



US Army Corps  
of Engineers®  
Portland District

Willamette Post Office Bar  
Sampled February 11, 2009

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# **WILLAMETTE RIVER FNC POST OFFICE BAR REACH (RM 2.2) SEDIMENT QUALITY EVALUATION REPORT**



*Number 01 Core – 10.2' Recovery*

**February 2009**

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## ACRONYMS

Ag	Silver
As	Arsenic
Cd	Cadmium
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CoC	Contaminate of concern
Cr	Chromium
CRCIP	Columbia River Channel Improvement Project
CRD	Columbia River Datum
CRM	Columbia River Mile
Cu	Copper
CY	Cubic Yard(s)
DDT	Dichlorodiphenyltrichloroethane
DEQ	Oregon Department of Environmental Quality
DMEF	Dredge Material Evaluation Framework
DMMP	Dredge Material Management Plan
DP	Dredge Prism
DQO	Data Quality Objectives
EPA	Environmental Protection Agency
FNC	Federal Navigation Channel
Hg	Mercury
J	Laboratory estimated value detected between MRL & MDL
MDL	Method Detection Limit
MLLW	Mean Lower Low Water
MRL	Method Reporting Limit
ND	Non-detected at MRL or MDL
NSM	New Surface Material - Exposed Surface after dredging
Ni	Nickel
OSM	Oregon Steel Mill
PAH	Polynuclear Aromatic Hydrocarbon
Pb	Lead
PCB	Polychlorinated Biphenyl
PQL	Practical Quantitation Limit
PRG	Project Review Group (federal and state agencies)
QA/QC	Quality Assurance/Quality Control
RM	River Mile
SAP	Sampling and Analysis Plan
Sb	Antimony
SEF	Sediment Evaluation Framework
SL	Screening Level(s)
TBT	Tributyltin
TEL	Threshold Effects Level
Tier II	Physical (a) & Chemical (b) analyses
Tier III	Bioassay & Bioaccumulation analyses
TOC	Total Organic Carbon
U	Laboratory non-detect at MRL or MDL
USFWS	U. S. Fish & Wildlife Service
WDOE	Washington Department of Ecology
WDNR	Washington Department of Natural Resources
Zn	Zinc
Σ DDT	Total value (i.e. DDT + DDE + DDD)

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**ABSTRACT**

The Willamette River federal navigation channel (FNC) project is 11.6 miles long; from the confluence with the Columbia River (RM 0.0) to near the Broadway Bridge in Portland, Oregon. Congressional authorization is to a depth of 43-feet (-43-feet CRD) (plus 2-feet advanced maintenance) and a 600 to 1,900-ft. width, but it is currently maintained to a 40-ft. depth (plus 2-feet advanced maintenance), with an “as needed” width for users.

Dredging is being requested by the Columbia River Pilots (ref. October 8, 2004 letter). It should, also, be noted that this material was last dredged in 1997 and all sampling event data from 1998 to 2006 (listed above) represents the material currently in need of dredging. The current need for characterization stems from proposed dredging within the study area of the Portland Harbor superfund. The entire river within the study area (confluence to the falls) has been classified with a ranking of “high” unless the existing data can provide a weight of evidence for a lower ranking. Recency of data within a high ranked area is 2-years. The current characterization is being done to fulfill the recency of data requirement even though the existing data would allow for a “low” ranking, as material has passed SEF guidance for 2 separate (1999 & 2004) rounds of bioassay testing.

The material characterized in this report is for sediment shoals, within the FNC, at approximate river mile (RM) 2.1-2.4, Post Office Bar. The proposed dredging prism (DP) varies from 4 to 7-feet deep, which includes 2-feet advanced maintenance and contains approximately 50,000 CY of silt, with approximately 10% sand.

A total of six (6) vibra-core samples were collected February 11, 2009. Three (3) cores were collected in the dredging prism (DP) and were retained as discrete samples, which were then divided to represent the dredging prism and the new surface material (NSM). Three (3) additional vibra-core samples were collected just shoreward of the DP to represent the potential sloughing materials; surface material and the area below that which might have the potential to slough.

The physical analyses classified material as elastic silt with 89.4% fines and 10.6% sand, with mean grain-size of 0.024 mm and 2.47% total organic carbon; ranging from 1.97% to 2.94 % (Table 3 and 4).

Chemical data from this sampling event are presented in tables 2 – 12. The Clean Water Act (CWA) requires characterization of sediment prior to dredging and disposal. Regional guidance developed to implement the CWA is the Sediment Evaluation framework (SEF), which is currently in the process of being updated. Screening levels to evaluate freshwater sediment have not been published in the 2009 SEF, currently under public review. Some freshwater SL numbers have been calculated based on biological testing results and will be presented later in the spring of 2009. The SLs being proposed (2009 SL) are included in the data tables along with the 2006 interim SEF screening levels.

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Some chemical data results exceed the interim 2006 SLs in one or more samples for Cd, Zn, DDT, PCBs and PAHs, but do not exceed any of the proposed 2009 screening levels (see data Tables 3-15).

## **INTRODUCTION**

This report outlines the characterization of the sediment within the Willamette River FNC at Post Office Bar for the purposes of dredging and disposal. The sampling and analysis objectives are stated in the RRG approved Sampling and Analysis Plan (SAP January 2009), and are also listed below. This report will outline the procedures used to accomplish these objectives.

### **Sampling and Analysis Objectives**

- Characterize sediments in accordance with the regional and national dredge material testing manual protocols:
  - Sediment Evaluation Framework (SEF), regional guidance for the Clean Water Act.
  - Data results are compared to both the Interim 2006 SEF and updated 2009 SEF version, with proposed 2009 screening levels added.
  - The Evaluation of Dredged Material Proposed for Disposal at Island, Nearshore, or Upland Confined Disposal Facilities – Testing manual (Upland Testing Manual).
  - ODEQ -NWR Clean Fill Screening Table for Unrestricted Upland Disposal Greater than 100 Feet from a Surface Water Body.
- Collect, handle and analyze representative sediment from the Willamette River FNC at Post Office Bar reach in accordance with protocols and Quality Assurance/Quality Control (QA/QC) requirements.
- Characterize sediments to be dredged for disposal and the new surface following dredging. Material will be compared to the open-inwater screening levels, but material management is planning upland placement at the Port of Portland's West Hayden Island disposal facility; material will be placed upland without return water.
- Analyze for full suite of physical parameters for the dredging prism samples and chemical parameters as outlined the SEF for samples within the channel proposed for dredging; including potential sloughing material and evaluate the surface exposed after dredging is complete. SEF – Table 7.2 contains the list of analytes, methods of analysis and reporting limits required.

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**PREVIOUS STUDIES**

**1996** TBT was detected in all of the samples testing for total (bulk) TBT, but was below the level of concern and the material approved for in-water disposal (last time Willamette FNC was dredged).

**1997** The sediment-sampling event for Columbia River Channel Deepening Feasibility Study (currently CRCIP) collected 1 surface sample at RM 2.05 (WR-BC-09) mid-channel. Results did not exceed any DMEF screening levels for unconfined in-water placement.

**1998** During permit dredging (around the water intake) at the Oregon Steel Mill (OSM) dock (RM 2.2), an oil sheen was detected on the water surface during the dredging activity, the site was contained and all dredging was suspended. The OSM dredging area is approximately 750 feet to the east of where the sediment shoal evaluated in the April 1999 sampling event is located.

**April 1999** Two (2) vibra-core samples were collected from the Post Office Bar shoal. These cores penetrated into what will be the new surface material (NSM) following dredging and was included as part of the dredging prism analyses. The grain-size for these 2 cores averaged 29.3% sand and 70.7% fine-grained material. The results were compared to the screening levels (SL) found in the 1998 DMEF. In the 02 sample DDT analytical results exceeded SLs total DDT (6.9ug /kg) at 11.3 ug/kg (2006 SEF has no SL for DDT). The laboratory detection level for TBT was 0.17ug/L; although it wasn't detected, the detection level exceeded the SL of 0.15 ug/L (2006 SEF has no porewater SL; it has total TBT of 75 ug/kg SL). It was determined that further characterization was needed; scheduled for November 1999.

**November 1999** A vibra-core sediment sample was collected at the 02 sampling station where TBT and DDT analytical levels were in need of further characterization (See April 1999). These cores penetrated into what will be the new surface material (NSM) following dredging and was included as part of the dredging prism analyses. Enough sediment was collected to re-run physical and chemical, with additional volume collected to run bioassays. The grain-size for this core was 19.6% sand and 80.4% fine-grained material. Analytical results showed all chemicals of concern were below their respective SLs; all bioassays passed the DMEF guidance (and current SEF guidance) for unconfined in-water placement.

**Hart Crowser for USACE 2004** As part of the operation and maintenance characterization, three (3) vibra-cores were collected from the Post Office Bar shoal and composited for one analysis. These cores penetrated into what will be the new surface material (NSM) following dredging and was included as part of the dredging prism analyses. The grain-size for this composite core was 16.2% sand and 83.8% fine-grained material. The result of the chemical analyses indicated a total DDT value of 14.3 ug/kg, which was the only DMEF SL exceedance (2006 SEF has no SL for DDT). Bioassay results: all 10-day *Hyaella azteca* and 10-day *Chironomus tentans* bioassay test results passed the DMEF guidance (and current SEF guidance) for unconfined in-water placement.

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**Tetra Tech for USACE 2006** In this study, the LWR FNC was divided into reaches including a reach encompassing Post Office Bar (WRM 0 to 3). On the eastside of the FNC at the Post Office Bar shoal, currently proposed for dredging, two surface samples were collected in 2005. This material was collected to characterize the material that had potential to slough into the channel if dredging occurred. The grain-size for these 2 surface samples averaged 4.8% sand and 95.2% fine-grained material, with all chemistry below their respective 2006 SEF screening levels.

## **CURRENT SAMPLING EVENT DISCUSSION**

Dredging is being requested by the Columbia River Pilots (ref. October 8, 2004 letter). It should, also, be noted that this material was last dredged in 1997 and all sampling event data from 1998 to 2006 (listed above) represents the material currently in need of dredging. The current need for characterization stems from proposed dredging within the study area of the Portland Harbor superfund. The entire river within the study area (confluence to the falls) has been classified with a ranking of “high” unless the existing data can provide a weight of evidence for a lower ranking. Recency of data within a high ranked area is 2-years. The current characterization is being done to fulfill the recency of data requirement even though the existing data would allow for a “low” ranking, as material has passed SEF guidance for 2 separate (1999 & 2004) rounds of bioassay testing.

The proposed dredging is for sediment shoals on the east side of the FNC, at approximate river mile (RM) 2.1-2.4, Post Office Bar. The proposed dredging prism (DP) varies from 4 to 7-feet deep, which includes 2-feet advanced maintenance and contains approximately 50,000 CY of silt with sand. Three (3) full length vibra-core samples were taken to 1-foot (or more) below the dredging prism as planned, with an additional 3 shorter (5-foot) vibra-core samples collected at the shoreward boundary of the dredge prism, to represent the material that could potentially slough in to the channel following dredging. Each of the 6 vibra-core samples was divided horizontally for a total of 12 discrete analyses; 3 analyses will represent each of the following:

- Dredging prism
- New surface material (NSM)
- Potential surface sloughing material
- Potential at depth sloughing material (see Figure 2)

The six (6) vibra-core samples were collected February 11, 2009. The three (3) cores collected in the dredging prism (DP) had recoveries from 8.9’ to 10.2’. The dredging prism in the study area varies from 4’ to 7’, which includes authorized advanced maintenance and precision of dredging considerations. Each of the 3 cores collected in the DP were retained as discrete samples, which were then divided to represent the dredging prism and the new surface material (NSM). The three (3) additional vibra-core samples were collected just shoreward of the DP to represent the potential sloughing materials, which were, also, divided horizontally to represent the surface material and the area below that which might have the potential to slough (cores recoveries from 5.3’ to 5.6’). All 12 sub-samples were then submitted for all standard SEF chemical parameters and because this material is scheduled to be placed upland ODEQ’s clean-fill screening list. Only three (3) samples were submitted for



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organotin (TBT) and volatile analyses. The dredge prism samples (3) and the 3-cores outside the DP were submitted for physical analyses (total of 6) were submitted for physical analyses.

The physical analyses classified material as elastic silt with 89.4% fines and 10.6% sand, with mean grain-size of 0.024 mm and 2.47% total organic carbon; ranging from 1.97% to 2.94 % (Table 3).

Chemical data from this sampling event are presented in Tables 4 – 15. The Clean Water Act (CWA) requires characterization of sediment prior to dredging and disposal. Regional guidance developed to implement the CWA is the Sediment Evaluation Framework (SEF), which is currently in the process of being updated. Screening levels to evaluate freshwater sediment have not been published in the 2009 SEF currently under public review. Some freshwater SL numbers have been calculated based on biological testing results and will be presented later in the spring of 2009. The SLs being proposed (2009 SL) are included in the data tables along with the 2006 interim SL values.

The chemical data results exceed the interim 2006 SLs in one or more samples for Cd, Zn, DDT, PCBs and PAHs, but do not exceed any of the proposed 2009 screening levels (see data Tables 4-15).

**Planning Team and Responsibilities**

Table 1 lists the Project Team's duties and responsibilities for the sediment-sampling project at the Willamette River (RM 2.1-2.4) Post Office Bar Reach.

**Table 1: Planning Team**

<b>Task/Responsibility</b>	<b>CENWP Tim Sherman</b>	<b>CENWP Donna Ebner</b>	<b>Contractor(s)</b>	<b>CENWP Mark Siipola</b>
Overall Project Management	X			
Sampling Plan Development	X			
Agency Coordination	X			X
Positioning/Log Record	X	X		
Sediment Sampling	X		X	X
Physical Analysis			X	
Chemical Analysis			X	
Final Report	X			
Technical Review				X
Vibra Core Equipment			X	
Boat & Operator			X	

**Location**

Table 2 lists the actual sampling coordinates at the Willamette River (RM 2.1-2.4) Post Office Bar (POB) (see Figure 2). Coordinates are based on the Lambert Projection for Oregon;

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North Zone (NAD 83, U.S. Survey Feet), Datum is Columbia River Datum (CRD). CRD is 1.40 feet above National Geodetic Vertical Datum at Willamette River mile 0.4, 1947 adjustment).

**Table 2: Sampling Station Coordinates NAD 83, Oregon State Plane North**

Sample ID	Latitude	Longitude
021108WRPB-VC-01	45° 37' 50.0"	122° 47' 20.4"
021108WRPB-VC-02	45° 37' 49.0"	122° 47' 19.4"
021108WRPB-VC-03	45° 37' 47.3"	122° 47' 21.6"
021108WRPB-VC-04	45° 37' 46.3"	122° 47' 20.5"
021108WRPB-VC-05	45° 37' 44.0"	122° 47' 23.0"
021108WRPB-VC-06	45° 37' 42.6"	122° 47' 22.1"

## **COORDINATION**

All aspects of the sampling and analysis plan (SAP) and the sediment evaluation report have been coordinated with the Project Review Group (PRG) consisting of these federal and state service agencies EPA, National Marine Fisheries Service (NMFS), US Fish and Wildlife (USF&W), Oregon Department of Environmental Quality (ODEQ) and Washington Department of Ecology (WDOE).

## **SAMPLING AND ANALYSIS REQUIREMENTS**

### **Ranking**

The Post Office Bar Reach (WRM 2.2) is within the designated study area for the Portland Harbor CERCLA (Super Fund) site. Any area within the Super Fund study area is automatically considered high ranked by the PRG unless sufficient data exists to demonstrate another ranking applies. Historic data for  $\Sigma$  DDT has exceeded the 6.9 ug/kg screening level adopted as an interim guideline by the PRG until an acceptable freshwater guideline was developed as part of the SEF (see proposed 2009 levels in data tables). However, 2 rounds (1999 & 2004) of subsequent sampling have passed bioassays testing, justifying a low ranking. Material is schedule to go upland at the Port of Portland's West Hayden Island disposal site.

### **Sampling Requirements**

Sampling requirements depend on:

- type of sediment (heterogeneous or homogeneous)
- grain-size
- organic content
- volume of sediment to be dredged
- level of contamination (ranking in the SEF)
- depth of dredging prism

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- need to characterize the new surface material after dredging
- need to characterize the potential sloughing material

**Sampling Device**

The sampling device of choice was a 4" diameter vibra-core sampler; allowing for both a full length dredging prism core and new surface material (NSM) characterization. No difficulties were encountered in coring sediments at Post Office Bar during this sampling event.

**Sediment Disposal**

A management decision has been made to place the dredge material upland at the Port of Portland's West Hayden Island disposal facility. Due to the size of the facility all water transported to the disposal site will be contained at the disposal site, no water will return to the river.

**RESULTS**

**Physical-Grain-size (ASTM D422)**

Six (6) samples were submitted for physical analyses, with data presented in Table 3. The mean grain-size for all samples was 0.024 mm, with 10.6% sand and 89.4% fines. Material was classified as elastic silt.

**Metals (EPA methods 6010B/6020/7471/7742), Total Organic Carbon (method 9060)**

Twelve (12) sub-samples were submitted for metals and TOC testing, with data presented in Table 4. The TOC analyses ranged from 1.97% to 2.94%. One (1) sample (3Z) exceeded the SEF 2006 SL (1.1 mg/kg) for cadmium (Cd) at 1.49 mg/kg (proposed 2009 SEF SL is 6.3 mg/kg). Two (2) samples (3Z and 5Z) exceeded the SEF 2006 SL (130 mg/kg) for zinc (Zn) at 226 and 156 mg/kg respectively (proposed 2009 SEF SL is 3190 mg/kg). All other metal analytical results were below both the 2006 and the 2009 (proposed) SEF screening levels.

**Pesticides/PCBs (EPA method 8081/8082)**

Twelve (12) sub-samples were submitted for pesticides/PCBs, with data presented in Table 5 and 6. DDT and its breakdown products were detected in all of the samples. The highest level detected was 14.5 ug/kg  $\Sigma$  DDT. This level is similar to the level found in the 2004 sampling event (14.3 ug/kg), which passed (see SEF) bioassay analyses. Total PCBs were detected above the 2006 SEF screening level of 60 ug/kg, but below the proposed 2009 screening level of 3130 ug/kg, at 154 ug/kg and 79 ug/kg in samples 3Z and 5Z respectively.

**Chlorinated Hydrocarbons, Phenols, Phthalates and Miscellaneous Extractables (EPA methods 8151/8270)**

Twelve (12) sub-samples were submitted for chlorinated hydrocarbons, phthalates, phenols and miscellaneous extractables, with data presented in Table 8, 9 and 10. None of these analytes were detected in any of the samples at levels approaching their respective screening levels in either the 2006 or proposed 2009 SEF.

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**Polynuclear Aromatic Hydrocarbons (PAHs) (EPA method 8270C)**

Twelve (12) sub-samples were submitted for low and high molecular weight PAHs, with data presented in Table 11 and 12. All samples contained Low density PAHs and High density PAHs. The sum of Benzo (b+k)-fluoranthene detected in the 5Z sample totaled 700 ug/kg, which exceeds the 2006 SEF screening level of 600 ug/kg. The proposed 2009 SEF screening levels do not have individual analyte SLs, but has a combined LPAH and HPAH total of 7610 ug/kg. The screening level (proposed 2009 SEF) for total PAHs was not exceeded in the results of the 5Z sample.

**Total Petroleum Hydrocarbons (TPHs) (NWTPH Method)**

Twelve (12) sub-samples were submitted for TPHs, with data presented in Table 13. No gasoline TPHs were detected in any of the samples. Diesel range organic (DRO) and residual range organics (RRO) were detected in all but 1 sample. The 2006 SEF does not have any SLs established for TPH. The proposed 2009 SEF SLs were not approached in any of the sample data results.

**Organotin (Tributyltin) (Krone Method)**

Three (3) sub-samples were submitted for total organotin analyses, with data presented in Table 14. Low levels of tributyltin and dibutyltin were detected in the dredging prism and in the potential sloughing material. None of the organotin detected in these areas approached either the 2006 or proposed 2009 SEF screening levels.

**Volatile Organic Compounds (VOCs) (Method 8260B)**

Three (3) samples from the dredging prism were submitted for total VOC analyses, with data presented in Table 12. This method was run for DEQ's upland solid waste disposal criteria; there are no SEF screening levels for these analytes. No levels of concern were detected.

**CONCLUSION**

This evaluation was conducted following procedures set forth in the Sediment Evaluation Framework (SEF), which is consistent with the federal guidance in the Inland Testing Manual. The SEF was developed jointly with regional federal and state agencies to address environmental issues associated with dredging and sediment management, which is currently in the process of being updated. This document is a guideline for implementing the Clean Water Act (40 CFR 230), Section 404 (b) (1).

Dredging is being requested by the Columbia River Pilots (ref. October 8, 2004 letter). It should, also, be noted that this material was last dredged in 1997 and all sampling event data from 1998 to 2006 (listed above) represents the material currently in need of dredging. The current need for characterization stems from proposed dredging within the study area of the Portland Harbor superfund. The entire river within the study area (confluence to the falls) has been classified with a ranking of "high" unless the existing data can provide a weight of evidence for a lower ranking. Recency of data within a high ranked area is 2-years. The current characterization is being done to fulfill the recency of data requirement even though the existing data would allow for a "low" ranking, as material has passed SEF guidance for 2 separate (1999 & 2004) rounds of bioassay testing.

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A total of six (6) vibra-core samples were collected February 11, 2009. Three (3) cores were collected in the dredging prism (DP) and were retained as discrete samples, which were then divided to represent the dredging prism and the new surface material (NSM). Three (3) additional vibra-core samples were collected just shoreward of the DP to represent the potential sloughing materials; surface material and the area below that which might have the potential to slough.

All method detection levels (MDLs) were well below the Sediment Evaluation Framework (SEF) screening levels (SL).

The physical analyses classified material as elastic silt with 89.4% fines and 10.6% sand, with mean grain-size of 0.024 mm and 2.47% total organic carbon; ranging from 1.97% to 2.94 %.

Sediment results were compared to both the Interim 2006 SEF screening levels and the proposed 2009 SEF screening levels. The proposed 2009 freshwater SL numbers have been calculated based on biological testing results and will be presented later in the spring of 2009.

The chemical data results exceed the interim 2006 SLs in one or more samples for Cd, Zn, DDT, PCBs and PAHs, but do not exceed any of the proposed 2009 screening levels (see data tables 4-15).

The data results will be discussed internally within the Corps and with state and federal agencies to determine the necessary protocol for dredging and disposal and will be added to this report when a consensus is determined.

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**Table 3: Physical – Grain Size**

Area Represented	Sample I.D.	Percent			Grain-size (µm)
		Gravel	Sand	Silt/Clay	
<b>Dredging Prism</b>	021108WRPB-VC-01A	0.1	16.7	83.4	28.8
	021108WRPB-VC-03A	0.2	5.6	94.2	17.3
	021108WRPB-VC-05A	0.0	6.1	93.9	20.8
<b>Potential Sloughing Material</b>	021108WRPB-VC-02A	0.0	9.3	90.7	22.8
	021108WRPB-VC-04A	0.0	9.1	90.9	24.9
	021108WRPB-VC-06A	0.0	16.6	83.5	29.5
<b>Mean</b>		0.05	10.55	89.40	24.0



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**Table 4: Inorganic Metals and Total Organic Carbon**

Sample I.D.	Sb	As	Ba	Cd	Cr	Cu	Pb	Hg	Ni	Se	Ag	Zn	TOC
	mg/kg (ppm)												%
021108WRPB-VC-01A	0.16	3.2	176	0.264	24.7	35.9	12.2	0.058	21.7	0.16	0.226	89.0	2.78
021108WRPB-VC-01Z	0.26	2.7	154	0.187	22.4	34.4	11.1	0.070	21.0	0.19	0.172	68.9	2.20
021108WRPB-VC-02A	0.19	3.3	162	0.280	23.0	33.7	10.5	0.094	20.3	0.19	0.169	83.8	2.94
021108WRPB-VC-02B	0.18	3.2	174	0.231	24.8	35.1	11.0	0.052	21.9	0.16	0.203	82.8	2.58
021108WRPB-VC-03A	0.17	3.1	174	0.223	24.4	37.0	14.5	0.075	21.8	0.24	0.198	87.1	2.06
021108WRPB-VC-03Z	0.41	4.2	162	<b>1.49</b>	25.0	40.0	30.5	0.154	20.4	0.21	0.336	<b>226</b>	2.24
021108WRPB-VC-04A	0.22	3.1	171	0.24	22.8	33.1	10.3	0.063	20.3	0.21	0.208	80.4	2.88
021108WRPB-VC-04B	0.21	3.5	178	0.265	26.1	38.1	12.0	0.062	23.2	0.17	0.228	87.5	2.41
021108WRPB-VC-05A	0.15	2.9	163	0.197	23.1	32.1	10.4	0.049	20.5	0.16	0.166	77.2	2.33
021108WRPB-VC-05Z	0.27	3.4	164	0.643	23.6	33.6	27.6	0.093	21.8	0.13	0.374	<b>156</b>	1.97
021108WRPB-VC-06A	0.16	2.9	152	0.188	21.2	30.5	9.73	.005	18.5	0.23	0.145	73.2	2.45
021108WRPB-VC-06B	0.21	3.7	194	0.23	28.2	40.6	12.2	0.061	25.7	0.21	0.227	87.7	2.84
Proposed SEF 2009 Screening level	11.8	7.56	--	6.3	72.3	1240	--	0.796	31.3	11.4	1.72	3190	--
SEF 2006 Screening level		20	--	1.1	95	80	340	0.28	60	--	2.0	130	--
-- = SL not established.													

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**Table 5: Chlorinated Pesticides**

Sample I.D.	ug/kg (ppb)									
	4,4'- DDD	4,4'- DDE	4,4'- DDT	Aldrin	Chlordane		Dieldrin	Heptachlor	Endrin	gamma- BHC (Lindane)
					Alpha	Gamma				
021108WRPB-VC-01A	1.5	2.4	<1.1	<0.16	<0.61	0.25JP	<0.18	<1.1	<0.21	<0.16
021108WRPB-VC-01Z	2.7	3.8	<0.80	0.65JP	1.1P	0.67J	<0.29	<1.0	<0.20	<0.15
021108WRPB-VC-02A	1.2J	1.9	<1.2	0.44J	<0.26	0.15J	<0.37	<1.2	<0.23	<0.17
021108WRPB-VC-02B	1.4	2.4	<1.0	<0.45	<0.23	0.31JP	<0.29	<1.0	<0.20	<0.15
021108WRPB-VC-03A	<b>2.3</b>	<b>4.4</b>	<b>2.7</b>	<0.17	<0.71	1.1	<0.19	<0.08	<0.20	<13
021108WRPB-VC-03Z	<b>6.3</b>	<b>8.2P</b>	<5.6	<1.0	<0.23	<2.3	<1.0	<0.08	<0.20	<0.15
021108WRPB-VC-04A	<b>1.4</b>	<b>2.2</b>	<b>3.3</b>	0.38J	<0.16	0.38JP	<0.22	<1.2	<0.24	<0.18
021108WRPB-VC-04B	1.3	2.5	<1.0	0.49JP	<0.29	0.27JP	<0.29	<1.0	<0.20	<0.15
021108WRPB-VC-05A	<b>2.0</b>	<b>2.4</b>	<b>4.0</b>	<0.15	<0.48	<0.20	<0.29	<1.0	<0.20	<1.0
021108WRPB-VC-05Z	<b>4.4</b>	<b>5.1</b>	<b>2.4</b>	<0.15	<0.50	<1.4	<0.29	<0.08	<0.20	<15
021108WRPB-VC-06A	0.96J	1.7	1.3P	<0.17	<0.59	<0.07	<0.32	<0.087	<0.22	<0.17
021108WRPB-VC-06B	1.5	3.0	<0.63	<0.16	<0.25	<0.069	<0.31	<0.086	<0.22	<0.16
Proposed SEF 2009 Screening level	2460	906	8110	--	--		1.45	--	20.7	--
SEF 2006 Screening level	--	--	--	9.5	2.8		1.9	1.5	--	--
-- SL not established. (<) = Non-detect (ND) at the value listed (Method Detection Limit). J = The result is an estimated concentration that is less then the MRL but greater than or equal to the MDL. P = The confirmation criteria was exceeded. The relative percent difference is greater than 25% between the two analytical results.										

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**Table 6: Polychlorinated Biphenyl (PCBs)**

Sample I.D.	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total
	ug/kg (ppb)							
021108WRPB-VC-01A	<1.4	<1.4	<1.4	<6.0	<1.4	<12	<1.4	ND
021108WRPB-VC-01Z	<1.3	<1.3	<1.3	<7.4	<1.3	<6.4	<1.3	ND
021108WRPB-VC-02A	<1.5	<1.5	<1.5	<3.6	<1.5	<12	<1.5	ND
021108WRPB-VC-02B	<1.3	<1.3	<1.3	<4.1	<1.3	<11	<1.3	ND
021108WRPB-VC-03A	<1.4	<1.4	<1.4	27P	<1.4	29	<1.4	56
021108WRPB-VC-03Z	<1.4	<1.4	<1.4	70	<1.4	84	<1.4	154
021108WRPB-VC-04A	<1.6	<1.6	<1.6	<12	<1.6	<12	<1.6	ND
021108WRPB-VC-04B	<1.3	<1.3	<1.3	<3.9	<1.3	<10	<1.3	ND
021108WRPB-VC-05A	<1.3	<1.3	<1.3	<9.3	<1.3	<12	<1.3	ND
021108WRPB-VC-05Z	<1.3	<1.3	<1.3	30	<1.3	49	<1.3	79
021108WRPB-VC-06A	<1.5	<1.5	<1.5	<2.5	<1.5	<7.2	<1.5	ND
021108WRPB-VC-06B	<1.4	<1.4	<1.4	<1.4	<1.4	<14	<1.4	ND
Proposed SEF 2009 Screening level								3130
SEF 2006 Screening level								60
Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit).								
P= The confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.								

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**Table 7: Chlorinated Hydrocarbons**

Sample I.D.	Hexachlorobenzene	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,4-Dichlorobenzene
	ug/kg (ppb)			
021108WRPB-VC-01A	<1.3	<2.7	<3.0	<3.0
021108WRPB-VC-01Z	<1.2	<2.6	<2.9	<2.9
021108WRPB-VC-02A	<1.4	<3.0	<3.3	<3.3
021108WRPB-VC-02B	<1.3	<2.7	<3.0	<3.0
021108WRPB-VC-03A	<1.2	<2.6	<2.9	<2.9
021108WRPB-VC-03Z	<1.2	<2.6	<2.9	<2.9
021108WRPB-VC-04A	<1.5	<3.1	<3.5	<3.5
021108WRPB-VC-04B	<1.2	<2.6	<2.9	<2.9
021108WRPB-VC-05A	<1.2	<2.6	<2.9	<2.9
021108WRPB-VC-05Z	<1.2	<2.6	<2.9	<b>4.1J</b>
021108WRPB-VC-06A	<1.3	<2.9	<3.2	<3.2
021108WRPB-VC-06B	<1.3	<2.8	<3.1	<3.1
Proposed SEF 2009 Screening level				
SEF 2006 Screening level	--	--	--	--
Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit). J = The result is an estimated concentration that is less then the MRL, but greater than or equal to the MDL.				

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**Table 8: Phthalates**

Sample I.D.	bis(2-Ethylhexyl) phthalate	Butyl-benzyl-phthalate	Di-n-butyl - phthalate	Di-n-octyl-phthalate	Diethyl-phthalate	Dimethyl-phthalate
	ug/kg (ppb)					
021108WRPB-VC-01A	<b>47J</b>	<b>5.3J</b>	<8.2	<1.8	<b>1.6J</b>	<1.1
021108WRPB-VC-01Z	<b>45J</b>	<b>12</b>	<b>12J</b>	<1.7	<1.3	<1.0
021108WRPB-VC-02A	<b>36J</b>	<3.7	<9	<2.0	<b>2.1J</b>	<1.2
021108WRPB-VC-02B	<b>33J</b>	<3.3	<8	<1.8	<1.1	<1.4
021108WRPB-VC-03A	<b>19J</b>	<3.2	<7.9	<1.7	<1.3	<1.0
021108WRPB-VC-03Z	<b>17J</b>	<3.2	<b>8.8J</b>	<1.7	<1.3	<1.0
021108WRPB-VC-04A	<b>59J</b>	<3.8	<9.4	<2.1	<b>1.8J</b>	<1.2
021108WRPB-VC-04B	<b>27J</b>	<3.2	<b>9.2J</b>	<1.7	<b>2.1J</b>	<1.0
021108WRPB-VC-05A	<b>24J</b>	<3.2	<7.9	<1.7	<1.3	<1.0
021108WRPB-VC-05Z	<b>48J</b>	<3.2	<b>9.7J</b>	<1.7	<b>2.3J</b>	<1.0
021108WRPB-VC-06A	<b>28J</b>	<3.5	<8.6	<1.9	<b>1.6J</b>	<1.1
021108WRPB-VC-06B	<b>36J</b>	<b>5.9J</b>	<b>11J</b>	<1.9	<b>2.1J</b>	<1.1
Proposed SEF 2009 Screening level	22300	--	1740	39	--	--
SEF 2006 Screening level	220	260	--	26	--	46
Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit).						
J = The result is an estimated concentration that is less then the MRL, but greater than or equal to the MDL.						

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**Table 9: Phenols**

Sample I.D.	Phenol	2-Methyl phenol	Pentachloro phenol	4-Methyl phenol	2,4-Dimethyl phenol
	ug/kg (ppb)				
021108WRPB-VC-01A	<b>7.7J</b>	<1.6	<1.5	<b>19</b>	<5.7
021108WRPB-VC-01Z	<b>67</b>	<1.5	<b>29</b>	<1.5	<5.5
021108WRPB-VC-02A	<b>8.3J</b>	<1.7	<1.7	<b>44</b>	<6.3
021108WRPB-VC-02B	<2.1	<1.6	<1.4	<b>19</b>	<5.6
021108WRPB-VC-03A	<2.0	<1.5	<1.4	<1.5	<5.5
021108WRPB-VC-03Z	<2.0	<1.5	<1.3	<b>5.0J</b>	<5.5
021108WRPB-VC-04A	<b>16J</b>	<1.8	<1.7	<b>15</b>	<6.5
021108WRPB-VC-04B	<2.0	<b>3.7J</b>	<1.5	<b>4.7J</b>	<5.5
021108WRPB-VC-05A	<b>5.8J</b>	<1.5	<1.4	<b>11</b>	<5.5
021108WRPB-VC-05Z	<b>13J</b>	<1.5	<1.2	<b>24</b>	<5.5
021108WRPB-VC-06A	<2.2	<b>3.1J</b>	<1.6	<b>8.4J</b>	<6.0
021108WRPB-VC-06B	<2.2	<1.6	<1.6	<b>5.1J</b>	<5.9
Proposed SEF 2009 Screening level	210	--	1240	--	--
SEF 2006 Screening level	--	--	--	--	--
Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit). J = The result is an estimated concentration that is less then the MRL, but greater than or equal to the MDL					

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**Table 10: Miscellaneous Extractables**

Sample I.D.	Hexachloro-butadiene	Benzoic Acid	Benzyl Alcohol	Dibenzofuran	N-Nitroso diphenylamine
	ug/kg (ppb)				
021108WRPB-VC-01A	<2.6	<99	<b>7.0J</b>	<b>2.0J</b>	<1.7
021108WRPB-VC-01Z	<2.5	<96	<b>8.6J</b>	<b>4.3J</b>	<1.6
021108WRPB-VC-02A	<2.9	<110	<2.4	<b>1.4J</b>	<1.9
021108WRPB-VC-02B	<2.6	<97	<2.2	<b>2.1J</b>	<1.7
021108WRPB-VC-03A	<2.5	<96	<b>4.0J</b>	<b>9.5J</b>	<1.6
021108WRPB-VC-03Z	<2.5	<96	<2.1	<b>35</b>	5.9J
021108WRPB-VC-04A	<3.0	<120	<b>6.6J</b>	<1.5	<1.9
021108WRPB-VC-04B	<2.5	<96	<b>6.7J</b>	<b>1.7J</b>	<1.6
021108WRPB-VC-05A	<2.5	<96	<b>5.9J</b>	<b>2.2J</b>	<1.6
021108WRPB-VC-05Z	<2.5	<96	<2.1	<1.2	<1.6
021108WRPB-VC-06A	<2.8	<110	<b>5.1J</b>	<1.3	<1.8
021108WRPB-VC-06B	<2.7	<110	<b>6.0J</b>	<b>2.5J</b>	<1.8
Proposed SEF 2009 Screening level	--	2910	--	3810	--
SEF 2006 Screening level	--	--	--	400	--
Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit). J = The result is an estimated concentration that is less then the MRL, but greater than or equal to the MDL.					

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**Table 11: Polynuclear Aromatic Hydrocarbons (PAHs), Low Molecular Weight Analytes**

Sample I.D.	Acenap hthene	Acenaph thylene	Anthracene	Fluorene	2-Methyl naphthalene	Naphthalene	Phen anthrene	Total Low PAHs
	ug/kg (ppb)							
021108WRPB-VC-01A	11J	16	18	6.5J	4.5J	11J	49	116
021108WRPB-VC-01Z	15	15	16	9.2J	6.5J	18	52	114
021108WRPB-VC-02A	5.9J	7.3J	9.2J	5.3J	4.1J	9.8J	32	74
021108WRPB-VC-02B	8.6J	5.3J	8.6J	6.0J	3.3J	7.0J	40	79
021108WRPB-VC-03A	36	19	35	22	17	28	150	307
021108WRPB-VC-03Z	90	28	52	60	100	94	270	694
021108WRPB-VC-04A	9.7J	6.7J	14	6.0J	3.6J	6.8J	37	84
021108WRPB-VC-04B	3.8J	4.5J	5.3J	3.4J	2.3J	6.0J	18	43
021108WRPB-VC-05A	11	11	18	6.8J	5.5J	16	55	123
021108WRPB-VC-05Z	130	85	100	80	77	140	410	1022
021108WRPB-VC-06A	3.1J	4.3J	5.8J	2.2J	<2.4	4.6J	15	35
021108WRPB-VC-06B	8.8J	11J	20	6.4J	4.5J	15	42	108
Proposed SEF 2009 Screening level	--	--	--	--	--	--	--	--
SEF 2006 Screening level	1100	470	1200	1000	470	500	61002	6600
Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit)								
J = The result is an estimated concentration that is less then the MRL, but greater than or equal to the MDL.								



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**Table 12: Polynuclear Aromatic Hydrocarbons (PAHs), High Molecular Weight Analytes**

Sample I.D.	Benzo(a)-anthracene	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene	Benzo(g,h,i)-perylene	Chrysene	Pyrene	Benzo(a)-pyrene	Dibenz(a,h)-anthracene	Indeno(1,2,3-cd)-pyrene	Fluoranthene	Total High PAHs
	ug/kg (ppb)										
021108WRPB-VC-01A	83	130	40	62	96	140	130	22	110	130	943
021108WRPB-VC-01Z	51	93	25	58	61	96	86	23	86	99	678
021108WRPB-VC-02A	23	32	9.0J	51	26	53	33	7.9J	28	52	315
021108WRPB-VC-02B	26	44	12	24	36	55	38	11J	37	59	342
021108WRPB-VC-03A	79	130	43	71	100	170	130	19	110	160	1012
021108WRPB-VC-03Z	96	170	55	78	140	220	180	24	160	210	1333
021108WRPB-VC-04A	47	49	12	48	61	120	47	6.2J	33	100	524
021108WRPB-VC-04B	18	30	9.6J	35	22	35	29	5.7J	27	36	247
021108WRPB-VC-05A	47	72	21	120	57	110	79	12	70	110	698
021108WRPB-VC-05Z	350	560	140	460	430	550	590	72	500	520	5222
021108WRPB-VC-06A	16	25	6.8J	28	20	36	26	4.9J	23	33	219
021108WRPB-VC-06B	46	73	22	32	59	96	79	14	75	93	589
Proposed SEF 2009 Screening level	--	--	--	--	--	--	--	--	--	--	Low & high total 7610
SEF 2006 Screening level	4300	b + k = 600	4000	5900	8800	3300	800	4100	11000	55000	
Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit).											
J = The result is an estimated concentration that is less then the MRL but greater than or equal to the MDL.											

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**Table 13: Petroleum**

Sample I.D.	Gasoline Range Organics	Diesel Range Organics	Residual Range Organics
	ug/kg (ppb)		
021108WRPB-VC-01A	ND	<b>58</b>	<b>260</b>
021108WRPB-VC-01Z	ND	ND	ND
021108WRPB-VC-02A	ND	<b>55</b>	<b>360</b>
021108WRPB-VC-02B	ND	<b>51</b>	<b>380</b>
021108WRPB-VC-03A	ND	<b>45</b>	<b>270</b>
021108WRPB-VC-03Z	ND	<b>140</b>	<b>330</b>
021108WRPB-VC-04A	ND	<b>49</b>	<b>290</b>
021108WRPB-VC-04B	ND	<b>49</b>	<b>280</b>
021108WRPB-VC-05A	ND	ND	ND
021108WRPB-VC-05Z	ND	<b>93</b>	<b>240</b>
021108WRPB-VC-06A	ND	<b>46</b>	<b>300</b>
021108WRPB-VC-06B	ND	<b>69</b>	<b>410</b>
Proposed SEF 2009 Screening level		1700	4400
SEF 2006 Screening level	--	--	--
Symbol (<) = Non-detect (ND) at the value listed (Method Reporting Limit).			

**Willamette Post Office Bar**  
**Sampled February 11, 2009**

**Table 14: Organotin (Tributyltin)**

Sample I.D.	Total Butyltin ug/Kg		
	Tetra	Tri	Di
021108WRPB-VC-01A	<0.94	<b>8.1</b>	<b>2.2P</b>
021108WRPB-VC-03Z	<0.84	<0.54	<0.43
021108WRPB-VC-06B	<0.99	<b>5.4</b>	<b>2.4</b>
Proposed SEF 2009 Screening level	97	320	910
SEF 2006 Screening level	75 total		
	Porewater Butyltin ug/L		
021108WRPB-VC-01A	<0.038	<0.012	<0.0073
021108WRPB-VC-03Z	<0.070	<0.022	0.025J
021108WRPB-VC-06B	<0.038	<0.012	<0.0073
Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit). Not SL for TBT in Freshwater P=			

**Willamette Post Office Bar**  
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**Table 15: Volatile Organic Compounds**

Sample I.D.	n-Propyl benzene	1,3,5-Tri methyl benzene	1,2,4-Tri methyl benzene	Isopropyl benzene	Methyl tert- Butyl Ether	Benzene	Toluene	Ethyl benzene	m,p- Xylenes	o-Xylene
	ug/kg (ppb)									
021108WRPB-VC-01A	<0.13	<0.081	<0.19	<0.063	<b>4.1J</b>	<0.29	<b>0.28J</b>	<0.083	<0.19	<0.12
021108WRPB-VC-03A	<0.12	<0.077	<0.18	<0.060	<b>2.9J</b>	<0.27	<b>0.15J</b>	<0.079	<0.18	<0.12
021108WRPB-VC-05A	<0.13	<0.081	<0.19	<0.063	<b>4.1J</b>	<0.29	<b>0.28J</b>	<0.083	<0.19	<0.12
Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit). J = The result is an estimated concentration that is less then the MRL but greater than or equal to the MDL.										

Willamette Post Office Bar  
Sampled February 11, 2009

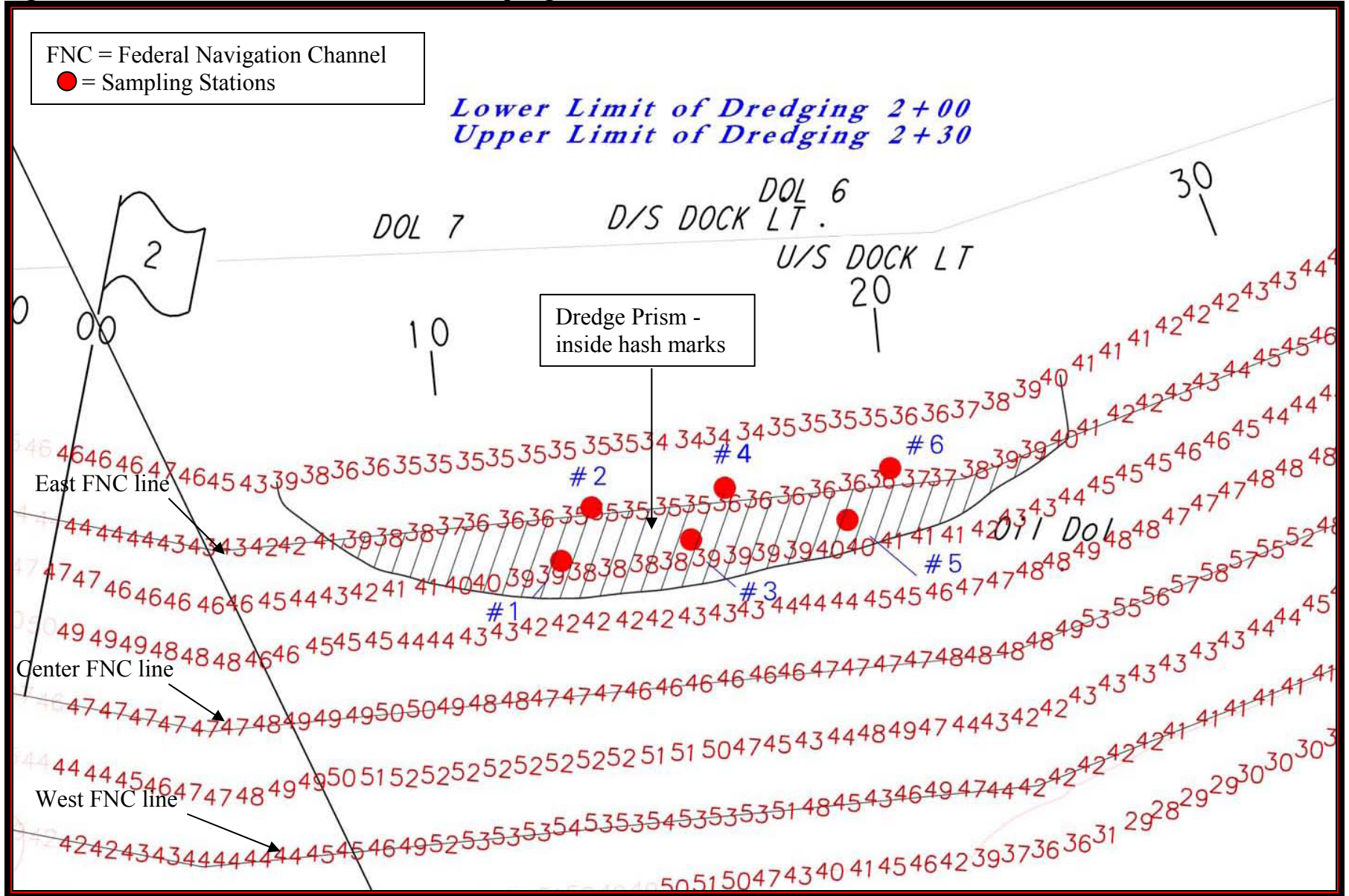
Figure 1: Willamette River, Post Office Bar, Vicinity Map





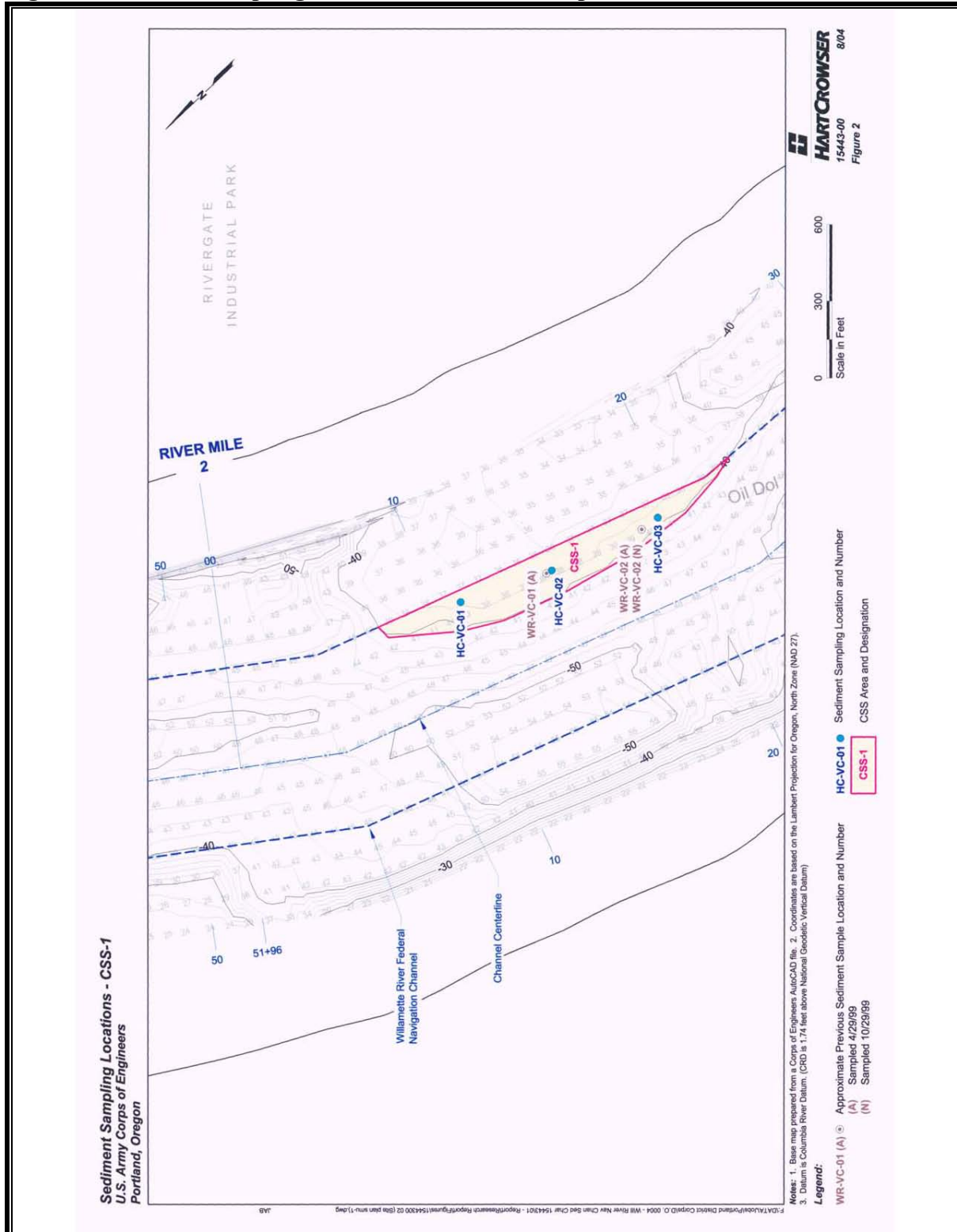
**Sampled February 11, 2009**

**Figure 2: Willamette River, Post Office Bar, Sampling Stations**



Willamette Post Office Bar  
Sampled February 11, 2009

Figure 3: Historic Sampling Stations 1999 & 2004 Reports



# Willamette Post Office Bar Sampled February 11, 2009

Figure 4: Historic Sampling Stations 2006 Report

