GEOENGINEERS

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TRANSMITTAL

To: Jeanette Hawkins
West Bay Reliable 0508 LLC
1500 79th Avenue SE, Building B
Olympia, Washington 98501

Date: 8/21/2009

File: 04301-010-03

Email:

Regarding: Reliable Steel Site, Olympia, Washington

We are sending attached via

☐ Courier ☐ Email ☐ FTP ☑ Hand ☐ Other ☐ Overnight ☐ SharePoint ☐ UPS ☐ US Mail

Copies	Date	Description
6	8/21/2009	Final Work Plan
1	8/21/2009	Response to Ecology Comments on Draft Work Plan Remedial Investigation/Feasibility Study

These are transmitted as checked below:

☑ For Your Use ☑ As Requested ☐ Returned ☐ Review & Comment ☐ Other (see remarks) ☐ Sign & Return

Remarks: Please call if you have questions.

Signed:
Iain Wingard
iwingard@geoengineers.com

GEOENGINEERS

August 21, 2009

Washington State Department of Ecology
Toxics Cleanup Program
Southwest Regional Office
P.O. Boxes 47775
Olympia, Washington 98504-7775

Attention: Steve Teel, LGH

Re: Response to Ecology Comments on the
Draft Work Plan Remedial Investigation/Feasibility Study
Reliable Steel Site
1218 West Bay Drive NW
Olympia, Washington
February 17, 2009
File No. 4301-010-03

Provided is the revised Work Plan for Remedial Investigation/Feasibility Study for the Reliable Steel Site, which incorporates the comments you provided in a letter dated June 18, 2009. Additionally, provided below is a response to the individual comments provided in the letter. Each individual comment is provided below followed by a response identified in italics.

DRAFT RESPONSE TO COMMENT LETTER

1. Page 3, April 2008 Report, Section 6.3.6 Comment Response: Ecology disagrees with this response. See below Work Plan Specific Comment #4.

Response: See response to Work Plan Specific Comment #4.

2. Page 8, Specific Comments, May 2008 Report, Appendix C, "…*southern parcel is not of concern*": Ecology disagrees with this response. See below Work Plan Specific Comment #4.

Response: See response to Work Plan Specific Comment #4.

3. Page 8, Wood Waste Toxicity Comment Response: The total organic carbon (TOC) percentages quoted in the response do not agree with Tables 7 and 8. For example, the response states that 15 of 18 samples have TOC percentages ≤ 2 percent. The tables show only 13 samples within this range. The potential for toxicity from wood waste still needs to be part of the Remedial Investigation and Feasibility Study (RI/FS).

Response: The statement in the response to comments was that 15 or 18 samples had TOC concentrations "at or below 2 percent". Thirteen of the samples identified in the draft Work Plan have TOC concentrations that are less than 2 percent. Two additional samples have TOC concentrations at 2 percent (i.e., 2.03 and 2.16 percent). The statement could have more accurately stated that the TOC concentrations were "at or below 2.16 percent." The more important component of the statement was/is that TOC concentrations up to 2.16 percent are within the typical range of TOC in the Puget Sound.

As discussed in the meeting between Ecology and representatives of West Bay Reliable-0508, LLC on August 5, 2009, the revised Work Plan will include evaluation of the potential toxicity of wood through performance of TOC, Total Volatile Solids (TVS) and sulfide and ammonia analyses on samples that are identified, based on visual observations, to contain wood. The revised Work Plan includes the methodology for sampling and analysis of sediment samples containing wood. Appendix C of the revised Work Plan identifies that visual observations will be made of all sediment samples. The presence, type and quantity of wood will be recorded on field logs during investigation. The Remedial Investigation report will include a discussion of the observations of wood and the results of TOC, TVS and sulfide and ammonia analyses.

4. Page 9, Section 2.3.1 Comment Response: Hexachlorobenzene reporting limits for RGS-1 (surface, 2-4 feet, and 6-8 feet), RGS-2 (0-2 feet), RGS-8 (6-8 feet), and RGS-10 (surface) and the 1,2,4-trichlorobenzene reporting limit for RGS-4 (surface) exceed the Sediment Quality Standard (SQS) but are less than the Cleanup Screening Level (CSL). Because the carbon ranges of these samples are between 0.5 and 3.5 percent, dry weight values are not preferred.

Response: The revised Work Plan presents the organic carbon-normalized results, detections and detection limits, when the organic carbon for a specific sample is equal to and between 0.5 and 3.5 percent including the results for hexachlorobenzene and 1,2,4-trichlorobenzene.

WORK PLAN GENERAL COMMENTS

1. Perimeter and bottom samples should be collected and analyzed from all former and close-in-place underground storage tank (UST) locations. Sampling should be consistent with Ecology's *Guidance for Site Checks and Site Assessments for Underground Storage Tanks* (Publication #90-52).

Response: Existing investigation locations in addition to the investigation locations identified in the Work Plan will provide assessment of site USTs in general accordance with Ecology's Guidance for Site Checks and Site Assessments for Underground Storage Tanks (Publication #90-52). The Work Plan includes additional investigation for the presence of suspected USTs and additional sampling around known or discovered USTs to assess the presence of a release and/or to characterize the extent of petroleum hydrocarbon concentrations greater than MTCA cleanup levels.

2. Budd Inlet sediment concentration data in the vicinity of the Site shall be incorporated into the report text, figures, and summary tables. Data sources shall include the *Sediment Characterization Study, Budd Inlet, Olympia Washington* (Ecology 2008) and the Hardel Mutual Plywood Site RI/FS Report.

Response: The revised Work Plan includes the results for sediment samples that are within or adjacent to the Reliable Steel Site from the Sediment Characterization Study, Budd Inlet, Olympia, Washington (Ecology, 2008) and Former Hardel Plywood Site, 1210 West Bay Drive NW, Olympia, Washington, Draft Feasibility Study (Greylock, 2008). Specifically, the revised Work Plan includes results for Sediment Management Standards (SMS) chemicals for three samples analyzed as part of the Ecology Budd Inlet Study and one sample analyzed as part of the investigation of the Hardel Plywood Site. The results for other analyses performed as part of the Ecology Budd Inlet and Hardel Plywood studies, including dioxin and furan analyses for sediment and tissue samples are presented in Ecology's Sediment Characterization Study, Budd Inlet, Olympia, Washington Report (Ecology 2008) and Former Hardel Plywood Site Draft Remedial Investigation Report (Greylock 2007).

WORK PLAN SPECIFIC COMMENTS

1. Section 2.5.1: The reference for Ecology (1994) needs to be added to Section 6.0, References.

Response: The reference for Ecology 1994 is included in the Work Plan. The reference is: Washington State Department of Ecology. 1994. Natural Background Soil Metals Concentrations in Washington State. Toxics Cleanup Program, Department of Ecology. Publication #94-115. October, 1994.

2. Section 2.5.3, page 21, 2nd paragraph: The correct background arsenic concentration value to use is 5 micrograms per liter (µg/L) based on WAC 173-340-900, Table 720-1. Therefore, the arsenic result for MW-7 (6.11 µg/L) is also elevated. This should be shown on Table 4 also. The source of the elevated arsenic and copper concentrations also needs to be determined.

Response: The revised Work Plan uses 5 ug/L as the groundwater background arsenic value. The source of the arsenic in MW-7 and MW-8 and the source of the copper in MW-8 is likely the welding slag and metal debris present along the shoreline as shown in Figure 4 of the Work Plan. MW-8 and MW-7 are the only wells out of nine wells present at the site that contain metals concentrations greater than screening criteria and the wells are located within 3 feet and 44 feet, respectively, from the welding slag and metal debris present along the shoreline of the site.

3. Section 2.5.5, Sediment, page 24, 2nd paragraph: Organic carbon (OC) normalized results should be used where the total organic carbon (TOC) is between 0.5 and 3.5 percent instead of between 1.0 and 4.0 percent.

Response: The revised Work Plan uses organic carbon-normalized results when the organic carbon contents are equal to and between 0.5 and 3.5 percent.

4. Section 2.5.5, Sediment, page 25, 3rd paragraph: We disagree that no further evaluation is needed to total petroleum hydrocarbons (TPH) at locations RGS-4 and -5. Results for both of these locations exceed the TPH sediment screening value of 100 mg/kg. Additional sampling is needed to verify the TPH compounds present (by the NWTPH-HCID Method) and to determine the extent of TPH contamination. (See Ecology Implementation Memorandum #4, "Determining Compliance with Method A Cleanup Levels for Diesel and Heavy Oil"). Bioassays are recommended to determine if the observed TPH concentrations are protective.

Response: Additional review of the petroleum hydrocarbon results for RGS-4 and RGS-5 was performed in response to Ecology's comments. A review of the chromatogram for the NWTPH-Dx analysis for RGS-5 identifies that two individual peaks representative of diesel and oil are present in the sample. As separate products are present in the sample, the concentrations of the individual products (i.e., diesel 53 mg/kg and oil 77 mg/kg) were compared to the screening criteria (100 mg/kg). The detected concentrations for diesel and oil are below the screening criteria. Therefore, no additional evaluation is necessary for sediment at RGS-5.

As discussed in the meeting between Ecology and representatives of West Bay Reliable-0508, LLC on August 5, 2009, sediment at RGS-4 will be resampled and analyzed using the NWTPH-HCID method to assess the presence of petroleum hydrocarbons with follow-up analyses for specific petroleum hydrocarbons if detected. The revised Work Plan includes the procedures for sampling and analysis of sediment at RGS-4.

5. Section 2.5.5, Sediment, page 25, last paragraph; page 26, 1st paragraph: We disagree that the results indicate that bis(2-ethylhexyl) phthalate (DEHP) is the only chemical of concern for sediments. Butylbenzyl phthalate appears to be co-located with DEHP and therefore shall remain as a chemical of concern. Fluoranthene and other creosote compounds should still be retained because their presence may be related to elevated TPH concentrations. Mercury shall also be included as a chemical of concern because it occurs elsewhere at the Site and because some sample reporting limits were above screening levels. Elevated mercury concentrations were found in upland sample RGB1-4. The extent of upland mercury contamination has not yet been defined. Samples with reporting limits above screening levels include: BS-1, S-3, and MS-1. Also, the mercury result from S1 (0.362 milligrams per kilogram, mg/kg) is only slightly below the SQS criteria of 0.41 mg/kg. Mercury reporting limits for groundwater samples from MW-7 and -8 are also above surface water criteria.

Response: Phthalates, PAHs, and mercury will be retained as potential chemicals of concern for sediment. Additional evaluation will be performed on sediment samples to evaluate the presence of mercury as described in the revised Work Plan.

6. Section 2.6.1, 2nd and 3rd bullets: Depth sampling should be performed at the Mt. Pit, P1, and A3 sample locations to determine the vertical extent of lead contamination. Also, it is recommended that an additional sample location be added near the southeast corner of the Maintenance Building to characterize the extent of lead and petroleum hydrocarbons in this area.

Response: As discussed during our meeting on June 5, 2009, the purpose of proposed sampling locations RI-2 through RI-6, RI-8 and RI-9 is to fill data gaps by fully delineating the extent of lead contamination in soil beneath the Maintenance Building. As discussed in the meeting, and as shown in Table 10 of the Work Plan, soil samples are to be collected from 0 to 0.5 feet below ground surface (bgs), then in 1-foot intervals to 3.5 feet bgs. The sample from 0 to 0.5 feet bgs will be analyzed for metals (including lead), and the remaining samples will be archived for potential future metals analysis. If metals are either not detected, or detected at concentrations less than cleanup levels in the proposed borings, no further analysis will be performed. If metals are detected at concentrations greater than cleanup levels, archived samples will be analyzed for metals to delineate vertical extent.

As discussed in the June 5 meeting, proposed sampling location RI-9 has been moved to the south from the previously proposed location toward the southeast corner of the Maintenance Building to delineate the extent of lead and petroleum hydrocarbon contaminated soil in this area.

7. Section 2.6.2, 1st bullet: Text should be added to explain why sample/location RGB-7 is listed as both containing and not containing concentrations above screening levels.

Response: The description in the revised Work Plan has been clarified. Soil samples were submitted for analyses from two depths at RGB-7 (6 to 7 feet bgs and 12 feet bgs). The sample submitted from 6 to 7 feet bgs contained diesel-range petroleum hydrocarbons at concentrations greater than screening levels. The sample from 12 feet bgs was non-detect for diesel-range petroleum hydrocarbons.

8. Section 2.6.3, 3rd bullet: We recommend that an additional sample location for petroleum hydrocarbons be added northwest of RGB-16 and near the north property line between locations RI-24 and RI-29.

Response: The revised Work Plan includes an additional boring between RI-24 and RI-29 that is identified as RI-30. The boring depth, field screening, and sampling protocol is identical to that described for RI-29 in the Work Plan. Also see response to Comment 9, below.

9. Section 2.6.4 (groundwater data gaps): We recommend that a new groundwater monitoring well be installed in the northern portion of the site to assess petroleum hydrocarbons in the area where soil (RGB-16) and stormwater (Ditch 2) contamination was observed.

Response: As discussed during the June 5 meeting, the revised Work Plan identifies that another monitoring well may be installed in boring RI-30 described above in Comment 8, if field observations (field screening) indicate the likely presence of petroleum hydrocarbon contamination of soil and/or groundwater.

10. Section 2.6.6, 1st bullet, Section 3.5 (sediment data gaps): Change text to address Comment #5, above. Please note also that the aerial and vertical extent of elevated mercury concentrations in the vicinity of RGS-7 needs to be defined. This section needs to clearly describe how the TPH exceedances at RGS-4, -5 and -8 will be further assessed.

Response: The text in this section has been revised to address comments concerning sediment investigation and characterization. See response to Comment 4 above that address the evaluation of TPH at RGS-4 and RGS-5. As discussed in the meeting between Ecology and representatives of West Bay Reliable-0508, LLC on August 5, 2009, additional sediment samples will be collected adjacent to RGS-8 and analyzed using the NWTPH-HCID method to assess the presence of petroleum hydrocarbons with follow-up analyses for specific petroleum hydrocarbons, if detected, to assess the presence of petroleum hydrocarbons at concentrations greater than the screening level. The revised Work Plan includes the procedures for sampling and analysis of sediment adjacent to RGS-8. Additionally, sediment core sampling is included in the revised Work Plan to characterize the subsurface horizontal and vertical extent of mercury in subsurface sediment.

11. Section 3.0, 3rd bullet, Section 3.3: Add text that states that wells will be sampled at low tide.

Response: As discussed in our meeting on June 5, the wells closest to the shoreline will be scheduled to be sampled on an ebb tide. The revised Work Plan (including the SAP) includes language that specifies that sampling of monitoring wells MW-5, -7, -8 and -9 will be scheduled to occur on an ebb tide and that an attempt will be made to collect the actual groundwater samples from these wells during mid-ebb tide or lower. As discussed during the June 5 meeting, sampling of the remaining wells will not be tide-dependent because these wells are not located adjacent to the shoreline and tidal influence is not expected to significantly affect groundwater results.

12. Section 3.1.4: An additional exception or clarification should be added regarding carbon ranges and the use of normalized vs. dry weight values. Ecology's approach is to generally compare sediment quality to dry weight basis when the organic carbon is below 0.5 percent or above 3.5 percent. The dry weight values should be compared to the 1988 Apparent Effects Threshold (AET) values instead of the carbon-normalized values from the Sediment Management Standards. However, Ecology may apply best professional judgment in determining whether average TOC values can be used verses individual results.

Response: Section 3.1.4 of the revised Work Plan includes a discussion of the use of organic carbon-normalized sediment results when organic carbon is equal to and between 0.5 and 3.5 percent and dry *weight AET values when the organic carbon concentrations are either less than 0.5 percent or greater than 3.5 percent.*

13. Section 3.2, Soil Investigation: Tin should be added to the metals constituent list for all soil samples.

Response: The revised Work Plan includes tin analyses in soil samples.

14. Section 3.3, Groundwater Investigation: A note should be added that hexavalent chromium will be added to the constituent list if total chromium values exceed the Method B value of 48 µg/L.

Response: The revised Work Plan includes hexavalent chromium analysis of groundwater samples if total chromium values exceed the Method B value of 48 µg/L.

15. Section 3.5 Sediment Investigation: Revise text to incorporate the comments pertaining to sediments.

Response: The text in this section has been revised to address comments concerning sediment investigation and characterization.

16. Section 4.1: It is likely that the biologically active zone at the Site extends deeper than 10 centimeters (cm). The sediment point of compliance needs to correspond to the maximum depth of biologic activity.

Response: Comment noted.

17. Figure 4: The TPH exceedances in samples RGS-4, -5, and -8 need to be shown on Figure 4. Figure 4 also needs to show the lead exceedance for BS-1.

Response: Figure 4 of the revised Work Plan shows TPH exceedances for RGS-4 and -8 and the lead exceedance at BS-1. As discussed in response to Comment 4 above, the petroleum hydrocarbon concentrations at RGS-5 are less than the screening criteria and therefore, are not shown on Figure 4.

18. Table 9, Soil Sample Analyses: Add carcinogenic polycyclic aromatic hydrocarbons (cPAH) analyses for RI-10, and -12. Add NWTPH-Dx Method analyses for RI-25 and -28.

Response: The revised Work Plan includes cPAH analyses for RI-10 and RI-12, and NWTPH-Dx analyses for RI-25 and RI-28.

19. Table 10, Investigate cPAHs Around Paint Shop: According to the table, approximately five to six samples will be collected at each location and only one to two will be analyzed, depending on the "screening." What evidence is there that screening will be effective at locating elevated cPAH concentrations? If samples are going to be held in archive, the results from the initial sampling need to be received and evaluated in time to choose which samples to archive. We recommend that additional samples be analyzed at several locations or that the work is carefully planned so that archive samples can be analyzed within holding times.

Response: Data collected to date indicate that the vast majority of cPAH exceedances are located in the top 2.5 feet of soil at the site, and that cPAHs do not exceed cleanup levels at depths greater than 2.5 feet bgs (with the exception of one soil sample at 4 feet bgs at MW-9) (Greylock, 2007, 2008).

As discussed in the June 5 meeting, and as shown in Table 10 of the Work Plan, we will be collecting and field screening multiple samples from locations in the vicinity of the Structural and Paint Shops for cPAHs. One sample (from the surface) will be analyzed for cPAHs from RI-21 and -23, and two samples (one from the surface and one at depth) will be analyzed for cPAHs from RI-15, -16, -17,-18, -19, -20, -22, -24, and -26 through -29. The samples analyzed at depth will be analyzed at depths slightly greater than previous cPAH exceedances, in order to further delineate the vertical extent of cPAH-contamination.

20. Tables 7 and 8: Data for polychlorinated biphenyls (PCBs) need to be added to both tables. These data are mentioned in Section 2.4.7.

Response: The revised Work Plan includes the PCB data in the tables.

21. Tables 9 and 10: Analyses for diesel and oil range hydrocarbons should be added at RI-28. Petroleum hydrocarbons were previously detected the PS Grit sample.

Response: The revised Work Plan includes analysis for NWTPH-Dx at RI-28.

22. Table 10, RI-26: Additional depth samples for mercury analysis need to be collected so that the vertical extent of mercury contamination can be defined.

Response: As discussed in the June 5 meeting, the revised Work Plan indentifies that mercury will be analyzed at two depths. In addition to the sample to be analyzed at 2.5 to 3.5 feet bgs in the draft Work Plan, the revised Work Plan indicates that a sample will be analyzed from the interval of 3.5 to 4.5 feet bgs.

23. Appendix B, Section 9.3: Relative percent difference goals should be changed to 20 percent for groundwater and stormwater and 35 percent for soil.

Response: The revised Work Plan has been updated to incorporate this comment.

24. Appendices B and C (Sampling and Analysis Plans): Revise text to incorporate the above comments. Also, metals need to be added to Tables C-1 and C-2.

Response: The Revised Sampling and Analysis Plans have been updated to incorporate the comments. Tables C-1 and C-2 have been substantially revised based on changes to the approach for sediment characterization.

Please give me a call if you have any questions concerning the responses to your comments.

Sincerely,

GeoEngineers, Inc.

Iain H. Wingard
Associate, Environmental Scientist

IHW:tt
Triway Enterprise Remedial Investigation > Geo Internal > Final [Word Processing] > Response to Ecology Comment Letter

FINAL WORK PLAN
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
RELIABLE STEEL
1218 WEST BAY DRIVE NW
OLYMPIA, WASHINGTON

AUGUST 21, 2009

FOR
WASHINGTON STATE DEPARTMENT OF ECOLOGY ON BEHALF OF
WEST BAY RELIABLE-0508, LLC

GEOENGINEERS

File No. 4301-010-03

Final Work Plan
File No. 4301-010-03

August 21, 2009

Prepared for:

West Bay Reliable-0508, LLC
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Olympia, Washington 98601

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FINAL WORK PLAN
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
RELIABLE STEEL
1218 WEST BAY DRIVE NW
OLYMPIA, WASHINGTON
FOR
WASHINGTON STATE DEPARTMENT OF ECOLOGY ON BEHALF OF
WEST BAY RELIABLE-0508, LLC

1.0 INTRODUCTION

This document presents a Work Plan for a Remedial Investigation/Feasibility Study (RI/FS) at the Reliable Steel Site (Site) located at 1218 West Bay Drive NW in the City of Olympia, Washington (Figure 1). West Bay Reliable-0508, LLC is voluntarily submitting this Work Plan. West Bay Reliable-0508, LLC is not a party to Agreed Order DE-08-TCPSR-5223 and as such, West Bay Reliable-0508, LLC reserves all rights.

The Site is approximately 6.5 acres in size and is comprised of both upland and in-water (i.e., tidelands) property. The upland portion of the Site is approximately 3.2 acres in size and the in-water portion of the Site is approximately 3.3 acres in size. Site use has consisted of commercial and industrial activities. Structures present on the upland portion of the Site include four buildings that have predominantly been used for steel tank and structural beam fabrication and painting, and an elevated crane structure (Figure 2). Structures present on the in-water portion of the Site include remnant piling, a former shipway and a segment of the elevated crane structure. Past investigations of the Site have identified the presence of chemicals at concentrations greater than Model Toxics Control Act (MTCA) cleanup levels (CULs).

An RI/FS Work Plan is required as part of the Scope of Work defined in the Agreed Order for the Site. The activities described in this Work Plan are proposed to characterize the nature and extent of contamination at the Site and to provide sufficient information to select a cleanup action. This Work Plan provides details for implementation of the RI/FS including: evaluation of existing Site soil, groundwater, stormwater, and sediment data; identification of potential data gaps for completion of the RI/FS; description of the proposed field investigation, data analysis program, anticipated schedule and reporting.

This voluntary Work Plan was prepared in general accordance with the requirements defined by the MTCA Regulation (WAC 173-340-350) for submittal to Ecology. Appendices to this Work Plan include discrete one-time groundwater sample results and groundwater monitoring for 2005 through 2007 (Appendix A); Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) for soil, groundwater and stormwater characterization (Appendix B); SAP and QAPP for sediment characterization (Appendix C); and Health and Safety Plan (HASP) (Appendix D).

2.0 BACKGROUND INFORMATION

This section presents background information for the Site, including soil and groundwater conditions; historical, current, and future Site uses; previous environmental evaluations; previous site characterization results; identification of data gaps; and identifies contaminants of potential concern (COPCs).

2.1 PROPERTY DESCRIPTION

The Site is located at 1218 West Bay Drive NW, within the City of Olympia, Thurston County, Washington (Figure 1). The property is approximately 6.5 acres in size and is comprised of both upland and in-water property. The Site is bounded by the Hardel Mutual Plywood Corporation property on the north, West Bay Drive NW on the west and undeveloped property owned by the Port of Olympia on the south. Budd Inlet of Puget Sound is located east of the Site.

The upland portion of the Site is approximately 3.2 acres in size. Structures present on the upland portion of the Site include four buildings that are used for steel tank and structural beam fabrication and painting. The buildings present on the Site are identified as the Maintenance Building, Tank Shop, Structural Shop and Paint Shop (Figure 2). Additional structures present on the Site include a shed previously used for storage of a mobile crane and an elevated trestle supporting a crane on rails (i.e., rail crane). The upland area surrounding the Site structures is comprised of paved and unpaved areas.

The Maintenance Building is a wood-frame building with walls comprised of painted galvanized corrugated metal sheeting. Equipment maintenance and materials storage have occurred in the Maintenance Building. The floor consists of wood planks partially covered with metal sheets. A pit, previously used for maintaining vehicles and equipment is located on the east end of the building. The sides of the pit are constructed of wood planking and the bottom of the pit is soil. A metal sheet covers the pit.

The Tank Shop is a wood-frame building with walls comprised of painted galvanized corrugated metal sheeting. The floor of the Tank Shop is predominantly comprised of concrete slab of unknown thickness. The Tank Shop is used for storage tank and vessel fabrication. Offices are present on a second floor located in the southwestern portion of the building. The Tank Shop is also identified as the Plate Shop in previous Site reports.

The Structural Shop is a metal-frame building with walls comprised of painted galvanized corrugated metal sheeting. Structural steel beams and girders are fabricated in the Structural Shop. The floor of the Structural Shop is predominantly soil.

The Paint Shop is a metal-frame building with painted galvanized corrugated metal walls on the north and south sides and retractable canvas panels on the east and west sides of the building. The fabricated steel products produced at the Site are sand blasted and painted in the Paint Shop. The floor of most of the Paint Shop is concrete. Additionally, a concrete pad is located west of the Paint Shop.

The in-water portion of the Site is approximately 3.3 acres in size. Structures present on the in-water portion of the Site include remnant piling, a former shipway and a segment of the elevated rail crane support (Figure 2). The shoreline is armored in places by concrete pieces and remnant structure debris (i.e., concrete piers and foundations), as well as oxidized metal debris adjacent to the Tank and Structural Shops, and a wooden bulkhead beneath the Tank Shop.

Stormwater drainage features present at the Site include catch basins and associated piping as well as two drainage ditches. One drainage ditch is located on the northeast corner of the Site and a second ditch is located beneath the Maintenance Building. Stormwater catch basins are present on the south side of the Tank Shop, west sides of the Tank and Structural Shops, and north and west sides of the Paint Shop (Figure 2). Stormwater culvert outfalls are present at four locations on the shoreline: 1) east of the Maintenance Building, 2) east of the Structural Shop, 3) south of the elevated crane structure and 4) into the drainage ditch at the northeast corner of the Site. Off-site sources of stormwater combine with Site stormwater and discharge at the Site outfalls.

2.1.1 Soil Conditions

Soil in the upland portion of the Site was previously investigated in February 2008 by Greylock Consulting, LLC (Greylock) (Greylock, 2008a, 2008b). The Greylock investigation included advancement of 22 borings (i.e., RGB1 through RGB20, MW-8 and MW-9) to depths of approximately 12 feet below ground surface (bgs).

In general, soils encountered in the borings consisted of silts, sands and silty gravels from the ground surface to depths ranging from 3.5 feet to 7 feet bgs. The soil present to those depths is likely to be fill material. Sand containing shells was encountered beneath the surficial material to the full depth of the borings. The sand with shells is likely to be dredged fill material.

Wood and brick was observed in four of the 22 soil borings. Wood was observed between 5 feet and 11 feet bgs in RGB14, and between 8 feet and 12 feet bgs in RGB15. The borings were located west of the Maintenance Building (Figure 3). Sand and gravel with wood was observed from 5 feet to 6.5 feet bgs in a boring located near the southeast corner of the Tank Shop (i.e., MW-8). Brick was observed from 11 feet to 12 feet bgs in RGB6, which was located in the southwest corner of the Tank Shop.

Additionally, a memorandum summarizing groundwater monitoring indicates that wood was present from 1 to 10 feet bgs in the boring advanced to install monitoring well MW-1 on the southwest portion of the Site (Greylock, 2007c).

2.1.2 Groundwater Conditions

The depth to groundwater was measured in seven monitoring wells (i.e., MW-1 through MW-7) during three rounds of quarterly groundwater monitoring completed in 2006 and 2007 (Greylock, 2007). The depth to groundwater was also measured in nine monitoring wells (i.e., MW-1 through MW-9) during a groundwater monitoring event in February 2008 (Greylock, 2008b). The depth to groundwater ranged from approximately 3.0 to 5.5 feet bgs. Monitoring wells were vertically surveyed to within 0.01 feet by the licensed surveying company Hatton, Goddat, Pantier.

Groundwater gradients were evaluated for the three rounds of quarterly groundwater monitoring performed in 2006 and 2007 (Greylock, 2007c). Depth to water was measured in MW-1 through MW-7 at or near the time of low tide. During the first two rounds of monitoring, the measurements indicated that the inferred groundwater flow direction was toward the northeast with a gradient of approximately 0.011 vertical feet for every horizontal foot (0.011V:1H). During the last round of monitoring, the measurements indicated that the inferred groundwater flow direction was toward the east with a gradient of approximately 0.004V:1H.

2.2 SITE USE HISTORY

Site use has consisted of commercial and industrial activities. Steel fabrication is identified to have occurred from 1941 to the present (Tetra Tech, 1998). The Site is identified to have been used to support lumber mill operations prior to 1941. Boat building has also been identified to have occurred at the Site.

The Site was purchased in 1941 by A.W. and Hazel Lewis to relocate their Reliable Welding business to the property. The rail crane structure was the only aboveground structure present at the Site when purchased by the Lewis' in 1941 (a section of the structure was removed post-2000). A Sanborn Map from 1945 identifies a 5-ton traveling crane with an elevation of 16 feet. The crane on the Sanborn Map is in the present location of the rail crane at the Site. The area on either side of the crane was identified as "Lumber in Transit" on the Sanborn Map. The western end of the rail crane structure abuts a railroad track. Based on the structures identified on the Sanborn Map, it appears that the rail crane may have previously been used to transfer lumber onto or off railroad cars.

The Maintenance Building and Tank Shop (identified in one previous report as the Plate Shop) were built by Reliable Welding in 1941. Additionally, during the 1940s, a dock was erected on Budd Inlet in the vicinity of the Tank Shop. A Sanborn Map from 1945 identifies that ship welding was occurring in the building currently identified as the Tank Shop.

Additional expansions were performed in 1962 to construct the Paint Shop and in 1980 to construct the Structural Shop.

During the late 1940s, the Lewis' formed a partnership of family members. In 1974, the partnership incorporated and in 1983, Bart and Jerry Olsen, members of the partnership, bought out other family member interests in the corporation (Tetra Tech, 1998). In January 1998, ownership of all of the parcels except the former railroad right-of-way was transferred from Reliable Steel Fabricators Inc., to Bojo Investments, LLC (also owned by Bart and Jerry Olson). Ownership of the former railroad right-of-way was transferred to Bojo Investments, LLC in 2004.

In August 2001, BMT Properties acquired the operating assets of Reliable Steel and leased the property. BMT simultaneously assigned the operating assets and lease to BMT-NW. In April 2008, West Bay Reliable-0508, LLC purchased the property (Greylock, 2008a).

2.3 FUTURE SITE USE

The Site was re-zoned in 2006 from Industrial to Urban Waterfront zoning. The Urban Waterfront zoning allows for a variety of uses including, but not limited to, condominiums, office, retail and hotels.

The anticipated future use of the Site is as mixed-use development. Anticipated uses include commercial (i.e., office space, retail and restaurants), residential (i.e., condominiums) and public access (i.e., shoreline plaza and/or trail).

2.4 PREVIOUS ENVIRONMENTAL EVALUATIONS

This section identifies and summarizes the scope of environmental evaluations that have been completed at the Site. Multiple environmental assessments and investigations have been completed that have included evaluation of Site activities as well as sampling and analysis of soil, groundwater, stormwater and sediment at the Site. Additionally, two investigations included evaluation of chemical concentrations in sediment on the Hardel Site. The results of sediment samples collected on the Hardel Plywood Site, adjacent to the Reliable Steel Site, have been included in this Work Plan.

Potential environmental concerns were identified at the Site by an initial environmental compliance audit and Phase I Environmental Site Assessment (ESA). These were the basis for initial environmental investigations to assess the presence of environmental contamination at the Site. Additional potential environmental concerns were identified during Site investigations. Table 1 provides a summary of the potential environmental concerns that have been identified for the Site as a result of all previous environmental evaluations and investigations. Table 1 presents the potential environmental concerns in relation to four areas. The four areas include the following:

1. Maintenance Building and southern portion of the Site;
2. Tank and Structural Shops and adjacent areas;
3. Paint Shop and northern portion of the Site; and
4. Shoreline and sediment.

Figure 3 identifies the location of the areas where potential environmental concerns have been identified at the Site that are summarized in Table 1. Figure 3 also contains previous sampling locations discussed in Section 2.5 below.

The following sections summarize each environmental evaluation that has been performed at the Site.

2.4.1 1998 Environmental Compliance Audit

Tetra Tech EM Incorporated (Tetra Tech) (Tetra Tech, 1998) performed an environmental compliance audit of the Site in February 1998, at which time the Site was owned and operated by Reliable Steel Fabricators. The purpose of the audit was to document baseline environmental conditions, identify significant environmental liabilities and to ascertain the status of environmental compliance. Tetra Tech personnel reviewed environmental files and background information for the Site. Additionally, Tetra Tech personnel interviewed then president and vice president of Reliable Steel Fabricators and toured the Site. The audit included evaluation of Site operations and identified environmental concerns associated with activities occurring in the Maintenance Building, Tank Shop, Structural Shop and Paint Shop as well as the areas surrounding these facilities (Table 1 and Figure 3).

2.4.2 2001 Phase I Environmental Site Assessment

LSI ADaPT (LSI) (LSI ADaPT, 2001) performed a Phase I ESA for the Site in June and July 2001. LSI performed the Phase I for Eidson Brown-Minneapolis Tank Company. The purpose of the ESA was to evaluate the Site for apparent recognized environmental conditions (RECs). LSI reviewed the 1998 Tetra Tech audit as part of their assessment, and performed a reconnaissance of the Site and observed adjacent portions of surrounding properties. The ESA documented many of the same features, activities, and potential environmental concerns identified in the 1998 Tetra Tech audit as well as additional Site features, activities and potential environmental concerns.

2.4.3 2001-2007 Prospective Purchaser Environmental Evaluations

Dalton, Olmsted & Fuglevand, Inc. (DOF) (DOF, 2007) performed sampling and analysis of various media present at the Site between 2001 and 2007 to assess potential environmental concerns prior to a potential purchase of the property by BMT-NW. Investigation activities were performed to evaluate the following:

- Welding rod slag present on the shoreline;
- Migration of welding rod slag constituents into Budd Inlet;
- Calcium chlorite sludge from production of acetylene;
- A former underground storage tank (UST) near the south end of the Tank Shop;
- Accumulations of sand blast grit associated with the Paint Shop; and
- Migration of sand blast grit into Budd Inlet.

Samples were collected from the surface of the Site, and from test pits and hand auger explorations (Figure 3). Four test pits (TP-1 through TP-4) and an unknown number of hand auger explorations were performed in the general area of welding slag and metal debris on the eastern side of the property. Two samples (S1 and S3) were collected from 2 feet bgs and submitted for analysis of total metals (i.e., arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium and silver) and using the Toxicity Characteristic Leaching Procedure (TCLP) for metals (i.e., arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver).

One sample was collected from 0.5 feet bgs near an area of former acetylene gas generation west of the Maintenance Building. The sample was submitted for analysis of the same total metals and TCLP metals as samples S1 and S3.

Two soil samples (Mt. Pit and P1) were collected from the soil surface beneath the Maintenance Building and submitted for analysis of the same total metals as samples S1 and S3. Sample "Mt. Pit" was also submitted for analysis of diesel- and heavy oil-range petroleum hydrocarbons.

A backhoe was used to investigate the suspected UST area south of the southwest corner of the Tank Shop. Two soil samples (U1 and U2) were collected from the area at 4 to 6 feet bgs and submitted for analysis of diesel- and oil-range petroleum hydrocarbons.

Samples of sand blast grit were collected in 2001 and 2007 for analysis of the same total metals and TCLP metals as samples S1 and S3. The sand blast grit samples collected in 2007 were also analyzed for zinc.

Three sediment samples (Sed. 1 through Sed. 3) were collected from the sediment east of the upland portion of the Site and were submitted for analysis of the same total metals as S1 and S3.

2.4.4 2005 Phase II Environmental Site Assessment

A Limited Phase II ESA was performed by Stemen Environmental, Inc. (Stemen) in October 2005 (Stemen, 2005). The purpose of the soil and groundwater investigation activities performed as part of the ESA was to assess the impacts of the current and/or past uses of the property and/or neighboring properties.

Sixteen direct-push borings were advanced to depths of approximately 12 feet bgs using a drill rig (S-1 through S-4, S-6, S-8 through S-11, and S-13 through S-19) (Figure 3). Four hand augers (S-22 through S-25) were advanced to depths ranging from approximately 3 feet to 8 feet bgs in the Maintenance Building. Two soil samples were collected from one of the direct-push borings (S-13), and one soil sample was collected from the remainder of the borings and hand auger explorations (a total of 22 soil samples). The depth of soil samples ranged from 3 to 12 feet bgs.

Twenty of the soil samples were analyzed for diesel-, heavy oil- and mineral oil-range petroleum hydrocarbons. Six of the samples were analyzed for gasoline-range petroleum hydrocarbons. Samples S-4 and S-7 were analyzed for benzene, toluene, ethylbenzene and xylene (BTEX). Samples from S-3 and S-13 were analyzed for metals including arsenic, cadmium, chromium, lead and mercury; and samples from S-13 and S-18 were analyzed for volatile organic compounds (VOCs).

Discrete, one-time groundwater samples were collected from seven of the direct-push soil borings (S-1, S-4, S-8, S-13, S-15, S-16 and S-19). The depth of collection for the one-time groundwater samples ranged from 3 feet to 5 feet bgs. Six of the groundwater samples were analyzed for diesel-, heavy oil- and mineral oil-range petroleum hydrocarbons. Three samples were analyzed for gasoline-range petroleum hydrocarbons. Two samples were analyzed for BTEX. Four samples were also analyzed for total arsenic, cadmium, chromium, lead and mercury.

2.4.5 2005 Remedial Investigation

Additional soil, water and slag sampling was performed by Stemen in December 2005 (Stemen, 2006). A drill rig was used to advance five borings at the Site (MS-1 through MS-5). One soil sample was collected from MS-1 at a depth of 4 feet bgs, 12 feet south of the southeastern corner of the Tank Shop (Figure 3). In addition to the borings, a sample of welding slag (BS-1) was collected from the eastern portion of the Site using a hammer and chisel. The soil and slag samples were analyzed for metals including arsenic, cadmium, chromium, lead and mercury. In addition, the slag sample was analyzed using TCLP for arsenic and lead.

Discrete, one-time groundwater samples were collected from the five borings. The water samples were collected from depths ranging from 4 to 5 feet bgs. The groundwater samples were analyzed for total metals including arsenic, cadmium, chromium, lead and mercury, and dissolved metals including arsenic, chromium and lead.

2.4.6 2006 Groundwater Monitoring

Seven groundwater monitoring wells (MW-1 through MW-7) were installed at the Site by Stemen in June and July 2006 (Stemen, 2007) (Figure 3). The depths of the tops of the well screens range from 2 to 3 feet bgs, and the depths of the bottoms of the wells range from 7 to 13 feet bgs. Three of the wells (MW-2, MW-3 and MW-5) are 3/4-inch-diameter wells, and four of the wells (MW-1, MW-4, MW-6 and MW-7) are 2-inch-diameter wells. The 3/4-inch wells utilize pre-packed filters. All of the wells are constructed from PVC casing and screen. The wells were surveyed by Hatton, Goddat, Pantier Licensed Surveyors. The wells have been surveyed to within 0.01 feet vertically (Stemen, 2007).

Groundwater monitoring was performed using low-flow sampling techniques on July 11, 2006, October 28, 2006 and February 7, 2007. The wells were sampled after depth to water was measured. The samples were analyzed for a combination of analyses including gasoline-, diesel-, oil- and mineral oil-range petroleum hydrocarbons, semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), specific halogenated compounds, ethylene dibromide (EDB), and metals (total and dissolved arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver and zinc).

2.4.7 2008 Sediment Sampling

Greylock and Integral Consulting, Inc. (Integral) performed an initial round of sediment sampling in November 2007 (Greylock, 2008b). The purpose of the sampling was to investigate possible environmental liabilities in the sediments on the east side of the property. Samples were collected from eight locations (RGS1 through RGS8) from the top 10 centimeters (cm) (4 inches) of sediment (Figure 3). Sample descriptions were recorded, including an estimation of the percentage of wood debris in the samples. Samples were submitted for a combination of conventionals (including TVS and TOC), metals (i.e., arsenic, cadmium, chromium, copper, lead, mercury, silver and zinc), tributyltin (TBT), diesel and oil-range petroleum hydrocarbons, SVOCs and PCBs.

2.4.8 2008 Soil, Groundwater, Stormwater and Sediment Sampling

An additional investigation was performed by Greylock in February and March 2008 (Greylock, 2008b). The investigation included a focused geophysical investigation on a portion of the Site, and additional soil, groundwater and sediment sampling. Stormwater samples were also collected as part of the investigation.

The geophysical investigation used ground penetrating radar and an electromagnetic survey to investigate the area south of the southwest corner of the Tank Shop and west of the Maintenance Building for potential USTs.

Soil sampling included the collection of 42 soil samples from 25 locations at the Site (Figure 3). Thirty-six samples ("RGB" samples) were collected from 22 direct-push borings at depths ranging between the ground surface and 12 feet bgs. Five samples ("Ditch" samples) were collected from two hand auger borings in the ditch in the northeast corner of the Site. One sample of sand blast grit (PS Grit) was grabbed from the surface inside the Paint Shop. The samples were submitted for a combination of analyses including gasoline-, diesel- and oil-range petroleum hydrocarbons, VOCs, SVOCs and metals (i.e., arsenic, cadmium, chromium, lead, mercury and zinc).

Two of the borings (MW-8 and MW-9) were completed as additional groundwater monitoring wells at the Site (Figure 3). One round of groundwater monitoring from all nine monitoring wells present at the Site was performed in February 2008. Groundwater samples were submitted for analysis of gasoline-, diesel- and oil-range petroleum hydrocarbons, VOCs, SVOCs and metals (i.e., arsenic, cadmium, chromium, copper, lead, mercury and zinc).

Two stormwater samples (SW1 and SW2) were collected from different stormwater discharge locations in the northern portion of the Site. Sample SW1 was collected from the ditch in the northeast corner of the Site, and SW2 was collected from a discharging stormwater pipe near the rail crane structure. SW1 was submitted for analysis of gasoline-, diesel- and heavy oil-range petroleum hydrocarbons, VOCs, SVOCs and metals (i.e., arsenic, cadmium, chromium, copper, lead, mercury and zinc). Sample SW2 was submitted for analysis of metals only. The other two known discharge locations were not sampled because no flow was observed.

Additional sediment sampling was performed as part of the additional investigation. Surface sediment samples (0 to 10 cm [0 to 4 inches]) were analyzed from five locations. Two of the surface sediment samples roughly coincided with previous surface sediment sampling locations (RGS1 and RGS2). The remaining three surface sediment samples were collected from new locations (RGS9, RGS10 and RGS11). Sample location RGS11 is located on the Hardel Plywood Site adjacent to the Reliable Steel Site. Sediment cores were collected and analyzed from four locations (RGS1, RGS2, RGS7 and RGS8). Sediment cores varied in length from 1.5 feet to 3.5 feet in length. Samples from the surface sediment samples and cores were submitted for a combination of analyses including conventionals, metals (i.e., arsenic, cadmium, chromium, copper, lead, mercury, silver and zinc), diesel- and oil-range petroleum hydrocarbons and SVOCs.

2.4.9 2007 Sediment Characterization Study, Budd Inlet, Olympia, Washington

Characterization of sediment in Budd Inlet was performed by Ecology in 2007 (Ecology, 2008). Ecology's Sediment Characterization Study, Budd Inlet, Olympia, Washington, included three sample locations within the intertidal portion of the Site. Three surface sediment samples (0 to 10 cm) were collected from intertidal locations T1-Sed, T1B-Sed and BI-S32 were analyzed for conventionals, Sediment Management Standards (SMS) chemicals of concern (metals, SVOCs and PCBs) and dioxins and furans. Additionally, tissue samples from shrimp and bent nose clams were collected from the location B1-Tissue1 (i.e., co-located T1-Sed) and tissue samples from little neck clams were collected BI-Tissue1B (i.e., co-located T1B-Sed) and analyzed for dioxins and furans. For this investigation, the results for conventional and SMS chemicals of concern from Ecology's Budd Inlet study have been included in this Work Plan. The results for dioxin and furan analyses for sediment and tissue samples are presented in Ecology's Sediment Characterization Study, Budd Inlet, Olympia, Washington Report (Ecology, 2008).

2.4.10 2007 Former Hardel Plywood Site, Draft Remedial Investigation Report

Remedial investigation activities were performed at the Former Hardel Plywood Site between July and September 2007 (Greylock, 2007b). The Former Hardel Plywood Site Draft Remedial Investigation Report included the results for one surface sediment (0 to 10 cm) sample location approximately 130 feet north of the Reliable Steel Site. The sample (GS-04) was analyzed for conventionals and SMS chemicals of concern (metals, SVOCs and PCBs) and dioxins and furans. For this investigation, the results for conventional and SMS chemicals of concern from the investigation of the Former Hardel Plywood Site have been included in this Work Plan. The results for dioxin and furan analyses for sediment samples are presented in The Former Hardel Plywood Site Draft Remedial Investigation Report (Greylock, 2007b).

2.5 SUMMARY OF PREVIOUS SITE CHARACTERIZATION RESULTS

This section presents a summary of the results of previous characterization activities completed at the Site. A summary of previous sampling and analysis activities to characterize the potential environmental concerns is provided to evaluate whether additional assessment is warranted.

Sections 2.5.1 through 2.5.5 summarize the soil, groundwater, surface water, shoreline material and sediment sampling and analysis that were completed to assess potential environmental concerns at the Site. The "data gaps" or additional characterization identified based on review of the previous Site characterization results are used as the basis for additional investigation activities described in the Work Plan.

Tables 2 through 8 and A-1 through A-4 summarize the analytical results for samples collected from the Site. Figure 3 shows the locations of the features and potential environmental concerns discussed below. Figure 4 summarizes the results for samples with chemical concentrations greater than the screening levels, and also presents the results for nearby samples where chemicals were either not detected, or were detected at concentrations less than screening levels. The results for groundwater and surface water sampling and analyses are presented separately from the discussion of potential environmental concerns for each area.

2.5.1 Summary of Soil Sampling and Analysis Results

The following sections summarize the results for soil samples collected at the Site. The results of soil samples are screened against MTCA Method A and B soil CULs for unrestricted land use based on the anticipated future use of the Site. Arsenic is screened against the background concentration for arsenic in the State of Washington (20 milligrams per kilogram [mg/kg]) (Ecology, 1994).

2.5.1.1 Soil Sample Results for the Maintenance Building and Southern Portion of the Site

Two Steel Fuel Transfer Pipes South of the Site

The Limited Phase II ESA (Stemen, 2005) identified that two soil samples (S-1 and S-2) were collected from the southern portion of the Site to evaluate the presence of petroleum hydrocarbon contamination potentially associated with buried fuel pipelines located on the property south of the Site. The borings that samples S-1 and S-2 were collected from were advanced to 12 feet bgs. Samples S-1 and S-2 were collected from 7 feet bgs and submitted for analysis of diesel-, oil- and mineral oil-range petroleum hydrocarbons (Table 2 and Figure 3).

Field screening (sheen testing) of the soil from the borings did not indicate the presence of petroleum hydrocarbon contamination, and the analytes were not detected in the samples.

Former Area of Two Petroleum USTs Removed in 1990

The Environmental Compliance Audit (Tetra Tech, 1998) and the Phase I ESA (LSI ADaPT, 2001) included review of a Notice of Permanent Closure of Underground Storage Tanks (USTs) for a 2,000-gallon gasoline UST and an 885-gallon diesel UST that were removed from the Site in 1990. The Limited Phase II ESA (Stemen, 2005) identifies that two USTs were previously located outside and adjacent to the western exterior of the Maintenance Building.

The Limited Phase II ESA identifies that three soil samples (S-4, S-7 and S-21) were collected in the vicinity of the former 2,000-gallon gasoline and 885-gallon diesel USTs (Stemen, 2005). The Phase II assessment identifies that samples S-4 and S-7 were collected from locations south and north of the former tank pit (i.e., former location where the USTs were buried), respectively, at a depth of 7 feet bgs. The samples were submitted for analysis of gasoline-range petroleum hydrocarbons and BTEX. The Phase II assessment identified that sample S-21 was collected from a location east of the former tank pit at a depth of 3 feet bgs. This sample was analyzed for diesel-, oil- and mineral oil-range petroleum hydrocarbons (Table 2 and Figure 3).

The Limited Phase II ESA identified that the borings that samples S-4, S-7 and S-21 were collected from were advanced to 12 feet bgs. Field screening (sheen testing) was performed on soil removed from the borings and the testing did not indicate the presence of petroleum products. Additionally, gasoline-, diesel-, and mineral oil-range petroleum hydrocarbons and BTEX were not detected in any of the samples. Oil-range petroleum hydrocarbons were detected in S-21 at 56 mg/kg, which is less than the MTCA Method A CUL of 2,000 mg/kg.

Two additional soil samples (RGB14 and RGB15) were collected west of the Maintenance Building in the vicinity of sample S-4, south of the former tank pit, during the additional investigation performed in 2008 (Greylock, 2008b). Sample RGB14 was collected west of S-4, and RGB15 was collected north of S-4. Both samples were collected from 4 feet bgs and submitted for analysis of gasoline-, diesel- and oil-range petroleum hydrocarbons, BTEX and metals (i.e., arsenic, cadmium, chromium, copper, lead, mercury and zinc).

Field screening (odor) did not indicate the presence of petroleum hydrocarbons in soil at RGB14 and RGB15. Gasoline-range petroleum hydrocarbons and BTEX were not detected in RGB14 or RGB15. Diesel-range petroleum hydrocarbons were detected at 130 mg/kg and 110 mg/kg in RGB14 and RGB15, respectively. Oil-range petroleum hydrocarbons were detected at 580 mg/kg and 440 mg/kg in RGB14 and RGB15, respectively. The detected concentrations of diesel- and heavy oil-range petroleum hydrocarbons were less than the MTCA Method A soil CUL of 2,000 mg/kg. Cadmium and mercury were not detected in RGB14 or RGB15. Chromium, copper, lead and zinc were detected at concentrations less than MTCA Method A and B CULs. Arsenic was detected at concentrations less than the background concentration for the State of Washington (20 mg/kg).

Additionally, the Limited Phase II ESA indicated that one soil sample (S-6) was collected from a boring advanced to 12 feet bgs near the base of the utility pole at the northwest corner of the Maintenance Building. Field screening (sheen testing) did not indicate the presence of petroleum hydrocarbons in soil removed from the boring. Sample S-6 was collected from 4.5 feet bgs and submitted for analysis of diesel-, oil- and mineral oil-range petroleum hydrocarbons. The analytes were not detected in the sample.

Calcium Carbide Waste

The Environmental Compliance Audit (Tetra Tech, 1998) identified that, prior to 1976, acetylene was generated at the Site by mixing calcium chloride with water. Review of a 1945 Sanborn Map shows an area of acetylene gas generation located outside the Maintenance Building adjacent to the northern portion of the west wall of the building (Figure 3). The audit also identified that a calcium carbide waste was generated and disposed of "on-site and also within an underground storage tank located in the vicinity of the maintenance building."

The Revised Work Plan and Work Summary RI/FS report (Greylock, 2008a) included a geophysical investigation of the area south of the Tank Shop and west of the Maintenance Building. One very strong geophysical anomaly indicated a potential UST was present approximately 18 feet west of the Maintenance Building (Figure 3). The anomaly was 20 feet long (in the east-west direction) and 7 feet wide (north-south) and present at a depth of 4.5 feet bgs. Due to the suspected UST's location near the area where acetylene gas generation was identified on the 1945 Sanborn Map, the suspected tank may be one that was identified to be used for storage of calcium carbide waste.

The Summary of Past DOF Sampling memorandum (DOF, 2007) identified that one sample (A3) was collected of a spent "carbine waste" visible near the west end of the Maintenance Building. The sample was submitted for analysis of pH and metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium and silver). TCLP analysis was also performed on the sample for metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver).

Silver and mercury were not detected in the sample. Barium, chromium, copper and selenium were detected at concentrations less than MTCA Method A and B CULs. Arsenic was detected at concentrations less than the background concentration for the State of Washington (20 mg/kg). Lead was detected at 1,540 mg/kg, which is greater than the MTCA Method A CUL of 250 mg/kg (Table 2 and Figure 4). Cadmium was detected at 2.87 mg/kg, which is greater than the MTCA Method A CUL of 2 mg/kg. The TCLP results were non-detect for all metals except lead (Table 3). The result for lead was 0.31 milligrams per liter (mg/l), which is less than the TCLP Dangerous Waste criteria of 5 mg/l. Additionally, the pH was stated to be 11.8.

Used Oil Storage

The Environmental Compliance Audit (Tetra Tech, 1998) indicated that a used oil drum storage area in the Maintenance Building did not have sufficient secondary containment to contain spills. The audit also indicated that a review of a 1993 Ecology inspection report stated that used oil drums in the Maintenance Building did not have any secondary containment.

The Phase I ESA (LSI ADaPT, 2001) documented petroleum-like staining beneath drums and containers of waste oil and new oil and lubricants, and indicated the containers were stored in the center of the Maintenance Building. Figure 1, attached to the Summary of Past DOF Sampling memorandum (DOF, 2007), shows an oil and lubricant drum storage area in the center of the Maintenance Building.

The Limited Phase II ESA (Stemen, 2005) included the collection of one soil sample (S-22) from near the center of the Maintenance Building (Figure 3). The boring that sample S-22 was collected from was advanced to 8 feet bgs. Field screening did not indicate the presence of petroleum hydrocarbons in the soil removed from the boring. Sample S-22 was collected from 94 inches (7.8 feet) bgs and submitted for analysis of diesel-, oil- and mineral oil-range petroleum hydrocarbons. The analytes were not detected in the sample (Table 2).

Additional soil samples were collected beneath the Maintenance Building and submitted for analysis of diesel-, oil-, and/or heavy oil-range petroleum hydrocarbons. The samples included "Mt. Pit" (DOF, 2007) collected from surface soil and S-21 and S-23 through S-25 (Stemen, 2005) that were collected from 3 to 8 feet bgs. The borings or hand augers that samples S-21 through S-25 were collected from were advanced to 3 feet to 8 feet bgs. Field screening did not indicate the presence of petroleum hydrocarbons in the soil removed from the borings or hand augers. Diesel-, oil- and/or heavy oil-range petroleum hydrocarbons were either not detected or were detected at concentrations less than the MTCA Method A CULs for these analytes in the samples collected from beneath the Maintenance Building.

The Summary of Past DOF Sampling memorandum (DOF, 2007) identified that Sample "Mt. Pit" was also submitted for analysis of total metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium and silver). Barium, cadmium, chromium, copper, mercury, selenium and silver were either not detected or were detected at concentrations less than MTCA Method A and B CULs. Arsenic was detected at a concentration less than the background concentration for the State of Washington (20 mg/kg). Lead was detected at a concentration of 338 mg/kg which is greater than the MTCA Method A CUL of 250 mg/kg in sample Mt. Pit (Table 2 and Figure 4).

Pit Previously Used for Vehicle/Equipment Maintenance

The Environmental Compliance Audit (Tetra Tech, 1998) and the Phase I ESA (LSI ADaPT, 2001) indicated that historically, used oil was disposed of into a pit beneath the Maintenance Building. The Limited Phase II Site Assessment (Stemen, 2005) identified that a mechanics-type pit was located 15 feet west of the eastern exterior wall of the building (Figure 3).

The Limited Phase II ESA (Stemen, 2005) identified that one soil sample (S-24) was collected from the pit area, and one soil sample (S-15) was collected approximately 20 feet east of the pit. Sample S-24 was collected from the pit at 3 feet bgs and submitted for analysis of gasoline-, diesel-, heavy oil- and mineral oil-range petroleum hydrocarbons. Sample S-15 was collected from outside the east wall of the Maintenance Building at a depth of 12 feet bgs and submitted for analysis of diesel-, heavy oil- and mineral oil-range petroleum hydrocarbons.

The boring that sample S-24 was collected from was advanced to 8 feet bgs and the boring that sample S-15 was collected from was advanced to 12 feet bgs. Field screening of the soil from the boring S-15 was collected from did not indicate the presence of petroleum hydrocarbon contamination. Diesel-, heavy oil- and mineral oil-range petroleum hydrocarbons were not detected in the sample.

Field screening of soil from the boring that sample S-24 was collected from indicated the presence of petroleum hydrocarbons. Gasoline-range petroleum hydrocarbons (identified as possible mineral spirits in the laboratory report) were detected at a concentration of 490 mg/kg, which is greater than the MTCA Method A soil CUL of 100 mg/kg (Table 2 and Figure 4). Diesel- and oil-range petroleum hydrocarbons were detected at 500 mg/kg and 1,200 mg/kg, respectively. The detected concentrations of diesel- and oil-range petroleum hydrocarbons are less than the MTCA Method A soil CULs of 2,000 mg/kg. Mineral oil-range petroleum hydrocarbons were not detected.

Based on the results described above, the soil in the pit located on the eastern end of the Maintenance Building contains gasoline-range petroleum hydrocarbons at concentrations greater than MTCA Method A soil CULs. The extent of soil in and adjacent to the pit with gasoline-range hydrocarbon concentrations greater than MTCA CULs is not delineated. Diesel- and oil-range petroleum hydrocarbons were detected in sample S-24 and not in samples S-15 and S-25, which indicates that the extent of diesel- and oil-range petroleum hydrocarbon contamination may be limited in the east and west directions.

The Summary of Past DOF Sampling memorandum (DOF, 2007) identified that one soil sample was collected from the pit beneath the Maintenance Building. Sample P1, identified in Figure 1 attached to the memorandum, was collected from the pit located at the eastern end of the building. The sample was collected from the surface of soil in the pit and submitted for analysis of metals (i.e., arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium and silver). Barium, cadmium, chromium, copper, mercury, selenium and silver were either not detected or were detected at concentrations less than the MTCA Method A and B CULs in the sample. Arsenic was detected at a concentration less than the background concentration for the State of Washington (20 mg/kg). The detected lead concentration (518 mg/kg) was greater than MTCA Method A CUL of 250 mg/kg (Table 2 and Figure 4).

Three Transformers on Utility Pole

The Environmental Compliance Audit (Tetra Tech, 1998) identified that three pole-mounted electrical transformers are located west of the Maintenance Building (Figure 3). The audit identified that one of the transformers ruptured in 1992 and that oil spilled on the ground.

The Limited Phase II ESA indicated that one soil sample (S-6) was collected from near the base of the utility pole from a boring advanced to 12 feet bgs. Field screening (sheen testing) did not indicate the presence of petroleum hydrocarbons in soil removed from the boring. Sample S-6 was collected from 4.5 feet bgs and submitted for analysis of diesel-, oil- and mineral oil-range petroleum hydrocarbons. The analytes were not detected in the sample (Table 2).

Former Paint and Solvent Storage

The Limited Phase II ESA (Stemen, 2005) indicated that paints and solvents were formerly stored outside the north wall of the Maintenance Building (Figures 3 and 4). Four soil samples, two from S-13, one from S-18 and one from S-23, were collected from this area as part of the Phase II ESA. Samples were collected from 6 feet and 10 feet bgs at the location of S-13, and 7.5 feet bgs at S-18. The sample depth for S-23 was reported as 4 to 8 feet bgs.

The sample collected from 6 feet bgs at S-13 and the sample from S-18 were submitted for analysis of gasoline-, diesel-, oil- and mineral oil-range petroleum hydrocarbons and VOCs. The sample collected from 10 feet bgs in S-13 was submitted for analysis of gasoline-, diesel-, heavy oil- and mineral oil-range petroleum hydrocarbons. The sample collected from 10 feet bgs at S-23 was submitted for analysis of gasoline-, diesel-, oil- and mineral oil-range petroleum hydrocarbons. Additionally, the sample from 6 feet bgs at S-13 was submitted for analysis of metals including arsenic, cadmium, chromium, lead and mercury. Diesel-, oil- and mineral oil-range petroleum hydrocarbons were not detected in samples submitted from S-13 or S-23. Diesel- and oil-range petroleum hydrocarbons were detected at 180 mg/kg and 1,000 mg/kg, respectively, in S-18 – both less than the MTCA Method A soil CULs of 2,000 mg/kg.

Gasoline-range petroleum hydrocarbons were detected at 106 mg/kg at 6 feet bgs in S-13 (Table 2 and Figure 4). Gasoline-range petroleum hydrocarbons (identified as mineral spirits in the laboratory report) were detected at 6,000 mg/kg at 10 feet in S-13. Gasoline-range petroleum hydrocarbons were detected at 100 mg/kg in S-18, which is equal to the MTCA Method A CUL for gasoline-range petroleum hydrocarbons.

Cadmium, chromium, lead and mercury were either not detected or were detected at a concentration less than MTCA Method A and B CULs in the sample collected from S-18. Arsenic was detected at a concentration less than the background concentration for the State of Washington (20 mg/kg).

The VOCs n-propylbenzene and sec-butylbenzene were detected in the sample submitted from 6 feet bgs in S-13 at 90 micrograms per kilogram (µg/kg) and 340 µg/kg, respectively. There are no MTCA cleanup criteria established for these chemicals. No other VOCs were detected in samples S-13 and S-18 at detection limits less than the MTCA Method A and B CULs except for methylene chloride. The detection limit for methylene chloride was greater moderately than the MTCA Method A CUL.

The Revised Work Plan and Work Summary RI/FS (Greylock, 2008a, 2008b) included the collection of eight soil samples from five borings (RGB10, RGB11, RGB12, RGB13 and RGB18) in the vicinity of the former solvent and paint storage area. Samples were submitted from depths ranging from the ground surface to 11 feet bgs. Seven of the samples were submitted for analysis of gasoline-range petroleum hydrocarbons and VOCs. Five of the samples were submitted for analysis of metals (arsenic, cadmium, chromium, copper, lead, mercury and zinc). The two samples from RGB18 were submitted for analysis of SVOCs.

Cadmium, chromium, copper, lead, mercury and zinc were either not detected or were detected at concentrations less than MTCA Method A and B CULs. Arsenic was detected at a concentration less than the background concentration for the State of Washington (20 mg/kg).

Gasoline-range petroleum hydrocarbons were not detected in samples submitted from RGB11, RGB12, RGB13 or RGB18. Gasoline-range petroleum hydrocarbons were not detected at 11 feet bgs in RGB10. Gasoline-range petroleum hydrocarbons were detected in RGB10 at the surface and 5 feet bgs at 7 mg/kg and 14 mg/kg, respectively. The MTCA Method A CUL criteria for gasoline-range petroleum hydrocarbons is 100 mg/kg.

VOCs were not detected in RGB11, RGB12, RGB13 or RGB18 and in the sample submitted from 11 feet in RGB10 at detection limits below MTCA Method A and B CULs except for 1,2-dibromoethane and methylene chloride. The detection limit for methylene chloride was greater than the MTCA Method A CUL. VOCs were detected in the samples submitted from the surface and from 5 feet bgs in RGB10 at concentrations less than MTCA Method A and B CULs. The detection limits for 1,2-dibromoethane and methylene chloride were moderately greater than the MTCA Method A CUL.

SVOCs were not detected in the sample submitted from 10 feet bgs in RGB18. SVOCs were detected in the sample submitted from 5 feet bgs in RGB18. The SVOCs detected included the carcinogenic polycyclic aromatic hydrocarbons (cPAHs) benzo(a)pyrene at 0.17 mg/kg, benzo(b)fluoranthene at 0.19 mg/kg, chrysene at 0.19 mg/kg, fluoranthene at 0.32 mg/kg, indeno(1,2,3-cd)pyrene at 0.091 mg/kg, phenanthrene at 0.14 mg/kg and pyrene at 0.33 mg/kg. The calculated Toxic Equivalency Concentration (TEC) for the detected cPAHs is 0.22 mg/kg, which is greater than the MTCA Method A CUL of 0.1 mg/kg (Table 2 and Figure 4). The sample collected from RGB18 from 5 feet bgs was identified to contain white layers.

One additional sample (MW-8) was collected north of the former paint and solvent storage area during the Revised Work Plan and Work Summary RI/FS report (Greylock, 2008a, 2008b). The sample was collected at a depth of 5 feet bgs. The sample was submitted for analysis of gasoline-, diesel and oil-range petroleum hydrocarbons. Diesel- and oil-range petroleum hydrocarbons were not detected in the sample. Gasoline-range petroleum hydrocarbons were detected at a concentration of 12 mg/kg, which is less than the MTCA Method A CUL of 100 mg/kg.

The sample from 5 feet bgs in MW-8 was also analyzed for VOCs. Three VOCs were detected in MW-8 at 5 feet bgs. The concentrations of the VOCs were at least an order of magnitude less than their applicable MTCA CULs. The VOC detection limits in the samples were less than MTCA Method A and B CULs except for 1,2-dibromoethane and methylene chloride, which were moderately greater than the respective MTCA Method A CULs.

Sand Dryer with 800-Gallon Diesel Above Ground Storage Tank (AST) on North Side of Building

The Environmental Compliance Audit (Tetra Tech, 1998) indicated that an 800-gallon diesel AST was located adjacent to a sand dryer at the Maintenance Building. The diesel AST was reported to not have secondary containment. During a Site visit on January 8, 2009, it was identified that the AST was located on the north side of the Maintenance Building, in the same general area where paints and solvents were stored as discussed above (Figure 3)

The Limited Phase II Environmental Site Assessment (Stemen, 2005) identified that four samples (two from S-13 and one from S-18 and S-23) were collected from this area. The four samples were submitted for analysis of diesel-, oil- and mineral oil-range petroleum hydrocarbons. Diesel-, oil- and mineral oil-range petroleum hydrocarbons were either not detected or were detected at concentrations less than their respective MTCA CULs in all four samples.

Crane Shed

The Phase I ESA (LSI ADaPT, 2001) identified the presence of petroleum-like staining beneath a mobile crane, and indicated the shed was located next to the Maintenance Building. The Summary of Past DOF Sampling memorandum (DOF, 2007) noted the oil staining inside the mobile crane shed, and located the shed south and adjacent to the Maintenance Building on Figure 1 attached to the memorandum.

The Limited Phase II ESA (Stemen, 2005) identifies that one sample, S-17, was collected adjacent to the west side of the mobile crane shed, at a depth of 7 feet bgs (Figure 3). The Phase II Assessment identified that field screening (sheen testing) did not indicate the presence of petroleum hydrocarbons in the soil located west of the mobile crane shed. The sample was submitted for analysis of diesel-, oil- and mineral oil-range petroleum hydrocarbons. Petroleum hydrocarbons were not detected in the sample.

Two additional soil samples were collected from RGB19, west of the shed (Figure 3). The samples were collected at the ground surface and 12 feet bgs. The surface sample was analyzed for metals (arsenic, cadmium, chromium, copper, lead, mercury and zinc). The sample collected from 12 feet bgs was analyzed for metals, gasoline- and diesel-range petroleum hydrocarbons, VOCs and SVOCs. Petroleum hydrocarbons, VOCs, and SVOCs were not detected in the samples. Cadmium, chromium, copper, lead, mercury and zinc were either not detected or were detected at concentrations less than the MTCA Method A and B soil CULs. Arsenic was detected at a concentration less than the background concentration for the State of Washington (20 mg/kg).

The analytical results from samples S-17 and RGB19 indicate that petroleum hydrocarbon contamination is not present in the area west of the crane shed. However, samples S-17 and RGB19 were not collected from within the crane shed where petroleum staining was observed.

2.5.1.2 Soil Sample Results for the Tank Shop, Structural Shop and Associated Areas

Underground Storage Tanks

The Environmental Compliance Audit (Tetra Tech, 1998) indicated that two out-of-service USTs were present at the Site. The Summary of Past DOF Sampling memorandum (DOF, 2007) indicates that a UST exists or existed near the southwest end of the Tank Shop. The DOF memorandum describes the tank as a "former" UST but also indicates that a 300-gallon UST containing diesel fuel "is" located near the southwest end of the Tank Shop. The DOF memorandum also identifies a 300-gallon UST on Figure 1 attached to the memorandum.

The Revised Work Plan and Work Summary RI/FS report (Greylock, 2008a) included a geophysical investigation of the area south of the southwest portion of the Tank Shop and west of the Maintenance Building. A high anomalous zone indicating a probable UST was documented adjacent to the south side of the west end of the Tank Shop (Figure 3). The location of the high anomalous zone indicates that a UST may be adjacent to the building or partially beneath the building. The high anomalous zone documented in the geophysical investigation likely represents one of the two out-of-service USTs that were identified during the Environmental Audit performed at the Site (Tetra Tech, 1998).

The Summary of Past DOF Sampling memorandum (DOF, 2007) identifies that two soil samples (U1 and U2) were collected during the July 2004 subsurface investigation. The memorandum indicates sample U1 was collected from the former tank excavation at a depth of 5 to 6 feet bgs. Sample U2 was collected 10 feet east of U1 at a depth of 4 to 5 feet bgs. Both samples were submitted for analysis of diesel- and heavy oil-range petroleum hydrocarbons. Diesel- and heavy oil-range petroleum hydrocarbons were detected in U1 at 16,500 mg/kg and 278 mg/kg, respectively (Table 2 and Figure 4). The MTCA Method A CUL for these analytes is 2,000 mg/kg. The analytes were not detected in sample U2.

The Limited Phase II ESA identifies that four soil samples (S-8 through S-11) were collected from the area southwest of the Tank Shop to investigate the possible presence of petroleum hydrocarbon contamination from the UST. One sample was collected from each boring at depths ranging from 4 to 8 feet bgs and the samples were submitted for analysis of diesel-, oil- and mineral oil-range petroleum hydrocarbons. Field screening (odor and sheen testing) indicated the presence of petroleum hydrocarbon contamination in soil from S-8, S-9 and S-11. Field screening (odor and sheen testing) did not indicate the presence of petroleum hydrocarbon contamination in soil from S-10. The analytes were not detected in S-10. Diesel-range petroleum hydrocarbons were detected in sample S-9 at a concentration of 1,200 mg/kg, which is less than the MTCA Method A CUL of 2,000 mg/kg. Diesel-range petroleum hydrocarbons were detected at 8,900 mg/kg and 8,700 mg/kg in S-8 and S-11, respectively.

Seven additional samples from five additional borings (RGB5 through RGB9) were collected in the area southwest of the Tank Shop to further characterize soil contamination from petroleum hydrocarbons (Greylock, 2008b). Samples were collected from depths ranging between 5 to 12 feet bgs. All seven samples were submitted for analysis of diesel- and oil-range petroleum hydrocarbons. The sample from 5 to 6 feet bgs at RGB5 and 6 to 7 feet bgs from RGB7 were also analyzed for BTEX and PAHs. The sample from 5 feet bgs in RGB8 was also analyzed for VOCs.

Benzene and ethylbenzene were not detected in the samples. Toluene and xylenes were detected in RGB7 at 6 to 7 feet bgs at concentrations of 0.15 mg/kg and 0.37 mg/kg, respectively. The MTCA Method A CULs for these analytes are 9 mg/kg and 6 mg/kg, respectively. Gasoline-range petroleum hydrocarbons were detected in RGB8 at 5 feet bgs at a concentration of 12 mg/kg, which is less than the MTCA Method A CUL of 100 mg/kg. Diesel-range petroleum hydrocarbons were detected in RGB5 at 5 to 6 feet bgs at a concentration of 2,600 mg/kg, which is greater than the MTCA Method A CUL of 2,000 mg/kg (Table 2 and Figure 4). Diesel-range petroleum hydrocarbons were detected in RGB7 at 6 to 7 feet bgs at a concentration of 15,000 mg/kg. Heavy oil-range petroleum hydrocarbons were detected in RGB7 at 6 to 7 feet bgs at a concentration of 400 mg/kg, which is less than the MTCA Method A CUL of 2,000 mg/kg. Diesel- and heavy oil-range petroleum hydrocarbons were not detected in the remaining samples collected from RGB5 through RGB9.

PAHs were not detected in RGB5. Four SVOCs were detected in RGB7 at 6 to 7 feet bgs. The concentrations of the SVOCs that were detected were at least two orders of magnitude less than their applicable MTCA CULs. Carcinogenic PAHs (cPAHs) were not detected in the samples, and the detection limits were less than the MTCA Method A CUL.

750-Gallon Bunker Oil UST Closed-In-Place

The Phase I ESA (LSI ADaPT, 2001) identifies that a 750-gallon UST was observed in the Tank Shop. The UST was reported to have contained bunker fuel until 1999, when it was pumped out and filled with inert material, possibly concrete. Figure 1 attached to the Summary of Past DOF Sampling memorandum (DOF, 2007) shows a closed-in-place UST on the south side of the Tank Shop (Figure 3).

Two soil samples (S-14 and S-26) were collected from adjacent to the closed UST during the Limited Phase II ESA (Stemen, 2005). Sample S-14 was collected from the southern end of the tank, and S-26 was collected from the northwestern end of the tank. The depth of collection for both samples was reported as ranging from 4 to 8 feet bgs.

The samples were submitted for analysis of diesel-, heavy oil- and mineral oil-range petroleum hydrocarbons. Field screening results of the soil removed from the borings did not indicate the presence of petroleum hydrocarbons and the analytes were not detected in either sample (Table 2).

2.5.1.3 Paint Shop and Northern Portion of Site

Staining at Location of Crane Transformer

The Phase I ESA (LSI ADaPT, 2001) identified a ground-mounted transformer for the rail crane. The report indicates the presence of soil staining at the location of the transformer.

The Limited Phase II ESA (Stemen, 2005) indicated a hand-auger boring was advanced adjacent to a shed identified to be where a transformer was previously housed that was associated with the rail crane. Boring S-27 was advanced in a location directly adjacent to the east side of the transformer shed. Field screening did not indicate the presence of petroleum hydrocarbon contamination in the soil removed from the boring. Therefore, no soil sample was submitted for analysis.

One soil sample (RGB20) was collected as part of the Revised Work Plan and Work Summary RI/FS report (Greylock, 2008a, 2008b) in the vicinity of the rail crane transformer (Figure 3). The sample was collected at the ground surface and was submitted for analysis of PCBs. Arochlor 1254 was detected at 0.6 mg/kg, which is less than the MTCA Method A CUL of 1 mg/kg for PCB mixtures.

Spent Sand Blast Grit

The Environmental Compliance Audit (Tetra Tech, 1998) identified spent sand blast grit mixed with paint overspray in and around the Paint Shop. The Phase I ESA (LSI ADaPT, 2001) identified 4 to 6 inches of the grit on the Paint Shop floor.

The Summary of Past DOF Sampling memorandum (DOF, 2007) identifies that samples of spent sand blast grit were collected in 2001 and 2007. A sample collected in 2001 was analyzed for total metals and

TCLP metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver). A sample collected in 2007 was analyzed for total zinc and two additional samples were collected and analyzed for TCLP metals.

Total barium, cadmium, chromium, lead, mercury, selenium, silver and zinc were either not detected or were detected at concentrations less than MTCA CULs (Table 2). Arsenic was detected at a concentration less than the background concentration for Washington State (20 mg/kg). The TCLP metals concentrations were less than the Dangerous Waste Criteria (Table 3).

Fourteen soil samples from six soil borings (RGB1 through RGB4, RGB16 and RGB17) and one soil sample from a surface grab (PS Grit) were collected in and around the Paint Shop as part of the Revised Work Plan and Work Summary RI/FS report (Greylock, 2008a, 2008b). The samples were collected from depths ranging from the surface to 10 feet bgs. Ten samples were submitted for analysis of metals (arsenic, cadmium, chromium, copper, lead, mercury and zinc). Nine of the samples were submitted for analysis of diesel- and heavy oil-range petroleum hydrocarbons, three samples were submitted for analysis of gasoline-range petroleum hydrocarbons and BTEX, two samples were submitted for analysis of VOCs, and 12 samples were submitted for analysis of SVOCs. Two samples were collected from MW-9 at the surface and 4 feet bgs and analyzed for metals, diesel- and oil-range petroleum hydrocarbons and SVOCs. The results for MW-9 are presented with the results for the Paint Shop due to the similarity of sample analyses and the sample results.

Gasoline-range petroleum hydrocarbons and BTEX were either not detected or were detected at concentrations less than MTCA CULs. Diesel-range petroleum hydrocarbons and heavy oil were detected in the surface sample collected from RGB4 and MW-9. The concentrations of diesel- and oil-range petroleum hydrocarbons in RGB4 were 180 mg/kg and 390 mg/kg, respectively. The concentrations of diesel- and oil-range petroleum hydrocarbons in MW-9 were 420 mg/kg and 860 mg/kg, respectively. The diesel- and oil-range concentrations are less than the MTCA Method A CUL of 2,000 mg/kg. Diesel was detected in the sample collected at 6 feet bgs in RGB16 at a concentration of 3,600 mg/kg, which is greater than the MTCA Method A CUL of 2,000 mg/kg. Diesel-range petroleum hydrocarbons were not detected in a sample collected at 10 feet bgs in RGB16.

Metals were either not detected or were detected at concentrations less than their respective MTCA Method A or B CULs with the exception of sample RGB1 at 4 feet bgs. Mercury was detected in that sample at a concentration of 2.4 mg/kg, which is greater than the MTCA Method A CUL of 2 mg/kg.

VOCs were either not detected or were detected at concentrations less than their respective MTCA Method A or B CULs in surface samples collected from RGB1 and RGB3. The detection limits for 1,2-dibromoethane and methylene chloride were greater than the MTCA Method A and/or B CULs.

SVOCs were either not detected or were detected at concentrations less than their respective MTCA Method A or B CULs in six samples. SVOCs (cPAHs) were detected at concentrations greater than the MTCA Method A CUL of 0.1 mg/kg in five samples. The samples were collected from RGB2, RGB3 and RGB4. Benzo(a)pyrene, benzo(b)fluoranthene, and chrysene were detected at concentrations ranging between 0.14 to 0.18 mg/kg in the surface sample at RGB2. Benzo(a) anthracene, benzo(b) fluoranthene, benzo(k)fluoranthene, and chrysene were detected at concentrations ranging from 0.25 to 0.6 mg/kg in the surface sample at RGB3. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k) fluroanthene and chrysene were detected at concentrations ranging from 0.55 mg/kg to 16 mg/kg in the three samples collected from the ground surface to 1.5 feet bgs from RGB4. The calculated TECs for the five samples range from 0.19 to 7.17 mg/kg, which are greater than the MTCA Method A CUL of

0.1 mg/kg. SVOCs were not detected in samples collected from RGB2 at 3.5 feet, RGB3 at 4 feet and RGB4 at 4 feet bgs. SVOCs were not detected in the sample from RGB16 at 6 feet bgs. The detection limits for benzo(a)pyrene and N-nitroso-di-n-propylamine were greater than the Method A and/or B CULs. The detection limit for N-nitroso-di-n-propylamine was greater than the Method B CUL in samples collected from the RGB4 from the surface to 1.5 feet bgs. In general, the detection limits for SVOCs in samples RGB4 from the surface to 1.5 feet bgs were higher than other samples, which was likely the result of the cPAHdetections in the samples.

At MW-9, diesel- and heavy oil-range petroleum hydrocarbons were detected in the surface sample at 420 mg/kg and 2 mg/kg, respectively. These concentrations are less than the MTCA Method A CUL of 2,000 mg/kg. Metals were either not detected or were detected at concentrations less than MTCA Method A or B CULs. cPAHs were detected in both the surface sample and the sample collected from 5 feet bgs. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and chrysene were detected at concentrations ranging from 0.64 mg/kg to 1.7 mg/kg. The cPAH TECs for the samples collected from MW-9 were 0.88 and 1.7 mg/kg, which is greater than the MTCA Method A soil CUL of 0.1 mg/kg. All other SVOCs detected in soil from MW-9 were less than MTCA CULs.

Drainage Ditch at Northeast Corner of Site

The Environmental Compliance Audit (Tetra Tech, 1998) identified a drainage ditch at the north end of the property. Five soil samples were collected from two boring locations in the drainage ditch as part of the Revised Work Plan and Work Summary RI/FS report (Greylock, 2008a, 2008b). Samples were collected at sample location Ditch-1 from the surface and 2.5 feet bgs, and at Ditch-2 from the surface, 2.5 feet and 5.5 feet bgs. Four of the samples were submitted for analysis of metals (arsenic, cadmium, chromium, copper, lead, mercury and zinc), gasoline-, diesel- and heavy oil-range petroleum hydrocarbons, VOCs and SVOCs. The sample collected from 5.5 feet bgs at Ditch-2 was submitted for analysis of diesel- and heavy oil-range petroleum hydrocarbons.

Gasoline-range petroleum hydrocarbons and metals were either not detected or were detected at concentrations less than the MTCA Method A and B CULs. Diesel- and heavy oil-range petroleum hydrocarbons were either not detected or were detected at concentrations less than the MTCA Method A CUL in all samples except the sample collected from 2.5 feet bgs at Ditch-2. Diesel- and oil-range petroleum hydrocarbons were detected in that sample at 5,000 mg/kg and 1,600 mg/kg, respectively. The MTCA Method A CUL for these analytes is 2,000 mg/kg.

Methylene chloride was the only VOC that was detected in ditch samples. Methylene chloride is a common laboratory contaminant. The detected concentration and detection limits for methylene chloride were greater than the MTCA Method A CUL. The detection limit for 1,2-dibromoethane was greater than the MTCA Method A and B CULs. The detection limits of all other VOCs were less than the MTCA Method A and B soil CULs.

Carcinogenic PAHs were detected in three of four drainage ditch samples. Benzo(a)pyrene, benzo(b) pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and chrysene were detected at concentrations ranging from 0.32 mg/kg to 1.8 mg/kg. The calculated TECs for the samples were 0.87 mg/kg for Ditch-1-S, 2.39 mg/kg for Ditch-1-2.5 and 0.72 mg/kg for Ditch-2-S. These values are all greater than the MTCA Method A CUL of 0.1 mg/kg. cPAHs were not detected in sample Ditch-2-2.5. The detection limit for N-nitroso-di-n-propylamine was greater than the Method B CUL in samples collected from the drainage ditch. Additionally, the detection limit for benzo(a)pyrene was greater than the MTCA Method A and B soil CULs.

2.5.2 Soil Characterization Data Gaps

Data gaps are identified to complete the characterization of the nature and extent of contamination at the Site, and to assess potential impacts in areas of potential environmental concerns that have not been characterized to date. The identified data gaps for soil include the following:

- Maintenance Building and Southern Portion of the Site
  - Presence of calcium carbide waste with lead and cadmium concentrations greater than MTCA Method A CULs in the former location used for acetylene production;
  - Extent of soil containing lead concentrations greater than the MTCA Method A soil CUL beneath the Maintenance Building;
  - Extent of soil with gasoline-range petroleum hydrocarbons at concentrations greater than the MTCA Method A soil CUL in the area of the former equipment and vehicle maintenance pit;
  - Extent of soil with gasoline-range petroleum hydrocarbons and cPAHs present at concentrations greater than the MTCA Method A soil CULs in the former paint and solvent storage area;
  - Presence of PCBs in soil adjacent to a utility pole at the northwest corner of the Maintenance Building;
  - Presence of a UST west of the Maintenance Building that may have been used to store calcium carbide waste;
  - Presence of petroleum hydrocarbons in stained soil in the crane shed; and
  - Presence of solvents in soil in the former location of a solvent hopper on the southern portion of the Site.
- Tank Shop and Structural Shop
  - Presence of a UST and extent of soil with diesel-range petroleum hydrocarbons at concentrations greater than the MTCA Method A soil CUL in the UST area in the southwest corner of the Tank Shop;
  - Presence of a UST at the southwest corner of the Tank Shop;
  - Presence of petroleum hydrocarbons in stained soil in the Structural Shop adjacent to the shear machine; and
  - Presence of petroleum hydrocarbons in stained soil beneath the fork lift parking area on the south side of the Tank Shop.
- Paint Shop and Northern Portion of the Site
  - Extent of soil with cPAH concentrations greater than the MTCA Method A soil CULs in the drainage ditch and area surrounding the Paint Shop;
  - Extent of soil with diesel-range petroleum hydrocarbons present at concentrations greater than the MTCA Method A soil CUL in the drainage ditch and area east of the Paint Shop;
  - Extent of soil with mercury present at concentrations greater than the MTCA Method A soil CUL in the area east of the Paint Shop; and
  - Presence of petroleum hydrocarbons in soil below the rail crane that may have been impacted by spilled oil.

2.5.3 Summary of Groundwater Sampling and Analysis

This section presents the results for groundwater sampling and analysis performed at the Site.

Groundwater sampling and analysis was performed during multiple investigation events at the Site. One-time groundwater samples were collected for field screening purposes from soil borings during the Limited Phase II ESA and additional remedial investigation activities performed in 2005 (Stemen, 2005 and 2006). Groundwater sampling of monitoring wells MW-1 through MW-7 was performed on July 11, 2006, October 28, 2006 and February 7, 2007. A limited and varied set of analyses were performed on samples collected during these sampling events. Groundwater sampling of monitoring wells MW-1 through MW-9 was performed on February 19, 2008. As the results from groundwater samples collected on February 19, 2008 are from the most recent sampling event and provide a comprehensive data set for all monitoring wells present at the Site, they are discussed below. The results from one-time groundwater samples collected in 2005 and groundwater samples from monitoring performed in July and October 2006 and February 2007 are provided in Appendix A.

Groundwater present at the Site is not a current source of drinking water and is not a potential future source of drinking water due to its proximity to marine water. Therefore, the potential environmental exposure pathway for groundwater is as surface water. For screening purposes, groundwater analytical results are compared to the lowest surface water quality level from the Water Quality Standards for Surface Waters of the State of Washington (State standards) (Chapter 173-201A WAC), National Recommended Water Quality Criteria (NRWQC) (Section 304 of the Clean Water Act), National Toxics Rule (NTR) criteria (40 CFR 131.36) and MTCA Surface Water CULs (WAC 173-340-730). If no applicable surface water level has been established for an analyte then the groundwater results are compared to MTCA Method A or B groundwater CULs (Table 4). Additionally, if the lowest groundwater screening level is less than background concentrations for groundwater in Washington State the background value is used as the screening level. Finally, if the screening level is less than the laboratory reporting limit, then the laboratory reporting limit is used as the screening level.

Groundwater samples collected on February 19, 2008 were analyzed for dissolved metals (arsenic, cadmium, chromium, copper, lead, mercury and zinc); gasoline-, diesel-, and oil-range petroleum hydrocarbons; VOCs and SVOCs.

Cadmium, lead and mercury were not detected in the groundwater samples. The mercury detection limit was greater than the surface water screening level. Chromium and zinc were detected in multiple samples but at concentrations less than the surface water screening level (Table 4). Arsenic was detected in MW-7 and MW-8 (6.11 microgram per liter [µg/l] and 15.3 µg/l, respectively) at concentrations greater than the background arsenic concentration in groundwater in Washington State (5.0 µg/l) (WAC 173-340-900). Copper was also detected at a concentration greater than the background copper concentration in groundwater in Washington State (20 µg/l) (PTI, 1989) in monitoring well MW-8 (40.3 µg/l). Monitoring wells MW-7 and MW-8 are located southwest of an area at the Site that has been identified to contain welding slag and metal debris.

Gasoline-range petroleum hydrocarbons were not detected in monitoring wells MW-1 through MW-5 and MW-7 through MW-9. Gasoline-range petroleum hydrocarbons were detected at a concentration of 120 µg/l in MW-6. The gasoline concentration in MW-6 was less than the MTCA Method A groundwater CUL of 1,000 µg/l. Monitoring well MW-6 is located in an area where gasoline-contaminated soil is present on the north side of the Maintenance Building. Although gasoline-range petroleum hydrocarbons were detected in groundwater from MW-6, gasoline was not detected in groundwater from MW-7 or MW-8 located between MW-6 and Budd Inlet.

Diesel- and oil-range petroleum hydrocarbons were either not detected or were detected at concentrations less than the MTCA Method A CUL in MW-1 through MW-3 and MW-5 through MW-9. Diesel-range petroleum hydrocarbons were detected in MW-4 at 61,000 µg/l, which is greater than the MTCA Method A groundwater CUL of 500 µg/l. Oil-range petroleum hydrocarbons were also detected in MW-4 at 3,300 µg/l, which is greater than the MTCA Method A CUL of 500 µg/l. Monitoring Well MW-4 is located within an area of diesel-contaminated soil at the southwest end of the Tank Shop. Oil-range petroleum hydrocarbons were not detected in all other groundwater samples.

Methylene chloride and tert-butybenzene were the only VOCs detected in groundwater samples collected in February 2008. Methylene chloride was detected in MW-1, MW-4 and MW-9 at concentrations ranging from 5.6 µg/l to 7.0 µg/l, which are less than the surface water screening level (590 µg/l) (Table 4). Methylene chloride is a common laboratory contaminant. Tert-butylbenzene was detected in MW-6 at a concentration of 1 µg/l. There is no surface water level or MTCA groundwater CULs for tert-butylbenzene. The detection limit for tetrachloroethene was marginally greater than the surface water screening level. The detection limits for multiple VOCs were greater than MTCA groundwater CULs (Table 4).

Bis(2-ethylhexyl)phthalate (DEHP) was the only SVOC detected in groundwater samples collect from the Site. DEHP was detected in MW-4 at 110 µg/l, which is greater than the surface water screening level (2.2 µg/l). The detection limits for all SVOCs were less than the screening levels based on surface water except for cPAHs, bis(2ethylhexyl)phthalate and bis(2-chloroethyl)ether (Table 4).

2.5.3.1 Groundwater Characterization Data Gaps

The existing results do not provide a complete characterization of chemical concentrations in groundwater. Only one comprehensive round of groundwater sampling and analysis has been performed to date. Additionally, the detection limits for several VOCs and PAHs were greater than screening levels.

2.5.4 Stormwater Sampling and Analysis

Two stormwater samples were collected at the Site on March 3, 2008. Sample SW-1 was collected from the eastern end (i.e., mouth) of the drainage ditch on the northwestern corner the Site (Figure 3). Sample SW-2 was collected from the outlet of the 12-inch-diameter culvert located just south of the rail crane railway between the Structural Shop and Paint Shop. SW-1 was submitted for analysis of gasoline-, diesel- and heavy oil-range petroleum hydrocarbons, SVOCs and total metals (i.e., arsenic, cadmium, chromium, copper, lead, mercury and zinc). SW-2 was submitted for analysis of total metals.

For screening purposes, stormwater analytical results are compared to the lowest surface water quality level from the Water Quality Standards for Surface Waters of the State of Washington (State standards) (Chapter 173-201A WAC), NRWQC (Section 304 of the Clean Water Act), NTR criteria (40 CFR 131.36), and MTCA Surface Water CULs (WAC 173-340-730). If no applicable surface water level has been established for an analyte then the stormwater results are compared to MTCA Method A or B groundwater CULs (Table 5). Additionally, if the lowest surface water screening level is less than the laboratory reporting limit, then the laboratory reporting limit is used as the screening level.

Gasoline-range petroleum hydrocarbons and SVOCs were not detected in SW-1. The detection limits for SVOCs, except cPAHs, bis(2-chloroethyl)ether and DEHP, were less than the screening levels. Diesel-range petroleum hydrocarbons were detected at a concentration (220 µg/l) less than the MTCA Method A groundwater CUL (500 µg/l) in SW-1. Oil-range petroleum hydrocarbons were detected at a concentration (670 µg/l) greater than the MTCA Method A groundwater CUL (500 µg/l).

Cadmium and mercury were not detected in the stormwater samples. However, the detection limits were greater than the screening levels. Chromium was detected in both samples at concentrations less than the screening level. Arsenic was detected in sample SW-1 but not detected in sample SW-2. The detected concentration and detection limit for arsenic were greater than the screening level. The detected concentrations of copper (251 µg/l and 68.10 µg/l), lead (129 µg/l and 29.30 µg/l) and zinc (5,550 µg/l and 2,470 µg/l) were greater than the screening levels.

It should be noted that the Site is an operating industrial facility and that stormwater discharging from the Site is managed under a National Pollutant Discharge Elimination System (NPDES) permit. Stormwater monitoring for pH, turbidity, lead, arsenic, copper and zinc is being performed and evaluated as part of the permit process. Additionally, the March 3, 2008 stormwater samples were collected and analyzed using procedures that likely do not represent future conditions or are comparable to the levels used for screening the stormwater results. Finally, stormwater from off-site sources flow onto the Reliable Steel Site and then discharge through the existing Site outfalls.

2.5.4.1 Stormwater Characterization Data Gaps

The existing results do not provide a complete characterization of chemical concentrations in stormwater. Only one round of stormwater sampling and analysis has been performed to date and only two stormwater outfalls were sampled (SW-1 and SW-2). Two additional stormwater outfalls are known to exist at the Site. Additional characterization should be performed to evaluate potential sources to stormwater including activities at the Maintenance Building, Structural Shop, Paint Shop and off-site stormwater. Additionally, the detection limits for several VOCs and PAHs were greater than screening levels.

2.5.5 Shoreline and Sediment Characterization

This section presents the results of shoreline and sediment characterization activities completed at the Site. Tables 6 through 8 present the results of sediment samples collected from materials present on the shoreline and from sediment adjacent to the Site.

2.5.5.1 Shoreline Materials

Welding slag and metal debris is present along the shoreline at the Site adjacent to the east end of the Tank and Structural Shops (Figure 3). The welding slag and metal debris is present generally as a solidified mass from the top of the bank down to intertidal sediment.

The results from shoreline material sample analyses are compared to SMS, Sediment Quality Standard (SQS) and Cleanup Screening Level (CSL) criteria and MTCA Method A and B soil CULs as the material is present at elevations above and below the ordinary high water line. The results from samples collected from borings west of the top of the bank in the vicinity of the shoreline are provided to evaluate chemical concentrations in soil adjacent to the slag and metal debris and are compared to MTCA Method A and B soil CULs. Additionally, the results for TCLP analyses performed on the slag and metal debris are compared to the Dangerous Waste Criteria (Ecology, 1997).

Samples were collected from the welding slag and metal debris during two separate events. Samples S1 and S3 (DOF, 2007) were collected from a depth of 2 feet bgs in June 2004 and analyzed for total metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium and silver) (Figure 3). Sample BS-1 (Stemen, 2006) was identified to be collected from a solidified mass of welding slag material located east of the Tank Shop in December 2005 and analyzed for metals (arsenic, cadmium, chromium, lead and mercury). Sample BS-1 was identified to be collected from the surface of the slag material with a hammer and chisel. The exact location where sample BS-1 was collected is not known. However, sample location BS-1 is shown in the area of slag material present on the shoreline in Figures 3, 4 and 5 for reference.

The results from analysis of samples S1 and S3 (DOF, 2007) indicate that the concentrations of copper are greater than the SMS CSL in the welding slag and metal debris. Lead was detected at a concentration greater than the CSL in one sample (S1) and arsenic and cadmium were detected at concentrations greater than the SQS within in one sample each in the slag material (Table 2). The results from analysis of sample BS-1 indicates that the concentrations of arsenic, cadmium, chromium, lead and mercury do not exceed SMS criteria in material chipped from the surface of the slag present on the shoreline. It should be noted that no copper analysis was performed on sample BS-1.

The detected concentrations of lead in the surface sample BS-1 and sample S1 collected from the slag material were greater than the MTCA Method A soil CUL (Table 2). The detected concentration of arsenic in sample S3 from the slag material was greater than the MTCA Method A soil CUL based on background soil concentrations. Additionally, the detected concentration of cadmium in sample S1 was greater than the MTCA Method A and B soil CULs in the slag material.

Samples were collected from borings west of the top of the bank in the vicinity of the shoreline slag and debris during two separate events. Sample S-3 (Stemen, 2005) was collected from a depth of 4 feet to 8 feet bgs and sample MS-1 (Stemen, 2006) was collected from a depth of 4 feet bgs. Both samples were submitted for analysis of arsenic, cadmium, chromium, lead and mercury. Metals were either not detected, or were detected at concentrations less than their respective MTCA CULs in samples S-3 and MS-1.

Samples S1 and S3 (DOF, 2007), and BS-1 (Stemen, 2006) were also analyzed for TCLP metals. Samples S1 and S3 were analyzed for arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver. Sample BS-1 was analyzed for arsenic and lead. The results from TCLP analyses indicate that the welding slag and metal debris material would not designate as a Dangerous Waste (Table 3).

Sediment

Sediment samples were collected at the Site during three separate events as part of investigations for the Reliable Steel Site. In addition, the results of surface sediment sampling performed on the Reliable Steel Site as part of Ecology's Sediment Characterization Study for Budd Inlet (Ecology, 2008) and the results of surface sediment sampling at a sample location on the Hardell Plywood Site adjacent to the Reliable Steel Site performed as part of the Former Hardel Plywood Site Draft Remedial Investigation (Greylock, 2007b) are discussed.

Surface sediment samples Sed.1 through Sed.3 were collected from intertidal areas adjacent to the Site in May 2004 (DOF, 2007) (Figure 3). Surface sediment was then collected at locations RGS1 through RGS8 on November 2, 2007 (Greylock, 2008b). Additional surface sediment investigation was performed in February 17, 2008 that included the collection of surface samples at RGS1, RGS2, RGS9 and RGS10. Sediment sampling in February 2008 also included the collection of sediment cores from locations RGS1, RGS2 and RGS7 through RGS11. Surface samples were collected from the top 10 cm (approximately 4 inches) of sediment, and cores were advanced to depths ranging from 2 feet to 10 feet below the mudline. The sampling performed in February 2008 was performed to further characterize the extent of chemical contamination in surface and subsurface sediment.

Ecology collected three surface sediment samples (0 to 10 cm) from locations T1-Sed, T1B-Sed and BI-S32 from the intertidal portion of the Reliable Steel Site in April 2007. One surface sample (0 to 10 cm) from location GS-04 was also collected 130 feet north of the Reliable Steel Site northern property line as part of the Former Hardel Plywood Site Remedial Investigation performed in 2007.

The results from sediment sample analyses for metals, SVOCs and PCBs are screened against the SMS SQS and CSL criteria. The results for specific organic chemicals are compared to the organic carbon (OC) normalized SMS and CSL criteria where the TOC for a specific sample is equal to or between 0.5 and 3.5 percent. The results for specific organic chemicals are compared to organic carbon normalized criteria as studies have shown that the toxicity of the organic chemicals correlate with the organic carbon content of sediment (Michelsen, 1992). However, the same studies have also shown that the toxicity of the organic chemicals can be overestimated as the organic carbon content approaches zero or is underestimated as the organic carbon content becomes elevated. Therefore, the results for specific organic chemicals are compared to lowest apparent effects threshold (LAET) values (i.e., LAET and 2LAET) that are based on dry weight concentrations if the TOC for a specific sample is less than 0.5 or greater than 3.5 percent. The results for total petroleum hydrocarbons (i.e., sum of diesel- and oil-range petroleum hydrocarbons) are compared to a screening level of 100 mg/kg recommended by Ecology except where analytical results identify that separate petroleum products (i.e., diesel and oil) are present in the sample. If the analytical results identify that separate petroleum products are present in the sample, the concentration of the individual product is compared to the screening level. Additionally, the results for tributyltin are compared to the Dredge Material Management Program (DMMP) screening criteria of 15 µg/l.

Surface sediment samples Sed.1 through Sed.3 were collected in May 2004 in areas where welding slag and sand blast grit were identified to potentially have migrated from the upland into Budd Inlet (Figure 3). The surface sediment samples were analyzed for total metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium and silver). The detected concentrations of metals and analytical detection limits were below SMS criteria (DOF 2007) (Table 7).

Surface sediment samples RGS1 through RGS8 were collected adjacent to the Site in November 2007 (Figure 3). Samples RGS4 through RGS8, located closest to the shoreline, were analyzed for metals (arsenic, cadmium, chromium, copper, lead, mercury, silver and zinc), SVOCs, PCBs, petroleum hydrocarbons, TOC and TVS. Additionally, samples RGS4 and RGS6 through RGS8, located closest to areas of the Site where industrial activities have historically been performed, were analyzed for tributyltin. RGS1 through RGS3 were collected from intertidal areas further from the shoreline adjacent to the Site (Figure 3). Samples RGS1 through RGS3 were analyzed for chemicals that exceeded SMS criteria in the samples collected nearest the shoreline (i.e., RGS7 and RGS8), which included SVOCs (Greylock, 2008b).

The detected concentrations and detection limits for metals in surface samples from RGS4 through RGS8 were less than SMS criteria (Table 7). The detected concentrations and detection limits for PCBs were also less than the appropriate OC normalized or dry weight LAET criteria (i.e., the OC normalized criteria if the TOC in the sample is equal to or between 0.5 and 3.5 percent or the dry weight criteria if the TOC is less than 0.5 percent or greater than 3.5 percent) (Tables 7 and 8). Tributyltin was not detected in the samples from RGS4 and RGS6 through RGS8, and the detection limits were less than the DMMP screening criteria (Table 7).

Dibenzo(a,h)anthracene was detected at a concentration greater than SMS SQS criteria in RGS1 and acenaphthene, phenanthrene, dibenso(a,h)anthracene, fluoranthene and indeno1,2,3-cd)pyrene were detected at concentrations greater than SMS SQS criteria in RGS7 (Table 8). Fluoranthene was detected at a concentration greater than the dry weight LAET criteria in the surface sample from RGS8 (Table 7).

Bis(2-ethylhexyl) phthalate (DEHP) was detected above either the CSL and/or SQS in surface sediment samples collected from RGS1, RGS2 and RGS7 and above the dry weight 2LAET in the sample collected from RGS8. Butybenzyl phthalate was also detected at a concentration greater than the SMS SQS criteria in the surface sample from RGS1.

The detection limit for 1,2,4-trichlorobenzene in the surface samples from RGS4 and RGS7, the detection limit 1,2-dichlorobenzene in the surface sample from RGS7 and the detection limit for hexachlorobenzene in the surface sample from RGS1 were greater than SQS criteria. The chemicals 1,2,4-trichlorobenzene, 1,2-dichlorobenzene and hexachlorobenzene are not anticipated to be present in the samples at concentrations greater than the SQS as these chemicals were not detected in any other sediment samples collected from the Site at detection limits below SQS criteria.

Finally, the total petroleum hydrocarbon concentrations in samples from RGS4 through RGS8 were compared to 100 mg/kg as suggested by Ecology. The total petroleum hydrocarbon concentrations for samples from RGS4, RGS5 and RGS8 were greater than the comparative value. Additional review of the petroleum hydrocarbon results for RGS4 and RGS5 was performed to evaluate the presence of individual petroleum products (i.e., diesel and oil). A review of the chromatogram for the NWTPH-Dx analysis for RGS5 identified that two individual peaks representative of diesel and oil are present in the sample. As separate products are present in the sample from RGS5, the concentrations of the individual products (i.e., diesel 53 mg/kg and oil 77 mg/kg) were compared to the screening criteria (100 mg/kg). The detected concentrations of diesel and oil in RGS5 are below the screening criteria. Separate distinctive peaks were not identified upon review of the chromatogram for RGS4.

Additional surface sediment and sediment core sampling and analysis were performed on February 4 and 5, 2008 to evaluate the presence of PAHs, DEHP and metals adjacent to the Site. Surface sediment samples were collected and analyzed from RGS1, RGS2 and RGS9 through RGS11 (Figure 3). Surface samples from RGS1 and RGS2 were analyzed for metals (arsenic, cadmium, chromium, copper, lead, mercury, silver and zinc), petroleum hydrocarbons, TOC, ammonia and sulfides. Surface samples from RGS9 and RGS11 were analyzed for metals, petroleum hydrocarbons, SVOCs, TOC, ammonia, sulfides and grain size. Sediment core samples were collected and analyzed from RGS1 (2 feet to 4 feet bgs and 6 feet to 8 feet bgs), RGS2 (0 to 2 feet deep), RGS7 (0 to 2 and 2 to 4 feet deep) and RGS8 (2 to 4 feet and 6 to 8 feet deep). Sediment core samples from RGS1, RGS2, RGS7 and RGS8 were analyzed for metals, SVOCs, TOC and grain size.

Analytes were not detected in surface sediment samples from RGS1, RGS2 and RGS9 through RGS11 at concentrations greater than SMS criteria (or screening level for petroleum hydrocarbons) (Table 8). Mercury was detected in the sediment core samples collected from 0 to 2 feet and 2 to 4 feet deep in RGS7 at concentrations greater than the CSL (Table 7). DEHP was also detected in the sediment core sample collected from 0 to 2 feet deep in RGS7 at a concentration greater than the dry weight LAET. The detection limits for hexachlorobenzene in samples from RGS1 (2 to 4 feet and 6 to 8 feet), RGS2 (0 to 2 feet), RGS8 (6 to 8 feet) and at the surface at RGS10 (0 to 10 cm) were slightly greater than the SMS SQS (Table 8). However, hexachlorobenzene is not anticipated to be present in the samples at concentrations greater than the SQS as these chemicals were not detected in any other sediment samples collected from the Site, where detection limits were below SQS criteria.

Ecology collected three surface sediment samples (T1-Sed, T1B-Sed and BI-S32) in April 2007 within the intertidal portion of the Reliable Steel Site during their Budd Inlet Sediment Characterization Study (Ecology, 2008). The samples that were collected by Ecology were analyzed for metals (arsenic, cadmium, chromium, copper, lead, mercury, silver and zinc), SVOCs, PCBs, TOC and TVS. Additionally, tributyltin analysis was performed on porewater from one location (i.e., BI-S32).

The detected concentrations and detection limits for metals in the Ecology surface samples from T1-Sed, T1B-Sed and BI-S32 were less than SMS criteria (Table 7). Tributyltin was not detected in the sample collected from BI-S32 and the detection limits was less than the DMMP screening criteria (Table 7).

Benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene were detected at concentrations greater than SMS SQS criteria in surface sample T1-Sed (Table 8) and benzo(g,h,i)perylene, fluoranthene and indeno(1,2,3-cd)pyrene were detected at concentrations greater than the dry weight LAET criteria in the surface sample from T1B-Sed (Table 7). Additionally, DEHP was detected above the CSL in the surface sediment sample collected from T1-Sed (Table 8) and above the dry weight 2LAET and/or LAET in the surface samples collected from T1B-Sed and BI-S32 (Table 7). Butybenzyl phthalate was also detected at a concentration greater than the SMS SQS criteria in the surface sample from TIB-Sed. Finally, the detected concentration of PCBs was greater than the dry weight LAET criteria at sample location BI-S32.

The detection limits for 2,4-dimethylphenol and benzoic acid in the surface sample from T1B-Sed were greater than the dry weight LAET. The chemicals are not anticipated to be present in the samples at concentrations greater than the SMS criteria as these chemicals were not detected in any other sediment samples collected from the Site at detection limits below SMS criteria.

One surface sediment sample, GS-04, was collected approximately 130 feet north of the north property line of the Reliable Steel Site during investigation of the Former Hardel Plywood Site (Greylock, 2008b). The sample was analyzed for metals (arsenic, cadmium, chromium, copper, lead, mercury, silver and zinc), SVOCs, PCBs, TOC, ammonia and sulfides. DEHP was detected at a concentration greater than the CSL criteria (Table 8). The detected concentrations of all other analytes were less than SQS criteria.

Sediment sampling indicates that DEHP is the chemical most frequently detected at concentrations greater than SMS criteria at the Site. DEHP is present at RGS7, RGS1, RGS2 and T1-Sed at concentrations greater than SMS CSL and/or SQS criteria and RGS8, T1B-Sed and BI-S32 at concentrations greater than 2LAET and/or LAET criteria (Tables 7 and 8). Butybenzyl phthalate was also detected at RGS-1 and T1-Sed at concentrations greater than the SMS SQS criteria. The area where DEHP and butybenzyl phthalate are present at concentrations greater than SMS criteria is bounded on the south by sample RGS4, on the east by samples RGS9 and RGS10 and to the northeast by RGS11 (Figure 4).

PAHs are present at RGS7, RGS1 and T1-Sed at concentrations greater than SMS SQS criteria and RGS8 and T1B-Sed at concentrations greater than LAET criteria (Tables 7 and 8). The area where PAHs are present at concentrations greater than SMS criteria is bounded on the south by samples RGS3 and RGS6, on the east by samples RGS9 and RGS10 and to the northeast by RGS11 (Figure 4).

The detected concentration of PCBs was greater than the dry weight LAET criteria at one sample location, BI-S32. PCBs were not detected at concentrations greater than SMS criteria in any other PCB analyses performed on samples collected from the Site. PCBs are not present at concentrations greater than SMS criteria in samples from RGS4 through RGS8, T1-Sed and T1-Sed located between BI-S32 and the upland portion of the Reliable Steel Site.

Although mercury was detected at concentrations greater than SMS criteria in subsurface sediment at RGS7, mercury was not detected in any samples collected from the compliance interval (0 to 10 cm) at the Site at concentrations greater than the SMS SQS, including two samples collected from the compliance interval at RGS7 (Table 7). A surface sample was collected from the location of RGS7 as part of investigations performed by DOF in 2004 (i.e., Sed.2 - DOF, 2007) and in 2007 (Greylock, 2008b). Additionally, mercury was not detected in any other subsurface sediment samples collected at the Site.

Surface sediment samples and cores consisted of sand with varying amounts of silt, shells and marine organisms. Wood was not observed in surface sediment samples collected from RGS1 through RGS4 and RGS6. Small quantities of wood (i.e., less than between 1 and 5 percent) consisting predominantly of sawdust were observed in surface samples from RGS5, RGS7 through RGS10. The surface sample collected from RGS11 on the Former Hardel Plywood Site consisted of between 25 and 50 percent wood. Trace to abundant quantities of sawdust was observed in one or more layers in all of the sediment cores except in the core from RGS8. Additionally, wood comprised between 50 and 100 percent by volume of sediment in a layer in cores from RGS11, RGS9, RGS7 and RGS1. The layers of wood were observed to depths of approximately 6 feet below mudline. Finally, chunks of Cedar were occasionally observed in surface and subsurface sediment samples.

The total petroleum hydrocarbon concentrations for samples from RGS4 and RGS8 were greater than the comparative value. Total petroleum hydrocarbons were not detected at concentrations greater than SMS criteria in any other petroleum hydrocarbon analyses performed on samples collected from the Site. Total petroleum hydrocarbons are not present at concentrations greater than the Ecology comparative criteria in samples from RGS1, RGS2, RGS5 through RGS7, RGS9 and RGS10 at the Reliable Steel Site.

Sediment Characterization Data Gaps

Mercury is present in subsurface sediment at RGS7 (i.e., 0 to 2 feet and 2 to 4 feet) at concentrations greater than the SMS CSL (Table 7). Additional subsurface sediment characterization should be performed in the area around and adjacent to RGS7 to delineate the subsurface horizontal and vertical extent, and possibly the source, of mercury.

Petroleum hydrocarbons were detected in surface sediment at RGS4 and RGS8 at concentrations greater than the screening level (i.e., 100 mg/kg). Additional characterization should be performed adjacent to RGS4 and RGS8 to evaluate the type, concentration and to delineate the horizontal extent of petroleum hydrocarbons with concentrations greater than the screening criteria.

Additional observation should be performed to characterize the presence and quantity of wood in sediment at the Reliable Steel Site. Evaluation of the potential impact of the presence of wood should be performed where wood is observed in sediment samples collected from the Site.

2.6 SUMMARY OF DATA GAPS, ADDITIONAL CHARACTERIZATION AND CHEMICALS OF POTENTIAL CONCERN

The purpose of the remedial investigation is to further characterize the nature and extent of contamination by COPCs at the Site and to fill in data gaps for areas of potential environmental concern that were identified to be present based on a review of the previous environmental evaluations described above. COPCs include chemicals previously detected at concentrations greater than screening levels including MTCA Method A and/or B CULs for soil, MTCA Method A and B CULs and surface water quality criteria for groundwater, surface water quality criteria for stormwater and the SMS criteria for sediment. Based on review of previous environmental evaluations and evaluation of existing Site data for potential environmental concerns, the following data gaps or additional characterization and COPCs have been identified.

2.6.1 Soil at the Maintenance Building and Southern Portion of Site

- **Presence of Calcium Carbide:** Acetylene generation was identified to have occurred outside and adjacent to the west end of the Maintenance Building in a 1945 Sanborn Map. Lead and cadmium were detected at concentrations greater than the MTCA Method A soil CUL in a sample identified as a white layer of “spent carbide waste” (A3) that was a byproduct of acetylene generation (Figure 4). Boring RGB18 on the north side of the Maintenance Building was identified to contain white layers from 5 feet bgs to 5.5 feet bgs and had detected concentrations of cPAHs that were greater than the MTCA Method A CUL as discussed below. Additionally, a potential UST was identified by a geophysical survey west of the Maintenance Building and south of the acetylene generation area that may have been used to store calcium carbide waste. The COPCs for the calcium carbide waste are metals including lead and cadmium, and cPAHs. The potential presence of calcium carbide waste in soil will be evaluated by soil sampling west of the Maintenance Building in the former acetylene generation area. If calcium carbide waste is identified, it will be sampled and analyzed for metals, cPAHs and pH. Additionally, a physical assessment (i.e., excavation) will be performed in the area of the geophysical anomaly to identify whether a UST is present in the area. If present, an attempt will be made to sample and analyze any product present within the UST. If present, an addendum to the Work Plan will be prepared identifying the procedures to be performed to assess the potential environmental concern from the UST. Proposed sampling location RI-2 is intended to fill this data gap (Figure 5).
- **Extent of lead contamination in soil beneath the Maintenance Building:** Lead concentrations greater than the MTCA Method A soil CUL were detected in soil present beneath the Maintenance Building (“Mt. Pit” and P1) (Figure 4). Lead concentrations for samples collected from locations around the Maintenance Building (i.e., S-13, RGB10, RGB12, RGB13, RGB14, RGB15, RGB18 and RGB19) were less than the MTCA CUL. The extent of lead at concentrations greater than the MTCA soil CUL will be evaluated by soil sampling beneath the Maintenance Building and analysis for metals. Proposed sampling locations RI-3 through RI-6 and RI-8 and RI-9 are intended to fill this data gap (Figure 5).
- **Extent of contamination of soil with gasoline-range petroleum hydrocarbons:** Gasoline-range petroleum hydrocarbons were detected at a concentration greater than the MTCA Method A soil CUL in a sample collected from a former equipment/vehicle maintenance pit (S-24) located in the northeast portion of the Maintenance Building (Figure 4). The extent of soil with gasoline-range petroleum hydrocarbons at concentrations greater than MTCA soil CULs will be evaluated by soil sampling beneath and adjacent to the Maintenance Building and analysis for gasoline-range petroleum hydrocarbons and BTEX. Proposed sampling locations RI-5 through RI-12 are intended to fill this data gap (Figure 5).
- **Presence of PCBs in soil adjacent to transformer utility pole:** Three pole-mounted electrical transformers are located west of the Maintenance Building (Figure 4). One of the transformers ruptured in 1992 and oil spilled on the ground adjacent to the transformer utility pole. PCB analysis has not been performed at the spill location. Even though the ground surface is paved in the area of the spill, the potential for PCB contamination in soil will be evaluated by soil sampling adjacent to the utility pole and analysis for PCBs at the spill location. Proposed sampling location RI-2 is intended to fill this data gap (Figure 5).
- **Extent of soil contaminated with gasoline-range petroleum hydrocarbons and cPAHs:** Gasoline-range petroleum hydrocarbons were detected at a concentration greater than the MTCA Method A soil CUL in a sample collected from the former paint and solvent storage area (S-13) located north of the Maintenance Building (Figure 4). Additionally, a sample located adjacent to

the Maintenance Building (RGB18) contained cPAHs at a concentration greater than the MTCA Method A CUL, and white layers were observed from 5 feet bgs to 5.5 feet bgs in the boring. The extent of soil with gasoline-range petroleum hydrocarbons and cPAHs at concentrations greater than MTCA soil CULs will be evaluated by soil sampling beneath and adjacent to the Maintenance Building and analysis for gasoline-range petroleum hydrocarbons, BTEX and cPAHs. Proposed sampling locations RI-4 through RI-7, RI-8, and RI-10 through RI-12 are intended to fill this data gap (Figure 5).

- **Potential contamination of soil in the crane shed:** Staining was observed in soil present in the crane shed located on the south side of the Maintenance Building (Figure 3). The COPCs for soil in the crane shed are gasoline-, diesel- and oil-range petroleum hydrocarbons. The potential for petroleum hydrocarbon contamination in soil will be evaluated by soil sampling within the crane shed and analysis for petroleum hydrocarbons. Proposed sampling location RI-7 is intended to fill this data gap (Figure 5).
- **Potential contamination of soil at the former location of a solvent hopper:** A solvent hopper was identified to be present on the southern portion of the Site (Figure 3). The COPCs for soil at the former location of the solvent hopper are VOCs. The potential for solvent contamination in soil will be evaluated by performing soil sampling at the former location of the solvent hopper and analysis for VOCs. Proposed sampling location RI-1 is intended to fill this data gap (Figure 5).

2.6.2 Soil at the Tank Shop, Structural Shop and Associated Areas

- **Extent of soil contaminated with diesel-range petroleum hydrocarbons:** Diesel-range petroleum hydrocarbons were detected at a concentration greater than the MTCA Method A soil CUL in samples collected from the area located south of the southwest portion of the Tank Shop (Figure 4). The contamination is likely associated with a current or former UST identified at that location. The COPCs for soil in the area are diesel-range petroleum hydrocarbons. Samples U1, S-8, S-11, RGB5 (at 5 to 6 feet bgs) and RGB7 (at 6 to 7 feet bgs) contain diesel-range petroleum hydrocarbons at concentrations greater than the MTCA Method A CUL of 2,000 mg/kg. The locations where diesel-range petroleum hydrocarbons were not detected or detected at concentration less than the Method A CUL include U2, S-9, S-10, RGB5 (8 feet bgs), RGB6, RGB7 (12 feet bgs), RGB8 and RGB9. These sample locations delineate the east side, west side and vertical extent of the contaminated area. The extent of soil with diesel-range petroleum hydrocarbons at concentrations greater than MTCA soil CUL will be evaluated on the north and south sides by soil sampling within and adjacent to the Tank Shop for diesel- and oil-range petroleum hydrocarbons. Additionally, a physical assessment (i.e., excavation) will be performed in the area of the geophysical anomaly to identify whether a UST is present. If present, any product present within the UST will be used to characterize the material for disposal. The existing data and additional data collected to fill data gaps will be used to define the nature and extent of diesel-range petroleum hydrocarbon contamination. The approach for managing the UST, if present, will be submitted as an addendum to this Work Plan. Proposed sampling locations RI-13 and RI-14 are intended to fill this data gap (Figure 5).
- **Potential contamination of soil adjacent to the shear machine:** Staining was observed in soil adjacent to the shear machine in the Structural Shop (Figure 4). The COPCs for soil adjacent to the shear machine are oil-range petroleum hydrocarbons. The potential for petroleum hydrocarbon contamination in soil will be evaluated by soil sampling adjacent to the shear machine within the Structural Shop and analysis for diesel- and oil-range petroleum

hydrocarbons. Proposed sampling locations RI-15 through RI-17, RI-19 and RI-21 are intended to fill this data gap (Figure 5).

- **Potential contamination of soil at the former forklift parking area:** Staining was observed in soil present at the former forklift parking area on the south side of the Tank Shop (Figure 4). The COPCs for soil at the former forklift parking area are gasoline-, diesel- and oil-range petroleum hydrocarbons. The potential for petroleum hydrocarbon contamination in soil will be evaluated by soil sampling at the former fork lift parking area on the south side of the Tank Shop and analysis for gasoline-, diesel- and oil-range petroleum hydrocarbons. Additionally, soil sampling to be performed at the former forklift parking area will provide additional information concerning the presence of petroleum contamination downgradient of the closed-in-place UST. Proposed sampling location RI-12 is intended to fill this data gap (Figure 5).

2.6.3 Soil at the Paint Shop and Northern Portion of the Site

- **Extent of soil contaminated with cPAHs:** cPAHs were detected at concentrations greater than the MTCA Method A CUL in soil samples collected from the Paint Shop area and east end of the Structural Shop (Figure 4). Additionally, cPAHs are present in the drainage ditch located on the northeast portion of the Site. The extent of soil with cPAHs at concentrations greater than the MTCA Method A soil CUL will be evaluated by soil sampling in and around the Paint Shop and within the Structural Shop and analysis for cPAHs. Proposed sampling locations RI-15 and RI-17 through RI-30 are intended to fill this data gap (Figure 5).
- **Extent of soil contaminated with mercury:** Mercury was detected in one sample collected east of the Paint Shop (RGB1) at a concentration greater than the MTCA Method A soil CUL (Figure 4). The extent of soil with mercury at concentrations greater than the MTCA Method A soil CUL will be evaluated by soil sampling east of the Paint Shop and analysis for metals. Proposed sampling locations RI-20 and RI-25 through RI-27 are intended to fill this data gap (Figure 5).
- **Extent of soil contaminated with diesel-range petroleum hydrocarbons:** Diesel-range petroleum hydrocarbons were detected at a concentration greater than the MTCA Method A soil CUL in a sample collected from the area located east of the Paint Shop (RGB16). Additionally, diesel-range petroleum hydrocarbons are also present in the drainage ditch located on the northeast portion of the Site (Ditch-2). The extent of soil with diesel-range petroleum hydrocarbons at concentrations greater than MTCA soil CUL will be evaluated by soil sampling east and north of the Paint Shop and adjacent to the drainage ditch for diesel- and oil-range petroleum hydrocarbons. Proposed sampling locations RI-20 and RI-25 through RI-30 are intended to fill this data gap (Figure 5).

2.6.4 Groundwater

- **Nature of chemical concentrations in groundwater:** One comprehensive round of groundwater sampling and analysis has been performed to date. Chemicals including metals, petroleum hydrocarbons, VOCs and DEHP have been detected in groundwater collected at the Site (Table 4 and Figure 4). The detection limits for mercury, several VOCs, cPAHs and DEHP were also greater than the screening levels. An additional round of groundwater sampling and analysis will be performed from existing monitoring wells to further characterize and evaluate chemical concentrations in groundwater at the Site. The characterization of chemicals in groundwater will be evaluated by sampling existing monitoring wells and analyzing for groundwater COPCs that include metals, petroleum hydrocarbons, VOCs, cPAHs and phthalates.

Low level detection limits will be requested from the analytical laboratory as necessary for specific chemicals (e.g., cPAHs). Sampling of monitoring wells MW-1 through MW-9 is intended to fill this data gap.

- **Presence of petroleum hydrocarbons in groundwater on the northern property boundary:** Diesel-range petroleum hydrocarbons were detected at a concentration greater than the MTCA Method A soil CUL in a sample collected from the area located east of the Paint Shop (RGB16). Additionally, diesel-range petroleum hydrocarbons are also present in the drainage ditch located on the northeast portion of the Site (Ditch-2). The presence of diesel-range petroleum hydrocarbons in groundwater on the northern boundary of the Site may be evaluated by installation of a new monitoring well in boring RI-30 (i.e., MW-10) if field observations (field screening) indicate the likely presence of petroleum hydrocarbon contamination of soil and/or groundwater at the investigation location to fill a data gap (Figure 5).

2.6.5 Stormwater

- **Presence of chemicals in stormwater:** Two of four known stormwater discharge locations (i.e., culvert outfalls or drainage ditches) have previously been sampled. Chemicals including metals and petroleum hydrocarbons have been detected in stormwater collected at the Site (Table 5 and Figure 4). The detection limits for several metals, cPAHs and DEHP were greater than the screening levels in previous samples. The presence of chemicals in stormwater will be evaluated by sampling existing discharge locations and analyzing for stormwater COPCs that include metals, petroleum hydrocarbons, cPAHs and phthalates. Sampling of stormwater at SW-1 through SW-4 is intended to fill this data gap. If additional outfalls are identified they will also be sampled.

2.6.6 Sediment

- **Nature and extent of petroleum hydrocarbons in sediment:** Petroleum hydrocarbons were detected in sediment at RGS4 and RGS8 at concentrations greater than the screening criteria (i.e., 100 mg/kg) (Table 7). The concentration of petroleum hydrocarbons at RGS4 (106 mg/kg) was only slightly greater than the screening criteria. Sampling will be performed at RGS4 to assess whether petroleum hydrocarbons are present at a concentration greater than the screening level. If sampling at RGS4 confirms that petroleum hydrocarbons are present at a concentration greater than the screening level, additional sampling will be performed to evaluate the type and extent of petroleum hydrocarbons at concentrations greater than the screening level. Sampling will be performed adjacent to RGS8 to evaluate the type and extent of petroleum hydrocarbons at concentrations greater than the screening criteria. Samples collected from RGS4 and RGS8 will be analyzed using HCID to identify the presence and type of petroleum hydrocarbons in the samples collected. Follow-up analyses will be performed to quantify the concentrations of petroleum hydrocarbons identified to be present in the samples (i.e., gasoline, diesel, and/or motor oil). Proposed sampling locations RI-S-1 and RI-S-5 through RI-S-7 are intended to fill this data gap.
- **Extent of mercury in subsurface sediment:** Mercury was detected at concentrations greater than SMS criteria in subsurface sediment at RGS7 (Table 7). The extent of subsurface sediment with mercury concentrations greater than the SMS criteria will be evaluated by collection of sediment cores and subsurface sediment samples adjacent to RGS7. The subsurface sediment samples will be analyzed for metals. Proposed sampling locations RI-S-2 through RI-S-4 are intended to fill this data gap.

- **Potential impacts from wood in sediment:** Wood has been observed in sediment present at the Reliable Steel Site. Additional observation will be performed to identify whether wood is present in the additional sediment samples collected as part of this Work Plan and if present, describe the type of wood (i.e., pieces, sawdust, etc.) and estimated quantity of wood (i.e., percent of wood comprising the sample material) in sediment at the Reliable Steel Site. Additional evaluation of the potential impact of the presence of wood will be performed on samples identified to contain wood based on visual observations that will include analysis for TVS and bulk ammonia and sulfide.
- **Nature of chemicals in catch basin material:** Additionally, samples of material contained in catch basins on the north side of the Paint Shop will be collected and analyzed for phthalates to evaluate potential inputs to the drainage ditch. Based on the existing data, the concentration gradient for DEHP at the Site indicates that the source is discharged from the drainage ditch located at the northeast corner of the Site. Contributions to stormwater in the drainage ditch have included stormwater runoff from the Hardel property as well as the Site. Review of the results for surface soil samples that were collected in close proximity to the drainage ditch indicate that upland surface soil concentrations are well below the SMS SQS. Proposed sampling locations RI-CB-1 and RI-CB-2 are intended to fill this data gap.

3.0 REMEDIAL INVESTIGATION

The RI will evaluate new and existing soil, groundwater, stormwater and sediment data from the Site to delineate the nature and extent of contamination. Additional data will be collected to complete the characterization of the Site for the purpose of developing and evaluating cleanup action alternatives and selecting a cleanup action. Although cleanup levels will be developed for Site media as part of the FS (discussed further in Section 4.0), preliminary cleanup levels are established during the RI to evaluate the nature and extent of contamination and to select analytical methods with reporting limits at or below the cleanup levels to the extent possible. The preliminary screening levels developed for this RI/FS have been compared with existing soil, groundwater, stormwater and sediment data to determine where data gaps exist and where additional characterization is to be performed. This section presents preliminary cleanup levels, the rationale for the preliminary cleanup levels, and the activities associated with the soil, groundwater, stormwater and sediment investigations.

The RI field activities will include sampling and analysis of soil, groundwater, stormwater and sediment to support contaminant characterization and delineation at the Site, as follows:

- Suspected USTs will be investigated by excavation. The locations of suspected USTs include west of the Maintenance Building (the UST identified to be used for storage of calcium carbide waste) and south of the southwest portion of the Tank Shop (the UST identified to be used for heating oil). If USTs are discovered, removal and/or closure of USTs will be performed in general accordance with Ecology's *Guidance for Site Checks and Site Assessments for Underground Storage Tanks.*
- Soil borings will be advanced at 30 locations at the Site (Figure 5). The borings will be completed using a direct-push drilling rig or hand auger to characterize soil conditions and obtain soil samples for field screening and chemical analyses. The soil field screening and chemical analytical results will be used to further characterize and delineate the extent of soil contamination at the Maintenance Building and southern portion of the Site, Tank Shop, Structural Shop, Paint Shop and northern portion of the Site. The samples will be analyzed for the COPCs identified for an area of known contamination or a potential environmental concern

that has not been characterized to date. Tables 9 and 10 summarize the purpose for each soil sample location and the methodology for selecting soil samples for analysis.

- The nine existing groundwater monitoring wells will be sampled and the samples analyzed to further characterize COPCs in groundwater. An additional groundwater monitoring well may be installed on the northern property boundary and sampled to provide additional characterization of groundwater on the northern property boundary. Low flow groundwater sampling will be performed upon completion of well purging to collect samples representative of Site groundwater conditions. The groundwater flow direction will be evaluated by measuring groundwater depths in the wells before sampling and calculating groundwater elevations. Sampling of monitoring wells located adjacent to the shoreline including MW-5, MW-7, MW-8 and MW-9 will be scheduled to occur on an ebb tide (i.e., as the tide is going out). Monitoring of MW-5, MW-7, MW-8 and MW-9 will attempt to collect groundwater samples from each well during mid-ebb tide or lower. However, the actual sample collection timing and associated tidal elevation will be dependent on the field conditions at the time of sampling including, but not limited to, well response to purging, stabilization of water quality parameters, tidal cycles at the time of sampling and possibly other field conditions.
- The four known stormwater outfalls will be sampled and the samples analyzed to further characterize COPCs in stormwater. If additional stormwater culvert outfalls are identified, samples will be collected and analyzed for stormwater COPCs. The samples will be collected using stormwater sampling procedures presented in Ecology's guidance document, "How to do Stormwater Sampling – A Guide for Industrial Facilities" (Ecology, 2002).
- Surface sediment samples will be collected from four locations and analyzed to further characterize petroleum hydrocarbon concentrations in sediment at RGS4 and RGS8. The samples will be collected from intertidal sediment at low tide using a stainless steel spoon and bowl or using a van Veen sampler deployed from a sampling vessel. The samples will be collected from the top 10 cm to evaluate petroleum hydrocarbons in surface sediment. Subsurface sediment samples will be collected from three locations and analyzed to further characterize mercury concentrations adjacent to RGS7. Samples will be collected at 2-foot depth intervals from the sediment cores and selected samples will be analyzed for metals. Sediment samples that are identified to contain wood will be analyzed for TVS, and bulk ammonia and sulfides to evaluate the potential impact of the presence of wood.

3.1 PRELIMINARY CLEANUP LEVELS

In accordance with MTCA, development of preliminary cleanup levels includes identifying potential exposure pathways for human and environmental impacts based on the current and future land use conditions. The Site was re-zoned in 2006 from Industrial to Urban Waterfront zoning. The Urban Waterfront zoning allows for a variety of uses including condominiums, office, retail and hotels. The anticipated future use of the Site is as mixed-use development including commercial (i.e., office space, retail and restaurants), residential (i.e., condominiums) and public access (i.e., shoreline plaza and/or trail).

3.1.1 Preliminary Soil Cleanup Levels

Based on current zoning and anticipated future use, preliminary soil cleanup levels will be based on unrestricted land use. Therefore, preliminary cleanup levels were developed using MTCA Method A and Method B cleanup levels. During the FS, cleanup levels and/or risk-based remediation levels for specific land uses and associated institutional controls may be considered as a component of cleanup alternative development and evaluation.

The soil cleanup levels for the Site will be selected from the following regulatory criteria:

- MTCA Method A Soil CULs – Unrestricted Land Use
- MTCA Method B Soil CULs – Soil Direct Contact/Ingestion

In addition to the criteria listed above, Washington State soil background concentrations for metals (Ecology, 1994) and method reporting limits will be considered in accordance with WAC 173-340-709, WAC 173-340-705(6) and WAC 173-340-707.

In general, the lowest applicable soil criteria will be identified as the preliminary soil cleanup levels. The following exceptions will be considered:

- **Background:** If the lowest regulatory criterion is less than the background concentration, the preliminary soil cleanup level will be set at the background concentration.
- **Method Reporting Limit:** If the lowest regulatory criterion is less than the method reporting limit, the preliminary soil cleanup level will be set at the method reporting limit, unless the method reporting limit is less than the background concentration. In that case, the preliminary soil cleanup level will be set at the background concentration.

3.1.2 Preliminary Groundwater Cleanup Levels

Groundwater at the Site is not used for drinking water at this time. Based on the availability of municipal water supply and the proximity to marine surface water, groundwater at the Site is not a reasonable future source of drinking water. Therefore, based on the proximity of the Site to marine surface water (Budd Inlet), preliminary groundwater cleanup levels will be developed for protection of marine surface water.

Preliminary groundwater cleanup levels will be selected from the following available state and federal surface water criteria according to WAC 173-340-730:

- Water Quality Standards for Surface Waters of the State of Washington (Chapter 173-201A)
- National Recommended Water Quality Criteria (Section 304 of the Clean Water Act)
- National Toxics Rule (40 CFR Part 131.36)
- MTCA Method B Surface Water Cleanup Levels (WAC 173-340-730[3][b][iii])

In addition to the criteria listed above, Washington State groundwater background concentrations for metals (PTI, 1989) and method reporting limits will be considered in accordance with WAC 173-340-709 and WAC 173-340-705(6) and WAC 173-340-707.

In general, the lowest applicable regulatory criterion for surface water will be identified as the preliminary groundwater cleanup level. If no surface water criteria exist for a specific chemical, then the MTCA Method A groundwater CUL will be used (WAC 173-340-720(3) and Chapter 173-340 WAC (Table 720-1). The following exceptions will be considered:

- **Background:** If the lowest published regulatory criterion is less than the background concentration, the preliminary groundwater cleanup level will be set at the background concentration.
- **Method Reporting Limit:** If the lowest published regulatory criterion is less than the method reporting limit, the preliminary groundwater cleanup level will be set at the method reporting limit, unless the method reporting limit is less than the background concentration. In that case, the preliminary groundwater cleanup level will be set at the background concentration.

3.1.3 Preliminary Surface Water Cleanup Levels

Preliminary surface water cleanup levels will be developed for protection of marine surface water. Preliminary surface water cleanup levels will be selected from the following available state and federal surface water criteria according to WAC 173-340-730:

- Water Quality Standards for Surface Waters of the State of Washington (Chapter 173-201A)
- National Recommended Water Quality Criteria (Section 304 of the Clean Water Act)
- National Toxics Rule (40 CFR Part 131.36)
- MTCA Method B Surface Water Cleanup Levels (WAC 173-340-730[3][b][iii])
- MTCA Method A Surface Water Cleanup Levels WAC 173-340-730(3)

In general, the lowest applicable regulatory criterion for surface water will be identified as the preliminary surface water cleanup level. The following exception will be considered:

- **Method Reporting Limit:** If the lowest published regulatory criterion is less than the method reporting limit, the preliminary surface water cleanup level will be set at the method reporting limit.

3.1.4 Preliminary Sediment Cleanup Levels

Preliminary sediment cleanup levels will be selected from SMS according to WAC 173-204-570. The sediment cleanup levels for the Site will be selected from the following criteria:

- CSL
- SQS

Chemical concentrations will be compared to the SMS organic carbon normalized criteria when the TOC is equal to or between 0.5 and 3.5 percent. Chemical concentrations will be compared to AET criteria (i.e., 2LAET and LAET) if the TOC is less than 0.5 percent or greater than 3.5 percent.

The following exception will be considered:

- **Method Reporting Limit:** If the regulatory criterion is less than the method reporting limit, the preliminary sediment cleanup level will be set at the method reporting limit.

3.2 SOIL INVESTIGATION

Soil at the Site will be investigated using a combination of excavation, direct-push drilling and hand auger explorations. Soil will be excavated at two locations to investigate the presence of suspected USTs at the

Site. These include a suspected calcium carbide waste UST located west of the Maintenance Building, and a suspected heating oil UST south of the southwest portion of the Tank Shop (Figures 3 through 5). An Ecology registered UST Site Assessor will be present during the excavations, and caution will be exercised to prevent a release from any discovered UST(s). An RI Addendum will be written to address any discovered UST(s). Any removal or closure of USTs will be performed in general accordance with Ecology's *Guidance for Site Checks and Site Assessments for Underground Storage Tanks.*

Twenty-seven subsurface investigation locations (RI-1 through RI-27) will be completed as part of the RI. The investigation locations are shown on Figure 5. Twenty-five of the locations are anticipated to be performed using a direct-push drilling rig. Two locations are anticipated to be performed using a hand auger. The rationale for the investigation locations, depths and target analytes are provided in Tables 9 and 10. Investigation techniques, including drilling methods, field screening and sample collection are discussed in detail in the project SAP and QAPP prepared for soil characterization (Appendix B). The QAPP also includes QA/QC procedures.

Table 10 presents detailed information regarding target analytes for each soil sample submitted. Based on the COPCs at the Site, samples are anticipated to be submitted for a combination of analyses including:

- Metals including arsenic, cadmium, chromium, copper, lead, mercury, tin and zinc using EPA Methods 6010/7060/7470/7471/7421;
- Diesel- and heavy oil-range petroleum hydrocarbons by Ecology Method NWTPH-Dx with silica gel/acid wash cleanup;
- Gasoline-range petroleum hydrocarbons by Ecology Method NWTPH-Gx;
- BTEX by EPA Method 8021;
- VOCs by EPA Method 8260;
- SVOCs (including cPAHs) by EPA Method 8270;
- PCBs by EPA Method 8082 (modified); and
- pH for samples identified to contain calcium carbide waste using SW-846 9045.

Samples collected for VOC analysis will be collected and prepared using EPA Method 5035A.

3.3 GROUNDWATER INVESTIGATION

A groundwater investigation will be completed during the RI to further characterize groundwater at the Site. The nine existing monitoring wells (MW-1 through MW-9) will be purged and sampled using low flow techniques described in the SAP (Appendix B). The well locations are shown on Figure 5.

Depth to groundwater will be measured and recorded before sampling the wells. The depth measurements will be made in as short a time interval as possible because groundwater elevation at the Site is anticipated to be tidally influenced. Depth to water measurements will be used along with surveyed well elevations to evaluate the slope of the water table and the inferred direction of groundwater flow at the Site.

All groundwater samples will be submitted for analysis of:

- Total and dissolved metals including arsenic, cadmium, chromium (including hexavalent chromium if total chromium concentration is greater than the MTCA Method B value of 48 ug/l), copper, lead, mercury and zinc using EPA Methods 6010/7060/7470/7471/7421;
- Diesel- and heavy oil-range petroleum hydrocarbons by Ecology Method NWTPH-Dx with silica gel/acid wash cleanup;
- Gasoline-range petroleum hydrocarbons by Ecology Method NWTPH-Gx;
- VOCs by EPA Method 8260;
- cPAHs and phthalates by EPA Method 8270-SIM; and
- Total dissolved solids (TDS) by EPA Method 160.1.

The SAP and QAPP includes procedures for groundwater sample collection and QA/QC procedures (Appendix B).

3.4 STORMWATER INVESTIGATION

A stormwater investigation will be conducted at the Site, including collection of samples from four known stormwater discharge points where discharge is observed. Additional identified discharge points will also be sampled, and the locations of the discharge points will be recorded. The known discharge locations (SW-1 through SW-4) are shown on Figure 5.

Sampling will be performed in general accordance with Ecology's guidance manual, "How to do Stormwater Sampling – A Guide for Industrial Facilities" (Ecology, 2002). Sampling will be performed during the first hour of rainfall, after a period of at least 24 hours of no measurable rainfall. Additionally, sample data will be qualified if the storm event is less than 0.1 inches in a 24-hour period. Sampling will include visual monitoring as described in Ecology's guidance document. Samples will be submitted for:

- Total and dissolved metals including arsenic, cadmium, chromium, copper, lead, mercury and zinc using EPA Methods 6010/7060/7470/7471/7421;
- Diesel- and heavy oil-range petroleum hydrocarbons by Ecology Method NWTPH-Dx with silica gel/acid wash cleanup;
- cPAHs and phthalates by EPA Method 8270-SIM.

The SAP and QAPP provide detailed descriptions of sampling protocol and QA/QC procedures for the stormwater investigation (Appendix B).

Because collection of stormwater during the first hour of rainfall represents a "first flush," analytical results of stormwater samples will be used as preliminary screening information only.

3.5 SEDIMENT INVESTIGATION

A sediment investigation will be conducted at the Site to further characterize the extent of petroleum hydrocarbons in surface sediment (0 to 10 cm), mercury in subsurface sediment and potential impacts of wood.

Surface sediment samples will be collected from four locations adjacent to previous sample locations RGS4 and RGS8 (RI-S-1 and RI-S-5 through RI-S-7). The investigation locations are shown on Figure 5.

All sampling activities will be completed in accordance with Puget Sound Estuary Program (PSEP) protocols. The surface sediment samples will be collected either during low tide using a decontaminated stainless steel spoon and bowl or using a van Veen sampler deployed from a sampling vessel. Surface sediment samples will be analyzed for the following:

- NWTPH-HCID with follow up analysis for the specific petroleum hydrocarbons detected in the samples using NWTPH-G for gasoline, NWTPH-Dx for diesel, and NWTPH-Dx for oil, as appropriate;
- Total organic carbon by EPA 9060
- Total solids by SM-2540B; and
- Samples where wood is observed to be present will be analyzed for TVS by SM-2540E, and bulk ammonia and sulfides by Plumb (1981).

Subsurface sediment samples will be collected from three locations adjacent to previous sample location RGS7 (RI-S-2 through RI-S-4). The investigation locations are shown on Figure 5.

All sampling activities will be completed in accordance with PSEP protocols. The subsurface sediment samples will be collected using coring methods. Subsurface sediment samples will be analyzed for the following:

- Metals using EPA 6000/7000 series and Method 245.5
- Total solids by SM-2540B; and
- If the samples that are selected for metals analysis are observed to contain wood, the samples will be analyzed for TVS by SM-2540E, bulk ammonia and sulfides by Plumb (1981).

Investigation techniques including sample collection and QA/QC are discussed in detail in the project SAP and QAPP prepared for sediment characterization (Appendix C).

4.0 FEASIBILITY STUDY

The RI/FS will develop cleanup levels for the Site and evaluate hazardous substances in soil, groundwater, surface water and sediment by comparing analytical results to appropriate cleanup levels. Cleanup criteria will be developed and used in accordance with MTCA. If chemical concentrations in Site media exceed cleanup levels, then the FS will develop and evaluate cleanup action alternatives for contaminated media so that cleanup actions may be selected. The FS will:

- Develop cleanup levels and points of compliance and, as necessary, establish remediation levels;
- Delineate affected media where evaluation of remedial action is appropriate;
- Develop remedial action objectives;
- Screen and evaluate specific cleanup alternatives and recommend a preferred alternative;
- Be presented in a written report along with the results of the RI (the RI/FS report).

The following sections provide the details of the FS process that will be completed for the Site.

4.1 ESTABLISHMENT OF CLEANUP LEVELS, POINTS OF COMPLIANCE AND REMEDIATION LEVELS

Cleanup standards, including cleanup levels and points of compliance, will be developed for Site media in accordance with MTCA requirements. Exposure pathways and receptors will be identified as part of cleanup level development. As needed, remediation levels may also be established for specific cleanup alternatives.

Cleanup levels for soil will be protective of human health and groundwater based on current and likely future uses of the property. The point of compliance for soil will also be established.

Cleanup levels for groundwater will be based on protection of marine surface water. Groundwater at or potentially affected by the Site is not a current or reasonable future source of drinking water. It is expected that information developed during the RI will be used to demonstrate that groundwater at the property meets the requirements of WAC 173-340-720 for non-potable groundwater. A groundwater point of compliance will be developed. The point of compliance is likely to be conditional, located at or near the groundwater/surface water interface.

Cleanup levels for surface water will be based on protection of marine surface water. Surface water present at the Site is stormwater. The point of compliance for surface water will also be established.

Cleanup levels and the point of compliance for sediment will be based on protection of human health and biological resources.

4.2 DELINEATION OF MEDIA REQUIRING REMEDIAL ACTION

The RI process will determine if the sample results for Site media exceed cleanup levels and, if so, identify the locations of the exceedances. Based on any exceedances and the established points of compliance, the FS will identify the extent or volume of Site media that requires remedial action.

4.3 DEVELOPMENT OF REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) that define the goals of the cleanup that must be achieved to adequately protect human health and the environment will be developed for each medium and area identified as requiring remedial action. These RAOs will be action-specific and/or media-specific. Action-specific RAOs are based on actions required for environmental protection that are not intended to achieve a specific chemical criterion. Media-specific RAOs are based on developed cleanup levels. The RAOs will specify the COCs, the potential exposure pathways and receptors, and acceptable contaminant levels or range of levels for each exposure pathway, as appropriate.

4.4 SCREENING OF CLEANUP ALTERNATIVES

Cleanup alternatives will be developed for each medium of concern. Initially, general remediation technologies will be identified for the purpose of meeting RAOs for each medium. General remediation technologies consist of specific remedial action technologies and process options and will be considered and evaluated based on the media type and the properties of any contaminant(s). These may include institutional controls, containment or other engineering controls, removal, in-situ treatment and natural attenuation.

Specific remedial action technologies are the engineering components of a general remediation technology. Examples include horizontal barriers, groundwater extraction, groundwater treatment, in-situ oxidation, in-situ bioremediation and capping. Process options are those specific processes within each specific technology. For example, groundwater treatment technology could include process options such as air stripping, activated carbon and ultra-violet/chemical oxidation. Several specific technologies may be identified for each general remediation technology and multiple process options may exist within each specific technology.

Specific remedial action technologies and representative process options will be selected for evaluation based on documented development or documented successful use for the particular medium and COPCs. Cleanup alternatives will be developed from the general and specific remedial technologies and process options consistent with Ecology expectations identified in WAC 173-340-370 using best professional judgment and guidance documents as appropriate.

During the development of cleanup alternatives, both the current and planned future land use will be considered. For example, where property is already developed, containment alternatives may be given preferential consideration over soil cleanup alternatives that would be more disruptive to Site use/ structures.

If the RI identifies localized hot spots of contaminants in soil, active cleanup alternatives such as excavation or in-situ treatment alternatives may be appropriate for those limited areas. If there are portions of the property with large volumes of materials with relatively low concentrations of hazardous substances, cleanup alternatives including engineering controls or monitored natural attenuation may be developed. Current and planned future property uses will be considered during development of cleanup alternatives.

4.5 EVALUATION OF CLEANUP ALTERNATIVES

MTCA requires that cleanup alternatives be compared to a number of criteria as set forth in WAC 173-340-360 to evaluate the adequacy of each alternative in achieving the intent of the regulations, and as a basis for comparing the relative merits of the developed cleanup alternatives. Consistent with MTCA, the alternatives will be evaluated with respect to compliance with threshold requirements, permanence, and restoration timeframe, and the results of the evaluation will be documented in the RI/FS report.

5.0 SCHEDULE AND REPORTING

The Agreed Order identifies that the RI Work Plan will identify the schedule for the remedial investigation. The proposed schedule for finalization of the Work Plan and implementation of Work Plan activities are summarized below.

The final RI/FS Work Plan for the Site will be submitted to Ecology on August 28, 2009. Ecology review and approval of the final Work Plan is assumed to be 6 weeks. Implementation of RI activities is anticipated to be performed in winter 2009/2010 based on the current schedule for finalization of the RI/FS Work Plan.

Following completion of all field activities and receipt of the analytical data, an RI/FS report will be prepared and submitted to Ecology for review, comment and approval. All sampling data will be submitted to Ecology in both printed and electronic formats in accordance with Ecology's Toxics Cleanup Program Policy 840. The RI/FS report will identify the nature and extent of contamination at the Site. The report will also include evaluation of potential remedial alternatives and recommendations regarding the preferred remedial action to be implemented.

Upon Ecology approval of the final RI/FS report, a draft Cleanup Action Plan (CAP) will be prepared that details the proposed cleanup action for addressing contamination at the Site. The CAP will include a description of the cleanup action, cleanup standards and a proposed schedule for implementation of the cleanup remedy.

Project Milestones	Schedule
Submittal of Final RI/FS Work Plan	August 28, 2009
Ecology Review/Acceptance of Final Work Plan	45 days after submittal
Preparation for Field Investigation	60-day duration after Work Plan acceptance
Field Investigation	60-day duration after preparation activities
Submittal of Draft RI/FS Report	120 days after completion of field investigation
Ecology Review of Draft RI/FS Report	60-day duration after submittal
Submittal of Final RI/FS Report	60 days after receipt of Ecology Comments

6.0 REFERENCES

Dalton, Olmstead & Fuglevand, Inc. 2007. Summary of Past DOF Sampling, Reliable Steel Site, Olympia, Washington (2001, 2004 and 2007 [DOF 2007]). November 4, 2007.

Environmental Policy Act. 1997. National Toxics Rule (NTR) (40 CFR 131.36). August 5, 1997.

Environmental Policy Act. 2002. National Recommended Water Quality Criteria (NRWQC) (Section 304 of the Clean Water Act). Record Last Revised December 10, 2002.

Greylock Consulting, LLC. 2007a. Draft Work Plan, Remedial Investigation/Feasibility Study, Reliable Steel Site, 1218 West Bay Drive NW Olympia, Washington. December 12, 2007.

Greylock Consulting, LLC. 2007b. Former Hardel Plywood Site Draft Remedial Investigation Report. December 17, 2007.

Greylock Consulting, LLC. 2008a. Revised Work Plan & Work Summary, Remedial Investigation/ Feasibility Study, Reliable Steel Site, 1218 West Bay Drive NW, Olympia, Washington. April 7, 2008.

Greylock Consulting, LLC. 2008b. Reliable Steel Remedial Investigation, Soil, Groundwater, Storm Water & Sediment Qualtiy Report, 1218 West Bay Drive NW, Olympia, Washington. May 27, 2008.

LSI ADaPT, Inc. 2001. Phase I Environmental Site Assessment, Reliable Steel, Inc., 1218 West Bay Drive, Olympia, Washington. July 31, 2001.

Michelsen. 1992. Technical Information Memorandum: Organic Carbon Normalization of Sediment Data. For Washington State Department of Ecology. Publication number 05-09-050.

PTI. 1989. Draft Report, Sections 1-7 Background Concentrations of Selected Chemicals in Water, Soil, Sediments, and Air of Washington State. April 1989.

Stemen Environmental, Inc. 2005. Limited Phase II Environmental Site Assessment Report. November 26, 2005.

Stemen Environmental, Inc. 2006. Additional Remedial Investigation Activities Report. January 27, 2006.

Stemen Environmental, Inc. 2007. Ground Water Monitoring Report. October 10, 2007.

Tetra Tech EM, Inc. 1998. Final Report Environmental Compliance Audit, Reliable Steel Fabricators, Inc., Olympia, Washington. For ITEQ, Inc. May 5, 1998.

U.S. Environmental Protection Agency (USEPA). 1999. Contract Laboratory Program National Functional Guidelines for Organic Data Review. 540/R-99/008.

U.S. Environmental Protection Agency (USEPA). 2004b. EPA Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies. EPA 04-03-030.

U.S. Environmental Protection Agency (USEPA). 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final.* EPA 540/G/89/004, OSWER 9355.3-01. October 1988.

U.S. Environmental Protection Agency (USEPA). 1998. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846). Revision 5, April 1998.

U.S. Environmental Protection Agency (USEPA). 2004a. Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. 540/R-04/004.

Washington State Administrative Code. 2001. WAC 173-340-709, Methods for Defining Background Concentrations, Statutory Authority: Chapter 70.105D RCW. 01-05-024 (Order 97-09A), § 173-340-709, filed 2/12/01, effective 8/15/01.

Washington State Administrative Code. 2003. WAC 173-340-705(6), Use of Method B.

Washington State Administrative Code. 2003. Surface Water Cleanup Standards (WAC 173-340-730(3)(b)(iii)(C)). May, 2003.

Washington State Administrative Code. 2003. WAC 173-340-707, Analytical Considerations.

Washington State Administrative Code. 2006. Water Quality Standards for Surface Waters of the State of Washington (State standards) (Chapter 173-201A WAC). Last updated November 20, 2006.

Washington State Administrative Code. 2006. Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A). November 20, 2006.

Washington State Adminsitrative Code. 2007. Dangerous Waste Regulations (WAC 173-303). October 5, 2007.

Washington State Adminstrative Code. 2003. Deriving Soil Concentrations for Ground Water Protection (WAC 173-340-747(4)(b).

Washington State Adminstrative Code. 2007. Model Toxics Control Act (MTCA) Surface Water CULs (WAC 173-340-730) Washington State. Last updated October 12, 2007.

Washington State Department of Ecology. 1994. Natural Background Soil Metals Concentrations in Washington State. Toxics Cleanup Program, Department of Ecology. Publication #94-115. October, 1994.

Washington State Department of Ecology. 1997. Analytical Methods for Petroleum Hydrocarbons. Publication No. ECY 97-602. June 1997.

Washington State Department of Ecology. 2001. Cleanup Levels and Risk Calculations under the Model Toxics Control Act Cleanup Regulation. (CLARC) Version 3.1. http://www.ecy.wa.gov/biblio/94145.html. Washington State Department of Ecology Toxics Cleanup Program. Publication No. 94-145, updated November, 2001.

Washington State Department of Ecology. 2007. Updated Model Toxics Control Act (MTCA) Cleanup Regulations, Updated November 2007.

Washington State Department of Ecology. Sediment Characterization Study, Budd Inlet, Olympia, Washington, Final Data Report. Prepared by SAIC. 2008.

Washington State Department of Ecology. 2008. Terrestrial Ecological Evaluation (TEE) Process – An Interactive User's Guide. http://www.ecy.wa.gov/programs/TCP/policies/terrestrial/TEEHome.htm. Accessed December 17, 2008.

Washington State Department of Ecology. 1994. Natural Background Soil Metals Concentration in Washington State. October 1994.

Washington State Department of Ecology. 1995. Sediment Management Standards (SMS). December 1995.

Washington State Department of Ecology. 1995. Sediment Quality Standard (SQS) (WAC 172-204-320), Last updated December 29, 1995.

Washington State Department of Ecology. 2001. Model Toxics Control Act Cleanup Levels & Risk Calculations (CLARC) Version 3.1, (CLARC). November 2001.

Washington State Department of Ecology. 2002. How to do Stormwater Sampling – A Guide for Industrial Facilities.

Washington State Department of Ecology. 2007. Model Toxics Control Act Statute and Regulation - Model Toxics Control Act Chapter 70.105D RCW, Uniform Environmental Covenants Act Chapter 64.70 RCW, MTCA Cleanup Regulation Chapter 173-340 WAC (MTCA). November 2007.

Washington State Department of Ecology. 2008. Sediment Characterization Study, Budd Inlet, Olympia, Washington. Final Data Report. March 12, 2008.

TABLE 1
SUMMARY OF POTENTIAL ENVIRONMENTAL CONCERNS
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Potential Environmental Concern	Documentation	Location	Description of Environmental Concern
Maintenance Building and Southern Portion of Site			
Two steel fuel transfer pipes south of site	Phase II	South of site	Presence of two steel underground fuel transfer pipes located south of the Site.
Former area of two petroleum USTs removed in 1990	Audit/Phase I	West end of building (outside of building)	Review of Ecology files indicated removal of a 2,000-gallon gasoline UST and an 885-gallon diesel UST in 1990. A site assessment was not performed at the time of removal.
Calcium Chlorite Sludge	Audit	Suspected to be on west side of building (outside of building)	Acetylene was historically manufactured on Site and a calcium carbide byproduct was disposed of on site and in a UST.
Used oil storage	Audit/Phase I	Inside building	Petroleum-like staining observed on the floor beneath the used oil storage area.
Pit previously used for vehicle/equipment maintenance	Audit/Phase I	Northeast end of building (inside of building)	Owner indicated that used oil from equipment and vehicles was historically drained into the pit. Audit personnel observed petroleum hydrocarbon residue in the pit during a Site visit.
Paint and solvent storage	Phase II	North side of building (outside of building)	Phase II documentation indicates paints and solvents were stored outside the Maintenance Building, north of the central portion of the building.
Sand dryer with 800-gallon diesel AST	Audit	Adjacent to north side of building (outside of building)	An 800-gallon AST with no secondary containment supplied a sand dryer with diesel fuel.
Crane shed	Phase I	South side of building (outside of building)	Oil-stained soil observed in the crane shed during Site visit
Three transformers on utility pole	Audit	Northwest corner of building (outside of building)	Owner indicated oil was spilled onto the ground during a 1992 transformer malfunction. Owner indicated Puget Power cleaned up impacted soil and removed it from Site.
Waste solvent hopper	Phase I	Southwest corner of site	A metal hopper for waste solvent was observed on the southern portion of the Site. No soil staining or distressed vegetation was observed beneath the hopper.
Tank Shop, Structural Shop and Surrounding Area			
Underground storage tanks	Audit/DOF	Southwest corner of Tank Shop	Various reports indicate the likely presence of a 300-gallon heating oil UST under the southwest portion of the Tank Shop.
750-gallon bunker UST closed in place in 1999	Phase I	In eastern portion of Tank Shop (partially inside Tank Shop)	UST observed inside the Tank Shop. The UST was filled with concrete. Owner indicated the UST was 750 gallons in size and was used to supply bunker fuel to a historic boiler in the Tank Shop.
Staining underneath forklift	Phase I	Southeast corner of Tank Shop	Petroleum-like oil staining observed beneath a forklift.
Shear machine	Phase I	Northeast portion of Structural Shop	Free product and soil staining observed beneath the shear machine.
Paint Shop and Northern Portion of Site			
Staining at location of crane transformer	Phase I	Transformer located below rail-crane	Stained soil observed beneath a ground-mounted rail-crane transformer.
Spent sandblast grit	Audit/Phase I	In and around Paint Shop	Audit personnel observed spent sandblast grit in and around the Paint Shop. Paint overspray observed mixed with sandblast grit. Sandblast grit exposed to stormwater.
Drainage/Ditch	Additional Evaluation	Northeast corner of site	Stormwater in the ditch on the northern portion of the Site is identified to contain zinc.
1996 rail-crane oil spill/soil staining	Audit/Phase I	Location unknown	1996 oil spill from the crane to a concrete pad underneath rail-crane. The amount of oil spilled was not known. The oil was cleaned up by Reliable Steel.
Shoreline and Sediment			
Oxidized welding slag and metal debris	Audit/Phase I	On shoreline east of Tank and Structural Shops	Audit personnel observed welding slag on shoreline adjacent to Tank and Structural Shops. Review of Ecology files indicated that a slag sample contained metals exceeding sediment standards.
Sediment potentially impacted by sandblast grit and welding slag	DOF	Shoreline adjacent to the Site	Intertidal area adjacent to the Reliable Steel Site where waste grit or welding slag may have migrated.

Notes:

Audit - Tetra Tech 1998 Environmental Compliance Audit.

Phase I - LSI ADaPT 2001 Phase I Environmental Site Assessment.

Phase II - Stemen 2005 Limited Phase II Environmental Site Assessment.

DOF - Dalton, Olmstead & Fugalvand, Inc. 2001, 2004 and 2007 prospective purchaser environmental investigations of site media (DOF 2007).

Additional Evaluation - Evaluation of soil, groundwater, surface water and sediment quality (Greylock 2008).

TABLE 2
SUMMARY OF SOIL ANALYTICAL RESULTS
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

				Maintenance Building and Southern Portion of Site																
				Fuel Transfer Pipes Area		**Former Area of Petroleum USTs (2,000-gallon gasoline and 885-gallon diesel tanks)**					**Calcium Chloride Sludge**	**Used Oil Storage**					**Former Maintenance Pit**			**Three Transformers**
	MTCA Soil Cleanup Levels[1]		Location	S-1	S-2	S-4	S-7	S-21	RGB14	RGB15	A3	S-22	Mt. Pit	S-21	S-23	S-25	S-24	S-15	P1	S-6
			Sample ID	S-1	S-2	S-4	S-7	S-21	RGB14-4	RGB15-4	A3	S-22	Mt. Pit	S-21	S-23	S-25	S-24	S-15	P1	S-6
			Depth (feet)	7	7	7	7	3	4	4	0.5	8	Surface	3	4-8	3	3	5-8	Surface	4.5
Analyte	Method A	Method B	Date	10/15/2005	10/15/2005	10/15/2005	10/15/2005	10/15/2005	2/11/2008	2/11/2008	6/3/2004	10/15/2005	5/7/2004	10/15/2005	10/15/2005	10/15/2005	10/15/2005	10/15/2005	6/3/2004	10/15/2005
Metals (mg/kg)																				
Arsenic	20	0.67		--	--	--	--	--	**5.45**	**2.75**	**7.82**	--	**5.21**	--	--	--	--	--	**7.28**	--
Barium	NE	16,000		--	--	--	--	--	--	--	**110**	--	**117**	--	--	--	--	--	**93.4**	--
Cadmium	2	40		--	--	--	--	--	<1	<1	**2.87**	--	<0.5	--	--	--	--	--	**1.52**	--
Chromium	2,000[2]	120,000[2]		--	--	--	--	--	**25.6**	**32.4**	**53.9**	--	**50.7**	--	--	--	--	--	**37.1**	--
Copper	NE	3,000		--	--	--	--	--	**22.3**	**20.6**	**84.4**	--	**75.8**	--	--	--	--	--	**119**	--
Lead	250	NE		--	--	--	--	--	**8.64**	**225**	**1,540**	--	**338**	--	--	--	--	--	**518**	--
Mercury	2	24		--	--	--	--	--	<0.2	<0.2	<0.1	--	<0.1	--	--	--	--	--	<0.1	--
Selenium	NE	400		--	--	--	--	--	--	--	**0.735**	--	<0.5	--	--	--	--	--	<0.5	--
Silver	NE	400		--	--	--	--	--	--	--	<0.5	--	**0.664**	--	--	--	--	--	<0.5	--
Zinc	NE	24,000		--	--	--	--	--	**38**	**47.6**	--	--	--	--	--	--	--	--	--	--
Petroleum Hydrocarbons (mg/kg)																				
Gasoline-range petroleum hydrocarbons	100	NE		--	--	<10	<10	--	<2	<2	--	--	--	--	--	--	**490**	--	--	--
Diesel-range petroleum hydrocarbons	2,000	NE		<20	<20	--	--	<20	**130 x**	**110 x**	--	<20	**59.2**	<20	<20	<20	**500**	<20	--	<20
Heavy-oil range petroleum hydrocarbons	2,000	NE		<40	<40	--	--	**56**	**580**	**440**	--	<40	**140**	**56**	<40	<40	**1,200**	<40	--	<40
Mineral oil-range petroleum hydrocarbons	4,000	NE		<40	<40	--	--	<40	--	--	--	<40	--	<40	<40	<40	<40	<40	--	<40
BTEX (mg/kg)																				
Benzene	0.03	18		--	--	<0.02	<0.02	--	<0.02	<0.02	--	--	--	--	--	--	--	--	--	--
Toluene	7	6,400		--	--	<0.05	<0.05	--	<0.02	<0.02	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	6	8,000		--	--	<0.05	<0.05	--	<0.02	<0.02	--	--	--	--	--	--	--	--	--	--
Xylenes	9	16,000		--	--	<0.05	<0.05	--	<0.06	<0.06	--	--	--	--	--	--	--	--	--	--

				Maintenance Building and Southern Portion of Site															
				Paint and Solvent Storage/Sand Drying with 800-gallon Diesel AST													Crane Shed		
			Location	S-13	S-13	S-18	S-23	RGB10	RGB10	RGB10	RGB11	RGB12	RGB13	RGB18	RGB18	MW8	S-17	RGB19	RGB19
	MTCA Soil Cleanup Levels[1]		Sample ID	S-13	S-13	S-18	S-23	RGB10-S	RGB10-5	RGB10-11	RGB11-5	RGB12-4	RGB13-4	RGB18-5	RGB18-10	MW8-5	S-17	RGB19-S	RGB19-12
			Depth (feet)	6	10	Surface	4-8	Surface	5	11	5	4	4	5	10	5	7	Surface	12
Analyte	Method A	Method B	Date	10/15/2005	10/15/2005	10/15/2005	10/15/2005	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/8/2008	10/15/2005	2/11/2008	2/11/2008
Metals (mg/kg)																			
Arsenic	20	0.67		<5	--	--	--	**1.82**	**4.71**	--	--	**3.64**	**5.85**	**3.55**	--	--	--	**2.25**	**9.72**
Barium	NE	16,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	2	40		<1	--	--	--	<1	<1	--	--	<1	<1	<1	--	--	--	<1	<1
Chromium	2,000[2]	120,000[2]		**112**	--	--	--	**25.3**	**24.3**	--	--	**16**	**19**	**24.5**	--	--	--	**18.5**	**10**
Copper	NE	3,000		--	--	--	--	**27.6**	**25.7**	--	--	**17.2**	**28.3**	**34.2**	--	--	--	**16.3**	**19.2**
Lead	250	NE		<5	--	--	--	**62.3**	**65.6**	--	--	**25.1**	**44.1**	**106**	--	--	--	**17.1**	**95.6**
Mercury	2	24		<0.5	--	--	--	<0.2	<0.2	--	--	<0.2	<0.2	<0.2	--	--	--	<0.2	<0.2
Selenium	NE	400		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	NE	400		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	NE	24,000		--	--	--	--	**1,120**	**128**	--	--	**53.4**	**84.7**	**150**	--	--	--	**70**	**164**
Petroleum Hydrocarbons (mg/kg)																			
Gasoline-range petroleum hydrocarbons	100	NE		**106**	**6,000**	**100**	--	**7**	**14**	<2	<2	<2	<2	<2	--	**12**	--	--	<2
Diesel-range petroleum hydrocarbons	2,000	NE		<20	<20	**180**	<20	--	--	--	--	--	--	--	--	<50	<20	--	<50
Heavy-oil range petroleum hydrocarbons	2,000	NE		<40	<40	**1,000**	<40	--	--	--	--	--	--	--	--	<250	<40	--	<250
Mineral oil-range petroleum hydrocarbons	4,000	NE		<40	<40	<40	<40	--	--	--	--	--	--	--	--	--	<40	--	--
BTEX (mg/kg)																			
Benzene	0.03	18		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	7	6,400		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	6	8,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylenes	9	16,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds (mg/kg)																			
1,1,1,2-Tetrachloroethane	NE	38		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
1,1,1-Trichloroethane	2	72,000		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
1,1,2,2-Tetrachloroethane	NE	5		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
1,1,2-Trichloroethane	NE	18		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
1,1-Dichloroethane	NE	8,000		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
1,1-Dichloroethene	NE	4,000		--	--	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
1,1-Dichloropropene	NE	4,000		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
1,2,3-Trichlorobenzene	NE	NE		<0.05	--	<0.05	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	--	--	<0.1
1,2,3-Trichloropropane	NE	0.14		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
1,2,4-Trichlorobenzene	NE	800		<0.05	--	<0.05	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	--	--	<0.1
1,2,4-Trimethylbenzene	NE	4,000		<0.05	--	<0.05	--	0.27	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	**0.13**	--	--	<0.05
1,2-Dibromo-3-chloropropane	NE	0.71		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
1,2-Dibromoethane (EDB)	0.005	0.012		<0.005	--	<0.005	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
1,2-Dichlorobenzene	NE	7,200		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
1,2-Dichloroethane (EDC)	NE	7,200		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
1,2-Dichloropropane	NE	15		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
1,3,5-Trimethylbenzene	NE	4,000		<0.05	--	<0.05	--	0.063	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	**0.093**	--	--	<0.05
1,3-Dichlorobenzene	NE	NE		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
1,3-Dichloropropane	NE	NE		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
1,4-Dichlorobenzene	NE	42		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
2,2-Dichloropropane	NE	42		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
2-Butanone (MEK)	NE	48,000		<0.5	--	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	--	--	<0.5
2-Chlorotoluene	NE	1,600		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
2-Hexanone	NE	NE		<0.05	--	<0.05	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	--	--	<0.5
4-Chlorotoluene	NE	NE		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
4-Methyl-2-pentanone	NE	NE		<0.05	--	<0.05	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	--	--	<0.5
Acetone	NE	8,000		<0.5	--	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	--	--	<0.5
Benzene	0.03	18		<0.02	--	<0.02	--	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	--	<0.03	--	--	<0.03
Bromobenzene	NE	NE		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
Bromochloromethane	NE	NE		<0.05	--	<0.05	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	NE	16		--	--	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
Bromoform	NE	130		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
Bromomethane	NE	110		<0.05	--	<0.05	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	--	--	<0.5
Carbon Tetrachloride	NE	8		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
Chlorobenzene	NE	1,600		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
Chloroethane	NE	350		<0.05	--	<0.05	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	--	--	<0.5
Chloroform	NE	160		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05

				Maintenance Building and Southern Portion of Site															
				Paint and Solvent Storage/Sand Drying with 800-gallon Diesel AST													Crane Shed		
	MTCA Soil Cleanup Levels[1]		Location	S-13	S-13	S-18	S-23	RGB10	RGB10	RGB10	RGB11	RGB12	RGB13	RGB18	RGB18	MW8	S-17	RGB19	RGB19
			Sample ID	S-13	S-13	S-18	S-23	RGB10-S	RGB10-5	RGB10-11	RGB11-5	RGB12-4	RGB13-4	RGB18-5	RGB18-10	MW8-5	S-17	RGB19-S	RGB19-12
			Depth (feet)	6	10	Surface	4-8	Surface	5	11	5	4	4	5	10	5	7	Surface	12
Analyte	Method A	Method B	Date	10/15/2005	10/15/2005	10/15/2005	10/15/2005	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/8/2008	10/15/2005	2/11/2008	2/11/2008
Chloromethane	NE	77		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
cis-1,2-Dichloroethene	NE	800		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
cis-1,3-Dichloropropene	NE	NE		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
Dibromochloromethane	NE	800		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
Dibromodichloromethane	NE	NE		<0.05	--	<0.05	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibromomethane	NE	800		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
Dichlorodifluoromethane	NE	16,000		<0.05	--	<0.05	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	--	--	<0.5
Dichloroethylene	NE	800		<0.05	--	<0.05	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	6	8,000		<0.05	--	<0.05	--	<0.05	**0.059**	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
Hexachlorobutadiene	NE	13		<0.05	--	<0.05	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	--	--	<0.1
Hexane	NE	48,000		--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	--	--	<0.1
Isopropylbenzene	NE	8,000		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
Total Xylenes	9	16,000		<0.05	--	<0.05	--	**0.15**	**0.21**	<0.1	<0.1	<0.1	<0.1	<0.1	--	**0.38**	--	--	<0.1
Methyl t-butyl ether (MTBE)	0.1	560		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
Methylene chloride	0.02	130		<0.5	--	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	--	--	<0.5
Naphthalene	5	1,600		<0.05	--	<0.05	--	**1.3**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
n-Butylbenzene	NE	NE		<0.05	--	<0.05	--	--	--	--	--	--	--	--	--	--	--	--	--
n-Propylbenzene	NE	NE		**90**	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
p-Isopropyltoluene	NE	NE		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
sec-Butylbenzene	NE	NE		**340**	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
Styrene	NE	33		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
tert-Butylbenzene	NE	NE		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
Tetrachloroethene	0.05	2		<0.02	--	<0.02	--	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	--	<0.025	--	--	<0.025
Toluene	7	6		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
trans-1,2-Dichloroethene	NE	1,600		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
trans-1,3-Dichloropropene	NE	NE		<0.05	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
Trichloroethene	0.03	3		<0.02	--	<0.02	--	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	--	<0.03	--	--	<0.03
Trichlorofluoromethane	NE	24,000		<0.05	--	<0.05	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	--	--	<0.5
Vinyl chloride	NE	0.67		<0.010	--	<0.010	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	--	--	<0.05
Semi-Volatile Organic Compounds (mg/kg)																			
Phenol	NE	48,000		--	--	--	--	--	--	--	--	--	--	<0.3	<0.3	--	--	--	<0.3
Bis(2-chloroethyl) ether	NE	0.91		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
2-Chlorophenol	NE	400		--	--	--	--	--	--	--	--	--	--	<0.3	<0.3	--	--	--	<0.3
1,3-Dichlorobenzene	NE	NE		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
1,4-Dichlorobenzene	NE	42		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
1,2-Dichlorobenzene	NE	7,200		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
Benzyl alcohol	NE	24,000		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
Bis(2-chloroisopropyl) ether	NE	0.91		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
2-Methylphenol	NE	4,000		--	--	--	--	--	--	--	--	--	--	<0.3	<0.3	--	--	--	<0.3
Hexachloroethane	NE	71		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
N-Nitroso-di-n-propylamine	NE	0.14		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
4-Methylphenol	NE	400		--	--	--	--	--	--	--	--	--	--	<0.3	<0.3	--	--	--	<0.3
Nitrobenzene	NE	40		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
Isophorone	NE	1,100		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
2-Nitrophenol	NE	NE		--	--	--	--	--	--	--	--	--	--	<0.3	<0.3	--	--	--	<0.3
2,4-Dimethylphenol	NE	1,600		--	--	--	--	--	--	--	--	--	--	<0.3	<0.3	--	--	--	<0.3
Benzoic acid	NE	320,000		--	--	--	--	--	--	--	--	--	--	<3	<3	--	--	--	<3
Bis(2-chloroethoxy)methane	NE	NE		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
2,4-Dichlorophenol	NE	240		--	--	--	--	--	--	--	--	--	--	<0.3	<0.3	--	--	--	<0.3
1,2,4-Trichlorobenzene	NE	800		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
Naphthalene	5	1,600		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
Hexachlorobutadiene	NE	13		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
4-Chloroaniline	NE	320		--	--	--	--	--	--	--	--	--	--	<3	<3	--	--	--	<3
4-Chloro-3-methylphenol	NE	NE		--	--	--	--	--	--	--	--	--	--	<0.3	<0.3	--	--	--	<0.3
2-Methylnaphthalene	NE	320		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
Hexachlorocyclopentadiene	NE	480		--	--	--	--	--	--	--	--	--	--	<0.09	<0.09	--	--	--	<0.09
2,4,6-Trichlorophenol	NE	91		--	--	--	--	--	--	--	--	--	--	<0.3	<0.3	--	--	--	<0.3
2,4,5-Trichlorophenol	NE	8,000		--	--	--	--	--	--	--	--	--	--	<0.3	<0.3	--	--	--	<0.3

Analyte	MTCA Soil Cleanup Levels[1]			Maintenance Building and Southern Portion of Site															
				Paint and Solvent Storage/Sand Drying with 800-gallon Diesel AST													Crane Shed		
			Location	S-13	S-13	S-18	S-23	RGB10	RGB10	RGB10	RGB11	RGB12	RGB13	RGB18	RGB18	MW8	S-17	RGB19	RGB19
			Sample ID	S-13	S-13	S-18	S-23	RGB10-S	RGB10-5	RGB10-11	RGB11-5	RGB12-4	RGB13-4	RGB18-5	RGB18-10	MW8-5	S-17	RGB19-S	RGB19-12
			Depth (feet)	6	10	Surface	4-8	Surface	5	11	5	4	4	5	10	5	7	Surface	12
Analyte	Method A	Method B	Date	10/15/2005	10/15/2005	10/15/2005	10/15/2005	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/8/2008	10/15/2005	2/11/2008	2/11/2008
2-Chloronaphthalene	NE	6,400		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
2-Nitroaniline	NE	NE		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
Dimethyl phthalate	NE	80,000		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
Acenaphthylene	NE	NE		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
2,6-Dinitrotoluene	NE	80		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
3-Nitroaniline	NE	NE		--	--	--	--	--	--	--	--	--	--	<0.9	<0.9	--	--	--	<0.9
Acenaphthene	NE	NE		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
2,4-Dinitrophenol	NE	160		--	--	--	--	--	--	--	--	--	--	<0.9	<0.9	--	--	--	<0.9
Dibenzofuran	NE	160		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
2,4-Dinitrotoluene	NE	160		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
4-Nitrophenol	NE	NE		--	--	--	--	--	--	--	--	--	--	<0.3	<0.3	--	--	--	<0.3
Diethyl phthalate	NE	64,000		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
Fluorene	NE	3,200		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
4-Chlorophenyl phenyl ether	NE	NE		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
N-Nitrosodiphenylamine	NE	200		--	--	--	--	--	--	--	--	--	--	<0.06	<0.06	--	--	--	<0.06
4-Nitroaniline	NE	NE		--	--	--	--	--	--	--	--	--	--	<0.9	<0.9	--	--	--	<0.9
4,6-Dinitro-2-methylphenol	NE	NE		--	--	--	--	--	--	--	--	--	--	<0.9	<0.9	--	--	--	<0.9
4-Bromophenyl phenyl ether	NE	NE		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
Hexachlorobenzene	NE	0.63		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
Pentachlorophenol	NE	8		--	--	--	--	--	--	--	--	--	--	<0.3	<0.3	--	--	--	<0.3
Phenanthrene	NE	NE		--	--	--	--	--	--	--	--	--	--	**0.14**	<0.03	--	--	--	<0.03
Anthracene	NE	24,000		--	--	--	--	--	--	--	--	--	--	**0.034**	<0.03	--	--	--	<0.03
Carbazole	NE	50		--	--	--	--	--	--	--	--	--	--	<0.06	<0.06	--	--	--	<0.06
Di-n-butyl phthalate	NE	8,000		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
Fluoranthene	NE	3,200		--	--	--	--	--	--	--	--	--	--	**0.32**	<0.03	--	--	--	<0.03
Pyrene	NE	2,400		--	--	--	--	--	--	--	--	--	--	**0.33**	<0.03	--	--	--	<0.03
Benzyl butyl phthalate	NE	16,000		--	--	--	--	--	--	--	--	--	--	<0.03	<0.03	--	--	--	<0.03
Benz(a)anthracene[3]	NE	NE		--	--	--	--	--	--	--	--	--	--	**0.13**	<0.03	--	--	--	<0.03
Chrysene[3]	NE	NE		--	--	--	--	--	--	--	--	--	--	**0.19**	<0.03	--	--	--	<0.03
Bis(2-ethylhexyl) phthalate	NE	71		--	--	--	--	--	--	--	--	--	--	<0.3	<0.3	--	--	--	<0.3
Di-n-octyl phthalate	NE	1,600		--	--	--	--	--	--	--	--	--	--	<0.03 J	<0.03	--	--	--	<0.03
Benzo(a)pyrene[3]	0.1	0.14		--	--	--	--	--	--	--	--	--	--	**0.17 J**	<0.03	--	--	--	<0.03
Benzo(b)fluoranthene[3]	NE	NE		--	--	--	--	--	--	--	--	--	--	**0.19 jr J**	<0.03	--	--	--	<0.03
Benzo(k)fluoranthene[3]	NE	NE		--	--	--	--	--	--	--	--	--	--	**0.064 jl J**	<0.03	--	--	--	<0.03
Indeno(1,2,3-cd)pyrene[3]	NE	NE		--	--	--	--	--	--	--	--	--	--	**0.091 J**	<0.03	--	--	--	<0.03
Dibenz(a,h)anthracene[3]	NE	NE		--	--	--	--	--	--	--	--	--	--	<0.03 J	<0.03	--	--	--	<0.03
Benzo(g,h,i)perylene	NE	NE		--	--	--	--	--	--	--	--	--	--	**0.099 J**	<0.03	--	--	--	<0.03
cPAH TEC [4]	0.1	0.14		--	--	--	--	--	--	--	--	--	--	**0.22**	<0.03	--	--	--	<0.03

				Tank Shop, Structural Shop and Associated Areas														
				USTs at Southwest Corner of Tank Shop													Closed In Place Bunker UST	
	MTCA Soil Cleanup Levels[1]		Location	U1	U2	S-8	S-9	S-10	S-11	RGB5	RGB5	RGB6	RGB7	RGB7	RGB8	RGB9	S-14	S-26
			Sample ID	U1	U2	S-8	S-9	S-10	S-11	RGB5-5-6	RGB5-8	RGB6-6	RGB7-6-7	RGB7-12	RGB8-5	RGB9-5	S-14	S-26
			Depth (feet)	5	4	4-8	6	4-8	4-8	5-6	8	6	6-7	12	5	5	4-8	4-8
Analyte	Method A	Method B	Date	6/3/2004	6/3/2004	10/15/2005	10/15/2005	10/15/2005	10/15/2005	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/11/2008	10/15/2005	10/15/2005
Metals (mg/kg)																		
Arsenic	20	0.67		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	NE	16,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	2	40		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	2,000[2]	120,000[2]		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	NE	3,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	250	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	2	24		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	NE	400		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	NE	400		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	NE	24,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Petroleum Hydrocarbons (mg/kg)																		
Gasoline-range petroleum hydrocarbons	100	NE		--	--	--	--	--	--	--	--	--	--	--	**12**	--	--	--
Diesel-range petroleum hydrocarbons	2,000	NE		**16,500**	<10	**8,900**	**1,200**	<20	**8,700**	**2,600**	<50	<50	**15,000**	<50	<50	<50	<20	<20
Heavy-oil range petroleum hydrocarbons	2,000	NE		**278**	<25	<40	<40	<40	<40	<250	<250	<250	**400 y**	<250	<250	<250	<40	<40
Mineral oil-range petroleum hydrocarbons	4,000	NE		--	--	<40	<40	<40	<40	--	--	--	--	--	--	--	<40	<40
BTEX (mg/kg)																		
Benzene	0.03	18		--	--	--	--	--	--	<0.02	--	--	<0.02	--	--	--	--	--
Toluene	7	6,400		--	--	--	--	--	--	<0.02	--	--	**0.15**	--	--	--	--	--
Ethylbenzene	6	8,000		--	--	--	--	--	--	<0.02	--	--	<0.02	--	--	--	--	--
Xylenes	9	16,000		--	--	--	--	--	--	<0.06	--	--	**0.37**	--	--	--	--	--
Volatile Organic Compounds (mg/kg)																		
1,1,1,2-Tetrachloroethane	NE	38		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1,1-Trichloroethane	2	72,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	NE	5		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	NE	18		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	NE	8,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	NE	4,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloropropene	NE	4,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-Trichlorobenzene	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-Trichloropropane	NE	0.14		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	NE	800		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene	NE	4,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dibromo-3-chloropropane	NE	0.71		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dibromoethane (EDB)	0.005	0.012		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	NE	7,200		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane (EDC)	NE	7,200		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane	NE	15		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3,5-Trimethylbenzene	NE	4,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichloropropane	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	NE	42		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,2-Dichloropropane	NE	42		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Butanone (MEK)	NE	48,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chlorotoluene	NE	1,600		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Hexanone	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chlorotoluene	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acetone	NE	8,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	0.03	18		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromobenzene	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromochloromethane	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	NE	16		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromoform	NE	130		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromomethane	NE	110		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon Tetrachloride	NE	8		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlorobenzene	NE	1,600		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloroethane	NE	350		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloroform	NE	160		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

				Tank Shop, Structural Shop and Associated Areas														
				USTs at Southwest Corner of Tank Shop													Closed In Place Bunker UST	
	MTCA Soil Cleanup Levels[1]		Location	U1	U2	S-8	S-9	S-10	S-11	RGB5	RGB5	RGB6	RGB7	RGB7	RGB8	RGB9	S-14	S-26
			Sample ID	U1	U2	S-8	S-9	S-10	S-11	RGB5-5-6	RGB5-8	RGB6-6	RGB7-6-7	RGB7-12	RGB8-5	RGB9-5	S-14	S-26
			Depth (feet)	5	4	4-8	6	4-8	4-8	5-6	8	6	6-7	12	5	5	4-8	4-8
Analyte	Method A	Method B	Date	6/3/2004	6/3/2004	10/15/2005	10/15/2005	10/15/2005	10/15/2005	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/11/2008	10/15/2005	10/15/2005
Chloromethane	NE	77		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	NE	800		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibromochloromethane	NE	800		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibromodichloromethane	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibromomethane	NE	800		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane	NE	16,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dichloroethylene	NE	800		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	6	8,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobutadiene	NE	13		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexane	NE	48,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopropylbenzene	NE	8,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes	9	16,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl t-butyl ether (MTBE)	0.1	560		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylene chloride	0.02	130		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	5	1,600		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n-Butylbenzene	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n-Propylbenzene	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
p-Isopropyltoluene	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
sec-Butylbenzene	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Styrene	NE	33		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tert-Butylbenzene	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	0.05	2		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	7	6		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	NE	1,600		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
trans-1,3-Dichloropropene	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene	0.03	3		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane	NE	24,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl chloride	NE	0.67		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Semi-Volatile Organic Compounds (mg/kg)																		
Phenol	NE	48,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bis(2-chloroethyl) ether	NE	0.91		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chlorophenol	NE	400		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	NE	42		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	NE	7,200		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzyl alcohol	NE	24,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bis(2-chloroisopropyl) ether	NE	0.91		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylphenol	NE	4,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachloroethane	NE	71		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitroso-di-n-propylamine	NE	0.14		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methylphenol	NE	400		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrobenzene	NE	40		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isophorone	NE	1,100		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Nitrophenol	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	NE	1,600		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzoic acid	NE	320,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bis(2-chloroethoxy)methane	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	NE	240		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	NE	800		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	5	1,600		--	--	--	--	--	--	<0.1	--	--	<0.1	--	--	--	--	--
Hexachlorobutadiene	NE	13		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chloroaniline	NE	320		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chloro-3-methylphenol	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	NE	320		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	NE	480		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	NE	91		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	NE	8,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

				Tank Shop, Structural Shop and Associated Areas														
				USTs at Southwest Corner of Tank Shop													**Closed In Place Bunker UST**	
	MTCA Soil Cleanup Levels[1]		Location	U1	U2	S-8	S-9	S-10	S-11	RGB5	RGB5	RGB6	RGB7	RGB7	RGB8	RGB9	S-14	S-26
			Sample ID	U1	U2	S-8	S-9	S-10	S-11	RGB5-5-6	RGB5-8	RGB6-6	RGB7-6-7	RGB7-12	RGB8-5	RGB9-5	S-14	S-26
			Depth (feet)	5	4	4-8	6	4-8	4-8	5-6	8	6	6-7	12	5	5	4-8	4-8
Analyte	Method A	Method B	Date	6/3/2004	6/3/2004	10/15/2005	10/15/2005	10/15/2005	10/15/2005	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/11/2008	10/15/2005	10/15/2005
2-Chloronaphthalene	NE	6,400		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Nitroaniline	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dimethyl phthalate	NE	80,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	NE	NE		--	--	--	--	--	--	<0.1	--	--	<0.1	--	--	--	--	--
2,6-Dinitrotoluene	NE	80		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3-Nitroaniline	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	NE	NE		--	--	--	--	--	--	<0.1	--	--	**0.92**	--	--	--	--	--
2,4-Dinitrophenol	NE	160		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenzofuran	NE	160		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	NE	160		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Nitrophenol	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Diethyl phthalate	NE	64,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fluorene	NE	3,200		--	--	--	--	--	--	<0.1	--	--	**3.3**	--	--	--	--	--
4-Chlorophenyl phenyl ether	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	NE	200		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Nitroaniline	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Bromophenyl phenyl ether	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	NE	0.63		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	NE	8		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	NE	NE		--	--	--	--	--	--	<0.1	--	--	**4.5**	--	--	--	--	--
Anthracene	NE	24,000		--	--	--	--	--	--	<0.1	--	--	<0.1	--	--	--	--	--
Carbazole	NE	50		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Di-n-butyl phthalate	NE	8,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	NE	3,200		--	--	--	--	--	--	<0.1	--	--	<0.1	--	--	--	--	--
Pyrene	NE	2,400		--	--	--	--	--	--	<0.1	--	--	**0.12**	--	--	--	--	--
Benzyl butyl phthalate	NE	16,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benz(a)anthracene[3]	NE	NE		--	--	--	--	--	--	<0.1	--	--	<0.1	--	--	--	--	--
Chrysene[3]	NE	NE		--	--	--	--	--	--	<0.1	--	--	<0.1	--	--	--	--	--
Bis(2-ethylhexyl) phthalate	NE	71		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Di-n-octyl phthalate	NE	1,600		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene[3]	0.1	0.14		--	--	--	--	--	--	<0.1	--	--	<0.1	--	--	--	--	--
Benzo(b)fluoranthene[3]	NE	NE		--	--	--	--	--	--	<0.1	--	--	<0.1	--	--	--	--	--
Benzo(k)fluoranthene[3]	NE	NE		--	--	--	--	--	--	<0.1	--	--	<0.1	--	--	--	--	--
Indeno(1,2,3-cd)pyrene[3]	NE	NE		--	--	--	--	--	--	<0.1	--	--	<0.1	--	--	--	--	--
Dibenz(a,h)anthracene[3]	NE	NE		--	--	--	--	--	--	<0.1	--	--	<0.1	--	--	--	--	--
Benzo(g,h,i)perylene	NE	NE		--	--	--	--	--	--	<0.1	--	--	<0.1	--	--	--	--	--
***cPAH TEC*[4]**	0.1	0.14		--	--	--	--	--	--	<0.1	--	--	<0.1	--	--	--	--	--
PCBs																		
1221	NE	NE		--	--	--	--	--	--	<0.1	--	--	--	--	--	--	--	--
1232	NE	NE		--	--	--	--	--	--	<0.1	--	--	--	--	--	--	--	--
1016	NE	5.6		--	--	--	--	--	--	<0.1	--	--	--	--	--	--	--	--
1242	NE	NE		--	--	--	--	--	--	<0.1	--	--	--	--	--	--	--	--
1248	NE	NE		--	--	--	--	--	--	<0.1	--	--	--	--	--	--	--	--
1254	NE	1.6		--	--	--	--	--	--	**0.6**	--	--	--	--	--	--	--	--
1260	NE	NE		--	--	--	--	--	--	<0.1	--	--	--	--	--	--	--	--
1262	NE	NE		--	--	--	--	--	--	<0.1	--	--	--	--	--	--	--	--
Total PCBs	1	0.5		--	--	--	--	--	--	**0.6**	--	--	--	--	--	--	--	--

				Paint Shop and North Side of Site															
				Crane Transformer	**Spent Sandblast Grit**														
			Location	RGB20	Sand Grit	Sand Grit	RGB1	RGB1	RGB2	RGB2	RGB3	RGB3	RGB4	RGB4	RGB4	RGB4	RGB16	RGB16-10	RGB17
			Sample ID	RGB20-5	Sand Grit	Sand Grit	RGB1-S	RGB1-4	RGB2-S	RGB2-3.5	RGB3-S	RGB3-4	RGB4-S	RGB4-1	RGB4-1.5	RGB4-4	RGB16-6	RGB16-10	RGB17-5
	MTCA Soil Cleanup Levels[1]		Depth (feet)	5	Surface	Surface	Surface	4	Surface	3.5	Surface	4	Surface	1	1.5	4	6	10	5
Analyte	Method A	Method B	Date	3/4/2008	6/19/2001	6/27/2007	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/8/2008	3/4/2008	3/4/2008	2/8/2008	2/11/2008	2/11/2008	2/11/2008
Metals (mg/kg)																			
Arsenic	20	0.67		--	**1.82**	--	<1	2.88	1.07	--	<1	**3.21**	**2.69**	--	--	**3.7**	**5.86**	--	**1.79**
Barium	NE	16,000		--	**469**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	2	40		--	<0.33	--	<1	1.57	<1	--	<1	<1	**1.6**	--	--	<1	**1.1**	--	<1
Chromium	$2,000^2$	$120,000^2$		--	**15.1**	--	**8.65**	**15.8**	**10.9**	--	**8.54**	**5.2**	**38.3**	--	--	**7.68**	**12.2**	--	**5.81**
Copper	NE	3,000		--	--	--	**15.9**	**8.06**	**17.7**	--	**22.4**	**3.63**	**86.1**	--	--	**5.61**	**10.9**	--	**5.81**
Lead	250	NE		--	**3**	--	**7.12**	**1.96**	**8.72**	--	**14.6**	<1	**34.6**	--	--	<1	**1.52**	--	<1
Mercury	2	24		--	<0.2	--	<0.2	**2.4**	<0.2	--	<0.2	<0.2	<0.2	--	--	<0.2	<0.2	--	<0.2
Selenium	NE	400		--	<0.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	NE	400		--	<0.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	NE	24,000		--	--	**1,570**	**955**	--	**513**	--	**808**	**12.3**	**1,330**	--	--	**16.3**	**23.5**	--	**13.2**
Petroleum Hydrocarbons (mg/kg)																			
Gasoline-range petroleum hydrocarbons	100	NE		--	--	--	<2	--	--	--	<2	--	--	--	--	--	**22**	--	--
Diesel-range petroleum hydrocarbons	2,000	NE		--	--	--	<50	<50	<50	--	<50	--	**180 x**	--	--	--	**3,600**	<50	<50
Heavy-oil range petroleum hydrocarbons	2,000	NE		--	--	--	<250	<250	<250	--	<250	--	**390**	--	--	--	<250	<250	<250
Mineral oil-range petroleum hydrocarbons	4,000	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BTEX (mg/kg)																			
Benzene	0.03	18		--	--	--	--	--	--	--	--	--	--	--	--	--	<0.02	--	--
Toluene	7	6,400		--	--	--	--	--	--	--	--	--	--	--	--	--	<0.02	--	--
Ethylbenzene	6	8,000		--	--	--	--	--	--	--	--	--	--	--	--	--	<0.02	--	--
Xylenes	9	16,000		--	--	--	--	--	--	--	--	--	--	--	--	--	<0.06	--	--
Volatile Organic Compounds (mg/kg)																			
1,1,1,2-Tetrachloroethane	NE	38		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,1,1-Trichloroethane	2	72,000		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	NE	5		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	NE	18		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,1-Dichloroethane	NE	8,000		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,1-Dichloroethene	NE	4,000		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,1-Dichloropropene	NE	4,000		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,2,3-Trichlorobenzene	NE	NE		--	--	--	<0.1	--	--	--	<0.1	--	--	--	--	--	--	--	--
1,2,3-Trichloropropane	NE	0.14		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	NE	800		--	--	--	<0.1	--	--	--	<0.1	--	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene	NE	4,000		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,2-Dibromo-3-chloropropane	NE	0.71		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,2-Dibromoethane (EDB)	0.005	0.012		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	NE	7,200		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,2-Dichloroethane (EDC)	NE	7,200		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,2-Dichloropropane	NE	15		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,3,5-Trimethylbenzene	NE	4,000		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	NE	NE		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,3-Dichloropropane	NE	NE		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	NE	42		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
2,2-Dichloropropane	NE	42		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
2-Butanone (MEK)	NE	48,000		--	--	--	<0.5	--	--	--	<0.5	--	--	--	--	--	--	--	--
2-Chlorotoluene	NE	1,600		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
2-Hexanone	NE	NE		--	--	--	<0.5	--	--	--	<0.5	--	--	--	--	--	--	--	--
4-Chlorotoluene	NE	NE		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone	NE	NE		--	--	--	<0.5	--	--	--	<0.5	--	--	--	--	--	--	--	--
Acetone	NE	8,000		--	--	--	<0.5	--	--	--	<0.5	--	--	--	--	--	--	--	--
Benzene	0.03	18		--	--	--	<0.03	--	--	--	<0.03	--	--	--	--	--	--	--	--
Bromobenzene	NE	NE		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
Bromochloromethane	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	NE	16		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
Bromoform	NE	130		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
Bromomethane	NE	110		--	--	--	<0.5	--	--	--	<0.5	--	--	--	--	--	--	--	--
Carbon Tetrachloride	NE	8		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
Chlorobenzene	NE	1,600		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
Chloroethane	NE	350		--	--	--	<0.5	--	--	--	<0.5	--	--	--	--	--	--	--	--
Chloroform	NE	160		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--

				Paint Shop and North Side of Site															
				Crane Transformer	**Spent Sandblast Grit**														
			Location	RGB20	Sand Grit	Sand Grit	RGB1	RGB1	RGB2	RGB2	RGB3	RGB3	RGB4	RGB4	RGB4	RGB4	RGB16	RGB16-10	RGB17
			Sample ID	RGB20-5	Sand Grit	Sand Grit	RGB1-S	RGB1-4	RGB2-S	RGB2-3.5	RGB3-S	RGB3-4	RGB4-S	RGB4-1	RGB4-1.5	RGB4-4	RGB16-6	RGB16-10	RGB17-5
	MTCA Soil Cleanup Levels[1]		Depth (feet)	5	Surface	Surface	Surface	4	Surface	3.5	Surface	4	Surface	1	1.5	4	6	10	5
Analyte	Method A	Method B	Date	3/4/2008	6/19/2001	6/27/2007	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/8/2008	3/4/2008	3/4/2008	2/8/2008	2/11/2008	2/11/2008	2/11/2008
Chloromethane	NE	77		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	NE	800		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	NE	NE		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
Dibromochloromethane	NE	800		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
Dibromodichloromethane	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibromomethane	NE	800		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
Dichlorodifluoromethane	NE	16,000		--	--	--	<0.5	--	--	--	<0.5	--	--	--	--	--	--	--	--
Dichloroethylene	NE	800		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	6	8,000		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
Hexachlorobutadiene	NE	13		--	--	--	<0.1	--	--	--	<0.1	--	--	--	--	--	--	--	--
Hexane	NE	48,000		--	--	--	<0.1	--	--	--	<0.1	--	--	--	--	--	--	--	--
Isopropylbenzene	NE	8,000		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
Total Xylenes	9	16,000		--	--	--	**0.063**	--	--	--	**0.079**	--	--	--	--	--	--	--	--
Methyl t-butyl ether (MTBE)	0.1	560		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
Methylene chloride	0.02	130		--	--	--	<0.5	--	--	--	<0.5	--	--	--	--	--	--	--	--
Naphthalene	5	1,600		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
n-Butylbenzene	NE	NE		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n-Propylbenzene	NE	NE		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
p-Isopropyltoluene	NE	NE		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
sec-Butylbenzene	NE	NE		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
Styrene	NE	33		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
tert-Butylbenzene	NE	NE		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
Tetrachloroethene	0.05	2		--	--	--	<0.025	--	--	--	<0.025	--	--	--	--	--	--	--	--
Toluene	7	6		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	NE	1,600		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
trans-1,3-Dichloropropene	NE	NE		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
Trichloroethene	0.03	3		--	--	--	<0.03	--	--	--	<0.03	--	--	--	--	--	--	--	--
Trichlorofluoromethane	NE	24,000		--	--	--	<0.5	--	--	--	<0.5	--	--	--	--	--	--	--	--
Vinyl chloride	NE	0.67		--	--	--	<0.05	--	--	--	<0.05	--	--	--	--	--	--	--	--
Semi-Volatile Organic Compounds (mg/kg)																			
Phenol	NE	48,000		--	--	--	<0.3	--	<0.3	<0.3	<0.3	<0.3	<3	<3	<3	<0.3	<3	--	<0.3
Bis(2-chloroethyl) ether	NE	0.91		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
2-Chlorophenol	NE	400		--	--	--	<0.3	--	<0.3	<0.3	<0.3	<0.3	<3	<3	<3	<0.3	<3	--	<0.3
1,3-Dichlorobenzene	NE	NE		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
1,4-Dichlorobenzene	NE	42		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
1,2-Dichlorobenzene	NE	7,200		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
Benzyl alcohol	NE	24,000		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
Bis(2-chloroisopropyl) ether	NE	0.91		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
2-Methylphenol	NE	4,000		--	--	--	<0.3	--	<0.3	<0.3	<0.3	<0.3	<3	<3	<3	<0.3	<3	--	<0.3
Hexachloroethane	NE	71		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
N-Nitroso-di-n-propylamine	NE	0.14		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
4-Methylphenol	NE	400		--	--	--	<0.3	--	<0.3	<0.3	<0.3	<0.3	<3	<3	<3	<0.3	<3	--	<0.3
Nitrobenzene	NE	40		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
Isophorone	NE	1,100		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
2-Nitrophenol	NE	NE		--	--	--	<0.3	--	<0.3	<0.3	<0.3	<0.3	<3	<3 jl	<3	<0.3	<3	--	<0.3
2,4-Dimethylphenol	NE	1,600		--	--	--	<0.3	--	<0.3	<0.3	<0.3	<0.3	<3	<3	<3	<0.3	<3	--	<0.3
Benzoic acid	NE	320,000		--	--	--	<3	--	<3	<3	<3	<3	<30	<30	<30	<3	<30	--	<3
Bis(2-chloroethoxy)methane	NE	NE		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
2,4-Dichlorophenol	NE	240		--	--	--	<0.3	--	<0.3	<0.3	<0.3	<0.3	<3	<3	<3	<0.3	<3	--	<0.3
1,2,4-Trichlorobenzene	NE	800		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
Naphthalene	5	1,600		--	--	--	**0.031**	--	<0.03	<0.03	**0.071**	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
Hexachlorobutadiene	NE	13		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
4-Chloroaniline	NE	320		--	--	--	<3	--	<3	<3	<3	<3	<30	<30	<30	<3	<30	--	<3
4-Chloro-3-methylphenol	NE	NE		--	--	--	<0.3	--	<0.3	<0.3	<0.3	<0.3	<3	<3	<3	<0.3	<3	--	<0.3
2-Methylnaphthalene	NE	320		--	--	--	<0.03	--	<0.03	<0.03	**0.031**	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
Hexachlorocyclopentadiene	NE	480		--	--	--	<0.09	--	<0.09	<0.09	<0.09	<0.09	<0.9	<0.9	<0.9	<0.09	<0.9	--	<0.09
2,4,6-Trichlorophenol	NE	91		--	--	--	<0.3	--	<0.3	<0.3	<0.3	<0.3	<3	<3	<3	<0.3	<3	--	<0.3
2,4,5-Trichlorophenol	NE	8,000		--	--	--	<0.3	--	<0.3	<0.3	<0.3	<0.3	<3	<3	<3	<0.3	<3	--	<0.3

				Paint Shop and North Side of Site															
				Crane Transformer	**Spent Sandblast Grit**														
			Location	RGB20	Sand Grit	Sand Grit	RGB1	RGB1	RGB2	RGB2	RGB3	RGB3	RGB4	RGB4	RGB4	RGB4	RGB16	RGB16-10	RGB17
			Sample ID	RGB20-5	Sand Grit	Sand Grit	RGB1-S	RGB1-4	RGB2-S	RGB2-3.5	RGB3-S	RGB3-4	RGB4-S	RGB4-1	RGB4-1.5	RGB4-4	RGB16-6	RGB16-10	RGB17-5
	MTCA Soil Cleanup Levels[1]		Depth (feet)	5	Surface	Surface	Surface	4	Surface	3.5	Surface	4	Surface	1	1.5	4	6	10	5
Analyte	Method A	Method B	Date	3/4/2008	6/19/2001	6/27/2007	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/8/2008	2/8/2008	3/4/2008	3/4/2008	2/8/2008	2/11/2008	2/11/2008	2/11/2008
2-Chloronaphthalene	NE	6,400		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
2-Nitroaniline	NE	NE		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
Dimethyl phthalate	NE	80,000		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
Acenaphthylene	NE	NE		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	**1.7**	**0.45**	<0.3	<0.03	<0.3	--	<0.03
2,6-Dinitrotoluene	NE	80		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
3-Nitroaniline	NE	NE		--	--	--	<0.9	--	<0.9	<0.9	<0.9	<0.9	<9	<9	<9	<0.9	<9	--	<0.9
Acenaphthene	NE	NE		--	--	--	<0.03	--	<0.03	<0.03	**0.083**	<0.03	**2.2**	<0.3	<0.3	<0.03	**0.46**	--	<0.03
2,4-Dinitrophenol	NE	160		--	--	--	<0.9	--	<0.9	<0.9	<0.9	<0.9	<9	<9	<9	<0.9	<9	--	<0.9
Dibenzofuran	NE	160		--	--	--	<0.03	--	<0.03	<0.03	0.048	<0.03	<1.5	<0.3	<0.3	<0.03	<0.3	--	<0.03
2,4-Dinitrotoluene	NE	160		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
4-Nitrophenol	NE	NE		--	--	--	<0.3	--	<0.3	<0.3	<0.3	<0.3	<3	<3	<3	<0.3	<3	--	<0.3
Diethyl phthalate	NE	64,000		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
Fluorene	NE	3,200		--	--	--	<0.03	--	<0.03	<0.03	0.083	<0.03	**2**	<0.3	<0.3	<0.03	<0.3	--	<0.03
4-Chlorophenyl phenyl ether	NE	NE		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
N-Nitrosodiphenylamine	NE	200		--	--	--	<0.06	--	<0.06	<0.06	<0.06	<0.06	<0.6	<0.6	<0.6	<0.06	<0.6	--	<0.06
4-Nitroaniline	NE	NE		--	--	--	<0.9	--	<0.9	<0.9	<0.9	<0.9	<9	<9	<9	<0.9	<9	--	<0.9
4,6-Dinitro-2-methylphenol	NE	NE		--	--	--	<0.9	--	<0.9	<0.9	<0.9	<0.9	<9	<9	<9	<0.9	<9	--	<0.9
4-Bromophenyl phenyl ether	NE	NE		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
Hexachlorobenzene	NE	0.63		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
Pentachlorophenol	NE	8		--	--	--	<0.3	--	<0.3	<0.3	<0.3	<0.3	<3	**4.2**	<3	<0.3	<3	--	<0.3
Phenanthrene	NE	NE		--	--	--	**0.065**	--	**0.23**	<0.03	**0.82**	<0.03	**34**	**3.6**	**0.88**	<0.03	<0.3	--	<0.03
Anthracene	NE	24,000		--	--	--	<0.03	--	**0.04**	<0.03	**0.18**	<0.03	**3.1**	**1.4**	<0.3	<0.03	<0.3	--	<0.03
Carbazole	NE	50		--	--	--	<0.06	--	<0.06	<0.06	**0.12**	<0.06	**7.1**	**1.1**	<0.6	<0.06	<0.6	--	<0.06
Di-n-butyl phthalate	NE	8,000		--	--	--	**0.067**	--	**0.051**	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
Fluoranthene	NE	3,200		--	--	--	**0.14**	--	**0.33**	<0.03	**1.3**	<0.03	**74 ve**	**8.9**	**2.2**	<0.03	<0.3	--	<0.03
Pyrene	NE	2,400		--	--	--	**0.081**	--	**0.24**	<0.03	**1**	<0.03	**49**	**11**	**2.2**	<0.03	<0.3	--	<0.03
Benzyl butyl phthalate	NE	16,000		--	--	--	<0.03	--	<0.03	<0.03	<0.03	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
Benz(a)anthracene[3]	NE	NE		--	--	--	**0.057**	--	**0.12**	<0.03	**0.53**	<0.03	**5.8**	**1.9**	**0.94**	<0.03	<0.3	--	<0.03
Chrysene[3]	NE	NE		--	--	--	**0.048**	--	**0.17**	<0.03	**0.6**	<0.03	**18**	**6**	**1.4**	<0.03	<0.3	--	<0.03
Bis(2-ethylhexyl) phthalate	NE	71		--	--	--	<0.3	--	<0.3	<0.3	**0.46**	<0.3	<15	<3	<3	<0.3	<0.3	--	<0.3
Di-n-octyl phthalate	NE	1,600		--	--	--	<0.03	--	<0.03	<0.03	**0.26**	<0.03	<0.3	<0.3	<0.3	<0.03	<0.3	--	<0.03
Benzo(a)pyrene[3]	0.1	0.14		--	--	--	**0.036**	--	**0.14**	<0.03	**0.49**	<0.03	**4.4**	**2.4**	**1.1**	<0.03	<0.3	--	<0.03
Benzo(b)fluoranthene[3]	NE	NE		--	--	--	**0.079 jr**	--	**0.18 jr**	<0.03	**0.57 jr**	<0.03	**12 jr**	**4.6**	**1.4**	<0.03	<0.3	--	<0.03
Benzo(k)fluoranthene[3]	NE	NE		--	--	--	<0.03	--	**0.078 jl**	<0.03	**0.25 jl**	<0.03	**5.0 jl**	**1.2**	**0.55**	<0.03	<0.3	--	<0.03
Indeno(1,2,3-cd)pyrene[3]	NE	NE		--	--	--	**0.032**	--	**0.095**	<0.03	**0.28**	<0.03	**3.1**	**2.2**	**0.85**	<0.03	<0.3	--	<0.03
Dibenz(a,h)anthracene[3]	NE	NE		--	--	--	<0.03	--	**0.033**	<0.03	**0.09**	<0.03	<1.5	**0.39**	<0.3	<0.03	<0.3	--	<0.03
Benzo(g,h,i)perylene	NE	NE		--	--	--	**0.035**	--	**0.099**	<0.03	**0.27**	<0.03	**2.8**	**2.6**	**0.85**	<0.03	<0.3	--	<0.03
***cPAH TEC*[4]**	0.1	0.14		--	--	--	**0.05**	--	**0.19**	<0.03	**0.67**	<0.03	**7.17**	**3.49**	1.49	<0.03	<0.3	--	<0.03

				Paint Shop and North Side of Site							
				Spent Sandblast Grit			**Drainage Ditch**				
			Location	PS Grit	MW9	MW9	Ditch1	Ditch1	Ditch2	Ditch2	Ditch2
			Sample ID	PS Grit	MW9-S	MW9-4	Ditch1-S	Ditch1-2.5	Ditch2-S	Ditch2-2.5	Ditch2-5.5
	MTCA Soil Cleanup Levels^1		Depth (feet)	Surface	Surface	4	Surface	2.5	Surface	2.5	5.5
Analyte	Method A	Method B	Date	2/8/2008	2/8/2008	2/8/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	3/4/2008
Metals (mg/kg)											
Arsenic	20	0.67		<1	**1.55**	**3.71**	**2.82**	**5.33**	**2.46**	**1.77**	--
Barium	NE	16,000		--	--	--	--	--	--	--	--
Cadmium	2	40		<1	<1	<1	<1	**1.38**	<1	<1	--
Chromium	2,000^2	120,000^2		**9.65**	**60.3**	**30.9**	**18.3**	**16.2**	**16**	**8.89**	--
Copper	NE	3,000		**14.7**	**117**	**46.6**	**29.2**	**69.3**	**31.1**	**6.95**	--
Lead	250	NE		**14.2**	**17.8**	**102**	**85.2**	**69.2**	**43.8**	**1.78**	--
Mercury	2	24		<0.2	<0.2	**0.27**	**0.29**	**0.91**	<0.2	<0.2	--
Selenium	NE	400		--	--	--	--	--	--	--	--
Silver	NE	400		--	--	--	--	--	--	--	--
Zinc	NE	24,000		**687**	**2,120**	**289**	**415**	**678**	**433**	**27.1**	--
Petroleum Hydrocarbons (mg/kg)											
Gasoline-range petroleum hydrocarbons	100	NE		--	--	--	<2	<2	<2	**14**	--
Diesel-range petroleum hydrocarbons	2,000	NE		<50	**420 x**	--	**110 x**	**160 x**	**220 x**	**5,000**	<50
Heavy-oil range petroleum hydrocarbons	2,000	NE		<250	**860**	--	**440**	<250	**810**	**1,600**	<250
Mineral oil-range petroleum hydrocarbons	4,000	NE		--	--	--	--	--	--	--	--
BTEX (mg/kg)											
Benzene	0.03	18		--	--	--	--	--	--	--	--
Toluene	7	6,400		--	--	--	--	--	--	--	--
Ethylbenzene	6	8,000		--	--	--	--	--	--	--	--
Xylenes	9	16,000		--	--	--	--	--	--	--	--
Volatile Organic Compounds (mg/kg)											
1,1,1,2-Tetrachloroethane	NE	38		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,1,1-Trichloroethane	2	72,000		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,1,2,2-Tetrachloroethane	NE	5		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,1,2-Trichloroethane	NE	18		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,1-Dichloroethane	NE	8,000		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,1-Dichloroethene	NE	4,000		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,1-Dichloropropene	NE	4,000		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,2,3-Trichlorobenzene	NE	NE		--	--	--	<0.1	<0.1	<0.1	<0.1	--
1,2,3-Trichloropropane	NE	0.14		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,2,4-Trichlorobenzene	NE	800		--	--	--	<0.1	<0.1	<0.1	<0.1	--
1,2,4-Trimethylbenzene	NE	4,000		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,2-Dibromo-3-chloropropane	NE	0.71		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,2-Dibromoethane (EDB)	0.005	0.012		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,2-Dichlorobenzene	NE	7,200		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,2-Dichloroethane (EDC)	NE	7,200		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,2-Dichloropropane	NE	15		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,3,5-Trimethylbenzene	NE	4,000		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,3-Dichlorobenzene	NE	NE		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,3-Dichloropropane	NE	NE		--	--	--	<0.05	<0.05	<0.05	<0.05	--
1,4-Dichlorobenzene	NE	42		--	--	--	<0.05	<0.05	<0.05	<0.05	--
2,2-Dichloropropane	NE	42		--	--	--	<0.05	<0.05	<0.05	<0.05	--
2-Butanone (MEK)	NE	48,000		--	--	--	<0.5	<0.5	<0.5	<0.5	--
2-Chlorotoluene	NE	1,600		--	--	--	<0.05	<0.05	<0.05	<0.05	--
2-Hexanone	NE	NE		--	--	--	<0.5	<0.5	<0.5	<0.5	--
4-Chlorotoluene	NE	NE		--	--	--	<0.05	<0.05	<0.05	<0.05	--
4-Methyl-2-pentanone	NE	NE		--	--	--	<0.5	<0.5	<0.5	<0.5	--
Acetone	NE	8,000		--	--	--	<0.5	<0.5	<0.5	<0.5	--
Benzene	0.03	18		--	--	--	<0.03	<0.03	<0.03	<0.03	--
Bromobenzene	NE	NE		--	--	--	<0.05	<0.05	<0.05	<0.05	--
Bromochloromethane	NE	NE		--	--	--	--	--	--	--	--
Bromodichloromethane	NE	16		--	--	--	<0.05	<0.05	<0.05	<0.05	--
Bromoform	NE	130		--	--	--	<0.05	<0.05	<0.05	<0.05	--
Bromomethane	NE	110		--	--	--	<0.5	<0.5	<0.5	<0.5	--
Carbon Tetrachloride	NE	8		--	--	--	<0.05	<0.05	<0.05	<0.05	--
Chlorobenzene	NE	1,600		--	--	--	<0.05	<0.05	<0.05	<0.05	--
Chloroethane	NE	350		--	--	--	<0.5	<0.5	<0.5	<0.5	--
Chloroform	NE	160		--	--	--	<0.05	<0.05	<0.05	<0.05	--

				Paint Shop and North Side of Site							
				Spent Sandblast Grit			**Drainage Ditch**				
			Location	PS Grit	MW9	MW9	Ditch1	Ditch1	Ditch2	Ditch2	Ditch2
			Sample ID	PS Grit	MW9-S	MW9-4	Ditch1-S	Ditch1-2.5	Ditch2-S	Ditch2-2.5	Ditch2-5.5
	MTCA Soil Cleanup Levels[1]		Depth (feet)	Surface	Surface	4	Surface	2.5	Surface	2.5	5.5
Analyte	Method A	Method B	Date	2/8/2008	2/8/2008	2/8/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	3/4/2008
Chloromethane	NE	77		--	--	--	<0.05	<0.05	<0.05	<0.05	--
cis-1,2-Dichloroethene	NE	800		--	--	--	<0.05	<0.05	<0.05	<0.05	--
cis-1,3-Dichloropropene	NE	NE		--	--	--	<0.05	<0.05	<0.05	<0.05	--
Dibromochloromethane	NE	800		--	--	--	<0.05	<0.05	<0.05	<0.05	--
Dibromodichloromethane	NE	NE		--	--	--	--	--	--	--	--
Dibromomethane	NE	800		--	--	--	<0.05	<0.05	<0.05	<0.05	--
Dichlorodifluoromethane	NE	16,000		--	--	--	<0.5	<0.5	<0.5	<0.5	--
Dichloroethylene	NE	800		--	--	--	--	--	--	--	--
Ethylbenzene	6	8,000		--	--	--	<0.05	<0.05	<0.05	<0.05	--
Hexachlorobutadiene	NE	13		--	--	--	<0.1	<0.1	<0.1	<0.1	--
Hexane	NE	48,000		--	--	--	<0.1	<0.1	<0.1	<0.1	--
Isopropylbenzene	NE	8,000		--	--	--	<0.05	<0.05	<0.05	<0.05	--
Total Xylenes	9	16,000		--	--	--	<0.1	<0.1	<0.1	<0.1	--
Methyl t-butyl ether (MTBE)	0.1	560		--	--	--	<0.05	<0.05	<0.05	<0.05	--
Methylene chloride	0.02	130		--	--	--	<0.5	**0.78 lc**	<0.5	<0.5	--
Naphthalene	5	1,600		--	--	--	<0.05	<0.05	<0.05	<0.05	--
n-Butylbenzene	NE	NE		--	--	--	--	--	--	--	--
n-Propylbenzene	NE	NE		--	--	--	<0.05	<0.05	<0.05	<0.05	--
p-Isopropyltoluene	NE	NE		--	--	--	<0.05	<0.05	<0.05	<0.05	--
sec-Butylbenzene	NE	NE		--	--	--	<0.05	<0.05	<0.05	<0.05	--
Styrene	NE	33		--	--	--	<0.05	<0.05	<0.05	<0.05	--
tert-Butylbenzene	NE	NE		--	--	--	<0.05	<0.05	<0.05	<0.05	--
Tetrachloroethene	0.05	2		--	--	--	<0.025	<0.025	<0.025	<0.025	--
Toluene	7	6		--	--	--	<0.05	<0.05	<0.05	<0.05	--
trans-1,2-Dichloroethene	NE	1,600		--	--	--	<0.05	<0.05	<0.05	<0.05	--
trans-1,3-Dichloropropene	NE	NE		--	--	--	<0.05	<0.05	<0.05	<0.05	--
Trichloroethene	0.03	3		--	--	--	<0.03	<0.03	<0.03	<0.03	--
Trichlorofluoromethane	NE	24,000		--	--	--	<0.5	<0.5	<0.5	<0.5	--
Vinyl chloride	NE	0.67		--	--	--	<0.05	<0.05	<0.05	<0.05	--
Semi-Volatile Organic Compounds (mg/kg)											
Phenol	NE	48,000		<0.3	<3	<3	<3	<3	<3	<3	--
Bis(2-chloroethyl) ether	NE	0.91		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
2-Chlorophenol	NE	400		<0.3	<3	<3	<3	<3	<3	<3	--
1,3-Dichlorobenzene	NE	NE		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
1,4-Dichlorobenzene	NE	42		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
1,2-Dichlorobenzene	NE	7,200		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
Benzyl alcohol	NE	24,000		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
Bis(2-chloroisopropyl) ether	NE	0.91		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
2-Methylphenol	NE	4,000		<0.3	<3	<3	<3	<3	<3	<3	--
Hexachloroethane	NE	71		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
N-Nitroso-di-n-propylamine	NE	0.14		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
4-Methylphenol	NE	400		<0.3	<3	<3	<3	<3	<3	<3	--
Nitrobenzene	NE	40		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3 J	--
Isophorone	NE	1,100		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3 J	--
2-Nitrophenol	NE	NE		<0.3	<3	<3	<3	<3	<3	<3 J	--
2,4-Dimethylphenol	NE	1,600		<0.3	<3	<3	<3	<3	<3	<3 J	--
Benzoic acid	NE	320,000		<3	<30	<30	<30	<30	<30	<30 J	--
Bis(2-chloroethoxy)methane	NE	NE		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3 J	--
2,4-Dichlorophenol	NE	240		<0.3	<3	<3	<3	<3	<3	<3 J	--
1,2,4-Trichlorobenzene	NE	800		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3 J	--
Naphthalene	5	1,600		0.49	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3 J	--
Hexachlorobutadiene	NE	13		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3 J	--
4-Chloroaniline	NE	320		<3	<30	<30	<30	<30	<30	<30 J	--
4-Chloro-3-methylphenol	NE	NE		<0.3	<3	<3	<3	<3	<3	<3 J	--
2-Methylnaphthalene	NE	320		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3 J	--
Hexachlorocyclopentadiene	NE	480		<0.09	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	--
2,4,6-Trichlorophenol	NE	91		<0.3	<3	<3	<3	<3	<3	<3	--
2,4,5-Trichlorophenol	NE	8,000		<0.3	<3	<3	<3	<3	<3	<3	--

				Paint Shop and North Side of Site							
				Spent Sandblast Grit			**Drainage Ditch**				
			Location	PS Grit	MW9	MW9	Ditch1	Ditch1	Ditch2	Ditch2	Ditch2
			Sample ID	PS Grit	MW9-S	MW9-4	Ditch1-S	Ditch1-2.5	Ditch2-S	Ditch2-2.5	Ditch2-5.5
	MTCA Soil Cleanup Levels[1]		Depth (feet)	Surface	Surface	4	Surface	2.5	Surface	2.5	5.5
Analyte	Method A	Method B	Date	2/8/2008	2/8/2008	2/8/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	3/4/2008
2-Chloronaphthalene	NE	6,400		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
2-Nitroaniline	NE	NE		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
Dimethyl phthalate	NE	80,000		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
Acenaphthylene	NE	NE		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<1.5	--
2,6-Dinitrotoluene	NE	80		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
3-Nitroaniline	NE	NE		<0.9	<9	<9	<9	<9	<9	<9	--
Acenaphthene	NE	NE		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	**2.3**	--
2,4-Dinitrophenol	NE	160		<0.9	<9	<9	<9	<9	<9	<9	--
Dibenzofuran	NE	160		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
2,4-Dinitrotoluene	NE	160		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
4-Nitrophenol	NE	NE		<0.3	<3	<3	<3	<3	<3	<3	--
Diethyl phthalate	NE	64,000		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
Fluorene	NE	3,200		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
4-Chlorophenyl phenyl ether	NE	NE		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
N-Nitrosodiphenylamine	NE	200		<0.06	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	--
4-Nitroaniline	NE	NE		<0.9	<9	<9	<9	<9	<9	<9	--
4,6-Dinitro-2-methylphenol	NE	NE		<0.9	<9	<9	<9	<9	<9	<9	--
4-Bromophenyl phenyl ether	NE	NE		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
Hexachlorobenzene	NE	0.63		<0.03	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
Pentachlorophenol	NE	8		<0.3	<3	<3	<3	<3	<3	<3	--
Phenanthrene	NE	NE		**0.049**	**1.6**	**0.45**	**0.86**	**2.1**	**1.9**	<0.3	--
Anthracene	NE	24,000		<0.03	<0.3	<0.3	<0.3	**0.7**	**0.38**	<1.5	--
Carbazole	NE	50		<0.06	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	--
Di-n-butyl phthalate	NE	8,000		**0.04**	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
Fluoranthene	NE	3,200		**0.074**	**3.2**	**1.4**	**1.4**	**4**	**1.3**	<1.5	--
Pyrene	NE	2,400		**0.05**	**2.2**	**1.4**	**1.1**	**3.3**	**1.2**	**2.3**	--
Benzyl butyl phthalate	NE	16,000		**0.29**	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
Benz(a)anthracene[3]	NE	NE		<0.03	**1.2**	**0.7**	**0.6**	**1.6**	**0.53**	<1.5	--
Chrysene[3]	NE	NE		**0.033**	**1.6**	**0.82**	**0.69**	**1.8**	**0.74**	<1.5	--
Bis(2-ethylhexyl) phthalate	NE	71		<0.3	**8.9**	<0.3	**0.79**	**5.2**	**1.3**	<0.3	--
Di-n-octyl phthalate	NE	1,600		**0.3**	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
Benzo(a)pyrene[3]	0.1	0.14		<0.03	**1.2**	**0.67**	**0.66**	**1.8**	**0.55**	<1.5	--
Benzo(b)fluoranthene[3]	NE	NE		<0.03 jr	**1.7 jr**	**0.64**	**0.64 jr**	**1.8 jr**	**0.68 jr**	<1.5	--
Benzo(k)fluoranthene[3]	NE	NE		<0.03	**0.74 jl**	**0.33 ca**	**0.35 jl**	**0.88 jl**	<0.3	<0.3	--
Indeno(1,2,3-cd)pyrene[3]	NE	NE		<0.03	**0.92**	**0.33**	**0.46**	**1.1**	**0.39**	<0.3	--
Dibenz(a,h)anthracene[3]	NE	NE		<0.03	**0.32**	<0.3	<0.3	**0.34**	<0.3	<0.3	--
Benzo(g,h,i)perylene	NE	NE		<0.03	**0.88**	**0.31**	**0.59**	**1.1**	**0.47**	<1.5	--
cPAH TEC [4]	0.1	0.14		**0.0003**	**1.70**	**0.88**	**0.87**	**2.39**	**0.72**	<1.5	--

Notes:

[1] Model Toxics Control Act Method A and B soil cleanup levels (WAC 173-340).

[2] Cleanup level is for Chromium III. MTCA Method A and B Cleanup levels for Chromium VI are 19 and 240 mg/kg, respectively.

[3] Indicates the SVOC is a carcinogenic polycyclic aromatic hydrocarbon (cPAH).

[4] Total Toxicity Equivalency Concentration (TEC) based on WAC 173-340-900 Table 708-2.

BETX = Benzene, ethylbenzene, toluene, and total xylenes

VOCs = Volatile Organic Compounds

SVOCs = Semi-volatile organic compounds

PCBs = Poly-chlorinated biphenyls

NE = Cleanup criteria not established

< = Indicates the analyte was not detected above the given reporting limit

-- Indicates the analysis was not performed

Bold indicates the analyte was detected in the sample

Shading indicates the value is greater than the cleanup criteria

UST = Underground storage tank

jl = The analyte result in the laboratory control sample is out of control limits. The reported concentration should be considered an estimate.

jr = The rpd result in laboratory control sample associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

ve = The value reported exceeded the calibration range established for the analyte. The reported concentration should be considered an estimate.

J = The internal standard associated with the analyte is out of control limits. The reported concentration in estimate.

x = The pattern of peaks present is not indicative of diesel.

y = The pattern of peaks present is not indicative of motor oil.

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TABLE 3

SUMMARY OF TCLP[1] ANALYTICAL RESULTS

RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Analyte	Dangerous Waste Criteria[2]	Location	A3	Blast Grit	Blast Grit	Blast Grit	S1	S3	BS-1
		Sample ID	A3	Blast Grit	Blast Grit	Blast Grit	S1	S3	BS-1
		Depth (feet)	0.5	Surface	Surface	Surface	2	2	Surface
		Date	6/3/2004	6/19/2001	6/27/2007	6/27/2007	6/3/2004	6/3/2004	12/19/2005
TCLP Metals (mg/l)									
Arsenic	5.0		<0.1	<0.05	<0.20	**0.2**	<0.1	<0.1	<0.80
Barium	100		<1.00	**1.16**	**0.67**	**0.79**	<1.00	<1.00	--
Cadmium	1.0		<0.05	<0.05	<0.01	<0.01	<0.05	<0.05	--
Chromium	5.0		<0.1	<0.05	<0.02	<0.02	<0.1	<0.1	--
Lead	5.0		**0.31**	<0.05	<0.1	<0.10	<0.1	<0.1	<0.20
Mercury	0.2		<0.005	<0.001	<0.0001	<0.0001	<0.05	<0.05	--
Selenium	1.0		<0.1	<0.05	<0.20	<0.20	<0.1	<0.1	--
Silver	5.0		<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	--

Notes:

[1] Toxicity Characteristic Leaching Procedure

[2] WAC 173-303-90

mg/l = milligrams per liter

< = The analyte was not detected at the given reporting limit

Bold indicates that the analyte was detected in the sample

-- = The analysis was not performed

TABLE 4
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS (FEBRUARY 2008)
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Analyte	Groundwater Cleanup Levels			MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9
	MTCA[1] Method A	MTCA Method B	Water Criteria[2]	2/19/08	2/19/08	2/19/08	2/19/08	2/19/08	2/19/08	2/19/08	2/19/08	2/19/08
Metals (µg/l)												
Arsenic	5	0.000058	5 [4]	**1.16**	<1	<1	<1	**2.66**	**3.48**	**6.11**	**15.3**	<1
Cadmium	5	8	8.8 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	50	NE	240,000 [6]	**12.2**	**17**	**31**	**26.3**	**28.4**	**34.6**	**42.5**	**16**	**19.5**
Copper	NE	590	20 [4]	<1	<1	**1.09**	<1	<1	**5.52**	**9.21**	**40.3**	<1
Lead	15	NE	10 [4]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Mercury	2	4.8	0.025 [7]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Zinc	NE	4,800	160 [4]	<1	<1	<1	**1.13**	<1	<1	**3.48**	**2.82**	<1
TPH (µg/l)												
Gasoline Range Hydrocarbons	1,000	NE	NE	<100	<100	<100	<100	<100	**120**	<100	<100	<100
Diesel Range Hydrocarbons	500	NE	NE	<50	<50	<50	**61,000**	**160**	**380**	<50	<50	<50
Heavy Oil Range Hydrocarbons	500	NE	NE	<250	<250	<250	**3,300 y**	<250	<250	<250	<250	<250
VOCs (µg/l)												
1,1,1,2-Tetrachloroethane	NE	1.7	130 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	200	7,200	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	NE	22	420,000 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	NE	0.77	4 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	NE	1,600	16 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	NE	NE	1.9 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	NE	0.0063	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	NE	NE	70 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	NE	400	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	NE	0.031	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromoethane (EDB)	0.01	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	NE	720	1,300 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane (EDC)	5	0.48	37 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	NE	0.64	15 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	NE	400	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	NE	NE	960 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	NE	NE	19 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	NE	1.8	4.9 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Butanone (MEK)	NE	4,800	NE	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Chlorotoluene	NE	160	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Hexanone	NE	NE	NE	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	NE	160	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Methyl-2-pentanone	NE	640	NE	<10	<10	<10	<10	<10	<10	<10	<10	<10
Acetone	NE	800	NE	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzene	5	0.8	23 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromobenzene	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	NE	0.71	17 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromoform	NE	5.5	140 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane	NE	11	970 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbon Tetrachloride	NE	0.34	1.6 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	NE	160	1,600 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	NE	15	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroform	NE	7.2	280 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloromethane	NE	3.4	130 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	NE	0.24	196	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromochloromethane	NE	0.52	13 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromomethane	NE	80	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	NE	1,600	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	700	800	2,100 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	NE	0.56	18 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	NE	800	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
m,p-Xylene	NE	NE	NE	<2	<2	<2	<2	<2	<2	<2	<2	<2
Methylene chloride	5	5.8	590 [5]	**7.0 lc**	<5	<5	**5.6 lc**	<5	<5	<5	<5	**6.2 lc**
Naphthalene	160	160	4,900 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
n-Propylbenzene	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
o-Xylene	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
Styrene	NE	1.5	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	NE	NE	NE	<1	<1	<1	<1	<1	**1**	<1	<1	<1
Tetrachloroethene	5	0.081	0.39 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	1,000	640	15,000 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1

	Groundwater Cleanup Levels			MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9
Analyte	MTCA[1] Method A	MTCA Method B	Water Criteria[2]	2/19/08	2/19/08	2/19/08	2/19/08	2/19/08	2/19/08	2/19/08	2/19/08	2/19/08
trans-1,2-Dichloroethene	NE	NE	10,000 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	NE	NE	19 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	5	0.49	1.5 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	NE	24,000	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
Vinyl chloride	0.2	0.029	2.4 [5]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
SVOCs (μg/l)												
1,2,4-Trichlorobenzene	NE	80	70 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	NE	720	1,300 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	NE	NE	960 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	NE	1.8	4.9 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
2,4,5-Trichlorophenol	NE	800	NE	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol	NE	4	10 [8]	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4-Dichlorophenol	NE	24	190 [6]	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4-Dimethylphenol	NE	160	550 [6]	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4-Dinitrophenol	NE	32	3,500 [6]	<30	<30	<30	<30	<30	<30	<30	<30	<30
2,4-Dinitrotoluene	NE	32	1 [8]	<1	<1	<1	<1	<1	<1	<1	<1	<1
2,6-Dinitrotoluene	NE	16	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Chloronaphthalene	NE	640	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Chlorophenol	NE	40	97 [6]	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Methylnaphthalene	NE	32	NE	<1	<1	<1	<10	<1	<1	<1	<1	<1
2-Methylphenol	NE	400	NE	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Nitroaniline	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Nitrophenol	NE	NE	NE	<10	<10	<10	<10	<10	<10	<10	<10	<10
3-Nitroaniline	NE	NE	NE	<3	<3	<3	<3	<3	<3	<3	<3	<3
4,6-Dinitro-2-methylphenol	NE	NE	NE	<30	<30	<30	<30	<30	<30	<30	<30	<30
4-Bromophenyl phenyl ether	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Chloro-3-methylphenol	NE	NE	NE	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-Chloroaniline	NE	32	NE	<3	<3	<3	<3	<3	<3	<3	<3	<3
4-Chlorophenyl phenyl ether	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Methylphenol	NE	NE	NE	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-Nitroaniline	NE	NE	NE	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-Nitrophenol	NE	NE	NE	<10	<10	<10	<10	<10	<10	<10	<10	<10
Acenaphthene	NE	960	640 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Acenaphthylene	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
Anthracene	NE	4,800	26,000 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benz(a)anthracene[3]	NE	NE	0.018 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzo(a)pyrene[3]	0.1	0.012	0.018 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzo(b)fluoranthene[3]	NE	NE	0.018 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzo(g,h,i)perylene	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzo(k)fluoranthene[3]	NE	NE	0.018 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzoic acid	NE	64,000	NE	<100	<100	<100	<100	<100	<100	<100	<100	<100
Benzyl alcohol	NE	2,400	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzyl butyl phthalate	NE	3,200	1,300 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bis(2-chloroethoxy)methane	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bis(2-chloroethyl) ether	NE	0.04	0.53 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bis(2-chloroisopropyl) ether	NE	NE	42,000 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bis(2-ethylhexyl) phthalate	NE	6.3	2.2 [5]	<10	<10	<10	**110 ve**	<10	<10	<10	<10	<10
Carbazole	NE	4.4	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chrysene[3]	NE	NE	0.018 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibenz(a,h)anthracene[3]	NE	NE	0.018 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibenzofuran	NE	32	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
Diethyl phthalate	NE	13,000	28,000 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dimethyl phthalate	NE	16,000	72,000 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Di-n-butyl phthalate	NE	NE	2,900 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Di-n-octyl phthalate	NE	320	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1
Fluoranthene	NE	640	90 [6]	<1	<1	<1	<1	<1	<1	<1	<1	1.1
Fluorene	NE	640	3,500 [6]	<1	<1	<1	<10	<1	<1	<1	<1	<1
Hexachlorobenzene	NE	0.055	1 [8]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	NE	0.56	18 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorocyclopentadiene	NE	48	1,100 [5]	<3	<3	<3	<3	<3	<3	<3	<3	<3
Hexachloroethane	NE	3.1	3.3 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Indeno(1,2,3-cd)pyrene[3]	NE	NE	0.018 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isophorone	NE	46	600 [7]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene	160	160	4,900 [6]	<1	<1	<1	<1	<1	<1	<1	<1	1.2
Nitrobenzene	NE	4	450 [6]	<1	<1	<1	<1	<1	<1	<1	<1	<1
N-Nitroso-di-n-propylamine	NE	NE	1 [8]	<1	<1	<1	<1	<1	<1	<1	<1	<1
N-Nitrosodiphenylamine	NE	NE	6 [5]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Pentachlorophenol	NE	0.73	10 [8]	<10	<10	<10	<10	<10	<10	<10	<10	<10

Analyte	Groundwater Cleanup Levels			MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9
	MTCA[1] Method A	MTCA Method B	Water Criteria[2]	2/19/08	2/19/08	2/19/08	2/19/08	2/19/08	2/19/08	2/19/08	2/19/08	2/19/08
Phenanthrene	NE	NE	NE	<1	<1	<1	<10	<1	<1	<1	<1	<1
Phenol	NE	4,800	1,100,000 [6]	<10	<10	<10	<10	<10	<10	<10	<10	<10
Pyrene	NE	480	2,600 [6]	<1	<1	<1	<1	<1	<1	<1	<1	1

Notes:

[1] Model Toxics Control Act (MTCA) (WAC 173-340-730).

[2] Lowest surface water criteria from Background Concentrations of Selected Chemicals in Water (PTI, 1989), Water Quality Standards for surface waters of the State of Washington (WAC 173-201A), National Recommended Water Quality Criteria (Section 304 of the Clean Water Act), National Toxics Rule (40 CFR Part 131.36), and the Model Toxics Control Act (MTCA) Method B Surface Water Cleanup Levels (WAC 173-340-730).

[3] The SVOC is also a carcinogenic polycyclic aromatic hydrocarbon (cPAH)

[4] Washington State Groundwater Background Concentrations

[5] National Recommended Water Quality Criteria

[6] MTCA Method B non-Carcinogen

[7] National Toxics Rule

[8] Laboratory reporting limit higher than some standards; reporting limit used.

NE = Indicates there is no applicable cleanup criteria established.

TPH = Total Petroleum Hydrocarbons

VOCs = Volatile organic compounds

SVOCs = Semi-volatile organic compounds

µg/l = microgram per liter

< = The analyte was not detected at the given reporting limit

y = Laboratory indicated that the pattern of peaks present is not indicative of motor oil

lc = The analyte is a common laboratory contaminant

ve = The reported value exceeded the calibration range. The reported concentration should be considered an estimate.

Values presented in **bold** indicate that the chemical was detected in the specific sample.

Highlighted items indicate that the chemical concentration is greater than the lowest surface water quality screening criteria or MTCA screening criteria if no surface water criteria has been established.

Triway Enterprise Remedial Investigation > Final [Word Processing] > Remedial Investigation Work Plan Report > Work Plan_Tables 1_10.xls

TABLE 5
SUMMARY OF STORMWATER ANALYTICAL RESULTS
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Analyte	Surface Water Criteria[2]	Location Sample ID Date	SW-1 SW-1 3/3/2008	SW-2 SW-2 3/3/2008
Metals (µg/l)				
Arsenic	0.14 [3]		<10	**1.18**
Cadmium	8.8 [3]		<10	<1
Chromium	240,000 [4]		**43.5**	**14.6**
Copper	2.4[5, 6]		**251**	**68.1**
Lead	8.1[6,7]		**129**	**29.3**
Mercury	0.025 [7]		<0.2	<0.2
Zinc	81[6,7]		**5,550**	**2,470**
Total Petroleum Hydrocarbons (µg/l)				
Gasoline Range Hydrocarbons	1,000 [8]		<100	
Diesel Range Hydrocarbons	500 [8]		**220 x**	--
Heavy Oil Range Hydrocarbons	500 [8]		**670**	--
SVOCs (µg/l)				
1,2,4-Trichlorobenzene	70 [3]		<1	--
1,2-Dichlorobenzene	1,300 [3]		<1	--
1,3-Dichlorobenzene	960 [3]		<1	--
1,4-Dichlorobenzene	4.9 [4]		<1	--
2,4,5-Trichlorophenol	NE		<10	--
2,4,6-Trichlorophenol	10 [9]		<10	--
2,4-Dichlorophenol	190 [4]		<10	--
2,4-Dimethylphenol	550 [4]		<10	--
2,4-Dinitrophenol	3,500 [4]		<30	--
2,4-Dinitrotoluene	1 [9]		<1	--
2,6-Dinitrotoluene	NE		<1	--
2-Chloronaphthalene	NE		<1	--
2-Chlorophenol	97 [4]		<10	--
2-Methylnaphthalene	NE		<1	--
2-Methylphenol	NE		<10	--
2-Nitroaniline	NE		<1	--
2-Nitrophenol	NE		<10	--
3-Nitroaniline	NE		<3	--
4,6-Dinitro-2-methylphenol	NE		<30	--
4-Bromophenyl phenyl ether	NE		<1	--
4-Chloro-3-methylphenol	NE		<10	--
4-Chloroaniline	NE		<3	--
4-Chlorophenyl phenyl ether	NE		<1	--
4-Methylphenol	NE		<10	--
4-Nitroaniline	NE		<10	--
4-Nitrophenol	NE		<10	--
Acenaphthene	640 [4]		<1	--
Acenaphthylene	NE		<1	--
Anthracene	26,000 [4]		<1	--
Benz(a)anthracene[1]	0.018 [3]		<1	--
Benzo(a)pyrene[1]	0.018 [3]		<1	--
Benzo(b)fluoranthene[1]	0.018 [3]		<1	--
Benzo(g,h,i)perylene	NE		<1	--
Benzo(k)fluoranthene[1]	0.018 [3]		<1	--
Benzoic acid	NE		<100	--
Benzyl alcohol	NE		<1	--
Benzyl butyl phthalate	1,300 [4]		<1	--
Bis(2-chloroethoxy)methane	NE		<1	--
Bis(2-chloroethyl) ether	0.53 [3]		<1	--
Bis(2-chloroisopropyl) ether	42,000 [4]		<1	--
Bis(2-ethylhexyl) phthalate	2.2 [3]		<10	--
Carbazole	NE		<1	--
Chrysene[1]	0.018 [3]		<1	--
Dibenz(a,h)anthracene[1]	0.018 [3]		<1	--
Dibenzofuran	NE		<1	--
Diethyl phthalate	28,000 [4]		<1	--
Dimethyl phthalate	72,000 [4]		<1	--
Di-n-butyl phthalate	2,900 [4]		<1	--
Di-n-octyl phthalate	NE		<1	--
Fluoranthene	90 [4]		<1	--
Fluorene	3,500 [4]		<1	--
Hexachlorobenzene	1 [9]		<1	--
Hexachlorobutadiene	18 [3]		<1	--
Hexachlorocyclopentadiene	1,100 [3]		<3	--
Hexachloroethane	3.3 [3]		<1	--
Indeno(1,2,3-cd)pyrene[1]	0.018 [3]		<1	--
Isophorone	600 [8]		<1	--
Naphthalene	4,900 [4]		<1	--
Nitrobenzene	450 [4]		<1	--

		Location	SW-1	SW-2
	Surface Water	Sample ID	SW-1	SW-2
Analyte	Criteria[2]	Date	3/3/2008	3/3/2008
N-Nitroso-di-n-propylamine	1 [9]		<1	--
N-Nitrosodiphenylamine	6 [3]		<1	--
Pentachlorophenol	10 [9]		<10	--
Phenanthrene	NE		<1	--
Phenol	1,100,000 [4]		<10	--
Pyrene	2,600 [4]		<1	--

Notes:

[1] The SVOC is also a carcinogenic polycyclic aromatic hydrocarbon (cPAH).

[2] Lowest surface water criteria from Water Quality Standards for surface waters of the State of Washington (WAC 173-201A), National Recommended Water Quality Criteria (Section 304 of the Clean Water Act), National Toxics Rule (40 CFR Part 131.36), and the Model Toxics Control Act (MTCA) Method B Surface Water Cleanup Levels (WAC 173-340-730).

[3] National Recommended Water Quality Criteria.

[4] MTCA Method B Surface Water Cleanup Level.

[5] National Toxics Rule.

[6] Facility stormwater benchmark values are: copper - 63.6 µg/l, lead - 81.6 µg/l, zinc - 117 µg/l.

[7] Water Quality Standards for surface waters of the State of Washington.

[8] MTCA Method A groundwater cleanup level. Applicable as surface water cleanup level for noncarcinogenic effects of petroleum mixtures per WAC 173-340-730(3)(b)(iii)(C).

[9] Laboratory reporting limit higher than some standards; reporting limit used.

SVOCs = Semivolatile Organic Compounds

µg/l = micrograms per liter

NE = No cleanup level established for the analyte

< = The analyte was not detected at the given reporting limit

-- = Indicates the analysis was not performed

x = Laboratory indicated that the pattern of peaks present is not indicative of diesel

Values presented in **bold** indicate that the chemical was detected in the specific sample

Highlighted items indicate that the chemical concentration is greater than the listed criteria

TABLE 6
SUMMARY OF SHORELINE MATERIAL ANALYTICAL RESULTS
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

COMPARISON TO MTCA SOIL CLEANUP LEVELS

Analyte	MTCA Soil Cleanup Levels[1]		Location	S1	S3	BS-1	S-3	MS-1
			Sample ID	S1	S3	BS-1	S-3	MS-1
			Depth (feet)	2	2	Surface	4-8	4
	Method A	Method B	Date	6/3/2004	6/3/2004	12/22/2005	10/15/2005	12/22/2005
Metals (mg/kg)								
Arsenic	20	0.67		**14.6**	**70**	<5	<5	<5
Barium	NE	16,000		**87**	**52.6**	--	--	--
Cadmium	2	40		**5.13**	**0.803**	<1	<1	<1
Chromium	2,000[2]	120,000[2]		**127**	**253**	**15**	<5	**32**
Copper	NE	3,000		**435**	**1,790**	--	--	--
Lead	250	NE		**533**	**99.8**	**360**	<5	**28**
Mercury	2	24		**0.362**	<0.1	<0.5	<0.5	<0.5
Selenium	NE	400		**1.21**	**0.538**	--	--	--
Silver	NE	400		<0.5	<0.5	--	--	--
Zinc	NE	24,000		--	--	--	--	--
Petroleum Hydrocarbons (mg/kg)								
Gasoline-range petroleum hydrocarbons	100	NE		--	--	--	--	--
Diesel-range petroleum hydrocarbons	2,000	NE		--	--	--	<20	--
Heavy-oil range petroleum hydrocarbons	2,000	NE		--	--	--	<40	--
Mineral oil-oil range petreolum hydrocarbons	4,000	NE		--	--	--	<40	--

COMPARISON TO SMS SEDIMENT STANDARDS

Analyte	Sediment Management Standards[3]		Location	S1	S3	BS-1	S-3	MS-1
			Sample ID	S1	S3	BS-1	S-3	MS-1
			Depth (feet)	2	2	Surface	4-8	4
	SQS[4]	CSL[5]	Date	6/3/2004	6/3/2004	12/22/2005	10/15/2005	12/22/2005
Metals (mg/kg)								
Arsenic	57	93		**14.6**	**70**	<5	<5	<5
Barium	NE	NE		**87**	**52.6**	--	--	--
Cadmium	5.1	6.7		**5.13**	**0.803**	<1	<1	<1
Chromium	260	270		**127**	**253**	**15**	<5	**32**
Copper	390	390		**435**	**1,790**	--	--	--
Lead	450	530		**533**	**99.8**	**360**	<5	**28**
Mercury	0.41	0.59		**0.362**	<0.1	<0.5	<0.5	<0.5
Selenium	NE	NE		**1.21**	**0.538**	--	--	--
Silver	6.1	6.1		<0.5	<0.5	--	--	--
Zinc	410	960		--	--	--	--	--
Petroleum Hydrocarbons (mg/kg)								
Gasoline-range petroleum hydrocarbons	NE	NE		--	--	--	--	--
Diesel-range petroleum hydrocarbons	NE	NE		--	--	--	<20	--
Heavy-oil range petroleum hydrocarbons	NE	NE		--	--	--	<40	--
Mineral oil-oil range petreolum hydrocarbons	NE	NE		--	--	--	<40	--

Notes:

[1] Model Toxics Control Act (WAC 173-340).

[2] Cleanup level is for Chromium III. MTCA Method A and B cleanup levels for Chromium VI are 19 and 240 mg/kg, respectively.

[3] Washington State Sediment Management Standards.

[4] Sediment Quality Standard.

[5] Cleanup Screening Level.

mg/kg = milligrams per kilogram

< = The analyte was not detected at the given reporting limit

-- = Indicates the analysis was not performed

NE = No cleanup level established for the analyte

Values presented in **bold** indicate that the chemical was detected in the specific sample

Shading indicates the concentration is greater than the MTCA Method A cleanup level (upper table) or the SQS (lower table).

Dark border indicates the concentration is greater than the CSL (lower table).

TABLE 7

SUMMARY OF SEDIMENT ANALYTICAL RESULTS (LAET[1])

RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

	SMS[2]		Sed.1	Sed.2	Sed.3	RGS-1	RGS-1	RGS-1	RGS-2	RGS-2	RGS-3	RGS-4	RGS-5	RGS-6	RGS-7	RGS-7	RGS-7	RGS-8	RGS-8	RGS-8	RGS-9	RGS-10	RGS-11	T1-Sed	T1B-Sed	BI-S32	GS-04
Analyte	LAET	2LAET[3]	Surface	Surface	Surface	Surface	2-4 ft.	6-8 ft.	Surface	0-2 ft.	Surface	Surface	Surface	Surface	Surface	0-2 ft.	2-4 ft.	Surface	2-4 ft.	6-8 ft.	Surface	Surface	Surface	Surface	Surface	Surface	Surface
Conventionals																											
Percent Fines (<62um) (%)	NE	NE	--	--	--	--	28	38.3	10.8	18.5	--	--	--	--	--	24.6	28.9	--	24.5	42.5	25.1	26.8	28.3	11.81	27.29	78.5	--
Total Solids (%)	NE	NE	--	--	--	66.8	68.1	70.1	75.1	73.8	74	69.1	75.4	76.6	75.8	59	68.8	78.2	75.7	71	58.1	56.2	53.1	73.7	53	38.5	--
N-Ammonia (mg-N/kg)	NE	NE	--	--	--	2.91	--	--	3.87	--	--	--	--	--	4.44	--	--	--	--	--	4.96	4.85	5.44	--	--	7.88	15.6
Total sulfides (mg/kg)	NE	NE	--	--	--	308	--	--	132	--	--	--	--	--	104	--	--	--	--	--	316	400	339	--	--	6.02	487
Total Volatile Solids (%)	NE	NE	--	--	--	--	--	--	--	--	--	3.05	2.35	1.74	1.55	--	--	1.93	--	--		--	--	2.84	12.4	12.4	--
Total organic carbon (%)	NE	NE	--	--	--	1.29	1.68	1.21	1.75	1.47	2.03	1.19	1.64	0.481	0.81	5.63	3.36	0.37	0.5	0.8	2.16	1.53	3.06	0.77	5.82	4.28	3.10
Metals (mg/kg DW)																											
Arsenic	57	93	3.57	3.05	1.96	<7	<7	<7	<6	<6	--	<7	<6	<7	<6	<9	<20	<6	<6	<7	<8	<8	<10	2.59 J	4.44 J	6.74 J	<22
Barium	NE	NE	21.8	70.3	77.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	5.1	6.7	1.11	<0.5	<0.5	1.2	1	1.4	0.6	0.8	--	0.5	0.5	<0.3	<0.3	0.8	0.8	<0.3	0.6	1.1	1.4	1.5	1.4	0.72	1.16	2.32	2.2
Chromium	260	270	23.3	28.9	20.5	20.8	20.3	24.6	30.2	29.9	--	16.1	18	0.86	34.9	34.3	26	26.8	14.6	22.8	18.1	22.7	18	20.4 J	24.2 J	36.3 J	35.5
Copper	390	390	24.4	38.6	11.7	20.5	14.4	16.1	25.4	23.9	--	22.2	18.2	35.8	27.9	47.6	46	32	14.2	15	24.1	50.6	22.8	16.8 J	41.4 J	51.1 J	50.2
Lead	450	530	59.6	73.7	42.8	33	4	3	41	27	--	17	10	20	58	90	11	54	<3	<3	12	23	12	34.6	52.7	52.8	43.5
Mercury	0.41	0.59	<0.1	0.118	<0.1	0.09	<0.07	<0.05	0.21	0.08	--	0.06	<0.05	<0.06	0.14	0.89	1.19	0.15	<0.06	<0.06	0.12	0.14	0.14	0.092	0.314	0.187	0.23
Selenium	NE	NE	<0.5	0.556	<0.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	6.1	6.1	<0.5	<0.5	<0.5	<0.4	<0.4	<0.4	<0.4	<0.4	--	<0.4	<0.4	<0.4	<0.4	<0.5	<1	<0.4	<0.4	<0.4	<0.5	<0.5	<0.6	0.11	0.21	0.52	<2.2
Zinc	410	960	--	--	--	209	42	30	270	206	--	66	45	153	343	218	59	382	22	31	62	127	62	260 J	182 J	133 J	166
Butyltin in Porewater (µg/l)																											
Tributyltin Ion	0.15[4]	NE	--	--	--	--	--	--	--	--	--	<0.019	--	<0.019	<0.019	--	--	<0.019	--	--	--	--	--	--	--	<0.041	--
Petroleum Hydrocarbons[5] (mg/kg DW)																											
Diesel range hydrocarbons	NE	NE	--	--	--	23	--	--	14	--	--	19	53	21	26	--	--	64	--	--	17	20	19	--	--	--	--
Motor Oil range hydrocarbons	NE	NE	--	--	--	62	--	--	36	--	--	87	77	54	69	--	--	160	--	--	48	61	54	--	--	--	--
Total petroleum hydrocarbons	100	NE	--	--	--	85	--	--	50	--	--	106	130[8]	75	95	--	--	224	--	--	65	81	73	--	--	--	--
LPAH[6] (mg/kg DW)																											
1-Methylnaphthalene	NE	NE	--	--	--	--	<0.02	<0.02	--	<0.02	--	--	--	--	--	<0.02	<0.02	--	<0.02	<0.02	<0.02	<0.02	<0.02	--	--	--	--
2-Methylnaphthalene	0.67	1.4	--	--	--	0.021	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.036	<0.02	<0.02	<0.02	<0.02	<0.02	0.008	0.028 J	0.018 J	<0.58
Acenaphthene	0.5	0.73	--	--	--	0.18	<0.02	<0.02	0.099	0.07	0.034	0.026	0.052	0.058	0.17	0.066	<0.02	0.17	<0.02	<0.02	0.025	0.052	<0.02	0.065	0.21	0.078	<0.58
Acenaphthylene	1.3	1.3	--	--	--	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.022	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.0085	0.0375	0.032	<0.58
Anthracene	0.96	4.4	--	--	--	0.3	<0.02	<0.02	0.16	0.12	0.059	0.1	0.17	0.11	0.27	0.13	<0.02	0.34	<0.02	<0.02	0.087	0.084	<0.02	0.14	0.39	0.15	<0.58
Fluorene	0.54	1	--	--	--	0.12	<0.02	<0.02	0.07	0.054	0.026	0.029	0.043	0.05	0.11	0.055	<0.02	0.15	<0.02	<0.02	0.022	0.041	<0.02	0.055	0.14	0.062	<0.58
Naphthalene	2.1	2.4	--	--	--	0.034	<0.02	<0.02	0.025	0.02	<0.02	<0.02	<0.02	<0.02	0.024	0.038	<0.02	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.058	0.065	<0.58
Phenanthrene	1.5	5.4	--	--	--	1	0.034	<0.02	0.66	0.44	0.24	0.32	1.1	0.68	1.1	0.49	0.038	1.2	<0.02	<0.02	0.27	0.33	0.069	0.54	1.4	0.69	0.91
Low Molecular Weight PAH	5.2	13	--	--	--	1.6 T	0.034 T	<0.02	1 T	0.704 T	0.36 T	0.48 T	1.4 T	0.9 T	1.7 T	0.801 T	0.038 T	1.9 T	<0.02	<0.02	0.404 T	0.507 T	0.069 T	0.8365 T	2.24 T	1.06 T	0.91 T
HPAH[7] (mg/kg DW)																											
Benzo(a)anthracene	1.3	1.6	--	--	--	0.78	0.022	<0.02	0.45	0.31	0.2	0.27	0.61	0.44	0.69	0.4	0.26	0.78	<0.02	0.055	0.22	0.25	0.059	0.49	1.1	0.49	0.84
Benzo(a)pyrene	1.6	3	--	--	--	0.86	0.024	<0.02	0.49	0.32	0.22	0.2	0.4	0.41	0.76	0.44	0.029	0.92	<0.02	0.032	0.18	0.26	0.065	0.48	1.1	0.51	0.86
Benzo(b+k)fluoranthene	3.2	3.6	--	--	--	1.5	0.024	<0.02	0.88	0.58	0.4	0.4	0.84	0.82	1.4	0.86	0.051	1.7	<0.02	0.025	0.31	0.47	0.123	0.81	1.79	0.98	1
Benzo(g,h,i)perylene	0.67	0.72	--	--	--	0.34	<0.02	<0.02	0.18	0.11	0.062	0.029	0.062	0.077	0.14	0.12	<0.02	0.13	<0.02	<0.02	0.058	0.092	0.025	0.29	0.68	0.31	<0.58
Chrysene	1.4	2.8	--	--	--	0.89	0.025	<0.02	0.53	0.35	0.24	0.33	0.79	0.57	0.86	0.51	0.031	0.93	<0.02	0.05	0.24	0.29	0.073	0.55	1.2	0.65	1.1
Dibenzo(a,h)anthracene	0.23	0.54	--	--	--	0.24	0.0062	<0.0062	0.11	0.068	0.061	<0.02	0.043	0.044	0.18	0.17	0.008	0.17	<0.006	<0.006	0.012	0.043	0.015	0.073	0.16	0.077	<0.58
Fluoranthene	1.7	2.5	--	--	--	1.6	0.053	<0.02	1.1	0.74	0.5	0.76	2.0	1.2	1.4	0.89	0.07	1.9	0.027	0.028	0.56	0.58	0.14	0.92	2.2	1.4	1.7
Indeno(1, 2, 3-cd)pyrene	0.6	0.69	--	--	--	0.38	<0.02	<0.02	0.19	0.14	0.07	0.078	0.16	0.18	0.35	0.15	<0.02	0.32	<0.02	<0.02	0.062	0.11	0.029	0.31	0.72	0.34	<0.58
Pyrene	2.6	3.3	--	--	--	1.2	0.041	<0.02	0.77	0.52	0.39	0.62	1.6	0.94	1.4	0.87	0.064	1.5	<0.02	0.048	0.37	0.42	0.11	0.83	2.1	1.2	1.5
High Molecular Weight PAH	12	17	--	--	--	7.8 T	0.1952 T	<0.02 T	4.7 T	3.138 T	2.1 T	2.7 T	6.5 T	4.7 T	7.2 T	4.41 T	0.279 T	8.3 T	0.027 T	0.238 T	2.012 T	2.515 T	0.639 T	4.753 T	11.05 T	5.957 T	5.3 T
Chlorinated Hydrocarbons (mg/kg DW)																											
1, 2, 4-Trichlorobenzene	0.031	0.051	--	--	--	<0.0059	<0.0062	<0.0062	<0.006	<0.0062	<0.0061	<0.01 J	<0.0098 J	<0.02	<0.02	<0.006	<0.006	<0.02	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0021	<0.015	<0.0078	<0.58
1, 2-Dichlorobenzene	0.035	0.05	--	--	--	<0.059	<0.0062	<0.0062	<0.006	<0.0062	<0.0061	<0.02	<0.02	<0.02	<0.02	<0.006	<0.006	<0.02	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0018	<0.013	<0.0068	<0.58
1, 4-Dichlorobenzene	0.11	0.12	--	--	--	<0.059	<0.0062	<0.0062	<0.006	<0.0062	<0.0061	<0.02	<0.02	<0.02	<0.02	<0.006	<0.006	<0.02	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0026	<0.018	<0.0099	<0.58
1, 3-Dichlorobenzene	NE	NE	--	--	--	--	<0.02	<0.02	--	<0.02	--	--	--	--	--	<0.02	<0.02	--	<0.02	<0.02	<0.02	<0.02	<0.02	<0.0022	<0.016	<0.0084	<0.58
Phthalates (mg/kg DW)																											
Bis(2-ethylhexyl) phthalate	1.3	3.1	--	--	--	1.5	0.082	<0.02	0.97	0.58	0.35	0.22	0.022	0.089	1.7	1.9	0.093	19	<0.02	<0.02	0.16	0.63	0.26	1.4	3.3	1.4	2.9
Butylbenzyl phthalate	0.063	0.9	--	--	--	0.067	<0.016	<0.016	0.068	0.022	0.013	<0.02	<0.02	0.038	0.028	0.029	<0.016	0.023	<0.015	<0.015	<0.016	0.017	<0.015	0.042	0.057	0.034	<0.58
Dibutyl phthalate	1.4	5.1	--	--	--	0.025	<0.02	<0.02	0.056	0.026	<0.02	<0.02	<0.02	<0.02	0.09	0.045	<0.02	0.11	<0.02	<0.02	<0.02	0.32	<0.02	0.016	<0.025	0.033	<0.58
Diethyl phthalate	0.2	1.2	--	--	--	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.0048	<0.034	<0.019	<0.58

	SMS[2]		Sed.1	Sed.2	Sed.3	RGS-1	RGS-1	RGS-1	RGS-2	RGS-2	RGS-3	RGS-4	RGS-5	RGS-6	RGS-7	RGS-7	RGS-7	RGS-8	RGS-8	RGS-8	RGS-9	RGS-10	RGS-11	T1-Sed	T1B-Sed	BI-S32	GS-04
Analyte	LAET	2LAET[3]	Surface	Surface	Surface	Surface	2-4 ft.	6-8 ft.	Surface	0-2 ft.	Surface	Surface	Surface	Surface	Surface	0-2 ft.	2-4 ft.	Surface	2-4 ft.	6-8 ft.	Surface	Surface	Surface	Surface	Surface	Surface	Surface
Dimethyl phthalate	0.071	0.16	--	--	--	<0.0059	<0.02	<0.02	<0.006	<0.02	<0.0061	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.0025	<0.017	<0.0094	<0.58
Di-n-octyl phthalte	6.2	6.2	--	--	--	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.0017	<0.012	<0.0063	<0.58
Ionizable Organics (mg/kg DW)																											
2, 4-Dimethylphenol	0.029	0.072	--	--	--	<0.0059	<0.0062	<0.0062	<0.006	<0.0062	<0.0061	<0.02	**0.02**	<0.02	<0.02	<0.006	<0.006	<0.02	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0075	<0.052	<0.029	<0.58
2-Methylphenol	0.063	0.072	--	--	--	<0.0059	<0.0062	<0.0062	<0.006	<0.0062	<0.0061	<0.02	<0.02	<0.02	<0.02	<0.006	<0.006	<0.02	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0047	<0.033	<0.018	<0.58
4-Methylphenol	0.67	1.8	--	--	--	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	<0.02	<0.11	<0.02	<0.02	<0.02	<0.02	**0.088**	<0.02	<0.02	<0.02	<0.02	<0.02	**0.0071**	**0.073**	**0.04**	<0.58
Pentachlorophenol	0.36	0.69	--	--	--	<0.03	<0.1	<0.099	<0.03	<0.1	<0.003	<0.099	<0.098	<0.098	<0.099	<0.1	<0.99	<0.099	<0.99	<0.99	<0.99	<0.1	<0.1	<0.012	<0.081	<0.045	<3.5
Phenol	0.42	1.2	--	--	--	**0.29**	<0.02	<0.02	**0.36**	<0.02	**0.23**	<0.02	**0.021 J**	<0.02	0.23 J	**0.035**	<0.02	0.066 J	<0.02	<0.02	<0.02	<0.02	<0.02	**0.011**	**0.039 J**	**0.017 J**	<0.58
Benzoic acid	0.65	0.65	--	--	--	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.14	<0.91	<0.5	<3.5
Benzyl alcohol	0.057	0.073	--	--	--	<0.02	<0.031	<0.031	<0.02	<0.031	<0.02	<0.02	<0.02	**0.046**	<0.02	<0.031	<0.031	<0.02	<0.031	<0.031	<0.031	<0.031	<0.031	<0.0051	<0.035	<0.02	<0.58
Miscellaneous Extractables (mg/kg DW)																											
Dibenzofuran	0.54	0.7	--	--	--	**0.058**	<0.02	<0.02	**0.037**	**0.026**	<0.02	<0.02	<0.02	**0.022**	**0.052**	**0.026**	<0.02	**0.088**	<0.02	<0.02	<0.02	<0.02	<0.02	**0.024**	**0.062**	**0.03**	<0.58
Hexachlorobutadiene	0.011	0.12	--	--	--	<0.0059	<0.0062	<0.0062	<0.006	<0.0062	<0.0061	<0.001	<0.001	<0.001	<0.001	<0.006	<0.006	<0.002	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0019	<0.014	<0.0073	<0.58
Hexachlorobenzene	0.022	0.07	--	--	--	<0.0059	<0.0062	<0.0062	<0.006	<0.0062	<0.0061	<0.001	<0.001	<0.001	<0.001	<0.006	<0.006	<0.002	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0029	<0.02	<0.011	<0.58
N-Nitrosodiphenylamine	0.028	0.04	--	--	--	<0.0059	<0.0062	<0.0062	<0.006	<0.0062	<0.0061	<0.02	<0.02	<0.02	<0.02	<0.006	<0.006	<0.02	<0.006	<0.006	<0.006	<0.006	<0.006	<0.003	<0.021	<0.012	<3.5
Polychlorinated Biphenyls (mg/kg DW)																											
Total PCBs	0.13	1.0	--	--	--	--	--	--	--	--	--	<0.020 T	<0.019 T	**0.093 T**	**0.096 T**	--	--	**0.068 T**	--	--	--	--	--	**0.015 T**	**0.12 T**	**0.27 T**	<0.19 T

Notes:

[1] Lowest Apparent Effects Threshold

[2] Washington State sediment management standards

[3] Second lowest apparent effects threshold

[4] Dedged Material Management screening level

[5] Total petroleum hydrocarbons with acid/silica gel cleanup

[6] Low Molecular weight polycyclic aromatic hydrocarbons

[7] High Molecular weight polycyclic aromatic hydrocarbons

[8] Review of chromatogram for this sample indicates diesel and heavy oil were present. The screening criteria was compared to individual petroleum hydrocarbons and diesel and heavy oil concentrations are less than the screening criteria.

J = Estimated concentration below reporting limits

T = Calculated sum of individual compounds or congeners

DW = Dry weight

NE = Criteria not established for this analyte

mg/kg = milligrams per kilogram

µg/l = micrograms per liter

< = The analyte was not detected at the given reporting limit

-- = Analysis not performed

Hatching indicates the organic carbon content of the sample is between 0.5 and 3.5 mg/kg; use Table 8 to interpret the data for this sample.

Bold indicates the analyte was detected

Shading indicates analyte was detected at a concentration greater than the LAET but less than the 2LAET

Dark border indicates analyte was detected at a concentration greater than the 2LAET

TABLE 8
SUMMARY OF SEDIMENT ANALYTICAL RESULTS (ORGANIC CARBON [OC] NORMALIZED)
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

	SMS[1]		Sed.1	Sed.2	Sed.3	RGS-1	RGS-1	RGS-1	RGS-2	RGS-2	RGS-3	RGS-4	RGS-5	RGS-6	RGS-7	RGS-7	RGS-7	RGS-8	RGS-8	RGS-8	RGS-9	RGS-10	RGS-11	T1-Sed	T1B-Sed	BI-S32	GS-04
Analyte	SQS[2]	CSL[3]	Surface	Surface	Surface	Surface	2-4 ft.	6-8 ft.	Surface	0-2 ft.	Surface	Surface	Surface	Surface	Surface	0-2 ft.	2-4 ft.	Surface	2-4 ft.	6-8 ft.	Surface	Surface	Surface	Surface	Surface	Surface	Surface
Conventionals																											
Percent Fines (<62um) (%)	NE	NE	--	--	--	--	28	38.3	10.8	18.5	--	--	--	--	--	24.6	28.9	--	24.5	42.5	25.1	26.8	28.3	11.81	27.29	78.5	--
Total Solids (%)	NE	NE	--	--	--	74.1	68.1	70.1	75.6	73.8	74	69.1	75.4	76.6	74.5	59	68.8	78.2	75.7	71	58.1	56.2	53.1	73.7	53	38.5	--
N-Ammonia (mg-N/kg)	NE	NE	--	--	--	2.91	--	--	3.87	--	--	--	--	--	4.44	--	--	--	--	--	4.96	4.85	5.44	--	--	7.88	15.6
Total sulfides (mg/kg)	NE	NE	--	--	--	308	--	--	132	--	--	--	--	--	104	--	--	--	--	--	316	400	339	--	--	6.02	487
Total Volatile Solids (%)	NE	NE	--	--	--	--	--	--	--	--	--	3.05	2.35	1.74	1.55	--	--	1.93	--	--		--	--	2.84	12.4	12.4	--
Total organic carbon (%)	NE	NE	--	--	--	1.29	1.68	1.21	1.75	1.47	2.03	1.19	1.64	0.481	0.81	5.63	3.36	0.37	0.5	0.8	2.16	1.53	3.06	0.77	5.82	4.28	3.10
Metals (mg/kg DW)																											
Arsenic	57	93	3.57	3.05	1.96	<7	<7	<7	<6	<6	--	<7	<6	<7	<6	<9	<20	<6	<6	<7	<8	<8	<10	2.59 J	4.44 J	6.74 J	<22
Barium	NE	NE	21.8	70.3	77.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	5.1	6.7	1.11	<0.5	<0.5	1.2	1	1.4	0.6	0.8	--	0.5	0.5	<0.3	<0.3	0.8	0.8	<0.3	0.6	1.1	1.4	1.5	1.4	0.72	1.16	2.32	2.2
Chromium	260	270	23.3	28.9	20.5	20.8	20.3	24.6	30.2	29.9	--	16.1	18	86	34.9	34.3	26	26.8	14.6	22.8	18.1	22.7	18	20.4 J	24.2 J	36.3 J	35.5
Copper	390	390	24.4	38.6	11.7	20.5	14.4	16.1	25.4	23.9	--	22.2	18.2	35.8	27.9	47.6	46	32	14.2	15	24.1	50.6	22.8	16.8 J	41.4 J	51.1 J	50.2
Lead	450	530	59.6	73.7	42.8	33	4	3	41	27	--	17	10	20	58	90	11	54	<3	<3	12	23	12	34.6	52.7	52.8	43.5
Mercury	0.41	0.59	<0.1	0.118	<0.1	0.09	<0.07	<0.05	0.21	0.08	--	<0.06	<0.05	<0.06	0.14	0.89	1.19	0.15	<0.06	<0.06	0.12	0.14	0.14	0.092	0.314	0.187	0.23
Selenium	NE	NE	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.11	0.21	0.52	--
Silver	6.1	6.1	<0.5	0.556	<0.5	<0.4	<0.4	<0.4	<0.4	<0.4	--	<0.4	<0.4	<0.4	<0.4	<0.5	<1	>0.4	<0.4	<0.4	<0.5	<0.5	<0.6	--	--	--	<2.2
Zinc	410	960	--	--	--	209	42	30	270	206	--	66	45	153	343	218	59	382	22	31	62	127	62	260 J	182 J	133 J	166
Butyltin in porewater (µg/l)																											
Tributyltin ion	0.15[4]	NE	--	--	--	--	--	--	--	--	--	<0.019	--	<0.019	<0.019	--	--	>0.019	--	--	--	--	--	--	--	<0.041	--
Petroleum Hydrocarbons[5] (mg/kg DW)																											
Diesel range hydrocarbons	NE	NE	--	--	--	23	--	--	14	--	--	19	53	21	26	--	--	64	--	--	17	20	19	--	--	--	--
Motor Oil range hydrocarbons	NE	NE	--	--	--	62	--	--	36	--	--	87	77	54	69	--	--	160	--	--	48	61	54	--	--	--	--
Total petroleum hydrocarbons	100	NE	--	--	--	85	--	--	50	--	--	106	130	75	95	--	--	224	--	--	65	81	73	--	--	--	--
LPAH[6] (mg/kg OC)																											
1-Methylnaphthalene	NE	NE	--	--	--	--	<1.2	<1.7	--	<1.4	--	--	--	--	--	<0.4	<0.6	--	<4	<2.5	<0.9	<1.3	<0.7	--	--	--	--
2-Methylnaphthalene	38	64	--	--	--	1.6	<1.2	<1.7	<1.1	<1.4	<1	<1.7	<1.2	<4.2	<2.5	<0.4	<0.6	9.8	<4	<2.5	<0.9	<1.3	<0.7	1.04	0.48 J	0.42 J	<0.87
Acenaphthene	16	57	--	--	--	14	<1.2	<1.7	5.6	4.8	1.7	2.2	3.2	12	21	1.2	<0.6	46	<4	<2.5	1.2	3.4	<0.7	8.44	3.61	1.82	3.5 J
Acenaphthylene	66	66	--	--	--	<1.6	<1.2	<1.7	<1.1	<1.4	<1	<1.7	<1.2	<4.2	<2.5	0.4	<0.6	>5.4	<4	<2.5	<0.9	<1.3	<0.7	1.1	0.64 J	0.75	<1.3
Anthracene	220	1,200	--	--	--	23	<1.2	<1.7	9.1	8.2	2.9	8.4	10	23	33	2.3	<0.6	92	<4	<2.5	4	5.5	<0.7	18.18	6.7	3.5	6.5 J
Fluorene	23	79	--	--	--	9.3	<1.2	<1.7	4	3.7	1.3	2.4	2.6	10	14	1	<0.6	41	<4	<2.5	1	2.7	<0.7	7.14	2.41	1.45	2.7 J
Naphthalene	99	170	--	--	--	2.6	<1.2	<1.7	1.4	1.4	<1	<1.7	<1.2	<4.2	3	0.7	<0.6	16	<4	<2.5	<0.9	<1.3	<0.7	2.6	1	1.52	1.8 J
Phenanthrene	100	480	--	--	--	78	2	<1.7	38	29.9	12	27	67	140	140	8.7	1.1	330	<4	<2.5	12.5	21.6	2.3	70.13	24.05	16.12	29
Low Molecular Weight PAH	370	780	--	--	--	120 T	2 T	<1.7	57 T	47.9 T	18 T	40 T	83 T	190 T	210 T	14.2 T	1.1 T	520 T	<4	<2.5	18.7 T	33.1 T	2.3 T	108.64 T	38.88 J	25.58 J T	44 JT
HPAH[7] (mg/kg OC)																											
Benzo(a)anthracene	110	270	--	--	--	60	1.3	<1.7	26	21.1	10	23	37	91	85	7.1	0.8	210	<4	6.9	10.2	16.3	1.9	63.64	18.9	11.45	27
Benzo(a)pyrene	99	210	--	--	--	67	1.4	<1.7	28	21.8	11	17	24	85	94	7.8	0.9	250	<4	4	8.3	17	2.1	62.34	18.9	11.92	28
Benzo(b+k)fluoranthene	230	450	--	--	--	120	1.4	<1.7	50	39.5	20	34	51	170	170	15.3	1.5	460	<4	3.1	14.4	30.7	4	105.19 J	30.76	22.9 J	45 J
Benzo(g,h,i)perylene	31	78	--	--	--	26	<1.2	<1.7	10	7.5	3.1	2.4	3.8	16	17	2.1	<0.6	35	<4	<2.5	2.7	6	0.8	37.66	11.68	7.24	17 J
Chrysene	110	460	--	--	--	69	1.5	<1.7	30	23.8	12	28	48	120	110	9.1	0.9	250	<4	6.3	11.1	19	2.4	71.43	20.62	15.19	35
Dibenzo(a,h)anthracene	12	33	--	--	--	19	0.4	<0.5	6.3	4.6	3	<1.7	2.6	9.1	22	3	0.2	46	<1.2	0.8	0.6	2.8	0.5	9.48	2.75	1.8	3.9
Fluoranthene	160	1,200	--	--	--	120	3.2	<1.7	63	50.3	25	64	120	250	170	15.8	2.1	520	5.4	3.5	25.9	37.9	4.6	119.48	37.8	32.71	55
Indeno(1, 2, 3-cd)pyrene	34	88	--	--	--	29	<1.2	<1.7	11	9.5	3.4	6.6	9.8	37	43	2.7	<0.2	87	<4	<2.5	2.9	7.2	0.9	40.26	12.37	7.94	17 J
Pyrene	1,000	1,400	--	--	--	93	2.4	<1.7	44	35.4	19	52	98	200	170	15.5	1.9	410	<4	6	17.1	27.5	3.6	107.79	36.08	28.04	48
High Molecular Weight PAH	960	5,300	--	--	--	600 T	11.6 T	<1.7	270 T	213.5 T	100 T	250 T	400 T	970 T	890 T	78.3 T	8.3 T	2,300 T	5.4 T	29.8 T	93.1 T	164.4 T	20.9 T	617.27 T	189.86 T	139.18 T	280 JT

Analyte	SMS[1]		Sed.1	Sed.2	Sed.3	RGS-1	RGS-1	RGS-1	RGS-2	RGS-2	RGS-3	RGS-4	RGS-5	RGS-6	RGS-7	RGS-7	RGS-7	RGS-8	RGS-8	RGS-8	RGS-9	RGS-10	RGS-11	T1-Sed	T1B-Sed	BI-S32	GS-04
	SQS[2]	CSL[3]	Surface	Surface	Surface	Surface	2-4 ft.	6-8 ft.	Surface	0-2 ft.	Surface	Surface	Surface	Surface	Surface	0-2 ft.	2-4 ft.	Surface	2-4 ft.	6-8 ft.	Surface	Surface	Surface	Surface	Surface	Surface	Surface
Chlorinated Hydrocarbons (mg/kg OC)																											
1, 2, 4-Trichlorobenzene	0.81	1.8	--	--	--	<0.46	<0.4	<0.5	<0.34	<0.4	<0.3	<0.84J	<0.6J	<4.2	<2.5	<0.1	<0.2	<5.4	<1.2	<0.8	<0.3	<0.4	<0.2	<0.27	<0.26	<0.18	<0.87
1, 2-Dichlorobenzene	2.3	2.3	--	--	--	<0.46	<0.4	<0.5	<0.34	<0.4	<0.3	<1.7	<1.2	<4.2	<2.5	<0.1	<0.2	<5.4	<1.2	<0.8	<0.3	<0.4	<0.2	<0.23	<0.22	<0.16	<1.4
1, 4-Dichlorobenzene	3.1	9	--	--	--	<0.46	<0.4	<0.5	<0.34	<0.4	<0.3	<1.7	<1.2	<4.2	<2.5	<0.1	<0.2	<5.4	<1.2	<0.8	<0.3	<0.4	<0.2	<0.34	<0.31	<0.23	<1.4
1, 3-Dichlorobenzene	NE	NE	--	--	--	--	<1.2	<1.7	--	**1.4**	--	--	--	--	--	<0.4	<0.2	--	<4	<2.5	<0.09	<1.3	<0.7	<0.29	<0.27	<0.20	--
Phthalates (mg/kg OC)																											
Bis(2-ethylhexyl) phthalate	47	78	--	--	--	**120**	**4.9**	<1.7	**55**	**39.5**	**17**	**18**	**1.3**	**19**	**210**	**33.7**	**2.8**	**5,200**	<4	<2.5	**7.4**	**41.2**	**8.5**	**181.82**	**56.7**	**32.71**	**94**
Butylbenzyl phthalate	4.9	64	--	--	--	**5.2**	<1	<1.3	**3.9**	**1.5**	**0.64**	<1.7	<1.2	**7.9**	**3.5**	**0.5**	<0.5	**6.3**	<3	<1.9	<0.7	**1.1**	<0.5	**5.45**	**0.98**	**0.79**	**4.2 J**
Dibutyl phthalate	220	1,700	--	--	--	**1.9**	<1.2	<1.7	**3.2**	**1.8**	<1	<1.7	<1.2	<4.2	**11**	**0.8**	<0.6	**30**	<4	<2.5	<0.9	**2.1**	<0.7	**2.08**	**1.62**	**0.77**	**3.9 J**
Diethyl phthalate	61	110	--	--	--	<1.6	<1.2	<1.7	<1.1	<1.4	<1	<1.7	<1.2	<4.2	<2.5	<0.4	<0.6	<5.4	<4	<2.5	<0.9	<1.3	<0.7	<0.62	**0.58**	<0.44	<1.1
Dimethyl phthalate	53	53	--	--	--	<0.46	<1.2	<1.7	<0.34	<1.4	<0.3	<1.7	<1.2	<4.2	<2.5	<0.4	<0.6	<5.4	<4	<2.5	<0.9	<1.3	<0.7	<0.32	**0.29**	<0.22	<1.3
Di-n-octyl phthalte	58	4,500	--	--	--	<1.6	<1.2	<1.7	<1.1	<1.4	<1	<1.7	<1.2	<4.2	<2.5	<0.4	<0.6	<5.4	<4	<2.5	<0.9	<1.3	<0.7	<0.22	**0.21**	<0.15	<1.9
Ionizable Organics (mg/kg DW)																											
2, 4-Dimethylphenol	0.029	0.029	--	--	--	<0.0059	<0.0062	<0.0062	<0.006	<0.006	<0.0061	<0.02	<0.02	<0.02	<0.02	<0.006	<0.006	<0.002	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0075	<0.052	<0.029	<0.037
2-Methylphenol	0.063	0.063	--	--	--	<0.0059	<0.0062	<0.0062	<0.006	<0.006	<0.0061	<0.02	<0.02	<0.02	<0.02	<0.006	<0.006	<0.002	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0047	<0.033	<0.018	<0.041
4-Methylphenol	0.67	0.67	--	--	--	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	**0.11**	<0.02	<0.02	<0.02	<0.02	**0.088**	<0.02	<0.02	<0.02	<0.02	<0.02	**0.0071**	**0.073**	**0.04**	<0.041
Pentachlorophenol	0.36	0.69	--	--	--	<0.03	<0.031	<0.031	<0.03	<0.031	<0.03	<0.099	<0.098	<0.098	<0.099	<0.031	<0.031	<0.99	<0.031	<0.031	<0.031	<0.031	<0.031	<0.012	<0.081	<0.045	<0.30
Phenol	0.42	1.2	--	--	--	**0.29**	<0.02	<0.02	**0.36**	<0.02	**0.23**	<0.02	**0.021J**	<0.02	**0.23**	**0.04**	<0.02	**0.066**	<0.02	<0.02	<0.02	<0.02	<0.02	**0.011**	**0.039 J**	**0.017 J**	<0.047
Benzoic acid	0.65	0.65	--	--	--	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.14	<0.91	<0.5	<0.34
Benzyl alcohol	0.057	0.073	--	--	--	<0.02	<0.031	<0.031	<0.02	<0.031	<0.02	<0.02	<0.02	**0.046**	<0.02	<0.031	<0.031	<0.02	<0.031	<0.031	<0.031	<0.031	<0.031	<0.0051	<0.035	<0.02	<0.041
Miscellaneous Extractables (mg/kg OC)																											
Dibenzofuran	15	58	--	--	--	**4.5**	<1.2	<1.7	**2.1**	**1.8**	**1**	<1.7	<1.2	**4.6**	**6.4**	**0.5**	<0.6	**24**	<4	<2.5	<0.9	**1.3**	<0.7	**3.12**	**1.07**	**0.7**	**0.94 J**
Hexachlorobutadiene	3.9	6.2	--	--	--	<0.46	<0.4	<0.5	<0.34	<0.4	<0.3	<0.082	<0.059	<0.2	<0.12	<0.1	<0.2	<0.54	<1.2	<0.8	<0.3	<0.4	<0.2	<0.25	**0.24**	<0.17	<1.1
Hexachlorobenzene	0.38	2.3	--	--	--	<0.46	<0.4	<0.5	<0.34	<0.4	<0.3	<0.082	<0.059	<0.2	<0.12	<0.1	<0.2	<0.54	<1.2	<0.8	<0.3	<0.4	<0.2	<0.38	<0.34	<0.26	<1.2
N-Nitrosodiphenylamine	11	11	--	--	--	<0.46	<0.4	<0.5	<0.34	<0.4	<0.3	<1.7	<1.2	<4.2	<2.5	<0.1	<0.2	<5.4	<1.2	<0.8	<0.3	<0.4	<0.2	<0.39	**0.36**	<0.28	<1.4
Polychlorinated Biphenyls (mg/kg OC)																											
Total PCBs	12	65	--	--	--	--	--	--	--	--	--	<0.029 T	<0.025 T	**0.12 T**	**0.13 T**	--	--	**0.087 T**	--	--	--	--	--	**1.95 T**	**2.06 T**	**6.31 T**	<6.1 T

Notes:

[1] Washington State sediment management standards

[2] Sediment quality standard

[3] Cleanup Screening Level

[4] Dedged Material Management screening leve

[5] Total petroleum hydrocarbons with acid/silica gel cleanup

[6] Low Molecular weight polycyclic aromatic hydrocarbons

[7] High Molecular weight polycyclic aromatic hydrocarbons

J = Estimated concentration below reporting limits

T = Calculated sum of individual compounds or congeners

DW = Dry weight

NE = Criteria not established for this analyte

mg/kg = milligrams per kilogram

µg/l = microgram per liter

< = The analyte was not detected at the given reporting limit

-- = Analysis not performed

Hatching indicates the organic carbon content of the sample is either less than 0.5 mg/kg or greater than 3.5 mg/kg; use Table 7 to interpret the data for this sample.

Bold indicates the analyte was detected

Shading indicates analyte was detected at a concentration greater than the SQS but less than the CSL.

Dark border indicates analyte was detected at a concentration greater than the CSL

TABLE 9
SOIL SAMPLE ANALYSES
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Area	Sample ID	Purpose for Soil Sample Collection	Analyses						
			BTEX	Gasoline- Range Petroleum Hydrocarbons	Diesel-/Oil-Range Petroleum Hydrocarbons	Metals^{1,2}	VOCs	cPAHs	PCBs
			EPA 8021	NWTPH-Gx	NWTPH-Dx	EPA 6000/7000	EPA8 260	EPA 8270-SIM	EPA 8082
Maintenance Building and Southern Portion of Site	RI-1	Investigate location of former solvent hopper					X		
	RI-2	Investigate the suspected presence of calcium chlorite sludge				X		X	
		Investigate the former transformer spill							X
	RI-3	Investigate extent of lead in soil beneath Maintenance Building				X			
	RI-4	Investigate extent of lead in soil beneath Maintenance Building				X			
		Investigate extent of cPAHs identified in RGB18				X		X	
	RI-5	Investigate extent of lead in soil beneath Maintenance Building				X			
		Investigate extent of cPAHs identified in RGB18						X	
		Investigate extent of gasoline-range petroleum hydrocarbons	X	X					
	RI-6	Investigate extent of lead in soil beneath Maintenance Building				X			
		Investigate extent of cPAHs identified in RGB18				X		X	
		Investigate extent of gasoline-range petroleum hydrocarbons	X	X					
	RI-7	Investigate stained soils in crane shed		X	X				
		Investigate extent of gasoline-range petroleum hydrocarbons	X	X					
	RI-8	Investigate extent of lead in soil beneath Maintenance Building				X			
		Investigate extent of cPAHs identified in RGB18				X		X	
		Investigate extent of gasoline-range petroleum hydrocarbons	X	X					
	RI-9	Investigate extent of gasoline-range petroleum hydrocarbons	X	X					
		Investigate extent of lead in soil beneath Maintenance Building				X			
	RI-10	Investigate extent of gasoline-range petroleum hydrocarbons	X	X					
		Investigate extent of cPAHs identified in RGB18						X	
	RI-11	Investigate extent of cPAHs identified in RGB18				X		X	
		Investigate extent of gasoline-range petroleum hydrocarbons	X	X					
Tank Shop, Structural Shop and Surrounding Area	RI-12	Investigate soil staining beneath former forklift parking area		X	X				
		Investigate potential soil contamination at bunker oil UST and the extent of gasoline range petroleum hydrocarbons	X	X	X				
		Investigate extent of cPAHs identified in RGB18						X	
	RI-13	Delineate diesel-range petroleum hydrocarbons			X				
	RI-14	Delineate diesel-range petroleum hydrocarbons			X				
Paint Shop and Northern Portion of the Site	RI-15	Investigate soil staining near shear machine			X				
		Investigate cPAHs in / around Paint Shop						X	
	RI-16	Investigate soil staining near shear machine			X				
	RI-17	Investigate soil staining near shear machine			X				
		Investigate cPAHs in / around Paint Shop						X	
	RI-18	Investigate cPAHs in / around Paint Shop						X	
	RI-19	Investigate soil staining near shear machine			X				
		Investigate cPAHs in / around Paint Shop						X	

			Analyses						
Area	Sample ID	Purpose for Soil Sample Collection	BTEX	Gasoline- Range Petroleum Hydrocarbons	Diesel-/Oil-Range Petroleum Hydrocarbons	Metals^{1,2}	VOCs	cPAHs	PCBs
			EPA 8021	NWTPH-Gx	NWTPH-Dx	EPA 6000/7000	EPA8 260	EPA 8270-SIM	EPA 8082
Paint Shop and Northern Portion of the Site	RI-20	Investigate cPAHs in / around Paint Shop						X	
		Investigate mercury in RGB1				X			
		Investigate petroleum hydrocarbons			X				
	RI-21	Invesgitate soil staining near shear machine			X				
		Investigate cPAHs in / around Paint Shop						X	
	RI-22	Investigate cPAHs in / around Paint Shop						X	
	RI-23	Investigate cPAHs in / around Paint Shop						X	
	RI-24	Investigate cPAHs in / around Paint Shop						X	
	RI-25	Investigate cPAHs in / around Paint Shop						X	
		Investigate mercury in RGB1				X			
		Investigate diesel in RGB16			X				
	RI-26	Investigate cPAHs in / around Paint Shop						X	
		Investigate diesel in RGB16			X				
		Investigate mercury in RGB1				X			
	RI-27	Investigate cPAHs in / around Paint Shop						X	
		Investigate diesel in RGB16			X				
		Investigate mercury in RGB1				X			
	RI-28	Investigate cPAHs in / around Paint Shop						X	
		Investigate diesel in RGB16			X				
	RI-29	Investigate cPAHs in / around Paint Shop						X	
		Investigate diesel in RGB16			X				
	RI-30	Investigate cPAHs in / around Paint Shop						X	
		Investigate petroleum hydrocarbons			X				

Notes:

[1] Metals will include arsenic, cadmium, chromium, copper, lead, mercury, tin and zinc.

[2] pH will be performed on samples suspected of containing calcium carbide material

BTEX = Benzene, Toluene, Ethylbenzene and Xylenes
VOCs = Volatile organic compounds
cPAHs = Carcinogenic polycyclic aromatic hydrocarbons
PCBs = Polychlorinated Biphenyls

TABLE 10
SOIL SAMPLE ANALYSIS COLLECTION METHODOLOGY
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Area	Sample ID	Purpose for Soil Sample Collection	Anticipated Core Depth (feet)	Anticipated Number of Samples to be analyzed	Methodology for Sample Selection for Analysis
Maintenance Building and Southern Portion of Site	RI-1	Investigate location of former solvent hopper	4	1	Field screen soil in 1-foot sample intervals for presence of VOCs; Sample with greatest indication of VOCs selected for analysis; Sample from surface interval (0-1 foot bgs) will be selected for analysis if VOCs not indicated to be present based on field screening.
	RI-2	Investigate presence of calcium chlorite sludge	4	1-2	Field observations of soil in one-foot intervals for presence of layer(s) of white material; Select a one-foot sample interval with white material present in the soil for analysis of metals and cPAHs. Sample from surface interval (0-1 foot bgs) will be selected for metals and cPAH analyses if white material not indicated to be present based on field observations.
		Investigate former transformer spill			Sample from surface interval (0-1 foot bgs) will be analyzed for PCBs.
	RI-3	Investigate extent of lead in soil beneath Maintenance Building	4	1	Sample from surface interval (0-0.5 foot bgs) will be selected for metals analysis; Collect soil samples at one foot intervals from 0.5 feet bgs to 3.5 feet bgs; Archive samples from 0.5 to 1.5, 1.5 to 2.5 and 2.5 to 3.5 feet bgs for potential metals analysis.
	RI-4	Investigate extent of lead in soil beneath Maintenance Building	12	2-3	Sample from surface interval (0-0.5 foot bgs) will be selected for metals analysis; Collect soil samples at one foot intervals from 0.5 feet bgs to 3.5 feet bgs; Archive samples from 0.5 to 1.5, 1.5 to 2.5 and 2.5 to 3.5 feet bgs for potential metals analysis.
		Investigate extent of cPAHs identified in RGB18			Field observations of soil in each interval for presence of layer(s) of white material; Select a sample interval with white material present in the soil for analysis of metals and cPAHs. Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analysis if white material not indicated to be present based on field observations.
	RI-5	Investigate extent of lead in soil beneath Maintenance Building	12	2-3	Sample from surface interval (0-0.5 foot bgs) will be selected for metals analysis; Collect soil samples at one foot intervals from 0.5 feet bgs to 3.5 feet bgs; Archive samples from 0.5 to 1.5, 1.5 to 2.5 and 2.5 to 3.5 feet bgs for potential metals analysis.
		Investigate extent of cPAHs identified in RGB18			Field observations of soil in each interval for presence of layer(s) of white material; Select a sample interval with white material present in the soil for analysis of metals and cPAHs. Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analysis if white material not indicated to be present based on field observations.
		Investigate extent of gasoline-range petroleum hydrocarbons			Field screening of soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for gasoline-range petroleum hydrocarbon and BETX analysis; Sample from elevation equivalent to 10 feet bgs at S-13 will be selected for analysis if petroleum hydrocarbons not indicated to be present based on field screening.
	RI-6	Investigate extent of lead in soil beneath Maintenance Building	12	3-4	Sample from surface interval (0-0.5 foot bgs) will be selected for metals analysis; Collect soil samples at one foot intervals from 0.5 feet bgs to 3.5 feet bgs; Archive samples from 0.5 to 1.5, 1.5 to 2.5 and 2.5 to 3.5 feet bgs for potential metals analysis.
		Investigate extent of cPAHs identified in RGB18			Field observations of soil in each interval for presence of layer(s) of white material; Select a sample interval with white material present in the soil for analysis of metals and cPAHs. Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analysis if white material not indicated to be present based on field observations.
		Investigate extent of gasoline-range petroleum hydrocarbons			Field screening of soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for gasoline-range petroleum hydrocarbon and BTEX analysis; Sample with little or no indication of hydrocarbon contamination present at a depth beneath the sample with greatest indication will be selected for gasoline-range petroleum hydrocarbon analysis to identify vertical extent. Sample from elevation equivalent to 10 feet bgs at S-13 will be selected for analysis if petroleum hydrocarbons not indicated to be present based on field screening.
	RI-7	Investigate stained soils in crane shed	12	2	Sample from surface interval (0-0.5 foot bgs) will be selected for diesel- and oil-range petroleum hydrocarbon analyses; Collect soil samples at one foot intervals from 0.5 feet bgs to 3.5 feet bgs; Perform petroleum hydrocarbon analyses on sample from one foot interval beneath visual soil staining;
		Investigate extent of gasoline-range petroleum hydrocarbons			Field screening of soil in each interval beneath surfical soil staining for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons beneath surficial soil staining selected for gasoline-range petroleum hydrocarbon and BTEX analyses. Sample from elevation equivalent to 3 feet bgs at S-24 will be selected for analysis if petroleum hydrocarbons not indicated to be present based on field screening.

Area	Sample ID	Purpose for Soil Sample Collection	Anticipated Core Depth (feet)	Anticipated Number of Samples to be analyzed	Methodology for Sample Selection for Analysis
Maintenance Building and Southern Portion of Site	RI-8	Investigate extent of lead in soil beneath Maintenance Building	12	3-4	Sample from surface interval (0-0.5 foot bgs) will be selected for metals analysis; Collect soil samples at one foot intervals from 0.5 feet bgs to 3.5 feet bgs; Archive samples from 0.5 to 1.5, 1.5 to 2.5 and 2.5 to 3.5 feet bgs for potential metals analysis.
		Investigate extent of cPAHs identified in RGB18			Field observations of soil in each interval for presence of layer(s) of white material; Select a sample interval with white material present in the soil for analysis of metals and cPAHs. Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analysis if white material not indicated to be present based on field observations.
		Investigate extent of gasoline-range petroleum hydrocarbons			Field screening of soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for gasoline-range petroleum hydrocarbon and BTEX analysis; Sample with little or no indication of hydrocarbon contamination present at a depth beneath the sample with greatest indication will be selected for gasoline-range petroleum hydrocarbon analysis to identify vertical extent. Sample from elevation equivalent to 3 feet bgs at S-24 will be selected for analysis if petroleum hydrocarbons not indicated to be present based on field screening.
	RI-9	Investigate extent of lead in soil beneath Maintenance Building	12	2-3	Sample from surface interval (0-1.0 foot bgs) will be selected for metals analysis; Collect soil samples at one foot intervals from 1.0 feet bgs to 4.0 feet bgs; Archive samples from 1.0 to 2.0, 2.0 to 3.0 and 3.0 to 4.0 feet bgs for potential metals analysis.
		Investigate extent of gasoline-range petroleum hydrocarbons			Field screening of soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for gasoline-range petroleum hydrocarbon and BTEX analysis; Sample with little or no indication of hydrocarbon contamination present at a depth beneath the sample with greatest indication will be selected for gasoline-range petroleum hydrocarbon analysis to identify vertical extent. Sample from elevation equivalent to 3 feet bgs at S-24 will be selected for analysis if petroleum hydrocarbons not indicated to be present based on field screening.
	RI-10	Investigate extent of gasoline-range petroleum hydrocarbons	12	2	Field screening of soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for gasoline-range petroleum hydrocarbon and BTEX analysis; Sample from elevation equivalent to 10 feet bgs at S-13 will be selected for analysis if petroleum hydrocarbons not indicated to be present based on field screening.
		Investigate extent of cPAHs identified in RGB18			Field observations of soil in each interval for presence of layer(s) of white material; Select a sample interval with white material present in the soil for analysis of metals and cPAHs. Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analysis if white material not indicated to be present based on field observations.
	RI-11	Investigate extent of cPAHs identified in RGB18	12	2	Field observations of soil in each interval for presence of layer(s) of white material; Select a sample interval with white material present in the soil for analysis of metals and cPAHs. Sample from surface interval (0-1.0 foot bgs) will be selected for metals and cPAH analyses if white material not indicated to be present based on field observations.
		Investigate extent of gasoline-range petroleum hydrocarbons			Field screening of soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of petroleum hydrocarbons selected for petroleum hydrocarbon analysis; Sample from elevation equivalent to 10 feet bgs at S-13 will be selected for analysis if petroleum hydrocarbons not indicated to be present based on field screening.
Tank Shop, Structural Shop and Surrounding Area	RI-12	Investigate soil staining beneath former forklift parking area	12	3-4	Sample from surface interval (0-0.5 foot bgs) will be selected for diesel- and oil-range petroleum hydrocarbon analyses; Collect soil samples at one foot intervals from 0.5 feet bgs to 3.5 feet bgs; Perform petroleum hydrocarbon analyses on sample from one foot interval beneath visual soil staining;
		Investigate potential soil contamination at bunker oil UST and extent of gasoline range petroleum hydrocarbons			Field screening of soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for gasoline-, diesel- and oil-range petroleum hydrocarbon and BTEX analyses; Sample with little or no indication of petroleum contamination present at a depth beneath the sample with greatest indication will be selected for petroleum hydrocarbon analysis to identify vertical extent. Analyze sample from approximate water table elevation if hydrocarbons not indicated at depth.
		Investigate extent of cPAHs identified in RGB18			Field observations of soil in each interval for presence of layer(s) of white material; Select a sample interval with white material present in the soil for analysis of metals and cPAHs. Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analysis if white material not indicated to be present based on field observations.
	RI-13	Delineate diesel-range petroleum hydrocarbons	12	1-2	Field screening of soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for diesel- and oil-range petroleum hydrocarbon analysis; Sample with little or no indication of petroleum contamination present at a depth beneath the sample with greatest indication will be selected for diesel- and oil-range petroleum hydrocarbon analysis to identify vertical extent. Analyze sample from approximate water table elevation if hydrocarbons not indicated at depth.
	RI-14	Delineate diesel-range petroleum hydrocarbons	12	1-2	Field screening of soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for diesel- and oil-range petroleum hydrocarbon analysis; Sample with little or no indication of petroleum contamination present at a depth beneath the sample with greatest indication will be selected for diesel- and oil-range petroleum hydrocarbon analysis to identify vertical extent. Analyze sample from approximate water table elevation if hydrocarbons not indicated at depth.

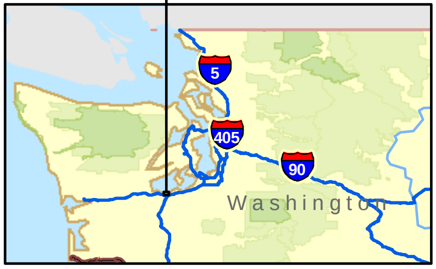
Area	Sample ID	Purpose for Soil Sample Collection	Anticipated Core Depth (feet)	Anticipated Number of Samples to be analyzed	Methodology for Sample Selection for Analysis
Paint Shop and Northern Portion of the Site	RI-15	Investigate soil staining near shear machine	8	2-3	Field screen soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for diesel- and oil-range petroleum hydrocarbon analysis. Analyze sample from approximate water table elevation if hydrocarbons not indicated at depth.
		Investigate cPAHs in / around Paint Shop			Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analyses; Collect and screen soil samples at one foot intervals from 0.5 feet bgs to 6.5 feet bgs; Perform cPAH analyses on sample collected from 1.5 to 2.5 feet bgs unless screening indicates that another interval should be analyzed for cPAHs.
	RI-16	Investigate soil staining near shear machine	8	2	Sample from surface interval (0-0.5 foot bgs) will be selected for petroleum hydrocarbon analyses; Field screen soil in each interval for presence of hydrocarbons; Sample with little or no indication of petroleum contamination present at a depth beneath the surface sample will be selected for diesel- and oil-range petroleum hydrocarbon analysis to identify vertical extent.
	RI-17	Investigate soil staining near shear machine	8	3-4	Field screening of soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for diesel- and oil-range petroleum hydrocarbon analysis; Sample with little or no indication of petroleum contamination present at a depth beneath the sample with greatest indication will be selected for diesel- and oil-range petroleum hydrocarbon analysis to identify vertical extent. Analyze sample from approximate water table elevation if hydrocarbons not indicated at depth.
		Investigate cPAHs in / around Paint Shop			Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analyses; Collect and screen soil samples at one foot intervals from 0.5 feet bgs to 6.5 feet bgs; Perform cPAH analyses on sample collected from 3.5 to 4.5 feet bgs unless screening indicates that another interval should be analyzed for cPAHs.
	RI-18	Investigate cPAHs in / around Paint Shop	8	2	Sample from surface interval (0-0.5 foot bgs) and from 3.5 to 4.5 feet bgs will be selected for cPAH analyses.
	RI-19	Investigate soil staining near shear machine	8	2-3	Field screen soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for diesel- and oil-range petroleum hydrocarbon analysis. Analyze sample from approximate water table elevation if hydrocarbons not indicated at depth.
		Investigate cPAHs in / around Paint Shop			Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analyses; Collect and screen soil samples at one foot intervals from 0.5 feet bgs to 6.5 feet bgs; Perform cPAH analyses on sample collected from 2.5 to 3.5 feet bgs unless screening indicates that another interval should be analyzed for cPAHs.
	RI-20	Investigate presence of petroleum hydrocarbons (i.e. shear machine and rail crane)	8	2-3	Field screen soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for diesel- and oil-range petroleum hydrocarbon analysis; Analyze sample from approximate water table elevation if hydrocarbons not indicated at depth.
		Investigate cPAHs in / around Paint Shop			Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analyses; Collect and screen soil samples at 1-foot intervals from 0.5 feet bgs to 6.5 feet bgs; Perform cPAH analyses on sample collected from 1.5 to 2.5 feet bgs unless screening indicates that another interval should be analyzed for cPAHs.
		Investigate mercury in RGB1			Perform metals analyses on samples collected from 2.5 to 3.5 feet bgs and 3.5 to 4.5 feet bgs.
	RI-21	Investigate soil staining near shear machine	8	2-3	Field screening of soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for diesel- and oil-range petroleum hydrocarbon analysis; Sample with little or no indication of petroleum contamination present at a depth beneath the sample with greatest indication will be selected for diesel- and oil-range petroleum hydrocarbon analysis to identify vertical extent. Analyze sample from approximate water table elevation if hydrocarbons not indicated at depth.
		Investigate cPAHs in / around Paint Shop			Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analyses.
	RI-22	Investigate cPAHs in / around Paint Shop	8	2	Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analyses; Collect and screen soil samples at one foot intervals from 0.5 feet bgs to 6.5 feet bgs; Perform cPAH analyses on sample collected from 1.5 to 2.5 feet bgs unless screening indicates that another interval should be analyzed for cPAHs.
	RI-23	Investigate cPAHs in / around Paint Shop	8	2	Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analyses.
	RI-24	Investigate cPAHs in / around Paint Shop	8	2	Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analyses; Collect and screen soil samples at one foot intervals from 0.5 feet bgs to 6.5 feet bgs; Perform cPAH analyses on sample collected from 1.5 to 2.5 feet bgs unless screening indicates that another interval should be analyzed for cPAHs.
	RI-25	Investigate cPAHs in / around Paint Shop	8	2-3	Collect and screen soil samples at one foot intervals from 0.5 feet bgs to 6.5 feet bgs; Perform cPAH analyses on sample collected from 0.5 to 1.5 feet bgs unless screening indicates that another interval should be analyzed for cPAHs.
		Investigate mercury in RGB1			Perform metals analyses on samples collected from 2.5 to 3.5 feet bgs and 3.5 to 4.5 feet bgs.
		Investigate diesel in RGB16			Field screen soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for diesel- and oil-range petroleum hydrocarbon analysis; Sample with little or no indication of petroleum contamination present at a depth beneath the sample with greatest indication will be selected for diesel- and oil-range petroleum hydrocarbon analysis to identify vertical extent. Sample from elevation equivalent to 6 feet bgs at RGB16 will be selected for analysis if petroleum hydrocarbons not indicated to be present based on field screening.

Area	Sample ID	Purpose for Soil Sample Collection	Anticipated Core Depth (feet)	Anticipated Number of Samples to be analyzed	Methodology for Sample Selection for Analysis
Paint Shop and Northern Portion of the Site	RI-26	Investigate cPAHs in / around Paint Shop	12	3-4	Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analyses; Collect and screen soil samples at one foot intervals from 0.5 feet bgs to 6.5 feet bgs; Perform cPAH analyses on sample collected from 1.5 to 2.5 feet bgs unless screening indicates that another interval should be analyzed for cPAHs.
		Investigate diesel in RGB16			Field screen soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for diesel- and oil-range petroleum hydrocarbon analysis; Sample with little or no indication of petroleum contamination present at a depth beneath the sample with greatest indication will be selected for diesel- and oil-range petroleum hydrocarbon analysis to identify vertical extent. Sample from elevation equivalent to 6 feet bgs at RGB16 will be selected for analysis if petroleum hydrocarbons not indicated to be present based on field screening.
		Investigate mercury in RGB1			Perform metals analyses on sample collected from 2.5 to 3.5 feet bgs.
	RI-27	Investigate cPAHs in / around Paint Shop	12	3-4	Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analyses; Collect and screen soil samples at one foot intervals from 0.5 feet bgs to 6.5 feet bgs; Perform cPAH analyses on sample collected from 2.5 to 3.5 feet bgs unless screening indicates that another interval should be analyzed for cPAHs.
		Investigate diesel in RGB16			Field screen soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for diesel- and oil-range petroleum hydrocarbon analysis; Sample with little or no indication of petroleum contamination present at a depth beneath the sample with greatest indication will be selected for diesel- and oil-range petroleum hydrocarbon analysis to identify vertical extent. Sample from elevation equivalent to 6 feet bgs at RGB16 will be selected for analysis if petroleum hydrocarbons not indicated to be present based on field screening.
		Investigate mercury in RGB1			Perform metals analyses on sample collected from 2.5 to 3.5 feet bgs.
	RI-28	Investigate cPAHs in / around Paint Shop	8	2-3	Sample from surface interval (0-0.5 foot bgs) below concrete will be selected for cPAH analyses; Collect and screen soil samples at one foot intervals from 0.5 feet bgs to 6.5 feet bgs; Perform cPAH analyses on sample collected from 2.5 to 3.5 feet bgs unless screening indicates that another interval should be analyzed for cPAHs.
		Investigate diesel in RGB16			Field screen soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for diesel- and oil-range petroleum hydrocarbon analysis; Sample with little or no indication of petroleum contamination present at a depth beneath the sample with greatest indication will be selected for diesel- and oil-range petroleum hydrocarbon analysis to identify vertical extent. Sample from elevation equivalent to 6 feet bgs at RGB16 will be selected for analysis if petroleum hydrocarbons not indicated to be present based on field screening.
	RI-29	Investigate cPAHs in / around Paint Shop	12	3-4	Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analyses; Collect and screen soil samples at one foot intervals from 0.5 feet bgs to 6.5 feet bgs; Perform cPAH analyses on sample collected from 3.5 to 4.5 feet bgs unless screening indicates that another interval should be analyzed for cPAHs.
		Investigate diesel in RGB16			Field screen soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for diesel- and oil-range petroleum hydrocarbon analysis; Sample with little or no indication of petroleum contamination present at a depth beneath the sample with greatest indication will be selected for diesel- and oil-range petroleum hydrocarbon analysis to identify vertical extent. Sample from elevation equivalent to 2.5 feet bgs at Ditch 2 will be selected for analysis if petroleum hydrocarbons not indicated to be present based on field screening.
	RI-30	Investigate cPAHs in / around Paint Shop	12	2-3	Sample from surface interval (0-0.5 foot bgs) will be selected for cPAH analyses; Collect and screen soil samples at one foot intervals from 0.5 feet bgs to 6.5 feet bgs; Perform cPAH analyses on sample collected from 3.5 to 4.5 feet bgs unless screening indicates that another interval should be analyzed for cPAHs.
		Investigate diesel in RGB16			Field screen soil in each interval for presence of petroleum hydrocarbons; Sample with greatest indication of hydrocarbons selected for diesel- and oil-range petroleum hydrocarbon analysis; Sample with little or no indication of petroleum contamination present at a depth beneath the sample with greatest indication will be selected for diesel- and oil-range petroleum hydrocarbon analysis to identify vertical extent. Sample from elevation equivalent to 6 feet bgs at RGB16 will be selected for analysis if petroleum hydrocarbons not indicated to be present based on field screening.

Notes:

bgs = below ground surface
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes
VOCs = Volatile organic compounds
SVOCs = Semi-volatile organic compounds
cPAHs = Carcinogenic polycyclic aromatic hydrocarbons
PCBs = Polychlorinated Biphenyls

Office: TAC Path: \\tac\projects\4\4301010\GIS\430101003 Figure1 VicinityMap.mxd KKS Map Revised: August 20, 2009



Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: 2008 Shaded Relief from ESRI, 2008 Topographic Maps from National Geographic Society

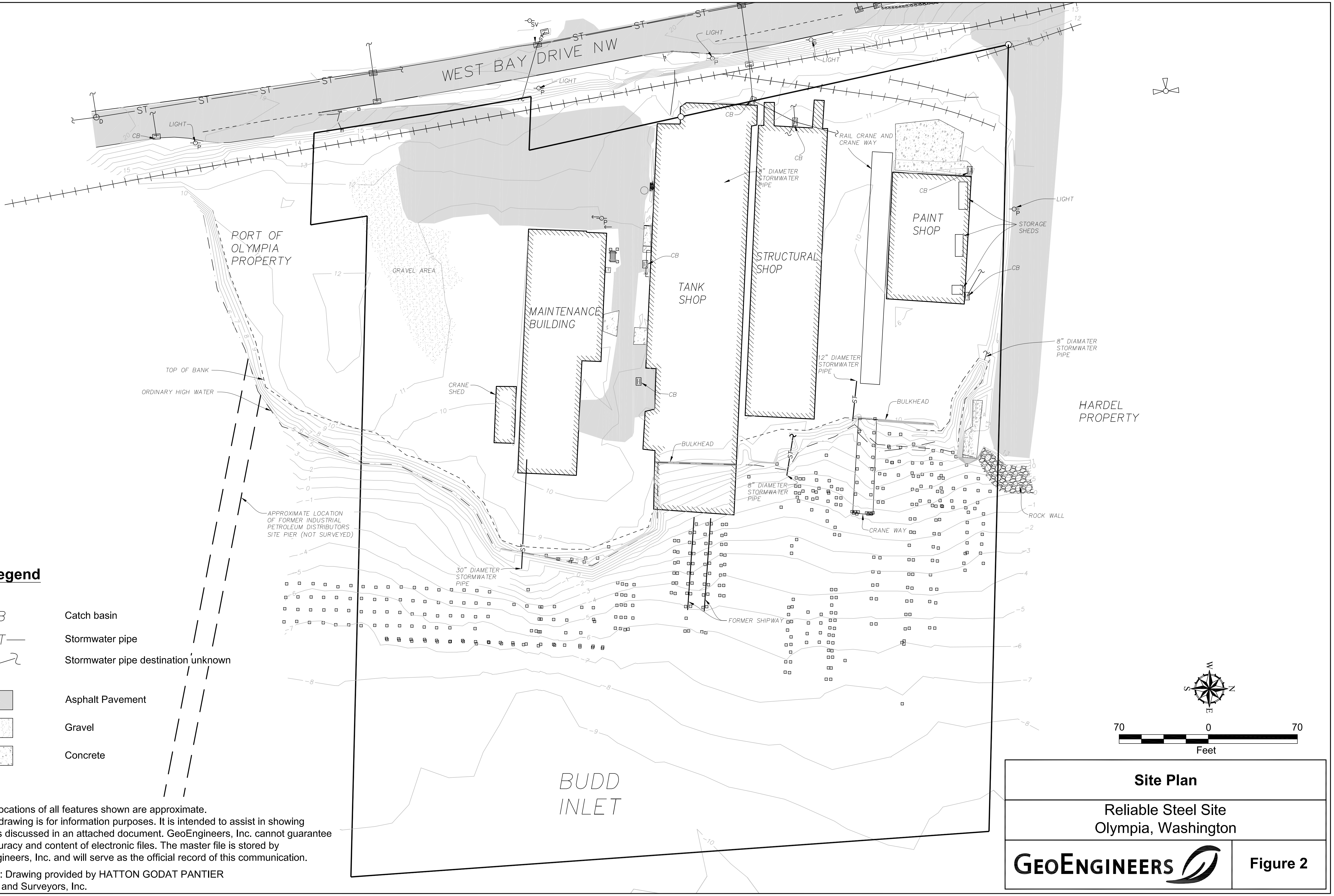
Projection: NAD_1983_StatePlane_Washington_South_FIPS_4602_Feet
Datum: D_North_American_1983

Vicinity Map

Reliable Steel Site
Olympia, Washington

GeoEngineers

Figure 1



Legend

CB	Catch basin
—ST—	Stormwater pipe
⌇	Stormwater pipe destination unknown
▨	Asphalt Pavement
▨	Gravel
▨	Concrete

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

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Site Plan

Reliable Steel Site
Olympia, Washington

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Figure 2

Legend

A3	DOF sample name and approximate location (DOF, 2007)
TP–2	DOF test pit name and approximate location (DOF, 2007)
Sed.1	DOF sediment sample name and approximate location (DOF, 2007)
1	Stemen sample name and approximate location (Stemen, 2005, 2006)
BS–1	Exact location of BS-1 not known. BS-1 was collected from the welding slag and metal debris area
RGB12	Greylock sample name and approximate location (Greylock, 2008)
SW2	Greylock surface water sample name and approximate location (Greylock, 2008)
RGS2	Greylock sediment core name and approximate location (Greylock, February 2008)
MW–1	Monitoring well number and approximate location (Greylock, 2008)
RGS3	Greylock surface sediment sample name and approximate location (Greylock, November 2007)
RGS2	Greylock surface sediment sample name and approximate location (Greylock, February 2008)
T1–SED	Ecology surface sediment sample name and approximate location (Ecology, 2008)
GS–04	Greylock surface sediment sample name and approximate location (Greylock, 2007)
CB	Catch basin
ST	Stormwater pipe
	Stormwater pipe destination unknown
□	Piling
▨	Asphalt Pavement
☐	Gravel
☐	Concrete

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Drawing provided by HATTON GODAT PANTIER Engineers and Surveyors, Inc.

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Potential Environmental Concerns and Sampling Locations

Reliable Steel Site
Olympia, Washington

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Figure 3

Diesel- and Oil-Range Petroleum Hydrocarbons in Soil at the Southwest Corner of the Tank Shop

Analyte		Diesel-range petroleum hydrocarbons	Heavy-oil range petroleum hydrocarbons
MTCA Method A (mg/kg)		2,000	2,000
Sample ID	Depth (feet)		
U1	5	**16,500**	**278**
S-8	4-8	**8,900**	<40
S-11	4-8	**8,700**	<40
RGB5-5-6	5-6	**2,600**	<250
RGB7-6-7	6-7	**15,000**	**400**
U2	4	<10	<25
S-6	4.5	<20	<40
S-9	6	**1,200**	<40
S-10	4-8	<20	<40
S-21	3	<20	**56**
RGB5-8	8	<50	<250
RGB6-6	6	<50	<250
RGB7-12	12	<50	<250
RGB8-5	5	<50	<250
RGB9-5	5	<50	<250

Diesel- and Oil-Range Petroleum Hydrocarbons in Groundwater at the Southwest Corner of the Tank Shop

Analyte		Diesel-range petroleum hydrocarbons	Heavy-oil range petroleum hydrocarbons
MTCA A (μg/l)		500	500
Surface Water Criteria		NE	NE
Well	Date		
MW-4	2/19/2008	**61,000**	**3,300**
MW-2	2/19/2008	<50	<250

cPAHs in Soil at the Paint Shop and the Northern Portion of the Site

Analyte		Benz(a) anthracene	Chrysene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h) anthracene	cPAH TEC
MTCA Method A (mg/kg)		NE	NE	0.1	NE	NE	NE	NE	0.1
Sample ID	Depth (feet)								
RGB2-S	Surface	**0.12**	**0.17**	**0.14**	**0.18**	**0.078**	**0.095**	**0.033**	**0.19**
RGB3-S	Surface	**0.53**	**0.6**	**0.49**	**0.57**	**0.25**	**0.28**	**0.09**	**0.67**
RGB4-S	Surface	**5.8**	**18**	**4.4**	**12**	**5**	**3.1**	<1.5	**7.17**
RGB4-1	1	**1.9**	**6**	**2.4**	**4.6**	**1.2**	**2.2**	**0.39**	**3.49**
RGB4-1.5	1.5	**0.94**	**1.4**	**1.1**	**1.4**	**0.55**	**0.85**	<0.3	**1.49**
Ditch1-S	Surface	**0.6**	**0.69**	**0.66**	**0.64**	**0.35**	**0.46**	<0.3	**0.87**
Ditch1-2.5	2.5	**1.6**	**1.8**	**1.8**	**1.8**	**0.88**	**1.1**	**0.34**	**2.39**
Ditch2-S	Surface	**0.53**	**0.74**	**0.55**	**0.68**	<0.3	**0.39**	<0.3	**0.72**
MW9-S	Surface	**1.2**	**1.6**	**1.2**	**1.7**	**0.74**	**0.92**	**0.32**	**1.70**
MW9-4	4	**0.7**	**0.82**	**0.67**	**0.64**	**0.33 ca**	**0.33**	<0.3	**0.88**
RGB1-S	Surface	**0.057**	**0.048**	**0.036**	**0.079**	<0.03	**0.032**	<0.03	**0.05**
RGB2-3.5	3.5	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
RGB3-4	4	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
RGB4-4	4	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
RGB16-6	6	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
RGB17-5	5	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Ditch2-2.5	2.5	<1.5	<1.5	<1.5	<1.5	<0.3	<0.3	<0.3	<1.5
PS Grit	Surface	<0.03	**0.033**	<0.03	<0.03	<0.03	<0.03	<0.03	**0.0003**

Metals in Soil Beneath and Adjacent to the Maintenance Building

Analyte		Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Selenium	Silver	Zinc
MTCA Method A/B (mg/kg)		20	16,000	2	NE	3,000	250	2	400	400	24,000
Sample ID	Depth (feet)										
A3	0.5	**7.82**	**110**	**2.87**	**53.9**	**84.4**	**1,540**	<0.1	**0.735**	<0.5	--
Mt. Pit	Surface	**5.21**	**117**	<0.5	**50.7**	**75.8**	**338**	<0.1	<0.5	**0.664**	--
P1	Surface	**7.28**	**93.4**	**1.52**	**37.1**	**119**	**518**	<0.1	<0.5	<0.5	--
S-13	6	<5	--	<1	**112**	--	<5	<0.5	--	--	--
RGB10-S	Surface	**1.82**	--	<1	**25.3**	**27.6**	**62.3**	<0.2	--	--	**1,120**
RGB10-5	5	**4.71**	--	<1	**24.3**	**25.7**	**65.6**	<0.2	--	--	**128**
RGB12-4	4	**3.64**	--	<1	**16**	**17.2**	**25.1**	<0.2	--	--	**53.4**
RGB13-4	4	**5.85**	--	<1	**19**	**28.3**	**44.1**	<0.2	--	--	**84.7**
RGB14-4	4	**5.45**	--	<1	**25.6**	**22.3**	**8.64**	<0.2	--	--	**38**
RGB15-4	4	**2.75**	--	<1	**32.4**	**20.6**	**225**	<0.2	--	--	**47.6**
RGB18-5	5	**3.55**	--	<1	**24.5**	**34.2**	**106**	<0.2	--	--	**150**
RGB19-S	Surface	**2.25**	--	<1	**18.5**	**16.3**	**17.1**	<0.2	--	--	**70**
RGB19-12	12	**9.72**	--	<1	**10**	**19.2**	**95.6**	<0.2	--	--	**164**

cPAHs in Soil Adjacent to the Maintenance Building

Analyte		Benz(a) anthracene	Chrysene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h) anthracene	cPAH TEC
MTCA Method A/B (mg/kg)		NE	NE	0.1	NE	NE	NE	NE	0.1
Sample ID	Depth (feet)								
RGB18-5	5	**0.13**	**0.19**	**0.17**	**0.19**	**0.064**	**0.091**	<0.03	**0.22**
RGB18-10	10	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
RGB19-12	12	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

Petroleum Hydrocarbons and Related Compounds in Soil Beneath and Adjacent to the Maintenance Building

Analyte		Gasoline-range petroleum hydrocarbons	Diesel-range petroleum hydrocarbons	Heavy-oil range petroleum hydrocarbons	Benzene	Ethyl-benzene	Toluene	Total Xylenes	Methyl t-butyl ether (MTBE)
MTCA Method A (mg/kg)		100	2,000	2,000	0.03	6	7	9	0.1
Sample ID	Depth (feet)								
S-13	6	**106**	<20	<40	<0.02	<0.05	<0.05	<0.05	<0.05
S-13	10	**6,000**	<20	<40	--	--	--	--	--
S-24	3	**490**	**500**	**1,200**	--	--	--	--	--
S-18	Surface	**100**	**180**	**1,000**	<0.02	<0.05	<0.05	<0.05	<0.05
RGB10-S	Surface	**7**	--	--	<0.03	<0.05	<0.05	**0.15**	<0.05
RGB10-5	5	**14**	--	--	<0.03	**0.059**	<0.05	**0.21**	<0.05
RGB10-11	11	<2	--	--	<0.03	<0.05	<0.05	<0.1	<0.05
RGB11-5	5	<2	--	--	<0.03	<0.05	<0.05	<0.1	<0.05
RGB12-4	4	<2	--	--	<0.03	<0.05	<0.05	<0.1	<0.05
RGB13-4	4	<2	--	--	<0.03	<0.05	<0.05	<0.1	<0.05
RGB18-5	5	<2	--	--	<0.03	<0.05	<0.05	<0.1	<0.05
RGB19-12	12	<2	<50	<250	<0.03	<0.05	<0.05	<0.1	<0.05
MW8-5	5	**12**	--	--	<0.03	<0.05	<0.05	**0.38**	<0.05

Petroleum Hydrocarbons and Related Compounds in Groundwater Adjacent to the Maintenance Building

Analyte		Gasoline-range petroleum hydrocarbons	Diesel-range petroleum hydrocarbons	Heavy-oil range petroleum hydrocarbons	Benzene	Ethyl-benzene	Toluene	Total Xylenes	Methyl t-butyl ether (MTBE)
MTCA Method A (ug/l)		1,000	500	500	5	700	1,000	1,000	--
Surface Water Criteria[1] (ug/l)		NE	NE	NE	23	2,100	15,000	NE	--
Well	Date								
MW-6	2/19/08	**120**	**380**	<250	<1	<1	<1	<2	--
MW-7	2/19/08	<100	<50	<250	<1	<1	<1	<2	--
MW-8	2/19/08	<100	<50	<250	<1	<1	<1	<2	--

Notes:

[1] See Work Plan Section 2.5.3 and Table 4 for an explanation of selected surface water criteria

Legend

See Figure 3 for general legend entries.

🟦	Petroleum Hydrocarbons at concentrations that exceed screening criteria
🟫	Metals at concentrations that exceed screening criteria
🟦	Gasoline-range petroleum hydrocarbons at concentrations that exceed screening criteria
🟪	Carcinogenic polycyclic aromatic hydrocarbons at concentrations that exceed screening criteria
🟨	Phthalates at concentrations that exceed screening criteria
🟩	PCBs at concentrations that exceed screening criteria
MW-4 ◎	Petroleum hydrocarbons at concentrations greater than screening criteria
MW-8 ◎	Metals at concetrations greater than screeninig criteria in MW-8
MTCA	Model Toxics Control Act (WAC 173-340)
mg/kg	Milligrams per kilogram
ug/L	Micrograms per liter
Bolding	The analyte was detected in the sample
Shading	The reported value is greater than the screening criteria
NE	Not Established
<	The analyte was not detected at a concentration greater than the indicated report limit
--	The analysis was not performed
BS–1	Exact location of BS-1 not known. BS-1 was collected from the welding slag and metal debris area

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Drawing provided by HATTON GODAT PANTIER Engineers and Surveyors, Inc.

Metals in Welding Slag and Soil on the Shoreline

Analyte		Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Selenium	Silver
MTCA Method A/B (mg/kg)		20	16,000	2	NE	3,000	250	2	400	400
SQS (mg/kg)		57	NE	5.1	260	390	450	0.41	NE	6.1
CSL (mg/kg)		93	NE	6.7	270	390	530	0.59	NE	6.1
Sample ID	Depth (feet)									
S1	2	**14.6**	**87**	**5.13**	**127**	**435**	**533**	**0.362**	**1.21**	<0.5
S3	2	**70**	**52.6**	**0.803**	**253**	**1,790**	**99.8**	<0.1	**0.538**	<0.5
BS-1	Surface	<5	--	<1	**15**	--	**360**	<0.5	--	--
S-3	4-8	<5	--	<1	<5	--	<5	<0.5	--	--
MS-1	4	<5	--	<1	**32**	--	**28**	<0.5	--	--

Metals in Groundwater Near the Shoreline

Analyte		Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Selenium	Silver
MTCA Method A/B (μg/l)		5	3,200	5	50	NE	15	2	80	80
Surface Water Criteria (μg/l)[1]		5	NE	8.8	240,000	20	10	0.025	71	1.9
Well	Date									
MW-7	2/19/2008	**6.11**	--	<1	**42.5**	**9.21**	<1	<0.2	--	--
MW-8	2/19/2008	**15.3**	--	<1	**16**	**40.3**	<1	<0.2	--	--
MW-9	2/19/2008	<1	--	<1	**19.5**	<1	<1	<0.2	--	--

Notes:

[1] See Work Plan Section 2.5.3 and Table 4 for an explanation of selected surface water criteria

Mercury in Soil at the Paint Shop and Northern Portion of the Site

Analyte		Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Zinc
MTCA Method A/B (mg/kg)		20	2	NE	3,000	250	2	24,000
Sample ID	Depth (feet)							
RGB1-4	4	2.88	1.57	**15.8**	**8.06**	**1.96**	**2.4**	--
RGB1-S	Surface	<1	<1	**8.65**	**15.9**	**7.12**	<0.2	**955**
RGB16-6	6	**5.86**	**1.1**	**12.2**	**10.9**	**1.52**	<0.2	**23.5**
RGB17-5	5	**1.79**	<1	**5.81**	**5.81**	<1	<0.2	**13.2**
PS Grit	Surface	<1	<1	**9.65**	**14.7**	**14.2**	<0.2	**687**

Petroleum Hydrocarbons in Soil at the Paint Shop and Northern Portion of the Site

Analyte		Gasoline-range petroleum hydrocarbons	Diesel-range petroleum hydrocarbons	Heavy-oil range petroleum hydrocarbons
MTCA Method A (mg/kg)		100	2,000	2,000
Sample ID	Depth (feet)			
RGB16-6	6	**22**	**3,600**	<250
Ditch2-2.5	2.5	**14**	**5,000**	**1,600**
RGB16-10	10	--	<50	<250
RGB1-S	Surface	<2	<50	<250
RGB-1-4	4	--	<50	<250
RGB17-5	5	--	<50	<250
Ditch1-S	Surface	<2	**110**	**440**
Ditch1-2.5	2.5	<2	**160**	<250
Ditch2-S	Surface	<2	**220**	**810**
Ditch2-5.5	5.5	--	<50	<250

Petroleum Hydrocarbons in Groundwater at the Paint Shop and Northern Portion of the Site

Analyte		Gasoline-range petroleum hydrocarbons	Diesel-range petroleum hydrocarbons	Heavy-oil range petroleum hydrocarbons
MTCA Method A (μg/l)		1,000	500	500
Well	Date			
MW-5	2/19/2008	<100	**160**	<250

Metals and Diesel-Range Petroleum Hydrocarbons in Stormwater

Analyte	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Zinc	Diesel-Range Hydrocarbons	Heavy Oil-Range Hydrocarbons
Surface Water Criteria (μg/l)	0.14	8.8	240,000	2.4	8.1	0.025	81	500	500
Sample ID									
SW-1	<10	<10	**43.5**	**251**	**129**	<0.2	**5,550**	**220**	**670**
SW-2	**1.18**	<1	**14.6**	**68.1**	**29.3**	<0.2	**2,470**	--	--

Chemicals in Sediment

Analyte		Total organic carbon (%)	Mercury	Total petroleum hydrocarbons	Acenaphthene	Phenanthrene	Benzo(g,h,i) perylene	Dibenzo(a,h) anthracene	Fluoranthene	Indeno(1, 2, 3-cd) pyrene	Bis(2-ethylhexyl) phthalate	Butylbenzyl phthalate	Total PCBs
Sample ID	Depth												
RGS-1	Surface	**1.29**	**0.09**	**85**	**14**	**78**	**26**	**19[a]**	**120**	**29**	**120[a]**	**5.2[a]**	--
RGS-2	Surface	**1.75**	**0.21**	**50**	**5.6**	**38**	**10**	**6.3**	**63**	**11**	**55[a]**	**3.9**	--
RGS-4	Surface	**1.19**	<0.06	**106[c]**	**2.2**	**27**	**2.4**	<1.7	**64**	**6.6**	**18**	<1.7	<0.029 T
RGS-7	Surface	**0.81**	**0.14**	**95**	**21[a]**	**140[a]**	**17**	**22[a]**	**170[a]**	**43[a]**	**210[a]**	**3.5**	**0.13 T**
RGS-7	0-2 ft.	**5.63**	**0.89[c]**	--	**0.066**	**0.49**	**0.12**	**0.17**	**0.89**	**0.15**	**1.9[b]**	**0.029**	--
RGS-7	2-4 ft.	**3.36**	**1.19[c]**	--	<0.6	**1.1**	<0.6	**0.2**	**2.1**	<0.2	**2.8**	<0.5	--
RGS-8	Surface	**0.37**	**0.15**	**224[c]**	**0.17**	**1.2**	**0.13**	**0.17**	**1.9[b]**	**0.32**	**19[b]**	**0.023**	**0.068 T**
T1-Sed	Surface	**0.77**	**0.092**	--	**8.44**	**70.13**	**37.7[a]**	**9.48**	**119.48**	**40.26[a]**	**181.82[a]**	**5.45[a]**	**1.95 T**
T1B-Sed	Surface	**5.82**	**0.314**	--	**0.21**	**1.4**	**0.68[b]**	**0.16**	**2.2[b]**	**0.72[b]**	**3.3[b]**	**0.057**	**0.12 T**
BI-S32	Surface	**4.28**	**0.187**	--	**0.078**	**0.69**	**0.31**	**0.077**	**1.4**	**0.34**	**1.4**	**0.034**	**0.27 T[b]**
GS-04	Surface	**3.10**	**0.23**	--	**3.5 J**	**29**	**17 J**	**3.9**	**55**	**17 J**	**94[a]**	**4.2 J**	<6.1 T

Notes:

All chemistry data are mg/kg except for total organic carbon. Mercury and total petroleum hydrocarbon concentrations are dry weight basis. Other chemical concentrations are dry weight basis if the organic carbon content of the sample is less than 0.5 or greater than 3.5 percent and organic carbon-normalized if the organic carbon content is equal to or between 0.5 and 3.5 percent.

[a] The concentration exceeds the cleanup screening level (CSL) and/or sediment quality standard (SQS) based on organic carbon-normalization (See Table 8).

[b] The concentration exceeds the second lowest apparent effects threshold (2LAET) and/or the LAET based on dry weight (See Table 7).

[c] The concentration exceeds the CSL and/or SQS based on dry weight (See Table 7 or 8).

W
S N
E

30 0 30
Feet

Exceedances of Screening Criteria

Reliable Steel Site
Olympia, Washington

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Figure 4

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Legend

RI-1 ●	Proposed Remedial Investigation location
◪ A3	DOF sample name and approximate location (DOF, 2007)
TP-2 ⊠	DOF test pit name and approximate location (DOF, 2007)
Sed.1 ⌖	DOF sediment sample name and approximate location (DOF, 2007)
⬡ 1	Stemen sample name and approximate location (Stemen, 2005, 2006)
⬡ BS-1	Exact location of BS-1 not known. BS-1 was collected from the welding slag and metal debris area
⊕ RGB12	Greylock sample name and approximate location (Greylock, 2008)
SW2 ✕	Greylock surface water sample name and approximate location (Greylock, 2008)
⊕ RGS2	Greylock sediment core name and approximate location (Greylock, February 2008)
MW-1 ⊙	Monitoring well number and approximate location (Greylock, 2008)
◬ RGS3	Greylock surface sediment sample name and approximate location (Greylock, November 2007)
△ RGS2	Greylock surface sediment sample name and approximate location (Greylock, February 2008)
⊗ T1-SED	Ecology surface sediment sample name and approximate location (Ecology, 2008)
⊗ GS-04	Greylock surface sediment sample name and approximate location (Greylock, 2007)
CB	Catch basin
ST	Stormwater pipe
⤳	Stormwater pipe destination unknown
▫	Piling
▨	Asphalt Pavement
☐	Gravel
☐	Concrete

Notes:
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Reference: Drawing provided by HATTON GODAT PANTIER Engineers and Surveyors, Inc.

Proposed Investigation Locations

Reliable Steel Site
Olympia, Washington

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Figure 5

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APPENDIX A

ONE-TIME GROUNDWATER AND GROUNDWATER MONITORING RESULTS

TABLE A-1
SUMMARY OF DISCREET ONE-TIME GROUNDWATER ANALYTICAL RESULTS (2005)
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Analyte	Groundwater Cleanup Levels		Surface Water Criteria[2]	S-1-W	S-4-W	S-8-W	S-13-W	S-15-W	S-16-W	S-19-W	MS-1-W	MS-2-W	MS-3-W	MS-4-W	MS-5-W
	MTCA[1] Method A	MTCA Method B		10/17/05	10/17/05	10/17/05	10/17/05	10/17/05	10/17/05	10/17/05	12/20/05	12/20/05	12/20/05	12/20/05	12/20/05
Metals[3] (µg/l)															
Arsenic	5	0.000058	8 [4]	**2.5**	--	--	**1.27**	**1.91**	**2.5**	--	**0.055**	**0.0066**	**0.013**	**0.12**	**0.031**
Cadmium	5	8	8.8 [5]	**2.5**	--	--	**2.5**	**2.5**	**2.5**	--	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Chromium	50	NE	240,000 [6]	**3.14**	--	--	**3.86**	**5.17**	**2.64**	--	**0.32**	**0.072**	**0.22**	**1.3**	**0.14**
Lead	15	NE	10 [4]	**2.5**	--	--	**2.5**	**2.5**	**2.5**	--	**0.093 B**	**0.014 B**	**0.010 B**	**0.25 B**	**0.14 B**
Mercury	2	4.8	0.025 [7]	**2**	--	--	**2**	**2**	**2**	--	**0.00026**	<0.00020	<0.00020	**0.0011**	**0.00097**
Dissolved Metals (µg/l)															
Arsenic	5	0.000058	8 [4]	--	--	--	--	--	--	--	**0.025**	<0.0025	**0.0058**	<0.0025	<0.0025
Chromium	50	NE	240,000 [6]	--	--	--	--	--	--	--	**0.011**	<0.0025	**0.0032**	**0.0057**	**0.0034**
Lead	15	NE	10 [4]	--	--	--	--	--	--	--	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
TPH (µg/l)															
Gasoline Range Hydrocarbons	1,000	NE	NE	--	<100	--	**42,000**	--	<100	--	--	--	--	--	--
Diesel Range Hydrocarbons	500	NE	NE	<200	--	**21,000**	<200	<200	<200	<200	--	--	--	--	<200
Heavy Oil Range Hydrocarbons	500	NE	NE	<400	--	<400	<400	<400	<500	<400	--	--	--	--	<400
Mineral Oil Range Hydrocarbons	500	NE	NE	<400	--	<400	<400	<400	<200	<400	--	--	--	--	<400
VOCs (µg/l)															
Benzene	5	0.8	23 [6]	--	<1	--	<1	--	<1	--	--	--	--	--	--
Ethylbenzene	700	800	2,100 [5]	--	<1	--	**1.9**	--	<1	--	--	--	--	--	--
Toluene	1,000	640	15,000 [5]	--	<1	--	<1	--	<1	--	--	--	--	--	--
Total Xylenes	1,000	1,600	NE	--	<1	--	**45**	--	<1	--	--	--	--	--	--
1,1,1,2-Tetrachloroethane	NE	1.7	130 [6]	--	--	--	--	--	<1	--	--	--	--	--	--
1,1,1-Trichloroethane	200	7,200	NE	--	--	--	--	--	<1	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	NE	22	420,000 [6]	--	--	--	--	--	<1	--	--	--	--	--	--
1,1,2-Trichloroethane	NE	0.77	4 [6]	--	--	--	--	--	<1	--	--	--	--	--	--
1,1-Dichloroethane	NE	1,600	16 [6]	--	--	--	--	--	<1	--	--	--	--	--	--
1,1-Dichloropropene	NE	NE	NE	--	--	--	--	--	<1	--	--	--	--	--	--
1,2,3-Trichlorobenzene	NE	NE	NE	--	--	--	--	--	<1	--	--	--	--	--	--
1,2,3-Trichloropropane	NE	0.0063	NE	--	--	--	--	--	<1	--	--	--	--	--	--
1,2,4-Trichlorobenzene	NE	NE	70 [5]	--	--	--	--	--	<1	--	--	--	--	--	--
1,2,4-Trimethylbenzene	NE	400	NE	--	--	--	--	--	<1	--	--	--	--	--	--
1,2-Dibromo-3-chloropropane	NE	0.031	NE	--	--	--	--	--	<1	--	--	--	--	--	--
1,2-Dibromoethane (EDB)	0.01	NE	NE	--	--	--	--	--	<0.1	--	--	--	--	--	--
1,2-Dichlorobenzene	NE	720	1,300 [5]	--	--	--	--	--	<1	--	--	--	--	--	--
1,2-Dichloroethane (EDC)	5	0.48	37 [5]	--	--	--	--	--	<1	--	--	--	--	--	--
1,2-Dichloropropane	NE	0.64	15 [5]	--	--	--	--	--	<1	--	--	--	--	--	--
1,3,5-Trimethylbenzene	NE	400	NE	--	--	--	--	--	<1	--	--	--	--	--	--
1,3-Dichlorobenzene	NE	NE	960 [5]	--	--	--	--	--	<1	--	--	--	--	--	--
1,3-Dichloropropane	NE	NE	19 [6]	--	--	--	--	--	<1	--	--	--	--	--	--
1,4-Dichlorobenzene	NE	1.8	4.9 [6]	--	--	--	--	--	<1	--	--	--	--	--	--
2,2-Dichloropropane	NE	NE	NE	--	--	--	--	--	<1	--	--	--	--	--	--
2-Butanone (MEK)	NE	4,800	NE	--	--	--	--	--	<10	--	--	--	--	--	--
2-Chlorotoluene	NE	160	NE	--	--	--	--	--	<1	--	--	--	--	--	--

Analyte	Groundwater Cleanup Levels		Surface Water Criteria[2]	S-1-W	S-4-W	S-8-W	S-13-W	S-15-W	S-16-W	S-19-W	MS-1-W	MS-2-W	MS-3-W	MS-4-W	MS-5-W
	MTCA[1] Method A	MTCA Method B		10/17/05	10/17/05	10/17/05	10/17/05	10/17/05	10/17/05	10/17/05	12/20/05	12/20/05	12/20/05	12/20/05	12/20/05
2-Hexanone	NE	NE	NE	--	--	--	--	--	<1	--	--	--	--	--	--
4-Chlorotoluene	NE	160	NE	--	--	--	--	--	<1	--	--	--	--	--	--
Acetone	NE	800	NE	--	--	--	--	--	<10	--	--	--	--	--	--
Bromobenzene	NE	NE	NE	--	--	--	--	--	<1	--	--	--	--	--	--
Bromodichloromethane	NE	0.71	17[5]	--	--	--	--	--	<1	--	--	--	--	--	--
Bromoform	NE	5.5	140[5]	--	--	--	--	--	<1	--	--	--	--	--	--
Bromomethane	NE	11	970[6]	--	--	--	--	--	<1	--	--	--	--	--	--
Carbon Tetrachloride	NE	0.34	1.6[6]	--	--	--	--	--	<1	--	--	--	--	--	--
Chlorobenzene	NE	160	1,600[6]	--	--	--	--	--	<1	--	--	--	--	--	--
Chloroethane	NE	15	NE	--	--	--	--	--	<1	--	--	--	--	--	--
Chloroform	NE	7.2	280[6]	--	--	--	--	--	<1	--	--	--	--	--	--
Chloromethane	NE	3.4	130[6]	--	--	--	--	--	<1	--	--	--	--	--	--
cis-1,2-Dichloroethene	NE	NE	NE	--	--	--	--	--	**2**	--	--	--	--	--	--
cis-1,3-Dichloropropene	NE	0.24	196	--	--	--	--	--	<1	--	--	--	--	--	--
Dibromochloromethane	NE	0.52	13[5]	--	--	--	--	--	<1	--	--	--	--	--	--
Dibromomethane	NE	80	NE	--	--	--	--	--	<1	--	--	--	--	--	--
Hexachlorobutadiene	NE	0.56	18[5]	--	--	--	--	--	<1	--	--	--	--	--	--
Isopropylbenzene	NE	800	NE	--	--	--	--	--	<1	--	--	--	--	--	--
Methylene chloride	5	5.8	590[5]	--	--	--	--	--	<10	--	--	--	--	--	--
Naphthalene	160	160	4,900[6]	--	--	--	--	--	<1	--	--	--	--	--	--
n-Propylbenzene	NE	NE	NE	--	--	--	--	--	<1	--	--	--	--	--	--
p-Isopropyltoluene	NE	NE	NE	--	--	--	--	--	<1	--	--	--	--	--	--
sec-Butylbenzene	NE	NE	NE	--	--	--	--	--	<1	--	--	--	--	--	--
Styrene	NE	1.5	NE	--	--	--	--	--	<1	--	--	--	--	--	--
tert-Butylbenzene	NE	NE	NE	--	--	--	--	--	<1	--	--	--	--	--	--
Tetrachloroethene	5	0.081	0.39[6]	--	--	--	--	--	<1	--	--	--	--	--	--
trans-1,2-Dichloroethene	NE	NE	10,000[5]	--	--	--	--	--	<1	--	--	--	--	--	--
trans-1,3-Dichloropropene	NE	NE	19[6]	--	--	--	--	--	<1	--	--	--	--	--	--
Trichloroethene	5	0.49	1.5[6]	--	--	--	--	--	<1	--	--	--	--	--	--
Trichlorofluoromethane	NE	24,000	NE	--	--	--	--	--	<1	--	--	--	--	--	--
Vinyl chloride	0.2	0.029	2.4[5]	--	--	--	--	--	<0.2	--	--	--	--	--	--

Notes

[1] Model Toxics Control Act (MTCA) (WAC 173-340-730).

[2] Lowest surface water criteria from Background Concentrations of Selected Chemicals in Water (PTI, 1989), Water Quality Standards for surface waters of the State of Washington (WAC 173-201A), National Recommended Water Quality Criteria (Section 304 of the Clean Water Act), National Toxics Rule (40 CFR Part 131.36), and the Model Toxics Control Act (MTCA) Method B Surface Water Cleanup Levels (WAC 173-340-730).

[3] Total Metals

[4] Washington State Groundwater Background Concentrations:

[5] National Recommended Water Quality Criteria

[6] MTCA Method B non-Carcinogen

[7] National Toxics Rule

[8] Laboratory reporting limit higher than some standards; reporting limit used.

B = The compound was found in the blank and sample

NE = Indicates there is no applicable cleanup criteria established.

TPH = Total Petroleum Hydrocarbons

VOCs = Volatile organic compounds

µg/l = microgram per liter

y = Laboratory indicated that the pattern of peaks present is not indicative of motor oil

lc = The analyte is a common laboratory contaminant

Values presented in **bold** indicate that the chemical was detected in the specific sample.

Highlighted items indicate that the chemical concentration is greater than the MTCA cleanup level

TABLE A-2
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS (JULY 2006)
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

	Groundwater Cleanup Levels			MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
Analyte	MTCA^{1} Method A	MTCA Method B	Surface Water Criteria^{2}	7/11/2006	7/11/2006	7/11/2006	7/11/2006	7/11/2006	7/11/2006	7/11/2006
Dissolved Metals (µg/l)										
Arsenic	5	0.000058	8 ^{4}	<2	<2	<2	<2	<2	<2	<2
Barium	NE	3,200	NE	<2	**7**	**7**	**7**	**7**	**43**	**33**
Cadmium	5	8	8.8 ^{5}	<3	<3	<3	<3	<3	<3	<3
Chromium	50	NE	240,000 ^{6}	<7	<7	<7	<7	<7	<7	<7
Lead	15	NE	10 ^{4}	<1	<1	<1	<1	<1	<1	**.003**
Mercury	2	4.8	0.025 ^{7}	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Selenium	NE	80	71^{7}	<50	<50	<50	<50	<50	<50	<50
Silver	NE	80	26,000^{6}	<7	<7	<7	<7	<7	<7	<7
TPH (µg/l)										
Gasoline Range	1,000	NE	NE	--	--	--	--	<100	<100	--
Diesel Range	500	NE	NE	--	--	--	**2,900**	--	<200	--
Heavy Oil Range	500	NE	NE	--	--	--	<400	--	<400	--
Mineral Oil	500	NE	NE	--	--	--	<400	--	<400	--
VOCs (µg/l)										
1,1,1,2-Tetrachloroethane	NE	1.7	130 ^{6}	--	--	--	<1	<1	<1	--
1,1,1-Trichloroethane	200	7,200	NE	--	--	--	<1	<1	<1	--
1,1,2,2-Tetrachloroethane	NE	22	420,000 ^{6}	--	--	--	<1	<1	<1	--
1,1,2-Trichloroethane	NE	0.77	4 ^{6}	--	--	--	**1.3**	<1	<1	--
1,1-Dichloroethane	NE	1,600	16 ^{6}	--	--	--	<1	<1	<1	--
1,1-Dichloropropene	NE	NE	NE	--	--	--	<1	<1	<1	--
1,2,3-Trichlorobenzene	NE	NE	NE	--	--	--	<1	<1	<1	--
1,2,3-Trichloropropane	NE	0.0063	NE	--	--	--	<1	<1	<1	--
1,2,4-Trichlorobenzene	NE	NE	70 ^{5}	--	--	--	<1	<1	<1	--
1,2,4-Trimethylbenzene	NE	400	NE	--	--	--	<1	**2.1**	<1	--
1,2-Dibromo-3-Chloropropane	NE	0.031	NE	--	--	--	<1	<1	<1	--
1,2-Dichlorobenzene	NE	720	1,300 ^{5}	--	--	--	<1	<1	<1	--
1,2-Dichloroethane	5	0.48	37 ^{5}	--	--	--	<1	<1	<1	--
1,2-Dichloropropane	NE	0.64	15 ^{5}	--	--	--	<1	<1	<1	--
1,3,5-Trimethylbenzene	NE	400	NE	--	--	--	<1	<1	<1	--
1,3-Dichlorobenzene	NE	NE	960 ^{5}	--	--	--	<1	<1	<1	--
1,3-Dichloropropane	NE	NE	19 ^{6}	--	--	--	<1	<1	<1	--
1,4-Dichlorobenzene	NE	1.8	4.9 ^{6}	--	--	--	<1	<1	<1	--
2,2-Dichloropropane	NE	NE	NE	--	--	--	<1	<1	<1	--
2-Butanone	NE	4,800	NE	--	--	--	<10	<10	<10	--
2-Chlorotoluene	NE	160	NE	--	--	--	<1	<1	<1	--
2-Hexanone	NE	NE	NE	--	--	--	<1	<1	<1	--
4-Chlorotoluene	NE	160	NE	--	--	--	<1	<1	<1	--
Acetone	NE	800	NE	--	--	--	<10	<10	<10	--
Benzene	5	0.8	23 ^{6}	--	--	--	<1	<1	<1	--
Bromobenzene	NE	NE	NE	--	--	--	<1	<1	<1	--
Bromochloromethane	NE	0.52	13 ^{5}	--	--	--	<1	<1	<1	--
Bromoform	NE	5.5	140 ^{5}	--	--	--	<1	<1	<1	--
Bromomethane	NE	11	970 ^{6}	--	--	--	<1	<1	<1	--
Carbon Tetrachloride	NE	0.34	1.6 ^{6}	--	--	--	<1	<1	<1	--
CFC-11	NE	2,400	NE	--	--	--	<1	<1	<1	--
CFC-12	NE	2,400	NE	--	--	--	<1	<1	<1	--
Chlorobenzene	NE	160	1,600 ^{6}	--	--	--	<1	<1	<1	--
Chloroethane	NE	160	1,600 ^{6}	--	--	--	<1	<1	<1	--
Chloroform	NE	7.2	280 ^{6}	--	--	--	<1	<1	<1	--
Chloromethane	NE	3.4	130 ^{6}	--	--	--	<1	<1	<1	--
Cis-1,2-Dichloroethene	NE	NE	NE	--	--	--	<1	<1	<1	--
Cis-1,3-Dichloropropene	NE	0.24	196	--	--	--	<1	<1	<1	--
Dibromochloromethane	NE	0.52	13 ^{5}	--	--	--	<1	<1	<1	--
Dibromodichloromethane	NE	NE	NE	--	--	--	<1	<1	<1	--
Dibromomethane	NE	80	NE	--	--	--	<1	<1	<1	--
Dichloroethylenes	NE	NE	NE	--	--	--	<1	<1	<1	--
Ethylbenzene	NE	80	NE	--	--	--	<1	**1.2**	<1	--
Ethylene dibromide	0.01	NE	NE	--	--	--	<0.1	<0.01	<0.01	--
Hexachlorobutadiene	NE	80	NE	--	--	--	<1	<1	<1	--
Isopropylbenzene (Cumene)	NE	80	NE	--	--	--	<1	<1	<1	--
Methyl isobutyl ketone	NE	NE	NE	--	--	--	<1	<1	<1	--
Methyl t-butyl ether	20	24	NE	--	--	--	<1	<1	<1	--
Methylene Chloride	5	5.8	590 ^{5}	--	--	--	<10	<10	<10	--
Naphthalene	160	160	4,900 ^{6}	--	--	--	<1	<1	<1	--
n-Butylbenzene	NE	NE	NE	--	--	--	<1	<1	<1	--
n-Propylbenzene	NE	NE	NE	--	--	--	<1	<1	<1	--
p-Isopropyltoluene	NE	NE	NE	--	--	--	<1	<1	<1	--
Sec-Butylbenzene	NE	NE	NE	--	--	--	<1	<1	<1	--
Styrene	NE	1.5	NE	--	--	--	**1.6**	<1	<1	--
Tert-Butylbenzene	NE	NE	NE	--	--	--	<1	<1	<1	--
Tetrachloroethene	NE	1.5	NE	--	--	--	<1	<1	<1	--
Toluene	1,000	640	15,000 ^{5}	--	--	--	**4**	**5.3**	<1	--
Total Xylenes	1,000	1,600	NE	--	--	--	<1	**8.2**	<1	--
Trans-1,2-Dichloroethene	NE	NE	10,000 ^{5}	--	--	--	<1	<1	<1	--

Analyte	Groundwater Cleanup Levels		Surface Water Criteria[2]	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
	MTCA[1] Method A	MTCA Method B		7/11/2006	7/11/2006	7/11/2006	7/11/2006	7/11/2006	7/11/2006	7/11/2006
Trans-1,3-Dichloropropene	NE	NE	19 [6]	--	--	--	<1	<1	<1	--
Trichloroethene	5	0.49	1.5 [6]	--	--	--	<1	<1	<1	--
Vinyl Chloride	0.2	0.029	2.4 [5]	--	--	--	<0.2	<0.2	<0.2	--
PAHs (µg/l)										
1-Methylnaphthalene	NE	NE	NE	--	--	--	<0.1	--	<0.1	--
2-Methylnaphthalene	NE	32	NE	--	--	--	<0.1	--	<0.1	--
Acenaphthene	NE	960	640 [6]	--	--	--	<0.1	--	<0.1	--
Anthracene	NE	4,800	26,000 [6]	--	--	--	<0.1	--	<0.1	--
Benz[a]anthracene	NE	4,800	26,000 [6]	--	--	--	<0.1	--	<0.1	--
Benzo(a)pyrene[3]	0.1	0.012	0.018 [5]	--	--	--	<0.1	--	<0.1	--
Benzo(b)fluoranthene[3]	NE	NE	0.018 [5]	--	--	--	<0.1	--	<0.1	--
Benzo(ghi)perylene[3]	NE	NE	NE	--	--	--	<0.1	--	<0.1	--
Benzo(k)fluoranthene[3]	NE	NE	NE	--	--	--	<0.1	--	<0.1	--
Chrysene[3]	NE	NE	0.018 [5]	--	--	--	<0.1	--	<0.1	--
Dibenzo(a,h)anthracene[3]	NE	NE	0.018 [5]	--	--	--	<0.1	--	<0.1	--
Fluoranthene	NE	NE	0.018 [5]	--	--	--	<0.1	--	**0.3**	--
Fluorene	NE	640	3,500 [6]	--	--	--	<0.1	--	<0.1	--
Indeno(1,2,3-cd)pyrene	NE	NE	0.018 [5]	--	--	--	<0.1	--	<0.1	--
Naphthalene	160	160	4,900 [6]	--	--	--	<0.1	--	<0.1	--
Phenanthrene	NE	NE	NE	--	--	--	<0.1	--	<0.1	--
Pyrene	NE	480	2,600 [6]	--	--	--	<0.1	--	**0.3**	--
PCBs (µg/l)										
PCB-aroclor 1016	NE	NE	NE	--	--	--	--	--	<0.1	--
PCB-aroclor 1221	NE	NE	NE	--	--	--	--	--	<0.1	--
PCB-aroclor 1232	NE	NE	NE	--	--	--	--	--	<0.1	--
PCB-aroclor 1242	NE	NE	NE	--	--	--	--	--	<0.1	--
PCB-aroclor 1248	NE	NE	NE	--	--	--	--	--	<0.1	--
PCB-aroclor 1254	NE	NE	NE	--	--	--	--	--	<0.1	--
PCB-aroclor 1260	NE	NE	NE	--	--	--	--	--	<0.1	--
Total PCBs	0.1	0.044	0.1[8]	--	--	--	--	--	<0.1	--

Notes:

[1] Model Toxics Control Act (MTCA) (WAC 173-340-730).

[2] Lowest surface water criteria from Background Concentrations of Selected Chemicals in Water (PTI, 1989), Water Quality Standards for surface waters of the State of Washington (WAC 173-201A), National Recommended Water Quality Criteria (Section 304 of the Clean Water Act), National Toxics Rule (40 CFR Part 131.36), and the Model Toxics Control Act (MTCA) Method B Surface Water Cleanup Levels (WAC 173-340-730).

[3] The compound is a Carcinogenic Polycyclic aromatic hydrocarbon.

[4] Washington State Groundwater Background Concentrations.

[5] National Recommended Water Quality Criteria

[6] MTCA Method B non-Carcinogen

[7] National Toxics Rule

[8] Laboratory reporting limit higher than some standards; reporting limit used.

B = The compound was found in the blank and sample

NE = Indicates there is no applicable cleanup criteria established.

TPH = Total Petroleum Hydrocarbons

VOCs = Volatile organic compounds

PAHs= Polycyclic Aromatic Hydrocarbons

PCBs= Polychlorinated Biphyenyls

µg/l = microgram per liter

y = Laboratory indicated that the pattern of peaks present is not indicative of motor oil

lc = The analyte is a common laboratory contaminant

Values presented in **bold** indicate that the chemical was detected in the specific sample.

Highlighted items indicate that the chemical concentration is greater than the MTCA cleanup level

TABLE A-3
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS (OCTOBER 2006)
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Analyte	Groundwater Cleanup Levels MTCA[1] Method A	Groundwater Cleanup Levels MTCA Method B	Surface Water Criteria[2]	MW-1 10/28/2006	MW-2 10/28/2006	MW-3 10/28/2006	MW-4 10/28/2006	MW-5 10/28/2006	MW-6 10/28/2006	MW-7 10/28/2006
Total Metals (µg/l)										
Arsenic	5	0.000058	8 [4]	<2	<2	<2	<2	**23**	<2	<2
Barium	NE	3,200	NE	**8**	<2	<2	<2	**14**	**140**	**65**
Cadmium	5	8	8.8 [5]	<3	<3	<3	<3	<3	<3	<3
Chromium	50	NE	240,000 [6]	<7	<7	<7	<7	<7	<7	<7
Lead	15	NE	10 [4]	<1	<1	<1	<1	**2**	**7**	**3**
Mercury	2	4.8	0.025 [7]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Selenium	NE	80	71[7]	<50	<50	<50	<50	<50	<50	<50
Silver	NE	80	26,000[6]	<7	<7	<7	<7	<7	<7	<7
Zinc	NE	4,800	160 [4]	<6	<6	<6	<6	**37**	<6	<6
Dissolved Metals (µg/l)										
Barium	NE	3,200	NE	**6**	--	--	--	**9**	**130**	**64**
Zinc	NE	4,800	160 [4]	--	--	--	--	<6	--	--
TPH (µg/l)										
Gasoline Range	1,000	NE	NE	--	--	--	--	<100	--	<100
Diesel Range	500	NE	NE	--	--	--	**2,600**	<200	--	<200
Heavy Oil Range	500	NE	NE	--	--	--	<400	<400	--	<400
Mineral Oil	500	NE	NE	--	--	--	<400	<400	--	<400
VOCs (µg/l)										
1,1,1,2-Tetrachloroethane	NE	1.7	130 [6]	--	--	--	--	<1	--	<1
1,1,1-Trichloroethane	200	7,200	NE	--	--	--	--	<1	--	<1
1,1,2,2-Tetrachloroethane	NE	22	420,000 [6]	--	--	--	--	<1	--	<1
1,1,2-Trichloroethane	NE	0.77	4 [6]	--	--	--	--	<1	--	<1
1,1-Dichloroethane	NE	1,600	16 [6]	--	--	--	--	<1	--	<1
1,1-Dichloropropene	NE	NE	NE	--	--	--	--	--	--	--
1,2,3-Trichlorobenzene	NE	NE	NE	--	--	--	--	--	--	--
1,2,3-Trichloropropane	NE	0.0063	NE	--	--	--	--	<1	--	<1
1,2,4-Trichlorobenzene	NE	NE	70 [5]	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene	NE	400	NE	--	--	--	--	--	--	--
1,2-Dibromo-3-Chloropropane	NE	0.031	NE	--	--	--	--	--	--	--
1,2-Dichlorobenzene	NE	720	1,300 [5]	--	--	--	--	<1	--	<1
1,2-Dichloroethane	5	0.48	37 [5]	--	--	--	--	<1	--	<1
1,2-Dichloropropane	NE	0.64	15 [5]	--	--	--	--	<1	--	<1
1,3,5-Trimethylbenzene	NE	400	NE	--	--	--	--	--	--	--
1,3-Dichlorobenzene	NE	NE	960 [5]	--	--	--	--	<1	--	<1
1,3-Dichloropropane	NE	NE	19 [6]	--	--	--	--	--	--	--
1,4-Dichlorobenzene	NE	1.8	4.9 [6]	--	--	--	--	<1	--	<1
2,2-Dichloropropane	NE	NE	NE	--	--	--	--	--	--	--
2-Butanone	NE	4,800	NE	--	--	--	--	--	--	--
2-Chlorotoluene	NE	160	NE	--	--	--	--	--	--	--
2-Hexanone	NE	NE	NE	--	--	--	--	--	--	--
4-Chlorotoluene	NE	160	NE	--	--	--	--	--	--	--
Acetone	NE	800	NE	--	--	--	--	--	--	--
Benzene	5	0.8	23 [6]	--	--	--	--	<1	--	<1
Bromobenzene	NE	NE	NE	--	--	--	--	<1	--	<1
Bromochloromethane	NE	0.52	13 [5]	--	--	--	--		--	
Bromoform	NE	5.5	140 [5]	--	--	--	--	<1	--	<1
Bromomethane	NE	11	970 [6]	--	--	--	--	<1	--	<1
Carbon Tetrachloride	NE	0.34	1.6 [6]	--	--	--	--	<1	--	<1
CFC-11	NE	2,400	NE	--	--	--	--	--	--	--
CFC-12	NE	2,400	NE	--	--	--	--	--	--	--
Chlorobenzene	NE	160	1,600 [6]	--	--	--	--	<1	--	<1
Chloroethane	NE	160	1,600 [6]	--	--	--	--	<1	--	<1
Chloroform	NE	7.2	280 [6]	--	--	--	--	<1	--	<1
Chloromethane	NE	3.4	130 [6]	--	--	--	--	<1	--	<1
Cis-1,2-Dichloroethene	NE	NE	NE	--	--	--	--	<1	--	<1
Cis-1,3-Dichloropropene	NE	0.24	196	--	--	--	--	<1	--	<1
Dibromochloromethane	NE	0.52	13 [5]	--	--	--	--	<1	--	<1
Dibromodichloromethane	NE	NE	NE	--	--	--	--	<1	--	<1
Dibromomethane	NE	80	NE	--	--	--	--	<1	--	<1
Dichloroethylenes	NE	NE	NE	--	--	--	--	<1	--	<1
Ethylbenzene	NE	80	NE	--	--	--	--	<1	--	<1
Ethylene dibromide	0.01	NE	NE	--	--	--	--	--	--	--
Hexachlorobutadiene	NE	80	NE	--	--	--	--	--	--	--
Isopropylbenzene (Cumene)	NE	80	NE	--	--	--	--	--	--	--
Methyl isobutyl ketone	NE	NE	NE	--	--	--	--	--	--	--
Methyl t-butyl ether	20	24	NE	--	--	--	--	<1	--	<1
Methylene Chloride	5	5.8	590 [5]	--	--	--	--	<1	--	<1
Naphthalene	160	160	4,900 [6]	--	--	--	--	--	--	--
n-Butylbenzene	NE	NE	NE	--	--	--	--	--	--	--
n-Propylbenzene	NE	NE	NE	--	--	--	--	--	--	--
p-Isopropyltoluene	NE	NE	NE	--	--	--	--	--	--	--
Sec-Butylbenzene	NE	NE	NE	--	--	--	--	--	--	--
Styrene	NE	1.5	NE	--	--	--	--	--	--	--
Tert-Butylbenzene	NE	NE	NE	--	--	--	--	--	--	--

Analyte	Groundwater Cleanup Levels		Surface Water Criteria[2]	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
	MTCA[1] Method A	MTCA Method B		10/28/2006	10/28/2006	10/28/2006	10/28/2006	10/28/2006	10/28/2006	10/28/2006
Tetrachloroethene	NE	1.5	NE	--	--	--	--	<1	--	<1
Toluene	1,000	640	15,000 [5]	--	--	--	--	<1	--	<1
Total Xylenes	1,000	1,600	NE	--	--	--	--	<1	--	<1
Trans-1,2-Dichloroethene	NE	NE	10,000 [5]	--	--	--	--	<1	--	<1
Trans-1,3-Dichloropropene	NE	NE	19 [6]	--	--	--	--	<1	--	<1
Trichloroethene	5	0.49	1.5 [6]	--	--	--	--	<1	--	<1
Vinyl Chloride	0.2	0.029	2.4 [5]	--	--	--	--	<1	--	<1

Notes:

[1] Model Toxics Control Act (MTCA) (WAC 173-340-730).

[2] Lowest surface water criteria from Background Concentrations of Selected Chemicals in Water (PTI, 1989), Water Quality Standards for surface waters of the State of Washington (WAC 173-201A), National Recommended Water Quality Criteria (Section 304 of the Clean Water Act), National Toxics Rule (40 CFR Part 131.36), and the Model Toxics Control Act (MTCA) Method B Surface Water Cleanup Levels (WAC 173-340-730).

[3] Total Metals

[4] Washington State Groundwater Background Concentrations.

[5] National Recommended Water Quality Criteria

[6] MTCA Method B non-Carcinogen

[7] National Toxics Rule

[8] Laboratory reporting limit higher than some standards; reporting limit used.

B = The compound was found in the blank and sample

NE = Indicates there is no applicable cleanup criteria established.

TPH = Total Petroleum Hydrocarbons

VOCs = Volatile organic compounds

µg/l = microgram per liter

y = Laboratory indicated that the pattern of peaks present is not indicative of motor oil

lc = The analyte is a common laboratory contaminant

Values presented in **bold** indicate that the chemical was detected in the specific sample.

Highlighted items indicate that the chemical concentration is greater than the MTCA cleanup level

TABLE A-4
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS (FEBRUARY 2007)
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Analyte	Groundwater Cleanup Levels		Surface Water Criteria[2]	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
	MTCA[1] Method A	MTCA Method B		2/7/2007	2/7/2007	2/7/2007	2/7/2007	2/7/2007	2/7/2007	2/7/2007
Total Metals (µg/l)										
Arsenic	5	0.000058	8 [4]	<2	**4**	<2	<2	**12**	**3**	**4**
Barium	NE	3,200	NE	**9**	**24**	**12**	**10**	**18**	**130**	**81**
Cadmium	5	8	8.8 [5]	<3	<3	<3	<3	<3	<3	<3
Chromium	50	NE	240,000 [6]	<7	<7	<7	<7	<7	<7	<7
Lead	15	NE	10 [4]	<1	<4	<1	<1	<1	<1	<1
Mercury	2	4.8	0.025 [7]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Selenium	NE	80	71[7]	<50	<50	<50	<50	<50	<50	<50
Silver	NE	80	26,000[6]	<7	<7	<7	<7	<7	<7	<7
Zinc	NE	4,800	160 [4]	<6	**31**	**11**	**16**	**33**	**52**	**8**
TPH (µg/l)										
Gasoline Range	1,000	NE	NE	--	--	--	--	--	<100	--
Diesel Range	500	NE	NE	--	--	--	**27,000**	<200	<200	<200
Heavy Oil Range	500	NE	NE	--	--	--	<400	<400	<400	<400
Mineral Oil	500	NE	NE	--	--	--	<400	<400	<400	<400
VOCs (µg/l)										
1,1,1,2-Tetrachloroethane	NE	1.7	130 [6]	--	--	--	--	--	<1	--
1,1,1-Trichloroethane	200	7,200	NE	--	--	--	--	--	<1	--
1,1,2,2-Tetrachloroethane	NE	22	420,000 [6]	--	--	--	--	--	<1	--
1,1,2-Trichloroethane	NE	0.77	4 [6]	--	--	--	--	--	<1	--
1,1-Dichloroethane	NE	1,600	16 [6]	--	--	--	--	--	<1	--
1,1-Dichloropropene	NE	NE	NE	--	--	--	--	--	--	--
1,2,3-Trichlorobenzene	NE	NE	NE	--	--	--	--	--	--	--
1,2,3-Trichloropropane	NE	0.0063	NE	--	--	--	--	--	<1	--
1,2,4-Trichlorobenzene	NE	NE	70 [5]	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene	NE	400	NE	--	--	--	--	--	--	--
1,2-Dibromo-3-Chloropropane	NE	0.031	NE	--	--	--	--	--	--	--
1,2-Dichlorobenzene	NE	720	1,300 [5]	--	--	--	--	--	<1	--
1,2-Dichloroethane	5	0.48	37 [5]	--	--	--	--	--	<1	--
1,2-Dichloropropane	NE	0.64	15 [5]	--	--	--	--	--	<1	--
1,3,5-Trimethylbenzene	NE	400	NE	--	--	--	--	--	--	--
1,3-Dichlorobenzene	NE	NE	960 [5]	--	--	--	--	--	<1	--
1,3-Dichloropropane	NE	NE	19 [6]	--	--	--	--	--	--	--
1,4-Dichlorobenzene	NE	1.8	4.9 [6]	--	--	--	--	--	<1	--
2,2-Dichloropropane	NE	NE	NE	--	--	--	--	--	--	--
2-Butanone	NE	4,800	NE	--	--	--	--	--	--	--
2-Chlorotoluene	NE	160	NE	--	--	--	--	--	--	--
2-Hexanone	NE	NE	NE	--	--	--	--	--	--	--
4-Chlorotoluene	NE	160	NE	--	--	--	--	--	--	--
Acetone	NE	800	NE	--	--	--	--	--	--	--
Benzene	5	0.8	23 [6]	--	--	--	--	--	<1	--
Bromobenzene	NE	NE	NE	--	--	--	--	--	<1	--
Bromochloromethane	NE	0.52	13 [5]	--	--	--	--	--		--
Bromoform	NE	5.5	140 [5]	--	--	--	--	--	<1	--
Bromomethane	NE	11	970 [6]	--	--	--	--	--	<1	--
Carbon Tetrachloride	NE	0.34	1.6 [6]	--	--	--	--	--	<1	--
CFC-11	NE	2,400	NE	--	--	--	--	--	--	--
CFC-12	NE	2,400	NE	--	--	--	--	--	--	--
Chlorobenzene	NE	160	1,600 [6]	--	--	--	--	--	<1	--
Chloroethane	NE	160	1,600 [6]	--	--	--	--	--	<1	--
Chloroform	NE	7.2	280 [6]	--	--	--	--	--	<1	--
Chloromethane	NE	3.4	130 [6]	--	--	--	--	--	<1	--
Cis-1,2-Dichloroethene	NE	NE	NE	--	--	--	--	--	<1	--
Cis-1,3-Dichloropropene	NE	0.24	196	--	--	--	--	--	<1	--
Dibromochloromethane	NE	0.52	13 [5]	--	--	--	--	--	<1	--
Dibromodichloromethane	NE	NE	NE	--	--	--	--	--	<1	--
Dibromomethane	NE	80	NE	--	--	--	--	--	<0.1	--
Dichloroethylenes	NE	NE	NE	--	--	--	--	--	<1	--
Ethylbenzene	NE	80	NE	--	--	--	--	--	<1	--
Ethylene dibromide	0.01	NE	NE	--	--	--	--	--	--	--
Hexachlorobutadiene	NE	80	NE	--	--	--	--	--	--	--
Isopropylbenzene (Cumene)	NE	80	NE	--	--	--	--	--	--	--
Methyl isobutyl ketone	NE	NE	NE	--	--	--	--	--	--	--
Methyl t-butyl ether	20	24	NE	--	--	--	--	--	<1	--
Methylene Chloride	5	5.8	590 [5]	--	--	--	--	--	<10	--
Naphthalene	160	160	4,900 [6]	--	--	--	--	--	--	--
n-Butylbenzene	NE	NE	NE	--	--	--	--	--	--	--
n-Propylbenzene	NE	NE	NE	--	--	--	--	--	--	--
p-Isopropyltoluene	NE	NE	NE	--	--	--	--	--	--	--
Sec-Butylbenzene	NE	NE	NE	--	--	--	--	--	--	--
Styrene	NE	1.5	NE	--	--	--	--	--	--	--
Tert-Butylbenzene	NE	NE	NE	--	--	--	--	--	--	--
Tetrachloroethene	NE	1.5	NE	--	--	--	--	--	<1	--
Toluene	1,000	640	15,000 [5]	--	--	--	--	--	<1	--

Analyte	Groundwater Cleanup Levels		Surface Water Criteria[2]	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
	MTCA[1] Method A	MTCA Method B		2/7/2007	2/7/2007	2/7/2007	2/7/2007	2/7/2007	2/7/2007	2/7/2007
Total Xylenes	1,000	1,600	NE	--	--	--	--	--	**3.4**	--
Trans-1,2-Dichloroethene	NE	NE	10,000 [5]	--	--	--	--	--	<1	--
Trans-1,3-Dichloropropene	NE	NE	19 [6]	--	--	--	--	--	<1	--
Trichloroethene	5	0.49	1.5 [6]	--	--	--	--	--	<1	--
Vinyl Chloride	0.2	0.029	2.4 [5]	--	--	--	--	--	<0.2	--

Notes:

[1] Model Toxics Control Act (MTCA) (WAC 173-340-730).

[2] Lowest surface water criteria from Background Concentrations of Selected Chemicals in Water (PTI, 1989), Water Quality Standards for surface waters of the State of Washington (WAC 173-201A), National Recommended Water Quality Criteria (Section 304 of the Clean Water Act), National Toxics Rule (40 CFR Part 131.36), and the Model Toxics Control Act (MTCA) Method B Surface Water Cleanup Levels (WAC 173-340-730).

[3] Total Metals

[4] Washington State Groundwater Background Concentrations.

[5] National Recommended Water Quality Criteria

[6] MTCA Method B non-Carcinogen

[7] National Toxics Rule

[8] Laboratory reporting limit higher than some standards; reporting limit used.

B = The compound was found in the blank and sample

NE = Indicates there is no applicable cleanup criteria established.

TPH = Total Petroleum Hydrocarbons

VOCs = Volatile organic compounds

µg/l = microgram per liter

y = Laboratory indicated that the pattern of peaks present is not indicative of motor oil

lc = The analyte is a common laboratory contaminant

Values presented in **bold** indicate that the chemical was detected in the specific sample.

Highlighted items indicate that the chemical concentration is greater than the MTCA cleanup level

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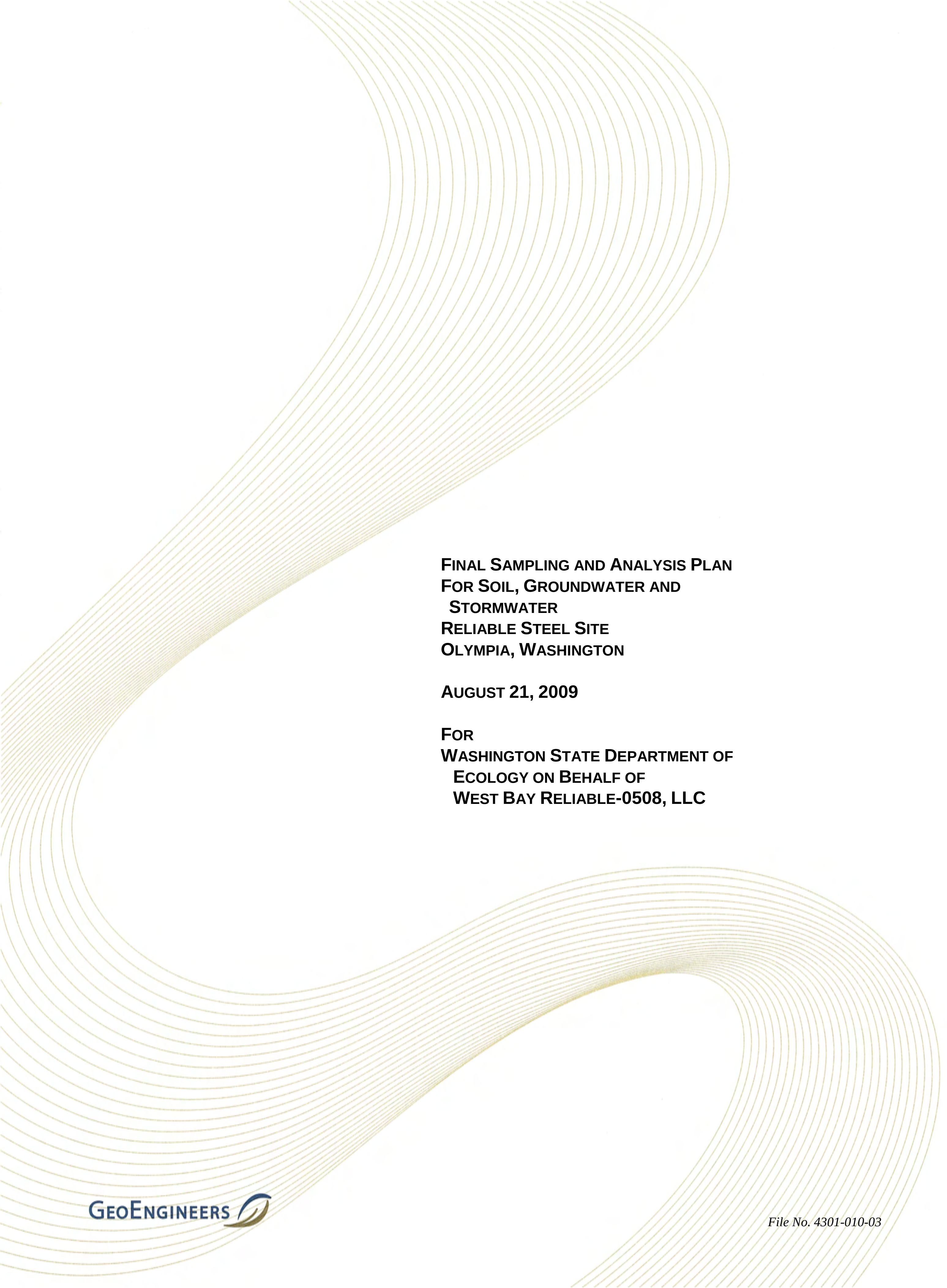
APPENDIX B

FINAL SAMPLING AND ANALYSIS PLAN FOR SOIL, GROUNDWATER AND STORMWATER



FINAL SAMPLING AND ANALYSIS PLAN FOR SOIL, GROUNDWATER AND STORMWATER
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

AUGUST 21, 2009

FOR
WASHINGTON STATE DEPARTMENT OF ECOLOGY ON BEHALF OF
WEST BAY RELIABLE-0508, LLC

GEOENGINEERS

File No. 4301-010-03

Final Sampling and Analysis Plan
Soil, Groundwater and Stormwater
File No. 4301-010-03

August 21, 2009

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RELIABLE STEEL SITE
OLYMPIA, WASHINGTON
FOR
WASHINGTON STATE DEPARTMENT OF ECOLOGY ON BEHALF OF
WEST BAY RELIABLE-0508, LLC

1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) summarizes field procedures for conducting site investigation activities as part of a remedial investigation (RI) at the Reliable Steel Site (Site) located in Olympia, Washington. The RI is being proposed by West Bay Reliable-0508, LLC. Objectives of the RI are discussed in the Work Plan. The purpose of the sampling is to further delineate the nature and extent of soil, groundwater, stormwater and sediment contamination at the Site and to fill data gaps identified from review of data from previous studies. The SAP will be used in conjunction with the RI Work Plan and Health and Safety Plan (HASP).

Detailed descriptions of soil, groundwater and stormwater sampling procedures are provided in this document. Sediment sampling is described in a separate SAP. Site conditions may make it necessary to modify the procedures described in this SAP. Substantial variations or modifications that become necessary during the investigation are to be coordinated with West Bay Reliable-0508, LLC, the Washington State Department of Ecology (Ecology) and other involved parties as appropriate. Variations or modifications implemented during the investigation and the reason for the modification will be documented in field records.

The purpose of this SAP is to describe field activities, sampling equipment, sampling locations and procedures that will be used during this investigation. This SAP also identifies quality assurance/ quality control (QA/QC) procedures that will be implemented during sampling activities and laboratory analyses.

2.0 EXCAVATION

A backhoe operator will be subcontracted to investigate the suspected calcium carbide waste UST located west of the Maintenance Building. Soil removed from the excavation will be temporarily stockpiled on durable plastic sheeting adjacent to the excavation. If necessary, the soil will be covered with additional sheeting to prevent exposure to rainfall. The HASP (Appendix D) describes safety measures to be taken during excavation work. Caution will be exercised to prevent a release from the UST. An Ecology registered UST Site Assessor will be on Site during excavation activities. If a UST is discovered, an RI addendum will be written to address further investigation, closing, removal etc. of the UST. Any removal or closure of USTs will be performed in general accordance with Ecology's *Guidance for Site Checks and Site Assessments for Underground Storage Tanks.*

3.0 DIRECT PUSH SOIL BORINGS

3.1 BORING LOCATIONS

The Proposed locations for 30 borings are shown on Figure 5 of the RI Work Plan. In general, borings will be performed as close as possible to the proposed locations; however, field conditions or observations may make it necessary or prudent to adjust boring locations. Boring locations will be determined and mapped using either hand-held global positioning (GPS) equipment, or by measuring distances in the field using a measuring tape.

3.2 BORING DEPTHS

Borings will be advanced to at least 4 feet beyond the depth of where contamination is anticipated to be present at a sample location (based on field screening – described in Section 3.4). If field screening does not indicate the presence of contamination, borings will be advanced to at least 8 feet below ground surface (bgs). Additionally, approximately five borings will be selected to be drilled to 20 feet bgs to further characterize the subsurface geology at the Site.

3.3 DRILLING AND SAMPLING PROCEDURES

Soil cores will be collected either from borings advanced using direct-push drilling equipment or by use of a hand auger. Continuous soil cores will be obtained from the direct-push borings using a 2-inch to 2.5-inch-diameter soil sampler with disposable acetate liners. The soil sampler will be cleaned prior to each sampling attempt with an Alconox wash, a tap water rinse and a distilled water rinse. The sampler will be handled with clean, disposable gloves during sample collection.

Cores will be advanced in 4-foot intervals (or less, as appropriate) by using 1.5-inch-diameter drilling rods. The drilling rods are driven with a pneumatic hammer. After the first core is obtained in a boring, subsequent drilling utilizes a drive point to prevent soil from entering the sampler until the sampler is driven to the depth achieved during the last interval. The drive point is then removed and the next interval is drilled.

Soil cores obtained from the borings will be visually classified in general accordance with the American Society for Testing and Materials (ASTM) Standard D 2488. The cores will also be evaluated for the presence of contaminants of concern at the Site using field screening techniques described in Section 2.4. Observations of soil and groundwater conditions and soil field screening results for each exploration will be included on a boring log.

Soil samples will be obtained from soil cores and submitted for chemical analysis and/or archiving. The rationale for collecting specific samples for analyses of the various Site COPCs and sample depth interval are presented in Tables 9 and 10 of the RI/FS Work Plan. Samples will be selected for analysis based on field screening results, elevation relative to samples collected during previous Site investigations, and/or depth relative to the groundwater table. If field screening indicates the presence of contamination, samples will be submitted for analysis from the locations where contamination is suspected of being present. Samples will also be submitted from soil present at a depth beneath the area of suspected contamination to help define the vertical extent of contamination.

Samples selected for analysis and/or archiving will be placed in containers provided by the analytical laboratory and logged on the chain-of-custody using the procedures described in the QAPP. Each sample container will be securely capped, labeled, and placed in a cooler with ice immediately upon collection. Investigation-derived waste will be stored in labeled 55-gallon drums at the Site for subsequent characterization and off-site disposal. Section 6.3 addresses the disposal of investigation-derived waste materials including soil and water.

Soil samples collected during the RI will be submitted for a combination of the following analyses:

- Metals including arsenic, cadmium, chromium, copper, lead, mercury, tin and zinc using EPA Methods 6010/7060/7470/7471/7421. Samples with greater than 19 mg/kg chromium will be re-analyzed for hexavalent chromium;
- Diesel- and heavy oil-range petroleum hydrocarbons by Ecology Method NWTPH-Dx with silica gel/acid wash cleanup;
- Gasoline-range petroleum hydrocarbons by Ecology Method NWTPH-Gx;
- Benzene, toluene, ethylbenzene and total xylenes (BTEX) by EPA Method 8021;
- VOCs by EPA Method 8260;
- SVOCs (including cPAHs) by EPA Method 8270;
- PCBs by EPA Method 8082 (modified); and
- pH for samples identified to contain calcium carbide waste using SW-846 9045.

Samples collected for VOC analysis will be collected and prepared using EPA Method 5035A.

The specific analyses to be completed for soil samples collected from each boring are described in Table 9 of the Work Plan.

3.4 FIELD SCREENING

Soil samples will be field screened for evidence of possible hydrocarbon, VOC, slag and metal, and calcium carbide waste contamination. Field screening results will be recorded on the field logs and the results will be used as a general guideline to delineate areas of possible contamination. Screening results will be used to aid in the selection of soil samples to be submitted for chemical analysis and/or archiving. The following screening methods will be used (in the order presented): 1) visual and olfactory screening; 2) headspace vapor screening; 3) water sheen screening; 4) magnet screening; and 5) dilute hydrochloric acid (HCl) screening. Field screening results are site- and location-specific. The results may vary with temperature, moisture content, soil type and chemical constituent.

3.4.1 Visual and Olfactory Screening

The soil will be observed for unusual color and stains and/or odor indicative of possible contamination from petroleum hydrocarbons or calcium carbide waste resulting from acetylene generation. The waste sludge is reported to exist as white layers visible in soil at the Site (DOF, 2007).

3.4.2 Headspace Vapor Screening

This is a semi-quantitative field screening method that can help identify the presence or absence of volatile chemicals. If visual and/or olfactory screening indicate the obvious presence of petroleum hydrocarbons or volatile chemicals in a portion of the soil core, approximately 50 grams of soil from will be collected from that portion of the core and placed into a re-sealable bag for headspace vapor screening. If visual and/or olfactory screening do not indicate the presence of contamination, the soil core will be divided into 1-foot-long (approximate) intervals. Approximately 50 grams of soil from each interval will be composited into a re-sealable plastic bag for headspace vapor screening.

For headspace vapor screening, ambient air is captured in the bag; the bag is sealed and then shaken gently to expose the soil to the air trapped in the bag. Vapors present within the sample bag's headspace are measured by inserting the probe of a photoionization detector (PID) through a small opening in the bag. A PID measures the concentration of organic vapors ionizable by a 10.6 electron volt (eV) lamp in parts per million (ppm) and quantifies organic vapor concentrations in the range between 0.1 ppm and 2,000 ppm (isobutylene equivalent) with an accuracy of 1 ppm between 0 ppm and 100 ppm. The maximum ppm value and the ambient air temperature will be recorded on the field log for each sample. The PID will be calibrated at the beginning of each day of field work and additionally as necessary using a 100 ppm isobutylene calibration gas.

3.4.3 Water Sheen Screening

This is a qualitative field screening method that can help identify the presence of petroleum hydrocarbons. The soil core will be divided into approximate 1-foot-long intervals. Approximately 50 grams of the soil core from each 1-foot-long section will be placed in a pan containing distilled water. The water surface will be observed for signs of sheen. The following sheen classifications will be used:

Classification	Identifier	Description
No Sheen	(NS)	No visible sheen on the water surface
Slight Sheen	(SS)	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly
Moderate Sheen	(MS)	Light to heavy sheen; may have some color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on the water surface
Heavy Sheen	(HS)	Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen

3.4.4 Magnet Screening

Welding slag and metal debris may be present in soil at the Site. If visual screening indicates the presence of slag and metal debris magnet screening will be performed on the soil. A magnet will be used to screen soil for the presence of slag and/or metal debris. Approximately 50 grams of soil will be collected from each 1-foot section of the soil sampler and placed in a disposable plastic re-sealable bag. The soil will be broken up in the bag and the bag will be placed on a flat surface to disperse the soil. A magnet will be moved along the top of the bag, and the soil will be observed for the presence magnetizable metals.

3.4.5 Dilute HCl Screening

Calcium carbide sludge was previously identified to be present at the Site. If visual screening indicates the presence of white material, approximately 10 grams of soil will be collected from each 1-foot section the soil sampler and composited in a clean stainless steel bowl. Approximately 10 milliliters (mL) of dilute HCl will be added to the soil and the soil will be observed for signs of effervescence.

3.5 MONITORING WELL INSTALLATION

An additional groundwater monitoring well (MW-10) may be installed at the location of RI-30 (see Figure 5 of the Work Plan) if field screening results indicate the likely presence of petroleum hydrocarbon contamination in RI-30. If a well is installed it will be installed in general accordance with WAC 173-160, *Minimum Standards for Construction and Maintenance of Wells.* The general method by which the well would be installed is as follows:

- After removing the 2.5-inch soil sampling equipment, the driller will over-bore the bore hole using 4-inch outside diameter casing to the desired depth (most likely 8 to 12 feet bgs based on field observations such as soil type and depth to groundwater). A sacrificial drive point will be used on the bottom end of the casing.

- A 5-foot-long, 1-inch-diameter pre-packed stainless well screen will be installed, and 10-20 silica sand will be poured around the well screen as the casing is removed (the sacrificial drive point will remain at the base of the well).
- A bentonite seal and concrete surface seal will be installed as per WAC 173-160.
- The well will be developed as per WAC 173-160.

4.0 GROUNDWATER MONITORING

4.1 PRE-SAMPLING

Before sampling, all well monuments will be opened and the wells will be inspected. A monitoring well inspection form will be recorded for each well.

To evaluate tidal influence on groundwater, two rounds of water level measurements will be performed; one round at a low tide with an elevation of 0 feet mean lower low water (MLLW) or lower and one round at a high tide with an elevation of 10 feet MLLW or higher. Depth to water in all wells will be measured as close to concurrently as is feasible. Depth to groundwater will be measured to the nearest 0.01 foot using an electric water level indicator. The water levels will be measured relative to the top of the casing rim on the north side of the casing. The water level indicator will be thoroughly decontaminated before being lowered in each well. Decontamination will consist of an Alcanox soap wash, followed by two deionized water rinses.

4.2 LOW FLOW SAMPLING

Groundwater samples will be obtained using low-flow/low-turbidity sampling techniques to minimize the suspension of particulates in the samples. An attempt will be made to sample wells MW-5, MW-7, MW-8 and MW-9 during mid-ebb tide or lower; however, the actual sample collection timing and associated tidal elevation will be dependent on the field conditions at the time of sampling including, but not limited to, well response to purging, stabilization of water quality parameters, tidal cycles at the time of sampling and possibly other field conditions.

Groundwater samples will be obtained from monitoring wells using a peristaltic pump and disposable polyethylene tubing. Groundwater will be pumped at approximately 0.5 liter per minute using a peristaltic pump attached to tubing placed within the approximate mid-point of the screened interval. A water quality measuring system (such as a Horiba U-22) with a flow-through-cell will be used to monitor the following water quality parameters during purging: electrical conductivity, dissolved oxygen, pH, salinity, total dissolved solids, turbidity, oxidation-reduction potential and temperature. Ambient groundwater conditions will be assumed to have been reached once these parameters vary by less than 10 percent on three consecutive measurements. All field measurements will be documented on the field log.

Following well purging, the flow through cell will be disconnected and groundwater samples will be collected in laboratory-prepared containers. The samples will be placed into a cooler with ice and logged on the chain-of-custody using the procedures described in the QAPP. Purge water will be stored in labeled 55-gallon drums at the Site for off-site disposal. Section 6.3 addresses the disposal of investigation-derived waste materials including purge water.

Groundwater samples collected during the RI will be submitted for the following analyses

- Total and dissolved metals including arsenic, cadmium, chromium, copper, lead, mercury and zinc using EPA Methods 6010/7060/7470/7471/7421;
- Diesel- and heavy oil-range petroleum hydrocarbons by Ecology Method NWTPH-Dx with silica gel/acid wash cleanup;
- Gasoline-range petroleum hydrocarbons by Ecology Method NWTPH-Gx;
- VOCs by EPA Method 8260;
- cPAHs and phthalates by EPA Method 8270-SIM; and
- Total dissolved solids (TDS) by EPA Method 160.1.

Samples collected for VOC analysis will be collected with no head-space in the sample vial.

5.0 STORMWATER SAMPLING

Stormwater sampling will be performed in general accordance with Ecology's "How to do Stormwater Sampling – A Guide for Industrial Facilities" (Ecology, 2002).

5.1 SAMPLE LOCATIONS

There are four surface water discharge locations at the Site. These include, from north to south 1) the drainage ditch at the north end of the Site, 2) a 12-inch-stormwater pipe just south of the rail-crane craneway, 3) an 8-inch-stormwater pipe east of the Structural Shop and 4) a 30-inch-stormwater pipe east of the Maintenance Building. During sampling, the four discharge locations will be checked to see if water is discharging. Any discharging locations will be sampled.

Additionally, samples from catch basins on the north side of the Paint Shop will be collected and analyzed for SVOCs to evaluate inputs to the drainage ditch.

5.2 TIMING

Stormwater sampling will occur after rainfall begins after a period of at least 24 hours of no rainfall. An attempt will be made to sample stormwater during the first hour after rainfall begins. Furthermore, samples will not be submitted for analysis unless the storm event intensity is at least 0.1 inch in a 24-hour period.

Some of the sampling locations discharge at elevations below ordinary high water. Accordingly, stormwater sampling will be coordinated to occur as close as possible to low tide at the Site.

5.3 RECORD KEEPING AND VISUAL MONITORING

General record keeping for this RI is described in the QAPP. In addition to routine record keeping, the following information will be recorded during stormwater sampling: 1) sample method, 2) time rainfall began, 3) circumstances that may affect stormwater results.

Visual monitoring will be performed at each stormwater sampling location, and observations will be recorded in a field notebook or appropriate form. Visual monitoring includes observations of any floating materials, sheen, discoloration or odor of the water, or excessive turbidity. An estimation of the stormwater flow rate (from stormwater pipe outfalls) will also be recorded.

5.4 SAMPLE COLLECTION

The method of sample collection will vary depending on the type of discharge point. For the four known outfalls, sampling containers and containers for measuring pH and turbidity will be placed under the discharging end of the pipe. Care will be used to not touch the sampling container to the pipe or surrounding vegetation.

Turbidity and pH will be measured in the field at the collection location for each stormwater sample. Stormwater samples collected during the RI will be submitted for the following laboratory analyses:

- Total and dissolved metals including arsenic, cadmium, chromium, copper, lead, mercury and zinc using EPA Methods 6010/7060/7470/7471/7421;
- Diesel- and heavy oil-range petroleum hydrocarbons by Ecology Method NWTPH-Dx with silica gel/acid wash cleanup;
- cPAHs and phthalates by EPA Method 8270-SIM.

6.0 GENERAL INFORMATION

6.1 SAMPLE HANDLING

Sample handling procedures, including labeling, container and preservation requirements, and holding times are described in the QAPP.

6.2 DECONTAMINATION

Drilling and sampling equipment will be decontaminated using the procedures described in the QAPP.

6.3 INVESTIGATION-DERIVED WASTE

Soil cuttings from borings completed during the RI will be placed in labeled and sealed 30- or 55-gallon drums. The drums will be stored temporarily at a secure location at the Site pending receipt of analytical results and off-site disposal at a permitted facility.

Purge water removed from the monitoring wells and decontamination water generated during all sampling activities will be stored on-site in labeled and sealed 30- or 55-gallon drums. The drums will be stored temporarily at a secure location at the Site pending receipt of analytical results and off-site disposal at a permitted facility.

Incidental waste generated during sampling activities includes items such as gloves, plastic sheeting, paper towels and similar expended and discarded field supplies. These materials are considered de minimis and will be disposed of in a local trash receptacle.

6.4 UNDERGROUND UTILITY LOCATE

Prior to drilling, an underground utility locate will be conducted in the area of the proposed boring locations to identify any subsurface utilities and/or potential underground physical hazards. A public utility locate (one-call) will be performed, and a private utility locating company may be contracted to mark underground utilities in the vicinity of the proposed borings.

6.5 CONCRETE CORING

Borings located in areas with concrete paving will be cored prior to drilling as needed.

7.0 QUALITY ASSURANCE PROJECT PLAN

This Quality Assurance Project Plan (QAPP) was developed for Remedial Investigation (RI) exploration activities at the Site. The RI is being proposed by West Bay Reliable-0508, LLC. Objectives of the RI are discussed in the Remedial Investigation/Feasibility Study (RI/FS) Work Plan (Work Plan). Sampling procedures are outlined in the SAP. The QAPP serves as the primary guide for the integration of quality assurance (QA) and quality control (QC) functions into RI activities. The QAPP presents the objectives, procedures, organization, functional activities, and specific quality assurance and quality control activities designed to achieve data quality goals established for the project. This QAPP is based on guidelines specified in Washington Administrative Code (WAC) Chapter 173-340-820 and Ecology Guidelines (EPA, 2004).

Throughout the project, environmental measurements will be conducted to produce data that are scientifically valid, of known and acceptable quality, and meet established objectives. QA/QC procedures will be implemented so that precision, accuracy, representativeness, completeness and comparability (PARCC) of data generated meet the specified data quality objectives.

8.0 PROJECT ORGANIZATION AND RESPONSIBILITY

Descriptions of the responsibilities, lines of authority and communication for the key positions to quality assurance and quality control are provided below. This organization facilitates the efficient production of project work, allows for an independent quality review, and permits resolution of any QA issues before submittal.

8.1 PROJECT LEADERSHIP AND MANAGEMENT

The Project Manager's duties consist of providing concise technical work statements for project tasks, selecting project team members, determining subcontractor participation, establishing budgets and schedules, adhering to budgets and schedules, providing technical oversight, and providing overall production and review of project deliverables. Garrett Leque is the Project Manager for activities at the Site. The Associate–in-Charge is responsible to West Bay Reliable-0508, LLC for fulfilling contractual and administrative control of the project. Iain Wingard is the Associate-in-Charge.

8.2 FIELD COORDINATOR

The Field Coordinator is responsible for the daily management of activities in the field. Specific responsibilities include the following:

- Provides technical direction to the field staff.
- Develops schedules and allocates resources for field tasks.
- Coordinates data collection activities to be consistent with information requirements.
- Supervises the compilation of field data and laboratory analytical results.
- Assures that data are correctly and completely reported.
- Implements and oversees field sampling in accordance with project plans.
- Supervises field personnel.

- Coordinates work with on-site subcontractors.
- Schedules sample shipment with the analytical laboratory.
- Assures that appropriate sampling, testing, and measurement procedures are followed.
- Participates in QA corrective actions as required.

The Field Coordinator for RI exploration activities at the Site is Garrett Leque.

8.3 QUALITY ASSURANCE LEADER

The GeoEngineers project Quality Assurance Leader is is responsible for the project's overall QA. The Project QA Leader is responsible for coordinating QA/QC activities as they relate to the acquisition of field data. The QA Leader has the following responsibilities:

- Serves as the official contact for laboratory data QA concerns.
- Responds to laboratory data, QA needs, resolves issues, and answers requests for guidance and assistance.
- Reviews the implementation of the QAPP and the adequacy of the data generated from a quality perspective.
- Maintains the authority to implement corrective actions as necessary.
- Reviews and approves the laboratory QA Plan.
- Evaluates the laboratory's final QA report for any condition that adversely impacts data generation.
- Ensures that appropriate sampling, testing, and analysis procedures are followed and that correct quality control checks are implemented.
- Monitors subcontractor compliance with data quality requirements.

The Project QA Leader is Iain Wingard.

8.4 LABORATORY MANAGEMENT

The subcontracted laboratory conducting sample analyses for this project is required to obtain approval from the QA Leader before the initiation of sample analysis to assure that the laboratory QA plan complies with the project QA objectives. The Laboratory's QA Coordinator administers the Laboratory QA Plan and is responsible for QC. Specific responsibilities of this position include:

- Ensures implementation of the QA Plan.
- Serves as the laboratory point of contact.
- Activates corrective action for out-of-control events.
- Issues the final QA/QC report.
- Administers QA sample analysis.
- Complies with the specifications established in the project plans as related to laboratory services.
- Participate in QA audits and compliance inspections.

The chemical analytical laboratory Quality Assurance Coordinator will be determined once an Ecology-accredited laboratory is chosen.

8.5 HEALTH AND SAFETY

A Site-specific Health and Safety Plan (HASP) will be used for RI field activities and is presented in Appendix D. The Field Coordinator will be responsible for implementing the HASP during sampling activities. The Project Manager will discuss health and safety issues with the Field Coordinator on a routine basis during the completion of field activities.

The Field Coordinator will conduct a tailgate safety meeting each morning before beginning daily field activities. The Field Coordinator will terminate any work activities that do not comply with the HASP. Companies providing services for this project on a subcontracted basis will be responsible for developing and implementing their own HASP.

9.0 DATA QUALITY OBJECTIVES

The quality assurance objective for technical data is to collect environmental monitoring data of known, acceptable, and documentable quality. The QA objectives established for the project are:

- Implement the procedures outlined herein for field sampling, sample custody, equipment operation and calibration, laboratory analysis, and data reporting that will facilitate consistency and thoroughness of data generated.
- Achieve the acceptable level of confidence and quality required so that data generated are scientifically valid and of known and documented quality. This will be performed by establishing criteria for PARCC and by testing data against these criteria.

The sampling design, field procedures, laboratory procedures, and QC procedures are set up to provide high-quality data for use in this project. Specific data quality factors that may affect data usability include quantitative factors (precision, bias, accuracy, completeness, and reporting limits) and qualitative factors (representativeness and comparability). The measurement quality objectives (MQO) associated with these data quality factors are summarized in Table B-1 and are discussed below.

9.1 ANALYTES AND MATRICES OF CONCERN

Samples of soil, groundwater, stormwater and sediment will be collected during RI activities. Tables B-2 and B-3 summarize the screening criteria and laboratory reporting limits for soil, groundwater and stormwater samples. Sediment sampling is described in a separate SAP and QAPP (Appendix C).

9.2 DETECTION LIMITS

Analytical methods have quantitative limitations at a given statistical level of confidence that are often expressed as the method detection limit (MDL). Individual instruments often can detect but not accurately quantify compounds at concentrations lower than the MDL, referred to as the instrument detection limit (IDL). Although results reported near the MDL or IDL provide insight to Site conditions, quality assurance dictates that analytical methods achieve a consistently reliable level of detection known as the practical quantitation limit (PQL) or reporting limit (RL). The contract laboratory will provide numerical results for all analytes and report them as detected above the RL or undetected at the RL.

Achieving a stated detection limit for a given analyte is helpful in providing statistically useful data. Intended data uses, such as comparison to numerical criteria or risk assessments, typically dictate specific project target reporting limits (TRLs) necessary to fulfill stated objectives. The reporting limits for Site COPCs are presented in Tables B-2 and B-3 for soil, groundwater and surface water. These reporting limits were obtained from an Ecology-certified laboratory (ARI Laboratory, Tukwila, Washington). The analytical methods and processes selected will provide RLs less than the TRLs under ideal conditions. However, the reporting limits presented in Tables B-2 and B-3 are considered targets because several factors may influence final detection limits. First, moisture and other physical conditions of soil affect detection limits. Second, analytical procedures may require sample dilutions or other practices to accurately quantify a particular analyte at concentrations above the range of the instrument. The effect is that other analytes could be reported as undetected but at a value higher than a specified TRL. Data users must be aware that high non-detect values, although correctly reported, can bias statistical summaries. Careful interpretation is required to correctly characterize Site conditions.

9.3 PRECISION

Precision is the measure of mutual agreement among replicate or duplicate measurements of an analyte from the same sample and applies to field duplicate or split samples, replicate analyses, and duplicate spiked environmental samples (matrix spike duplicates) and laboratory control duplicates. The closer the measured values are to each other, the more precise the measurement process. Precision error may affect data usefulness. Good precision is indicative of relative consistency and comparability between different samples. Precision will be expressed as the relative percent difference (RPD) for spike sample comparisons of various matrices and field duplicate comparisons for water samples. This value is calculated by:

$$RPD = 100[(Xs - Xd)/(Xs + Xd)]/2,$$

where

RPD = relative percent difference

Xs = sample analytical result

Xd = duplicate sample analytical result

The RPD will be calculated for appropriate sample sets and compared to the applicable criteria. Precision can also be expressed as the percent difference (%D) between replicate analyses. Persons performing the evaluation must review one or more pertinent documents (USEPA, October 1999; USEPA, October 2004a) that address criteria exceedances and courses of action. Relative percent difference goals for this effort is 20 percent in groundwater and stormwater and 35 percent in soil for all analyses, unless the duplicate sample concentrations are less than 5 times the reporting limit.

9.4 ACCURACY

Accuracy is a measure of bias in the analytic process. The closer the measurement value is to the true value, the greater the accuracy. This measure is defined as the difference between the reported value versus the actual value and is often measured with the addition of a known compound to a sample. The amount of known compound reported in the sample, or percent recovery, assists in determining the performance of the analytical system in correctly quantifying the compounds of interest. Since most environmental data collected represent one point spatially and temporally rather than an average of values, accuracy plays a greater role than precision in assessing the results. In general, if the percent recovery is low, non-detect results may indicate that compounds of interest are not present when in fact these compounds are present. Detected compounds may be biased low or reported at a value less than actual environmental conditions. The reverse is true when recoveries are high. Non-detect values are considered accurate while detected results may be higher than the true value.

Accuracy will be expressed as the percent recovery of a surrogate compound (also known as “system monitoring compound”), a matrix spike result, or from a standard reference material where:

$PR = 100(Xss - Xs)/T$, where

PR = percent recovery

Xss = spike sample analytical result

Xs = sample analytical result

T = known spike concentration

Persons performing the evaluation must review one or more pertinent documents (USEPA, October 1999; USEPA, October 2004) that address criteria exceedances and courses of action. Accuracy criteria for surrogate spikes, matrix spikes, and laboratory control spikes are found in Table B-1 of this QAPP.

9.5 REPRESENTATIVENESS, COMPLETENESS AND COMPARABILITY

Representativeness expresses the degree to which data accurately and precisely represent the actual Site conditions. The determination of the representativeness of the data will be performed by completing the following:

- Comparing actual sampling procedures to those delineated within the SAP and this QAPP.
- Comparing analytical results of field duplicates to determine the variations in the analytical results.
- Invalidating nonrepresentative data or identifying data to be classified as questionable or qualitative. Only representative data will be used in subsequent data reduction, validation, and reporting activities.

Completeness establishes whether a sufficient amount of valid measurements were obtained to meet project objectives. The number of samples and results expected establishes the comparative basis for completeness. Completeness goals are 90 percent useable data for samples/analyses planned. If the completeness goal is not achieved an evaluation will be made to determine if the data are adequate to meet study objectives.

Comparability expresses the confidence with which one set of data can be compared to another. Although numeric goals do not exist for comparability, a statement on comparability will be prepared to determine overall usefulness of data sets, following the determination of both precision and accuracy.

9.6 HOLDING TIMES

Holding times are defined as the time between sample collection and extraction, sample collection and analysis, or sample extraction and analysis. Some analytical methods specify a holding time for analysis only. For many methods, holding times may be extended by sample preservation techniques in the field. If a sample exceeds a holding time, then the results may be biased low. For example, if the extraction holding time for volatile analysis of soil sample is exceeded, then the possibility exists that some of the organic constituents have volatilized from the sample or degraded. Results for that analysis will be qualified as estimated to indicate that the reported results may be lower than actual Site conditions. Holding times are presented in Table B-4.

9.7 BLANKS

According to the *National Functional Guidelines for Organic Data Review* (USEPA, 1999), “The purpose of laboratory (or field) blank analysis is to determine the existence and magnitude of contamination resulting from laboratory (or field) activities. The criteria for evaluation of blanks apply to any blank associated with the samples (e.g., method blanks, instrument blanks, trip blanks, and equipment blanks).” Trip blanks are placed with samples during shipment; method blanks are created during sample preparation and follow samples throughout the analysis process.

Analytical results for blanks will be interpreted in general accordance with *National Functional Guidelines for Organic Data Review* and professional judgment. Blanks are discussed further in Section 13.1.

10.0 SAMPLE COLLECTION, HANDLING AND CUSTODY

10.1 SAMPLING EQUIPMENT DECONTAMINATION

Reusable sampling/monitoring equipment (trowels, drill samplers, hand augers, etc.) that comes in contact with soil or groundwater will be decontaminated before each use. Decontamination procedures for this equipment will consist of the following: 1) wash with nonphosphate detergent solution (Alconox and distilled water), 2) rinse with distilled water, and 3) second distilled water rinse. Field personnel will limit cross-contamination by changing gloves between sampling events. Wash water used to decontaminate the sampling equipment will be stored at the Site in labeled 55-gallon drums for subsequent characterization and off-site disposal.

10.2 SAMPLE CONTAINERS AND LABELING

The Field Coordinator will establish field protocol to manage field sample collection, handling and documentation. Soil, groundwater and stormwater samples obtained during this study will be placed in appropriate laboratory-prepared containers. Sample containers and preservatives are listed in Table B-4.

Sample containers will be labeled with the following information at the time of collection:

- project number,
- sample name, which will include a reference to depth if applicable, and
- date and time of collection.

The sample collection activities will be noted on field logs. The Field Coordinator will monitor consistency between the SAP, sample containers/labels, field logs and the chain-of-custody.

10.3 SAMPLE STORAGE

Samples will be placed in a cooler with “blue ice” or double-bagged “wet ice” immediately after they are collected. The objective of the cold storage will be to attain a sample temperature of 4 degrees Celsius. Holding times will be observed during sample storage. Holding times for the project analyses are summarized in Table B-4.

10.4 SAMPLE SHIPMENT

The samples will be transported and delivered to the analytical laboratory in the coolers. Field personnel will transport and hand deliver samples to the laboratory or to a laboratory courier for analysis. All analyses for this project are anticipated to be performed using a local laboratory, and sample shipping is not anticipated.

10.5 CHAIN-OF-CUSTODY RECORDS

Field personnel are responsible for the security of samples from the time the samples are collected until the samples have been received by the laboratory or courier. A chain-of-custody (COC) form will be completed at the end of each field day for samples being shipped to the laboratory. Information to be included on the COC form includes:

- Project name and number.
- Sample identification numbers.
- Date and time of sampling.
- Sample matrix (soil, water, etc.) and number of containers from each sampling point, including preservatives used.
- Depth of sample if applicable.
- Analyses to be performed or samples to be archived.
- Names of sampling personnel and transfer of custody acknowledgment spaces.

The original COC record will be signed by a member of the field team and bear a unique tracking number. Field personnel shall retain carbon copies and place the original and remaining copies in a plastic bag, placed within the cooler or taped to the inside lid of the cooler before sealing the container for transport. This record will accompany the samples during transit by the field team member or courier to the laboratory.

10.6 LABORATORY CUSTODY PROCEDURES

The laboratory will follow their standard operating procedures (SOPs) to document sample handling from time of receipt (sample log-in) to reporting. Documentation will include at a minimum, the analysts name or initial, and the time and date of analysis.

10.7 FIELD DOCUMENTATION

Field documentation provides important information about potential problems or special circumstances surrounding sample collection. Field personnel will maintain daily field logs while on site. The field logs will be prepared on field report forms. Entries in the field logs and associated sample documentation forms will be made in pencil on Rite-in-the-Rain logs, or waterproof ink on standard paper, and corrections will consist of line-out deletions that are initialed and dated. Individual logs will become part of the project files at the conclusion of the RI field explorations.

At a minimum, the following information will be recorded during the collection of each sample:

- Sample location and description

- Site or sampling area sketch showing sample location and measured distances
- Sampler's name(s)
- Date and time of sample collection
- Type of sample (soil or water)
- Type of sampling equipment used
- Field instrument readings as appropriate
- Field observations and details that are pertinent to the integrity/condition of the samples (e.g., weather conditions, performance of the sampling equipment, sample depth control, sample disturbance, etc.)
- Preliminary sample descriptions (e.g., lithologies, noticeable odors, colors, field screening results)
- Sample preservation

In addition to the sampling information, the following specific information also will be recorded in the field log for each day of sampling:

- Names of team members
- Time of arrival/entry on Site and time of Site departure
- Other personnel present at the Site as appropriate
- Summary of pertinent meetings or discussions with regulatory agency or contractor personnel
- Deviations from sampling plans, Site safety plans and QAPP procedures
- Changes in personnel and responsibilities with reasons for the changes
- Levels of safety protection
- Calibration readings for any equipment used and equipment model and serial number

The handling, use, and maintenance of field logs are the field coordinator's responsibilities.

11.0 CALIBRATION PROCEDURES

11.1 FIELD INSTRUMENTATION

Equipment and instrumentation calibration facilitates accurate and reliable field measurements. Field and laboratory equipment used on the project will be calibrated and adjusted in general accordance with the manufacturer's recommendations. Methods and intervals of calibration and maintenance will be based on the type of equipment, stability characteristics, required accuracy, intended use and environmental conditions. The basic calibration frequencies are described below.

The photo or flame-ionization detector (PID/FID) used for vapor measurements will be calibrated daily, and more frequently as necessary. The calibration results will be recorded in the field logbook.

The water quality measuring system (e.g., Horiba U-22) will be calibrated daily, and more frequently as necessary. The calibration results will be recorded in the field report.

11.2 LABORATORY INSTRUMENTATION

For analytical chemistry, calibration procedures will be performed in general accordance with the methods cited and laboratory standard operating procedures. Calibration documentation will be retained at the laboratory and readily available for a period of six months.

12.0 DATA REPORTING AND LABORATORY DELIVERABLES

Laboratories will report data in formatted hardcopy and digital form. Analytical laboratory measurements will be recorded in standard formats that display, at a minimum, the field sample identification, the laboratory identification, reporting units, qualifiers, analytical method, analyte tested, analytical result, extraction and analysis dates, and detection limit (PQL only). Each sample delivery group will be accompanied by sample receipt forms and a case narrative identifying data quality issues. Laboratory electronic data deliverables (EDD) will be established by GeoEngineers, Inc., with the contract laboratory. Final results will be sent to the Project Manager.

Chromatograms will be provided for samples analyzed using Ecology Methods NWTPH-Dx and NWTPH-Gx. The laboratory will assure that the full height of all peaks appear on the chromatograms and that the same horizontal time scale is used to allow for comparisons to other chromatograms.

13.0 INTERNAL QUALITY CONTROL

Table B-5 summarizes the types and frequency of Quality Control samples to be collected during the RI, including both field QC and Laboratory QC samples.

13.1 FIELD QUALITY CONTROL

Field QC samples serve as a control and check mechanism to monitor the consistency of sampling methods.

13.1.1 Field Duplicates

In addition to replicate analyses performed in the laboratory, field duplicates also serve as measures for precision. Under ideal field conditions, field duplicates are created when a volume of the sample matrix is thoroughly mixed, placed in separate containers, and identified as different samples. This tests both the precision and consistency of laboratory analytical procedures and methods, and the consistency of the sampling techniques used by field personnel.

One field duplicate soil sample will be collected for every 20 soil samples (5 percent). Duplicate soil sample analyses will be performed at a rate of 5 percent for every soil COPC analysis. A field duplicate groundwater sample will be collected from one of the monitoring wells and analyzed for the full suite of COPCs that are specified for groundwater. A field duplicate stormwater sample will be collected from one of the stormwater outfalls and analyzed for the full suite of COPCs that is specified for the stormwater samples.

13.1.2 Trip Blanks

Trip blanks accompany groundwater sample containers prepared for VOC analysis, and will be analyzed on a one per cooler basis. Trip blanks will be analyzed for VOCs following procedures similar to groundwater VOC sample analyses.

13.2 LABORATORY QUALITY CONTROL

Laboratory quality control procedures will be evaluated through a formal data validation process. The analytical laboratory will follow standard method procedures that include specified QC monitoring requirements. These requirements will vary by method but generally include:

- method blanks
- internal standards
- calibrations
- matrix spike/matrix spike duplicates (MS/MSD)
- laboratory control spikes/spike duplicates (LCS/LCSD)
- laboratory replicates or duplicates
- surrogate spikes

13.2.1 Laboratory Blanks

Laboratory procedures employ the use of several types of blanks but the most commonly used blank for QA/QC assessments are method blanks. Method blanks are laboratory QC samples that consist of either a soil-like material having undergone a contaminant destruction process or HPLC water. Method blanks are extracted and analyzed with each batch of environmental samples undergoing analysis. Method blanks are particularly useful during volatiles analysis since VOCs can be transported in the laboratory through the vapor phase. If a substance is found in the method blank then one (or more) of the following occurred:

- Measurement apparatus or containers were not properly cleaned and contained contaminants.
- Reagents used in the process were contaminated with a substance(s) of interest.
- Contaminated analytical equipment was not properly cleaned.
- Volatile substances in the air with high solubility or affinities toward the sample matrix contaminated the samples during preparation or analysis.

It is difficult to determine which of the above scenarios occurred if blank contamination occurs. However, it is assumed that the conditions that affected the blanks also likely affected the project samples. Given method blank results, validation rules assist in determining which substances in samples are considered “real,” and which ones are attributable to the analytical process. Furthermore, the guidelines state, “. . . there may be instances where little or no contamination was present in the associated blank, but qualification of the sample is deemed necessary. Contamination introduced through dilution water is one example.”

13.2.2 Calibrations

Several types of calibrations are used, depending on the method, to determine whether the methodology is “in control” by verifying the linearity of the calibration curve and to assure that the sample results reflect accurate and precise measurements. The main calibrations used are initial calibrations, daily calibrations and continuing calibration verification.

13.2.3 Matrix Spike/Matrix Spike Duplicates (MS/MSD)

Matrix spike/spike duplicate samples are used to assess influences or interferences caused by the physical or chemical properties of the sample itself. For example, extreme pH affects the results of SVOCs. Or, the presence of a particular compound may interfere with accurate quantitation of another analyte. MS/MSD data is reviewed in combination with other QC monitoring data to determine matrix effects. In some cases, matrix affects cannot be determined due to dilution and/or high levels of related substances in the sample. A matrix spike is evaluated by spiking a known amount of one or more of the target analytes ideally at a concentration of 5 to 10 times higher than the sample result. A percent recovery is calculated by subtracting the sample result from the spike result, dividing by the spiked amount, and multiplying by 100.

The samples for the MS and MSD analyses should be collected from a boring or sampling location that is believed to exhibit low-level contamination. A sample from an area of low-level contamination is needed because the objective of MS/MSD analyses is to determine the presence of matrix interferences, which can best be achieved with low levels of contaminants. Additional sample volume will be collected for these analyses. This MS/MSD sample will be a composite to achieve a level of representativeness and reproducibility in the data.

13.2.4 Laboratory Control Spikes/Spike Duplicates (LCS/LCSD)

Also known as blanks spikes, laboratory control spikes are similar to matrix spikes in that a known amount of one or more of the target analytes are spiked into a prepared media and a percent recovery of the spiked substances are calculated. The primary difference between a matrix spike and LCS is that the LCS spike media is considered “clean” or contaminant free. For example, HPLC water is typically used for LCS water analyses. The purpose of an LCS is to help assess the overall accuracy and precision of the analytical process including sample preparation, instrument performance, and analyst performance. LCS data must be reviewed in context with other controls to determine if out-of-control events occur.

13.2.5 Laboratory Replicates/Duplicates

Laboratories often utilize MS/MSDs, LCS/LCSDs and/or replicates to assess precision. Replicates are a second analysis of a field-collected environmental sample. Replicates can be split at varying stages of the sample preparation and analysis process, but most commonly occur as a second analysis on the extracted media.

13.2.6 Surrogate Spikes

The purposes of using a surrogate are to verify the accuracy of the instrument being used and extraction procedures. Surrogates are substances similar to, but not one of, the target analytes. A known concentration of surrogate is added to the sample and passed through the instrument, noting the surrogate recovery. Each surrogate used has an acceptable range of percent recovery. If a surrogate recovery is low, sample results may be biased low and depending on the recovery value, a possibility of false negatives may exist. Conversely, when recoveries are above the specified range of acceptance a possibility of false positives exist, although non-detected results are considered accurate.

14.0 DATA REDUCTION AND ASSESSMENT PROCEDURES

14.1 DATA REDUCTION

Data reduction involves the conversion or transcription of field and analytical data to a useable format. The laboratory personnel will reduce the analytical data for review by the Quality Assurance Leader and Project Manager.

14.2 FIELD MEASUREMENT EVALUATION

Field data will be reviewed at the end of each day by following the quality control checks outlined below and procedures in the SAP. Field data documentation will be checked against the applicable criteria as follows:

- Sample collection information
- Field instrumentation and calibration
- Sample collection protocol
- Sample containers, preservation and volume
- Field QC samples collected at the frequency specified
- Sample documentation and chain-of-custody (COC) protocols
- Sample delivery

Cooler receipt forms and sample condition forms provided by the laboratory will be reviewed for out-of-control incidents. The final report will contain what effects, if any, an incident has on data quality. Sample collection information will be reviewed for correctness before inclusion in a final report.

14.3 FIELD QUALITY CONTROL EVALUATION

A field quality control evaluation will be conducted by reviewing field logs and daily reports, discussing field activities with staff, and reviewing field QC samples (trip blanks and field duplicates). Trip blanks will be evaluated using the same criteria as method blanks.

Precision for field duplicate soil samples will only be qualitatively evaluated because even a well mixed sample is not entirely homogenous due to sampling procedures, soil conditions, and contaminant transport mechanisms.

14.4 LABORATORY DATA QUALITY CONTROL EVALUATION

The laboratory data assessment will consist of a formal review of the following quality control parameters:

- Holding times
- Method blanks
- Matrix spike/spike duplicates
- Laboratory control spikes/spike duplicates
- Surrogate spikes
- Replicates

In addition to these quality control mechanisms, other documentation such as cooler receipt forms and case narratives will be reviewed to fully evaluate laboratory QA/QC.

15.0 REFERENCES

Dalton, Olmstead & Fugalvand, Inc. 2007. Summary of Past DOF Sampling, Reliable Steel Site, Olympia, Washington (2001, 2004 and 2007 [DOF 2007]). November 4, 2007.

Washington State Department of Ecology. 2002. How to do Stormwater Sampling – A Guide for Industrial Facilities.

USEPA. 1999. National Functional Guidelines for Organic Data Review.

USEPA. October 1999. Contract Laboratory Program National Functional Guidelines for Organic Data Review.

USEPA. October 2004. Contract Laboratory Program National Functional Guidelines for Inorganic Data Review

TABLE B-1
MEASUREMENT QUALITY OBJECTIVES
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

		Check Standard (LCS) %R Limits[2,3]		Matrix Spike (MS) %R Limits[3]		Surrogate Standards (SS) %R Limits [1,2,3]	MS Duplicate Samples or Lab Duplicate RPD Limits[4]		Field Duplicate Samples RPD Limits[4]	
Laboratory Analysis	Reference Method	Soil	Water	Soil	Water	Soil/Water	Soil	Water	Soil	Water
Gasoline-range petroleum hydrocarbons	Ecology NWTPH-Gx	70%-130%	70%-130%	NA	NA	70%-130%	≤30%	≤30%	≤35%	≤20%
Diesel- and Heavy oil-range Hydrocarbons	Ecology NWTPH-Dx with silica gel/acid wash cleanup	50%-150%	50%-150%	NA	NA	50%-150%	≤40%	≤40%	≤35%	≤20%
BTEX	EPA 8021	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%	≤30%	≤30%	≤35%	≤20%
VOCs	EPA 8260	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%	≤30%	≤30%	≤35%	≤20%
SVOCs	EPA 8270	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%	≤30%	≤30%	≤35%	≤20%
cPAHs	EPA 8270SIM	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%	≤30%	≤30%	≤35%	≤20%
PCBs	EPA 8082 Modified	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%	≤40%	≤40%	≤35%	≤20%
Metals	EPA 6010/7060/7470/7471/7421	80%-120%	80%-120%	75%-125%	75%-125%	NA	≤20%	≤20%	≤35%	≤20%

Notes:

Method numbers refer to EPA SW-846 Analytical Methods or Washington State Department of Ecology (Ecology) recommended analytical methods.

[1] Individual surrogate recoveries are compound specific.

[2] Recovery ranges are estimates.

[3] Percent Recovery Limits are expressed as ranges based on laboratory control limits. Limits will vary for individual analytes.

[4] RPD control limits are only applicable if the concentrations are greater than 5 times the method reporting limit (MRL). For results less than 5 times the MRL, the difference between the sample and

BTEX = benzene, toluene, ethylbenzene, xylenes

VOCs = Volatile organic compounds

SVOCs = Semi-volatile organic compounds

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

PCBs = Polychlorinated biphenyls

LCS = Laboratory Control Sample

MS/MSD = Matrix Spike/Matrix Spike Duplicate

RPD = Relative Percent Difference

NA = Not Applicable

TABLE B-2
SOIL TARGET REPORTING LIMITS
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Analyte	MTCA Soil Cleanup Levels[1]		Laboratory Reporting Limits
	Method A	Method B	
Metals (mg/kg)			
Arsenic	20	0.67	5
Barium	NE	16,000	0.3
Cadmium	2	40	0.2
Chromium	2,000	120,000	0.5
Copper	NE	3,000	0.5
Lead	250	NE	2
Mercury	2	24	0.05
Selenium	NE	400	5
Silver	NE	400	0.3
Zinc	NE	24,000	4
Petroleum Hydrocarbons (mg/kg)			
Gasoline-range petroleum hydrocarbons	100	NE	5
Diesel-range petroleum hydrocarbons	2,000	NE	10
Heavy-oil range petroleum hydrocarbons	2,000	NE	10
Mineral oil-range petroleum hydrocarbons	4,000	NE	40
BTEX (mg/kg)			
Benzene	0.03	18	0.001
Toluene	7	6,400	0.001
Ethylbenzene	6	8,000	0.001
Xylenes	9	16,000	0.001
Volatile Organic Compounds (mg/kg)			
1,1,1,2-Tetrachloroethane	NE	38	0.001
1,1,1-Trichloroethane	2	72,000	0.001
1,1,2,2-Tetrachloroethane	NE	5	0.001
1,1,2-Trichloroethane	NE	18	0.001
1,1-Dichloroethane	NE	8,000	0.001
1,1-Dichloroethene	NE	4,000	0.001
1,1-Dichloropropene	NE	4,000	0.001
1,2,3-Trichlorobenzene	NE	NE	0.005
1,2,3-Trichloropropane	NE	0.14	0.002
1,2,4-Trichlorobenzene	NE	800	0.005
1,2,4-Trimethylbenzene	NE	4,000	0.001
1,2-Dibromo-3-chloropropane	NE	0.71	0.005
1,2-Dibromoethane (EDB)	0.005	0.012	0.001
1,2-Dichlorobenzene	NE	7,200	0.001
1,2-Dichloroethane (EDC)	NE	7,200	0.001
1,2-Dichloropropane	NE	15	0.001
1,3,5-Trimethylbenzene	NE	4,000	0.001
1,3-Dichlorobenzene	NE	NE	0.001
1,3-Dichloropropane	NE	NE	0.001
1,4-Dichlorobenzene	NE	42	0.001
2,2-Dichloropropane	NE	42	0.001
2-Butanone (MEK)	NE	48,000	0.005
2-Chlorotoluene	NE	1,600	0.001
2-Hexanone	NE	NE	0.005
4-Chlorotoluene	NE	NE	0.001
4-Methyl-2-pentanone	NE	NE	0.005
Acetone	NE	8,000	0.005
Benzene	0.03	18	0.001
Bromobenzene	NE	NE	0.001

Analyte	MTCA Soil Cleanup Levels[1]		Laboratory Reporting Limits
	Method A	Method B	
Bromochloromethane	NE	NE	0.001
Bromodichloromethane	NE	16	0.001
Bromoform	NE	130	0.001
Bromomethane	NE	110	0.001
Carbon Tetrachloride	NE	8	0.001
Chlorobenzene	NE	1,600	0.001
Chloroethane	NE	350	0.001
Chloroform	NE	160	0.001
Chloromethane	NE	77	0.001
cis-1,2-Dichloroethene	NE	800	0.001
cis-1,3-Dichloropropene	NE	NE	0.001
Dibromochloromethane	NE	800	0.001
Dibromodichloromethane	NE	NE	0.001
Dibromomethane	NE	800	0.001
Dichlorodifluoromethane	NE	16,000	0.001
Dichloroethylene	NE	800	0.001
Ethylbenzene	6	8,000	0.001
Hexachlorobutadiene	NE	13	0.005
Isopropylbenzene	NE	8,000	0.001
Total Xylenes	9	16,000	0.001
Methyl t-butyl ether (MTBE)	0.1	560	0.001
Methylene chloride	0.02	130	0.002
Naphthalene	5	1,600	0.005
n-Butylbenzene	NE	NE	0.001
n-Propylbenzene	NE	NE	0.001
p-Isopropyltoluene	NE	NE	0.001
sec-Butylbenzene	NE	NE	0.001
Styrene	NE	33	0.001
tert-Butylbenzene	NE	NE	0.001
Tetrachloroethene	0.05	2	0.001
Toluene	7	6	0.001
trans-1,2-Dichloroethene	NE	1,600	0.001
trans-1,3-Dichloropropene	NE	NE	0.001
Trichloroethene	0.03	3	0.001
Trichlorofluoromethane	NE	24,000	0.001
Vinyl chloride	NE	0.67	0.001
Semi-Volatile Organic Compounds (mg/kg)			
Phenol	NE	48,000	0.067
1,2,4-Trichlorobenzene	NE	800	0.067
1,2-Dichlorobenzene	NE	7,200	0.067
1,3-Dichlorobenzene	NE	NE	0.067
1,4-Dichlorobenzene	NE	42	0.067
2,4,5-Trichlorophenol	NE	8,000	0.33
2,4,6-Trichlorophenol	NE	91	0.33
2,4-Dichlorophenol	NE	240	0.33
2,4-Dimethylphenol	NE	1,600	0.067
2,4-Dinitrophenol	NE	160	0.67
2,4-Dinitrotoluene	NE	160	0.33
2,6-Dinitrotoluene	NE	80	0.33
2-Chloronaphthalene	NE	6,400	0.067
2-Chlorophenol	NE	400	0.067
2-Methylnaphthalene	NE	320	0.067
2-Methylphenol	NE	4,000	0.067
2-Nitroaniline	NE	NE	0.33
2-Nitrophenol	NE	NE	0.33
3-Nitroaniline	NE	NE	0.33

Analyte	MTCA Soil Cleanup Levels[1]		Laboratory Reporting Limits
	Method A	Method B	
4,6-Dinitro-2-methylphenol	NE	NE	0.67
4-Bromophenyl phenyl ether	NE	NE	0.067
4-Chloro-3-methylphenol	NE	NE	0.33
4-Chloroaniline	NE	320	0.33
4-Chlorophenyl phenyl ether	NE	NE	0.067
4-Methylphenol	NE	400	0.067
4-Nitroaniline	NE	NE	0.33
4-Nitrophenol	NE	NE	0.33
Acenaphthene	NE	NE	0.067
Acenaphthylene	NE	NE	0.067
Anthracene	NE	24,000	0.067
Benz(a)anthracene	NE	NE	0.067
Benzo(a)pyrene	0.1	0.14	0.067
Benzo(b)fluoranthene	NE	NE	0.067
Benzo(g,h,i)perylene	NE	NE	0.067
Benzo(k)fluoranthene	NE	NE	0.067
Benzoic acid	NE	320,000	0.67
Benzyl alcohol	NE	24,000	0.33
Benzyl butyl phthalate	NE	16,000	0.02
Bis(2-chloroethoxy)methane	NE	NE	0.067
Bis(2-chloroethyl) ether	NE	0.91	0.067
Bis(2-chloroisopropyl) ether	NE	0.91	0.02
Bis(2-ethylhexyl) phthalate	NE	71	0.067
Carbazole	NE	50	0.067
Chrysene	NE	NE	0.067
Dibenz(a,h)anthracene	NE	NE	0.067
Dibenzofuran	NE	160	0.067
Diethyl phthalate	NE	64,000	0.067
Dimethyl phthalate	NE	80,000	0.067
Di-n-butyl phthalate	NE	8,000	0.067
Di-n-octyl phthalate	NE	1,600	0.067
Fluoranthene	NE	3,200	0.067
Fluorene	NE	3,200	0.067
Hexachlorobenzene	NE	0.63	0.067
Hexachlorobutadiene	NE	13	0.067
Hexachlorocyclopentadiene	NE	480	0.33
Hexachloroethane	NE	71	0.067
Indeno(1,2,3-cd)pyrene	NE	NE	0.067
Isophorone	NE	1,100	0.067
Naphthalene	5	1,600	0.067
Nitrobenzene	NE	40	0.067
N-Nitroso-di-n-propylamine	NE	0.14	0.33
N-Nitrosodiphenylamine	NE	200	0.067
Pentachlorophenol	NE	8	0.33
Phenanthrene	NE	NE	0.067
Pyrene	NE	2,400	0.067
PCBs			
Arochlor 1016 and 1260	1	0.5	0.1

Notes:

[1] Model Toxics Control Act (MTCA) (WAC 173-340-730).

BTEX= Benzene, Toluene, Ethylbenzene, Xylene

TABLE B-3
GROUNDWATER AND STORMWATER TARGET REPORTING LIMITS
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Analyte	Groundwater Cleanup Levels		Surface Water Criteria[2]	Laboratory Reporting Limits
	MTCA[1] Method A	MTCA Method B		
Metals (µg/l)				
Arsenic	5	0.000058	8[4]	1
Cadmium	5	8	8.8[5]	2
Chromium	50	NE	240,000[6]	5
Copper	NE	590	20[4]	2
Lead	15	NE	10[4]	1
Mercury	2	4.8	0.025[7]	0.02
Zinc	NE	4,800	160[4]	10
TPH (µg/l)				
Gasoline Range Hydrocarbons	1,000	NE	NE	250
Diesel Range Hydrocarbons	500	NE	NE	500
Heavy Oil Range Hydrocarbons	500	NE	NE	500
VOCs (µg/l)				
1,1,1,2-Tetrachloroethane	NE	1.7	130[6]	1
1,1,1-Trichloroethane	200	7,200	NE	1
1,1,2,2-Tetrachloroethane	NE	22	420,000[6]	1
1,1,2-Trichloroethane	NE	0.77	4[6]	1
1,1-Dichloroethane	NE	1,600	16[6]	1
1,1-Dichloroethene	NE	NE	1.9[6]	1
1,1-Dichloropropene	NE	NE	NE	1
1,2,3-Trichlorobenzene	NE	NE	NE	5
1,2,3-Trichloropropane	NE	0.0063	NE	2
1,2,4-Trichlorobenzene	NE	NE	70[5]	5
1,2,4-Trimethylbenzene	NE	400	NE	1
1,2-Dibromo-3-chloropropane	NE	0.031	NE	5
1,2-Dibromoethane (EDB)	0.01	NE	NE	1
1,2-Dichlorobenzene	NE	720	1,300[5]	1
1,2-Dichloroethane (EDC)	5	0.48	37[5]	1
1,2-Dichloropropane	NE	0.64	15[5]	1
1,3,5-Trimethylbenzene	NE	400	NE	1
1,3-Dichlorobenzene	NE	NE	960[5]	1
1,3-Dichloropropane	NE	NE	19[6]	5
1,4-Dichlorobenzene	NE	1.8	4.9[6]	1
2,2-Dichloropropane	NE	NE	NE	1
2-Butanone (MEK)	NE	4,800	NE	5
2-Chlorotoluene	NE	160	NE	1
2-Hexanone	NE	NE	NE	5
4-Chlorotoluene	NE	160	NE	1
4-Methyl-2-pentanone	NE	640	NE	5

Analyte	Groundwater Cleanup Levels		Surface Water Criteria[2]	Laboratory Reporting Limits
	MTCA[1] Method A	MTCA Method B		
Acetone	NE	800	NE	5
Benzene	5	0.8	23[6]	1
Bromobenzene	NE	NE	NE	1
Bromodichloromethane	NE	0.71	17[5]	1
Bromoform	NE	5.5	140[5]	1
Bromomethane	NE	11	970[6]	1
Carbon Tetrachloride	NE	0.34	1.6[6]	1
Chlorobenzene	NE	160	1,600[6]	1
Chloroethane	NE	15	NE	1
Chloroform	NE	7.2	280[6]	1
Chloromethane	NE	3.4	130[6]	1
cis-1,2-Dichloroethene	NE	NE	NE	1
cis-1,3-Dichloropropene	NE	0.24	196	1
Dibromochloromethane	NE	0.52	13[5]	1
Dibromomethane	NE	80	NE	1
Dichlorodifluoromethane	NE	1,600	NE	1
Ethylbenzene	700	800	2,100[5]	1
Isopropylbenzene	NE	800	NE	1
m,p-Xylene	NE	NE	NE	2
Methylene chloride	5	5.8	590[5]	2
Naphthalene	160	160	4,900[6]	5
n-Propylbenzene	NE	NE	NE	1
o-Xylene	NE	NE	NE	1
sec-Butylbenzene	NE	NE	NE	1
Styrene	NE	1.5	NE	1
tert-Butylbenzene	NE	NE	NE	0.2
Tetrachloroethene	5	0.081	0.39[6]	0.2
Toluene	1,000	640	15,000[5]	1
trans-1,2-Dichloroethene	NE	NE	10,000[5]	1
trans-1,3-Dichloropropene	NE	NE	19[6]	1
Trichloroethene	5	0.49	1.5[6]	1
Trichlorofluoromethane	NE	24,000	NE	1
Vinyl chloride	0.2	0.029	2.4[5]	1
SVOCs (µg/l)				
1,2,4-Trichlorobenzene	NE	80	70[5]	1
1,2-Dichlorobenzene	NE	720	1,300[5]	1
1,3-Dichlorobenzene	NE	NE	960[5]	1
1,4-Dichlorobenzene	NE	1.8	4.9[6]	1
2,4,5-Trichlorophenol	NE	800	NE	5
2,4,6-Trichlorophenol	NE	4	10[8]	5
2,4-Dichlorophenol	NE	24	190[6]	5
2,4-Dimethylphenol	NE	160	550[6]	1
2,4-Dinitrophenol	NE	32	3,500[6]	10

Analyte	Groundwater Cleanup Levels		Surface Water Criteria[2]	Laboratory Reporting Limits
	MTCA[1] Method A	MTCA Method B		
2,4-Dinitrotoluene	NE	32	1 [8]	5
2,6-Dinitrotoluene	NE	16	NE	5
2-Chloronaphthalene	NE	640	NE	1
2-Chlorophenol	NE	40	97 [6]	1
2-Methylnaphthalene	NE	32	NE	0.01
2-Methylphenol	NE	400	NE	1
2-Nitroaniline	NE	NE	NE	5
2-Nitrophenol	NE	NE	NE	5
3-Nitroaniline	NE	NE	NE	5
4,6-Dinitro-2-methylphenol	NE	NE	NE	10
4-Bromophenyl phenyl ether	NE	NE	NE	1
4-Chloro-3-methylphenol	NE	NE	NE	5
4-Chloroaniline	NE	32	NE	5
4-Chlorophenyl phenyl ether	NE	NE	NE	1
4-Methylphenol	NE	NE	NE	1
4-Nitroaniline	NE	NE	NE	5
4-Nitrophenol	NE	NE	NE	5
Acenaphthene	NE	960	640 [6]	0.01
Acenaphthylene	NE	NE	NE	0.01
Anthracene	NE	4,800	26,000 [6]	0.01
Benz(a)anthracene[3]	NE	NE	0.018 [5]	0.01
Benzo(a)pyrene[3]	0.1	0.012	0.018 [5]	0.01
Benzo(b)fluoranthene[3]	NE	NE	0.018 [5]	0.01
Benzo(g,h,i)perylene	NE	NE	NE	0.01
Benzo(k)fluoranthene[3]	NE	NE	0.018 [5]	0.01
Benzoic acid	NE	64,000	NE	10
Benzyl alcohol	NE	2,400	NE	5
Benzyl butyl phthalate	NE	3,200	1,300 [6]	1
Bis(2-chloroethoxy)methane	NE	NE	NE	1
Bis(2-chloroethyl) ether	NE	0.04	0.53 [5]	1
Bis(2-chloroisopropyl) ether	NE	NE	42,000 [6]	1
Bis(2-ethylhexyl) phthalate	NE	6.3	2.2 [5]	1
Carbazole	NE	4.4	NE	1
Chrysene[3]	NE	NE	0.018 [5]	0.01
Dibenz(a,h)anthracene[3]	NE	NE	0.018 [5]	0.01
Dibenzofuran	NE	32	NE	0.01
Diethyl phthalate	NE	13,000	28,000 [6]	1
Dimethyl phthalate	NE	16,000	72,000 [6]	1
Di-n-butyl phthalate	NE	NE	2,900 [6]	1
Di-n-octyl phthalate	NE	320	NE	1
Fluoranthene	NE	640	90 [6]	0.01
Fluorene	NE	640	3,500 [6]	0.01
Hexachlorobenzene	NE	0.055	1 [8]	1
Hexachlorobutadiene	NE	0.56	18 [5]	1

Analyte	Groundwater Cleanup Levels		Surface Water Criteria[2]	Laboratory Reporting Limits
	MTCA[1] Method A	MTCA Method B		
Hexachlorocyclopentadiene	NE	48	1,100 [5]	5
Hexachloroethane	NE	3.1	3.3 [5]	1
Indeno(1,2,3-cd)pyrene[3]	NE	NE	0.018 [5]	0.01
Isophorone	NE	46	600 [7]	1
Naphthalene	160	160	4,900 [6]	0.01
Nitrobenzene	NE	4	450 [6]	1
N-Nitroso-di-n-propylamine	NE	NE	1 [8]	5
N-Nitrosodiphenylamine	NE	NE	6 [5]	5
Pentachlorophenol	NE	0.73	10 [8]	5
Phenanthrene	NE	NE	NE	0.01
Phenol	NE	4,800	1,100,000 [6]	1
Pyrene	NE	480	2,600 [6]	0.01

Notes:

[1] Model Toxics Control Act (MTCA) (WAC 173-340-730).

[2] Lowest surface water criteria from Background Concentrations of Selected Chemicals in Water (PTI, 1989), Water Quality Standards for surface waters of the State of Washington (WAC 173-201A), National Recommended Water Quality Criteria (Section 304 of the Clean Water Act), National Toxics Rule (40 CFR Part 131.36), and the Model Toxics Control Act (MTCA) Method B Surface Water Cleanup Levels (WAC 173-340-730).

[3] The Compound is a Carcinogenic Polyaromatic Hydrocarbon (cPAH)

[4] Washington State Groundwater Background Concentrations.

[5] National Recommended Water Quality Criteria

[6] MTCA Method B non-Carcinogen

[7] National Toxics Rule

[8] Laboratory reporting limit higher than some standards; reporting limit used.

TPH = Total Petroleum Hydrocarbons

VOC = Volatile organic compounds

µg/l = microgram per liter

lc = The analyte is a common laboratory contaminant

Shading indicates the Reporting Limit is greater than the criteria.

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TABLE B-4
TEST METHODS, SAMPLE CONTAINERS, PRESERVATION AND HOLDING TIME
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Analysis	Method	Soil				Groundwater/Stormwater			
		Minimum Sample Size	Sample Containers	Sample Preservation	Holding Times	Minimum Sample Size	Sample Containers	Sample Preservation	Holding Times
Gasoline Range Hydrocarbons	Ecology NWTPH-Gx	2 oz*	4 or 8 oz glass widemouth with Teflon-lined lid and 5035 kit with methanol preserved vial	Cool 4°C	14 days	120 mL	3 - 40 mL VOA Vials (no headspace)	HCl - pH<2	14 days preserved 7 days unpreserved
Diesel- and Oil-Range Hydrocarbons	Ecology NWTPH-Dx with silica gel/acid wash cleanup	8 oz	8 or 16 oz amber glass wide-mouth with Teflon-lined lid	Cool 4°C	14 days to extraction, 40 days from extraction to analysis	1 L	1 liter amber glass with Teflon-lined lid	Cool 4 C, HCl to pH < 2	14 days to extraction 40 days from extraction to analysis
BTEX	EPA 8021	2 oz*	4 or 8 oz glass widemouth with Teflon-lined lid and 5035 kit with methanol preserved vial	Cool 4°C	14 days	120 mL	3 - 40 mL VOA Vials (no headspace)	HCl - pH<2	14 days preserved 7 days unpreserved
VOCs	EPA 8260	2 0z	4 or 8 oz glass widemouth with Teflon-lined lid and 5035 kit with methanol preserved vial and two dry vials	Cool 4°C	48 hours to freeze samples in laboratory then 14 days	120 mL	3 - 40 mL VOA Vials (no headspace)	HCl - pH<2	14 days preserved 7 days unpreserved
SVOCs / cPAHs	EPA 8270 (SIM)	8 oz	4 or 8 oz glass widemouth with Teflon-lined lid	Cool 4°C	14 days to extraction, 40 days from extraction to analysis	1 L	1 liter amber glass with Teflon-lined lid	Cool 4°C	7 days to extraction 40 days from extraction to analysis

Analysis	Method	Soil				Groundwater/Stormwater			
		Minimum Sample Size	Sample Containers	Sample Preservation	Holding Times	Minimum Sample Size	Sample Containers	Sample Preservation	Holding Times
PCBs	EPA 8082 Modified	8 oz	4 or 8 oz glass widemouth with Teflon-lined lid	Cool 4°C	14 days to extraction, 40 days from extraction to analysis	1 L	1 liter amber glass with Teflon-lined lid	Cool 4°C	7 days to extraction 40 days from extraction to analysis
Metals**	EPA 6010/7060/7470/ 7471/7421	4 oz	4 or 8 oz glass widemouth with Teflon-lined lid	Cool 4°C	180 days/ 28 days for Mercury	500 mL	1 L poly bottle	HNO_3 - pH<2 (Dissolved metals preserved after filtration)	180 days (28 days for Mercury)

Notes:

Holding Times are based on elapsed time from date of collection

* For both soil and water the Gx and BTEX can be combined and do not require separate containers

**Metals to be analyzed are RCRA 8 and potentially copper, tin and zinc

BTEX = benzene, toluene, ethylbenzene, xylenes

VOCs = Volatile organic compounds

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

PCBs = polychlorinated biphenyls

HCl = Hydrochloric Acid

HNO_3 = Nitric Acid

oz = ounce

mL = milliliter

L = liter

g = gram

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TABLE B-5
QUALITY CONTROL SAMPLES TYPE AND FREQUENCY
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Parameter	Field QC		Laboratory QC			
	Field Duplicates	Trip Blanks	Method Blanks	LCS	MS / MSD	Lab Duplicates
Gasoline-Range Hydrocarbons	1/20 groundwater samples	NA	1/batch	1/batch	NA	1/batch
Diesel- and Oil-Range Hydrocarbons with silica gel/acid wash cleanup	1/20 groundwater samples and 1/20 soil samples	NA	1/batch	1/batch	NA	1/batch
BTEX	1/20 groundwater samples	1/cooler	1/batch	1/batch	1 set/batch	NA
VOCs	1/20 groundwater samples	1/cooler	1/batch	1/batch	1 set/batch	NA
SVOCs	1/20 groundwater samples	NA	1/batch	1/batch	1 set/batch	NA
PCBs	1/20 groundwater samples	NA	1/batch	1/batch	1 set/batch	NA
Metals*	1/20 groundwater samples	NA	1/batch	1/batch	1 MS/batch	1/batch

Notes:

An analytical lot or batch is defined as a group of samples taken through a preparation procedure and sharing a method blank, LCS, and MS/ MSD (or MS and lab duplicate).

No more than 20 field samples can be contained in one batch.

LCS = Laboratory control sample

MS = Matrix spike sample

MSD = Matrix spike duplicate sample

VOCs = Volatile organic compounds

SVOCs = Semi-volatile organic compounds

BTEX = benzene, toluene, ethylbenzene, xylenes

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

PCBs = polychlorinated biphenyls

*Metals to be analyzed are RCRA 8 and potentially copper, tin and zinc

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APPENDIX C

FINAL SAMPLING AND ANALYSIS PLAN SEDIMENT CHARACTERIZATION

FINAL SAMPLING AND ANALYSIS PLAN (SAP)
SEDIMENT CHARACTERIZATION
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

AUGUST 21, 2009

FOR
WASHINGTON STATE DEPARTMENT OF
ECOLOGY ON BEHALF OF
WEST BAY RELIABLE-0508, LLC

GEOENGINEERS

File No. 4301-010-03

Final Sampling and Analysis Plan (SAP)
Sediment Characterization
File No. 4301-010-03

August 21, 2009

Prepared for:

Washington State Department of Ecology
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ACRONYMS AND ABBREVIATIONS

ASTM	American Standards for Testing and Materials
bgs	below ground surface
Ecology	Department of Ecology
EPA	Environmental Protection Agency
GPS	Global Positioning System
HCID	Hydrocarbon Identification
MLLW	Mean Lower Low Water
NAD	North American Datum
NWTPH-D	Northwest Total Petroleum Hydrocarbons – Diesel
NWTPH-Dx	Northwest Total Petroleum Hydrocarbons – Diesel Extended
NWTPH-G	Northwest Total Petroleum Hydrocarbons – Gasoline
PSEP	Puget Sound Estuary Program
QA/QC	Quality Assurance/Quality Control
SAP	Sampling and Analysis Plan
SL	Screening Level
SMS	Sediment Management Standards
SQS	Sediment Quality Standards
WAC	Washington State Administrative Code

FINAL SAMPLING AND ANALYSIS PLAN (SAP)
SEDIMENT CHARACTERIZATION
RELIABLE STEEL SITE
OLYMPIA, WASHINGTON
FOR
WASHINGTON STATE DEPARTMENT OF ECOLOGY ON BEHALF OF
WEST BAY RELIABLE-0508, LLC

1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) summarizes field procedures for conducting Site investigation activities as part of a remedial investigation (RI) at the Reliable Steel Site (Site) located in Olympia, Washington. The RI is being proposed by West Bay Reliable-0508, LLC. Objectives of the RI are discussed in the Work Plan. The purpose of the sampling is to further delineate the extent of sediment contamination at the Site and to fill data gaps identified from review of data from previous studies. The SAP will be used in conjunction with the RI Work Plan and Health and Safety Plan (HASP).

Detailed descriptions of sediment sampling procedures are provided in this document. Soil, groundwater, and surface water sampling is described in a separate SAP. Site conditions may make it necessary to modify the procedures described in this SAP. Substantial variations or modifications that become necessary during the investigation will be coordinated with West Bay Reliable-0508, LLC, the Washington State Department of Ecology (Ecology) and other involved parties as appropriate. Variations or modifications implemented during the investigation and the reason for the modification will be documented in field records.

The purpose of this Plan is to describe field activities, sampling equipment, sampling locations and procedures that will be used during this investigation. This Plan also identifies quality assurance/ quality control (QA/QC) procedures that will be implemented during sampling activities and laboratory analyses.

2.0 SAMPLING AND ANALYSIS APPROACH

The approach used to characterize sediment as part of the RI is based on the results of previous investigations at the Site and communications with Ecology. The SAP was developed utilizing previously identified Site conditions and focuses on further characterization of the extent of contaminants of potential concern (COPCs) in sediment. COPCs identified in Site sediment during previous investigations that are to be further evaluated using the procedures specified in this SAP include:

- Petroleum hydrocarbons at concentrations greater than a screening level of 100 mg/kg in surface sediment at two locations;
- Mercury at concentrations greater than Sediment Management Standards (SMS) criteria in subsurface sediment at one location; and
- Wood in surface and subsurface sediment.

The sediment investigation location is an intertidal area that may make it necessary to alter the sampling approach (i.e., sample collection methodology) due to tide elevation and sediment surface conditions at the time of sampling. Some samples may be collected by hand if adequate tides (i.e., low tides) occur when sampling is scheduled to be performed and if the sediment surface is firm enough to walk on. However, there is the potential that all sediment samples will need to be collected using sampling equipment deployed from a sampling vessel at higher tides if adequate low tides are not occurring during the scheduled sampling period and/or the sediment surface is too soft to walk on.

Sediment characterization sampling and analysis will include the following:

- Collection of a surface sediment sample (i.e., from the surface or mudline to 10 cm below the surface or 0 to 10 cm) from the former sample location RGS4 for petroleum hydrocarbon identification analysis with follow up analysis for specific petroleum hydrocarbons (i.e., gasoline, diesel and/or oil) if detected in the sample.
- Collection of three surface sediment samples (0 to 10 cm) from locations around RGS8 for petroleum hydrocarbon identification analysis with follow up analysis for specific petroleum hydrocarbons if detected in the samples.
- Collection of sediment cores (i.e., from the surface or mudline to 8 feet below mudline or to refusal) from three locations around RGS7 for analysis of mercury.
- In addition to the analyses identified above, all samples will be analyzed for total solids and total organic carbon (TOC).
- Additionally, samples in which wood is observed to be present will be analyzed for TVS and bulk ammonia and sulfides and a visual assessment of wood in the sediment (i.e., percent wood by volume) will be performed.
- Collection of one field duplicate from a sample undergoing petroleum hydrocarbon analysis, one field duplicate from a sample undergoing metals analysis and one field duplicate from a sample undergoing TVS and bulk ammonia and sulfide analyses.

The results of the chemical analyses for metals will be evaluated with reference to Sediment Management Standards (SMS) Sediment Quality Standards (SQS) and Cleanup Screening Levels (CSLs) criteria. There are no promulgated SMS criteria for petroleum hydrocarbons or wood debris. Petroleum hydrocarbon concentrations will be compared to the screening criteria of 100 mg/kg.

The SMS SQS and CSL criteria, petroleum hydrocarbon screening level, recommended sample preparation methods and analytical methods, sediment sample volumes and containers for physical/ chemical analyses, storage temperatures and holding times are presented in Tables C-1 through C-4 of this SAP.

3.0 SAMPLE COLLECTION AND HANDLING

3.1 SEDIMENT SAMPLE COLLECTION

All sampling activities will be completed in accordance with Puget Sound Estuary Program (PSEP) protocols. Sediment sampling at the Site will be completed as follows:

- Sample locations will be determined in the field to the nearest 0.1 second (North American Datum 83) using a hand-held global positioning system (GPS) unit or GPS unit on the sampling vessel. The accuracy of measured and recorded horizontal coordinates will be within 3 meters. Vertical elevations will be referenced to mean lower low water (MLLW) based on actual Site elevations from the most recent Site survey.
- Surface samples will be collected from sediment present from 0 to 10 cm in four locations (RI-S-1 and RI-S-5 through RI-S-7) at the Site as shown on Figure 5 of the Work Plan. The

samples will either be collected by hand using a decontaminated stainless steel spoon and bowl at low tide or using a Van Veen sampler operated from a vessel outfitted for that purpose.

- Subsurface sediment samples will be collected from three sediment cores (RI-S-2 through RI-S-4) located as shown on Work Plan Figure 5 around previous sediment core sample location RGS7. The sediment cores will be completed using either vibracore equipment operated from a vessel outfitted for that purpose, coring equipment operated by hand from a small boat, or coring equipment operated by hand from the sediment surface during low tide depending on site conditions at the time of sampling.
- Sediment cores will be completed to a depth of 8 feet below mudline or to refusal. Sediment samples will be collected from approximate 2-foot intervals (i.e., 0 to 2 feet, 2 to 4 feet, 4 to 6 feet and 6 to 8 feet below the mudline) in each core. Samples from two intervals will be submitted for analysis. It is anticipated that the 2- to 4-foot and 4- to 6-foot interval samples from each core will be submitted for analysis. However, the final selection of samples to be submitted may be adjusted based on field observations. The samples from remaining intervals will be archived for potential future analysis.
- Surface and subsurface samples will be characterized in the field at the time of collection and will be processed and stored in an iced cooler for delivery to the analytical laboratory. Field observations will include penetration depth, color, odor, sediment type, water depth at the sample location, presence of organisms, signs of contamination (e.g., stains, sheen, debris etc.). Field observations will include an estimation of the quantity (i.e., percent of the sample material) comprised of wood (i.e., wood pieces, sawdust, etc.) and other organic material, if present.
- The surface and subsurface sediment samples collected at the Site will be submitted to a certified analytical laboratory for a combination of analyses including metals, petroleum hydrocarbon identification with appropriate follow up petroleum hydrocarbon analysis and conventional analyses (total solids, TOC, TVS, and bulk ammonia and sulfide). Each sample will be homogenized by mixing prior to placement into sample containers. The sediment samples will be shipped to the analytical laboratory according to appropriate chain of custody protocols.

3.2 EQUIPMENT DECONTAMINATION

All equipment that will potentially contact sediment will be decontaminated before each use. Decontamination procedures will consist of the following:

- Wash with non-phosphate detergent solution (Liqui-Nox and distilled water),
- Triple rinse with distilled water, and
- Storage of the decontaminated equipment on clean plastic sheeting or covered with aluminum foil pending subsequent use.

Field personnel will limit cross contamination by changing gloves between sampling events.

3.3 FIELD DOCUMENTATION

Sample documentation will be recorded on sample forms. In addition, field reports will be completed on field report forms or in a bound logbook. Field sample forms and reports will become part of the project files at the conclusion of this field exploration.

At a minimum, the following information will be recorded during the collection of each sample:

- Sample location and description, including sketch, measured distances, or coordinates.
- Sampler's name(s).
- Date and time of sample collection.
- Water depth.
- Sampling equipment penetration, sample material recovery depth, and sample interval.
- Gross characteristics of the sediment including:
    - Texture,
    - Color,
    - Presence of biological structures,
    - Presence of debris including wood on the surface of the sediment
    - Presence of debris including wood beneath the surface
- Description of wood presence, type, and quantity of wood, if observed, including:
    - Type of wood (e.g., sawdust, bark, processed lumber, stick)
    - Location of wood (e.g., on the surface, beneath the surface, in a layer, mixed throughout)
- Visually based volumetric estimate of wood in sediment (using percentage diagrams available on soil classification charts).
- Field screening for evidence of contamination including:
    - Unusual color,
    - Presence of sheen,
    - Odor,
    - Headspace vapor.
- Gross characteristics of the vertical profile including:
    - Presence of a redox layer and redox layer thickness, if present
    - Changes in material characteristics.
- Name of recipient laboratory.

The following information also will be recorded in the field log for each day of sampling:

- Team members and their responsibilities.
- Time of arrival/entry on Site and time of Site departure.
- Other personnel present at the Site.
- Summary of pertinent meetings or discussions with regulatory agency or contractor personnel.
- Deviations from sampling plans, Site safety plans, and Quality Assurance Project Plan (QAPP) procedures.
- Calibration readings for any equipment used and equipment model and serial number.

The handling, use and maintenance of field log books are the field coordinator's responsibilities.

3.4 SAMPLE CONTAINER LABELING

Field protocol will be established to manage field sample collection, handling and documentation. Sediment samples obtained during this study will be placed in appropriate laboratory-prepared containers. Sample containers are listed in Table C-3.

Sample containers will be labeled with the following information at the time of collection:

- Project number;
- Sample name, which will include a reference to depth if appropriate; and
- Date and time of collection.

The sample collection activities will be recorded on the sample forms. The Field Coordinator will monitor the consistency of sample container labeling between the SAP, sample container labels, field log books and the chain-of-custody.

3.5 SAMPLE STORAGE

Samples will be placed in a cooler with “blue ice” or “wet ice” immediately after they are collected. Holding times will be observed during sample storage. Holding times for the project analyses are summarized in Table C-4.

3.6 SAMPLE SHIPMENT

The samples will be transported and delivered to the analytical laboratory in coolers. Field personnel will transport and hand-deliver samples to the laboratory or to a laboratory courier. All analyses for this project are anticipated to be performed using a local laboratory, and sample shipping is not anticipated. The shipping containers (coolers) will be properly secured using clear plastic tape and custody seals prior to shipment.

3.7 CHAIN-OF-CUSTODY RECORDS

Field personnel are responsible for the security of samples from the time the samples are collected until the samples have been received by the shipper or laboratory. A chain-of-custody form will be completed at the end of each field day for samples being shipped to the laboratory. Information to be included on the chain-of-custody form includes:

- Project name and number.
- Sample identification number.
- Date and time of sampling.
- Sample matrix (soil, water, etc.) and number of containers from each sampling point, including preservatives used.
- Depth of the sample.
- Analyses to be performed.
- Names of sampling personnel.

The original chain-of-custody record will be signed by a member of the field team and bear a unique tracking number. The transfer of the samples will be documented by signing the appropriate custody acknowledgment spaces on the chain-of-custody form. Field personnel shall retain copies and place the original and remaining copies in a plastic bag, taped to the inside lid of the cooler before sealing the container for shipment. This record will accompany the samples during transit by carrier to the laboratory.

The laboratory will measure the temperature of the samples upon receipt. The temperature will be recorded on the chain-of-custody record or the laboratory's sample receipt forms.

3.8 FIELD INSTRUMENTATION

Proper calibration of equipment and instrumentation facilitates accurate and reliable field measurements. Field and laboratory equipment used on the project will be calibrated and adjusted in general accordance with the manufacturer's recommendations. Methods and intervals of calibration and maintenance will be based on the type of equipment, stability characteristics, required accuracy, intended use, and environmental conditions.

3.9 FIELD MEASUREMENT EVALUATION

Field data will be reviewed at the end of each day by following the quality control checks outlined below and procedures in the SAP. Field data documentation will be checked against the applicable criteria as follows:

- Sample collection information.
- Field instrumentation and calibration.
- Sample collection protocol.
- Sample containers, preservation and volume.
- Field Quality Control (QC) samples collected at the frequency specified.
- Sample documentation and chain-of-custody protocols.
- Sample shipment.

3.10 HEALTH AND SAFETY

A Site-specific Health and Safety Plan (HASP) is presented in Appendix D of the RI/FS Work Plan for the Reliable Steel Site. GeoEngineers field staff will conduct a tailgate safety meeting each morning before beginning daily field activities. The field staff will terminate any work activities that do not comply with the HASP.

4.0 SAMPLE ANALYSES AND ANALYTICAL METHODS

Samples will be submitted for a combination of analyses that include the following :

- Petroleum hydrocarbon identification using Ecology method NWTPH-HCID.
- Appropriate follow up analyses including NWTPH-G for gasoline, NWTPH-D for diesel and/or NWTPH-Dx for oil.
- SMS metals (including mercury) using EPA 6000/7000 series and 245.5 methodology.
- Conventional parameters including total solids by SM-2540B and TOC by EPA Method 9060.

- Additional conventional parameters including TVS by SM-2540E, bulk ammonia by EPA 350.1 M and bulk sulfides by EPA 9030B when wood is observed to be present.

Analyses will be conducted in accordance with SMS/PSEP protocols. A list of analytes, preparation methods, cleanup methods, detection limits and analytical methods used for chemical analysis of marine sediments are summarized in Table C-2.

5.0 QUALITY ASSURANCE PROJECT PLAN OVERVIEW

5.1 GENERAL

This Quality Assurance Project Plan (QAPP) was developed for sediment exploration activities at the Reliable Steel Site. This QAPP and the SAP provide the framework for completing the data collection and analytical phases of the project. The QAPP serves as the primary guide for the integration of QA and QC functions into project activities. The QAPP presents the objectives, procedures, organization, functional activities and specific quality assurance and quality control activities designed to achieve data quality goals established for the project. This QAPP is based on guidelines specified in the SMS of the Washington Administrative Code (WAC) 173, Chapter 204-100 to 204-620 and the *Sediment and Sampling Analysis Plan Appendix, Guidance on the Development of Sediment Sampling and Analysis Plans Meeting the Requirements of the Sediment Management Standards — Chapter 173-204 WAC* (SAPA).

Environmental measurements will be conducted throughout the project to produce data that are scientifically valid, of known and acceptable quality and meet established objectives. QA/QC procedures will be implemented so that precision, accuracy, representativeness, completeness and comparability (PARCC) of data generated meet the specified data quality objectives.

This QAPP will be used during the following three stages of the sediment investigation:

- Project Planning – to present the plans for project execution from a quality assurance viewpoint.
- Project Implementation – to act as a guide for quality assurance reviews and as the specifications for assessing the quality of data generated.
- Project Completion – to serve as a basis for determining whether the project has attained established goals.

5.2 CHEMICAL ANALYTICAL DATA QUALITY OBJECTIVES

5.2.1 General

The quality assurance objective for technical data is to collect environmental monitoring data of known, acceptable and documentable quality. The QA objectives established for the project are:

- Implement the procedures outlined herein for sample custody, equipment operation and calibration, laboratory analysis, and data reporting that will facilitate consistency and thoroughness of data generated.
- Achieve the acceptable level of confidence and quality required so that data generated are scientifically valid and of known and documented quality. This will be performed by establishing criteria for precision, accuracy, representativeness, completeness and comparability and by testing data against these criteria.

Specific data quality objectives (DQOs) to evaluate data quality and usability are provided in the following sections.

5.2.2 Detection Limits

Analytical methods have quantitative limitations at a given statistical level of confidence that are often expressed as the method detection limit (MDL). Individual instruments often can detect but not accurately quantify compounds at concentrations lower than the MDL, referred to as the instrument detection limit (IDL). Although results reported near the MDL or the IDL provide insight to Site conditions, quality assurance dictates that analytical methods achieve a consistently reliable level of detection known as the practical quantitation limit (PQL). The contract laboratory will provide numerical results for all analytes and report them as detected above the PQL or undetected at the PQL.

Sediment detection limits for this project were developed from SMS criteria. Achieving a stated PQL for a given analyte is helpful in providing statistically useful data; however, the target PQLs presented in Table C-2 are only targets. The PQLs presented in Table C-2 are considered targets because several factors may influence final PQLs. First, moisture and other physical conditions of sediment affect PQLs. Second, analytical procedures may require sample dilutions or other practices to accurately quantify a particular analyte at concentrations above the range of the instrument. The effect is that other analytes could be reported as undetected but at a value much higher than a specified TDL. High non-detect values, although correctly reported, can bias statistical summaries and careful interpretation is required to correctly characterize Site conditions.

5.2.3 Precision

Precision is the measure of mutual agreement among replicate or duplicate measurements of an analyte from the same sample and applies to field duplicate or split samples, replicate analyses and duplicate spiked environmental samples (matrix spike duplicates). The closer the measured values are to each other, the more precise the measurement process. Precision error may affect data usefulness. Good precision is indicative of relative consistency and comparability between different samples. Precision will be expressed as the relative percent difference (RPD) for spike sample comparisons of various matrices and field duplicate comparisons for water samples. This value is calculated by:

$$RPD(\%) = \frac{|D_1 - D_2|}{(D_1 + D_2)/2} \; X\ 100,$$

Where

D_1 = Concentration of analyte in sample

D_2 = Concentration of analyte in duplicate sample

The calculation applies to split samples, replicate analyses, duplicate spiked environmental samples (matrix spike duplicates) and laboratory control duplicates. The RPD will be calculated for samples and compared to the applicable criteria. Precision can also be expressed as the percent difference (%D) between replicate analyses. Evaluation of precision will be based on one or more pertinent documents (USEPA, 1994; USEPA, 2004) that address criteria exceedances and courses of action.

5.2.4 Accuracy

Accuracy is a measure of bias in the analytical process. The closer the measurement value is to the true value, the greater the accuracy. This measure is defined as the difference between the reported value versus the actual value and is often measured with the addition of a known compound to a sample. The amount of known compound reported in the sample, or percent recovery, assists in determining the performance of the analytical system in correctly quantifying the compounds of interest. Since most environmental data collected represent one point spatially and temporally rather than an average of values, accuracy plays a greater role than precision in assessing the results. In general, if the percent recovery is low, non-detect results may indicate that compounds of interest are not present when in fact these compounds are present. Detected compounds may be biased low or reported at a value less than actual environmental conditions. The reverse is true when recoveries are high. Non-detect values are considered accurate while detected results may be higher than the true value.

Accuracy will be expressed as the percent recovery of a surrogate compound (also known as “system monitoring compound”), a matrix spike result, or from a standard reference material where:

$$Recovery\,(\%) = \frac{Sample\ Result}{Spike\ Amount}\ X\ 100$$

The evaluation of accuracy will be based on one or more pertinent documents (USEPA, 1994; USEPA, 2004) that address criteria exceedances and courses of action.

5.2.5 Representativeness, Completeness and Comparability

Representativeness expresses the degree to which data accurately and precisely represent the actual Site conditions. The determination of the representativeness of the data will be performed by completing the following:

- Comparing actual sampling procedures to those delineated within the project SAP and QAPP.
- Comparing analytical results of field duplicates to determine the variations in the analytical results.
- Invalidating nonrepresentative data or identifying data to be classified as questionable or qualitative. Only representative data will be used in subsequent data reduction, validation, and reporting activities.

Completeness establishes whether a sufficient amount of valid measurements were obtained to meet project objectives. The number of samples and results expected establishes the comparative basis for completeness. Completeness goals are 90 percent useable data for samples/analyses planned. If the completeness goal is not achieved an evaluation will be made to determine if the data are adequate to meet study objectives.

Comparability expresses the confidence with which one set of data can be compared to another. Although numeric goals do not exist for comparability, a statement on comparability will be prepared to determine overall usefulness of data sets, following the determination of both precision and accuracy.

5.2.6 Holding Times

Holding times are defined as the time between sample collection and extraction, sample collection and analysis or sample extraction and analysis. Some analytical methods specify a holding time for analysis only. For many methods, holding times may be extended by sample preservation techniques in the field. If a sample exceeds a holding time, then the results may be biased low. For example, if the extraction holding time for volatile analysis of soil sample is exceeded, then the possibility exists that some of the organic constituents have volatilized from the sample or degraded. Results for that analysis will be qualified as estimated to indicate that the reported results may be lower than actual Site conditions. Holding times are presented in Table C-4.

5.2.7 Blanks

According to the *National Functional Guidelines for Organic Data Review* (USEPA, 1999), "The purpose of laboratory (or field) blank analysis is to determine the existence and magnitude of contamination resulting from laboratory (or field) activities. The criteria for evaluation of blanks apply to any blank associated with the samples (e.g., method blanks, instrument blanks, trip blanks, and equipment blanks)." Trip blanks are placed with samples during shipment; method blanks are created during sample preparation and follow samples throughout the analysis process.

Analytical results for blanks will be interpreted in general accordance with *National Functional Guidelines for Organic Data Review* and professional judgment.

5.2.8 Laboratory Custody Procedures

The laboratory will follow their standard operating procedures (SOPs) to document sample handling from time of receipt (sample log-in) to reporting. Documentation will include at a minimum, the analysts name or initial, time and date.

5.2.9 Laboratory Calibration Procedures

For analytical chemistry, calibration procedures will be performed in general accordance with the methods cited and laboratory standard operating procedures. Calibration documentation will be retained at the laboratory and readily available for a period of six months.

5.2.10 Laboratory Quality Control

Laboratory quality control procedures will be evaluated through a formal data validation process. The analytical laboratory will follow standard method procedures that include specified QC monitoring requirements. These requirements will vary by method but generally include:

- Method blanks
- Internal standards
- Calibrations
- Matrix spike/matrix spike duplicates (MS/MSD)
- Laboratory control spikes/spike duplicates (LCS/LCSD)
- Laboratory replicates or duplicates
- Surrogate spikes

5.2.10.1 Laboratory Blanks

Laboratory procedures employ the use of several types of blanks but the most commonly used blank for QA/QC assessments are method blanks. Method blanks are laboratory QC samples that consist of either a soil-like material having undergone a contaminant destruction process or High Purity Liquid Chromatography (HPLC) water. Method blanks are extracted and analyzed with each batch of environmental samples undergoing analysis. Method blanks are particularly useful during volatile analysis since volatile compounds can be transported in the laboratory through the vapor phase. If a substance is found in the method blank then one (or more) of the following occurred:

- Measurement apparatus or containers were not properly cleaned and contained contaminants.
- Reagents used in the process were contaminated with a substance(s) of interest.
- Contaminated analytical equipment was not properly cleaned.
- Volatile substances in the air with high solubility or affinities toward the sample matrix contaminated the samples during preparation or analysis.

It is difficult to determine which of the above scenarios took place if blank contamination occurs. However, it is assumed that the conditions that affected the blanks also likely affected the project samples. Given method blank results, validation rules assist in determining which substances in samples are considered “real” and which ones are attributable to the analytical process. Furthermore, the guidelines state, “. . . there may be instances where little or no contamination was present in the associated blank, but qualification of the sample is deemed necessary. Contamination introduced through dilution water is one example.”

5.2.10.2 Calibrations

Several types of calibrations are used, depending on the method, to determine whether the methodology is “in control” by verifying the linearity of the calibration curve and to assure that the sample results reflect accurate and precise measurements. The main calibrations used are initial calibrations, daily calibrations, and continuing calibration verification.

5.2.10.3 Matrix Spike/Matrix Spike Duplicates (MS/MSD)

Matrix spike/matrix spike duplicate samples are used to assess influences or interferences caused by the physical or chemical properties of the sample itself. For example, extreme pH affects the results of SVOCs. Or, the presence of a particular compound may interfere with accurate quantitation of another analyte. MS/MSD data is reviewed in combination with other QC monitoring data to determine matrix effects. In some cases, matrix affects cannot be determined due to dilution and/or high levels of related substances in the sample. A matrix spike is evaluated by spiking a known amount of one or more of the target analytes ideally at a concentration of 5 to 10 times higher than the sample result. A percent recovery is calculated by subtracting the sample result from the spike result, dividing by the spiked amount and multiplying by 100.

The samples for the MS and MSD analyses should be collected from a boring or sampling location that is believed to exhibit low-level contamination. A sample from an area of low-level contamination is needed because the objective of MS/MSD analyses is to determine the presence of matrix interferences, which can best be achieved with low levels of contaminants. Additional sample volume will be collected for these analyses. This MS/MSD sample will be a composite to achieve a level of representativeness and reproducibility in the data.

5.2.10.4 Laboratory Control Spikes/Spike Duplicates (LCS/LCSD)

Also known as blanks spikes, laboratory control spikes are similar to matrix spikes in that a known amount of one or more of the target analytes are spiked into a prepared media and a percent recovery of the spiked substances are calculated. The primary difference between a MS and LCS is that the LCS spike media is considered "clean" or contaminant free. For example, HPLC water is typically used for LCS water analyses. The purpose of a LCS is to help assess the overall accuracy and precision of the analytical process, including sample preparation, instrument performance and analyst performance. LCS data must be reviewed in context with other controls to determine if out-of-control events occur.

5.2.10.5 Laboratory Replicates/Duplicates

Laboratories often utilize MS/MSDs, LCS/LCSDs and/or replicates to assess precision. Replicates are a second analysis of a field collected environmental sample. Replicates can be split at varying stages of the sample preparation and analysis process, but most commonly occur as a second analysis on the extracted media.

5.2.10.6 Surrogate Spikes

The purposes of using a surrogate are to verify the accuracy of the instrument being used and extraction procedures. Surrogates are substances similar to, but not one of, the target analytes. A known concentration of surrogate is added to the sample and passed through the instrument, noting the surrogate recovery. Each surrogate used has an acceptable range of percent recovery. If a surrogate recovery is low, sample results may be biased low and depending on the recovery value, a possibility of false negatives may exist. Conversely, when recoveries are above the specified range of acceptance a possibility of false positives exist, although non-detected results are considered accurate.

5.2.11 Chemical Data Reduction and Assessment Procedures

5.2.11.1 Data Reduction

Data reduction involves the conversion or transcription of field and analytical data to a useable format. The laboratory personnel will reduce the analytical data for review by the Quality Assurance Leader and Project Manager.

5.2.11.2 Laboratory Data Quality Control Evaluation

The laboratory data assessment will consist of a formal review of the following quality control parameters, utilizing criteria identified in previous sections of this QAPP:

- Holding times.
- Method blanks.
- Matrix spike/spike duplicates.
- Laboratory control spikes/spike duplicates.
- Surrogate spikes.
- Replicates.

Cooler receipt forms and sample condition forms provided by the laboratory will be reviewed for out-of-control incidents. The final report will contain what effects, if any, an incident has on data quality.

6.0 ANALYTICAL DATA REPORTING

Conventional and chemical analytical data will be reported in formatted hard copy and digital form. Analytical laboratory measurements will be recorded in standard formats that display, at a minimum, the field sample identification, the laboratory identification, reporting units, qualifiers, analytical method, analyte tested, analytical result, extraction and analysis dates, and detection limit (PQL only). Each sample delivery group will be accompanied by sample receipt forms and a case narrative identifying data quality issues. Laboratory electronic data deliverables (EDD) will be established by GeoEngineers, Inc., with the contract laboratory. Final results will be sent to the Project Manager.

Data will be formatted by GeoEngineers for upload to Ecology's EIM database system, as required by Ecology. Electronic EIM template data must be verified to be compatible with the current version of EIM which uses ASCII protocol, comma delimited text files prior to delivery to Ecology. Verification shall be conducted by the consultant importing each of the data templates into their EIM database, correcting any errors, and then exporting the corrected final templates for delivery to Ecology.

Sediment sampling data shall also be submitted to Ecology in hardcopy reports containing data tables in both dry weight and total organic carbon normalized units in comparison to applicable state regulatory criteria. Electronic EIM template data shall be submitted to Ecology simultaneously with the hardcopy report.

7.0 SCHEDULE AND DELIVERABLES

Field activities are currently proposed to occur in winter 2009/2010. The deliverables for this sediment investigation will be integrated with the upland investigation sampling.

8.0 PROJECT ORGANIZATION AND RESPONSIBILITY

Descriptions of the responsibilities, lines of authority and communication for the key positions to quality assurance and quality control are provided below. This organization facilitates the efficient production of project work, allows for an independent quality review, and permits resolution of any QA issues before submittal.

8.1 PROJECT LEADERSHIP AND MANAGEMENT

The Project Manager's duties consist of providing concise technical work statements for project tasks, selecting project team members, determining subcontractor participation, establishing budgets and schedules, adhering to budgets and schedules, providing technical oversight, and providing overall production and review of project deliverables. Garrett Leque is the Project Manager for activities at the Site. The Associate-in-Charge is responsible to West Bay Reliable-0508, LLC for fulfilling contractual and administrative control of the project. Iain Wingard is the Associate-in-Charge.

8.2 FIELD COORDINATOR

The Field Coordinator is responsible for the daily management of activities in the field. Specific responsibilities include the following:

- Provides technical direction to the field staff.
- Develops schedules and allocates resources for field tasks.
- Coordinates data collection activities to be consistent with information requirements.
- Supervises the compilation of field data and laboratory analytical results.
- Assures that data are correctly and completely reported.
- Implements and oversees field sampling in accordance with project plans.

- Supervises field personnel.
- Coordinates work with on-site subcontractors.
- Schedules sample shipment with the analytical laboratory.
- Assures that appropriate sampling, testing, and measurement procedures are followed.
- Participates in QA corrective actions as required.

The Field Coordinator for RI exploration activities at the Site is Garrett Leque.

8.3 QUALITY ASSURANCE LEADER

The GeoEngineers project Quality Assurance Leader for this project is Iain Wingard, who is responsible for the project's overall QA. The Project QA Leader is responsible for coordinating QA/QC activities as they relate to the acquisition of field data. The QA Leader has the following responsibilities:

- Serves as the official contact for laboratory data QA concerns.
- Responds to laboratory data, QA needs, resolves issues, and answers requests for guidance and assistance.
- Reviews the implementation of the QAPP and the adequacy of the data generated from a quality perspective.
- Maintains the authority to implement corrective actions as necessary.
- Reviews and approves the laboratory QA Plan.
- Evaluates the laboratory's final QA report for any condition that adversely impacts data generation.
- Ensures that appropriate sampling, testing, and analysis procedures are followed and that correct quality control checks are implemented.
- Monitors subcontractor compliance with data quality requirements.

8.4 LABORATORY MANAGEMENT

The subcontracted laboratory conducting sample analyses for this project is required to obtain approval from the QA Leader before the initiation of sample analysis to assure that the laboratory QA plan complies with the project QA objectives. The Laboratory's QA Coordinator administers the Laboratory QA Plan and is responsible for QC. Specific responsibilities of this position include:

- Ensure implementation of the QA Plan.
- Serve as the laboratory point of contact.
- Activate corrective action for out-of-control events.
- Issue the final QA/QC report.
- Administer QA sample analysis.
- Comply with the specifications established in the project plans as related to laboratory services.
- Participate in QA audits and compliance inspections.

The chemical analytical laboratory Quality Assurance Coordinator will be determined once an Ecology-accredited laboratory is chosen.

8.5 HEALTH AND SAFETY

A Site-specific HASP will be used for RI field activities and is presented in Appendix D. The Field Coordinator will be responsible for implementing the HASP during sampling activities.

The Field Coordinator will conduct a tailgate safety meeting each morning before beginning daily field activities. The Field Coordinator will terminate any work activities that do not comply with the HASP. Companies providing services for this project on a subcontracted basis will be responsible for developing and implementing their own HASP.

9.0 REFERENCES

Greylock Consulting, LLC. December 2007. "Draft Work Plan, Remedial Investigation/Feasibility Study, Reliable Steel Site, 1218 West Bay Drive NW, Olympia, Washington," December 12, 2007.

Greylock Consulting, LLC. December 2007. "Reliable Steel Remedial Investigation, Soil, Groundwater, Storm Water & Sediment Quality Report, 1218 West Bay Drive NW, Olympia, Washington," December 12, 2007.

U.S. Environmental Protection Agency (EPA). 1999. Contract Laboratory Program National Functional Guidelines for Organic Data Review.

U.S. Environmental Protection Agency (EPA). 2004. Contract Laboratory Program National Functional Guidelines for Inorganic Data Review.

Washington State Department of Ecology. "Sediment Sampling and Analysis Plan Appendix: Guidance on the Development of Sediment Sampling and Analysis Plans Meeting the Requirements of the Sediment Management Standards (Chapter 173-204 WAC)," Revised April 2003.

Washington State Department of Ecology, "Agreed Order No. DE-080TCPSR-5223, BOJO Investments, LLC," January 28, 2008.

TABLE C-1

SMS[1] CHEMICAL EVALUATION CRITERIA

SEDIMENT CHARACTERIZATION, RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Chemical	SMS Criteria	
	SQS	CSL
Organics (mg/kg)		
Total Petroleum Hydrocarbons	100[2]	
Metals (mg/kg)		
Arsenic	57	93
Cadmium	5.1	6.7
Chromium	260	270
Copper	390	390
Lead	450	530
Mercury	0.41	0.59
Silver	6.1	6.1
Zinc	410	960

Notes:

[1] SMS = Sediment Management Standards last updated October 13, 2008, Ecology.

[2] There is no SQS or CSL established for total petroleum hydrocarbons. The 100 mg/kg is a screening criteria being applied to sediment by the Washington State Department of Ecology.

SQS= Sediment quality standards

CSL = Cleanup screening level

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TABLE C-2
RECOMMENDED SAMPLE PREPARATION METHODS, CLEANUP METHODS, ANALYTICAL METHODS AND PRACTICAL QUANTITATION LIMITS
SEDIMENT CHARACTERIZATION, RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Chemical	Recommended Sample Preparation Methods[a]	Recommended Sample Cleanup Methods[b]	Recommended Analytical Methods[c]	Recommended Practical Quantitation Limits
Metals (mg/kg dry weight)				
Arsenic	PSEP/3050B	--	6010B/6020/7061A	19
Cadmium	PSEP/3050B	--	6010B/6020/7131A	1.7
Chromium	PSEP/3050B	--	6010B/6020/7191	87
Copper	PSEP/3050B	--	6010B/6020	130
Lead	PSEP/3050B	--	6010B/6020	150
Mercury	--[d]	--	7471A/245.5	0.14
Silver	PSEP/3050B	--	6010B/6020	2
Zinc	PSEP/3050B	--	6010B/6020	137
Total Petroleum Hydrocarbons (mg/kg dry weight)				
Hydrocarbon Identification	--	--	8440, Ecology method - pub. 97-602 (1997)	20 mg/kg (gasoline), 50 mg/kg (#2 diesel), 100 mg/kg (lmotor oil) based on 100% solids
Gasoline	--	--	NWTPH-G	5
Diesel	--	EPA 3665A/3630C	NWTPH-Dx	5
Motor Oil	--	EPA 3665A/3630C	NWTPH-Dx	10
Conventionals				
Total solids	--[e]	--	SM-2540B	0.1% (wet wt)
Total volatile solids	--[e]	--	SM 2540 E/PSEP	0.1% (dry weight)
Ammonia	--[e]	--	EPA 350.1M	100 mg/kg
Total sulfides	--[e]	--	Plumb (1981)/9030B	10 mg/kg
Total organic carbon (TOC)	--[e]	--	EPA 9060	0.1% (dry weight)

Notes:

PSEP - Puget Sound Estuary Program

[a] Recommended sample preparation methods are:

PSEP(1997a)
-Method 3000 series - sample preparation methods from SW-846 (U.S. EPA 1996) and subjected to changes by EPA updates.

[b] Recommended sample cleanup methods are:

EPA 3665A Sulfuric Acid Cleanup
EPA 3630C Silica Gel

[c] Recommended analytical methods are:

- Method 6000, 7000, 8000 and 9000 series - analytical methods from SW-846 (U.S. EPA 1996) and updates
- The SW-846 and updates are available from the web site at: http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm
- Plumb (1981) - US EPA/US Army Corps of Engineers Technical Report EPA/CE-81-1
- PSEP (1986a)
-Washington State Department of Ecology - Analytical Methods for Petroleum Hydrocarbons ECY-97/602

[d] The sample digestion method for mercury is described in the analytical method (Method 7471A, September 1994).

[e] Sample preparation methods for sediment conventional analyses are described in the analytical methods.

TABLE C-3

MINIMUM SEDIMENT SAMPLE SIZES AND ACCEPTABLE CONTAINERS FOR PHYSICAL/CHEMICAL ANALYSES

SEDIMENT CHARACTERIZATION, RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Sample Type	Minimum Sample Size[a]	Container Type[b]
Physical/Chemical Analyses		
Total solids	50 g	P,G
Total volatile solids	50 g	P,G [c]
Total organic carbon	25 g	P,G
Ammonia	25 g	P,G
Total sulfides	50 g	P,G [c]
Metals (except mercury)	50 g	P,G
Mercury	1 g	P,G
Petroleum Hydrocarbons	20 g	G [c]

Notes:

[a] Recommended minimum field sample sizes (wet weight basis) for one laboratory analysis. If additional laboratory analyses are required (e.g., laboratory replicates, allowance for having to repeat an analysis), the field sample size should be increased accordingly. For some chemical analyses, smaller sample sizes may be used if comparable sensitivity can be obtained by adjusting instrumentation, extract volume, or other factors of the analysis.

[b] P - linear polyethylene; G - borosilicate glass;

[c] No headspace or air pockets should remain. If such samples are frozen in glass containers, breakage of the container is likely to occur.

Triway Enterprise Remedial Investigation > Geo Internal > Final [Word Processing] > Remedial Investigation Work Plan > Appendices > Appendix C Tables.xls

TABLE C-4
STORAGE TEMPERATURES AND MAXIMUM HOLDING TIMES FOR PHYSICAL/CHEMICAL ANALYSES
SEDIMENT CHARACTERIZATION, RELIABLE STEEL SITE
OLYMPIA, WASHINGTON

Sample Type	Sample Preservation Technique	Maximum Holding Time
Total solids	Cool, 4°C	14 days
	Freeze, -18°C	6 months
Total volatile solids	Cool, 4°C	14 days
	Freeze, -18°C	6 months
Total organic carbon	Cool, 4°C	14 days
	Freeze, -18°C	6 months
Ammonia	Cool, 4°C	7 days
Total sulfides	Cool, 4°C, zero headspace required	7 days
	(a 250 ml sample for 5 ml of 2 N zinc acetate)	
Metals (except mercury)	Cool, 4°C	6 months
	Freeze, -18°C	2 years
Mercury	Freeze, -18°C	28 days
after extraction	Cool, 4°C	40 days
Petroleum Hydrocarbons	Cool, 4°C	14 days

Triway Enterprise Remedial Investigation > Geo Internal > Final [Word Processing] > Remedial Investigation Work Plan > Appendices > Appendix C Tables.xls

GeoEngineers

APPENDIX D
HEALTH AND SAFETY PLAN

SITE HEALTH AND SAFETY PLAN (HASP)
RELIABLE STEEL SITE
1218 WEST BAY DRIVE NW
OLYMPIA, WASHINGTON

AUGUST 21, 2009

GEOENGINEERS

File No. 4301-010-03

TABLE OF CONTENTS

This HASP is to be used in conjunction with the GeoEngineers Safety Program Manual. Together, the written safety programs and this HASP constitute the site safety plan for this site. This plan is to be used by GeoEngineers personnel on this site and must be available on-site. If the work entails potential exposures to other substances or unusual situations, additional safety and health information will be included, and the plan will need to be approved by the GeoEngineers Health and Safety Manager. All plans are to be used in conjunction with current standards and policies outlined in the GeoEngineers Health and Safety Program Manual.

Liability Clause - This Site Safety Plan is intended for use by GeoEngineers Employees only. It does not extend to the other contractors or subcontractors working on this site. If requested by subcontractors, this site safety plan may be used as a minimum guideline for those entities to develop safety plans or procedures under which their own staff will work. In this case, Form C-3 shall be signed by the subcontractor.

GEOENGINEERS, INC.
SITE HEALTH & SAFETY PLAN (HASP)

Reliable Steel Site
File No. 4301-010-03

GENERAL PROJECT INFORMATION

Project Name:	Reliable Steel Site RI
Project Number:	4301-010-03
Type of Project:	Remedial Investigation
Project Address:	1218 West Bay Drive NW
Start:	Winter 2009/2010
Subcontractors:	TBD

PROJECT OBJECTIVES

- Investigate (by excavation) two areas where potential USTs exist.
- Advance Approximately 28 direct push or hand auger explorations for soil sample collection (RI-1 through RI-28).
- Sample 9 existing groundwater monitoring wells at the Site using low-flow techniques (MW-1 through MW-9).
- Sample four known stormwater outfalls at the Site in general accordance with Ecology's guidance manual for stormwater sampling (RI-SW-1 through RI-SW-4).
- Sample sediment at three locations at the Site (RI-S-1 through RI-S-3).
- Sample solid material in two catch basins at the Site (RI-CB-1 and RI-CB-2).

SITE DESCRIPTION

The Site is located at 1218 West Bay Drive NW in the City of Olympia, Washington (see figure above). West Bay Reliable 0508 LLC is performing the RI/FS in accordance with Agreed Order DE-08-TCPSR-5223, the Model Toxics Control Act (MTCA) and associated implementing regulations (i.e., Chapter 173-340 Washington Administrative Code [WAC]).

The Site is approximately 6.5 acres in size and is comprised of both upland and in-water (i.e., tidelands) property. The upland portion of the site is approximately 3.2 acres in size and the in-water portion of the Site is approximately 3.3 acres in size. Site use has consisted of commercial and industrial activities. Structures present on the upland portion of the Site include four buildings that have predominantly been used for steel tank and structural beam fabrication and painting, and an elevated crane structure (Figure 2). Structures present on the in-water portion of the Site include remnant piling, a former shipway and a segment of the elevated crane structure. Past investigations of the Site have identified the presence of chemicals at concentrations greater than MTCA cleanup levels (CULs).

The activities described in the Work Plan for the Site will be completed to characterize the nature and extent of contamination at the Site and to provide sufficient information to select a cleanup action. The Work Plan provides details for implementation of the RI/FS including evaluation of existing Site soil, groundwater, storm water, and sediment data, identification of potential data gaps for completion of the RI/FS, description of the proposed field investigation, data analysis program, anticipated schedule and reporting. This HASP is to be used in conjunction with the Site RI WP, and 2 SAP/QAPPs for the Site (attached to the WP).

LIST OF FIELD ACTIVITIES

Check the activities to be completed during the project

X Site reconnaissance
X Exploratory Borings
____ Construction Monitoring
____ Surveying
X Test Pit Exploration for USTs
____ Monitoring Well Installation
____ Monitoring Well Development
X Soil Sample Collection
____ Remediation System Monitoring
X Collection of Stormwater Samples

X Field Screening of Soil Samples
X Vapor Measurements
X Groundwater Sampling
X Groundwater Depth and Free Product Measurement, as appropriate
X Product Sample Collection as appropriate
____ Soil Stockpile Testing
____ Remedial Excavation
____ Underground Storage Tank (UST) Removal Monitoring
X Recovery of Free Product (if necessary)
X Collection of Sediment / Catch Basin Samples

LIST OF FIELD PERSONNEL AND TRAINING

Name of Employee on Site	Level of HAZWOPER Training (24-/40-hr)	Date of 8-Hr Refresher Training	Date of HAZWOPER Supervisor Training	First Aid/ CPR	Date of Other Trainings	Date of Respirator Fit Test
Garrett Leque	40	Oct 2008		Nov 2008		Dec 2008
Aaron Waggoner	40	Oct 2008		Nov 2008		July 2008

CHAIN of COMMAND	TITLE	NAME	TELEPHONE NUMBERS
1	Project Manager	Garrett Leque	(253) 312-7958
2	HAZWOPER Supervisor	Garrett Leque	(253) 312-7958
3	Field Scientist/Geologist	Garrett Leque and Aaron Waggoner	(253) 312-7958 and (253) 579-2176
4	Site Safety and Health Supervisor*	Garrett Leque	(253) 312-7958
5	Client Assigned Site Supervisor	NA	NA
6	Health and Safety Program Manager	Wayne Adams	(253) 383-4940
7	Subcontractor(s)	NA	NA
8	Current Owner	West Bay Reliable-0508 LLC	(360) 292-77805

* **Site Safety and Health Supervisor --** The individual present at a hazardous waste site responsible to the employer and who has the authority and knowledge necessary to establish the site-specific health and safety plan and verify compliance with applicable safety and health requirements.

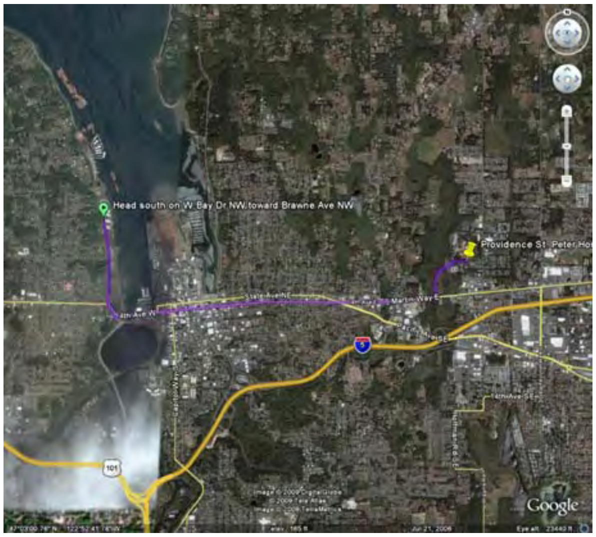
EMERGENCY INFORMATION

Hospital Name and Address:	Providence St. Peter 413 Lilly Road N.E. Olympia, Washington 98506-
Phone Numbers [Main / ER (Automated)]:	Phone: **(360) 491-9480 / (360) 493-7289**

Distance: 4.1 Miles, 12 Minutes

Route to Hospital:

1. Head South on West Bay Dr NW 0.7 miles
2. At traffic circle, take second exit to Olympic Way NW, go 0.1 miles
3. At the next traffic circle, take the third exit to 4th Ave W, go 2.3 miles
4. Continue on Martin Way, 0.5 miles
5. Turn Left at Ensign Road NE, go 0.3 miles
6. Arrive at Hospital



Ambulance, police or fire:	9-1-1
Poison Control:	Washington (800) 222-1222
Location of Nearest Telephone:	Cell phones are carried by field personnel.
Nearest Fire Extinguisher:	Located in the GeoEngineers vehicle on-site.
Nearest First-Aid Kit:	Located in the GeoEngineers vehicle on-site.

STANDARD EMERGENCY PROCEDURES

1. Get help -
    - send another worker to phone 9-1-1 (if necessary)
    - as soon as feasible, notify GeoEngineers' Project Manager
2. Reduce risk to injured person -
    - turn off equipment
    - move person from injury location (if in life-threatening situation only)
    - keep person warm
    - perform CPR (if necessary)
3. Transport injured person to medical treatment facility (if necessary) -
    - by ambulance (if necessary) or GeoEngineers vehicle
    - stay with person at medical facility

- keep GeoEngineers manager apprised of situation and notify Human Resources Manager of situation

HAZARD ANALYSIS

- *Note: A hazard assessment will be completed at every site prior to beginning field activities. Updates will be included in the daily log. This list is a summary of hazards listed on the form.*

Physical Hazards

X	Drill rigs
	Trains
X	Backhoe and or trackhoe
	Crane
	Front End Loader
X	Excavations
	Shored/braced excavation if greater than 4 feet of depth
X	Overhead hazards/power lines
X	Tripping/puncture hazards (debris on-site, steep slopes or pits)
	Unusual traffic hazard – Site is active business with vehicular and equipment traffic
X	Cold
X	Utilities/ utility locate

- Work areas will be marked with reflective cones, barricades and/or caution tape as necessary. Currently, the Site contains an active business (tank welding). Personnel will wear high-visibility vests for increased visibility by vehicle and equipment operators.
- Field personnel will be aware constantly of the location and motion of drill rigs and heavy equipment. A safe distance will be maintained between personnel and the equipment. Personnel will be visible to the operator at all times and will remain out of the immediate drilling area. Personnel will approach the drill rig only when they are certain the driller has indicated that it is safe to do so.
- The drill rig and/or vehicles used on this site will not work within 20 feet of overhead utility lines without first ensuring that the lines are not energized. This distance may be reduced to 10 feet depending on the client and the use of a safety watch.
- Personnel shall avoid tripping hazards, steep slopes, pit and other hazardous encumbrances. If it becomes necessary to work within 6 feet of the edge of a pit, slope, pier or other potentially hazardous area, appropriate fall protection measures will be implemented by the Site Safety and Health Supervisor in accordance with OSHA/DOSH regulations and the GeoEngineers Safety Program manual.

Chemical Hazards in Soil (potentially present at site)

Maximum Soil Chemistry (mg/kg)	**Petroleum Products**
	BTEX (benzene, toluene, ethylbenzene, xylenes)
	Gasoline
	Diesel fuel
	Heavy Oil
	Mineral oil
	PCBs
	Organic Compounds
	VOCs
	SVOCs
	cPAHs
	Pesticides/Herbicides
	Other
	Metals
	Arsenic
	Lead
	Copper
	Chromium
	Zinc
	Mercury
	Other metals

Biological Hazards and Procedures

Y/N	**Hazard**	**Procedures**
Y	Poison Ivy or other vegetation	Level D PPE and sharp machete as needed
Y	Insects or snakes	Level D PPE and use caution
N	Used hypodermic needs or other infectious hazards	NA
	Others	

Site personnel shall avoid contact with or exposures to potential biological hazards encountered.

Additional Hazards (Update in Daily Report)

Include evaluation of:

- *Physical Hazards* (equipment, traffic, tripping, cold stress and others)
- Chemical Hazards (odors, spills, free product, airborne particulates and others present)
- Biological Hazards

AIR MONITORING PLAN

A photoionization detector will be used on Site for field screening soil samples. The PID will also be used to occasionally monitor ambient air quality for VOCs as necessary. If VOCs are detected at a PID measured concentration of greater than 5 ppm for 5 minutes in the breathing zone, personnel shall upgrade to Level C protection: respirators with organic vapor filters.

TRAFFIC OR VEHICLE ACCESS CONTROL PLANS

The Site is an active industrial business. Care will be taken to ensure proper safety at the Site. This includes coordinating the times and locations of GeoEngineers' work to not conflict with business employees. Verbal and visual communication will be used during the movement of any equipment at the Site.

SITE WORK ZONES

The work zone will be within 30' of the drill rig. Do not approach, or let anyone else approach, to within 15 feet of the drilling area.

Hot zone/exclusion zone (Define and indicate on site map): *Within 15 feet of borings*

	Method of delineation/ excluding non-site personnel
	Fence
	Survey Tape
X	Traffic Cones
	Other

Contamination reduction zone: Outside of the 30-foot radius of the work area

Decontamination Zone – will be set up and area will be delineated

BUDDY SYSTEM

Personnel on-site should use the buddy system (pairs), particularly whenever communication is restricted. If only one GeoEngineers employee is on-site, a buddy system can be arranged with subcontractor/ contractor personnel.

SITE COMMUNICATION PLAN

Positive communications (within sight and hearing distance or via radio) should be maintained between pairs on-site, with the pair remaining in proximity to assist each other in case of emergencies. The team should prearrange hand signals or other emergency signals for communication when voice communication becomes impaired (including cases of lack of radios or radio breakdown). In these instances, you should consider suspending work until communication can be restored; if not, the following are some examples for communication:

1. Gripping partner's wrist or placing both hands around waist: Leave area immediately, no debate.
2. Hands on top of head: Need assistance.

3. Thumbs up: Okay, I'm all right: or I understand.
4. Thumbs down: No, negative.

DECONTAMINATION PROCEDURES

Decontamination consists of removing outer protective clothing and washing soiled boots and gloves using bucket and brush provided on-site in the contamination reduction zone. Hands and face will be washed in either a portable wash station or a bathroom facility in the support zone. Employees will perform decontamination procedures and wash prior to eating, drinking or leaving the site.

WASTE DISPOSAL OR STORAGE

PPE disposal (specify): Used PPE to be placed in on-site trash bags pending disposal.

PERSONAL PROTECTIVE EQUIPMENT

Level D PPE will be worn at all times on the site. Potentially exposed personnel will wash gloves, hands, face and other pertinent items to prevent hand-to-mouth contact. This will be done prior to hand-to-mouth activities including eating, smoking, etc. Adequate personnel and equipment decontamination will be used to decrease potential ingestion and inhalation. If air quality requires, PPE will be upgraded to Level C. **Personal Protective Equipment (PPE).** The minimum level of protective equipment for the Site is Level D. After the initial and/or daily hazard assessment has been completed, select the appropriate protective gear (that is, PPE) to preserve worker safety. Task-specific levels of PPE shall be reviewed with field personnel during the pre-work briefing conducted prior to the start of site operations.

Check applicable personal protection gear to be used:

__X__ Hardhat (if overhead hazards, or client requests)
__X__ Steel-toed boots (if crushing hazards are a potential or if client requests)
__X__ Safety glasses (if dust, particles, or other hazards are present or client requests)
__X__ Hearing protection (if it is difficult to carry on a conversation 3 feet away)
__X__ Rubber boots (if wet conditions)

Gloves (specify):

__X__ Nitrile and/or
__X__ Latex
______ Liners
______ Leather
______ Other (specify) __________________________________

Protective clothing:

______ **Tyvek (if dry conditions are encountered, Tyvek is sufficient)**
______ Saranex (personnel shall use Saranex if liquids are handled or splash may be an issue)
______ Cotton
__X__ Rain gear (as needed)
__X__ Layered warm clothing (as needed)

Inhalation hazard protection:

__X__ Level C (respirators with organic vapor/HEPA or P100 filters) if necessary

Limitations of Protective Clothing

PPE clothing ensembles designated for use during site activities shall be selected to provide protection against known or anticipated hazards. However, no protective garment, glove or boot is entirely chemical-resistant, nor does any PPE provide protection against all types of hazards. To obtain optimum performance from PPE, site personnel shall be trained in the proper use and inspection of PPE. This training shall include the following:

- Inspect PPE before and during use for imperfect seams, non-uniform coatings, tears, poorly functioning closures or other defects. If the integrity of the PPE is compromised in any manner, proceed to the contamination reduction zone and replace the PPE.
- Inspect PPE during use for visible signs of chemical permeation such as swelling, discoloration, stiffness, brittleness, cracks, tears or other signs of punctures. If the integrity of the PPE is compromised in any manner, proceed to the contamination reduction zone and replace the PPE.
- Disposable PPE should not be reused after breaks unless it has been properly decontaminated.

Respirator Selection, Use and Maintenance (not anticipated)

GeoEngineers has developed a written respiratory protection program in compliance with OSHA requirements contained in 29 CFR 1910.134. Site personnel shall be trained on the proper use, maintenance and limitations of respirators. Site personnel who are required to wear respiratory protection shall be medically qualified to wear respiratory protection in accordance with 29 CFR 1910.134. Site personnel who will use a tight-fitting respirator must have passed a qualitative or quantitative fit test conducted in accordance with an OSHA-accepted fit test protocol. Fit testing must be repeated annually or whenever a new type of respirator is used. Respirators will be stored in a protective container.

Respirator Cartridges

If site personnel are required to wear air-purifying respirators, the appropriate cartridges shall be selected to protect personnel from known or anticipated site contaminants. The respirator/cartridge combination shall be certified and approved by the National Institute for Occupational Safety and Health (NIOSH). A cartridge change-out schedule shall be developed based on known site contaminants, anticipated contaminant concentrations and data supplied by the cartridge manufacturer related to the absorption capacity of the cartridge for specific contaminants. Site personnel shall be made aware of the cartridge change-out schedule prior to the initiation of site activities. Site personnel shall also be instructed to change respirator cartridges if they detect increased resistance during inhalation or detect vapor breakthrough by smell, taste or feel, although breakthrough is not an acceptable method of determining the change-out schedule. At a minimum, cartridges should be changed at least once daily.

Respirator Inspection and Cleaning

The Site Safety and Health Supervisor shall inspect respirators at the project site before each use (i.e. daily or more frequently, as needed). Site personnel shall inspect respirators prior to each use in accordance with the manufacturer’s instructions. In addition, site personnel wearing a respirator shall perform a positive and negative pressure user seal check each time the respirator is donned, to ensure proper fit and function. User seal checks shall be performed in accordance with the GeoEngineers respiratory protection program or the respirator manufacturer’s instructions.

ADDITIONAL ELEMENTS

EMERGENCY RESPONSE

Indicate what site-specific procedures you will implement.

- Personnel on-site should use the "buddy system" (work with the drilling subcontractor).
- Visual contact should be maintained between workers on-site, with the team remaining in proximity to assist each other in case of emergencies.
- If any member of the field crew experiences any adverse exposure symptoms while on-site, the entire field crew should immediately halt work and act according to the instructions provided by the Site Safety and Health Supervisor.
- Wind indicators visible to all on-site personnel should be provided by the Site Safety and Health Supervisor to indicate possible routes for upwind escape. Alternatively, the Site Safety and Health Supervisor may ask on-site personnel to observe the wind direction periodically during site activities.
- The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated should result in the evacuation of the field team, contact of the PM, and reevaluation of the hazard and the level of protection required.
- If an accident occurs, the Site Safety and Health Supervisor and the injured person are to complete, within 24 hours, an Accident Report for submittal to the PM, the Health and Safety Program Manager and Human Resources. The PM should ensure that follow-up action is taken to correct the situation that caused the accident or exposure.

SITE CONTROL MEASURES

The Site is an active business. The general public may access the Site. If approached by any individual, use necessary precautions to keep them safe and away from the work area.

PERSONNEL MEDICAL SURVEILLANCE

GeoEngineers employees are not in a medical surveillance program because they do not fall into the category of “Employees Covered” in OSHA 1910.120(f)(2), which states a medical surveillance program is required for the following employees:

> (1) All employees who are or may be exposed to hazardous substances or health hazards at or above the permissible exposure limits or, if there is no permissible exposure limit, above the

published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year;

(2) All employees who wear a respirator for 30 days or more a year or as required by state and federal regulations;

(3) All employees who are injured, become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation; and

(4) Members of HAZMAT teams.

SANITATION

There is a bathroom on site.

FALL PROTECTION

- GeoEngineers Personnel will not be providing services requiring fall protection for this project.

DOCUMENTATION TO BE COMPLETED FOR HAZWOPER PROJECTS

The following forms are required for Hazardous Waste Operations and Emergency Response (HAZWOPER) projects:

- Field Report
- Health and Safety Plan acknowledgment by GeoEngineers employees (Form C-2)
- Contractors Health and Safety Plan Disclaimer (Form C-3)
- Conditional forms available at GeoEngineers office: Accident Report

NOTE: The Field Report is to contain the following information:

- Updates on hazard assessments, field decisions, conversations with subcontractors, client or other parties, etc.;
- Actions taken;
- Action level for upgrading PPE and rationale; and
- Meteorological conditions (temperature, wind direction, wind speed, humidity, rain, snow, etc.).

APPROVALS

1. Plan Prepared	Jodie Lathrop Signature	08/21/09 Date
2. Plan Approval	PM Signature	08/21/09 Date
3. Health & Safety Officer	Wayne Adams Health & Safety Program Manager	08/21/09 Date

FORM C-1
HEALTH AND SAFETY PRE-ENTRY BRIEFING

Reliable Steel Site
File No. 4301-010-03

Inform employees, contractors, and subcontractors or their representatives about:

- The nature, level and degree of exposure to hazardous substances they're likely to encounter;
- All site-related emergency response procedures; and
- Any identified potential fire, explosion, health, safety or other hazards.

Conduct briefings for employees, contractors, and subcontractors, or their representatives as follows:

- A pre-entry briefing before any site activity is started; and
- Additional briefings, as needed, to make sure that the site-specific HASP is followed.

Make sure all employees working on the site are informed of any risks identified and trained on how to protect themselves and other workers against the site hazards and risks

Update all information to reflect current sight activities and hazards.

All personnel participating in this project must receive initial health and safety orientation. Thereafter, brief tailgate safety meetings will be held as deemed necessary by the Site Safety and Health Supervisor.

The orientation and the tailgate safety meetings shall include a discussion of emergency response, site communications and site hazards.

Date	Topics	Attendee	Company Name	Employee Initials

FORM C-2
SITE SAFETY PLAN – GEOENGINEERS' EMPLOYEE ACKNOWLEDGMENT

Reliable Steel Site
File No. 4301-010-03

(All GeoEngineers' site workers shall complete this form, which should remain attached to the safety plan and filed with other project documentation).

I, ____, do hereby verify that a copy of the current Safety Plan has been provided by GeoEngineers, Inc., for my review and personal use. I have read the document completely and acknowledge a full understanding of the safety procedures and protocol for my responsibilities on-site. I agree to comply with all required, specified safety regulations and procedures. I understand that I will be informed immediately of any changes that would affect site personnel safety.

Signed ______________________________ Date ______________________

Range of Dates From: ______________________________
To: ______________________________

Signed ______________________________ Date ______________________

Range of Dates From: ______________________________
To: ______________________________

Signed ______________________________ Date ______________________

Range of Dates From: ______________________________
To: ______________________________

Signed ______________________________ Date ______________________

FORM C-3
SUBCONTRACTOR AND SITE VISITOR SITE SAFETY FORM

Reliable Steel Site
File No. 4301-010-03

I, ____, verify that a copy of the current site Safety Plan has been provided by GeoEngineers, Inc. to inform me of the hazardous substances on-site and to provide safety procedures and protocols that will be used by GeoEngineers' staff at the site. By signing below, I agree that the safety of my employees is the responsibility of the undersigned company.

Signed ____________________________ Date ______________________

Firm: ____

Signed ____________________________ Date ______________________

Firm: ____

Signed ____________________________ Date ______________________

Firm: ____

Signed ____________________________ Date ______________________

Firm: ____

Signed ____________________________ Date ______________________

Firm: ____

Signed ____________________________ Date ______________________

Firm: ____