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Remedial Action Report - Soil Operable Unit (OU-1)

For

McCormick and Baxter Creosoting Company Superfund Site
Portland, Multnomah County, Oregon

ORD009020603

March 2007

Prepared by:

Oregon Department of
Environmental Quality (DEQ)

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TABLE OF CONTENTS

Section **Page**

I. INTRODUCTION **1**
II. BACKGROUND **1**
Site Description 1
Site History 2
Regulatory History 4
Removal Actions 5
Remedy Selection 5
Redevelopment Potential 6
III. REMEDY DESCRIPTION AND CONSTRUCTION ACTIVITIES **6**
Soil Remedy 6
Engineering and Institutional Controls for Soil 9
IV. CHRONOLOGY OF EVENTS **9**
V. PERFORMANCE STANDARDS AND CONSTRUCTION QUALITY CONTROL FOR SOIL REMOVAL AND UPLAND SOIL CAP **11**
Quality Control 11
Quality Assurance 11
Health and safety 11
VI. FINAL INSPECTION AND CERTIFICATION **12**
VII. OPERATION AND MAINTENANCE **12**
Soil Remedy 12
Engineering and Institutional Controls for Soil 13
VIII. SUMMARY OF PROJECT COSTS **13**
IX. OBSERVATIONS AND LESSONS LEARNED **14**
X. CONTACT INFORMATION **14**

Tables

Table 1 - Chronology of Major Site Events
Table 2 - Cost Summary for Soil OU-1

Figures

Figure 1 - Site Location Map
Figure 2 - Current Site Layout and Features
Figure 3 - Current Site Layout and Features with Surface Elevations

REMEDIAL ACTION REPORT
SOIL OPERABLE UNIT (OU-1)

McCORMICK & BAXTER CREOSOTING COMPANY
PORTLAND, OREGON

I. INTRODUCTION

The Record of Decision (ROD) for the McCormick & Baxter Creosoting Company Site was issued by the Oregon Department of Environmental Quality (DEQ) and the U.S. Environmental Protection Agency (EPA) in March 1996. The ROD specifies cleanup remedies for soil, groundwater and sediments which are separated into four Operable Units (OUs) for administrative purposes: Soil OU-1, Interim Groundwater OU-2, Final Groundwater OU-3 and Sediment OU-4.

This Remedial Action (RA) Report describes the current status of the selected remedy for the Soil OU. An Interim RA Report issued in September 2003 describes the status of the Final Groundwater OU. DEQ will issue an RA Report for the Sediment OU upon completion of the Operational and Functional determination of the Sediment OU, which currently is anticipated to extend through September 2007.

This RA Report for Soil OU-1 has been prepared in accordance with the EPA OSWER Directive 9320.2-09A (titled *Close Out Procedures for National Priority List Sites*, January 2000) and will be used, along with the RA Reports for Groundwater OU-3 and Sediment OU-4, as the basis for developing of the site Final Close Out Report. As specified in this Directive, the purpose of the RA Report is to document the cleanup activities that took place at a single OU under remedial authority. The RA Report is a key document to gather historical cleanup information for analysis of Superfund remedies. It is the mechanism used to share information within EPA, and between EPA and other Federal agencies. The RA Report includes cost and performance data which, along with other information, assists with future remedy selection decision-making, provides a means to compare technology performance, supports in provided cost comparisons, and documents progress made at sites.

II. BACKGROUND

Site Description

The Site is a former wood treating facility located on the east bank of the Willamette River in Portland, Oregon. The Site encompasses approximately 41 acres of land and an additional 23 acres of contaminated river sediments. Figure 1 is the Site location map. Figure 2 shows the current Site layout and features from an aerial photograph. Figure 3 depicts the current Site layout and features on a topographic map of the sediment and terrestrial surface elevations.

The upland portion of the Site is on a terrace of imported sand fill (dredged material placed in the early 1900s) within the historic flood plain of the Willamette River. This upland area is generally flat and lies between a 120-foot-high bluff along the northeast border and a 25- to 30-foot-high

bank along the Willamette River to the southwest. Currently, the Site is vacant except for a paved parking area, small shop building, two field office trailers, and associated utilities which are used to support ongoing creosote extraction.

Inactive industrial properties border the Site to the southeast, and a residential area is located above the Site on the adjacent bluff. A Burlington Northern Santa Fe railway track crosses the northwest portion of the property, and Union Pacific Railroad tracks border the Site to the southeast below the bluff. Beyond the Burlington Northern Santa Fe railway tracks, toward the northwest, is a former industrial property that likely will be developed as a public green space. Additionally, the 115-acre University of Portland college campus is located approximately 0.5 mile east of the Site. The perimeter of the Site property is fenced and posted with warning signs.

Three hydrostratigraphic units are present at the Site: the shallow, intermediate, and deep aquifer zones, which are interconnected to varying degrees depending upon the location within the Site. The shallow zone consists of poorly-graded dredge fill sand and wood debris; it ranges in thickness from 5 to greater than 30 feet. In parts of the Site, the shallow zone consists mostly of sawdust and wood chips up to 20 to 25 feet thick. The shallow zone acts as an unconfined aquifer that is in hydraulic connection with the river. This connection, however, significantly diminishes toward the bluff and within the barrier wall area. Depth to groundwater ranges from approximately 20 to 25 feet below ground surface (bgs). In much of the Site, the shallow zone is underlain by a silt aquitard, ranging in thickness from zero near the river to greater than 100 feet closer to the bluff.

The intermediate aquifer zone is composed of fine to medium grained alluvial sand and is present below the silt aquitard over most portions of the Site. This zone varies in thickness from zero to greater than 50 feet. In the north-central portion of the Site, the intermediate zone is approximately 12 feet thick and hydraulically separated from the shallow aquifer. In the south-central portion of the Site, the silt aquitard is greater than 100 feet thick, and no intermediate aquifer zone is present. Along the beach adjacent to the river, the intermediate zone is up to 50 feet or more thick and is separated from the shallow zone by a discontinuous, thin silt layer.

The deep aquifer zone is present in all portions of the Site. The deep zone consists of alluvial sands and is directly connected with the intermediate and shallow zones along the river margin. Near the center of the Site, the deep zone is separated from the shallow zone by more than 100 feet of low-permeability silt. Near the bluff, the deep zone is composed of gravel and sands of the Troutdale Formation and Catastrophic Flood Deposits.

Shallow groundwater gradients generally exist from the bluff toward the river. Intermediate and deep zone groundwater surface elevations and gradients have been inferred to flow toward the river in these zones.

The Willamette River is the only surface water body at the Site. Near the Site, the river is approximately 1,550 feet wide, with a typical maximum depth of about 45 to 55 feet below the National American Vertical Datum [NAVD]. Average flow rates in the river near the Site range from 8,300 cubic feet per second (cfs) in summer to 73,000 cfs in winter.

Site History

Much of the Site was created from dredged materials in the early 1900s. At that time, a sawmill operated in the southeast portion of the property. McCormick & Baxter Creosoting Company

was founded in 1944 to produce treated wood products, including lumber, piling, timbers, and railroad ties during World War II. The wood treating operations continued until October 1991.

Four retorts were located in the central processing area (CPA) at the Site and were used for various pressure treating processes, which included the use of creosote, pentachlorophenol (PCP), chromium, ammoniacal copper arsenate, ammoniacal copper zinc arsenate (ACZA), and Cellon (PCP in diesel oil, liquid butane, and isopropyl ether). Also present at the Site were a 750,000-gallon creosote product storage tank and a tank farm area (TFA) with several additional tanks for storing wood-treatment chemicals.

From 1950 to 1965, waste oil containing creosote and/or PCP was applied to the Site soil for dust suppression in the CPA. Liquid process wastes were reportedly discharged to a low area near the tank farm prior to 1971.

The Site included a wastewater discharge outfall that was used to discharge cooling water to the river when the plant was operating. Contact wastewater also was discharged from this outfall in the early years of operation. Three stormwater outfalls were also present along the river. Two of the outfalls were permitted under the National Pollutant Discharge Elimination System. Following plant shutdown, DEQ placed earthen berms around stormwater collection sumps at the Site as an early response action to minimize off-site discharge. The stormwater outfalls were removed as part of the first phase of the soil remedial action in 1999.

Two major spills have reportedly occurred at the Site: a 50,000-gallon creosote release in the tank farm area in approximately 1950; and a large spill of an unspecified volume of creosote from a tank car near the tank farm in 1956.

Sludge from on-site processes was disposed of at an unknown off-site location until 1968. From 1968 to at least 1973, residues from the retorts, oil/water separator, and evaporators were disposed of on Site in the former waste disposal area (FWDA) in the western portion of the Site. Beginning in 1972, wood preservative sludge was placed in metal containers that were stored on Site in the FWDA. After 1978, wood preservative sludge was shipped to Chem-Security System, Inc., a permitted hazardous waste disposal facility near Arlington, Oregon. In 1981, the hazardous waste storage area was secured with a fence and lock, and a manifest system was implemented to comply with hazardous waste regulations.

Concrete walls and slabs were built around the ACZA process and storage facilities in 1980 to prevent spills from entering the soil. The retorts and retort openings were lined with concrete, but the integrity of the concrete was not verified. The creosote lines and other pipelines passed through a concrete underground walkway that extended from the tank farm to the retort building. In 1985, 2 feet of soil and sludge were excavated from the tank farm and were shipped to a hazardous waste landfill. Visibly contaminated soil remained at the tank farm.

Site investigations have revealed many releases of wood-treating chemical compounds to soils, groundwater, and sediments as a result of these operations. Contaminants detected include polynuclear aromatic hydrocarbons (PAHs, comprising 85% of the creosote), PCP, arsenic, chromium, copper, zinc, and dioxins/furans. Three main contaminant sources existed at the Site: the FWDA, which was located in the western corner of the Site adjacent to the Willamette River and was characterized by a large depression where waste oils, retort sludges, and wastewater were disposed of over a period of several years; the CPA, which was located in the center portion of the Site and was where retorts, PCP mixing shed and ACZA storage areas were formerly located; and the TFA, which was located in the south-central portion of the Site and was the former

location of the main tank farm, creosote storage tank, and several other wood treatment process-related tanks or process areas. Releases from these source areas (particularly in the TFA and FWDA) in the form of insoluble wood-treating contaminants or non-aqueous phase liquids (NAPL) have significantly impacted subsurface soils, groundwater, and sediment. Remedial investigations identified two large NAPL plumes migrating to the river and impacting surface water and sediments. Subsequent monitoring identified another NAPL plume migrating under the Burlington Northern Santa Fe railway right-of-way toward Willamette Cove.

Additional investigation was recently performed in the northern corner of the Site to determine the nature and extent of NAPL associated with monitoring well MW-1s. This investigation, documented in a January 2006 report, found only trace amounts of NAPL apparently comprised of weathered crude or bunker oil.

Regulatory History

The McCormick & Baxter Creosoting Company began environmental investigations of their property in 1983. Based on those investigations, DEQ entered into a Stipulated Order with McCormick & Baxter Creosoting Company in 1987 requiring the implementation of corrective actions. Corrective actions included the installation and operation of a groundwater extraction and treatment system, construction of drip pads in retort areas, construction of covered storage areas for treated wood, and collection and treatment of stormwater. In December 1988 the McCormick & Baxter Creosoting Company filed for Chapter 11 bankruptcy; and, in 1990 DEQ assumed responsibility for completing the investigations and cleanup activities at the Site. In October 1991 the McCormick & Baxter Creosoting Company ceased operations.

DEQ began the Remedial Investigation and Feasibility Study in 1990 and issued a public notice of a proposed cleanup plan in January 1993. DEQ elected not to finalize the proposed remedial actions at the Site due to the proposed addition of the Site to the National Priorities List (NPL) by U.S. Environmental Protection Agency (EPA) in June 1993. The Site was added to the NPL on June 1, 1994. DEQ completed a revised Feasibility Study in 1995.

DEQ and EPA entered into a Superfund State Contract (SSC) in May 1996. The SSC documents the responsibilities of DEQ as the lead agency and EPA as the support agency during the remedial action. Among other items, the SSC specifies cost sharing between DEQ and EPA. The SSC was most recently amended in February 2005.

Additional regulatory background information on the McCormick & Baxter Superfund Site can be found in the following documents:

- *Record of Decision*, McCormick and Baxter Creosoting Company Portland Plant, Portland, Oregon, EPA and DEQ, March 1996.
- *Amended Record of Decision*, McCormick and Baxter Creosoting Company Portland Plant, Portland, Oregon, EPA and DEQ, March 1998.
- *First Five-Year Review Report,* McCormick and Baxter Creosoting Company Superfund Site, Portland, Multnomah County, Oregon, EPA and DEQ, September 2001.
- *Explanation of Significant Differences (OU3 – Final Groundwater)*, McCormick and Baxter Creosoting Company Superfund Site, Portland, Multnomah County, Oregon, EPA and DEQ, August 2002.

- *Interim Remedial Action Report Final Groundwater Operable Unit (OU3),* McCormick and Baxter Creosoting Company Site, Portland, Multnomah County, Oregon, prepared by Ecology & Environment, Inc. for DEQ, September 2002.
- *Preliminary Close-Out Report*, McCormick and Baxter Creosoting Company Superfund Site, Portland, Multnomah County, Oregon, EPA, September 2005.
- *Second Five-Year Review Report,* McCormick and Baxter Creosoting Company Superfund Site, Portland, Multnomah County, Oregon, EPA and DEQ, September 2006.

Removal Actions

Removal Actions were completed by DEQ under State of Oregon cleanup regulations prior to listing on the NPL and under CERCLA authority between Site listing and issuance of the Record of Decision (ROD). A list of these Removal Actions is provided in the document titled *Preliminary Close-Out Report* (EPA, September 2005).

Remedy Selection

In March 1996 EPA and DEQ issued one ROD for the Site to address several different media: contaminated soil, groundwater, stormwater, and Willamette River sediment. The selected remedy required the following media-specific actions to mitigate the principal threats at the Site:

- Excavation, consolidation and biological treatment/stabilization of the most highly contaminated soils.
- Soil capping.
- Enhancement of the existing groundwater and NAPL extraction and treatment system.
- As a contingency remedy, installation of a vertical subsurface barrier wall in the event that mobile NAPL cannot be reliably controlled.
- Sediment capping.
- Monitoring.
- Institutional controls.

In March 1998 an Amended ROD was issued by EPA and DEQ to change a component of the selected remedial action for contaminated soil. The soil remedy in the ROD called for excavation and on-site biological treatment. After the ROD was signed, DEQ initiated additional soil sampling for remedial design. This sampling found dioxin contamination was more widespread than previous analyses indicated. Accordingly, DEQ and EPA reevaluated the remedy and subsequently selected an alternative that called for removal and off-site disposal of shallow soil with concentrations above designated action levels and capping the remaining contaminated soil.

In August 2002 EPA and DEQ issued an "Explanation of Significant Differences" (ESD) explaining the decision to implement the contingency remedy for groundwater as specified in the 1996 ROD. The groundwater remedy selected in the ROD included a contingency for installing an impermeable subsurface barrier wall in the event that either: (1) NAPL could not be reliably contained using hydraulic methods; or (2) the barrier wall improves the overall cost-effectiveness of the groundwater remedy. DEQ and EPA determined that NAPL had not been contained using groundwater/NAPL extraction and recovery measures, and concluded that hydraulic control of NAPL or groundwater had not been established in either the TFA or the FWDA. To implement the contingency plan, DEQ and EPA selected a fully encompassing, impermeable subsurface

barrier wall alignment surrounding the TFA, CPA and the FWDA, and a riverfront alignment located along the ordinary high-water mark of the Willamette River.

Redevelopment Potential

A Site Re-Use Assessment was conducted between February 2000 and June 2001 by the City of Portland Bureau of Planning under a grant from EPA. In developing reuse recommendations the City analyzed the Site's redevelopment potential and engaged stakeholders and the interested public in learning about, proposing and jointly considering what uses would best fit the Site. The City's findings were presented in a final report dated June 2001 and endorsed by the Portland City Council on July 25, 2001.

In conducting the assessment, the City developed a list of reuse criteria that would need to be balanced in order to arrive at the most feasible land reuse, such as minimizing traffic impacts, ensuring adequacy of infrastructure, being compatible with cleanup remedies, serving an identified market or community needs and being consistent with the City of Portland Comprehensive Plan. Using these criteria, the City developed, presented and discussed a variety of reuse ideas and conceptual site plans. Four reuse scenarios were further studied and reviewed at public open houses: an open space demonstration site, recreational use, industrial use and mixed use (residential, commercial and university facilities). Project consultants prepared market feasibility and traffic analysis reports for these four scenarios. The City concluded that the Site is best suited for recreational use.

III. REMEDY DESCRIPTION AND CONSTRUCTION ACTIVITIES

Soil Remedy

The soil remedy is composed of three primary components: institutional controls, removal of highly contaminated soil within 4 feet of the ground surface, and capping. The Remedial Action Objectives for the soil remedy are:

- Prevent human exposure through direct contact (ingestion, inhalation, or dermal contact) to contaminated surface and near-surface soil that would result in an excess lifetime cancer risk above $1x10^{-6}$ for individual compounds, above $1x10^{-5}$ for additive carcinogenic compounds, or above a Hazard Index (HI) of 1 for noncarcinogenic compounds in an industrial land use scenario.
- Prevent storm water runoff containing contaminated soil from reaching the Willamette River.

<u>Soil Removal</u>

The purpose of the soil remedy is to eliminate the potential for future human contact with soil less than 4 feet in depth that has contaminant concentrations above removal action levels. Removal action levels for contaminated soils were defined for excavation and off-site disposal for arsenic, PCP, and total carcinogenic PAHs. These action levels indirectly address the removal of dioxins/furans due to their presence predominantly in areas where elevated concentrations of PCP or PAHs were found in soil.

Soil excavation activities were performed from February through May 1999 and effectively eliminated the presence of the contaminated soils above removal action levels in the surficial 4 feet. In several major source areas, excavation proceeded to depths of 8 to 10 feet; although, large volumes of deeper soil still contain NAPL and high concentrations of Site contaminants. Approximately 32,604 tons of contaminated soil and debris were excavated and disposed off-site at permitted landfills. A total of 33,128 tons of clean sand were imported from an off-site quarry to backfill the excavation pits.

Documentation, record drawings, and a detailed summary of the soil removal construction activities are provided in the document titled *Phase 1 Soil Remedial Action Summary Report* (E & E, November 1999).

Upland Soil Cap

The selected soil remedy requires capping upland areas where residual soil contamination remains above human health and ecological risk-based protective levels. Documentation, record drawings, and a detailed summary of the upland soil cap construction activities are provided in the document titled *Upland Soil Cap Construction Summary Report* (E & E, May 2006).

Construction activities for the upland soil cap were performed between March and September 2005 and included the following major components: demolition and off-site disposal of existing structures and infrastructure; reinstallation of key support facilities; construction of an impermeable cap within a 15-acre portion of the 18-acre subsurface barrier wall; and construction of an earthen soil cap outside of the impermeable cap.

Demolition and removal were conducted from May through June 2005 and included the removal of all remaining structures and disposal of the generated waste in a State-approved disposal facility. All existing water, gas, and electrical utilities were removed or abandoned. Most fire hydrants were removed, any associated piping was grouted to prevent preferential flow paths, and water lines were capped. Demolition items were salvaged, scrapped, or disposed of as non-hazardous waste or hazardous waste. Concrete, creosote-contaminated steel, and asbestos-containing water pipe were also buried on site. All on-site burial locations were surveyed. Twenty groundwater monitoring wells were abandoned.

Support facility construction was conducted from March to July 2005 and included the reinstallation of a 1-acre paved entrance road and parking area, construction of a 25-foot by 40-foot shop building, and reinstallation of electrical, telephone, and water services.

A Resource Conservation and Recovery Act-type impermeable cap was constructed over the entire 15-acre area inside of the barrier wall, excluding the riparian zone bordering the river. Capping of the riparian zone with an earthen cap had been completed in 2004 as part of the sediment cap construction.

The purpose of the impermeable cap is to minimize infiltration of rainwater into the contaminated areas within the wall. The impermeable cap is composed of the following materials, listed in order from bottom to top:

- 8,000 cubic yards of sand used as a leveling layer about 4 inches thick.
- 72,000 square yards of high density polyethylene (HDPE) geomembrane liner which prevents water from flowing vertically into the contaminated aquifer.

- 72,000 square yards of a geocomposite plastic 'fabric' that allows water to flow laterally.
- 47,000 cubic yards of sand of varying depths to allow for drainage.
- 12,000 cubic yards of 4"-minus crushed rock, forming a screened biotic barrier layer approximately 6 inches thick.
- 72,000 square yards of geotextile filter fabric.
- 24,000 cubic yards of topsoil placed approximately 9 to 12 inches in depth.
- 20 species of native grasses to provide a diverse and sustainable herbaceous cover, thus minimizing surface erosion.

The impermeable cap has a minimum thickness of 29 inches; the thickness varies because of varying subgrade and the final grade of the Site. The sand drainage layer increases in depth to create the grades necessary to achieve Site drainage. The maximum thickness of the cap is approximately 7 feet, which includes a 4-inch sand leveling layer, a 62-inch sand drainage layer, a 6-inch rock biotic barrier, and 12 inches of topsoil.

The impermeable cap also consists of a subsurface drainage system above the HDPE liner to collect stormwater percolating through upper soil, rock, and sand layers of the cap. Stormwater is collected in the geocomposite fabric and perforated piping and conveyed by gravity flow through conveyance piping to an outfall structure, which daylights at approximately the Ordinary High Water (OHW)[1] level of the Willamette River.

An earthen soil cap, consisting of a 2-foot layer of imported topsoil, was installed over 19 acres of the Site outside of the barrier wall area, excluding the gravel entrance road and parking area (1 acre). An additional 6 acres of earthen cap were installed over the riparian zone during construction of the sediment cap. The total area of earthen cap is 25 acres. The purpose of the earthen cap is to prevent direct contact with low-level contamination remaining in the soils throughout the rest of the Site. The soil layer is underlain with a demarcation layer consisting of orange HDPE safety fencing to provide a distinction between the clean soil cap and contaminated soil. The earthen soil cap was seeded with native herbaceous vegetation.

A stormwater management system was constructed to minimize stormwater runoff from the Site to neighboring properties and the Willamette River. This system consists of a swale that conveys stormwater directly to an on-site retention/infiltration pond. Except for the 6-acre riparian zone, the surface of the upland soil cap (including both the earthen and impermeable caps) is constructed with sloped surfaces (approximately 1 percent slope) to direct surface water runoff towards the drainage swale. Rainwater falling onto the riparian zone, which generally has a slope of 25 percent slope, flows overland toward the river and/or infiltrates into Site soil and groundwater.

A 6-foot high, chain-link fence topped with barbed wire was also reinstalled along the Site perimeter. Along the riverfront, the fence is located 35 feet inland from the top of bank. Gravel access ways and roads were constructed around the perimeter of the Site (except along the north side where the drainage swale is located), with spurs that cross the interior area to allow monitoring and maintenance of the Site. Warning signs were placed along the perimeter of the Site.

[1] OHW at the Site is +20 feet NAVD.

Several thousand native trees and shrubs were planted throughout the drainage swale and riparian zone in February 2006, and a temporary, above-ground irrigation system was installed in May 2006. The purpose of this vegetation, along with the native grasses, is to help stabilize the soil against stormwater erosion and river flood erosion and to reduce rainwater percolation into groundwater by evapotranspiration.[2]

Engineering and Institutional Controls for Soil

The institutional controls specified in the ROD pertaining to the soil remedy are:

- Physical restrictions (e.g., fencing), warning signs, and safety measures until completion of the remedies.
- Controls on future uses of the property that are inconsistent with the level of protectiveness achieved by the cleanup.

DEQ currently maintains a site perimeter fence and warning signs and restricts public access to the upland portion of the Site. Public assess to the beach is not restricted; however, the public rarely accesses the beach due to the Site's remote location. Although not all monitoring wells are located within the fence, all wells have locked, steel monuments. These physical Site restrictions will be maintained into the foreseeable future. DEQ and EPA have developed a draft Easement and Equitable Servitude that has been provided to a perspective purchaser of the Site. DEQ will require an Easement and Equitable Servitude to be recorded upon the eventual sale of the property. At minimum these restrictions will prohibit development within the 6-acre riparian zone along the riverbank as required by the Endangered Species Act Biological Opinion issued by the National Marines Fisheries Service, prohibit use of Site groundwater as specified by the ROD and limit excavation of Site soils unless authorized by DEQ.

IV. CHRONOLOGY OF EVENTS

Following is a list of major events for the site.

TABLE 1 - CHRONOLOGY OF MAJOR SITE EVENTS

Event	Date
EPA performs a site inspection which raises concerns about possible releases of hazardous substances.	1983
McCormick and Baxter Creosoting Company performs a preliminary site investigation and notifies DEQ of possible off-site releases near the former waste disposal area.	1983
McCormick and Baxter Creosoting Company completes site investigation concluding that soil and groundwater contamination exists at the Site.	1985

[2] Restoration and maintenance of the riparian zone is required by the Biological Opinion issued by the National Marine Fisheries Service, pursuant to Section 7 of the Endangered Species Act.

TABLE 1 - CHRONOLOGY OF MAJOR SITE EVENTS	
Event	**Date**
DEQ and McCormick and Baxter Creosoting Company sign a Stipulation and Final Order requiring the firm to perform specified remedial activities.	Nov 1987
McCormick and Baxter Creosoting Company files for bankruptcy protection.	Dec 1988
McCormick and Baxter Creosoting Company ceases operations.	Oct 1991
DEQ conducts a Remedial Investigation and Feasibility Study under State cleanup regulations.	1990 to 1992
DEQ conducts Removal Actions, including NAPL extraction, under State of Oregon cleanup regulations.	1992 to 1996
The McCormick & Baxter Creosoting Company site is added to the NPL.	June 1994
DEQ revises Feasibility Study to comply with CERCLA.	Sept 1995
EPA issues ROD.	Mar 1996
NAPL extraction resumed as a Remedial Action.	Mar 1996
DEQ and EPA entered into a Superfund State Contract.	May 1996
EPA issues Amended ROD specifying off-site disposal of highly contaminated soils.	Mar 1998
Excavation and off-site disposal of highly contaminated soils completed.	Feb to May 1999
DEQ and EPA complete first five-year review.	Sept 26, 2001
EPA issues an ESD for groundwater contingency remedy.	Aug 2002
The subsurface barrier wall is constructed.	Apr to Sept 2003
DEQ issues Interim RA Report for Final Groundwater OU-3	September 2003
The sediment cap is constructed.	July 2004 to Sept 2005
The soil cap is constructed.	May to Sept 2005
Prefinal inspection of remedial actions is conducted by DEQ and EPA - Construction Completion is Achieved.	9/26/05
Preliminary Close Out Report is signed by EPA.	9/27/05
Operational and Functional (O&F) period begins.	Oct 2005
Draft O&M Plan submitted to EPA	July 2006
DEQ and EPA complete second five-year review.	9/26/06
O&F Determination Completed for Soil and Groundwater OUs	9/27/06

TABLE 1 - CHRONOLOGY OF MAJOR SITE EVENTS	
Event	**Date**
DEQ issues first annual O&M Report covering activities through December, 30 2006.	March 2007
DEQ Issues RA Report for Soil OU-1	March 2007
O&M Plan finalized by DEQ with concurrence by EPA.	May 2007 (anticipated)
O&F Determination Completed for Sediment OU	9/30/07 (anticipated)

V. PERFORMANCE STANDARDS AND CONSTRUCTION QUALITY CONTROL FOR SOIL REMOVAL AND UPLAND SOIL CAP

E & E, under contract with the DEQ, prepared and implemented Construction Quality Assurance Plans (CQAPs) for the soil removal and upland soil cap as an on-site daily guidance for oversight of the RA contractor and as quality control during RA construction activities. These CQAPs are entitled: *Construction Quality Assurance Plan for Soil Remedial Activities* (E&E, 1998) and *Upland Cap Construction Quality Assurance Plan* (E&E, 2005). Included in the CQAP are procedural guidelines for construction management, including quality control (QC) and quality assurance (QA) described below; pollution control plans; health and safety plans; standard operating procedures; archaeological monitoring protocol; procedures for daily construction reporting; and a project organization chart.

Quality Control

Construction QC was achieved through assurance and verification that adequately trained, certified, and skilled personnel performed QC measures. The contractor's Quality Control Inspector (QCI) was responsible for performing the daily on-site QC duties. Those duties included documentation, maintaining a QC checklist, overseeing QC testing, inspecting critical items, and implementing corrective measures if quality-related issues arose.

Quality Assurance

Construction QA procedures included periodic inspections and audits by oversight engineers and the project engineer of QC procedures. Inspections included but were not limited to: QC documentation, QC testing results, and testing procedures. All QC data supplied by the contractor were reviewed for testing adequacy and compliance with the plans and specifications.

Health and Safety

All contractors and consultants performing work on the Site are responsible for developing and implementing their own site safety plans in accordance with the provisions of the Occupational Safety and Health Administration (OSHA) Standards (29 CFR 1910) and General Construction Standards (29 CFR 1926), including OSHA Hazardous Waste Operations and Emergency Response, Interim Final Rule (29 CFR 1910.120). Compliance with all other applicable federal, state, and local laws and regulations is also required.

Protective clothing, such as a hard hat, steel-toed boots, safety vests, and safety glasses, was required for entry into the Site's work zones (exclusion zone). The primary physical hazards at the Site included: heavy equipment operation; excavation; noise; slips; trips; and falls. During excavation activities in highly contaminated areas (e.g., FWDA), there was a potential for contact with contaminated soil and/or air. The major concern was dermal contact and/or ingestion of the contaminated matter and inhalation of vapors and/or contaminated particulates (i.e., dust). Air quality monitoring was performed by the contractor throughout the construction activites. Workers were required to don air-purifying respirators (APRs) for respiratory protection when airborne contaminant concentrations exceeded action levels.

Overall, work was conducted safely at the site during the construction activities. Daily safety meetings to discuss physical and chemical hazards associated with the day's activities were conducted each morning before work began. Only a few minor injuries and safety concerns were reported during implementation of the construction activities.

VI. FINAL INSPECTION AND CERTIFICATION

E & E oversight engineers continuously performed inspections during implementation of the construction activities to ensure compliance with design specifications and contract requirements. Any deficiencies and/or nonconformance observed were immediately reported to the contractor and DEQ, and appropriate corrective actions were subsequently taken.

Near substantial completion of the construction, DEQ and E & E performed a walkthrough inspection of the site. Based on this inspection, a punch-list was developed by E & E for work items remaining to be completed by the construction contractor. After completion of the punch-list items, a final walkthrough inspection was performed by DEQ and E & E, after which it was determined all required site work items were completed. Additionally, EPA conducted a pre-final inspection on September 26, 2005, and determined that DEQ constructed the remedies in accordance with remedial design (RD) plans and specifications.

As part of the required contract closeout documentation, the construction contractor submitted a closeout letter to DEQ stating all work had been performed in accordance with the contract specifications and was complete in every respect.

VII. OPERATION AND MAINTENANCE

The DEQ will be conducting operation and maintenance (O&M) activities according to an O&M Plan prepared by DEQ and approved by EPA. It is anticipated that the approved O&M Plan will be finalized by May 2007, following resolution of comments received by EPA and the project team on a proposed O&M Plan issued by DEQ in July 2006. The primary activities for soil associated with the proposed O&M Plan are described below.

Soil Remedy

Soils beneath the soil cap remain contaminated with arsenic, PCP, PAHs, dioxins and NAPL, thus requiring the need for long-term monitoring and maintenance. The performance standards for the soil cap, as specified in the proposed O&M Plan, are:

- Maintain contaminant concentrations in surface soil below the following risk-based cleanup goals, as specified in the ROD:
    - Arsenic – 8 milligrams per kilogram (mg/kg)
    - Pentachlorophenol – 50 mg/kg
    - Total Carcinogenic PAHs – 1 mg/kg
    - Dioxins/furans – 0.00004 mg/kg
- Maintain the topsoil layer to within 50 percent of its design specification:
    - Area over impermeable geomembrane cap – maintain thickness of at least 6 inches
    - All areas except over impermeable geomembrane cap - maintain thickness of at least 12 inches
- Minimize infiltration of rainwater within the subsurface barrier wall by maintaining a subsurface stormwater conveyance system.
- Minimize stormwater erosion and ponding by maintaining Site grading, surface stormwater conveyance, and native vegetation.
- Maintain native vegetation within the 6-acre riparian zone for compliance with the National Marine Fisheries Service Biological Opinion.

Monitoring activities for the soil cap (including the riparian zone) include visual inspections of the cap surface, stormwater conveyance system, security fencing, and warning signs. The soil cap is designed to be generally maintenance free, except for maintaining the native vegetation. Routine maintenance will include irrigation of native vegetation through Summer 2008, mowing of open grass areas, manual removal of invasive plants, and targeted application of herbicides. Non-routine maintenance may include repairs of the fence, replacement of warning signs, repairs of the gravel roads, filling of potential animal burrows, removal of sediments from manholes and replanting of unsuccessful trees and shrubs. The frequency of these O&M activities over the first five years of O&M is provided in the proposed O&M Plan.

Engineering and Institutional Controls for Soil

Engineering and Institutional Controls are an integral part of the Site remedies and require long-term monitoring and maintenance. Monitoring activities for the Engineering and Institutional Controls include visual inspections of the security fencing, monitoring well locks and warning signs. The engineering and institutional controls are designed to be generally maintenance free. Routine maintenance will include periodical application of lubricant to monitoring well and gate locks. Non-routine maintenance may include repairs of the fence and replacement of warning signs damaged by vandalism or replacement of buoys lost during river flooding. The frequency of these O&M activities over the first five years of O&M is provided in the proposed O&M Plan.

VIII. SUMMARY OF PROJECT COSTS

Table 2 provides a summary of the costs for each major cost element and a comparison of the actual project costs with the Amendment ROD estimate of project costs.

TABLE 2 – COST SUMMARY FOR SOIL OU-1			
Cost Element [1]	**Amended ROD Estimate (1998 $$)** [2]	**Amended ROD Estimate (2005 $$)** [3]	**Actual Cost (2005)**
Total RA Costs for Soil OU-1	$10,230,000	$11,854,000	$12,749,000
Projected Annual O&M Costs	$36,000	$42,000	NA[4]
Difference between actual RA cost and estimate RA cost (based on 2005 dollars).	+$895,000 or +8%		

[1] See Section III for a description of these construction activities. Costs also include contractor procurement, construction oversight and quality assurance, project management and project oversight. Costs for the Upland Soil Cap also include stockpiling of topsoil in 2004. Since the 6-acre riparian zone was regraded and capped as part of the 2004 sediment cap construction contract, these costs are not provided as part of the Upland Soil Cap. Costs are rounded to nearest $1,000.

[2] Includes 25% contingency.

[3] As specified in OSWER Directive 9320.2-09A, ROD costs are adjusted from 1998 dollars to 2005 dollars using 7% annual inflation rate.

[4] Projected costs for O&M activities are provided in the Draft O&M Plan, July 2006. Due to the interrelated nature of the remedies and associated O&M activities, the costs are not separated by OU.

IX. OBSERVATIONS AND LESSONS LEARNED

- Implementation of the soil remedy cost 8% more than the ROD estimate which included a 25% contingency.

- The construction contractor's proposed source of clean topsoil contained native American artifacts which could have delayed the start of construction had DEQ and EPA not established a cooperative working relationship with tribal governments during the design phase of the project.

- Use of river-going barges proved to be a cost effective and efficient means of importing the large quantities of topsoil and sand required to construct the soil cap.

- During soil cap installation, completion of the cap at the property boundaries was complicated due to inadequate survey data (i.e., needed to develop a 3D surface) within the contractor's automated grade control system at those locations. A field directive was issued to modify the design to reconcile the required design grade, cap components, and to keep within the property boundary. A more accurate and complete survey beyond the edges of the property and onto adjoining properties would have helped allow development of a 3D surface beyond the edges of the property and onto the adjoining property.

X. CONTACT INFORMATION

Major design and remediation contractor addresses and phone numbers are listed below:

The EPA project manager for the site is Nancy Harney:

USEPA, Region 10
Attn: Nancy Harney
1200 Sixth Avenue, ECL-111
Seattle, Washington 98101
(206) 553-1200
email: harney.nancy@epamail.epa.gov

The DEQ project manager for the site is Kevin Parrett:

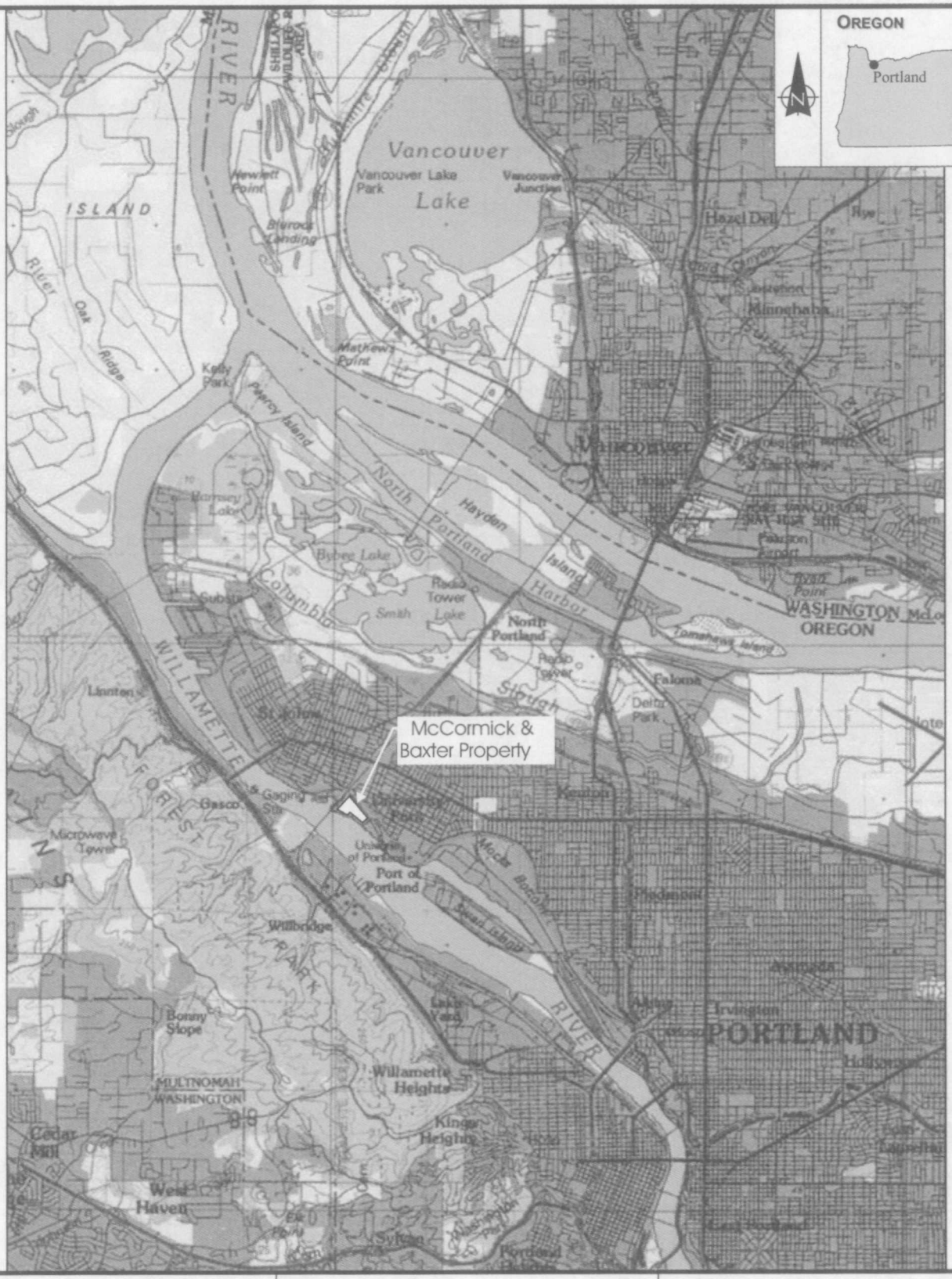
Oregon Department of Environmental Quality, Northwest Region
Attn: Kevin Parrett
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201
(503) 229-6748
email: parrett.kevin@deq.state.or.us

DEQ used the following contractor for the soil removal and construction of the upland soil cap:

Wilder Construction Company
Joe Spink - Project Manager Soil Removal
Pat Turina - Project Manager Upland Soil Cap
6645 NE 78th Court, Suite C10
Portland, Oregon 97218
(503)255-1444

DEQ used the following contractor for design and construction oversight of the soil removal and upland soil cap and performance monitoring:

Ecology and Environment, Inc.
John Montgomery
333 S.W. Fifth Avenue, Suite 608
Portland, Oregon 97204
(503) 248-5600



ecology and environment, inc.
International Specialists in the Environment
Portland, Oregon

McCORMICK & BAXTER
CREOSOTING CO.
Portland, Oregon

Figure 1

SITE LOCATION MAP

Date:
2-21-03

10:001688OY021402\fig 1

N W E S

0 70 140 280 420 560 700

Feet

Approximate Scale

Map Reference: Orthorectified Photo Image, September 28, 2005 @ 12:30 pm.
River Stage at Time of Photo is 4.93 ft. NAVD at Morrison Street Bridge.

McCormick & Baxter Creosoting Company

Portland, Oregon

Figure 2
CURRENT SITE LAYOUT AND FEATURES

Date:	GIS:	Job Number:
6/23/2006	avh	002688.OY25.30.03

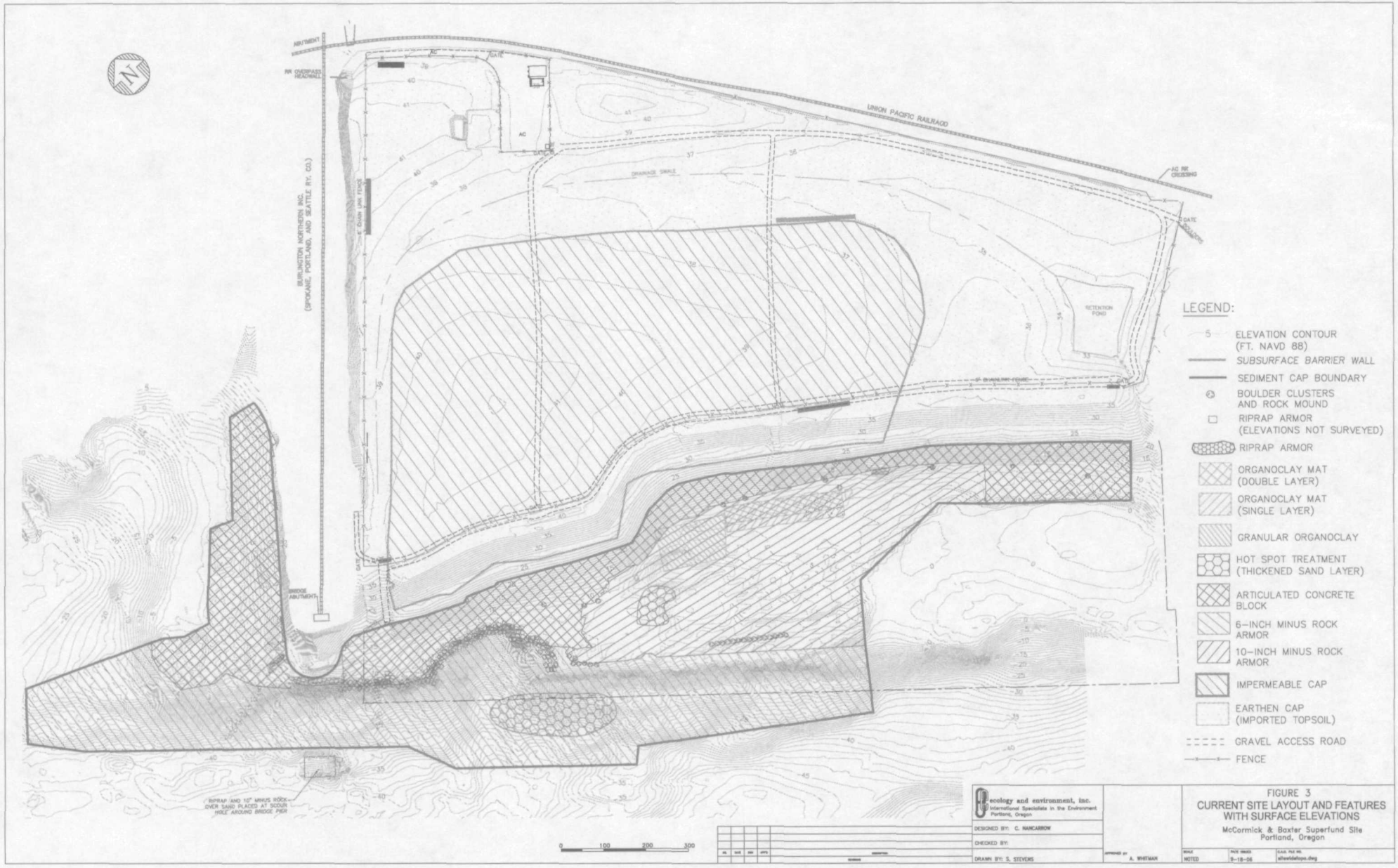


FIGURE 3
CURRENT SITE LAYOUT AND FEATURES WITH SURFACE ELEVATIONS
McCormick & Baxter Superfund Site
Portland, Oregon

Remedial Action Report - Soil Operable Unit (OU-1)

McCormick and Baxter Creosoting Company Superfund Site

Portland, Oregon

March 2007

Issuance by:

Bruce Gilles, Acting Administrator
Northwest Region
Oregon Department of Environmental Quality

Date: 3-20-07

Concurrence by:

Daniel D. Opalski, Director
Office of Environmental Cleanup
U.S. Environmental Protection Agency

Date: 4-6-07