DRAFT CLEANUP ACTION PLAN

Maralco Redevelopment Project

7730 South 202nd Street
Kent, Washington

Prepared for:

Brown Dog, LLC

November 12, 2004

URS

1501 Fourth Avenue, Suite 1400
Seattle, WA 98101-1616
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1.0 INTRODUCTION

This Draft Cleanup Action Plan (CAP) describes the approach that will be used to further investigate site conditions and implement remedial actions at the former Maralco Aluminum Company, Inc. Site (the "site"), located at 7730 South 202nd Street in Kent, Washington (Figure 1). URS Corporation (URS) has prepared this CAP on behalf of Brown Dog Investments, LLC (Brown Dog). Brown Dog is consulting with the Washington State Department of Ecology (Ecology) to investigate, remediate, and monitor site conditions. This CAP has been prepared in general accordance with the requirements outlined in the Model Toxics Control Act (MTCA) Cleanup Regulations specified in WAC 173-340.

Several phases of soil and groundwater investigation have been conducted at the site since 1987 to assess the extent and effects of aluminum black dross, baghouse dust, chromium-containing dross, and a former underground storage tank (UST) at the site. The previous investigations and remedial actions on the property have been summarized in reports prepared by Ecology & Environment (E&E) (1987), MK-Environmental Services (MKE) (1991a, b), Enviros (1995), URS (2000) and EMR (2003a, b). Identified known and potential contaminants include metals, salts and petroleum hydrocarbons.

1.1 GOALS AND OBJECTIVES

The goals of the cleanup action are to:

- Remove dross, baghouse dust, and impacted soil and sediment from the site and transport these materials to a permitted disposal facility, to prevent:

  1) Direct contact by humans and ecological receptors;

  2) Aerial transport of stockpiled wastes; and

  3) Contact with water (i.e., precipitation, surface water and groundwater) and subsequent mobilization of contaminants in surface water and groundwater

- Achieve compliance with applicable groundwater cleanup levels by removing contaminant sources and/or relying on natural attenuation.

The objectives of the CAP are to:

- Provide background information regarding site conditions
- Present a conceptual model describing the fate and transport of metals, salts, and petroleum hydrocarbons at this site to potential receptors.
- Describe cleanup action alternatives that were considered for the site and the rationale for selecting the preferred alternative.

- Describe the scope of work and rationale for a Supplemental Remedial Investigation (RI) at the site that is focused to address data gaps that relate directly to implementation of the selected remedy.
- Describe the approach that will be used to implement the preferred remedial alternative.
- Provide a groundwater monitoring plan to track changes in the metals, salts, and petroleum hydrocarbon distribution after the cleanup action is implemented.

1.2 DOCUMENT ORGANIZATION

Section 2.0 presents the site background and description, including the site conceptual model. Section 3.0 describes regulatory requirements and cleanup levels, describes the three cleanup action alternatives that were considered, and identifies the preferred alternative. The Supplemental RI scope and rationale is described in Section 4.0. Section 5.0 describes approach that will be used to implement the preferred alternative. The groundwater monitoring plan and other administrative controls are described in Section 6.0, and a proposed project schedule is provided in Section 7.0. Project reporting for the cleanup action is described in Section 8.0. References used in this report are included in Section 9.0.

2.0 SITE BACKGROUND

2.1 SITE LOCATION

The site is located in the City of Kent at 7730 South 202nd Street (Figure 1). The Site is bounded by South 202nd Street on the north, 80th Avenue South on the east and Burlington Northern Santa Fe Railway tracks on the west (Figure 2). A vacant property is located on the south. The elevation is approximately 25 feet above mean sea level (msl). The property is in the northeast 1/4 of the southeast 1/4 of Section 1, Township 22 North, Range 4 East.

2.2 SITE DESCRIPTION

The site encompasses approximately 13 acres in an industrial-zoned portion of the city (Figure 2). The eastern half of the site is comprised of undeveloped land. The undeveloped portion of the site is characterized by undergrowth (grass, blackberries, etc.) and is trisected by seasonal drainages. Christopher Ditch enters the property near the northeastern corner and flows southwest to the center of the subject property. Another drainage ditch extends from the southwest and joins Christopher Ditch near the center of the property. At the intersection of these drainages, Christopher Ditch makes a sharp

bend and trends northwest to an off-site ditch that runs west (Figure 2). Approximately 0.75 acres of wetland are adjacent to the ditches (URS, 2004).

A farmhouse and associated buildings were constructed on the site between 1960 and 1968 (EMR, 2003b). The farmhouse is located in the north-central portion of the site, and is currently vacant and surrounded by dense blackberry growths (Figure 2).

The western half of the site is comprised of an approximately 45,000 square-foot warehouse building where aluminum refining/recycling operations took place. The warehouse building is constructed of precast concrete. The north side of the building is surrounded by asphalt pavement. The central and southwestern portions of the site are dominated by the aluminum dross stockpile (Figure 2).

2.3 BACKGROUND AND SITE HISTORY

Maralco operated an aluminum recycling/refinery facility at the site from 1980 to 1986 (EMR, 2003b). The recycling/refinery operations took place in the warehouse building.

The recycling process used at the Maralco Site produced aluminum alloy from recycled aluminum cans, Kawecki-Berylco, Inc. (KBI) dross, and scrap metal (EMR, 2003b). The wastes created from this process include black dross and particulate matter that was collected in baghouses located in the southwest corner of the warehouse. Dross is a by-product if the aluminum refining process and is typically a gray fine-grained granular material. During its early operation beginning in 1980, the waste materials were shipped off-site to a landfill. After 1981, the materials were stored east of the warehouse in two locations. The primary stockpile was adjacent east of the warehouse, and a second, smaller stockpile was located near the center of the site south-southeast of the farmhouse (MKE, 1991). This stockpile has since been combined with the larger stockpile. Maralco filed for bankruptcy in 1983 and ceased their operations in November 1986. In February 1986, Ecology received a complaint from the Metro Industrial Wastewater Section concerning leachate from the dross piles that was potentially entering the drainage systems surrounding the site. Ecology began investigations at the site in March 1986; however, an enforcement action was never carried out at the site due to the bankruptcy agreements on the property.

In September 1991, interim remedial activities were performed at the site by Morrison Knudsen on behalf of Ecology in accordance with a work plan prepared for Ecology (Morrison Knudsen, 1991). The interim actions consisted of five activities: fencing the site, improvement of a stormwater collection pond, rerouting of roof drains, grading the plant area, and tarping the black dross piles. The fence and gates were installed around the perimeter of the site, except the farmhouse on the northern side of the site, to limit access. Warning signs were installed along the fence. The stormwater collection pond was improved northwest of the warehouse building. Approximately 2 feet of sediment

and soils were removed from the pond. The depth of excavation was determined based on visual observation of dross-like materials in the pond bottom and previous surface soil analytical results from samples collected at the site by MKE. Post-excavation confirmation samples were not collected. Materials excavated from the pond were drummed and stored on site until their later removal (EMR, 2003b). The roof drains of the warehouse building were re-routed to prevent drainage from running onto the dross piles. The dross piles were graded to prevent ponding of stormwater on their surface, and the piles were covered with 5-mil plastic tarping.

A 35,000-gallon diesel underground storage tank (UST) was removed from the northwest corner of the parking lot in 1995 (Enviros, 1995). Visible observations and soil and groundwater analytical results indicate a release from the UST system occurred previously (Sections 2.6 and 2.7).

2.4 SITE GEOLOGY

The site is located in the lower Green River Valley. The valley runs north from Auburn to Renton. The valley is located within the Puget Sound Lowland. The physiography of this area has been dominated by the advance and retreat of continental glaciers during the Vashon Glaciation period (Table 1). The site and vicinity are underlain by alluvium deposited by the Green River (Woodward, et al, 1995). The alluvium consists chiefly of sand, silt, and clay and contains curvilinear-channel gravels and thin peat lenses. The upper portion consists predominately of clayey silt and fine sand with local peat deposits. This portion is typically less than 30 feet thick in the site vicinity. The lower portions of alluvium consist of mostly medium and coarse sand are more than 75 feet thick (Woodward, et al, 1995).

Based on previous subsurface investigations at the site, the site is underlain by 1 to 2 feet of brown gravelly sand fill (Enviros, 1995; EMR, 2003b). In the vicinity of the dross pile, the fill may have been laid as a grade preparation or liner material for the dross. Native soils underlying the fill material is dark brown fine silty sand and interbedded silty sand and clay layers to an observed depth of 17 feet below ground surface (bgs), consistent with alluvium and floodplain deposits. From eight feet to sixteen feet bgs (the maximum boring depth), a dark brown fine sand was observed in some borings completed at the site. Observations from one boring completed through the dross pile (DP-4) indicated that dross may extend up to 5 feet below the current property grade, and suggests it may have been placed in low-lying areas (EMR, 2003b). All other borings indicated that dross is above the original ground surface level only.

2.5 SITE HYDROGEOLOGY

The site is located within the Duwamish (Green) River Basin. Shallow groundwater in the area of the site is influenced by the Green River, and groundwater occurring in shallow alluvium generally flows toward the river (Woodward, et al, 1995). Five distinct hydrogeologic units comprise the aquifer system and are (from youngest to oldest), alluvium, Vashon recessional outwash, Vashon advance outwash, and two older undifferentiated glacial and interglacial drift units (Woodward, et al, 1995). The units' thicknesses, depositional features, and interbedded confining units are summarized on Table 1.

The site is trisected by drainage ditches (Christopher Ditch and unnamed drainages). These ditches may affect shallow groundwater flow at the site. Recharge of the shallow groundwater at the site is from precipitation and the drainage ditches.

Five groundwater monitoring wells have been installed at the site for water level and groundwater quality monitoring. Groundwater level information indicates the water table is approximately 5 feet below ground surface (bgs) at an approximate elevation of 20 feet msl. Based on water levels collected in 1990 and 2003, shallow groundwater flows in a northerly to northwesterly direction in the vicinity of the site generally consistent with the surface drainage flow (Figure 3). The wells are screened in shallow alluvial materials (dark brown fine sand) at depths of approximately 5 to 15 feet bgs. The thickness of the alluvial material at the site is not known, but regional information (Table 1) indicates that the alluvium in the Kent Valley is typically up to 200 feet thick and is underlain by undifferentiated, unconsolidated deposits (Woodward, et al, 1995).

2.6 SOURCES OF CONTAMINATION

MKE conducted a feasibility study and pilot plant investigation at the site from January 1990 to March 1991 (MKE, 1991b). As part of the feasibility study an aerial topographic survey was conducted. Based on the survey, MKE estimated the volume of waste materials located outside of the warehouse as follows:

- Volume of black dross: 19,325 cubic yards (20,871 tons, dry basis)
- Volume of washed oxides 1,074 cubic yards (1,160 tons, dry basis)

The black dross was a by-product of the aluminum scrap refining process consisting of salts, non-metallic residue, and metal oxides. The washed oxides (primarily aluminum oxide) were produced when water-soluble components of the dross (typically salts) were removed from the dross as part of re-processing.

In addition to the dross stockpile, approximately 500 pounds of baghouse dust and 10 tons of chromium–bearing dross were reportedly stored inside the warehouse building (MKE, 1991b). Mr. Norm Peck of Ecology also reported that a portion of the dross pile had been moved inside of the building (personal communication, 2004). URS' recent inventory of wastes inside of the warehouse indicates that over 1,000 tons of dross-like wastes may be stored inside the building (Table 2 and Figure 4).

A 35,000-gallon UST was removed from the site in 1995 (Enviros, 1995). Soil sampling at the time of the UST removal detected petroleum hydrocarbons in exceedance of MTCA cleanup levels in one sidewall sample. Groundwater samples were not collected. A subsequent subsurface investigation conducted by EMR identified petroleum hydrocarbons in soil near the MTCA cleanup level for diesel-range petroleum and petroleum concentrations in groundwater above MTCA Method A groundwater cleanup levels (EMR, 2003b) (See Section 2.7).

2.7 PREVIOUS INVESTIGATIONS

The nature and extent of waste materials at the site was determined through several investigations performed since 1987. The following summaries of Ecology & Environment and MKE documents were provided by EMR (2003b). Figures 5 through 7 show sampling locations, and Tables 3 through 9 summarize the analytical results of the various dross, soil, sediment, groundwater and UST removal sampling events at the site between 1987 and 2003.

2.7.1 Site Assessment Report - Ecology & Environment, 1987

A Site Assessment Report was produced by Ecology & Environment, Inc. (E&E) on Ecology's behalf in October 1987. As part of the initial site assessment investigation E&E collected samples from the dross piles east of the warehouse, samples of the baghouse dust and KBI dross interior of the building, sediment and surface water samples from the drainage ditches trisecting the property, and soil samples from the east side of the property as well as adjacent properties to the south and north. The Site Assessment Report concluded that there were four types of refining waste at the Site that consisted of black dross, washed aluminum oxides, KBI dross, and baghouse dusts. Sample locations are shown on Figures 5 and 6 and analytical reports from the E&E report are summarized in Tables 3, 5, 6, and 7. The sampling and analytical results showed that the black dross had impacted the drainage ditches that trisect the property (Figure 5, Table 7), and that the KBI dross and baghouse dusts were considered an extremely hazardous waste based on a ninety-six hour fish toxicity test. However, according to the report, the waste, soil, and sediment samples did not exceed EP Tox hazardous waste criteria (E&E 1987).

2.7.2 Phase I Remedial Investigation - MK-Environmental Services, 1991

A Phase I Remedial Investigation Report was then generated by MKE on behalf of Ecology in February 1991. This report was not available for URS' review; however, EMR (2003b) summarized the findings of this report. The remedial investigation involved characterizing the black dross piles surrounding the warehouse, installation of four monitoring wells, investigation of a former dross storage area in the eastern portion of the property, and investigation of a holding pond located in the northwest corner of the property. All of the samples collected during this investigation were surficial with the exception of soil and groundwater samples collected from the monitoring well locations. Analytical results from the MKE report are summarized on Tables 3, 4, 5, 6, and 8. The summary of groundwater analytical results included in the EMR (2003b) report is included in Table 8. Not all of the 1991 data is included in this table.

The soil samples from MW-3 and MW-4 contained elevated levels of sodium, potassium, and chloride (Table 6). Shallow groundwater results showed elevated concentrations of sodium, potassium, and various metals in monitoring wells MW-3 and MW-4. MW-1 on the southeast portion of the site also had elevated levels of arsenic and aluminum. The report concluded that material from the piles was entering the drainage ditches on the property and the surface water was then transporting the material off-site (MKE, 1991).

2.7.3 Feasibility Study and Pilot Plant Investigation - MKE, 1991

MKE conducted a feasibility study and pilot plant investigation at the site from January 1990 to March 1991 (MKE, 1991b). In May 1990 MKE transported approximately 74 tons of washed oxide material from the interior of the warehouse building to the La Farge Cement Plant in Kamloops, British Columbia. The material was shipped to the cement plant for investigation of marketability of the material in the cement manufacturing industry.

The investigation involved a preliminary assessment of the black dross piles on-site. Thirteen dross samples were analyzed for indicator metals. Toxicity characteristics leaching procedure (TCLP) metals analysis was performed on three composite samples and hexavalent chromium analysis was performed on four composite samples. All of the TCLP metals concentrations were below detectable levels, except for one sample that had a result of 0.2 milligrams per liter (mg/l) lead (Tables 3 and 4). This concentration is well below the 5.0 mg/l dangerous waste level for lead.

The purpose of the pilot plant was to investigate the feasibility of washing the black dross material to remove sodium and potassium and then recycling the washed aluminum oxide. The pilot plant was operated at the site from July 18, 1990 to December 18, 1990. During the five-month pilot program, the plant processed 2,179 tons of black dross. This processed material was left on-site, while the wash water was discharged to the King County Metro sewer system (MKE, 1991b).

2.7.4 UST Decommissioning - Enviros, 1995

Enviros completed a UST decommissioning and assessment at the site in 1995 (Enviros 1995). The 35,000-gallon UST was formerly located in the northwest corner of the site, north of the warehouse building (Figure 2). The UST was removed and disposed of off site. During the excavation and removal of the UST, groundwater was encountered at approximately 8 feet bgs. Free product and a sheen were noted on the water surface at the time of the UST removal, and the petroleum was removed with absorbent pads. Soil samples were collected from the sidewalls and base of the excavation, as well as from the excavated soils (approximately 150 cubic yards). The petroleum concentrations in the post-excavation soil samples ranged from non-detectable levels to 6,300 milligrams per kilogram (mg/kg), and the concentrations in stockpile composite samples ranged from 1,200 to 2,100 mg/kg (Table 6). The MTCA cleanup level for diesel-range petroleum hydrocarbons is 2,000 mg/kg. Groundwater samples were not collected. After receipt of the analytical results, Ecology directed that the excavated soils be backfilled into the UST excavation.

2.7.5 Black Dross Pile Characterization - URS, 2000

URS performed further waste characterization sampling of the dross at the site in August 2000 (URS, 2000). The dross samples were collected using a hand auger and were collected from depths of five feet or less with the exception of one sample collected from a depth of 9.5 feet. A part of this investigation, four composite samples (each made up of three discrete samples) and one discrete sample (the sample from a depth of 9.5 feet) were analyzed for leachable metals using the TCLP and for toxicity using a fish bioassay. None of the five samples analyzed exceeded the dangerous waste threshold based on TCLP testing and there was no mortality in any of the fish bioassays. These results indicated that the portions of the dross pile sampled should not be designated as a toxic dangerous waste (Table 4).

2.7.6 Former UST Investigation - EMR, 2003

Two soil borings (SB-1 and SB-2) were advanced at the location of the former UST. The borings were completed near the center of the former excavation and adjacent to the location of the 6,300 mg/kg sidewall sample, respectively. Petroleum concentrations in soils collected from SB-1 ranged from 1,000 to 1,800 mg/kg, below MTCA soil cleanup levels (Table 9). The soil sample collected from SB-2 did not contain detectable petroleum hydrocarbons. A groundwater grab sample was collected from boring SB-1, and contained a petroleum concentration of 450 mg/l, above the MTCA cleanup level of 0.5 mg/l (Table 9). This value is anomalously high and may be indicative of cross contamination of the water sample by soils. Based on the findings of this investigation, soils containing petroleum in exceedance of cleanup levels were not identified, but groundwater in the vicinity of the former UST has been impacted by petroleum

hydrocarbons. This investigation was not summarized in subsequent reports, and a copy of the findings memorandum, boring logs and analytical results is included as Appendix A.

2.7.7 Remedial Investigation/Feasibility Study - EMR, 2003

EMR completed a draft remedial investigation/feasibility study (RI/FS) of the site in 2003. EMR's scope of work included installing one groundwater monitoring well (MW-5) north of the dross pile and drilling four soil borings (DP1 through DP4) through the main aluminum dross pile. A fifth soil boring (DP5) was drilled in the area of the former dross storage area in the eastern portion of the property (Figure 6). EMR collected soil samples during drilling for purposes of logging soils and chemical analyses at selected depth intervals.

EMR located existing monitoring wells MW-2 through MW-4, measured the depth to groundwater to prepare a potentiometric surface map of shallow aquifer, developed the wells, and collected groundwater samples for chemical analyses. Monitoring well MW-1 was not located due to heavy overgrowth in the vicinity.

EMR's analytical results confirmed previous investigations results showing that elevated concentrations of aluminum, arsenic, barium, and chloride are present in groundwater (Table 8). In addition, analytical results showed that soils underlying the existing and former dross piles do not contain elevated levels of metals (Table 6).

During the investigation the main dross pile was found to be underlain by a brown gravelly sand fill. This fill extends approximately 2 feet below the dross pile and may have been laid as a grade preparation or liner material for the pile. Below the fill material is uniformly graded dark brown fine silty sand.

Shallow groundwater was measured at approximately 5 feet below the ground surface. The shallow groundwater flow direction below the site is north-northwest. Metals were present above naturally occurring concentrations in groundwater, including MW-1, the upgradient monitoring well. The concentrations in groundwater generally diminished since the 1990 sampling. However, concentrations of aluminum remained above the applicable maximum contaminant levels (MCLs) in the four sampled wells. Arsenic was above cleanup levels in MW-3, -4, and -5, and barium exceeded cleanup levels in MW-3.

2.8 SITE CONCEPTUAL MODEL

The site conceptual model combines data from the investigations and identifies which processes govern migration and transport of metals, salts, and petroleum in the subsurface at this site. The conceptual model also identifies the potential receptor pathways that could exist at the site.

The primary release mechanism for metals and salts at the site is believed to have been the leaching of dissolved constituents into the subsurface under the aluminum dross stockpile east of the warehouse building. Precipitation onto the stockpiles leached metals and salts from the dross, which then infiltrated through the subsurface. The dissolved metals and salts migrated through underlying soils, and reached the water table and migrated with the groundwater creating the concentrations seen in the shallow groundwater (Table 8). Higher concentrations of metals and salt are observed in groundwater samples from monitoring wells located north and west (i.e., downgradient) of the dross stockpile.

The site is trisected by drainage ditches. Two of these ditches are located directly adjacent to the black dross stockpile. Surface water runoff and erosion have transported dross into the ditches adjacent to the pile. Under high surface water flow conditions, the dross may become suspended in surface water. Under lower flow conditions, salts and metals present in the dross may dissolve into the surface water. Groundwater recharge at the site may also occur as surface water infiltrates through bottom of the ditches. If the surface water is impacted by the dross, then this recharge has the potential to impact groundwater quality. Conversely, under high water table conditions, impacted groundwater may discharge into the ditches. Stormwater in the drainage ditch is conveyed off-site to the west and eventually discharges to an unnamed creek tributary to Springbrook Creek.

Potential receptor pathways are discussed below. It should be noted that the potential receptor pathways may not be complete.

Dross and Soil – Currently, the dross, and dross-affected soils present potential exposure at the site. Ecology regulates the direct exposure pathway for soils from 0 to 15 feet bgs. Metals concentrations in the dross exceed applicable soil cleanup levels (Tables 3 and 5). There is the potential for direct dross contact by on-site workers or trespassers.

Groundwater – Shallow groundwater at the site has been affected by salts and possibly metals. According to a drinking water well survey completed by EMR (2003b), drinking water or municipal supply wells were not identified within a half-mile radius of the site. Drinking water for the site and the surrounding area is supplied by the local public utility district (PUD). According EMR (2003b), the City of Kent obtains its water from water supply wells throughout the city limits. One City of Kent well is located in Section 1, northeast of the site. This well was completed to approximately 100 feet in alluvial materials. However this will is in an inferred upgradient position to the site, and is not likely used due to its status as a test well. Other City of Kent wells are not located in the site vicinity or downgradient of the site, and are typically completed in deeper formations. There

is the potential for worker exposure at the site if future excavation activities (e.g. for utility work or site redevelopment) encounter groundwater. Based on the absence of water supply wells in the vicinity of the site, there is currently no direct exposure pathway to groundwater. Secondary exposure may occur when impacted groundwater discharges to drainage ditches and becomes surface water.

Surface Water and Sediment – Dross-affected surface water and sediment are present in the site drainages adjacent to the dross stockpile. There is the potential for incidental worker or trespasser exposure at the site based on the affected surface water.

Airborne - Airborne exposure potential from dross at the site consists of inhalation of metals-containing dust from uncovered portions of the dross, as well as the potential for release of ammonia due to exposure of the dross to water. There is the potential for airborne contact by on-site workers or trespassers and under the most adverse weather conditions (i.e., dry and windy), dross may become airborne and blow offsite.

2.9 DATA GAPS

Several data gaps were identified during the review and compilation of work previously performed at the site. The data gaps generally relate to the extent of soil and groundwater impacts related to the dross and releases from the former UST. Given that the proposed remedy includes removal of the dross and other wastes from the property, some of the data gaps need to be filled prior to initiating the cleanup work and other data gaps can be addressed during the cleanup. These data gaps are described below.

- **Chemical characteristics of the dross in the lower portion of the pile** - The characterization sampling at the dross pile has consisted primarily of collection of surface samples and near-surface samples in the pile. Because of the potential for variability in leaching characteristics and metals and salt content throughout the pile, representative sampling throughout the portions of the pile that have not been tested should be completed to better characterize the pile. This data gap needs to be addressed prior to removal of the dross from the property in order to receive approval for landfill disposal of the wastes.
- **Chemical characteristics of the wastes within the warehouse** - The characterization sampling at the warehouse wastes consisted of collection of samples baghouse dust and KBI dross. However, a significant additional volume of wastes was observed inside the warehouse during a site visit by URS on November 5, 2004. Some of these wastes may have been moved into the warehouse during previous interim actions. Because of the uncertainty associated

with the identification of these stockpiles, representative sampling throughout the individual stockpiles should be completed for characterization and waste disposal purposes. This data gap needs to be addressed prior to removal of these wastes from the property in order to receive approval for landfill disposal of the wastes.

- **Extent of Dross Impacts to Soil and Sediment** – Limited sampling of the soil and sediment beneath and adjacent to the dross piles was conducted previously to assess the extent of potential impacts related to the dross. Sampling to address this data gap may be conducted prior to removal of the dross and impacted soil and sediment so that a more accurate estimate of the total volume of material that requires removal can be made. Alternatively, the removal of the material may proceed and the extent of the impacted soil and sediment can be assessed as part of the post-removal confirmation soil and sediment sampling.

- **Dissolved metals, salts, and VOC concentrations in groundwater** – Previous groundwater sampling for four of the site's five monitoring wells was conducted in 2003 (EMR, 2003). The groundwater samples were analyzed for total metals and may not be representative of the metals and other constituents that are mobile within the groundwater system. A supplemental round of groundwater sampling (including background well MW-1) will be used to confirm concentrations of metals and salts in groundwater at the site and develop a baseline condition for post-remedial sampling. Sampling for volatile organic compounds (VOCs) will also be conducted to address potential historic groundwater impacts from industrial activities. The City of Kent has expressed concern that these constituents may be present and review of historic data indicates that samples have not been previously analyzed for VOCs. This data gap will be addressed prior to removal of the dross so that a baseline can be established against which future monitoring results can be compared.

- **Extent of soil and groundwater impacts near the former UST** – Soil samples collected during the UST decommissioning and removal, and well as EMR's 2003 soil boring program, identified petroleum hydrocarbons in soil near or above MTCA cleanup levels. Additionally, according to the UST removal report (Enviros, 1995), stockpiled soils containing petroleum concentrations above the cleanup level were backfilled into the UST excavation. A water sample collected during EMR's 2003 soil investigation contained petroleum concentrations above MTCA cleanup level, but it is uncertain whether this sample is representative of groundwater quality. Supplemental soil and groundwater sampling at the former UST location will be completed to identify the extent, if any, of soils containing petroleum hydrocarbons above cleanup levels, and confirm whether petroleum-affected groundwater is present in the vicinity of the former UST. This data gap

needs to be addressed in order to determine whether any remedial action is required to address the release at the former UST.

The proposed scope of work that will be used to fill the data gaps is described in Section 4.0, following the discussion in Section 3.0 of the overall goal and approach for the cleanup action. The intent is to develop a scope of work that collects only the data needed to effectively implement the preferred remedial alternative.

3.0 CLEANUP ACTION GOALS AND STRATEGIES

This section describes the applicable regulatory requirements for the cleanup action, the alternatives considered, and the preferred alternative.

3.1 REGULATORY REQUIREMENTS

The voluntary cleanup action will comply with applicable state and federal laws and regulations including the MTCA, which is the primary regulation that establishes the requirements and standards for the cleanup action in the State of Washington. The alternative will also comply with applicable regulations associated with management, transportation, and disposal of soils and other wastes on-site and work activities in delineated wetlands.

Cleanup standards developed under the MTCA must meet the statutory requirement of being at least as stringent as all applicable state and federal laws. The laws and regulations that were considered in the development of the cleanup action for the site are identified and evaluated in Table 10.

3.2 SITE REQUIREMENTS

The site will continue to be used in the present and the future as an industrial site, most likely for building materials storage. The planned site redevelopment will include paving and improvement of the stormwater drainage system. Wetlands on the site will be enhanced. These site requirements were considered during the development and evaluation of the alternatives described in the following section.

3.3 CLEANUP ACTION ALTERNATIVES

Three cleanup alternatives were evaluated by EMR in the draft RI/FS (2003b). EMR's evaluation of these alternatives is summarized below.

3.3.1 Alternative 1 – Limited Action/Institutional Controls

This alternative includes repairing and maintaining the existing fence and plastic tarp at the site, and long-term groundwater monitoring. Groundwater monitoring and maintenance of the existing fence and tarp could easily be implemented, although the long-term integrity and effectiveness of the cap cannot be quantified with certainty and therefore this alternative may not prevent future contaminant migration at the site. As described by EMR, the alternative did not address the soil and groundwater at the former UST. EMR's estimated cost for this alternative was approximately $372,000.

This alternative is not compatible with the intended future use of the site and does not provide a high degree of reliability. It is not considered to represent a long-term or permanent solution.

3.3.2 Alternative 2 – Removal and Off-site Disposal

Alternative 2, removal and off-site disposal would involve removal of the existing dross, other wastes inside the building and impacted soils and sediment. The materials would then be removed from the site and transported to a disposal facility. The site would be redeveloped after dross and contaminated media removal and long-term groundwater monitoring would be conducted. As described by EMR, this alternative did not address the soil and groundwater at the former UST. However, additional cleanup work may be required near this former UST depending on the results of the planned investigation.

Assuming that the black dross does not designate as a toxic dangerous waste following additional testing, URS has estimated the capital costs, including confirmation sampling, for this alternative to be approximately $1,100,000 excluding contingencies, management, and oversight. This estimate is based on the quantities of waste described in Section 2.5 and is similar to the estimate previously developed by EMR ($1,132,000).

This alternative would remove all of dross, baghouse dust and aluminum oxides from the site and place them in a permitted landfill. Therefore, it is considered a permanent solution. Once the sources of contamination are removed, there would be an immediate improvement in surface water quality and it is expected that groundwater quality would improve with time through natural attenuation. This improvement in groundwater quality would be confirmed through monitoring.

3.3.3 Alternative 3 – On-Site Containment

Alternative 3 involves excavation of contaminated sediments, blocking of drainage onto the site from the southern adjacent property, grading of the undeveloped areas of the site, placement of a geocomposite and bottom liner over the graded areas, grading the dross and excavated sediments to a mounded surface over the bottom liner, and then installing a concrete cap at the site. The cap would be installed over the entire surface of the

graded dross. It would be designed to prevent human and ecological receptor exposure to the dross beyond the protection offered by the fence, and to allow limited reuse of the site for industrial purposes. The concrete pad could be used for material storage at the site. As described by EMR, the alternative did not address the soil and groundwater at the former UST. EMR's estimated cost for this alternative was approximately $491,000.

Because the dross would remain on site, Alternative 3 would require a restrictive covenant and limit potential future use of the property. In addition, the City of Kent indicated concern over the long-term effectiveness of the integrity of the containment.

3.4 SELECTION OF PREFERRED ALTERNATIVE AND RATIONALE

Alternative 2 is the preferred remedial alternative for the site. This alternative will meet the minimum requirements for cleanup actions by:

- Eliminating human health and ecological risks associated with the waste materials at the site by removing the wastes and placing them in a permitted landfill.
- Complying with applicable cleanup standards for soil, sediment and surface water following removal of the dross, and eventually complying with groundwater cleanup standards.
- Complying with applicable state and federal laws including those identified in Table 10.
- Providing for compliance monitoring of the groundwater to confirm that concentrations of salt and other constituents decrease with time.
- Achieving the shortest restoration timeframe of the three alternatives considered.
- Providing a permanent solution for the dross and other waste materials and addressing concerns raised by the City of Kent.

The alternative is also compatible with the current and proposed use of the site and the surrounding properties. The planned placement of pavement in the areas where the dross is currently stockpiled will significantly reduce infiltration through the soil in this area and will minimize the leaching of any residual salts or other constituents that may be present in the soil.

The alternative is considered cost effective, provided that the dross material is not characterized as Dangerous Waste per WAC 173-303-100 and provides environmental protection from contaminants of concern. In the event that some of the dross is considered a dangerous waste following additional characterization, then the preferred alternative may be reconsidered.

3.5 CLEANUP STANDARDS AND OBJECTIVES

Cleanup levels for soil and groundwater for contaminants of concern are summarized on Table 11. The soil cleanup levels will be used to verify removal of the black dross and the sediment and soil adjacent to the dross that may have been impacted by leaching or other contaminant transport mechanisms. The groundwater cleanup levels are applicable to assess the impacts to groundwater quality and to confirm that cleanup levels have been achieved.

Applicable cleanup standards are not readily available to verify that the wastes inside the building have been removed and that residual waste materials do not represent a threat to building occupants. Therefore, a visual assessment of the presence of fine-grained residue will be performed to demonstrate compliance. These procedures are described in Section 5.5.

The objectives for the soil and groundwater cleanup are described below.

3.5.1 Waste, Soil and Sediment

The soil cleanup action will focus on removal of the black dross and aluminum oxide stockpile, as well as dross-affected soils and sediment to prevent ongoing contamination of groundwater, surface water and air. Soils in the vicinity of the dross pile have been shown to contain elevated levels of metals and salts. Since groundwater at the site has been affected by metals and salts, this cleanup objective will be to reduce metals and salts concentrations in soil to minimize future impacts to the shallow groundwater at the site. Confirmation soil samples will be collected following removal of the dross, oxides and impacted soil and sediment for analysis. The soil analytical results would be compared to soil cleanup levels outlined in Table 11 to document that affected soils have been removed.

At the former UST location, the results for the Supplement Remedial Investigation will be compared to the applicable cleanup levels in Table 11. If petroleum hydrocarbon concentrations in exceedance of MTCA cleanup levels are detected, a cleanup action will be developed to achieve compliance with the applicable standard. This would most likely include the removal of impacted soil and natural attenuation and monitoring for groundwater impacts.

3.5.2 Groundwater

Concentrations of selected metals, salts, and inorganics in groundwater at the site exceed the MTCA Method A and/or B cleanup level and for drinking water MCLs for groundwater. The objective of the preferred cleanup action will be to reduce the concentrations of metals, salts and inorganics in the source area and downgradient so that concentrations at a conditional point of compliance, which will be determined at the site

in consultation with Ecology, will be at or below the applicable cleanup levels (Table 11). A conditional point of compliance for groundwater is proposed because metals and salts concentrations throughout the site may not drop below the applicable cleanup levels within the foreseeable future. However, over time, compliance with groundwater cleanup levels is expected to be achieved throughout the site.

4.0 SUPPLEMENTAL REMEDIAL INVESTIGATIONS

This section describes the additional investigations that will be completed to address the data gaps described above in Section 2.9. The investigation is intended to focus on obtaining data needed to dispose of the wastes on the site, further investigate the conditions around the former UST, and to provide baseline groundwater quality data that will be used to assess the effectiveness of the source removal action and natural attenuation.

It is anticipated that the scope of work for the supplemental remedial investigation described below will be discussed with Ecology and an agreement will be reached on the number, type and samples and location of analyses required. This scope of work would then be implemented and a report would be prepared summarizing the results of the investigation. Based on these results, this draft Cleanup Action Plan will then be modified as needed to address the results of the investigation. Upon approval of the final CAP by Ecology, the cleanup would be initiated. Ecology has already reviewed and commented on some of the sampling analysis proposed below, but a final plan has not yet been developed.

4.1 DROSS PILE

The black dross and aluminum oxides are stockpiled at the site in a pile that is up to approximately 25 feet thick. The aluminum oxides are located at the north end of the pile. In order to collect representative samples of the material, a track-mounted excavator will be used to excavate test pits throughout the material for observation and sampling. Based on the configuration of the pile and the locations of the previously collected samples, 17 test pits are proposed throughout the pile. Samples will be collected at selected depth intervals throughout the test pits for laboratory analyses. Two samples will be collected at each test pit location. At locations where the stockpile is generally less than 10 feet thick, shallow and deep samples will be collected. In the thickest portion of the stockpile, samples will be collected from the middle and near the bottom of the pile, as previous sampling characterized the shallow materials. During the sampling activities, up to 10 discrete dross samples will be field screened for reactivity by wetting the dross material and monitoring for generation of ammonia and phosphene using a Draeger tube sampler (or equivalent), and the generation of methane, hydrogen, and hydrogen sulfide using a gas monitor (GasTech or equivalent).

To evaluate the book designation as a Washington State toxic dangerous waste, 34 discrete samples will be analyzed at an Ecology-accredited analytical laboratory for salt content (sodium and potassium by EPA Method 6010, and chloride by EPA Method 300.0). The sodium, potassium, and chloride concentrations will be compared to estimate the relative abundance of chloride salts in the dross and to evaluate the potential presence of other sodium or potassium salts (e.g. hydroxides). If the sum of sodium chloride and potassium chloride salt concentrations exceed 10 percent of the sample weight (100,000 mg/kg) in a sufficient number of samples that the t-value does not meet the 90% confidence limit, then the portions of the pile that are represented by the samples with more the 10 percent salt concentrations would still be a book designated dangerous waste unless the waste passes the additional tests recommended below.

To further evaluate waste characteristics and to fulfill Rabanco's waste acceptance criteria for disposal at the Roosevelt Regional Landfill in Klickitat County, dross and aluminum oxide samples from similar pile locations and depths will be composited and tested for hazardous waste characteristics (reactive cyanide and reactive sulfide, pH, flashpoint, TCLP metals, and toxicity by fish bioassay). URS has confirmed with Rabanco personnel that this analytical program (1 composite sample for approximately every 5,000 tons of waste for the above listed parameters) is sufficient for waste that has previously been book designated as a toxic dangerous waste.

The results of these analyses, in addition to those from a previous sampling event (URS, 2000), will be assessed in accordance with Washington State Dangerous Waste Regulations (WAC 173-303) and statistical guidance provided by Ecology to determine the proper designation of the waste.

The purpose of the dross pile sampling and analysis is to obtain a sufficient number of representative samples to characterize the material for disposal. Following completion of the sampling proposed above combined with the samples already collected and analyzed by URS in 2000, a total of 47 discrete samples will have been collected from the dross pile. This number of samples is approximately equivalent to the number of samples recommended by Ecology for a 21,000 cubic yard soil stockpile in *Guidance for Remediation of Petroleum Contaminated Soils*. Although the dross is not petroleum contaminated soil, we understand that this guidance is considered by Ecology to be applicable to the dross pile. WAC 173-303-040 defines a representative sample as "a sample which can be expected to exhibit the average properties of the samples source". According to EPA (1995), "composite samples reflect an 'average' concentration within the composite area, flow, or interval. Compositing is appropriate when determining the general characteristics or representativeness of certain sources (e.g., a waste pile or impoundment) when considering methods of treatment or disposal". Therefore, with the exception of the chloride, potassium and sodium analyses, representative samples can be obtained by compositing.

4.2 WAREHOUSE WASTES

The visual inventory of the warehouse completed by URS on November 5, 2004 indicated that a significantly larger volume of wastes is stored inside the warehouse building than previously reported. From previous investigations, wastes identified as baghouse dust and KBI dross were classified as hazardous waste based on fish toxicity (E&E, 1987).

To further evaluate waste characteristics and to fulfill the waste acceptance criteria for disposal at a hazardous waste landfill, such as Chemical Waste Management's hazardous waste landfill in Arlington, Oregon, samples from each individual stockpile in the warehouse (Table 2 and Figure 4) will be composited and tested for hazardous waste characteristics (reactive cyanide and reactive sulfide, pH, flashpoint, total and TCLP metals, and toxicity by fish bioassay). Three to seven discrete samples for compositing will be collected from each distinct stockpile in accordance with Ecology's Guidance for Remediation of Petroleum-Contaminated Soils (1995), with the exception of the drummed wastes, which will be composited from discrete samples from the individual drums.

4.3 FORMER UST LOCATION

URS will complete a subsurface investigation in the vicinity of the former UST (Figure 7). The purpose of the soil and groundwater investigation is to conduct additional assessment to determine the extent and current concentrations of petroleum-containing soil and groundwater at the former UST location. In order to accomplish this investigation, URS will complete the following tasks:

- Advance six soil borings using a geoprobe-type drill rig in the vicinity of the former UST (Figure 7). Two borings will be completed within the former UST excavation. One boring will be completed south of the excavation near a former boring location containing petroleum in exceedence of cleanup levels, and three borings will be completed in inferred downgradient position of the former UST. The borings will be completed to several feet below the groundwater surface (estimated depth of approximately 5 feet below ground surface). The borings will be sampled continuously for lithologic logging. A portion of the soil left in the drive shoe of the split-spoon will be screened in the field, utilizing the headspace screening method and a photoionization detector (PID) to check for the presence of volatile organic compounds (VOCs) in the soil. Soil and groundwater samples from each boring will be collected for chemical analysis.
- Analyze up to two soil samples from each boring for diesel-range hydrocarbons using Method NWTPH-Dx. Soil samples with the highest PID indications and at the

groundwater table in each boring will be analyzed. If there is no indication of petroleum impact, the soil sample collected at the groundwater table will be analyzed.

- Analyze up to four groundwater samples from selected boring for diesel-range hydrocarbons using Method NWTPH-Dx. One groundwater sample will be collected from within the former UST excavation, and two samples will be collected from the inferred downgradient boring locations. In addition, the groundwater sample collected from monitoring MW-4 located west (downgradient) of the UST will be analyzed for diesel-range petroleum (Section 4.4).
- Place all drill cutting and purge water in drums, backfill borings with bentonite and restore the surface to match the existing grade.

Upon receipt of the analytical results, the results will be used to assess the extent of petroleum-affected soils and groundwater. If diesel-range petroleum concentrations in soils exceed the MTCA cleanup level, then URS will recommend, as part of the site cleanup action, the removal of affected soils for source reduction purposes. If groundwater sampling indicates that diesel-range petroleum concentrations in groundwater exceed the MTCA cleanup level, then recommendations will be made to install one or more groundwater monitoring wells in this area to serve as a point of compliance for the release from the former UST as part of the Groundwater Compliance Monitoring Plan (see Section 6.1).

4.4 GROUNDWATER SAMPLING

Previous groundwater sampling of the site's five monitoring wells was conducted in 1990 and 2003 (EMR, 2003). The previous sampling round included metals and inorganic compounds associated with the contaminants of concern identified in the dross (Table 8). However, metals analyses were reported for total metals, which may not be representative of actual groundwater conditions and some contaminants of concern in the dross, such as chromium, were not analyzed. URS will complete a supplemental round of groundwater sampling to confirm existing concentrations of contaminants of concern and develop a baseline condition for post-cleanup monitoring.

- Water levels will be measured at all existing groundwater monitoring wells prior to the sampling event
- Water samples will be collected from MW-1 through MW-5 using standardized low-flow well purging and sampling procedures, including measurement of dissolved oxygen, temperature, electrical conductivity, oxidation-reduction potential and pH.
- Groundwater samples from the wells will be submitted to an analytical accredited laboratory for analyses for total and dissolved metals (aluminum, arsenic, barium, beryllium, cadmium, chromium, copper lead, manganese, mercury, selenium, and

zinc) by EPA Method 6000 Series, chloride by EPA Method 300.0, ammonia by EPA Method 350.3 and fluoride by EPA Method 340.2 and total dissolve solids by EPA Method 160.1 (Table 11). The groundwater samples collected for dissolved metals analyses will be filtered in the field. Additionally, one round of sampling for VOCs by EPA Method 8260 would be conducted to document potential historic groundwater impacts from the site vicinity's industrial activities. The groundwater sample collected from monitoring MW-4 located west (downgradient) of the UST will be analyzed for diesel-range petroleum (Section 4.3).

The final groundwater compliance monitoring plan (Section 6.1) may be modified based upon the findings of the initial sampling round.

5.0 CONCEPTUAL CLEANUP ACTION

This section outlines the conceptual cleanup action that will be implemented at the site. This action may be modified based on the results of the Supplemental Remedial Investigation and comments received from Ecology and other stakeholders. All work would be completed following the requirements of a site-specific health and safety plan by appropriately trained workers. Sampling and analysis would be performed in accordance with standard environmental procedures and applicable guidance documents. In addition, all work would comply with applicable regulations summarized in Table 10.

5.1 SITE PREPARATION

Site preparation would include removal of fencing for site access and preparation of an exclusion zone. The exclusion zone would encompass the area of the dross and oxide piles, the warehouse and necessary maneuvering space for construction equipment such as the excavator. The exclusion zone would also include an area for loading the dross and soil. Site preparation would also include the installation of temporary roads to enable access to the eastern side of the warehouse building and to the rail spur on the west side of the site.

5.2 BLACK DROSS AND ALUMINUM OXIDE REMOVAL

Excavators would be used to excavate dross and aluminum oxides and place the material into trailer trucks, roll-off boxes, or rail cars depending on the most efficient method of transport to the selected disposal sites. The excavation would continue until all of the visible dross and oxides have been removed. If dump trucks are used, these would transport the loads to an offsite transfer station. The loads will be covered to prevent the waste materials from dispersing during transport. At the transfer station, the dross and aluminum oxides would be loaded onto rail cars and transported to a landfill for disposal.

There is the potential that the on-site rail spur may be utilized for direct loading onto rail cars.

Dust and odor suppression would be supplied by equipment (e.g. tanker trucks) standing by. Based on previous information, there is the potential for release of ammonia or other gasses due to exposure of the dross to water. If the supplemental remedial investigation (Section 4.1) indicates that gas release is a concern, non-water-based dust suppression will be utilized for the dross.

5.3 SUPPLEMENTAL SOIL AND SEDIMENT REMOVAL

Excavators would also be used to excavate affected soils and sediment into covered trailers, containers, or rail cars as appropriate. It is anticipated that some soil beneath and adjacent to the dross pile will require excavation. The actual quantity will be determined as part of the confirmation sampling program described below. With respect to the sediment in the ditches on the property, approximately 1 foot of soil from the base and 0.5 foot from the sides of each ditch adjacent to or downstream of the dross pile will be excavated, prior to collecting any confirmation samples for analysis. The sediment removal from the ditches would be performed in the dry season when water is not flowing in the ditches on the property.

As with the dross and oxides, trucks would transport the soil and sediment to the adjacent rail spur or transfer station. Contaminated soil and sediment would be loaded onto rail cars and transported to a landfill for disposal.

5.4 CONFIRMATION SOIL SAMPLING AND ANALYSIS

After completion of the initial excavation activities, post-excavation soil and sediment samples would be collected and analyzed for the following contaminants of concerns in Table 11 (excluding diesel-range petroleum), subject to modification based on the findings of the Supplemental R.I. at an Ecology-accredited analytical laboratory to document the cleanup action. The same analytical methods as specified for the Supplemental RI will be used. Samples would be collected on a grid of approximately 50 feet by 50 feet. For the dross and oxides pile, this corresponds to approximately 30 to 35 confirmation samples. Post-excavation sediment samples would be collected for every approximately 50 linear feet of excavated drainage. For the drainages adjacent to the dross and oxide pile, this corresponds to approximately 10 to 12 samples. If the results of the analyses exceeded the cleanup levels (Table 11), then additional excavation would occur in the entire area represented by that sample and the area would then be sampled again and the results would be compared to the cleanup levels. This process would be repeated until the results for all of the final confirmation soil samples were at or below the cleanup levels.

Four soil samples would also be collected from the stormwater pond in the northwest portion of the site to confirm that the 1991 interim action removed dross-affected sediments. The samples would be collected along the centerline of the pond on approximately 30-foot intervals. If pond sediments contain analytes in exceedence of applicable cleanup levels, the area of the pond represented by that sample would be excavated. Sampling and analysis followed by further excavation would be repeated until the final confirmation samples were at or below the applicable cleanup levels (Table 11).

5.5 BAGHOUSE DUST AND OTHER WASTE REMOVAL

The baghouse dust, chromium-bearing dross, and other wastes identified inside the warehouse will be removed from the site. The baghouse dust and chromium-bearing dross are classified as hazardous waste based on fish toxicity, and will be required to be disposed of at a hazardous waste landfill, such as Arlington Regional Landfill in Oregon. The other wastes may not be designated as a dangerous or hazardous waste depending on the results of the testing described in Section 4.2

Removal of the baghouse dust, chromium-bearing dross and associated wastes within the warehouse will be performed as follows:

- Containment (i.e., polyethylene sheeting) will be established which separates the work areas from adjacent spaces and prevents dust generated inside the warehouse from leaving the warehouse.
- If the work process requires exiting from the work area following establishment of containment, and prior to final cleanup of dusts generated by waste removal activities, a controlled access chamber which facilitates load-out of waste, and functions as a decontamination unit for personnel conducting the remediation prior to exiting to exterior of the building will be established.
- Personnel will don appropriate protective equipment including respiratory and skin protection to minimize potential exposures to metal-bearing dusts.
- Appropriate engineering controls will be used to reduce airborne dust levels to the extent possible during bulk removal. Based on previous information, there is the potential for release of ammonia or other gasses due to exposure of the dross to water. If the supplemental remedial investigation (Section 4.1) indicates that gas release is a concern, non-water-based dust suppression will be utilized.
- Bulk removal of baghouse dust, chromium-bearing dross and associated wastes will be accomplished using heavy equipment (e.g., backhoe, loader) to transfer wastes to an appropriate leak-tight container for transport to the disposal facility.

- Following bulk removal, surfaces in each work area contaminated with baghouse dust, dross and/or associated wastes will be cleaned using HEPA-filter equipped vacuums and wet-wiping.
- During removal operations, a real-time particle counter will be used to monitor dust levels inside and outside the containment. The referenced sampling results will be used to predict an action level for total dust concentrations at which one or more of the heavy metals detected in the baghouse dust, chromium-bearing dross and/or associated wastes reaches its Permissible Exposure Limit (PEL) enforced by Washington L&I. If total dust levels exceed the pre-determined action level, contaminant-specific air sampling will be conducted.
- Following removal operations, visual means will be used to verify that the Contractor has satisfactorily cleaned each enclosed work area. Removal of the containment will not occur and the controlled access chamber will not be decommissioned until visual inspection has been approved. Such inspections are an important part of the quality control process.
- Waste will be properly collected, stored, labeled and transported to an appropriate landfill for disposal as determined by the methodology specified in Section 4.2.

5.6 FORMER UST SOIL REMOVAL

If petroleum concentrations above applicable cleanup levels are identified during the Supplemental RI, the area of affected soils will most likely be excavated from the former UST location. At the time of the excavation, a field geologist or engineer will be on-site to observe the excavation activities. Excavated soils will visually inspected for signs of staining and will field screened with a photoionization detector (PID) for evidence of petroleum hydrocarbons. The contaminated soils will be excavated until field screening and observations indicate concentrations are below the cleanup level (approximately 5 feet below ground surface). The soils will be placed in covered trailers or containers and transported off site using trucks. The excavated soils will be treated or disposed of at a permitted facility (i.e. landfill, thermal treatment, etc.).

Post-excavation soil samples will be collected and analyzed in accordance with Ecology's *Guidance for Remediation of Petroleum Contaminated Soils* (Ecology, 1995). Post excavation samples will be collected for analysis from the base and sidewalls of the excavation to verify that residual petroleum hydrocarbons in the exposed soils are below the 2,000 mg/kg cleanup level for diesel-range petroleum. Soil samples will also be collected from the soil stockpiles for chemical analysis for disposal in accordance with Ecology guidance and disposal/treatment facility requirements. Soil samples will be analyzed for diesel-range petroleum hydrocarbons.

5.7 SITE RESTORATION

Following completion of the cleanup actions, redevelopment of the property, including grading, paving and construction of stormwater facilities would occur. The need to backfill any excavations that are created during the cleanup action would be dependent on the grading requirements for site redevelopment. Backfilling could be accomplished with the use on onsite materials from portions of the site that are not impacted or with clean, imported fill.

6.0 COMPLIANCE MONITORING AND ADMINISTRATIVE CONTROLS

In order to monitor groundwater conditions at the site following the cleanup action, a groundwater monitoring plan will be initiated. Additionally, if soils and/or groundwater at the site contain contaminants of concern in exceedance of applicable cleanup levels, institutional controls will be put into place to minimize potential human and ecological contact.

6.1 GROUNDWATER COMPLIANCE MONITORING PLAN

The purpose of compliance monitoring will be to monitor the extent and changes in elevated metals and salts concentrations downgradient of the former dross pile location and demonstrate the effectiveness of the cleanup action, and its impact upon groundwater quality.

Groundwater compliance monitoring will consist of periodic sampling and analysis of groundwater of the groundwater monitoring wells on the site to assess the effectiveness of the source removal action. Monitoring of the groundwater will commence immediately after start-up of the cleanup action and will continue for at least 5 years, or until the criteria for a NFA are met. The groundwater monitoring program will include the following:

- Quarterly groundwater monitoring events will be scheduled for the months of January, April, July, and October each year. After one year (four quarters) of groundwater monitoring, the sampling frequency would be decreased to semi-annual monitoring.
- Water levels will be measured at all existing groundwater monitoring wells during each event.
- Water samples will be collected from MW-1 through MW-5, and any other newly installed downgradient monitoring wells during each event using standardized low-flow well purging and sampling procedures, including measurement of dissolved oxygen, temperature, electrical conductivity, oxidation-reduction potential and pH.

- The water samples will be analyzed for total and dissolved metals and other contaminants of concern listed in Table 11 subject to modification based on the findings of the supplemental RI. Additionally, water samples from wells (existing and new) downgradient of the former UST location will also be analyzed for petroleum hydrocarbons by Washington Method NWTPH-Dx.
- After one year (four quarters) of groundwater monitoring, the analytical program, sampling frequency, and sampled wells will be evaluated to determine if the groundwater monitoring program continues to be appropriate, or if the program may be modified to reduce frequency or analytes. Based on prior groundwater monitoring experience at the site and vicinity, the highest water table generally occurs in April, and the lowest in October. Therefore, semi-annual monitoring would occur in these months.

The sampling results for each sampling event will be documented in a short technical memorandum.

6.2 ADMINISTRATIVE CONTROLS

It is anticipated that the cleanup action will be able to remove all of the dross, oxides and impacted soil and sediment. Therefore, it is not anticipated that administrative controls, such as a restrictive covenant, would be required to obtain agency approval for this portion of the cleanup. In the event that the removal action is not completely successful, then administrative controls would be considered. Depending on the rate at which contaminant concentrations in groundwater decrease following removal of the dross and other waste, a restrictive covenant may be considered.

7.0 REPORTING

A report will be prepared summarizing the results of the Supplement R.I. and then based on the results of that investigation, it is anticipated that the draft Cleanup Action Plan will be revised and submitted to Ecology for review and approval.

Upon completion of the waste removal and confirmation sampling, an Interim Cleanup Action Report will be prepared and submitted to Ecology. The report will describe the corrective actions carried out and the results of the confirmation sampling and analysis described above. If appropriate, recommendations for supplemental corrective actions will be presented in the interim report.

During the monitoring period, annual groundwater monitoring reports will be prepared for the first two years at which time the frequency of sampling and reporting will be re-evaluated. Upon achieving acceptable cleanup levels in the soil and groundwater, a final

cleanup report will be prepared that provides supporting analytical results and recommendations for site closure.

8.0 SCHEDULE

The scope of work for the Supplemental R.I. described in Section 4.0 will be discussed with Ecology and an agreement will be reached on the information needed to fill data gaps including the number, type and location of analyses required. This scope of work would then be implemented and a report would be prepared summarizing the results of the investigation. It is anticipated the Supplemental R.I. and report preparation will take approximately 2 to 3 months to complete. Based on these results, this draft Cleanup Action Plan would then be modified as needed to address the results of the investigation. The revised CAP would then be submitted to Ecology for review and approval.

Once Ecology has approved the CAP and Brown Dog LLC has obtained all the permits and successfully met all the other requirements for site redevelopment, the cleanup action will proceed unless the redevelopment of the property is postponed due to an increase in estimated cleanup costs or other considerations. It is anticipated that the dross removal would occur in the spring and summer of 2005. It is anticipated that the source removal action will take approximately 3 months to complete. As described above in Section 6.0 groundwater monitoring could continue for up to 5 years and potentially longer depending on the results.

9.0 REFERENCES

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Table 1
Regional Hydrogeologic Data
Maralco Site
Kent, Washington

Unit	Approximate Thickness (feet)	Geologic Material	Waterbearing Capability
Recent Alluvium	0-200 (typically <60)	medium-grained sand and silt	Aquifer/Confining Unit
Vashon Recessional Outwash	30	sand, with some gravel and clay	Aquifer
Vashon Till	0-200 (typically ~60)	compact sand and gravel in silt matrix	Confining Unit
Vashon Advance Outwash	0-200	well-sorted sand and gravel	Aquifer
Fine-Grained Interglacial Sediments (upper)	0-200 (typically <50)	clay, silt and fine sand	Confining Unit
Undifferentiated Drift Deposits (upper)	0-200 (typically 85)	sand and gravel, glacial outwash	Aquifer
Fine-Grained Interglacial Sediments (lower)	50 to 150	clay, fine silt and sand	Confining Unit
Undifferentiated Drift Deposits (lower)	50, limited data	sand and gravel, glacial outwash	Aquifer
Undiferentiated, Unconsolidated Sediments	unknown	limited data	Unknown

after Woodward, et al, 1995

Table 2
Warehouse Waste Stockpile Volumes
Maralco Site
Kent, Washington

Stockpile ID	Description	Location	Approximate Volume	Approximate Weight	Comments
A	Covered, cribbed stockpile	East-central warehouse, adjacent north of furnace	93x33x4 feet	500 tons	Stockpiles may be from same source
B	Covered, cribbed stockpile	West-central warehouse wall	22x32x4 feet	115 toms	
C	Covered, cribbed stockpile	West-central warehouse wall	20x20x4 feet	65 tons	
D	Uncovered, cribbed stockpile	Southwest warehouse corner, north of baghouse hoppers	6x8x4 feet	8 tons	
E	Uncovered, cribbed stockpile	Southwest warehouse corner, north of baghouse hoppers	10x25x4 feet	40 tons	
F	Uncovered, cribbed stockpile	Southwest warehouse corner, north of baghouse hoppers	53x25x7 feet	380 tons	
G	Uncovered, cribbed stockpile	Southeast building corner, adjacent south of furnace	50x10x5 feet	100 tons	
H	Uncovered drums in container	Southeast building corner	5x55 gallon drums	2 tons	

Notes:
Stockpile locations depicted on Figure 4
Observations based upon URS 11/5/04 site visit
Weight based on 1.1 tons per cubic yard dry weight (estimated from MKE, 1991)

	Analyte (mg/kg, except as noted)																									
um	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium (total)	Hexavalent Chromium (mg/l)	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Ammonia	Kjeldahl Nitrogen	Chloride	Cyanide
	19	8.6		**6**	**7.5**		588			**13,300**		**861**			0.2 ND	438		0.3 ND	3.0 ND		0.5 ND		7,600				
	57	4.1		**26**	**3.4**		442			2,610		226			0.2 ND	118		0.3 ND	3.0 ND		0.5 ND		1,760				
	3.1	3.9		**14**	1.2		233			2,190		146			0.2 ND	110		0.3 ND	3.0 ND		0.5 ND		1,140				
	20	4.5		**6**	**4.1**		186			2,710		176			0.27	47		0.48	3.0 ND		0.5 ND		1,130				
0	2.88 ND	0.722	91.5	**2.6**	**5.19**	6,800	196		7.36	2,860	8,100	144	21,600	**19,600**	0.351	67.9	17,300	0.577 ND	1.44 ND	15,900	0.577 ND	137	2,000	153	4,089	15,752	1.3
0	2.89 ND	2.75	66.1	**1.88**	**2.31**	4,340	119		3.47	1,660	3,040	115	20,500	1,070	0.064	39.1	43,400	0.578 ND	1.45 ND	27,500	0.578 ND	84.8	1,060	686	3,006	59,427	1.5
0			61.5			5,120	412			1,200		93.1	24,800	1,000			115,000			45,000			952	149	554	131,988	0.66
0	2.78 ND	1.94	76.4	**1.94**	**2.36**	5,000	120		11	746	6,700	97.2	22,800	986	0.059	36.1	70,700	0.555 ND	1.39 ND	33,000	0.555 ND	197	634	95	664	95,593	0.56
0	4.65	8.61	120	**8.377**	**6.98**	23,000	349		6.28	**4,600**	6,500	116	30,000	893	0.238	115	27,900	0.931 ND	2.33 ND	25,600	0.931 ND	98.4	6,100	26	398	2,025	1.04
0			128			7,600	140			2,100		129	27,500	827			57,000			21,000			1,730	109	824	41,901	1.07
0	3.9	4.87	152	**5.65**	**7.8**	12,500	1860		8.38	2,180	6,000	214	39,600	1,060	0.155	56.5	29,000	0.780 ND	1.95 ND	18,900	0.780 ND	280	2,000	46	684	20,541	1.53
0			66.8			4,700	1200			1,600		103	19,700	1,200			22,400			16,200			780	101	856	30,614	1.08
0	3	5.25	86.6	**2.8**	**5.07**	6,700	324			**5,400**		81.1	24,300	841			33,600			32,400			2,820	197	879	5,728	1.51
0			105			7,350	146		7.52	1,290	7,200	70	33,200	1,220	0.076	57.7	17,500	0.700 ND	1.75 ND	16,500	0.700ND	124	1,320	145	777	1,655	0.7
0			167			13,900	322			2,100		172	38,200	879			42,000			30,600			1,870	61	646	80	0.74
)			236			10,100	207			1,300		176	61,700	1,270			22,000			26,000			960	109	795	108	1.49
0			289			1,000	172			1,100		168	45,000	1,100			21,700			20,100			864	64	658	81	1.43
								ND																			
								ND																			
								0.087																			
								0.092																			
)	NA	7	NA	0.6	1	NA	48	NA	NA	36	58,700	24	NA	1,200	0.07	48	NA	NA	NA	NA	NA	NA	85				
	NA	20	NA	NA	2	NA	2000	19	NA	NA	NA	250	NA	NA	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	32	0.667	5,600	160	80	NA	NA	240	NA	2,960	NA	NA	NA	11,200	24	NA	NA	400	400	NA	NA	560	24000	NA	NA	NA	16000

Method A available)

Table 4
Dross Analytical Results
TCLP Metals Analysis
Maralco Site
Kent, Washington

Sample ID	Depth (ft bgs)	Date	Analyte (mg/L)							
			Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
MKE, 1991										
TC-1	--	9/11/90	0.2 ND	1.0 ND	0.05 ND	0.1 ND	0.2	0.001 ND	0.05 ND	0.07
TC-3	--	9/11/90	0.2 ND	1.0 ND	0.05 ND	0.1 ND	0.1 ND	0.001 ND	0.05 ND	0.05 ND
TC-5	--	9/11/90	0.2 ND	1.0 ND	0.05 ND	0.1 ND	0.1 ND	0.001 ND	0.05 ND	0.05 ND
URS, 2000										
HA-2-9.5	9.5	7/6/00	0.5 ND	1.0 ND	0.005 ND	0.001 ND	0.2 ND	0.001 ND	0.15 ND	0.05 ND
Composite 1	1	7/6/00	0.5 ND	1.0 ND	0.005 ND	0.012	0.2 ND	0.001 ND	0.15 ND	0.05 ND
Composite 2	4.5-5.5	7/6/00	0.5 ND	1.0 ND	0.00711	0.0173	0.2 ND	0.001 ND	0.15 ND	0.05 ND
Composite 3	1	7/6/00	0.5 ND	1.0 ND	0.00651	0.0196	0.2 ND	0.001 ND	0.15 ND	0.05 ND
Composite 4	5	7/6/00	0.5 ND	1.0 ND	0.005 ND	0.0212	0.2 ND	0.001 ND	0.15 ND	0.05 ND
Regulatory Levels	WAC 173-303		5	100	1	5	5	0.2	1	5

Notes:
TCLP - Tocicity Characteristic Leaching Procedure
ND - Not Detected at reporting limits
Bold - exceeds maximum concentration level for dangerous waste (WAC 173-303)

Analyte (mg/kg)																									
Aluminum	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Calcium**	**Chromium**	**Cobalt**	**Copper**	**Iron**	**Lead**	**Magnesium**	**Manganese**	**Mercury**	**Nickel**	**Potassium**	**Selenium**	**Silver**	**Sodium**	**Thallium**	**Vanadium**	**Zinc**	**Ammonia**	**Kjeldahl Nitrogen**	**Chloride**	**Cyanide**
	2.9	1.5		3.9	13		975		5,120		307			0.44	81		0.2 ND	2.0 ND		0.4 ND		3,020				
	107	3.8		2.0 ND	19		21		198		587			0.49	15		1.5	6.9		0.71		16,500				
172,000	3.15 ND	0.633 ND	65.2	1.26	2.05	2,840	153	4.1	1,200	3,630	110	19,200	1,510	0.26	31.5	190,000	0.633 ND	1.57 ND	93,100	0.633 ND	84.7	773	292	884	140,642	0.67
130,000			81.2			4,200	189		1,420		108	15,000	1,100			86,600			65,000			871	188	677	150,755	0.42
32,600	NA	7	NA	0.6	1	NA	48	NA	36	58,700	24	NA	1,200	0.07	48	NA	NA	NA	NA	NA	NA	85				
NA	NA	20	NA	NA	2	NA	2,000	NA	NA	NA	250	NA	NA	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	32	0.667	5,600	160	80	NA	NA	NA	2,960	NA	NA	NA	11,200	24	NA	NA	400	400	NA	NA	560	24,000	NA	NA	NA	16,000

f no Method A available)

Table 6
Soil Analytical Results
Maralco Site
Kent, Washington

Sample Location	Sample Depth (ft bgs)	Date	Analyte (mg/kg)																				
			Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	Aluminum	Lead*	Arsenic*	Chromium*	Mercury*	Ammonia	Kjeldahl Nitrogen	Chloride	Cyanide
Ecology & Environment, 1987																								
S1	surface	06/87	0.5 ND	2.8	2.0 ND	1.0 ND	19	19	10 ND	0.1 ND	23	0.2 ND	2.0 ND	0.4 ND	55									
S2	surface	06/87	0.5 ND	4.3	2.0 ND	1.0 ND	21	29	26	0.1 ND	25	0.34	2.0 ND	0.4 ND	57									
S3	surface	06/87	0.5 ND	12	2.0 ND	1.0 ND	10	21	44	0.1 ND	14	0.2 ND	2.0 ND	0.4 ND	56									
S4	surface	06/87	0.5 ND	11	2.0 ND	1.0 ND	13	21	27	0.1 ND	13	0.2 ND	2.0 ND	0.4 ND	60									
S5	surface	06/87	0.5 ND	9.2	2.0 ND	1.0 ND	11	18	27	0.1 ND	14	0.2 ND	2.0 ND	0.4 ND	66									
MKE, 1991																								
HB-4	0-1	09/11/90																			57	760	4	0.25
	2-3	09/11/90																			13	102	3	0.21 ND
HB-5	0-2	09/11/90																			109	1,098	17	0.65
	1-2	09/11/90																			28	331	3	0.29
HB-6	0-1	09/11/90																			108	1,110	6	0.22
	2-3	09/11/90																			13	6	4	0.22 ND
HB-7	05-1.3	09/10/90																			347	1,479	30	1.32
HB-8	0-1	09/11/90																			341	631	65,743	0.33
	2.5-3	09/11/90																			222	316	42,001	0.29
HB-9	0-1	09/11/90																			53	1,754	21,092	0.51
	3-4	09/11/90																			206	690	41,498	0.25 ND
HB-11	0-0.75	09/10/90																			164	1,171	58,535	0.55
	1.5-2.5	09/10/90																			97	237	17,874	0.22 ND
	2.5-4	09/10/90																			64	173	12,726	0.33
HB-12	1-1.5	09/10/90																			201	2,373	45,153	0.71
HB-13	1.2-2.5	09/10/90																			38	593	4,175	1.04
HB-14	0-1	09/12/90																			120	1,753	5	0.22
	2-3.3	09/12/90																			23	298	2	0.21 ND
HB-15	0-0.5	09/11/90																			93	885	6	0.3
	2-3	09/11/90																			27	255	7	0.18 ND
HB-16	0-1	09/12/90																			128	1,807	10	0.21
	2-3	09/12/90																			21	241	5	0.18 ND
MW-1	3-4	09/25/90																			12	154	3	0.21 ND
	6-7.5	09/25/90																			33	343	4	0.27 ND
	12-13.5	09/25/90																			55	193	3	0.25 ND
	15-16.5	09/25/90																			46	137	3 ND	0.25 ND
MW-2	2-3	09/25/90																			15	169	3	0.21 ND
	6-7.5	09/25/90																			7	72	3	0.22 ND
	10.5-12	09/25/90																			10	90	4	0.25 ND
	15.6-16.5	09/25/90																			148	693	8	0.25 ND
MW-3	3-4.5	09/24/90																			10	81	1,936	0.25 ND
	6.5-7.5	09/24/90																			47	258	3,608	0.25 ND
	12.5-13.5	09/24/90																			62	15	2,517	0.24 ND
	15-16.5	09/24/90																			72	281	2,860	0.23 ND
MW-4	1.5-3	09/24/90																			34	266	120	0.27 ND
	4.5-6	09/24/90																			12	67	83	0.23 ND
	9-10.5	09/24/90																			97	415	3,974	0.73
	12-13.5	09/24/90																			13	43	765	ND
EMR, 2003																								
MW-5	5	1/30/03															18							
	10	1/30/03															ND							
	15	1/30/03															13.9							
DP-1	1	2/4/03		5 ND		1 ND										3,000								
DP-2	1	2/4/03															ND	ND	ND	ND				
	3	2/4/03		5 ND		1 ND										1,400	ND	ND	ND	ND				
DP-3	1	2/4/03															ND	ND	ND	ND				
	3	2/4/03		5 ND		1 ND										2,000	ND	ND	ND	ND				
DP-4	3	2/4/03		5 ND		1 ND										2,300	ND	ND	ND	ND				
DP-5	1	2/4/03															ND	ND	ND	ND				
	2.5	2/4/03		5 ND		1 ND										1,400	ND	ND	ND	ND				
Puget Sound Background Levels (Ecology, 1994)			NA	7	0.6	1	48	36	24	0.07	48	NA	NA	NA	85	32,600	24	7	48	0.07				
Regulatory Levels	MTCA Method A		NA	20	NA	2	2,000	NA	250	2	NA	NA	NA	NA	NA	NA	250	20	2000	2	NA	NA	NA	NA
	MTCA Method B		32	0.667	160	80	NA	2,960	NA	24	NA	400	400	NA	24,000	NA	NA	0.667	NA	24	NA	NA	NA	16,000

Notes:
MTCA - Model Toxics Cleanup Act
* - Analyzed by XRF
ND - Not Detected at reporting limits
NA - No Applicable MCL
(blank) - Not Analyzed
Bold - exceeds Method A soil cleanup level (Method B if no Method A available)

Table 7
Sediment Analytical Results
Maralco Site
Kent, Washington

Sample Location	Date	Analyte (mg/kg)												
		Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
Ecology & Environment, 1987														
B1	06/87	1.2	19	3.0 ND	2.0 ND	36	262	64	0.26	31	0.35	3.0 ND	0.6 ND	365
B2	06/87	3.2	5.8	5	**4.5**	232	1,500	144	0.2 ND	74	0.3 ND	3.0 ND	0.6 ND	1,300
B3	06/87	0.6 ND	4.4	2.0 ND	1.0 ND	14	16	14	0.2 ND	12	0.2 ND	2.0 ND	0.5 ND	58
B4	06/87	0.6 ND	5.2	3.0 ND	2.0 ND	14	21	20	0.1 ND	15	0.3 ND	3.0 ND	0.6 ND	67
MKE, 1991														
Not available at time of reporting.														
Puget Sound Background Levels		NA	7	0.6	1	48	36	24	0.07	48	NA	NA	NA	85
Regulatory Levels	MTCA Method A (soils)	NA	20	NA	2	2000	NA	250	2	NA	NA	NA	NA	NA
	MTCA Method B (soils)	32	0.667	160	80	NA	2,960	NA	24	NA	400	400	NA	24,000

Notes:
MTCA - Model Toxics Cleanup Act
ND - Not Detected at reporting limits
NA - No applicable cleanup level
(blank) - Not analyzed
Bold - exceeds Method A soil cleanup level (Method B if no Method A available)

Table 8
Groundwater Analytical Results
Maralco Site
Kent, Washington

Sample Location	Date	Analyte* (ug/L)								Analyte (mg/L)			
		Aluminum	Arsenic	Barium	Cadmium	Lead	Mercury	Selenium	Silver	Ammmonia-Nitrogen**	Chloride	Nitrate-Nitrogen	Fluoride
EMR, 2003 (includes data from MEK, 1991)													
MW-1	10/2/90	**17,800**	**7.96**	109	ND	5.32	0.12	ND	ND	0.175			
MW-2	10/1/90	**2,350**	**5.3**	33.3	ND	2	ND	ND	ND	0.124			
	1/24/03	**600**	3.3 ND	56 ND	4.4 ND	1.2	0.5 ND	5.6 ND	11 ND	1.26	9.64	0.2 ND	0.2 ND
MW-2(D)	1/24/03	**860**	3.3 ND	56 ND	4.4 ND	1.4	0.5 ND	5.6 ND	11 ND	0.433	8.89	0.2 ND	0.2 ND
MW-3	10/1/90	**3,850**	**5.38**	**3,530**	ND	1	0.11	ND	ND	**14.638**			
	1/24/03	**820**	**40**	**2,500**	4.4 ND	2.7	0.5 ND	**43**	11 ND	**33.7**	**9100**	0.2 ND	0.2 ND
MW-4	10/1/90	**27,500**	**17.1**	605	ND	9.51	0.077	ND	ND	**6.638**			
	1/24/03	**3,600**	**19**	77	4.4 ND	9	0.5 ND	5.6 ND	11 ND	1.71	92	0.2 ND	**6.89**
MW-5	1/24/03	**28,000**	**11**	170	4.4 ND	8	0.5 ND	5.6 ND	11 ND	1.52	**442**	1.5	2.1
Regulatory Levels	MTCA Method A	NA	5	NA	5	15	2	NA	NA	NA	NA	NA	NA
	MTCA Method B	NA	0.00583	1,120	NA	NA	4.8	8	8	NA	NA	25.6	NA
	Drinking Water MCL	200	50	2,000	5	15	2	50	100	NA	250	10	4

Notes:
MTCA - Model Toxics Cleanup Act
* - Total Metals
** - No groundwater standards. Ammonia concentrations compared to calculated surface water standard of 6.5 mg/l (WAC 173-201A). See Table 11.
ND - Not Detected at reporting limits
(blank) - Not Analyzed
NA - No applicable MCL
Bold - exceeds applicable cleanup level
(D) - Duplicate sample

Table 9
Former UST Analytical Results
Maralco Site
Kent, Washington

Sample Location	Sample Depth (ft bgs)	Date	Analyte	
			Diesel-Range Petroleum (soil) (mg/kg)	Diesel-Range Petroleum (groundwater) (ml/l)
Enviros, 1995				
PE-1	~8-10	6/29/95	**6,300**	NA
PE-2	~8-10	6/29/95	96	NA
PE-3	~8-10	6/29/95	25 ND	NA
PE-4	~8-10	6/29/95	25 ND	NA
PE-5	~17	6/29/95	25 ND	NA
SP-1	NA	6/29/95	1,800	NA
SP-2	NA	6/29/95	**2,100**	NA
SP-3	NA	6/29/95	1,200	NA
EMR, 2003				
SB-1	5	1/22/03	1,100	NA
	15	1/22/03	1,800	NA
SB-2	5	1/22/03	25 ND	NA
SB-1	~8	1/22/03	NA	**450**
Regulatory Levels	MTCA Method A		2,000	0.5

Notes:
MTCA - Model Toxics Cleanup Act
ND - Not Detected at reporting limits
NA - Not Analyzed or Not Applicable
Bold - exceeds applicable cleanup level

Table 10
Regulatory Requirements
Maralco Site
Kent, Washington

Requirement	Citation	Description	Evaluation
Chemical-Specific			
MTCA Method A Soil Cleanup Levels for Industrial Land Use	WAC 173-304-745(3)(b), -740(6)(b) and (c), -740(6); RCW 70.105D	MTCA establishes cleanup standards for soils (Table 745-1), adjustments to these cleanup standards, and points of compliance.	MTCA Method A Industrial Cleanup Levels (CLs) may apply to the cleanup of on-site soils and sediment. The cleanup levels for the site contaminants of concern (COCs) are listed in Tables 6 and 7 of this document. Concentrations related to ecological receptors will be compared to established screening levels (173-340 WAC, Table 749-2).
MTCA Method A Soil Cleanup Levels for Unrestricted Land Use	WAC 173-304-740(2)(b), -740(6)(b) and (c), -740(6); RCW 70.105D	MTCA establishes cleanup standards for soils (Table 740-1), adjustments to these cleanup standards, and points of compliance.	MTCA Method A CLs may apply to the cleanup of on-site soils and sediment. The cleanup levels for the site COCs are listed in Tables 6 and 7 of this document. Concentrations related to ecological receptors will be compared to established screening levels (173-340 WAC, Table 749-2).
MTCA Method B Soil Cleanup Levels for Unrestricted Land Use	WAC 173-304-740(3)(b), -740(6)(b) and (c), -740(6); RCW 70.105D	MTCA establishes cleanup standards for soils (Ecology Publication 94-145), adjustments to these cleanup standards, and points of compliance.	MTCA Method B CLs will apply to the cleanup of on-site soils and sediment. The cleanup levels for the site COCs are listed in Tables 6 and 7 of this document. Concentrations related to ecological receptors will be compared to established screening levels (173-340 WAC, Table 749-2).
MTCA Standard Method A Potable Groundwater Cleanup Levels	WAC 173-304-720(3)(b), -720(7)(b) and (c), -720(8)(b); RCW 70.105D	MTCA establishes cleanup standards for groundwater (720-1), adjustments to these cleanup standards, and points of compliance.	MTCA Method A Groundwater CLs will apply to groundwater at the site. The CLs for the site COCs are listed in Table 8 of this document.
MTCA Standard Method B Potable Groundwater Cleanup Levels	WAC 173-304-720(4)(b), -720(7)(b) and (c), -720(8)(b); RCW 70.105D	MTCA establishes cleanup standards for groundwater (Ecology Publication 94-145), adjustments to these cleanup standards, and points of compliance.	MTCA Method B Groundwater CLs will apply to groundwater at the site. The CLs for the site COCs are listed in Table 8 of this document.
National Primary and Secondary Drinking Water Regulations, Maximum Contaminant Levels (MCLs)	40 CFR 141.61(a) and (c), 141.26; 42 USC 300	Establish maximum contaminant levels for drinking water in public water systems.	Per WAC 173-304-720(3)(b), MCLs are potentially relevant and appropriate to groundwater at the site. These MCLs for site COCs are listed in Table 8 of this document.
Water Quality Standards, Surface Waters	WAC 173-201A	Establish maximum contaminant levels for surface waters consistent with public health and public enjoyment	WAC 173-201A will be used for site COCsin groundwater where groundwater or drinking water CLs are not available.
Washington State MCLs	WAC 246-247-310(2)(e) and (6)(b); RCW 70.19A	Establish maximum contaminant levels for drinking water in public water systems. Those state standards that are more stringent then the federal MCLs are potentially relevant and appropriate.	Per WAC 173-304-720(3)(b), state MCLs are potentially relevant and appropriate to groundwater at the site. These state MCLs for site COCs are listed in Table 8 of this document.
MTCA Standard Method B Cleanup Standards for Air Quality	WAC 173-340-750(1)(a), (3)(b)(1), and (6)	The MTCA regulations indicate that cleanup standards for air quality during implementation of a remedial action may need to be established, i.e., applicable state and federal laws. A point of compliance may be set at the facility boundary.	Based upon previous actions at the site by Ecology and management of historical or weathered aluminum dross at other sites in Washington, no air contaminant levels need to be established. If analysis of the dross indicates that occupational cleanup levels need to be established, these levels will comply with the Washington State Industrial Health Act requirements as described.
Washington State Department of Labor and Industries (L&I) Regulations, General Occupational Health Standards, Part F: Carcinogens	WAC 296-62-07347 Arsenic	This section applies to occupational exposures to inorganic arsenic. The section establishes an action level of 5 micrograms lead per cubic meter of air (µg/m3) and permissible exposure limit (PEL) of 10 $\mu g/m^3$, as well as requirements for exposure monitoring, personal protective equipment (PPE) and engineering controls.	Historical sampling of the dross and baghouse dust piles on site has identified arsenic to be present in both materials. There is a potential for worker exposure to arsenic during removal of the materials from the warehouse. This section will apply during all removal operations.
Washington State Department of Labor and Industries (L&I) Regulations, Safety Standards for Construction Work, Occupational Health and Environmental Control	WAC 296-155-174 Cadmium	This standard applies to all occupational exposures to cadmium and cadmium compounds, in all forms, in all construction work where an employee may potentially be exposed to cadmium. The section establishes an action level of 2.5 micrograms cadmium per cubic meter of air (mg/m3) and permissible exposure limit (PEL) of 5 mg/m3, as well as requirements for exposure monitoring, personal protective equipment (PPE) and engineering controls.	Historical sampling of the dross and baghouse dust piles on site has identified cadmium to be present in both materials. There is a potential for worker exposure to cadmium during removal of the materials from the warehouse. This section will apply during all removal operations.
Washington State Department of Labor and Industries (L&I) Regulations, Safety Standards for Construction Work, Occupational Health and Environmental Control	WAC 296-155-176 Lead	This section applies to all construction work where an employee may be occupationally exposed to lead. The section establishes an action level of 30 micrograms lead per cubic meter of air ($\mu g/m^3$) and permissible exposure limit (PEL) of 50 $\mu g/m^3$, as well as requirements for exposure monitoring, personal protective equipment (PPE) and engineering controls.	Historical sampling of the dross and baghouse dust piles on site has identified lead to be present in both materials. There is a potential for worker exposure to lead during removal of the materials from the warehouse. This section will apply during all removal operations.
Action-specific			
Washington MTCA	WAC 173-340-360(4), -440, -410,-720(9), -730(7), -360(6); -830; RCW 70.105D	Model Toxics Control Act specifies requirements for determining when the establishing that affect the implementation of remedial action at a site. These regulations specify action specific requirements for choosing technologies, establishing institutional controls, conducting compliance monitoring for groundwater, surface water, and soil, providing for a reasonable restoration time frame to meet the cleanup level, and using an Ecology accredited laboratory to analyze environmental samples.	Applicable MTCA requirements will be followed.
Minimum Standards for Construction and Maintenance of Water Wells	WAC 173-160-101, -121, -161 to –241, -261 to –341, -381; RCW 18.104	Well construction regulations establish minimum standards for water well construction	Groundwater monitoring wells will be constructed and/or decommissioned in accordance with these requirements.
Regulation and Licensing of Well Contractors and Operators	RCW 180104; WAC 173-162-020, -030	These regulations apply to all water well contractors and operators who are providing well installation, maintenance, or abandonment services in Washington State.	Licensed contractors will be used to install, maintain and abandon any on-site wells.
Dangerous Waste Act and Regulations; Resource Conservation and Recovery Act	WAC 173-303- 016, -070, -071, -090 to 104, -170 to 230, -630, RCW 70.105; 42 USC 6901	The Washington State Dangerous waste regulations establish requirements for characterizing, managing, transportation and off-site disposal of dangerous /hazardous waste.	Solid wastes materials (i.e., baghouse dust and dross), will be characterized, managed, transported and disposed of in accordance with these requirements.
Washington State Solid Waste Handling Requirements	Chapter 173-350 WAC; RCW 70.95	The solid waste regulations establish criteria for the transportation and off-site disposal of solid waste and requirements for permitting of off-site disposal facilities.	The non-dangerous soilid wastes such as dross, soil and other potential wastes generated during the voluntary action will be transported and disposed of at a permitted solid waste facility.
Underground Storage Tank Cleanup	Chapter 173-360 WAC; RCW 90.76	The Underground Storage Tank regulations establish requirements for the cleanup contaminated soils resulting from leaking USTs.	The soils surrounding a previous LUST will be characterized and if necessary remediated in accordance with these requirements.
City of Kent, Wetlands Management	City of Kent Code 11.05 (Ord. No. 3109, 5-18-93)	The City of Kent regulations specify requirements for rating wetlands, regulated activity, wetland buffers and compensating for wetland impacts.	Wetlands have been delineated in accordance with these requirements. Any impacts to wetlands during remedial action and future site development will be performed in accordance with these requirements.
Corps of Engineers, Nationwide Permit, Clean Water Act Section 404	33 USC 1344(a) – (d); 33 CFR 230 and 330	Dredging, filling or construction that occurs in waters of the United States requires compliance with CWA Section 404 Permit from the US Army Corps of Engineers. Nationwide Permit No. 39 which covers "discharges of dredged or fill material into non-tidal waters of the US for the construction or expansion of commercial buildings and attendant features" covers activities at the Maralco site.	The voluntary action and redevelopment will comply with requirements under NWP, including notification requirements, Section 401 Water Quality Certification, and CZM Consistency.

Table 10
Regulatory Requirements
Maralco Site
Kent, Washington

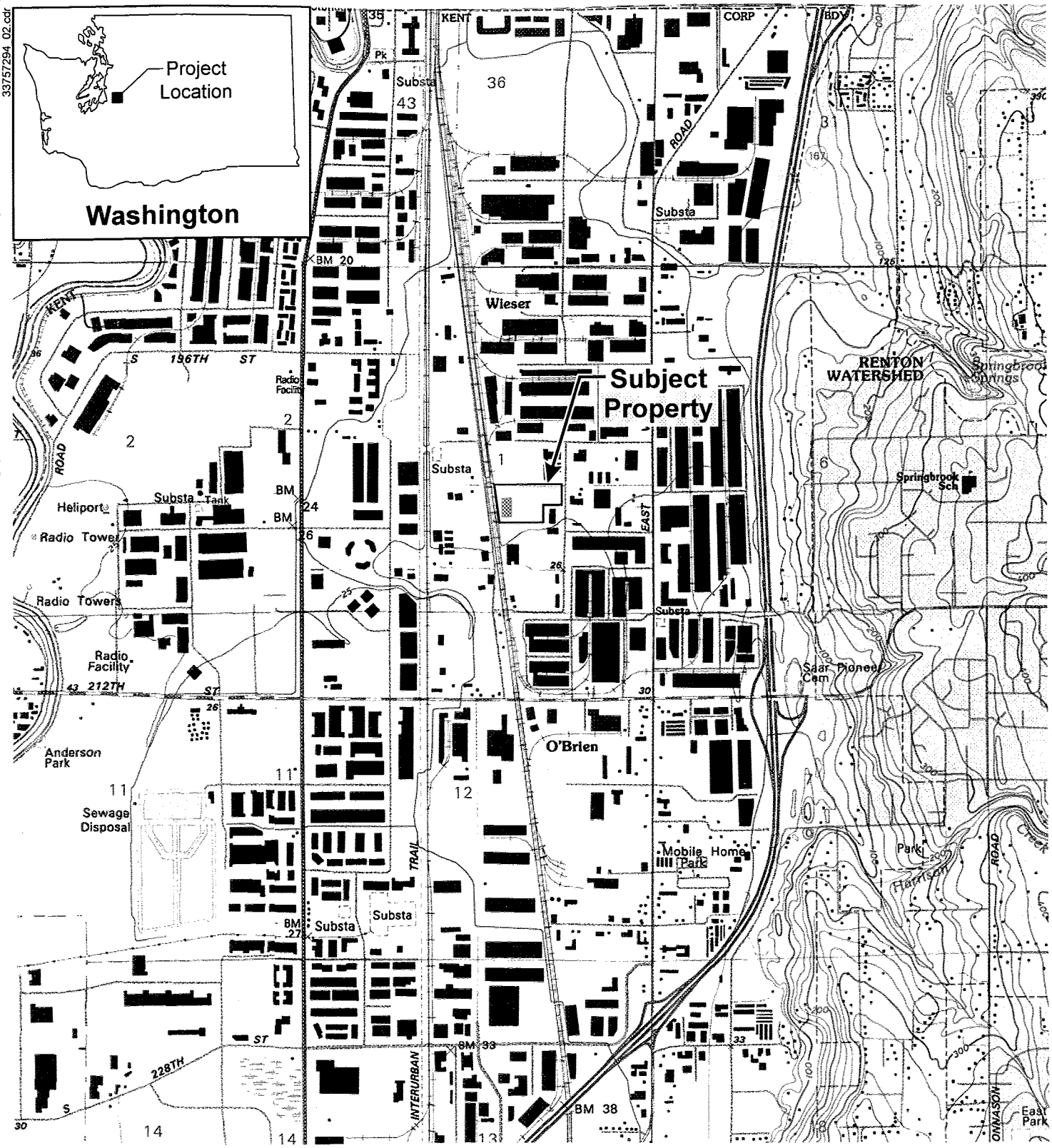
Requirement	Citation	Description	Evaluation
Federal Clean Water Act Water Section 401 Water Quality Certification	33 USC 1341(a) and (d); WAC 173-225-010	Section 401 of the Federal Water Pollution Control Act (FWPCA) provides that applicants for a license or permit from the federal government relating to any activity which may result in any discharge into the navigable waters shall obtain a certification from the state that the water quality standards will be met. The 401 Certification is included in the Joint Aquatic Resource Permit Application (JARPA) permit.	Section 401 Water Quality Certification requirements will be delineated in the JARPA permit.
Hydraulic Project Approval	RCW 75.20.100; WAC 220-110-040, -050, -070, -080, -120, -130, -150, -170, and -190	Construction activity below the ordinary high water mark that uses, diverts, obstructs or changes the natural flow or bed of any waters of the state requires a hydraulic project approval (HPA) from the Washington State Department of Fish and Wildlife. The HPA requirements are covered in the JARPA permit.	HPA requirements will be delineated in the JARPA permit.
General Regulations for Air Contaminant Sources	(RCW 70.94; WAC 173-400-040(8)).	The Washington Clean Air and implementing regulations require that reasonable precautions be taken to prevent fugitive dust from becoming airborne and to maintain and operate the source to minimize emissions.	Although fugitive dust is not anticipated during the remedial action, actions will be taken to minimize fugitive emissions during the remedial action.
Hazardous Waste Operations	Chapter 296-843 WAC; RCW 49.17	The Washington State Department of Health and Industries Act and implementing regulations establish criteria for conducting assessment and cleanup actions at uncontrolled sites and sites ranked on Ecology's list of sites.	The Health and Safety Plan (HASP) identifies the requirements to address these requirements.
Washington State Department of Labor and Industries (L&I) Regulations, General Occupational Health Standards	WAC 296-62 General Occupational Health Standards	The rules in this chapter are designed to protect the health of employees and help to create a healthy workplace by establishing requirements to control health hazards.	In order to protect workers, all on site operations associated with investigation and removal of the dross and baghouse dust piles from the warehouse must be conducted in accordance with L&I's General Occupational Health Standards.
Washington State Department of Labor and Industries (L&I) Regulations, Safety Standards for Construction Work	WAC 296-155-426 to 462 Electrical	These sections address electrical safety requirements that are necessary for the practical safeguarding of employees involved in construction work.	In order to protect workers, all on site operations associated with removal of the dross and baghouse dust piles from the warehouse must be conducted in accordance with L&I's Electrical Standards for Construction Work.
Washington State Department of Labor and Industries (L&I) Regulations, Safety Standards for Construction Work	WAC 296-155-475 to 48080 Stairways and Ladders	This part applies to all stairways and ladders used in construction, alteration, repair (including painting and decorating), and demolition workplaces covered under chapter 296-155 WAC, and also sets forth, in specified circumstances, when ladders and stairways are required to be provided.	In order to protect workers, all on site operations associated with removal of the dross and baghouse dust piles from the warehouse must be conducted in accordance with L&I's Stairway and Ladder Standards for Construction Work.
Washington State Department of Labor and Industries (L&I) Regulations, Safety Standards for Construction Work	WAC 296-155-481 to 498 Scaffolds	This part applies to all scaffolds used in used in construction, alteration, repair (including painting and decorating), and demolition workplaces.	In order to protect workers, all on site operations associated with removal of the dross and baghouse dust piles from the warehouse must be conducted in accordance with L&I's Scaffold Standards for Construction Work.
Washington State Department of Labor and Industries (L&I) Regulations, Core Rules	WAC 296-800-290 Portable Ladders: Metal and Wooden	This section states that is the employer's responsibility to make sure the portable ladders in the workplace are used safely and kept in good condition, and provides requirements to accomplish this.	In order to protect workers, all on site operations associated with removal of the dross and baghouse dust piles from the warehouse must be conducted in accordance with L&I's Portable Ladder Standard.
Washington State Department of Labor and Industries (L&I) Regulations	WAC 296-809 Confined Space	This chapter applies to all confined spaces and provides requirements to protect employees from the hazards of entering and working in confined spaces. This chapter applies in any of the following circumstances: 1) There are confined spaces in a workplace, 2) Employees will enter another employer's confined spaces, 3) A contractor will enter confined spaces, and/or 4) An employer provides confined space rescue services.	In order to protect workers, all on site operations associated with removal of the dross and baghouse dust piles from the warehouse must be conducted in accordance with L&I's Confined Space Standard.
Washington State Department of Labor and Industries (L&I) Regulations	WAC 296-817 Hearing Loss Prevention	The purpose of this chapter is to prevent employee hearing loss by minimizing employee noise exposures and make sure employees exposed to noise are protected.	In order to protect workers, all on site operations associated with subsurface investigations with a drill rig removal of the dross and baghouse dust piles from the warehouse must be conducted in accordance with L&I's Hearing Loss Prevention Standard.
Washington State Department of Labor and Industries (L&I) Regulations	WAC 296-841 Respiratory Hazards	It is the employer's responsibility to protect its employees from exposure to respiratory hazards in the workplace. This section requires identification of hazards, notification of employees, and control of hazards (e.g., by engineering controls and respiratory protection).	In order to protect workers, all on site operations associated with investigation and removal of the dross and baghouse dust piles from the warehouse must be conducted in accordance with L&I's Respiratory Hazards Standard.
Washington State Department of Labor and Industries (L&I) Regulations	WAC 296-842 Respirators	This chapter applies to all use of respirators at work. Before an employer decides to require the use respirators, the employer is required to evaluate respiratory hazards and implement control methods as outlined in WAC 296-841, Respiratory Hazards	In order to protect workers, all on site operations associated with investigation and removal of the dross and baghouse dust piles from the warehouse must be conducted in accordance with L&I's Respirator Standard.
Location-Specific			
Coastal Zone Management Consistency	RCW 90.58; WAC 173-27-060; 16 USC 1451-1464;	Construction activities in Washington's 15 coastal counties must obtain a Coastal Zone Management Program Consistency Determination.	A CZM Consistency will be obtained from Ecology as part of the JARPA process.
National Historic Preservation Act	15 CFR 923-930)	The National Historic Preservation Act (NHPA) requires federal agencies to assess the impact of proposed actions on historic or culturally important sites, structures, or objects within the site of the proposed projects. It further requires federal agencies to assess all sites, buildings, and objects on the site to determine if any qualify for inclusion in the National Register of Historic Places (NRHP) or as a National Historic Landmark and if not, document lack of qualification.	A building and drainage ditches on the site must be considered and evaluated to document that thse do not meet preservation criteria of this Act with approval of the State Historical Preservation Office (SHPO)
Historic Site, Buildings and Antiquities Act	16 USC 461-471; 40 CFR 6.301(a)	This act requires that historic sites, buildings, and objects of national significance be preserved, if specified criteria apply	Building on-site which must be evaluated under this Act will be documented as not meeting this criteria with approval of the SHPO.
Endangered Species Act	16 USC 1531-1543, 50 CFR 402	This act protects fish, wildlife and plants that are threatened or endangered (T/E) with extinction. It also protects habitat designated as critical to the conservation of the species and requires consultation with resource agencies for remedial actions that may affect these species.	Proper federal and state agencies have been contacted and no threatened or endangered specifies have been identified at the site. A "no effects" letter will be submitted along with the JARPA application to demonstrate compliance with this requirement.
State Environmental Policy Act	Chapter 197-11 WAC; RCW 4e.21C	The SEPA requirements are triggered for voluntary cleanup actions.	A SEPA application will be (or has been submitted) to address the SEPA requirements.

Table 11
Cleanup Levels for Selected Contaminants of Concern
Maralco Site
Kent, Washington

Contaminant of Concern	Cleanup Level	Standard	Laboratory Method	Detection Limit
Soils (mg/kg)				
Arsenic	20	MTCA Method A	EPA 6020	0.5
Barium	5,600	MTCA Method B	EPA 6020	0.5
Beryllium	0.233	MTCA Method B	EPA 6020	0.5
Cadmium	2	MTCA Method A	EPA 6020	0.5
Chromium	2,000 (total)/19 (hexavalent)	MTCA Method A	EPA 6020/7196A	0.5/0.4
Copper	2,960	MTCA Method B	EPA 6020	0.5
Lead	250	MTCA Method A	EPA 6020	0.5
Manganese	11,200	MTCA Method B	EPA 6020	5
Mercury	2	MTCA Method A	EPA 7471A	0.1
Selenium	400	MTCA Method B	EPA 6020	0.5
Zinc	24,000	MTCA Method B	EPA 6020	5
Sodium	100,000 (combined)	WAC 173-303	EPA 6010	15
Potassium			EPA 6010	15
Chloride			EPA 300.0	4
Diesel-range Petroleum*	2,000	MTCA Method A	NWTPH-Dx	10
Groundwater (ug/l) **				
Aluminum	200	Drinking Water MCL	EPA 6010	250
Arsenic	5	MTCA Method A	EPA 6020	1
Barium	560	MTCA Method B	EPA 6020	10
Beryllium	32	MTCA Method B	EPA 6020	1
Cadmium	5	MTCA Method A	EPA 6020	1
Chromium	50 (total)	MTCA Method A	EPA 6020	1
Copper	592	MTCA Method B	EPA 6020	1
Lead	15	MTCA Method A	EPA 6020	1
Manganese	2,240	MTCA Method B	EPA 6020	1
Mercury	2	MTCA Method A	EPA 6020	1
Selenium	8	MTCA Method B	EPA 6020	1
Zinc	4,800	MTCA Method B	EPA 6020	1
Ammonia ***	6.5	WAC 173-201A	EPA 350.3	100 (as N)
Fluoride	4,000	Drinking Water MCL	EPA 340.2	100
Chloride	250,000	Drinking Water MCL	EPA 300.0	400
Total Dissolved Solids	500	Drinking Water MCL	EPA 160.1	10
Diesel-range Petroleum*	500	MTCA Method A	NWTPH-Dx	250

Notes:
* - Associated with the former UST location only
** - Dissolved metals results will be compared to applicable standards.
*** - No groundwater or drinking water standard available. Cleanup level assumes water temperature of 13 degrees C and 7 pH.

FIGURES



Map created with TOPO!™ © 1997 Wildflower Productions, www.topo.com, based on USGS topographic map

0 0.5 1.0

Scale in Miles

Figure 1

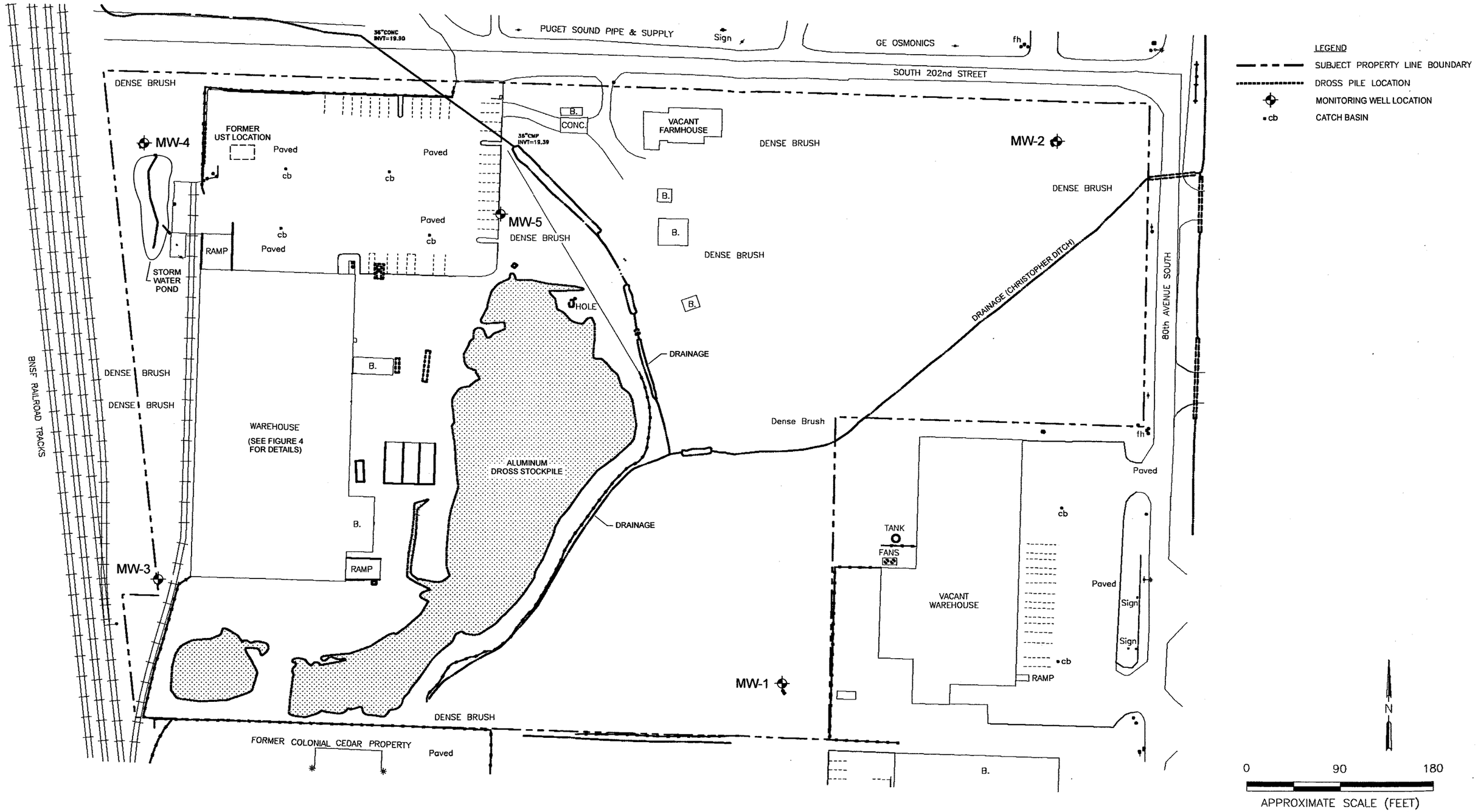
Site Location

Job No. 33757294

URS

Former Maralco Aluminum Site
Kent, Washington

33757294_03.CDR



SOURCE: EMR Incorporated

Note:
Dross stockpile extent based on 1990 topographic survey.
Stockpile was re-graded in 1991.

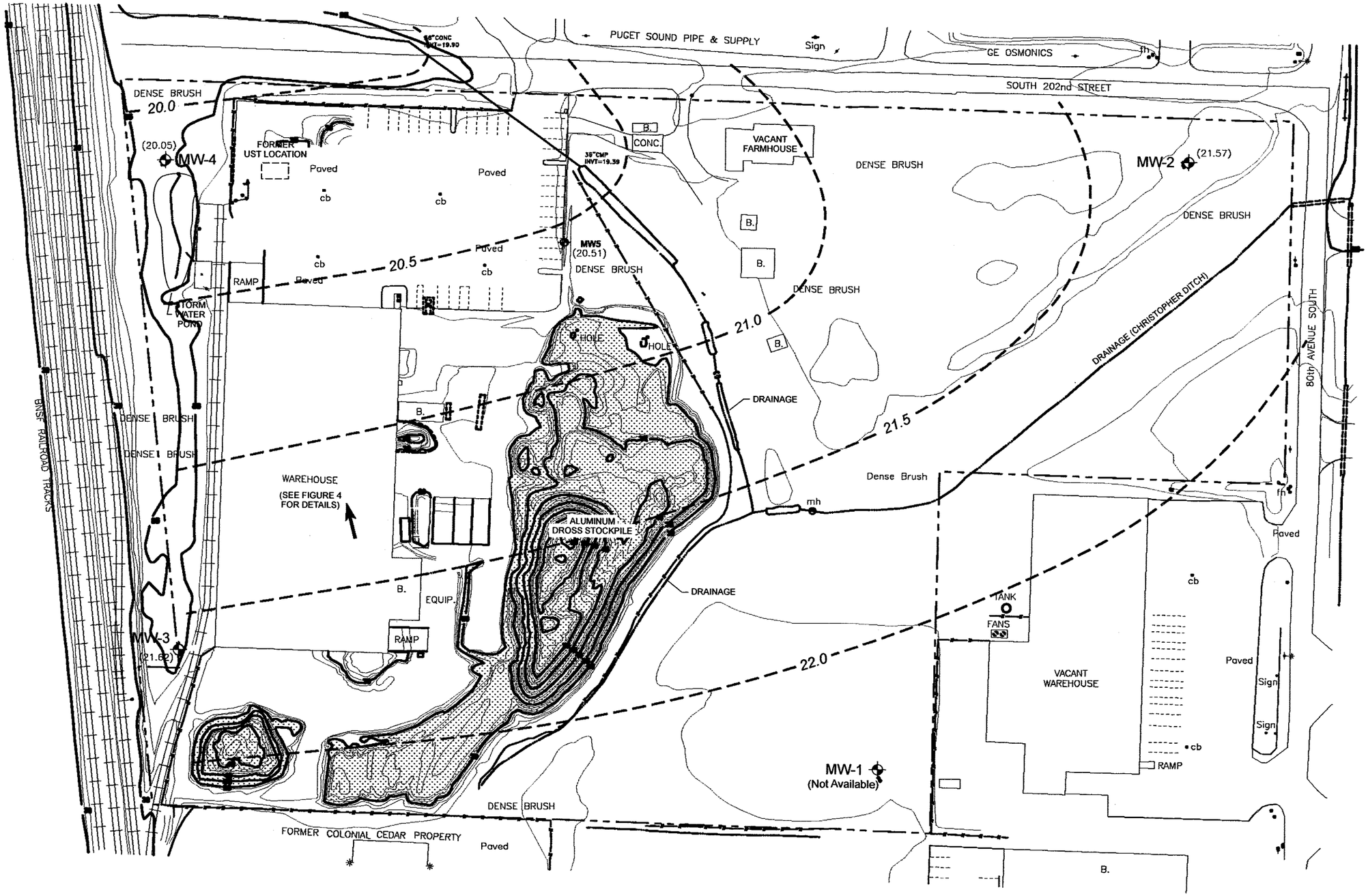
Job No. 33757294

Figure 2
Site Plan

URS

Former Maralco Aluminum Site
Kent, Washington

33757294_04.CDR



SOURCE: EMR Incorporated

Note:
Dross stockpile extent based on 1990 topographic survey.
Stockpile was re-graded in 1991.

Job No. 33757294

Figure 3
April 2003 Groundwater Potentiometric Map

URS

Former Maralco Aluminum Site
Kent, Washington

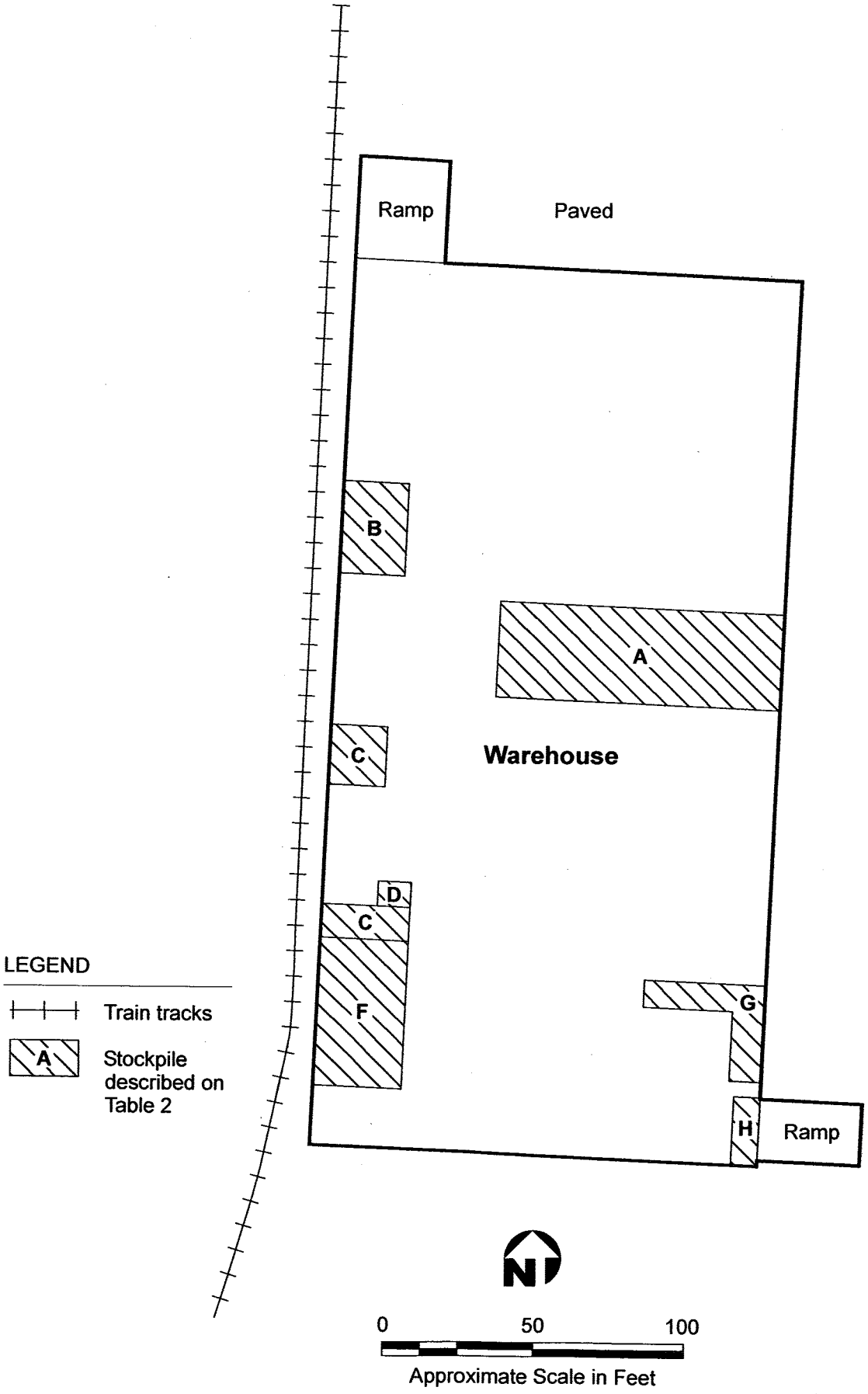


Figure 4

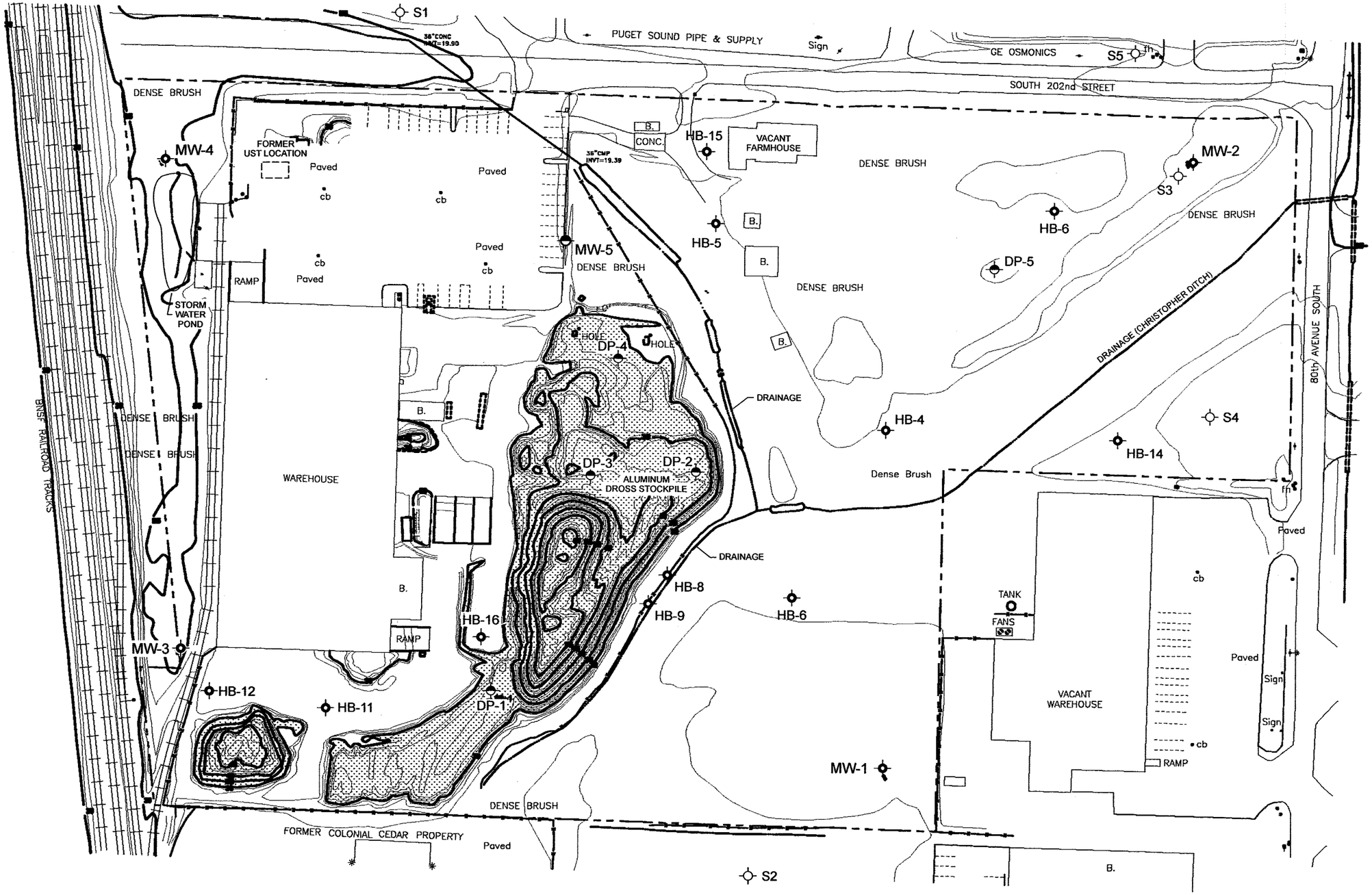
Warehouse Waste Stockpiles

Job No. 33757294

URS

Former Maralco Aluminum Site
Kent, Washington

33757294_06.CDR



SOURCE: EMR Incorporated

Note:
Dross stockpile extent based on 1990 topographic survey.
Stockpile was re-graded in 1991.

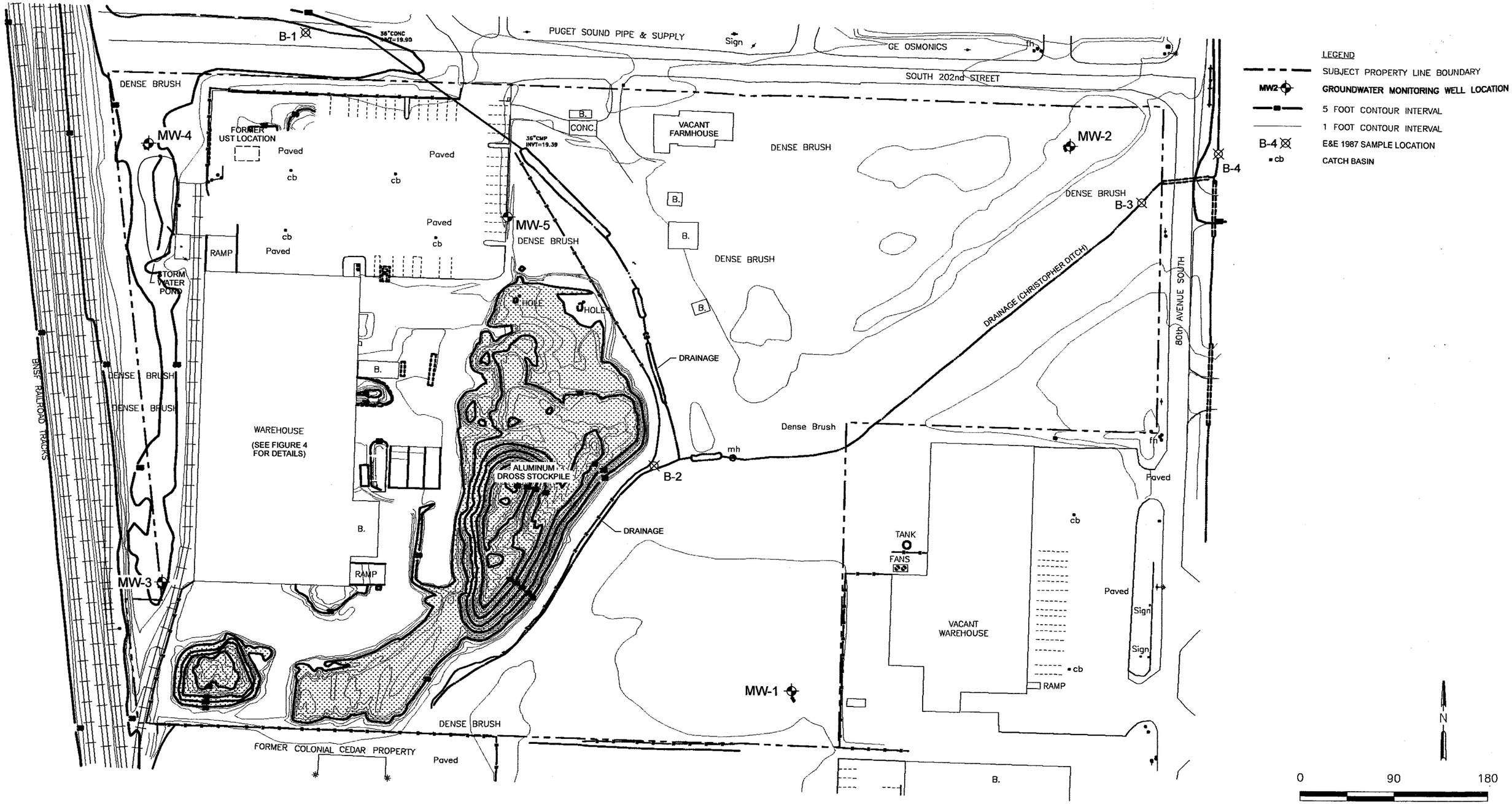
Job No. 33757294

Figure 5
Soil Sample Locations

Former Maralco Aluminum Site
Kent, Washington

URS

33757294_05.CDR



LEGEND

- SUBJECT PROPERTY LINE BOUNDARY
- MW2 GROUNDWATER MONITORING WELL LOCATION
- 5 FOOT CONTOUR INTERVAL
- 1 FOOT CONTOUR INTERVAL
- B-4 E&E 1987 SAMPLE LOCATION
- cb CATCH BASIN

N

0 90 180

APPROXIMATE SCALE (FEET)

SOURCE: EMR Incorporated

Note:
Dross stockpile extent based on 1990 topographic survey.
Stockpile was re-graded in 1991.

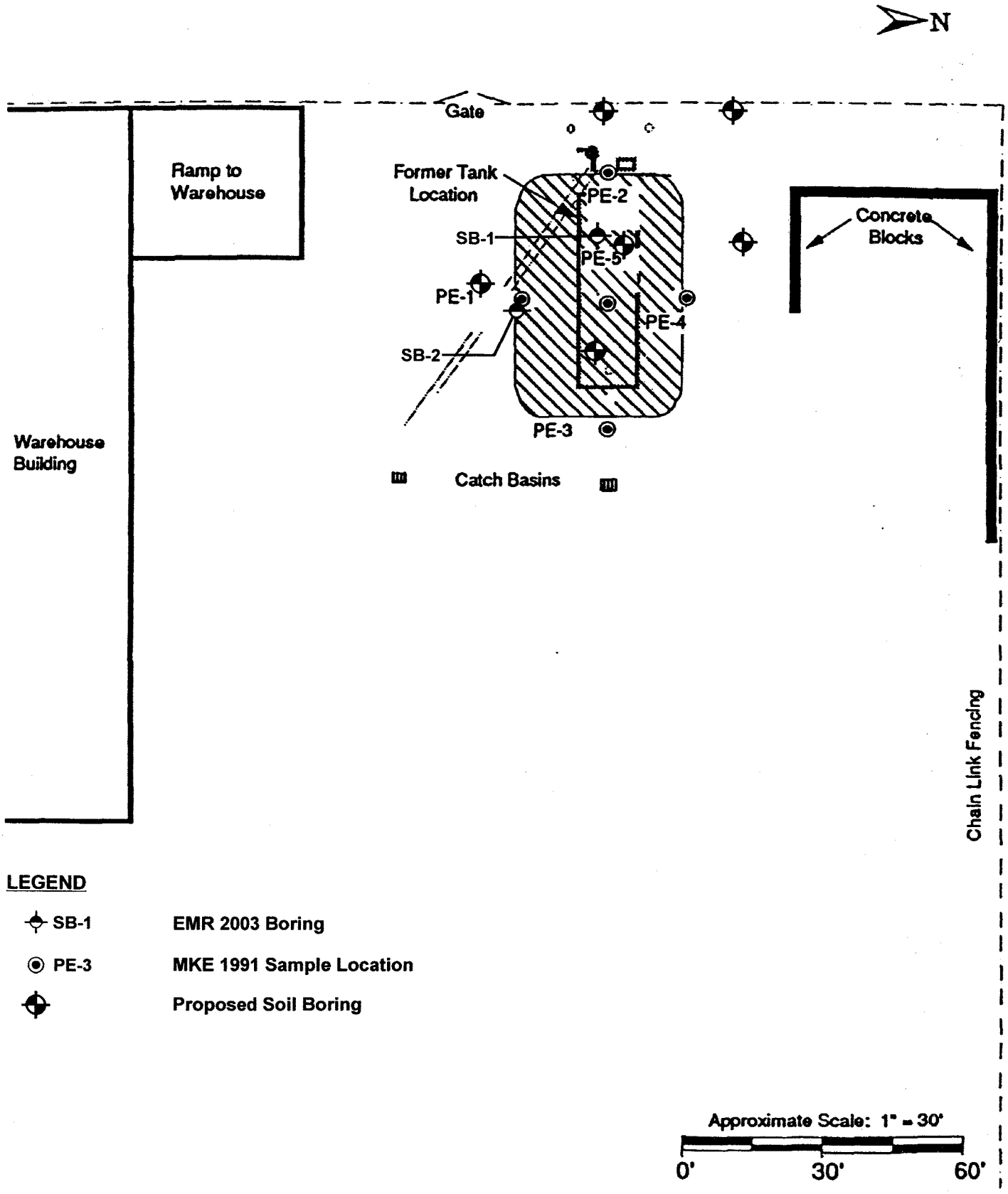
Job No. 33757294

URS

Figure 6
Sediment Sample Locations

Former Maralco Aluminum Site
Kent, Washington

33757294_07.cdr



SOURCE: Enviros, 1998

Job No. 33757294

Figure 7

Former UST Sample Locations

URS

Former Maralco Aluminum Site
Kent, Washington

APPENDIX A

APPENDIX A

FORMER UST AREA SAMPLING MEMORANDUM AND DOCUMENTATION, EMR, 2003

EMR, Inc.

Memo

To: Christina Merten

From: Dave Welch

CC: Don Clabaugh

Date: 1/27/2003

Re: Maralco Investigation

Summary of Work Activities: Week of January 20-24, 2003

This memo summarizes field activities conducted at the Maralco Investigation site in Kent, WA.

Tuesday, January 21, 2003:

Met with Christina Merten to discuss my responsibility to oversee drilling operations at the site the following day. Calibrate field equipment, including PID and pH/temperature meters. Download soil boring log, monitoring well construction, groundwater development and groundwater sampling forms from the technical group directory on the server. Copy forms onto write-in-the-rain paper.

Wednesday, January 22, 2003

Meet Cascade Drilling on-site at 7:45 am. Weather is rainy. Hold tailgate safety meeting and discuss contents of HASP. All field personnel sign the tailgate meeting acknowledgement form.

Monitoring Well MW-5 Installation

Using 9-inch diameter hollow stem augers, drill soil boring north of the dross pile and complete as monitoring well MW-5. Encounter groundwater at 7.5 feet depth below ground surface. Drill to 15 feet depth; sample to 16 ½ feet depth. Soils are brown, dense silty sands (SM) grading into poorly graded, dark brown, loose fine sands (SP). Complete well using 10 feet of 2-inch diameter PVC screen (.010") flush threaded to 5 feet of blank PVC. Place 2-12 sand pack from 15 feet to 4 feet depth, install a 1 foot thick bentonite chip seal to 3 feet depth and concrete seal to the surface. Install a flush-mounted well monument at the surface.

Soil Borings SB-1 and SB-2

After the well was installed, Cascade Drilling drilled two soil borings through surface asphalt in the vicinity of the former diesel UST in the northwest portion of the property. Soil boring SB-1 was drilled to 15 feet depth in the center of the former diesel UST field. There was a hydrocarbon odor and visible sheen at the 5-foot interval but negligible readings on the PID. These low readings may have been at least partially due to the wet and cold factor. Groundwater was encountered at approximately 7.5 feet below ground surface during drilling. Soils encountered in soil boring SB-1 were poorly graded coarse gravels. While attempting to collect the 10-foot interval sample, the steel shoe off the split-spoon sampler was lost down the boring. The driller was not able to retrieve the shoe but was able to kick off of this point and continue down to 15 feet depth. For this reason, there was no sample recovery at 10 feet. A grab groundwater sample was collected with a disposable bailer through the augers at the completion of the boring before backfilling with bentonite chip.

Soil boring SB-2 was advanced to a depth of 15 feet off the south edge of the excavation in the vicinity of a previous soil sample that contained 6,300 ppm diesel TPH. There was a trace hydrocarbon odor and no visible sheen observed

in soil recovery from this boring. There were no detectable PID readings. Soil samples were collected at the 5, 10 and 15 feet intervals. A grab groundwater sample was collected with a disposable bailer through the augers at the completion of the boring before backfilling with bentonite chip. Soil cuttings were placed in open top 55-gallon steel drums. Two drums were used for the two soil borings, one filled and the second half-filled.

Well development-Well MW-5:

After Cascade Drilling leaves site, proceed to develop well MW-5. The original intention was to develop the well using a purge pump. As there was not sufficient battery power to pull sufficient hydrostatic head through the tubing to the surface, a disposable bailer was used instead to develop the well. Ten gallons of water were bailed from the well. It was observed that this bailing did remove the bulk of the coarse fraction of suspended solids from the well. All water was placed in an open top 55-gallon steel drum. The soil and purge water drums were placed on the east side of the paved lot.

Thursday, January 23, 2003

Arrived on site at approximately 9:30 am to oversee air monitoring operations of two Rupert, Inc. personnel who were on-site conducting structural analysis of the tilt slab concrete warehouse building. Weather warm and partly cloudy. Hold tailgate safety meeting upon arrival. After tailgate safety meeting, it is agreed that EMR will monitor Rupert personnel for potential airborne lead dust that may be encountered during their analysis. Dave Welch of fit Mr. Jeff Baker of Rupert, Inc. with a 37 mm glass ester filter cassette and low flow air pump that Mr. Baker wore during the analysis. In addition to air monitoring, EMR issued a dust mask respirator both of the Rupert personnel. These dust mask respirators were capable of removing 95% of particulates down to 5 microns. A second high flow air sample was set up inside the building. The high volume pump was powered by Rupert's generator that had been brought on-site to power halogen lights to illuminate the inside of the structure.

After setting up and running the air samples, I proceeded to locate monitoring wells MW-3 (SW corner of property) and MW-4 (NW corner of property). Well MW-4 is accessed by dropping down to the drainage ditch from the asphalt lot in the NW corner of the property, slogging through 6-inches of standing water and then stepping onto a slight hill above the drainage ditch. The well monument has a 3' foot high steel stick-up monument.

The balance of the day was spent searching for wells MW-1 (SE corner of property) and MW-2 (NE corner of property). A swath radius of approximately 10-15 feet was cleared within the blackberry brambles around each expected location of the two flush-mounted wells using a machete. A metal detector was used to locate the monument lids but neither well was found.

Friday, January 24, 2003

Arrived on site with Ms. Christina Merten of EMR to collect water samples from groundwater monitoring wells MW-3, MW-4 and newly installed MW-5. Weather upon arrival through the day was overcast to rainy. Locate wells and take off well caps to allow pressure to equalize in the well. Prepare sample labels and groundwater sampling forms for the wells while Ms. Merten collected depth to groundwater and depth to bottom of well data. Depth to groundwater is approximately 2.68 to 5.75 feet below top of well casing.

Prior to water sampling, 15 gallons of water were purged from each of wells MW-3 and MW-4, while 10 gallons of water were purged from well MW-5. All purging was conducted using disposable bailers. The groundwater purged from wells MW-2 and MW-3 was discolored brown but not turbid. The water purged from well MW-5 was turbid. Immediately after purging, waster samples were collected.

Prior to leaving the site, EMR personnel attempted to locate monitoring well MW-2 in the northwest corner of the property. A "pulaski" tool was used to chop the surface soil near the 55-gallon drums and the monument was found. After approximately 2-inches of overlying soil were removed, the monument lid was unbolted and removed to reveal the PVC well casing and well cap submerged in approximately 6-inches of standing water. This water was bailed off using a sample jar, the well cap removed and the well allowed to vent to equalize pressure. After pressure equalization, depth to water and bottom of well were recorded. Then approximately 12 gallons of water were purged from the well using a disposable bailer. Immediately following purging, water samples were collected. In addition, a duplicate water sample set was collected for laboratory QA/QC.

VISUAL CLASSIFICATION OF SOILS

EMR INCORPORATED
ENVIRONMENTAL MANAGEMENT RESOURCES

EMR Project Name: MARALCO INVESTIGATION
EMR Project Number: 6070.001-1
Note:

Drilling Information
Drilling Contractor: CASCADE
Drilling Method: HOLLOWSTEM AUGER
Drillers Name: JAMES GOBEL
Borehole Diameter: 9"
Sampler Type: SPLIT-SPOON

Event Information

Logged by: D. WELCH
Boring Depth: 16½' (SAMPLED) 15' (DRILLED)
GW Encountered 7.5'
Static GW Level: 7.5'
Location: INSIDE FORMER DIESEL UST FIELD

Boring #: SB-1
MW #:
Surface Elevation:
Start time/date: 1-22-03 10:30A
End time/date: 1-22-03 11:00A

Depth (ft)	Sample Interval	Sample Recovery	Evacuation Rate	Groundwater	PID/FID Readings	GC Reading	Graphic Log	USCS Classification	Soil Classification/ Description
0									3" OF ASPHALT
1	0-4							GP	COARSE GRAVEL, MOIST
2									
3									
4		7							BROWN, MEDIUM DENSE
5	4-8	12			8.0			GW	SANDY GRAVEL, WET HYDROCARBON ODOR, VISIBLE SHEEN
6		15							
7				▽					GROUNDWATER ENCOUNTERED AT 7.5'
8									
9									
10	8-12	50/6"						SP	NO RECOVERY. LOST SPLIT SPOON SHOE DOWN HOLE. GO TO 15' AND SAMPLE
11									

Boring Number:	0	Project :	Project #:	0

Depth (ft)	Sample Interval	Sample Recovery	Evacuation Rate	Ground water	PID/FID Readings	GC Reading	Graphic Log	USCS Classificatio	Soil Classification/ Description
12	12-16'	4+4			2			SP	DARK BROWN LOOSE FINE SAND, TRACE VISIBLE SHEEN AND HYDROCARBON ODOR
13									
14									
15									
16	16-20'								* END OF BORING AT 16.5' (SAMPLES DEPTH) DRILLED DEPTH AT 15'. FILL WITH BENTONITE CHIP.
17									
18									* NOTE COLLECT GRAB GROUNDWATER SAMPLE THROUGH HOLLOW STEM AUGER PRIOR TO BACKFILLING BORING. COLLECT SAMPLE WITH DISPOSABLE BAILER.
19									
20	20-24'								
21									
22									
23									
24	24-28'								
25									
26									
27									

VISUAL CLASSIFICATION OF SOILS

EMR INCORPORATED
ENVIRONMENTAL MANAGEMENT RESOURCES

EMR Project Name: MARALCO INVESTIGATION
EMR Project Number: 6070.001-1
Note:

Drilling Information
Drilling Contractor: CASCADE
Drilling Method: HOLLOW-STEM AUGER
Drillers Name: JAMES GOBEL
Borehole Diameter: 9"
Sampler Type: SPLIT-SPOON

Event Information

Logged by: D. WELCH
Boring Depth: 16½' (SAMPLED) 15' (DRILLED)
GW Encountered 7.5'
Static GW Level: 7.5'
Location: S. EDGE OF FORMER DIESEL UST FIELD

Boring #: SB-2
MW #:
Surface Elevation:
Start time/date: 1-22-03 11:00A
End time/date: 1-22-03 11:30A

Depth (ft)	Sample Interval	Sample Recovery	Evacuation Rate	Groundwater	PID/FID Readings	GC Reading	Graphic Log	USCS Classification	Soil Classification/ Description
0									3" OF ASPHALT
1	0-4							GW	BROWN COARSE SANDY GRAVEL, MOIST, NO HYDROCARBON ODOR
2									
3									
4									
5	4-8	3 2 3			0.6			SM	BROWN, LOOSE SILTY FINE SAND, DAMP TRACE HYDROCARBON ODOR, NO VISIBLE SHEEN
6									
7				▽					GROUNDWATER ENCOUNTERED AT 7.5'
8									
9	8-12	3 3 3			0.0			SP	BROWN, LOOSE FINE SAND, WET, NO HYDROCARBON ODOR, NO VISIBLE SHEEN
10									
11									

Boring Number:	0	Project :	Project #:	0

Depth (ft)	Sample Interval	Sample Recovery	Evacuation Rate	Ground water	PID/FID Readings	GC Reading	Graphic Log	USCS Classificatio	Soil Classification/ Description
12									
13	12-16'							SP	BROWN, LOOSE FINE SAND, SATURATED NO VISIBLE SHEEN, NO HYDROCARBON ODOR
14									
15		WWW			0.0				
16									*END OF BORING (SAMPLED @ 16.5'. DRILLED DEPTH = 15'. FILL WITH BENTONITE CHIPS
17									
18	16-20'								
19									
20									* NOTE: COLLECT GRAB GROUNDWATER SAMPLE THROUGH HOLLOW-STEM AUGER PRIOR TO BACK-FILLING BORING. COLLECT SAMPLE WITH DISPOSABLE BAILER.
21	20-24'								
22									
23									
24									
25									
26	24-28'								
27									

VISUAL CLASSIFICATION OF SOILS

EMR INCORPORATED
ENVIRONMENTAL MANAGEMENT RESOURCES

EMR Project Name: MARALCO INVESTIGATION
EMR Project Number: 6070.001-1
Note:

Drilling Information
Drilling Contractor: CASCADE
Drilling Method: HOLLOW STEM AUGER
Drillers Name: JAMES GOBEL
Borehole Diameter: 9"
Sampler Type: SPLIT SPOON

Event Information

Logged by: D. WELCH
Boring Depth: 16½' (SAMPLED); 15' (DRILLED)
GW Encountered 7.5'
Static GW Level: 7.5'
Location: OFF PAVED LOT N. OF DROSS PILE

Boring #: MW-5
MW #: MW-5
Surface Elevation:
Start time/date: 1-22-03 9:00A
End time/date: 1-22-03 9:30A

Depth (ft)	Sample Interval	Sample Recovery	Evacuation Rate	Groundwater	PID/FID Readings	GC Reading	Graphic Log	USCS Classification	Soil Classification/ Description
0	0-4							SM	BROWN SILTY SAND, TRACE COARSE GRAVEL, MOIST
1									
2									
3									
4	4-8	13							
5		15			0			SM	BROWN, DENSE SILTY SAND, DAMP
6		17							
7				▽					GROUNDWATER ENCOUNTERED AT 7.5'
8	8-12								
9		2						SP	LOOSE DARK BROWN FINE SAND TRACE MEDIUM SAND, WET
10		2			0				
11		2							

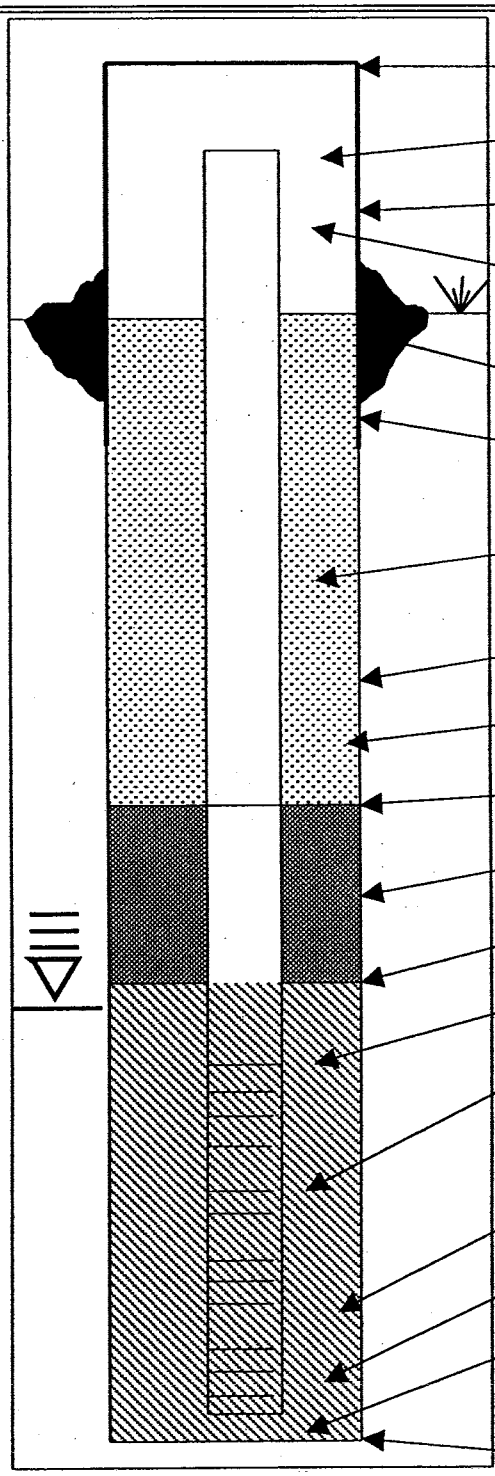
Boring Number: MW-5 Project: MARALCO Project #: 6070.001-1

Depth (ft)	Sample Interval	Sample Recovery	Evacuation Rate	Ground water	PID/FID Readings	GC Reading	Graphic Log	USCS Classificatio	Soil Classification/ Description
12	12-16'	4 6 6			0			SP	DARK BROWN MEDIUM DENSE FINE SAND, SATURATED
13									
14									
15									
16	16-20'								BOTTOM OF BORING @ 15'. SAMPLED DEPTH @ 16½'
17									
18									INSTALL 2" MONITORING WELL
19									
20	20-24'								
21									
22									
23									
24	24-28'								
25									
26									
27									

WELL CONSTRUCTION LOG

EMR INCORPORATED
ENVIRONMENTAL MANAGEMENT RESOURCES

Date	1-22-03	Driller	CASCADE
Project	MARALCO	Drilling License	
Project No.	6070.001-1	Drilling Method	HOLLOW STEM AUGER
Location	N. OF DROSS PILE	Developement Method	
Boring I.D.	MW-5		DISPOSABLE BAILER
Elevation		Static Water Level	7.5'
Geologist	D. WELCH		



Elevation of top of Casing: SURVEY

Elevation of top of Riser Pipe: SURVEY

Stick - up top of Protective Casing: NONE

Stick - up Riser Pipe: NONE

Type of Surface Seal: CONCRETE

I.D. of Surface Casing: 8"

Type of Surface Casing: MONUMENT (FLUSH)

I.D. of Riser Pipe: 2"

Type of Riser Pipe: PVC

Borehole Diameter 9"

Type of Backfill: CONCRETE

Depth of Top of Seal: 2'

Type of Seal: BENTONITE CHIP

Depth to top of Sand Pack: 4'

Depth to top of Screen: 5'

I.D. of Screen 2"

Type of Screen: PVC

Slot size & Length 0.01" ≠ 10'

Type of Sand Pack: 2-12

Depth to bottom of Screen: 15'

Depth to bottom of sand pack: 16.5' (SAMPLED)

Type of Backfill below Observation Well: SILTY SAND

Depth of Hole 16.5' (SAMPLED)

EMR INCORPORATED
ENVIRONMENTAL MANAGEMENT RESOURCES

WELL DEVELOPMENT FORM

PROJECT NAME: MARALCO INVESTIGATION		PROJECT #: 6070.001-1
LOCATION: N. OF DROSS PILE ON E. SIDE OF PAVED LOT		
SAMPLING POINT: MW-5		
SAMPLE ID:	DATE:	TIME:
WELL DEPTH: 15'	CASING DIAMETER: 2"	
DEPTH TO WATER: 7.5'	DATE: 1-22-03	TIME: 12:30
DISCHARGE RATE =	gpm x 0.00223 =	cfs.
PUMP INTAKE OR BAILER SET AT:	FT. BELOW MP	
SAMPLE APPEARANCE: TURBID	ODOR: NONE	
NOTE ANY SAMPLING PROBLEMS: PURGE PUMP NOT WORKING CORRECTLY		
NOTE ANY CLEANUP PERFORMED IN FIELD:		

EVACUATION / STABILIZATION TEST DATA

TIME	pH	SPECIFIC CONDUCTANCE (umhos/cm)	TEMPERATURE (C)	WATER LEVEL (ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)
12:40	5.7	N/A	10.7		2	
12:50	6.3	N/A	10.7		4	
13:00	6.6	N/A	10.8		6	
13:10	6.9	N/A	10.7		8	
13:20	6.9	N/A	10.8		10	

PUMPING START TIME:	WATER LEVEL:
PUMPING STOP TIME:	WATER LEVEL:

COMMENTS: PURGE PUMP NOT WORKING. DEVELOP WELL USING DISPOSABLE BAILER

FORM COMPLETED BY: David L. Welch

GROUNDWATER COLLECTION LOG

EMR INCORPORATED
ENVIRONMENTAL MANAGEMENT RESOURCES

DATE: 1-24-03
PROJECT NAME: MARALCO
PROJECT NUMBER: 6070.001-1
SAMPLE LOCATION: NW
SAMPLE ID: MW-4-1-24-03

WELL DIMENSIONS
Static Water Level (ft): 4.17' TIME 11:30
Filter Pack Thickness (ft):
Well Depth (ft): 18.15'
Well Diameter (in): 2
Casing Diameter (in): 2
Screened Interval (in): 2
T.O.C 25.01
Water El 20.37

PURGE CALCULATIONS
Standing Water Column (ft): 14'
1 Casing Volume (gal):
1 Well Volume (gal): 2.4 GALS
Filter Pack Saturated Thickness (ft):
Filter Pack Volume (gal):
Recommended purged volume: 15 GALS

SAMPLING INFORMATION
TIME 12:45
Analytical Parameters:
Previous Event
GW depth:
Elevation:
DO:
Eh:
Cond.:
pH:

SAMPLING INSTRUMENTATION
pH: ✓
D.O.:
Conductivity:
Eh:
Turbidity:
TEMP ✓

WATER QUALITY MEASUREMENTS

PURGED VOLUME (gal)	pH	SPECIFIC CONDUCTANCE UMHOS/CM	TEMPERATURE C	TIME	COMMENTS	INITIALS
						JDLW

Note Any Sampling Problems:

14
.17
9 3
0
1 4
2 3 3

GROUNDWATER COLLECTION LOG

EMR INCORPORATED
ENVIRONMENTAL MANAGEMENT RESOURCES

DATE: 1-24-03

PROJECT NAME: MARAL Co INVESTIGATION

PROJECT NUMBER: 6070.005-1

SAMPLE LOCATION: N. of DROSS PILE

SAMPLE ID: MW-5-1-24-03

WELL DIMENSIONS

TIME 11:50

Static Water Level (ft): 5.75
Filter Pack Thickness (ft): 11
Well Depth (ft:) 15.2
Well Diameter (in): 2
Casing Diameter (in): 2
Screened Interval (in): 2

PURGE CALCULATIONS

Standing Water Column (ft):
1 Casing Volume (gal):
1 Well Volume (gal):
Filter Pack Saturated Thickness (ft):
Filter Pack Volume (gal):
Recommended purged volume: 10

SAMPLING INFORMATION

TIME 13:30

Analytical Parameters:
Previous Event
GW depth:
Elevation:
DO:
Eh:
Cond.:
pH:

SAMPLING INSTRUMENTATION

pH:
D.O.:
Conductivity:
Eh:
Turbidity:

WATER QUALITY MEASUREMENTS

PURGED VOLUME (gal)	pH	SPECIFIC CONDUCTANCE UMHOS/CM	TEMPERATURE C	TIME	COMMENTS	INITIALS
						DLW

Note Any Sampling Problems:

GROUNDWATER COLLECTION LOG

EMR INCORPORATED
ENVIRONMENTAL MANAGEMENT RESOURCES

DATE: 1-24-03

PROJECT NAME: MARALCO INVESTIGATION

PROJECT NUMBER: 6070.001-1

SAMPLE LOCATION: SW CORNER

SAMPLE ID: MW-3-1-24-03

WELL DIMENSIONS

		TIME
Static Water Level (ft):	2.68'	11.40
Filter Pack Thickness (ft):		
Well Depth (ft):	16.75'	T.O.C 24.81'
Well Diameter (in):	2	
Casing Diameter (in):	2	
Screened Interval (in):	2	Water Elev. 22.13'

PURGE CALCULATIONS

Standing Water Column (ft):	14
1 Casing Volume (gal):	2.4 GAL
1 Well Volume (gal):	
Filter Pack Saturated Thickness (ft):	
Filter Pack Volume (gal):	
Recommended purged volume:	15 GAL

SAMPLING INFORMATION

	TIME
Analytical Parameters:	
Previous Event	13:00
GW depth:	
Elevation:	
DO:	
Eh:	
Cond.:	
pH:	

SAMPLING INSTRUMENTATION

pH:	✓
D.O.:	
Conductivity:	
Eh:	
Turbidity:	
TEMP:	✓

WATER QUALITY MEASUREMENTS

PURGED VOLUME (gal)	pH	SPECIFIC CONDUCTANCE UMHOS/CM	TEMPERATURE C	TIME	COMMENTS	INITIALS
						DLW

Note Any Sampling Problems:

GROUNDWATER COLLECTION LOG

EMR INCORPORATED
ENVIRONMENTAL MANAGEMENT RESOURCES

DATE: 1/24/03
PROJECT NAME: Maralco Invest.
PROJECT NUMBER: 6070.001-1
SAMPLE LOCATION: MW-2
SAMPLE ID: MW-2-1-24-03

WELL DIMENSIONS
Static Water Level (ft): 4.71' TIME 14:55
Filter Pack Thickness (ft): 16.2'
Well Depth (ft:)
Well Diameter (in): 2
Casing Diameter (in): 2
Screened Interval (in): 10
TOC 26.99
Water Elev 22.28

PURGE CALCULATIONS
Standing Water Column (ft):
1 Casing Volume (gal):
1 Well Volume (gal):
Filter Pack Saturated Thickness (ft):
Filter Pack Volume (gal):
Recommended purged volume: +5 gal 12

SAMPLING INFORMATION sampled @ 15:20
Analytical Parameters:
Previous Event
GW depth:
Elevation:
DO:
Eh:
Cond.:
pH:

SAMPLING INSTRUMENTATION
pH:
D.O.:
Conductivity:
Eh:
Turbidity:

WATER QUALITY MEASUREMENTS

PURGED VOLUME (gal)	pH	SPECIFIC CONDUCTANCE UMHOS/CM	TEMPERATURE C	TIME	COMMENTS	INITIALS

Note Any Sampling Problems:

GROUNDWATER COLLECTION LOG

EMR INCORPORATED
ENVIRONMENTAL MANAGEMENT RESOURCES

DATE:

PROJECT NAME:

PROJECT NUMBER:

SAMPLE LOCATION :

SAMPLE ID:

WELL DIMENSIONS
Static Water Level (ft):
Filter Pack Thickness (ft):
Well Depth (ft:)
Well Diameter (in):
Casing Diameter (in):
Screened Interval (in):

PURGE CALCULATIONS
Standing Water Column (ft):
1 Casing Volume (gal):
1 Well Volume (gal):
Filter Pack Saturated Thickness (ft):
Filter Pack Volume (gal):
Recommended purged volume:

SAMPLING INFORMATION
Analytical Parameters:
Previous Event
- GW depth:
- Elevation:
- DO:
- Eh:
- Cond.:
- pH:

SAMPLING INSTRUMENTATION
pH:
D.O.:
Conductivity:
Eh:
Turbidity:

WATER QUALITY MEASUREMENTS

PURGED VOLUME (gal)	pH	SPECIFIC CONDUCTANCE UMHOS/CM	TEMPERATURE C.	TIME	COMMENTS	INITIALS

Note Any Sampling Problems:

CASCADE DRILLING DAILY WORK REPORT

P.O. Box 1184 · Woodinville, WA 98072 · 425-485-8908
6400 SE 101st Ave., Unit 2-D · Portland, OR 97266 · 503-775-4118

CLIENT: EMR | **PROJECT NO.:** Malarico 6070.001-1 | **DATE:** 11/22/03 | **DAY:** Wed.

JOB LOCATION: 7730 S. 202nd St. (Kent) | **C.D.I. JOB#:** 3037

HOURS START	HOURS STOP	DESCRIPTION OF WORK (Please explain reasons for all Down Time and Stand-by Time. Please enter Client and State hole numbers.)	FOOTAGE DRILLED HOLE #	DRILLING	TRAVEL TO/FROM JOB SITE	OTHER CLEAN-UP GROUTING DECON	STAND BY DEVELOPING MOVE DRUMS	NON CHARGEABLE DOWN TIME	NON CHARGEABLE SHOP
6:00	6:30	A.M. SHOP TIME							.5
6:30	7:30	TRAVEL TO SITE			1.0				
7:30	8:30	Site Walk Health/Safety Meeting Set up Equip.				1.0			
8:30	9:30	Drill, Sample, Install 1-15' 2"	15'	1.0					
9:30	10:30	Set 1-8" Box Driven Mode + Set up				1.0			
10:30	11:00	Drill Sample, Backfill 2-15' Borings	30'	1.5					
11:00	11:30	Finish Holes, Decon Clean up				.5			
11:30		Travel							
		TRAVEL TO SHOP							
		P.M. SHOP TIME							
		TOTAL CHARGEABLE RIG HOURS							

EQUIPMENT

DRILL RIG #	861	GROUT MIXER	
SUPPORT TRUCK #	13	GROUT PUMP	
SUPPORT TRUCK #		COMPRESSOR/JACK HAMMER	
DECON TRAILER	3	SERVICE RUNS	
VAC TRUCK		CONTINUOUS SAMPLER	
BOBCAT		PERISTALTIC PUMP	
FORKLIFT		HYDROPUNCH	
# CORE CUTS		AUTO HAMMER #	
# BULLDOG CUTS			

LABOR

CREW WITH PERDIEM | CHARGEABLE EXTRA LABOR HRS.

NAME	SIGNATURE	SHOP HRS.	DRILL HRS.	OTHER HRS.	TOTAL HRS.
James					
Dave					
Donna					

CASING	DIA 2	DIA 4
TYPE ___ SLOT		
20 FT. SCREEN		
10 FT. SCREEN	1	
5 FT. SCREEN		
20 FT. BLANK		
10 FT. BLANK		
5 FT. BLANK	1	
5 FT. PP SCREEN		
10 FT. PP SCREEN		
SLIP CAP		
THREADED CAP	1	
LOCKING CAPS	1	
DRIVE SHOE		
CENTRALIZERS		
LOCKS		

MATERIALS

ITEM	QTY.	ITEM	QTY.
SAND	41	WELL COVER 8"	1
READY MIX	17	WELL COVER 12"	
QUICK SET		MONUMENT CASING	
PORTLAND	1	BOLLARDS	
BENTONITE GROUT		SOIL DRUMS	2
BENTONITE CHIPS	15	DEVELOPMENT DRUMS	1
BENTONITE POWDER		DECON DRUMS	
BENTONITE PELLETS		HOLE COVER PLATES	
SAMPLER TUBES		TRAFFIC CONTROL	
SHELBY TUBES		PLASTIC SHEETING	
L.B. LINERS		CORE BOXES	
PROBE POINTS		PLYWOOD	
GW PROBE POINTS		# SOIL SAMPLES	9
MACRO LINERS		# WATER SAMPLES	
SAMPLER SHOE		# HYDROPUNCH SAMPLES	

REMARKS

DIG ALERT # | **DEPTH TO WATER**

CLIENT SIGNATURE X | OPERATOR SIGNATURE

Chain of Custody

Page _____ of _____

OnSite Environmental Inc.
14648 NE 95th Street • Redmond, WA 98052
Fax: (425) 885-4603 • Phone: (425) 883-3881

Turnaround Request (in working days)

(Check One)

☐ Same Day ☐ 1 Day

☐ 2 Day ☐ 3 Day

☒ Standard (Hydrocarbon analyses: 5 days, All other analyses: 7 days)

☐ _____ (other)

Company: EMR

Project No.: 6070.001-1

Project Name: Marlco

Project Manager: Christina Morton

Project Chemist:

Laboratory No.

Requested Analysis

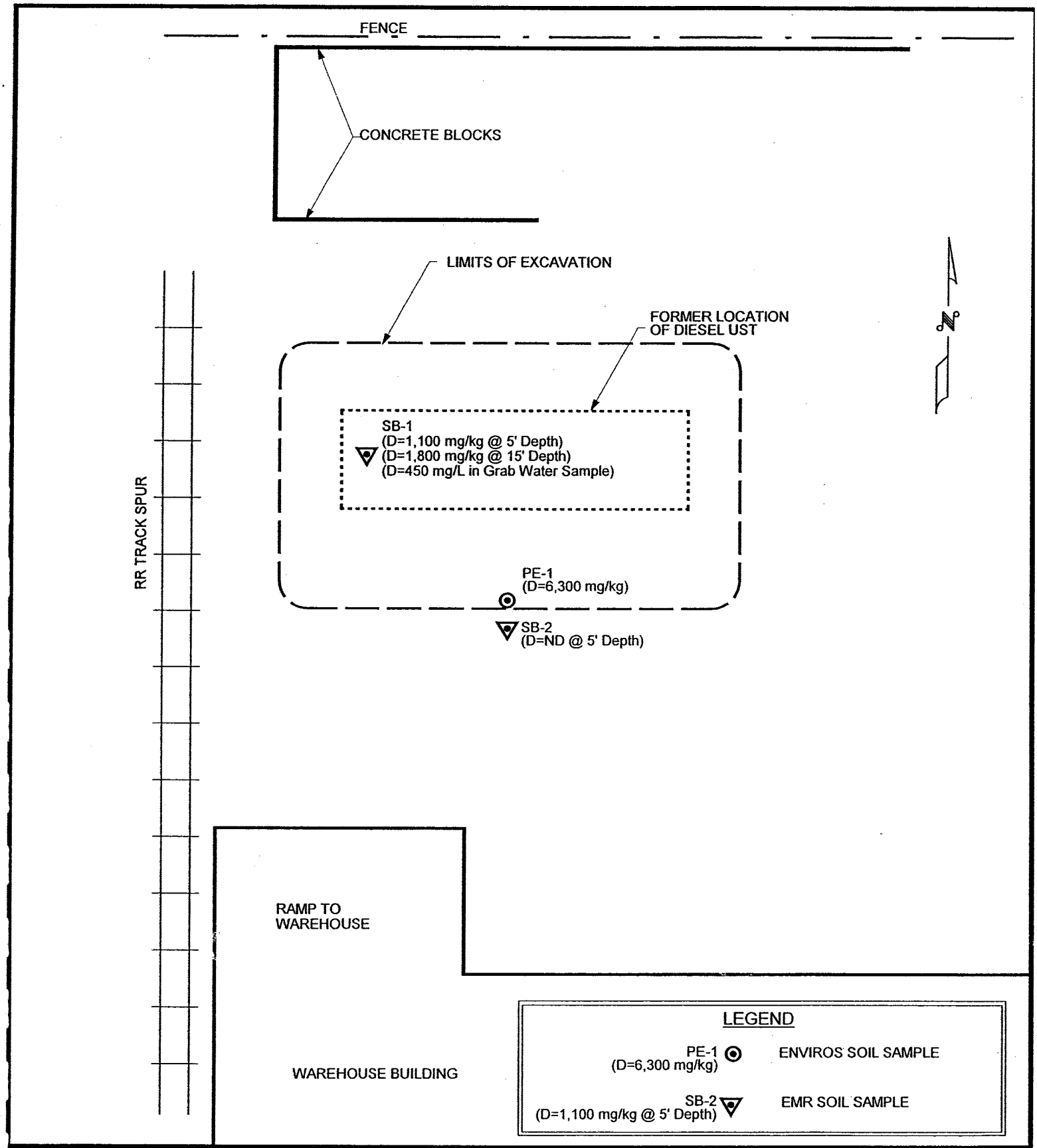
Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Dx	Volatiles by 8260B	Halogenated Volatiles by 8260B	Semivolatiles by 8270C	PAHs by 8270C	PCB's by 8082	Pesticides by 8081	Total RCRA Metals (8)	TCLP Metals	VPH	EPH						% Moisture
	SB-1-1'	1-22-03	10:00	S	1			X																
	SB-1-15'	1-22-03	11:00	S	2			X									X	X						
	SB-1-5'	1-22-03	10:30	S	2			X									X	X						
	SB-2-5'	1-22-03	11:15	S	2			X									X	X	X					HOLD
	SB-2-15'	1-22-03	11:30	S	2																			

RELINQUISHED BY	DATE	RECEIVED BY	DATE
FIRM EMR	TIME 11:30	FIRM	TIME
RELINQUISHED BY	DATE	RECEIVED BY	DATE
FIRM	TIME	FIRM	TIME
REVIEWED BY		DATE REVIEWED	

COMMENTS:

Chromatographs with final report ☐

DISTRIBUTION LEGEND: White - OnSite Copy, Yellow - Report Copy, Pink - Client Copy



EMR INCORPORATED

Former Maralco UST Site
Site Map
Kent, Washington

Drawn by:	DLW	Date:	2/6/02
Checked by:	CM	Scale:	Not to Scale
Project No:	6070.001-1	File:	6070-001-1.vcd

FIGURE 2

Dale F. Frank, Jr.

From: Christina Merten [merten@emr-inc.com]
Sent: Monday, January 27, 2003 3:59 PM
To: Dale Frank (E-mail)
Subject: Maralco update

Dale-

We completed the monitoring well installation and groundwater sampling last week. Results for the groundwater from the monitoring wells should be back by the end of the week.

We also collected soil samples and one groundwater sample from the former UST area. The preliminary results for the UST location are back and the soils passed MTCA, however, the water sample was very hot (450 parts per million and the cleanup requirement is 500 parts per billion). There will need to be a release report done for the impact to groundwater. The release must be reported to WDOE within 90 days of discovery. The report must include: 1) the identification and location of the release, 2) the circumstances of the release and discovery, 3) any remedial actions planned, completed or underway, and 4) the tank registration number. We can do this paperwork and reporting for you, however, it is beyond the original scope for this portion of the project. If you'd like us to register the release, I can send you a change order tomorrow.

I also talked to Rabanco on Friday about disposing of the material that is in the warehouse (as per Chad's e-mail). They said that due to the fact that the material is currently classified as an extremely hazardous waste, they wouldn't be able to take it. However, when I sent them the data that we have from the '87 investigation (minus the fish bioassay) they said it didn't look that bad. They would need to get a re-characterization done before they could accept it for their landfills. I am putting together costs for that re-characterization. I'm hoping to get that to you via e-mail tomorrow.

So that's last week's activities, if you have any questions or want us to shoot you a change order for the reporting just let me know.

Thanks!

Christina Merten, PE
Project Engineer
Environmental Management Resources, Inc.

Dale F. Frank, Jr.

From: Christina Merten [merten@emr-inc.com]
Sent: Tuesday, January 28, 2003 3:44 PM
To: Dale F. Frank, Jr.
Cc: Chad Moore; Don Clabaugh
Subject: RE: Maralco update

Dale-

What we are recommending on the UST is for cleanup of the material. We found that the soil will pass cleanup standards, but that the water will not. As part of the cleanup, you will need to register a release to groundwater based on the results we got back from our sampling. I was going to send you a proposal for cleanup of the groundwater. If you want us to register the release, that would go with the cleanup proposal.

As for the material in the warehouse, the assumption during our proposal was that the warehouse would not be used until cleanup actions were in place and we would be able to place that material under the cap. Based on Chad's e-mail I understood that he wanted the material moved now so that the warehouse could be used. In order to move that material at this time, we need to characterize it for immediate disposal. Characterization would require collecting 2-3 composite samples from the piles and submitting them for analysis of TCLP and pH. If you want to include this material in the cleanup action for the piles exterior to the building, then the building needs to be off limits for any personnel not having proper hazardous materials training and wearing personal protective equipment (dust masks and tyvek) until the material is moved. If the building was off limits, the material would not need to be characterized again, because it would just be lumped in with the material outside at the time of grading.

If you have any additional questions please let me know.

Thanks!

Christina Merten, PE
Project Engineer
Environmental Management Resources, Inc.

-----Original Message-----
From: Dale F. Frank, Jr. [mailto:dffjr2@attbi.com]
Sent: Tuesday, January 28, 2003 1:27 PM
To: Christina Merten
Cc: Chad Moore
Subject: RE: Maralco update

We understand that the removal of the material in the builing is a separate line item. Maybe it is our misunderstanding on what you are suggesting as a change. EMR was to do all work that was necessary prior to any cleanup. What we understood you to ask is for a change order for evaluation of soil or material on site. This again was our understanding. We specified to Don that we wanted a lump sum to do everything that is necessary to get us a permit and a plan to remove or spread the dross and other materials on site. EMR would oversee all those tasks. We are not the experts and did not say lets only do these items, we relied on your knowledge to give us a price to do everything to get us to a point where we can then pay to do the cleanup. Please tell us again what it is exactly that needs to be done. We assumed one price plus cleanup. Are there other items not in your price. We should resolve now if there is a misunderstanding so we all are on the same page. Thanks

-----Original Message-----
From: Christina Merten [mailto:merten@emr-inc.com]
Sent: Tuesday, January 28, 2003 11:42 AM

Dale F. Frank, Jr.

From: Don Clabaugh [clabaugh@emr-inc.com]
Sent: Sunday, February 02, 2003 1:08 PM
To: Dale F. Frank, Jr.
Subject: RE: Maralco update

Dale,
I'll give you a call tomorrow to discuss. This work is not a change order. The backfilling of the UST pit with contaminated soil has resulted in groundwater contamination. It shouldn't have if the Enviros results were accurate. They must have picked some "lucky" samples to get the readings they got - or discharged some liquid product during the tank removal. Anyway that is cleanup.

The waste in the building can be disposed of cheaper than the optional disposal line item in out proposal. The additional samples are needed to get the cheaper disposal. We can do it the more expensive way, but don't see a need. Bottom line is if L&I or WISHA observe that workers are potentially exposed without their knowledge, then someone is going to get fined or worse. This is an immediate concern that needs your attention.

Let's talk tomorrow. I'll be traveling on my cell phone, and will try you in the morning and then the afternoon.
Thanks,
Don

-----Original Message-----
From: Dale F. Frank, Jr. [mailto:dffjr2@attbi.com]
Sent: Monday, January 27, 2003 8:03 PM
To: Christina Merten
Cc: Don Clabaugh
Subject: RE: Maralco update

Well here we are 3 weeks into the project and a change order. Please speak
to Don. We did not make the assessment of what needed to be done to do the
job. EMR did. I made it clear we did not want any change orders and the
price was to do all the work. Not some of the work. This request is exactly what I made clear and the basis that Chad selected you to do the work. Please let us know if this is not the understanding.

-----Original Message-----
From: Christina Merten [mailto:merten@emr-inc.com]
Sent: Monday, January 27, 2003 3:59 PM
To: Dale Frank (E-mail)
Subject: Maralco update

Dale-

We completed the monitoring well installation and groundwater sampling last
week. Results for the groundwater from the monitoring wells should be back
by the end of the week.

We also collected soil samples and one groundwater sample from the former
UST area. The preliminary results for the UST location are back and the soils passed MTCA, however, the water sample was very hot (450 parts per

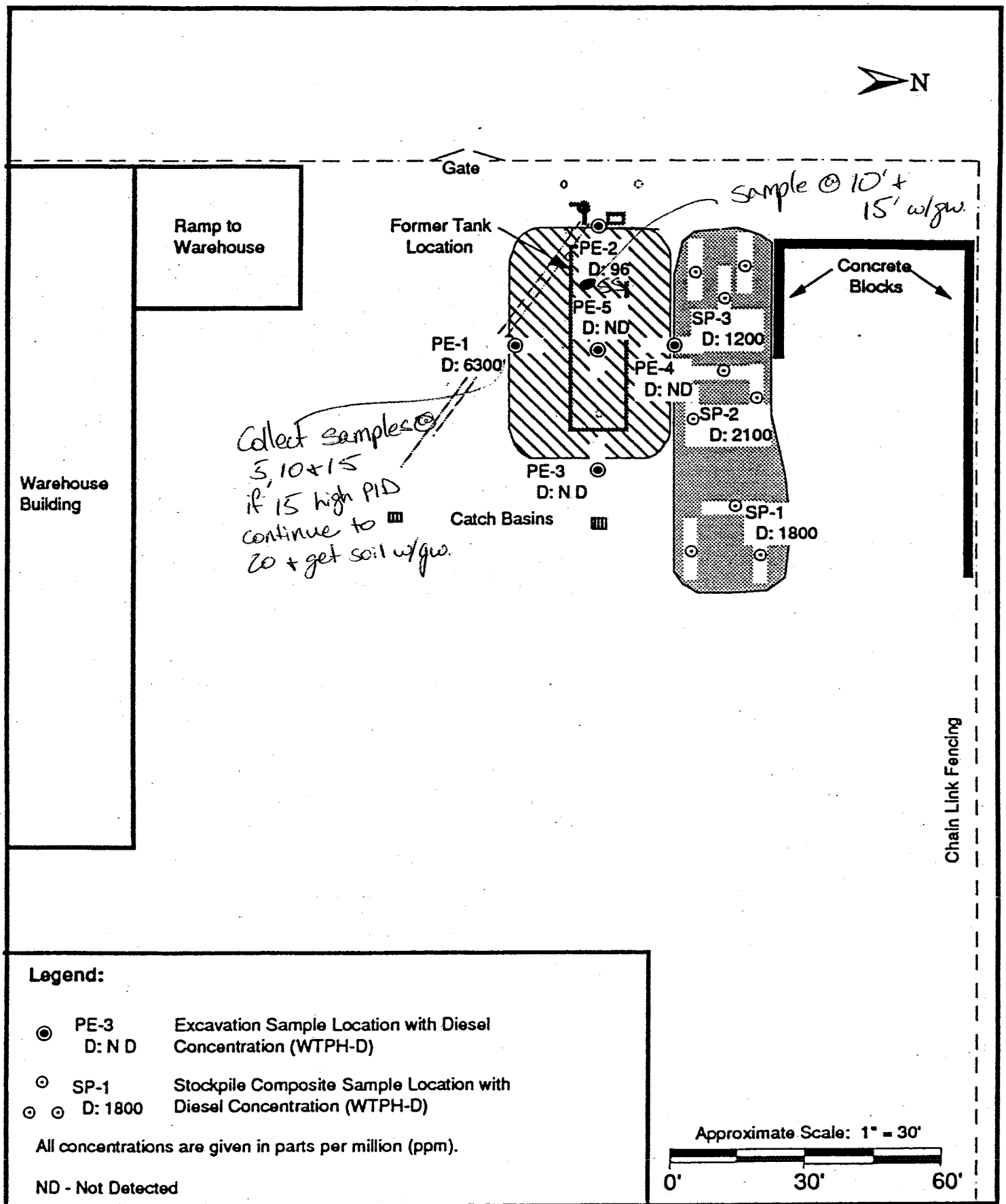
million and the cleanup requirement is 500 parts per billion). There will need to be a release report done for the impact to groundwater. The release must be reported to WDOE within 90 days of discovery. The report must include: 1) the identification and location of the release, 2) the circumstances of the release and discovery, 3) any remedial actions planned, completed or underway, and 4) the tank registration number. We can do this paperwork and reporting for you, however, it is beyond the original scope for this portion of the project. If you'd like us to register the release, I can send you a change order tomorrow.

I also talked to Rabanco on Friday about disposing of the material that is in the warehouse (as per Chad's e-mail). They said that due to the fact that the material is currently classified as an extremely hazardous waste, they wouldn't be able to take it. However, when I sent them the data that we have from the '87 investigation (minus the fish bioassay) they said it didn't look that bad. They would need to get a re-characterization done before they could accept it for their landfills. I am putting together costs for that re-characterization. I'm hoping to get that to you via e-mail tomorrow.

So that's last week's activities, if you have any questions or want us to shoot you a change order for the reporting just let me know.

Thanks!

Christina Merten, PE
Project Engineer
Environmental Management Resources, Inc.



Legend:

◉ PE-3 D: N D	Excavation Sample Location with Diesel Concentration (WTPH-D)
⊙ SP-1 ⊙ ⊙ D: 1800	Stockpile Composite Sample Location with Diesel Concentration (WTPH-D)

All concentrations are given in parts per million (ppm).

ND - Not Detected

Approximate Scale: 1" = 30'

0' 30' 60'

Figure 3. Excavation & Soil Stockpile Location with Analytical Results at the Maralco Aluminum Recycling Site Located at 7730 South 202nd Street, Kent, King County, Washington.

enviros®
E1/941008

Drawn By: SDH Date: 7/31/95

Approved By: _____ Date: 7/31/95

OnSite Environmental Inc.
Analytical Testing and Mobile Laboratory Services

January 29, 2003

Christina Merten
Environmental Management Resources, Inc.
2509 152nd Avenue NE, Suite E
Redmond, WA 98052-5548

Re: Analytical Data for Project 6070.001-1
Laboratory Reference No. 0301-115

Dear Christina:

Enclosed are the analytical results and associated quality control data for samples submitted on January 22, 2003.

The standard policy of OnSite Environmental Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: January 29, 2003
Samples Submitted: January 22, 2003
Lab Traveler: 01-115
Project: 6070.001-1

Case Narrative

Samples were collected on January 22, 2003. Samples were maintained at the laboratory at 4°C and followed SW846 analysis and extraction methods.

NWTPH-Dx Analysis

Any QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

NWTPH-Dx (Water) Analysis

No surrogate data is available for sample SB-1 due to the necessary dilution of the sample.

Any QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: January 29, 2003
Samples Submitted: January 22, 2003
Lab Traveler: 01-115
Project: 6070.001-1

NWTPH-Dx

Date Extracted: 1-23-03
Date Analyzed: 1-23&24-03

Matrix: Soil
Units: mg/Kg (ppm)

Client ID:	SB-1-15'	SB-1-5'	SB-2-5'
Lab ID:	01-115-02	01-115-03	01-115-04
Diesel Range:	1800	1100	ND
PQL:	31	29	32
Identification:	Diesel Fuel#2	Diesel Fuel#2	---
Lube Oil Range:	290	170	ND
PQL:	63	57	64
Identification:	Lube Oil	Lube Oil	---
Surrogate Recovery			
o-Terphenyl:	97%	90%	97%

Flags:

Date of Report: January 29, 2003
Samples Submitted: January 22, 2003
Lab Traveler: 01-115
Project: 6070.001-1

NWTPH-Dx
METHOD BLANK QUALITY CONTROL

Date Extracted:	1-23-03
Date Analyzed:	1-23-03
Matrix:	Soil
Units:	mg/Kg (ppm)
Lab ID:	MB0123S1
Diesel Range:	ND
PQL:	25
Identification:	---
Lube Oil Range:	ND
PQL:	50
Identification:	---
Surrogate Recovery	
o-Terphenyl:	108%

Flags:

Date of Report: January 29, 2003
Samples Submitted: January 22, 2003
Lab Traveler: 01-115
Project: 6070.001-1

NWTPH-Dx
DUPLICATE QUALITY CONTROL

Date Extracted:	1-23-03
Date Analyzed:	1-23-03
Matrix:	Soil
Units:	mg/Kg (ppm)

Lab ID:	01-111-01	01-111-01 DUP
Diesel Range:	ND	ND
PQL:	25	25
RPD:	N/A	
Surrogate Recovery		
o-Terphenyl:	102%	105%

Flags:

Date of Report: January 29, 2003
Samples Submitted: January 22, 2003
Lab Traveler: 01-115
Project: 6070.001-1

NWTPH-Dx

Date Extracted:	1-23-03
Date Analyzed:	1-24-03
Matrix:	Water
Units:	mg/L (ppm)
Client ID:	SB-1
Lab ID:	01-115-01
Diesel Range:	450
PQL:	5.0
Identification:	Diesel Fuel#2
Lube Oil Range:	ND
PQL:	8.0
Identification:	---
Surrogate Recovery	
o-Terphenyl:	---
Flags:	Y,S

Date of Report: January 29, 2003
Samples Submitted: January 22, 2003
Lab Traveler: 01-115
Project: 6070.001-1

NWTPH-Dx
METHOD BLANK QUALITY CONTROL

Date Extracted:	1-23-03
Date Analyzed:	1-23-03
Matrix:	Water
Units:	mg/L (ppm)
Lab ID:	MB0123W1
Diesel Range:	ND
PQL:	0.25
Identification:	---
Lube Oil Range:	ND
PQL:	0.40
Identification:	---
Surrogate Recovery	
o-Terphenyl:	98%
Flags:	Y

Date of Report: January 29, 2003
Samples Submitted: January 22, 2003
Lab Traveler: 01-115
Project: 6070.001-1

NWTPH-Dx
DUPLICATE QUALITY CONTROL

Date Extracted:	1-23-03
Date Analyzed:	1-23-03
Matrix:	Water
Units:	mg/L (ppm)

Lab ID:	01-121-01	01-121-01 DUP
Diesel Range:	ND	ND
PQL:	0.25	0.25
RPD:	N/A	
Surrogate Recovery		
o-Terphenyl:	90%	91%

Flags:

Date of Report: January 29, 2003
Samples Submitted: January 22, 2003
Lab Traveler: 01-115
Project: 6070.001-1

% MOISTURE

Date Analyzed: 1-23-03

Client ID	Lab ID	% Moisture
SB-1-15'	01-115-02	20
SB-1-5'	01-115-03	13
SB-2-5'	01-115-04	22

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

D - Data from 1:____ dilution.

E - The value reported exceeds the quantitation range, and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

G - Insufficient sample quantity for duplicate analysis.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeniety. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

O - Hydrocarbons outside the defined gasoline range are present in the sample.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a silica gel cleanup procedure.

Y - Sample extract treated with an acid cleanup procedure.

Z -

ND - Not Detected at PQL
MRL - Method Reporting Limit
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

Chain of Custody

OnSite Environmental Inc.
14648 NE 95th Street • Redmond, WA 98052
Fax: (425) 885-4603 • Phone: (425) 883-3881

Turnaround Request (in working days)

(Check One)

☐ Same Day ☐ 1 Day

☐ 2 Day ☐ 3 Day

☒ Standard
(Hydrocarbon analyses: 5 days, All other analyses: 7 days)

☐ _____ (other)

Project Chemist: DB

Laboratory No. 01-115

Company: EMR

Project No.: 6070.001-1

Project Name: Maralco

Project Manager: Christina Merten

Requested Analysis

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Dx	Volatiles by 8260B	Halogenated Volatiles by 8260B	Semivolatiles by 8270C	PAHs by 8270C	PCB's by 8082	Pesticides by 8081	Total RCRA Metals (8)	TCLP Metals	VPH	EPH	% Moisture
1	SB-1	1-22-03	10:50	W	1			X											X
2	SB-1-15'	1-22-03	11:00	S	2			X											X
3	SB-1-5'	1-22-03	10:30	S	2			X											X
4	SB-2-5'	1-22-03	11:15	S	2			X											X
5	SB-2-15'	1-22-03	11:30	S	2			HOLD											HOLD

RELINQUISHED BY: [signature]	DATE: 1/22/03	RECEIVED BY: [signature]	DATE: 1/22/03
FIRM: EMR	TIME: 14:50	FIRM: OSE	TIME: 1550
RELINQUISHED BY	DATE	RECEIVED BY	DATE
FIRM	TIME	FIRM	TIME
REVIEWED BY		DATE REVIEWED	

COMMENTS: Water sample SB-1 is unpreserved.

Chromatographs with final report ☐

White - Original Yellow - Report Copy Pink - Client Copy