PUBLIC REVIEW DRAFT
TECHNICAL MEMORANDUM

TO: Liu, Jing, Washington State Department of Ecology

FROM: Larry Beard, P.E.

DATE: December 19, 2013

RE: **BOUNDARY FISH INTERIM ACTION PLAN**
WESTMAN MARINE SITE
BLAINE, WASHINGTON

INTRODUCTION

This technical memorandum presents the interim action plan to remediate soil contaminated with heavy metals, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), and diesel-range petroleum hydrocarbons encountered during construction of a new building partially located within the preliminary boundary of the Westman Marine site (Site). Concentrations of these hazardous substances exceeded the Site soil screening levels (SLs) in a portion of the Site where Boundary Fish, a tenant of the Port of Bellingham (Port), is constructing a new building. A remedial investigation/feasibility study (RI/FS) is currently underway for the Site under Agreed Order No. DE-9001 (AO) between the Port and the Washington State Department of Ecology (Ecology).

The contaminated soil present within the new Boundary Fish building footprint requires remediation to allow continued use of the leasehold by the Port's tenant in advance of completing the RI/FS and selecting a final cleanup action for the Site. Although the initial phase of the RI field activities for the Site is complete, the RI is still in progress and the final cleanup action for the Site, presented in a cleanup action plan (CAP), is not anticipated to be completed for about 3 years based on the current project schedule. Boundary Fish requires the new building to continue and expand its operations at Blaine Harbor, and could not delay construction until the final cleanup action is selected and implemented for the Site. As a result, an interim action is required to accommodate continued tenant use prior to selection of the final cleanup action. The location of the new building and interim action area are shown on Figure 1.

The following sections of this interim action plan provide background information on the interim action area, the basis for the interim action, a discussion of interim action alternatives considered, a description of the selected interim action, and a discussion of interim action implementation.

BACKGROUND

The interim action area is located within the western portion of the estimated Site boundary, as shown on Figure 2. The area is in a portion of the Site where historical boatyard activities occurred, but outside of the area of current boatyard operations.

When mobilizing for RI activities at the Site, Landau Associates discovered that initial construction activities were underway for a new building in the Boundary Fish lease area. Upon discovery, the Port, in consultation with Ecology, collected surface soil samples within the proposed new building footprint to determine if soil contamination was present (WM-SS-1 through WM-SS-8). The contaminant concentrations were generally low, although there were a number of exceedances of the Site SLs for metals (because the screening levels are conservative and mostly based on protection of groundwater), and a couple exceedances for cPAHs, as indicated in Table 1.

Based on the sample results indicating that shallow soil contamination was present in the upper 1 to 2 feet in a portion of the building site, the Port in consultation with Ecology decided to remove approximately 200 cubic yards (CY) of contaminated soil from within the building footprint. Figure 2 shows the original sample locations and surface soil excavation boundaries. Boundary Fish's construction contractor conducted the soil excavation under oversight by Landau Associates personnel. After the surface soil was removed, compliance sampling was conducted that included the collection of 11 surface soil samples (WM-SS-9 through WM-SS-19), which were analyzed for heavy metals and PAHs. Compliance monitoring soil analytical results are provided in Table 1.

During the soil removal, evidence of the boatyard historical sidetracks was uncovered in the southeastern portion of the building footprint, and a concrete vault was encountered roughly in the center of the building footprint, as shown on Figure 3. Additional soil samples were collected of dark-stained soil adjacent to concrete foundations for the former sidetracks (WM-SS-20 through WM-SS-22). The concrete vault did not have a bottom and diesel-contaminated soil was encountered below the base of the vault. Most of the diesel-contaminated soil that could be removed through the bottom of the vault was removed after the vault was discovered. This initial excavation advanced approximately 8 ft below ground surface (BGS). Groundwater was not encountered at this time. After removing soil with a strong diesel odor from below the concrete vault, soil compliance monitoring samples were collected (WM-BF-Vault B-1, S-1, and S-2) and analyzed for gasoline- and diesel-range total petroleum hydrocarbons, PAHs, heavy metals, and volatile organic compounds (VOCs). Figure 3 shows the compliance sample locations.

Compliance sampling results, provided in Table 1, showed that the soil remaining in place after surface soil removal contained contaminant concentrations below Site SLs except in the southeastern portion of the interim action area where the former sidetracks were located. Compliance sampling at the vault indicated that contaminant concentrations were below Site SLs in the bottom sample and one of two sidewall samples. The only SL exceedance at the vault was diesel-range petroleum hydrocarbons in one sidewall sample (WM-BF-Vault-S-2).

Following receipt of the soil compliance sampling results for the vault excavation, the Port conducted an investigation in the vault vicinity to delineate the lateral extent of diesel-range petroleum hydrocarbon contamination in soil. Four borings were advanced approximately 10 feet away from the vault in each of the cardinal directions using a direct-push boring machine (boring locations were moved slightly based on the presence of electrical utilities). No evidence of contamination was observed in the borings, and an additional subsurface soil sample was collected from each boring to confirm the field observations (WM-BF-GP-1 through WM-BF-GP-4). The analytical results for these samples (WM-BF-GP-1 through -4) were either below laboratory reporting limits, or well below the Site SLs, as indicated in Table 1. Based on these results, it was concluded that the diesel contamination was limited to the immediate vicinity of the former vault.

Based on these analytical data, the Port conducted one last soil removal effort, removing approximately 15 additional cubic yards of apparent diesel-impacted soil from the vault area (bringing the total removal at the vault to approximately 25 cubic yards). During the removal of this additional soil from the vault area, the excavation advanced to approximately 10 ft BGS. Groundwater was encountered at the bottom of this excavation. There were no observations of sheen in the encountered groundwater. Additionally, the Port removed approximately 15 additional cubic yards of dark-stained soil from the former sidetrack foundation vicinity, where cPAHs and metals contamination were correlated with the visual observation of darker soils adjacent to the concrete footings. After removing the additional soil from the vault excavation sidewall, sample WM-BF-Vault-S-3 was collected to document remaining conditions in the new sidewall, and six samples were collected to document remaining conditions near the former sidetracks (WM-BF-SS-26 through WM-BF-SS-31). Samples WM-BF-SS-24 and WM-BF-SS-25 were collected from within the dark-stained soil at the former sidetracks to characterize the nature of soil contamination associated with former activities along the tracks. Figure 4 shows the locations where additional soil was removed and the locations of the last round of sampling.

No visual evidence of soil contamination in the vicinity of the sidetrack foundations was observed following removal of the additional soil. There was still a slight petroleum odor to the soil along the fresh excavation face of the vault excavation, but the decision was made to not excavate any additional soil because of the instability of the excavation and the exploration data that indicated that the extent of diesel contamination was very localized. The tenant was allowed to recommence construction of the building following these activities because further delay would have compromised the construction schedule and had significant cost ramifications.

The analytical results for the final round of soil compliance monitoring indicated that petroleum hydrocarbon concentrations in soil in the vicinity of the former vault location were below the Site SLs. Concentrations of heavy metals, primarily copper, mercury, and zinc, were still above the soil SLs in the southeastern portion of the building footprint where the former sidetracks were located. However, soil SLs for metals are based on protection of groundwater, so further groundwater characterization during the RI is needed to determine whether these metals concentrations in soil represent a threat to human health or the environment. One exceedance of the cPAH SL was detected in soil sample WM-BF-SS-26.

In all, the Port removed approximately 230 cubic yards of soil, which is currently stockpiled in the Site vicinity.

BASIS FOR INTERIM ACTION

The Washington State Model Toxics Control Act (MTCA) distinguishes an interim action from a cleanup action in that an interim action only partially addresses the cleanup of a site and achieves one of the following purposes [WAC 173-340-430(1)]:

- Is technically necessary to reduce the threat to human health and the environment by eliminating or substantially reducing one or more pathways for exposure to a hazardous substance [WAC 173-340-430(1)(a)]
- Corrects a problem that may become substantially worse or cost substantially more to address if the remedial action is delayed [WAC 173-340-430(1)(b)]
- Is needed to complete a site hazard assessment, RI/FS, or design a cleanup action [WAC 173-340-430(1)(c)].

Interim actions may [WAC 173-340-430(2)]:

- Achieve cleanup standards for a portion of the site
- Provide a partial cleanup (clean up hazardous substances from all or part of the site, but not achieve cleanup standards)
- Provide a partial cleanup and not achieve cleanup standards, but provide information on how to achieve cleanup standards.

The proposed interim action meets the MTCA requirements described above by reducing the threat to human health and the environment through eliminating or substantially reducing one or more pathways for exposure to a hazardous substance, as well as correcting a problem that may become substantially more expensive to address if remedial action is delayed. The interim action will provide a partial cleanup by removing contaminated soil from the building footprint. Further RI groundwater characterization will be required to establish final soil cleanup levels and determine whether the interim action achieves cleanup standards.

EVALUATION OF INTERIM ACTION ALTERNATIVES

MTCA requires that an interim action plan present the alternative interim actions considered and an explanation of why the proposed alternative was selected [WAC 173-340-430(7)(b)(ii)]. This section describes the alternatives considered for the interim action and the basis for selecting the proposed interim action.

Three interim action alternatives were evaluated as potential options for addressing contaminated soil within the building footprint:

- Alternative 1: Excavation and Offsite Thermal Desorption
- Alternative 2: Excavation and Landfill Disposal
- Alternative 3: Containment In Place.

Alternative 1 would include the excavation and offsite disposal, with subsequent treatment by thermal desorption, of the contaminated soil from the Boundary Fish building footprint. The excavated soil would be moved off site to a facility with a thermal desorber, which heats the soil to evaporate the contaminants and collect the resulting gases. Thermal desorption is most effective for lighter weight molecules such as VOCs and semivolatile compounds. The technology could remove diesel contamination and some cPAHs from the soil, but would be ineffective for heavy metals. As a result, this alternative would require that most of the contaminated soil be disposed of at a solid waste facility following, or in lieu of, treatment.

In Alternative 2, contaminated soil would be transported and disposed of off site at a Resource Conservation and Recovery Act (RCRA) Subtitle D municipal solid waste (MSW) landfill. Disposal in a MSW landfill would prevent exposure to human or ecological receptors, and is an applicable and commonly used cleanup technology for the hazardous substances present in the interim action area.

Alternative 3 would leave the contaminated soil in place and use the completed building as a containment cap to prevent direct human contact and infiltration of precipitation through the contaminated soil. This cleanup technology may be appropriate as part of a final cleanup action, but additional RI characterization and a more thorough evaluation of remedial alternatives would be required to confirm the effectiveness of this technology, and to determine that it is permanent to the maximum extent practicable. Additionally, significant difficulty and expense would be incurred to implement an alternative treatment technology once the building is in place. As a result, containment was not considered an appropriate interim action technology at this early stage of the MTCA cleanup process. However, as described in the Background section, a small amount of cPAH-contaminated soil, and possibly metals-contaminated soil, was left in place in the southeast corner of the building footprint due to the burden further delay to building construction would cause the Port's tenant, and the *de minimis* amount of contaminated soil that remained in place. This residual contamination will be addressed as part of the final cleanup action for the Site.

SELECTION OF THE INTERIM ACTION ALTERNATIVE

Alternative 1 was not considered practicable because thermal desorption would not be effective in treating most of the hazardous substances present in the subject soil, so most of the soil would still require disposal at a solid waste facility. Alternative 3 was not considered appropriate because Site characterization has not progressed to the point where a containment remedy can be fully evaluated, and the cost for implementing an alternative final cleanup action would be greatly increased due to the presence of the building. Alternative 2 uses effective and commonly applied remedial technologies (removal and offsite disposal) for the hazardous substances present in the subject soil. As a result, Alternative 2 was considered the only practicable interim action alternative for addressing contaminated soil present within the footprint of the new Boundary Fish building, and was selected as the interim action alternative for cleanup of contaminated soil within the Boundary Fish building footprint.

INTERIM ACTION IMPLEMENTATION

The contaminated soil to be addressed as part of the interim action is currently stockpiled and covered at the Site. The remaining activities associated with implementation of the interim action will consist of loading, transport, and disposal of the contaminated soil. The Port intends to complete the interim action as soon as the interim action is approved by Ecology and a contractor is selected for transport and disposal of the contaminated soil. The soil stockpile is anticipated to be removed from the Site by March 2014.

ATTACHMENTS

Figure 1: Vicinity Map
Figure 2: Surface Soil Sampling and Initial Surface Soil Removal
Figure 3: Compliance Sample Locations
Figure 4: Additional Soil Removal and Sample Locations
Table 1: Boundary Fish Analytical Results, Westman Marine, Port of Blaine

N

0 0.5 1
Miles

Data Source: Esri 2012

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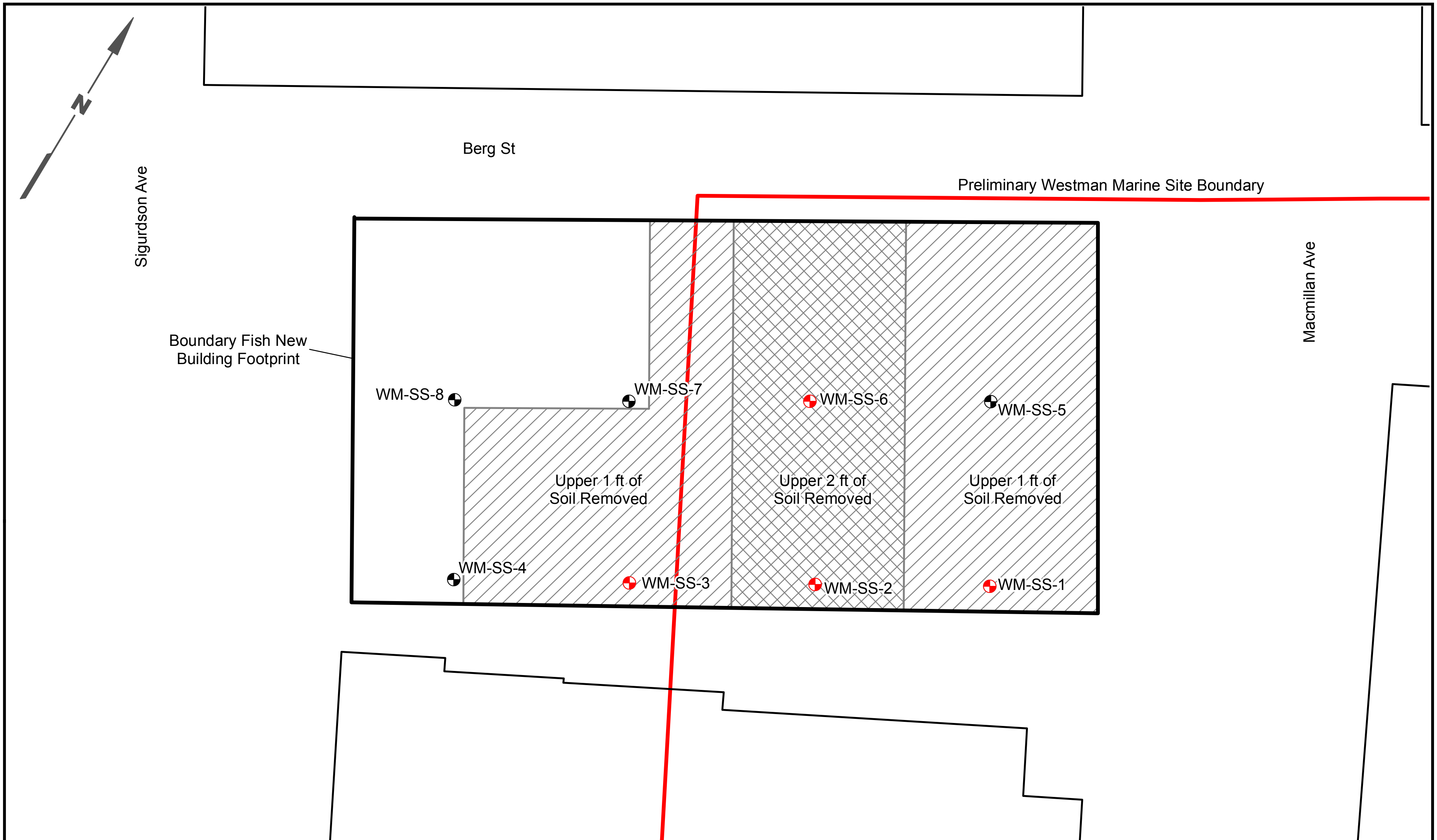
LANDAU ASSOCIATES

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

G:\Projects\001\034\010\014\BoundaryFish\Figure2BoundaryFishInitialSoilRemoval.mxd 12/3/2013 NAD 1983 StatePlane Washington North FIPS 4601 Feet



Legend

- Surface Soil Sample Locations
- Surface Soil Sample Locations where Concentrations Exceed Site Screening Levels

0 20 40

Scale in Feet

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

Note

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

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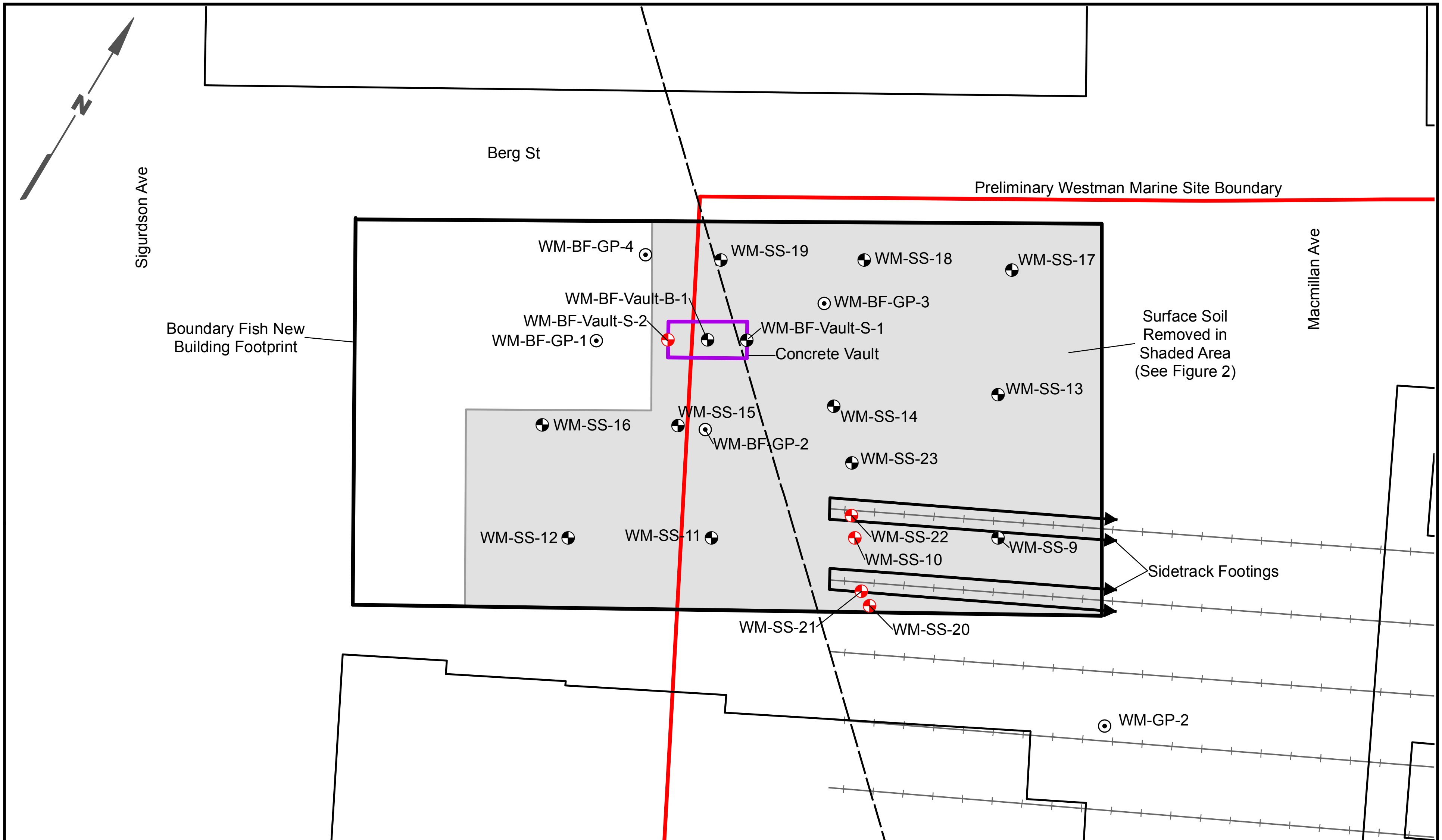
Westman Marine
Blaine Harbor
Blaine, Washington

Surface Soil Sampling and Initial Surface Soil Removal

Figure
2



Legend

- Soil Sample Locations where Concentrations Exceed Site Screening Levels
- Soil Sample Location
- Geoprobe Location

0 20 40

Scale in Feet

Landau Associates

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

Note

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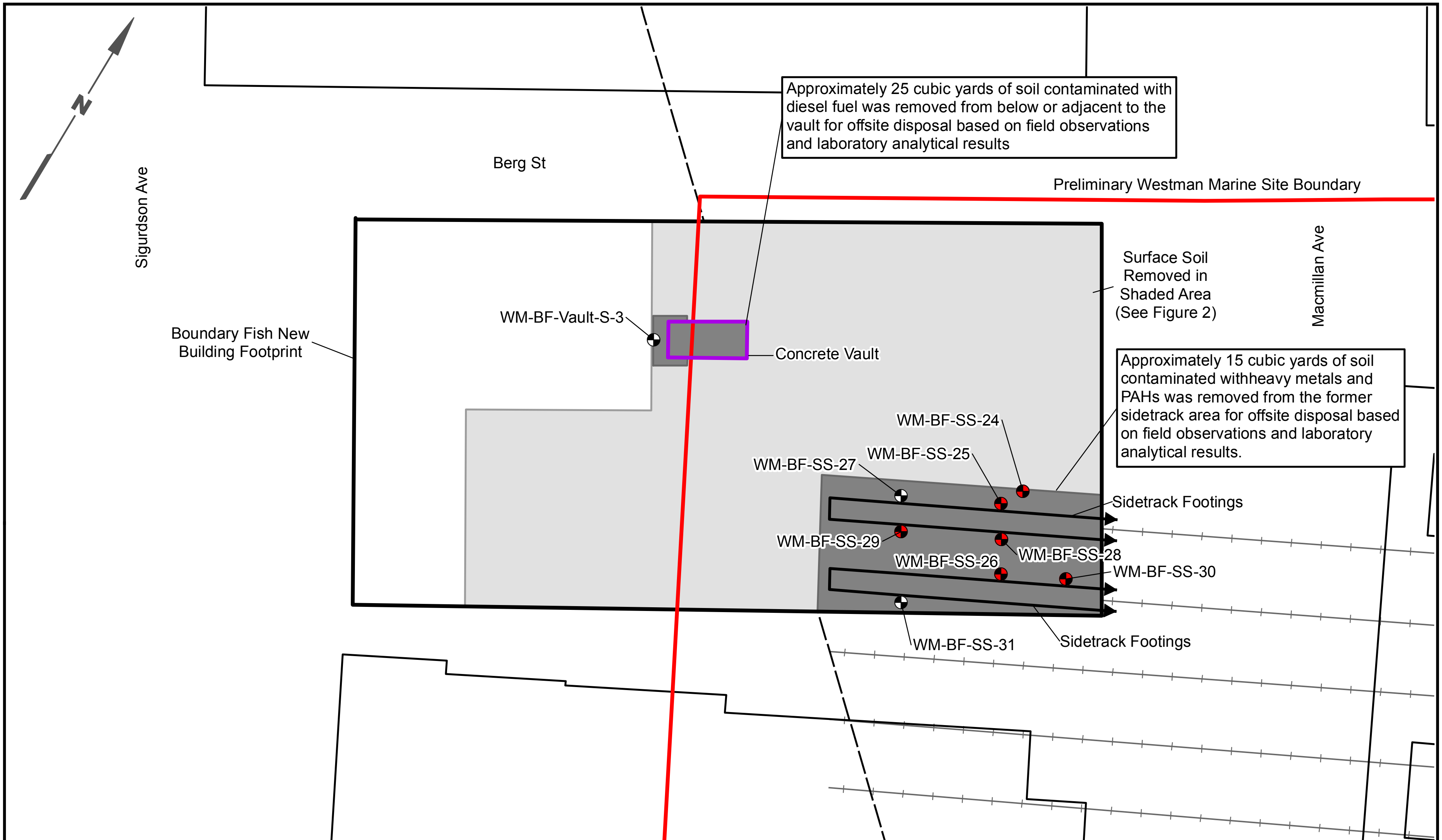
Westman Marine Blaine Harbor Blaine, Washington	**Compliance Sample Locations**	Figure 3

G:\Projects\001\034\010\014\BoundaryFish\Figure4BoundaryFishAdditionalSoilRemoval.mxd 12/3/2013 NAD 1983 StatePlane Washington North FIPS 4601 Feet



Legend

- Soil Sample Location
- Soil Sample Location Where Concentrations Exceed Site Screening Level

0 20 40
Scale in Feet

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

Note

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Westman Marine
Blaine Harbor
Blaine, Washington

Additional Soil Removal and Sample Locations

Figure 4

TABLE 1
BOUNDARY FISH ANALYTICAL RESULTS
WESTMAN MARINE SITE
PORT OF BELLINGHAM
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-2 XK09R 10/16/2013	WM-BF-VAULT S-3 XL60A 10/28/2013	WM-BF STOCKPILE XL60J 10/28/2013	WM-BF-VAULT STOCKPILE XL60K 10/28/2013	WM-SS-1 0-0.5 XI41A 10/03/2013	WM-SS-1 1-1.5 XI74A 10/03/2013	WM-SS-2 0-0.5 XI41B 10/03/2013	WM-SS-2 1-1.5 XI74B 10/03/2013	WM-SS-2 2.0-3.0 XJ09L 10/16/2013	WM-SS-3 0-0.5 XI41C 10/03/2013	WM-SS-3 1-1.5 XI74C 10/03/2013	WM-SS-4 0-0.5 XI74D 10/03/2013	WM-SS-4 1-1.5 XI74E 10/03/2013
TOTAL METALS (mg/kg) Methods EPA200.8/ SW6010C/SW7471A																
Arsenic	7	**3.1**	**5.8**	**3.4**				**3.0**		**3.7**			**5.0**			
Cadmium	80	**0.3**	**0.2**	**0.2**				**0.2**		**0.4**			**0.3**			
Chromium	2,000	**18.2**	**37.2**	**18.0**				**16.5**		**48.8**			**24.3**			
Copper	36	**22.6** J	**45.7**	**16.3**	**23**			**81.4** J	**38.9**	**44.5**	**8,540**		**46.8**	**37.6**	**32.4**	**47.5**
Lead	250	**5.1**	**5.8**	**2.9**				**31.1** J	**10**	**50.7**	**43**		**8.0**	**3.32** J	**5**	**7**
Mercury	0.16	0.03 U	**0.04**	0.03 U				**0.10** J	**0.12**	**0.09**	**0.57**		**0.48**	**0.04**	**0.0220** J	**0.05**
Nickel		**14**	**44**	**18**												
Zinc	100	**40**	**77**	**29**				**233**	**79**	**205**	**217**		**156**	**60**	**53**	**85**
TCLP METALS (mg/L) SW6010C/SW7470A																
Arsenic						0.2 U	0.2 U									
Barium						**0.37**	**0.29**									
Cadmium						0.01 U	0.01 U									
Chromium						0.02 U	0.02 U									
Lead						0.1 U	0.1 U									
Mercury						0.0001 U	0.0001 U									
Selenium						0.2 U	0.2 U									
Silver						0.02 U	0.02 U									
TOTAL PETROLEUM HYDROCARBONS (mg/kg)																
NWTPH-Dx																
Diesel Range Organics	2,000	**950**	**1,200**	**4,900**	**960**			**15**		**23**			**16**			
Lube Oil	2,000	13 U	14 U	12 U	13 U			**84**		**100**			**150**			
NWTPH-Gx																
Gasoline	100	**93**	**100**	**110**	**110**											
PAHs (µg/kg) Method SW8270DSIM																
Naphthalene	2,300	49 U	**130** M	95 U				4.6 U		**6.2**			4.9 U			
2-Methylnaphthalene	320,000	**460**	**1,000**	**3,800**				**5.6**		**8.6**			4.9 U			
1-Methylnaphthalene	35,000	**670**	**920**	**3,600**				4.6 U		5.0 U			4.9 U			
Acenaphthylene	---	**51**	4.6 U	95 U				4.6 U		5.0 U			4.9 U			
Acenaphthene	340	49 U	**24**	**330**				4.6 U		5.0 U			4.9 U			
Fluorene	470	**100**	**140**	**680**				4.6 U		**6.5**			4.9 U			
Phenanthrene	---	**92**	**140**	**530**				**38**		**53**			4.9 U			
Anthracene	4,500	49 U	**7.6**	95 U				**8.2**		**14**			4.9 U			
Fluoranthene	3,200	49 U	4.6 U	95 U				**87**		**97**			**5.8**			
Pyrene	20,000	49 U	**5.2**	95 U				**70**		**75**			**6.0**			
Benzo(a)anthracene		49 U	4.6 U	95 U				**39**		**33**			4.9 U			
Chrysene		49 U	4.6 U	95 U				**57**		**63**			4.9 U			
Benzo(a)pyrene	140	49 U	4.6 U	**200** M				**52**		**48**			4.9 U			
Indeno(1,2,3-cd)pyrene		49 U	**14** M	**290** M				**45**		**47**			4.9 U			
Dibenz(a,h)anthracene		49 U	4.6 U	95 U				**10**		**9.8**			4.9 U			
Benzo(g,h,i)perylene	---	49 U	**4.7**	95 U				**51**		**66**			**5.0**			
Dibenzofuran	---	**52**	**85**	**360**				4.6 U		5.0 U			4.9 U			
Total Benzofluoranthenes		49 U	4.6 U	95 U				**120**		**120**			4.9 U			
TEQ	140	ND	**1.4**	**229**				**74**		**70**			ND			

TABLE 1
BOUNDARY FISH ANALYTICAL RESULTS
WESTMAN MARINE SITE
PORT OF BELLINGHAM
BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-SS-5 0-0.5 XI41D 10/03/2013	WM-SS-6 0-0.5 XI41E 10/03/2013	WM-SS-6 1-1.5 XI74F/XJ59A 10/03/2013	WM-SS-7 0-0.5 XI41F 10/03/2013	WM-SS-9 0.75-1.0 XK09B 10/15/2013	WM-SS-10 2.0-2.25 XK09G 10/15/2013	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	2.3	4.0		3.1											
Cadmium	80	0.2	1.2		0.2											
Chromium	2,000	13.6	22.0		21.4											
Copper	36	47.6	92.0	29.4	27.0	15.2	103	25.9	40.4	12.0	12	19.7	20.6	13.6	24.0	27.9
Lead	250	7.4	45.7	11.4	7.4											
Mercury	0.16	0.02 U	0.22	0.05	0.03	0.02 U	1.46	0.02	0.05	0.02 U	0.04	0.04	0.03	0.02 U	0.03	0.03
Nickel																
Zinc	100	84	339	73	53	31	127	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	5.5	110		5.6 U											
Lube Oil	2,000	44	160		11 U											
NWTPH-Gx																
Gasoline	100															
PAHs (µg/kg) Method SW8270DSIM																
Naphthalene	2,300	4.9 U	8.4	5.5	4.6 U	4.7 U	4.8 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	4.9 U	14	29	4.6 U	4.7 U	15	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	4.9 U	12	14	4.6 U	4.7 U	6.2	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	---	4.9 U	65	9.1	11											
Acenaphthene	340	4.9 U	16	4.6 U	4.6 U											
Fluorene	470	4.9 U	32	10	4.6 U											
Phenanthrene	---	9.4	360	77	39											
Anthracene	4,500	4.9 U	320	97	14											
Fluoranthene	3,200	22	950	220	120											
Pyrene	20,000	19	780	190	130											
Benzo(a)anthracene		10	590	140	82	4.7 U	8.5	4.4 U	8.2	4.8 U	4.6 U	4.8 U	4.7 U	6.2	21	4.6 U
Chrysene		18	570	160	73	4.7 U	9.5	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	140	18	450	140	78	4.7 U	19	10	18	4.8 U	11	4.8 U	14	16	30	10
Indeno(1,2,3-cd)pyrene		15	330	73	41	4.7 U	22	14	18	4.8 U	15	4.8 U	17	18	27	15
Dibenz(a,h)anthracene		4.9 U	110	22	13	4.7 U	26	4.4 U	26	4.8 U	4.6 U	4.8 U	26	25	28	4.6 U
Benzo(g,h,i)perylene	---	16	360	89	48											
Dibenzofuran	---	4.9 U	16	6.8	4.6 U											
Total Benzofluoranthenes		42	930	260	140	4.7 U	20	4.4 U	14	4.8 U	4.6 U	4.8 U	9.4	14	50	4.6 U
TEQ	140	25	652	191	106	ND	27	11	25	ND	13	ND	19	22	43	12

TABLE 1
BOUNDARY FISH ANALYTICAL RESULTS
WESTMAN MARINE SITE
PORT OF BELLINGHAM
BLAINE, WASHINGTON

	Soil Screening Level (Unsaturated)	WM-SS-20 3.0 XK09L 10/16/2013	WM-SS-21 3.0 XK09M 10/16/2013	WM-SS-22 3.0 XK09N 10/16/2013	WM-SS-23 3.0 XK09O 10/16/2013	WM-BF-SS-24 2.3-2.5 XL60B 10/28/2013	WM-BF-SS-25 2.3-2.5 XL60C 10/28/2013	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	**24.3**	**10.1**	**15.1**	**2.0**	**22.1**	**143**	**3.5**	**2.6**	**4.4**	**7.1**	**4.2**	**2.1**				
Cadmium	80	**1.1**	**0.7**	**0.4**	**0.2**	**1.1** J	**1.6**	**2.0**	**0.2**	**0.7**	**0.3**	**0.5**	**0.5**				
Chromium	2,000	**42.6**	**26.2**	**13.6**	**6.0**	**47.1** J	**49.9**	**11.9**	**7.1**	**11.1**	**9.0**	**8.7**	**7.9**				
Copper	36	**1,340**	**198**	**186**	**3**	**1,830**	**3,690**	**62.7**	**18**	**98**	**93.0**	**61.6**	**21**				
Lead	250	**976**	**52.3**	**28.6**	**0.7**	**3,870** J	**1,650**	**50.6**	**1.1**	**29.2**	**14.8**	**5.2**	**6.3**				
Mercury	0.16	**20.5**	**1.37**	**2.57**	0.02 U	**17.7**	**104**	**0.49**	**0.03**	**0.79**	**0.68**	**0.17**	**0.05**				
Nickel						**31**	**22**	**15**	**11**	**10**	**16**	**11**	**8**				
Zinc	100	**814**	**233**	**177**	5 U	**1,630**	**1,030**	**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	**320**	**18**	**37**	5.2 U									**11**	**6.7**	6.3 U	6.5 U
Lube Oil	2,000	**680**	**58**	**34**	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	**73**	**12**	4.9 U	4.6 U	**170**	**560**	32 U	15 U	32 U	14 U	14 U	15 U				
2-Methylnaphthalene	320,000	**99**	**27**	**14**	4.6 U	**89**	**650**	32 U	15 U	32 U	14 U	14 U	15 U				
1-Methylnaphthalene	35,000	**50**	**13**	**6.2**	4.6 U	**86**	**640**	32 U	15 U	32 U	14 U	14 U	15 U				
Acenaphthylene	---	**33**	4.6 U	4.9 U	4.6 U	**80**	**1300**	32 U	15 U	32 U	14 U	14 U	15 U				
Acenaphthene	340	**20**	4.6 U	4.9 U	4.6 U	**490**	**450**	**36**	15 U	32 U	14 U	14 U	15 U				
Fluorene	470	**24**	**5.8**	4.9 U	4.6 U	**350**	**920**	**33**	15 U	32 U	14 U	14 U	15 U				
Phenanthrene	---	**380**	**71**	**15**	4.6 U	**6,000**	**12,000**	**750**	15 U	**52**	14 U	14 U	15 U				
Anthracene	4,500	**87**	**14**	4.9 U	4.6 U	**1,600**	**1,400**	**100**	15 U	32 U	14 U	14 U	15 U				
Fluoranthene	3,200	**590**	**130**	**29**	4.6 U	**7,800**	**15,000**	**1,800**	15 U	**81**	14 U	**20**	15 U				
Pyrene	20,000	**460**	**98**	**24**	4.6 U	**9,300**	**20,000**	**1,900**	15 U	**110**	14 U	**24**	15 U				
Benzo(a)anthracene		**270**	**70**	**13**	4.6 U	**4,400**	**6,600**	**610**	15 U	**54**	14 U	14 U	15 U				
Chrysene		**390**	**78**	**17**	4.6 U	**4,200**	**11,000**	**1,300**	15 U	**73**	14 U	**28**	15 U				
Benzo(a)pyrene	140	**330**	**64**	**24**	**10** M	**4,000**	**8,600**	**550**	15 U	**63**	14 U	14 U	15 U				
Indeno(1,2,3-cd)pyrene		**330**	**54**	**26**	**14** M	**2,300**	**5,900**	**360**	15 U	**68**	14 U	**17**	15 U				
Dibenz(a,h)anthracene		**140**	**35**	**28**	4.6 U	**640**	**1,600**	**110**	15 U	32 U	14 U	14 U	15 U				
Benzo(g,h,i)perylene	---	**490**	**60**	**18**	4.6 U	**2,900**	**7,200**	**510**	15 U	**110**	14 U	**31**	15 U				
Dibenzofuran	---	**27**	4.6 U	4.9 U	4.6 U	**150**	**330**	32 U	15 U	32 U	14 U	14 U	15 U				
Total Benzofluoranthenes		**770**	**140**	**32**	4.6 U	**6,300**	**15,000**	**1,700**	**32**	**190**	**38**	**71**	**32**				
TEQ	140	**485**	**95**	**34**	**11**	**5,406**	**11,620**	**841**	**3.2**	**95**	**3.8**	**9**	**3.2**				

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.
Bold = Detected compound.
Box = Exceedance of cleanup level.