

December 2001

**Columbia River Channel Deepening (CRCD)  
Station #76 (CR-BC-76)  
Sediment Quality Evaluation**

**ABSTRACT**

This evaluation was conducted following procedures set forth in the Inland Testing Manual, developed jointly by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency to assess dredged material. Guidelines used are those developed to implement the Clean Water Act. These guidelines and associated screening levels are those adopted for use in the Dredge Material Evaluation Framework for the Lower Columbia River Management Area, November 1998.

Three (3) surface grab samples were collected at the CR-BC-76 sampling station (river mile 100.38) of the Columbia River Channel Deepening sampling event (June 1997). A composite of the three (3) samples was submitted for physical analysis. The three (3) samples were analyzed for metals (9 inorganic), total organic carbon, pesticides, polychlorinated biphenyls, phenols, phthalates, miscellaneous extractables, and polynuclear aromatic hydrocarbons.

The level for silver in sample CR76-PG-01 was initially found to be above the SL; this result was suspected to be a lab error. To verify the results, the lab reanalyzed this sample in duplicate; these showed good correlation, were below the SL for silver and therefore, did not verify the earlier hit for silver (see note in reference section regarding lab analysis of silver).

None of the other contaminants tested were found to be at or above their respective SLs in the samples. This material is located at a depth below any current or proposed authorized channel depth and not likely to ever be dredged; however, the sediments represented by the three (3) samples meet suitability requirements for unconfined, in-water placement without further characterization.

**INTRODUCTION**

This report characterizes the sediment at the site of sample station CR-BC-76 of the Columbia River Channel Deepening (CRCD) sediment sampling in June 1997. The material collected at this station was not typical of Columbia River sediment and further characterization is being conducted as a follow-up to that event. The sampling and analysis objectives are stated in the Sampling and Analysis Plan (SAP June 2001), 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 dredge material testing manual, the Dredge Material Evaluation Framework for the Lower Columbia River Management Area (DMEF).
- Three (3) surface grab samples will be collected at the location of CR-BC-76 sampling station of the Columbia River Channel Deepening (CRCD) sampling event (June 1997), where low-level contamination was detected.
- Collect, handle and analyze representative sediment of the proposed dredging prism, in accordance with protocols and Quality Assurance/Quality Control (QA/QC) requirements.
- Characterize sediments to be dredged for evaluation of environmental impact.
- Conduct physical and chemical characterization only for this sediment evaluation.

## **PREVIOUS STUDIES**

Sample station CR-BC-76 was sampled in June 1997 as part of the Columbia River Channel Deepening Feasibility study. The material collected at this station was not typical of Columbia River sediment. It is speculated that this material originated from the 1996 Willamette River O&M dredging disposal at Morgan's Bar. Contamination was detected at this site and further characterization is being conducted as a follow-up to that event.

The following narrative is from the 1996 Sediment Evaluation Report associated with Station CR-BC-76: "This sample was not scheduled to be chemically analyzed, but when the field personnel saw that it was fine-grained material, a chemical sample was added. Although sample CR-BC-76 contained the highest levels detected of most chemicals of concern, these levels were still well below SLs" (total DDT 4.0 ug/kg and total PCBs 61.0 ug/kg). The material represented by this sample contained 55.9 % silt and 12.3% clay. This material is thought to be disposal material from the Willamette River, as it is near the Morgan's Bar disposal site for the 1996 Willamette River dredging event.

## **CURRENT SAMPLING EVENT/DISCUSSION**

A composite of three (3) surface grab samples collected at sample station CR-BC-76 was submitted for physical analysis. The three (3) samples also were analyzed separately for metals (9 inorganic), total organic carbon (TOC), pesticides and polychlorinated biphenyls (PCBs), phenols, phthalates, miscellaneous extractables, and polynuclear aromatic hydrocarbons (PAHs).

**Table 1.**  
**Sample Location Coordinates for this Re-sample Event and the Original CR-BC-76**  
**(NAD 83 Oregon State Plane North)**

Sample Number	Latitude	Longitude
CR76-PG-01	45° 40' 7.73"	122° 46' 12.6"
CR76-PG-02	45° 40' 7.84"	122° 46' 12.5"
CR76-PG-03	45° 40' 7.87"	122° 46' 12.4"
CR-BC-76	45° 40' 7.80"	122° 46' 12.6"

## RESULTS

Physical Analysis (ASTM methods). A composite of the three (3) samples was submitted for physical analysis and data are presented in Table 1. Mean grain size for the composite sample is 1.14 mm, with 10.23% gravel, 89.71% sand and 0.06% fines.

Metals (EPA method 6020/7471), Total Organic Carbon (EPA method 9060). Three (3) samples were submitted for testing and the data are presented in Table 2. The TOC ranged from 580 to 870 mg/kg in the samples. Low levels of most metals were found in the samples, but most did not approach the screening level (SL), except for silver. In one sample (CR76-PG-01), the level for silver was found to exceed the SL. This result was suspected to be in error since the lab was having a problem with their silver analyses (the sediment evaluation reports that showed a lab problem with the silver analysis are listed on the reference page). In order to verify the results, the lab reanalyzed this sample, in duplicate, and the level of silver was found to be <0.058 mg/kg and <0.52 mg/kg, which show good correlation and are below the SL.

Pesticides/PCBs (EPA method 8081A/8082), Phenols, Phthalates and Miscellaneous Extractables (EPA method 8270). Three (3) samples were tested and the data are presented in Table 3. No PCBs, pesticides (including DDT), phenols, or miscellaneous extractables were found at the MDL in the samples. Two phthalate compounds were detected in two (2) samples but all values were well below the SL (<0.5%).

Polynuclear Aromatic Hydrocarbons (EPA method 8270C). Three (3) samples were tested and the data are presented in Tables 4 and 5. The “low molecular weight” PAHs were not detected at the MDL in any of the samples. Low levels of all “high molecular weight” PAHs were found in one sample (CR76-PG-02) but all values ranged below 0.5% of their respective SLs. The “high molecular weight” PAHs were not detected at the MDL in the other two samples.

## CONCLUSION

Collection and evaluation of the sediment data was completed using guidelines from the Dredge Material Evaluation Framework for the Lower Columbia River Management Area (DMEF). The DMEF is a regional manual developed jointly with regional EPA, Corps,

Oregon Department of Environmental Quality and Washington Departments of Ecology and Natural Resources. This document is a guideline for implementing the Clean Water Act (40 CFR 230) and Section 404 (b)(1). The screening levels used are those adopted for use in the DMEF, final November 1998. The DMEF tiered testing approach requires that material in excess of 20% fines and greater than 5% volatile solids, as well as any material with prior history or is suspected (“reason to believe”) of being contaminated, be subjected to chemical as well as physical analyses.

Three (3) surface grab samples were collected at the CR-BC-76 sampling station of the Columbia River Channel Deepening (CRCD) sampling event (June 1997). A composite of the three (3) samples was submitted for physical analysis. The three (3) samples were analyzed for metals (9 inorganic), TOC, pesticides, PCBs, phthalates, miscellaneous extractables, and PAHs.

The level for silver in sample CR76-PG-01 was initially found to be above the SL; this result was suspected to be a lab error. To verify the results, the lab reanalyzed this sample in duplicate; these showed good correlation, were below the SL for silver and therefore, did not verify the earlier hit for silver. None of the other contaminants tested were found to be at or above their respective SLs in the samples. Therefore, the sediments represented by the three (3) samples are determined to be suitable for unconfined, in-water placement without further characterization.

The material represented by the original sample CR-BC-76 contained 68.2% fines. This material is thought to be disposal material from the Willamette River, as it is near the Morgan’s Bar disposal site for the 1996 Willamette River dredging event. The physical analysis for the composite of the 3 samples collected for the current sampling event indicated only 0.06% fines. The difference in the amount of fine-grained material and lack of contaminants associated with the material, between the 2 sampling events indicates that the fine-grained material dissipated (as anticipated) from the high energy disposal site at Morgan’s Bar.

## REFERENCES

1. U.S. Army Corps of Engineers, Portland District and Seattle District; U.S. Environmental Protection Agency, Region 10; Oregon Department of Environmental Quality; Washington State Department of Natural Resources and Department of Ecology. 1998 Final. Dredge Material Evaluation Framework for the Lower Columbia River Management Area.
2. U.S. Environmental Protection Agency and U.S. Army Corps of Engineers. February 1998. Evaluation of Dredged Material Proposed for Discharge in Inland and Near Coastal Waters - Testing Manual (referred to as the "Inland Testing Manual").
3. Clean Water Act, 40 CFR 230 (b)(1).
4. U.S. Army Corps of Engineers. June 2001. Sediment Sampling and Analysis Plan for VANALCO Aluminum (Former ALCO Aluminum Plant) and Columbia River Channel Deepening (CRCD) Station #76 (CR-BC-76). Portland District.
5. U.S. Army Corps of Engineers. 1996. Columbia River Channel Deepening Sediment Evaluation Report. Portland District.

The following reports, prepared by the U.S. Army Corps of Engineers, Portland District, December 2001, also showed a lab problem with the silver analysis:

Coquille River and Boat Basin, Sediment Quality Evaluation  
Skipanon Entrance Channel and Boat Basin, Sediment Quality Evaluation  
Chetco River and Boat Basin, Sediment Quality Evaluation  
Oregon Slough Entrance Channel, Sediment Quality Evaluation

## Physical Analysis

Sample I.D.	Grain Size (mm)		Percent		
	Median	Mean	Gravel	Sand	Silt/Clay
Composite CR76-PG-01, 02, 03	0.90	1.14	10.23	89.71	0.06

## Inorganic Metals and TOC

Sample I.D.	As	Sb	Cd	Cu	Pb	Hg	Ni	Ag	Zn	TOC
	mg/kg (ppm)									
CR76-PG-01	1.2	0.14 J B1	0.18 J	4.6	1.5	<0.032	5.1	<b>6.3*</b>	19	640
CR76-PG-02	1.2	0.48 J B1	0.28 J	5.2	2.6	<0.024	5	<0.055	27	580
CR76-PG-03	1.4	0.33 J B1	0.27 J	7.3	2.4	<0.023	6.5	<0.052	28	870
Screening level (SL)	57	150	5.1	390	450	0.41	140	6.1	410	
<p>* Silver (Ag) for CR76-PG-01 was reanalyzed 7/19/01 and the result = &lt;0.058 mg/kg; reanalysis on 8/16/01 showed a value of &lt;0.52 mg/kg at Practical Quantitation Limit (PQL).</p> <p>J = Estimated value (reported values are above the MDL, but below the PQL).</p> <p>B1 = Low-level contamination was present in the method blank (reported level was &lt;10 times blank concentration).</p> <p>Symbol (&lt;) = Non-detect (ND) at the value listed (Method Detection Limit).</p>										

**Pesticides\*, PCBs\*, Phenols\*, Phthalates  
and Extractables\***

Sample I.D.	bis(2-Ethylhexyl)- phthalate (ug/kg)	Butylbenzyl- phthalate (ug/kg)
CR76-PG-01	<5.4	<2.5
CR76-PG-02	8.1 J B1	3.5 J
CR76-PG-03	6.2 J B1	3.4 J
Screening level (SL)	8300	970
<p>* <b>No pesticides, PCBs, Phenols or Extractables</b> were found in any sample at the MDL.                      J = Estimated value (reported values are above the MDL, but below the PQL).                      B1 = Low-level contamination was present in the method blank (reported level was &lt;10 times blank concentration).                      Symbol (&lt;) = Non-detect (ND) at the value listed (Method Detection Limit).</p>		

Table 4. CRCD Station #76

Sampled June 20, 2001

**Polynuclear Aromatic Hydrocarbons (PAHs)**  
**Low Molecular Weight Analytes**  
**ug/kg (ppb)**

Sample I.D.	Acenaphthene	Acenaphthylene	Anthracene	Fluorene	2-Methyl naphthalene	Naphthalene	Phenanthrene	Total Low PAHs
CR76-PG-01	<0.65	<0.57	<0.33	<0.62	<0.21	<0.62	<0.28	ND
CR76-PG-02	<0.79	<0.69	<0.4	<0.74	<0.25	<0.74	<0.34	ND
CR76-PG-03	<0.7	<0.61	<0.35	<0.66	<0.22	<0.66	<0.3	ND
Screen level (SL)	500	560	960	540	670	2100	1500	5200
Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit)								

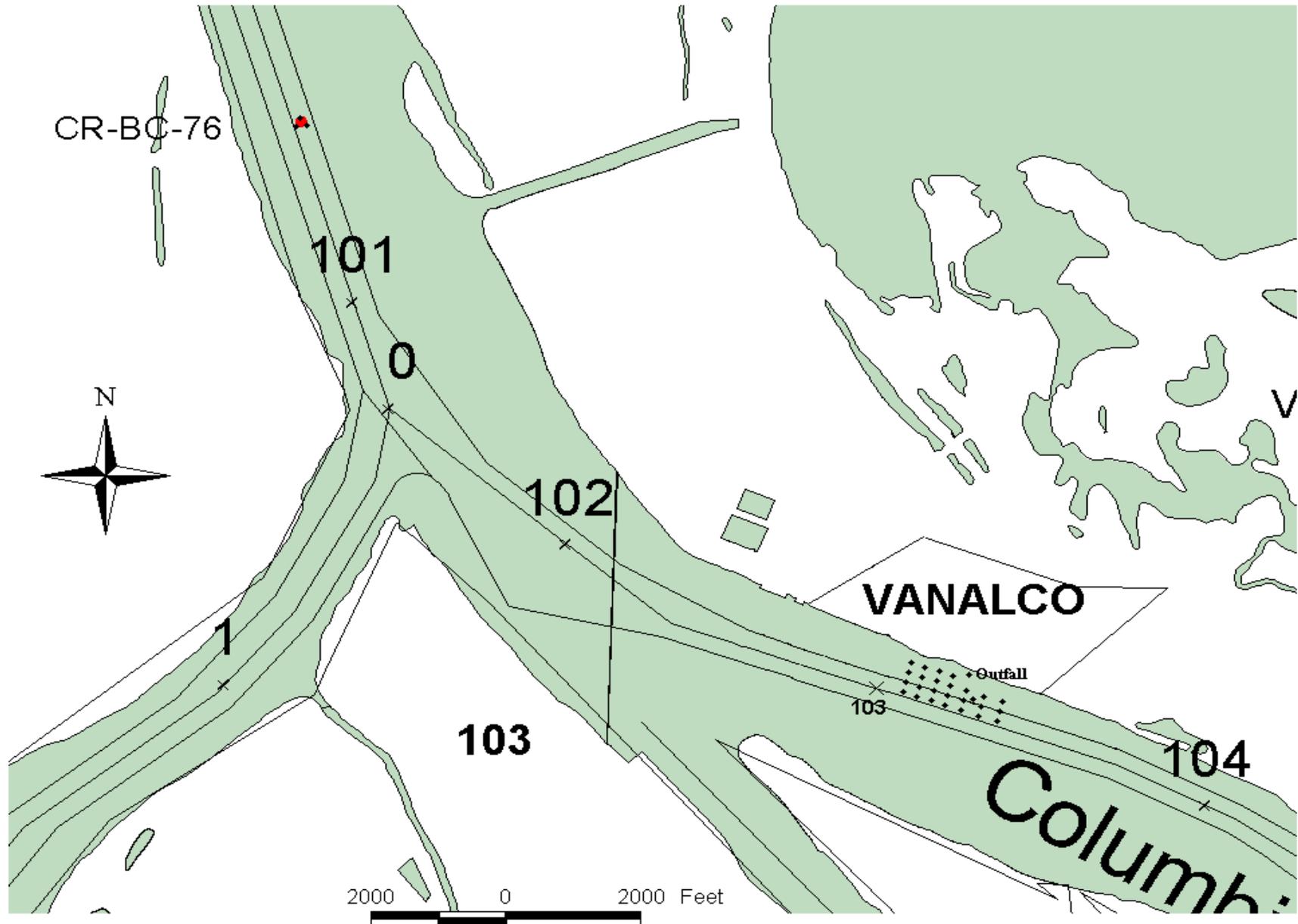
Table 5. CRCD Station #76

Sampled June 20, 2001

**Polynuclear Aromatic Hydrocarbons (PAHs)**  
**High Molecular Weight Analytes**  
**ug/kg (ppb)**

Sample I.D.	Benzo(b)- fluro- anthene	Benzo(k)- fluro- anthene	Benzo- (g,h,i)- perylene	Chrysene	Pyrene	Benzo(a)- pyrene	Benzo(a)- anthracene	Indeno- (1,2,3-cd)- pyrene	Fluor- anthene	Total High PAHs
CR76-PG-01	<0.28	<0.57	<0.22	<0.77	<0.44	<0.77	<0.8	<0.31	<0.62	ND
CR76-PG-02	3.8	<0.69	<0.26	2.2 J	4.1	2.9	2.4 J	1.7	3.3	20.4
CR76-PG-03	<0.3	<0.61	<0.23	<0.83	<0.46	<0.83	<0.86	<0.33	<0.66	ND
Screen level (SL)	b + k = 3200		670	1400	2600	1600	1300	600	1700	12000
J = Estimated value (reported values are above the MDL, but below the PQL). Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit)										

Figure 1. CRCD Station #76 Sampling Locations



**Figure 2. CRCD Station #76 Sampling Locations**

