reached its absorptive capacity.

From 1996 to December 2008, approximately 13,128 pounds of explosives were removed by the treatment system. As predicted, the rate of removal of explosives from treated groundwater steadily decreased over time, as the reduced mass of explosives in the subsurface has led to reduced mass extraction efficiencies.

Remedial action groundwater monitoring for explosives has been conducted at the EWL Groundwater OU routinely since January 1997. In October 2005, monitoring frequency was

reduced from quarterly (with a subset of wells sampled either semi-annually or annually) to semi-annually for all wells. Some of the UMCD monitoring wells are over 30 years old. BRAC requested USACE to address decommissioning wells in the property leaving Army control. A total of 11 wells were removed. Two were removed from areas slated for development and were replaced with wells in the ORARNG (south edge of UMCD) area and the Wildlife Refuge area (east edge of UMCD). Eight were in the Active Landfill area and one along the south edge of UMCD. Locations of well removal, installation, and function are illustrated in Figure 6. There are currently 29 monitoring wells in the chemical monitoring program and 57 in the groundwater level monitoring program. The details of the sample results are presented in the Annual Groundwater Sampling Report. A discussion of the sampling results for this FYR is in paragraph 6.5, *Data Review*.

Figure 6
Well Decommissioning Project Map



In 2009, the groundwater extraction and treatment system briefly operated in a pulse-pumping mode to evaluate this operational method. Pulse-pumping was discontinued in August 2009 due to marginal results. Following the 2009 pulse-pumping operational evaluation, and as described in the Final Focused Feasibility Study (FFS) for Groundwater at the EWL (Army 2011), the

groundwater extraction system was expanded between October 2012 to August 2013 for bioremediation and system optimization. This included the installation of two new extraction wells, EW-5 and EW-6, which were tied into the existing system. The goal of the expansion was to optimize the extraction and treatment system to capture the remaining high-concentration portion of the RDX and TNT plumes. To that end, EW-5 was located approximately 900 feet northwest of the treatment plant, beyond the effective capture zones of EW-3 and EW-1. EW-6 was located approximately 2,300 feet east-northeast of the treatment plant, in what has been referred to as the RDX plume's eastern lobe. Six additional monitoring wells and one investigation well (IW-7) for bioremediation testing were installed at the time of the system expansion and optimization. Wells EW-5, EW-6, and IW-7 were tested, with water treated by the plant's GAC, for three weeks in April 2013.

The Lagoon Amendment Pilot Project (LAPP) was an in-situ bioremediation testing that involved injecting bioremediation substrate-amended site groundwater through the source area soil to the aquifer using the existing lagoon infiltration gallery. Five LAPP tests were conducted between 2011 and 2013. In June 2016, LAPP Test 6 occurred. This in-situ bioremediation test is not part of the selected remedy for the EWL Groundwater OU.

Aside from maintenance and repair, the groundwater extraction and treatment system (GETS) operated continuously during this FYR period. As of late 2013, the entire extraction and treatment capacity was being used to remedy the eastern lobe. EW-4 and EW-6 operation averaged 660 gpm and 570 gpm, respectively. EW-5 was initially tested in August 2018 and began operating at 200 gpm in October 2018. All treated groundwater from the GETS was discharged back into the subsurface through IF-2 and IF-3. The effectiveness of EW-4 and EW-6 extraction and treatment to reduce RDX concentrations in the eastern lobe are readily apparent and explained in further detail in paragraph 6.5. RDX is the only contaminant above its remedial action objective in the eastern lobe.

Remedial efforts continue to show decrease contamination throughout the EWL site to meet requirements as stipulated in the ROD. Total estimated explosives mass removed from groundwater via the GETS since start of operation is 13,257 pounds as of January 2019.

Figure 7
Treatment System Layout

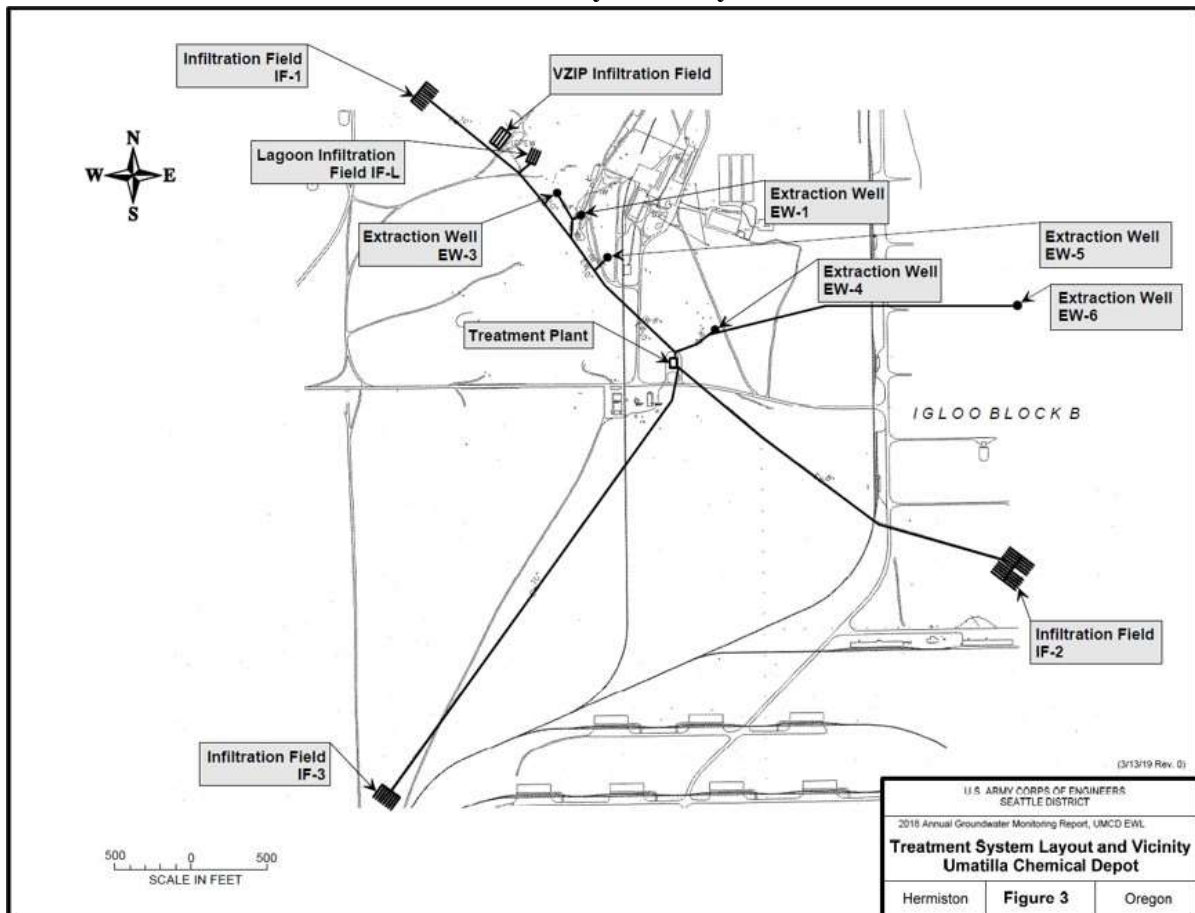
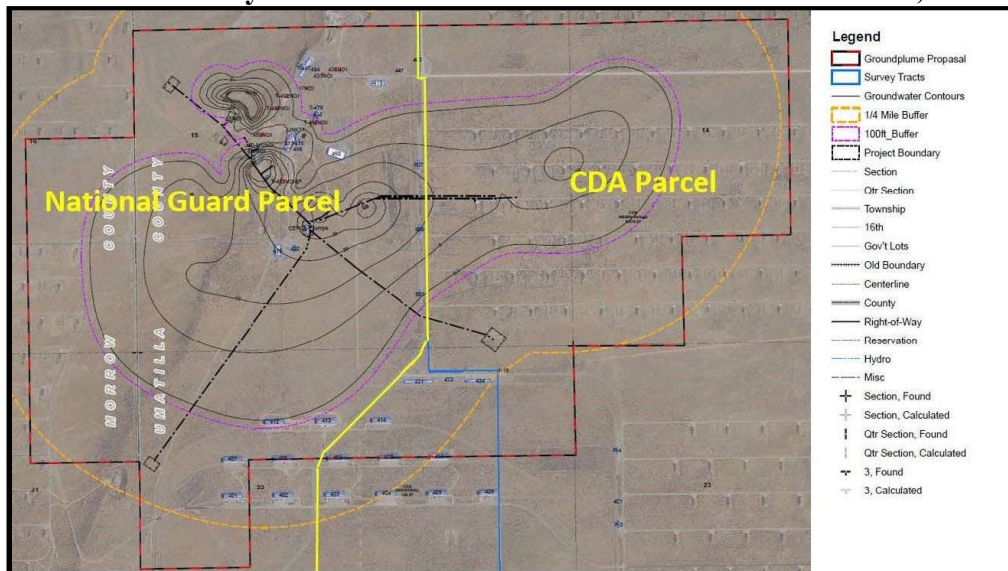


Figure 8
Groundwater System with National Guard and CDA Boundaries, 2016



ADA OU:

The selected remedy for the ADA OU in the June 1994 ROD addressed soil contamination and MEC clearance. The ROD identified the following remedial actions:

- Clean up chemically contaminated soils
- Remove unexploded ordnance (UXO) items from the ground surface
- Detect and quantify UXO below the ground surface
- Conduct retrieval and treatment of buried UXO to a depth that will allow for the selected land use under BRAC

ADA OU Soil Remediation: The ADA Sites that required soil remediation were 15, 17, 19, 31, and 32. This included MEC removal during excavation as necessary to permit safe excavation and access. The contract for the remedial construction was awarded in September 1995, and the fieldwork was conducted between June 1996, and August 1997. During the course of the remedial construction, additional areas of contaminated soil (beyond the quantities identified in the ROD) were identified near the two burn trenches (Site 19E/F). Some of the additional soils were excavated, treated, and disposed in the Active Landfill under the original remedial action contract.

Subsequent field investigations were performed to characterize the extent of the additional contamination, and provide information required for evaluation of additional remedial action for the soils at Site 19E/F. In the intervening time, the Active Landfill at UMCD had been closed, making it impossible to follow the provisions of the ROD to dispose of the soils in the Active Landfill, thus forcing selection of a revised remedy.

The revised remedy was defined in a 2002 ESD. The ESD incorporated updated information that revised the contaminants and cleanup levels and changed the treatment/disposal location for Site 19E/F to offsite disposal. A detailed description of the changes brought about by the ESD are as follows:

- Applies to additional quantities of soil (beyond the amounts included in the ROD) from a portion of Site 19 only.
- Specifies excavation of the additional soils from Site 19E/F, off-post treatment by solidification/stabilization, and disposal in an off-post landfill.
- Provides revised cleanup levels to:
 - Incorporate improved future land use knowledge.
 - Reduce the amount of soil going off post.
 - Account for updated risk assessment methodology.
- Update treatment-specific performance requirements for leachate.
- Based on historical chemical results from Site 19E/F, the number of contaminants requiring analytical confirmation was reduced from 13 to 6 by removing contaminants not previously detected above the ROD cleanup levels by remedial screening or confirmation sampling.

ADA OU MEC Remediation:

In addition to soil remediation, the ADA OU ROD requires:

- Removal of munitions debris from the ground surface
- Detect and quantify munitions debris below the ground surface
- Conduct retrieval and treatment of buried munitions debris to a depth that will allow for the selected land use after closure

The Remedial Design/Remedial Action (RD/RA) phases were contracted in September 2012 with the intention of completing all ROD requirements. The contractor began field clearance work in 2014 and completed a DGM survey in 2014. Based on the results of the survey, the contractor believed the 355-acre high-density area was more saturated with metallic debris than was originally anticipated and stated they could not complete the RA objectives within the funding of the contract. The contract was partially terminated for convenience in March 2015 without completion of all tasks.

As a result of the schedule slippage, the Army received a Notice of Violation (NOV) from EPA. In response to the NOV, a Settlement Agreement was made by and between the Army, ODEQ, and the EPA in July 2016. In agreement with the regulators and as defined in the Settlement Agreement, clearance of MEC is to three (3) feet below ground surface and all pits and trenches to depth. In addition to completion of the 355-acre High Density Area (HDA) and the small arms ranges, the Army will also investigate and clear 13 acres between the west fence line and the property boundary. The Army also intends to investigate and clear the adjacent private property.

In response to the 2016 Settlement Agreement with EPA, the Army revised the RD/RA Uniform Federal Program for Quality Assurance Project Plan (UFP-QAPP) and completed a Final Remedial Action Report. In July 2016, an updated RD/RA UFP-QAPP was approved and contained the following remediation objectives:

- In the HDA, clear MEC to three feet below the original ground surface of all MEC and metallic debris greater in size than a 20-millimeter projectile
- Clear disposal pits/trenches to depth
- Clear the approximate 13-acre area between the western fence-line to the west property boundary to three feet below ground surface
- Reacquire, interrogate, and resolve targets identified by previously collected geophysical data to a depth of three feet below ground surface within the four ORARNG active small arms ranges.

Since 2016, clearance activities have continued to address subsurface anomalies, including MEC identified within the 355-acre HDA. UXO clearance included geophysical mapping and munitions clearance to three feet and to depth for pits and trenches. The amount of MEC and contaminated soil has greatly exceeded the original estimates needed to complete remediation. Table 8 below compares estimates used for the contract award and actual values as of December 2019.

Table 8
Comparison of Original Estimates to Current

Actions	Original Estimate	Complete as of December 2019
Area scraped, 1 st scrape	355 acres	351.5 acres
Area re-scraped, 2 nd scrape	0	199.8 acres
Material Screened	250,000 cubic yards	1,033,720 cubic yards
DGM targets investigated	13,000	19,341
Remove Hazardous soil	250 tons	20,914 tons

A list of the most common recovered MEC is below in Table 9. In addition, more than five million pounds of material documented as safe (MDAS) has been moved off-site and recycled. Figures depicting the progress of remedial actions at the ADA are presented in Appendix B. As of December 2019, less than 200 acres of the 355-acre HDA have been completed. Current funding limitations will not allow for the additional work required to complete remediation. The Army will continue to budget for the funds and will award another contract as funds become available.

Table 9
Abbreviated List of Recovered MEC Items in the ADA

MEC ITEM NOMENCLATURE	TOTAL
2.75in Rocket Warhead, Practice, MK 61	115
20mm HE Projectile	71,443
20mm HEI, M97 Projectile	337
37mm HE-T, SD, M54 Projectile	17,151
40mm Projectile, HE, MK 2	229
76mm WP, M64	449
90mm Projectile, HE, M71	413
Bulk HE	519
Fuze Component	2448
Fuze Component, Bomb, M14	1366
Fuze Component, Bomb, M16	846
Fuze, BD, M404A1	1183
Fuze, BD, M58	262
Fuze, BD, M62	535
Fuze, BD, M66A1	2117
Fuze, BD, M72	3035
Fuze, BD, MK 166	1210
Fuze, from Rifle Grenade, M9A1	1666
Fuze, MT, M565	1503
Fuze, PD, M56	23,028

Fuze, PD, M48 series	914
Fuze, PD, M51 series	1473
Powder Actuated Cutter, M2A1	2938

The west side of the ADA is bound by a chain-link fence. The actual Army property boundary is approximately 60 feet beyond the fence. The 28.07-acre strip runs along the entire western edge, the northwest diagonal, and the northern strip. This area consists of open desert grassland with some encroachment by the neighboring farmer. While it was not included in the original ADA ROD, the Army is investigating this area for potential MEC as part of the ADA remediation project.

Additionally, MEC is present to the west of the ADA on private property. The Army has budgeted for the additional funds to define the extent of MEC and remediate the private property. The Army intends to complete remediation by December 2024. The portion of the ADA that is under control of the ORARNG encompasses the firing range and the SDZ. It is fenced and access is controlled. The 60-foot strip west of the firing range fence is not fenced. The adjacent property owner has been notified of the risk of MEC and been directed not to trespass. Additionally, the two companies that have communication fiber in this area have been notified not to access it until remediation is complete. The Army has notified the private property owner that there is also a risk of MEC on their property.

Active Landfill OU:

The Active Landfill OU ROD was finalized in March 1993. The ROD selected "No Action" as the remedy for the Active Landfill OU. This selection was based on information generated during the RI, which indicated that it did not pose an unacceptable threat to human health and/or the environment. In 1997 the Active Landfill was closed and capped in accordance with RCRA requirements, and a closure permit was issued by the State of Oregon in August 2000. The remedy for the site was a cap constructed with the following layers from bottom to top is as follows: a general fill of sandy gravel, subgrade preparation (more than four-foot soil to achieve 4 percent slope), a 40-mil HDPE geomembrane liner (geotextile layers placed immediately below and above the geomembrane), and a one foot thick layer of vegetative soil placed on top of the geomembrane. This material consists of silty fine sand, containing organic material, from areas immediately adjacent to the landfill, and revegetation (hydroseed, local grasses).

On August 12, 2011, the ODEQ Solid Waste Program terminated the Solid Waste Permit No. 320 for the Active Landfill. At that time, they transferred the site to their Environmental Cleanup Program and any substantive solid waste rule requirements would be dealt with as part of the overall base closure. This process would include land use restriction related to the landfill, to be implemented when the land is transferred out of Federal ownership.

Post-closure requirements required groundwater sampling to continue for four years after closure if no evidence of a release has been detected, and for the monitoring well network to be maintained for 10 years after the date of closure. The groundwater monitoring was implemented at all 12 landfill wells for selenium, total dissolved solids. Five of the 12 wells, which were used for Oregon's solid waste landfill permit compliance, also had sampling

requirements for anions and cations, total metals, and volatile organic compounds. The Monitoring wells were sampled quarterly until January 2004, then semi-annually up until the last sampling round was conducted in November 2010. The last sampling results indicated exceedances of water quality criteria for nitrate, selenium, and total dissolved solids (TDS) at one well. These parameters are national secondary drinking water criteria (Secondary drinking water regulations are considered to pose less health risk than a primary COCs). Selenium and TDS were not elevated at sampled down gradient wells, only at cross-gradient and up-gradient wells. Nitrate concentrations exceeded the applicable standards in most permit-required compliance wells, as they have during the entire record of monitoring. Elevated nitrate and selenium concentrations are considered regionally elevated and are not associated with any landfill release. Groundwater monitoring was terminated when the permit was closed in 2011. In 2014 and 2019 eight wells were decommissioned near the landfill leaving wells 11-2 and 11-6 for future sampling, if needed.

Deactivation Furnace OU:

The Deactivation Furnace ROD specified a lead clean-up level of 500 mg/kg as acceptable for the residential land use. Cleanup of the Deactivation Furnace OU soils was implemented accordingly. The standards for lead contamination under a residential re-use scenario have since become more stringent and the 500 mg/kg cleanup goal no longer supports a UU/UE standard. That clean-up level is considered protective of industrial, but not for residential use. An ESD was signed in January 2021 to acknowledge that the lead cleanup level in the ROD will be protective of industrial, but not residential use. Accordingly, the ESD revises the reasonably expected future use exposure scenario from residential to industrial. The ESD revises the exposure scenario resulting in LUCs to protect against residential use. As a result, remediation of the Deactivation Furnace OU to cleanup levels required by the ROD will remain protective of the environment and human health if land use is restricted to industrial activities. The LUCs prohibit residential use to achieve that restriction. The LUCs will include deed notifications and the recording of an EES.

QA Function Range OU:

From the 1940s to the mid-1970s, the Army tested munitions within 259 acres of the 635.68-acre QA Function Range. During a remedial action performed in 2008 and 2009 the Army removed MEC from the 259-acre parcel. The 2005 ROD defined the selected remedy and remedial objectives of the QA Function Range. The 259-acres area included MEC clearance to a depth of two feet for the Rifle Range Area and Test Pit Area and for the Test Pad Area to be cleared to a depth of six. The remedy also required the soil around the three former QA function test pads with high-density geophysical anomalies to be sifted to a depth of two feet.

With respect to the remaining 376.68 acres of Site 39, the Army and EPA determined that no further action was necessary for investigation and clearance. LUCs are needed to restrict uses in the 259-acre MEC parcel, as well as a LUC notice for the remaining 376.68-acres section, as it is adjacent to property which contained MEC items. The LUCs will include deed notifications and the recording of an EES.

4.4 Institutional Controls

EWL Groundwater OU:

Institutional controls were established in the EWL ROD that restricted access to the contaminated aquifer, the contaminated groundwater, the remediation equipment, and the interconnecting piping of the treatment system. The legal restrictions, as specified in the ROD, have the following components:

- Restrict access to the site to prevent direct human exposure to contaminants.
- Land use restriction on the site to prevent future residential development where contaminants in the groundwater are at concentrations greater than the groundwater cleanup levels.
- Restriction on the installation of new water wells in the contaminated portion of the alluvial aquifer or the basalt layers underlying the contamination. The use of any existing wells would also be banned within the area of contamination.

The Guard has an Order and Agreement for the Maintenance of Institutional Controls between ODEQ and the OMD, signed April 2021. It provides ODEQ enforcement action for the institutional controls on the Guard property. The Army property manages institutional controls through the Land Use Control Implementation Plan (LUCIP). The EES is the enforceable document for the property leaving Army control.

ADA OU:

The majority of the ADA is within the ORARNG firing range and associated SDZ for the range. The site is fenced, and access is controlled by the Installation manager. Guard personnel are only allowed access to the firing range areas. The Guard's Order and Agreement between ODEQ and the OMD provides ODEQ enforcement action for the institutional controls on the Guard property. Additionally, LUCs restricting groundwater usage is documented in the Order and Agreement.

The Army intends to complete remediation of the portion west of the western fence in 2024 to UU/UE. The 60-foot strip of Army property west of the firing range fence is not fenced. The adjacent property owner has been notified of the risk of MEC and has been directed not to trespass. Additionally, the two companies that have communication fiber in this area have been notified not to access it until remediation is complete. The Army has notified the private property owner that there is also a risk of MEC on their property and has obtained a right of entry to complete remediation. The property owner has been notified, and the Army is working to address any off-post exposure to MEC.

Active Landfill:

LUCs were not originally a component of the remedy, but are now being required under an ESD dated January 2021, which restricts the disturbance and integrity of the landfill cap. The ESD requires LUCs that prohibit excavation of any kind (i.e., digging, drilling, or any other excavation or disturbance of the land surface or subsurface) and changes the remedy for the Active Landfill OU from "No Action" to "No Further Action with Land Use Controls." Upon transfer out of Army control, the LUCs are documented with deed restrictions and an EES.

Deactivation Furnace:

An ESD dated January 2021 revises the lead exposure scenario resulting in LUCs to protect against residential use. As a result, remediation of the Deactivation Furnace OU to cleanup levels required by the ROD will remain protective of the environment and human health if landuse is restricted to industrial activities. LUCs which prohibit residential use will be used to achieve that restriction. Upon transfer out of Army control the LUCs will be recorded with deed restrictions and an EES.

QA Function Range:

Per the 2021 MFR only the following uses are appropriate for the MEC remediated 259-acre parcel of QA Function Range:

- Agricultural use and incidental residential use (e.g., farmhouse and barns/utility buildings)
- Limited recreational use (e.g., hiking and hunting)
- Shall not be used for residential use other than residential use incidental to agricultural use

LUCs are needed to restrict uses in the 259-acre MEC parcel, as well as a LUC notice for the remaining 376.68-acres section, as it is adjacent to property which contained MEC items. The LUCs will include deed notifications and the recording of an EES.

Prior to any tenancy, occupation or use of QA Function Range, the Owner shall also inform the lessee, tenant, occupant, or user of this notice. If the Owner should become aware of any item that is suspected MEC on QA Function Range or anywhere else on the Property, the Owner shall immediately stop any intrusive or ground-disturbing work in the area or in any adjacent areas and shall not attempt to disturb, remove or destroy the suspected MEC. The owner shall immediately notify the Umatilla County Sheriff, so that appropriate explosive ordnance disposal personnel can be dispatched to address such suspected MEC. The Owner shall further inform each lessee, tenant, occupant or user of QA Function Range shall immediately notify the owner of any suspected MEC. Upon transfer out of Army control, the LUCs will be recorded with deed restrictions and an EES.

4.5 Systems Operations & Maintenance

EWL Groundwater OU:

The GETS was operational during this FYR period. In 2014, only extraction well EW-6 was operational, so as to target the eastern plume, which was located in an area leaving Army control. In 2015, the treatment system operated intermittently due to high pressure differentials in the GAC vessels and extraction pump failures. The GAC in the vessels were replaced and the pumps were either repaired or replaced. From mid-2016 through 2017, extraction wells EW-4 and EW-6 and the treatment system were operating normally. In 2018, extraction well EW-5 was updated and pumping from this well began in October 2018. The following table presents the average yearly flow rates for each extraction well within the FYR period.

Table 10
Average Yearly Flow Rates GPM

	2015*	2016	2017	2018	2019
EW-4	750	525	480	660	680
EW-5	300	-	-	220	100
EW-6	700	650	620	570	620
TOTAL	-	1,175	1,100	1,470	1,400

*In 2015, EW-4, EW-5, EW-6 were intermittently operating due to various pump failures and treatment system issues; the flow rates are average rates when pumps were operational. The total flow rate is not cumulative, as not all the well pumps were operational at the same time.

The treatment system is removing COCs from groundwater as evident by the reduction in the plume (See Figures 9 and 12). Plant process water is sampled at startup and monthly during continuous operations from the influent, midpoint between each GAC bank, and effluent. When the RDX concentration at the mid-GAC location exceeds 25 percent of the influent concentration, the mid-GAC and effluent sampling locations are sampled weekly until the mid-GAC sample exceeds 50 percent of the influent. When this occurs, the plant process water is sampled three times a week and analyzed by the colorimetric method for RDX at the mid-GAC and affluent sampling locations until color is detected in the effluent location. At this point, the plant is shut down for a GAC change-out event. The following table presents the volume of contaminated water treated.

Table 11
Volume of Contaminated Water Treated

Year	Million Gallons
2014	336
2015	210
2016	432
2017	555
2018	568
2019	718

Over the FYR period of this FYR, the average annual costs for operations and maintenance (O&M) at the EWL OU was \$375,432 and \$132,000 for biannual well sampling and annual reporting.

ADA OU:

Maintenance is minimal for the ADA OU and includes LUCs such as fencing and signage.

Active Landfill OU:

Groundwater monitoring at the Active Landfill OU ended in November 2010. The Landfill cap is annually inspected and during the FYR to ensure that it remains intact and in acceptable condition.

Deactivation Furnace OU:

Maintenance is not required for this OU.

QA Function Range:

Maintenance is not required for this OU.

5. *Progress Since the Last Five-Year Review*

5.1 *Protectiveness Statements from Last Review*

The protectiveness statements from the previous (fourth) FYR for each operable unit are provided below.

EWL Groundwater OU from the 2015 FYR:

The remedy at the EWL currently protects human health and the environment because land use controls and past remedies have reduced exposures to acceptable levels; no exposure pathways are complete. However, in order for the remedy to be protective in the long-term the following actions need to be taken: optimization of the EWL groundwater remedy to achieve the cleanup objectives to ensure protectiveness.

ADA OU from the 2015 FYR:

The remedy at the ADA OU is protective of human health and the environment because controls are in place to prevent exposure to the remaining subsurface MEC. However, in order for the remedy to be protective in the long term, the following actions need to be taken: follow up remedial actions required for future land use, and a groundwater study of arsenic to determine if the arsenic is related to releases from activities on the ADA and, if so, what land use controls are required to ensure protectiveness

Active Landfill OU from the 2015 FYR:

The remedy at the Active Landfill is protective of human health and the environment. The remedial action criteria have been achieved for all COCs except selenium. Selenium is a COC known to exist in the soils at Umatilla, and it has a regionally elevated background concentration in groundwater.

Deactivation Furnace OU:

A protectiveness statement was not completed for the QA function range, as this site was not addressed in the 2015 FYR.

QA Function Range OU:

A protectiveness statement was not completed for the Deactivation Furnace, as this site was not addressed in the 2015 FYR.

5.2 Status of Recommendations and Follow-up Actions from Last Review

Table 12
Status of Recommendations from the Last Five-Year Review

Issues from Previous Review	Recommendations/ Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Outcome
EWL Groundwater OU				
1. Concentrations of TNT and RDX at the EWL Groundwater OU are still above the RAOs.	Protectiveness of the remedy has been maintained by the installation and operation of a new extraction well, EW-6, in the eastern extent of the RDX contaminant plume. 1. Continue operation of this well at the maximum extraction rate, and operate extraction well EW-4 to utilize remaining treatment capacity 2. Evaluate the need for and effectiveness of an additional extraction well in the southwest extent of the RDX contaminant plume. 3. Aerobic bio-augmentation has been demonstrated to be an effective method for remediation of the limited contaminant plume area that may remain after additional groundwater extraction and treatment. The Guard is working on a FFS to pursue bioremediation. Prepare proposed plan and if appropriate following public comment, prepare a supplemental record of decision identifying bioremediation as a contingent remedy.	Army	1. Current 2. 06/2016 3. 01/2019	1. The cleanup effort has been focused on the eastern plume. EW-6 has been used to its capacity and supplemented with EW-4 to achieve maximum optimization of the GETS. EW-6 capacity diminishes in late summer; therefore, EW-5 has been brought on-line. Outcome: eastern lobe groundwater contamination has diminished significantly and is approaching ROD cleanup goals. 2. A FFS draft investigating bio-augmentation is in review. If feasible the Guard will take the next steps for approval and implementation.
ADA OU				
		Army	2020	

Issues from Previous Review	Recommendations/ Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Outcome
2. Arsenic concentrations may be above maximum contaminant levels (MCL) at the ADA OU, as EPA lowered the arsenic drinking water MCL to 10 ug/L.	EPA has asked for evaluation of the groundwater conditions in the ADA in the 2010 FYR. BRAC and USACE proposed evaluation of well conditions, distribution in the aquifer, and the historic analytical data before proceeding with resampling of ADA groundwater			38 wells were sampled in 2017, with arsenic ranging from 8.67 µg/L to 40.2 µg/L. All are above the MCL except one. LUCs are documented in the Order and Agreement between OMD and ODEQ. See further discussion in ADA portion in paragraph 6.5.

6 Five-Year Review Process

6.1 Administrative Components

The review team consisted of personnel from the Army's on-site BRAC Environmental Coordinator (BEC), Michele Lanigan, and USACE personnel, Marlowe Laubach, Justin McNabb, Sara Benovic, Alison Burcham, Joe Marsh, Dan Carlson.

6.2 Community Involvement

The FYR report will be made available to the public once it has been finalized. Copies of this document will be placed in the Hermiston Public Library. Upon completion of the FYR, a public notice will be placed in local newspapers (for example, East Oregonian, Hermiston Herald) to announce the availability of the final FYR report in the Site document repository.

6.3 Document Review

This FYR consisted of a review of relevant documents including past investigation and monitoring data. Current cleanup standards and guidance were also reviewed. Documents reviewed for this FYR are listed in Section 10.

6.4 Site Inspection

A site inspection was conducted November 21, 2019, with USACE and BRAC Division personnel. A summary of the Site inspection is presented in the following paragraph. The full site inspection trip report is presented in Appendix D. Participants included Alison Burcham, Joe Marsh and Dan Carlson from the USACE Seattle District; Michele Lanigan, the on-site BEC; and Lewis Kovarik of the USACE Omaha District. The site visit and inspection included a site debriefing with the on-site BEC, and a visual inspection of all three active OUs. Inspection personnel drove to the various areas of the site where the OUs are located and performed an on-ground visual inspection of the areas. A summary of the Site inspection for each OU is detailed below.

EWL Groundwater OU:

The site inspection of the EWL Groundwater OU treatment system and associated infiltration area did not yield any notable observations. Both the infiltration field and the washout lagoons appeared to be dry. Wells that were included in the inspection appeared to be in acceptable condition. The GETS building, located adjacent to the EWL area was also visited during the inspection. The building appeared to be in good condition, though an exterior gutter leak was noted to be dripping directly onto a valve associated with the GAC treatment system.

ADA OU:

This area had active site work at the time of the inspection with contractors performing munitions clearance as a part of the UXO clearance investigations. As such, this area was not accessible to the personnel performing the site visit due to safety concerns.

Active Landfill OU:

During the site inspection, it was noted that a sign on the southern portion of the landfill had fallen. Animal burrows and distressed, black vegetation were observed in the cap. Photos of the active landfill area are included in the full site inspection report.

Deactivation Furnace OU:

The site inspection did not yield any notable observations.

QA Function Range OU:

The site inspection did not yield any notable observations.

6.5 Data Review

The data review considered Groundwater OU hydrology and groundwater chemistry, the ADA soil and groundwater, and the soil from the Deactivation Furnace. The QA Function Range OU will not be discussed, as it was closed in 2005 and no additional data collection has occurred since the last FYR. The closed Active Landfill OU will not be discussed as it was closed in 1997 and groundwater sampling was terminated in 2010 and no new data has been collected since the last FYR.

EWL Groundwater OU:

During the previous FYR period the extraction wells were offline for LAPP testing and the GETS expansion. As of late 2013, EW-4 and EW-6, and the entire extraction and treatment capacity were used to remedy the eastern lobe. EW-4 and EW-6 operation averaged 660 gpm and 570 gpm, respectively. EW-5 was initially tested in August 2018 and began partial operation (if EW-4 or -6 were off-line) in October 2018 at 200 gpm. A trend analysis was performed on the full data set collected in 20 randomly selected wells out of 66 (30 percent) across the plume.

RDX is used as the indicator species for all the COCs in the groundwater for the EWL OU because it is the most mobile contaminant and had the largest original plume. Wells that have not been sampled in the past 5 years were not considered for analysis. The wells were randomly selected using the freeware program R Sample command on a list of all the wells. This random sample was well distributed across the plume and EWL Groundwater OU. However, only some of the wells sampled relate to the performance of the remedy which targeted the eastern plume.

The remainder, which are primarily in the main plume area, lie outside the influence of EW-4 and EW-6.

The sample wells can be divided into the main part of the plume, the east plume (focus of the remedy during this review period), and the peripheral areas. Table 13 summarizes the well sampling results.

Table 13
Well Sample Results RDX (µg/L)

Area	Well #	Location	Begin	End
Main Part of Plume	006	Northwest	0.6	20.0
	4-1	Center	62.0	30.4
	4-5	Southeast of EW-4	13.0	0.3
	4-105	Northwest of EW-4	15.0	16.0
	4-126	Near EW-5	81.0	22.3
	4-128	Near IW-7	33.0	0.3
	4-136	Center	73.0	49.8
	4-148	Northwest edge	0.2	1.6
	47-1	Northeast of main plume	0.8	0.4
	IW-7	Central part of plume	0.1	0.2
	WO-23	Northwest	78.0	75.0
	WO-24	Northwest edge	90.0	0.7
Eastern Plume	4-6	East of EW-4	74.0	2.0
	4-24	South	0.57	0.4
	4-25	Near EW-6	21.0	0.3
	4-124	Near EW-6	3.8	0.2
	EW-6	Eastern Lobe	12.0	1.3
Peripheral Areas	008	Southwest edge	10.0	7.0
	4-3	Southwest lobe	15.0	15.2
	4-116	Near South IF	0.5	0.2

Of the 20 wells sampled, 12 are below the 2.1 µg/L cleanup level for RDX. It is important to note, that the GETS was used to target the eastern plume with EW-4 and EW-6 and the monitoring wells associated with these wells showed a marked decrease in RDX concentration and have achieved 2.1 µg/L. The radius of influence of well EW-4 and EW-6 and the reduction of the plume is evident in Figures 9 and 12. The impact of EW-4 extraction is far reaching to the west and south areas, reducing the footprint of the plume, either directly through its radius of influence, or indirectly, by intercepting contaminant migration. With the influence of EW-4, well 4-3 RDX levels are static, and well 4-5 decreased from 13ppb to 0.3 in the review period.

The main part of the plume has historically had the highest concentrations of RDX. While not part of the remedy, bioremediation augmentation injections took place in the lagoon

infiltration gallery near wells 4-111 and 4-112 from 2010-2013 and in 2016 during LAPP testing. All wells in this area have non-detect concentrations and this has been true since the previous FYR.

The wells that are increasing in RDX are distributed around the western and northern regions of the plume. Changes in the water table around the EWL Groundwater OU can be seen in Figures 11 and 12. The wells that are decreasing in RDX concentrations, but above the 2.1 µg/L cleanup level are along the central northwestern axis of the plume, where some of the highest concentrations of RDX are present. Since the GETS was used to target the eastern plume with EW-4 and EW-6, extraction from wells EW-1 and EW-3 has ceased. These extraction wells are located in the northern part of the site. Well 4-2, north of the plume, has not been sampled in recent years; only water level measurements have been taken. Collecting analytical data from well 4-2 may be beneficial to verify containment of the northern edge of the plume. The wells that exhibit no trend or stable trends in Figures 9 and 10 are mostly below the cleanup level for RDX (with two exceptions noted above).

Figure 9
2018 RDX Plume Map with Increasing, Decreasing, and Stable/No Trend Wells Highlighted,
Modified from the Most Recent Annual Report

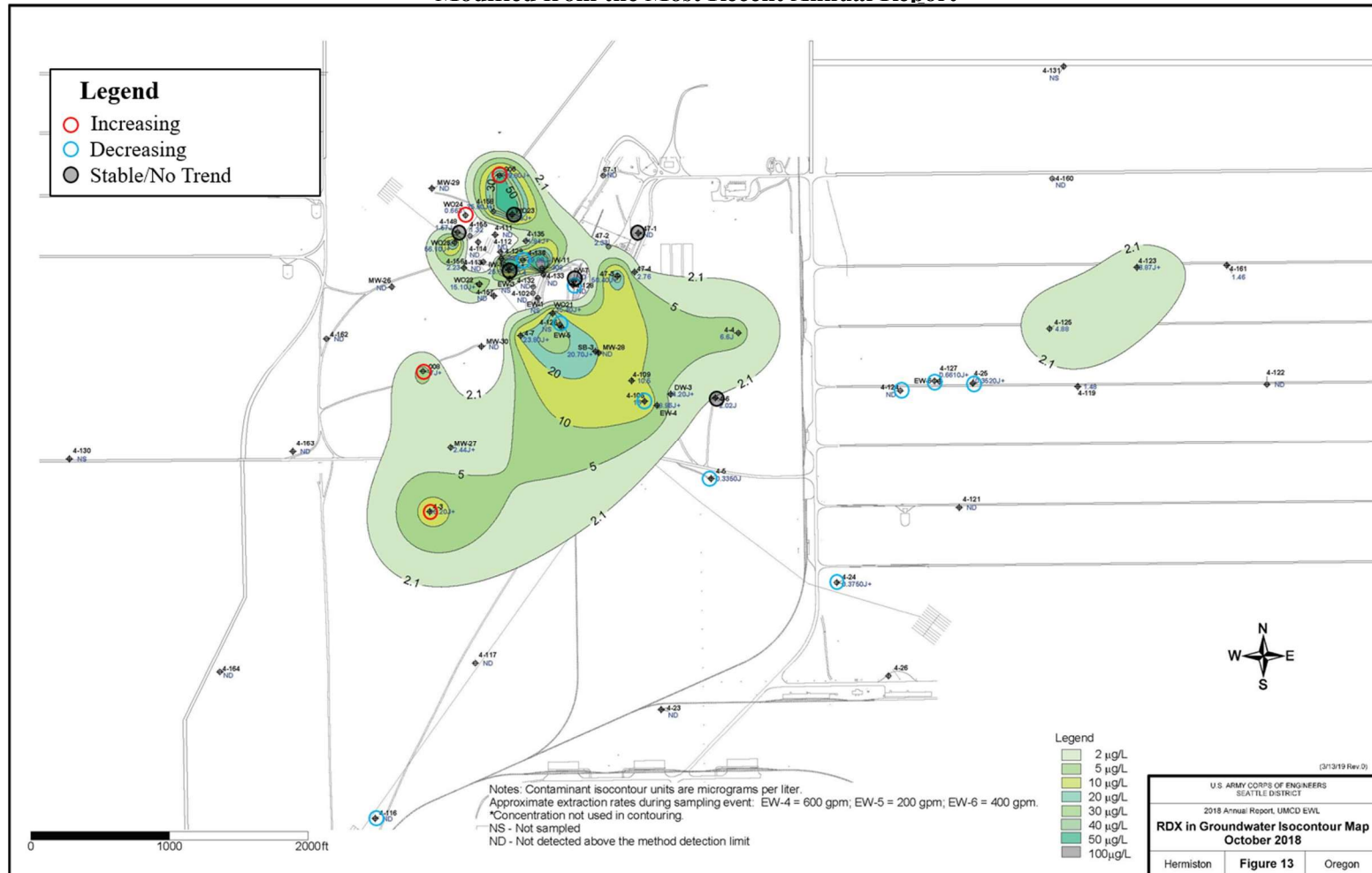


Figure 10
Previous Five-Year Review Contour Map Highlighting the RDX Plume in the EWL Groundwater
OU

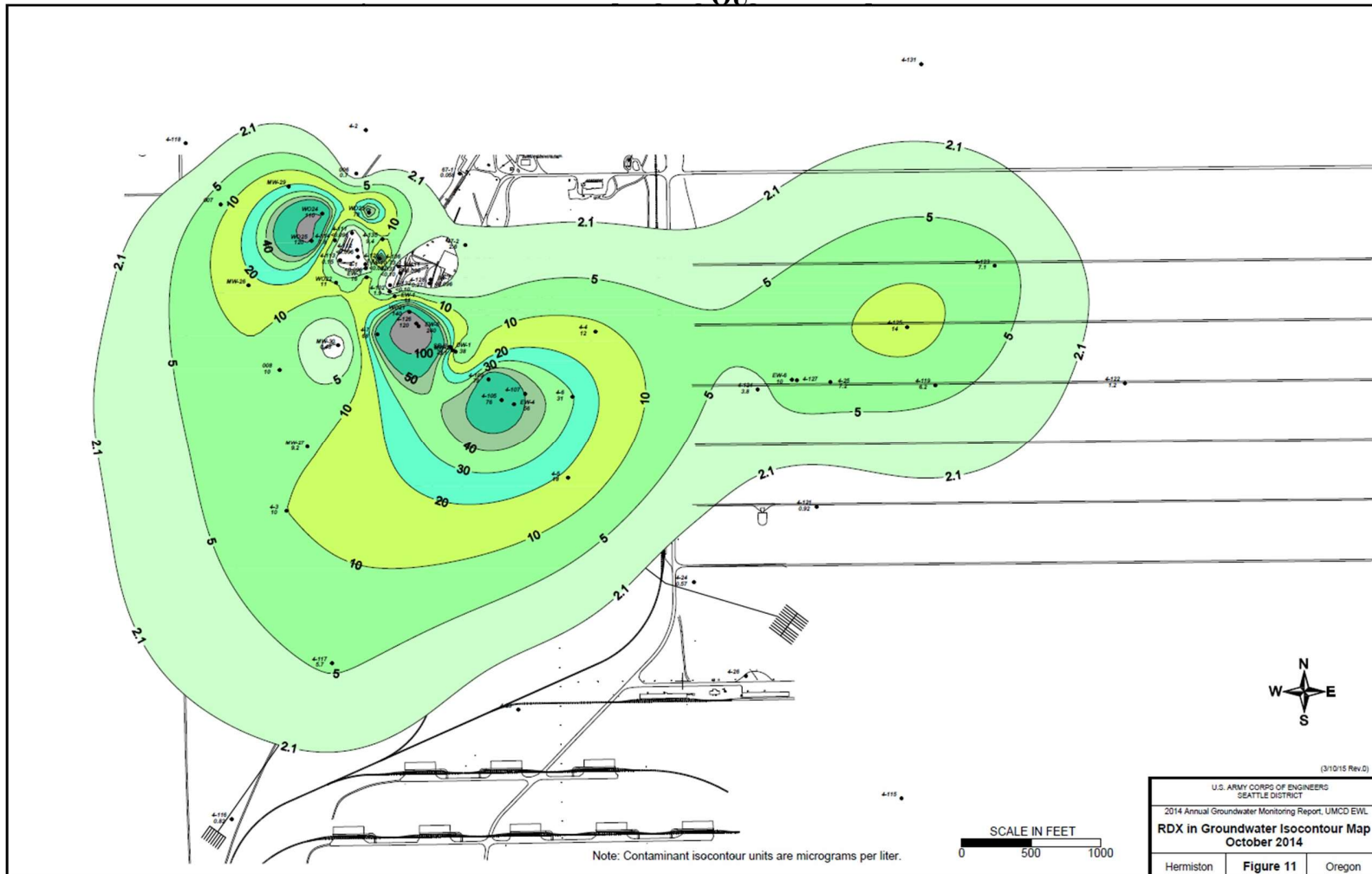


Figure 11
2014 Dry Season EWL Groundwater OU Water Table Elevation.

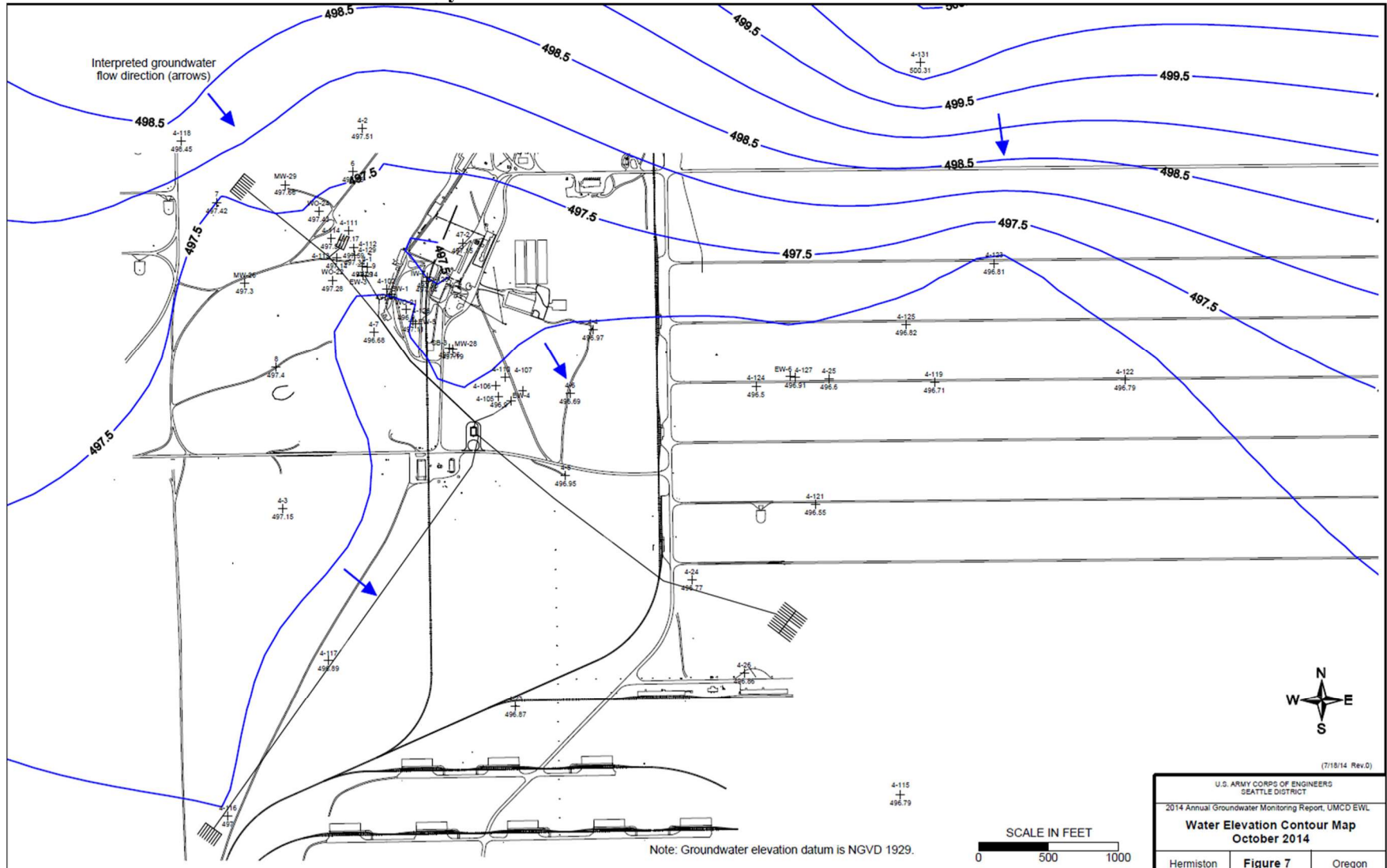
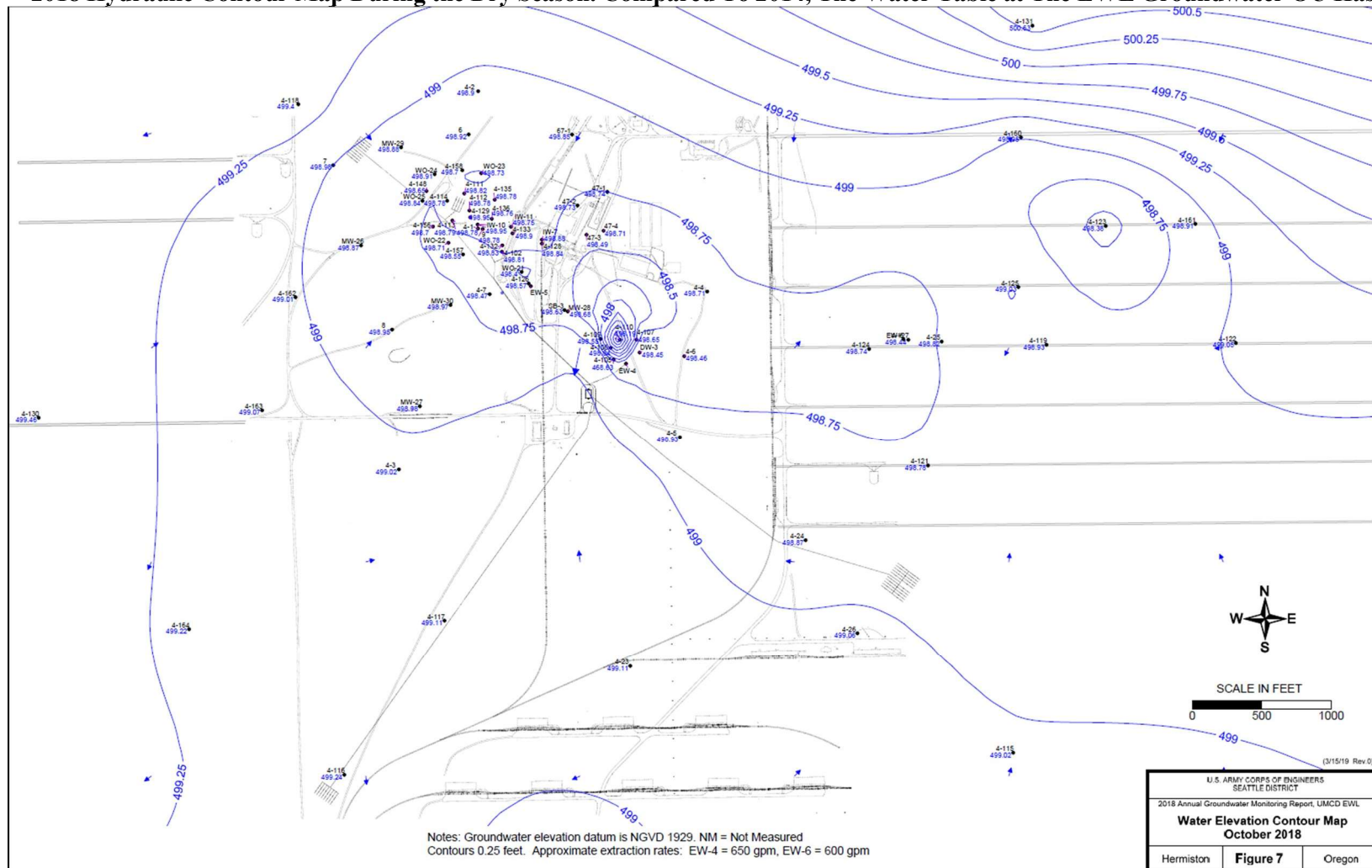


Figure 12
2018 Hydraulic Contour Map During the Dry Season. Compared To 2014, The Water Table at The EWL Groundwater OU Has Risen



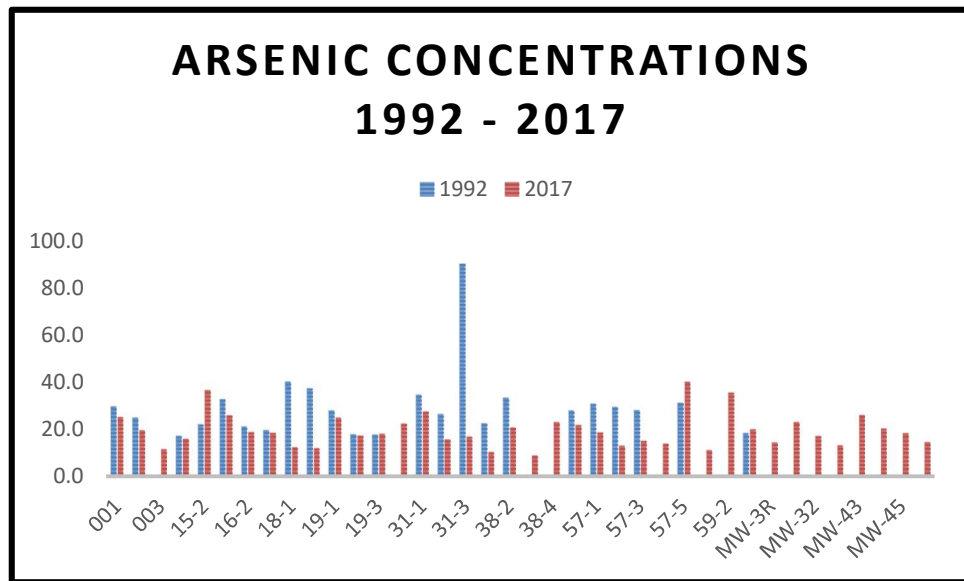
ADA OU:

Arsenic groundwater concentrations in the ADA OU were reported in the 1992 RI and were again sampled as part of the Bay West contract in 2017. The 2017 well sampling results showed arsenic in groundwater ranged from 8.67 µg/L to 40.2 µg/L (Bay West, 2017). The current MCL for arsenic 10 ug/L. The ADA OU does not have a cleanup value for groundwater and while most are above the MCL, there is a general decrease since 1992 see Table 14 and Figure 13). Of the 38 wells only 23 were sampled in 1992. The average concentration for those wells was from 29.5 ug/L to 20.1 ug/L. The only well that was below the MCL was 38-3 with a concentration of 8.67, therefore LUC are required for the ADA groundwater. LUCs restricting groundwater usage is documented in the Order and Agreement between the ODEQ and OMD. The Guard has an Order and Agreement for the Maintenance of Institutional Controls between ODEQ and the OMD, signed April 2021. It provides ODEQ enforcement action for the institutional controls on the Guard property. The Army property manages institutional controls through the LUCIP. For property leaving Army control, LUCs will be in the EES and through deed restrictions.

Table 14
Arsenic Levels in Groundwater 1992 – 2017 (µg/L)

Well ID	1992	2017	Well ID	1992	2017
001	29.7	25.0	38-3	NS	8.67
002	24.8	19.5	38-4	NS	22.8
003	NS	11.4	41-1	27.8	21.6
15-1	17.0	15.8	57-1	30.6	18.5
15-2	21.9	36.4	57-2	29.3	12.9
16-1	32.5	25.7	57-3	27.9	14.9
16-2	21.0	18.7	57-4	NS	13.7
16-3	19.4	18.3	57-5	31.0	40.2
18-1	40.0	12.3	59-1	NS	11.0
18-2	37.1	11.8	59-2	NS	35.4
19-1	27.8	24.8	SB-4	18.2	19.8
19-2	17.7	17.2	MW-3R	NS	14.3
19-3	17.5	17.9	MW-31	NS	22.8
19-4	NS	22.2	MW-32	NS	17.0
31-1	34.4	27.4	MW-42	NS	13.0
31-2	26.3	15.5	MW-43	NS	25.8
31-3	90.5	16.7	MW-44	NS	20.1
38-1	22.3	10.2	MW-45	NS	18.2
38-2	33.2	20.5	MW-46	NS	14.4

Figure 13
Arsenic Levels in Groundwater 1992 – 2017 (µg/L)



In 2014, as part of the MEC removal, surface soil in the ADA OU was analyzed for metal and explosive concentrations relative to the ESD cleanup levels. In the results of the explosives analysis, 3 samples out of 61 samples exceeded cleanup levels for a COC. In one sample, the concentration of 2,4-DNT (4.9 mg/kg) exceeded the cleanup level of 2.7 mg/kg. In two other samples, the concentrations of TNT (91 mg/kg and 88 mg/kg) exceeded the cleanup level of 49 mg/kg. All other explosive COCs were below ESD cleanup levels. These three samples represent less than five percent of all the samples collected.

In the results of the metals analysis, the only metal with concentrations exceeding ROD cleanup levels was chromium in 42 of 61 the samples. These soil samples were collected from four-inch-deep soil samples. It is hypothesized that the chromium results are erroneous, and that additional chromium may have been added to the samples analyzed in the lab during the analysis as stainless-steel used during grinding contains up to 11 percent chromium (Bay West, 2017). This possible source of cross contamination from grinding samples in a stainless-steel dish is supported by results from two samples that were too coarse to grind with this method. These samples were sieved and then analyzed and resulted in chromium concentrations up to eight times less than the lowest recorded concentration for samples put through the grinding process.

In 2016, Bay West was awarded a contract to finish remediation of MEC in the ADA. Bay West also conducted soil sampling to identify COCs which was in accordance with the UFP-QAPP Revision 05 dated January 20, 2018. The samples were taken from soil deposited as part of the sieve process to remove MEC items.

Soil COCs concentrations defined the soil as either hazardous or non-hazardous.

Hazardous soil had exceedances above the levels defined in 40 CFR 261.21-24 using Toxicity Characteristic Leaching Procedure (TCLP; Method 1311). Non-hazardous soils have exceedances that are below the TCLP levels, but above the ROD clean-up levels. Table 15 lists the ROD/ESD criteria for the COC.

Table 15
ROD/ESD Criteria

Analyte	RG (mg/kg)	Source
Explosives by SW8330B		
1,3,5-Trinitrobenzene	25	ESD
2,4,6-Trinitrotoluene	49	ESD
2,4-Dinitrotoluene	2.7	ESD
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	19	ESD
Metals by SW6010C		
Antimony	820	ROD
Arsenic	15	ROD
Barium	3300	ESD
Beryllium	8.1	ROD
Cadmium	213	ESD
Chromium	40	ROD
Cobalt	25	ROD
Lead	500	ROD
Thallium	160	ROD

Soil sampling revealed three primary COC that were above the ROD/ESD level, thus generating non-hazardous soil. The COCs were:

<u>Contaminant</u>	<u>Clean-up level</u>
Lead	500 ppm
24-DNT	2.7 ppm
Arsenic	15 ppm

As of November 2019, a total of 15,255 tons of non-hazardous soil had been recovered from the ADA.

The only contaminant identified in the soil exceeding the hazardous levels has been lead, which resulted in 20,914 tons of soil being disposed at a permitted hazardous waste facility.

A project total of 2,557 soil samples were collected through 31 December 2019. Table 16 below summarizes the above information.

Table 16
Summary of Soil Sampling

Soil samples collected	2,402
Non-hazardous soil onsite	13,000 tons
Hazardous soil onsite	None
Non-hazardous soil removed	2,255 tons

from site	
Hazardous soil removed from site	20,914 tons

Active Landfill OU:

No new data has been collected since the last FYR, as it was closed and capped in 1997. Groundwater monitoring was terminated in 2010 with ODEQ concurrence.

Deactivation Furnace OU:

No new data has been collected since the last FYR. The Deactivation Furnace ROD specified a lead clean-up level of 500 mg/kg as acceptable for the residential land use and cleanup of the Deactivation Furnace OU soils was implemented accordingly. The standards for lead contamination under a residential re-use scenario have since become more stringent and the 500 mg/kg cleanup goal no longer supports a UU/UE standard. That clean-up level is considered protective of industrial, but not residential, use. An ESD was signed in January 2021 to acknowledge that the lead cleanup level in the ROD will be protective of industrial, but not residential use.

QA Function Range OU:

No new data has been collected since the last FYR, as the remedy was complete in 2005.

6.6 Interviews

Questionnaires were sent to those involved with the Site including personnel from BRAC Division and USACE. The overall impression for the active UMCD OUs from the interview responses of BRAC and USACE is that the remedies are functioning as expected. The addition of new extraction wells in the EWL Groundwater OU have increased the efficiency of the system and it is believed that the remedy may be enhanced in the source area with bioremediation. Significant progress has been made in the identification and clearance of MEC in the ADA OU. Re-scraping and re-mapping with DGM has yielded better characterization and ultimate reduction of subsurface debris. The Site interviews can be found in Appendix E.

7 Technical Assessment

7.1 Question A – Is the remedy functioning as intended by the decision documents?

EWL Groundwater OU:

The remedy for the EWL Groundwater OU as described in the 1994 ROD is still functioning as intended. During this FYR period the remedy targeted the eastern plume. Based on analysis of wells sampled, extraction well EW-6 and EW-4 appears to have greatly reduced the COC concentrations and areal extent in the eastern lobe of the plume.

Compared to the 2014 plume map (see Figures 9 and 10), the RDX plume has decreased in areal extent and concentration magnitude. Other COCs such as TNT and HMX are all below the cleanup levels established in the ROD. Upon transfer out of Army control LUCs will be documented in a deed restriction and EES.

ADA OU:

Implementation of the remedy is ongoing. The portion that has already been remediated is operating as intended and the remedy, as a whole, when completely implemented, will function as intended. Implementation of the selected remedy is currently paused while funding can be secured. The Army intends to complete remediation of the portion west of the western fence in 2024 to UU/UE. The portion of the ADA that is under control of the ORARNG encompasses the firing range and SDZ. It is fenced and access is controlled. The site is not fully protective due to the findings of potential MEC in an area off-post. The 60-foot strip of Army property west of the firing range fence is not fenced. The adjacent property owner has been notified of the risk of MEC and has been directed not to trespass. Additionally, the two companies that have communication fiber in this area have been notified not to access it until remediation is complete. The LUCs component and restricted access to the site mitigate any unacceptable risks. Continuation of the remedy will address all unacceptable risks in the future, however the property owner has been notified, and the Army is working to address any off-post exposure to MEC. The remedy, which when implemented, will be protective.

Active Landfill OU:

The remedy for the Active Landfill OU as described in the ROD is still functioning as intended. The landfill was closed in 1997 in accordance with the Oregon State Landfill regulations. No disturbance of the landfill was observed during the site inspection indicating that the landfill contents are still intact.

Deactivation Furnace:

The remedy for the Deactivation Furnace is functioning as intended. No structures have been built on the property, since the demolition of the furnace and associated buildings. Additionally, it is fenced and restricted from public access.

QA Function Range:

The remedy for the QA Function Range is functioning as intended. No structures have been built on the property, since remediation was complete. Additionally, it is fenced and restricted from public access.

7.2 Question B - Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?

The summary of these evaluations and reviews are presented below for each OU. Appendix A presents the detailed toxicity data assessment.

EWL Groundwater OU:

Yes, the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives

used at the time of the EWL Groundwater OU remedy selection are still valid.

Changes in standards

Changes to the standards identified in the ROD have occurred. However, these changes do not affect protectiveness of the remedy. Health advisories for the COCs (TNT, RDX, and HMX) were used as other factors to be considered (TBC). These health advisories were based on human health risks of 1×10^{-6} and a Hazard Quotient of 1. These TBCs are still relevant and do not call into question the protectiveness of the remedy. The TBCs used to select the remedy have not changed since the EWL ROD, and therefore will not affect the result of the remedial action to be conducted at the EWL Groundwater OU.

Changes in toxicity and other contaminant characteristics

Changes to toxicity values for Site COCs with risk-based cleanup levels were assessed by comparing the 1992 EWL ROD cleanup levels to the EPA regional screening level (RSL) for tap water. The RSL represents a 10^{-6} excess cancer risk level. The cleanup levels for five COCs were greater than that RSL. The groundwater cleanup levels for the EWL OU are risk-based values (EPA risk range of 10^{-6} to 10^{-4}) and are not based on promulgated statutes. Therefore, cleanup levels for these OUs will not be impacted by any changes to promulgated standards (e.g. drinking water standards). Appendix A includes a discussion of toxicity value changes, which could affect the risk-based cleanup levels for the EWL.

Expected Progress toward Meeting RAOs

The remedy is progressing as expected. Concentrations of the COCs have been reduced significantly and are approaching RAOs as determined by the risk assessment of the COCs.

Changes in Exposure Pathways

The exposure pathways assumed in the 1992 EWL ROD are still valid.

Changes in Land Use

During this FYR period, the property where the main plume of the EWL Groundwater OU lies, was transferred to the ORARNG. The property is used for military use for training. The eastern part of the plume will be leaving Army control and transferring to the CDA. An OPS memorandum is in place and LUC will be implemented via an EES and deed restrictions that will be recorded when the property transfers. These changes in land use do not affect the remedy. However, there is a potential impact from changes in neighboring site use. Umatilla County is currently investigating development of an aquifer storage and recovery project. They propose to divert water from the Columbia River for aquifer storage and recovery approximately 1.5 miles east of the EWL. See additional discussion in paragraphs. 3.1.1 and 7.3.

ADA OU:

Yes, the exposure assumptions, toxicity data, cleanup levels, and remedial action

objectives used at the time of the ADA OU remedy selection are still valid. The boundaries of the known contamination have changed with the finding of potential MEC beyond the perimeter fencing. The remedy applies to the release and needs to be updated to include a response to the adjacent property. The remedy will be modified to select UU/UE for the adjacent property. MEC will be cleared to depth of detection and soil will be remediated to RSL. Additionally, the Army will work with the property owner to coordinate long term site inspections and notification procedures. This work will be memorialized in a ROD change.

Changes in standards

The ROD established a range of UXO/MEC removal depth based on future land use. A 3-ft clearance depth has been determined to be suitable for the ADA's future use for military training. The MCL for arsenic has decreased during the FYR period (from 50 ug/l to 10 ug/l). However, these changes do not affect protectiveness of the remedy.

Changes in toxicity and other contaminant characteristics

The impact to changes to toxicity values for Site COCs with risk-based cleanup levels were assessed by comparing the 1994 ADA ROD and 2002 ADA ESD cleanup levels to the EPA RSL for industrial soil. The ROD cleanup levels for four COCs were greater than the RSLs. However, the ROD/ESD soil cleanup levels are risk-based numbers and are within the EPA risk range of 10^{-6} to 10^{-4} and are not based on promulgated statutes. Therefore, cleanup levels for these OUs will not be impacted by any changes to promulgated standards, unless those changes impact the toxicity of a COC. Appendix A includes a discussion of toxicity value changes that could affect the risk-based cleanup levels for the ADA.

Changes in Exposure Pathways

The exposure pathways assumed in the 1994 ADA ROD and 2002 ADA ESD are still valid. The 1994 ADA ROD and 2002 ADA ESD described the exposure pathways for onsite Army receptors. These exposure pathways are still valid. New information has revealed additional exposure pathways for adjacent receptors but this does not invalidate the onsite Army receptors.

Changes in Land Use

In 2017, the property where the ADA OU lies transferred to the ORARNG. The property is being used for military use as a firing range. This change in land use does not affect the remedy. However, the 60-foot strip along the western, northwest and northern edge will be leaving Army control. The entirety of this area has not been investigated. The off-site receptor was not addressed in the ADA ROD or ESD and even though the remedy selected under those documents is being implemented in the adjacent area, the remedy has not been fully implemented here.

Active Landfill OU:

Yes, the exposure assumptions, toxicity data, cleanup levels, and remedial action

objectives used at the time of the Active Landfill OU remedy selection are still valid.

Changes in standards

The ROD was finalized in 1993 for the Landfill OU, which declared a remedy of “No Further Action.” Based on results of the human health risk assessment, this OU under both current and future land use scenarios, was determined not to pose an unacceptable risk to human health or the environment. When routine monitoring was conducted between 1995 and 2010, elevated levels of nitrate and selenium were detected in some landfill wells. The monitoring data do not represent a change in exposure assumptions because nitrate and selenium concentrations have either remained stable or declined since the ROD and these contaminants are not attributable to a release from the landfill. Under the ODEQ cleanup plan, deed restrictions are in place ensuring protectiveness of any applicable reuse.

Changes in Exposure Pathways

The exposure pathways described in the 1992 Active Landfill ROD are still valid.

Changes in Land Use

The ROD assumed that the Active Landfill would remain within the UCMD. However, the area where it is located will be transferred out of Army control. Future land use could affect the protectiveness of the remedy. An ESD has been written to add LUCs to the remedy that will be implemented along with deed restriction and an EES that will be recorded at the time of transfer.

Deactivation Furnace

Yes, the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the Deactivation Furnace OU remedy selection are still valid.

Changes in standards

Changes to the standards identified in the ROD have occurred for lead. However, these changes do not affect protectiveness of the remedy, as an ESD has been written to implement LUCs upon property transferring out of Army control with deed restrictions and an EES.

Changes in Exposure Pathways

The exposure pathways described in the ROD are still valid.

Changes in Land Use

The ROD assumed that the Deactivation Furnace would remain within the UCMD. However, the area where it is located will be transferred out of Army control. Future land use could affect the protectiveness of the remedy. An ESD has been written to add LUCs to the remedy that will be implemented along with deed restriction and an EES that will be recorded at the time of transfer.

QA Function Range:

Yes, the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the QA Function Range OU remedy selection are still valid.

Changes in standards

The standard identified in the QA Function Range ROD has not changed.

Changes in Exposure Pathways

The exposure pathways described in the ROD are still valid.

Changes in Land Use

The ROD assumed that the Deactivation Furnace would remain within the UCMD. However, the area where it is located will be transferred out of Army control. Future land use could affect the protectiveness of the remedy. An MFR has been written to add LUCs to the remedy that will be implemented along with deed restrictions and an EES that will be recorded at the time of transfer.

7.3 Question C - Has any other information come to light that could call into question the protectiveness of the remedy?

EWL Groundwater OU:

As mentioned in paragraphs 3.1.1 and 7.2, the UMCD, including the EWL Groundwater OU and the closed Active Landfill OU, lies within one of the CGAs known as the Ordnance Gravel aquifer. The OWRD diverts water from the Columbia Rivers during high winter and spring flow periods and store in the Ordnance Gravel aquifer for later use for irrigation. The potential impact to the Installation groundwater elevation has not been addresses.

Additionally, the Umatilla County is currently investigating development of an aquifer storage and recovery project. They propose to divert water from the Columbia River for aquifer storage and recovery near the vicinity of the northeast corner of B-Block. This is approximately 1.5 miles east of the EWL and 1.5 miles southeast of the Active Landfill. The Army, the Guard, and USACE are cooperating with Umatilla County by sharing their extensive data set of historical water levels with their contractors. The contractors will use the data for groundwater modeling to explore potential effects to the groundwater table within the EWL plume area. As this is land that will transfer out of Army control, it falls under the enforceable actions of the EES, which specifically states:

... neither withdrawal of groundwater nor any activity that may interfere with the groundwater remedy, is allowed within the EWL Groundwater Pump and Treat Area or the closed Active Landfill OU...without prior written approval of the Army, EPA, and DEQ.

ADA OU:

The west side of the ADA is bound by a chain-link fence. The actual Army property boundary is approximately 60 feet beyond the fence. The 28.07-acre 60-foot strip runs the entire western edge, the northwest diagonal, and the northern strip. The Army is investigating this area for

potential MEC as part of the ADA remediation project. Additionally, MEC is present to the west of the ADA on private property. During a 2020 remediation effort, the Army conducted a DGM survey of 84 acres on private property adjacent to the 60-foot strip along the west edge of the ADA. There were over 19,000 single point anomalies and 10 acres of polygons identified in the survey. Since MEC is in adjacent Army property, it is assumed that many of these anomalies may be MEC. It was not possible to investigate these anomalies at that time. The Army intends to investigate and clear the adjacent private property pending contracting actions and permission from the property owner.

Per- and Polyfluoroalkyl Substances (PFAS):

The Army does not suspect there has been a PFAS release, though steps are being taken to confirm whether historic usage of PFAS-containing material released PFAS into the environment. Previous drinking water samples did not detect PFAS contamination. The Army and Guard are investigating potential PFAS use and disposal at the former UMCD. This investigation is being conducting under CERCLA authority and will follow the CERCLA process. Results of those investigations will be presented in the Sixth (September 2024) FYR.

8 *Issues/Recommendations*

Table 16
Current Issues for the UMCD Site

OU: EWL	Issue 1. Concentrations of TNT and RDX at the EWL Groundwater OU are still above the RAOs.			
	Recommendation: Continue operation of EW-4, EW-5 & EW-6 to utilize system capacity. Complete FFS Study and determine path forward. Coordinate with Umatilla County contractors to evaluate potential effects of neighboring groundwater storage project. Additionally, Consult with OWRD to determine their plan for the aquifer elevation.			
Affects Current Protectiveness (Yes or No)	Affects Future Protectiveness (Yes or No)	Party Responsible	Oversight Party	Milestone Date
No	No	Army	EPA	September 30, 2024
OU: ADA	Issue 2. UXO remediation is incomplete. Concentration of MEC and contaminated soil exceeded contract scope and remediation was not complete.			
	Recommendation: Execute new contract to complete ADA remediation. The remedy selected for the historic MEC items has not been fully implemented, however site use is restricted and remains protective in the short term, per EPA's September 2020 letter. The ORARNG is restricted to the use the range and the property owner has been advised to avoid this area until remediation is complete.			
Affects Current Protectiveness (Yes or No)	Affects Future Protectiveness (Yes or No)	Party Responsible	Oversight Party	Milestone Date

No	No	Army	EPA	February 28, 2025
OU: ADA	Issue 3. UXO is present outside the Installation western fence line on Army property.			
	Recommendation: Award contract to remediate area west of fence. The property owner has been advised to avoid this area until remediation is complete.			

Affects Current Protectiveness (Yes or No)	Affects Future Protectiveness (Yes or No)	Party Responsible	Oversight Party	Milestone Date
Yes	Yes	Army	EPA	May 2024
OU: ADA	Issue 4. Site characterization is necessary west of the ADA in private property. Remediation may also be necessary.			
	Recommendation: Award contract to conduct site characterization and remediation, with property owner's permission. The property owner has been advised to avoid this area until remediation is complete.			
Affects Current Protectiveness (Yes or No)	Affects Future Protectiveness (Yes or No)	Party Responsible	Oversight Party	Milestone Date
Yes	Yes	Army	EPA	May 2024
OU: Deactivation Furnace	Issue 5. Lead clean-up level of 500 mg/kg are not acceptable for residential use			
	Recommendation: An EES will be in place when property transfers out of Army control to implement LUCs			
Affects Current Protectiveness (Yes or No)	Affects Future Protectiveness (Yes or No)	Party Responsible	Oversight Party	Milestone Date
No	Yes	Army	EPA	March 3, 2023
OU: QA Function Range	Issue 6. Clean-up was not completed to allow for residential use.			
	Recommendation: MFR defined LUC which will be documented with deed restrictions and an EES and recorded when the property transfers out of Army control			
Affects Current Protectiveness (Yes or No)	Affects Future Protectiveness (Yes or No)	Party Responsible	Oversight Party	Milestone Date
No	Yes	Army	EPA	March 3, 2023

9 *Protectiveness Statements*

Protectiveness Statement(s)	
Operable Unit: Explosive Washout Lagoon	Protectiveness Determination: Protective

<i>Protectiveness Statement:</i> The remedy for the EWL OU is protective of human health and the environment. The pump and treat system is functioning as intended and the eastern portion of the plume contaminant concentration has significantly reduced. The areal extent of the plume has also decreased significantly since the last five-year review. General restrictions on groundwater use and land use restrictions are meant to prevent exposure pathways. Current Land Use Controls (LUCs) are implemented by the Army and Oregon National Guard. For property leaving Army control, LUCs will be implemented via deed restrictions and an Easement and Equitable Servitude (EES), with Oregon Department of Environmental Quality (ODEQ) as the enforceable entity.	
<i>Operable Unit:</i> Ammunition Demolition Area	<i>Protectiveness Determination:</i> Protective for short-term
<i>Protectiveness Statement:</i> The remedy at the ADA OU is protective of human health and the environment in the short-term. On a portion of the ADA OU, the remedial excavation activities are complete and have adequately addressed all exposure pathways that could result in unacceptable risk to human health and the environment. However, the remedy is still ongoing on part of the ADA OU and potentially on part of adjoining private property. For private property and property leaving Army control, remediation will be to UU/UE. LUC are documented in the LUCIP for Army Property and in the Order and Agreement between OMD and ODEQ. Once the remedy is complete, the ADA OU will be protective. Therefore, the remedy at the ADA OU will be protective.	
<i>Operable Unit:</i> Active Landfill OU	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The remedy for the Active Landfill OU is protective of human health and the environment while under Army control. The landfill is capped, access to the landfill is limited, and groundwater concentrations are not indicative of landfill leachate. General restrictions on groundwater use and land use restrictions prevent exposure pathways. Current LUCs are implemented by the Army. An ESD defining LUCs was signed in January 2021 and are documented in the LUCIP upon leaving Army control, LUCs selected in the ESD will be implemented via LUC/RD, deed restrictions and an EES.	
<i>Operable Unit:</i> Deactivation Furnace OU	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The remedy for the Deactivation Furnace OU is protective of human health and the environment while under Army control. General LUCs implemented by the Army prevent exposure pathways. An ESD defining LUCs was signed in January 2021 and are documented in the LUCIP. Upon leaving Army control, LUCs selected in the ESD will be implemented via LUC/RD, deed restrictions and an EES.	
<i>Operable Unit:</i> QA Function Range OU	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The remedy at the QA Function Range OU is protective of human health and the environment. General LUCs implemented by the Army prevent exposure pathways. An MFR was signed in July 2021 defining LUCs and are documented in the LUCIP. Upon leaving Army control, LUCs will be implemented via deed restrictions and an EES.	

10 Next Review

The next FYR will be due in September 2024. Pursuant to CERCLA §121(d) the start of construction of the Washout Lagoons Soils OU (June 20, 1994) triggered periodic FYRs. The first FYR was completed September 30, 1999. Subsequent reviews are required every five years from the date of the first review, regardless of the completion date of the previous five-6year review.

Second FYR: Due September 2004

Third FYR: Due September 2009

Forth FYR: Due September 2014

Fifth FYR (current): Due September 2019

Sixth FYR (next): Due September 2024

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Appendix A

Toxicity Assessment

Toxicity Assessment

Summary

EPA's Integrated Risk Information System updates toxicity values used by EPA in risk assessments when newer scientific information becomes available. For the Umatilla Chemical Depot, risk-based cleanup levels were selected for groundwater at the EWL Groundwater OU (1994 ROD) and for soil at the ADA OU (1994 ROD and 2002 ESD). Additionally, an ESD has been draft for the Deactivation Furnace to document changes in lead exposure levels that resulted in changes to land use restrictions. The Active Landfill OU and QA Function Range OU will not be discussed in this section as there have been not changes since the last FYR.

Since the signing of decision documents for the EWL Groundwater and ADA OUs, there have been changes to the toxicity values for COCs at the site. Toxicity values were not listed in the decision documents, and the baseline risk assessment for this Site was not available at the time of this FYR. However, the cumulative impact of toxicity value revisions can be inferred by comparing current EPA regional screening levels with the risk-based cleanup levels in the decision documents for the EWL Groundwater and ADA OUs.

The RSLs are chemical-specific concentrations for individual contaminants that correspond to an excess cancer risk level of 1×10^{-6} or a hazard quotient of 1 for non-carcinogens. They have been developed for a variety of exposures scenarios (e.g., residential, commercial/industrial). RSLs are not de facto cleanup standards, but they do provide a good indication of whether actions may be needed to address potential human health exposures.

EWL Groundwater OU

Table A-1 compares the EWL Groundwater OU ROD groundwater risk-based cleanup levels to the most current tap water RSLs (November 2019). The selected cleanup level for HMX was based on the health advisory level at the time.

Table A-1
Summary of Groundwater Toxicity Changes for the EWL OU

Contaminant of Concern	EWL ROD Cleanup Level (ug/L)	Current Tap water RSL (ug/L) (November 2019)	ROD<RSL?	Within EPA's acceptable risk range?
1,3,5-trinitrobenzene (TNB)	1.8	590	Yes	Yes
1,3-dinitrobenzene (DNB)	4.0	2	No	Yes
TNT	2.8	2.5	No	Yes
HMX	350	400*	NA	NA

NA – Not applicable

*The current EPA health advisory level for HMX is 400 µg/L.

The EWL Groundwater OU ROD cleanup levels for TNB is less than the tap water RSL indicating that the risk-based cleanup level for this COC is still protective. The EWL ROD groundwater risk-based cleanup levels for 1,3-DNB and TNT are greater than the tap water RSLs. However, the cleanup levels for these compounds are within the EPA risk range of 10^{-6} and 10^{-4} . The health advisory level for HMX increased to 400 µg/L indicating that the HMX ROD cleanup level is still protective. Therefore, changes to toxicity values do not affect the protectiveness of the remedy at the EWL Groundwater OU.

ADA OU

Table A-2 compares the ADA ROD and ESD soil cleanup levels to the most current industrial soil RSL (November 2019).

Table A-2
Summary of Soil Toxicity Changes for the ADA OU

Contaminant of Concern	ADA ROD Cleanup Level (mg/kg)	ADA ESD Cleanup Level (mg/kg)	Industrial Soil RSL (mg/kg) (November 2019)	ROD < RSL?	Within EPA's acceptable risk range?
1,3,5-trinitrobenzene (TNB)	2.3	25	1,500	Yes	Yes
TNT	23	49	960	Yes	Yes
2,4-DNT	1.9	2.7	7.4	Yes	Yes
RDX	52	19	38	No	Yes
Antimony	820	-	470	No	Yes
Barium	860	3,300	220,000	Yes	Yes
Beryllium	8.1	-	2,300	Yes	Yes
Cadmium	28	213	980	Yes	Yes
Cobalt	25	-	350	Yes	Yes
Thallium	160	-	120	No	Yes

The following COCs for the ADA OU have cleanup levels less than the industrial soil RSLs: 1,3,5-TNB, TNT, 2,4-DNT, barium, beryllium, cadmium, and cobalt. RDX, antimony, and thallium have ROD cleanup levels greater than the industrial soil RSL. However, the cleanup levels in the ADA OU ROD are within the EPA risk range of 10^{-6} and 10^{-4} . Therefore, changes to toxicity values do not affect the protectiveness of the remedy at the ADA OU.

Active Landfill OU

The Active Landfill is not discussed in this section, as it was closed in 1997 and groundwater monitoring was terminated in 2010. No changes have occurred since the last FYR.

Deactivation Furnace OU

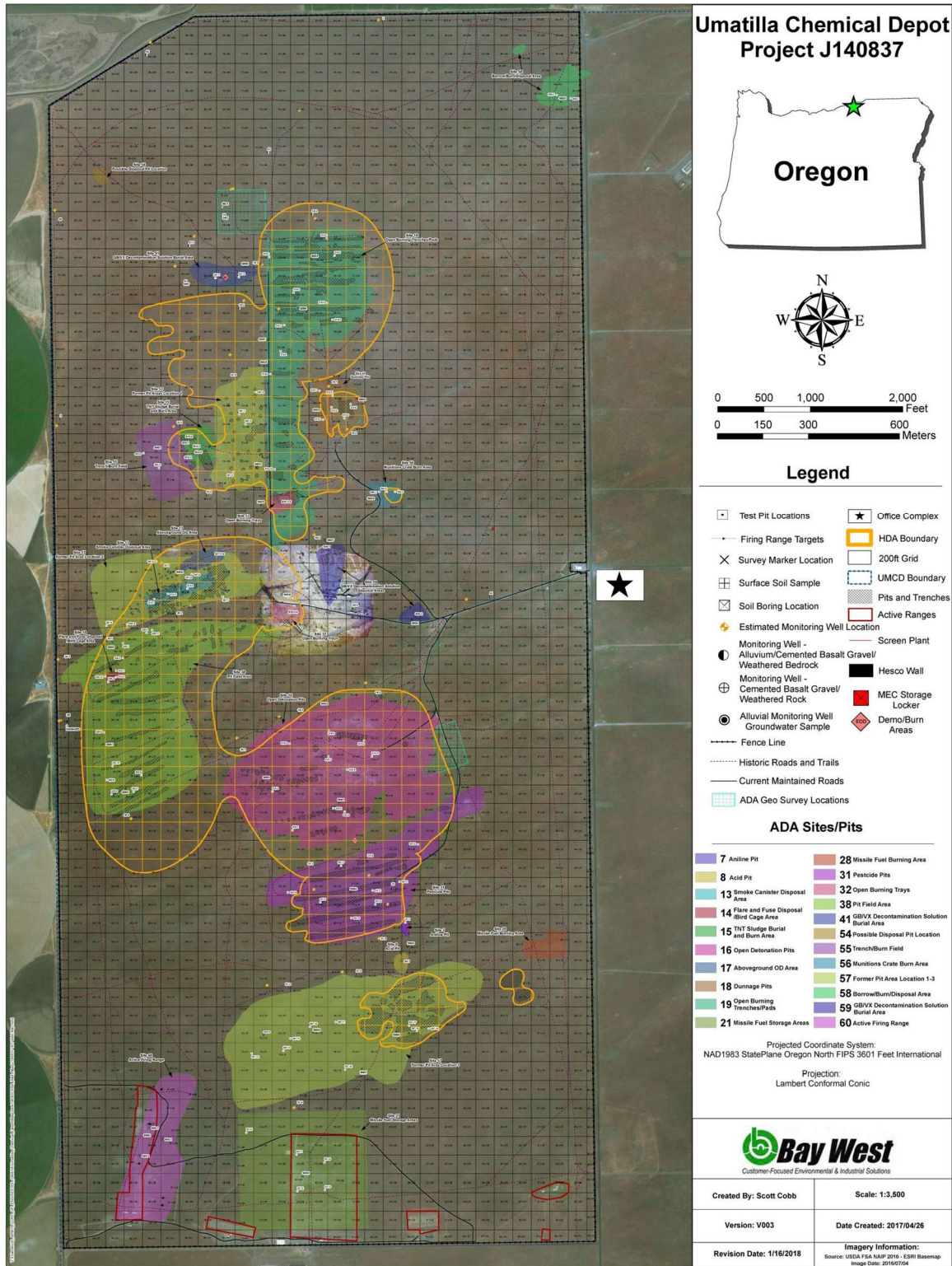
At the time the ROD was issued, the reasonably anticipated future land use was residential and achieving a 500 mg/kg lead cleanup level for soils was considered protective of that use. This decision was consistent with the EPA's 1994 *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (Office of Solid Waste and Emergency Response [OSWER] Directive 9355.4-12. Since the residual lead level in soil following cleanup was below the 500 mg/kg protectiveness standard, there was no need for LUCs. While that level is still considered protective of adults in a residential or industrial use scenario, it is no longer protective of children. This protectiveness determination is set forth in the EPA's Memorandum *Umatilla Deactivation Furnace Operable Unit (OU) Lead Soil Protectiveness at 500 mg/kg, not including exposure to young children* (July 25, 2019), which is based on the EPA's Memorandum *Updated Scientific Considerations for Lead in Soil Cleanups* (Office of Land and Emergency Management [OLEM] Directive 9200.2-167, Dec. 22, 2016). As a result, to protect against potential exposure to unacceptable levels of lead by children, the MFR changes the allowable land use from residential to industrial. Upon transfer out of Army control LUCs that prohibit residential will be recorded in deed restriction and the EES.

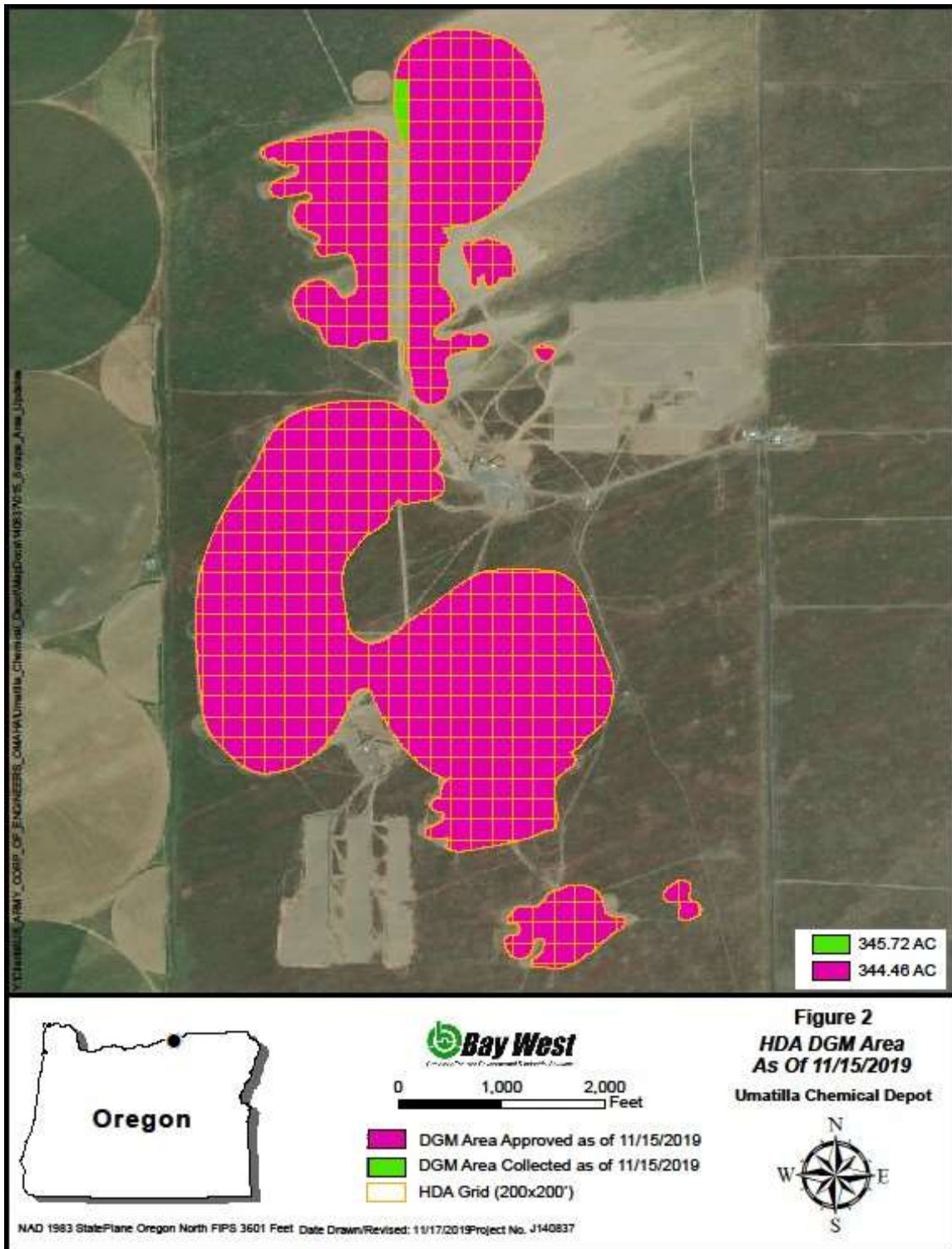
QA Function Range OU

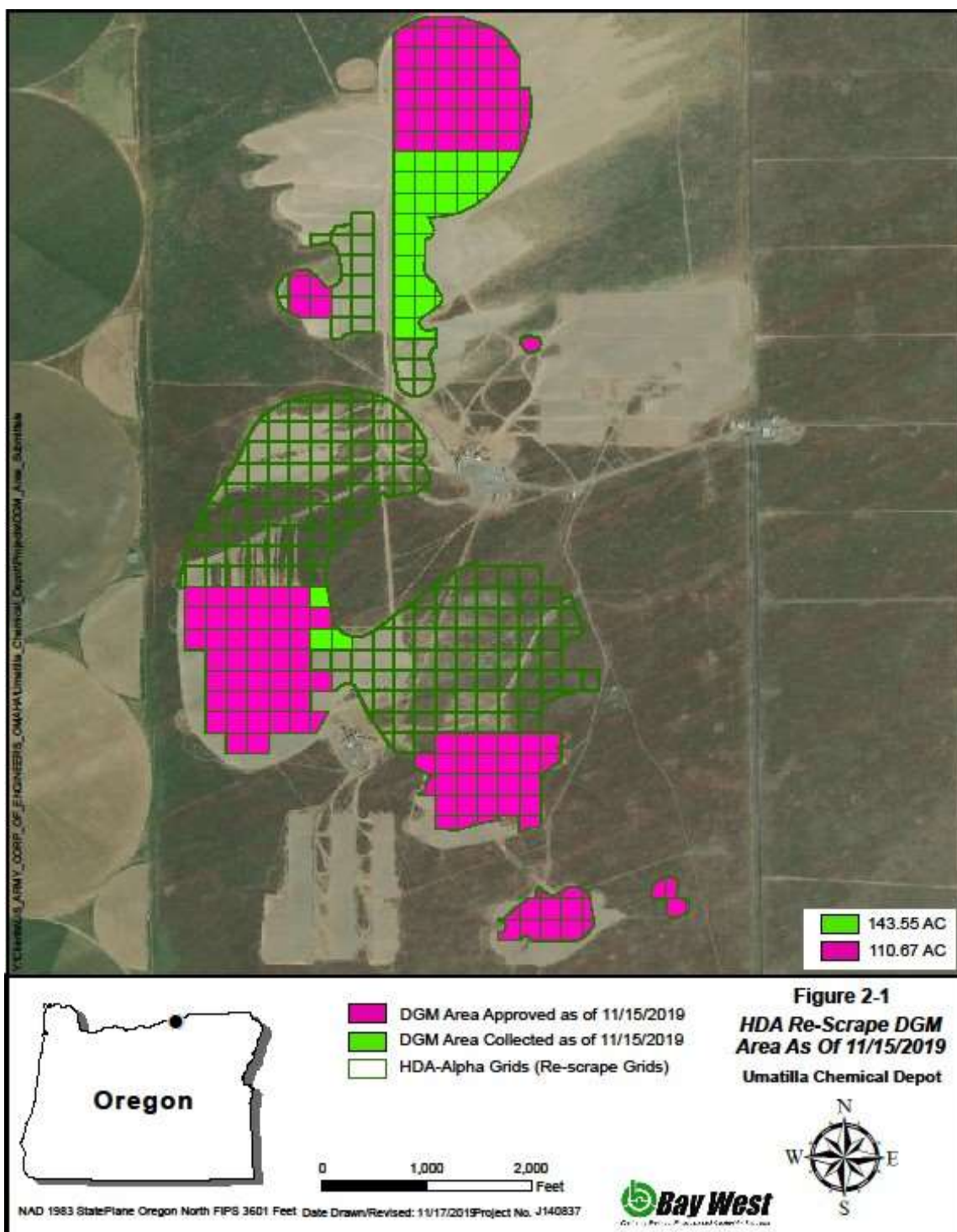
The QA Function Range OU is not discussed in this section, as remediation was completed in 2005. No changes have occurred since the last FYR.

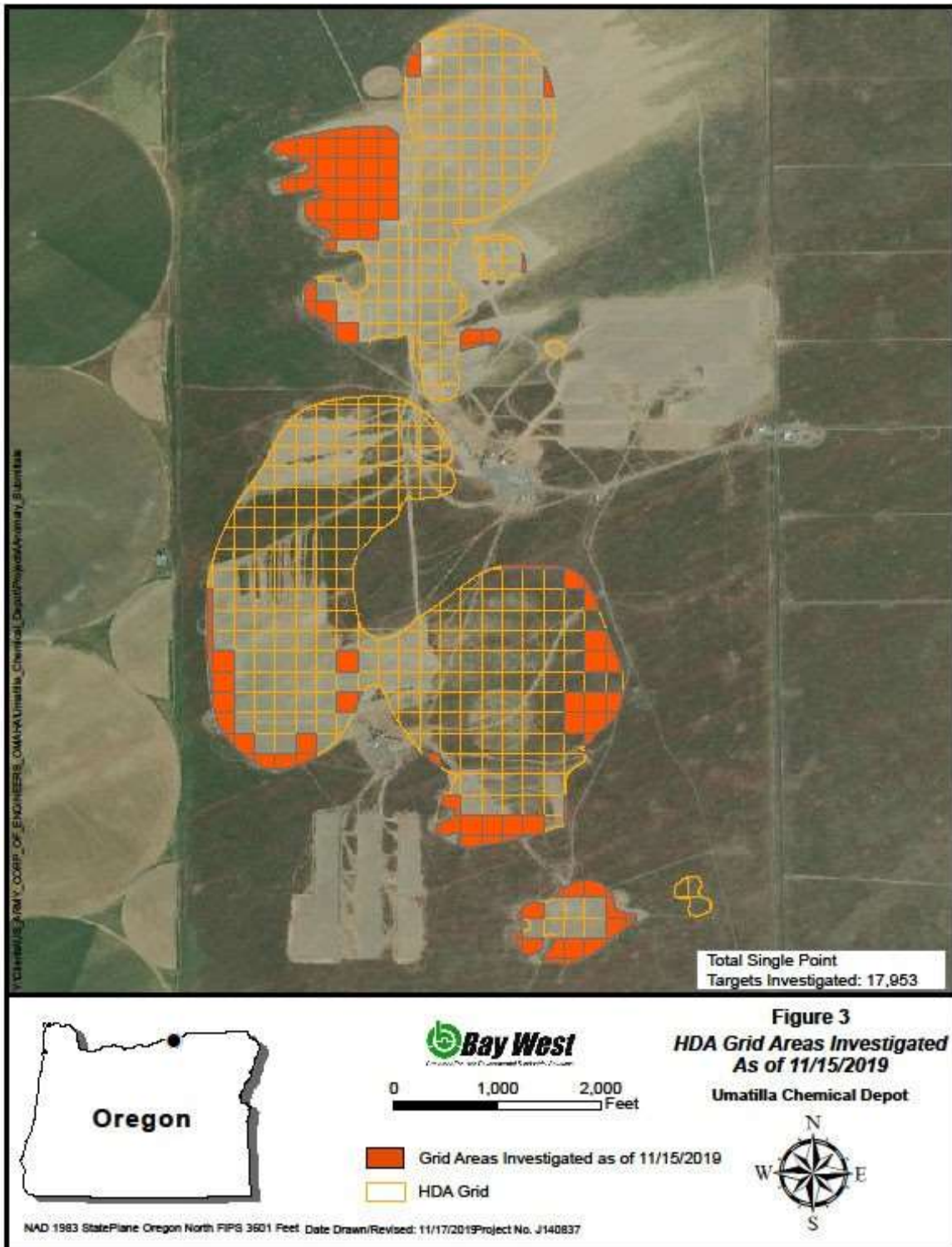
Appendix B

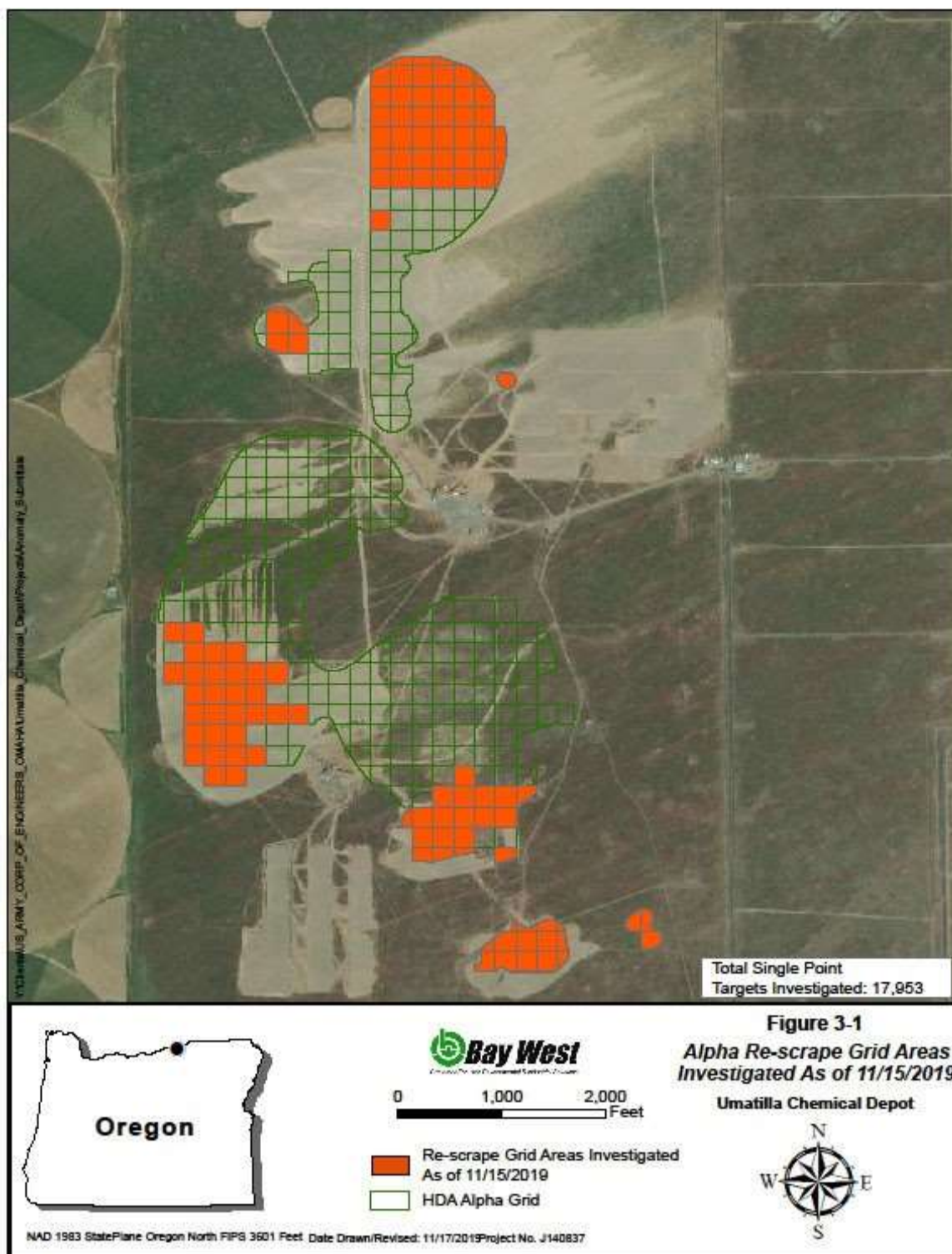
ADA OU Maps

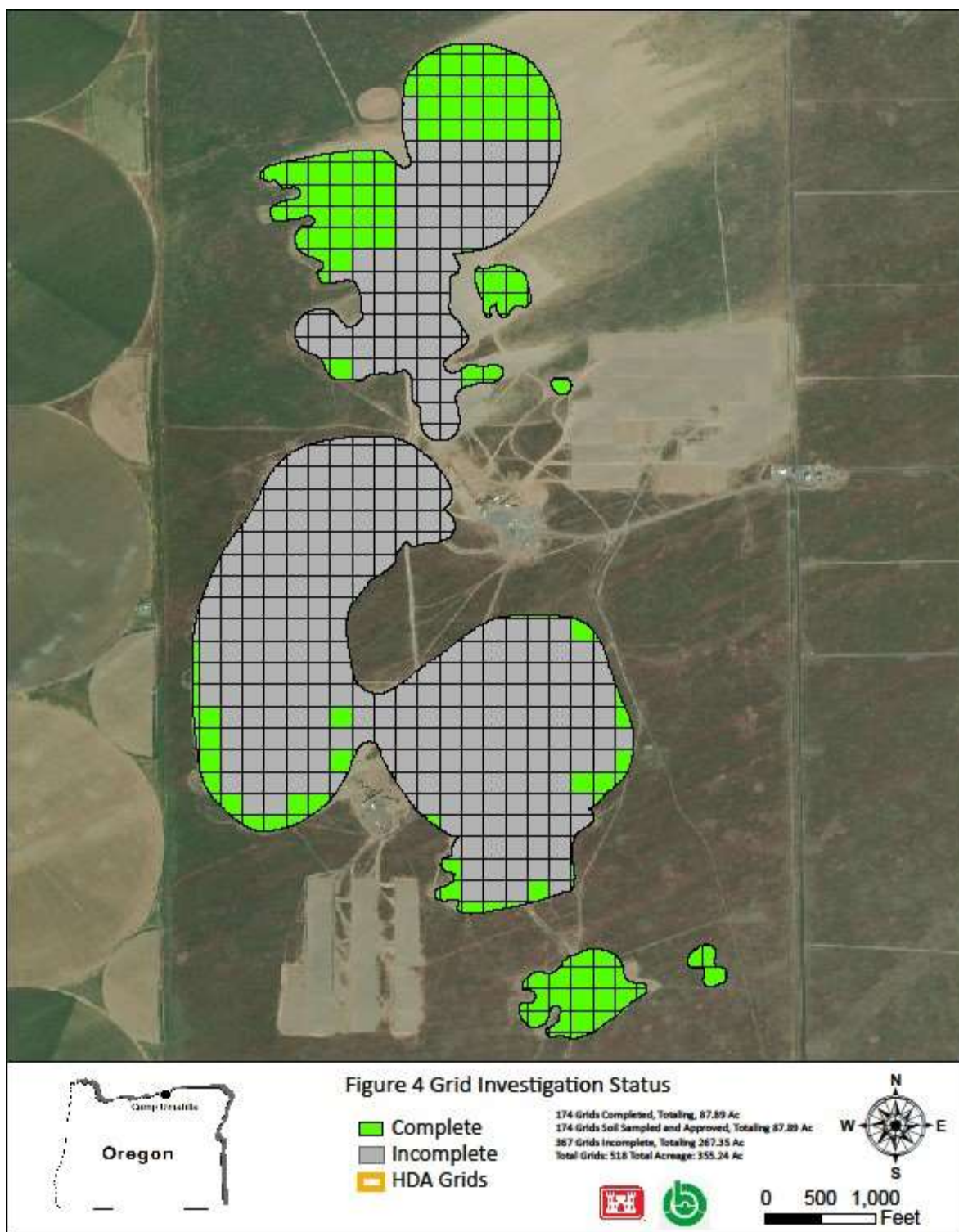


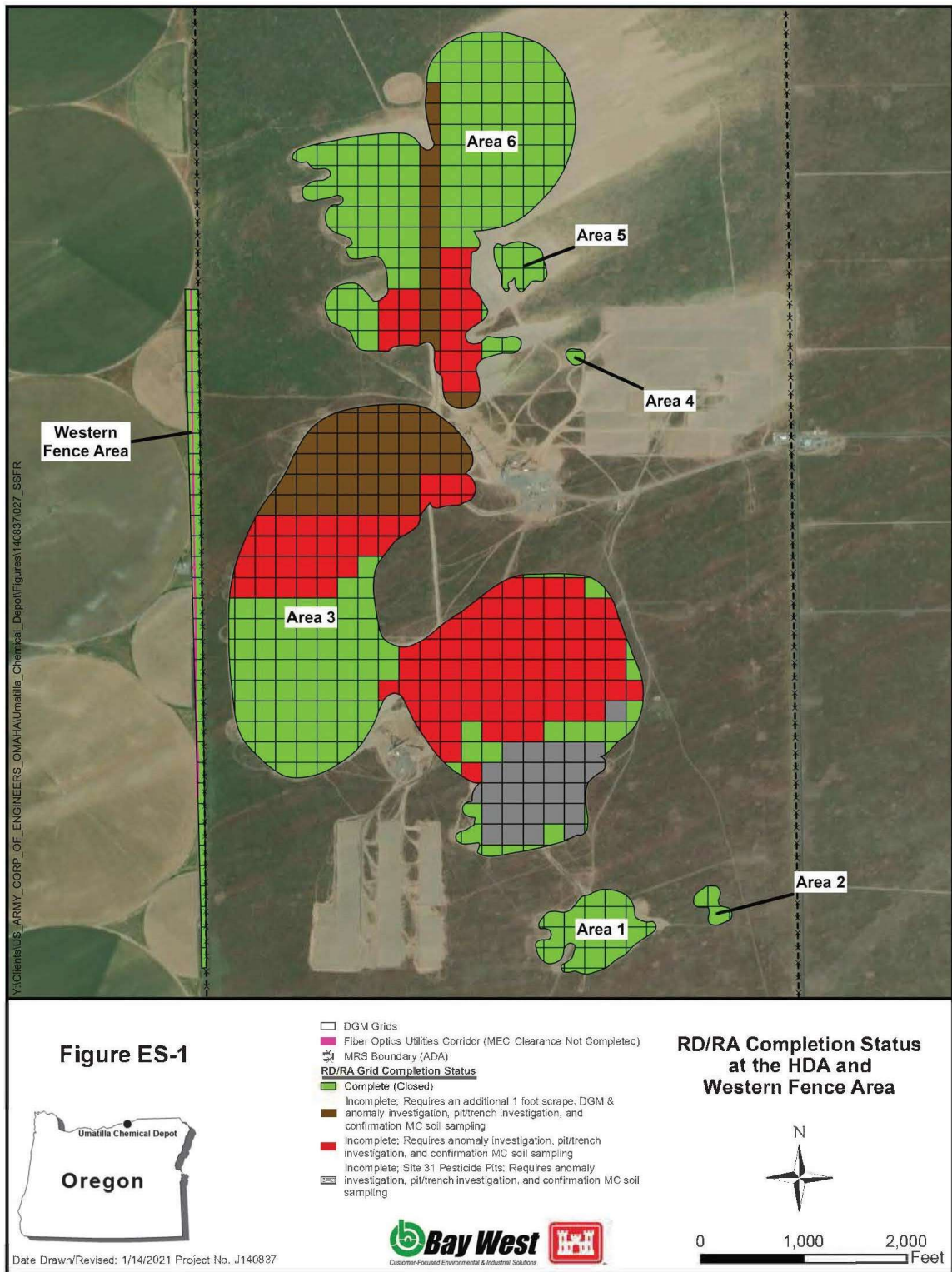












Appendix C

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION													
Site name: Umatilla Chemical Depot	Date of inspection: November 21, 2019												
Location: Umatilla, OR	EPA ID: OR6213820917												
Agency, office, or company leading the five-year review: U.S. Army	Weather/temperature:												
Remedy Includes: (Check all that apply) <table border="0"> <tbody> <tr> <td>☒ Landfill cover/containment</td> <td>☐ Monitored natural attenuation</td> </tr> <tr> <td>☐ Access controls</td> <td>☐ Groundwater containment</td> </tr> <tr> <td>☒ Institutional controls</td> <td>☐ Vertical barrier walls</td> </tr> <tr> <td>☒ Groundwater pump and treatment</td> <td></td> </tr> <tr> <td>☐ Surface water collection and treatment</td> <td></td> </tr> <tr> <td>☒ Other: Groundwater monitoring</td> <td></td> </tr> </tbody> </table> Remedies for each OU Explosives Washout Lagoon OU – Groundwater pump and treat, groundwater monitoring, institutional controls Ammunition Demolition Area OU – Soil excavation, munitions and explosives of concern removal, institutional controls Active Landfill OU – Landfill Cap		☒ Landfill cover/containment	☐ Monitored natural attenuation	☐ Access controls	☐ Groundwater containment	☒ Institutional controls	☐ Vertical barrier walls	☒ Groundwater pump and treatment		☐ Surface water collection and treatment		☒ Other: Groundwater monitoring	
☒ Landfill cover/containment	☐ Monitored natural attenuation												
☐ Access controls	☐ Groundwater containment												
☒ Institutional controls	☐ Vertical barrier walls												
☒ Groundwater pump and treatment													
☐ Surface water collection and treatment													
☒ Other: Groundwater monitoring													

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply) – Interviews were not conducted during the Site Inspection

1. **O&M site manager** _____

Name

Title

Date

Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____

Problems, suggestions; ☐ Report attached

2. **O&M staff** _____

Name

Title

Date

Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____

Problems, suggestions; ☐ Report attached

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency: _____

Contact: _____

Name

Title

Date

Phone no.

Problems; suggestions; ☐ Report attached _____

Agency: _____

Contact: _____

Name

Title

Date

Phone no.

Problems; suggestions; ☐ Report attached _____

Agency: _____

Contact: _____

Name

Title

Date

Phone no.

Problems; suggestions; ☐ Report attached _____

Agency: _____

Contact: _____

Name

Title

Date

Phone no.

Problems; suggestions; ☐ Report attached _____

4.	Other interviews (optional) ☐ Report attached.
III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)	
1.	O&M Documents ☐ O&M manual ☐ As-built drawings ☐ Maintenance logs ☒ Readily available ☒ Readily available ☒ Readily available ☐ Up to date ☐ Up to date ☐ Up to date ☐ N/A ☐ N/A ☐ N/A Remarks _____ _____
2.	Site-Specific Health and Safety Plan ☒ Readily available ☐ Up to date ☐ N/A ☐ Contingency plan/emergency response plan ☒ Readily available ☐ Up to date ☐ N/A Remarks _____ _____
3.	O&M and OSHA Training Records ☒ Readily available ☐ Up to date ☐ N/A Remarks _____ _____
4.	Permits and Service Agreements ☐ Air discharge permit ☐ Effluent discharge ☐ Waste disposal, POTW ☐ Other permits _____ ☐ Readily available ☒ Readily available ☒ Readily available ☐ Up to date ☐ Up to date ☐ Up to date ☒ N/A ☐ N/A ☐ N/A Remarks _____ _____

5.	Gas Generation Records	☐ Readily available	☐ Up to date	☒ N/A
Remarks _____				

6.	Settlement Monument Records	☐ Readily available	☐ Up to date	☒ N/A
Remarks _____				

7.	Groundwater Monitoring Records	☒ Readily available	☐ Up to date	☐ N/A
Remarks _____				

8.	Leachate Extraction Records	☐ Readily available	☐ Up to date	☒ N/A
Remarks _____				

9.	Discharge Compliance Records			
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A
	☐ Water (effluent)	☒ Readily available	☐ Up to date	☐ N/A
Remarks _____				

10.	Daily Access/Security Logs			
	☒ Readily available ☐ Up to date ☐ N/A			
Remarks: Access is limited to the Umatilla Chemical Depot.				

IV. O&M COSTS

1. O&M Organization

- ☐ State in-house
 ☐ Contractor for State
☐ PRP in-house
 ☐ Contractor for PRP
☐ Federal Facility in-house
 ☒ Contractor for Federal Facility
☐ Other _____

2. O&M Cost Records

- ☒ Readily available
 ☐ Up to date
 ☐ Funding mechanism/agreement in place

Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ ☐ Breakdown attached

Date Date Total cost

From _____ To _____ ☐ Breakdown attached

Date Date Total cost

From _____ To _____ ☐ Breakdown attached

Date Date Total cost

From _____ To _____ ☐ Breakdown attached

Date Date Total cost

From _____ To _____ ☐ Breakdown attached

Date Date Total cost

3.	Unanticipated or Unusually High O&M Costs During Review Period		
	Describe costs and reasons:		
V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A			
A. Fencing			
1.	Fencing damaged	☐ Location shown on site map	☒ Gates secured ☐ N/A
Remarks: Access to the Umatilla Chemical Depot is limited. Access to the ADA is also limited because of the on-going MEC removal work. Fences are intact and gates secured.			
B. Other Access Restrictions			
1.	Signs and other security measures	☐ Location shown on site map	☐ N/A
Remarks: Signs are posted at the landfill and ADA. One sign at the landfill has fallen down.			

C. Institutional Controls (ICs)**1. Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) _____

Frequency _____

Responsible party/agency _____

Contact _____

Name

Title

Date

Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☒ No ☐ N/A ☒ Other

problems or suggestions: ☐ Report attached

Institutional controls for the EWL OU are in place; a county ordinance is in place restricting groundwater usage on the depot. Fencing and signage are in place for the ADA OU. Signage is in place for the Active Landfill OU. A future ESD for the Active Landfill OU is anticipated, which will include land use controls.

2. Adequacy ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks:

D. General

1. Vandalism/trespassing ☐ Location shown on site map ☒ No vandalism evident

Remarks:

2.	Land use changes on site ☐ N/A	Remarks: Property ownership of parts of the ADA and EWL OUs transferred to the Oregon National Guard.
3.	Land use changes off site ☒ N/A	Remarks:
VI. GENERAL SITE CONDITIONS		
A. Roads ☐ Applicable ☐ N/A		
1.	Roads damaged ☐ Location shown on site map ☐ Roads adequate ☒ N/A	Remarks: There are no roads being maintained as part of these OUs.
B. Other Site Conditions		
Remarks:		
VII. LANDFILL COVERS ☒ Applicable ☐ N/A – For the Active Landfill OU		
A. Landfill Surface – The landfill cover is a soil cap with vegetation		
1.	Settlement (Low spots) ☐ Location shown on site map ☒ Settlement not evident Areal extent _____ Depth _____	Remarks: No settlement was observed during the site inspection.
2.	Cracks ☐ Location shown on site map ☒ Cracking not evident Lengths _____ Widths _____ Depths _____ Remarks _____ _____	

3.	Erosion	☐ Location shown on site map	☒ Erosion not evident
Areal extent _____ Depth _____			
Remarks _____ _____			
4.	Holes	☐ Location shown on site map	☐ Holes not evident
Areal extent _____ Depth _____			
Remarks _____ Animal holes were observed on the landfill cover. The cap is only a soil cap with vegetation.			
5.	Vegetative Cover	☒ Grass	☒ Cover properly established
☒ No signs of stress ☐ Trees/Shrubs (indicate size and locations on a diagram)			
Remarks _____ _____			
6.	Alternative Cover (armored rock, concrete, etc.)	☐ N/A	
Remarks _____ The toe around the landfill is rock.			
7.	Bulges	☐ Location shown on site map	☒ Bulges not evident
Areal extent _____ Height _____			
Remarks _____ _____			

8.	Wet Areas/Water Damage	☐ Wet areas/water damage not evident
	☐ Wet areas	☐ Location shown on site map Areal extent_____
	☐ Ponding	☐ Location shown on site map Areal extent_____
	☐ Seeps	☐ Location shown on site map Areal extent_____
	☐ Soft subgrade	☐ Location shown on site map Areal extent_____
Remarks:		
N/A		

9.	Slope Instability	☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability
		Areal extent_____
Remarks:		

B. Benches	☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)	

1.	Flows Bypass Bench	☐ Location shown on site map ☐ N/A or okay
	Remarks_____	

2.	Bench Breached	☐ Location shown on site map ☐ N/A or okay
	Remarks_____	

3.	Bench Overtopped	☐ Location shown on site map ☐ N/A or okay
	Remarks_____	

C. Letdown Channels	☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)	

1.	Settlement	☐ Location shown on site map	☐ No evidence of settlement
Areal extent _____ Depth _____			
Remarks _____ _____			
2.	Material Degradation	☐ Location shown on site map	☐ No evidence of degradation
Material type _____ Areal extent _____			
Remarks _____ _____			
3.	Erosion	☐ Location shown on site map	☐ No evidence of erosion
Areal extent _____ Depth _____			
Remarks _____ _____			
4.	Undercutting	☐ Location shown on site map	☐ No evidence of undercutting
Areal extent _____ Depth _____			
Remarks _____ _____			
5.	Obstructions	Type _____	☐ No obstructions
☐ Location shown on site map		Areal extent _____	
Size _____			
Remarks _____ _____			
6.	Excessive Vegetative Growth		
Type _____			
☐ No evidence of excessive growth			
☐ Vegetation in channels does not obstruct flow			
☐ Location shown on site map		Areal extent _____	
Remarks _____ _____			

D. Cover Penetrations ☐ Applicable ☒ N/A			
1.	Gas Vents	☐ N/A ☐ Active ☐ Passive ☐ Properly secured/locked ☐ Functioning	☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance Remarks _____ _____
2.	Gas Monitoring Probes	☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A	Remarks _____ _____
3.	Monitoring Wells (within surface area of landfill)	☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A	Remarks _____ _____
4.	Leachate Extraction Wells	☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A	Remarks _____ _____
5.	Settlement Monuments	☐ Located ☐ Routinely surveyed ☐ N/A	Remarks _____ _____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A		
1.	Gas Treatment Facilities	☐ Flaring ☐ Thermal destruction ☐ Collection for reuse ☐ Good condition ☐ Needs Maintenance Remarks _____ _____
2.	Gas Collection Wells, Manifolds and Piping	☐ Good condition ☐ Needs Maintenance Remarks _____ _____
3.	Gas Monitoring Facilities (<i>e.g.</i> , gas monitoring of adjacent homes or buildings)	☐ Good condition ☐ Needs Maintenance ☐ N/A Remarks _____ _____
F. Cover Drainage Layer ☐ Applicable ☒ N/A		
1.	Outlet Pipes Inspected	☐ Functioning ☐ N/A Remarks _____ _____
2.	Outlet Rock Inspected	☐ Functioning ☐ N/A Remarks _____ _____
G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A		
1.	Siltation ☐ N/A ☐ Siltation not evident Areal extent _____ Depth _____ Remarks _____ _____	

2.	Erosion	Areal extent _____	Depth _____	☐ Erosion not evident
Remarks _____ _____				
3.	Outlet Works	☐ Functioning ☐ N/A		
Remarks _____ _____				
4.	Dam	☐ Functioning ☐ N/A		
Remarks _____ _____				
H. Retaining Walls ☐ Applicable ☒ N/A				
1.	Deformations	☐ Location shown on site map ☐ Deformation not evident		
Horizontal displacement _____ Vertical displacement _____				
Rotational displacement _____				
Remarks _____ _____				
2.	Degradation	☐ Location shown on site map ☐ Degradation not evident		
Remarks _____ _____				
I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A				
1.	Siltation	☐ Location shown on site map ☐ Siltation not evident		
Areal extent _____ Depth _____				
Remarks _____ _____				
2.	Vegetative Growth	☐ Location shown on site map ☐ N/A		
☐ Vegetation does not impede flow				
Areal extent _____ Type _____				
Remarks _____ _____				

3.	Erosion	☐ Location shown on site map	☐ Erosion not evident
Areal extent_____ Depth_____			
Remarks_____			
4.	Discharge Structure	☐ Functioning	☐ N/A
Remarks_____			
VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A			
1.	Settlement	☐ Location shown on site map	☐ Settlement not evident
Areal extent_____ Depth_____			
Remarks_____			
2.	Performance Monitoring Type of monitoring_____		
☐ Performance not monitored			
Frequency_____		☐ Evidence of breaching	
Head differential_____			
Remarks_____			
IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A			
A. Groundwater Extraction Wells, Pumps, and Pipelines		☒ Applicable ☐ N/A	
1.	Pumps, Wellhead Plumbing, and Electrical		
☒ Good condition ☒ All required wells properly operating ☐ Needs Maintenance ☐ N/A			
Remarks_____			

2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances ☒ Good condition ☐ Needs Maintenance Remarks _____ _____
3.	Spare Parts and Equipment ☒ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks _____ _____
B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A	
1.	Collection Structures, Pumps, and Electrical ☐ Good condition ☐ Needs Maintenance Remarks _____ _____
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances ☐ Good condition ☐ Needs Maintenance Remarks _____ _____
3.	Spare Parts and Equipment ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks _____ _____

C. Treatment System	☒ Applicable ☐ N/A
1. Treatment Train (Check components that apply) ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation ☐ Air stripping ☒ Carbon adsorbers ☐ Filters _____ ☐ Additive (e.g., chelation agent, flocculent) _____ ☐ Others _____ ☐ Good condition ☐ Needs Maintenance ☒ Sampling ports properly marked and functional ☐ Sampling/maintenance log displayed and up to date ☒ Equipment properly identified ☐ Quantity of groundwater treated annually _____ ☐ Quantity of surface water treated annually _____ Remarks _____ _____	
2. Electrical Enclosures and Panels (properly rated and functional) ☐ N/A ☒ Good condition ☐ Needs Maintenance Remarks _____ _____	
3. Tanks, Vaults, Storage Vessels ☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance Remarks _____ _____	
4. Discharge Structure and Appurtenances ☐ N/A ☐ Good condition ☐ Needs Maintenance Remarks _____ _____	

5.	Treatment Building(s) ☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair ☒ Chemicals and equipment properly stored Remarks: A leak in the gutter of the building was observed during the site inspection.
6.	Monitoring Wells (pump and treatment remedy) ☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A Remarks _____ _____
D. Monitoring Data	
1.	Monitoring Data ☒ Is routinely submitted on time ☒ Is of acceptable quality
2.	Monitoring data suggests: ☐ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining
D. Monitored Natural Attenuation – N/A	
1.	Monitoring Wells (natural attenuation remedy) ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A Remarks _____ _____
X. OTHER REMEDIES	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.	

XI. OVERALL OBSERVATIONS	
A.	Implementation of the Remedy
	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). Based on the site inspection, it appears that the remedies are functioning as designed for each of the OUs discussed in this FYR.
B.	Adequacy of O&M
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. The O&M for the EWL OU appears to be adequate. Continued optimization of the treatment system is on-going. Pilot study results are positive in decreasing contaminant concentrations in a shorter timeframe.
C.	Early Indicators of Potential Remedy Problems
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. No early indicators of potential remedy problems were noted.
D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Using the existing three extraction wells for the remedy appears to be adequate. The current monitoring wells numbers have decreased since the initial monitoring event. As the remedy continues, wells to be monitoring could be further reduced.

Appendix D

Site Inspection Trip Report

Trip Report

Umatilla Chemical Depot

1. INTRODUCTION

- a. Date of Visit: 21 November 2019
- b. Location: Umatilla/Hermiston, Oregon
- c. Purpose: A site visit was conducted to visually inspect and document the conditions of the remedy, the site, and the surrounding area for inclusion into the Five-Year Review Report.
- d. Participants:

Alison Burcham	USACE-Seattle, Environmental Engineer	206-316-3969
Michele Lanigan	BRAC, Environmental Coordinator	541-564-5325
Dan Carlson	USACE-Seattle, Physical Scientist	206-764-6499
Joe Marsh	USACE-Seattle, Environmental Protection Specialist	206-316-3847
Lewis Kovarik	USACE-Omaha, Ordnance and Explosives Safety Specialist	402-740-4979

2. SUMMARY

The site visit occurred in November 2019. Issues observed included a fallen sign, a leaky gutter on the treatment system building, and animal burrowing in the cap cover. The leaking gutter does not currently appear to be damaging any of the system elements, however it drips directly onto one of the carbon valves.

3. DISCUSSION

Ms. Burcham met Ms. Lanigan at the BRAC office to get an overview of the site. Of particular note is that due to a recent change in the lead standard, there is a new ESD in process to add controls to the deactivation furnace area. Departed the office approximately 1045. Weather at the time was clear and 35 degrees with light wind.

Viewed infiltration field (IF-3) and wells on the way to the GETS building. The infiltration area appeared dry. Wells viewed appeared in reasonable condition. Arrived at the GETS building at approximately 1100. The contractor was onsite actively performing a GAC change out on CA-2. The building generally appeared to be in good condition and clean, though dust and cobwebs were observed on some piping. There is an exterior gutter leak dripping directly onto a valve for carbon. It does not appear to be causing any current deterioration of the metal. Labels are also peeling and paint is coming off of some of the valves.

The visit to the Washout Lagoons and associated infiltration area occurred at approximately 1115. The area appeared dry. A monitoring well near the lagoons only has two bollards and is exposed on one side.

The next area visited was the landfill cap. The signs generally appear to be in good condition, though a sign on the South side of the landfill has fallen down. There are signs of animal burrowing in the cap cover. Vegetation on the cap is generally tall, though some areas are flatted and black, likely due to animal presence. Walking along the cap indicated there are varying densities of material below the cap cover. The slopes are much softer than the center area.

The ADA had active site work occurring. Attended a status update meeting with USACE, Contractor, and BRAC representatives. Munitions recovery at the site continues.

The final location visited was the Deactivation Area. The Deactivation area is the subject of a recent ESD. Departed site approximately 1500 and temperature had increased to 44 degrees and sunny.

Returned to the site the following morning at approximately 0830 to observe regular sampling being performed by Dan Carlson and Joe Marsh. There were no issues with sampling at the well observed. Temperature was approximately 28 degrees with no wind, but dense fog.

4. ACTIONS

The USACE will incorporate information obtained from the site visit into the Five Year Review report.

Alison T. Burcham
Environmental Engineer
CENWS-ENT-E

Site Visit Photos

Groundwater Treatment



Typical well condition on site (pictured: 4-116)



Infiltration area (IF-3)



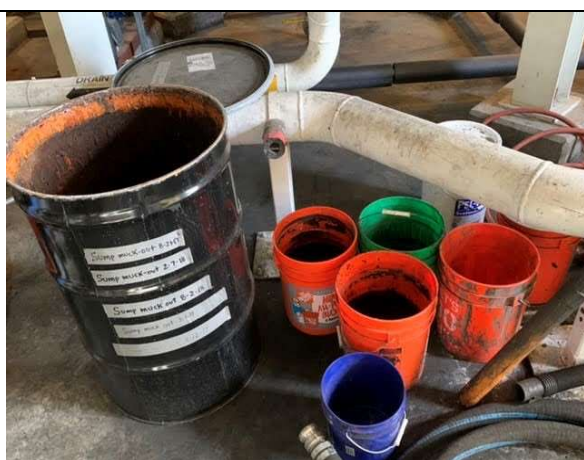
Exterior front of the GETS building



Storage tanks in front of the GETS building



Lockers in front of GETS building



Containers inside GETS building



Valves next to ST-1



GETS Influent piping



Storage shelving in GETS building



GETS Display

GETS Control Panel



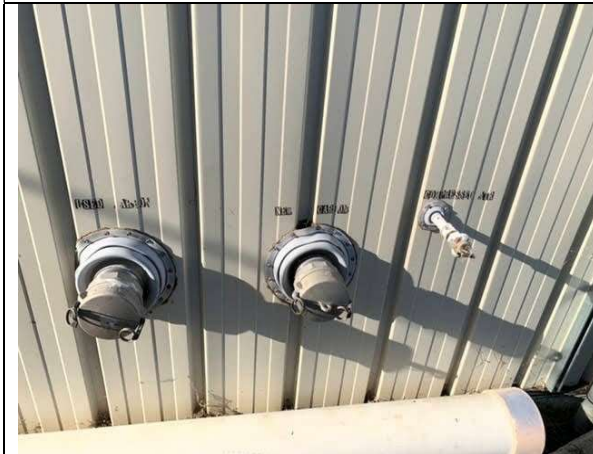
Exterior tank (View 1)



Exterior tank (View 2)



Exterior tank (View 3)



Exterior valves



New carbon entering the building



Exterior drum storage



Leaking gutter with location of leak and drip path



Lagoon area

Peeling labels and paint



Lagoon area with Lagoon Infiltration Field in the background



Well near washout lagoons with only two bollards



Lagoon Infiltration Field



Extraction Well

Active Landfill



Landfill Cap (Southern side)



Landfill sign



Landfill



Rock at landfill toe



Animal burrows in landfill cap



Flattened and dark vegetation on landfill cap

Ammunition Disposal Area (ADA)



Examples of munitions debris recovered from the ADA



Entrance to ADA



ADA Plant one



ADA Entrance with Construction sign



ADA Staging Area



Recovered MEC Items

Deactivation Furnace Area



Well Sampling



Appendix E

Site Interviews

Five-Year Review Interview Record				
Site:	Umatilla Chemical Depot			EPA ID No: OR62132820917
Interview Type: Email				
Location of Interview: N/A				
Date: 11/26/2019				
Interviewees				
Name	Organization	Title	Telephone	Email
Blair Kinser	CENWS	Project Manager	2067646875	Blair.c.kinser@usace.army.mil
Summary of Questions				
1) What is your overall impression of the project? Concerning the groundwater OU the Groundwater Extraction Treatment System (GETS) has been running for almost 30 years. The plume has shrunk significantly; however, the RDX persist above ROD cleanup levels. The treatment plant continues to operate as expected to contain and remove RDX from the groundwater. 2) Is the remedy functioning as expected? How well is the remedy performing? The remedy is containing the RDX plume as expected. RDX still persist due to a continuing RDX source in the vadose zone. The remedy should consider whether the non-confined aquifer will be used for residential use and if not LUC and a revised risk assessment should occur to determine a cleanup level for industrial standards as the site is not used for residential and the water impacted is only in the non-confined aquifer which has minimal beneficial use. 3) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? The plume continues to shrink in extent due to the GETS operating at full capacity. Contaminant levels continue to decrease; however, during groundwater fluctuations in the source area, contamination concentrations do increase due to RDX leaching in the source area vadose zone. 4) Is there a continuous O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities. No. O&M occurs once a day every month and includes cleaning, minor repairs and replacements, and vegetation control. If a shutdown occurs, the staff can remotely restart the system. If that does not work staff are sent to the site to correct the shutdown. 5) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines in the last five years? If so, do they affect protectiveness of the remedy? Please describe changes and impacts. No. 6) What are the annual operating costs for your organization's involvement with the site? \$100K for onsite sampling and oversight of the O&M contract. 7) Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details. No. 8) Have there been opportunities to optimize O&M or sampling efforts? Would any of the OUs benefit from an enhanced remedy? Please describe changes and resultant or desired cost savings or improved efficiency. No. Enhanced remedy at the source area with bioremediation is a way to resolve the source in the vadose zone. 9) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the remedy? No.				

Umatilla Chemical Depot Fifth Five Year Review

Five-Year Review Interview Record				
Site: <u>Umatilla Chemical Depot</u>		EPA ID No: <u>OR62132620917</u>		
Interview Type: <u>Email</u>				
Location of Interview:				
Date: <u>12/16/19</u>				
Interviewees				
Name	Organization	Title	Telephone	Email
Michele Lanigan	Army BRAC	BRAC Environmental Coordinator	541-564-5325	Michele.m.lanigan.civ@mail.mil
Summary of Questions				
1) What is your overall impression of the project? ADA: Field clean-up work should be completed this year. Ground water: This is a long term project. The eastern plume has an OPS memo in place. Land Use Controls will protect the area while pump & treat continues. This plume in this area has drastically reduced since the installation of well 6. The main part of the plume is stable and more effort will need to be applied to this area in the future, as the east plume shrinks. Landfill: This site has been closed and monitoring discontinued. PFAS: this project is being tracked by Joint Base Lewis McCord for the CDA property. There have been no incidents of PFAS in their sampling. The Guard has their own PFAS program. 2) Is the remedy functioning as expected? How well is the remedy performing? Yes, see #1 3) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? Yes, for the groundwater, particularly in the east plume The ADA is physically being cleaned. 4) Is there a continuous O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities. Yes, for the pump and treat system. There is an O&M contract in place. The pump and treat system is actually on the National Guard Property and funded by the Guard (so defer to them) 5) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines in the last five years? If so, do they affect protectiveness of the remedy? Please describe changes and impacts. Defer to the Guard. 6) What are the annual operating costs for your organization's involvement with the site? Defer to the National Guard for Pump & Treat For the landfill, it's minimal. Just making sure signs are up. 7) Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details. no, the last 2 contracts were written to allow flexibility. 8) Have there been opportunities to optimize O&M or sampling efforts? Would any of the OUs benefit from an enhanced remedy? Please describe changes and resultant or desired cost savings or improved efficiency. no 9) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the remedy? no 10) Do you have any comments, suggestions, or recommendations regarding the project? The Landfill will be leaving federal control when the property transfers. The LUC will be recorded in and Easement and Equitable Servitude upon transfer.				

Umatilla Chemical Depot Fifth Five Year Review

Five-Year Review Interview Record				
Site:	Umatilla Chemical Depot			EPA ID No: OR62132820917
Interview Type: Email				
Location of Interview:				
Date: 4 December 2019				
Interviewees				
Name	Organization	Title	Telephone	Email
Adam Plack	USACE Omaha	Project Manager	402-995-2755	Adam.R.Plack@usace.army.mil
Summary of Questions				
1) What is your overall impression of the project? My impression is that the Umatilla ADA Remedial Action (RA) project is going well. Significant progress is being made. 2) Is the remedy functioning as expected? How well is the remedy performing? The RA technical approach is functioning as expected. Areas are being mechanically scraped, geophysically mapped, and anomalies identified by the geophysical mapping are being intrusively interrogated. The RA technical approach is effectively removing subsurface munitions and soils contaminated with munitions constituents. 3) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? The geophysical data continues to result in a revised definition of the site. It's allowing for a more accurate estimate of the number of anomalies that require clearance in the High Density Area and provides a basis for a better understanding of the location, dimensions, and quantity of pits and trenches. The data is continually being used to quantify an estimated amount of additional subsurface contamination and associated remediation. Based on the site data and quantity of MEC recovered to date, the RA technical approach is removing a substantial amount of contamination. 4) Is there a continuous O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities. The RA project has been contracted by the USACE Omaha District. The contractor is executing the RA. The USACE Omaha District is providing continuous on-site support from an Ordnance and Explosives Safety Specialist. The on-site personnel ensures quality assurance and safety. Inspections are performed daily. 5) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines in the last five years? If so, do they affect protectiveness of the remedy? Please describe changes and impacts. Because there is more subsurface contamination on site than what could have been expected, additional remediation has been performed. Therefore, the RA scheduled has increased. The additional subsurface contamination will not affect the protectiveness of the remedy. 6) What are the annual operating costs for your organization's involvement with the site? The annual in-house costs for the USACE's support of the project is approximately \$645,000. 7) Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details. The results from the geophysical mapping have led to the conclusion that substantially more material is buried than what could have been previously anticipated and that there are significantly more highly saturated areas than originally assumed. The results have had an impact on subsequent MEC remediation efforts, and are the cause for unexpected cost increases. More remedial quantities needed to be added to the contract scope to clear the remaining subsurface contamination at the site and achieve the ROD objectives. 8) Have there been opportunities to optimize O&M or sampling efforts? Would any of the OUs benefit from an enhanced remedy? Please describe changes and resultant or desired cost savings or improved efficiency. An effective and cost efficient method to remove shallow subsurface clutter is to re-scrape the area to an additional one foot and re-map with DGM. It's been found that re-scraping results in a good reduction of the subsurface debris and masking, and provides for better characterization of the subsurface features. It better allows for more effective target interrogation and treatment of small pits/trenches through manual excavation or mechanized excavation with an excavator.				

Umatilla Chemical Depot Fifth Five Year Review

Appendix F

EPA Settlement Agreement

SETTLEMENT AGREEMENT
Concerning Umatilla ADA Remedial Action Completion Report

THIS SETTLEMENT AGREEMENT is made by and between the United States of America Department of the Army (ARMY), the Oregon Department of Environmental Quality (ODEQ) and the United State of America Environmental Protection Agency (EPA).

Whereas on April 18, 2015, the ARMY failed to submit a complete draft final Remedial Action Completion Report (RACR) for the Umatilla Ammunition Demolition Activity (ADA) Operable Unit to EPA and the ODEQ on March 7, 2015 and a complete draft final RACR on April 18, 2015, as required by Section 2.1 and Figure 2-2 Baseline Schedule of the approved ADA Remedial Design/Remedial Action (RD/RA) Workplan, dated February 2014;

Whereas EPA issued a Notice of Violation (NOV) dated November 2, 2015 to the ARMY for failing to submit the required draft and draft final ADA RACR in accordance with the approved ADA RD/RA Workplan, as required under § 8.11 of the U.S. Army Umatilla Depot Federal Facilities Agreement under CERCLA Section 120;

Whereas the Army submitted a request to modify the approved ADA Remedial Design/Remedial Action (RD/RA) Workplan on November 2, 2015, and submitted a request to modify the workplan and to extend the schedule for completing the second phase of the Military Munitions Response Program Remedial Design/ Remedial Action at the ADA on April 7, 2016;

Whereas the Army, ODEQ and EPA wish to resolve and settle this matter as set forth below.

NOW, THEREFORE, IT IS AGREED THAT:

1. This Settlement Agreement shall apply and be binding upon EPA, ODEQ, and the ARMY, and their officers, directors, employees, successors and assigns.
2. The ARMY stipulates that EPA has jurisdiction over the subject matter alleged and that penalties can be assessed. The ARMY waives any defenses it might have as to jurisdiction and venue, and without admitting or denying the facts or that violations have occurred, the ARMY consents to the terms of this Settlement Agreement.
3. The ARMY hereby waives it rights to any administrative proceedings on any issues of law or fact related to the failure to complete work required under the approved ADA RD/RA Workplan.
4. Pursuant to Section 109 of CERCLA and Section XXIII of the U.S. Army Umatilla Depot Federal Facility Agreement under CERCLA Section 120 (Umatilla FFA), and in consideration of the nature of the alleged failures, and other relevant factors, EPA has determined that an appropriate civil stipulated penalty to settle this matter is in the amount of \$125,000.
5. The ARMY consents to the Settlement Agreement, and for the purposes of settlement, to the payment of the civil stipulated penalty cited in the foregoing paragraph.

6. The Army shall pay the stipulated penalty to the Hazardous Substances Response Trust Fund in the manner and to the extent expressly provided for in Acts authorizing funds for, and appropriations to, the Department of Defense, as required under Section XIII of the Umatilla FFA. Upon such authorization of funds for and appropriations to the Department of Defense, the Army will notify EPA and make payment in accordance with payment instructions provided by EPA.
7. As provided in Attachment A, the Army shall submit a revised ADA RD/RA Workplan which will, among other things, establish new dates for submission of the draft and draft final ADA RACR when approved in accordance with the Umatilla FFA.
8. The Settlement Agreement constitutes a settlement by EPA of all claims for penalties pursuant to the Umatilla FFA for violations of CERCLA for the failure to submit the required draft ADA RACR on March 7, 2015 and the draft final RACR on April 18, 2015, provided the Army submits a revised ADA RD/RA Workplan in accordance with Attachment A.
9. Compliance with this Settlement Agreement shall not be a defense to any actions subsequently commenced pursuant to the Umatilla FFA and federal laws and regulations administered by EPA. It is the responsibility of the ARMY to comply with the Umatilla FFA and such laws and regulations, including the attached schedule and requirements for submitting a revised ADA RD/RA Workplan.
10. Each undersigned representative of the parties to this Settlement Agreement certifies that he or she is fully authorized by the party represented to enter into the terms and conditions of this Settlement Agreement and to execute and legally bind that party to it.
11. Nothing in this Settlement Agreement shall be interpreted to require obligations or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. § 1341.

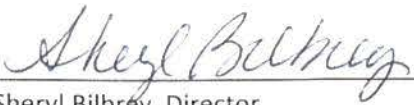
Each party shall bear its own costs and attorney's fees in connection with the action resolved by this Settlement Agreement.



Rene Terrell, Acting Chief
Base Realignment and Closure Division
U.S. Army

Date: _____

7/14/14



Date 6/29/16

Sheryl Bilbray, Director
Office of Environmental Cleanup
U.S. Environmental Protection Agency,
Region 10

Date: _____
Linda Hayes-Gorman, Eastern Region Division Administrator
Oregon Department of Environmental Quality

Attachment A

Schedule and requirements for submitting a Revised RD/RA ADA Workplan for Approval

Under the Umatilla FFA

In accordance with the Federal Facility Agreement the Army shall submit a revised draft ADA RD/RA Workplan to EPA and ODEQ for review and comment on or before October 21, 2016, and a draft final ADA RD/RA Workplan to EPA and ODEQ on or before December 22, 2016, which shall include the following revisions:

1. Revise the overall MEC clearance depth in the ADA from 4 feet to 3 feet below ground surface (bgs);
2. Plans for completing required MEC clearance in the 355 acre High Anomaly Density Area (HADA) to depth of 3 feet bgs;
3. Plans for completing the required MEC clearance to depth of the disposal pits, trenches, and Open Burn/Open Detonation (OB/OD) rework areas within the HADA;
4. Plans for MEC clearance of the previously identified STOLS anomalies in the ORNG ranges to depth of 3 feet bgs; and
5. Appropriate timetables and schedules for completing the revised ADA RD/RA Workplan and submitting a Draft RACR on or before August 23, 2019 and a Draft Final RACR on or before October 23, 2019.

Appendix G

EPA Letters;

Protectiveness Statements



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

OSWER 9200.2-111

SEP 13 2012

MEMORANDUM

SUBJECT: Clarifying the Use of Protectiveness Determinations for Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Reviews

FROM: James E. Woolford, Director 
Office of Superfund Remediation and Technology Innovation

Reggie Cheatham, Director 
Federal Facilities Restoration and Reuse Office

TO: National Superfund Program Managers, Region 1-10

PURPOSE

The purpose of this memorandum is to clarify the use of protectiveness determinations in Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Five-Year Reviews (FYR). It provides general guidance for the use of specific protectiveness determinations and recommends language to be used when drafting a protectiveness statement. The information provided in this memorandum supplements, but does not supersede, the language in the "Comprehensive Five-Year Review Guidance," OSWER No. 9355.7-03B-P (June 2001).

BACKGROUND

An audit by the Office of Inspector General (OIG) entitled "Stronger Management Controls Will Improve EPA Five-Year Reviews of Superfund Sites" issued February 6, 2012 identified situations where data provided in a FYR report did not fully support the region's protectiveness determination. Specifically, the OIG identified situations where the regions did not follow agency guidance for making protectiveness determinations for remedies under construction and concluded that short-term protectiveness was not adequately defined in Agency guidance. As a result, the OIG recommended that the Office of Solid Waste and Emergency Response (OSWER) clearly define the protectiveness categories used in Agency guidance and ensure that protectiveness definitions are consistently applied across the Agency.

The purpose of a FYR is to evaluate the implementation and performance of a remedy in order to determine if the remedy is or will be protective of human health and the environment. Protectiveness is generally defined in the National Contingency Plan (NCP) by the risk range for carcinogens and the hazard index (HI) for non-cancer effects. Evaluation of the remedy and the determination of protectiveness should be based on and sufficiently supported by data and observations. Consistent with the "*Comprehensive Five-Year Review Guidance*," a discussion of this evaluation should be described and presented in the FYR report, along with the protectiveness determination.

IMPLEMENTATION

To assess the protectiveness of the remedy, it is important to evaluate human health risks, ecological risks, and the general performance of the selected remedy. To facilitate this evaluation, a technical assessment of a remedy is conducted to answer the following questions. The answers to these questions provide a framework for organizing and evaluating the FYR data and information:

Question A –Is the remedy functioning as intended by the decision documents?

Question B – Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Question C – Has any other information come to light that could call into question the protectiveness of the remedy?

Evaluating Remedy Protectiveness

For CERCLA sites that require a FYR, a separate protectiveness statement is required for each operable unit (OU) where the remedial action is currently underway or remedial construction is complete. If the site is construction complete, a site-wide protectiveness determination is also required and will generally be the same protectiveness determination as the least protective OU at the site.

The OSWER "*Comprehensive Five-Year Review Guidance*" defines five protectiveness categories: protective, short-term protective, will be protective, protectiveness deferred, and not protective. The following discussion provides general guidance for the use of the specific protectiveness determinations and recommends language to be used when drafting the protectiveness statement for the FYR report.

Protective

A protectiveness determination of "protective" may be appropriate for remedies where:

- Construction activities are complete and remedy is operating; or
- Construction activities are complete, remedial action objectives (RAOs) have been achieved, and operation and maintenance activities are occurring.

A protectiveness determination of "protective" is typically used when the answers to Questions A, B and C provide sufficient data and documentation to conclude that the remedy is functioning as intended and all human and ecological risks are currently under control and are anticipated to be under control in the

future.

Recommended Language for a Protectiveness Determination of “Protective”

“The remedy at OUX is protective of human health and the environment.”

The Remedial Project Manager should briefly describe in a separate paragraph below the protectiveness statement the elements of the remedy that protect human health and the environment and how the RAOs have been met or are being met.

Short-Term Protective

A protectiveness determination of “short-term protective” may be appropriate for remedies where:

- Construction activities are complete and remedy is operating; or
- Construction activities are complete, remedial action objectives have been achieved, and operation and maintenance activities are occurring.

A protective determination of “short-term protective” is typically used when the answers to Questions A, B and C provide sufficient data and documentation to conclude that the human and ecological exposures are currently under control and no unacceptable risks are occurring. However, the data and/or documentation review also raise issues that could impact future protectiveness or remedy performance but not current protectiveness. Examples of scenarios that may result in a short-term protectiveness determination may include:

- No exposure is occurring but institutional controls have not been fully implemented;
- Future land use assumptions may have changed;
- Engineering performance issues related to the operation of the remedy; or
- Monitoring data indicates that remedy will not achieve goals in the anticipated time frame

Recommended Language for a Protectiveness Determination of “Short-Term Protective”

“The remedy at OUX currently protects human health and the environment because (describe the elements of the remedy that protect human health and the environment in the short-term). However, in order for the remedy to be protective in the long-term, the following actions need to be taken (describe the actions needed) to ensure protectiveness.

Will be Protective

A protectiveness determination of “will be protective” may be appropriate for remedies where:

- Construction activities are ongoing

A protective determination of “will be protective” is typically used when the answers to Questions A, B and C provide sufficient data and documentation to conclude that the human and ecological exposures are currently under control and no unacceptable risks are occurring in those areas. In addition, answers

to Questions A, B and C also indicate that the remedy under construction is anticipated to be protective upon completion and no remedy implementation or performance issues have been identified.

Recommended Language for a Protectiveness Determination of “Will Be Protective”

“The remedy at OUX is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.”

Protectiveness Deferred

A protectiveness determination of “protectiveness deferred” may be appropriate for remedies where:

- Construction activities are ongoing;
- Construction activities are complete and remedy is operating; or
- Construction activities are complete, remedial action objectives have been achieved, and operation and maintenance activities are occurring.

This protective determination is generally used when the available information to answer Questions A, B and C does not provide sufficient data and documentation to conclude that all human and ecological risks are currently under control and no unacceptable exposures are occurring. Examples of scenarios that may result in a “protectiveness deferred” determination include:

- A new exposure pathway (e.g., vapor intrusion) has been identified and additional data are required to determine if an unacceptable risk is occurring;
- An emerging contaminant is present and the current risk has not been evaluated;
- An ecological risk assessment has never been adequately addressed at the site; or
- The toxicity value has changed and it unclear whether the current remedy at a site is protective or whether the selected remedy can achieve the new risk-based cleanup level.

When a protectiveness deferred determination is made, the protectiveness statement generally discusses the actions needed to collect the missing information and the timeframe anticipated to complete these actions. Once the necessary data and/or information are obtained, a Five-Year Review addendum is typically completed that documents the protectiveness determination for the OU(s) where the protectiveness had been deferred.

Recommended Language for a Protectiveness Determination of “Protectiveness Deferred”

“A protectiveness determination of the remedy at OU X cannot be made at this time until further information is obtained. Further information will be obtained by taking the following actions (describe the actions). It is expected that these actions will take approximately (insert time frame) to complete, at which time a protectiveness determination will be made.”

Not Protective

A protectiveness determination of “not protective” may be appropriate for remedies where:

- Construction activities are ongoing;
- Construction activities are complete and remedy is operating; or
- Construction activities are complete, remedial action objectives have been achieved, and operation and maintenance activities are occurring.

A protectiveness determination of “not protective” is generally used when the answers to Questions A, B and C provide adequate data and documentation to conclude that the human and/or ecological risks are not currently under control. Examples of scenarios that may result in a “not protective” determination include:

- An immediate threat is present (ex. new exposure pathway identified and it is reasonably likely to assume that unacceptable exposures are occurring)
- Migration of contaminants is uncontrolled and poses an unacceptable risk to human health and the environment; or
- Potential or actual exposure is clearly present or there is evidence of exposure

Recommended Language for a Protectiveness Determination of “Not Protective”

“The remedy at OU X is not protective because of the following issues(s) (describe each issue). The following actions need to be taken (describe the actions needed) to ensure protectiveness.”

CONCLUSION

A five-year review should determine whether the remedy at a site is or upon completion will be protective of human health and the environment. The level of effort necessary to conduct a five-year review is site-specific and should be tailored appropriately for the remedial action and its stage of implementation.

If you have any questions, please contact David Cooper at (703) 603-8763 or at cooper.davide@epa.gov.

cc: Barnes Johnson, OSWER/OSRTI
Phyllis Anderson, OSWER/OSRTI
Bruce Means, OSWER/OSRTI
David Cooper, OSWER/OSRTI
John Michaud, OGC
David Kling, FFEO
Construction and Post Construction Management Branch, OSWER/OSRTI
Regional Five-Year Review Coordinators, Regions 1-10
NARPM Co-Chairs



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10**

1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3188

SUPERFUND &
EMERGENCY
MANAGEMENT
DIVISION

September 25, 2020

Thomas E. Lederle
Chief, DCS, G-9 BRAC Division
Department of the Army
Office of the Deputy Chief of Staff, G-9
600 Army Pentagon
Washington, DC 20310-0600

Re: CERCLA Fifth Five-Year Review Umatilla Army Depot, Hermiston, Oregon

Dear Mr. Lederle:

This letter is in reference to the Fifth Five-Year Review Report for the Umatilla Army Depot (Umatilla), Hermiston, Oregon. The statutory deadline for completing this Five-Year Review for Umatilla is September 30, 2020. However, as of September 18, 2020, the U.S. Environmental Protection Agency (EPA) had not received a Five-Year Review Report from the United States Army (Army). While it is EPA's understanding that the Army staff hope to submit a draft Five-Year Review Report in the near term, please note that EPA cannot grant extensions to statutory deadlines. It is also concerning that the Army never produced a Fourth Five-Year Review Report.

Five-Year Reviews are prepared to fulfill the requirements of Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9621 (c). Pursuant to 40 CFR § 300.430(f)(4)(ii), reviews no less often than every five years are required of any remedial actions that have been selected in Records of Decision that do not allow for unlimited use and unrestricted exposure (UU/UE). The primary purpose of Five-Year Reviews is to provide determinations as to whether remedial actions remain protective of public health and the environment. The Army failed to make these determinations for Umatilla in 2015 and it appears will not do so in a timely manner in 2020 as well.

EPA ordinarily makes an independent protectiveness determination based on the current report provided by the Army. However, because EPA has not received the draft Five-Year Review Report, EPA's protectiveness determination is based on EPA's knowledge of the site and on EPA's review of other documents submitted by the Army.

Our review was conducted in accordance with EPA's "Comprehensive Five-Year Review Guidance" (OSWER Directive No. 9355.7-03B-P) and other relevant guidance. The remedies for the following Operable Units (OU) do not meet UU/UE criteria and are accordingly subject to five-year review protectiveness determinations:

- Explosives Washout Lagoon Groundwater (EWL-GW) OU
- Ammunition Demolition Activity (ADA) OU
- Deactivation Furnace OU

- Active Landfill OU

The remedies that are considered protective by EPA at this time are:

- Explosives Washout Lagoons Groundwater OU
- Deactivation Furnace OU

Due to a claimed budget shortfall, the Army has halted remedial action for the ADA OU. Although the Army has represented that it is restricting access to the ADA OU in order to prevent exposure to contamination, it is essential to the long term protection of public health and the environment for the Army to obtain funding and complete the remedial action.

Based on information provided by the Army, Munitions and Explosives of Concern (MEC) have been identified on private property which borders the west side of the ADA OU, but the full nature and extent of this MEC contamination has not yet been evaluated by the Army. In addition, it appears that no Land Use Controls (LUCs) or access controls are in place to prevent potential exposure to these MEC hazards on private property. As such, EPA has determined that the ADA OU is “not protective” under the EPA Five Year Review guidance.

With respect to Per and Poly Fluoroalkyl Substances (PFAS), EPA is not aware of any investigation or cleanup at Umatilla addressing PFAS. PFAS are potentially present in a number of materials, including landfill wastes and as binders in explosives, propellants, and pyrotechnic materials. PFAS are pollutants or contaminants under CERCLA and may have been released into groundwater at the Active Landfill and ADA OUs. The Army needs to conduct PFAS investigations at these two OUs to determine whether cleanup action is necessary.

Please be aware that EPA will review and provide comments on the draft Fifth Five-Year Review Report after it is submitted by the Army. EPA will be reporting to Congress a “not protective” determination for the private property component of ADA OU and a need for investigation and potential cleanup of PFAS in groundwater at the Active Landfill and ADA OUs. In addition, EPA will be reporting the incomplete performance of remedial action for the federal property portion of ADA OU. EPA also reports annually to Congress on the progress made towards achieving and determining protectiveness and will look to the Army in providing progress updates for that purpose.

In order for the ADA OU remedy to be considered protective for the adjoining private property, the following actions must be taken by the Army:

- 1) Submit a draft Geophysical Site Investigation Workplan to EPA and Oregon Department of Environmental Quality (DEQ) for review and approval to fully characterize the nature and extent of MEC contamination on private property. The Army should submit the draft Workplan to EPA and DEQ by January 1, 2021.
- 2) Based on the results of the Geophysical investigation and applicable cleanup criteria, the Army must determine whether cleanup action is necessary to address MEC on private property. If so, the Army must expeditiously initiate the appropriate response actions in accordance with all requirements of the Umatilla Federal Facility Agreement and CERCLA.

In order for the remedies for the Active Landfill OU and ADA OU groundwater to remain protective, the following actions must be taken by the Army:

- 1) Submit a draft Sampling and Analysis Plan (SAP)/Quality Assurance Project Plan (QAPP) to EPA and Oregon DEQ for review and approval for PFAS groundwater investigation of existing

monitoring wells at the Active Landfill and ADA OUs. The Army should submit a draft PFAS SAP/QAPP Workplan by April 1, 2021.

- 2) The Army should screen the results of the PFAS groundwater investigation based on EPA's current PFAS Guidance of Dec 2019.
- 3) If there is PFAS in groundwater that presents a threat or potential threat to public health or the environment, the Army must expeditiously initiate the appropriate response actions in accordance with all requirements of the Umatilla Federal Facility Agreement and CERCLA.

In order for the remedy for the federal property portion of ADA OU to achieve long term protectiveness, the Army must obtain funding and complete the remedial action.

EPA has evaluated the Superfund Performance Measures for Umatilla and has determined the status is as follows:

Environmental Indicators

- Human Exposure - Not Under Control
- Groundwater Migration - Under Control

EPA reaffirms its commitment to working in partnership with the Army to expeditiously facilitate cleanup at Umatilla in a manner that is protective of public health and the environment. In keeping with that partnership, we request your assistance in making every effort to provide EPA with sufficient time to offer timely reviews and support of the Army cleanup efforts, including those related to Five-Year Reviews. The statutory deadline for completing the next Five-Year Review for Umatilla will be September 30, 2025.

If you have any questions concerning this matter, please contact me or have your staff contact Harry Craig of my staff by e-mail at: craig.harry@epa.gov, or by phone at 503-326-3689.

Sincerely,

CALVIN
TERADA

Digitally signed by
CALVIN TERADA
Date: 2020.09.25
13:56:16 -07'00'

Calvin J. Terada
Director

Cc: Michele Lanigan, UMCD
Dan Duso, Oregon DEQ
David Anderson, Oregon DEQ
David Connolly, National Guard Bureau
Jim Arnold, Oregon National Guard