TECHNICAL MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: Jing Liu, Washington State Department of Ecology

CC: Sonia Fernandez, Washington State Department of Ecology
Mike Stoner, Port of Bellingham

FROM: Jeremy Davis, P.E., C.H.M.M., and Larry Beard, P.E., L.G.

DATE: February 4, 2014

**RE: REMEDIAL INVESTIGATION UPLAND DATA SUMMARY
WESTMAN MARINE INC. SITE
BLAINE, WASHINGTON**

INTRODUCTION

This technical memorandum presents the results of soil and groundwater characterization for the Phase I remedial investigation (RI) of the upland portion of the Westman Marine Inc. site (Site) in Blaine, Washington (Figure 1). The RI is being conducted under Agreed Order No. DE 9001 between the Port of Bellingham (Port) and the Washington State Department of Ecology (Ecology). A technical memorandum summarizing the Phase I RI results for the sediment investigation will be submitted separately. The sections below describe the upland RI activities including the collection and analysis of soil and groundwater samples, a description of an interim cleanup action currently underway at the Site, and a summary of the analytical results with a comparison to the preliminary screening levels (PSLs) established in the RI Work Plan (Landau Associates 2013a; Work Plan). This document also presents proposed locations for the installation of groundwater monitoring wells and additional RI activities to address remaining data gaps during Phase II upland RI activities.

SITE DESCRIPTION

The Westman Marine Site is located in Blaine, Washington, within Blaine Harbor. Blaine Harbor was created within Drayton Harbor in the 1950s to provide moorage and other supporting services for the commercial marine industry. Westman Marine leased approximately 1.5 acres of upland property at 218 McMillan Avenue from the Port from 1989 until January 2011 (Figure 2). Westman Marine and previous tenants conducted boatyard activities at this location. RI activities began in October 2013 and are ongoing to determine the nature and extent of contamination in the upland and marine portions of the Site. With the exception of the vicinity map presented as Figure 1, the figures in this technical memorandum are oriented to the northwest at the top of the page, which is used as *project north* for the Site. Descriptions of direction in this technical memorandum will be in reference to project north, consistent with the alignment of Figures 2 through 5.

SAMPLE COLLECTION AND ANALYSIS

Groundwater and soil samples were collected at the Site between October 3 and October 28, 2013 in accordance with the RI Sampling and Analysis Plan (Appendix C of the Work Plan; Landau Associates 2013a) using hand tools and a direct-push drilling rig at the locations shown on Figure 2. Summaries of the analyses conducted on soil and groundwater samples are provided in Tables 1 and 2, respectively. Samples were submitted to Analytical Resources, Inc. of Tukwila, Washington for the analyses described below.

Soil

Soil samples were collected from 19 boring locations (WM-GP-2 to WM-GP-19 and WM-HA-1). The borings were advanced to at least 2 feet (ft) below the estimated depth of the groundwater table to conduct field screening for potential contamination, to observe soil lithology, and to collect samples for laboratory analyses. Because the core sampler length is 5 ft and the depth to groundwater varies and was somewhat difficult to interpret at the time of drilling, borings were typically advanced to 15 ft below ground surface (BGS). Boring logs are included for reference in Attachment 1.

Boring WM-HA-1 was advanced with a hand auger to 4 ft BGS, in place of planned boring WM-GP-1, based on physical access limitations due to construction in the area. Sample locations did not change significantly from those presented in the Work Plan. Some slight lateral adjustments to location (less than 5 ft) were necessary to accommodate underground utilities or other Site features. The observed soil lithology and results of environmental field screening [observations for the presence of odors, volatile organic compounds (VOCs), and visible staining or sheen] were recorded on field forms and will be presented on boring logs in the RI report.

Soil samples were collected for laboratory analysis from four depth intervals at most boring locations to test for constituents of potential concern (COPCs) in shallow soils. The sample depth intervals were typically 0 to 1 ft BGS, 1 to 2 ft BGS, 2 to 3 ft BGS, and 3 to 4 ft BGS, although these intervals were adjusted downward based on the presence of pavement and base-course material at the surface, or if sample recovery for a particular interval was not possible. Additional samples were collected from intervals where field screening indicated the presence of sheen or VOCs. Two additional borings (WM-GP-18 and WM-GP-19) were advanced north and south of WM-GP-14, where an organic sheen and unusual odor were observed near the groundwater table. Because these additional borings were focused on observations near the groundwater interface, soil samples were not collected from the shallower intervals at these two locations. Field-screening results at other boring locations did not indicate the need for additional borings.

Soil boring locations where more than four intervals were sampled based on the results of field screening consisted of WM-GP-14 (six samples), WM-GP-7 (five samples), WM-GP-11 (six samples), and WM-GP-17 (five samples). A total of 55 samples from the 19 borings were analyzed by the laboratory. Forty-one of the samples analyzed were collected from the shallow intervals (0 to 4 ft BGS) and 14 were collected from deeper intervals ranging from 5 to 14.5 ft BGS. Soil samples collected from the shallowest interval at each location (representing surface or near-surface soil quality) were analyzed immediately. Deeper samples were then analyzed only for the COPCs that were detected in the shallower samples at concentrations greater than Site PSLs. Based on this approach, 35 soil samples that were originally archived at the laboratory were analyzed by follow-up request in order to further evaluate the vertical extent of COPCs at 12 boring locations.

Soil samples from each boring location were analyzed for the following COPCs:

- Petroleum hydrocarbons by the hydrocarbon identification method (Method NWTPH-HCID), with follow-up analyses by Method NWTPH-G or NWTPH-Dx if petroleum hydrocarbons were identified
- Polycyclic aromatic hydrocarbons (PAHs) by U.S. Environmental Protection Agency (EPA) Method 8270D SIM
- Arsenic, cadmium, chromium, copper, lead, mercury, and zinc by EPA Method 6020 and mercury by EPA Method 7471B.

Additional analyses were conducted on samples from some boring locations based on reported historical Site activities or previous observations at the Site. These additional analyses and the corresponding sample locations were as follows:

- Semivolatile organic compounds (SVOCs) by EPA Method 8270D (WM-GP-9, WM-GP-12, and WM-GP-14)
- Polychlorinated biphenyls (PCBs) by EPA Method 8082 (WM-GP-8, WM-GP-9, WM-GP-12, WM-GP-14, and WM-GP-16)
- Organotins by EPA Method 8270D SIM (WM-GP-5, WM-GP-6, and WM-GP-16)
- VOCs by EPA Method 8260C (WM-GP-14, WM-GP-7, and WM-GP-11).

A soil sample collected near the groundwater table from WM-GP-17 was analyzed for the following conventional parameters for use in assessing groundwater flow characteristics:

- Total organic carbon by Method PLUMB81TC
- Grain size by ASTM International Method D422.

Groundwater

Groundwater grab samples were collected from the 10 soil borings indicated with a blue dot on Figure 2. The samples were collected using a temporary sample collection screen exposed from approximately 11 to 15 ft BGS. Groundwater grab samples were analyzed for the following COPCs:

- VOCs by EPA Method 8260C
- PAHs by EPA Method 8270D SIM
- Petroleum hydrocarbons by Method NWTPH-HCID with follow-up analyses by Method NWTPH-G or NWTPH-Dx if petroleum hydrocarbons were identified
- Total metals (arsenic, cadmium, chromium, copper, lead, and zinc) by EPA 6020 and mercury by EPA Method 7471B
- Dissolved metals, if total metals concentrations exceeded the PSLs, by EPA 6020 and mercury by EPA Method 7471B
- SVOCs by EPA Method 8270 (sample locations WM-GP-9, WM-GP-12, WM-GP-14, and WM-GP-17).

DEVIATIONS FROM REMEDIAL INVESTIGATION WORK PLAN

This section identifies substantive deviations from the RI Work Plan. It provides a summary of the deviations and an expanded discussion of two of the deviations, the analysis of deeper soil samples due to more recent filling and paving activities, and the evaluation of small diameter well performance as a potential substitute to traditional 2-in diameter wells. The uplands investigation was completed according to the Work Plan with the following exceptions:

- As previously mentioned, the boring identified as WM-GP-1 in the Work Plan was located within the construction area of the Boundary Fish building and could not be accessed by the drill rig. The boring was advanced with a hand auger and renamed WM-HA-1. Additionally, the groundwater grab sample planned for collection from this location was instead collected from WM-GP-2.
- Based on poor sample volume recovery, nine sample cores had less than 4 ft of recovery (within a 5-ft sampler). As a result, sample intervals at borings WM-GP-2, WM-GP-3, WM-GP-4, WM-GP-7, WM-GP-8, WM-GP-9, WM-GP-12, WM-GP-13, and WM-GP-17 were shifted deeper as necessary to collect samples from the planned four 1-ft sample intervals.
- Two additional soil borings were drilled (WM-GP-18 and WM-GP-19) to help assess the lateral extent of potential contamination observed in WM-GP-14 from 10 to 12 ft BGS.
- During soil excavation for the Boundary Fish building interim action, it became apparent that soil had been placed over the historical ground surface present during boatyard activities in this portion of the Site. This was evidenced by the presence of fill soil over the top of a small section of the former rail tracks and a number of rail foundations that had not been removed from the eastern portion of the new Boundary Fish building footprint. In response, soil samples collected from deeper intervals at nearby borings WM-GP-2 and WM-GP-5 were analyzed because surface soil samples collected in the vicinity of the historical rail tracks west of the current boatyard did not represent the ground surface during historical boatyard activities in this area.
- Similar to the Boundary Fish building area, samples collected from uppermost sampling interval at WM-GP-4, WM-GP-6, and WM-GP-17 may have been collected from fill (asphalt base course) placed above the former ground surface during pavement construction in these locations. This potential issue was not discovered until planned sample analysis was

completed, so analysis of deeper samples from these borings was conducted later than for other samples, as is discussed below.

- A small (1-inch) diameter well was installed and developed to evaluate whether a low turbidity groundwater sample could be obtained from a well that can be installed using direct-push drilling equipment, which has the potential to substantively reduce well installation costs.

Analysis of Deeper Samples (WM-GP-3, WM-GP-4, WM-GP-6, and WM-GP-17)

Review of the boring logs indicates that the shallowest soil samples from borings WM-GP-3, WM-GP-4, WM-GP-6, and WM-GP-17 may represent base-course material placed in conjunction with surface paving instead of the pre-pavement working surface present during historical boatyard activities. Since all of the parameters were below PSLs in the initially analyzed shallow samples, deeper samples were not initially analyzed. However, to ensure that the soil representing the historical ground surface (prior to paving) was characterized, soil samples from the next two deeper intervals at each of these locations were analyzed for heavy metals. Testing of these discretionary samples was limited to heavy metals because metals concentrations were greater than the PSLs in all other Site soil samples where other COPCs were detected at concentrations greater than the PSL. As a result, metals concentrations were considered an adequate indicator of whether soil at the deeper interval was contaminated, and other analytes would be tested for only if at least one metal PSL was exceeded. The additional metals analyses were requested with an expedited turnaround time to allow the data to be incorporated into this data report.

Evaluation of Small-Diameter Well Performance

On October 4, 2013, a 1-inch-diameter well casing with a pre-packed filter (0.010-slot, 20/40 sand) was installed in an open boring near WM-GP-5 to evaluate the potential to use direct-push methods to advance borings and install groundwater monitoring wells during the second phase of the upland RI. Well installations using direct-push drilling rigs can be significantly lower in cost than those installed with a hollow-stem auger. Potential disadvantages to this approach include excessive turbidity in groundwater samples, limitations in the use of some downhole equipment due to the relatively small diameter of the well, and installation depth is limited to 30 ft based on the minimum standards for the construction of wells in Washington State [Washington Administrative Code (WAC) 173-160-451], except when a variance is provided by Ecology.

The pre-pack filter used for this test is designed to filter the fine-grained soil present at the Site. Since groundwater at the Site is relatively shallow and there are no plans for use of downhole equipment greater than ¾-inch in diameter, the well casing size and installation depth do not appear to be limitations in using direct-push boring methods, which leaves only the turbidity issue to be evaluated. After installing the screen, it was developed by typical surge and pump methods. A total of 15 gallons of water was removed during this effort. Turbidity decreased from an initial measurement of 280 nephelometric turbidity units (NTUs) after 2 gallons of purging to 4.8 NTUs after 15 gallons, indicating the pre-pack filter tested provides an appropriate screening for the fine-grained soil present at this Site. The casing was removed and the borehole decommissioned like the other boring locations with a bentonite plug and surface repair.

BOUNDARY FISH INTERIM ACTION

In preparing for the Uplands investigation, Landau Associates discovered that one of the Port's tenants (Boundary Fish) was beginning to construct a new building within the preliminary boundary of the Site. The Port requested that the contractor stop work. On October 3, 2013, Landau Associates collected soil samples from eight locations at multiple shallow depths to characterize soil within the footprint of the new building. The Site soil PSLs were exceeded in a number of the samples. Based on the analytical results, the Port, with the review and concurrence of Ecology, initiated an interim action for removing the impacted soil, which is documented in the Boundary Fish Interim Action Plan (Landau Associates 2013b), currently under public review.

Affected soil was excavated from the Boundary Fish building area and is currently stockpiled nearby awaiting disposal at a solid waste landfill following approval of the interim action plan. Only analytical results for soil remaining following the interim action are discussed in this data report, as presented on Figure 3. A detailed description of interim action activities and soil quality for the excavated soil is provided in the Boundary Fish Interim Action Plan (Landau Associates 2013b).

ANALYTICAL RESULTS

The analytical results of the upland Phase I RI and for soil remaining in the Boundary Fish interim action area are presented in this section. Tables 3 and 4 provide a summary of the soil analytical results from RI activities and the soil remaining in the Boundary Fish interim action area, respectively. Table 5 provides a summary of the groundwater analytical results. Laboratory analytical data were validated and verified in accordance with the EPA functional guidelines (EPA 1999, 2004).

The detected COPCs were compared to the Site PSLs. Because Site PSLs for soil were developed to be protective of groundwater, and subsequent groundwater discharge to marine sediment, the soil PSLs for some COPCs may be revised upward if it can be empirically demonstrated that groundwater concentrations of COPCs are less than PSLs, consistent with WAC-173-340-747(3)(f). As indicated in the results discussion for groundwater grab samples, there were very few exceedances of groundwater PSLs. If this is confirmed by groundwater analytical results from the permanent groundwater monitoring wells to be installed during Phase II of the upland RI, the relevant soil PSLs will be revised to base the screening level on protection of direct human contact instead of the protection of groundwater.

Figure 4 indicates where COPCs were detected in soil at concentrations greater than the Site PSLs. If the detected concentrations were greater than twice the PSL, those constituents are indicated in red. Interim action sample locations for samples that represent soil that was removed from the Site are not shown on Figure 4. Figure 5 shows groundwater grab sample results, using the same black/red color designations as for soil on Figure 4.

Soil Quality

The concentrations of COPCs in soil at the Site exceed the PSLs at the following locations, as indicated on Figure 4:

- Metals (19 locations)
- Carcinogenic PAHs (cPAHs; 13 locations)
- Petroleum hydrocarbons [gasoline-range total petroleum hydrocarbons (TPH-G): 2 locations; diesel-range total petroleum hydrocarbons (TPH-D): 1 location]
- SVOCs (2 locations)
- PCBs (1 sample).

There were no exceedances in any of the samples from the five locations analyzed for VOCs. Tributlytin (TBT) was detected at one of four sampled locations (WM-GP-16); and dibutyltin and/or butyltin were detected at WM-GP-16, and also WM-GP-5. At both locations, the detections were in the 0- to 1-ft BGS sample interval, and the samples collected from immediately below (1 to 2 ft BGS) did not have detections of organotin concentrations greater than the reporting limits. No PSL has been developed for TBT or other organotins, because applicable criteria are not available.

The most common COPCs detected in soil at concentrations greater than Site PSLs were metals and cPAHs. Four of the seven metals that were analyzed in the soil samples (arsenic, copper, mercury, and zinc) were detected at concentrations greater than PSLs. Copper concentrations were greater than the PSL at most sampled locations (35 exceedances), followed by zinc (25 exceedances), mercury (20 exceedances) and arsenic (13 exceedances). Other COPCs, including SVOCs, TPH-G, and PCBs, had a low frequency of detection at concentrations greater than the Site PSLs. Many PAHs are also included in the SVOC analysis. Only one SVOC (pentachlorophenol) was detected above the PSL that is not already included in the PAH monitoring.

In the area west of the marine railway, metals and cPAH detections greater than PSLs were encountered mostly in areas around the historical side tracks. In the area just west of the marine railway, where current operations are conducted beneath a canopy, concentrations of COPCs in soil were less than Site PSLs except at WM-GP-4, where copper and zinc concentrations were greater than PSLs in the shallowest sample interval, and at WM-GP-7, where concentrations of metals and cPAHs were greater than the PSLs throughout the boring. Metals concentrations were less than PSLs in all samples tested from WM-GP-3, WM-GP-4, WM-GP-6, and WM-GP-17, including the eight deeper samples discussed above.

The samples from the Boundary Fish interim action were collected from the northwestern portion of the Site, in the area of the new building under construction. The analytical results indicate that some metals and cPAHs remain in the soil at concentrations greater than Site PSLs. The additional data from this area will be used to refine the preliminary Site boundary during the RI.

In the area east of the marine railway, concentrations of metals and organic COPCs (cPAHs, pentachlorophenol, and PCBs) were greater than PSLs at some locations. Most exceedances were in the surface soil samples and the number exceedances declined rapidly with depth. In subsurface soil, concentrations of most organic COPCs were less than PSLs, and the PSL exceedances were limited to metals. Two exceptions to this are soil samples from WM-GP-11 and from the northeast corner of the Site, where organic COPCs were detected greater than PSLs in deeper soils. In both of these areas, shallow soil quality was similar to other areas east of the marine railway.

From approximately 5 to 6 ft BGS in boring WM-GP-11, TPH-D was detected at a concentration twice the PSL and concentrations of cPAHs were slightly greater than the PSL. A petroleum hydrocarbon odor and elevated PID readings were observed within this sample interval. Soil samples collected from just above and below this interval (3 to 4 ft BGS and 7 to 8 ft BGS) had TPH-D and cPAH concentrations that were less than PSLs, which indicates that the impacts were vertically isolated. No elevated PID readings or petroleum hydrocarbon odors were observed at the closest sample locations (MW-GP-10, -12, or -15). Because these adjacent sample locations were up to 70 ft from WM-GP-11, additional characterization will be needed in the WM-GP-11 vicinity to estimate the lateral extent of impacted soil in this area.

In the northeast corner of the Site, concentrations of metals and organic COPCs were greater than PSLs between 10 and 12 ft BGS in samples collected from borings WM-GP-14, -18, and -19. The analytical results from this area correlated to visual field observations of dark soil with an organic odor and sheen. In this area, copper and cPAHs were detected in soil and these impacts may extend north of the preliminary Site boundary. As a result, additional characterization will be needed to estimate the lateral extent of impacted soil in this area.

The concentrations of COPCs in soil were greater than PSLs at the maximum sample depth interval at five RI sample locations (WM-HA-1, WM-GP-2, WM-GP-7, WM-GP-10, and WM-GP-13).

At three of these locations, copper was the only COPC with concentrations that exceeded the PSL in the deepest sample and was present at concentrations relatively close to the PSL of 36 milligrams per kilogram (mg/kg;(37.4 mg/kg at WM-GP-2-5-6, 44.0 mg/kg at WM-GP-13-6-7, and 52.2 mg/kg at WM-HA-1-3-4). As a result, these PSL “exceedances” may reflect natural concentrations of copper in the fill material, unrelated to Site releases.

At WM-GP-7, the metals and cPAH PSL exceedances were found throughout the boring, from the shallowest sampled interval to at least 11 ft BGS. At WM-GP-10, metals concentrations (arsenic, copper, and zinc) exceeded the soil PSLs by at least a factor of two in the deepest sample (3 to 4 ft BGS). As a result, additional data will be needed to delineate the vertical extent of potential contamination at these locations.

Groundwater

The analytical results and water quality parameters recorded during sample collection for groundwater grab samples are provided in Table 5. COPCs detected at concentrations greater than Site PSLs are shown on Figure 5. These COPCs include total and dissolved metals, cPAHs, and SVOCs. Only dissolved metals exceedances are shown on Figure 5. No VOCs were detected in groundwater at concentrations exceeding PSLs.

Concentrations of total metals in groundwater grab samples can be biased high as an artifact of sampling from a boring rather than a monitoring well. It is difficult to obtain a low-turbidity groundwater grab sample using direct-push methods. As a result, total metals results can be artificially elevated due to entrained particles in the samples. This is evidenced in Site groundwater samples by the high turbidity levels measured at some of the direct-push sampling locations, where results ranged from about 12 NTU to as high as 263 NTU (WM-GP-9), which are all greater than the 4.8 NTU measured in the small-diameter test well near the WM-GP-5 location previously discussed.

All groundwater samples with concentrations of total metals greater than the PSL were also analyzed for dissolved metals. Concentrations of total metals were greater than the PSLs for arsenic (six locations), copper (six locations), lead (two locations), and zinc (one location). Concentrations of dissolved metals were greater than PSLs for arsenic (four locations) and copper (three locations). Copper, lead, and zinc dissolved concentrations were consistently lower than total concentrations, while arsenic total and dissolved concentrations were similar.

SVOCs, including cPAHs, were infrequently detected at concentrations greater than PSLs. CPAH concentrations were greater than PSLs at one location (WM-GP-9 and its duplicate sample) and one other SVOC, acenaphthene, had a concentration greater than the PSL at one location (WM-GP-12). Acenaphthene is included in the PAH analysis and is indicated on Figure 5 as a PAH exceedance. Similar to metals, concentrations of SVOCs can be biased high by the presence of particulates, and, as a result, the SVOC groundwater analytical results may not be representative of groundwater quality. This is evidenced by the highest turbidity measurement (263 NTU) corresponding to the only location where the cPAH PSL was exceeded. SVOCs, primarily cPAHs, in groundwater will require further characterization to determine whether they represent Site COPCs.

UPLAND REMEDIAL INVESTIGATION DATA GAPS

The results of the Phase I upland RI indicate that soil and groundwater have been impacted by Site activities. The lateral extent of these impacts is generally demarcated by the preliminary Site boundary except in the eastern portion of the Site uplands. Impacts west of the marine railway appear to be generally limited to the soil near historical side tracks and the vicinity of the marine railway. East of the marine railway, COPCs are present at concentrations greater than Site PSLs throughout most shallow soil, which is consistent with the use of this area for boat maintenance activities. The following sections discuss existing data gaps in the upland RI and the proposed scope of additional characterization to address these data gaps.

Groundwater Quality Characterization

Consistent with the RI Work Plan, eight groundwater monitoring wells will be installed to provide better quality data than the screening-level data provided by groundwater grab samples collected during the Phase I upland RI. The eight proposed monitoring well locations are shown on Figure 5 and are based on the analytical results of the first phase of the investigation. The locations of monitoring wells near the shoreline will be placed as close as possible to the bulkhead so groundwater samples from these wells will characterize groundwater at the point of discharge to surface water to the greatest degree possible. The rationale for selecting the proposed groundwater monitoring well locations is presented in Table 6 along with the proposed analyses.

The one proposed variance from the RI Work Plan is the use of 1-inch-diameter well casing with a pre-packed filter (0.010-slot, 20/40 sand) to be installed using direct-push drilling equipment for monitoring well construction rather than using 2-inch-diameter well screen installed using hollow-stem auger drilling equipment, which is the conventional method for constructing monitoring wells. The groundwater turbidity quality results for the test installation of a small-diameter well near WM-GP-5 during the Phase I RI indicate that using this type of well would provide low turbidity groundwater quality data. The use of small-diameter wells will significantly reduce RI costs for groundwater monitoring without compromising the quality of the data.

The RI Work Plan indicated that only COPCs detected at concentrations greater than laboratory reporting limits in Phase I groundwater grab samples would be analyzed during Phase II of the RI. Although mercury was not detected in groundwater grab samples, we proposed to analyze groundwater samples during Phase II for mercury due to the frequency of detection of mercury in soil. Similar to the approach for groundwater metals analyses in Phase I, total metals will be evaluated first, and samples will be analyzed for dissolved metals only for those constituents with detected concentrations greater than PSLs in the total metals sample.

SVOCs were detected in only one groundwater grab sample, WM-GP-12. As discussed above, the only SVOC above its PSL was acenaphthene, which is also included in the PAH analysis. However, WM-GP-12 is also the only location where an SVOC constituent other than PAHs (pentachlorophenol) was detected at a concentration greater than its PSL in soil and, as a result, groundwater samples collected from monitoring well WM-MW-6 will be analyzed for SVOCs.

Although the RI Work Plan does not include analyzing groundwater samples for PCBs, because PCBs were detected in soil and were broadly distributed in surface sediment at the Site, groundwater from proposed monitoring wells WM-MW-2, WM-MW-4, WM-MW-6, WM-MW-7, WM-MW-8 will be analyzed for PCBs.

The frequency of detection for VOCs was very low for both soil and groundwater and no VOCs were detected at concentrations greater than PSLs at the Site. As a result, groundwater monitoring during Phase II will not include analysis for VOCs.

Additional Delineation of Soil Contamination

There are a few locations where either the lateral or vertical extent of soil contamination was not well delineated during Phase I of the upland RI. The following sections identify the proposed scope for additional delineation of soil contamination in these areas.

WM-GP-7 and WM-GP-10

The vertical and lateral extent of soil contamination at boring locations WM-GP-7 and WM-GP-10 need to be better delineated. The deepest sample collected for laboratory analysis at WM-GP-10 was 4 ft BGS and highly elevated metals concentrations were detected in the deepest sample. Sampling at WM-GP-7 extended to a depth of 10 ft BGS, but concentrations of a few metals remained above the PSLs, and cPAH concentrations were above the PSLs to a depth of 9 ft BGS at this location.

Rather than drill additional borings at the exact same locations, new borings will be advanced about 20 ft from the original to evaluate the extent of contamination in both the vertical and lateral directions. At WM-GP-7, borings will be advanced to the north, south, and west, since the area is bordered by the marine railway to the east. At WM-GP-10, the borings will be advanced to the north, south, and east, since the area is bordered by the marine railway to the west. Proposed boring locations are shown on Figure 5, and will be labeled relative to the subject boring with letter descriptors (i.e., WM-GP-7a).

Additional borings near WM-GP-7 will be drilled to 15 ft BGS and samples will be collected in alternating 1-ft intervals to reduce the number of samples requiring analysis (i.e., 1-2 ft, 3-4 ft, 5-6 ft, etc.) down to the maximum depth of the boring. The first three samples at each location will be analyzed for metals previously detected at MW-GP-7 at concentrations greater than the PSLs (arsenic, copper, mercury, and zinc), and PAHs. Additional samples will be analyzed sequentially downward if PSL exceedances are detected in the deepest sample tested.

Additional borings near WM-GP-10 will be advanced to 10 ft BGS and samples will be collected in 1-ft intervals down to the maximum depth of the boring. However, since surface soil is generally affected throughout the east work yard, the first sample tested at each location will be the 1- to 2-ft interval. The samples will be tested sequentially downward consistent with the protocols identified in the RI Work Plan. Initial samples will be tested for metals (arsenic, copper, mercury, and zinc) and PAHs, and subsequent samples will be tested for COPCs that exceeded the PSL in the overlying sample.

Additional "step-out" borings may be advanced 10 to 15 ft away from these locations in order to determine the extent of impacts if evidence of potential contamination is observed in the planned borings.

WM-GP-11

Additional characterization is necessary to determine the extent of TPH-D and cPAH concentrations greater than the PSLs in the vicinity of boring WM-GP-11. PSL exceedances in soil were detected in the interval from 5 to 6 ft BGS at WM-GP-11. Additional borings will be advanced to the north, east, and south of the original location to a maximum depth of 10 ft BGS. Because the PSL exceedances in the 5-to 6-ft BGS interval at WM-GP-11 were correlated to elevated PID readings and petroleum hydrocarbons odors, samples from the additional borings will be collected from the zone exhibiting elevated PID readings and/or petroleum hydrocarbon odor, if present. If field screening does not indicate the presence of potential contamination, a soil sample will be collected from the 5-to 6-ft interval. The soil samples will analyzed for TPH-D and PAHs. Soil samples collected from above and below the affected interval will be analyzed if the results from the initially tested sample are greater than the PSLs.

Additional "step-out" borings may be advanced at these locations if evidence of potential contamination is observed in the planned borings.

Northeast Corner of the Site (Near WM-GP-19, WM-GP-14, and WM-GP-18)

Additional characterization is necessary in the WM-GP-14 area to determine the lateral extent of affected soil in the interval of approximately 10 to 12 ft BGS. Additional borings will be advanced to 15 ft BGS north of WM-GP-19, west and east of WM-GP-14, and south of WM-GP-18. Soil contamination present at depth in this area was associated with dark soil exhibiting an organic odor and sheen. As a result, soil samples will be collected for laboratory analysis based on visual and olfactory indications of potential contamination. If no evidence of contamination is observed during drilling, soil samples will be collected from the 10- to 12-ft interval. All soil samples will be analyzed for metals (arsenic, copper, zinc), TPH-G, and PAHs. Samples from above and below each of the initially tested intervals will be analyzed for any COPCs that exceed the PSLs in the initially tested interval.

Additional "step-out" borings may be advanced at these locations if evidence of potential contamination is observed in the planned borings.

PCBs

Although the PCB PSL was exceeded at only one location (WM-GP-16) of the seven locations tested, PCBs were broadly distributed in surface sediment. As a result, it is important to better understand the distribution of PCBs in upland soil. To further characterize the extent of PCBs in soil at the Site, we propose to analyze some existing samples that are archived at the laboratory for PCBs. PCBs were detected in all three of the surface soil samples collected from east of the marine railway, and the concentration from 0 to 1 ft BGS at WM-GP-16 was greater than the PSL. Archived surface soil samples WM-GP-7, WM-GP-10, WM-GP-13, and WM-GP-15 will be analyzed for PCBs. Additionally, soil from 5 to 6 ft BGS at WM-GP-7, and from 5 to 6 ft BGS at WM-GP-11 will be analyzed for PCBs based on the significant impacts of other COPCs at these locations, including metals and cPAHs at WM-GP-7, and petroleum hydrocarbons and cPAHs at WM-GP-11.

Tributlytin

The TBT concentration was elevated in surface soil at WM-GP-16. Although there are no PSLs for TBT, additional characterization data to understand the distribution of TBT in surface soil is necessary due to the extent of TBT in Site surface sediment. Of primary interest, is the distribution of TBT in the vicinity of the marine railway and travel lift piers. To better characterize the extent of surface soil impacted by TBT, existing surface soil samples from WM-GP-10 through WM-GP-13 will be analyzed for organotins.

SCHEDULE

We expect that the additional soil and groundwater characterization activities described herein will fill the known data gaps and provide sufficient Site information to prepare the RI report and conduct the feasibility study. Phase II of the upland RI will be initiated following Ecology's approval of the proposed approach.

USE OF THIS TECHNICAL MEMORANDUM

This document has been prepared for the use of the Port of Bellingham and the Washington State Department of Ecology for specific application to the Westman Marine Site. None of the information, conclusions, and recommendations included in this document can be used for any other project without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the Pacific Northwest under similar conditions as this project. We make no other warranty, either express or implied.

JMD/LDB/ccy

REFERENCES

EPA. 2004. *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. EPA-540-R-04-004. Office of Superfund Remediation and Technology Innovation. U.S. Environmental Protection Agency. Washington, D.C. October.

EPA. 1999. *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*. EPA-540/R-99-008. Office of Emergency and Remedial Response. U.S. Environmental Protection Agency. Washington, D.C. October.

Landau Associates. 2013a. *Remedial Investigation Work Plan, Westman Marine Site, Blaine, Washington*. Prepared for the Port of Bellingham. August 21.

Landau Associates. 2013b. Public Review Draft Technical Memorandum: *Boundary Fish Interim Action Plan, Westman Marine Site, Blaine, Washington*. From Larry Beard, P.E., to Jing Liu, Washington State Department of Ecology. December 19.

ATTACHMENTS

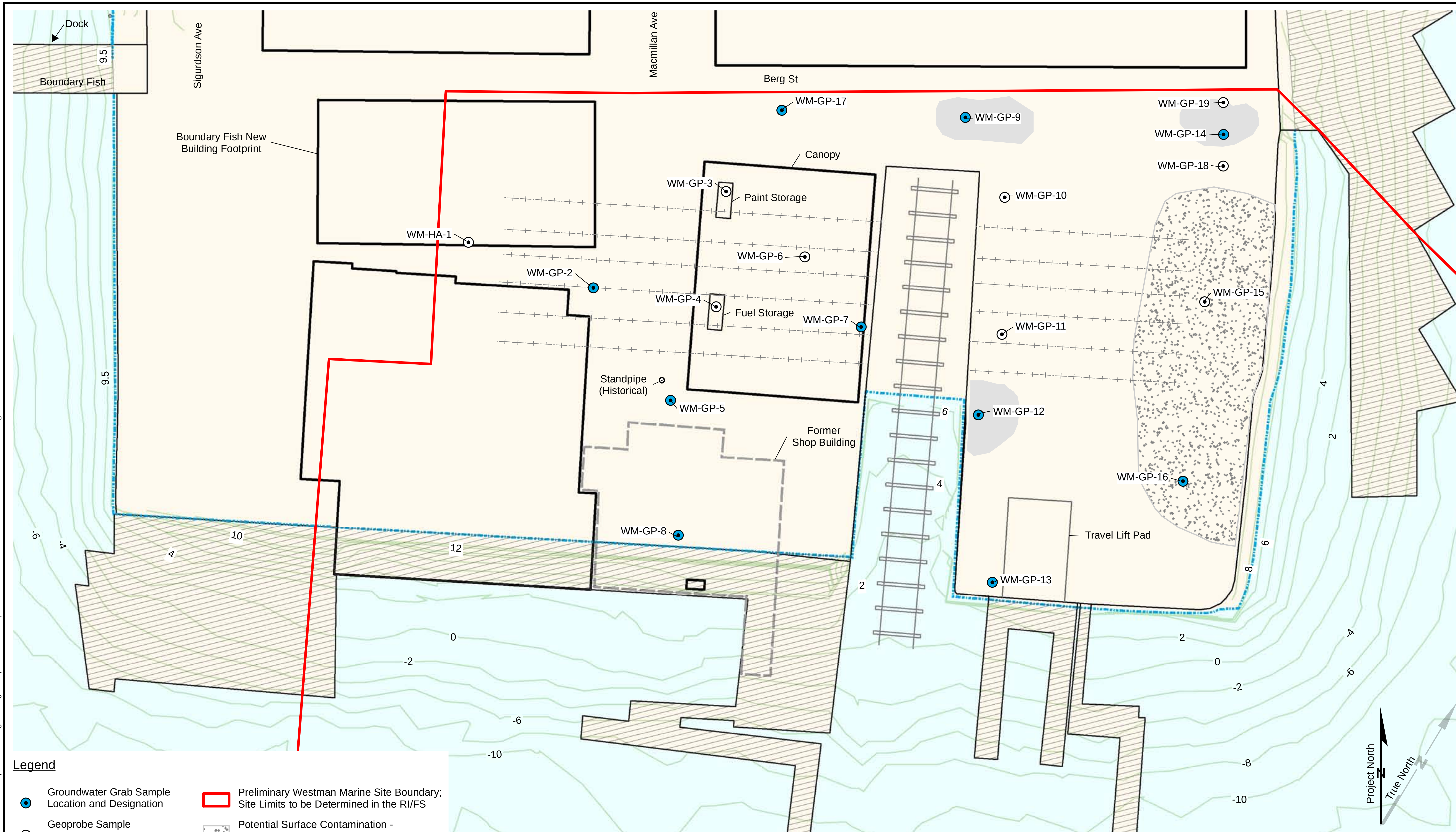
Figure 1:	Vicinity Map
Figure 2:	Upland Remedial Investigation Sample Locations
Figure 3:	Boundary Fish Interim Action – Surface Soil Sampling and Removal
Figure 4:	Constituents of Potential Concern in Soil
Figure 5:	Constituents of Potential Concern in Groundwater
Table 1:	Soil Sample Analyses by Location
Table 2:	Groundwater Sample Analyses by Location
Table 3:	Soil Analytical Results
Table 4:	Boundary Fish Interim Action Analytical Results
Table 5:	Groundwater Analytical Results
Table 6:	Groundwater Monitoring Well Locations, Rationale, and Analyses
Attachment 1:	Boring Logs

Data Source: Esri 2012

G:\Projects\001\035\010\015\RI Uplands Investigation\Figure1VicinityMap.mxd 1/8/2014 NAD 1983 StatePlane Washington North FIPS 4601 Feet

Landau Associates

Westman Marine Blaine Harbor Blaine, Washington	**Vicinity Map**	Figure 1



G:\Projects\001\035\010\015\RI Uplands Investigation\Figure2UplandRISoilSampLocations.mxd 1/20/2014 NAD 1983 StatePlane Washington North FIPS 4601 Feet

Legend

- Groundwater Grab Sample Location and Designation
- Geoprobe Sample Location and Designation
- Historical Track Location (1966)
- Bathymetric Contours (MLLW)
- Preliminary Westman Marine Site Boundary; Site Limits to be Determined in the RI/FS
- Potential Surface Contamination - Paint Chips (1993)
- Potential Surface Contamination - Staining (1993)
- Structure Over Water

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 30 60
Scale in Feet

Source: Wilson Engineering 2011, Port of Blaine 2011, Walker and Associates, Inc.

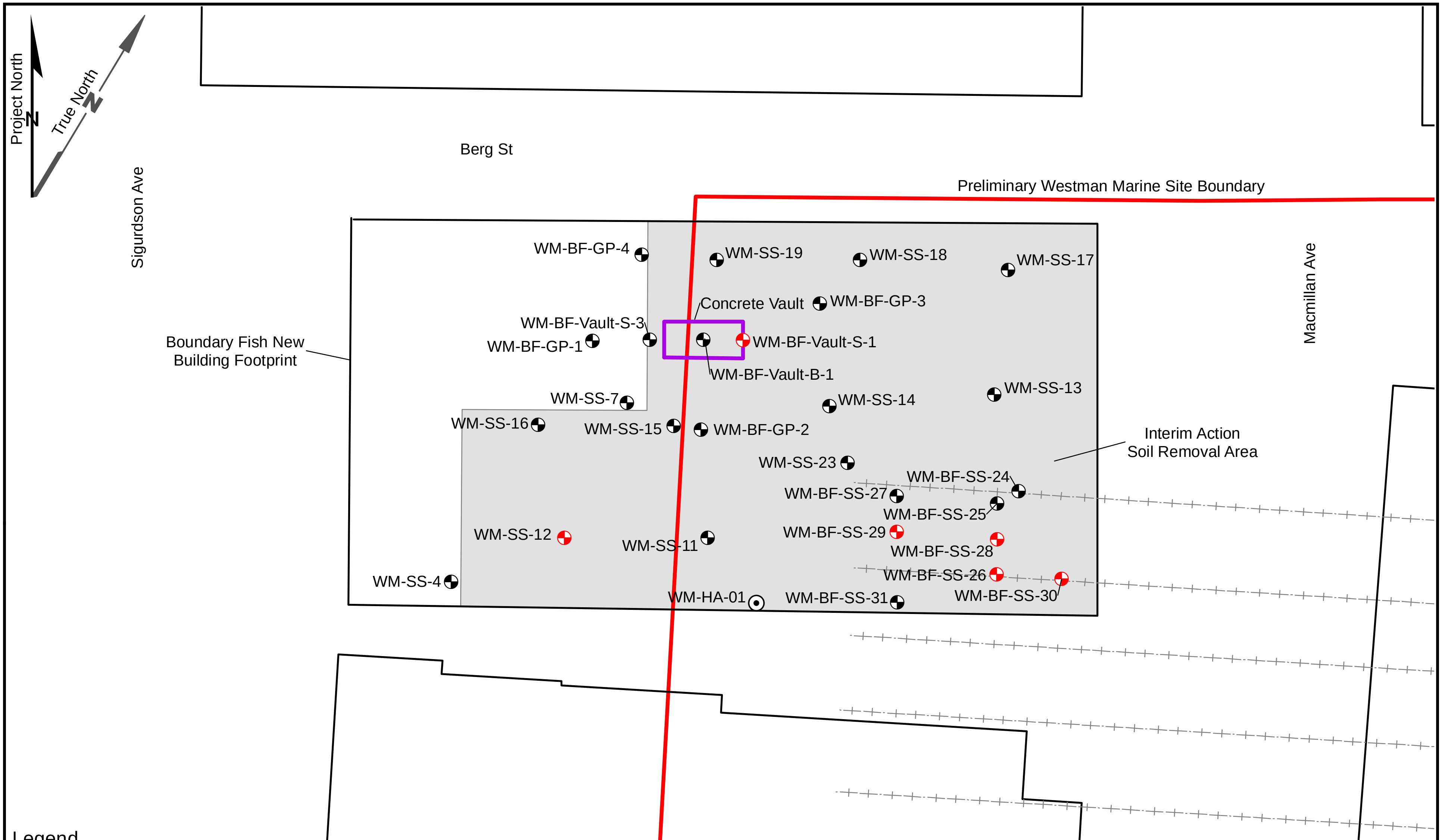
LANDAU ASSOCIATES

Westman Marine
Blaine Harbor
Blaine, Washington

Upland RI Sample Locations

Figure
2

G:\Projects\001\035\010\015\RI Uplands Investigation\Figure3BoundaryFishIASoilRemoval.mxd 2/3/2014 NAD 1983 StatePlane Washington North FIPS 4601 Feet



Legend

- Interim Action Soil Sample Location (COPCs are less than the PSL)
- Interim Action Soil Sample Location (COPCs Exceed the PSL)
- RI Sample Location and Designation
- Historical Track Location (1966)

0 20 40

Scale in Feet

LANDAU ASSOCIATES

Note

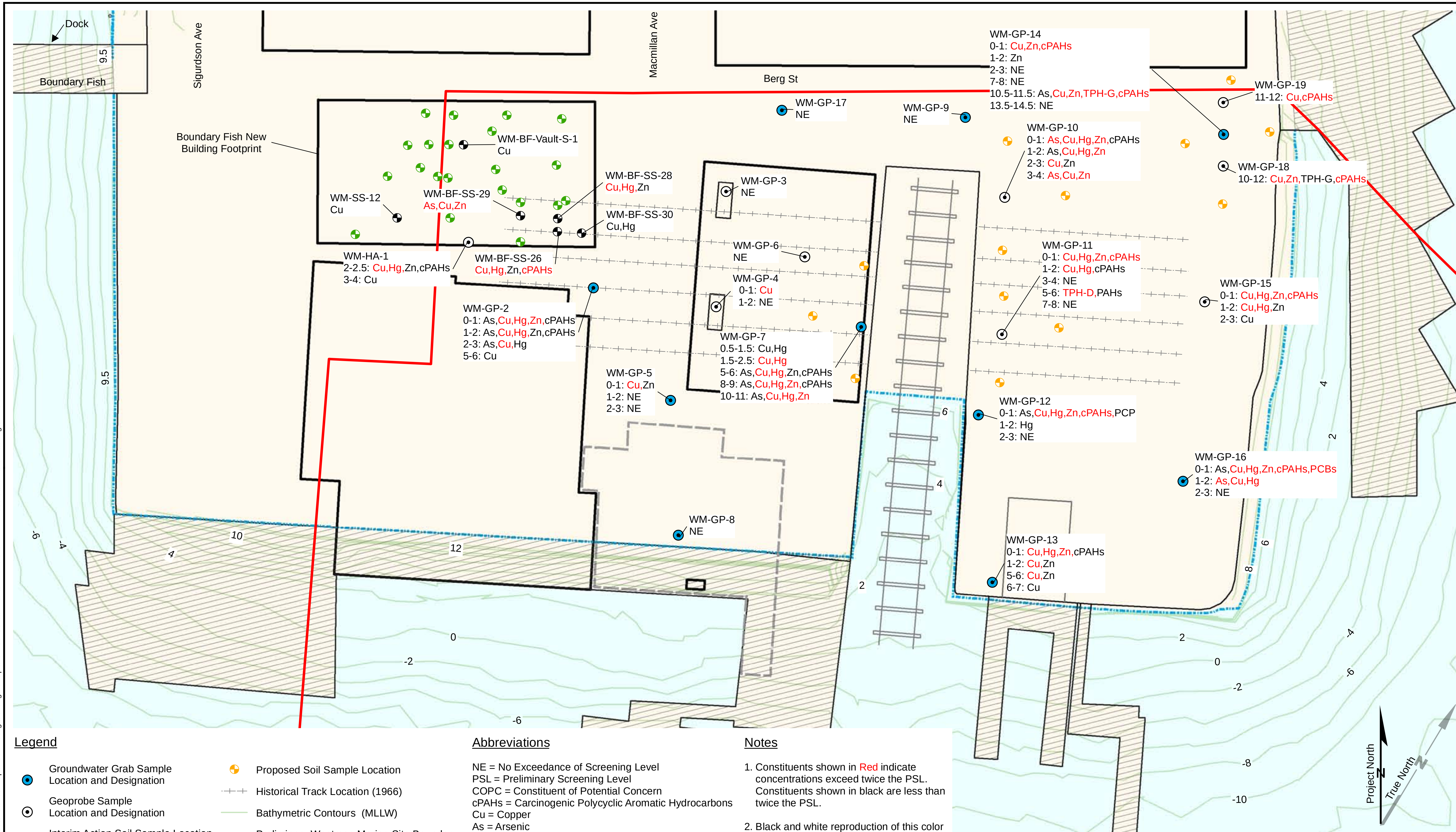
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Sources: Wilson Engineering 2011; Port of Blaine 2011; Walker and Associates, Inc; Google Earth Professional 2011

Westman Marine
Blaine Harbor
Blaine, Washington

Boundary Fish Interim Action Surface Soil Sampling and Removal

Figure 3



Legend

- Groundwater Grab Sample Location and Designation
- Geoprobe Sample Location and Designation
- Interim Action Soil Sample Location (COPCs Exceed the PSL)
- Interim Action Soil Sample Location (COPCs are less than the PSL; See Figure 3 for Sample Names)
- Proposed Soil Sample Location
- Historical Track Location (1966)
- Bathymetric Contours (MLLW)
- Preliminary Westman Marine Site Boundary; Site Limits to be Determined in the RI/FS
- Structure Over Water

Abbreviations

NE = No Exceedance of Screening Level
PSL = Preliminary Screening Level
COPC = Constituent of Potential Concern
cPAHs = Carcinogenic Polycyclic Aromatic Hydrocarbons
Cu = Copper
As = Arsenic
Hg = Mercury
Zn = Zinc
TPH-D = Diesel-Range Petroleum Hydrocarbons
TPH-G = Gasoline-Range Petroleum Hydrocarbons
PCP = Pentachlorophenol

Notes

1. Constituents shown in Red indicate concentrations exceed twice the PSL. Constituents shown in black are less than twice the PSL.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Source: Wilson Engineering 2011, Port of Blaine 2011, Walker and Associates, Inc.

0 30 60
Scale in Feet

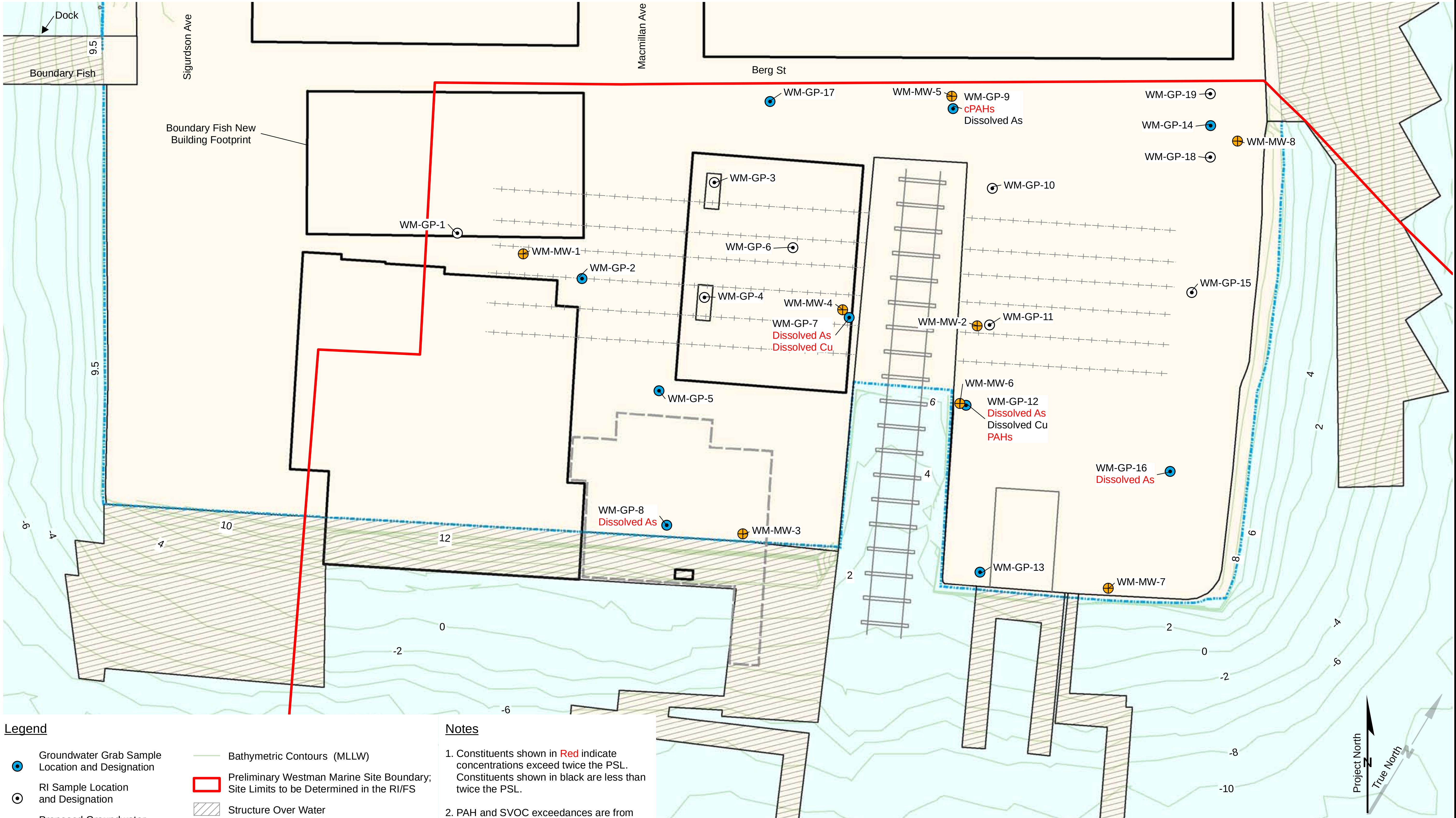
Westman Marine
Blaine Harbor
Blaine, Washington

Constituents of Potential Concern in Soil

Figure 4

LANDAU ASSOCIATES

G:\Projects\001\035\010\015\RI Uplands Investigation\Figure4UplandRISoilContaminants.mxd 2/4/2014 NAD 1983 StatePlane Washington North FIPS 4601 Feet



Legend

- Groundwater Grab Sample Location and Designation
- RI Sample Location and Designation
- Proposed Groundwater Monitoring Well Location
- Historical Track Location (1966)
- Bathymetric Contours (MLLW)
- Preliminary Westman Marine Site Boundary; Site Limits to be Determined in the RI/FS
- Structure Over Water

Notes

1. Constituents shown in Red indicate concentrations exceed twice the PSL. Constituents shown in black are less than twice the PSL.
2. PAH and SVOC exceedances are from uncentrifuged samples and may be biased by particulates.
3. See Figure 4 for abbreviations.
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 30 60

Scale in Feet

Source: Wilson Engineering 2011, Port of Blaine 2011, Walker and Associates, Inc.

G:\Projects\001\035\010\015\RI Uplands Investigation\Figure5UplandRIGWContaminants.mxd 1/20/2014 NAD 1983 StatePlane Washington North FIPS 4601 Feet

LANDAU ASSOCIATES

Westman Marine Blaine Harbor Blaine, Washington	**Constituents of Potential Concern in Groundwater**	Figure 5

TABLE 1
SOIL SAMPLE ANALYSES BY LOCATION
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

Sample Location	Depth Interval (ft BGS)	Chemical Analyses																
		Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	HCID	TPH-D/O	TPH-G	PAHs	VOCs	TCLP	Organotins	PCBs	SVOCs
RI Sample Locations																		
WM-HA-1	0-0.75	X	X	X	X	X	X		X	X	X		X					
	1-1.5	X	X	X	X	X	X		X		X		X					
	2-2.5	X	X	X	X	X	X		X		X		X					
	3-4				X		X		X				X					
WM-GP-2	0-1	X	X	X	X	X	X		X	X	X		X					
	1-2	X	X	X	X	X	X		X		X		X					
	2-3	X	X	X	X	X	X		X		X		X					
	5-6	X			X		X											
WM-GP-3*	0.4-1.4	X	X	X	X	X	X		X	X			X					
	1.4-2.4	X	X	X	X	X	X											
	2.4-3.4	X	X	X	X	X	X											
WM-GP-4*	0.4-1.4	X	X	X	X	X	X		X	X	X		X					
	1.4-2.4	X	X	X	X	X	X											
	2.4-3.4	X	X	X	X	X	X											
WM-GP-5	0-1	X	X	X	X	X	X		X	X			X			X		
	1-2	X	X	X	X	X	X		X		X		X			X		
	2-3	X	X	X	X	X	X		X		X		X			X		
WM-GP-6*	0.5-1.5	X	X	X	X	X	X		X	X			X			X		
	1.5-2.5	X	X	X	X	X	X											
	2.5-3.5	X	X	X	X	X	X											
WM-GP-7	0.5-1.5	X	X	X	X	X	X		X	X	X		X					
	1.5-2.5				X		X											
	5-6	X			X		X		X				X					
	8-9	X	X	X	X	X	X		X	X	X	X	X	X				
	10-11	X			X		X		X				X					
WM-GP-8	0.7-1.7	X	X	X	X	X	X		X	X	X		X					
WM-GP-9	0-1.5	X	X	X	X	X	X		X	X			X				X	
WM-GP-10	0-1	X	X	X	X	X	X		X	X	X		X					
	1-2	X			X		X		X				X					
	2-3	X			X		X		X									
WM-GP-11	0-1	X	X	X	X	X	X		X	X	X		X					
	1-2				X		X		X									
	3-4				X		X				X		X					
	5-6	X	X	X	X	X	X		X	X	X	X	X	X				
	7-8										X		X					
WM-GP-12	0-1	X	X	X	X	X	X		X	X	X		X				X	X
	1-2	X			X		X		X				X					X
	2-3						X											

TABLE 1
SOIL SAMPLE ANALYSES BY LOCATION
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

Sample Location	Depth Interval (ft BGS)	Chemical Analyses																
		Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	HCID	TPH-D/O	TPH-G	PAHs	VOCs	TCLP	Organotins	PCBs	SVOCs
WM-GP-13	0-1	X	X	X	X	X	X		X	X	X		X					
	1-2				X		X		X				X					
	2-3				X				X									
	5-6				X				X									
WM-GP-14	0-1	X	X	X	X	X	X		X	X	X		X				X	X
	1-2				X				X				X					X
	2-3								X									
	3-4								X									
	7-8	X			X				X			X	X					X
	10.5-11.5	X	X	X	X	X	X		X	X	X	X	X	X			X	X
	13.5-14.5	X			X				X			X	X					X
WM-GP-15	0-1	X	X	X	X	X	X		X	X	X		X					
	1-2				X		X		X				X					
	2-3				X		X		X									
WM-GP-16	0-1	X	X	X	X	X	X		X	X	X		X			X	X	
	1-2	X			X		X		X				X			X	X	
	2-3	X			X		X											
WM-GP-17*	0.5-1	X	X	X	X	X	X		X	X			X				X	
	1-2	X	X	X	X	X	X											
	2-3	X	X	X	X	X	X											
WM-GP-18	10-12		X		X				X			X	X	X				
WM-GP-19	11-12		X		X				X			X	X	X				
Interim Action Sample Locations																		
WM-BF-Vault-B-1	-	X	X	X	X	X	X	X	X		X	X	X	X				
WM-BF-Vault-S-1	-	X	X	X	X	X	X	X	X		X	X	X	X				
WM-BF-Vault-S-3	-				X						X	X						
WM-SS-4	0-0.5				X	X	X		X									
	1-1.5				X	X	X		X									
WM-SS-7	0-0.5	X	X	X	X	X	X		X		X		X					
WM-SS-11	0.75-1.0				X		X		X				X					
WM-SS-12	0.75-1.0				X		X		X				X					
WM-SS-13	0.75-1.0				X		X		X				X					
WM-SS-14	2.0-2.25				X		X		X				X					
WM-SS-15	0.75-1.0				X		X		X				X					
WM-SS-16	0.75-1.0				X		X		X				X					
WM-SS-17	0.75-1.0				X		X		X				X					
WM-SS-18	2.0-2.25				X		X		X				X					
WM-SS-19	0.75-1.0				X		X		X				X					
WM-SS-23	3	X	X	X	X	X	X		X		X		X					
WM-BF-SS-24	2.3-2.5	X	X	X	X	X	X	X	X				X					

TABLE 1
SOIL SAMPLE ANALYSES BY LOCATION
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

Sample Location	Depth Interval (ft BGS)	Chemical Analyses																
		Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	HCID	TPH-D/O	TPH-G	PAHs	VOCs	TCLP	Organotins	PCBs	SVOCs
WM-BF-SS-25	2.3-2.5	X	X	X	X	X	X	X	X				X					
WM-BF-SS-26	2.3-2.5	X	X	X	X	X	X	X	X				X					
WM-BF-SS-27	2.3-2.5	X	X	X	X	X	X	X	X				X					
WM-BF-SS-28	2.3-2.5	X	X	X	X	X	X	X	X				X					
WM-BF-SS-29	2.3-2.5	X	X	X	X	X	X	X	X				X					
WM-BF-SS-30	2.3-2.5	X	X	X	X	X	X	X	X				X					
WM-BF-SS-31	2.3-2.5	X	X	X	X	X	X	X	X				X					
WM-BF-GP-1	9.0-10.0										X	X						
WM-BF-GP-2	9.0-10.0										X	X						
WM-BF-GP-3	8.5-9.5										X	X						
WM-BF-GP-3	8.5-9.5										X	X						
Total Soil Analyses:		**56**	**48**	**46**	**80**	**48**	**73**	**10**	**69**	**20**	**32**	**14**	**62**	**7**	**0**	**6**	**7**	**7**

TPH = Total Petroleum Hydrocarbons.
HCID = Total Petroleum Hydrocarbon Identification by NWTPH-HCID.
TPH-D/O = Total Petroelum Hydrocarbons in the diesel (D) or oil (O) range by NWTPH-Dx. Method includes acid/silica gel cleanup.
TPH-G = Total Petroleum Hydrocarbons in the gasoline range by NWTPH-Gx.
VOCs = Volatile Organic Compounds by EPA Method 8260C.
Metals analyses by EPA Method 6020 except for mercury (EPA Method 7471b)
* Samples from these location are being analyzed.

TABLE 2
GROUNDWATER SAMPLE ANALYSES BY LOCATION
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

Sample Location	Chemical Analyses														
	Total Metals							Dissolved Metals			HCID	TPH-D/O	PAHs	SVOCs	VOCs
	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Zinc	Arsenic	Copper	Lead					
WM-GP-2	X	X	X	X	X	X	X				X		X		X
WM-GP-5	X	X	X	X	X	X	X				X		X		X
WM-GP-7	X	X	X	X	X	X	X	X	X		X	X	X		X
WM-GP-8	X	X	X	X	X	X	X	X			X		X		X
WM-GP-9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WM-GP-12	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WM-GP-13	X	X	X	X	X	X	X		X		X	X	X		X
WM-GP-14	X	X	X	X	X	X	X		X		X		X	X	X
WM-GP-16	X	X	X	X	X	X	X	X			X		X		X
WM-GP-17	X	X	X	X	X	X	X	X			X		X	X	X
Total Groundwater Grab Sample Analyses:															
	10	10	10	10	10	10	10	6	5	2	10	4	10	4	10

TPH = Total Petroleum Hydrocarbons.
HCID = Total Petroleum Hydrocarbon Identification by NWTPH-HCID.
TPH-D/O = Total Petroelum Hydrocarbons in the diesel (D) or oil (O) range by NWTPH-Dx. Method includes acid/silica gel cleanup.
TPH-G = Total Petroleum Hydrocarbons in the gasoline range by NWTPH-Gx.
VOCs = Volatile Organic Compounds by EPA Method 8260C.
Metals analyses by EPA Method 6020 except for mercury (EPA Method 7471b).

TABLE 3
SOIL ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-HA-1 0-0.75 XJ14A 10/8/2013	WM-HA-1 1-1.5 XM23A 10/08/2013	WM-HA-1 2-2.5 XM23B 10/08/2013	WM-HA-1 3-4 XO58A 10/08/2013	WM-GP-2 0-1 XJ56G 10/09/2013	WM-GP-2 1-2 XM22C 10/09/2013	WM-GP-2 2-3 XM22D 10/09/2013	WM-GP-2 5-6 XO58C 10/09/2013	WM-GP-3 0.4-1.4 XJ56I 10/09/2013	WM-GP-3 1.4-2.4 XV37C 10/09/2013	WM-GP-3 2.4-3.4 XV37E 10/09/2013	WM-GP-4 0.4-1.4 XJ56H 10/09/2013	WM-GP-4 1.4-2.4 XM22E/XV37B 10/09/2013	WM-GP-4 2.4-3.4 XV37F 10/09/2013	WM-GP-5 0-1 XJ56F 10/09/2013	WM-GP-5 1-2 XM22A 10/09/2013	WM-GP-5 2-3 XM22B 10/09/2013
TOTAL METALS (mg/kg)																		
Methods EPA200.8/ SW6010C/SW7471A																		
Arsenic	7	4.2	3.1	5.9		10.0	13.5	9.3	2.5	2.6	2.9	2.2	2.7	3.9	5.2	3.8	3.1	3.0
Cadmium	80	0.5	0.2	0.5		0.6	0.7	0.2		0.1	0.1	0.1	0.2	0.1	0.2	0.3	0.1	0.1 U
Chromium	2,000	21.4 J	14.4	21.4		16.0	19.7	29.9		17.0	15.3	11.2	18.7	12.9	21.1	21.2	18.7	16.4
Copper	36	150 J	72.3	284	52.2	778	480	128	37.4	18.9	11.7	5.7	52.1	19.7	19.8	87.2	26.9	17.1
Lead	250	42.2 J	16.9	43.1		103	56.1	15.0		4.2	1.7	1.0	3.1	2.3	2.7	51.1	4.3	2.6
Mercury	0.16	0.06	0.10	0.47	0.07 J	2.21	2.3	0.25	0.16 J	0.03	0.02 U	0.02 U	0.03	0.11	0.06	0.14	0.03	0.02
Zinc	100	671	83	128	59	282	186	90		32	30	20	83	33	42	112	47	32
TOTAL PETROLEUM HYDROCARBONS (mg/kg)																		
HCID																		
Gasoline	---	<20				<20				<20			<20			<20		
Diesel	---	<50				>50				<50			<50			<50		
Oil	---	>100				>100				<100			>100			<100		
NWTPH-Dx																		
Diesel Range Organics	2,000	43	30	33		91	47	9.7					20				5.3 U	5.4 U
Lube Oil	2,000	160	160	120		250	480	41					190				14	13
NWTPH-Gx																		
Gasoline	30/100 (a)																	
PAHs (µg/kg)																		
Method SW8270DSIM																		
Naphthalene	2,300	4.8 U	4.7 UJ	12 J	12	23	14 UJ	4.8 UJ		4.8 U			9.6 U			5.5	4.8 UJ	5.0 UJ
2-Methylnaphthalene	320,000	4.8 U	5.3 J	12 J	16	24	14 UJ	4.8 UJ		4.8 U			11			4.8 U	4.8 UJ	5.0 UJ
1-Methylnaphthalene	35,000	4.8 U	4.7 UJ	5.4 J	6.0	17	14 UJ	4.8 UJ		4.8 U			9.6 U			4.8 U	4.8 UJ	5.0 UJ
Acenaphthylene	---	4.8 U	4.7 UJ	4.8 UJ	4.6 U	42	14 UJ	4.8 UJ		4.8 U			9.6 U			4.8 U	4.8 UJ	5.0 UJ
Acenaphthene	340	4.8 U	4.7 UJ	15 J	4.6 U	100	14 U	4.8 UJ		4.8 U			9.6 U			6.8	4.8 UJ	5.0 UJ
Fluorene	470	4.8 U	4.7 UJ	11 J	4.6 U	260	14 UJ	4.8 UJ		4.8 U			9.6 U			6.9	4.8 UJ	5.0 UJ
Phenanthrene	---	34	5.5 J	230 J	6.3	2,600	120 J	9.3 J		4.8 U			17			76	4.8 UJ	5.0 UJ
Anthracene	4,500	7.0	4.7 UJ	38 J	4.6 U	350	15 J	4.8 UJ		4.8 U			9.6 U			15	4.8 UJ	5.0 UJ
Fluoranthene	3,200	86	13 J	360 J	6.4	4,100	230 J	5.3 J		4.8 U			9.6 U			97	4.8 UJ	5.0 UJ
Pyrene	20,000	71	14 J	300 J	6.5	3,700	150 J	9.9 J		4.8 U			9.6 U			74	4.8 UJ	5.6 J
Benzo(a)anthracene	130	41	5.9 J	140 J	4.6 U	1,400	85 J	4.8 UJ		4.8 U			9.6 U			42	4.8 UJ	5.0 UJ
Chrysene	140	70	8.6 J	190 J	5.1	2,300	140 J	6.4 J		4.8 U			14			43	4.8 UJ	5.0 UJ
Benzo(a)pyrene	350	53	5.0 J	120 J	4.6 U	1,200	110 J	4.8 UJ		11			24			38	4.8 UJ	5.0 UJ
Indeno(1,2,3-cd)pyrene	700	52	5.6 J	78 J	4.6 U	820	78 J	4.8 J		4.8 U			9.6 U			32	4.8 UJ	5.0 UJ
Dibenz(a,h)anthracene	140	34	4.7 UJ	26 J	4.6 U	190	19 J	4.8 UJ		4.8 U			9.6 U			30	4.8 UJ	5.0 UJ
Benzo(g,h,i)perylene	---	56	7.9 J	88 J	4.9	610	97 J	8.2 J		4.8 U			14			20	4.8 UJ	5.0 UJ
Dibenzofuran	---	4.8 U	4.7 UJ	6.7 UJ	4.6 U	99	14 UJ	4.8 UJ		4.8 U			9.6 U			4.8 U	4.8 UJ	5.0 UJ
Total Benzofluoranthenes	430	150	26 J	260 J	8.3	3,300	300 J	19 J		4.8 U			9.6 U			75	12 J	14 J
TEQ	140	81	8.8 J	172 J	0.9	1,794	160 J	2.4 J		11			24.1			56	1.2 J	1.4 J
PCBs (µg/kg)																		
Method SW8082A																		
Aroclor 1016	33																	
Aroclor 1242	---																	
Aroclor 1248	---																	
Aroclor 1254	500																	
Aroclor 1260	490																	
Aroclor 1221	---																	
Aroclor 1232	---																	
Aroclor 1262	---																	
Aroclor 1268	---																	
Total PCBs	160																	

TABLE 3
SOIL ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil	WM-HA-1	WM-HA-1	WM-HA-1	WM-HA-1	WM-GP-2	WM-GP-2	WM-GP-2	WM-GP-2	WM-GP-3	WM-GP-3	WM-GP-3	WM-GP-4	WM-GP-4	WM-GP-4	WM-GP-5	WM-GP-5	WM-GP-5
	Screening	0-0.75	1-1.5	2-2.5	3-4	0-1	1-2	2-3	5-6	0.4-1.4	1.4-2.4	2.4-3.4	0.4-1.4	1.4-2.4	2.4-3.4	0-1	1-2	2-3
	Level	XJ14A	XM23A	XM23B	XO58A	XJ56G	XM22C	XM22D	XO58C	XJ56I	XV37C	XV37E	XJ56H	XM22E/XV37B	XV37F	XJ56F	XM22A	XM22B
	(Unsaturated)	10/8/2013	10/08/2013	10/08/2013	10/08/2013	10/09/2013	10/09/2013	10/09/2013	10/09/2013	10/09/2013	10/09/2013	10/09/2013	10/09/2013	10/09/2013	10/09/2013	10/09/2013	10/09/2013	10/09/2013
VOLATILES (µg/kg)																		
Method SW8260C																		
Chloromethane	---																	
Methylene Chloride	2,600																	
Acetone	72,000,000																	
Carbon Disulfide	8,000,000																	
2-Butanone	48,000,000																	
Benzene	130																	
Toluene	110,000																	
m, p-Xylene	---																	
Isopropylbenzene	8,000,000																	
n-Propylbenzene	8,000,000																	
sec-Butylbenzene	---																	
4-Isopropyltoluene	---																	
SEMIVOLATILES (µg/kg)																		
Method SW8270D																		
Phenol	2,700																	
Benzyl Alcohol	8,000,000																	
4-Methylphenol	400,000																	
Naphthalene	2,300																	
2-Methylnaphthalene																		
Dimethylphthalate	---																	
Acenaphthylene	---																	
Acenaphthene	340																	
Dibenzofuran	80,000																	
Diethylphthalate	4,200																	
Fluorene	470																	
Pentachlorophenol	160																	
Phenanthrene	---																	
Carbazole	---																	
Anthracene	4,500																	
Di-n-Butylphthalate	5,000																	
Fluoranthene	3,200																	
Pyrene	20,000																	
Butylbenzylphthalate	280																	
Benzo(a)anthracene	130																	
bis(2-Ethylhexyl)phthalate	6,600																	
Chrysene	140																	
Benzo(a)pyrene	350																	
Indeno(1,2,3-cd)pyrene	700																	
Dibenz(a,h)anthracene	140																	
Benzo(g,h,i)perylene	---																	
1-Methylnaphthalene	35,000																	
Total Benzofluoranthenes	430																	
ORGANOTINS (µg/kg)																		
KRONE88																		
Tributyltin Ion	---															3.4 U	3.4 U	3.5 U
Dibutyltin Ion	---															5.1 U	5.1 U	5.3 U
Butyltin	---															**4.0**	3.6 U	3.7 U
CONVENTIONALS (%)																		
Total Organic Carbon (PLUMB81TC)	---																	

TABLE 3
SOIL ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-HA-1 0-0.75 XJ14A 10/8/2013	WM-HA-1 1-1.5 XM23A 10/08/2013	WM-HA-1 2-2.5 XM23B 10/08/2013	WM-HA-1 3-4 XO58A 10/08/2013	WM-GP-2 0-1 XJ56G 10/09/2013	WM-GP-2 1-2 XM22C 10/09/2013	WM-GP-2 2-3 XM22D 10/09/2013	WM-GP-2 5-6 XO58C 10/09/2013	WM-GP-3 0.4-1.4 XJ56I 10/09/2013	WM-GP-3 1.4-2.4 XV37C 10/09/2013	WM-GP-3 2.4-3.4 XV37E 10/09/2013	WM-GP-4 0.4-1.4 XJ56H 10/09/2013	WM-GP-4 1.4-2.4 XM22E/XV37B 10/09/2013	WM-GP-4 2.4-3.4 XV37F 10/09/2013	WM-GP-5 0-1 XJ56F 10/09/2013	WM-GP-5 1-2 XM22A 10/09/2013	WM-GP-5 2-3 XM22B 10/09/2013
GRAIN Size (%)																		
ASTM_D422																		
Particle/Grain Size, Gravel	---																	
Particle/Grain Size, Sand	---																	
Particle/Grain Size, Silt	---																	
Particle/Grain Size, Clay	---																	

TABLE 3
SOIL ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-GP-6 0.5-1.5 XJ56Q 10/10/2013	WM-GP-6 1.5-2.5 XV37A 10/10/2013	WM-GP-6 2.5-3.5 XV37G 10/10/2013	WM-GP-7 0.5-1.5 XJ56M 10/09/2013	WM-GP-7 1.5-2.5 XM22J 10/09/2013	WM-GP-7 5-6 XM22K 10/09/2013	WM-GP-7 8-9 XJ56C 10/09/2013	WM-GP-7 10-11 XM22L 10/09/2013	WM-GP-8 0.7-1.7 XJ56J 10/09/2013	WM-GP-9 0-1.5 XJ14F 10/8/2013	WM-GP-10 0-1 XJ56O 10/10/2013	WM-GP-10 1-2 XM22P 10/10/2013	WM-GP-10 2-3 XO58G 10/10/2013	WM-GP-10 3-4 XR13C 10/10/2013	WM-GP-11 0-1 XJ56N 10/10/2013	WM-GP-11 1-2 XM22M 10/10/2013	WM-GP-11 2-3 XR13B 10/10/2013
TOTAL METALS (mg/kg) Methods EPA200.8/ SW6010C/SW7471A																		
Arsenic	7	**2.7** J	**3.5**	**5.0**	**3.1**		**11.9**	**12.3**	**8.7**	**6.7**	**2.2**	**17.6**	**9.2**		**15.9**	**6.7**		
Cadmium	80	**0.2**	**0.2**	**0.2**	**0.2**			**0.4**		**0.1**	**0.1**	**0.7**				**0.5**		
Chromium	2,000	**17.1**	**15.8**	**18.0**	**16.2**			**74.0**		**23.4**	**13.5**	**34.4**				**22.2**		
Copper	36	**32.5**	**12.4**	**18.9**	**55.1**	**1,540**	**186**	**358**	**257**	**30.2**	**32.2**	**1,600**	**301**	**113**	**179**	**554**	**160**	**26.4**
Lead	250	**5.1** J	**1.8**	**2.3**	**5.6**			**41.8**		**3.4**	**1.9**	**138**				**81.6**		
Mercury	0.16	0.02 U	**0.03**	**0.04**	**0.18**	**1.62**	**2.6**	**0.69**	**1.08**	**0.03**	0.02 U	**2.04**	**0.55**	**0.03** J		**1.00**	**2.3**	**0.04** J
Zinc	100	**41**	**31**	**40**	**46**		**106**	**223**	**217**	**49**	**59**	**1,640**	**264**	**112**	**1,450**	**318**	**78**	
TOTAL PETROLEUM HYDROCARBONS (mg/kg)																		
HCID																		
Gasoline	---	<20			<20			<20		<20	<20	<20				<20		
Diesel	---	<50			<50			**>50**		<50	<50	**>50**				**>50**		
Oil	---	<100			**>100**			**>100**		**>100**	<100	**>100**				**>100**		
NWTPH-Dx																		
Diesel Range Organics	2,000				**24**			**64**		**65**		**300**				**170**		
Lube Oil	2,000				**110**			**140**		**200**		**940**				**220**		
NWTPH-Gx																		
Gasoline	30/100 (a)							6.6 U										
PAHs (µg/kg) Method SW8270DSIM																		
Naphthalene	2,300	4.9 U			4.9 U		**15** J	**36**	**8.6** J	9.7 U	4.8 U	13 U	**7.6** J			**12**	**79** J	
2-Methylnaphthalene	320,000	4.9 U			4.9 U		**12** J	**46**	**8.9** J	9.7 U	4.8 U	13 U	4.6 UJ			**19**	**25** J	
1-Methylnaphthalene	35,000	4.9 U			4.9 U		**10** J	**14**	14 UJ	9.7 U	4.8 U	13 U	4.6 UJ			10 U	**20** J	
Acenaphthylene	---	4.9 U			4.9 U		**30** J	**14**	14 UJ	9.7 U	4.8 U	13 U	**5.3** J			**13**	11 UJ	
Acenaphthene	340	4.9 U			4.9 U		14 UJ	**14**	14 UJ	9.7 U	4.8 U	13 U	4.6 UJ			**10**	**28** J	
Fluorene	470	4.9 U			4.9 U		**8.8** J	**25**	**8.0** J	9.7 U	4.8 U	**16**	4.6 UJ			**17**	**18** J	
Phenanthrene	---	4.9 U			**15**		**110** J	**100**	**83** J	**18**	4.8 U	**180**	**47** J			**140**	**84** J	
Anthracene	4,500	4.9 U			4.9 U		**33** J	**61**	**27** J	9.7 U	4.8 U	**39**	**11** J			**40**	**26** J	
Fluoranthene	3,200	4.9 U			**22**		**120** J	**1,000**	**180** J	**13**	4.8 U	**320**	**81** J			**310**	**200** J	
Pyrene	20,000	4.9 U			**20**		**160** J	**1,100**	**270** J	9.7 U	4.8 U	**240**	**83** J			**260**	**260** J	
Benzo(a)anthracene	130	4.9 U			**14**		**71** J	**240**	**77** J	9.7 U	4.8 U	**130**	**37** J			**170**	**130** J	
Chrysene	140	4.9 U			**19**		**110** J	**270**	**91** J	9.7 U	4.8 U	**200**	**54** J			**220**	**180** J	
Benzo(a)pyrene	350	4.9 U			**25**		**110** J	**120**	**60** J	9.7 U	4.8 U	**150**	**47** J			**220**	**140** J	
Indeno(1,2,3-cd)pyrene	700	4.9 U			**24**		**96** J	**58**	**38** J	**31** M	**15**	**160**	**43** J			**200**	**95** J	
Dibenz(a,h)anthracene	140	4.9 U			**28**		**20** J	**37**	14 UJ	9.7 U	4.8 U	**96**	**25** J			**94**	**26** J	
Benzo(g,h,i)perylene	---	4.9 U			**19**		**140** J	**53**	**48** J	9.7 U	4.8 U	**200**	**73** J			**240**	**110** J	
Dibenzofuran	---	4.9 U			4.9 U		**7.5** J	**35**	**9.5** J	9.7 U	4.8 U	13 U	4.6 UJ			10 U	**26** J	
Total Benzofluoranthenes	430	4.9 U			**34**		**220** J	**330**	**130** J	9.7 U	4.8 U	**400**	**86** J			**560**	**310** J	
TEQ	140	ND			**35**		**152** J	**189**	**85** J	**3.1**	**1.5**	**231**	**67** J			**325**	**198** J	
PCBs (µg/kg) Method SW8082A																		
Aroclor 1016	33										32 U							
Aroclor 1242	---										32 U							
Aroclor 1248	---										32 U							
Aroclor 1254	500										32 U							
Aroclor 1260	490										32 U							
Aroclor 1221	---										32 U							
Aroclor 1232	---										32 U							
Aroclor 1262	---										32 U							
Aroclor 1268	---										32 U							
Total PCBs	160										ND							

TABLE 3
SOIL ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-GP-6 0.5-1.5 XJ56Q 10/10/2013	WM-GP-6 1.5-2.5 XV37A 10/10/2013	WM-GP-6 2.5-3.5 XV37G 10/10/2013	WM-GP-7 0.5-1.5 XJ56M 10/09/2013	WM-GP-7 1.5-2.5 XM22J 10/09/2013	WM-GP-7 5-6 XM22K 10/09/2013	WM-GP-7 8-9 XJ56C 10/09/2013	WM-GP-7 10-11 XM22L 10/09/2013	WM-GP-8 0.7-1.7 XJ56J 10/09/2013	WM-GP-9 0-1.5 XJ14F 10/8/2013	WM-GP-10 0-1 XJ56O 10/10/2013	WM-GP-10 1-2 XM22P 10/10/2013	WM-GP-10 2-3 XO58G 10/10/2013	WM-GP-10 3-4 XR13C 10/10/2013	WM-GP-11 0-1 XJ56N 10/10/2013	WM-GP-11 1-2 XM22M 10/10/2013	WM-GP-11 2-3 XR13B 10/10/2013 ›
VOLATILES (µg/kg)																		
Method SW8260C																		
Chloromethane	---							**1.2**										
Methylene Chloride	2,600							5.6 UJ										
Acetone	72,000,000							**45**										
Carbon Disulfide	8,000,000							**18**										
2-Butanone	48,000,000							5.7 U										
Benzene	130							**1.2**										
Toluene	110,000							1.1 U										
m, p-Xylene	---							**1.8**										
Isopropylbenzene	8,000,000							1.1 U										
n-Propylbenzene	8,000,000							1.1 U										
sec-Butylbenzene	---							1.1 U										
4-Isopropyltoluene	---							1.1 U										
SEMIVOLATILES (µg/kg)																		
Method SW8270D																		
Phenol	2,700										19 U							
Benzyl Alcohol	8,000,000										19 U							
4-Methylphenol	400,000										19 U							
Naphthalene	2,300										19 U							
2-Methylnaphthalene											19 U							
Dimethylphthalate	---										19 U							
Acenaphthylene	---										19 U							
Acenaphthene	340										19 U							
Dibenzofuran	80,000										19 U							
Diethylphthalate	4,200										19 U							
Fluorene	470										19 U							
Pentachlorophenol	160										95 U							
Phenanthrene	---										19 U							
Carbazole	---										19 U							
Anthracene	4,500										19 U							
Di-n-Butylphthalate	5,000										19 U							
Fluoranthene	3,200										19 U							
Pyrene	20,000										19 U							
Butylbenzylphthalate	280										19 U							
Benzo(a)anthracene	130										19 U							
bis(2-Ethylhexyl)phthalate	6,600										48 U							
Chrysene	140										19 U							
Benzo(a)pyrene	350										19 U							
Indeno(1,2,3-cd)pyrene	700										19 U							
Dibenz(a,h)anthracene	140										19 U							
Benzo(g,h,i)perylene	---										19 U							
1-Methylnaphthalene	35,000										19 U							
Total Benzofluoranthenes	430										38 U							
ORGANOTINS (µg/kg)																		
KRONE88																		
Tributyltin Ion	---	3.4 U																
Dibutyltin Ion	---	5.2 U																
Butyltin	---	3.6 U																
CONVENTIONALS (%)																		
Total Organic Carbon (PLUMB81TC)	---																	

TABLE 3
SOIL ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-GP-6 0.5-1.5 XJ56Q 10/10/2013	WM-GP-6 1.5-2.5 XV37A 10/10/2013	WM-GP-6 2.5-3.5 XV37G 10/10/2013	WM-GP-7 0.5-1.5 XJ56M 10/09/2013	WM-GP-7 1.5-2.5 XM22J 10/09/2013	WM-GP-7 5-6 XM22K 10/09/2013	WM-GP-7 8-9 XJ56C 10/09/2013	WM-GP-7 10-11 XM22L 10/09/2013	WM-GP-8 0.7-1.7 XJ56J 10/09/2013	WM-GP-9 0-1.5 XJ14F 10/8/2013	WM-GP-10 0-1 XJ56O 10/10/2013	WM-GP-10 1-2 XM22P 10/10/2013	WM-GP-10 2-3 XO58G 10/10/2013	WM-GP-10 3-4 XR13C 10/10/2013	WM-GP-11 0-1 XJ56N 10/10/2013	WM-GP-11 1-2 XM22M 10/10/2013	WM-GP-11 2-3 XR13B 10/10/2013 ›
GRAIN Size (%)																		
ASTM_D422																		
Particle/Grain Size, Gravel	---																	
Particle/Grain Size, Sand	---																	
Particle/Grain Size, Silt	---																	
Particle/Grain Size, Clay	---																	

TABLE 3
SOIL ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-GP-11 3-4 M22N/XO58F 10/10/2013	WM-GP-11 5-6 XJ56D 10/10/2013	WM-GP-11 7-8 XM22O 10/10/2013	WM-GP-12 0-1 XJ14D 10/8/2013	WM-GP-12 1-2 XM23C 10/08/2013	WM-GP-12 2-3 XO07A 10/5/2013	WM-GP-13 0-1 XJ56K 10/09/2013	WM-GP-13 1-2 XM22F 10/09/2013	WM-GP-13 5-6 XO58D 10/09/2013	WM-GP-13 6-7 XR13A 10/09/2013	WM-GP-14 0-1 XJ56L 10/09/2013	WM-GP-14 1-2 XM22G 10/09/2013	WM-GP-14 2-3 XO58E 10/09/2013	WM-GP-14 7-8 XM22H 10/09/2013	WM-GP-14 10.5-11.5 XJ56B 10/10/2013	WM-GP-14 13.5-14.5 XM22I 10/09/2013
TOTAL METALS (mg/kg)																	
Methods EPA200.8/ SW6010C/SW7471A																	
Arsenic	7	2.9	2.8		10.8	6.4		5.8				5.8			3.5	8.6	1.4
Cadmium	80		0.2		0.8			2.5				0.9				0.3	
Chromium	2,000		17.4		29			25.4				23.9				16.9	
Copper	36	16.5	36.0		1,100	32.8		3,920	273	182	44.0	810	30.8		9.0	466	2.8
Lead	250		12.0		67.8			73.4				111				136	
Mercury	0.16	0.03 UJ	0.07		1.30	0.25	0.02 UJ	0.52	0.16			0.14				0.03	
Zinc	100		44		829	43		1,240	172	137	49	763	116	54	23	151	10
TOTAL PETROLEUM HYDROCARBONS (mg/kg)																	
HCID																	
Gasoline	---		>20		<20			<20				<20				<20	
Diesel	---		>50		>50			>50				>50				>50	
Oil	---		>100		>100			>100				>100				>100	
NWTPH-Dx																	
Diesel Range Organics	2,000	16	4,000	8.7	120			79				96				140	
Lube Oil	2,000	11 U	710	12 U	400			290				410				57	
NWTPH-Gx																	
Gasoline	30/100 (a)		11												8.0 U	65	7.2 U
PAHs (µg/kg)																	
Method SW8270DSIM																	
Naphthalene	2,300	14 J	30 U	57 J	11 U	7.6 J		10 U	4.6 UJ			15	4.8 UJ		31 J	320	4.8 UJ
2-Methylnaphthalene	320,000	20 J	140	10 J	12	5.0 UJ		11	4.6 UJ			15	8.0 J		4.7 UJ	46	4.8 UJ
1-Methylnaphthalene	35,000	18 J	850	27 J	11 U	5.0 UJ		10 U	4.6 UJ			11 U	4.8 UJ		4.7 UJ	29	4.8 UJ
Acenaphthylene	---	12 J	150	4.8 UJ	11 U	5.0 UJ		10 U	4.6 UJ			32	4.8 UJ		4.7 UJ	92	4.8 UJ
Acenaphthene	340	5.6 J	450	38 J	11 U	5.0 UJ		10 U	4.6 UJ			11 U	4.8 UJ		4.7 UJ	22	4.8 UJ
Fluorene	470	11 J	1,300	46 J	11 U	5.0 UJ		10 U	4.6 UJ			19	4.8 UJ		4.7 UJ	61	4.8 UJ
Phenanthrene	---	53 J	2,000	15 J	60	16 J		73	15 J			120	4.8 UJ		11 J	480	4.8 UJ
Anthracene	4,500	9.0 J	30 U	5.5 J	14	5.0 UJ		22	4.6 UJ			44	4.8 UJ		4.7 UJ	160	6.6 J
Fluoranthene	3,200	140 J	170	19 J	120	40 J		170	19 J			260	4.8 UJ		15 J	630	6.1 J
Pyrene	20,000	160 J	190	26 J	97	49 J		130	23 J			210	4.8 UJ		19 J	720	5.7 J
Benzo(a)anthracene	130	77 J	54	4.8 UJ	64	21 J		73	12 J			120	4.8 UJ		7.2 J	310	4.8 UJ
Chrysene	140	91 J	99	6.6 J	120	26 J		160	20 J			200	4.8 UJ		7.8 J	330	4.8 UJ
Benzo(a)pyrene	350	74 J	110	6.4 J	98	23 J		110	14 J			160	4.8 UJ		6.3 J	290	4.8 UJ
Indeno(1,2,3-cd)pyrene	700	55 J	120	7.5 J	130	16 J		120	10 J			160	4.8 UJ		4.7 UJ	150	4.8 UJ
Dibenz(a,h)anthracene	140	11 J	160	4.8 UJ	75	5.3 J		72	4.6 UJ			85	4.8 UJ		4.7 UJ	60	4.8 UJ
Benzo(g,h,i)perylene	---	73 J	45	11 J	150	20 J		120	15 J			200	4.8 UJ		5.5 J	200	4.8 UJ
Dibenzofuran	---	9.3 J	450	23 J	11 U	5.0 UJ		10 U	4.6 UJ			11 U	4.8 UJ		4.7 UJ	49	4.8 UJ
Total Benzofluoranthenes	430	150 J	110	23 J	310	51 J		410	41 J			440	13 J		20 J	490	12 J
TEQ	140	104 J	155	10 J	157	33 J		179	21 J			243	1.3 J		9.1 J	394	1.2 J
PCBs (µg/kg)																	
Method SW8082A																	
Aroclor 1016	33				33 U							31 U				32 U	
Aroclor 1242	---				33 U							31 U				32 U	
Aroclor 1248	---				33 U							31 U				32 U	
Aroclor 1254	500				110							31 U				32 U	
Aroclor 1260	490				40							34				32 U	
Aroclor 1221	---				33 U							31 U				32 U	
Aroclor 1232	---				33 U							31 U				32 U	
Aroclor 1262	---				33 U							31 U				32 U	
Aroclor 1268	---				33 U							31 U				32 U	
Total PCBs	160				150							34				ND	

TABLE 3
SOIL ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-GP-11 3-4 XM22N/XO58F 10/10/2013	WM-GP-11 5-6 XJ56D 10/10/2013	WM-GP-11 7-8 XM22O 10/10/2013	WM-GP-12 0-1 XJ14D 10/8/2013	WM-GP-12 1-2 XM23C 10/08/2013	WM-GP-12 2-3 XO07A 10/5/2013	WM-GP-13 0-1 XJ56K 10/09/2013	WM-GP-13 1-2 XM22F 10/09/2013	WM-GP-13 5-6 XO58D 10/09/2013	WM-GP-13 6-7 XR13A 10/09/2013	WM-GP-14 0-1 XJ56L 10/09/2013	WM-GP-14 1-2 XM22G 10/09/2013	WM-GP-14 2-3 XO58E 10/09/2013	WM-GP-14 7-8 XM22H 10/09/2013	WM-GP-14 10.5-11.5 XJ56B 10/10/2013	WM-GP-14 13.5-14.5 XM22I 10/09/2013
VOLATILES (µg/kg)																	
Method SW8260C																	
Chloromethane	---		1.2 U													1.4 U	
Methylene Chloride	2,600		12 UJ													12 UJ	
Acetone	72,000,000		**59**													**110**	
Carbon Disulfide	8,000,000		**5.7** J													**10** J	
2-Butanone	48,000,000		**7.0**													6.9 U	
Benzene	130		1.2 U													**1.9**	
Toluene	110,000		1.2 U													**1.7**	
m, p-Xylene	---		**1.5**													1.4 U	
Isopropylbenzene	8,000,000		**1.3**													1.4 U	
n-Propylbenzene	8,000,000		**1.3**													1.4 U	
sec-Butylbenzene	---		**18**													1.4 U	
4-Isopropyltoluene	---		**14**													**2,300**	
SEMIVOLATILES (µg/kg)																	
Method SW8270D																	
Phenol	2,700				**37**	61 U						**61**	59 U		62 U	**86** J	63 U
Benzyl Alcohol	8,000,000				**29**	300 U						**82**	300 U		310 U	22 UJ	320 U
4-Methylphenol	400,000				20 U	61 U						20 U	59 U		62 U	**49** J	63 U
Naphthalene	2,300				20 U	61 U						**32**	59 U		62 U	**390** J	63 U
2-Methylnaphthalene					20 U	61 U						**30**	59 U		62 U	**39** J	63 U
Dimethylphthalate	---				**100**	61 U						**190**	59 U		62 U	22 UJ	63 U
Acenaphthylene	---				20 U	61 U						**72**	59 U		62 U	22 UJ	63 U
Acenaphthene	340				20 U	61 U						**24**	59 U		62 U	**30** J	63 U
Dibenzofuran	80,000				20 U	61 U						**20**	59 U		62 U	**51** J	63 U
Diethylphthalate	4,200				**22**	61 U						20 U	59 U		62 U	22 UJ	63 U
Fluorene	470				20 U	61 U						**20**	59 U		62 U	**54** J	63 U
Pentachlorophenol	160				**180**	300 U						**110**	300 U		310 U	110 UJ	320 U
Phenanthrene	---				**130**	61 U						**380**	59 U		62 U	**670** J	63 U
Carbazole	---				**22**	61 U						**94**	59 U		62 U	**25** J	63 U
Anthracene	4,500				**29**	61 U						**93**	59 U		62 U	**160** J	63 U
Di-n-Butylphthalate	5,000				**31**	61 U						**85**	59 U		62 U	22 UJ	63 U
Fluoranthene	3,200				**230**	61 U						**870**	59 U		62 U	**1,000** J	63 U
Pyrene	20,000				**260**	61 U						**610**	59 U		62 U	**960** J	63 U
Butylbenzylphthalate	280				20 U	61 U						**110**	59 U		62 U	22 UJ	63 U
Benzo(a)anthracene	130				**110**	61 U						**280**	59 U		62 U	**430** J	63 U
bis(2-Ethylhexyl)phthalate	6,600				**240**	61 U						**370**	59 U		62 U	55 UJ	63 U
Chrysene	140				**180**	61 U						**500**	59 U		62 U	**470** J	63 U
Benzo(a)pyrene	350				**120**	61 U						**410**	59 U		62 U	**490** J	63 U
Indeno(1,2,3-cd)pyrene	700				**150**	61 U						**370**	59 U		62 U	**310** J	63 U
Dibenz(a,h)anthracene	140				**38**	61 U						**98**	59 U		62 U	**76** J	63 U
Benzo(g,h,i)perylene	---				**170**	61 U						**430**	59 U		62 U	**400** J	63 U
1-Methylnaphthalene	35,000				20 U	61 U						**20**	59 U		62 U	**27** J	63 U
Total Benzofluoranthenes	430				**310**	61 U						**940**	59 U		62 U	**650** J	63 U
ORGANOTINS (µg/kg)																	
KRONE88																	
Tributyltin Ion	---																
Dibutyltin Ion	---																
Butyltin	---																
CONVENTIONALS (%)																	
Total Organic Carbon (PLUMB81TC)	---																

TABLE 3
SOIL ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-GP-11 3-4 XM22N/XO58F 10/10/2013	WM-GP-11 5-6 XJ56D 10/10/2013	WM-GP-11 7-8 XM22O 10/10/2013	WM-GP-12 0-1 XJ14D 10/8/2013	WM-GP-12 1-2 XM23C 10/08/2013	WM-GP-12 2-3 XO07A 10/5/2013	WM-GP-13 0-1 XJ56K 10/09/2013	WM-GP-13 1-2 XM22F 10/09/2013	WM-GP-13 5-6 XO58D 10/09/2013	WM-GP-13 6-7 XR13A 10/09/2013	WM-GP-14 0-1 XJ56L 10/09/2013	WM-GP-14 1-2 XM22G 10/09/2013	WM-GP-14 2-3 XO58E 10/09/2013	WM-GP-14 7-8 XM22H 10/09/2013	WM-GP-14 10.5-11.5 XJ56B 10/10/2013	WM-GP-14 13.5-14.5 XM22I 10/09/2013
GRAIN Size (%)																	
ASTM_D422																	
Particle/Grain Size, Gravel	---																
Particle/Grain Size, Sand	---																
Particle/Grain Size, Silt	---																
Particle/Grain Size, Clay	---																

TABLE 3
SOIL ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-GP-15 0-1 XJ56P 10/10/2013	WM-GP-15 1-2 XM22Q 10/10/2013	WM-GP-15 2-3 XO58H 10/10/2013	WM-GP-16 0-1 XJ14E 10/8/2013	WM-GP-16 1-2 XM23D/XO58B 10/08/2013	WM-GP-16 2-3 XO07B 10/5/2013	WM-GP-17 0.5-1 XJ14B 10/8/2013	WM-GP-17 5-6 XJ14C 10/08/2013	WM-GP-17 1-2 XV37D 10/8/2013	WM-GP-17 2-3 XV37H 10/8/2013	WM-GP-18 10-12 XO58I 10/10/2013	WM-GP-19 11-12 XO58J 10/10/2013
TOTAL METALS (mg/kg)													
Methods EPA200.8/													
SW6010C/SW7471A													
Arsenic	7	**5.2**			**7.8**	**30.8**	**3.7**	**2.6**		**2.3**	**2.6**		
Cadmium	80	**0.7**			**0.8**			**0.1**		0.1 U	0.1 U	**0.6**	**0.2**
Chromium	2,000	**49.0**			**24**			**12.5**		**12.0**	**12.6**		
Copper	36	**2,340**	**341**	**36.2**	**2,470**	**408**	**27.4**	**13.3**		**12.6**	**19.7**	**408**	**44.7**
Lead	250	**116**			**90.6**			**1.6**		**1.4**	**5.4**		
Mercury	0.16	**0.88**	**0.55**	**0.09** J	**1.89**	**17.7**	**0.04** J	0.02 U		0.02 U	**0.03**		
Zinc	100	**1,340**	**169**	**43**	**887**	**65**		**26**		**26**	**51**	**365**	**58**
TOTAL PETROLEUM HYDROCARBONS (mg/kg)													
HCID													
Gasoline	---	<20			<20			<20					
Diesel	---	**>50**			**>50**			<50					
Oil	---	**>100**			**>100**			<100					
NWTPH-Dx													
Diesel Range Organics	2,000	**210**			**140**								
Lube Oil	2,000	**600**			**370**								
NWTPH-Gx													
Gasoline	30/100 (a)											**50** J	9.6 UJ
PAHs (µg/kg)													
Method SW8270DSIM													
Naphthalene	2,300	**14**	13 UJ		**12**	**34** J		4.7 U				**200**	**49**
2-Methylnaphthalene	320,000	**20**	**59** J		**43**	**72** J		4.7 U				**53** J	**11**
1-Methylnaphthalene	35,000	**12**	**72** J		**37**	**30** J		4.7 U				**32** J	**10**
Acenaphthylene	---	**36**	**18** J		11 U	4.6 UJ		4.7 U				**440**	**27**
Acenaphthene	340	**20**	**38** J		11 U	4.6 UJ		4.7 U				**43** J	**20**
Fluorene	470	**18**	**26** J		11 U	4.6 UJ		4.7 U				**190**	**44**
Phenanthrene	---	**320**	**87** J		**64**	**15** J		4.7 U				**2,000**	**320**
Anthracene	4,500	**74**	13 UJ		**15**	**5.2** J		4.7 U				**730**	**62**
Fluoranthene	3,200	**900**	**72** J		**120**	**12** J		4.7 U				**5,300**	**410**
Pyrene	20,000	**590**	**44** J		**110**	**16** J		4.7 U				**6,000**	**450**
Benzo(a)anthracene	130	**310**	13 UJ		**100**	**9.1** J		4.7 U				**2,300**	**140** J
Chrysene	140	**470**	**41** J		**310**	**15** J		4.7 U				**2,700**	**170** J
Benzo(a)pyrene	350	**360**	**72** J		**170**	**14** J		4.7 U				**2,800**	**160** J
Indeno(1,2,3-cd)pyrene	700	**380**	13 UJ		**270**	**12** J		**15**				**1,400**	**81**
Dibenz(a,h)anthracene	140	**130**	13 UJ		**110**	4.6 UJ		4.7 U				**350**	**20**
Benzo(g,h,i)perylene	---	**460**	13 UJ		**310**	**18** J		4.7 U				**1,800**	**100**
Dibenzofuran	---	**12**	**14** J		11 U	4.6 UJ		4.7 U				**73**	**18**
Total Benzofluoranthenes	430	**1,000**	13 UJ		**840**	**37** J		4.7 U				**3,600**	**220**
TEQ	140	**547**	**72** J		**305**	**20** J		**1.5**				**3,592**	**208**
PCBs (µg/kg)													
Method SW8082A													
Aroclor 1016	33				33 U	32 U		32 U					
Aroclor 1242	---				33 U	32 U		32 U					
Aroclor 1248	---				33 U	32 U		32 U					
Aroclor 1254	500				**250**	32 U		32 U					
Aroclor 1260	490				**100**	32 U		32 U					
Aroclor 1221	---				33 U	32 U		32 U					
Aroclor 1232	---				33 U	32 U		32 U					
Aroclor 1262	---				33 U	32 U		32 U					
Aroclor 1268	---				33 U	32 U		32 U					
Total PCBs	160				**350**	ND		ND					

TABLE 3
SOIL ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-GP-15	WM-GP-15	WM-GP-15	WM-GP-16	WM-GP-16	WM-GP-16	WM-GP-17	WM-GP-17	WM-GP-17	WM-GP-17	WM-GP-18	WM-GP-19
		0-1	1-2	2-3	0-1	1-2	2-3	0.5-1	5-6	1-2	2-3	10-12	11-12
		XJ56P	XM22Q	XO58H	XJ14E	XM23D/XO58B	XO07B	XJ14B	XJ14C	XV37D	XV37H	XO58I	XO58J
		10/10/2013	10/10/2013	10/10/2013	10/8/2013	10/08/2013	10/5/2013	10/8/2013	10/08/2013	10/8/2013	10/8/2013	10/10/2013	10/10/2013
VOLATILES (µg/kg)													
Method SW8260C													
Chloromethane	---											2.2 UJ	1.2 UJ
Methylene Chloride	2,600											**220** J	**18** J
Acetone	72,000,000											**1,100** J	**460** J
Carbon Disulfide	8,000,000											**33** J	**23** J
2-Butanone	48,000,000											**160** J	**66** J
Benzene	130											2.2 UJ	**1.3** J
Toluene	110,000											**2.7** J	1.2 UJ
m, p-Xylene	---											2.2 UJ	1.2 UJ
Isopropylbenzene	8,000,000											2.2 UJ	1.2 UJ
n-Propylbenzene	8,000,000											2.2 UJ	1.2 UJ
sec-Butylbenzene	---											2.2 UJ	1.2 UJ
4-Isopropyltoluene	---											**30** J	1.2 UJ
SEMIVOLATILES (µg/kg)													
Method SW8270D													
Phenol	2,700							19 U					
Benzyl Alcohol	8,000,000							19 U					
4-Methylphenol	400,000							19 U					
Naphthalene	2,300							19 U					
2-Methylnaphthalene								19 U					
Dimethylphthalate	---							19 U					
Acenaphthylene	---							19 U					
Acenaphthene	340							19 U					
Dibenzofuran	80,000							19 U					
Diethylphthalate	4,200							**20**					
Fluorene	470							19 U					
Pentachlorophenol	160							94 U					
Phenanthrene	---							19 U					
Carbazole	---							19 U					
Anthracene	4,500							19 U					
Di-n-Butylphthalate	5,000							19 U					
Fluoranthene	3,200							19 U					
Pyrene	20,000							19 U					
Butylbenzylphthalate	280							19 U					
Benzo(a)anthracene	130							19 U					
bis(2-Ethylhexyl)phthalate	6,600							47 U					
Chrysene	140							19 U					
Benzo(a)pyrene	350							19 U					
Indeno(1,2,3-cd)pyrene	700							19 U					
Dibenz(a,h)anthracene	140							19 U					
Benzo(g,h,i)perylene	---							19 U					
1-Methylnaphthalene	35,000							19 U					
Total Benzofluoranthenes	430							38 U					
ORGANOTINS (µg/kg)													
KRONE88													
Tributyltin Ion	---				**2,100**	3.6 U							
Dibutyltin Ion	---				**3,000**	5.3 U							
Butyltin	---				**2,800**	3.8 U							
CONVENTIONALS (%)													
Total Organic Carbon (PLUMB81TC)	---								**0.082**				

TABLE 3
SOIL ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-GP-15 0-1 XJ56P 10/10/2013	WM-GP-15 1-2 XM22Q 10/10/2013	WM-GP-15 2-3 XO58H 10/10/2013	WM-GP-16 0-1 XJ14E 10/8/2013	WM-GP-16 1-2 XM23D/XO58B 10/08/2013	WM-GP-16 2-3 XO07B 10/5/2013	WM-GP-17 0.5-1 XJ14B 10/8/2013	WM-GP-17 5-6 XJ14C 10/08/2013	WM-GP-17 1-2 XV37D 10/8/2013	WM-GP-17 2-3 XV37H 10/8/2013	WM-GP-18 10-12 XO58I 10/10/2013	WM-GP-19 11-12 XO58J 10/10/2013
GRAIN Size (%)													
ASTM_D422													
Particle/Grain Size, Gravel	---								0.1 U				
Particle/Grain Size, Sand	---								**83.3**				
Particle/Grain Size, Silt	---								**14.7**				
Particle/Grain Size, Clay	---								**2.1**				

U = Indicates the compound was not detected at the reported concentration.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ = The analyte was not detected in the sample; the reported sample detection limit is an estimate.
M = Indicates an estimated value of analyte found and confirmed by analyst, but with low spectral match.
ND = Not Detected
Bold = Detected compound.
Box = Exceedance of cleanup level.

(a) For gasoline-range petroleum hydrocarbons, 30 mg/kg is the screening level if benzene is present. If benzene is not present, the screening level is 100 mg/kg.

TABLE 4
BOUNDARY FISH INTERIM ACTION ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-BF-VAULT B-1 XK09P 10/16/2013	WM-BF-VAULT S-1 XK09Q 10/16/2013	WM-BF-VAULT S-3 XL60A 10/28/2013	WM-SS-4 0-0.5 XI74D 10/03/2013	WM-SS-4 1-1.5 XI74E 10/03/2013	WM-SS-7 0-0.5 XI41F 10/03/2013	WM-SS-11 0.75-1.0 XK09H 10/16/2013	WM-SS-12 0.75-1.0 XK09I 10/16/2013	WM-SS-13 0.75-1.0 XK09C 10/15/2013	WM-SS-14 2.0-2.25 XK09F 10/15/2013	WM-SS-15 0.75-1.0 XK09J 10/16/2013	WM-SS-16 0.75-1.0 XK09A 10/15/2013	WM-SS-17 0.75-1.0 XK09D 10/15/2013	WM-SS-18 2.0-2.25 XK09E 10/15/2013	WM-SS-19 0.75-1.0 XK09K 10/16/2013
TOTAL METALS (mg/kg) Methods EPA200.8/ SW6010C/SW7471A																
Arsenic	7	**3.1**	**5.8**				**3.1**									
Cadmium	80	**0.3**	**0.2**				**0.2**									
Chromium	2,000	**18.2**	**37.2**				**21.4**									
Copper	36	**22.6** J	**45.7**	**23**	**32.4**	**47.5**	**27.0**	**25.9**	**40.4**	**12.0**	**12**	**19.7**	**20.6**	**13.6**	**24.0**	**27.9**
Lead	250	**5.1**	**5.8**		**5**	**7**	**7.4**									
Mercury	0.16	0.03 U	**0.04**		**0.0220** J	**0.05**	**0.03**	**0.02**	**0.05**	0.02 U	**0.04**	**0.04**	**0.03**	0.02 U	**0.03**	**0.03**
Nickel		**14**	**44**													
Zinc	100	**40**	**77**		**53**	**85**	**53**	**51**	**68**	**23**	**13**	**32**	**45**	**34**	**52**	**50**
TCLP METALS (mg/L) SW6010C/SW7470A																
Arsenic																
Barium																
Cadmium																
Chromium																
Lead																
Mercury																
Selenium																
Silver																
TOTAL PETROLEUM HYDROCARBONS (mg/kg)																
NWTPH-Dx																
Diesel Range Organics	2,000	**950**	**1,200**	**960**			5.6 U									
Lube Oil	2,000	13 U	14 U	13 U			11 U									
NWTPH-Gx																
Gasoline	100	**93**	**100**	**110**												
PAHs (µg/kg) Method SW8270DSIM																
Naphthalene	2,300	49 U	**130** M				4.6 U	4.4 U	4.8 U	4.8 U	4.6 U	4.8 U	4.7 U	4.7 U	4.6 U	**8.8**
2-Methylnaphthalene	320,000	**460**	**1,000**				4.6 U	4.4 U	4.8 U	4.8 U	4.6 U	4.8 U	4.7 U	4.7 U	4.6 U	**12**
1-Methylnaphthalene	35,000	**670**	**920**				4.6 U	4.4 U	4.8 U	4.8 U	4.6 U	4.8 U	4.7 U	4.7 U	4.6 U	4.6 U
Acenaphthylene	---	**51**	4.6 U				**11**									
Acenaphthene	340	49 U	**24**				4.6 U									
Fluorene	470	**100**	**140**				4.6 U									
Phenanthrene	---	**92**	**140**				**39**									
Anthracene	4,500	49 U	**7.6**				**14**									
Fluoranthene	3,200	49 U	4.6 U				**120**									
Pyrene	20,000	49 U	**5.2**				**130**									
Benzo(a)anthracene	130	49 U	4.6 U				**82**	4.4 U	**8.2**	4.8 U	4.6 U	4.8 U	4.7 U	**6.2**	**21**	4.6 U
Chrysene	140	49 U	4.6 U				**73**	4.4 U	**8.7**	4.8 U	4.6 U	4.8 U	**7.4**	**6.1**	**27**	4.6 U
Benzo(a)pyrene	350	49 U	4.6 U				**78**	**10**	**18**	4.8 U	**11**	4.8 U	**14**	**16**	**30**	**10**
Indeno(1,2,3-cd)pyrene	700	49 U	**14** M				**41**	**14**	**18**	4.8 U	**15**	4.8 U	**17**	**18**	**27**	**15**
Dibenz(a,h)anthracene	140	49 U	4.6 U				**13**	4.4 U	**26**	4.8 U	4.6 U	4.8 U	**26**	**25**	**28**	4.6 U
Benzo(g,h,i)perylene	---	49 U	**4.7**				**48**									
Dibenzofuran	---	**52**	**85**				4.6 U									
Total Benzofluoranthenes	430	49 U	4.6 U				**140**	4.4 U	**14**	4.8 U	4.6 U	4.8 U	**9.4**	**14**	**50**	4.6 U
TEQ	140	ND	**1.4**				**106**	**11**	**25**	ND	**13**	ND	**19**	**22**	**43**	**12**

TABLE 4
BOUNDARY FISH INTERIM ACTION ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-BF-VAULT B-1 XK09P 10/16/2013	WM-BF-VAULT S-1 XK09Q 10/16/2013	WM-BF-VAULT S-3 XL60A 10/28/2013	WM-SS-4 0-0.5 XI74D 10/03/2013	WM-SS-4 1-1.5 XI74E 10/03/2013	WM-SS-7 0-0.5 XI41F 10/03/2013	WM-SS-11 0.75-1.0 XK09H 10/16/2013	WM-SS-12 0.75-1.0 XK09I 10/16/2013	WM-SS-13 0.75-1.0 XK09C 10/15/2013	WM-SS-14 2.0-2.25 XK09F 10/15/2013	WM-SS-15 0.75-1.0 XK09J 10/16/2013	WM-SS-16 0.75-1.0 XK09A 10/15/2013	WM-SS-17 0.75-1.0 XK09D 10/15/2013	WM-SS-18 2.0-2.25 XK09E 10/15/2013	WM-SS-19 0.75-1.0 XK09K 10/16/2013
VOLATILES (µg/kg)																
Method SW8260C																
Chloromethane		1.3 U	1.3 U													
Bromomethane		1.3 U	1.3 U													
Vinyl Chloride		1.3 U	1.3 U													
Chloroethane		1.3 U	1.3 U													
Methylene Chloride		9.6 UJ	11 UJ													
Acetone		6.4 U	6.3 U													
Carbon Disulfide		**4.0** J	**1.4** J													
1,1-Dichloroethene		1.3 U	1.3 U													
1,1-Dichloroethane		1.3 U	1.3 U													
trans-1,2-Dichloroethene		1.3 U	1.3 U													
cis-1,2-Dichloroethene		1.3 U	1.3 U													
Chloroform		1.3 U	1.3 U													
1,2-Dichloroethane		1.3 U	1.3 U													
2-Butanone		6.4 U	6.3 U													
1,1,1-Trichloroethane		1.3 U	1.3 U													
Carbon Tetrachloride		1.3 U	1.3 U													
Vinyl Acetate		6.4 U	6.3 U													
Bromodichloromethane		1.3 U	1.3 U													
1,2-Dichloropropane		1.3 U	1.3 U													
cis-1,3-Dichloropropene		1.3 U	1.3 U													
Trichloroethene		1.3 U	1.3 U													
Dibromochloromethane		1.3 U	1.3 U													
1,1,2-Trichloroethane		1.3 U	1.3 U													
Benzene		1.3 U	1.3 U													
trans-1,3-Dichloropropene		1.3 U	1.3 U													
2-Chloroethylvinylether		6.4 U	6.3 U													
Bromoform		1.3 U	1.3 U													
4-Methyl-2-Pentanone (MIBK)		6.4 U	6.3 U													
2-Hexanone		6.4 U	6.3 U													
Tetrachloroethene		1.3 U	1.3 U													
1,1,2,2-Tetrachloroethane		1.3 U	1.3 U													
Toluene		1.3 U	1.3 U													
Chlorobenzene		1.3 U	1.3 U													
Ethylbenzene		1.3 U	1.3 U													
Styrene		1.3 U	1.3 U													
Trichlorofluoromethane		1.3 U	1.3 U													
1,1,2-Trichloro-1,2,2-trifluoroethane		2.5 U	2.5 U													
m, p-Xylene		1.3 U	1.3 U													
o-Xylene		1.3 U	1.3 U													
1,2-Dichlorobenzene		1.3 U	1.3 U													
1,3-Dichlorobenzene		1.3 U	1.3 U													
1,4-Dichlorobenzene		1.3 U	1.3 U													
Acrolein		64 U	63 U													
Iodomethane		1.3 U	1.3 U													
Bromoethane		2.5 U	2.5 U													
Acrylonitrile		6.4 U	6.3 U													
1,1-Dichloropropene		1.3 U	1.3 U													
Dibromomethane		1.3 U	1.3 U													
1,1,1,2-Tetrachloroethane		1.3 U	1.3 U													
1,2-Dibromo-3-chloropropane		6.4 UJ	6.3 UJ													
1,2,3-Trichloropropane		2.5 U	2.5 U													
trans-1,4-Dichloro-2-butene		6.4 U	6.3 U													
1,3,5-Trimethylbenzene		1.3 U	1.3 U													
1,2,4-Trimethylbenzene		1.3 U	1.3 U													
Hexachlorobutadiene		6.4 U	6.3 U													

TABLE 4
BOUNDARY FISH INTERIM ACTION ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-BF-VAULT B-1 XK09P 10/16/2013	WM-BF-VAULT S-1 XK09Q 10/16/2013	WM-BF-VAULT S-3 XL60A 10/28/2013	WM-SS-4 0-0.5 XI74D 10/03/2013	WM-SS-4 1-1.5 XI74E 10/03/2013	WM-SS-7 0-0.5 XI41F 10/03/2013	WM-SS-11 0.75-1.0 XK09H 10/16/2013	WM-SS-12 0.75-1.0 XK09I 10/16/2013	WM-SS-13 0.75-1.0 XK09C 10/15/2013	WM-SS-14 2.0-2.25 XK09F 10/15/2013	WM-SS-15 0.75-1.0 XK09J 10/16/2013	WM-SS-16 0.75-1.0 XK09A 10/15/2013	WM-SS-17 0.75-1.0 XK09D 10/15/2013	WM-SS-18 2.0-2.25 XK09E 10/15/2013	WM-SS-19 0.75-1.0 XK09K 10/16/2013
1,2-Dibromoethane		1.3 U	1.3 U													
Bromochloromethane		1.3 U	1.3 U													
2,2-Dichloropropane		1.3 U	1.3 U													
1,3-Dichloropropane		1.3 U	1.3 U													
Isopropylbenzene		1.3 U	1.3 U													
n-Propylbenzene		1.3 U	1.3 U													
Bromobenzene		1.3 U	1.3 U													
2-Chlorotoluene		1.3 U	1.3 U													
4-Chlorotoluene		1.3 U	1.3 U													
tert-Butylbenzene		1.3 U	1.3 U													
sec-Butylbenzene		1.3 U	1.3 U													
4-Isopropyltoluene		1.3 U	1.3 U													
n-Butylbenzene		1.3 U	1.3 U													
1,2,4-Trichlorobenzene		6.4 U	6.3 U													
Naphthalene		6.4 U	6.3 U													
1,2,3-Trichlorobenzene		6.4 U	6.3 U													
Methyl tert-Butyl Ether		1.3 U	1.3 U													

TABLE 4
BOUNDARY FISH INTERIM ACTION ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-SS-23 3.0 XK09O 10/16/2013	WM-BF-SS-26 2.3-2.5 XL60D 10/28/2013	WM-BF-SS-27 2.3-2.5 XL60E 10/28/2013	WM-BF-SS-28 2.3-2.5 XL60F 10/28/2013	WM-BF-SS-29 2.3-2.5 XL60G 10/28/2013	WM-BF-SS-30 2.3-2.5 XL60H 10/28/2013	WM-BF-SS-31 2.3-2.5 XL60I 10/28/2013	WM-BF-GP-1 9-10 XL10A 10/23/2013	WM-BF-GP-2 9-10 XL10B 10/23/2013	WM-BF-GP-3 8.5-9.5 XL10C 10/23/2013	WM-BF-GP-4 8.5-9.5 XL10D 10/23/2013
TOTAL METALS (mg/kg) Methods EPA200.8/ SW6010C/SW7471A												
Arsenic	7	**2.0**	**3.5**	**2.6**	**4.4**	**7.1**	**4.2**	**2.1**				
Cadmium	80	**0.2**	**2.0**	**0.2**	**0.7**	**0.3**	**0.5**	**0.5**				
Chromium	2,000	**6.0**	**11.9**	**7.1**	**11.1**	**9.0**	**8.7**	**7.9**				
Copper	36	**3**	**62.7**	**18**	**98**	**93.0**	**61.6**	**21**				
Lead	250	**0.7**	**50.6**	**1.1**	**29.2**	**14.8**	**5.2**	**6.3**				
Mercury	0.16	0.02 U	**0.49**	**0.03**	**0.79**	**0.68**	**0.17**	**0.05**				
Nickel			**15**	**11**	**10**	**16**	**11**	**8**				
Zinc	100	5 U	**189**	**19**	**101**	**71**	**73**	**21**				
TCLP METALS (mg/L) SW6010C/SW7470A												
Arsenic												
Barium												
Cadmium												
Chromium												
Lead												
Mercury												
Selenium												
Silver												
TOTAL PETROLEUM HYDROCARBONS (mg/kg)												
NWTPH-Dx												
Diesel Range Organics	2,000	5.2 U							**11**	**6.7**	6.3 U	6.5 U
Lube Oil	2,000	10 U							**21**	12 U	13 U	13 U
NWTPH-Gx												
Gasoline	100								10 U	7.3 U	7.0 U	6.8 U
PAHs (µg/kg) Method SW8270DSIM												
Naphthalene	2,300	4.6 U	32 U	15 U	32 U	14 U	14 U	15 U				
2-Methylnaphthalene	320,000	4.6 U	32 U	15 U	32 U	14 U	14 U	15 U				
1-Methylnaphthalene	35,000	4.6 U	32 U	15 U	32 U	14 U	14 U	15 U				
Acenaphthylene	---	4.6 U	32 U	15 U	32 U	14 U	14 U	15 U				
Acenaphthene	340	4.6 U	**36**	15 U	32 U	14 U	14 U	15 U				
Fluorene	470	4.6 U	**33**	15 U	32 U	14 U	14 U	15 U				
Phenanthrene	---	4.6 U	**750**	15 U	**52**	14 U	14 U	15 U				
Anthracene	4,500	4.6 U	**100**	15 U	32 U	14 U	14 U	15 U				
Fluoranthene	3,200	4.6 U	**1,800**	15 U	**81**	14 U	**20**	15 U				
Pyrene	20,000	4.6 U	**1,900**	15 U	**110**	14 U	**24**	15 U				
Benzo(a)anthracene	130	4.6 U	**610**	15 U	**54**	14 U	14 U	15 U				
Chrysene	140	4.6 U	**1,300**	15 U	**73**	14 U	**28**	15 U				
Benzo(a)pyrene	350	**10** M	**550**	15 U	**63**	14 U	14 U	15 U				
Indeno(1,2,3-cd)pyrene	700	**14** M	**360**	15 U	**68**	14 U	**17**	15 U				
Dibenz(a,h)anthracene	140	4.6 U	**110**	15 U	32 U	14 U	14 U	15 U				
Benzo(g,h,i)perylene	---	4.6 U	**510**	15 U	**110**	14 U	**31**	15 U				
Dibenzofuran	---	4.6 U	32 U	15 U	32 U	14 U	14 U	15 U				
Total Benzofluoranthenes	430	4.6 U	**1,700**	**32**	**190**	**38**	**71**	**32**				
TEQ	140	**11**	**841**	**3.2**	**95**	**3.8**	**10**	**3.2**				

TABLE 4
BOUNDARY FISH INTERIM ACTION ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-SS-23 3.0 XK09O 10/16/2013	WM-BF-SS-26 2.3-2.5 XL60D 10/28/2013	WM-BF-SS-27 2.3-2.5 XL60E 10/28/2013	WM-BF-SS-28 2.3-2.5 XL60F 10/28/2013	WM-BF-SS-29 2.3-2.5 XL60G 10/28/2013	WM-BF-SS-30 2.3-2.5 XL60H 10/28/2013	WM-BF-SS-31 2.3-2.5 XL60I 10/28/2013	WM-BF-GP-1 9-10 XL10A 10/23/2013	WM-BF-GP-2 9-10 XL10B 10/23/2013	WM-BF-GP-3 8.5-9.5 XL10C 10/23/2013	WM-BF-GP-4 8.5-9.5 XL10D 10/23/2013
VOLATILES (µg/kg)												
Method SW8260C												
Chloromethane												
Bromomethane												
Vinyl Chloride												
Chloroethane												
Methylene Chloride												
Acetone												
Carbon Disulfide												
1,1-Dichloroethene												
1,1-Dichloroethane												
trans-1,2-Dichloroethene												
cis-1,2-Dichloroethene												
Chloroform												
1,2-Dichloroethane												
2-Butanone												
1,1,1-Trichloroethane												
Carbon Tetrachloride												
Vinyl Acetate												
Bromodichloromethane												
1,2-Dichloropropane												
cis-1,3-Dichloropropene												
Trichloroethene												
Dibromochloromethane												
1,1,2-Trichloroethane												
Benzene												
trans-1,3-Dichloropropene												
2-Chloroethylvinylether												
Bromoform												
4-Methyl-2-Pentanone (MIBK)												
2-Hexanone												
Tetrachloroethene												
1,1,2,2-Tetrachloroethane												
Toluene												
Chlorobenzene												
Ethylbenzene												
Styrene												
Trichlorofluoromethane												
1,1,2-Trichloro-1,2,2-trifluoroethane												
m, p-Xylene												
o-Xylene												
1,2-Dichlorobenzene												
1,3-Dichlorobenzene												
1,4-Dichlorobenzene												
Acrolein												
Iodomethane												
Bromoethane												
Acrylonitrile												
1,1-Dichloropropene												
Dibromomethane												
1,1,1,2-Tetrachloroethane												
1,2-Dibromo-3-chloropropane												
1,2,3-Trichloropropane												
trans-1,4-Dichloro-2-butene												
1,3,5-Trimethylbenzene												
1,2,4-Trimethylbenzene												
Hexachlorobutadiene												

TABLE 4
BOUNDARY FISH INTERIM ACTION ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-SS-23 3.0 XK09O 10/16/2013	WM-BF-SS-26 2.3-2.5 XL60D 10/28/2013	WM-BF-SS-27 2.3-2.5 XL60E 10/28/2013	WM-BF-SS-28 2.3-2.5 XL60F 10/28/2013	WM-BF-SS-29 2.3-2.5 XL60G 10/28/2013	WM-BF-SS-30 2.3-2.5 XL60H 10/28/2013	WM-BF-SS-31 2.3-2.5 XL60I 10/28/2013	WM-BF-GP-1 9-10 XL10A 10/23/2013	WM-BF-GP-2 9-10 XL10B 10/23/2013	WM-BF-GP-3 8.5-9.5 XL10C 10/23/2013	WM-BF-GP-4 8.5-9.5 XL10D 10/23/2013
1,2-Dibromoethane												
Bromochloromethane												
2,2-Dichloropropane												
1,3-Dichloropropane												
Isopropylbenzene												
n-Propylbenzene												
Bromobenzene												
2-Chlorotoluene												
4-Chlorotoluene												
tert-Butylbenzene												
sec-Butylbenzene												
4-Isopropyltoluene												
n-Butylbenzene												
1,2,4-Trichlorobenzene												
Naphthalene												
1,2,3-Trichlorobenzene												
Methyl tert-Butyl Ether												

U = Indicates the compound was not detected at the reported concentration.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ = The analyte was not detected in the sample; the reported sample detection limit is an estimate.
M = Indicates an estimated value of analyte found and confirmed by analyst, but with low spectral match.
ND = Not Detected.
Bold = Detected compound.
Box = Concentration is greater than the Site Preliminary Screening Level.

TABLE 5
GROUNDWATER ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	GW Screening Level (Unsaturated)	WM-GP-2 XJ62B 10/09/2013	WM-GP-5 XJ62A 10/09/2013	WM-GP-7 XJ62F/ XM52I 10/09/2013	WM-GP-8 XJ62C/ XM52F 10/09/2013	WM-GP-9 XJ17D/J XM52D 10/08/2013	Dup of WM-GP-9 WM-GP-DUP XJ17E/K XM52E 10/08/2013	WM-GP-12 XJ17B/ XM52B 10/08/2013	WM-GP-13 XJ62D/ XM52G 10/09/2013	WM-GP-14 XJ62E/ XM52H 10/09/2013	WM-GP-16 XJ17C/ XM52C 10/08/2013	WM-GP-17 XJ17A/ XM52A 10/08/2013
TOTAL METALS (µg/L)												
Methods EPA200.8/SW7470A												
Arsenic	0.5	**0.4**	**0.200** J	**17**	**4**	**1.8**	**1.8**	**5**	**2.50** J	**0.48** J	**3**	**0.6**
Cadmium	8.8	0.1 U	0.1 U	1 U	1 U	0.1 U	0.1 U	1 U	1 U	0.2 U	1 U	0.1 U
Chromium	50	0.5 U	**1.3**	5 U	5 U	**4.4**	**4.2**	**6**	5 U	**3**	5 U	**0.8**
Copper	2.4	**1.2**	0.5 U	**13**	**3.40** J	**35.0**	**34.4**	**21**	**5**	**3**	**4.10** J	**0.8**
Lead	8.1	**0.3**	**0.2**	**4**	1 U	**46.7**	**42.3**	**2**	1 U	**3.5**	1 U	**1**
Mercury	0.15	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Zinc	81	4 U	4 U	**40**	40 U	**20** J	**19**	**410**	40 U	10 U	40 U	**5**
DISSOLVED METALS (µg/L)												
Methods EPA200.8/SW7470A												
Arsenic	0.5			**19**	**2.2** J	**0.82** J	0.5 U	**4**			**4**	**0.5**
Copper	2.4			**6**		**0.7** J	**4.9** J	**3**	2 U	**0.9**		
Lead	8.1					**0.6** J	**1.2** J					
Zinc	81							20 U				
TOTAL PETROLEUM HYDROCARBONS (mg/L)												
HCID												
Gasoline	---	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Diesel	---	0.62 U	0.54 U	**>0.59**	0.62 U	0.50 U	**>0.50**	**>0.50**	**>0.62**	0.56 U	0.50 U	0.50 U
Oil	---	0.62 U	0.54 U	0.59 U	0.62 U	**>0.50**	**>0.50**	0.50 U	0.62 U	0.56 U	0.50 U	0.50 U
NWTPH-Dx												
Diesel Range Organics	0.5			0.12 U		0.10 UJ	0.10 U	0.10 U	0.12 U			
Lube Oil	0.5			0.24 U		**0.21**	0.20 U	0.20 U	0.25 U			
PAHs (µg/L)												
Method SW8270DSIM												
Naphthalene	83	**0.035**	**0.011**	**0.031**	**0.011**	**0.022** J	**0.053** J	**0.26**	0.012 U	**0.017**	0.010 U	**0.024**
2-Methylnaphthalene	15	0.010 U	0.011 U	**0.016** M	0.010 U	0.010 UJ	**0.020** J	0.10 U	0.012 U	0.010 U	0.010 U	**0.011**
1-Methylnaphthalene	---	0.010 U	0.011 U	**0.012** M	0.010 U	0.010 UJ	**0.019** J	**0.13**	0.012 U	0.010 U	0.010 U	**0.022**
Acenaphthylene	13	0.010 U	0.011 U	0.011 U	0.010 U	**0.018** J	**0.043** J	0.10 U	0.012 U	0.010 U	0.010 U	0.010 U
Acenaphthene	3.3	**0.015**	**0.11**	**0.012**	0.010 U	**0.017**	**0.026**	**17**	0.012 U	0.010 U	0.010 U	**0.038**
Fluorene	3	0.010 U	**0.042**	**0.017**	0.010 U	**0.020** J	**0.039** J	**0.15**	0.012 U	**0.011**	0.010 U	**0.032**
Phenanthrene	6	0.010 U	**0.036**	**0.036**	0.010 U	**0.13** J	**0.29** J	0.10 U	0.012 U	**0.052**	0.010 U	**0.07**
Anthracene	9.6	0.010 U	0.011 U	0.011 U	0.010 U	**0.030** J	**0.071** J	0.10 U	0.012 U	**0.022**	0.010 U	**0.011**
Fluoranthene	3.3	0.010 U	**0.033**	**0.016**	0.010 U	**0.18** J	**0.41** J	0.10 U	0.012 U	**0.034**	0.010 U	**0.030**
Pyrene	15	0.010 U	**0.04**	**0.039**	**0.017**	**0.28** J	**0.71** J	0.10 U	0.012 U	**0.032**	0.010 U	**0.037**
Benzo(a)anthracene	0.018	0.010 U	0.011 U	0.011 U	0.010 U	**0.094** J	**0.24** J	0.10 U	0.012 U	0.010 U	0.010 U	0.010 U
Chrysene	0.018	0.010 U	0.011 U	0.011 U	0.010 U	**0.12** J	**0.28** J	0.10 U	0.012 U	**0.011**	0.010 U	**0.011**
Benzo(a)pyrene	0.018	0.010 U	0.011 U	0.011 U	0.010 U	**0.11**	**0.28**	0.10 U	0.012 U	0.010 U	0.010 U	0.010 U
Indeno(1,2,3-cd)pyrene	0.01	0.010 U	0.011 U	0.011 U	0.010 U	**0.062** J	**0.16** J	0.10 U	0.012 U	0.010 U	0.010 U	0.010 U
Dibenz(a,h)anthracene	0.01	0.010 U	0.011 U	0.011 U	0.010 U	**0.015** J	**0.036** J	0.10 U	0.012 U	0.010 U	0.010 U	0.010 U
Benzo(g,h,i)perylene	0.055	0.010 U	0.011 U	0.011 U	0.010 U	**0.077** J	**0.19** J	0.10 U	0.012 U	0.010 U	0.010 U	0.010 U
Dibenzofuran	---	0.010 U	0.011 U	**0.044**	0.010 U	**0.010** J	**0.024** J	**0.97**	0.012 U	0.010 U	0.010 U	0.010 U
Total Benzofluoranthenes	0.018	0.021 U	0.022 U	0.022 U	0.021 U	**0.17** J	**0.43** J	0.20 U	0.023 U	0.021 U	0.020 U	0.020 U
cPAH TEQ	0.018	ND	ND	ND	ND	**0.145**	**0.369**	ND	ND	**0.00011**	ND	**0.00011**
SVOCs (µg/L)												
Method SW8270D												
Acenaphthene	3.3					1.0 U	1.0 U	**19**		1.0 U		1.0 U
Dibenzofuran						1.0 U	1.0 U	**1.1**		1.0 U		1.0 U

TABLE 5
GROUNDWATER ANALYTICAL RESULTS
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

	GW Screening Level (Unsaturated)	WM-GP-2 XJ62B 10/09/2013	WM-GP-5 XJ62A 10/09/2013	WM-GP-7 XJ62F/ XM52I 10/09/2013	WM-GP-8 XJ62C/ XM52F 10/09/2013	WM-GP-9 XJ17D/J XM52D 10/08/2013	Dup of WM-GP-9 WM-GP-DUP XJ17E/K XM52E 10/08/2013	WM-GP-12 XJ17B/ XM52B 10/08/2013	WM-GP-13 XJ62D/ XM52G 10/09/2013	WM-GP-14 XJ62E/ XM52H 10/09/2013	WM-GP-16 XJ17C/ XM52C 10/08/2013	WM-GP-17 XJ17A/ XM52A 10/08/2013
VOCs (µg/L)												
Method SW8260C												
Carbon Disulfide	---	0.20 U	0.20 U	**0.87**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	**0.27**	0.20 U	0.20 U
Chlorobenzene	100	0.20 U	0.20 U	**0.24**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
1,2-Dichlorobenzene	6.1	0.20 U	0.20 U	**0.62**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
4-Isopropyltoluene	---	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	**26**	0.20 U	0.20 U
Naphthalene	---	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.59**	0.50 U	0.50 U	0.50 U	0.50 U
FIELD PARAMETERS												
Temperature (°C)		11.99	12.36	13.65	14.55	14.12	14.12	15.07	14.84	14.11	14.21	13.91
Conductivity (uS/cm)		1,659	211	42,975	32,954	2,737	2,737	30,486	19,873	8,855	30,414	2,057
Dissolved Oxygen (mg/L)		3.59	8.56	0.92	4.40	0.86	0.86	0.28	1.74	1.30	0.55	0.66
pH (SU)		6.78	9.17	7.51	7.25	6.70	6.70	7.17	7.20	6.82	7.24	6.72
ORP (mV)		-19.6	41.9	-359.8	-243.4	-251.8	-251.8	-338.6	-342.4	-3191	-333.6	-110.1
Turbidity (NTU)		20.4	26.1	233	112	263	263	80.6	20.4	103	14.0	11.8

U = Indicates the compound was not detected at the reported concentration.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ = The analyte was not detected in the sample; the reported sample detection limit is an estimate.
M = Indicates an estimated value of analyte found and confirmed by analyst, but with low spectral match.
Bold = Detected compound.
Box = Exceedance of cleanup level.

TABLE 6
GROUNDWATER MONITORING WELL LOCATIONS, RATIONALE, AND ANALYSES
WESTMAN MARINE SITE
BLAINE HARBOR – BLAINE, WASHINGTON

<table>
<tr><th>Location ID</th><th>Location Description</th><th>Rationale for Sample Collection</th><th>Groundwater Analytical Testing</th></tr>
<tr><td>WM-MW-1</td><td>Northwest area of Site near historical rail side tracks</td><td>Evaluate groundwater potentially impacted by previous Site activities along the rail side tracks</td><td rowspan="8">All wells:

-Total metals (arsenic, chromium, copper, lead, mercury, and zinc)

-Dissolved metals (for total metals detected above PSLs)

-Petroleum Hydrocarbon Identification

-TPH-G, TPH-Dx, as followup if petroleum hydrocarbons are identified

-PAHs

At WM-MW-12:
-Add SVOCs

At WM-MW-2, WM-MW-4, WM-MW-6, WM-MW-7, and WM-MW-8:
-Add PCBs</td></tr>
<tr><td>WM-MW-2</td><td>East of marine railway; near WM-GP-11</td><td>Evaluate groundwater quality near point of discharge to surface water; COPCs including TPH-D and cPAHS detected in soil at WM-GP-11</td></tr>
<tr><td>WM-MW-3</td><td>South of the canopy; near former shop</td><td>Evaluate groundwater quality near point of discharge to surface water</td></tr>
<tr><td>WM-MW-4</td><td>West of marine railway beneath canopy; near WM-GP-7</td><td>Evaluate groundwater quality near point of discharge to surface water; COPCs including metals and cPAHs detected above PSLs in soil and dissolved arsenic and copper in groundwater grab samples</td></tr>
<tr><td>WM-MW-5</td><td>North of the marine railway well; near WM-GP-9</td><td>Evaluate groundwater quality; COPCs detected above PSLs in groundwater grab samples at WM-GP-9 include cPAHs and dissolved arsenic</td></tr>
<tr><td>WM-MW-6</td><td>West of the marine railway; near WM-GP-12</td><td>Evaluate groundwater quality near point of discharge to surface water; COPCs including metals, cPAHs, and PCP detected above PSLs in soil, and dissolved arsenic, dissolved copper, and PAHs (only acenaphthene) above PSLs in the groundwater grab sample</td></tr>
<tr><td>WM-MW-7</td><td>East of the marine railway, southern portion of the uplands</td><td>Evaluate groundwater quality near the point of discharge to surface water potentially impacted by activities in the Site uplands east of the marine railway</td></tr>
<tr><td>WM-MW-8</td><td>East of the marine railway in the northeastern portion of the Site</td><td>Evaluate groundwater quality near WM-GP-14 and WM-GP-18; COPCs detected above PSLs in this area include metals, TPH-G, and cPAHs in soil</td></tr>
</table>

PAHs = Polycyclic Aromatic Hydrocarbons
PCBs = Polychlorinated Biphenyls
SVOCs = Semivolatile Organic Compounds
TPH-D = Total Petroleum Hydrocarbons - Diesel and motor-oil range
TPH-G = Total Petroleum Hydrocarbons - Gasoline Range
PCP = Pentachlorophenol

ATTACHMENT 1

Boring Logs

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL (1)	TYPICAL DESCRIPTIONS (2)(3)
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

Notes: 1. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.

2. Soil descriptions are based on the general approach presented in the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the Standard Test Method for Classification of Soils for Engineering Purposes, as outlined in ASTM D 2487.

3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50%	"GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤ 50%	"very gravelly," "very sandy," "very silty," etc.
	> 15% and ≤ 30%	"gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 15%	"with gravel," "with sand," "with silt," etc.
	≤ 5%	"with trace gravel," "with trace sand," "with trace silt," etc., or not noted.

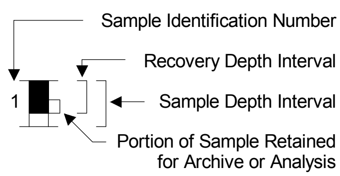
4. Soil density or consistency descriptions are based on judgement using a combination of sampler penetration blow counts, drilling or excavating conditions, field tests, and laboratory tests, as appropriate.

Drilling and Sampling Key

SAMPLER TYPE

Code	Description
a	3.25-inch O.D., 2.42-inch I.D. Split Spoon
b	2.00-inch O.D., 1.50-inch I.D. Split Spoon
c	Shelby Tube
d	Grab Sample
e	Single-Tube Core Barrel
f	Double-Tube Core Barrel
g	2.50-inch O.D., 2.00-inch I.D. WSDOT
h	3.00-inch O.D., 2.375-inch I.D. Mod. California
i	Other - See text if applicable
1	300-lb Hammer, 30-inch Drop
2	140-lb Hammer, 30-inch Drop
3	Pushed
4	Vibrocore (Rotosonic/Geoprobe)
5	Other - See text if applicable

SAMPLE NUMBER & INTERVAL



Field and Lab Test Data

Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
GT	Other Geotechnical Testing
CA	Chemical Analysis

Groundwater

▽ Approximate water level at time of drilling (ATD)

▼ Approximate water level at time other than ATD

LANDAU ASSOCIATES

Westman Marine
Blaine, Washington

Soil Classification System and Key

Figure 1-1

HA-1

Drilling Method: Hand Auger
Ground Elevation (ft):
Drilled By: Landau Associates

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Soil Profile	Groundwater
0	WM-HA-1-0-0.75	d		0.0	SM	Brown, silty, medium to coarse SAND with abundant gravel and trace fine sand and root debris (loose to medium dense, moist) (no sheen, no odor) **(FILL)**	Groundwater not encountered.
	WM-HA-1-1-1.5	d		0.7	SP	Brown, gravelly medium to coarse SAND with silt and trace fine sand (medium dense, moist) (no odor, no sheen)	
						-- no recovery	
2	WM-HA-1-2-2.5	d		0.2	SP	Gray, fine SAND with silt, abundant shell fragments, and trace medium to coarse sand (medium dense, damp) (no sheen, no odor)	
	WM-HA-1-3-4	d		0.0	CL	Gray, CLAY with trace silt (medium stiff, damp)	
4							

Boring Completed 10/08/13
Total Depth of Boring = 4.0 ft.

6

8

10

Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

LANDAU ASSOCIATES

Westman Marine
Blaine, Washington

Log of Boring HA-1

Figure 1-2

WM-GP-2

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Description	Water Level
0	WM-GP-2-0-1				SP	Brown-gray, fine to medium SAND with trace coarse sand and silt (medium dense, damp) (no odor, no sheen) **(FILL)**	
	WM-GP-2-1-2				SM/ML	Gray, gravelly, SILT with sand to a sandy SILT with shell fragments and debris (dense, damp) (no odor, no sheen)	
2	WM-GP-2-2-3	d3		0.5 / 0.0 / 1.0			
4							
	WM-GP-2-5-6				SP	Brown, fine SAND with trace silt (medium dense, damp) (no odor, no sheen)	
6							ATD
8		d3					
10							
12		d3					
					WD	Brown-black wood debris (no odor, no sheen)	
14					SP	Dark gray, fine SAND with trace silt and shell fragments (no odor, no sheen)	

Drilling Method: Geoprobe™

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

Boring Completed 10/09/13
Total Depth of Boring = 15.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1035010016. 2/4/14 \\EDMDATA01\GINTPROJECTS\001035.010.015_BHB.GPJ SOIL BORING LOG

Landau Associates

Westman Marine
Blaine, Washington

Log of Boring WM-GP-2

Figure 1-3

WM-GP-3

SAMPLE DATA | SOIL PROFILE | GROUNDWATER

Drilling Method: Geoprobe™

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Description	Water Level
0					AC	Asphalt	
	WM-GP-3-0.4-1.4				SP	Brown, fine to medium SAND with gravel and trace silt (medium dense, damp) (no sheen, no odor) **(FILL)**	
2	WM-GP-3-1.4-2.4	d3		0.0 0.0 0.0			
	WM-GP-3-2.4-3.4						
4					SP-SM	Gray, fine SAND with silt and trace shell fragments (medium dense to loose, damp) (no sheen, no odor)	
	WM-GP-3-5-6						ATD
6				0.0			
8		d3					
10							
					CL	Gray CLAY with trace silt and fine sand (very soft, wet) (no sheen, no odor)	
12		d3			WD	Brown WOOD DEBRIS (wet)	
					SP	Gray, fine SAND with abundant shell fragments and trace silt (medium dense, wet) (no sheen, sulfide odor)	
14							

Boring Completed 10/09/13
Total Depth of Boring = 15.0 ft.

16

18

20

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

WM-GP-4

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Soil Profile	Water Level
0					AC	Asphalt	
	WM-GP-4-0.4-1.4			0.2	SP-SM	Brown, fine to medium SAND with gravel and silt (medium dense, damp) (no sheen, no odor) **(FILL)**	
2	WM-GP-4-1.4-2.4	d3		0.5			
	WM-GP-4-2.4-3.4			0.7	ML	Brown-gray, SILT with trace fine sand (medium stiff, damp) (no sheen, no odor)	
4					SP	Gray, fine SAND with trace silt and shell fragments (medium dense, moist to wet) (no sheen, no odor)	
6	WM-GP-4-5-6			0.7			ATD
8		d3					
12		d3			WD	Wood Debris (loose, wet)	
					SP	Gray, fine to medium SAND with trace shell fragments and trace silt (loose, wet) (no sheen, no odor)	
14						-- no recovery	

Drilling Method: Geoprobe™

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

Boring Completed 10/09/13
Total Depth of Boring = 15.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1035010016. 2/4/14 \\EDMDATA01\GINTPROJECTS\001035.010.015_BHB.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Westman Marine
Blaine, Washington

Log of Boring WM-GP-4

Figure 1-5

WM-GP-5

Drilling Method: Geoprobe™
Ground Elevation (ft):
Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Soil Profile	Water Level
0	WM-GP-5-0-1	d3		0.2	SP	Brown, fine to coarse SAND with gravel and trace silt (loose, damp) (no sheen, no odor) **(FILL)**	
	WM-GP-5-1-2			0.5			
2	WM-GP-5-2-3			0.7	SM	Gray-brown, silty, fine SAND with abundant shell fragments (medium dense, damp) (no sheen, no odor)	
	WM-GP-5-3-4				ML-SM	Gray SILT with sand to a silty, fine SAND (soft, moist) (No sheen, no odor)	
4–6		d3		0.7			
6					SP	Brown, fine SAND with trace silt and shell fragments (medium dense, moist to wet) (no sheen, no odor)	ATD
					WD	WOOD DEBRIS	
8					SP	Gray, fine SAND with trace silt and with shell fragments (medium dense, wet) (no sheen, no odor)	
12		d3			ML	Dark gray, SILT with trace fine sand (soft, wet)	
					WD	WOOD DEBRIS	
14–15					SP	Gray, fine SAND with trace silt and shell fragments (medium dense, wet) (no sheen, sulfide odor) **(MARINE DEPOSITS)**	

Boring Completed 10/09/13
Total Depth of Boring = 15.0 ft.

Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

WM-GP-6

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): Drilled By: Cascade Drilling Inc.	Water Level

Depth (ft)	Sample Number & Interval	Sampler Type	PID (ppm)	USCS Symbol	Description	Water Level
0				AC	Asphalt	
	WM-GP-6-0.5-1.5		2.6	SP	Brown, fine to coarse SAND with trace silt and debris (medium dense, damp) (no sheen, no odor) **(FILL)**	
2	WM-GP-6-1.5-2.5	d3	0.0			
	WM-GP-6-2.5-3.5		0.0			
4	WM-GP-6-3.5-4.3		0.0			
				RK	Black crushed ASPHALT or ROCK debris (dense, wet) (no sheen, no odor)	ATD
6				SP	Brown, fine SAND with trace silt (medium dense, wet) (no sheen, no odor)	
8		d3				
				GP	Black, fine GRAVEL with sand and trace silt (very loose, wet) (no sheen, organic decomposition odor)	
10				ML	Gray, sandy, SILT with trace shell fragments (soft, wet) (no sheen, no odor)	
12		d3		GP-GM	Brown, fine GRAVEL with sand and silt (loose, wet) (no sheen, no odor)	
				WD	Brown WOOD DEBRIS (dense, wet) (no sheen, no odor)	
14				SP	Gray, fine SAND with trace silt and shell fragments (medium dense, wet) (no sheen, no odor)	

Boring Completed 10/10/13
Total Depth of Boring = 15.0 ft.

16

18

20

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

LANDAU ASSOCIATES

Westman Marine
Blaine, Washington

Log of Boring WM-GP-6

Figure 1-7

WM-GP-7

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): Drilled By: Cascade Drilling Inc.	Water Level
0				0.0		AC	Asphalt	
	WM-GP-7-0.5-1.5			2.6		SP	Brown, fine to coarse SAND with gravel (medium dense, damp) (no sheen, no odor) **(FILL)**	
2	WM-GP-7-1.5-2.5	g3		0.0		SP-SM	Brown, fine SAND with silt (dense, moist to wet) (no sheen, no odor)	
4								
6	WM-GP-7-5-6			0.0				ATD
8	WM-GP-7-8-9	g3				SM	Brown to black, silty, fine SAND with trace gravel (loose, wet) (possible sheen, petroleum odor)	
10	WM-GP-7-10-11					SP-SM	Gray, fine to medium SAND with silt and trace gravel (medium dense, wet) (no sheen, no odor)	
						SP	Gray, fine SAND with trace silt and abundant shell fragments (medium dense, wet) (no sheen, no odor)	
12		g3					-- no recovery	
14								

Boring Completed 10/09/13
Total Depth of Boring = 15.0 ft.

16

18

20

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1035010016. 2/4/14 \\EDMDATA01\GINT\PROJECTS\001035.010.015_BHB.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Westman Marine
Blaine, Washington

Log of Boring WM-GP-7

Figure 1-8

WM-GP-8

Drilling Method: Geoprobe™
Ground Elevation (ft):
Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Soil Profile	Water Level
0					CONC	CONCRETE	
	WM-GP-8-0.7-1.7	g3		0.2	SP	Brown, fine to medium SAND with gravel and trace silt (medium dense, moist) (no sheen, no odor) **(FILL)**	
2	WM-GP-8-1.7-2.7			0.5	ML	Gray, SILT with sand and dispersed bands of red sand and silt (hard, damp) (no sheen, no odor)	
	WM-GP-8-2.7-3.7			1.0	SM	Gray, silty, fine SAND wiith trace shell fragments (medium dense, damp) (no sheen, no odor)	
6	WM-GP-8-5-6	g3		1.0	SP	Gray, fine SAND with shell fragments and trace silt (medium dense, damp) (no sheen, no odor)	
					SM	Gray, silty, fine SAND with shell fragments and thin bands of silt (medium dense to loose, damp) (no sheen, no odor)	
12		g3			SP	Gray, fine SAND with silt (medium dense, damp) (no sheen, no odor)	ATD
					SM	Dark gray, silty, fine SAND with trace shell fragments (loose, wet) (no sheen, no odor)	
14					WD	WOOD DEBRIS(dense, damp) (no sheen, no odor)	
					SP	Gray, fine SAND with shell debris (medium dense, wet) (no sheen, no odor) **(MARINE DEPOSTS)**	

Boring Completed 10/09/13
Total Depth of Boring = 15.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

Landau Associates

Westman Marine
Blaine, Washington

Log of Boring WM-GP-8

Figure 1-9

WM-GP-9

Drilling Method: Geoprobe™
Ground Elevation (ft):
Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Soil Profile	Water Level
0					AC	ASPHALT	
	WM-GP-9-0.5-1.5	g3		0.0	SP	Brown, fine to coarse SAND with trace silt and gravel (medium dense, damp) (no sheen, no odor) **(FILL)**	
2	WM-GP-9-1.5-2.5			0.2	SM/ML	Brown SILT with sand to a silty, fine SAND with shell fragments and occasional gravel (stiff to medium dense, moist to wet) (no sheen, no odor)	
4	WM-GP-9-3.5-4.5			0.2			
6	WM-GP-9-5-6.5			0.0			ATD
8		g3					
9					WD	Black-red WOOD DEBRIS (dense, wet) (no sheen, no odor)	
12.5		g3			SP-SM	Gray, fine SAND with silt, debris, and shell fragments (medium dense, wet) (no sheen, no odor)	
14						-- no recovery	

Boring Completed 10/08/13
Total Depth of Boring = 15.0 ft.

Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

Landau Associates

Westman Marine
Blaine, Washington

Log of Boring WM-GP-9

Figure 1-10

WM-GP-10

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Soil Profile	Water Level
0–1	WM-GP-10-0-1	d3		0.0	SP	Brown, gravelly, fine to coarse SAND with trace silt (medium dense, damp) (no sheen, no odor) **(FILL)**	
1–2	WM-GP-10-1-2	d3			SM	Brown, silty, fine SAND with occasional debris (dense, damp) (no sheen, no odor)	
2–3	WM-GP-10-2-3	d3		0.0	RK	White, crushed white rock (dense, dry) (no sheen, no odor)	
3–4	WM-GP-10-3-4	d3		0.0	SM	Brown, silty, fine to coarse SAND with trace gravel (medium dense, damp) (no sheen, no odor)	ATD
					SP	Brown, gravelly, fine to coarse SAND with debris (medium dense, moist) (no sheen, no odor)	
4–5						-- no recovery	
5–6		d3			WD	Brown WOOD DEBRIS (medium dense, wet) (no sheen, no odor)	
6–10		d3				-- no recovery	
10–10.3		d3			SM	Brown, silty, gravelly, fine SAND with debris (loose to medium dense, wet) (no sheen, no odor)	
10.3–11.2		d3			WD	Brown WOOD DEBRIS (medium dense, wet) (no sheen, no odor)	
11.2–15		d3			SM	Gray, fine SAND with silt and abundant shell fragments (dense, wet) (no sheen, strong sulfide odor) **(MARINE DEPOSITS)**	

Drilling Method: Geoprobe™

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

Boring Completed 10/10/13
Total Depth of Boring = 15.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1035010016. 2/4/14 \\EDMDATA01\GINT\PROJECTS\001035.010.015_BHB.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Westman Marine
Blaine, Washington

Log of Boring WM-GP-10

Figure 1-11

WM-GP-11

SAMPLE DATA | SOIL PROFILE | GROUNDWATER

Drilling Method: Geoprobe™

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Description	Water Level
0	WM-GP-11-0-1			0.0	SP	Brown, fine to coarse SAND with fine gravel and trace silt (medium dense, damp) (no sheen, no odor) **(FILL)**	
	WM-GP-11-1-2			0.5	ML	Brown, sandy, SILT with tarce gravel and medium to coarse sand (stiff, damp)	
2	WM-GP-11-2-3	d3		0.0	SM	Brown, silty, fine SAND with trace gravel (medium dense, damp) (no sheen, no odor)	
	WM-GP-11-3-4			0.0	SP	Gray, fine SAND with trace silt and debris (dense, damp) (no sheen, no odor)	
4				11.4	ML	Dark gray SILT (hard, damp) (no sheen, petroleum odor)	
	WM-GP-11-5-6			15.0	SP-SM	Gray, fine SAND with silt (medium dense, damp) (no sheen, no odor)	ATD
6							
	WM-GP-11-7-8	d3		1.0			
8					ML	Gray, fine sandy, SILT with trace shell fragments (very soft, wet) (no sheen, no odor)	
				0.5	SP-SM	Brown, fine to coarse SAND with gravel and silt (loose, wet) (no sheen, no odor)	
10					WD	Dark brown, WOOD DEBRIS with lens of sandy silt (dense, damp) (no sheen, no odor)	
12		d3			SP	Brown, fine SAND with abundant shell fragments and trace silt (medium dense, damp) (no sheen, strong sulfide odor) **(MARINE DEPOSTS)**	
14							

Boring Completed 10/10/13
Total Depth of Boring = 15.0 ft.

16

18

20

Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

WM-GP-12

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Geoprobe™

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Description	Water Level
0	WM-GP-12-0-1	d3		0.0	GP	Gray, crushed fine GRAVEL (loose, damp) **(FILL)**	
1	WM-GP-12-1-2			0.0	SP-SM	Brown to red-brown fine to coarse SAND with silt and gravel (medium dense, damp)	
2	WM-GP-12-2-3			0.0			
5	WM-GP-12-5-6	d3		1.0	SP-SM	Brown, fine SAND with silt and trace corse sand (medium dense, damp) (no sheen, no odor)	ATD
6					SM	Gray, silty, fine SAND with trace shell fragments (loose, wet) (no sheen, no odor)	
10		d3		0.2			
10.8					SP-SM	Gray, fine SAND with silt (medium dense stiff, damp) (no sheen, no odor)	
12.2					WD	Black WOOD DEBRIS (dense, wet) (no sheen, no odor)	
13.1					SP-SM	Light gray, fine SAND with silt and shell debris (medium dense to lose, wet) (no sheen, no odor) **(MARINE DEPOSITS)**	

Boring Completed 10/08/13
Total Depth of Boring = 15.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

LANDAU ASSOCIATES

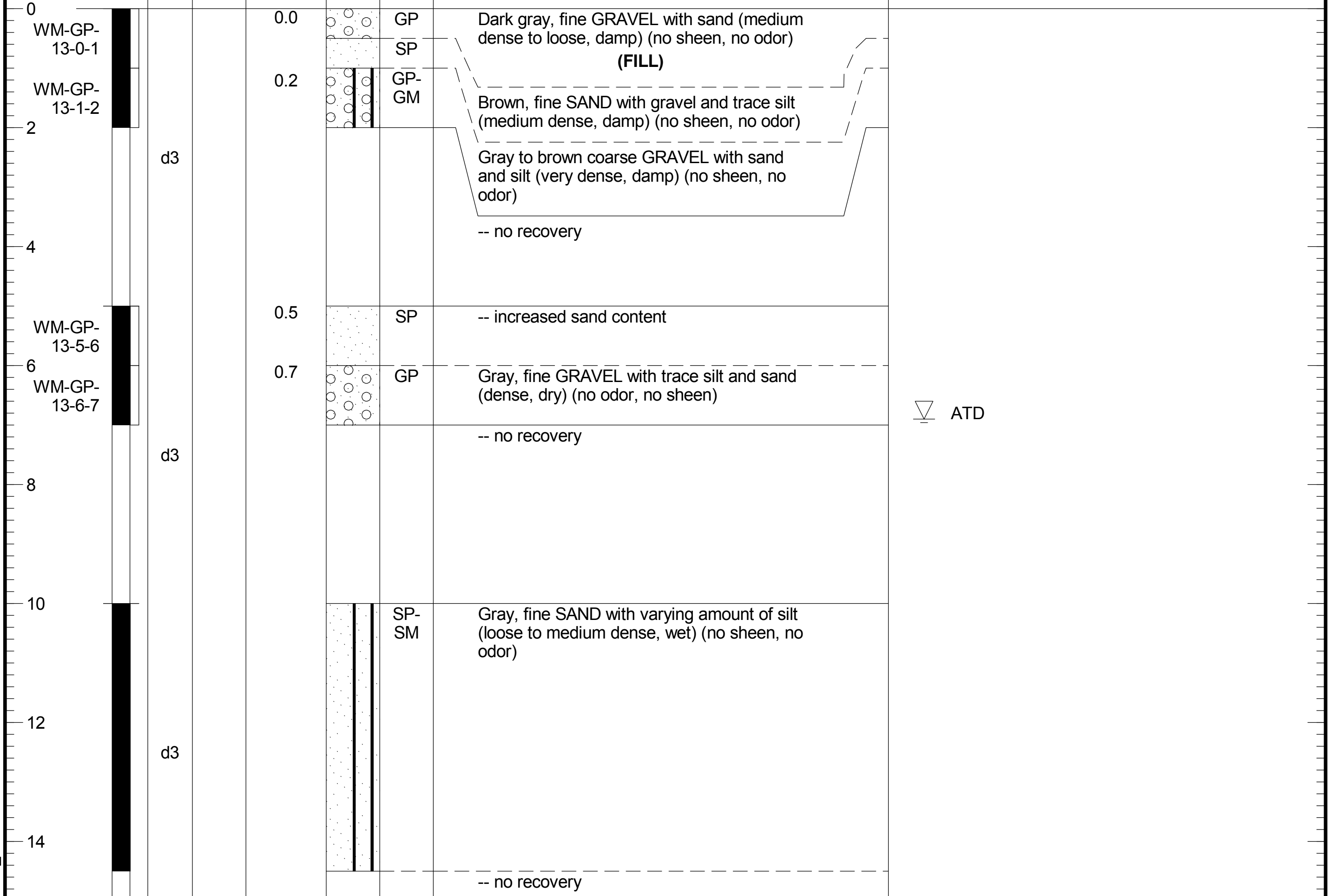
Westman Marine
Blaine, Washington

Log of Boring WM-GP-12

Figure 1-13

WM-GP-13

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): Drilled By: Cascade Drilling Inc.	Water Level
0	WM-GP-13-0-1			0.0		GP	Dark gray, fine GRAVEL with sand (medium dense to loose, damp) (no sheen, no odor) **(FILL)**	
						SP	Brown, fine SAND with gravel and trace silt (medium dense, damp) (no sheen, no odor)	
	WM-GP-13-1-2			0.2		GP-GM	Gray to brown coarse GRAVEL with sand and silt (very dense, damp) (no sheen, no odor)	
2		d3					-- no recovery	
4								
	WM-GP-13-5-6			0.5		SP	-- increased sand content	
6	WM-GP-13-6-7			0.7		GP	Gray, fine GRAVEL with trace silt and sand (dense, dry) (no odor, no sheen)	ATD
		d3					-- no recovery	
8								
10						SP-SM	Gray, fine SAND with varying amount of silt (loose to medium dense, wet) (no sheen, no odor)	
12		d3						
14							-- no recovery	



Boring Completed 10/09/13
Total Depth of Boring = 15.0 ft.

Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

WM-GP-14

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): Drilled By: Cascade Drilling Inc.	Water Level
0	WM-GP-14-0-1			0.0		GP	Gray-brown, fine to medium GRAVEL with sand and trace silt (medium dense, damp) (no sheen, no odor) **(FILL)**	
	WM-GP-14-1-2			0.0		SP	Brown, fine SAND with gravel and trace silt (medium dense, damp) (no sheen, no odor)	
2		d3		0.0		ML	Brown SILT with fine sand (stiff, damp) (no sheen, no odor)	
	WM-GP-14-3-4			0.0		SP	Brown, fine SAND with gravel and trace silt (meidum dense, damp) (no sheen, no odor)	
4						CL	Brown CLAY with pockets of fine sand (medium stiff, damp) (no sheen, no odor)	
						SM	Brown, silty, fine SAND with shell fragments and debris (medium dense, damp) (no sheen, no odor)	
6						ML	Gray, sandy, SILT (soft, moist) (no sheen, no odor)	ATD
	WM-GP-14-7-8	d3				SM	Gray, silty, fine SAND (loose to medium dense, wet) (no sheen, no odor)	
8						WD	Black WOOD DEBRIS (dense, wet) (no sheen, organic decomposition odor)	
							-- no recovery	
10						ML	Black, sandy, SILT (soft, wet) (no sheen, no odor)	
	WM-GP-14-10.5-11.5			4.6		SP	Black-brown, gravelly, fine to coarse SAND with silt (loose, wet) (no sheen, no odor)	
12		d3				WD	Brown WOOD DEBRIS (dense, wet) (no sheen, no odor)	
				0.0				
14	WM-GP-14-13.5-14.5					SP-SM	Gray, fine SAND with silt and shell fragments (medium dense, wet) (no sheen, sulfide odor) **(MARINE DEPOSITS)**	

Boring Completed 10/09/13
Total Depth of Boring = 15.0 ft.

16

18

20

Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

LANDAU ASSOCIATES

Westman Marine
Blaine, Washington

Log of Boring WM-GP-14

Figure 1-15

WM-GP-15

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): Drilled By: Cascade Drilling Inc.	Water Level
0	WM-GP-15-0-1			0.7		SP	Brown, gravelly, fine to coarse SAND with trace silt and wood debris (loose to medium dense, damp) (no sheen, no odor) **(FILL)**	
	WM-GP-15-1-2			1.0				
2	WM-GP-15-2-3	d3		1.0		SP-SM	Light brown, fine SAND with silt and debris (medium dense, damp) (no sheen, no odor)	
	WM-GP-15-3-4			0.7				
4								
6								ATD
8		d3				SM	Gray, silty, fine SAND (loose, wet) (no sheen, no odor)	
						RK	White crushed ROCK debris with sand (dense, damp) (no sheen, no odor)	
						WD	Black WOOD DEBRIS (dense, damp) (no sheen, no odor)	
10						ML	Gray/brown, sandy, SILT with trace coarse sand and pockets of fine sand (soft, wet) (no sheen, no odor)	
						WD	Black WOOD DEBRIS with fine to coarse sand and silt (loose, wet) (no sheen, no odor)	
12		d3						
14						SP	Gray, fine SAND with trace silt and shell fragments (dense, wet) (no sheen, no odor) **(MARINE DEPOSTIS)**	
16								
18								
20								

Boring Completed 10/10/13
Total Depth of Boring = 15.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

Landau Associates

Westman Marine
Blaine, Washington

Log of Boring WM-GP-15

Figure 1-16

WM-GP-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): Drilled By: Cascade Drilling Inc.	Water Level
0	WM-GP-16-0-1					SP	Brown, fine SAND with medium to course sand and trace silty and gravel (medium dense, moist) (no sheen, no odor) **(FILL)**	
				0.5		WD	Brown WOOD DEBRIS (no sheen, no odor)	
	WM-GP-16-1-2					SP-SM	Gray-brown, fine SAND with silt (medium dense, moist to wet) (no sheen, no odor)	
2				1.0				
	WM-GP-16-2-3	d3						
	WM-GP-16-3-4			1.0				
4				1.0				
6								ATD
8		d3						
10								
12		d3				SP	Gray-black, fine SAND with trace silt and shell fragments (medium dense, wet) (no sheen, sulfide odor) **(MARINE DEPOSITS)**	
14								
16								
18								
20								

Boring Completed 10/08/13
Total Depth of Boring = 15.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

WM-GP-17

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Soil Profile	Groundwater / Water Level
0					AC	Asphalt	
0.5-1	WM-GP-17-0.5-1			0.0	SP	Brown to dark gray, gravelly, medium SAND with trace silt, and shell fragments (medium dense, dry) (no sheen, no odor) [base course]	
1-2	WM-GP-17-1-2						
2-3	WM-GP-17-2-3	d3					
3-4	WM-GP-17-3-4						
4				0.0			
5-6	WM-GP-17-5-6			0.0			
6				0.0			▽ ATD
7.5		d3					
12.5		d3					
12.8					WD	Black-brown WOOD DEBRIS (shredded fibers, wet)	
13.4					SM	Gray, silty, fine SAND with trace shell fragments (medium dense, moist) (no odor, no sheen) **(MARINE DEPOSITS)**	

Drilling Method: Geoprobe™

Ground Elevation (ft):

Drilled By: Cascade Drilling Inc.

Boring Completed 10/08/13
Total Depth of Boring = 15.0 ft.

Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

WM-GP-18

Drilling Method: Geoprobe™
Ground Elevation (ft):
Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Soil Profile	Water Level
0		d3		0.0, 0.0	SP	Brown, gravelly fine to coarse SAND with trace silt (medium dense to loose, damp) (no odor, no sheen)	
2		d3		0.0	SM	Brown, silty, fine SAND with trace sand and debris (medium dense, moist to wet) (no sheen, no odor)	ATD (approx. 6 ft)
7.2		d3			WD	White-yellow WOOD DEBRIS	
8						-- no recovery	
10	WM-GP-18-10-12				SM/ML	Black-brown, fine SAND with silt to a fine sandy SILT (very soft, wet) (no sheen, no odor) Black-brown fine sandy SILT trace course sand	
12		d3		0.0	WD	Brown wood debris	
13				2.2	SP-SM	Gray fine SAND with silt (medium dense, damp) (no sheen, no odor)	

Boring Completed 10/10/13
Total Depth of Boring = 15.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

LANDAU ASSOCIATES

Westman Marine
Blaine, Washington

Log of Boring WM-GP-18

Figure 1-19

WM-GP-19

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): Drilled By: Cascade Drilling Inc.	Water Level
0				0.0, 0.0		AC	Asphalt	
						SP	Brown, fine to medium SAND with trace silt (medium dense, moist) (no sheen, no odor) **(FILL)**	
2		d3		0.0		SM-ML	Brown, SILT (soft, moist) (no sheen, no odor)	
				0.0		SM	Brown, silty fine SAND (dense, moist) (no sheen, no odor)	
4								
6								
8		d3		0.0		ML	Gray, SILT with sand, wood debris and shell fragments (medium stiff, wet) (no sheen, no odor)	ATD
10								
12	WM-GP-19-11-12			0.0				
		d3				WD	Brown WOOD DEBRIS	
14				0.0		SP	Gray, fine SAND with trace silt and shell fragments (medium dense, wet) (no sheen, no odor)	
16								
18								
20								

Boring Completed 10/10/13
Total Depth of Boring = 15.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

LANDAU ASSOCIATES

Westman Marine
Blaine, Washington

Log of Boring WM-GP-19

Figure
1-20