DRAFT FINAL

CLEANUP ACTION PLAN

FORMER AMERICAN PLATING INC.

2110 EAST D STREET

TACOMA, WASHINGTON

NOVEMBER 24, 2003

FOR

THEA FOSS WATERWAY DEVELOPMENT AUTHORITY

File No. 10751-002-00

DRAFT FINAL

GEOENGINEERS

November 24, 2003

Thea Foss Waterway Development Authority
515 East Dock Street, Suite 204
Tacoma, Washington 98402

Attention: Don Meyer

Subject: Draft Final
Cleanup Action Plan
Former American Plating Site
2110 East D Street
Tacoma, Washington
File No. 10751-002-00

GeoEngineers is pleased to submit our Draft Final "Cleanup Action Plan, Former American Plating Site, 2110 East D Street, Tacoma, Washington". Our environmental consulting services were completed in general accordance with our proposal dated November 12, 2003.

We appreciate the opportunity to provide environmental consulting services for this project. Please call if you have any questions regarding this report.

Respectfully submitted,

GeoEngineers, Inc.

Terry E. Parks, LG, LHG
Principal

TEP:TCM:tt
TACO:10\10751002\00\Finals\1075100200DraftR.doc

Disclaimer: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

TABLE OF CONTENTS

Page No.

TABLE OF CONTENTS (CONTINUED)

Page No.

TABLE OF CONTENTS (CONTINUED)

Page No.

TABLE OF CONTENTS (CONTINUED)

DRAFT FINAL
CLEANUP ACTION PLAN
FORMER AMERICAN PLATING INC.
2110 EAST D STREET, TACOMA
FOR
THEA FOSS WATERWAY DEVELOPMENT AUTHORITY

This Cleanup Action Plan (CAP) identifies and describes final remedial actions for the former American Plating, Inc. facility (Site) located at 2110 East D Street in Tacoma, Washington. The interim remedial actions at the Site were performed by the Washington State Department of Ecology (Ecology) in 2003. The development and selection of final remedial options for the Site were evaluated using guidance and information provided by Ecology.

This CAP has been developed in accordance with the Washington Model Toxics Control Act (MTCA) and Chapter 173-340 of the Washington Administrative Code (WAC).

1.0 INTRODUCTION AND BACKGROUND

1.1 SITE DESCRIPTION, GEOLOGY AND HYDROGEOLOGY

The Site occupies approximately 1.4 acres on the eastern bank near the head of the Thea Foss Waterway (Waterway). The Site address is 2110 East D Street. The Site is located in the southwest 1/4 of the southwest 1/4 of Section 4, Township 20 north, Range 3 east and at latitude north 47° 14’ 37” and longitude west 122° 25’ 51”. The Site is bound to the west by the Waterway, to the north by Foss Landing, to the east by East D Street, and to the south by Berg Scaffolding. A vicinity map is included as Figure 1.

The Site is built on fill material placed in the early 1900s, coincident with the development of the Waterway. The following geologic summary was drawn largely from the *Final RCRA Facility Assessment Preliminary Assessment Report* (Science Applications International Corporation [SAIC] 1994). Additional detail, including geologic cross-sections, well logs, and water table contours are presented in the *Phase II Soil and Groundwater Investigation, American Plating Co. Facility* (Applied Geotechnology, Inc. [AGI] 1989).

Geology at the Site consists of fill material of variable thickness. This fill material overlies unconsolidated silt, which ranges in thickness from 0 to over 15 feet. Beneath the silt is a deposit of sand, gravel and silt that ranges in thickness from 5 to over 10 feet. The deepest unit encountered is a dense to very dense silty sand to silty gravel of unknown thickness that was encountered approximately 25 to 30 feet below ground surface (bgs). This deepest unit has been interpreted by AGI as a glacial till.

Groundwater at the Site occurs primarily in the upper fill unit (the "fill aquifer") and in the sand, gravel and silt unit (the "sand aquifer"). The upper unconsolidated silt unit and the lower till unit are low-permeability formations that inhibit vertical groundwater flow. The relationship between the two aquifers is complex and they appear to be connected in some places beneath the site.

Depth to groundwater at the Site is approximately 5 to 9 feet bgs. Groundwater flow is interpreted to be in a northwesterly direction towards the Waterway. Vertical flow components are difficult to establish at the Site because of complicated stratigraphy and tidal influence. Groundwater flow velocities have been estimated to be 17 feet per year in the fill unit and 41 feet per year in the sand and gravel unit.

Groundwater at the Site discharges directly to the marine waters in the adjacent Waterway. The fill aquifer is heavily influenced by the adjacent marine waters, as evidenced by the significant tidal influence of water levels in the on-site wells and by the high salinity of much of the groundwater. Chloride concentrations in groundwater had been previously reported up to percent values (SAIC, 1994).

1.2 SITE HISTORY

1.2.1 General

The property has primarily been used for light industrial activities. Puget Sound Plating and Seymour Electroplating occupied the Site between 1955 and 1976. Lewis R. Jones has owned the property since 1962. American Plating Inc. occupied the Site from 1976 to 1986. All three of these firms performed metal electroplating, including brass, cadmium, chromium, copper, nickel and zinc plating. American Plating ceased operations in January 1986.

1.2.2 Former Site Structures

The Site included two buildings and a concrete pad (see Site Plan, Figure 2). Building 1 housed most of the plating lines. Zinc, cadmium and nickel plating operations were located in the southeastern portion of the building. Brass, chromium, copper and nickel plating operations occupied the western portion of the building. These operations were located over a 25,000-gallon concrete-lined sump. A 1,000-gallon tank was located in the south central part of the building. Items to be plated were degreased in this tank using chlorinated organic solvents before plating. A 658-gallon underground storage tank (UST) was located east of Building 1 adjacent to East D Street. The UST was previously used for storage of gasoline. The UST was removed on June 25, 2003 (Farallon 2003). The UST removal is described in Section 3.0, (Interim Actions Performed to Date) of this CAP. In addition to electroplating, Building 1 was also used for painting operations, chemical storage, product testing and office space. Building 1 was demolished and removed from the Site in May 2003. Removal of Building 1 is described in Section 3.0 of this CAP.

Building 2 reportedly housed a zinc plating line and was also used to store drums of chemicals and wastes. Building 2 was demolished and removed in May 2003. Removal of Building 2 is described in Section 3.0 of this CAP.

1.2.3 Former Site Operations

During operations, spent plating and washdown solutions from both buildings were directed to the large sump in Building 1. Wastes from the plating operations in the western part of Building 1 went directly into the underlying sump through a grated floor. Wastes from operations in the southeast part of Building 1 were directed via drains and a trench cut into the concrete floor of the building to a small sump immediately west of Building 1. From there the wastes were pumped to the large sump in Building 1.

Between 1976 and 1978, wastes that accumulated in the large sump were pumped directly into the Waterway via an aboveground effluent line. From 1978 until 1986, wastes were pumped directly into Tacoma's municipal sanitary sewer system. The wastes entering the sewer system were not pre-treated until 1984. Beginning in 1984, wastes were routed to a pretreatment plant located immediately west of Building 1. Records suggest that pretreatment utilized limestone, gravel and carbon filtration and was designed to achieve reduction of hexavalent chromium, oxidation of cyanide and precipitation of metals.

The concrete pad was located south of Building 1. Prior to 1978, the pad was the location of a third building on the Site. Since that time, its use was largely unknown. In 1987 and 1988, 18 drums were observed being stored on the pad. At least one drum was suspected to contain paint-booth sludge, and another was suspected to contain chloroethane. Some of the other drums were overpack drums remaining from Site stabilization activities.

The 658-gallon UST was located east of Building 1 adjacent to East D Street. According to interviews with former employees of American Plating indicated that the UST had been used in the late 1960s for gasoline storage and that the UST had not been used during the operation of American Plating (AGI 1989). Investigation of this UST in 1988 indicated that it contained about 3 inches of water and 1/8 inch of floating product. Chemical analyses of the residual material were consistent with the tank having been formerly used for fuels such as gasoline, diesel or light fuel oil. The UST was removed on June 25, 2003 in accordance with Chapter 173-360 WAC. UST removal is described in Section 3.0 of this CAP.

The following list summarizes the regulatory enforcement history of the Site related to the metal electroplating firms.

- 1980 through 1985: A number of inspections by Ecology determined that discharges, leaks and spills occurred at the Site as a result of facility operations and that American Plating was in potential violation of a number of State Dangerous Waste Regulations.
- January 1986: American Plating ceased operations. Chemicals and equipment used in the electroplating processes were abandoned on Site.
- March 1986: A Preliminary Site Assessment conducted by the Environmental Protection Agency (EPA) determined that the Site posed a serious environmental threat and that high levels of plating wastes and contaminated materials were present on Site (Weston 1986).
- April 1986: American Plating filed for Chapter 7 bankruptcy.

- November 20, 1986: Ecology entered into a consent order with the property owner, Lewis R. Jones, for an emergency Site stabilization.
- June 1987: Site stabilization activities were performed by Northwest Enviroservices and overseen by Ecology. These activities included transporting and disposing of hazardous chemical solutions and sludge that remained on the Site to a permitted waste disposal facility and cleaning of aboveground storage tanks (AST) and floors of the buildings. The UST adjacent to Building 1 was not addressed during Site stabilization.
- September 23, 1987: Ecology signed a second consent order with Lewis R. Jones, requiring a remedial investigation of the Site. The investigation was to include soil and groundwater sampling in order to identify the areas and levels of on-site contamination to assess Site closure options.
- September 30, 1987: EPA took over lead-agency status from Ecology and began to address corrective action and closure of the Site under the federal Resource Conservation and Recovery Act (RCRA). EPA issued a complaint and compliance order with American Plating and Lewis R. Jones addressing a number of potential RCRA violations that had been noted in an August 1987 EPA inspection. These violations included not having a closure plan, not installing a groundwater monitoring system, not demonstrating financial assurance, not conducting facility inspections, and not securing the facility from unauthorized entry.
- February 9, 1988: EPA issued a consent agreement and final order with American Plating and Lewis R. Jones requiring a detailed hydrogeological, soil, and groundwater investigation, including the installation of a groundwater monitoring well network.
- 1988, 1989, and 1994: Lewis R. Jones' contractor, AGI, conducted Phase I and Phase II site investigations and a supplemental groundwater investigation. These investigations included characterization of soil and groundwater contamination and included installation of 12 monitoring wells (AGI 1988, 1989 and 1994).
- July 1994: EPA's contractor, SAIC, prepared a RCRA Facility Assessment (RFA) for the Site. No additional environmental sampling was conduced as part of this RFA (SAIC 1994).
- January 1995: EPA's contractor, PRC Environmental Management, Inc. (PRC), prepared a Comprehensive Groundwater Monitoring Evaluation (CME). This evaluation included an additional groundwater sampling event (PRC 1995).
- October 17, 1995: Ecology once again assumed lead-agency status for the Site. EPA rescinded the RCRA closure order and agreed that the Site could be cleaned up by Ecology under MTCA. Ecology added the Site to its Site Information System (SIS) of known or suspected contaminated sites and recommended it for a Site Hazard Assessment (SHA).
- August 5, 1997: The Tacoma-Pierce County Health Department (TPCHD) completed a SHA on the Site. The Site's ranking was determined to be a "2" under the Washington Ranking Method (WARM) and the Site was placed on Ecology's Hazardous Sites List (HSL) (TPCHD 1997).
- February 13, 2001: The City of Tacoma's contractor, Hart Crowser, Inc., prepared a brief summary of previous investigations at the American Plating Site and described a conceptual cleanup action scenario involving soil removal. This work was conducted for the City of Tacoma

as part of an evaluation of potential hazardous waste sites associated with the City's East D Street Grade Separation Project (Hart Crowser 2001).

- September 29, 2002: Ecology contracted with SAIC to prepare an Interim Action Plan (IAP) for the Site (SAIC 2003).
- Spring of 2003: Ecology conducted an Interim Action Cleanup (IAC) under the guidance presented in the IAP. The IAC addressed some, but not all, of the contamination identified on site. Details of the IAC are summarized in Section 3.0 of this report.

2.0 NATURE AND EXTENT OF CHEMICALS OF CONCERN

2.1 GENERAL

Chemical analytical data for the Site fall into two general categories:

- Data from AGI's 1988, 1989 and 1994 Phase I and II site investigations and supplemental groundwater investigation (historical chemical analytical data), summarized in the Interim Action Plan (IAP) dated April 25, 2003.
- Data collected during the IAC in the summer of 2003 (IAC data) transmitted to us by Ecology that has not been presented in a formal report.

Historical chemical analytical data and IAC data indicate that soil exceeding interim action cleanup levels was restricted to the areas beneath and between former Building 1, former Building 2 and the concrete pad. Figures from the IAP indicating the historical areas of contamination are presented in Appendix A, Figure A-1. Results also indicate that cadmium was the only heavy metal found in soil at concentrations designating the soil as dangerous waste.

2.1.1 Soils

2.1.1.1 Cadmium

Historical chemical analytical data from soil samples indicate concentrations of cadmium above the MTCA Method B cleanup level (80 milligrams per kilogram [mg/kg]) were restricted to areas within and adjacent to the footprint of former Building 1 (Appendix A, Figure A-1). In this area, cadmium concentrations in soil samples ranged from less than 80 mg/kg to 1,370 mg/kg. Sample depths ranged from ground surface to 6.5 feet bgs.

Chemical analytical data from samples collected during the IAC were similar to results from AGI's previous reports. Concentrations of cadmium above the MTCA Method B cleanup level in soil samples were restricted to areas within and adjacent to the footprint of former Building 1 (Interim Action Total Metals, Figure 3). In this area, cadmium concentrations in samples ranged from less than 80 mg/kg to 415 mg/kg. Toxicity Characteristic Leaching Potential (TCLP) concentrations ranged from 1.42 milligrams per liter (mg/l) to 5.06 mg/l (Interim Action TCLP Metals, Figure 4). The minimum TCLP cadmium concentration designating soil as dangerous waste is 5 mg/l. Sample depths ranged from ground surface to 5 feet bgs.

2.1.1.2 Copper

Only historical chemical analytical data exist for copper. The IAP dated April 25, 2003 indicates concentrations of copper above statewide background levels of 36 mg/kg were detected at nearly every sampling location. However, concentrations of copper in all soil samples were below the MTCA Method B cleanup level of 2,960 mg/kg (Appendix A, Figure A-2).

2.1.1.3 Lead

Historical chemical analytical data for lead indicate concentrations of lead above the MTCA Method A cleanup level (only a MTCA Method A cleanup level exists for lead) is widespread at the site (Appendix A, Figure A-3). Concentrations of lead ranged from less than the MTCA Method A cleanup level of 250 mg/kg to 3,250 mg/kg. Sample depths ranged from ground surface to 9 feet bgs.

Chemical analytical data from samples collected during the IAC are similar to results from AGI's previous reports. Concentrations of total lead ranged from less than 250 mg/kg to 13,000 mg/kg (Figure 3). All TCLP concentrations of lead were less than 5 mg/l (Figure 4). These concentrations were less than the dangerous waste criteria for TCLP lead in soil (lead concentrations greater than or equal to 5 mg/l). Sample depths ranged from ground surface to 5 feet bgs.

2.1.1.4 Nickel

Only historical chemical analytical data exist for nickel. Concentrations of nickel in one sample, located south of and adjacent to former Building 1, was 2,845 mg/kg. The MTCA Method B cleanup level for nickel is 1,600 mg/kg. All other samples were below this concentration. Sample depths ranged from ground surface to 3 feet bgs (Appendix A, Figure A-4).

2.1.1.5 Chromium

Historical data regarding concentrations of chromium at the Site were not available at the time of this CAP.

Chemical analytical data from samples collected during the IAC indicate concentrations of chromium above the MTCA Method B cleanup level in soil samples were restricted to areas within and adjacent to the footprint of former Building 1 and the former sump west of Building 2 (Figure 3). In these areas, chromium concentrations in samples ranged from less than 30 mg/kg to a maximum of 15,500 mg/kg. TCLP concentrations ranged from less than 0.05 µg/l to a maximum of 37.3 µg/l (Figure 4). Sample depths ranged from ground surface to 6.5 feet bgs.

2.1.1.6 Cyanide

Historical chemical analytical data for total cyanide indicate concentrations of cyanide ranged from less than 50 mg/kg throughout the Site to 840 mg/kg in the footprint of former Building 1 (Appendix A, Figure A-5). The MTCA Method B cleanup level for total cyanide is 1,600 mg/kg. Sample depths ranged from ground surface to 6.5 feet bgs.

Chemical analytical data from one sample collected during the IAC indicate total cyanide was detected at 110 mg/kg in the location of the footprint of former Building 1. Sample depth was indicated as 1 to 3 feet bgs.

2.1.1.7 Vinyl Chloride

Historical chemical analytical data for vinyl chloride indicate concentrations of vinyl chloride ranged from less than 0.7 mg/kg to 8.4 mg/kg in the footprint of former Building 1 (Appendix A, Figure A-6). The MTCA Method B cleanup level for vinyl chloride is 0.667 mg/kg. Sample depths ranged from ground surface to 6.5 feet bgs.

Chemical analytical data from samples collected during removal of the UST during the IAC indicate concentrations of vinyl chloride were below the MTCA Method B cleanup level of 0.667 mg/kg except in one sample. The concentration of vinyl chloride in this sample was 1.3 mg/kg. Sample depths were 7 feet bgs.

2.1.2 Groundwater

2.1.2.1 General

Only historical chemical analytical data exist for groundwater samples. Others have concluded that groundwater discharge from the site does not pose a threat to the adjacent Waterway. Ecology, in a letter dated July 19, 1995 states that "In the Commencement Bay Nearshore/Tideflats (CBN/T) Milestone 1 Report for the Thea Foss Waterway (dated July 1, 1993), Ecology concluded that American Plating was not a confirmed source of problem chemicals to the Head of Thea Foss Waterway. … Review of the new data does not change Ecology's original conclusion in the Milestone 1 report," (Ecology 1995).

2.1.2.2 Copper

During the 1994 sampling event, copper was detected in one well, MW-11, at a concentration of 3.4 micrograms per liter (µg/l). This is essentially equal to the most stringent surface water criterion of 3.1 µg/l. However, the reporting limits for the other wells ranged from 15 µg/l to 30 µg/l, precluding meaningful comparisons to this criterion. Copper had been detected during previous sampling events in several other wells, including MW-1, MW-5 and MW-12 at concentrations ranging between 40 and 70 µg/l (Appendix A, Figure A-7).

2.1.2.3 Nickel

Nickel was detected during the 1994-sampling event in monitoring wells MW-10 and MW-12 at 110 µg/l and 120 µg/l, respectively. These concentrations are well above the most stringent surface water criterion of 8.1 µg/l. However, the reporting limit for the other wells in this sampling event was 30 µg/l, precluding meaningful comparisons to this criterion. Nickel had been detected during previous sampling events in several other wells, including MW-3, MW-5 and MW-7 at concentrations ranging from 20 to 30 µg/l. Nickel was also detected in a groundwater sample from MW-12 at a concentration of 880 µg/l during the 1993 sampling event (Appendix A, Figure A-8).

2.1.2.4 Cyanide

Cyanide was detected at concentrations above the groundwater cleanup level of 1 µg/l (based on protection of aquatic organisms) in 10 of the 12 monitoring wells at the Site. The detected concentrations ranged from 3 to 30 mg/l. The highest concentrations occurred just to the east of former Building 1, in MW-10 and MW-11, and west of former Building 2, in MW-3 (Appendix A, Figure A-9). It is important to note that the surface water quality criterion for cyanide of 1 µg/l is based on the fraction of the total cyanide that is weak-acid dissociable (WAD). The toxicity of cyanide is due to the presence of free cyanide. Cyanide-metal complexes are much less toxic. For example, iron, nickel and silver cyanide complexes are stable and do not release free cyanide under normal ambient water conditions. Zinc, copper and cadmium complexes are less stable and can release free cyanide. Total cyanide analysis uses strong acid treatment to measure all types of cyanide, including cyanide that, in the environment, is strongly bound in stable metal complexes. The WAD method uses weak acid treatment of waters to determine free cyanide and those cyanide complexes, which might dissociate to free cyanide in ambient waters.

The groundwater results, on the other hand, are from analysis of *total* cyanide. Depending on the exact forms of cyanide in the groundwater, the total results could overstate the WAD fraction to an unknown degree. Total cyanide analyses can overestimate the amount of the biologically available cyanide. WAD cyanide provides a more appropriate criterion for protecting aquatic organisms.

2.1.3 Summary of Contaminant Distribution

This section summarizes the distribution of chemicals of concern in soil and groundwater at the site. The distribution of these chemicals and the media they are found in forms the basis for selecting final cleanup actions for the Site.

2.1.3.1 Cadmium

Cadmium was detected at concentrations above the MTCA Method B cleanup level in soil beneath and adjacent to former Building 1, both historically and during recent sampling. Groundwater results from the most recent comprehensive sampling event (PRC 1995) indicate that cadmium is not a significant ecological risk issue in site groundwater (via the surface water pathway). Cadmium was detected in an earlier sampling round at 1,700 µg/l in MW-12. This concentration exceeds surface water levels for protection of aquatic organisms.

2.1.3.2 Copper

Concentrations of copper in all historical soil samples were below the MTCA Method B cleanup level of 2,960 mg/kg. Groundwater concentrations of copper were reported at 3.4 µg/l during 1994, and at concentrations ranging between 40 and 70 µg/l prior to 1994. These concentrations of copper exceed surface water levels for protection of aquatic organisms.

2.1.3.3 Lead

The SAIC report dated April 25, 2003 indicates groundwater concentrations of lead are "not an issue for human health or aquatic organisms via surface water pathways."

2.1.3.4 Nickel

Nickel was detected at concentrations above the MTCA Method B cleanup level in one soil sample location. Groundwater concentrations of nickel were reported at 110 µg/l and 120 µg/l during the 1994 round of sampling, and during previous sampling rounds at concentrations ranging from 20 to 30 µg/l. Nickel was also detected in a groundwater sample at a concentration of 880 µg/l during the 1993 sampling event. All of these concentrations of nickel exceed surface water levels for protection of aquatic organisms.

2.1.3.5 Chromium

It is anticipated that chromium may be present in Site soils at levels that exceed the MTCA Method B cleanup level. Chromium was detected at concentrations above the MTCA Method B cleanup level during the IAC.

2.1.3.6 Cyanide

Cyanide in soil was not detected above the MTCA Method B cleanup level at the Site. Total cyanide was detected at concentrations above the groundwater cleanup level of 1 µg/l (based on protection of aquatic organisms) in 10 of the 12 monitoring wells at the Site. The surface water quality criterion for cyanide of 1 µg/l is based on the fraction of the total cyanide that is weak-acid dissociable (WAD). Groundwater concentrations of cyanide may exceed surface water levels for protection of aquatic organisms, depending on the degree to which the cyanide presence in groundwater is in the form of free cyanide.

2.1.3.7 Vinyl Chloride

The 2003 SAIC report indicates vinyl chloride was detected at concentrations above the MTCA Method B cleanup level in two relatively deep samples at the site. The report indicates concentrations of VOCs in groundwater have declined through the years to "relatively low levels." Vinyl chloride was detected at concentrations above the MTCA Method B cleanup level in one sample from the UST removal event during the IAC.

2.1.4 Results of Ecology Interim Action

Ecology's cleanup work on the Site identified four areas where soils designate as dangerous waste. These areas are shown on Figure A-1 in the Appendix. Ecology identified two areas in the footprint of the former Building 1 with soil that designates as dangerous waste. Ecology also identified approximately 288 cubic yards (490 tons) of concrete that designates as dangerous waste.

3.0 INTERIM ACTIONS PERFORMED TO DATE

Ecology began the interim action cleanup on the Site in May 2003. The following tasks were completed as part of the interim action cleanup.

- Samples were collected for chemical analyses from an estimated 18,000 gallons of water contained in the 25,000-gallon concrete sump. Results indicated the water was acceptable for disposal into Tacoma's municipal sanitary sewer system. The water was transferred to the sanitary sewer system after obtaining the necessary permits.
- A discrete layer of burn debris in soil located beneath the concrete pad was found to contain elevated levels of lead. The contamination exceeded MTCA Industrial Standards, but the soil was not designated as Dangerous Waste under Washington State Dangerous Waste Regulations (Chapter 173-303 WAC). The concrete was demolished and 3,418 tons of contaminated materials were disposed of at a Subtitle D landfill.
- Building 2, which had partly collapsed before interim remedial actions began, was demolished and disposed of at a Subtitle D landfill. Building 1 was found to contain substantial amounts of asbestos throughout the majority of the structure. Due to its dilapidated condition, it was determined that the asbestos containing material (ACM) could not be safely separated from the structural components of the building. Building 1 was demolished and approximately 630 cubic yards of debris were packaged and disposed of as ACM. An additional 315 tons of concrete, building structural components and non-friable asbestos were also disposed of at a Subtitle D landfill. Building components contaminated with heavy metals but not designated as dangerous waste under Chapter 173-303 WAC, were also disposed of at a Subtitle D landfill.
- The 25,000-gallon sump located in the west side of former Building 1 was demolished and soil samples were collected for chemical analyses. Results indicated concentrations of lead, chromium, and cadmium in the samples slightly exceeded MTCA Method B standards (< 2x standard values). None of the samples were designated as Dangerous Waste under Chapter 173-303 WAC except for one surface sample at the southeast corner of the sump. This sample contained concentrations of cadmium that designated the soil as Dangerous Waste under Chapter 173-303 WAC. Analysis of a composite sample of the concrete sump indicated concentrations of chromium that designated the concrete as a Dangerous Waste. The concrete from this structure remains on site pending treatment and disposal at a Subtitle C landfill.
- Based on historical knowledge, previous sampling of the Site, and visual observations during demolition, soil samples were collected from eight additional areas on the Site. The samples were submitted for chemical analysis of metals and cyanide to assess if they exceeded either MTCA Method B criteria or Dangerous Waste designation. Test trenches were excavated to a depth of 4 feet in eight locations within the footprints of former Buildings 1 and 2. Composite samples were collected for chemical analyses from the sidewalls of the trenches from ground surface to 4 feet bgs. In five of the locations, soils were found to have cadmium concentrations that designated them as Dangerous Waste under Chapter 173-303 WAC. In all cases, the elevated cadmium concentrations corresponded with visually observable staining in the soil. These soils remain on-site pending excavation and disposal.
- An UST located in the northeast corner of the property was emptied of approximately 160 gallons of residual petroleum product and water on June 24, 2003. The tank measured approximately 7 feet in length and 4 feet in diameter, and had an estimated capacity of 658 gallons. Rivers Edge

Construction removed the UST on June 25, 2003 under the supervision of Washington State-Registered UST Site Assessor of ETS provided by Farallon Consulting (Farallon 2003). The UST was recycled at Schnitzer Steel in Tacoma, Washington. The UST excavation measured approximately 14 by 16 feet and extended approximately 9 to 10 feet below surrounding grade. A visual inspection of the UST revealed that the tank's exterior was tar-coated, and that numerous small holes existed along the sides and bottom of the tank. Five confirmation soil samples were collected from the bottom and sidewalls of the excavation and one composite sample was collected from the stockpiled soil. The samples were submitted for chemical analyses. The analytical results of soil samples indicate that soil containing concentrations of gasoline-range organics, benzene, trichloroethene and vinyl chloride exceeding MTCA Method A cleanup levels remain in place near the former UST.

4.0 PROPOSED REDEVELOPMENT PLANS

The permanent use of the former American Plating Co. Site will be for a public park. The construction of the D Street Overpass necessitates a two-phased approach to the development of the Site, which includes separate phases of construction for temporary and permanent site development.

4.1 TEMPORARY USE – PHASE 1 CLEANUP

Temporary use will include access to Berg Scaffolding located directly south of the Site. The construction activities will eliminate the current access to this property and the only way to access the property will be across the Site. A portion of the Site may be used temporarily by Berg Scaffolding for storage of scaffolding equipment and for parking as needed. A 35-foot-wide section of the property along East D Street will be fenced off and used for a construction easement for the D Street Overpass construction activities. The proposed layout of the Site for temporary use is shown on Figure 5.

4.2 PERMANENT USE – PHASE 2 CLEANUP

The permanent use of the Site as a public park is consistent with the Thea Foss Waterway Design and Development Plan and Tacoma's Comprehensive Land Use Management Plan developed in compliance with the Washington State Growth Management Act. The park will provide public access that is consistent with the Shoreline Management Act as well as enhancing the pedestrian access component of the overpass.

The park will include hard surfaced areas for parking as well as green space on the former American Plating Site. The final proposed site layout is shown on Figure 6. The property immediately south of the Site is also planned for inclusion in the park and is expected to include public restrooms, a rowing center building and green space. Development of the park includes a connection to the water with a float for non-motorized boating activities located north of the Site. The Thea Foss Waterway Development Authority (TFWDA) is currently working with the City of Tacoma to designate a portion of the park's shoreline (south of the Site) for habitat enhancements and restoration in conjunction with the EPA-mandated in-water cleanup.

5.0 CLEANUP ALTERNATIVES REVIEW AND RATIONALE FOR SELECTION OF THE PREFERRED ALTERNATIVE

5.1 OBJECTIVES

Interim remedial actions were performed at the Site during the summer of 2003. Soil and debris containing elevated concentrations of chemicals of concern remain on the Site. Ecology has determined that further remedial actions are warranted at this site in order to reduce potential threats to human health and the environment by reducing exposure to hazardous substances. Remedial actions at the Site will also reduce physical hazards posed by debris remaining at the Site. The remedial action objectives identified for this Site are listed below.

- Reduce potential human health risk posed by exposure to contaminated soils.
- Reduce physical hazards associated with debris at the Site.
- Reduce potential ecological risk to aquatic organisms in the Waterway caused by discharge of contaminated groundwater from the Site.
- Allow for future development of the Site as a public use area.

5.2 REMEDIAL ALTERNATIVE EVALUATION AND SELECTION

5.2.1 General Response Actions

The general response actions presented below are potential responses that could satisfy remedial action objectives. Response actions that were identified as potentially appropriate for metals and/or cyanide in soil are:

- No Action,
- Institutional Controls,
- Isolation/Containment,
- In-Situ Stabilization, and
- Removal/Disposal.

General response actions were not developed for site groundwater. Existing groundwater information for the Site is limited, and does not allow for a meaningful comparison to potential cleanup standards based on adjacent surface water quality. Ecology has concluded that the Site was not a confirmed source of problem chemicals to the Waterway, as noted above in Section 2.1.2, Groundwater.

Groundwater sampling will be performed after implementation of the Phase 1 final cleanup action to provide baseline information for the groundwater compliance monitoring program. If the baseline information indicates apparent exceedences of the cleanup standards for metals and cyanide, Ecology will be notified and appropriate response actions and remedial scenarios will be identified for groundwater.

5.2.1.1 No Action

The no action alternative is included to provide a basis for comparison to the proposed remedial actions. Under the no action alternative, no specific actions would be taken to remove or control chemicals of concern at the Site. In addition, no monitoring of subsurface conditions with respect to chemicals of concern would occur. The no action alternative would not be expected to alter exposure to metals or reduce potential groundwater loading conditions to the Waterway.

5.2.1.2 Institutional Controls and Monitoring

Institutional controls are administrative measures that are intended to limit the potential for exposure to chemicals of concern by limiting access and providing routine environmental monitoring. Common institutional controls include:

- Deed restrictions,
- Fencing and similar access limitations,
- Zoning and ordinances regarding property usage, and
- Monitoring site conditions.

Monitoring could involve periodic sampling and analysis to assess groundwater chemistry. Changes in water quality could be monitored to evaluate metals concentrations, including the extent to which natural attenuation of the chemicals of concern occurs. Institutional controls and monitoring are components of most remediation programs.

Institutional controls and monitoring may be effective means for limiting exposure to hazardous substances, but these remedial measures do not reduce the mobility, volume or toxicity of the contaminants.

Implementation of institutional controls and a monitoring program would not be expected to reduce potential groundwater loading conditions to the waterway.

5.2.3 Isolation/Containment

Isolation/containment measures generally are designed to reduce potential migration and population exposure by isolating or containing contaminants with the use of vertical and/or horizontal barriers. This response would not reduce the volume or toxicity of impacted material.

5.2.4 In-Situ Stabilization

In-situ stabilization actions reduce the mobility of contaminants, either by physical or chemical means, while the contaminants remain in place. Such a response action could reduce exposure and migration potential of the contaminants.

5.2.5 Removal and Disposal

Removal and disposal would involve excavation and/or relocation of contaminated material to a permitted disposal facility. Removal of contaminants could reduce the potential for exposure at a site. However, the toxicity of the contaminants would remain unchanged and treatment, stabilization, or containment may be required at the disposal facility.

5.3 EVALUATION OF GENERAL RESPONSE ACTIONS

The general response actions were evaluated in detail based on short- and long-term effectiveness, permanence, implementability, cost, restoration time frame, community acceptance, and protection of human health and the environment. Detailed remedial costs were not prepared for this evaluation. Rather, cost was evaluated relative to the various alternatives. The following remedial alternatives were evaluated as potentially applicable.

5.3.1 No Action

The no action alternative requires no remedial action, site restrictions, or monitoring. The no action alternative would not be effective in reducing potential human health risk posed by exposure to contaminated soils nor would it be effective in reducing physical hazards associated with debris at the Site.

5.3.2 Institutional Controls and Monitoring

5.3.2.1 General

This remedial alternative involves the use of: (1) institutional controls to limit potential future exposures, and (2) groundwater monitoring to evaluate whether concentrations of chemicals of concern change significantly with time. Institutional controls at the Site would consist of site access restrictions such as fencing, and deed restrictions to require activities resulting in the removal or disturbance of subsurface materials to be performed by qualified personnel. Deed restrictions would mandate that excavation spoils and water from dewatering activities would be handled and disposed of in a manner to prevent risk to human health or the environment.

Deed restrictions would also prohibit the installation of wells for use as a water supply. Although groundwater beneath the Site is not potable due to its high salinity, the restriction would still be necessary to prevent uncontrolled withdrawals. The restriction also would prohibit transfer of the property to another owner without notification to Ecology.

Monitoring of groundwater beneath the Site would be conducted to assess trends in the concentrations of chemicals of concern. Additional monitoring wells may be required to adequately monitor conditions. Concentrations of chemicals of concern and associated loading to the Waterway would be evaluated within the framework of the compliance monitoring data.

Site-access restrictions would limit unauthorized access to the Site through fencing or other barriers.

5.3.2.2 Short-Term Effectiveness

Monitoring and institutional controls would not reduce the mobility, volume, or toxicity of chemicals of concern at the Site. This alternative would meet the goal of reducing potential human health risk posed by exposure to contaminated soils and reduce physical hazards associated with debris at the Site.

5.3.2.3 Long-Term Effectiveness

Long-term effectiveness of institutional controls and monitoring is similar to the short-term effectiveness described above.

This alternative would meet the goal of reducing potential human health risk posed by exposure to contaminated soils and reduce physical hazards associated with debris at the Site. It would not meet the remedial action goal of allowing for future development of the Site as a public use area.

5.3.2.4 Permanence

This alternative would not achieve a permanent reduction in toxicity, mobility, or volume of hazardous constituents at the Site.

5.3.2.5 Implementability

There are no technical limitations to implementing this alternative.

5.3.2.6 Cost and Restoration Time Frame

The estimated costs for this alternative are low relative to other potential remedial actions at the Site. Institutional controls and monitoring alone would have no effect on the restoration time frame.

5.3.2.7 Community Acceptance

Community acceptance of this alternative is anticipated to be low.

5.3.2.8 Protection of Human Health and the Environment

Site conditions pose some risk due to the potential for direct contact with soils containing chemicals of concern, or from physical injury on rubble stockpiles. This risk is extremely low under present conditions. Institutional controls would further limit the potential for future direct exposures to impacted media.

5.3.2.9 Evaluation Conclusion

We conclude that this alternative would meet the goal of reducing potential human health risk posed by exposure to contaminated soils and reduce physical hazards associated with debris at the Site.

This alternative would not meet the remedial action goal of allowing for future development of the Site as a public use area.

5.3.3 Isolation and Containment

5.3.3.1 General

This remedial alternative would involve the use of a soil or asphalt cap over areas of the Site where analytical results indicate the presence of residual metals. A soil cap would require 2 feet of clean fill compacted sufficiently to support the planned use of the area, and 1 foot of topsoil placed over the fill. An asphalt cap would require 16 inches of fill compacted as described above, and 2 to 3 inches of asphalt placed over the fill.

5.3.3.2 Short-Term Effectiveness

This alternative presents short-term risks to human health. Protective measures may be required for workers installing the remedial system.

The short-term impact of the soil or asphalt cap would likely be positive following implementation because there would be a decreased likelihood of contact with contaminated soils or debris at the Site. The installation of an asphalt cap may reduce potential ecological risk to aquatic organisms in the Waterway by reducing the discharge of potentially contaminated groundwater to the adjacent Waterway.

5.3.3.3 Long-Term Effectiveness

This alternative would have a positive long-term impact on the Site in terms of human exposure to contaminated soils and debris at the Site. However, discharge of potentially contaminated groundwater to the Waterway could pose a potential ecological risk to aquatic organisms in the Waterway, as cap installation may reduce, but not eliminate groundwater discharge to the Waterway.

5.3.3.4 Permanence

A properly designed and constructed cap should have a lifespan of approximately 50 years. Replacement of some of the cap material may be required during the design life of this remedial alternative.

5.3.3.5 Implementability

The installation of a soil or asphalt cap in areas of the Site would pose only minor technical issues typically associated with construction sites.

5.3.3.6 Cost and Restoration Time Frame

The estimated cost of a soil or asphalt cap for the Site is estimated as moderate to high. The restoration time frame associated with this alternative is expected to be relatively short.

5.3.3.7 Community Acceptance

Community acceptance of a soil or asphalt cap is anticipated to be moderate. Community acceptance may be improved if the cap areas are used for parking surfaces. Contaminated soil would remain in-place below the cap. Discharge of potentially contaminated groundwater to the Waterway would continue to pose an ecological risk to aquatic organisms in the Waterway. Furthermore, while unlikely, there is no guarantee that contaminated soil would not be mobilized during construction to areas outside of the limits of the sediment cover.

5.3.3.8 Protection of Human Health and the Environment

This alternative includes some short-term risk to human health during construction as previously discussed. Overall protection of human health is expected to be relatively high. Overall protection of the environment would be lessened by potential impacts to aquatic habitat as described above.

5.3.3.9 Evaluation Conclusion

We conclude that this alternative is feasible but not cost effective to implement across the entire site. Isolation and containment would achieve all the remedial action objectives discussed above, although the cost for implementation of this alternative is much higher than the other alternatives evaluated. This alternative will be retained for consideration at selected areas of the Site.

5.3.4 In-Situ Stabilization

5.3.4.1 General

This remedial alternative would involve the use of cement or similar materials to chemically bond metals into the soil matrix. Contaminated soils are mixed with cement or fly ash using large-diameter auger bits that will blend the soil with the cement mixture. Typically, a pilot study is done before implementation of the remedy to develop mix designs and assess the effectiveness of the stabilization. In-situ stabilization will typically reduce the hydraulic conductivity of the soil, and potential changes in groundwater flow because of this must be considered when evaluating this technique.

5.3.4.2 Short-Term Effectiveness

In-situ stabilization would reduce the mobility of metals. This alternative would meet the goals of reducing potential human health risk posed by exposure to contaminated soils, as well as reducing ecological risks to aquatic organisms in the Waterway. It would not reduce physical hazards associated with debris at the Site.

5.3.4.3 Long-Term Effectiveness

Long-term effectiveness of in-situ stabilization is similar to the short-term effectiveness described above; however, it would not meet the remedial action goal of allowing for future development of the Site as a public use area.

5.3.4.4 Permanence

This alternative would not achieve a permanent reduction in toxicity or volume of hazardous constituents at the Site. However, it would reduce the mobility of the contaminants at the Site.

5.3.4.5 Implementability

This technology has been implemented successfully on other sites. There are minor technical limitations to implementing this alternative. A pilot study would need to be performed on the materials at the Site to evaluate the suitability of the materials for this technology.

5.3.4.6 Cost and Restoration Time Frame

The estimated costs for this alternative are high to very high relative to other potential remedial actions at the Site. The estimated time frame for implementation of this alternative would be relatively short.

5.3.4.7 Community Acceptance

Community acceptance of this alternative is anticipated to be moderate. Although mobility of contaminants contained in soil is reduced, the public would perceive these contaminants as remaining on site.

5.3.4.8 Protection of Human Health and the Environment

This alternative provides some short-term risk to human health and the environment as previously discussed. Overall protection of human health and the environment is expected to be high.

5.3.4.9 Evaluation Conclusion

We conclude that this alternative is feasible but not cost effective to implement across the entire site. In-situ stabilization would achieve all the remedial action objectives discussed above, although the cost for implementation of this alternative is the highest of all alternatives evaluated. We conclude that the cost of this alternative is disproportionate to the benefits achieved from the remedial action.

5.3.5 Removal and Disposal

5.3.5.1 General

This remedial alternative would involve, to the extent possible, excavation of all contaminated soil where sampling analytical results indicate the presence of metals. Excavated contaminated soil likely would require temporary on-site stockpiling. The material would be removed from the Site for stabilization and treatment or encapsulation at an off-site landfill.

Upon completion of the excavation activities, the excavation would be backfilled with imported backfill material suitable for structural fill. The excavations would be backfilled to within 1 foot of design grade. One foot of topsoil would be placed over the fill to bring the backfill to finish grade. Restoration of the surface of the backfilled excavation would be required following completion of the remedial activities.

5.3.5.2 Short-Term Effectiveness

This alternative would present short-term risks to human health during construction. Excavation, handling, and transportation of contaminated soil would present potential short-term exposure risks to human health and the environment.

The short-term risks are manageable by the use of appropriate measures to protect human health by preventing exposures and appropriate construction techniques to prevent releases of metals to the environment during construction.

This alternative is expected to have excellent short-term effectiveness at the Site.

5.3.5.3 Long-Term Effectiveness

This alternative would remove all contaminated soils from the Site. The long-term effectiveness is expected to be excellent. All of the remedial action objectives discussed above would be met.

5.3.5.4 Permanence

Removal of contaminated soil through excavation would be permanent. However, the toxicity of the contaminants would remain unchanged and treatment, stabilization, or containment may be required at the disposal facility

5.3.5.5 Implementability

It is probable that all contaminated soil could be excavated from the Site at a considerable cost, as discussed below.

5.3.5.6 Cost and Restoration Time Frame

The estimated cost for excavation of contaminated soil at the Site, assuming soils are disposed of by stabilization and treatment or encapsulation at an off-site landfill, is assumed to be high.

The overall restoration time frame associated with this alternative is expected to be short.

5.3.5.7 Community Acceptance

Community acceptance of excavation of all contaminated soil is anticipated to be good.

5.3.5.8 Protection of Human Health and the Environment

This alternative provides some short-term risk to human health and the environment as previously discussed. Overall protection of human health and the environment is expected to be high.

5.3.5.9 Evaluation Conclusion

We conclude that this alternative is feasible but not cost effective to implement across the entire site. Removal would achieve all the remedial action objectives discussed above, although the cost for implementation of this alternative is much higher than most of the other alternatives evaluated. This alternative will be retained for consideration at selected areas of the Site.

5.4 PREFERRED CLEANUP ALTERNATIVE

The objectives of the remedial action for this site as described in Section 5.1 of this report are listed below.

- Reduce potential human health risk posed by exposure to contaminated soils.
- Reduce potential ecological risk to aquatic organisms in the Waterway caused by discharged of contaminated groundwater from the Site.
- Reduce physical hazards associated with debris at the Site.
- Allow for future development of the Site as a public use area.

The preferred cleanup alternative for the Site was developed based on an evaluation of which general response actions effectively met the remedial action objectives for the Site. The preferred cleanup alternative includes the following general response actions:

- Institutional Controls,
- Isolation/Containment, and
- Removal/Disposal.

The specific work elements for the preferred cleanup alternative are summarized below.

- Implement institutional controls where residual contamination remains following remediation to control future excavations, provide for long-term maintenance of the surface cap, and to provide for long-term groundwater compliance monitoring.
- Isolate remaining soils above MTCA cleanup levels below 3 feet of clean soil cover or an impermeable cap. The intended use of the Site as a public open space may include a paved parking area and a paved access road. The conceptual design will allow for a minimum of 3 feet of cover with clean fill over the majority of the Site. A paved parking area may located at the north end of the Site, which would allow for an impervious cap covering the footprint of former Building 1, where the most contaminated soils had been located.
- Excavate and dispose of soils and concrete that designate as dangerous waste to remove the threat of contact and to remove this material as a potential source of metals leaching to groundwater.
- Excavate and remove localized hotspots of contaminated soil with chemical concentrations above MTCA cleanup levels from areas where no capping is proposed. These areas should be well defined, readily accessible, technically and economically treatable, and pose a potential threat to human health and the environment were the soil to remain.

A detailed description of the implementation of these work elements may be found in Section 8.0 (Implementation of Final Cleanup Action) of this report.

6.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

6.1 GENERAL

Applicable or Relevant and Appropriate Requirements (ARARs) are federal, tribal, state and local laws and regulations that apply to environmental cleanup or remedial construction activities at the Site. Applicable state and federal laws are categorized as chemical-, location- or action-specific laws. Identified potentially applicable state and federal laws are described in the following sections. Location-specific requirements apply to the geographical or physical position of the Site rather than the nature of the chemicals or cleanup actions at the Site. Action-specific requirements specify acceptable containment, treatment, storage, and disposal criteria and procedures. Chemical-specific requirements set quality and cleanup standards for water, soil and sediment. Actions at the Site must be evaluated to assess if they are in compliance with the ARARs governing site activities. A listing of the known ARARs for this site includes the following:

6.1.1 Federal Laws and Regulations

- 33 USC 1251 et. Seq. (Clean Water Act) and 40 CFR 230
- 40 CFR 131 Subpart D (Federally Promulgated Water Quality Standards); Subtitles C and D-42 USC 6921-6949a and 40 CFR Part 268 (Resource Conservation and Recovery Act-RCRA)
- 20 CFR Subpart 1910.120 (Occupational Safety and Health Act); and Executive Order 11988 (40 CFR Part 6, Appendix A – Flood Plain Management)

6.1.2 Tribal Laws

- Tribal Council Resolution 151288C (Puyallup Tribe Water Quality Program)
- Public Law 101-41; 103 Stat. 83 (Puyallup Tribe of Indians Settlement Act of 1989)

6.1.3 State Laws and Regulations

- Chapter 70.105D RCW (Model Toxics Control Act – MTCA), and Chapter 1 73-340 WAC (MTCA Regulations)
- Chapter 70.105 RCW (Washington State Hazardous Waste Management Act) and Chapter 173-303 WAC (State Dangerous Waste Regulations); Chapter 90.48 RCW (State Water Pollution Control Act); Chapter 90.70 RCW (Puget Sound Water Quality Act)
- Chapter 1 73-201A WAC (Water Quality Standards for Surface Waters of the State of Washington)
- Chapter 1 73-14 WAC (Shoreline Management Act)
- Chapter 75-20 RCW (State Hydraulic Code) and Chapter 220-11 WAC (Hydraulic Code Rules)
- Chapter 70.95 (Solid Waste Management – Reduction and Recycling), Chapter 70.94 RCW (Washington Clean Air Act)
- Chapter 1 73-160 WAC (Minimum Standards for Construction and Maintenance of Wells)
- Chapter 43.21C RCW (State Environmental Policy Act [SEPA]) and Chapter 197-11 WAC (State Environmental Policy Act Rules)
- Washington Industrial Safety and Health Act (WISHA)

6.1.4 Regional and Local

- Puget Sound Clean Air Agency (Regulation I and III)
- City of Tacoma Municipal Code – Chapter 13.10 (Shoreline Regulations)
- City of Tacoma Municipal Code – Chapter 70 (Uniform Building Code-Excavation and Grading)
- City of Tacoma Municipal Code – Chapter 12.08 City Code (Provisions for Acceptance for Discharges to Sewer System)
- Tacoma Pierce County Health Department (Waste Disposal Authorization)

The selected cleanup plan complies with the ARARs from the laws and regulations listed above. These ARARs include compliance with the specific substantive requirements for project permits. Other administrative approvals and authorizations that are separate from substantive requirements will be complied with as part of the permitting process.

6.1.5 Other Guidance To Be Considered

Potentially applicable state and federal laws provide a framework for development of a remedial action, if necessary, for the Site. Other regulations that may affect remedial activities at the Site, but are not codified as law, are to be considered when selecting and developing the remedial alternative. These regulations are referred to as "To Be Considered" or TBCs.

6.1.5.1 City of Tacoma, Storm Water Management Manual – Project activities will comply with provisions of the City of Tacoma Storm Water Management Manual and underlying regulations for storm water management in accordance with the National Clean Water Act, the Puget Sound Water Quality Management Plan and the National Pollutant Discharge Elimination System Stormwater Permit. Environmental cleanup and redevelopment activities must comply with Best Management Practices (BMP) identified in Section A5 of the Manual "Construction and Demolition Activities" and Section A6 "Other Activities."

6.1.6 Protection, Performance and Compliance Monitoring

Protection monitoring will be implemented during construction and will include monitoring for vapor, dust, stormwater runoff or other potential release mechanisms at the Site during implementation of the remedial action. Performance monitoring will include treatment or disposal of obvious waste material that is encountered, and confirmation sampling to evaluate the effectiveness of these treatment and disposal actions. Post-construction groundwater compliance monitoring will be performed to ensure that groundwater quality remains unchanged from pre-site remediation conditions or improves as a result of the site remediation. Previous reports indicate that groundwater discharge from the Site has had no net adverse effect to the adjacent Waterway.

6.2 ARARS SUBSTANTIVE REQUIREMENTS

Substantive requirements, which are either legally applicable or relevant and appropriate to the project, are summarized below for selected laws and regulations. This discussion focuses on substantive requirements, which are pertinent to permitting and to the implementation of the remedial action. Since the cleanup action is being performed under MTCA, the actual permitting of the site activities is not required (as described in RCW 70.105D.090), and only the substantive provisions of the permit terms must be complied with.

6.2.1 Ecology, Chapter 90.48 RCW, Water Pollution Control

Construction design and implementation shall include measures to prevent any discharge into any waters of the state of any organic or inorganic matter that shall cause or tend to cause pollution of such waters according to the determination of Ecology.

6.2.2 Ecology, Chapter 70.105 RCW, Hazardous Waste Management

Remedial action shall not allow for disposal of dangerous wastes in any manner not in compliance with regulations under Chapter 173-303 WAC.

6.2.3 State Environmental Policy Act (SEPA - Chapter 43.210 RCW) and SEPA Rules (Chapter 197-11 WAC)

Rules describing the integration of MTCA and SEPA provided in WAC 197-11-250 through -268 list applicable requirements for the project. Implementation of the site remediation action triggers SEPA environmental review (e.g., SEPA checklist), threshold determination, and public notice. Pursuant to WAC 197-11-060(5) and WAC 197-11-630, a review will be done to ensure compliance of the remedial action with SEPA. This review will be completed concurrent with agency review of this CAP. If the responsible official issues a Determination of Nonsignificance (DNS) for the Site, the public comment period on the DNS will be the same as the public comment period for the cleanup action plan.

6.2.4 Puget Sound Clean Air Agency, Regulation I of the Puget Sound Clean Air Agency

Remedial action shall be performed so as to not allow the emission of any air contaminants in violation of the visual standard established by Section 9.03 of the regulation. Remedial actions shall be performed so as to not allow the emission of particulate matter in violation of Section 9.04 of the regulation.

Remedial action shall be performed so as not to allow the emission of air contaminants in violation of Section 9.11 of the regulation. Remedial action shall be performed so as not to allow the emission of fugitive dust in violation of Section 9.15 of the regulation. Equipment utilized on site for the remedial action shall be maintained in such a manner as to not be in violation of Section 9.20(b) of the regulation.

6.2.5 Regulation III of the Puget Sound Clean Air Agency

The numerical standards for compliance with air emissions regulations that apply to remedial action on the Site are those listed in Appendix A, Acceptable Source Impact Levels, of the regulation. Remedial activities on the Site will be performed using construction techniques to minimize dust and particulate emissions from the Site, and maintain these emissions below standards promulgated by the Puget Sound Clean Air Agency.

6.2.6 City of Tacoma, Chapter 13.10, Shoreline Regulations

Construction design shall include the following.

- Measures to minimize erosion during and after construction and for the replanting of the Site after construction.
- Measures to minimize the problems of contamination of surface waters, depletion and contamination of groundwater, and the generation of increased surface water runoff.
- Provisions for facilities or appurtenances for disposal of sanitary waste and monitoring the use of chemicals, fertilizers, and other pollutants in such a manner so as to not degrade existing levels of surface water and groundwater quality. Dust control measures, including plants and vegetation where feasible shall be taken.
- Signs required for safety and security shall be allowed. All signs shall be of permanent materials.

6.2.7 City of Tacoma, Chapter 70, Uniform Building Code – Excavation and Grading

Grading and excavation requirements include the following.

- The slope cut surface shall be no steeper than safe for intended use, and shall be no steeper than two horizontal to one vertical. Detrimental amounts of organic material shall not be permitted in fills.
- No rock or similar irreducible material with a maximum dimension greater than 6 inches shall be buried or placed in fills.
- The top cut slopes shall not be made nearer to a site boundary line than one fifth of the vertical height of the cut with a minimum of 2 feet and a maximum of 10 feet. The setback may need to be increased for any required interceptor drains.
- Unless otherwise indicated on the approved grading plan, drainage facilities and terracing shall conform to the provisions of Section 7012 for cut or fill slopes steeper than three horizontal to one vertical.
- The faces of cut and fill slopes shall be prepared and maintained to control against erosion. This control may consist of effective planting. The protection for slopes shall be installed as soon as practicable and prior to calling final approval.

6.2.8 City of Tacoma, Chapter 12.08, City Code

Remedial actions will comply with provisions for acceptance of any water generated by remedial action discharged into the city sewer system.

6.2.9 City of Tacoma, Chapter 8.30.030 Part D, City Code

Remedial actions will comply with provisions regarding loud or unnecessary noises.

6.2.10 Tacoma Pierce County Health Department, Waste Disposal Authorization

Remedial actions will comply with provisions for acceptance of any soils to be disposed of at the City of Tacoma Municipal Landfill according to criteria developed for the facility.

7.0 CLEANUP STANDARDS

7.1 SITE CLEANUP LEVELS

The final cleanup action selected for the Site involves a combination of cleanup action components and institutional controls, including removal and treatment of soil designated as dangerous waste, containment of contaminated soils on-site, and institutional controls and compliance monitoring of groundwater. Cleanup action activities at the Site will coincide with site development, which will be conducted in two phases. The first phase (referred to as temporary phase) will be conducted in conjunction with the construction of the D Street Overpass. The Site, as previously described in Section 4.0 (Proposed Redevelopment Plans) will be used for temporary parking, equipment storage areas and temporary site access to the Berg Scaffolding property during construction of the D Street Overpass. The final phase and permanent site use will be the development of a public park area.

Soil and groundwater cleanup action levels for contaminants of concern (COC) are developed for the Site. COCs were identified in the IAP. Analytical data collected during the IAC was evaluated and chromium was identified as a potential COC in soil at the site. The cleanup action levels are intended to achieve the following objectives.

- Reduce human health risk by limiting the potential for direct contact with contaminated soil.
- Reduce potential risk to aquatic organisms in the Waterway caused by potential exposure to groundwater discharging from the Site.

Cleanup action levels for soil have been developed for both the temporary phase and final site development. Cleanup action levels for groundwater will be the same for both phases.

7.1.1 Soil

The site COCs listed below were identified in the IAP, with the exception of chromium. Chromium was identified as a potential COC in soil based on our review of chemical data collected during the IAC.

- Cadmium,
- Chromium,
- Copper,
- Cyanide,
- Lead,
- Nickel, and
- Vinyl chloride.

It is assumed that the site COCs for soil and associated cleanup action levels developed for the IAP are applicable and relevant to the final cleanup action objectives.

Soil cleanup levels to address human health via direct contact (ingestion) were developed for this site in the IAP, and in accordance with Chapter 173-340-740 WAC. MTCA Method B soil cleanup levels for unrestricted (residential) land use were selected for the final cleanup action and these levels were derived from *Cleanup Levels and Risk Calculations Under the Model Toxics Control Act Cleanup Regulation (CLARC),* Version 3.1, Publication 94-145, updated 11/01. Cleanup action levels for the final site use are presented in the IAP and are included in Table 1. These cleanup action levels will be used during final site development for the public park area.

Soil cleanup levels to address drinking water protection were not developed because groundwater at the Site is considered non-potable according to Chapter 173-340-720(2)(b)(ii) WAC due to its association with water in the Waterway and its resultant high salinity.

Soil cleanup levels to address protection of terrestrial animals and plants were not developed because the site and surrounding area contain insufficient habitat per Chapter 173-340-7491(1)(c) WAC.

Soil cleanup levels to address protection of marine organisms through the soil-to-groundwater-to-surface-water pathway were not developed. Groundwater compliance monitoring will be conducted as part of the final cleanup action. Analytical data collected during compliance monitoring activities will be evaluated for potential impacts to marine organisms through this pathway. Section 10.0 (Institutional Controls and Compliance Monitoring) provides a discussion of the groundwater compliance monitoring that will be performed as part of the final cleanup action.

7.1.1.1 Temporary Site Use Cleanup Action Levels

Cleanup action levels were developed for temporary site development that are consistent with current and anticipated site use during the first phase development. These cleanup action levels are based on MTCA Method C soil cleanup levels for industrial land use and were selected for the temporary site use and these levels were derived from *Cleanup Levels and Risk Calculations Under the Model Toxics Control Act Cleanup Regulation (CLARC),* Version 3.1, Publication 94-145, updated 11/01. The Site is zoned as a high intensity, mixed commercial area and is currently vacant. Berg Scaffolding Co. will temporarily operate on the Site during the construction of the D Street Overpass. The use of industrial cleanup standards for the Site during the temporary phase is consistent with the criteria for “industrial properties” stated in Chapter 173-3540-765 WAC. The use of the industrial cleanup standards represents a “reasonable maximum exposure” scenario for on-site workers. Additionally, people do not normally live on or near the Site and access by the general public will not be allowed during the temporary site development phase. The temporary site use cleanup action levels are presented in Table 1.

7.1.2 Groundwater

Ecology has concluded that the Site was not a confirmed source of problem chemicals to the Waterway, as noted above in Section 2.1.2, Groundwater. Groundwater cleanup levels developed in the IAP were based on protection of marine organisms (Water Quality Standards for Surface Waters of the State of Washington Chapter 173-201A WAC) for the groundwater-to-surface water pathway.

The IAP evaluated previous analytical data for groundwater that exceed the State Surface Water Quality Standard for protection of aquatic organisms at the Site. COCs that were identified in the IAP include the following:

- Copper,
- Nickel, and
- Cyanide.

Groundwater cleanup action levels for COCs at the Site were evaluated in the IAP and are presented in Table 2. It is assumed that the COCs for groundwater and associated cleanup action levels developed for the IAP are applicable and relevant to the final cleanup action objectives.

Cleanup action levels based on protection of drinking water were not developed because the shallow groundwater beneath the site is considered non-potable under Chapter 173-340-720(2)(b)(ii) WAC.

Groundwater cleanup action levels for direct human contact were not established for the Final Cleanup Action Plan. It is assumed that this exposure pathway will not be present with the completion of the site development and remediation along the bank areas at the Site as part of the overall Waterway cleanup. Bank areas along the Waterway are to be regraded and capped, and it is likely that any existing discrete groundwater discharge points will be eliminated as part of these activities.

Groundwater concentrations at the Site will be measured at a conditional point of compliance. Natural attenuation processes exist at the Site that will produce a reduction in these measured concentrations by the time actual discharge occurs at the point of compliance. The existence of these natural attenuation processes is well known. The point of compliance for groundwater discharge is assumed to be diffuse groundwater discharge from the Waterway bank during low-tide conditions. The effect of these natural attenuation processes will be assessed by evaluation of groundwater samples collected from the monitoring wells during compliance monitoring. The procedures used for this evaluation are described in Section 10.0 (Institutional Controls and Compliance Monitoring) of this document.

8.0 IMPLEMENTATION OF FINAL CLEANUP ACTION

8.1 GENERAL

The D Street Overpass construction activity necessitates a two-phased approach to the development of the Site, which includes separate phases of construction for temporary and permanent site development. Site remediation activities will be incorporated into both the temporary and permanent site development phases.

Cost estimates have been developed for both phases of the site development and remediation. Several general assumptions, references, contingencies, and other information were used in preparing cost estimates for this document. It should be noted that remediation cost estimates based on data from full-scale remedial investigations typically fall within an accuracy range of -30 to +50 percent.

In estimating the cost for this alternative, unit cost information was obtained from various resources including vendors, cost estimating guides, and our previous experience on similar projects. Unit costs have been estimated in 2003 dollars.

Only capital costs have been considered in preparation of this estimate. Capital costs consist of expenditures that are incurred during the design and construction of a remedial action. These include construction costs, as well as contingencies associated with construction and design of the remedial action. Operation and maintenance costs included with on-going site monitoring were not developed as part of this estimate.

In compiling the capital cost estimates for the remedial actions, contingencies for construction, permitting, engineering design, and construction services were factored into the total capital cost for each alternative. These contingencies are as follows:

- A 15 percent bid contingency was added to the construction cost subtotal to cover unknown conditions, including adverse weather, labor strikes, and unfavorable market conditions.
- A 20 percent scope contingency was added to the construction cost subtotal to cover change orders reflecting the specialized nature of the work and the lack of precise definition of the extent of contaminated material.
- A 5 percent permitting and legal allowance was added to the subtotal of construction costs.
- An 8 percent engineering design allowance was added to the subtotal of construction costs.
- An 8 percent construction service fee was added to the subtotal of construction costs to cover construction oversight and design modifications during construction.

8.2 PHASE 1 ACTIVITIES

8.2.1 Phase 1 Site Layout and Development

The proposed layout of site features during Phase 1 of Site Remediation is shown on Figure 5. A paved access road will be provided that enters the Site at its northernmost entrance. This roadway will be generally aligned east-west, and will make a 90-degree turn to the south approximately 120 feet from the west edge of East D Street. The roadway will then follow a north-south alignment, stopping at the northernmost edge of the building located on the Berg Scaffolding property (not shown on Figure 5). Fencing will be installed to limit site access. Existing fencing on the northern property line of the Site may remain installed, and the existing fence located along the eastern edge of the property may be moved to the edge of the construction easement for the D Street Overpass as indicated on Figure 5. Within the fenced areas, but excluding the access road, the Site will be covered with a gravel-surfaced parking/ storage area.

8.2.2 Phase 1 Site Cleanup

During Phase 1 Cleanup (Phase 1), temporary access controls will be established at the Site, and soil designated as dangerous waste per WAC 173-303 and miscellaneous construction debris, including concrete rubble will be removed from the Site. Temporary access controls will include a chain-link fence closing off the Site, with a locked 31-foot-wide swing-gate located on East D Street as shown on Figure 5. The chain-link fence may be placed along the westernmost extent of the temporary construction and utility easements.

Construction activities will include clearing and removal of contaminated material from the Site, and the construction of a paved access road. Cadmium-containing soil designated as dangerous waste per WAC 173-303 in the area indicated on Figure 4 will be excavated to depths of a minimum of 3 feet below design grade.

8.2.2.1 Site Clearing and Debris Removal

Removal of materials from the Site will include clearing miscellaneous trash and debris from the Site for disposal as non-regulated waste.

Approximately 288 cubic yards (490 tons) of concrete rubble from the large sump in the former Building 1 is located along the proposed access roadway alignment. Samples of this concrete have been analyzed for TCLP metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) and the concrete has been designated as dangerous waste per WAC 173-303. This material will be removed from the Site and transported to a Subtitle C landfill for disposal.

8.2.2.2 Areas to be Excavated

Chemical analytical results from the IAC indicate that soil anticipated to be designated as dangerous waste based on cadmium concentrations extends from the existing ground surface to a depth of approximately 3 feet below existing grade in the areas indicated on Figure 4. This soil designated as dangerous waste per WAC 173-303 will be excavated to depths of a minimum of 3 feet below design grade in the area indicated on Figure 4 and disposed of in a Subtitle C landfill as part of the Phase 1 activities. We anticipate this soil volume removed from these locations will be approximately 290 cubic yards.

These excavation areas were delineated using chemical analytical data collected during the IAC. Actual lateral excavation limits will be established using “field screening” techniques such as observation of staining, discoloration, odor, sheen or other indicators of potential contamination.

When field screening indicates excavation limits have been reached, confirmation soil samples from the base and sidewalls of the excavation, as well as stockpiled soil samples of the excavated material will be collected. Proper decontamination procedures will be followed during sample collection. Soil samples from the stockpile will be analyzed for cadmium using TCLP to evaluate disposal options. Confirmation soil samples will be tested for total and TCLP for cadmium to confirm the cadmium-contaminated soil has been effectively removed.

When confirmation sampling indicates soil designated as dangerous waste has been removed, clean backfill will be placed in the excavations to approximately 1 foot below surrounding grade. Backfill will be compacted sufficiently for the final design use of the area. One foot of topsoil will be placed over the clean backfill. The excavated areas will be graded to allow proper drainage and ensure proper erosion control, and the areas will be revegetated as necessary.

8.2.2.3 Temporary Capping Layout

8.2.2.3.1 General

There will be three general capped areas on the Site. These will consist of the gravel-surfaced parking/ storage areas, the paved access road, and a "No Use" area as indicated on Figure 5. Caps placed on the Site during Phase 1 will need to be excavated and removed from the Site during Phase 2.

8.2.2.3.2 "No Use" Area

The No Use area indicated on Figure 5 will be capped and barricaded. The cap will consist of a 12-inch subgrade section placed over geotextile fabric. The area will be barricaded off using jersey barriers or other such methods.

8.2.2.3.3 Paved Access Road

A paved access roadway sufficient for providing access to Berg Scaffolding will be located as shown on Figure 5. This roadway will consist of a 12-inch subgrade over geotextile fabric, capped by 4 inches of asphalt. For purposes of discussion, a 31-foot-wide roadway is indicated on Figure 5.

8.2.2.3.4 Gravel-Surfaced Parking/Storage Area

The remainder of the Site will be capped with 18 inches of pit run or higher quality material suitable for parking/storage. Imported fill material will be compacted suitably for the proposed site use.

8.2.2.4 Abandon Lower Aquifer Monitoring Wells

Monitoring wells MW-6, MW-7, MW-8, MW-9 and MW-11 will be abandoned consistent with WAC 173-160-560 requirements (also abandon MW-2 should it lie in an area where soil excavation is required). These wells tap the deeper "sand aquifer." The remaining wells tap the upper "fill aquifer." The upper aquifer wells have historically contained higher contaminant concentrations and will provide the best indicators of long-term contaminant levels and trends. The deeper aquifer wells are of much less value for contaminant monitoring and their continued presence could provide potential connections between the aquifers.

The estimated cost for this work is approximately $2,400 to abandon five wells

8.2.3 Phase 1 Site Cleanup Cost Estimate

Phase 1 site cleanup cost estimates were broken into six elements. These include

- General Construction Costs and Site Access Controls,
- Site Clearing and Debris Removal,
- Soil Excavation and Disposal,
- Construction of Temporary Access Road,
- Placement of Temporary Gravel Surfacing, and
- Abandonment of Five Monitoring Wells.

The total construction cost estimate for Phase 1 is $292,059. This cost estimate includes sales tax at 8.8 percent.

Other costs associated with construction include contingencies and construction support services such as permitting, engineering, and construction observation. The total capital cost estimates for Phase 1 cleanup, including contingencies and support services is $508,178. A detailed cost estimate is included as Table 3.

8.3 PHASE 2 ACTIVITIES

Phase 2 activities will implement the final remedial activities at the Site and provide the final site layout.

8.3.1 Phase 2 Site Layout and Development

The proposed layout of site features during Phase 2 of Site Remediation is shown on Figure 6. A paved one-way access road and parking is proposed adjacent to East D Street. A 12-foot-wide concrete walkway is proposed to extend across the western portion of the Site as shown on Figure 6. A grass surface is proposed between the access road and walkway, and a vegetative buffer zone is proposed west of the walkway.

8.3.2 Phase 2 Cleanup

Phase 2 cleanup will consist of removing temporary features installed during Phase 1 and remediating site soils to MTCA Method B cleanup levels.

8.3.2.1 Remove Temporary Caps

Phase 2 will consist of removal of the temporary access road constructed during Phase 1 except near the entrance of the Site (compare Figures 5 and 6). Phase 2 will also include removal of the cap in the No Use area capped during Phase 1, as well as the gravel-surfaced area making up the remainder of the Site.

8.3.2.2 Soil Excavation and Removal

During Phase 2, contaminated soil remaining at the Site will be remediated in the following way:

- Areas where soil designated as dangerous waste per WAC 173-303 exist at or above design grade will be excavated to a maximum of 16 inches below design grade, filled with clean soil to within 2 to 3 inches of design grade, and capped with asphalt.
- Areas where soil designated as dangerous waste per WAC 173-303 exist between design grade and 3 feet below design grade will be excavated to a maximum of 3 feet below design grade and filled to design grade with 2 feet of clean fill and 1 foot of topsoil.
- Areas where soil designated as dangerous waste per WAC 173-303 exist below 3 feet below design grade will be filled with clean soil to 1 foot below design grade and 1 foot of topsoil.

In all cases, the fill will be compacted sufficiently for the proposed use of the area.

Actual vertical and lateral excavation limits will be established using "field screening" techniques such as observation of staining, discoloration, odor, sheen or other indicators of potential contamination.

If field screening indicates excavation limits have been reached before the above-indicated maximum excavation depths are reached, confirmation soil samples from the base and sidewalls of the excavation as well as stockpiled soil samples of the excavated material will be collected. Proper decontamination procedures will be followed during sample collection. Soil samples from the stockpile will be analyzed for metals to include cadmium, chromium and lead. Results exceeding MTCA Method B cleanup levels will be further analyzed using the TCLP to evaluate disposal options. Confirmation soil samples will be tested for metals to include cadmium, chromium and lead to confirm contaminated soil has been effectively removed.

If confirmation sampling indicates soil designated as dangerous waste has been removed, clean backfill will be placed in the excavations to approximately 1 foot below surrounding grade. Backfill will be compacted sufficiently for the final design use of the area. One foot of topsoil will be placed over the clean backfill. The excavated areas will be graded to allow proper drainage and ensure proper erosion control, and the areas will be revegetated as necessary.

8.3.3 Phase 2 Cost Estimate

Phase 2 Site cleanup cost estimates were broken into five elements. These include

- General Construction Costs and Site Access Controls,
- Site Clearing and Preparation,
- Soil Excavation and Disposal,
- Construction of Permanent Access Road, and
- Complete Site Buildout - Landscaping and Sidewalks.

The total construction cost estimate for Phase 2 is $264,412. This cost estimate includes sales tax at 8.8 percent.

Other costs associated with construction include contingencies and construction support services such as permitting, engineering, and construction observation. The total capital cost estimates for Phase 2 including contingencies and support services is $460,072. A detailed cost estimate is included as Table 4.

9.0 FINAL CLEANUP ACTION IMPLEMENTATION SCHEDULE

The overpass construction activity necessitates a two-phased approach to the development of the Site, which includes separate phases of construction for temporary and permanent site development. Site remediation activities will be incorporated into both the temporary and permanent site development activities. Site remediation will include site preparation, excavation and removal of contaminated soil, removal of concrete rubble and capping of contaminated soils.

9.1 PHASE 1

Site development to prepare the area for temporary use is expected to begin with the construction of the D Street Overpass. Site preparation is anticipated to be completed by the end of 2004. The temporary site development will include access for Berg Scaffolding located directly south of the Site.

The D Street Overpass construction is anticipated to begin in 2004. The D Street Overpass construction activities will eliminate the current access to Berg Scaffolding and the only way to retain access will be across the Site. A portion of the Site located away from areas where remedial actions are to take place may be established as temporary storage for Berg Scaffolding as well as temporary parking for Berg Scaffolding employees and clients. It may be necessary to perform some remediation of contaminated materials as part of the construction of the temporary access and use features. General site layout during Phase 1 construction is shown on Figure 5.

9.2 PHASE 2

The TFWDA intends the permanent use of the Site to be a public park. Site development for its final planned use will not begin until the D Street Overpass construction activities are completed in 2007. Site development for its final planned use is expected to take place between 2007 and 2009. Final build-out for the park may include hard surfaced roadways and parking areas as well as green space on the Site. The planned final layout of site features for Phase 2 construction is shown on Figure 6.

10.0 INSTITUTIONAL CONTROLS AND COMPLIANCE MONITORING

Institutional controls and compliance monitoring will be performed at the Site during both temporary site use and after final site construction. Initial groundwater compliance monitoring activities will be performed to establish recent baseline groundwater quality information for the Site. The groundwater compliance monitoring plan will be reviewed after baseline information is available

10.1 INSTITUTIONAL CONTROLS PLAN

The following institutional controls will be established at the Site:

10.1.1 Notification and Disclosure

Written notice will be provided to Ecology Southwest Regional Office Toxics Cleanup Program in Olympia, Washington, at least 30 days prior to a conveyance of title, leasehold interest in the property, or planned earthwork activities on the Site. Notification will include the following items:

- Description of planned site activities;
- Identification of appropriate actions to eliminate or minimize direct contact with potentially contaminated soil;
- Description of how soil will be removed from the Site, if applicable; and
- Description of what actions will be taken to characterize and dispose of soil, if applicable.

Disclosure of the site background, list of site chemicals of concern, characterization of residual soil contamination on the Site, summary of groundwater monitoring activities, and recommendations for minimizing soil disturbances should be disclosed to property owners, lessees and contractors prior to accessing the Site.

Contact Information

Washington State Department of Ecology
Southwest Region, Toxics Cleanup Program
P.O. Box 47600
Olympia, Washington 98504-7600
(360) 407-7170
Site Manager, Marv Coleman

10.1.2 Access Control

The Site fencing will be improved and maintained as necessary to prevent unauthorized access and to limit contact with potentially contaminated areas during remedial activities. The Site will be accessible to Ecology officials or their representatives as long as groundwater-monitoring activities continue and contaminated soils exist beneath capped areas.

10.1.3 Maintenance of Cover

By way of deed restriction or other appropriate method, current and subsequent property owners will be restricted from excavating or grading the Site so as to leave less than 3 feet of clean soil cover over areas where contaminants exceeding soil cleanup levels exist. The property owner must maintain the surface of the property in such a way as to prevent erosion of the clean soil cover (e.g., maintain vegetative or paved surface).

Should excavation into contaminated material be required, Ecology would be notified as previously described, and excavation and waste-handling activities would be in accordance with MTCA (Chapter 173-340 WAC) and Washington State Dangerous Waste Regulations (Chapter 173-303 WAC). It is anticipated that any excavation activities will require a Site Sampling and Analysis Plan (SAP) and a site-specific Health and Safety Plan (HASP).

10.1.4 Groundwater Use Restrictions

Groundwater at the Site has been assessed to be non-potable and would not typically be suitable for drinking or irrigation purposes; however, use of groundwater for drinking and irrigation will still be specifically prohibited. Groundwater should not be withdrawn from the Site without prior notification of Ecology, except for groundwater monitoring purposes. Groundwater withdrawal and disposal activities will be in accordance with applicable Washington State environmental regulations.

10.1.5 Institutional Controls Plan Summary

Ecology is the regulatory authority for this site and should be notified at least 30 days prior to a conveyance of title, leasehold interest in the property, or planned earthwork activities on the Site. Institutional controls at the Site include the following action items.

- Notification and disclosure of site background and conditions to legal owners, lessees or contractors conducting earthwork at the Site.
- Grant Site access to Ecology and their representatives.
- Prepare a SAP and HASP for excavation activities greater than 3 feet.
- Prohibit groundwater use for drinking water or irrigation purposes. Obtain Ecology approval for other groundwater uses.

10.2 GROUNDWATER COMPLIANCE MONITORING

10.2.1 General

Groundwater compliance monitoring will be performed semi-annually in accordance with an Ecology-approved Compliance Monitoring Plan (CMP). A summary report presenting the results of the semi-annual sampling will be provided to Ecology for review within three months of the completion of each sampling event. Compliance monitoring will be performed for a minimum of three years, and possibly up to five years. At the request of the TFWDA, Ecology may reevaluate the groundwater compliance-monitoring program.

The seven monitoring wells that tap the upper fill aquifer (MW-1, -2, -3, -4, -5, -11 and -12) will be sampled using low-flow sampling techniques and analyzed for total and dissolved metals, total cyanide and weak-acid dissociable cyanide (WAD) using low detection limit analytical techniques. Statistical analysis of the data will be performed using the procedures outlined in MTCA and the *Statistical Guidance for Ecology Site Managers* published by Ecology (Ecology 1992).

The techniques for purging, sampling, sample handling and purge water collection will be presented in a Work Plan developed in accordance with appropriate regulations and the guidelines presented in this document. HASPs and SAPs will be developed meeting the requirements of WAC 173-340-810 and -820, respectively.

10.2.2 Sampling Procedure

Monitoring wells will be sampled during high-tide conditions in order to be comparable to previous groundwater results. Groundwater samples from the monitoring wells will be collected using a submersible pump under low-flow conditions in order to minimize turbidity. The following field measurements will also be made during the sampling event:

- Static water level,
- Depth to bottom of well,
- pH,
- Temperature,
- Electrical conductivity,
- Salinity, and
- Turbidity.

The field activities will include obtaining groundwater samples from the seven monitoring wells in the near-shore area of the Site on a semi-annual basis. Analytical laboratory services will be provided by an Ecology-approved analytical laboratory. Groundwater generated during the sampling activities will be treated and disposed of in accordance with applicable regulations. Procedures specific to the low-flow sampling techniques are as follows.

- Each monitoring well will be purged and groundwater samples will be collected using low-flow/ low-turbidity sampling techniques to minimize sediment suspension in groundwater samples. Groundwater samples will not be submitted for analysis from monitoring wells that contain visible nonaqueous phase liquid. After measuring and recording the groundwater level, and evaluating for the presence of visible nonaqueous phase liquids, the wells will be purged and sampled using a dedicated 2-inch-diameter submersible pump equipped with a discharge control valve. The pump intake will be located at the approximate center of the screened interval of the monitoring well. Flow rates during purging and sampling will be approximately 0.5 liters per minute or less.
- Water quality parameters, including temperature, pH, turbidity, and conductivity will be measured during well purging. Wells generally will be considered purged when three consecutive temperature and conductivity measurements are within 10 percent of each other, the pH is within 1 pH unit, and the turbidity is approximately 5 NTUs or less. However, during previous groundwater monitoring activities, conductivity of the purge water from monitoring wells in the tidally influenced area of the Site did not equilibrate during purging in all cases. The changes in measured conductivity of groundwater from these monitoring wells are likely the result of the exchange of seawater and groundwater as the result of tidal fluctuations in the nearby Waterway. In these cases, temperature, pH and turbidity measurements will be used to evaluate when purging is complete. Sample collection will occur immediately after purging is completed.

- In cases where the 5-NTU turbidity purge criteria cannot be met within a reasonable time, both field filtered and unfiltered groundwater samples from the monitoring well will be submitted for chemical analysis. Both field filtered and unfiltered samples will be submitted for analysis to assess the effects of particulate matter on observed chemical concentrations in the samples. Samples to be filtered will be passed through a 0.45 µm in-line filter and discharged directly into the sample container.

10.2.3 Analytical Methods

Analytical methods will be used that are sensitive enough to quantify each analyte at or below its groundwater cleanup level.

10.2.4 Baseline Establishment

The analyses from the first round of sampling will provide baseline chemical analytical data for groundwater at the Site. The analyses will also determine the forms of cyanide that occur in groundwater at the Site. As discussed in Section 7.0 (Cleanup Standards) in this document, the surface-water based groundwater cleanup level for cyanide is based on WAD cyanide; however, only total cyanide has ever been analyzed at the Site. This first round of sampling will be used to evaluate if WAD cyanide concentrations in groundwater exceed the cleanup levels for WAD cyanide, and whether or not further sampling for WAD cyanide is appropriate.

Salinity will also be measured during sampling as a basis for determining baseline salinity in the wells. This baseline salinity will be used to estimate the effects of attenuation on dissolved metals concentrations and determine a correction factor to be applied to the chronic surface water criteria as discussed below.

10.2.5 POC and CPOC

The Point of Compliance (POC) for the Site is where groundwater discharges to the Waterway. The location for a Conditional Point of Compliance (CPOC) for the Site is the location of the existing seven monitoring wells located closest to the edge of the Waterway. These wells will be used for monitoring at the CPOC.

10.2.6 Estimation of Attenuation

Groundwater samples collected from the monitoring wells at the CPOC (nearshore monitoring wells) will not represent chemical concentrations at the POC (sediment surface in the Waterway). Attenuation of metal concentrations in groundwater by sorption and tidal dispersion occurs as groundwater flows towards the Waterway. The existence of these attenuation processes is well known.

The attenuation processes will be evaluated by assuming that the attenuation is directly proportional to the difference in the salinity of the groundwater samples from the monitoring wells (determined during baseline sampling) and surface water in the Waterway. An example of this approach is as follows. The salinity concentration in the Waterway has been estimated at approximately 28 parts per thousand (ppt) during previous studies in the Waterway (Hart Crowser 1998). If the highest average salinity concentration in groundwater from a monitoring well at the CPOC is 12.4 ppt, this is 44.3 percent of the observed salinity in the Waterway. Using this as a conservative basis for estimating the effects of natural attenuation would result in a correction factor of 1/0.443 or 2.25 to be applied to the chronic surface water criteria for metals and cyanide. This approach to estimating attenuation of chemical concentrations in groundwater was used at the D Street Terminal on the east side of the Waterway (Hart Crowser 1991) as well as at the former coal gasification site on the west side of the Waterway (GeoEngineers 2001).

10.2.7 Compliance Monitoring Criteria

The concentrations of metals in groundwater samples from the CPOC monitoring wells, corrected as described above, will be compared to Washington State surface water cleanup levels presented in WAC 173-340, WAC 173-201A, and federal surface water quality criteria presented in 40 CFR 131. The most stringent criteria from these various sources will be used as a basis for establishing the compliance criteria at the CPOC. The statistical requirements for evaluating chemical concentrations in groundwater described in MTCA (WAC 173-340-720(8), WAC 173-340-740(7)(e) and (f)) will be performed to provide compliance with the MTCA cleanup protocols.

10.2.8 Statistical Analysis

Statistical analysis of chemical analytical results for groundwater samples from each monitoring well will be performed to assess if the groundwater sample from that location meets the compliance criteria as described in the previous section. The procedures are described in detail in Section 5.0 of the *Statistical Guidance for Ecology Site Managers, August 1992*, *Publication No. 92-54,* published by the Washington State Department of Ecology (Ecology 1992).

Chemical analytical data for each groundwater sample will be assessed. If a primary and a duplicate sample are collected from a monitoring well, the primary sample will be used to perform the statistical analysis. Historical information used for the estimation of the mean and median of the sample population will consist of analytical data collected during future compliance monitoring events.

Initial data evaluation will be performed to evaluate whether the concentrations of the chemicals of concern in a single sample are greater than two times the established cleanup levels, and whether less than 10 percent of the chemical concentrations in groundwater exceed the cleanup level during a representative sampling period.

Statistical evaluation will be performed using MTCA*Stat* to estimate the 95 percent upper confidence interval of the 50th percentile (the mean) of the data set using a one-tailed confidence interval. For the purposes of the statistical evaluation, it will be assumed that the data from each well is lognormally distributed. Detailed computational procedures are described in Section 5.2.1 of the *Statistical Guidance for Ecology Site Managers, August 1992, Publication No. 92-54,* published by the Washington State Department of Ecology.

10.2.9 Reporting

A report describing the results of each semi-annual sampling event will be submitted to Ecology within three months of the completion of each sampling event. The report will be in a format similar to the previous groundwater monitoring reports for the Site. The reports will contain the following sections.

- A summary of field activities during groundwater sampling.
- Validated chemical analytical results and a copy of the analytical data validation report.
- A comparison of analytical results for selected metals and cyanide with previous analytical results.
- A summary of the statistical analysis performed on the analytical data.
- Recommendations.

10.2.10 Exceedence of Cleanup Criteria/Corrective Action

If the initial review of chemical analytical data or subsequent statistical evaluation indicates an exceedence of the cleanup criteria the following procedures will be followed.

- Ecology will be notified of the possibility of an exceedence in the cleanup criteria.
- Review field documentation to assess whether field activities could have biased the sample results. Contact the laboratory and review the analytical data to evaluate whether the exceedence is related to a laboratory error or laboratory contamination.
- If neither field or laboratory procedures appear to be responsible for the exceedence, the well in question will be resampled using the procedures described in the CMP and the work plan. The analytical results will be evaluated using the procedures described in the CMP.
- If the resampling activities do not indicate an exceedence of the cleanup criteria, monitoring will resume using the methods and frequency as described in the CMP using the most recent data.

If the results of the resampling effort agree with the previous results, monitoring will resume using the methods and frequency as described in the CMP. If cleanup criteria are exceeded over two consecutive groundwater monitoring events, the TFWDA would discuss possible alternative sampling scenarios or corrective actions with Ecology. The extent of any corrective actions would be based on the degree of risk or threat to human health and the environment posed by the possible release. Possible alternative sampling scenarios may include pore water sampling, or evaluation of metals concentrations in sediments adjacent to the Site. Possible corrective actions may include expanding the monitoring network across the Site and/or implementing further remedial actions.

11.0 REFERENCES

AGI 1988. Soil and Ground Water Investigation, American Plating, Inc., Tacoma, Washington. August 1988.

AGI 1989. Phase II Soil and Ground Water Investigation, American Plating, Inc., Tacoma, Washington. May 1989.

AGI 1994. Supplemental Ground Water Investigation, American Plating Co. Facility, Tacoma, Washington. WAD08335 0231. February 11, 1994.

Ecology 1992. Statistical Guidance for Ecology Site Managers. Washington State Department of Ecology, Toxics Cleanup Program. Publication No. 92-54. August 1992.

Farallon 2003. Summary of Underground Storage Tank Closure and Site Characterization Report, Tacoma, Washington. June 2003.

GeoEngineers 2001. Property Remedial Design Report, Former Oil/Creosote Storage Tank, Tacoma Coal Gasification Site/Tacoma Gas Company Site, Tacoma, Washington December 21, 2001.

Hart Crowser 2001. Summary of Data and Potential Cleanup Actions, American Plating Site, Tacoma, Washington. February 13, 2001.

Hart Crowser 1991. Hart Crowser & Associates, Inc., 1991, Remedial Investigation Report, D Street Petroleum Site, prepared for D Street Petroleum Terminal.

PRC 1995. Final Report for Resource Conservation and Recovery Act Comprehensive Groundwater Monitoring Evaluation, American Plating Company, Inc. (Lewis R. Jones), Tacoma, Washington. January 5, 1995.

SAIC 1994. Final RCRA Facility Assessment Preliminary Assessment Report, American Plating, Inc., Tacoma, Washington. WAD 08335 0231. July 1994.

SAIC 2003. Final Interim Action Plan, American Plating Site, Tacoma, Washington. April 25, 2003.

TPCHD 1997. Site Hazard Assessment Report, American Plating Site, Tacoma Washington. Letter report to Lewis R. Jones dated August 5, 1997.

Weston 1986. Technical Assistance Team (TAT) Activities Report, American Plating Preliminary Site Assessment. Tacoma, Washington. March 13, 1986.

It has been a pleasure working with you on this project. If you have any questions, please call.

Respectfully submitted,

GeoEngineers, Inc.

Tony C. Mathis, PE, LG, LHG
Senior Hydrogeologist

Terry E. Parks, LG, LHG
Principal

TCM:TEP:tt
TACO:\10\10751002\00\Finals\1075100200DraftR.doc

Attachments

It has been a pleasure working with you on this project. If you have any questions, please call.

Respectfully submitted,

GeoEngineers, Inc.

Tony C. Mathis, PE, LG, LHG
Senior Hydrogeologist

Terry E. Parks, LG, LHG
Principal

TCM:TEP:tt
TACO:\10\10751002\00\Finals\1075100200DraftR.doc

Disclaimer: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Attachments

TABLE 1
SOIL CLEANUP ACTION LEVELS[1]

Chemicals of Concern[2]	Cleanup Action Levels (mg/kg) Final Use MTCA B	Cleanup Action Levels (mg/kg) Temporary MTCA C	Max. Detected Soil Concentrations (mg/kg)[3]	Max. Exceeds Cleanup Action Level
Cadmium	80	3,500	1,370	yes
Chromium VI	240	10,500	3,480 [6]	yes
Copper	2,960	130,000	924	no
Nickel	1,600	70,000	2,845	yes
Lead	250 [4]	1,000 [5]	3,092	yes
Cyanide, total	1,600	70,000	840	no
Vinyl Chloride	0.667	87.5	8.4	yes

Notes:

[1] Soil cleanup action levels were developed for the Interim Cleanup Action Plan (SAIC 2003). The final cleanup action levels for soil are based on MTCA Method B unrestricted land use values. The temporary phase cleanup levels for soil are based MTCA Method C industrial land use values for protection of human health through direct contact (ingestion only).

[2] Chemicals of concern were developed for the Interim Cleanup Action Plan (SAIC 2003).

[3] Data source: Final Interim Action Plan, American Plating Co. Facility, Tacoma, Washington, Table 2 (SAIC 2003). Based on previous site investigations AGI (1989).

[4] There is not a MTCA Method B cleanup level for lead, therefore, the Method A for unrestricted land use was used as the default.

[5] There is not a MTCA Method C cleanup level for lead, therefore, the Method A for industrial use was used as the default.

[6] Data Source: Interim Cleanup Action conducted by Ecology Spring 2003. Data provided by Marv Coleman, Ecology, personal communication.

mg/kg - miligrams per kilogram.

TACO:\10\10751002\00\Finals\1075100200Tables.xls

TABLE 2
GROUNDWATER CLEANUP ACTION LEVELS[1]

Chemicals of Concern[2]	State Surface Water Quality Standards[3] (Protection of Aquatic Organisms, Chronic Exposure) (μg/l)	State Surface Water Quality Standards[3] (Protection of Aquatic Organisms, Acute Exposure) (μg/l)	Maximum Detected Groundwater Concentration[4] (μg/l)	Maximum Exceeds Cleanup Action Level
Cadmium	42	9.3	10	yes
Copper	4.8	3.1	3.4	yes
Nickel	74	8.2	150	yes
Cyanide	1 (WAD)[5]	NA	29 (total cyanide)	yes

Notes:

[1] Groundwater cleanup action levels were developed for the Interim Cleanup Action Plan (SAIC 2003). The cleanup action levels for groundwater are based on the State Surface Water Quality Standards (WAC 173-201A, Marine Water) for protection of aquatic organisms for the groundwater to surface water pathway.

[2] Chemicals of concern were developed for the Interim Cleanup Action Plan (SAIC 2003).

[3] Chapter 173-201A WAC Water Quality Standards for Surface Waters of the State of Washington.

[4] Data Source: Final Interim Action Plan, American Plating Site, Tacoma, Washington, Table 4 (SAIC 2003). Data based on previous site investigations (AGI 1994 and PRC 1995).

[5] Weak Acid Dissociable (WAD).

NA = Not available.

μg/l = Micrograms per liter.

TACO:\10\10751002\00\Finals\1075100200Tables.xls

TABLE 3
FORMER AMERICAN PLATING INC.
PHASE 1 COST ESTIMATE

Client: Thea Foss Waterway Development Authority
Site: Former American Plating Site
Project Number: 10751-002-00
Title: Phase 1 - Interim Remedial Action Cost Estimate

Computed By: TCM
Date: 19-Nov-03
Checked By: GRL
Date: 19-Nov-03
Page: 1 of 1

Item	Quantity	Unit	Unit Cost	Total Cost
CONSTRUCTION COSTS				
General Construction Costs and Site Access Control				
Mobilization	1	Lump Sum	$ 4,000	**$ 4,000**
Fencing	160	Linear Foot	$ 9	**$ 1,453**
Gate	1	Each	$ 650	**$ 650**
Installation of Temporary Erosion Control Structures	1	Lump Sum	$ 2,000	**$ 2,000**
Site Clearing and Debris Removal				
Remove and Dispose Wood Timbers	1	Lump Sum	$ 1,300	**$ 1,300**
Removed and Dispose Miscellaneous Construction Debris	1	Lump Sum	$ 2,000	**$ 2,000**
Break, Load and Transport Concrete Rubble designated as Dangerous Waste	490	Ton	$ 35	**$ 17,150**
Transport and Disposal of Concrete Rubble designated as Dangerous Waste	490	Ton	$ 175	**$ 85,750**
Soil Excavation and Disposal				
Excavate Soil from Footprint of Former Building 1	292	Cubic Yard	$ 20	**$ 5,840**
Provide Observation and Sampling of Excavations and Excavated Soil	1	Lump Sum	$ 1,750	**$ 1,750**
Chemical Analysis of Soil Samples for Confirmation and Characterization	1	Lump Sum	$ 2,500	**$ 2,500**
Transport and Disposal of Excavated Soil Designated as Dangerous Waste	400	Ton	$ 175	**$ 70,000**
Construct Temporary Access Road				
Backfill excavation in Footprint of Former Building 1	292	Cubic Yard	$ 16	**$ 4,672**
Place and Compact 12-inch-thick Roadway Subgrade	450	Cubic Yard	$ 16	**$ 7,200**
Place 4-inch-thick 31-foot-wide asphaltic concrete roadway	12,000	Square Foot	$ 1.75	**$ 21,000**
Place Temporary Gravel Surfacing				
Place Nonwoven Geotextile over Existing Surface	37,700	Square Foot	$ 0.25	**$ 9,425**
Place and Compact Gravel Surfacing Approximately 1.5 feet thick	2,100	Cubic Yard	$ 16	**$ 33,600**
Provide Barricades to Delineate "No Use" Areas Exceeding MTCA Level C	1	Lump Sum	$ 1,200	**$ 1,200**
Abandon Monitoring Wells				
Abandon Five (5) 2-inch-diameter Monitoring Wells Approximately 30 feet deep	1	Lump Sum	$ 2,400	**$ 2,400**

TOTAL CONSTRUCTION COSTS	**$268,437**
Sales Tax (8.8 percent)	**$23,622**
TOTAL CONSTRUCTION COST INCLUDING SALES TAX	**$292,059**
CONTINGENCY AND SUPPORT COSTS	
Bid Contingency (15 percent)	**$40,266**
Scope Contingency (20 percent)	**$53,687**
CONSTRUCTION SUBTOTAL WITH CONTINGENCY	**$386,012**
Permitting and Legal Allowance (5 percent)	**$19,301**
Engineering Design Allowance (8 percent)	**$30,881**
Services During Construction (8 percent)	**$30,881**
CONSTRUCTION SUBTOTAL WITH SUPPORT COSTS	**$467,075**
Sales Tax (8.8 percent)	**$41,103**
TOTAL CAPITAL COST INCLUDING SALES TAX	**$508,178**

Notes:

Costs are from Mean's Environmental Site Restoration, 1996 Edition adjusted by 4% inflation per year to year 2000, unless otherwise noted.

TACO:\10\10751002\00\Finals\1075100200Tables3&4.xls

TABLE 4
FORMER AMERICAN PLATING INC.
PHASE 2 COST ESTIMATE

Client: Thea Foss Waterway Development Authority
Site: Former American Plating Site
Project Number: 10751-002-00
Title: Phase 2 - Interim Remedial Action Cost Estimate

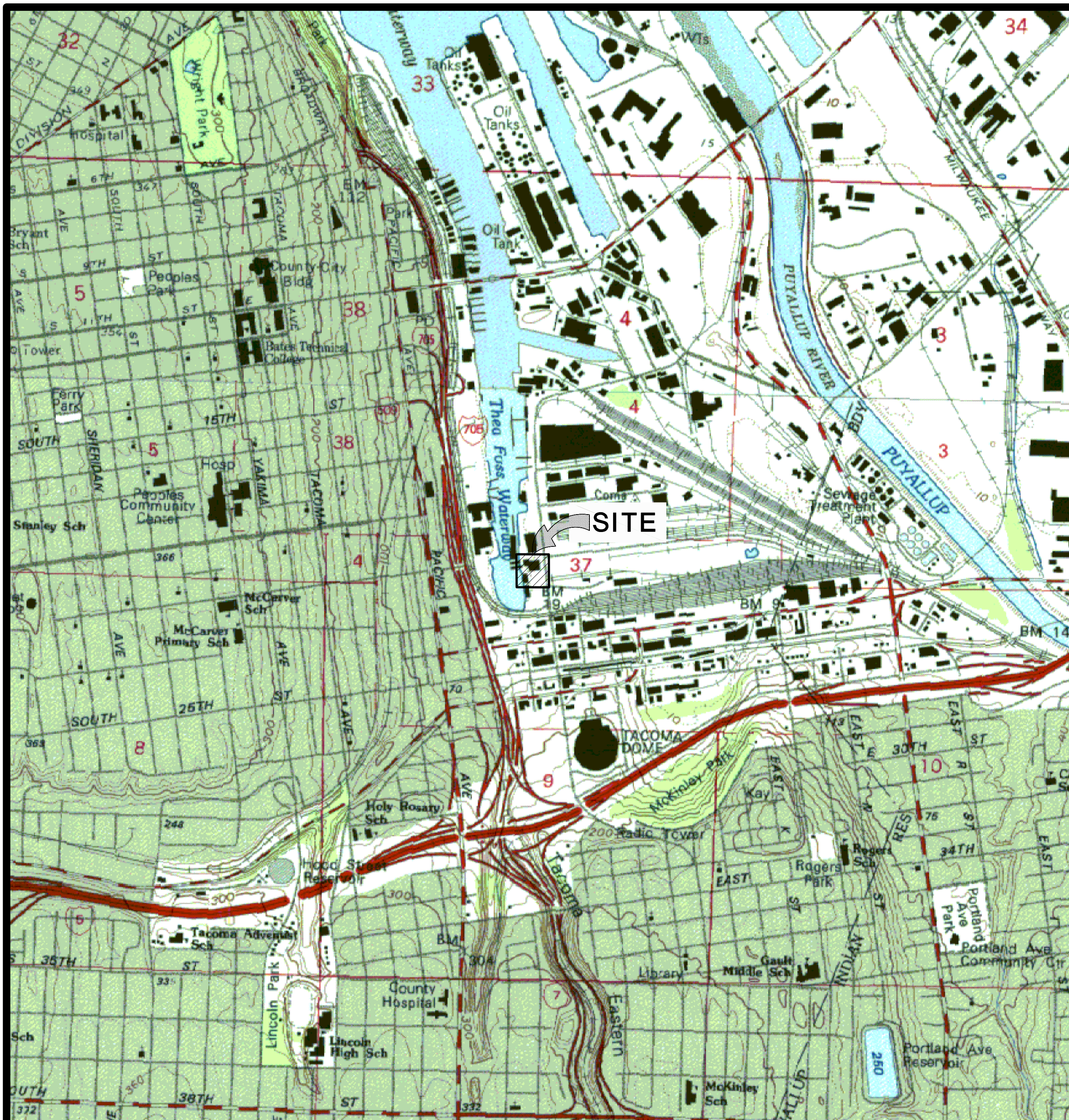
Computed By: TCM
Date: 19-Nov-03
Checked By: GRL
Date: 19-Nov-03
Page: 1 of 1

Item	Quantity	Unit	Unit Cost	Total Cost
CONSTRUCTION COSTS				
General Construction Costs and Site Access Control				
Mobilization	1	Lump Sum	$ 4,000	**$ 4,000**
Installation of Temporary Erosion Control Structures	1	Lump Sum	$ 2,000	**$ 2,000**
Site Clearing and Preparation				
Remove and Stockpile Temporary Gravel Wear Course	2100	Cubic Yard	$ 16	**$ 33,600**
Remove and Dispose of Nonwoven Geotextile	37,700	Square Foot	$ 0.10	**$ 3,770**
Remove and Dispose of Temporary Access Road	12,000	Square Foot	$ 0.50	**$ 6,000**
Remove and Dispose of Barricades from "No Use" Zone	1	Lump Sum	$ 800	**$ 800**
Soil Excavation and Disposal				
Excavate Soil to Planned Subgrade Elevations	2,100	Cubic Yard	$ 16	**$ 33,600**
Provide Observation and Sampling of Excavations and Excavated Soil	1	Lump Sum	$ 5,500	**$ 5,500**
Chemical Analysis of Soil Samples for Confirmation and Characterization	1	Lump Sum	$ 4,500	**$ 4,500**
Transport and Dispose of Excavated Soil as Non-Regulated Waste	3,120	Ton	$ 28	**$ 87,360**
Construct Permanent Access Road				
Place and Compact 12-inch-thick Roadway Subgrade	206	Cubic Yard	$ 16	**$ 3,296**
Place 4-inch thick 31-foot wide asphaltic concrete roadway	5,600	Square Foot	$ 1.75	**$ 9,800**
Install Concrete Curbing - Both Sides of Roadway	360	Linear Foot	$ 5.00	**$ 1,800**
Compete Site Buildout - Landscaping and Sidewalks				
Place and Compact Fill on-site to Design Grade Elevations less 1 foot	700	Cubic Yard	$ 16	**$ 11,200**
Place 1-foot-thick Topsoil Top Course	1,400	Cubic Yard	$ 16	**$ 22,400**
Install 12-foot-wide Concrete Sidewalk	217	Linear Foot	$ 25.00	**$ 5,425**
Install Vegetative Buffer Zone at Top of Waterway Bank	3,600	Square Foot	$ 0.25	**$ 900**
Install Irrigation System	1	Lump Sum	$ 4,800	**$ 4,800**
Seed Open Grass Areas	38,500	Square Foot	$ 0.15	**$ 5,775**
Install Miscellaneous Plantings in Landscaped Areas	1	Lump Sum	$ 2,500	**$ 2,500**

TOTAL CONSTRUCTION COSTS	**$243,026**
Sales Tax (8.8 percent)	**$21,386**
TOTAL CONSTRUCTION COST INCLUDING SALES TAX	**$264,412**
CONTINGENCY AND SUPPORT COSTS	
Bid Contingency (15 percent)	**$36,454**
Scope Contingency (20 percent)	**$48,605**
CONSTRUCTION SUBTOTAL WITH CONTINGENCY	**$349,471**
Permitting and Legal Allowance (5 percent)	**$17,474**
Engineering Design Allowance (8 percent)	**$27,958**
Services During Construction (8 percent)	**$27,958**
CONSTRUCTION SUBTOTAL WITH SUPPORT COSTS	**$422,860**
Sales Tax (8.8 percent)	**$37,212**
TOTAL CAPITAL COST INCLUDING SALES TAX	**$460,072**

Notes:
Costs are from Mean's Environmental Site Restoration, 1996 Edition adjusted by 4% inflation per year to year 2000, unless otherwise noted.

TACO:\10\10751002\00\Finals\1075100200Tables3&4.xls



Data Source: Topography from Sure!Maps at scale of 1:24k.

All locations are approximate.

Lambert Conformal Conic
Washington State Plane South
North American Datum 1983

0 2000 4000
SCALE IN FEET

N

Note: This drawing is for information purpose. It is intended to assist in showing features discussed in an attached document.

GEOENGINEERS

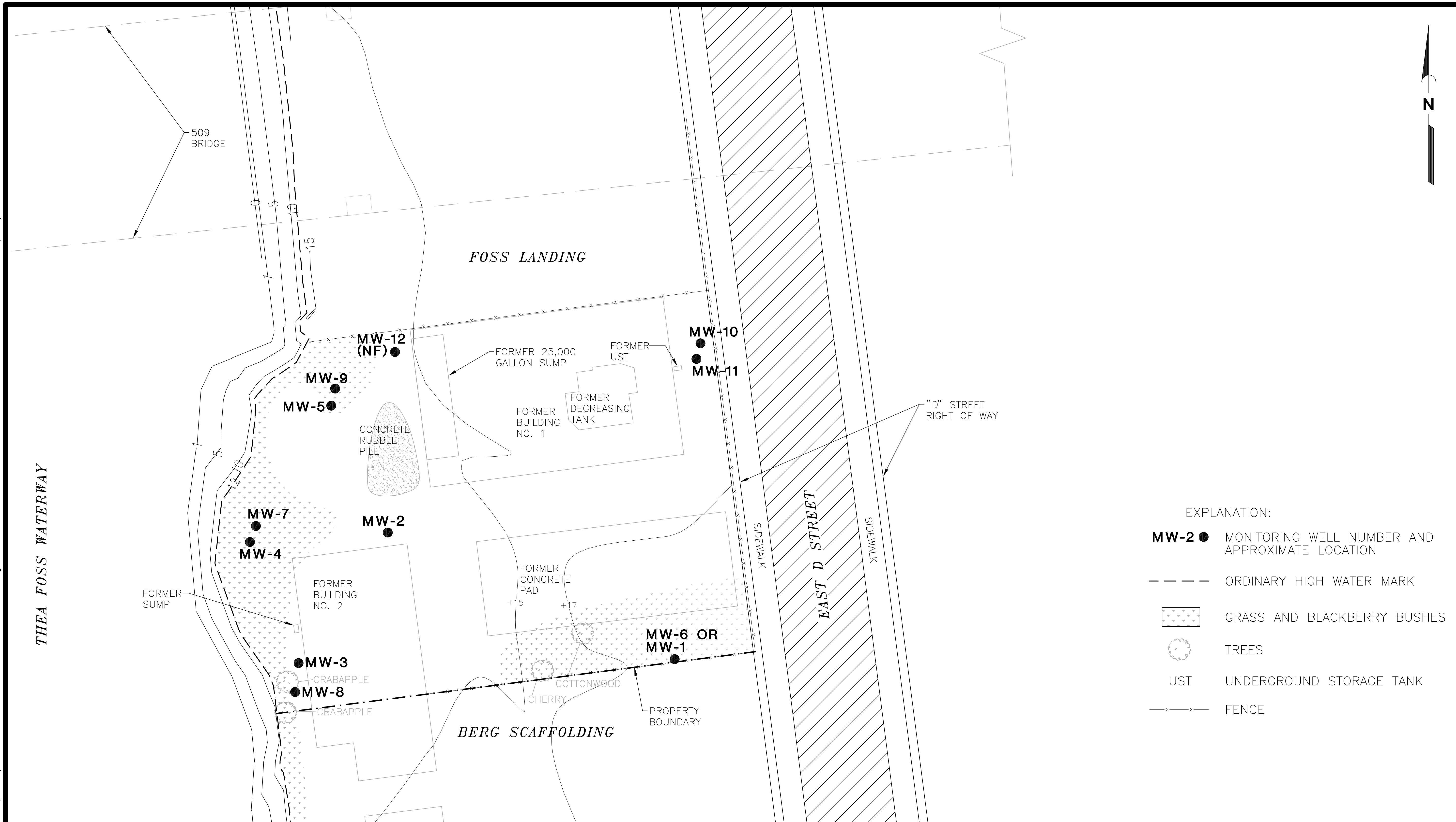
VICINITY MAP

FIGURE 1

TACO\10\10751002\00\CAD\107510020_FIG-1.dwg GRL:TCM:SCY 11/24/03

DRAFT FINAL

TACO\10\10751002\00\CAD\1075100200_FIG-2_3_4_5_6.dwg GRL:TCM:SCY 11/24/03



Notes: 1. The locations of all features shown are approximate.
2. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Data were compiled from sources as listed in this figure. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The master hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.
3. Elevation datum shown is Mean Lower Low Water (MLLW).

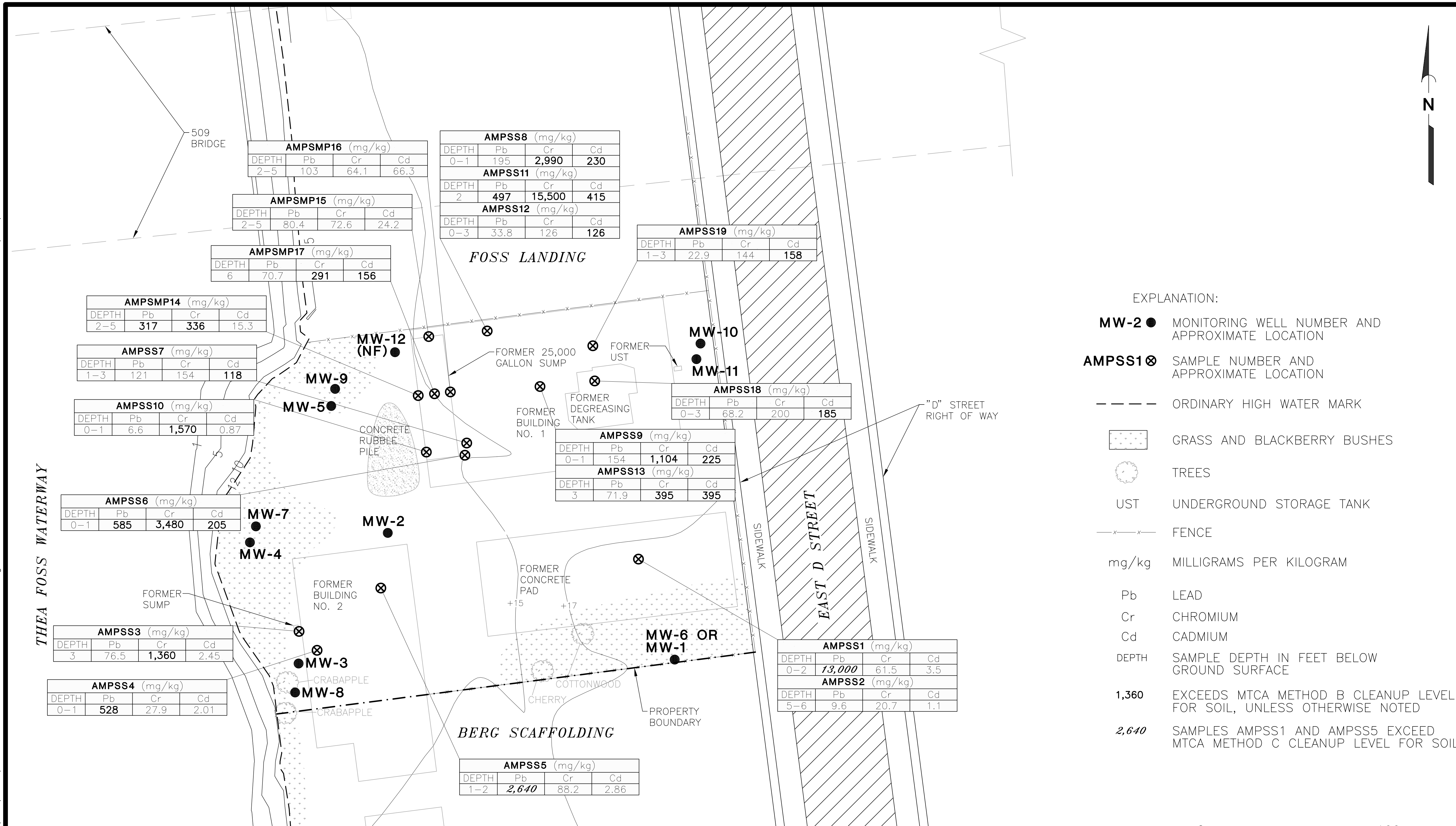
Reference: Information and sample locations provided by Marv Coleman, Ecology Personal Communication November 10, 2003.

GeoEngineers

SITE PLAN

FIGURE 2

TACO\10\10751002\00\CAD\1075100200_FIG-2_3_4_5_6.dwg GRL:TCM:SCY 11/24/03



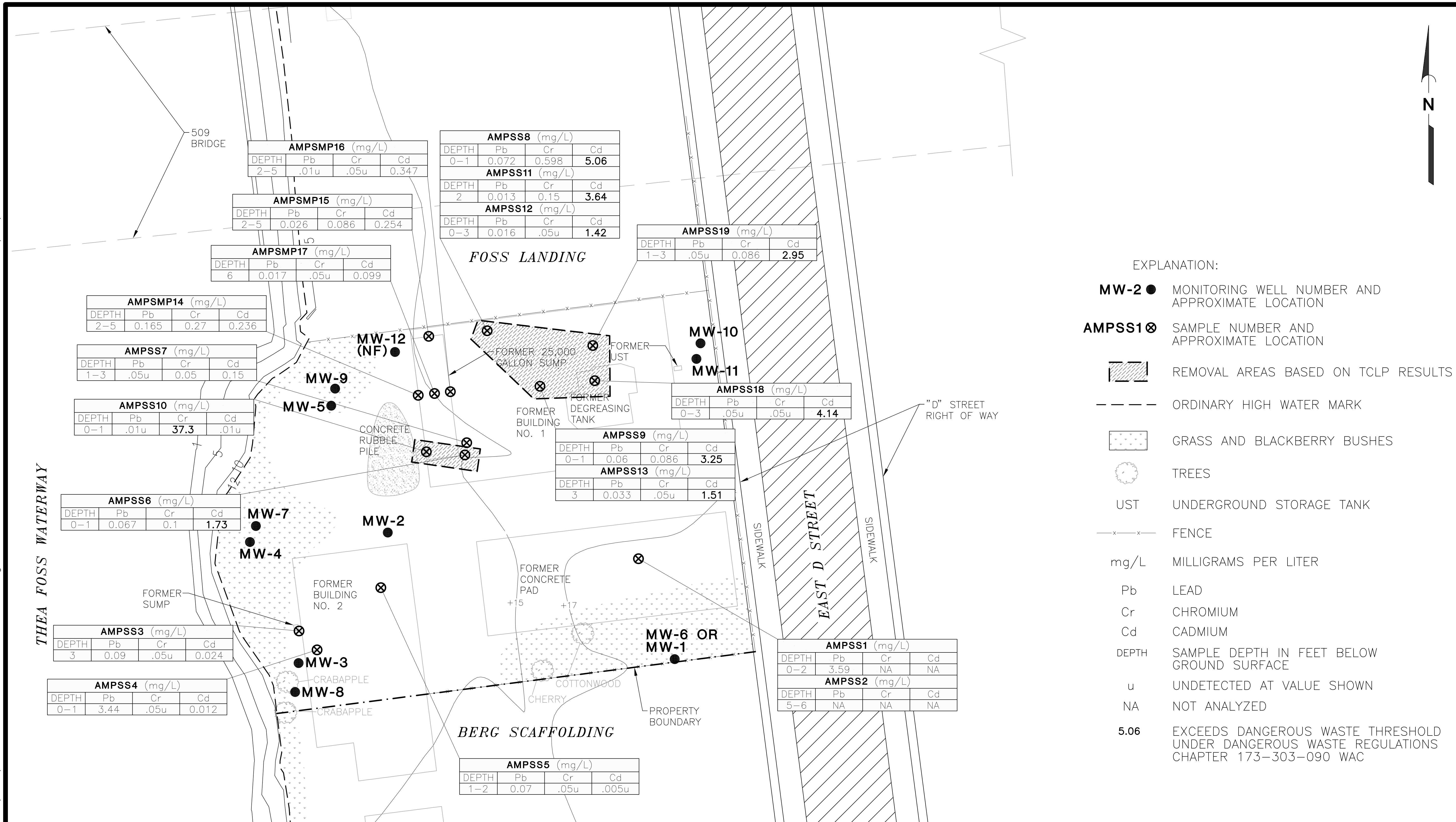
Notes:
1. The locations of all features shown are approximate.
2. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Data were compiled from sources as listed in this figure. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The master hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.
3. Elevation datum shown is Mean Lower Low Water (MLLW).

Reference: Information and sample locations provided by Marv Coleman, Ecology Personal Communication November 10, 2003.

GEOENGINEERS

INTERIM ACTION TOTAL METALS

FIGURE 3



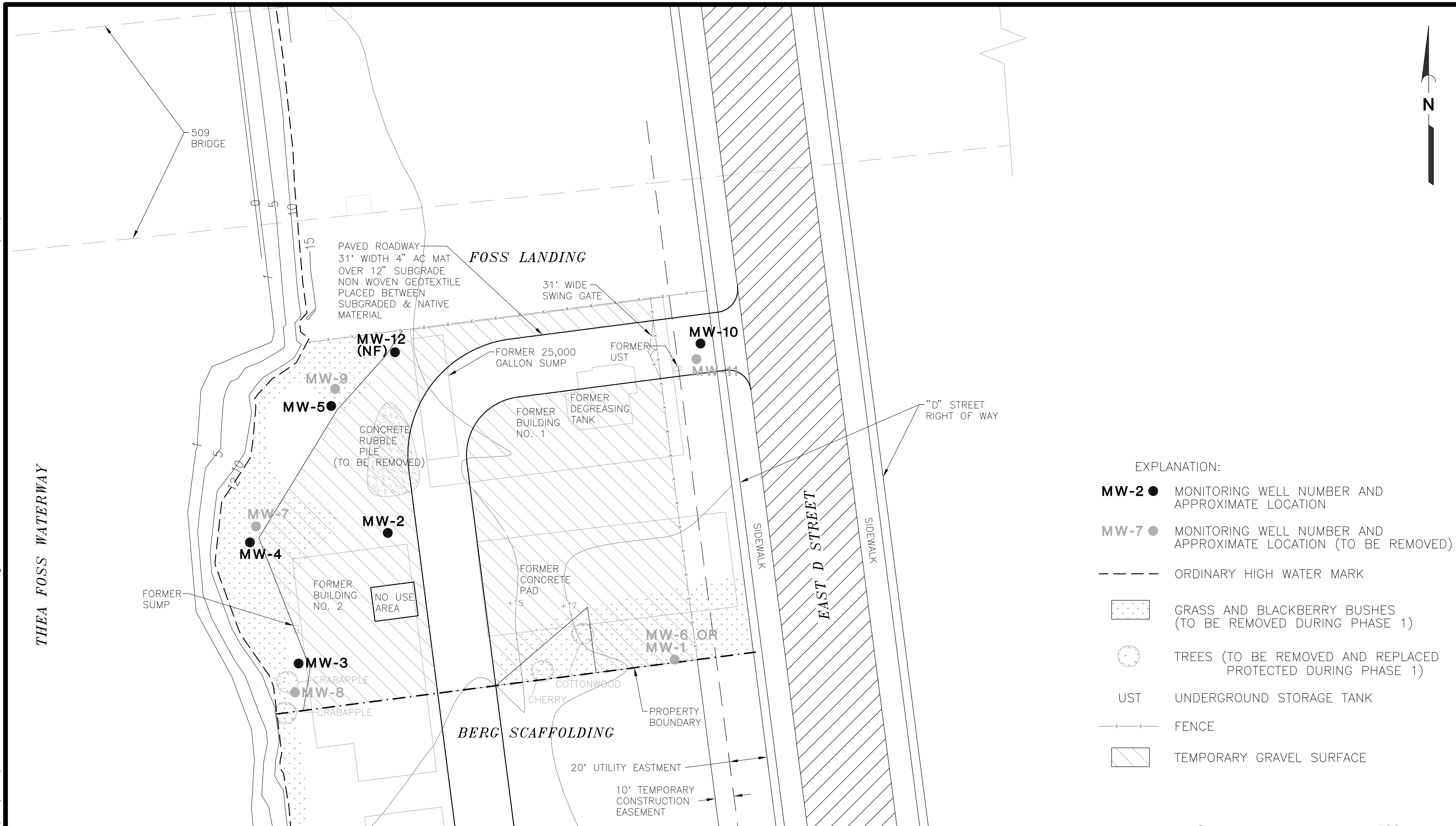
Notes:
1. The locations of all features shown are approximate.
2. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Data were compiled from sources as listed in this figure. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The master hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.
3. Elevation datum shown is Mean Lower Low Water (MLLW).

Reference: Information and sample locations provided by Marv Coleman, Ecology Personal Communication November 10, 2003.

GEOENGINEERS

INTERIM ACTION TCLP METALS

FIGURE 4



Notes:
1. The locations of all features shown are approximate.
2. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Data were compiled from sources as listed in this figure. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The master hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.
3. Elevation datum shown is Mean Lower Low Water (MLLW).

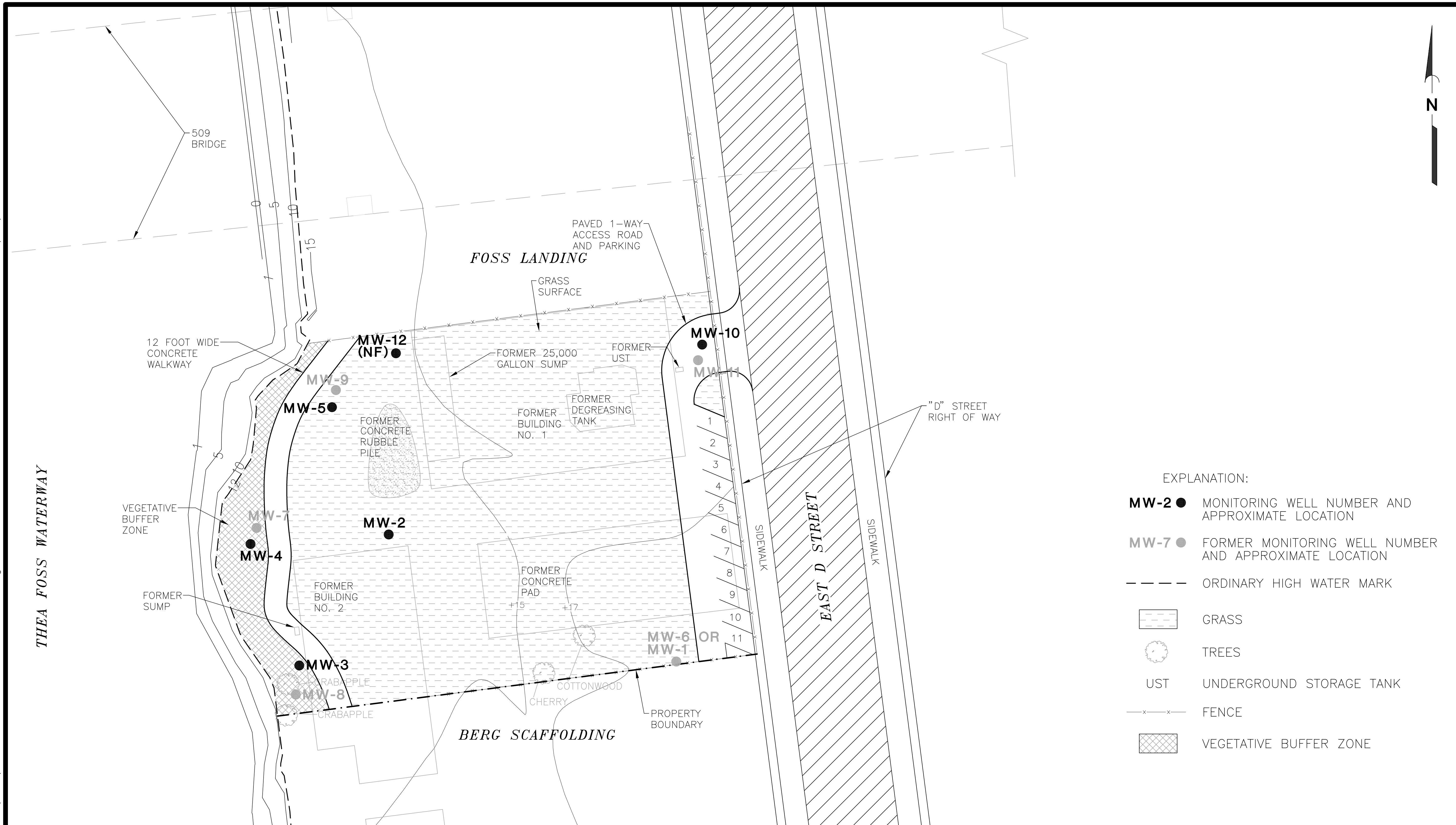
Reference: Information and sample locations provided by Marv Coleman, Ecology Personal Communication November 10, 2003.

GEOENGINEERS

PHASE 1 CONSTRUCTION
PROPOSED TEMPORARY SITE LAYOUT

FIGURE 5

DRAFT FINAL



Notes:
1. The locations of all features shown are approximate.
2. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Data were compiled from sources as listed in this figure. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The master hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.
3. Elevation datum shown is Mean Lower Low Water (MLLW).

Reference: Information and sample locations provided by Marv Coleman, Ecology Personal Communication November 10, 2003.

GEOENGINEERS

PHASE 2 CONSTRUCTION PROPOSED FINAL SITE LAYOUT

FIGURE 6

DRAFT FINAL

APPENDIX A

INTERIM ACTION PLAN SAIC 2003

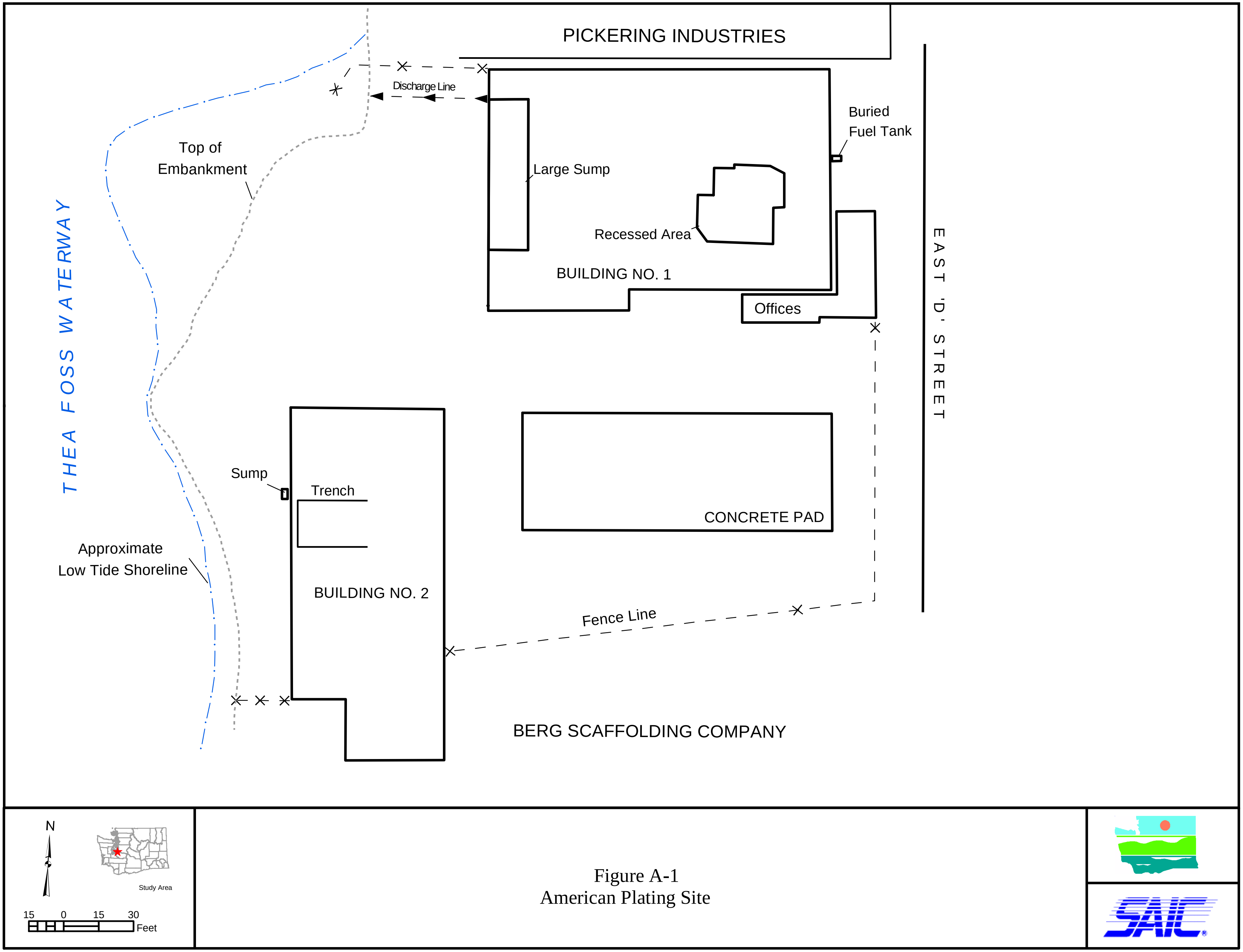
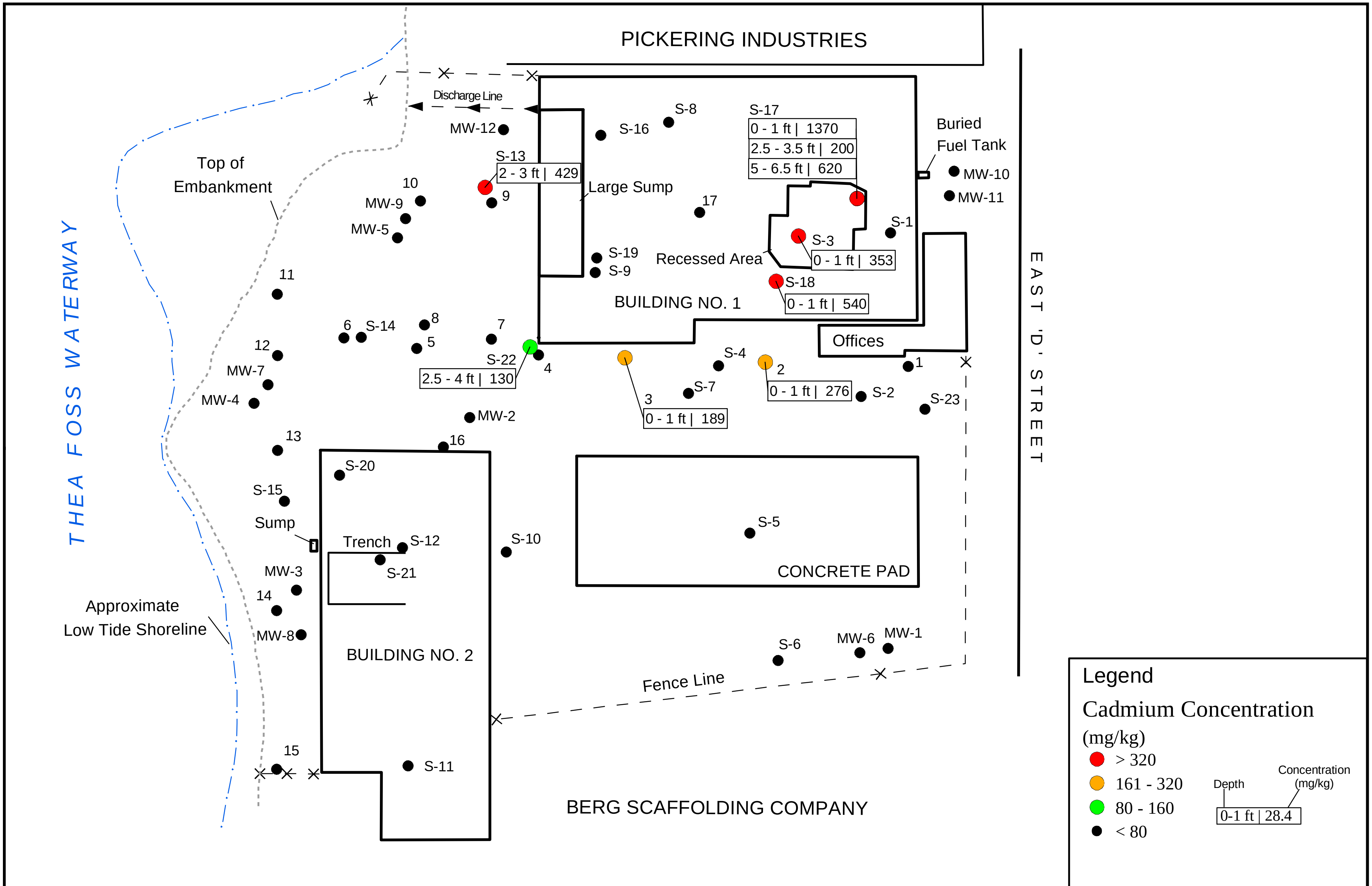


Figure A-1
American Plating Site

x:/americanplating/figure2_033103.mxd March 31, 2003



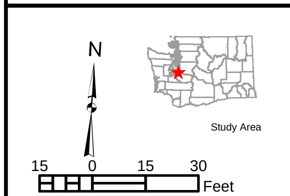
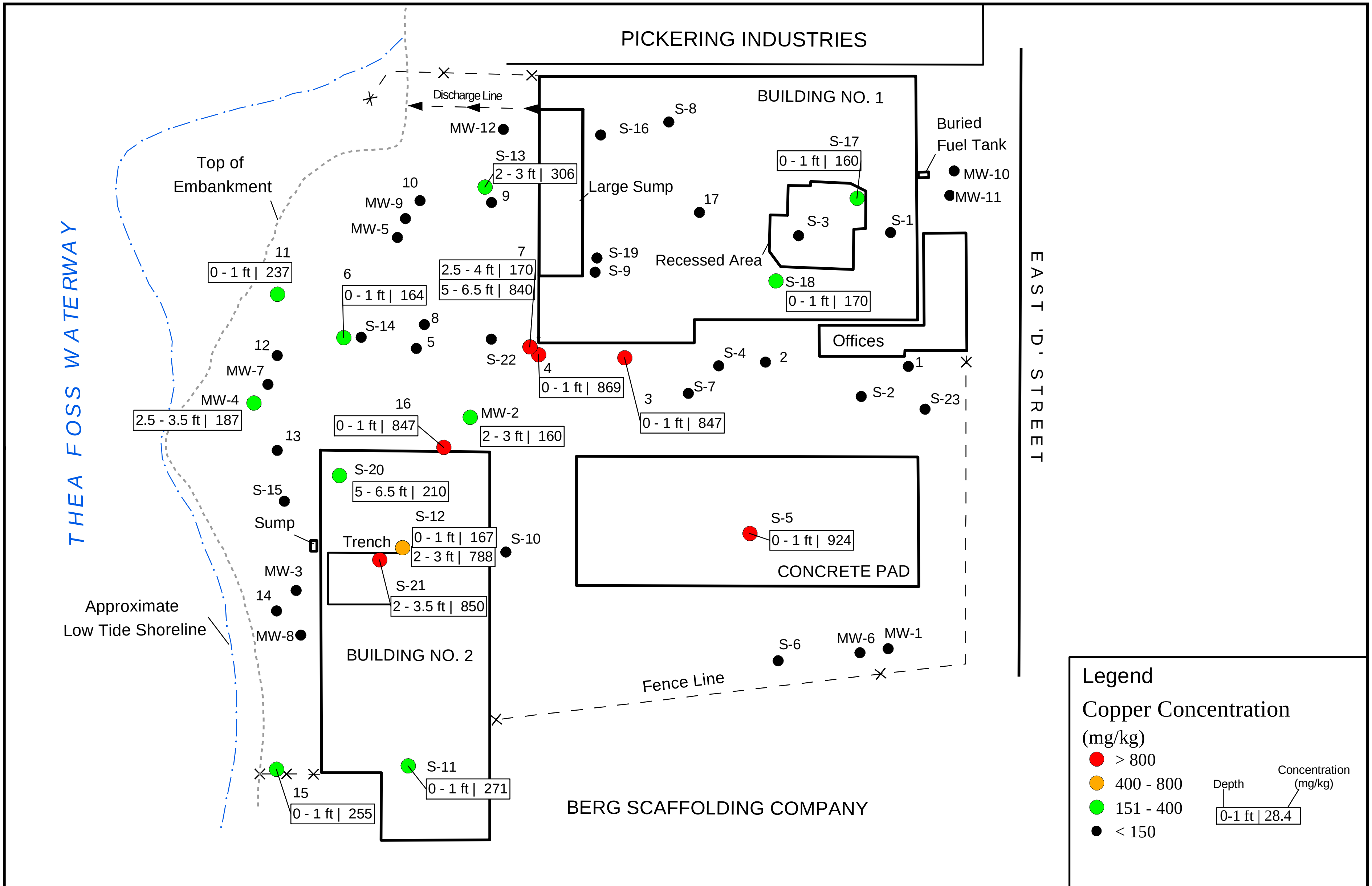


Figure A-2
Cadmium Concentrations in Soil

x:/americanplating/figure3_033103.mxd March 31, 2003



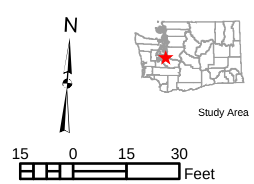
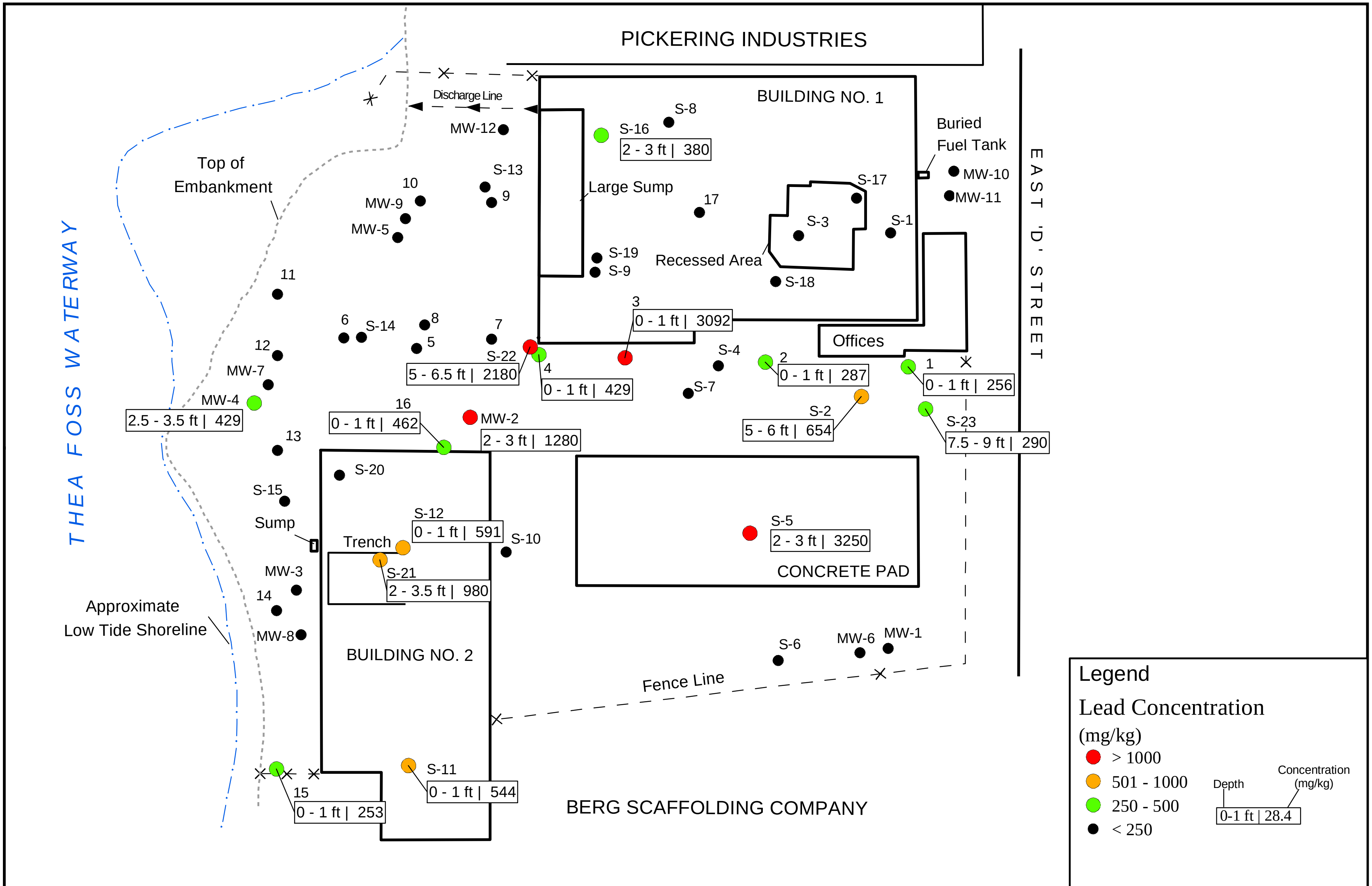


Figure A-3
Copper Concentrations in Soil

x:/americanplating/figure4_033103.mxd March 31, 2003



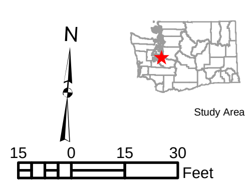
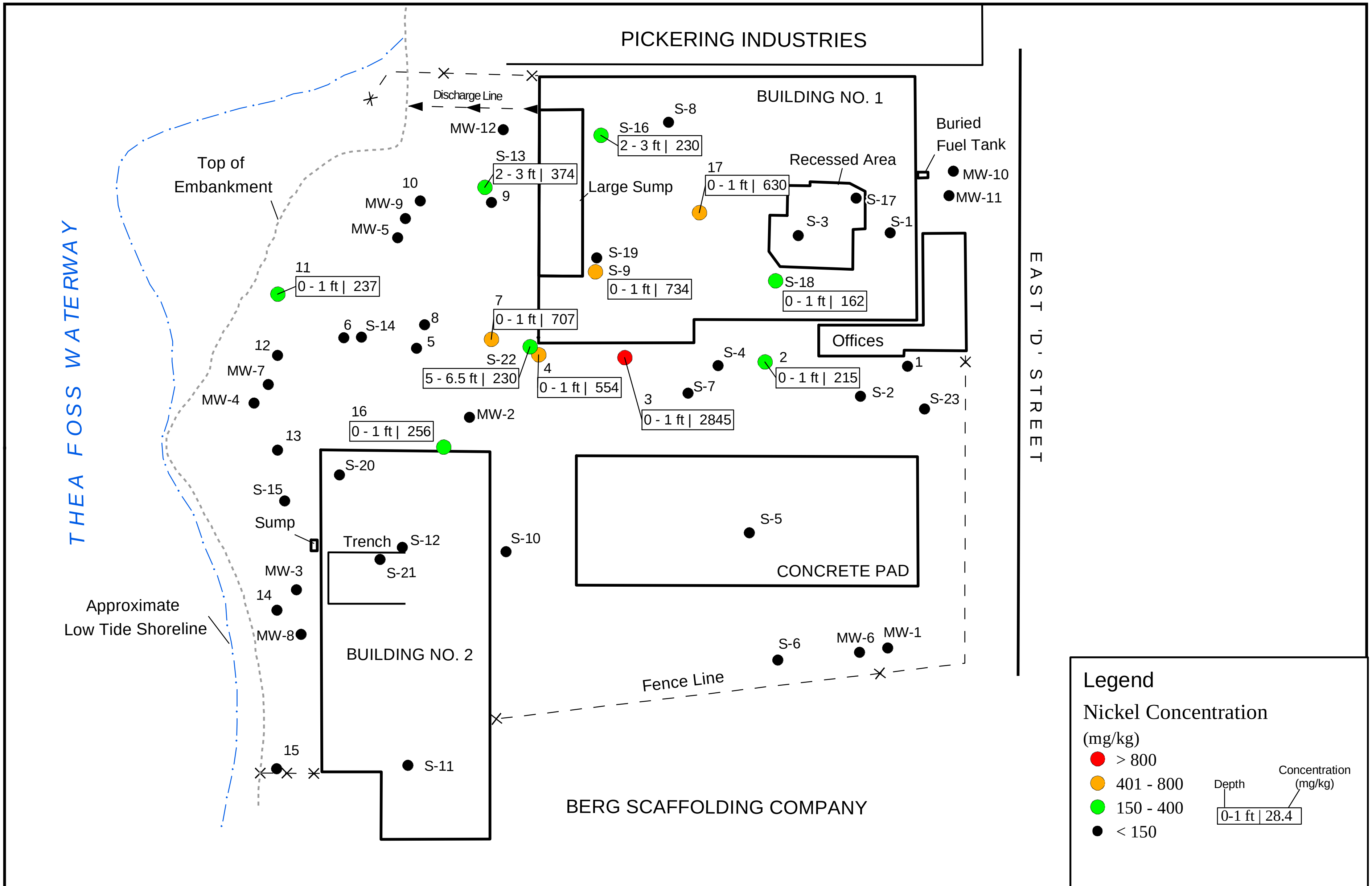


Figure A-4
Lead Concentrations in Soil

x:/americanplating/Figure5_033103.mxd March 31, 2003



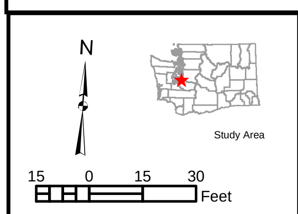
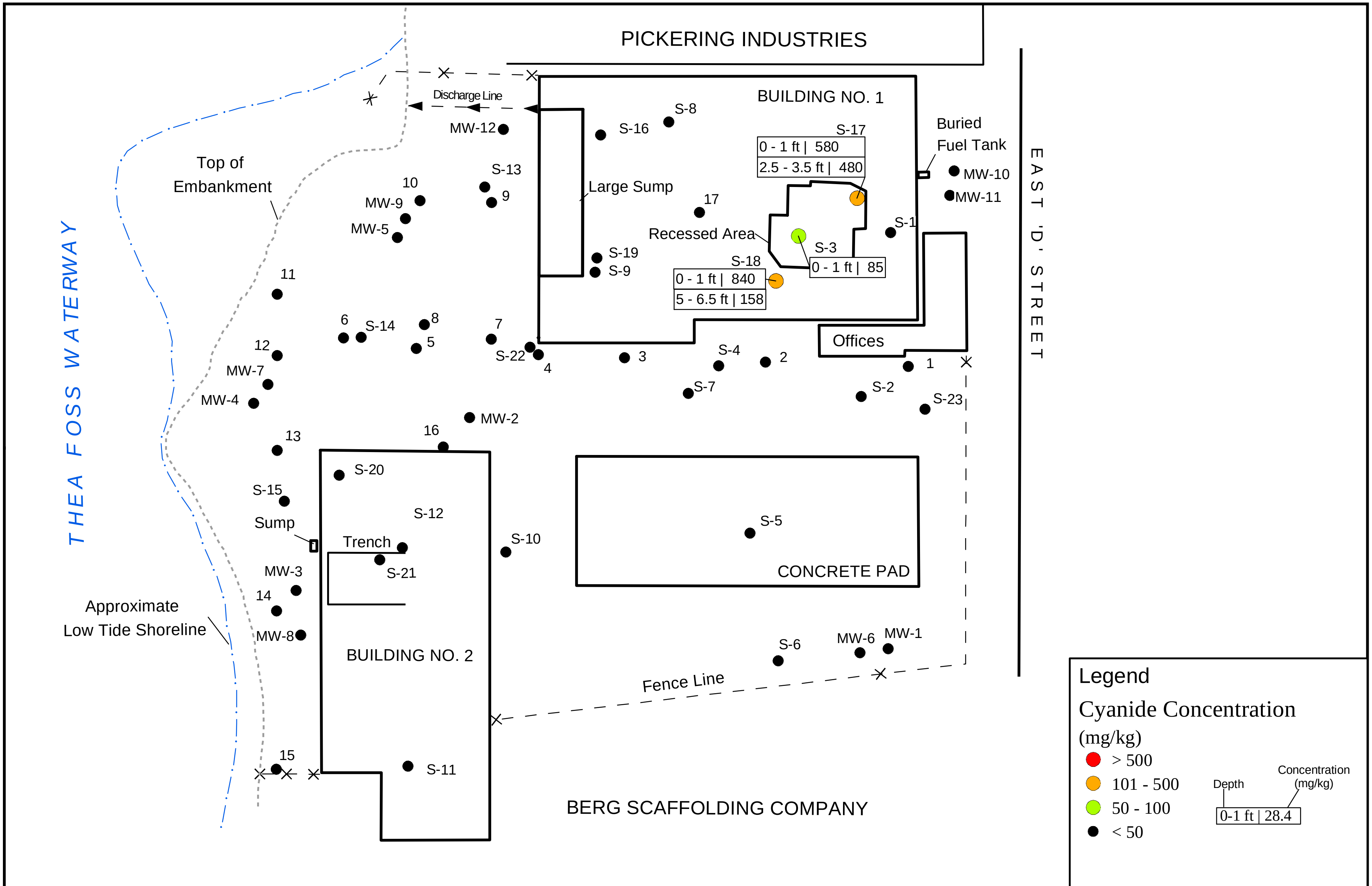


Figure A-5
Nickel Concentrations in Soil

x:/americanplating/Figure6_033103.mxd March 31, 2003



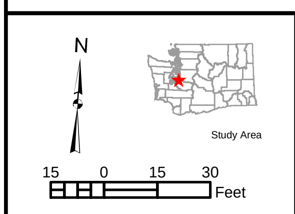
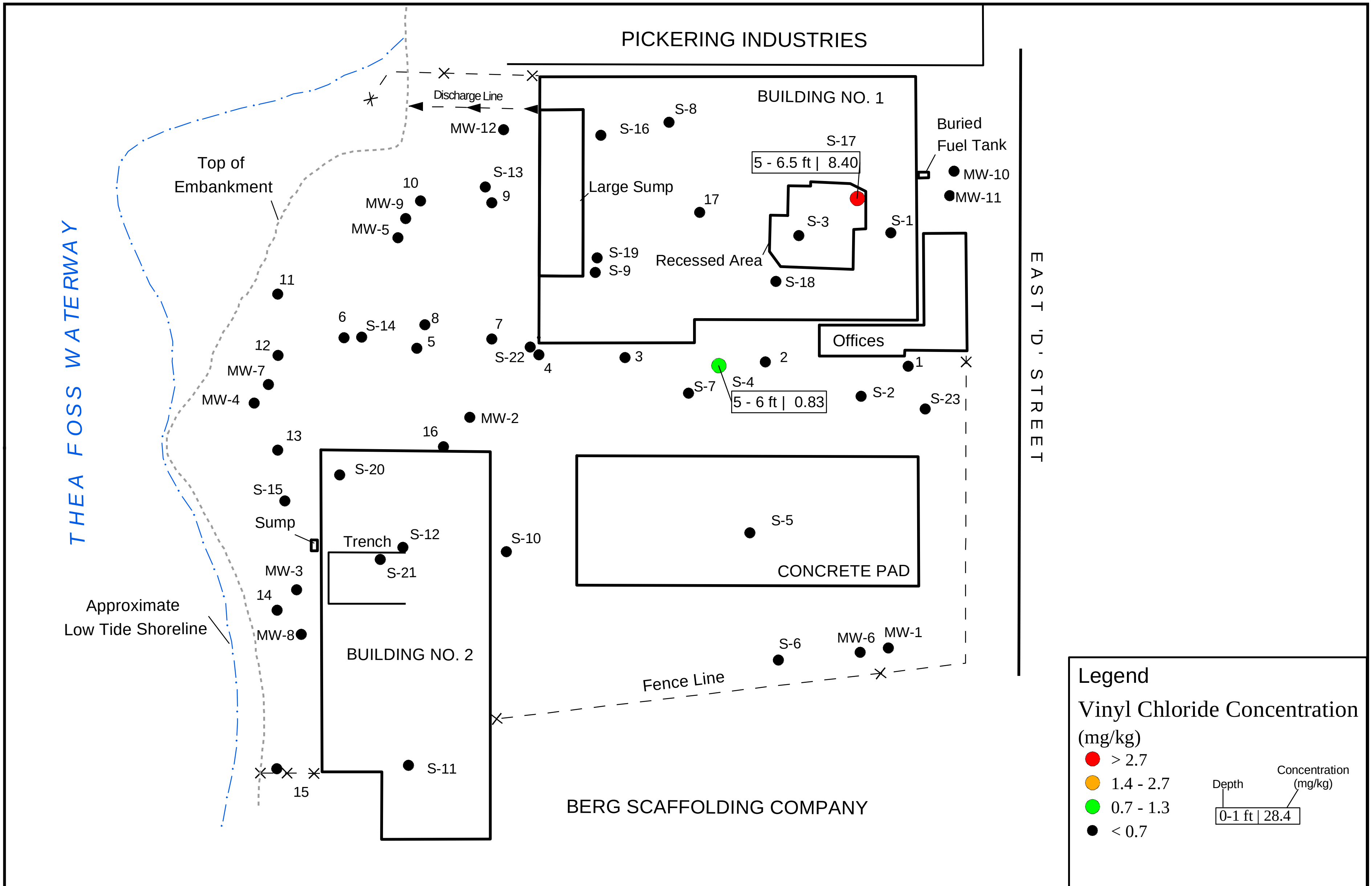


Figure A-6
Cyanide Concentrations in Soil



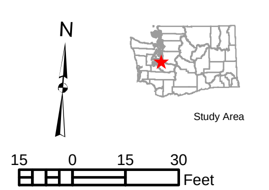
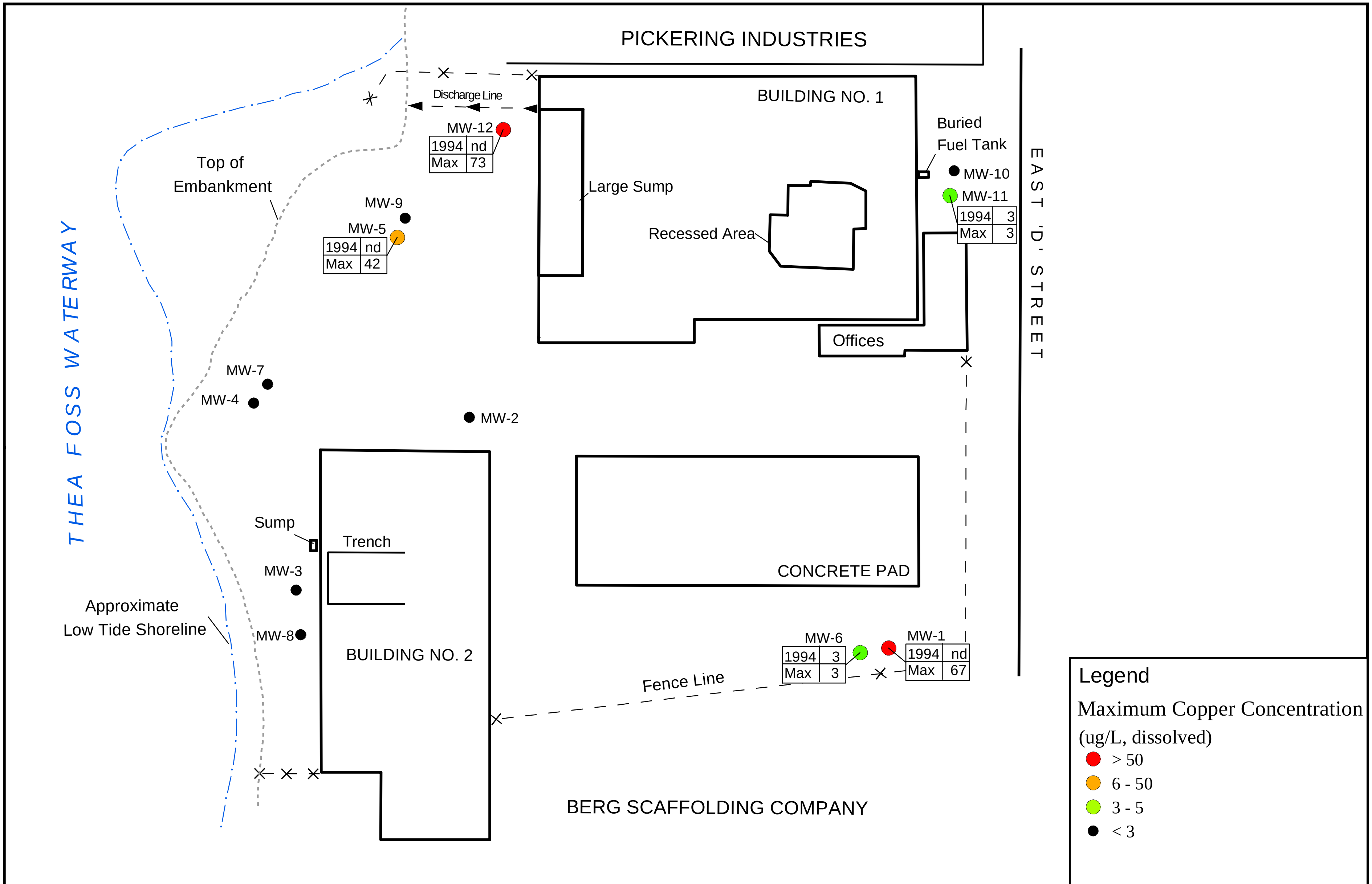


Figure A-7
Vinyl Chloride Concentrations in Soil

x:/americanplating/Figure7_033103.mxd March 31, 2003

x:/americanplating/Figure8_033103.mxd March 31, 2003



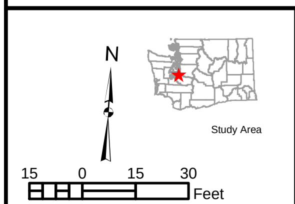
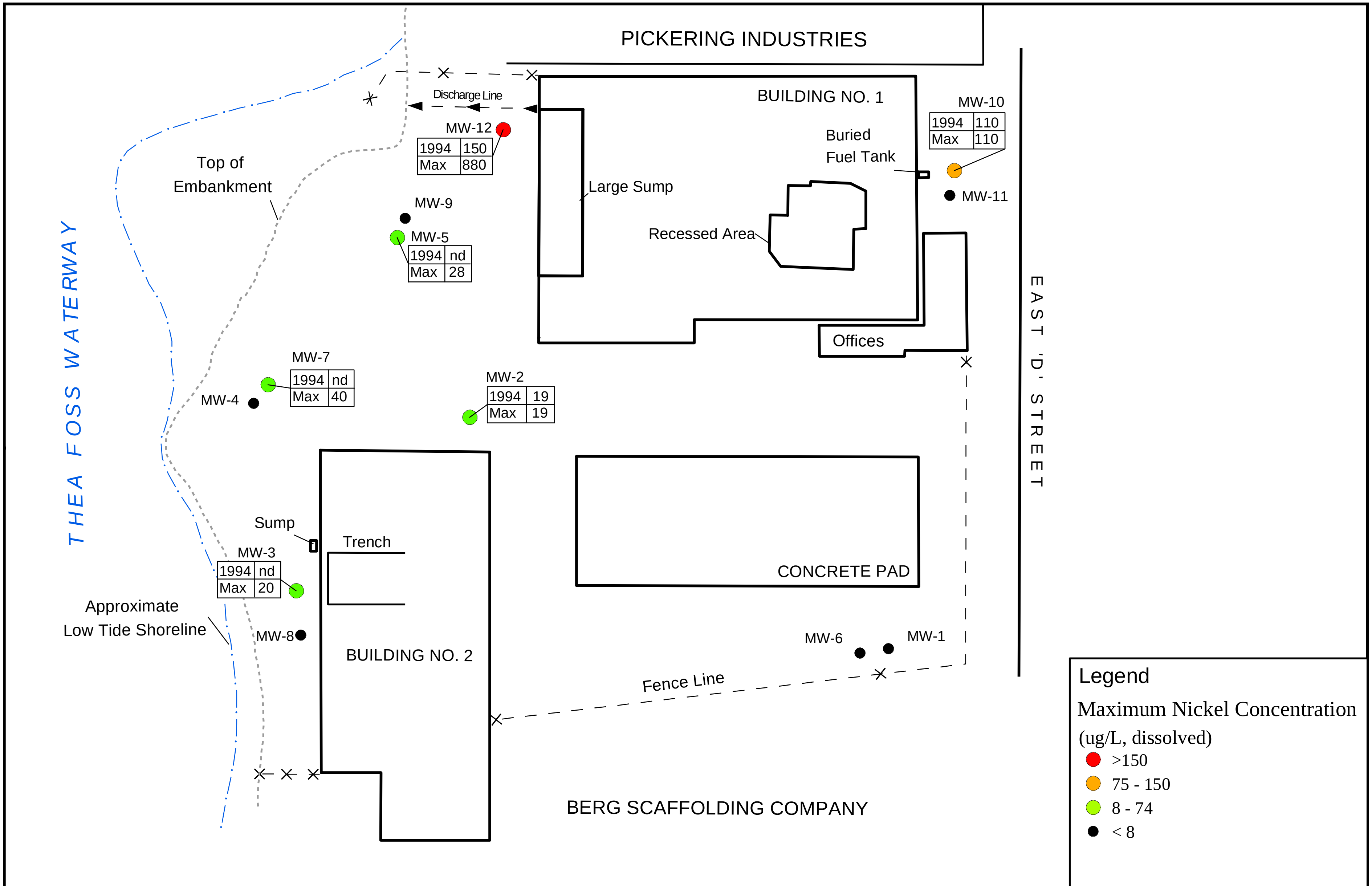


Figure A-8
Dissolved Copper Concentrations in Groundwater

x:/americanplating/Figure9_033103.mxd March 31, 2003



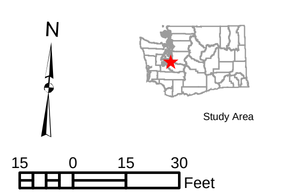
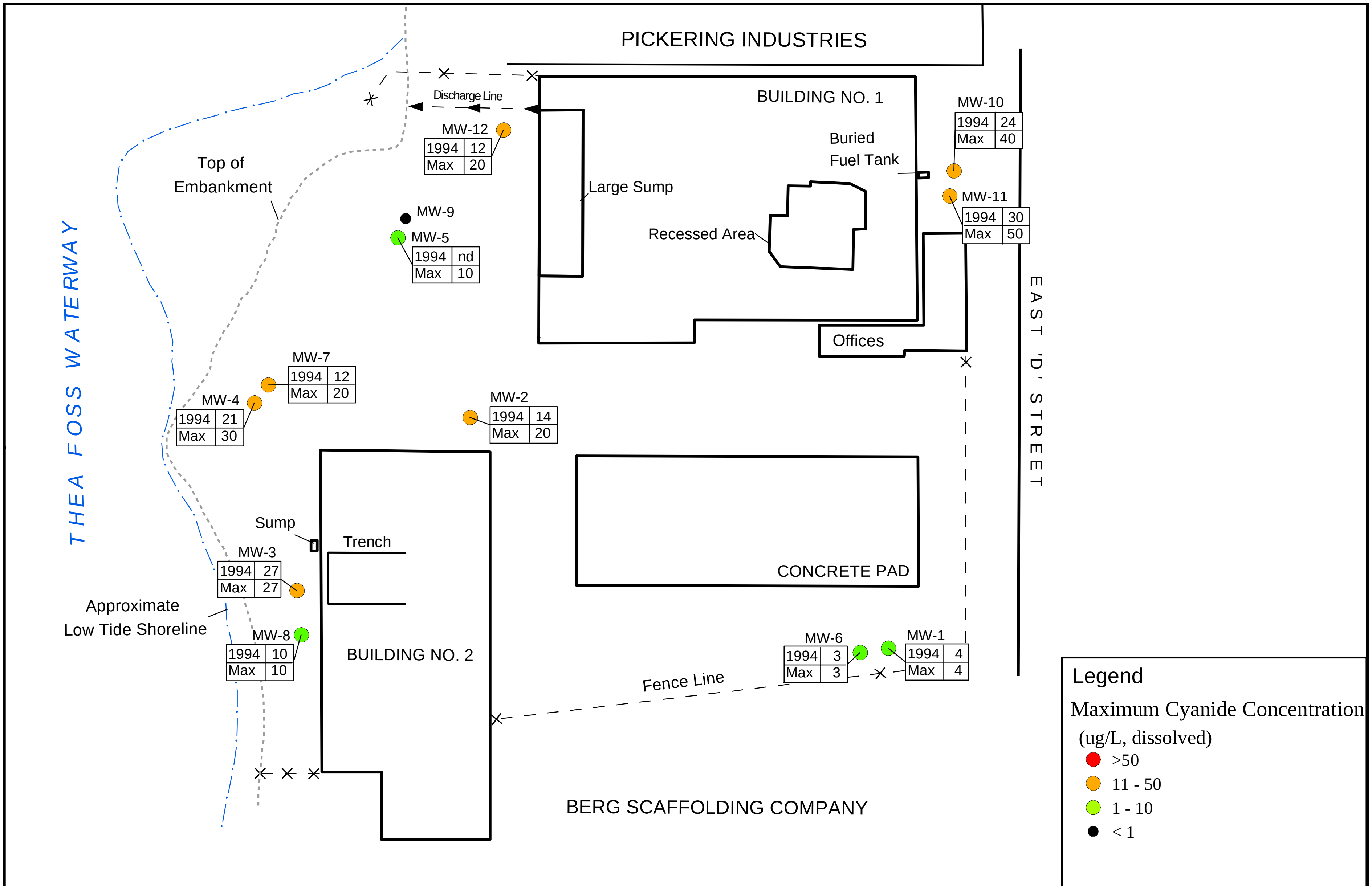


Figure A-9
Dissolved Nickel Concentrations in Groundwater



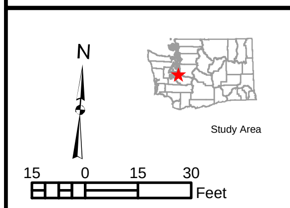
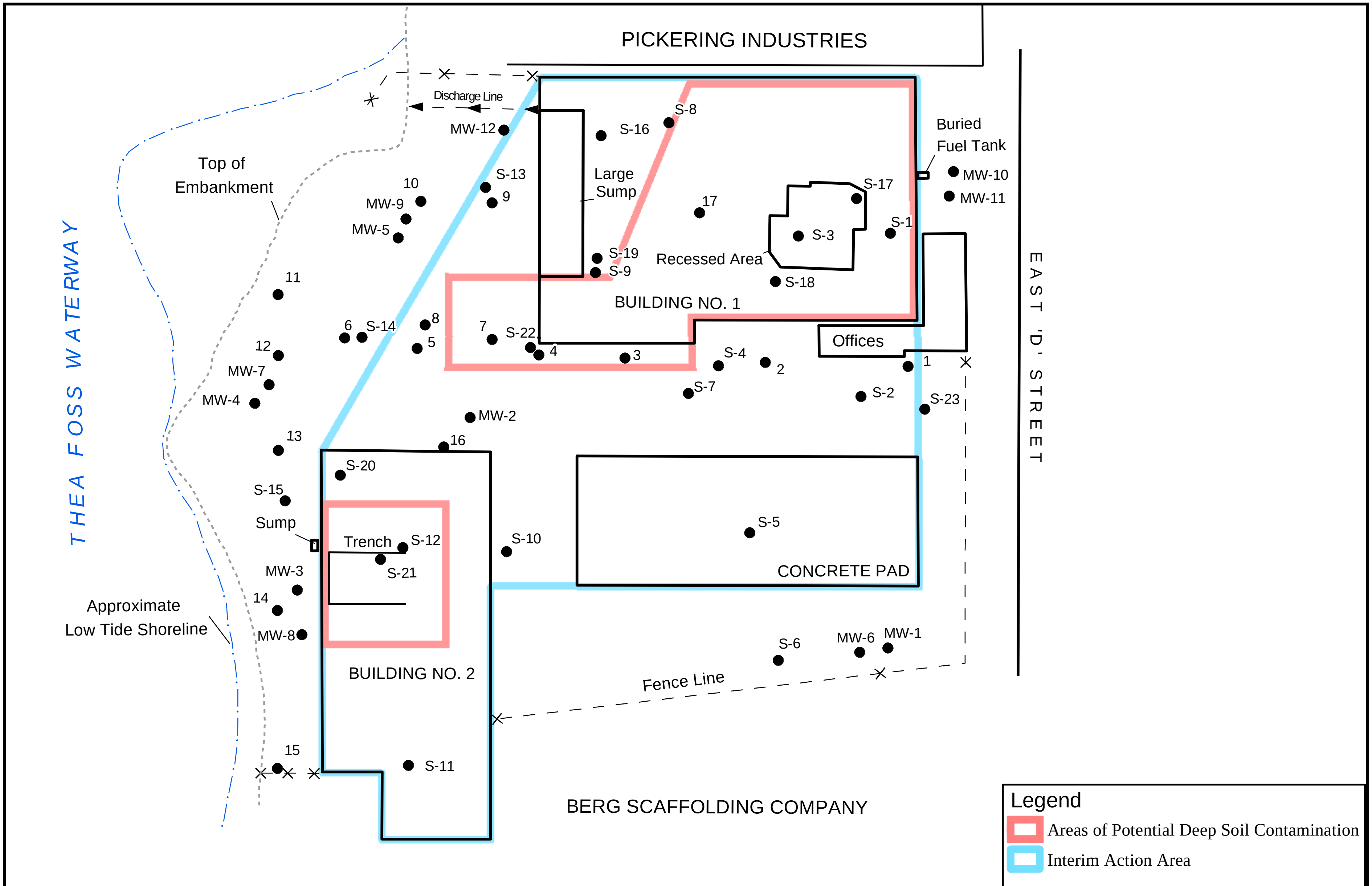


Figure A-10
Dissolved Cyanide Concentrations in Groundwater

x:/americanplating/Figure10_033103.mxd March 31, 2003

x:/americanplating/Figure11_033103.mxd March 31, 2003



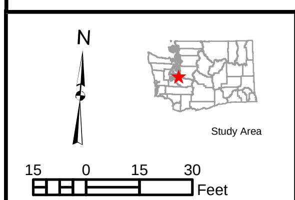


Figure A-11
Interim Action Area