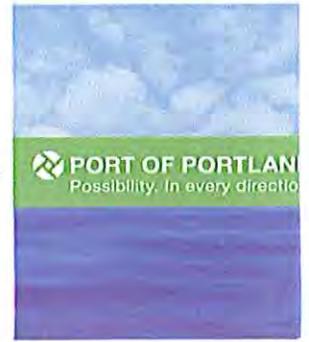


Mission: To enhance the region's economy and quality of life by providing efficient cargo and air passenger access to national and global markets.



March 14, 2013

Attn: Audrey O'Brien
Northwest Region Environmental Partnership Section
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, OR. 97201



RE: Port of Portland Beneficial Use Application - Terminal 4, Berth 410 Dredged Sediment as Fill Material on West Hayden Island

The Port of Portland (Port) will be conducting maintenance dredging at Marine Terminal 4 during the 2013 in-water work window for the Willamette River (July 1 – October 31). Enclosed with this letter is a Department of Environmental Quality Solid Waste Beneficial Use Application and the required \$2,000 fee which requests authorization to place approximately 3,000 – 5,000 cubic yards of dredged material at the existing dredged material placement site on West Hayden Island. Screening of chemical data against ecological and human health screening levels indicates that the dredge material, after placement, will be in compliance with acceptable risk levels and will not pose a risk to human health or the environment.

We appreciate DEQ's willingness to work with us on this project. Please feel free to contact me should you have any questions.

Sincerely,

A handwritten signature in black ink that reads "Michelle Hollis".

Michelle Hollis
Environmental Specialist | Port of Portland
7200 NE Airport Way
Portland, OR 97218
(503) 415-6832 (office)

7200 NE Airport Way Portland OR 97218
Box 3529 Portland OR 97208
(503) 415-6000





State of Oregon
Department of
Environmental
Quality

Application for a Solid Waste Beneficial Use Determination

DEQ USE ONLY - BUSINESS OFFICE			
Date Received: _____			
Amount Received: _____			
Check No.: _____			
Deposit No.: _____			
Forward confirmation of fee payment for: Eastern Region to DEQ, The Dalles Northwestern Region to DEQ-NWR, Portland Western Region to DEQ, Salem			

A. REFERENCE INFORMATION (Please type or print clearly.)

Port of Portland		_____	
Legal name of applicant		Business name of applicant if different	
7200 NE Airport Way		Portland	OR 97218
Mailing address		City	State Zip
503-415-6833		marla.harrison@portofportland.com	
Phone	Mobile	E-mail	Fax

Same as applicant			
Generator of solid waste (may be same as applicant)			

Mailing address		City	State Zip
_____		_____	_____
Phone	Mobile	E-mail	Fax

B. TYPE OF BENEFICIAL USE DETERMINATION REQUESTED Beneficial Use Determination applications are categorized based on the type of information and potential amount of work required by DEQ staff to review application materials and render a decision. A tiered review and fee system has been established in rule. The tiers are:

- Tier 1 For a beneficial use of a solid waste that does not contain hazardous substances significantly exceeding the concentration in a comparable raw material or commercial product and that will be used in a manufactured product;
- Tier 2 For a beneficial use of a solid waste that contains hazardous substances significantly exceeding the concentration in a comparable raw material or commercial product, or involves application on the land;
- Tier 3 For a beneficial use of a solid waste that requires research, such as a literature review or risk assessment, or for a demonstration project to demonstrate compliance with this rule.

I am applying for a Tier 1 Tier 2 Tier 3 determination.

C. DOES THIS PROPOSED BENEFICIAL USE INVOLVE LAND APPLICATION OF ANY MATERIAL?

Yes No

D. SIGNATURE I hereby certify by my signature below that the information contained in this application, and the documents I have attached, are true and correct to the best of my knowledge and belief.

Vince Granato Vince Granato Chief Operating Officer 3-15-13

 Signature of legally authorized representative Print name Title Date

E. REQUIRED ATTACHMENTS TO THIS APPLICATION *(For an application to be complete, it must provide the required information for each listed item of the tier which is being applied for.)*

Tier 1

- A description of the material, manner of generation, and estimated quantity to be used each year;
- A description of the proposed use;
- A comparison of the chemical and physical characteristics of the material proposed for use with the material it will replace;
- A demonstration of compliance with the performance criteria in OAR 340-093-0280 based on knowledge of the process that generated the material, properties of the finished product, or testing; and
- Any other information that DEQ may require to evaluate the proposal.

Tier 2

- The information required for a Tier 1 application;
- Sampling and analysis that provides chemical, physical, and biological characterization of the material and that identifies potential contaminants in the material or the end product, as applicable;
- A risk screening comparing the concentration of hazardous substances in the material to existing, DEQ approved, risk-based screening level values, and demonstrating compliance with acceptable risk levels;
- Location or type of land use where the material will be applied, consistent with the risk scenarios used to evaluate risk;
- Contact information of property owner(s) if this is a site-specific land application proposal, including name, address, phone number, e-mail, site address and site coordinates (latitude and longitude); and
- A description of how the material will be managed to minimize potential adverse impacts to public health, safety, welfare, or the environment.

Tier 3

- The information required for a Tier 1 & 2 application;
- A discussion of the justification for the proposal;
- An estimate of the expected length of time that would be required to complete the project, if it is a demonstration; and
- If it is a demonstration project, the methods proposed to ensure safe and proper management of the material.

F. PERFORMANCE CRITERIA *(For all tiers - An application for a beneficial use determination must demonstrate satisfactory compliance with the following performance criteria.)*

The use is productive, including:

- ◆ There is an identified or reasonably likely use for the material that is not speculative;
- ◆ The use is a valuable part of a manufacturing process, an effective substitute for a valuable raw material or commercial product, or otherwise authorized by DEQ, and does not constitute disposal; and
- ◆ The use is in accordance with applicable engineering standards, commercial standards, and agricultural or horticultural practices.

The use will not create an adverse impact to public health, safety, welfare, or the environment, including:

- ◆ The material is not a hazardous waste under ORS 466.005;
- ◆ Until the time the material is used in accordance with a beneficial use determination, the material will be managed, including any storage, transportation, or processing, to prevent releases to the environment or nuisance conditions;
- ◆ Hazardous substances in the material do not significantly exceed the concentration in a comparable raw material or commercial product, or do not exceed naturally occurring background concentrations, or do not exceed acceptable risk levels, including evaluation of persistence and potential bioaccumulation, when the material is managed according to a beneficial use determination.

The use will not result in the increase of a hazardous substance in a sensitive environment.

The use will not create objectionable odors, dust, unsightliness, fire, or other nuisance conditions.

The use will comply with all applicable federal, state, and local regulations.

G. FEES (Must accompany the application for it to be considered complete)

<input type="checkbox"/>	Tier 1 beneficial use determination	\$1,000
<input checked="" type="checkbox"/>	Tier 2 beneficial use determination	\$2,000
<input type="checkbox"/>	Tier 3 beneficial use determination	\$5,000

Make checks out to: Oregon DEQ

Total fees included: \$2,000**H. APPLICATION PROCEDURE**Step 1

Contact a DEQ staff person for assistance with the preparation of the application. DEQ staff will help with: 1) Determination of the eligibility for a beneficial use determination of a particular waste or process; and, 2) If eligible, establish the tier of beneficial use determination review required and associated fee to submit with the application.

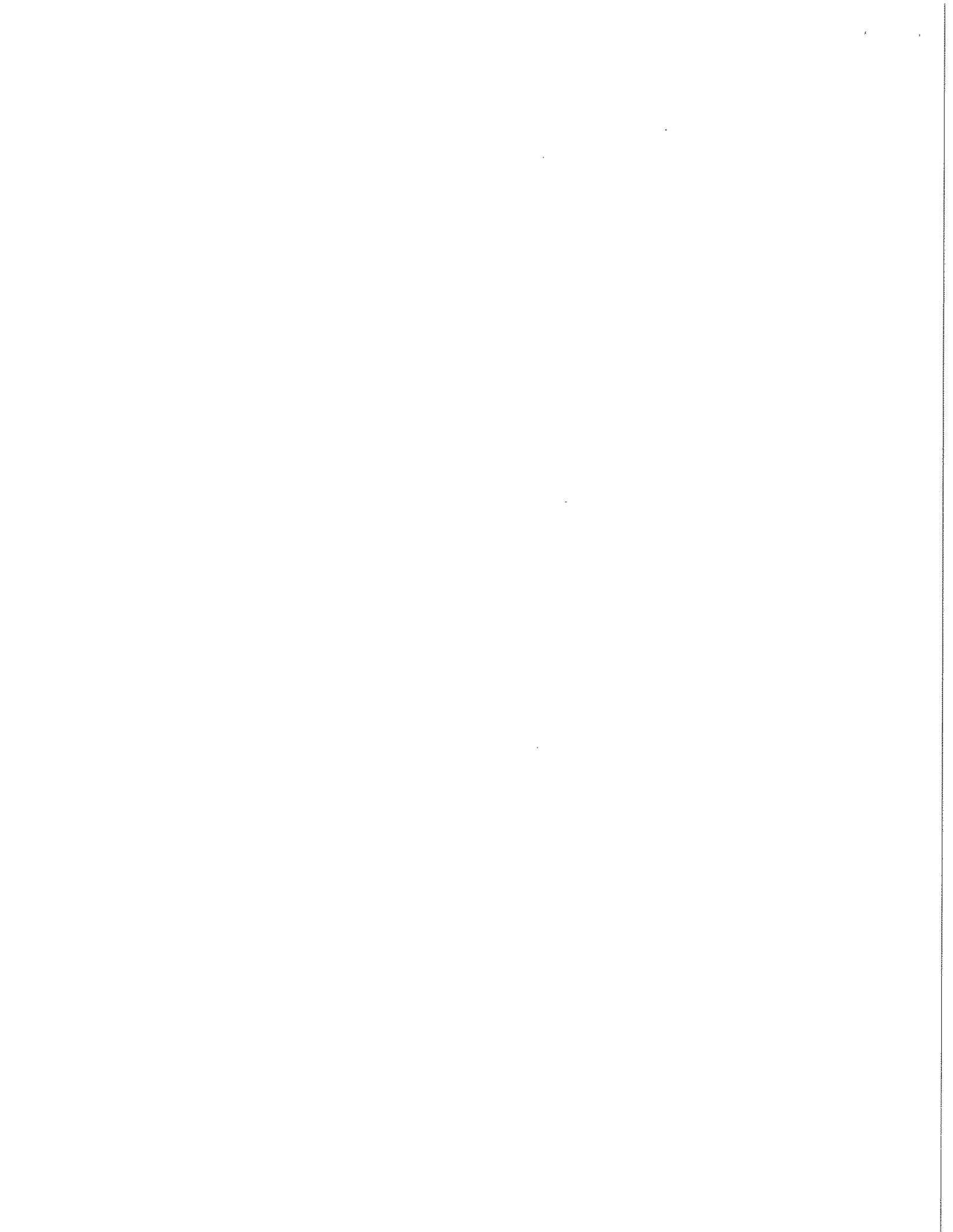
Step 2

Mail the original signed application, all attachments, including the fee payment plus one extra copy to the appropriate regional office (see listing below.) Note that DEQ review work will not begin until a complete application packet is received. Incomplete applications may be returned. DEQ recommends the applicant keep a full copy of all application materials to guard against possible loss in transit.

Step 3

DEQ will contact the applicant, acknowledging receipt of the application, and will identify the staff person assigned to carryout the review. This staff person will contact the applicant if any additional information is needed.

Region	Counties Served	Address & Phone
Eastern Region	Baker, Crook, Deschutes, Gilliam, Grant, Harney, Hood River, Jefferson, Klamath, Lake, Malheur, Morrow, Sherman, Umatilla, Union, Wallowa, Wasco, and Wheeler	Eastern Region Department of Environmental Quality 400 E Scenic Drive, Ste 2.307 The Dalles, OR 97058 (541) 298-7255 ext. 221
Northwest Region	Clatsop, Clackamas, Columbia, Multnomah, Tillamook, and Washington	Northwest Region DEQ Solid Waste Programs 2020 SW Fourth Ave. Ste 400 Portland, OR 97201 (503) 229-5353
Western Region	Benton, Coos, Curry, Douglas, Jackson, Josephine, Lane, Lincoln, Linn, Marion, Polk, and Yamhill	Western Region DEQ Solid Waste Programs 750 Front St. NE Suite 120 Salem, OR 97301 (503) 378-5047



Information for Tier 2 BUD Application

The proposed beneficial use of dredged material from the Port of Portland's (Port's) dredging operation of the middle and west areas of Berth 410 at Marine Terminal 4 would involve "application on the land," placing it in the Tier 2 category. This is the case even though the dredged material does not contain hazardous substances "significantly exceeding the concentration in a comparable raw material or commercial product." Provided below is the required information for a Tier 2 application.

1. *A description of the material, manner of generation, and estimated quantity to be used each year.*

The Port proposes to place approximately 3,000 to 5,000 cubic yards of fill material at its West Hayden Island (WHI) Upland Placement Site. This material will be generated from maintenance dredging operations at the Port's Marine Terminal 4 along the Willamette River (Figure 1), specifically from middle and west areas of Berth 410 (Figure 2). Dredging will occur within the July 1 through October 31, 2013, in-water work window for the Willamette River. The material consists of clayey, silty sand and the actual volumes will be determined by pre-dredge bathymetric surveys.

2. *A description of the proposed use.*

The material from the middle and west areas of Berth 410 (as shown on Figure 2) will be placed at an existing dredged material placement site (the WHI Placement Site) that is designated for future marine commercial and industrial development, and may be used as fill in connection with that or another future development. The proposed use is identical to the use described in previous Beneficial Use Determination (BUD) applications for dredged material from Terminals 2, 5, and 6 and the Post Office Bar. The Oregon Department of Environmental Quality (DEQ) also describes this use in recent Beneficial Use for Solid Waste Determination Evaluation Forms and approval letters for the Post Office Bar and Terminals 2 and 6 (DEQ, 2011a,b, 2012).

3. *A comparison of the chemical and physical characteristics of the material proposed for use with the material it will replace.*

The dredged material proposed for placement has similar characteristics to soil fill, except for very low concentrations of several detected chemical constituents (see items 6 and 7 below which presents the analytical data and details how the material meets DEQ regulations). The material is similar to material which has historically been placed at the WHI Placement Site, and which has more recently been approved for placement under the DEQ's beneficial use rules.

4. *A demonstration of compliance with the performance criteria in OAR 340-093-0280 based on knowledge of the process that generated the material, properties of the finished product, or testing.*

The use is productive as the material is equivalent to soil fill that would be needed to raise the grade for future development. The use will not create an adverse impact to public health, safety, welfare or the environment. The material is not a hazardous waste. Dredging will occur in accordance with an U.S. Army Corps of Engineers (Corps) permit, a State or Oregon DSL permit, a National Marine Fisheries Service Biological Opinion and an Oregon DEQ Water Quality Certification. The dredged material will be transported to West Hayden Island by barge and off-loaded into a placement cell on the island. No return water to the Columbia River will occur. Chemical analysis for hazardous substances has been performed (see Item 6 below), and evaluation of the chemical data (see Item 7 below) indicates that the material does not pose an unacceptable risk to people or ecological species.

5. *Any other information that DEQ may require to evaluate the proposal.*

No additional information is required by DEQ. However, as noted above, the subject material is similar to material historically placed at this site, which has come from dredging projects on the Columbia and Willamette Rivers. DEQ's BUD determinations for dredged material from the Corps' Post Office Bar project and the Port's Terminal 2 and 6 project also contain relevant information for DEQ's determination in this case (DEQ, 2011a,b, 2012).

6. *Sampling and analysis that provides chemical, physical, and biological characterization of the material and that identifies potential contaminants in the material or the end product, as applicable.*

Tables 1 and 2 list the physical and chemical data, respectively, associated with dredge material from Berth 410 proposed to be placed at the WHI placement site (data from Hart Crowser, 2012). The physical analyses indicate fine-grained sediments. Chemical results on samples from the west and middle areas of Berth 410 (i.e., cores 410A and 410B on Figure 2) had low concentrations of chemical compounds, with dredge prism material being classified suitable for unconfined in-water placement by the multi-agency Portland Sediment Evaluation (PSET) team. For the middle area, dredging will also remove new surface material (NSM) represented by sample 410B/NSM.

7. *A risk screening comparing the concentration of hazardous substances in the material to existing, DEQ approved, risk-based screening level values, and demonstrating compliance with acceptable risk levels.*

Table 2 lists the chemical data associated with dredged material proposed for upland placement at the WHI placement site, specifically the dredge prism sample at core 410A and

the dredge prism and NSM samples at core 410B. These data are screened against risk-based screening levels (RBSLs) for upland ecological and human receptors in Table 2. For terrestrial species, we used available EPA ecological soil screening levels (SSLs) derived from evaluation of numerous toxicological studies (EPA, 2005a-2008). In 2001, the DEQ also compiled screening level values (SLVs) for assessing risks to ecological receptors (DEQ, 2001); these were used to fill in gaps where no SSLs were available. Non-threatened and endangered (non-T&E) species of birds and mammals were derived by multiplying T&E SLVs by a factor of 5 for protection of a population basis (per DEQ [2001]). Since no T&E species are found on West Hayden Island, non-T&E SLVs were used. For human health, the most stringent DEQ risk-based concentrations (RBCs) for residential and occupational use were used (DEQ, 2011). If no DEQ RBCs were available, EPA regional screening levels were used (EPA, 2011). Because metals are naturally occurring, only those metal detections above background concentrations were screened (DEQ, 2010). The initial screening shows only one compound (benzo(a)pyrene) that exceeds RBSLs at least once, warranting further evaluation.

The material will be placed upland at the West Hayden Island Placement Site. Currently, the West Hayden Island Placement Site is not developed and consists of approximately 100 acres of West Hayden Island. This placement site has been configured to accommodate and appropriately manage dredge material, and has been an approved placement site for at least 75 years. Terrestrial and bird species occupying the upland portions of the island consist of non-T&E species. The primary and future human health risk scenario is occupational, which is protective for commercial/industrial, recreational, and other uses. No residential use of the property is planned.

In the process of dredging the west and middle areas of Berth 410 and hydraulic placement of the sediment upland, the dredged material will undergo substantial mixing. We calculated the resulting weighted concentrations of the material based on the minimum, average, and maximum anticipated dredge volumes. Table 3 presents the weighted concentrations for benzo(a)pyrene. The highest of these concentrations was then screened against applicable RBSLs for future occupational workers. As shown in Table 3, benzo(a)pyrene is below RBSLs, indicating this compound does not pose an unacceptable risk to people.

In summary, very low concentrations of several chemical compounds have been detected in the sediment to be dredged. Screening of chemical data against ecological and human health screening levels indicates that the dredged material, after placement, will be in compliance with acceptable risk levels and not pose an unacceptable risk to human health or the environment.

8. *Location or type of land use where the material will be applied, consistent with the risk scenarios used to evaluate risk.*

The land use is zoned MUF19 (Multiple Use Forest, 19 Acre Minimum). This is a low density land use designation within Multnomah County. The West Hayden Island Placement Site is used exclusively for dredged material placement and has no other land use associated with the site. The Port is presently engaged in a land use proceeding to annex the subject property, to fulfill long-term plans for marine terminal development. We note, however, that the material will not eliminate the possibility of other types of uses (including recreation and open space). The risk screening assumed these uses.

9. *Contact information of property owner(s) if this is a site-specific land application proposal, including name, address, phone number, e-mail, site address and site coordinates (latitude and longitude).*

Marla Harrison
Port of Portland
7200 NE Airport Way, PO Box 3529
Portland, Oregon 97218
marla.harrison@portofportland.com
503-415-6833

Site Address: West Hayden Island Placement Site
Approximate Coordinates: 45° 37' 25" N, 122° 42' 9" W

10. *A description of how the material will be managed to minimize potential adverse impacts to public health, safety, welfare, or the environment.*

Upland placement involves pumping dredge material directly from the transport barge to a diked area created on West Hayden Island. The dikes are constructed to contain and direct the slurry of dredge material as it is pumped from the barge. Excess water is held in settling ponds controlled by one or more weirs; no surface water would be released back into the adjacent Columbia River. After dewatering, the dredged sediment may be graded. The West Hayden Island Placement Site is not open to the general public or readily accessible to the public. As demonstrated in Item 7 above, the material does not pose an unacceptable risk to human health and the environment.

References:

Anchor, 2012. *Work Plan, Human Health and Ecological Risk Assessment, NW Natural Gasco Site*. March 2012.

DEQ, 2001. *Guidance for Ecological Risk Assessment. Level II – Screening*. December 2001.

DEQ, 2010. *Human Health Risk Assessment Guidance*. Table 1. October 2010.

DEQ, 2011a. *Beneficial Use Determination BUD20100708 (Reconsidered) – Use of Post Office Bar Dredged Sediments as Fill Material at West Hayden Island Placement Facility*. Approval letter dated May 9, 2011, with attached May 6, 2011, evaluation form.

DEQ, 2011b. *Beneficial Use Determination Approval, BUD20110803, Port of Portland, T-6 Dredge Sediment, Multnomah County*. Approval letter dated November 1, 2011, with attached September 30, 2011, evaluation form.

DEQ, 2012. *Beneficial Use Determination Approval, BUD-20120320, Port of Portland, T-2 Dredge Sediment, Multnomah County*. Approval letter dated June 1, 2012, with attached evaluation form dated May 10, 2012, and updated June, 1, 2012.

DEQ, 2012. Excel® Spreadsheet for Risk Based Concentrations for Individual Chemicals. June 7, 2012.

EPA, 2005a. *Ecological Soil Screening Levels for Arsenic – Interim Final*. OSWER Directive 9285.7-62. March 2005.

EPA, 2005b. *Ecological Soil Screening Levels for Cadmium – Interim Final*. OSWER Directive 9285.7-65. March 2005.

EPA, 2005c. *Ecological Soil Screening Levels for Lead – Interim Final*. OSWER Directive 9285.7-70. March 2005.

EPA, 2006. *Ecological Soil Screening Levels for Silver – Interim Final*. OSWER Directive 9285.7-77. September 2006.

EPA, 2007a. *Ecological Soil Screening Levels for Copper – Interim Final*. OSWER Directive 9285.7-68. Issued July 2006, Revised February 2007.

EPA, 2007b. *Ecological Soil Screening Levels for Nickel – Interim Final*. OSWER Directive 9285.7-76. March 2007.

EPA, 2007c. *Ecological Soil Screening Levels for Dieldrin – Interim Final*. OSWER Directive 9285.7-56. Issued March 2005, Revised April 2007.

EPA, 2007d. *Ecological Soil Screening Levels for DDT and Metabolites*. OSWER Directive 9285.7-57. April 2007.

EPA, 2007e. *Ecological Soil Screening Levels for Pentachlorophenol – Interim Final*. OSWER Directive 9285.7-58. Issued March 2005, Revised April 2007.

EPA, 2007f. *Ecological Soil Screening Levels for Zinc – Interim Final*. OSWER Directive 9285.7-73. June 2007.

EPA, 2007g. *Ecological Soil Screening Levels for Polycyclic Aromatic Hydrocarbons (PAHs) – Interim Final*. OSWER Directive 9285.7-78. June 2007.

EPA, 2008. *Ecological Soil Screening Levels for Chromium – Interim Final*. OSWER Directive 9285.7-76. Issued March 2005, Revised April 2008.

EPA, 2012. *Regional Screening Levels*. November 2012.

Hart Crowser, 2012a. *Sediment Characterization Report, Terminal 4 Berths 401 and 410, 14400 N. Lombard Street, Portland, Oregon*. July 11, 2012.

Hart Crowser, 2012b. *Work Plan to Address NSM Sediments, Terminal 4 Berth 410 – Mid and East Berth Areas, 14400 N. Lombard Street, Portland, Oregon*. July 11, 2012.

Table 1 - Grain Size Distributions
Terminal 4 Berth 410 Beneficial Use Determination
11040 N. Lombard Street, Portland, Oregon

Sediment Horizon		Prism		NSM
		Sample ID Lab ID Date	410A/DP UU16G 8-May-12	410B/DP UU16H 8-May-12
Classification	Microns	Percent (%)		
Gravel	>2,000	0.1	0.2	0.0
Very Coarse Sand	850-2000	1.0	0.5	0.8
Coarse Sand	425-850	14.6	17.8	21.0
Medium Sand	250-425	24.5	46.5	40.5
Fine Sand	150-250	5.3	9.8	8.4
Very Fine Sand	75-150	3.8	2.8	3.1
Coarse Silt	32-75	14.6	5.8	7.9
Medium Silt	13-32	15.0	7.1	7.8
Fine Silt	9-13	4.4	1.9	1.9
Very Fine Silt	7-9	4.4	1.9	1.9
8-9 Phi Clay	3.2-7	7.5	3.8	4.9
9-10 Phi Clay	1.3-3.2	3.1	1.9	1.0
> 10 Phi Clay	<1.3	1.9	0.0	0.0
Total Fines	<75	50.9	22.4	25.4
Material Description		Clayey, very silty SAND	Slightly clayey, silty SAND	Slightly clayey, silty SAND

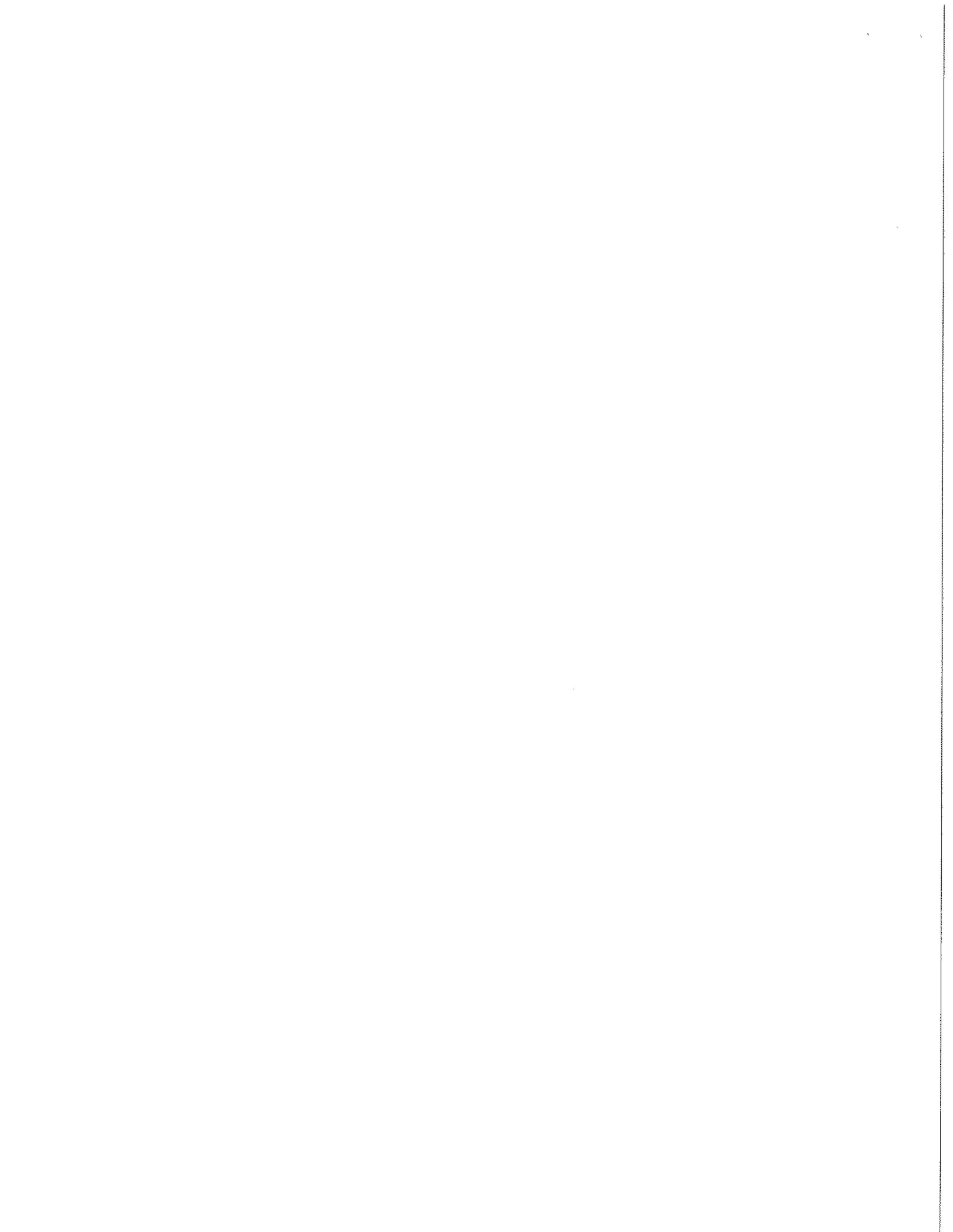
Notes:

1. Sample 410A was run in triplicate as part of laboratory quality control. The result shown is the first sample. The other samples were almost the same (total fines of 64.7 and 63.2 percent).
2. Samples were analyzed by ASTM D421/422 which has a slightly different grain scale from the Udden-Wentworth Scale used in the SEF. The SEF classifications listed above are approximately match the micron sizes specified.

Acronyms:

NSM = New surface material

SEF = Sediment Evaluation Framework for the Pacific Northwest, dated September 2009



**Table 2 - Sediment Chemical Analyses Results and Risk Screening
Terminal 4 Berth 410 Beneficial Use Determination
11040 N. Lombard Street, Portland, Oregon**

Sediment Horizon Sample Lab ID Date	Prism		NSM	Natural Background	Ecological SLs				Human RBCs	
	410A/DP UU16G 8-May-12	410B/DP UU16H 8-May-12	410B/NSM UU16K 8-May-12		Plants	Invert.	Non-T&E Bird	Non-T&E Mammal	Occupational	Critical Pathway
	Conventional Parameters									
Total Solids (%)	55.3	71.1	72.7	-	-	-	-	-	-	-
Total Organic Carbon (%)	1.84	1.18	1.19	-	-	-	-	-	-	-
Ammonia (mg/kg)	105	81.9	96.2	-	-	-	-	-	-	-
Total Sulfides (mg/kg)	28.6	18.3	32.9	-	-	-	-	-	-	-
TPH in mg/kg										
Diesel-Range	10	1.3 U	-	-	-	-	-	-	14,000	Direct
Oil-Range	150	2.7 U	-	-	-	-	-	-	-	-
Total TPH	160	2.7 U	-	-	-	-	-	-	14,000	Direct
Metals in mg/kg										
Antimony	0.023 UJ	0.018 UJ	0.018 UJ	4	5	78*	-	1.35*	410	EPA
Arsenic	3.6	2.9	3.0	7	18*	60	215*	230*	1.7	Direct
Cadmium	0.021 U	0.017 U	0.1	1	32*	140*	3.9*	1.8*	500	Direct
Chromium	22	16	18	42	1	0.4	130*	170*	1,500,000	Direct (III)
Copper	31.7	24.5	26.8	36	70*	80*	140*	245*	41,000	Direct
Lead	9.5	8.3	19.1	17	120*	1,700*	55*	280*	30	Leaching
Mercury	0.0018 U	0.03	0.0018 U	0.07	0.3	0.1	7.5	365	310	Direct
Nickel	23.7	19.8	20.0	38	38*	280*	1,050*	650*	20,000	Direct
Silver	0.014 U	0.011 U	0.011 U	1	560*	50	21*	70*	5,100	Direct
Zinc	85	67	79	86	160*	120*	230*	395*	310,000	EPA
Tributyltin (TBT)										
TBT in Bulk Sediment (µg/kg)	1.0 U	1.9 J	14	-	-	-	-	-	180,000	EPA
PAHs in µg/kg										
<u>LPAHs</u>										
Naphthalene	34	37	47	-	10,000	-	-	1,950,000	15,000	Leaching
Acenaphthylene	7.1	4.1 J	9.3 J	-	-	-	-	-	-	-
Acenaphthene	49	38	83	-	20,000	-	-	-	41,000,000	Direct
Fluorene	27	28	40	-	-	30,000	-	-	35,000,000	Direct
Phenanthrene	100	130	270	-	-	-	-	-	-	-
Anthracene	23	36	60	-	-	-	-	-	310,000,000	Direct
2-Methylnaphthalene	12	20	21	-	-	-	-	-	-	-
Total LPAHs	252	293	530	-	-	29,000*	-	500,000*	2,200,000	EPA
<u>HPAHs</u>										
Fluoranthene	160	170	500	-	-	-	-	-	29,000,000	Direct
Pyrene	160	170	450	-	-	-	-	-	21,000,000	Direct
Benz(a)anthracene	57	66	280	-	-	-	-	-	2,700	Direct
Chrysene	83	84	320	-	-	-	-	-	270,000	Direct
Benzo(b)fluoranthene	-	-	-	-	-	-	-	-	2,700	Direct
Benzo(k)fluoranthene	-	-	-	-	-	-	-	-	27,000	Direct
Benzo(b+k)fluoranthenes	130	130	640	-	-	-	-	-	2,700	Direct
Benzo(a)pyrene	86	83	400	-	-	-	-	625,000	270	Direct
Indeno(1,2,3-cd)pyrene	50	41	160	-	-	-	-	-	2,700	Direct
Dibenz(a,h)anthracene	12	8.4	58	-	-	-	-	-	270	Direct
Benzo(g,h,i)perylene	62	44	160	-	-	-	-	-	-	-
Total HPAHs	800	796	2,968	-	-	18,000*	-	5,500*	-	-
SVOCs in µg/kg										
<u>Chlorinated Hydrocarbons</u>										
1,4-Dichlorobenzene	2.7 U	2.8 U	2.7 U	-	-	-	-	-	410	Leaching
1,2-Dichlorobenzene	2.4 U	2.4 U	2.3 U	-	-	20,000	-	-	290,000	Leaching
1,2,4-Trichlorobenzene	3.3 U	3.4 U	3.2 U	-	-	20,000	-	-	99,000	EPA
Hexachlorobenzene	4.0 U	4.4 U	4.2 U	-	-	1,000,000	-	-	1,200	Direct
<u>Phthalates</u>										
Dimethyl Phthalate	2.8 U	2.8 U	2.7 U	-	-	200,000	-	-	-	-
Diethyl Phthalate	35 U	36 U	34 U	-	100,000	-	-	-	490,000,000	EPA
Di-n-butyl Phthalate	7.7 U	7.9 U	7.6 U	-	200,000	-	2,250	150,000,000	62,000,000	EPA
Butyl Benzyl Phthalate	5.8 U	6.0 U	5.7 U	-	-	-	-	-	910,000	EPA
Bis(2-ethylhexyl) Phthalate	62 U	68 U	44 U	-	-	-	22,500	5,100,000	150,000	Direct
Di-n-octyl Phthalate	5.6 U	5.7 U	5.4 U	-	-	-	-	-	-	-

Please refer to notes on the last page of this table.

**Table 3 - Risk Screening of Sediment Data for Upland Placement
Terminal 4 Berth 410 Beneficial Use Determination
11040 N. Lombard Street, Portland, Oregon**

Sediment Horizon Sample Lab ID Date	Prism		NSM	Natural Background	Ecological SLVs				Human RBCs	
	410A/DP UU16 8-May-12	410B/DP UU16 8-May-12	410B/NSM UU16 8-May-12		Plants	Invert.	Non-T&E Bird	Non-T&E Mammal	Occupational	Critical Pathway
	SVOCs in µg/kg (Continued)									
<i>Phenols</i>										
2,4-Dimethylphenol	3.3 U	3.4 U	3.2 U	-	20,000	-	-	-	12,000,000	EPA
2-Methylphenol	5 U	5.1 U	4.9 U	-	50,000	-	-	80,000,000	31,000,000	EPA
4-Methylphenol	14 J	6.5 U	9.3 J	-	-	-	-	-	3,100,000	EPA
Pentachlorophenol	46 UJ	47 UJ	45 UJ	-	5,000*	31,000*	10,500*	14,000*	1,000	Leaching
Phenol	30 J	11 J	8.0 U	-	70,000	30,000	-	-	180,000,000	EPA
<i>Miscellaneous Extractables</i>										
Benzoic Acid	110 J	98 U	94 U	-	-	-	-	-	2,500,000,000	EPA
Benzyl Alcohol	73	20	5.6 U	-	-	-	-	-	62,000,000	EPA
Dibenzofuran	14	17	18 J	-	-	-	-	85,000**	1,000,000	EPA
Hexachlorobutadiene	4.4 U	4.4 U	4.2 U	-	-	-	-	-	22,000	EPA
n-Nitrosodiphenylamine	5.1 U	5.2 U	5.0 U	-	-	-	-	-	350,000	EPA
Pesticides in µg/kg										
4,4'-DDD	0.92 J	1.1 JP	1.3	-	-	-	50	500,000	11,000	Direct
4,4'-DDE	1.7	0.96 J	2.5 JP	-	-	-	50	500,000	7,600	Direct
4,4'-DDT	0.19 U	0.18 U	0.19 U	-	-	-	50	500,000	7,700	Direct
Total DDx				-	-	-	465*	105*	-	-
Aldrin	0.053 U	0.052 U	0.054 U	-	-	-	-	125,000	110	Direct
alpha-Chlordane	0.049 U	0.048 U	0.050 U	-	-	-	45,000	1,250,000	7,000	Direct
Dieldrin	0.097 U	0.095 U	0.098 U	-	-	-	110*	24.5*	28	Leaching
Heptachlor	0.13 U	0.12 U	0.13 U	-	-	-	-	75,000	460	Direct
gamma-BHC (Lindane)	0.046 U	0.015 U	0.047 U	-	-	-	40,000	5,000,000	21	Leaching
PCBs in µg/kg										
Aroclor 1016	0.99 U	0.96 U	0.99 U	-	-	-	-	500,000	21,000	EPA
Aroclor 1221	1.3 U	1.3 U	1.3 U	-	-	-	-	-	540	EPA
Aroclor 1232	1.3 U	1.3 U	1.3 U	-	-	-	-	-	540	EPA
Aroclor 1242	9.7 U	5.6 U	1.3 U	-	-	-	7,500	25,000	740	EPA
Aroclor 1248	1.3 U	1.3 U	5.8 U	-	-	-	-	-	740	EPA
Aroclor 1254	5.8 U	1.3 U	5.8 U	-	-	-	3,500	20,000	740	EPA
Aroclor 1260	5.7	3.8	4.9	-	-	-	-	-	740	EPA
Aroclor 1262	1.3 U	1.3 U	1.3 U	-	-	-	-	-	-	-
Aroclor 1268	1.3 U	1.3 U	1.3 U	-	-	-	-	-	-	-
Total PCBs	5.7 J	3.8 J	4.9 J	-	40,000	-	-	20,000	560	Direct

Notes:

- PAH and dibenzofuran concentrations are the higher of the EPA Method 8270D-SIM and EPA Method 8270D analyses.
- Bolded values are detected concentrations.
- Background and screening levels are from the following sources:
 - Background metals concentrations from Table 1 of the DEQ's Human Health Risk Assessment guidance (DEQ, 2010).
 - *Ecological SLs are based on SSLs (EPA, 2005a - 2008). If no SSL was available, then the SLV from DEQ (2001) is listed. **The DEQ (2001) SL for dibenzofuran incorrectly used a chlorinated dibenzofuran for its derivation; recently, the DEQ has calculated an alternative SL of 17,000 µg/kg (Anchor QEA, 2012). Because ecological SSLs and SLVs are for T&E terrestrial species and no T&E species have been identified at the West Hayden Island Upland Placement Site, these SLs were multiplied by 5 times to derive a non-T&E terrestrial SL for birds and mammals per DEQ (2001).
 - Background metals concentrations from Table 1 of the DEQ's Human Health Risk Assessment guidance (DEQ, 2010).
 - Lowest RBC for occupational worker pathways from DEQ (2012b), where available.
 - EPA Regional Screening Level for industrial soil from EPA (2012).
- Shaded value is a concentration exceeding its respective SL (exceeded SL is also shaded). For metals, the background must be exceeded first.
- For undetected compounds, MDLs are shown.
- = Not analyzed or not available.
- J = Estimated concentration between MDL and method reporting limit.
- P = The analyte was detected on both chromatographic columns but the RPD was greater than 40%.
- U = Not detected at the indicated MDL.

Acronyms:

DEQ = Oregon Department of Environmental Quality
 EPA = Environmental Protection Agency
 MDL = Method detection limit
 NSM = New surface material
 PAHs = Polycyclic aromatic hydrocarbons
 PCBs = Polychlorinated biphenyls
 RBC = Risk-based concentration
 RPD = Relative percent difference
 SL = Screening level
 SLV = Screening level value
 SSL = Soil screening level
 SVOCs = Semivolatile organic compounds
 T&E = Threatened and endangered

**Table 3 - Risk Screening of Estimated Post-Dredge Concentrations
Terminal 4 Berth 410 Beneficial Use Determination
11040 N. Lombard Street, Portland, Oregon**

Berth Area:	West - Dredge Prism	Middle - Dredge Prism	Middle - NSM	Resulting Weighted Concentration		
Sample ID:	410A/DP	410B/DP	410B/NSM			
Volumes (cy)				Volume (cy)		
Minimum	1,200	600	1,200	Min	Average	Max
Average	1,850	900	1,300	3,000	4,050	5,100
Maximum	2,500	1,200	1,400			
SVOCs in µg/kg Benzo(a)pyrene	86	83	400	211	186	171

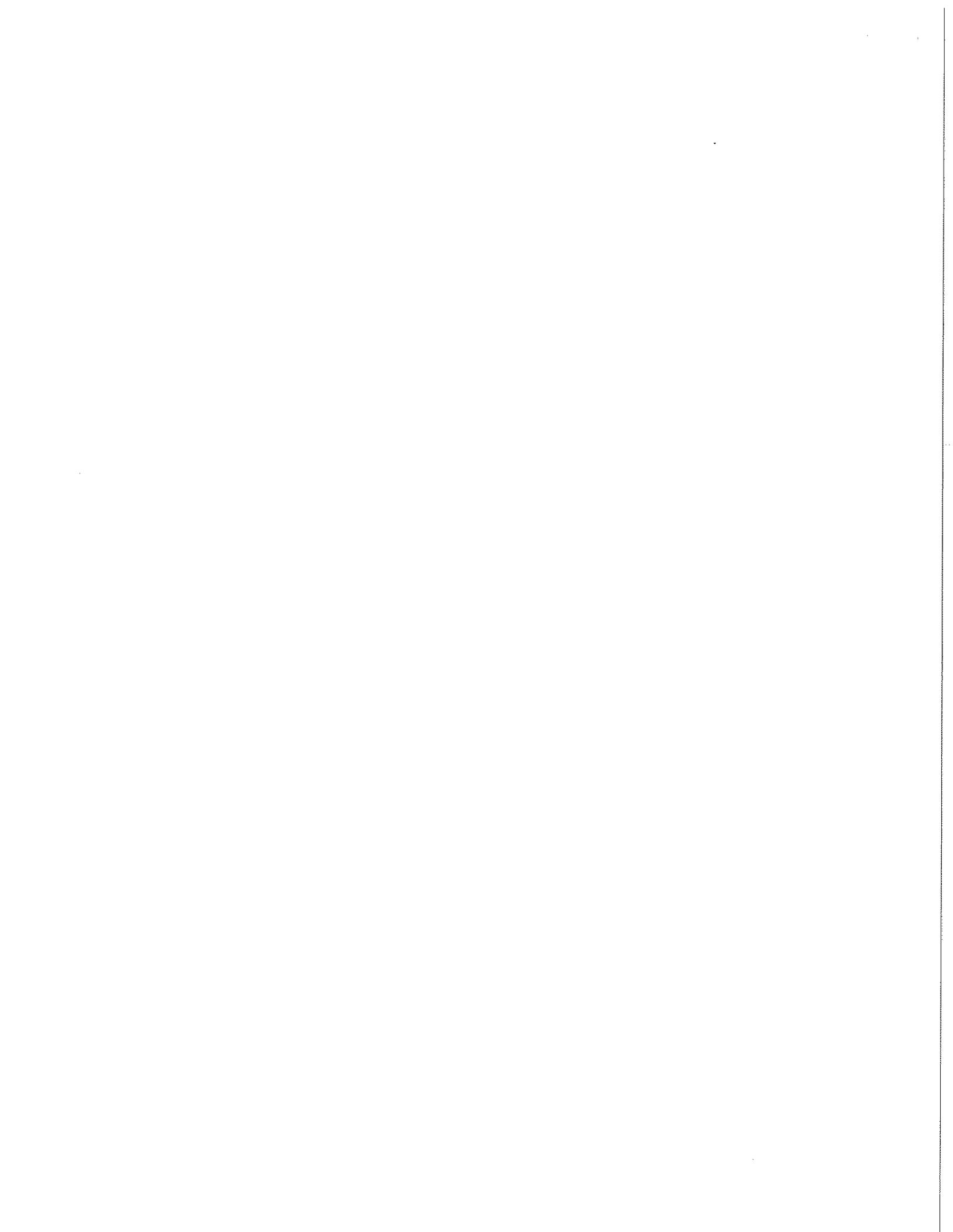
Chemical of Concern	Highest Weighted Conc.	Ecological SLs				Human RBCs
		Plant	Invertebrate	Non-T&E Bird	Non-T&E Mammal	Occupational
SVOCs in µg/kg Benzo(a)pyrene	211	-	18,000*	-	5,500*	270

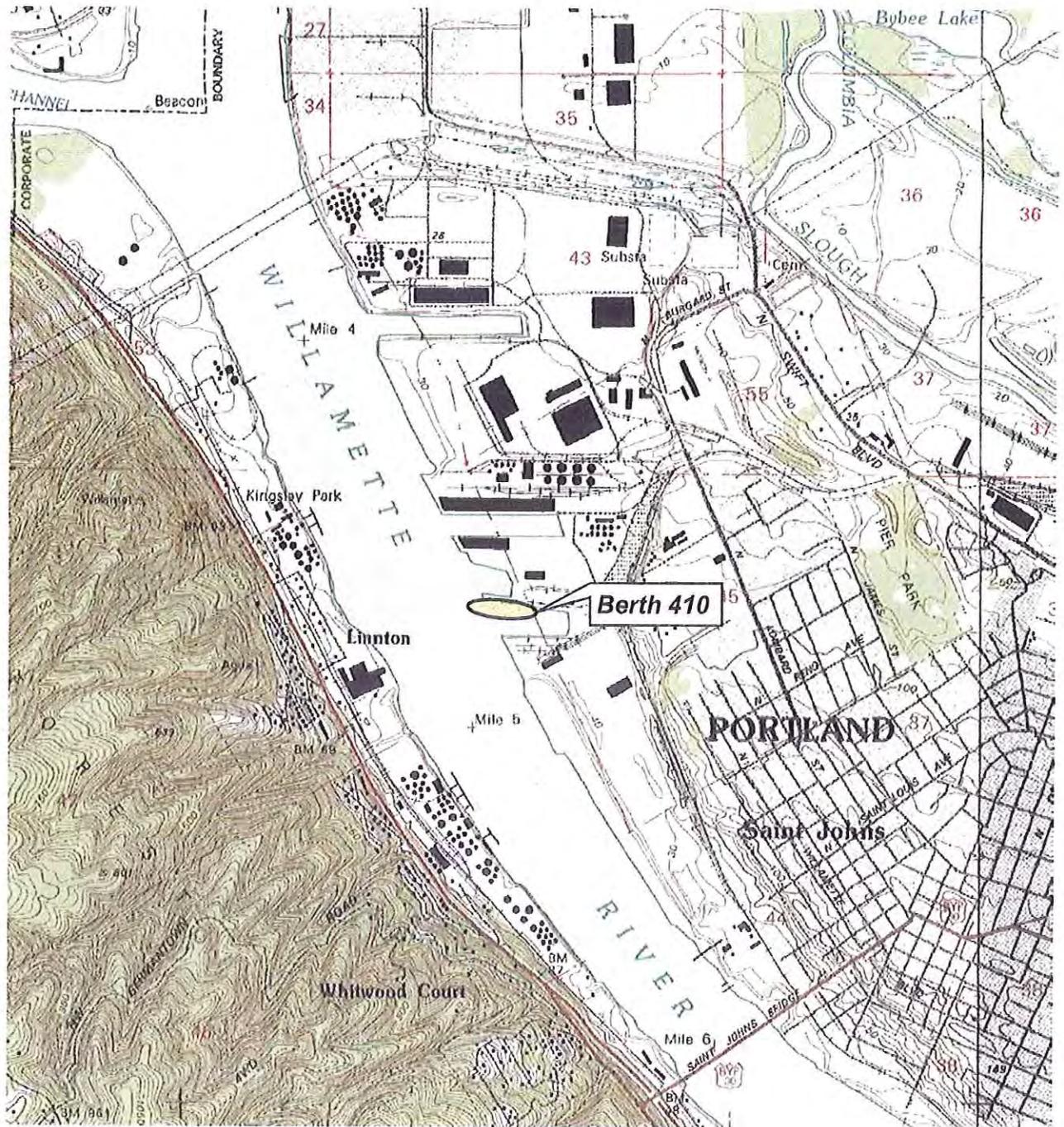
Notes:

- This table only lists compounds exceeding screening levels from Table 2.
- Bolded values are detected and calculated concentrations.
- Screening levels are from the following sources:
 - *Ecological SLs based on SSLs (EPA, 2007g) for total HPAHs. Per DEQ (2001), the ecological SL was multiplied by 5 times to derive a non-T&E terrestrial SL for mammals. No benzo(a)pyrene SSL or SLV is available for invertebrates, plants, or birds. DEQ (2001) lists a benzo(a)pyrene SLV of 125,000 µg/kg for T&E mammals which is higher than the HPAH T&E SSL of 1,100 µg/kg. The lower SSL value (multiplied by 5) was used as a more conservative mammal SL.
 - Lowest RBC for occupational worker pathways from DEQ (2012).
- = Not available.

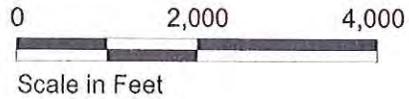
Acronyms:

cy = Cubic yard
DEQ = Oregon Department of Environmental Quality
EPA = Environmental Protection Agency
HPAHs = High molecular weight PAHs
NSM = New surface material
PAHs = Polycyclic aromatic hydrocarbons
RBC = Risk-based concentration
SL = Screening level
SLV = Screening level value
SSL = Soil screening level
SVOCs - Semivolatile organic compounds
T&E = Threatened and endangered



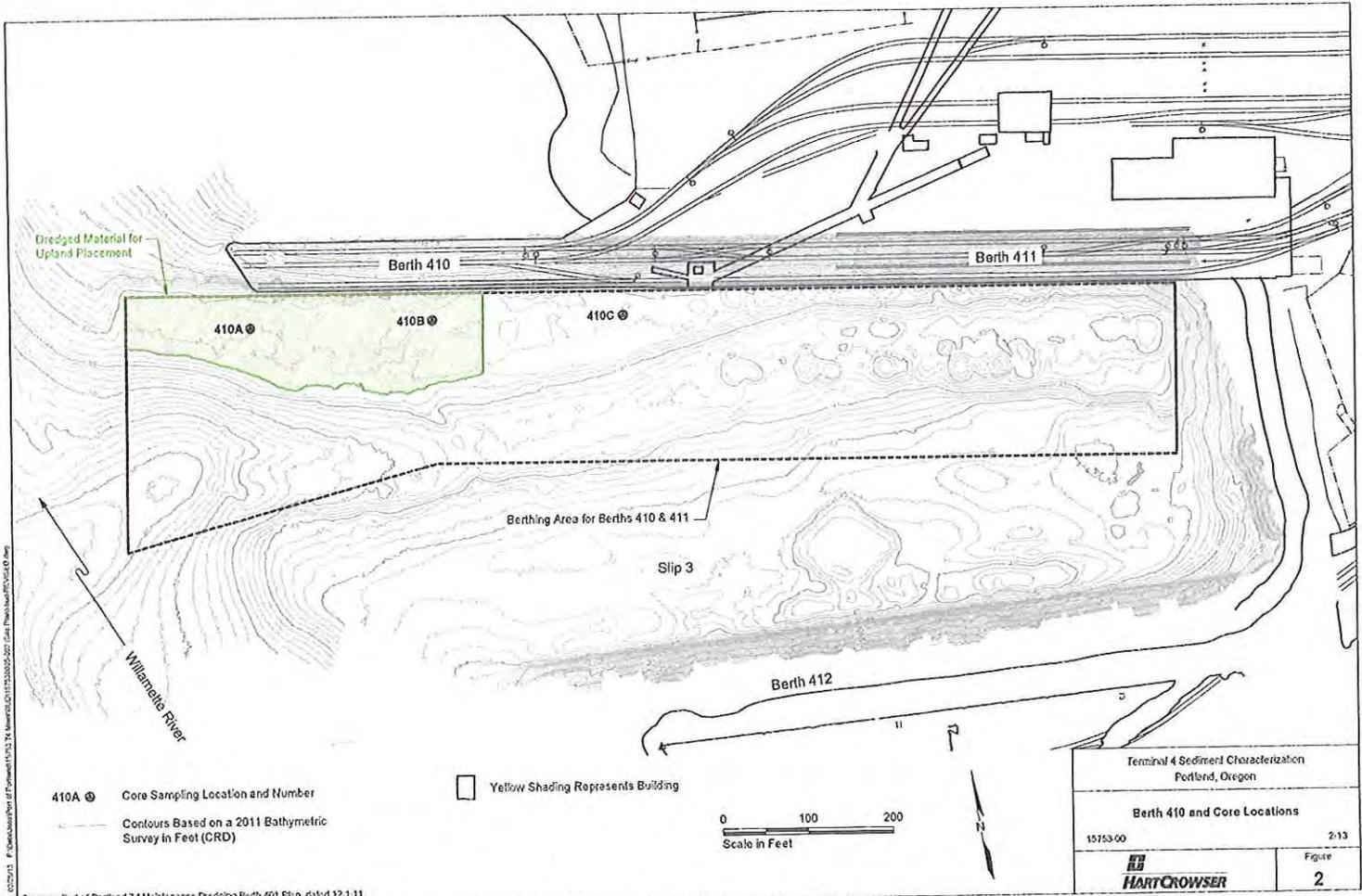


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Terminal 4 Sediment Characterization Portland, Oregon	
Site Location Map	
15753-00	2/13
	Figure 1

Source: Base map prepared from the USGS 7.5-minute quadrangle of Linnton, Oregon, dated 1990.



Source: Port of Portland T4 Maintenance Dredging Berth 401 Plan, dated 12-1-11.

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