

SECOND FIVE YEAR REVIEW REPORT

for

Umatilla Chemical Depot

Hermiston

Umatilla and Morrow Counties, Oregon

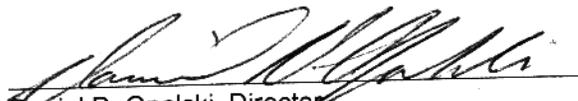
October 2004

PREPARED BY:

**United States Army Corps of Engineers
Seattle District**

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SECOND FIVE YEAR REVIEW
UMATILLA CHEMICAL DEPOT

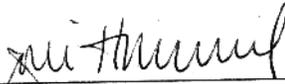
This signature sheet documents the United States Environmental Protection Agency concurrence with the second Five-Year Review for the Umatilla Chemical Depot.


Daniel D. Opalski, Director
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UMATILLA CHEMICAL DEPOT

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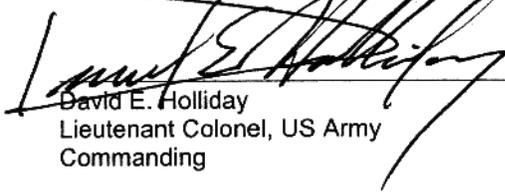
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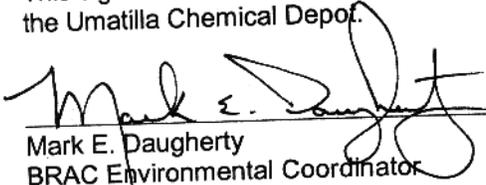
This signature sheet documents the United States Army acceptance of the second Five-Year Review for the Umatilla Chemical Depot.


David E. Holliday
Lieutenant Colonel, US Army
Commanding

31 OCT 09
DATE

LEAD AGENCY SIGNATURE
SECOND FIVE YEAR REVIEW
UMATILLA CHEMICAL DEPOT

This signature sheet documents the United States Army acceptance of the second Five-Year Review for the Umatilla Chemical Depot.


Mark E. Daugherty
BRAC Environmental Coordinator
Umatilla Chemical Depot

10/31/04
DATE

FIVE-YEAR REVIEW REPORT

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List of Acronyms

ADA	Ammunition Demolition Activity
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DRMO	Defense Re-utilization Marketing Office
EE/CA	Engineering Evaluation Cost Analysis
EPA	Environmental Protection Agency
ESD	Explanation of Significant Difference
gpm	gallons per minute
MCL	Maximum Contaminant Level
MEC	Munitions and Explosives of Concern
MPPEH	Materials Potentially Presenting an Explosive Hazard
MTADS	Multiple-sensor Towed Array Detection System
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
ODEQ	Oregon Department of Environmental Quality
OU	Operable Unit
PCB	Polychlorinated Biphenyl
ppm	parts per million
QA	Quality Assurance
RA	Remedial Action
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
ROD	Record of Decision
TAL	Target Analyte List
TCLP	Toxicity Characteristic Leaching Procedure
USACE	US Army Corps of Engineers
UXO	Unexploded Ordnance

Executive Summary

This second five year review covers selected remedies for Operable Units (OUs) at Umatilla Chemical Depot that were recommended for further five year reviews in the first (September 30, 1999) five year review, as well as those OUs where subsequent five year reviews were not required but where there were changes since the 1999 review.

The 1999 review concluded that for the Explosive Washout Lagoons Soils, Explosives Washout Plant, Deactivation Furnace Soils, Miscellaneous Sites, Active Landfill (hereafter referred to as the Landfill), and Inactive Landfills OUs, the selected remedies “did not result in hazardous substances remaining on-site above levels that allow for unlimited and unrestricted use.” The 1999 review further concluded that “no CERCLA Five Year Review Requirements will apply” to the remedial actions undertaken at these OUs, and that these OUs did not “require any long-term management or review.” The Miscellaneous Sites and the Landfill OUs, however, are addressed in this follow-up review because of changes in those OUs since the 1999 review.

For two other OUs -- the Explosive Washout Lagoons Groundwater OU and Ammunition Demolition Activity OU -- the 1999 review concluded that remedial actions at these OUs resulted “in hazardous substances remaining on-site above levels that allow for unlimited and unrestricted use,” and that these OUs “will require long-term management or review,” with reviews conducted at least every five years.

On July 7, 2004, the Army and ODEQ remedial managers conducted a site visit, after which the Army, EPA, and ODEQ reviewed the remedies presently implemented for all eight operable units. All remedies remain protective of human health and the environment. The remedial systems are operating and functioning as designed and no modifications are currently necessary. Therefore, the Army certifies that the remedies implemented at UMCD remain protective of human health and the environment.

The next five year review will be completed by September 2009. Future five year reviews are necessary at the Explosives Washout Lagoons Groundwater OU and the Ammunition Demolition Activity (ADA) OU, and Site 39 in the Miscellaneous Sites OU because contamination remains above levels that allow for unrestricted use and unlimited exposure. An update on the status of the Landfill OU will also be included in the next five year review, due to changes at that OU.

Five Year Review Summary Form

SITE IDENTIFICATION		
EPA ID (from WasteLAN): OR6213820917		
Region: 10	State: OR	City/County: Hermiston / Morrow & Umatilla
SITE STATUS		
NPL status: Final on the NPL		
Remediation status: Operating		
Multiple OUs? YES	Construction completion date: September 2010	
Has site been put into reuse? NO		
REVIEW STATUS		
Lead agency: U.S. Army		
Author/Organization: US Army Corps of Engineers		
Review period: 06/28/2004 to 08/27/2004		
Date of site inspection: 07/07/2004		
Type of review: Post-SARA		
Review number: 2 (second)		
Triggering action: Previous Five Year Review Report		
Triggering action date: 09/30/1999		
Due date: 09/30/2004		

Five Year Review Summary Form, cont'd.

Issues:

1. Disposal trenches at the ammunition demolition activity (ADA) that are believed to contain munitions and explosives of concern (MEC) have not been fully characterized or remediated. Stained soils have been found at the ADA that exceed cleanup levels agreed to in previous decision documents.
2. Subsurface munitions and explosive of concern (MEC) remain at Site 39. A Record of Decision is under development to select final remediation actions for Site 39.

Recommendations and Follow-up Actions:

1. Once an agreement is reached on the future land use for the ADA OU, the Phase II subsurface MEC clearance activities will be performed for the burial trenches. Remedial options will also be considered and implemented as necessary for the stained soil sites in the ADA once the future land use is decided.
3. Completion of the Site 39 ROD and remedial actions are expected to eliminate any threats to human health and the environment associated with MEC at that site. The ROD for this site is expected to be finalized by December 31, 2004. Remedial actions may be delayed due to the ongoing incineration of chemical weapons. Site 39 falls within the safety arc for that operation, therefore funding of the final remedial action for Site 39 may be delayed until that work is complete. The work is presently budgeted for fiscal year 2007.

Protectiveness Statement(s):

1. The remedial actions are complete at the following Operable Units: Deactivation Furnace, Washout Plant, Washout Lagoon Soils, Inactive Landfills, Active Landfills. Remedial actions were implemented and completed in accordance with the RODs for these OUs. Cleanup levels have been achieved. Therefore, the remedies for these OUs are protective.
2. To ensure protectiveness in the short-term for the Lagoon Groundwater OU, continued prohibitions on groundwater use, as well as the continued plume containment and treatment, will be required until cleanup levels are achieved.
3. To ensure protectiveness in the short-term, access restriction will continue to be required for the ADA and Site 39 until final remedial actions are selected, implemented, and completed.

Other Comments: OU Remedial Action Completion Dates

Deactivation Furnace OU	December 6, 1994
Explosives Washout Lagoons Soils OU	May 1, 1997
Explosives Washout Plant OU	December 5, 1997
Miscellaneous Sites OU	September 28, 2001

I. Introduction

Purpose

The purpose of this second Five Year Review is to determine whether the remedial actions selected in the Records of Decision (RODs) for the eight Operable Units (OUs) at Umatilla Chemical Depot (UMCD) remain protective of public health and the environment and are functioning as designed. The start of construction of the Washout Lagoons Soils OU (June 20, 1994) triggered the periodic (five year) review requirement, with the first five year review completed on September 30, 1999. This second five year review is a follow-up to the September 30, 1999 five year review. The scope of this review covers selected remedies for the OUs recommended for further five year reviews in 1999, as well as those OUs where subsequent five year reviews were not required but where there were changes since the 1999 review. The OUs addressed in the second five year review include: Explosive Washout Lagoons Groundwater OU; Ammunition Demolition Activity OU; Landfill OU; and Site 39 in the Miscellaneous Sites OU.

Authority Statement

The United States Army (Army) has conducted this review pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 USC 962 I(c), the National Contingency Plan (NCP) - 40 CFR 300.400(f)(4)(ii), Executive Order 12580 (January 23, 1987), and Section 19.1 of the Federal Facilities Agreement (FFA) for Umatilla Army Depot dated October 31, 1989.

CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Army interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and

unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

This review document is consistent with OSWER Directive 9355.07-03B-P (June 2001). Consistent with the FFA, the project managers for EPA Region 10 and the Oregon Department of Environmental Quality (ODEQ) have participated in this review. This review is limited to only those sites being remediated under CERCLA authority.

II. Site Chronology

TABLE 1. CHRONOLOGY OF SITE EVENTS

Event	Date
Initial discovery of problem or contamination RCRA Facility Assessment and Initial RI	Discovery: May 1, 1980 PA/SI: December 1, 1982
NPL listing	August 21, 1987
Federal Facility Agreement signature	October 31, 1989
Expanded Remedial Investigation/Feasibility Study conducted	1990 – 1993
ROD signatures	Lagoon Soils: September 25, 1992 Deactivation Furnace: December 31, 1992 Active Landfills; Inactive Landfills: August 10, 1993 Lagoon Groundwater; ADA; Washout Plant; Miscellaneous Sites: July 19, 1994
ROD Amendments or ESDs	Explosive Washout Plant O.U - August 28, 1995 ADA Soils OU – June 27, 2002
Remedial design start	Lagoon Soils: February 25, 1993 Deactivation Furnace: February 25, 1993 Active Landfills; Inactive Landfills: N/A Lagoon Groundwater: September 12, 1994 ADA: September 2, 1994 Washout Plant: July 19, 1994 Miscellaneous Sites: September 2, 1994

Event	Date
Remedial design complete	Lagoon Soils: June 23, 1993 Deactivation Furnace: September 14, 1993 Active Landfills; Inactive Landfills: N/A Lagoon Groundwater: July 31, 1995 ADA Soils: Tier 1 August 10, 1995 ADA Soils Tier 2: August 2002 Washout Plant: October 19, 1995 Miscellaneous Sites: August 10, 1995
Remedial action start	Lagoon Soils: September 23, 1993 Deactivation Furnace: October 26, 1993 Active Landfills; Inactive Landfills: N/A Lagoon Groundwater: December 30, 1995 ADA Soils Tier 1: September 30, 1995 ADA Soils Tier 2: January 8, 2002 Washout Plant: February 1, 1996 Miscellaneous Sites: November 6, 1995
Construction dates (start / finish)	Lagoon Soils: November 1993 / May 1997 Deactivation Furnace: November 1993 / December 1997 Active Landfills; Inactive Landfills: N/A Lagoon Groundwater: January 1996 / December 1996 ADA Soils Tier 1: November 1995 / April 2000 ADA Soils Tier 2: February 2002 / August 2003 Washout Plant: February 1996 / April 1998 Miscellaneous Sites: November 1995 / December 1997
Final Remedial Action Reports	Lagoon Soils: September 28, 2001 Deactivation Furnace: September 28, 2001 Active Landfills; Inactive Landfills: N/A Lagoon Groundwater: RA Ongoing ADA Soils: RA not complete Washout Plant: September 28, 2001 Miscellaneous Sites: September 28, 2001
Deletion from NPL	Still Active
Previous Five Year review	September 30, 1999

III. Background

Installation Description

Umatilla Chemical Depot (UMCD) is a 19,728-acre military reservation established in 1941 as an ordnance depot. The UMCD is located in northeastern Oregon in Umatilla and Morrow Counties. It is approximately 5 miles west of Hermiston, Oregon, and 3.5 miles south of the Columbia River. The installation was placed on the Base Realignment and Closure (BRAC) list for realignment in 1998. The current activities at the facility include remediation of CERCLA sites and demilitarization of nerve agents, blister agents, and chemical munitions under RCRA authorities. Closure of the installation will not occur until the demilitarization activities are completed.

Physical Site Characteristics

The installation lies in the semi-arid Columbia Plateau. UMCD is within the Umatilla Lowlands and is surrounded primarily by irrigated agricultural land. 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 surface feature, cutting across the depot in a northeast trend. No surface water bodies are present at UMCD. The regional climate can be characterized as a semi-arid cold desert. Average annual precipitation is 8 to 9 inches, predominately occurring between November and March. Potential evapotranspiration is high, averaging 32 inches per year. The average temperature is 75° F in the summer and 35° F in the winter.

Overburden soils at the facility typically consist of Quaternary silt, clay, and alluvial sand and gravel. Topography at the facility is relatively flat with some gently rolling hills or slopes. Vegetation is extremely sparse. A thin layer of windblown fine sands and silt from reworked glacial river deposits and volcanic sediments cover much of the land surface.

Groundwater occurs beneath 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). 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. Depth to groundwater ranges from 60 to 100 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 of UMCD, the majority of which are used for domestic and irrigation water. The Columbia River is a major source of potable and irrigation water, and is used for recreation, fishing, and the generation of hydroelectric power. The principal use of the Umatilla River is for irrigation.

Land Use and History of Contamination

Most hazardous waste activities at UMCD have been associated with munitions, including the disassembly, analysis, modification, reassembly, and repacking of conventional munitions and the storage of chemical munitions and containerized blister agents. Specific disposal operations include release of wastewater from the Explosives Washout Plant into two leaching beds; and various deactivation, demolition, burning, or burial sites for sewage treatment sludge, munitions, and scrap. UMCD also received a RCRA permit to incinerate toxic nerve agents, blister agents, and chemical-filled munitions.

Section IV presents more detailed descriptions of the historical activities leading to contamination at the specific OUs at UMCD.

Initial Response

RCRA Facility Assessment and initial Remedial Investigations were conducted in the late 1970s through 1988 leading to the NPL Listing in August 1987. Response actions did not occur until after the Federal Facilities Agreement was signed in October 1989. The Operable Unit response actions followed completion of RI/FS Reports and ROD signatures in September 1992 through July 1994 (See Table 1, Chronology of Site Events).

Basis for Taking Action

With realignment of UMCD under Base Realignment and Closure (BRAC), the facility may be approved for future closure. If the Army vacates the site, the facility could be released to other federal, state, or local agencies or to private interests for either industrial or residential use. Due to historical activities on the site, environmental investigations (including a Preliminary Assessment and Remedial Investigation) were conducted in order to identify areas of concern, characterize site conditions, and define the nature and extent of contamination. UMCD was listed on the National Priorities List (NPL) in 1987 and a three party Federal Facilities Agreement between the Army, EPA, and the ODEQ was signed in October 1989.

IV. Remedial Actions

The CERCLA remedial activities at UMCD were divided into eight Operable Units because of the variety of potential contaminants and the number of discrete sites (Army 1992). These OUs and their respective ROD dates are listed below.

<u>OPERABLE UNIT</u>	<u>ROD DATE</u>
Explosive Washout Lagoons Soils OU	September 1992
Deactivation Furnace OU	December 1992
Active Landfill OU	August 1993
Inactive Landfills OU	August 1993
Explosives Washout Lagoons Groundwater OU	July 1994
Explosives Washout Plant OU	July 1994
Ammunition Demolition Activity (ADA) OU	July 1994
Miscellaneous Sites OU	July 1994

The following paragraphs discuss the Remedial Actions selected for the specific OUs are addressed in this second five year review and their implementation.

Explosives Washout Lagoons Groundwater OU

The Explosives Washout Lagoons Groundwater OU addresses contamination in groundwater caused by past waste disposal at the lagoons. The Explosives Washout Lagoons were two adjacent, unlined rectangular lagoons constructed in the native sandy-gravelly soil. The north and south lagoons measured 80 feet by 39 feet and 80 feet by 27 feet respectively, and both were 6 feet deep. A 15-foot wide gravel berm separated the lagoons, and gravel berms encircled both lagoons. The depth from the bottom of the lagoons to groundwater generally varied from 45 to 50 feet. The lagoons were typically dry; any collected precipitation tends to infiltrate rapidly. There was virtually no vegetation in the lagoons and on the berms.

From the 1950s until 1965, UMCD operated an on-site explosive washout plant. The plant processed munitions to remove and recover explosives using a pressurized hot water system. The principal explosives consisted of TNT (2,4,6-trinitrotoluene), RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine), HMX (octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine), and tetryl (2,4,6-tetranitro-N-methylaniline). In addition, the munitions contained small quantities of 2,4-DNT (2,4-dinitrotoluene), 2,6-DNT (2,6-dinitrotoluene), TNB (1,3,5-trinitrobenzene), DNB (1,3-dinitrobenzene), and NB (nitrobenzene), occurring as either impurities or degradation products of TNT.

Operation of the plant included flushing and draining the explosives washout system. The wash water was discharged via an open metal trough to the two infiltration

lagoons located northwest of the plant. The lagoons were constructed in the 1950s and used until 1965, when plant operations and all discharges to the lagoons ended. A total of 85 million gallons of effluent is estimated to have been discharged to the lagoons during the period of plant operation. The wastewater from the washout operation, also known as "pink water", contained high concentrations of explosives, primarily TNT and RDX.

The wastewater seeped from the lagoons and contaminated the soils and groundwater beneath them. The groundwater contamination was isolated to the unconfined (alluvial) aquifer (described in Section III). At the Explosives Washout Lagoons, the saturated thickness of the entire unconfined aquifer ranges from approximately 15 to 35 feet.

Several soil and groundwater investigations were conducted at the Explosives Washout Lagoons from 1981 to 1994. A network of 78 groundwater-monitoring wells was used to identify and map groundwater contamination. Contaminants of concern identified in groundwater were TNT, TNB, DNB, NB, 2,4-DNT, 2,6-DNT, tetryl, RDX, and HMX. The most common contaminant was RDX, with concentration ranging from below detection limit ($< 0.556 \mu\text{g/L}$) to $6,816 \mu\text{g/L}$. RDX also had the largest plume at approximately 350 acres, all of it contained within the UMCD facility boundary.

The Maps section of the attachments contains the most recent maps (Maps 3 and 4) of the TNT and RDX plumes from the January 2004 Annual Monitoring Report for the Explosives Washout Lagoons Groundwater Treatment (USACE 2004e).

Remedial Action Criteria were established in the ROD for the Explosive Washout Lagoons Groundwater OU based on Applicable, or Relevant and Appropriate Requirements (ARARs; e.g., Maximum Contaminant Levels (MCLs), Lifetime Health Advisories (HA)) or risk-based levels that provide a carcinogenic protection of 1×10^{-6} or a non-carcinogenic hazard quotient of 1. These criteria are:

Contaminant of Concern	Remedial Action Criteria ($\mu\text{g/L}$)	Basis
TNB	1.8	Risk-based
DNB	4.0	Risk-based
TNT	2.8	Risk-based/HA
2,4-DNT	0.6	PQL
2,6-DNT	1.2	PQL
HMX	350	HA
RDX	2.1	PQL/HA

The selected remedial action for the Explosives Washout Lagoons Groundwater OU was extraction of the contaminated groundwater followed by granular activated

carbon (GAC) treatment and reinfiltration of the treated groundwater back into the aquifer. The major components of the remedy were:

- Extraction of the groundwater from an estimated three extraction wells over an estimated 10- to 30-year period.
- Treatment by GAC to meet performance standards based on the groundwater cleanup levels.
- In-situ flushing of subsurface soils beneath the lagoons with all or part of the treated groundwater for an estimated period of one year.
- Upgradient reinfiltration of the treated groundwater that does not go to the Explosives Washout Lagoons and all the treated water after the in-situ soil flushing is completed.
- Testing of the spent GAC to determine RCRA characteristic hazardous waste status.
- Off-site thermal treatment and disposal of explosives-contaminated GAC to the level specified in the Remedial Design (off-site thermal treatment will comply with the NCP Off Site Rule)
- Monitoring of groundwater contamination to determine the effectiveness of the remedial action and to determine when the groundwater cleanup levels have been attained.
- Institutional controls on the contaminated groundwater to prevent the use of the groundwater until the groundwater cleanup levels are met.

The RDX plume has the maximum extent of explosive groundwater contamination. The remaining explosives-related contaminants are much less mobile than RDX and have smaller, more localized plumes. Three extraction wells pumping at 1,300 gallons per minute (gpm), one treatment plant consisting of four 20,000-pound GAC filters, and three infiltration fields were constructed beginning in November 1995. The groundwater treatment system began operating in January 1997 and has been in operation to the present day. Spent GAC is periodically sent off-site for thermal regeneration treatment. The objective of the remediation is to restore the unconfined aquifer to its beneficial use by reducing the concentrations of contaminants of concern to less than the cleanup levels specified in the ROD within 10 to 30 years. The soil flushing component of the remedy was completed in 2000.

From start up in 1996 through October 2003, approximately 3.9 billion gallons of contaminated groundwater were treated, and approximately 12,700 pounds of explosives were removed by the treatment system. The rate of removal of explosives from treated groundwater has steadily decreased over time. The concentration of explosives has also decreased over time. The Maps section of this report includes contaminant concentration mapping (Maps 3 and 4) from the January 2004 Annual Monitoring Report for the Explosives Washout Lagoons Groundwater Treatment (USACE 2004e).

Figures 2-2 and 2-4 from the annual report indicate that removal rates and concentrations are beginning to level off, but have not met ROD remediation levels. (These two figures are reproduced below as Figures 1 and 2.) The ability of the groundwater treatment system to meet the ROD cleanup requirements must continue to be evaluated, and may require adjustments to further optimize removal efficiencies.

Figure 1. Rate of Contaminant Mass Removal Over Time

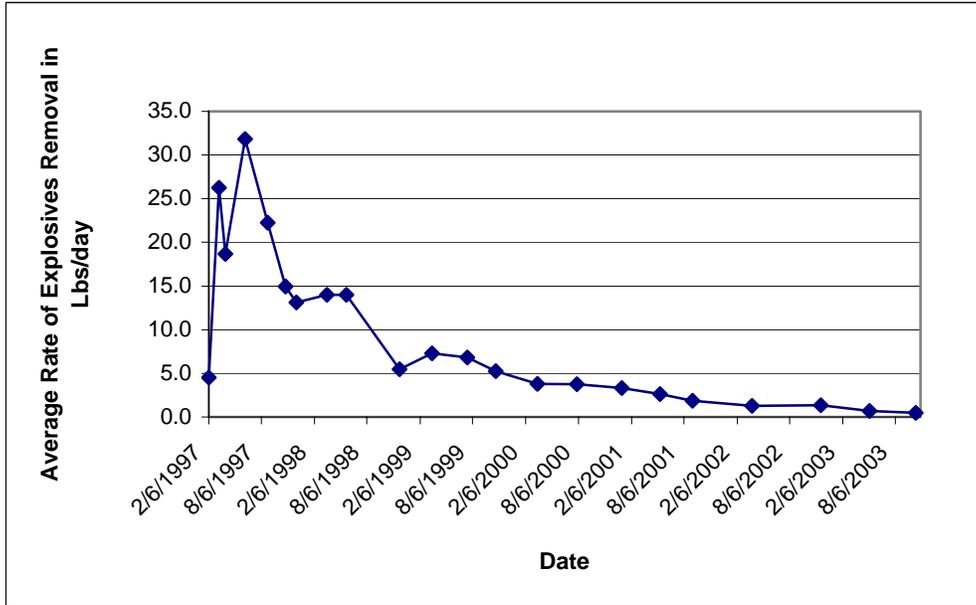
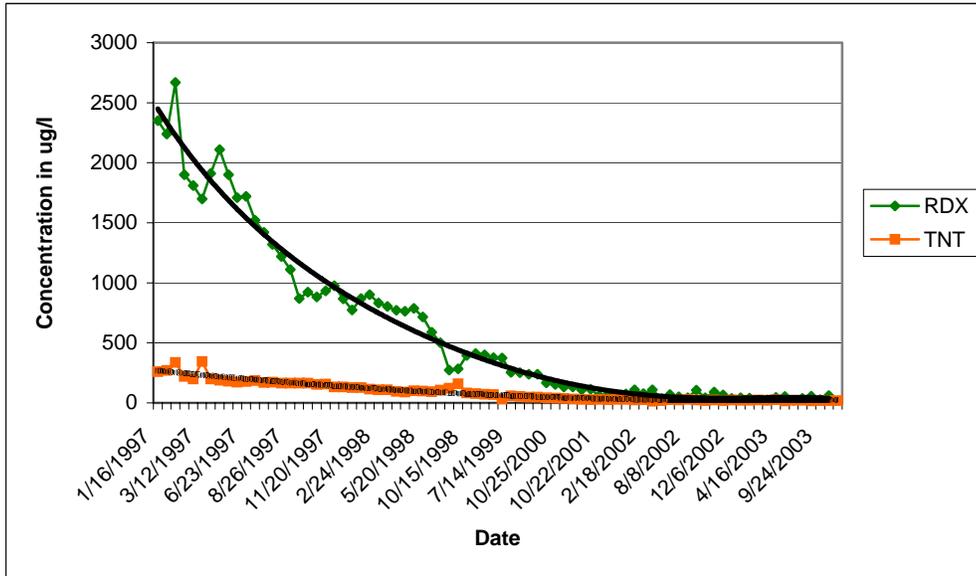


Figure 2. Changes in Explosive Concentrations



Ammunition Demolition Activity (ADA) OU

The Ammunition Demolition Activity (ADA) OU is a 1,750-acre area located in the northwestern corner of UMCD. From 1945 to 1992, the ADA was used by the Army to dispose of ordnance by burning, detonation, dumping, or burial. Activities were conducted at a number of locations throughout the ADA. Soil contamination exists at 20 sites within the ADA. In addition, ADA activities resulted in the presence of quantities of munitions and explosives of concern (MEC) at locations across the entire ADA.

An extensive sampling and analysis program was initiated at the ADA as part of the Remedial Investigation (RI) conducted in 1992. The RI included an assessment of soil contamination at each of the 20 ADA OU sites as well as an overall assessment of potential groundwater contamination beneath the ADA. Future residential use of the ADA was viewed as unlikely, due to the presence of MEC in unknown quantities at unknown depths and locations throughout the ADA. Based on the results of the RI, five locations -- Sites 15, 17, 19, 31, and Site 32 -- exceeded soil carcinogenic and non-carcinogenic risk-based levels based on an anticipated future industrial land use scenario, primarily for metals and explosives residues. The remaining 15 sites had soil carcinogenic and non-carcinogenic risk levels below a level of concern. No significant contaminants of concern were identified in ADA groundwater.

The selected remedy for the ADA OU in the June 1994 ROD had components for soil contamination and MEC clearance. The remedy to cleanup up soil contamination associated with the ADA 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 were:

Contaminant of Concern	Cleanup Level (mg/kg)
Antimony	820
Arsenic	15
Barium	860
Beryllium	8.1
Cadmium	28
Chromium	40
Cobalt	25
Lead	500
Thallium	160
RDX	52
TNB	2.3
TNT	23
2,4-DNT	1.9

Cleanup steps designated in the ROD included excavation of approximately 14,000 cubic yards of soil at ADA Sites 15, 17, 19, 31, and 32, with MEC removed from these sites during excavation as necessary to permit safe excavation and access.

The ROD specified that the safety and environmental risks due to the presence of MEC were to be quantified and reduced in two phases, a Phase I surface clearance and a Phase II subsurface clearance. Phase I was to consist of a metallic object survey over the entire ADA to better estimate the quantity of metallic debris that would need to be removed to clear the ADA of MEC. Concurrently with the survey, a "visual sweep" would be conducted over the entire surface of the ADA to locate and remove objects identifiable as MEC. Phase II MEC clearance activities would then be dependent upon the future use selected for the ADA. As part of the Base Closure (BRAC) process, future use for the ADA would be decided by the Army, the state of Oregon, and the local community. When a suitable future use was determined, additional Phase II MEC clearance activities would be conducted to a depth that was protective for the selected land use. Upon completion of the Phase II MEC clearance actions, appropriate institutional controls would be applied to the ADA to permanently limit the use of, and access to, the ADA. These institutional controls would be consistent with the final use selected for the area and the degree to which MEC was successfully cleared. Possible controls could include deed restrictions, and/or maintenance of existing fencing and security. The ROD designated that Phase II MEC clearance activities would be initiated within 15 months after the final land use and disposal decision was made for the ADA.

In August 1995, the remedial design for soils at the ADA OU, as well as two other OUs -- Miscellaneous Sites OU and Deactivation Furnace OU -- was completed. The original remedial construction activities were conducted between June 1996 and August 1997. Treatment of contaminated soil was done from November 1995 to August 1997 utilizing a mobile onsite solidification/ stabilization (S/S) system. The remedial action contractor was required to develop a mix design that would concurrently stabilize both metals and explosives to a TCLP level such that the treated soil would not be characterized as a RCRA hazardous waste and could be safely disposed in the UMCD Landfill. Sampling and analysis demonstrated that each batch of material sent to the Landfill met the leachate performance goals. The treated soil TCLP leachate criteria for the contaminants of concern in the ADA OU are shown below:

Contaminant of Concern	TCLP Leachate Level (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

The soil remediation for the ADA was not completed under the remedial actions described in the preceding paragraph due to higher volumes of contaminated soil than was expected and budgeted for during the remediation. On June 27, 2002, an explanation of significant differences (ESD) was published for Site 19E/F in the ADA. The ESD addressed the additional soils for remediation; the costs associated with the additional soils; updated cleanup levels based on revised exposure assumptions (elimination of troop training due to post closure under BRAC); and offsite treatment and disposal due to closure of on-post landfill. The ESD and actions taken pursuant to it are described in more detail in Section V.

Miscellaneous Sites OU

The Miscellaneous Sites OU consists of 32 sites that were identified as actual or possible locations of Army activities. The Miscellaneous Sites served a wide variety of specific functions, including sewage treatment and storm water discharge, munitions disassembly, Defense Reutilization Marketing Area (recycle materials stockpile), storage of raw materials, metal ingot storage, pesticide storage, paint spray and removal areas, paint sludge discharge areas, boiler/laundry wastewater discharge areas, disposal pits, and hazardous waste storage. The types of contaminants include organic compounds, metal salts, and pesticides (through application or disposal). Most of the Miscellaneous Sites are clustered in the southwestern or southern portions of the depot. The southwestern cluster of sites centers on warehousing, railroad unloading, and stockpiling activities. The southern sites include the administrative areas as well as support activities such as

sewage treatment and storm water discharge. The remaining Miscellaneous Sites are spread throughout UMCD and relate to a variety of support facilities for mission activities.

An extensive sampling program was conducted as part of the Remedial Investigation to assess soil contamination at each of the 32 sites as well as potential groundwater contamination beneath these sites. Groundwater was not found to be affected by past activities at the Miscellaneous Sites and required no cleanup under this OU. Based on the results of the RI, two sites, Site 22 (the Defense Re-utilization Marketing Office DRMO) and Site 36 (Building 493 Paint Sludge Discharge Area), had soil contamination sufficiently elevated to require remediation. The contaminants of concern at Site 22 and Site 36 were lead, cadmium, and chromium. The other 30 remaining sites had acceptable levels of carcinogenic and non-carcinogenic risk for a future residential land use scenario and did not require remediation.

The remedy selected to clean up soil contamination associated with Sites 22 and 36 of the Miscellaneous Sites OU ROD was solidification/stabilization treatment and on-site disposal of the treated soil in the UMCD Landfill. These activities were carried out from November 1995 to September 1997. A total of 1,923 cubic yards of soils containing lead greater than 500 mg/kg and cadmium and chromium levels greater than the concentrations corresponding to a Hazard Quotient of 1 (127 mg/kg, and 40 mg/kg, respectively) were treated. The soil treatment resulted in meeting the TCLP criteria (1.0 mg/L, 5.0 mg/L, and 5.0 mg/L for cadmium, lead, and chromium, respectively) necessary for the treated soil to be placed in the UMCD Landfill.

After the 1999 five year review, concerns were raised by UMCD about one of the 32 Miscellaneous Sites, Site 39 (the former Quality Assurance Testing Range where ordnance was used). Site 39 is a 640-acre rectangular parcel of land located outside the northerly boundary of the UMCD. The site was acquired by the Army for use as a quality assurance (QA) function range for various types of conventional weapons, munitions, and related materials. Actions taken since 1999 to address Site 39 are discussed further in Section V.

Landfill OU

The Landfill OU is a 5-acre solid waste disposal area located in the northeastern portion of UMCD, near the eastern border, in a former gravel pit approximately one-half mile east of Coyote Coulee. The landfill is located between areas known at UMCD as storage igloos blocks E and D. The disposal area consists of a depression approximately 50 feet deep. Materials disposed at the site include garbage, demolition debris, asbestos from brake linings, dried sludge from the sewage treatment plant, possibly ash from the Deactivation Furnace, and explosives sludges.

The Army operated the landfill from 1968 to 1997. ODEQ issued a landfill permit to the Army in 1979, and the permit was renewed in 1982. Municipal wastes from the UMCD facility, including debris generated by maintenance such as clearing and renovation activities, were disposed at the site and covered on a weekly schedule. The extent of activity at UMCD was significantly reduced over the last 20 years, thereby reducing the volume of material placed in the landfill. The peak work force at UMCD existed when the Landfill was first opened. During the Vietnam Conflict, approximately 1,000 people were employed at UMCD. However, by 1970, the work force began to decline and by 1987, the work force had fallen to 3 military and 250 civilian employees. The Landfill ceased receiving municipal waste on October 3, 1993, but continued to receive treated soil from remediation of the Deactivation Furnace OU, Miscellaneous Sites OU, and the Ammunition Demolition Activity OU. The Landfill was capped and closed in accordance with ODEQ Solid Waste Regulations in November 1997. The existing operating permit was reissued as a Solid Waste Disposal Closure Permit in August 2000.

A RI was conducted in 1992 with groundwater sampling activities performed at 10 adjacent monitoring wells. Analyses performed on the groundwater samples include: Target Analyte List (TAL) inorganics (which includes metals, non-metallic elements and cyanide), volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, explosives, and nitrate/nitrite. The RI results found elevated nitrate/nitrite and selenium levels.

The ROD selected "No Action" as the remedy for the Landfill OU. This selection was based on information generated during the RI, which indicated that the OU did not pose an unacceptable threat to human health and/or the environment. Under a future residential land use scenario, the potential carcinogenic risks and non-carcinogenic hazard quotient due to ingestion of groundwater at the Landfill OU were 5×10^{-5} and 2.0, respectively. Closure requirements for the landfill were taken in accordance with the State of Oregon permit requirements. The State of Oregon Department of Environmental Quality provides oversight for inspections of the landfill to ensure that post-closure requirements are maintained.

Groundwater monitoring of the Landfill was initiated in and has continued since October 1996. Monitoring has been conducted in accordance with the Environmental Monitoring Plan approved by ODEQ in July 1997 (Army 1997). With the exception of selenium, the results from the sampling have been 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 have been compared to a risk-based level of 50 µg/L established by the ODEQ Cleanup Department in January 2003 (ODEQ 2003). Since the last five year review, ODEQ has re-evaluated the selenium data and is developing a separate cleanup plan under State authorities.

V. Progress Since the Last Review

Summary of September 30, 1999 Five Year Review

Protectiveness of each OU was evaluated in the September 30, 1999 five year review (the 1999 review). The 1999 review concluded that for the Explosive Washout Lagoons Soils, Explosives Washout Plant, Deactivation Furnace Soils, Miscellaneous Sites, Active Landfill (hereafter referred to as the Landfill), and Inactive Landfills OUs, the selected remedies “did not result in hazardous substances remaining on-site above levels that allow for unlimited and unrestricted use.” The 1999 review further concluded that “no CERCLA Five Year Review Requirements will apply” to the remedial actions undertaken at these OUs and that these OUs did not “require any long-term management or review.” However, for the Landfill OU, the 1999 review recognized that ODEQ Solid Waste Regulations governing closure and post closure, including groundwater monitoring, did apply.

For the remaining two OUs -- the Explosive Washout Lagoons Groundwater OU and the Ammunition Demolition Activity OU -- the 1999 review concluded that the remedial actions taken at these OUs resulted “in hazardous substances remaining on-site above levels that do not allow for unlimited and unrestricted use” and that these OUs “will require long-term management or review,” with reviews conducted every five years. Finally, since the 1999 review, issues were raised associated with munitions and explosives of concern at Site 39 in the Miscellaneous Sites OU.

The following paragraphs describe progress and changes since the 1999 initial five year review at the two OUs requiring follow-up reviews, and at two other OUs (Miscellaneous Sites and Landfill OUs), where follow-up review was not required but changes have occurred.

Explosives Washout Lagoons Groundwater OU

Since the initial five year review, several changes have occurred at the Explosives Washout Lagoons Groundwater OU project. Three additional groundwater monitoring wells were installed in the eastern portion of the site in 2001 and 2003. These wells were installed to better define the plume boundary in this area and to confirm contaminant capture.

In 2000 and 2001, several attempts were made to update and recalibrate the numerical flow and contaminant transport model developed for the design of the Explosives Washout Lagoons Groundwater OU. The recalibrated model provided better agreement with actual data, and suggested that contaminant cleanup will occur approximately 26 years after system startup.

As a follow up to numerical model recalibration, an independent effort was made to apply optimization-simulation techniques to the fate and transport model. This work indicated that cleanup times could be significantly reduced by various operational modifications. One of the suggested changes was to eliminate injection in the northernmost infiltration field (IF-1). This recommended adjustment was implemented in April 2002. From this time to the present, the infiltration water that would have been piped to IF-1 from the treatment plant has been diverted to the two other infiltration fields. Gradually, this operational modification has produced positive results, including additional reductions in total plume extent and the size of areas with the highest contaminant concentrations.

Ammunition Demolition Activity OU

During the course of original remedial action at the Ammunition Demolition Activity OU, additional areas of contaminated soil beyond the quantities identified in the ROD were found near two burn trenches (19 E/F). Some of the additional soils were excavated, treated, and land filled on-site under the original remedial action contract. However, due to funding limitations, the work could not be completed under the original contract. In addition, during a field investigation in 2000, 10 stained soil sites were discovered during a metallic object survey and subsequent visual characterization and subsurface geophysical mapping throughout the ADA.

During the time period between the original remedial action and the field investigations the on-post landfill at UMCD was closed, thus eliminating the on-site treatment and disposal provisions of the ROD. Therefore, a revision to the selected remedy was needed to address the additional contaminated soils at Site 19 E/F. In June 2002, these changes in the selected remedy were published and approved by the Army and EPA in an ESD (Explanation of Significant Differences) to the ROD (Army 2002).

The ESD presented four significant differences to the remedy outlined in the ROD. The ESD incorporated updated information that revised the contaminants and cleanup levels; changed the on-post treatment/disposal requirement for Site 19 E/F to off-post treatment and disposal; updated the cost estimate. In addition, the revised cleanup criteria resulted in a reduction in the final volume of soil requiring excavation. The ESD applied only to the remedial activities at Site 19 E/F. It specified the excavation of additional soils from Site 19 E/F, off-post treatment by Stabilization and Solidification (S/S), as needed to meet treatment standards, and disposal in an off-post landfill.

The major elements identified in the ESD were:

- revised exposure assumptions;

- allowing for off-post S/S treatment to meet leachability goals and off-post disposal at a permitted treatment, storage and disposal facility;
- the estimated additional volume of soil needing excavation, treatment, and disposal decreased (from 5,177 cy to 1,127 cy); and
- cleanup levels for barium, cadmium, 2,4,6-trinitrotoluene, RDX, 2,4-dinitrotoluene, 1,3,5-trinitrobenzene were changed based on revised exposure scenarios and updated toxicity information.

Contaminant	ROD Cleanup Level	ESD Cleanup Level
Barium	860 ppm	3,330 ppm
Cadmium	28 ppm	213 ppm
2,4,6-trinitrotoluene	23 ppm	49 ppm
RDX	52 ppm	19 ppm
2,4-dinitrotoluene	1.9 ppm	2.7 ppm
1,3,5-trinitrobenzene	2.3 ppm	25 ppm

The additional remedial action elements of work identified for soil cleanup at Site 19 E/F were the excavation of approximately 1,250 cubic yards of contaminated soil. UXO clearance personnel identified and removed MEC and MPPEH (Materials Potentially Presenting an Explosive Hazard) debris from Site 19 E/F prior to surveyors setting sampling grids. UXO personnel then monitored the soil excavation activities. Stockpiled excavated material was tested and approximately 330 cubic yards required treatment/stabilization off-site prior to disposal at an approved waste facility. Approved amendments were added to the soil to produce stabilized material. The soil was treated and then tested in accordance with the following leachability requirements.

Compounds of Concern	TCLP Leachate Requirements (mg/L)
Barium	100
Cadmium	1
RDX	0.20
TNT	0.20
2,4-DNT	0.13
1,3,5-TNB	0.18

The actions required by the ESD were performed from July 2002 to October 2002. The final inspection for the soil remedial activities was performed in October 2002.

No outstanding issues were identified. The cost of the ESD actions was approximately \$655,000. All together approximately 14,000 cubic yards of contaminated soils were remediated from the ADA Soils OU at a cost of approximately \$6,025,000. Currently a draft revised remedial action report for the ADA Soils OU is under review by EPA and ODEQ.

Also performed at the ADA were additional field investigations in 2000 to characterize the extent of metal and explosive residue contamination at the 10 stained soil sites identified during ordnance remediation activities in 1988 (Army 2000). The data is summarized in the table below.

TABLE 2. RESULTS FROM 2000 SOIL SAMPLING FOR ADA STAINED SOIL SITES (LOCATIONS WITH DETECTIONS) (ARMY 2000)

Bolded values are those exceeding the comparison criteria or action levels established in the ADA June 1994 ROD

Site	TNT (field)	RDX (field)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead
Comparison Criteria (action levels from the ADA 1994 ROD)	23	52	820	15	860	8.1	28	40	25	500
Range of Detected Concentrations (mg/kg)										
0608	12.4	4.6	ND	3.5-4.6	120-140	0.12-0.19	ND	16-19	8.9-9.6	4.1-5.1
0613P	2.6	ND	ND	2.6-3.9	100-340	0.098	1.3-2	14-21	8.5-12	4.6-6.4
0808	55-959.8	4.1	1.2-2.9	4.1-5.2	91-1500	0.11-0.12	0.64- 160	12-20	7.8-9.2	830-2900
0809	ND	3.0-4.2	ND	3.5-4.4	88-110	0.11-0.17	0.13	17-27	8.3-11	4.4-9.4
0834P	21.6- 31.1	10.2-10.7	ND	2.2-2.6	140-190	0.073-0.11	2-9.8	11-20	8.3-8.6	7.3-9.4
1009	2.3	ND	ND	4-5.5	95-120	0.13-0.19	0.47-0.59	17-23	9.5-10	5.9-27
1604	ND	ND	0.36-2.9	ND	59-71	0.11-0.15	0.2	6-7.8	5.8-7.8	4.5-44
1605	6.5	7.7	74	5.7	390	0.085	2.9	22	9.1	5000

The data from these investigations indicate TNT, barium, cadmium, and lead soil concentrations above the action levels set in the ADA 1994 ROD and TNT and lead concentrations above the action levels set in the Site 19 E/F 2002 ESD. Future evaluation of remedial options for the sites with elevated explosive residues and/or metals is planned once the future land use of the ADA is determined.

In addition to the identification and cleanup of contaminated soils at Site 19 E/F, the ROD specified that the safety and environmental risks due to the presence of MEC

were to be quantified and reduced in two phases, a Phase I, with surface MEC clearance and a determination of subsurface anomalies, and a Phase II, with subsurface MEC clearance. In addition to these phases, there have been several MEC clearances associated with the soil investigative and remediation activities. These clearances and the Phase I/II work are described below.

In the course of conducting the soil investigations, clearance of MEC was performed to ensure safe access by personnel collecting chemical samples. Approximately 80 MEC items were found, as well as an extensive amount of inert metal debris. The total area cleared during the RI investigation was small (less than 100 acres) compared to the entire ADA, but involved the areas most likely to have MEC. Because the clearance included only a small area, the total quantities, locations, and depths of MEC in the ADA were not well defined during the RI.

In 1995 through 1997, surface clearance of MEC under Phase I was conducted throughout the ADA. Approximately 6,900 recovered MEC items were thermally treated via open detonation from either surface clearance of MEC or MEC recovered from soil sifting operations at the five chemically contaminated soil sites. Approximately 350,000 pounds of MEC related scrap was transported off-site for recycling. Upon completion of soil sifting operations and surface clearance, subsurface geophysical mapping was conducted over 97% of the ADA. Subsurface mapping detected 212,000 buried anomalies (MEC or MEC-related scrap).

Ordnance identification and clearing activities were also performed during the summer 2002 excavation and remediation of soils at Site 19 E/F. Although no MEC was encountered, a total of 829 pounds of MPPEH scrap was inspected, certified as explosive free and transported for disposal

The surface clearances and the subsurface geophysical mapping of subsurface anomalies were completed in Phase I. The Phase II MEC clearance activities subject to review and approval by EPA, ODEQ and Army will be dependent upon the future use selected for the ADA. When the future use has been finalized, Phase II MEC activities will be conducted in accordance with the following activities:

1. Preparation of a CERCLA Feasibility Study (FS) or Remedial Design (RD) document that will include all components of the Phase II remedial action, including subsurface clearance of MEC, long term Operations and Maintenance (O&M), Institutional Controls, and Five Year Review requirements.
2. A joint Army, EPA, and ODEQ decision on whether any MEC clearance is necessary and, if so, the appropriate depth(s) of the MEC clearance and the associated long-term maintenance requirements.

3. Initiation of the MEC Phase II remedial action within 15 months of the final land use decision and appropriate institutional controls applied to the ADA.
4. Transfer of land in accordance with the provisions of CERCLA Section 120(h) and all associated EPA and DOD criteria and guidance related to federal property transfers under BRAC.

Miscellaneous Sites OU

After the 1999 five year review, concerns were raised by UMCD about one of the 32 Miscellaneous Sites, Site 39 (the former Quality Assurance Testing Range where ordnance was used). Site 39 is a 640-acre rectangular parcel of land located outside the northerly boundary of the UMCD. The site was acquired by the Army for use as a quality assurance (QA) function range for various types of conventional weapons, munitions, and related materials. Chemical weapons were never tested at Site 39; only conventional munitions items such as ground signal flares, photo flash grenades, illumination and smoke canisters, and mines were tested. Testing of munitions at Site 39 occurred from the late 1940s through the mid-1970s.

A 100 percent surface clearance was conducted by UXB International, Inc., in 1996. Over 600 pounds of scrap were removed during the clearance, with two MEC items (an M16 mine and a ground signal) and five ordnance-related items (inert components of five ground signals) found. UXB found no indication of subsurface ordnance based on instrument aided visual inspection.

A subsequent 100 percent geophysical mapping, along with a 100 percent visual surface clearance, including brush clearing, was performed by Parsons in the summer of 2001. The sampling was performed using MTADS to map relatively level areas of the site and a dual towed EM-61 to map steep areas. The purpose of the geophysical mapping was to identify anomalies that could potentially represent buried MEC. After evaluation of the data, Parsons returned in fall 2002 to intrusively investigate 840 geophysical anomalies. An intrusive investigation of these anomalies resulted in four MEC items, 342 MPPEH items, 479 non-MPPEH items, and 66 no-finds. Based on the locations of the ordnance that was found, the Project Team defined three areas of concern (AOCs): the Test Pad Area (68.5 acres), the Rifle Range Area (106.9 acres), and the Test Pit Area (0.8 acres). The Army prepared an EE/CA recommending no further action on the 464 acres outside the three identified AOCs and a subsurface clearance to 2 feet in depth for the 176 acres included in the three AOCs. EPA concluded that the EE/CA contained sufficient information and analysis of alternatives to be equivalent to an RI/FS under CERCLA. The recommendations of the EE/CA were included in a Proposed Plan and an August 2004 Draft Final ROD. The draft ROD is currently under review by EPA and ODEQ.

Landfill OU

The Landfill received stabilized (treated) soils from the Deactivation Furnace, ADA, and Miscellaneous Sites Operable Units. In order to receive this additional solid waste ODEQ upgraded the solid waste permit and requirements to reflect a RCRA Subtitle D operating landfill. After consolidating this waste in the Landfill, a Subtitle D compliant landfill cap was installed in 1997. ODEQ approved closure of the Landfill and the permit was modified in August 2000 to reflect a post-closure condition.

Quarterly monitoring of the groundwater has continued since October 1996 according to the Environmental Monitoring Plan approved in July 1997 (USACE 1997). The results are reported to ODEQ in semi-annual and annual reports, which compare the data, with the exception of selenium, to values from the Oregon Administrative Rules, Department of Environmental Quality 340 Groundwater Quality Protection (OAR 340-040). Selenium is compared to 50 µg/L, which is the risk-based level established by ODEQ in January 2003 (ODEQ 2003).

The ODEQ Cleanup Department is presently preparing a selenium remedy document under State authorities that will potentially include monitoring and an equitable servitude agreement. The Army is in the process of completing data collection for the revision of the existing Environmental Monitoring Plan (Army 1997).

VI. Five Year Review Process

Administrative Components

Members of the UMCD BRAC Cleanup Team were notified of the initiation of the second five year review in the summer of 2004. The review team consisted of personnel from EPA, ODEQ, USACE and the Army's BRAC Environmental Coordinator at UMCD.

Community Notification and Involvement

The Army published notification of the second five-year review in the Tri-City Herald, The Hermiston Herald, and East Oregonian on July 23, 2004 and requested comments by August 23, 2004. No comments were received.

The US Army will issue a fact sheet announcing the availability of this second five year review report once it is completed. The results of the review will be available to the public at the Hermiston Public Library, 213 Gladys; Umatilla Chemical Depot Environmental Office, Hermiston, OR; and Oregon Department of Environmental

Quality, Columbia Gorge Community College, 400 E. Scenic, Suite 2, Room 307, The Dalles, OR, and at the EPA Region Web site at: <http://www.epa.gov/r10>.

Document Review

This second five year review consisted of a review of relevant documents including RODs, Explanations of Significant Difference, Site Closure Report, Remedial Action Reports, and various monitoring data. A list of the reviewed documents is provided in the attachments.

Site Inspection

A site inspection was conducted by the Army and ODEQ on July 7, 2004. The purpose of the inspection was to assess the protectiveness of the operable unit remedies, including the groundwater treatment plant, security fencing, and landfill cap. See the attachments for the complete Site Condition Checklist.

No significant issues were identified. The treatment plant was in operation but showed areas requiring maintenance. The maintenance is programmed for fiscal year 2005. The landfill cap and vegetative cover are in good condition.

Access and institutional controls are in place and signage is in good condition.

VII. Technical Assessment

Present Five Year Review Status of the OUs

Consistent with OSWER No. 9355.7-03, three questions were asked regarding each OU to determine its current five year review status. These questions were:

1. Is the remedy (s) functioning as intended by the decision documents?
2. Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy still valid?
3. Has any other information come to light that could call into question the protectiveness of the remedy?

For four of the six OUs that the 1999 review concluded no long-term management or review was necessary, the remedies are functioning as intended, the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at

the time of the remedy are still valid, and there is no other information that would call into question the protectiveness of the remedy.

The other two OUs for which the 1999 review concluded that no long-term management or review was necessary are the Landfill OU and the Miscellaneous Sites OU. These two OUs are further discussed below, along with the two OUs -- Ammunition Demolition Activity, and the Explosive Washout Lagoons Groundwater -- for which the 1999 review required future five year reviews.

Explosives Washout Lagoons Groundwater OU

The treatment system has operated for a period of seven and a half years. Current data indicate that all known explosives contamination is within the capture zone of the groundwater extraction system, hot spots of contamination have been reduced, contaminant concentrations of the treatment plant influent have been declining with time, and contaminant concentrations at monitoring wells have been generally declining with time. This is documented in the annual monitoring reports for this OU (see Figures 1 and 2 in Section IV and Maps 3 and 4 in the Maps section of this report). Based on this information, the Explosives Washout Lagoons Groundwater OU treatment system is operating and functioning as designed.

In 2003, an additional extraction well was installed to capture a portion of the plume that was migrating to the east out of the capture zone. This work was coupled with a demonstration project funded by the Environmental Security Technology Certification Program to optimize infiltration and extraction processes. These efforts succeeded in capturing the plume and optimizing treatment system processes.

Because this remedial action results in hazardous substances remaining on-site above levels that do not allow for unlimited and unrestricted use, CERCLA Five Year Review requirements will apply to this action and this OU will require long-term management or review. In order to ensure that this cleanup remedy continues to be protective, a Washout Lagoons Groundwater OU review will continue to be conducted every five years. In addition, prohibitions on the use of groundwater will continue to be required until cleanup levels are met. The results of the annual monitoring reports for this OU will also be relied on to evaluate opportunities to further optimize the treatment system. No issues were identified during this Five Year Review.

Ammunition Demolition Activity OU

Since the last Five Year Review, stained soils were discovered that contain contaminants above cleanup levels established in previous decision documents. These soils will require remedial actions consistent with previous soil remediation actions at this

OU. In addition, the Phase II MEC clearance work has not been undertaken. Therefore, MEC items are believed to be present in the subsurface environment. No other new information was discovered that would further affect these two areas for response actions in the ADA.

Since an industrial land use was used to establish the cleanup levels for the soil remediation at the ADA, this remedial action resulted in hazardous substances remaining on-site in soil above levels that do not allow for unlimited and unrestricted use. In addition, the ordnance removal remedial actions have resulted in the possibility of subsurface munitions and explosives of concern remaining on-site that will not allow for unlimited and unrestricted use. Therefore, CERCLA Five Year Review requirements will apply to the soil and ordnance remedial actions and this OU will require long-term management or review. In order to ensure that this cleanup remedy continues to be protective, an ADA OU review will be conducted every five years. This review will include review of the progress of the completion of the Phase II MEC clearance, verifying that Institutional Controls (access restrictions) remain in place, and the land use of the ADA has not changed. In addition, any land transfer will be subject to CERCLA Section 120(h) provisions.

Miscellaneous Sites OU

The 1999 Five Year review concluded that the soil remedial action at the Miscellaneous Sites OU had reduced hazardous substances remaining on-site to levels that allowed for unlimited and unrestricted use, and no CERCLA Five Year Review requirement applied to this action.

Since the last Five Year review, further investigation was performed at one site in the OU (Site 39, the Quality Assurance Function Range) where there was a history of ordnance use. The investigation found a remaining potential for the presence of subsurface MEC (USACE 2003c). An Engineering Evaluation Cost Analysis (EE/CA) (USACE 2003c) was performed and provided recommendations for further work at the site. The final remedy identified in the draft Final ROD (USACE 2004c) is removal of subsurface ordnance to support the expected future land use as agricultural property; and implementation of a deed notification via an equitable servitude and easement agreement. That ROD is currently under review prior to final signature.

This remedy will be implemented following an Army, EPA, and ODEQ agreement on the future land use controls. Since this remedial action may result in hazardous substances remaining on-site that do not allow for unlimited and unrestricted use, CERCLA Five Year Review Requirements potentially apply to Site 39, along with associated long-term management or review.

Landfill OU

ODEQ Solid Waste and Cleanup Regulations will continue to apply, along with associated monitoring and inspection requirements. Currently, ODEQ is developing a cleanup plan for selenium in groundwater pursuant to State authorities. Once that plan is finalized, any implications for the CERCLA remedy should be evaluated to ensure that the remedy remains protective.

Institutional Controls

There are several types of institutional controls (ICs) in place at various OUs as part of the CERCLA response actions. These are in addition to security requirements in place at the UMCD. The security requirements include perimeter fencing, warning signs that UMCD is a military operations facility, and 24 hour armed patrols. Access to the facility is very tightly controlled and requires an escort for non-UMCD personnel.

UMCD Policy Statement Number 03-75 enforces restrictions on all subsurface excavation. The policy requires contractors, sub-contractors, federal and state agencies, tenants, residents, and visitors to complete an Excavation Permit application for review and approval by the installation Public Works, Environmental, and Safety Departments. After completion of the excavation, a copy of the Permit, as-built drawings, and all pertinent records are submitted to the Director of Public Works and Logistics.

The ADA and Site 39 also have additional fencing, signage, and restrictions on subsurface activities. The Landfill also has restrictions on subsurface activities that might disturb the cap, which is required under the State permits.

VIII. Issues

This section details issues related to current site operations, conditions, or activities and evaluates whether the issues affect current or future protectiveness of the associated remedy. The table below summarizes the issues identified during this five year review.

Issue	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Ammunition Demolition Activity. Disposal trenches at the ADA OU that are believed to contain munitions and explosives of concern have not been fully characterized or remediated. In addition, stained soils have been discovered with contaminants detected above ROD cleanup levels. Current access restrictions are adequate to maintain protectiveness until final remedial actions are selected and implemented. These will need to continue to be inspected and maintained until final remedial actions are in place.	N	N
Miscellaneous Site OU. Site 39. Subsurface munitions and explosives of concern remain at Site 39. A Record of Decision is under development to select final remedial actions for Site 39 that are expected to be protective of human health and the environment. Until the final remedial action(s) are in place, the existing access controls will be required to ensure protectiveness.	N	N

IX. Recommendations and Follow-up Actions

Recommendations and follow up actions have been identified and are presented in the table below.

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Action Affects Current Protectiveness (Y/N)	Follow-up Action Affects Future Protectiveness (Y/N)
<p>Ammunition Demolition Activity OU</p> <p>Once an agreement is reached on the future land use for the ADA OU, the Phase II subsurface MEC clearance activities will be performed. Remedial options will also be considered and implemented as necessary for the stained soil sites in the ADA once the future land use is decided. In addition stained soils have been discovered with contaminant levels above ROD levels that will require remediation.</p>	Army	EPA ODEQ	2007	Y	Y

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Action Affects Current Protectiveness (Y/N)	Follow-up Action Affects Future Protectiveness (Y/N)
<p>Explosive Washout Lagoon Groundwater OU.</p> <p>The groundwater pump and treatment system is operating and functioning as designed. The rate of contaminant reduction, as well as the contaminant concentrations, has significantly decreased since the start of operations. Optimization of the system operations will need to continue to be evaluated in order to meet ROD levels.</p>	Army	EPA ODEQ	Annual	N	Y
<p>Inactive Landfill OU.</p> <p>ODEQ is currently developing a cleanup plan for selenium in groundwater pursuant to State authorities. Once that plan is finalized, any implications for the CERCLA remedy should be evaluated to ensure that the remedy remains protective.</p>	Army	ODEQ	2005	Unknown	Unknown

X. Protectiveness Statement(s)

On July 7, 2004, the Army and ODEQ remedial managers conducted a site visit, after which Army project managers for the Army, EPA, and ODEQ reviewed the remedies presently implemented for all eight operable units. All implemented remedies remain protective of human health and the environment. The remedial systems are operating and functioning as designed and no modifications are currently necessary. Therefore, the Army certifies that the remedies implemented at UMCD remain protective of human health and the environment.

Ammunition Demolition Activity OU

The actions taken at this OU are considered to be protective in the short-term. However, in order for this OU to be protective in the long-term, additional actions will need to be undertaken. Once an agreement is reached on the future land use for the ADA OU, the Phase II subsurface MEC clearance activities will be performed. Remedial

options will also be considered and implemented as necessary for the stained soil sites in the ADA once the future land use is decided. In the interim, fences and signs will be required to maintain access restrictions to ensure short-term protectiveness.

Explosive Washout Lagoon Groundwater OU

The groundwater pump and treatment system is operating and functioning as designed. The rate of contaminant reduction, as well as the contaminant concentrations, has significantly decreased since the start of operations. Optimization of the system operations will need to continue to be evaluated in order to meet ROD levels. In the interim, the prohibition on the use of groundwater will be required to ensure short-term protectiveness.

Miscellaneous Site OU, Site 39

Subsurface munitions and explosives of concern remain at Site 39. A Record of Decision is under development to select final remedial actions for Site 39 that are expected to be protective of human health and the environment. Until the ROD is finalized and remedial actions are completed, fencing, signs, and access restrictions will need to be maintained to ensure short-term protectiveness.

Landfill OU

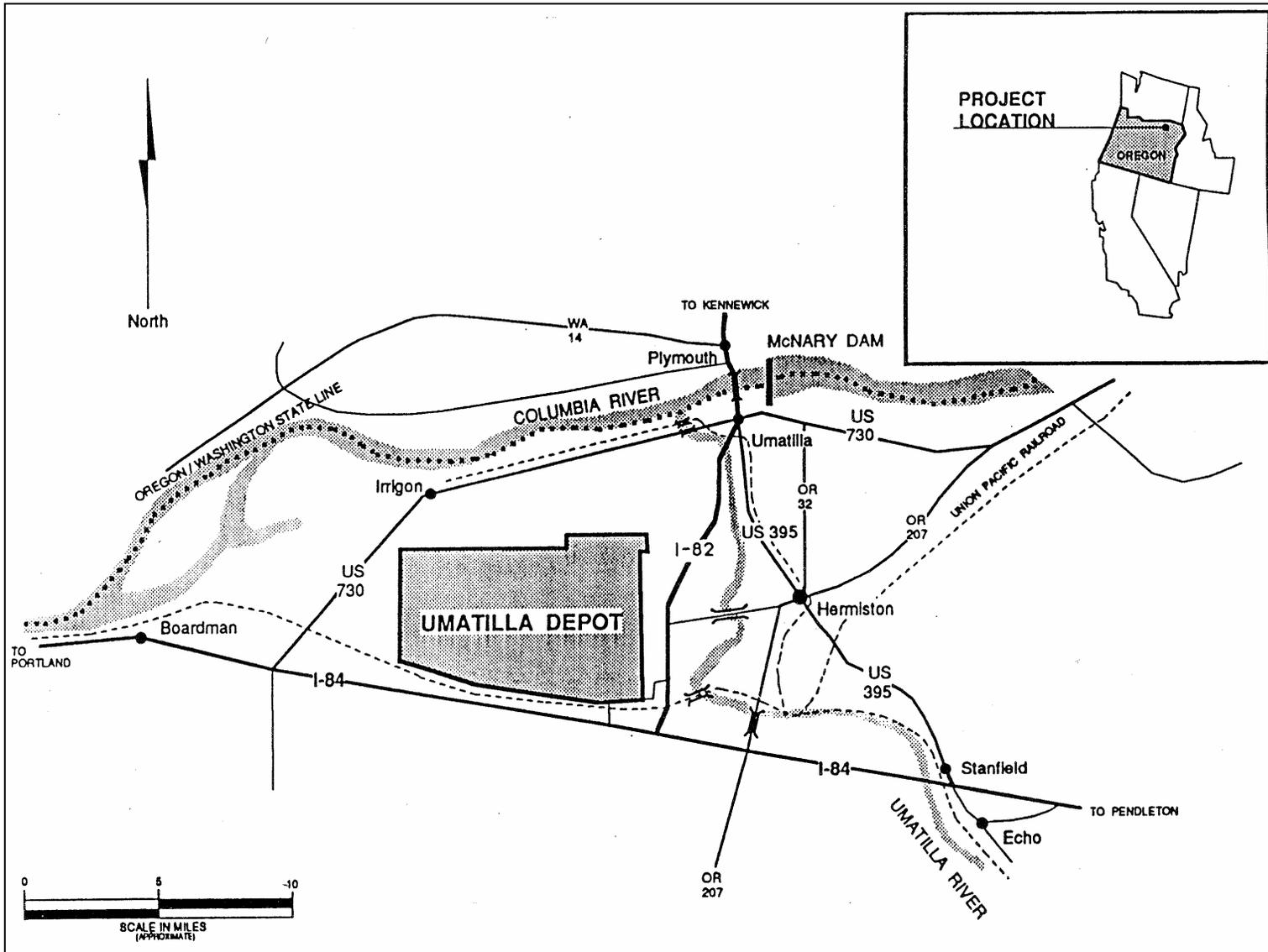
ODEQ is currently developing a cleanup plan for selenium in groundwater pursuant to State authorities. Once that plan is finalized, any implications for the CERCLA remedy should be evaluated to ensure that the remedy remains protective. In the interim, groundwater restrictions and cap integrity will need to be maintained.

XI. Next Review

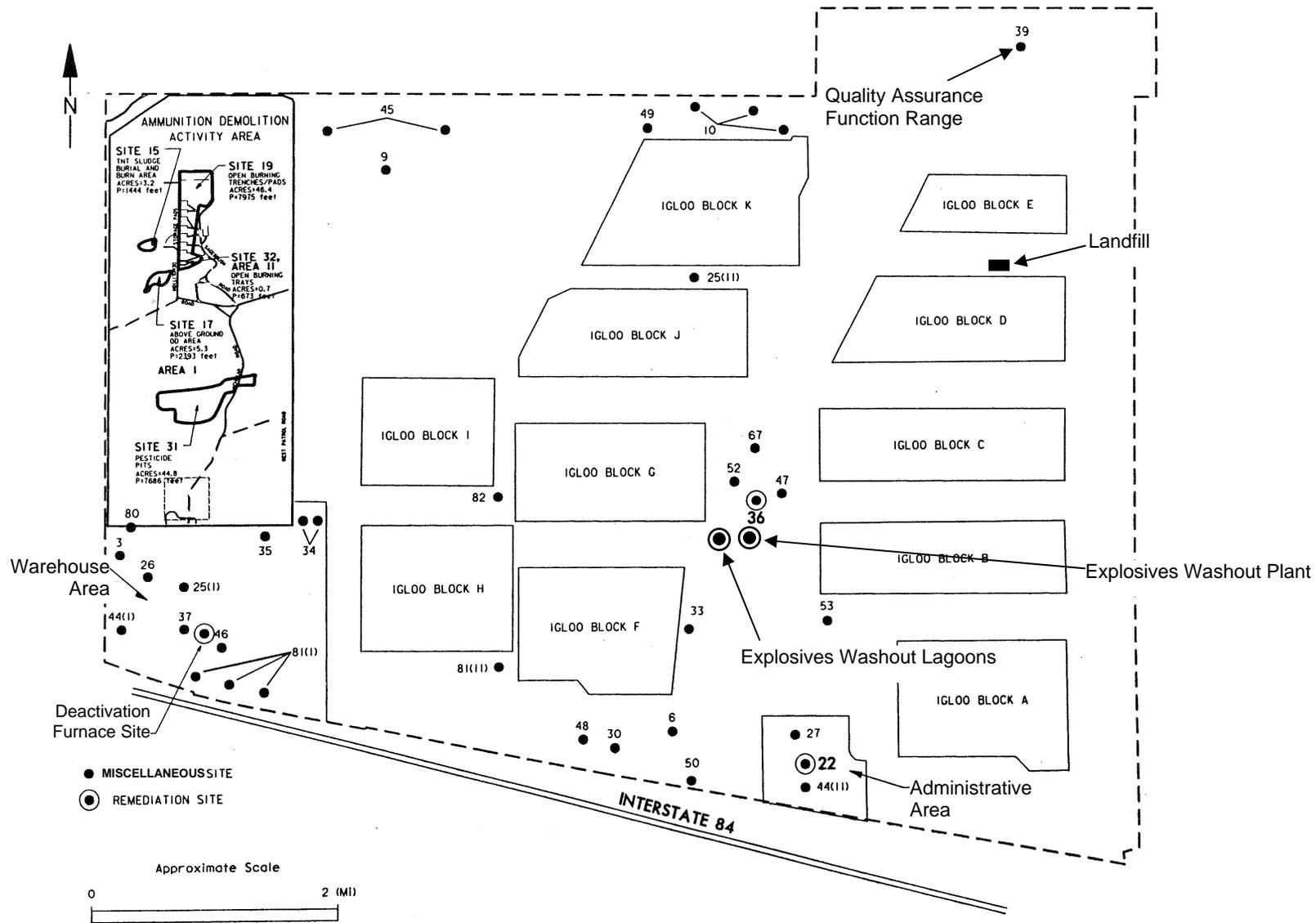
The next five year review will be completed by September 2009. Future five year reviews are necessary because contamination from the selected remedies remains above levels that allow for unrestricted use and unlimited exposure at the Explosives Washout Lagoons Groundwater OU, the ADA OU, and Site 39. An update on the status of the ODEQ selenium cleanup plan for the Landfill will also be included in the next five year review.

ATTACHMENTS

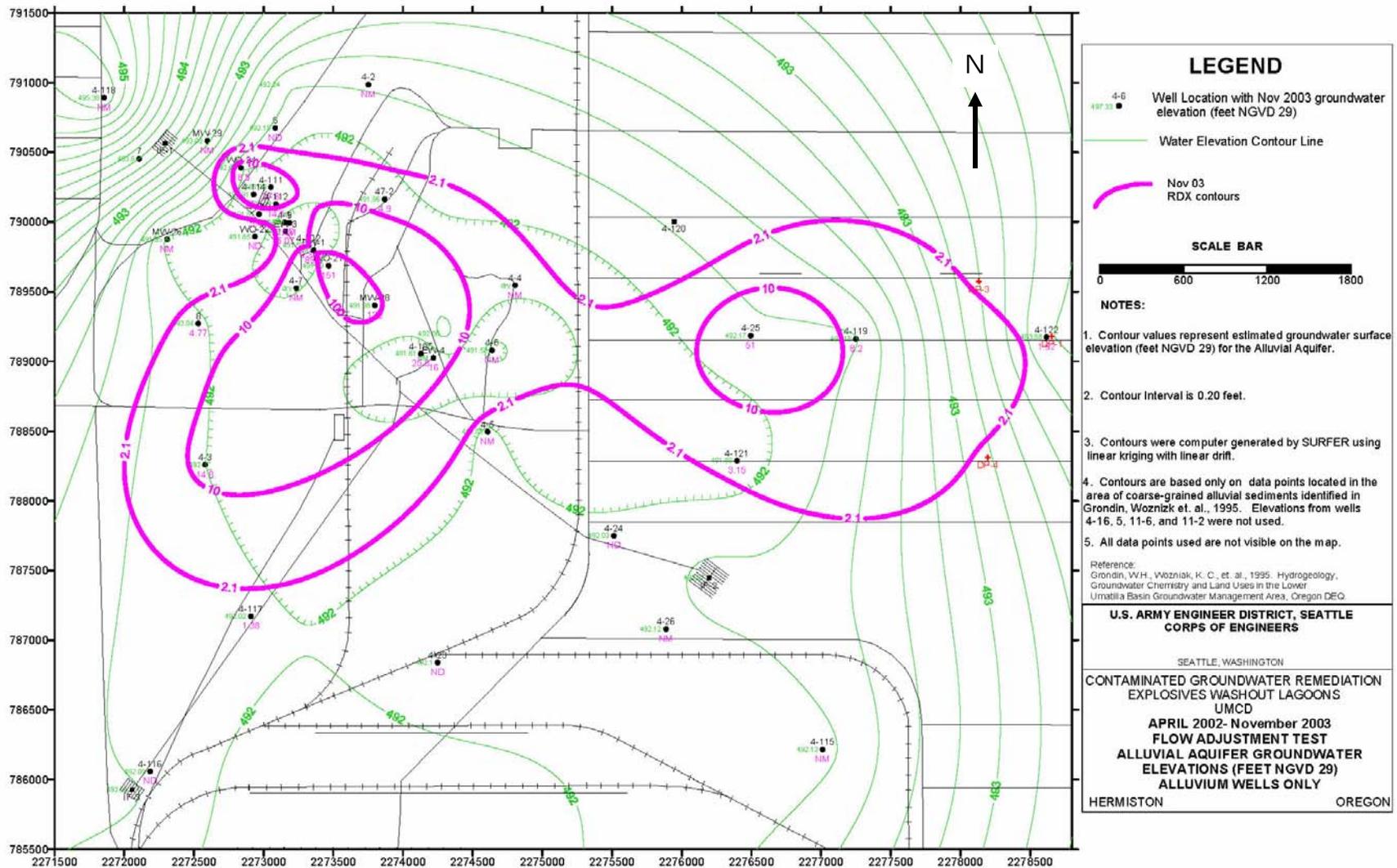
Maps



Map 1. Facility location map



Map 2. Site Map



Map 3. RDX plume, Washout Lagoons Groundwater OU

Site Condition Checklist

I. SITE INFORMATION														
Site name: Umatilla Chemical Depot	Date of inspection: July 7, 2004													
Location and Region: Hermiston, OR Region 10	EPA ID: OR6213820917													
Agency, office, or company leading the five-year review: U.S. Army	Weather/temperature: Sunny 95 F													
Remedy Includes: (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"><input checked="" type="checkbox"/> Landfill cover/containment</td> <td style="width: 50%; border: none;">Monitored natural attenuation</td> </tr> <tr> <td style="border: none;">Access controls</td> <td style="border: none;">Groundwater containment</td> </tr> <tr> <td style="border: none;"><input checked="" type="checkbox"/> Institutional controls</td> <td style="border: none;">Vertical barrier walls</td> </tr> <tr> <td style="border: none;"><input checked="" type="checkbox"/> Groundwater pump and treatment</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;">Surface water collection and treatment</td> <td style="border: none;">Other</td> </tr> </table>					<input checked="" type="checkbox"/> Landfill cover/containment	Monitored natural attenuation	Access controls	Groundwater containment	<input checked="" type="checkbox"/> Institutional controls	Vertical barrier walls	<input checked="" type="checkbox"/> Groundwater pump and treatment		Surface water collection and treatment	Other
<input checked="" type="checkbox"/> Landfill cover/containment	Monitored natural attenuation													
Access controls	Groundwater containment													
<input checked="" type="checkbox"/> Institutional controls	Vertical barrier walls													
<input checked="" type="checkbox"/> Groundwater pump and treatment														
Surface water collection and treatment	Other													
II. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)														
1. O&M Documents	<input checked="" type="checkbox"/> O&M manual	<input checked="" type="checkbox"/> Readily available	Up to date	N/A										
	<input checked="" type="checkbox"/> As-built drawings	<input checked="" type="checkbox"/> Readily available	Up to date	N/A										
	<input checked="" type="checkbox"/> Maintenance logs	<input checked="" type="checkbox"/> Readily available	Up to date	N/A										
Remarks: Records and Documents kept at UMCD BECT Offices.														
2. Site-Specific Health and Safety Plan	<input checked="" type="checkbox"/> Contingency plan/emergency response plan	<input checked="" type="checkbox"/> Readily available	Up to date	N/A										
Remarks: Records and Documents kept at UMCD BECT Offices.														
3. O&M and OSHA Training Records	<input checked="" type="checkbox"/> Readily available	Up to date	N/A											
Remarks: Records and Documents kept at UMCD BECT Offices.														
4. Permits and Service Agreements	Air discharge permit	Readily available	Up to date	X N/A										
	Effluent discharge	Readily available	Up to date	X N/A										
	Waste disposal, POTW	Readily available	Up to date	X N/A										
	Other permits _____	Readily available	Up to date	X N/A										
Remarks: No permits required for on-site CERCLA activities.														
5. Gas Generation Records	Readily available	Up to date	X N/A											
Remarks: Not applicable. No gas generation associated with CERCLA activities.														
6. Settlement Monument Records	Readily available	Up to date	X N/A											
Remarks: None.														
7. Groundwater Monitoring Records	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	N/A											
Remarks: Records and Documents kept at UMCD BECT Offices.														
8. Leachate Extraction Records	Readily available	Up to date	X N/A											
Remarks: Not applicable. No leachate generation.														

9.	Discharge Compliance Records				
	Air	Readily available	Up to date	X	N/A
	Water (effluent)	Readily available	Up to date		N/A
	Remarks: Not applicable. No discharges.				

10.	Daily Access/Security Logs	Readily available	X	Up to date	N/A
	Remarks: Separate security logs maintained as a function of the military mission at the UMCD. These include access to CERCLA sites at the installation.				

III. O&M COSTS

1.	O&M Organization		
	State in-house	Contractor for State	
	PRP in-house	Contractor for PRP	
	Federal Facility in-house	X Contractor for Federal Facility	

2.	O&M Cost Records		
	Readily available	X	Up to date
	X Funding mechanism/agreement in place		
	Original O&M cost estimate \$265,832		
	Total annual cost by year for review period if available		
	From Oct 2001 To Sept 2002	\$222,500	
	Date	Date	Total cost
	From Oct 2002 To Sept 2003	\$256,100	
	Date	Date	Total cost
	From Oct 2003 To Sept 2004	\$338,600	
	Date	Date	Total cost
	From _____ To _____		
	Date	Date	Total cost
	From _____ To _____		
	Date	Date	Total cost

3.	Unanticipated O&M Costs for Deferred Maintenance During Review Period
	Describe costs and reasons: Plant upgrades and deferred maintenance in 2004.

IV. ACCESS AND INSTITUTIONAL CONTROLS X Applicable N/A

A. Fencing

1.	Fencing damaged N/A
	Remarks. Fences at UMCD are required for the installation security activities. These are inspected daily and maintained in good condition.

B. Other Access Restrictions

1.	Signs and other security measures
2.	Remarks Security signs placed on fences at 500 foot intervals.

C. Institutional Controls (ICs)

1.	Implementation and enforcement			
	Site conditions imply ICs not properly implemented		Yes	X No N/A
	Site conditions imply ICs not being fully enforced		Yes	X No N/A
	Type of monitoring (<i>e.g.</i> , self-reporting, drive by) Armed military security patrols			
	Frequency Every four hours			
	Responsible party/agency U.S. Army			
	Contact Mark Daugherty	BRAC Envl. Coord.	8/20/04 (541) 564-5294	
	Name	Title	Date	Phone no.
	Reporting is up-to-date		X Yes	No N/A
	Reports are verified by the lead agency		X Yes	No N/A
	Specific requirements in deed or decision documents have been met		X Yes	No N/A
	Violations have been reported		Yes	No X N/A
	Other problems or suggestions:	None		
2.	Adequacy	X ICs are adequate	ICs are inadequate	N/A
D. General				
1.	Vandalism/trespassing	Location shown on site map	X No vandalism evident	
2.	Land use changes on site	X N/A		
3.	Land use changes off site	X N/A		
V. GENERAL SITE CONDITIONS				
A. Roads	X Applicable	N/A		
1.	Roads damaged	Location shown on site map	X Roads adequate	N/A
	Remarks: None __			
B. Other Site Conditions				
	Remarks __	None		
VI. LANDFILL COVERS X Applicable N/A				
A. Landfill Surface				
1.	Settlement (Low spots)	Location shown on site map	X Settlement not evident	
2.	Cracks	Location shown on site map	X Cracking not evident	
3.	Erosion	Location shown on site map	X Erosion not evident	
5.	Vegetative Cover Grass	Cover properly established	X No signs of stress	

6.	Alternative Cover (armored rock, concrete, etc.)		X	N/A
7.	Bulges	Location shown on site map	X	Bulges not evident
8.	Wet Areas/Water Damage	X Wet areas/water damage not evident		
9.	Slope Instability Slides	Location shown on site map	X	No evidence of slope instability
	B. Benches	Applicable	X	N/A
	C. Letdown Channels	N/A		
	D. Cover Penetrations	N/A		
	E. Gas Collection and Treatment	Applicable	X	N/A
	F. Cover Drainage Layer	Applicable	X	N/A
	G. Detention/Sedimentation Ponds	Applicable	X	N/A
	H. Retaining Walls	Applicable	X	N/A
	I. Perimeter Ditches/Off-Site Discharge	Applicable	X	N/A
VII. VERTICAL BARRIER WALLS Applicable X N/A				
VIII. GROUNDWATER/SURFACE WATER REMEDIES fl Applicable N/A				
	A. Groundwater Extraction Wells, Pumps, and Pipelines	fl Applicable		N/A
1.	Pumps, Wellhead Plumbing, and Electrical	fl Good condition		All required wells properly operating
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances	fl Good condition		
3.	Spare Parts and Equipment	Readily available	X	Good condition Requires upgrade Needs to be provided
	B. Surface Water Collection Structures, Pumps, and Pipelines	Applicable	X	N/A
	C. Treatment System	fl Applicable		N/A
1.	Treatment Train (Check components that apply)			
	Metals removal	Oil/water separation		Bioremediation
	Air stripping	fl Carbon adsorbers		
	Filters	_____		
	Additive (e.g., chelation agent, flocculent)	_____		
	Others	_____		
	fl 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 fl Needs Maintenance Remarks Install individual pump motor protection relays. Replace well flow meters and low water level pump shut off.
3.	Tanks, Vaults, Storage Vessels N/A Good condition Proper secondary containment fl Needs Maintenance Remarks Install passive ventilation in the three extraction well pump vaults.
4.	Discharge Structure and Appurtenances N/A fl Good condition Needs Maintenance Remarks _____
5.	Treatment Building(s) N/A Good condition (esp. roof and doorways) fl Needs repair Chemicals and equipment properly stored Remarks Pipe supports show some rusting
6.	Monitoring Wells (pump and treatment remedy) fl Properly secured/locked fl Functioning fl Routinely sampled fl Good condition fl All required wells located Needs Maintenance N/A Remarks _____
D. Monitoring Data	
1.	Monitoring Data fl Is routinely submitted on time fl Is of acceptable quality
2.	Monitoring data suggests: fl Groundwater plume is effectively contained fl Contaminant concentrations are declining
D. Monitored Natural Attenuation	
1.	Monitoring Wells (natural attenuation remedy) Properly secured/locked Functioning Routinely sampled Good condition All required wells located Needs Maintenance fl 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.). The groundwater extraction, carbon adsorption, and infiltration remedy is containing the contaminant plume as designed and constructed.	
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 treatment system remains protective of human health and the environment.	

C.	Early Indicators of Potential Remedy Problems
<p>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.</p> <p>None_____</p>	
D.	Opportunities for Optimization
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p>Groundwater treatment remedy is functioning effectively and consideration should be given to reducing the quarterly sampling events to semi-annual and reducing the number of monitoring wells sampled.</p>	

Site Condition Photos



Photo 1. Former Landfill (now capped)



Photo 2. Perimeter Fence surrounding Umatilla Chemical Depot



Photo 3. Quality Assurance Function Range (Site 39)



Photo 4. Former Deactivation Furnace Site



Photo 5. Former Explosives Washout Plant Site



Photo 6. Former Explosives Washout Lagoons Site



Photo 7. Remaining treated material from Explosives Washout Lagoons Soils OU



Photo 8. Washout Lagoons Groundwater Treatment Plant

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