Blaine Marina Tank Farm
Site Overview
Blaine, Washington

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Prepared for

Port of Bellingham
Bellingham, Washington

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BLAINE MARINA TANK FARM OVERVIEW
BLAINE, WASHINGTON

INTRODUCTION

This document presents a brief overview of the Blaine Marina Tank Farm Site (Site) to support discussions between the Washington State Department of Ecology (Ecology) and the Port of Bellingham (Port) regarding development of an agreed order to conduct a remedial investigation/feasibility study (RI/FS) for the Site and an interim action to repair a section of failing bulkhead at the Site shoreline, as discussed in the Known Environmental Conditions section below. A number of previous Site environmental investigations have identified the release of petroleum hydrocarbons from the fueling facility to Site soil and groundwater. The Site is currently listed on the Ecology Hazardous Sites List (FSID 2888) and ranked 3 out of 5 on its priority list for cleanup, with a ranking of 1 being the highest priority for cleanup.

The Site is located within Blaine Harbor in Blaine, Washington, as shown on Figure 1. More specifically, the Site is located in the western portion of the Blaine Harbor industrial area, as shown on Figure 2. The Inner Harbor Line shown on Figure 2 defines the boundary between Port property and State land managed by the Washington Department of Natural Resources (DNR), with State land located to the west of the Inner Harbor Line. Available data indicate that the extent of contamination, and thus the Site boundary, extends onto State land, as shown on Figure 3.

The following sections of this Site overview provide a brief Site history, present available environmental data, and identify anticipated constituents of concern (COCs) based on the available environmental data.

SITE HISTORY

Blaine Harbor is located within the northern portion of Drayton Harbor at the entrance to Semiahmoo Bay, as shown on Figure 1. A small boat harbor and marina were created when aquatic lands were dredged prior to 1949. The upland industrial area was created at that time and was generally constructed of hydraulic fill with timber bulkheads along the shoreline, although in some areas riprap was used instead of, or in conjunction with, the bulkheads to establish the shoreline. Industrial area features are shown on the Blaine Harbor Industrial Area Site Plan (Figure 2). The marina was expanded several times since its original construction, but the footprint of the upland industrial area has remained largely unchanged.

Blaine Marina is the name of the family-owned business that operates the tank farm fueling facility. The tenant has leased the area indicated on Figure 2 from the Port since the 1950s. In 1955, the tenant installed three aboveground storage tanks (ASTs) to store gasoline and diesel fuel for dispensing at

the fueling dock, and also for filling tanker trucks for delivery of home heating oil. The facility has been operated continuously from 1955 to present.

KNOWN ENVIRONMENTAL CONDITIONS

Several investigations have been conducted at the Site since 1990 to investigate soil and groundwater quality for releases of petroleum hydrocarbons from facility operations. At least one documented fuel spill occurred at the Site on May 2, 1990. The sampling locations for these investigations are shown on Figure 3 and the analytical results are summarized in Tables 1 and 2. Additionally, in 2001 the Port conducted a marina-wide sediment investigation that collected and analyzed surface sediment samples BH-01, BH-09, and BH-10 in the vicinity of the Site uplands. The analytical results for surface sediment samples collected in the Site vicinity are summarized in Table 3.

As shown in Tables 1 and 2, and on Figure 3, analysis of samples collected from many of these locations indicate concentrations of diesel-range petroleum hydrocarbons in soil and groundwater exceed the preliminary screening levels. Additionally, product sheen was observed in soil and groundwater over a large area in the vicinity of the ASTs, as shown on Figure 3. The tenant has been conducting passive product recovery from existing monitoring wells MW-2 and MW-3 by using bailing equipment and absorbent pads since 1997. While available data suggest that extent of soil and groundwater was generally bounded to the north, west, and south during previous investigations, most of the data are 15 to 20 years old, so available data may not represent current conditions. Additionally, it is not known whether utilities such as the pipelines to the fuel dock shown on Figure 3 may provide preferential pathways for contaminant migration that could result in contamination extending to areas such as the fuel office area at the shoreline.

Available sediment quality data in the Site vicinity do not indicate that Site releases have impacted sediment quality. At sample location BH-01, the detected concentration of bis(2-ethylhexyl)phthalate (BEHP) exceeded both the Sediment Quality Standards (SQS), and the Cleanup Screening level (CSL) established in the Sediment Management Standards (WAC 173-304). However, BEHP is not associated with known Site releases or activities, and is a common laboratory contaminant; if present, it would not be related to the petroleum hydrocarbon constituents associated with Site releases.

The potential for soil and groundwater contamination to be present in the vicinity of the fuel office is of particular concern because the bulkhead underlying and supporting the eastern side of the fuel office is deteriorating and has partially failed, as shown in the attached photographs. Further failure of the bulkhead could result in the release of contaminated soil and groundwater to surface water and sediment, exacerbating the extent of Site contamination. As a result, the Port intends to conduct an

interim action to repair the section of failing bulkhead before more catastrophic failure can occur that could threaten surface water and sediment quality. Because the Port anticipates replacing the entire bulkhead in this area during future redevelopment of the Site, a temporary repair will be conducted for the interim action.

ATTACHMENTS

Figure 1: Vicinity Map
Figure 2: Blaine Harbor Industrial Area Site Plan
Figure 3: Blaine Marina Tank Farm Site Plan
Table 1: Summary of Upland Soil Analytical Results – Previous Investigations
Table 2: Summary of Groundwater Analytical Results – Previous Investigations
Table 3: Summary of Sediment Analytical Results – Previous Investigation
Photos 1 & 2: Photographs of Failing Bulkhead

N

0 0.5 1

Miles

Data Source: ESRI 2008

V:\0011033\Figure 1 Blaine Marina.mxd

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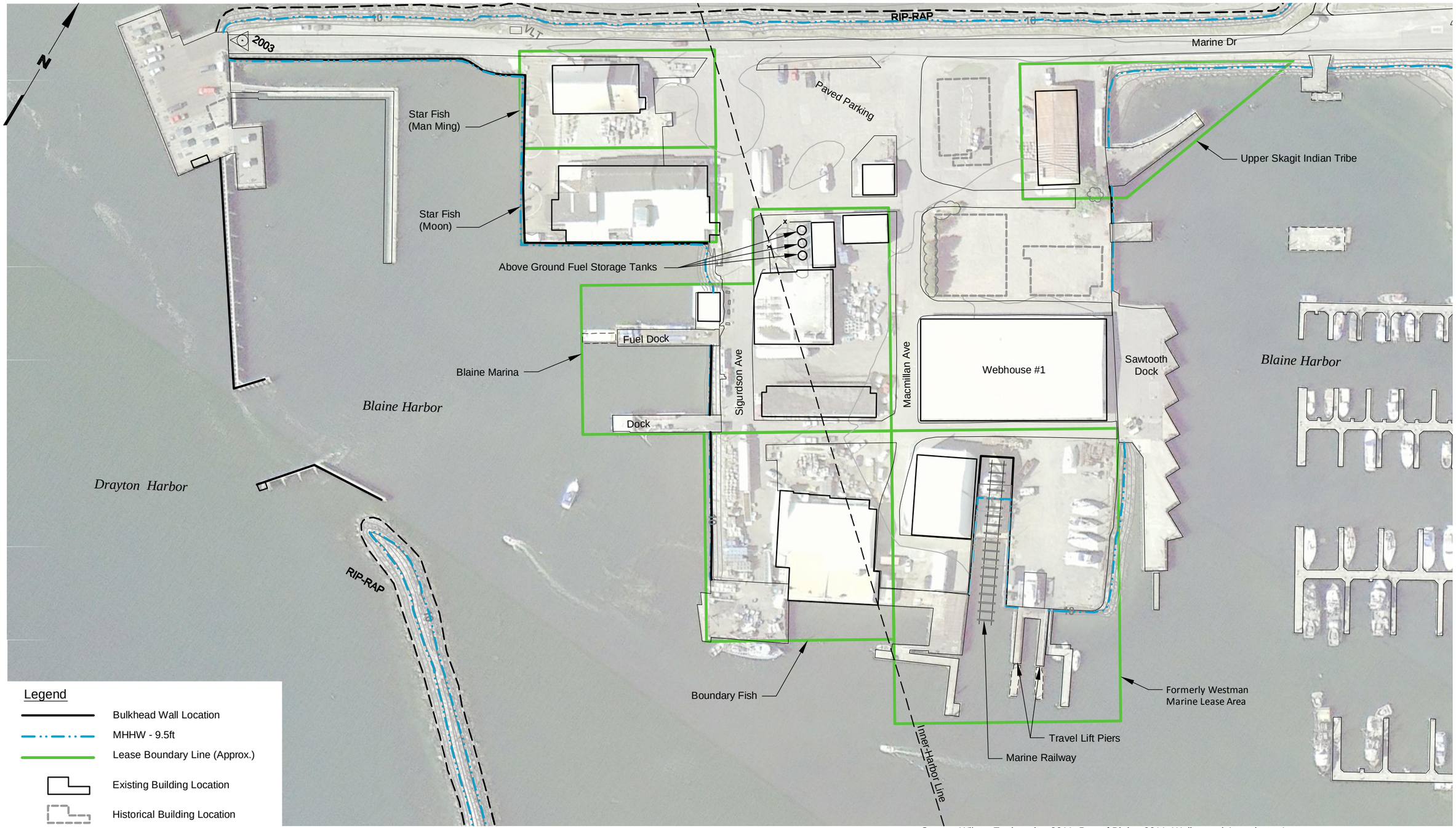
Blaine Marina Blaine Harbor Blaine, Washington	**Vicinity Map**	Figure 1



Source: Wilson Engineering 2011, Port of Blaine 2011, Walker and Associates, Inc.
Aerial Photo Source: Google Earth Professional 2011

Note

Explorations shown in Red indicates contaminant levels exceed preliminary screening levels.

0 100 200
Scale in Feet

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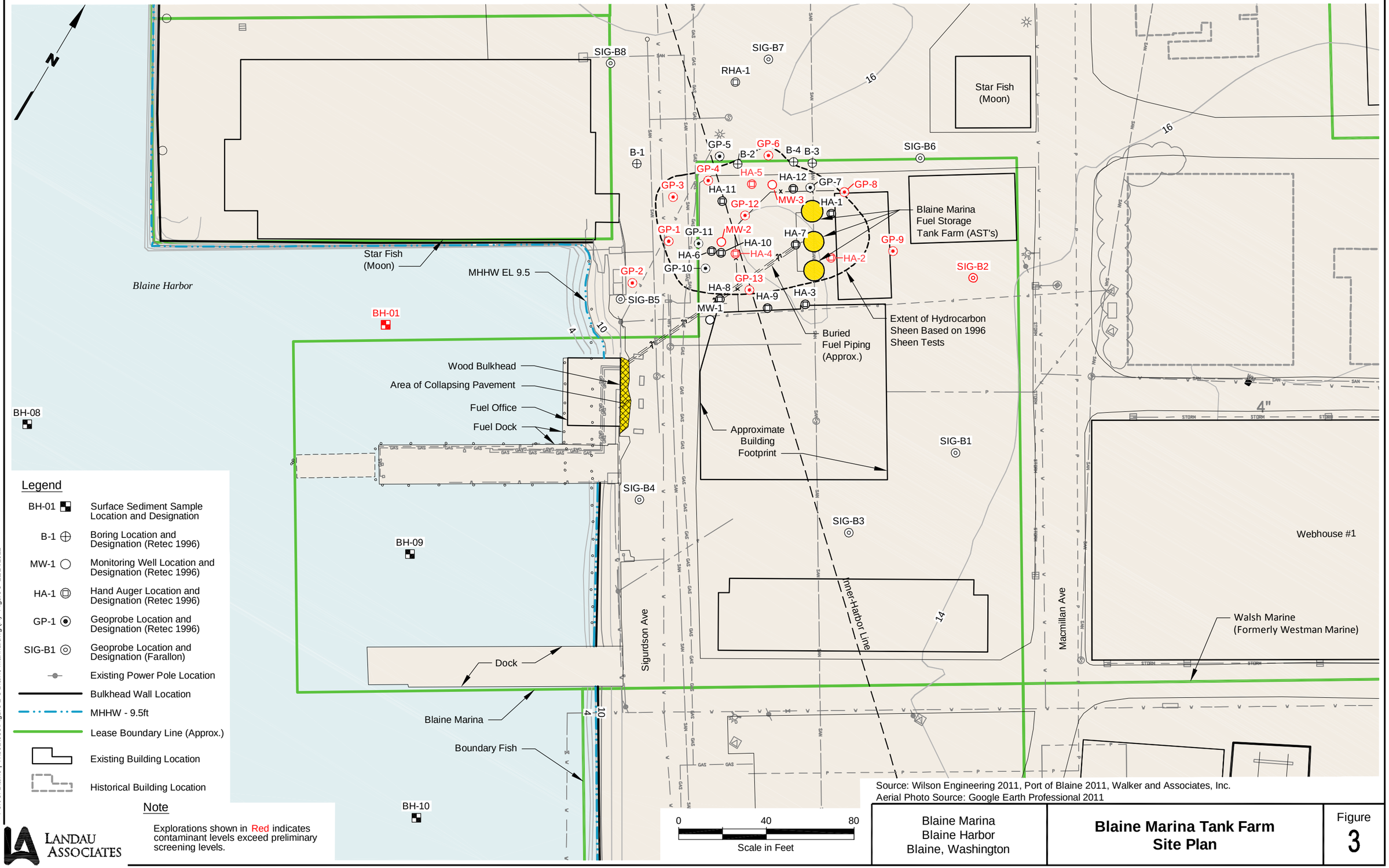
Blaine Marina
Blaine Harbor
Blaine, Washington

Blaine Harbor Industrial Area
Site Plan

Figure
2

Port of Blaine | V:\0011033\Figure 2-3 Blaine Marina.dwg (A) "Figure 2" 11/15/2011



Legend

- BH-01 — Surface Sediment Sample Location and Designation
- B-1 — Boring Location and Designation (Retec 1996)
- MW-1 — Monitoring Well Location and Designation (Retec 1996)
- HA-1 — Hand Auger Location and Designation (Retec 1996)
- GP-1 — Geoprobe Location and Designation (Retec 1996)
- SIG-B1 — Geoprobe Location and Designation (Farallon)
- Existing Power Pole Location
- Bulkhead Wall Location
- MHHW - 9.5ft
- Lease Boundary Line (Approx.)
- Existing Building Location
- Historical Building Location

Note

Explorations shown in Red indicates contaminant levels exceed preliminary screening levels.

Source: Wilson Engineering 2011, Port of Blaine 2011, Walker and Associates, Inc.
Aerial Photo Source: Google Earth Professional 2011

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Blaine Marina Blaine Harbor Blaine, Washington	**Blaine Marina Tank Farm Site Plan**	Figure **3**

Port of Blaine | V:\0001033\Figure 2-3 Blaine Marina.dwg (A) "Figure 3" 11/14/2011

TABLE 1
SUMMARY OF UPLAND SOIL ANALYTICAL RESULTS - PREVIOUS INVESTIGATIONS
BLAINE MARINA TANK FARM - BLAINE, WASHINGTON

Sample ID	Screening	B-1	SIG-B1	SIG-B2	SIG-B3	SIG-B4	SIG-B5	SIG-B6	SIG-B7	SIG-B8	SIG-B10	HA-1
Sample Date	Level	Unknown	1/7/2008	1/7/2008	1/7/2008	1/7/2008	1/7/2008	1/7/2008	1/7/2008	1/7/2008	1/8/2008	5/8/1990
Petroleum Hydrocarbons (mg/kg)												
Total Petroleum Hydrocarbons (a)	2,000	**34**	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1,600**
Gasoline Range Organics	100/30	NA	3.5 U	8.4 U	4.1 U	5.4 U	4.1 U	4.2 U	4 U	4.3 U	6.9 U	
Diesel Range Organics	2,000	NA	27 U	**3,300**	33 U	32 U	34 U	34 U	34 U	33 U	**19,000**	
Motor Oil	2,000	NA	**68**	68 U	**70**	64 U	68 U	68 U	**210**	66 U	**15,000**	
BTEX (mg/kg)												
Benzene	0.03	NA	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.18**	
Toluene	7	NA	0.35 U	0.084 U	0.041 U	0.054 U	0.041 U	0.042 U	0.04 U	0.043 U	0.069 U	
Ethylbenzene	6	NA	0.35 U	0.084 U	0.041 U	0.054 U	0.041 U	0.042 U	0.04 U	0.043 U	0.72	
m, p-Xylene	9 total	NA	0.35 U	0.084 U	0.041 U	0.054 U	0.041 U	0.042 U	0.04 U	0.043 U	0.46	
o-Xylene		NA	0.35 U	0.084 U	0.041 U	0.054 U	0.041 U	0.042 U	0.04 U	0.043 U	0.15	

TABLE 1
SUMMARY OF UPLAND SOIL ANALYTICAL RESULTS - PREVIOUS INVESTIGATIONS
BLAINE MARINA TANK FARM - BLAINE, WASHINGTON

Sample ID	Screening	HA-2	HA-3	HA-4	HA-5	HA-6	HA-7	HA-8	HA-9	HA-10	HA-11	HA-12
Sample Date	Level	5/8/1990	5/8/1990	5/8/1990	5/8/1990	5/8/1990	5/8/1990	5/8/1990	5/8/1990	5/8/1990	5/8/1990	5/8/1990
Petroleum Hydrocarbons (mg/kg)												
Total Petroleum Hydrocarbons (a)	2,000	**16,000**	**1,400**	**12,000**	**11,000**	**10**	**389**	**407**	**183**	**217**	**10**	**732**
Gasoline Range Organics	100/30											
Diesel Range Organics	2,000											
Motor Oil	2,000											
BTEX (mg/kg)												
Benzene	0.03											
Toluene	7											
Ethylbenzene	6											
m, p-Xylene	9 total											
o-Xylene												

Bold = Detected compound.
Boxed value = Concentration exceeds screening level.
NA = Not Analyzed.
Screening Level = Washington State Model Toxics Control Act Method A Cleanup Level for Unrestricted Land Uses.
Sample results presented in milligrams per kilogram
U = Indicates the compound was undetected at the reported concentration.
(a) Historical data do not distinguish between gasoline-, diesel-, or motor oil-range total petroleum hydrocarbons.

TABLE 2
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - PREVIOUS INVESTIGATIONS
BLAINE MARINA TANK FARM - BLAINE, WASHINGTON

Sample ID	Screening	GP-1	GP-10	GP-11	GP-12	GP-13	GP-2	GP-3	GP-4	GP-5	GP-6	GP-7	GP-8
Sample Date	Level	7/19/1996	7/19/1996	7/19/1996	7/19/1996	7/19/1996	7/19/1996	7/19/1996	7/19/1996	7/19/1996	7/19/1996	7/19/1996	7/19/1996
Diesel Range Organics (mg/L)	0.5	**55**	**251**	**85.6**	FP	**33.5**	**1.4**	**160.5**	**27.5**	0.2	**54.7**	0.2	**11.4**

TABLE 2
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - PREVIOUS INVESTIGATIONS
BLAINE MARINA TANK FARM - BLAINE, WASHINGTON

Sample ID	Screening	GP-9	MW-1	MW-2	MW-3
Sample Date	Level	7/19/1996	7/19/1996	7/19/1996	7/19/1996
Diesel Range Organics (mg/L)	0.5	**13.4**	0.1	FP	FP

Bold = Detected compound.
Boxed Value = Concentration exceeds screening level.
FP = Free product encountered during sample collection; sample concentration assumed to exceed screening level.
NA = Not analyzed.
Screening Level = Washington State Model Toxics Control Act Method A Cleanup Levls for Groundwater.
U = Indicates the compound was undetected at the reported concentration.

TABLE 3
SUMMARY OF SEDIMENT ANALYTICAL RESULTS - PREVIOUS INVESTIGATION
BLAINE MARINA TANK FARM - BLAINE, WASHINGTON

Sample ID			BH-01	BH-08	BH-09	BH-10
Sample Date	SQS (a)	CSL (b)	9/27/2001	9/27/2001	9/27/2001	9/27/2001
Metals (mg/kg)						
Arsenic	57	93	6 U			
Cadmium	5.1	6.7	1.1			
Chromium	260	270	28.4			
Copper	390	390	76.8 J			
Lead	450	530	13 J			
Mercury	0.41	0.59	0.09 J			
Silver	6.1	6.1	0.3			
Zinc	410	960	103			
PCBs (mg/kg OC) (c)						
Aroclor 1016	NA	NA	1.2 U			
Aroclor 1242	NA	NA	1.2 U			
Aroclor 1248	NA	NA	1.2 U			
Aroclor 1254	NA	NA	1.2 U			
Aroclor 1260	NA	NA	1.2 U			
Aroclor 1221	NA	NA	2.4 U			
Aroclor 1232	NA	NA	1.2 U			
Total PCBs (d)	12	65	2.4 U			
PAHs (mg/kg OC) (c)						
Naphthalene	99	170	1.2 U	1.1 U	1.3 U	
Acenaphthylene	66	66	6.1	2.8	2.8	
Acenaphthene	16	57	1.7	1.1 U	1.4 M	
Fluorene	23	79	2.9	2.0	2.1	
Phenanthrene	100	480	28.1	17.2	25.3	
Anthracene	220	1,200	17.5	6.7	7.3	
2-Methylnaphthalene	38	64	1.2 U	1.1 U	1.3 U	
LPAH (d)(e)	370	780	56.3	28.7	39.0	
Fluoranthene	160	1,200	87.5	32.2	47.3	
Pyrene	1,000	1,400	87.5	31.1	46.0	
Benzo(a)anthracene	110	270	35.0	16.1	20.0	
Chrysene	110	460	68.8	28.3	34.7	
Benzo(b)fluoranthene	NA	NA	55.0	15.6	24.0	
Benzo(k)fluoranthene	NA	NA	55.0	16.7	24.0	
Total Benzofluoranthenes (f)	230	450	110.0	32.2	48.0	
Benzo(a)pyrene	99	210	28.8	15.0	20.7	

TABLE 3
SUMMARY OF SEDIMENT ANALYTICAL RESULTS - PREVIOUS INVESTIGATION
BLAINE MARINA TANK FARM - BLAINE, WASHINGTON

Sample ID Sample Date	SQS (a)	CSL (b)	BH-01 9/27/2001	BH-08 9/27/2001	BH-09 9/27/2001	BH-10 9/27/2001
Indeno(1,2,3-c,d)pyrene	34	88	19.4	7.8	13.3	
Dibenz(a,h)anthracene	12	33	3.2	1.8	2.8	
Benzo(g,h,i)perylene	31	78	9.4	7.8	12.0	
HPAH (d)(g)	960	5,300	449.4	172.4	244.8	
SVOCs (mg/kg OC) (c)						
1,2-Dichlorobenzene	2.3	2.3	1.2 U	1.1 U	1.3 U	
1,3-Dichlorobenzene	NA	NA	1.2 U	1.1 U	1.3 U	
1,4-Dichlorobenzene	3.1	9	1.2 U	1.1 U	1.3 U	
1,2,4-Trichlorobenzene	0.81	1.8	1.2 U (h)	1.1 U (h)	1.3 U (h)	
Hexachlorobenzene	0.38	2.3	0.06 U	1.1 U (h)	1.3 U (h)	
Dimethylphthalate	53	53	1.8	1.1 U	2.5	
Diethylphthalate	61	110	1.2 U	1.1 U	1.3 U	
Di-n-Butylphthalate	220	1,700	1.2 U	1.1 U	1.3 U	
Butylbenzylphthalate	4.9	64	1.2 U	1.1 U	1.3 U	
bis(2-Ethylhexyl)phthalate	47	78	81.3	7.2	16.0	
Di-n-octyl phthalate	58	4,500	1.2 U	1.1 U	1.3 U	
Dibenzofuran	15	58	1.4	1.1 U	1.3 U	
Hexachlorobutadiene	3.9	6.2	0.06 U	1.1 U	1.3 U	
N-Nitrosodiphenylamine	11	11	1.2 U	1.1 U	1.3 U	
SVOCs (µg/kg)						
Phenol	420	1,200	19 U	20 U	20 U	
2-Methylphenol	63	63	19 U	20 U	20 U	
4-Methylphenol	670	670	19 U	20 U	64	
2,4-Dimethylphenol	29	29	19 U	20 U	20 U	
Pentachlorophenol	360	690	120	98 U	99 U	
Benzyl Alcohol	57	73	19 U	20 U	20 U	
Benzoic Acid	650	650	190 U	200 U	200 U	
Organotins (µg/kg)						
Tributyltin (as chloride)	NA	NA	35			24
Tributyltin (as TBT ion)	73 (i)	NA	31			21
Conventionals						
Total Organic Carbon (percent)	NA	NA	1.6	1.8	1.5	
Total Solids (percent)	NA	NA	44.6	52.2	61.5	
Preserved Total Solids (percent)	NA	NA	41.2			

TABLE 3
SUMMARY OF SEDIMENT ANALYTICAL RESULTS - PREVIOUS INVESTIGATION
BLAINE MARINA TANK FARM - BLAINE, WASHINGTON

Sample ID			BH-01	BH-08	BH-09	BH-10
Sample Date	SQS (a)	CSL (b)	9/27/2001	9/27/2001	9/27/2001	9/27/2001
N-Ammonia (mg-N/kg)	NA	NA	38			
Sulfide (mg/kg)	NA	NA	310			
Fecal Coliform (CFU/g)	NA	NA	49 U			

OC = Organic Carbon
NA = Not available.
U = Indicates compound was analyzed for, but was not detected at the given detection limit.
J = Estimated value.
M = Indicates an estimated value of analyte detected and confirmed by analyst with low spectral match parameters.
CFU = Colony-forming units.
Boxed results exceed the SQS.
Shaded results exceed the CSL.
(a) SMS sediment quality standard (Chapter 173-204 WAC).
(b) SMS cleanup screening level (Chapter 173-204 WAC).
(c) Where chemical criteria in this table represent the sum of individual compounds or isomers, the following methods shall be applied:
  (i) Where chemical analyses identify an undetected value for every individual compound/isomer, then the single highest detection limit shall represent the sum of the respective compounds/isomers.
  (ii) Where chemical analyses detect one or more individual compounds/isomers, only the detected concentrations will be added to represent the group sum.
(d) All organic data (except phenols, benzyl alcohol, and benzoic acid) are normalized to total organic carbon; this involves dividing the dry weight concentration of the constituent by the fraction of total organic carbon present.
(e) The LPAH criterion represents the sum of the following "low molecular weight polycyclic aromatic hydrocarbon" compounds: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene. The LPAH criterion is not the sum of the criteria values for the individual LPAH compounds listed.
(f) The total benzofluoranthenes criterion represents the sum of the concentrations of the "B," "J," and "K" isomers.
(g) The HPAH criterion represents the sum of the following "high molecular weight polynuclear aromatic hydrocarbon" compounds: fluoranthene, pyrene, benzo(a)anthracene, chrysene, total benzofluoranthenes, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene. The HPAH criterion is not the sum of the criteria values for the individual HPAH compounds as listed.
(h) Method detection limits exceed the SQS or CSL criteria.
(i) TBT bulk sediment screening level established by Ecology, which is conceptually equivalent to the SQS.

Photograph 1: Collapsing pavement at bulkhead near fuel office, November 7, 2011

Photograph 2: Aging timber soldier pile bulkhead beneath fuel office, November 7, 2011.