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, PO Box 3529		Portland	Oregon	97218
Mailing address		City	State	Zip
503-415-6220		sam.ruda@portofportland.com		
Phone	Mobile	E-mail		Fax

Port of Portland				
Generator of solid waste (may be same as applicant)				
7200 NE Airport Way, PO Box 3529		Portland	Oregon	97218
Mailing address		City	State	Zip
503-415-6220		sam.ruda@portofportland.com		
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.

Sam Ruda — Director of Marine and Industrial Development

Signature of legally authorized representative	Print name	Title	Date
	NATHANIEL M RUDA	DIRECTOR	8.1.11

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)*

☐	Tier 1 beneficial use determination	$1,000
☒	Tier 2 beneficial use determination	$2,000
☐	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 T-6 dredging operation 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.*

   Approximately 20,000 to 40,000 cubic yards of fine- and medium-grained sediments (mix of silt and fine- to medium-grained sand) that will be dredged from the Columbia River at Port of Portland Marine Terminal 6, Berths 601, 603, 604, 605, and 607. Actual volumes will be determined by pre-dredge bathymetric surveys.

2. *A description of the proposed use.*

   The material will be placed at an existing dredged material placement site that is designated for future marine commercial and industrial development, and used as fill in connection with that future development. The proposed use is identical to the use proposed in the recent Post Office Bar BUD (May 9, 2011), and is discussed in detail in DEQ's Response to Comments on the BUD (May 5, 2011, at page 8.) DEQ, 2011.

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 attached Table 1 and item 7 below which details how the material meets DEQ regulations). The material is similar to material which has historically been placed at the West Hayden Island dredged material site.

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 existing U.S. Army Corps of Engineers (Corps) permit (Permit Nos. NWP-2006-635 and NWP 2008-28). 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 (Table 1), and evaluation of the chemical data (see Item 7 below and attached Tables 1 and 2) 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 necessary. However, as noted above, the material described here is similar to material historically placed at this site, which has come from dredging projects on the Columbia and (more recently) the Willamette Rivers. DEQ's records relating to the Beneficial Use Determination for material from the Corps of Engineer's Post Office Bar project dated May 9, 2011 contain a great deal of information that may be relevant to DEQ's analysis in this case. DEQ, 2011.

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 3 provide the chemical and physical data, respectively, associated with sediments to be dredged. Very low concentrations of several detected chemical constituents have been identified (Table 1), and physical analysis indicates fine- to medium-grained sediments. Dredge prism sediments from Berths 601, 603, 604, 605, and 607 have been deemed suitable for unconfined in-water placement by the Regional Sediment Evaluation Team's Project Review Group (PRG).

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.*

   The material will be placed upland at the West Hayden Island Placement Site. Chemical data were screened against risk-based screening levels for upland ecological and human receptors in Table 1. For terrestrial species, the most stringent Oregon Department of Environmental Quality (DEQ) Level II ecological screening level values (SLVs) were used (DEQ, 2001). For human health, the most stringent DEQ risk-based concentration (RBC) for residential and occupational use was used (DEQ, 2009). If no DEQ RBCs were available, EPA regional screening levels were used. Because metals are naturally occurring, only those metal detections above background concentrations were screened. The initial screening shows three compounds (mercury, zinc, and dibenzofuran) exceeding SLVs at least once, warranting further evaluation. There is no risk to human health, as no RBCs were exceeded.

   Currently, most of West Hayden Island is undeveloped. The Dredge Material Placement Site consists of approximately 100 acres of West Hayden Island. The Dredged Material 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 species occupying the upland portions of the island consist of non-threatened and endangered (non-T&E) species, except for the bald eagle which is a state-listed threatened bird (Audubon Society, 2011; ODFW, 2011). In the process of dredging the Terminal 6 berths 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 2 presents the weighted concentrations for mercury, zinc, and dibenzofuran. The highest of these concentrations was then screened against SLVs for non-T&E terrestrial species and T&E birds (bald eagles) likely to be present (per DEQ [2001], non-T&E SLVs were derived by multiplying T&E SLVs by a factor of 5 for protection of a population basis).

Further screening evaluation of the chemical data in Table 2 indicates that only zinc exceeds the T&E SLV for birds (98 mg/kg versus 60 mg/kg). This does not mean, however, an unacceptable risk is present to bald eagles based on the anticipated background concentration for zinc and more-appropriate screening levels, as discussed below.

- This zinc concentration (98 mg/kg) is slightly above the 86 mg/kg background concentration used by DEQ (DEQ, 2010). This value is the state-wide 90 percentile for Washington (Washington State Department of Ecology [WDOE, 1994]). More locally, WDOE (1994) lists a 96 mg/kg background concentration for Clark County (1994), located on the north side of the Columbia River and just north of Terminal 6. Thus, the zinc concentration is similar to background conditions. DEQ (2010) also notes that zinc ranges in Oregon soils from <25 to 159 mg/kg.
- The DEQ SLV for zinc was derived based on direct exposure and ingestion of soil by a bird (i.e., a robin). The T&E birds which have been observed to use the site is the bald eagle (a carnivore), which primarily feeds on fish and opportunistically on carrion. Recently, EPA derived ecological soil screening levels (SSLs) for zinc from evaluation of numerous toxicological studies, including three types of birds (EPA, 2007). The zinc SSL for a hawk (also a carnivore) is 30,000 mg/kg. Using this avian carnivore SSL would indicate that zinc in the dredged material would not pose any risk to bald eagles. (Additionally, we note that eagles would likely experience even less soil exposure than hawks, due to eagles' piscivorous diet).

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 dredge material, after placement, will be in compliance with acceptable risk levels and will not pose a 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 Forrest, 19 Acre Minimum). This is a low density land use designation within Multnomah County. The Dredge Material 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 above included the most conservative human use (residential) and applicable upland ecological receptors.

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).*

   Mr. Nathaniel (Sam) Ruda
   Port of Portland
   7200 NE Airport Way, PO Box 3529
   Portland, Oregon 97218
   sam.ruda@portofportland.com
   503-415-6220

   Site Address: West Hayden Island Placement Facility
   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. Return 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 will be graded. The West Hayden Island Dredged Material Placement Site is not readily accessible to the general public. As demonstrated in Item 7 above, the material does not pose a risk to human health and the environment. Upon development of the area, the fill will likely be covered with landscaping or hardscape, further preventing any potential exposures.

References:

Audubon Society of Portland, 2011. Summary of Natural Resources on West Hayden Island. Accessed on June 29, 2011. Available at: http://audubonportland.org/issues/hayden/resources.

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

DEQ, 2009. Excel® Spreadsheet for Risk Based Concentrations for Individual Chemicals. September 15, 2009.

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

DEQ, 2011. *Beneficial Use Determination BUD20100708 (Reconsidered) – Use of Post Office Bar Dredged Sediments as Fill Material at West Hayden Island* May 9, 2011.

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

EPA, 2010. *Regional Screening Levels.* November 2010.

Oregon Department of Fish and Wildlife (ODFW), 2011. Threatened, Endangered, and Candidate Fish and Wildlife Species in Oregon. Accessed on June 29, 2011. http://www.dfw.state.or.us/wildlife/diversity/species/threatened_endangered_candidate_list.asp.

U.S. Army Corps of Engineers, Seattle District, Portland District, Walla Walla District, and Northwestern Division; U.S. EPA, Region 10; Washington Departments of Ecology and Natural Resources; Oregon Department of Environmental Quality; Idaho Department of Environmental Quality; National Marine Fisheries Service; and U.S., Fish and Wildlife Service, 2006. *Northwest Region Sediment Evaluation Framework, Interim Final.* September 2006.

U.S. Army Corps of Engineers, Seattle District, Portland District, Walla Walla District, and Northwestern Division; U.S. EPA, Region 10; Washington Departments of Ecology and Natural Resource; Oregon Department of Environmental Quality; Idaho Department of Environmental Quality; National Marine Fisheries Service; and U.S. Fish and Wildlife Service, 2009. *Sediment Evaluation Framework for the Pacific Northwest.* May 2009.

Washington State Department of Ecology, 1994. *Natural Background Soil Metals Concentrations in Washington State.* October 1994.

Table 1 - Analytical Results for Sediment Samples
Terminal 6 Beneficial Use Determination
N Marine Drive, Portland, Oregon

Berth	601	603/604-West	604-East	605	607		Ecological SLVs			Human RBCs		
DMMU	-	1	2	3	-							
Sample	T601-MD	C5	C2-4	C1	T607-MD							
Lab ID	MN43G	SH66C	SH66E	SH66A	MN42G	Natural						
Date	3/12/08	2/4/11	2/4/11	2/1/11	3/12/08	Background	T&E	Non-T&E	Critical Receptor	Residential	Occupational	Critical Pathway
Conventional Parameters												
Total Solids (%)	**63**	**51.6**	**69.2**	**69.5**	**64**	-	-	-	-	-	-	-
Total Organic Carbon (%)	**1.04**	**1.06**	**1.15**	**0.936**	**0.96**	-	-	-	-	-	-	-
Ammonia (mg/kg)	**112**	**74.0**	**44.5**	**54.4**	**120**	-	-	-	-	-	-	-
Total Sulfides (mg/kg)	**61.7**	**63.1**	**14.9**	**80.5**	**72**	-	-	-	-	-	-	-
TPH in mg/kg												
Diesel-Range	-	0.9 U	0.7 U	0.7 U	-	-	-	-	-	-	-	-
Oil-Range	-	5.9 U	4.4 U	4.6 U	-	-	-	-	-	-	-	-
Metals in mg/kg												
Antimony	0.2 UJ	0.017 UJ	0.012 UJ	0.012 UJ	0.21 UJ	4	5	25	Plants	31	410	EPA*
Arsenic	**3.1**	**3.8**	**2.2**	**2.5**	**3.1**	7	10	50	Plants, Birds	0.39	1.7	Direct
Cadmium	**0.8**	**0.8**	**0.4**	**0.6**	**0.8**	1	4	20	Plants	39	500	Direct
Chromium	**18.7**	**19.0**	**14.4**	**17.0**	**17.1**	42	0.4	2	Inverts	120,000	1,500,000	Direct (III)
Copper	**24.7**	**27.9**	**19.2**	**22.8**	**37.4**	36	50	250	Inverts	2,900	38,000	Direct
Lead	**10**	**9**	**5**	**7**	**9**	17	16	80	Birds	30	30	Leaching
Mercury	**0.09**	**0.11**	**0.04**	**0.07**	**0.08**	0.07	0.1	0.5	Inverts	23	310	Direct
Nickel	**16**	**17.0**	**14.4**	**15.7**	**15**	38	30	150	Plants	1,600	20,000	Direct
Silver	0.17 U	0.077 U	0.053 U	0.056 U	0.17 U	1	2	10	Plants	390	5,100	Direct
Zinc	**115**	**99**	**61**	**80**	**114**	86	50	250	Plants	23,000	310,000	EPA*
Butyltins in µg/kg												
TBT in Bulk Sediment (µg/kg	**2.3 J**	**90**	**11**	1.5 U	**160**	-	-	-	-	18,000	180,000	EPA*
TBT in Porewater (µg/L)	-	**0.048**	-	-	-							
PAHs in µg/kg												
LPAHs												
Naphthalene	1.3 U	1.8 U	1.8 U	1.7 U	1.3 U	-	10,000	50,000	Plants	3,800	15,000	Leaching
Acenaphthylene	1.0 U	1.4 U	1.4 U	1.3 U	1.0 U	-	-	-	-	-	-	-
Acenaphthene	1.2 U	1.5 U	1.6 U	1.5 U	**100**	-	20,000	100,000	Plants	2,900,000	41,000,000	Direct
Fluorene	0.64 U	1.4 U	1.4 U	1.3 U	**95**	-	30,000	150,000	Inverts	2,600,000	35,000,000	Direct
Phenanthrene	**7.4**	**12**	**6.5**	**13**	**270**	-	-	-	-	-	-	-
Anthracene	0.95 U	1.3 U	1.4 U	1.3 U	**50**	-	-	-	-	21,000,000	-	Direct
1-Methylnaphthalene	1.1 U	**8.6**	1.3 U	1.3 U	**9.9**	-	-	-	-	-	-	-
2-Methylnaphthalene	0.88 U	**4.8**	2.1 U	2.0 U	**5.9**	-	-	-	-	-	-	-
HPAHs												
Fluoranthene	**29**	**21**	**7.5**	**26**	**210**	-	-	-	-	2,300,000	29,000,000	Direct
Pyrene	**27**	**16**	**7.0**	**23**	**200**	-	-	-	-	1,700,000	21,000,000	Direct
Benz(a)anthracene	**8.8**	**7.2**	2.2 U	**6.5**	**72**	-	-	-	-	150	2,700	Direct
Chrysene	**22**	**10**	1.7 U	**22**	**120**	-	-	-	-	15,000	270,000	Direct
Benzo(b)fluoranthene	**20**	-	-	-	**51**	-	-	-	-	150	2,700	Direct
Benzo(k)fluoranthene	**16 J**	-	-	-	**85**	-	-	-	-	1,500	27,000	Direct
Benzo(b+k)fluoranthenes	**36 J**	**3.2**	**6.5**	**11**	**136**	-	-	-	-	150	2,700	Direct
Benzo(a)pyrene	**9.8**	**7.7**	2.2 U	**5.1**	**60**	-	125,000	625,000	Mammals	15	270	Direct
Indeno(1,2,3-cd)pyrene	**5.9**	**4.8**	1.7 U	1.6 U	**27**	-	-	-	-	150	2,700	Direct
Dibenz(a,h)anthracene	2.1 U	2.1 U	2.2 U	2.1 U	**7.9**	-	-	-	-	15	270	Direct
Benzo(g,h,i)perylene	**6.9**	**6.2**	2.0 U	**4.7**	**25**	-	-	-	-	-	-	-

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

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Terminal 6 Beneficial Use Determination
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DMMU	-	1	2	3	-							
Sample	T601-MD	C5	C2-4	C1	T607-MD							
Lab ID	MN43G	SH66C	SH66E	SH66A	MN42G	Natural Background	T&E	Non-T&E	Critical Receptor	Residential	Occupational	Critical Pathway
Date	3/12/08	2/4/11	2/4/11	2/1/11	3/12/08							
SVOCs in µg/kg												
Chlorinated Hydrocarbons												
1,4-Dichlorobenzene	7.2 U	2.7 U	2.7 U	2.7 U	7.2 U	-	-	-	-	81	410	Leaching
1,2-Dichlorobenzene	7.7 U	2.9 U	2.9 U	2.9 U	7.7 U	-	20,000	100,000	Inverts	70,000	29,000	Leaching
1,2,4-Trichlorobenzene	8.9 U	3.8 U	3.8 U	3.7 U	8.9 U	-	20,000	100,000	Inverts	22,000	99,000	EPA*
Hexachlorobenzene	7.8 U	3.3 U	3.3 U	3.3 U	7.9 U	-	1,000,000	5,000,000	Inverts	400	1,800	Direct
Phthalates												
Dimethyl Phthalate	7.6 U	3.7 U	3.7 U	3.6 U	7.6 U	-	200,000	1,000,000	Plants	--	--	--
Diethyl Phthalate	16 U	3.7 U	3.7 U	3.7 U	16 U	-	100,000	500,000	Plants	49,000,000	490,000,000	EPA*
Di-n-butyl Phthalate	12 U	4.6 U	4.6 U	4.6 U	12 U	-	450	2,250	Birds	6,100,000	62,000,000	EPA*
Butyl Benzyl Phthalate	11 U	4.1 U	4.1 U	4.0 U	11 U	-	-	-	-	260,000	910,000	EPA*
Bis (2-ethylhexyl) Phthalate	**23**	8.6 U	8.6 U	8.5 U	**76**	-	4,500	22,500	Birds	35,000	150,000	Leaching
Di-n-octyl Phthalate	8.1 U	5.2 U	5.2 U	5.1 U	8.2 U	-	-	-	-	-	-	-
Phenols												
2,4-Dimethylphenol	14 U	7.9 U	7.9 U	7.8 U	14 U	-	20,000	100,000	Plants	1,200,000	12,000,000	EPA*
2-Methylphenol	14 U	5.3 U	5.3 U	5.2 U	14 U	-	50,000	250,000	Plants	3,100,000	31,000,000	EPA*
4-Methylphenol	12 U	4.8 U	4.8 U	4.7 U	13 U	-	-	-	-	310,000	3,100,000	EPA*
Pentachlorophenol	46 U	27 U	27 U	27 U	47 U	-	3,000	15,000	Plants	480	3,500	Leaching
Phenol	**29**	3.8 U	3.8 U	3.7 U	13 U	-	30,000	150,000	Inverts	18,000,000	180,000,000	EPA*
Miscellaneous Extractables												
Benzoic Acid	**350**	42 UJ	42 UJ	42 UJ	**230**	-	-	-	-	240,000,000	2,500,000,000	EPA*
Benzyl Alcohol	14 U	46 U	45 U	45 U	14 U	-	-	-	-	6,100,000	62,000,000	EPA*
Dibenzofuran	0.96 U	1.6 U	1.7 U	1.6 U	**37**	-	2	10	Mammals	78,000	1,000,000	EPA*
Hexachlorobutadiene	7.9 U	2.8 U	2.9 U	2.8 U	7.9 U	-	-	-	-	6,200	22,000	EPA*
n-Nitrosodiphenylamine	8.5 U	13 U	13 U	13 U	8.5 U	-	-	-	-	99,000	350,000	EPA*
Pesticides in µg/kg												
4,4'-DDE	**3.3 J**	0.13 UJ	0.13 UJ	0.12 UJ	**2.0 J**	-	10	50	Birds	1,700	7,700	Direct
4,4'-DDD	**4.4 J**	**1.2 J**	0.12 U	**1.0 J**	2.5 U	-	10	50	Birds	2,400	11,000	Direct
4,4'-DDT	1.7 U	0.19 UJ	0.19 UJ	0.19 UJ	1.7 U	-	10	50	Birds	1,700	7,700	Direct
Aldrin	0.93 U	0.054 U	0.055 U	0.054 U	0.94 U	-	25,000	125,000	Mammals	29	130	Direct
alpha-Chlordane	0.71 U	0.050 U	0.051 U	0.050 U	0.72 U	-	9,000	45,000	Birds	1,600	7,200	Direct
Dieldrin	1.6 U	0.098 U	0.099 U	0.098 U	1.6 U	-	300	1,500	Birds	23	130	Direct/Leaching
Heptachlor	0.79 U	0.13 U	0.13 U	0.13 U	0.79 U	-	15,000	75,000	Mammals	110	480	Direct
gamma-BHC (Lindane)	0.96 U	0.047 U	0.048 U	0.047 U	0.96 U	-	8,000	40,000	Birds	17	120	Leaching
PCBs in µg/kg												
Aroclor 1016	3.2 U	1.0 U	1.0 U	0.99 U	3.2 U	-	100,000	500,000	Mammals	-	-	-
Aroclor 1221	3.2 U	1.3 U	1.4 U	1.3 U	3.2 U	-	-	-	-	-	-	-
Aroclor 1232	3.2 U	1.3 U	1.4 U	1.3 U	3.2 U	-	-	-	-	-	-	-
Aroclor 1242	3.2 U	1.3 U	1.4 U	1.3 U	3.2 U	-	1,500	7,500	Birds	-	-	-
Aroclor 1248	3.2 U	1.3 U	1.4 U	1.3 U	3.2 U	-	-	-	-	-	-	-
Aroclor 1254	3.2 U	1.3 U	1.4 U	1.3 U	3.2 U	-	700	3,500	Birds	-	-	-
Aroclor 1260	3.2 U	1.3 U	1.4 U	1.3 U	3.2 U	-	-	-	-	-	-	-
Aroclor 1262	-	1.3 U	1.4 U	1.3 U	-	-	-	-	-	-	-	-
Aroclor 1268	-	1.3 U	1.4 U	1.3 U	-	-	-	-	-	-	-	-
Total PCBs	3.2 U	1.3 U	1.4 U	1.3 U	3.2 U	-	-	-	-	220	980	Direct

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

Table 1 - Analytical Results for Sediment Samples
Terminal 6 Beneficial Use Determination
N Marine Drive, Portland, Oregon

Notes:

1. This table only lists compounds that are listed on Table 6-3 of the Final SEF, plus gamma-BHC.
2. PAH concentrations are the higher of the EPA Method 8270D-SIM and EPA Method 8270D analyses.
3. Bolded values are detected concentrations.
4. 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 screening level values (SLVs) for terrestrial receptors from DEQ (2001).
   - Lowest risk-based concentration (RBC) for resident and occupational worker pathways from DEQ (2009), if available.
   - *EPA Regional Screening Level for residential and industrial soil from EPA (2010).
4. Shaded value is a concentration exceeding its respective SL (exceeded SL is also shaded). For metals, background level has to be exceeded first.
5. For undetected compounds, method detections limits (MDLs) are shown.
6. - = Not analyzed or not available.
7. DMMU = Dredged material management unit.
8. J = Estimated concentration between MDL and method reporting limit (MRL).
9. U = Not detected at the indicated MDL.
10. UJ = Estimated MDL.

Table 2 - Ecological Risk Screening of Estimated Post-Dredge Concentrations
Terminal 6 Beneficial Use Determination
N Marine Drive, Portland, Oregon

Berth:	601	603/604-West	604-East	605	607	Resulting Weighted Concentration		
Volumes (cy)						Volume (cy)		
Minimum	7,000	1,500	2,500	2,500	1,100	Min	Average	Max
Average	9,500	6,000	4,500	6,500	2,000	14,600	28,500	43,000
Maximum	13,000	10,000	6,000	10,000	4,000			
Metals in mg/kg								
Mercury	**0.09**	**0.11**	**0.04**	**0.07**	**0.08**	**0.079**	**0.081**	**0.082**
Zinc	**115**	**99**	**61**	**80**	**114**	**98**	**95**	**96**
SVOCs in µg/kg								
Dibenzofuran	0.96 U	1.6 U	1.7 U	1.6 U	**37**	**3.4**	**3.2**	**4.1**

Chemical of Concern	Highest Weighted Conc.	Natural Background	Ecological SLVs				
			Non-T&E Plant	Non-T&E Invertebrate	Non-T&E Bird	T&E Bird	Non-T&E Mammal
Metals in mg/kg							
Mercury	**0.082**	0.07	1.5	0.5	7.5	1.5	365
Zinc	**98**	86	250	1,000	300	60	100,000
SVOCs in µg/kg							
Dibenzofuran	**4.1**	-	-	**-**	-	-	10

Notes:
1. This table only lists compounds exceeding screening levels from Table 1.
2. Bolded values are detected and calculated concentrations.
3. For undetected (U-flagged) compounds, method detections limits (MDLs) are shown.
4. Half the MDL was used for undetected compounds in calculating weighted average concentrations.
5. 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 screening level values (SLVs) for terrestrial receptors from DEQ (2001). SLVs for non-threatened and endangered (non-T&E) species are 5 times the T&E value, per DEQ (2001).
6. Shaded value is a SLV that was exceeded by the highest weighted concentration.
7. - = Not available.

Table 3 - Grain Size Distributions
Terminal 6 Beneficial Use Determination
N Marine Drive, Portland, Oregon

Berth	601	603/604-West	604-East	605	607
Sample ID	T601-MD	C5	C2-4	C1	T607-MD
Date	3/12/08	2/4/11	2/4/11	2/1/11	3/12/08
Grain Size in %					
Gravel	0.2	0.0	0.1	0.0	0.4
Very Coarse Sand	0.3	0.4	1.1	0.3	0.5
Coarse Sand	0.5	0.7	3.3	0.8	0.9
Medium Sand	4.2	2.0	17.1	6.1	4.3
Fine Sand	14.5	5.2	34.1	18.8	10.1
Very Fine Sand	20.9	18.3	14.1	26.1	29.2
Coarse Silt	21.2	26.6	11.8	22.1	26.7
Medium Silt	16.0	22.9	7.8	10.9	13.5
Fine Silt	9.2	9.3	3.7	5.3	5.3
Very Fine Silt	4.7	4.2	2.1	2.5	2.6
8-9 Phi Clay	2.8	3.1	1.5	2.1	2.1
9-10 Phi Clay	2.1	2.4	1.4	1.9	1.6
> 10 Phi Clay	3.4	4.7	1.9	2.9	2.7
Total Fines	59.5	73.4	30.1	47.7	54.5
Material Description	Slightly clayey, very sandy SILT	Slightly clayey, sandy SILT	Silty, very fine to fine SAND	Slightly clayey, very silty SAND	Slightly clayey, very sandy SILT