

# Vancouver to The Dalles Sediment Quality Evaluation September 1999

## Abstract

The Clean Water Act (CWA) of 1977, as amended regulates dredging activities and requires sediment quality evaluation, including testing, prior to dredging. Guidelines to implement 40 CFR Part 230-Section 404(b)(1) regulations of the CWA, the national Inland Testing Manual (ITM) and the regional Dredge Material Evaluation Framework for the Lower Columbia River Management Area (DMEF) have adopted a tiered testing approach for the evaluation of dredge material. Tier IIa (physical testing) was completed for this evaluation, using screening levels (SL) use adopted in the DMEF.

Twelve box-core surface sediment samples were collected from shoals at 6 stations in the Columbia River, river mile (RM) 106+30, 113+00, 114+00, 118+20 and 125+00 (Figure 1 - 5), August 25, 1999. Four of the 12 samples were collected near the I-5 Bridge, approximate RM 106+30, two samples from the main channel and 2 from the alternate barge channel, under the wide span of the I-5 Bridge, which connects to the main channel 7,500 feet upstream. All samples were sent to Sound Analytical Services, Inc. laboratory of Tacoma, WA, for physical analyses only. The material collected consisted of 8.7% gravel, 89.8% sand and 1.6% silt/clay. The median grain size was 0.87mm, in the range of coarse sand, (mean 1.3mm very coarse sand) and 0.87% volatile solids. The Dredge Material Evaluation Framework (DMEF) for the Lower Columbia River Management Area has characterized the sediment in this reach of the Columbia River as "exclusionary". Visual and laboratory physical analyses confirm the exclusionary ranking. The material represented by the samples collected from the Columbia River sites is considered suitable for either open unconfined in-water or upland placement without further characterization.

## Introduction

The purpose of this sampling event is to confirm the exclusionary characterization of the Columbia River main channel shoals within the study area. This report will outline the procedures used to accomplish these goals.

### SAMPLING AND ANALYSIS OBJECTIVES

The sediment characterization program objectives and constraints are summarized below:

- To confirm characterization of sediments in accordance with the regional dredge material testing manual, the Dredge Material Evaluation Framework (DMEF) for the Lower Columbia River Management Area.
- Collect, handle and analyze representative sediment, of the purposed 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 characterization only, for this sediment evaluation, unless fine-grained material in the sediment sample exceeds 20% and volatile solids exceed 5%.

### **Previous Studies**

In 1985 samples were taken at Day Beacons (dolphins) number 11, 13 and 15 in the channel with an average density of 1907 gm/L a specific gravity of 2.71, a void ratio of 1.483 and a volatile solids content of 0.6 percent. The sediment was classified as poorly graded sand.

In 1992 three surface samples were taken upstream of the Glen Jackson Bridge adjacent to Day Beacons 11, 13 and 14. The samples were subjected to physical analyses that included dredge tests, gradations and volatile solids. The samples averaged 96.2 % poorly graded sand with a median grain size in the range of coarse sand (0.82 mm). Volatile solids were 0.4 % indicating a low organic content. With > 80% sand and <5% volatile solids and no known contaminant sources nearby these sediments were characterized as “exclusionary”, no further testing was required for in-water or upland placement

### **Current Sampling Event**

The Corps of Engineers, Portland District personnel, collected 12 box-core surface sediment samples from shoals in the Columbia River, river mile (RM) 106+30, 113+00, 114+00, 118+20 and 125+00 (Figure 1), August 25, 1999. Two samples collected near the I-5 Bridge, RM 106+30, were taken from the proposed channel re-location site. All samples were sent to Sound Analytical Services, Inc. laboratory of Tacoma, WA, for physical analyses only. The material collected consisted of >80% sand and <5% volatile solids (Table 1). The Dredge Material Evaluation Framework (DMEF) for the Lower Columbia River Management Area has characterized the sediment in this reach of the Columbia River as “exclusionary”. Visual and laboratory physical analyses confirm the exclusionary ranking. The material represented by the samples collected from the Columbia River sites is considered suitable for either open unconfined in-water or upland placement without further characterization.

### **Results/Discussion**

Physical and Volatile Solids: Data for these analyses are presented in Table 1. Samples CR-BC 04 and 10 were classified as “poorly graded sand with gravel” the balance of the samples were classified as “poorly graded sand”. The material collected consisted of 8.7% gravel, 89.8% sand and 1.6% silt/clay. The median grain size was 0.87mm, in the range of coarse sand, (mean 1.3mm very coarse sand) and 0.87% volatile solids.

### **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 Dept. of Environmental Quality and Washington Depts. of Ecology and Natural Resources. This document is a guideline for implementing the Clean Water Act, 40 CFR 230 sec 404 (b)(1). The DMEF Tiered testing approach does not require material >80% sand and < 5% volatile solids be subjected to chemical or biological analysis. As long as there is no prior history, proximity to contamination or suspicion (“reason to believe”) of being contaminated, further analyses are not required.

The material represented by this sampling event is considered “exclusionary” and is therefore, determined to be suitable for open in-water or up-land placement without further characterization.

## **References**

1. U.S. army Corps of Engineers, Portland District, 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, dated (referred to as the “Inland Testing Manual”).
3. The Clean Water Act, 40 CFR 230 (b) (1).
4. U.S. army Corps of Engineers, Portland District. 1985. Results of 1985, Day Beacons – Government Island, Columbia River Sediment Quality Testing—USACE Portland District O&M Dredging.
5. Britton, J., U.S. army Corps of Engineers, Portland District. 1992. Results of 1992, Day Beacons – Government Island, Columbia River Sediment Quality Testing—USACE Portland District O&M Dredging.

## Physical Analysis

Sample I.D.	Grain Size (mm)			%			
	Median		Mean	Gravel	Sand	Silt/Clay	Volatile solids
CR-BC-01	0.60		0.37	0.3	98.1	1.6	1.47
CR-BC-02	0.30		0.22	0.0	99.0	1.0	0.77
CR-BC-03	0.40		0.47	2.3	97.0	0.7	0.65
CR-BC-04	2.0		5.1	46.2	51.4	2.4	0.87
CR-BC-05	1.0		0.83	3.1	93.5	3.4	1.04
CR-BC-06	0.80		0.75	3.9	95.4	0.7	0.78
CR-BC-07	0.85		0.54	0.2	99.4	0.4	0.91
CR-BC-08	0.73		0.41	0.2	98.5	1.3	0.75
CR-BC-09	0.90		0.63	1.6	97.8	0.6	0.68
CR-BC-10	1.8		5.4	45.0	49.2	5.8	0.97
CR-BC-11	0.67		0.44	0.8	98.6	0.6	0.77
CR-BC-12	0.40		0.36	0.6	99.4	0.0	0.80
CR-BC-12 Lab Dup.	0.40		0.34	0.2	98.0	1.8	0.80
Average	0.87		1.3	8.7	89.8	1.6	0.87

Figure 1, Vancouver to The Dalles, Project Site Map

Sampled August 25, 1999

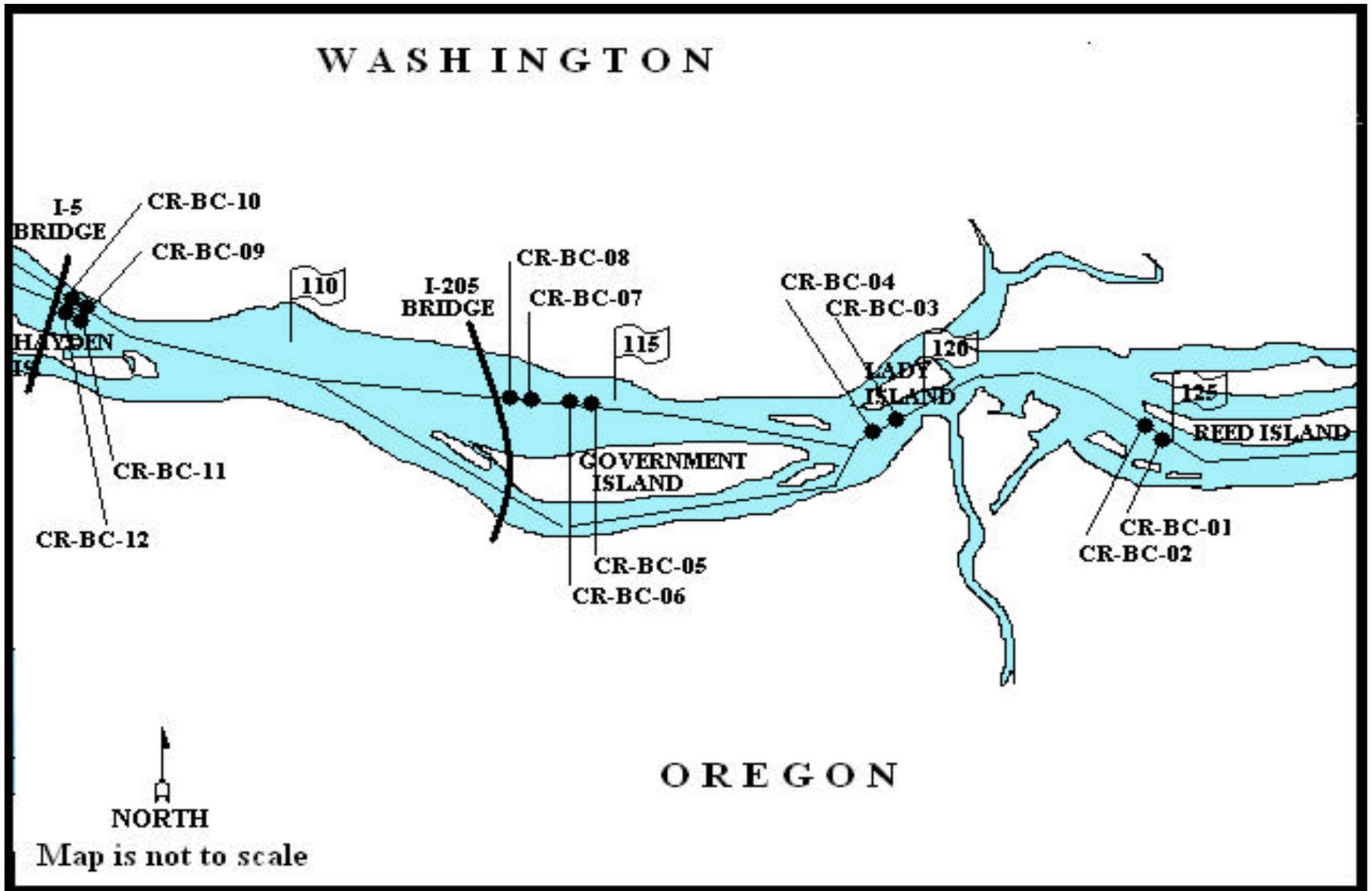


Figure 2, Vancouver to The Dalles, RM 123-126

Sampled August 25, 1999

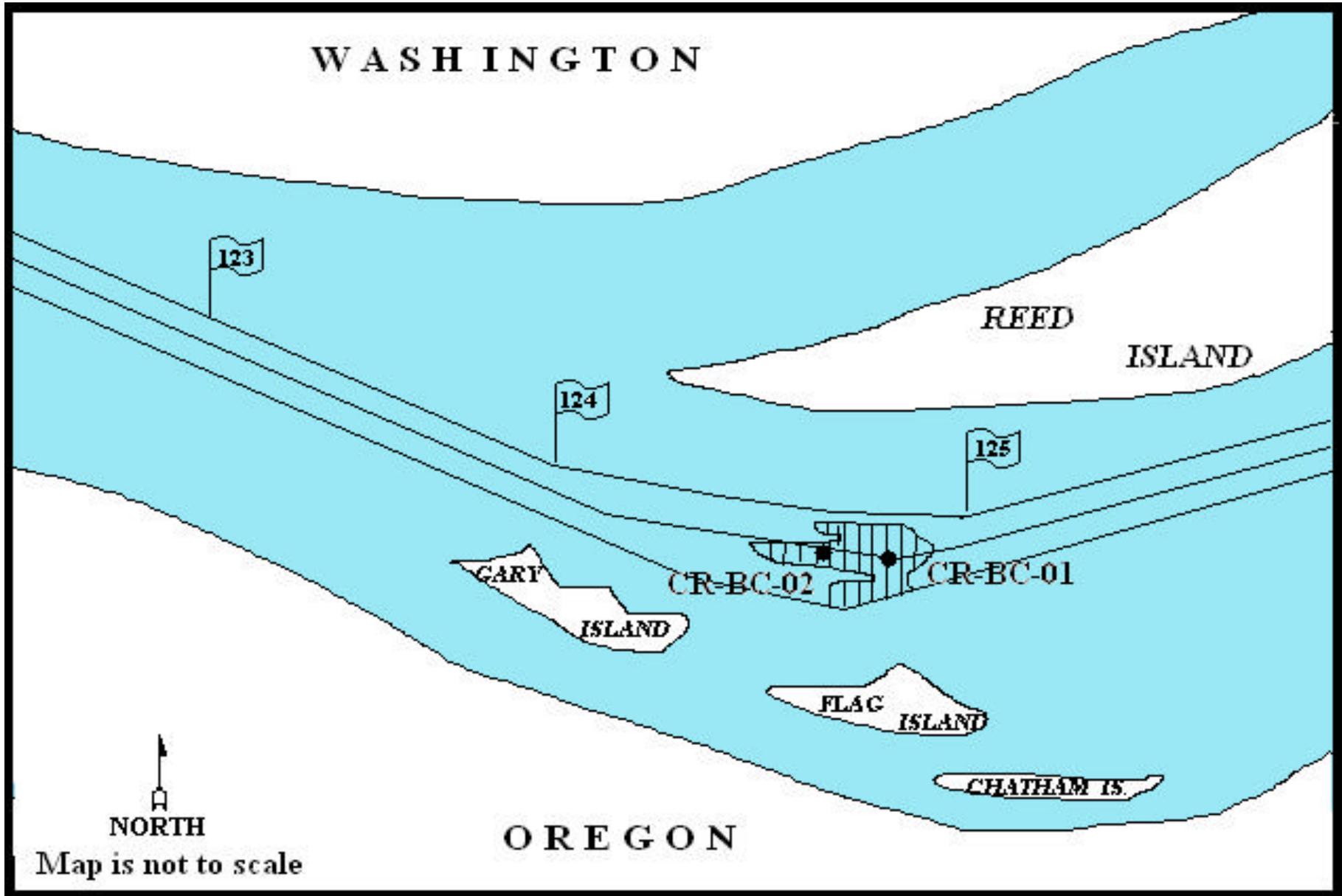


Figure 3, Vancouver to The Dalles, RM 117-125

Sampled August 25, 1999

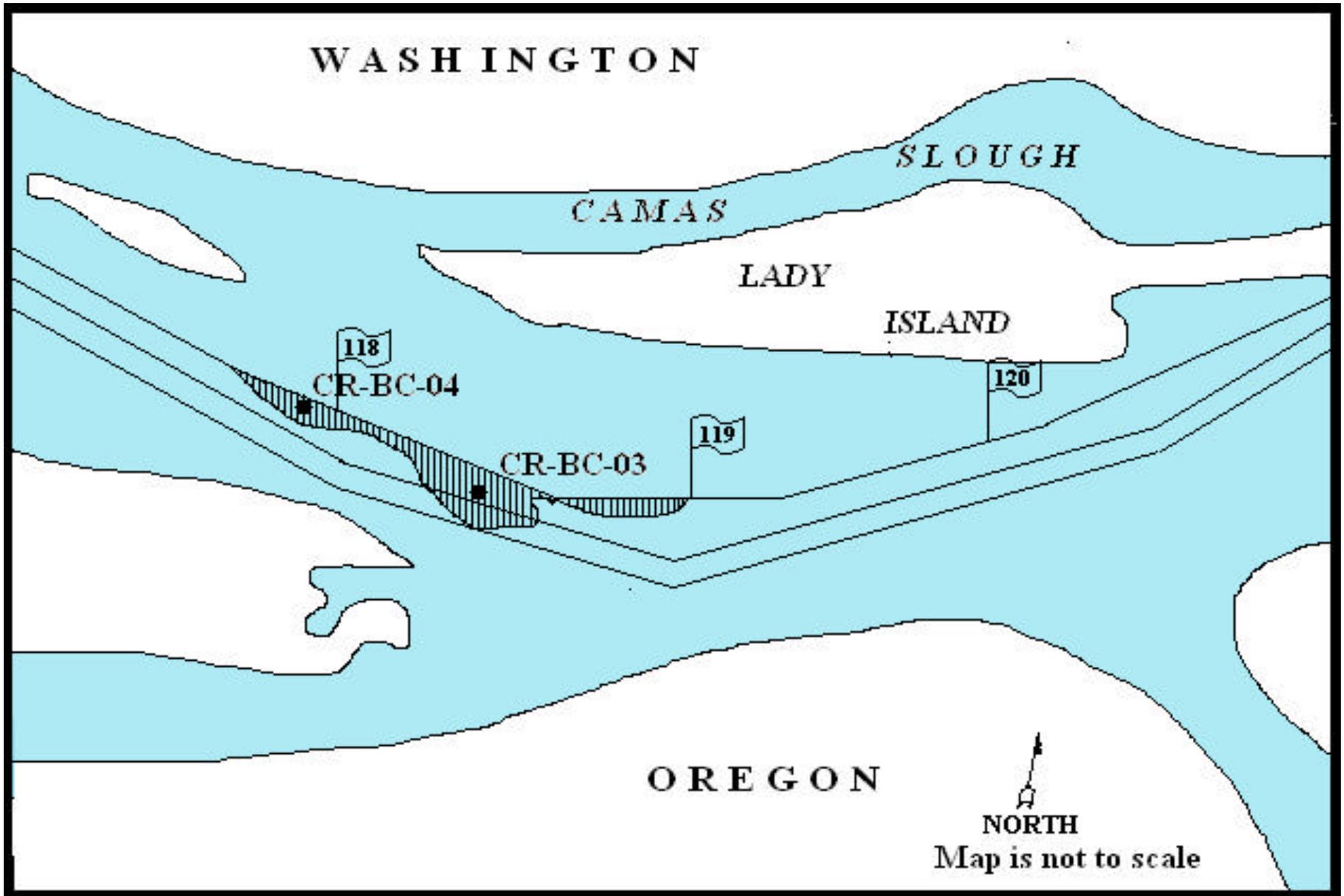


Figure 4, Vancouver to The Dalles, RM 112-115

Sampled August 25, 1999

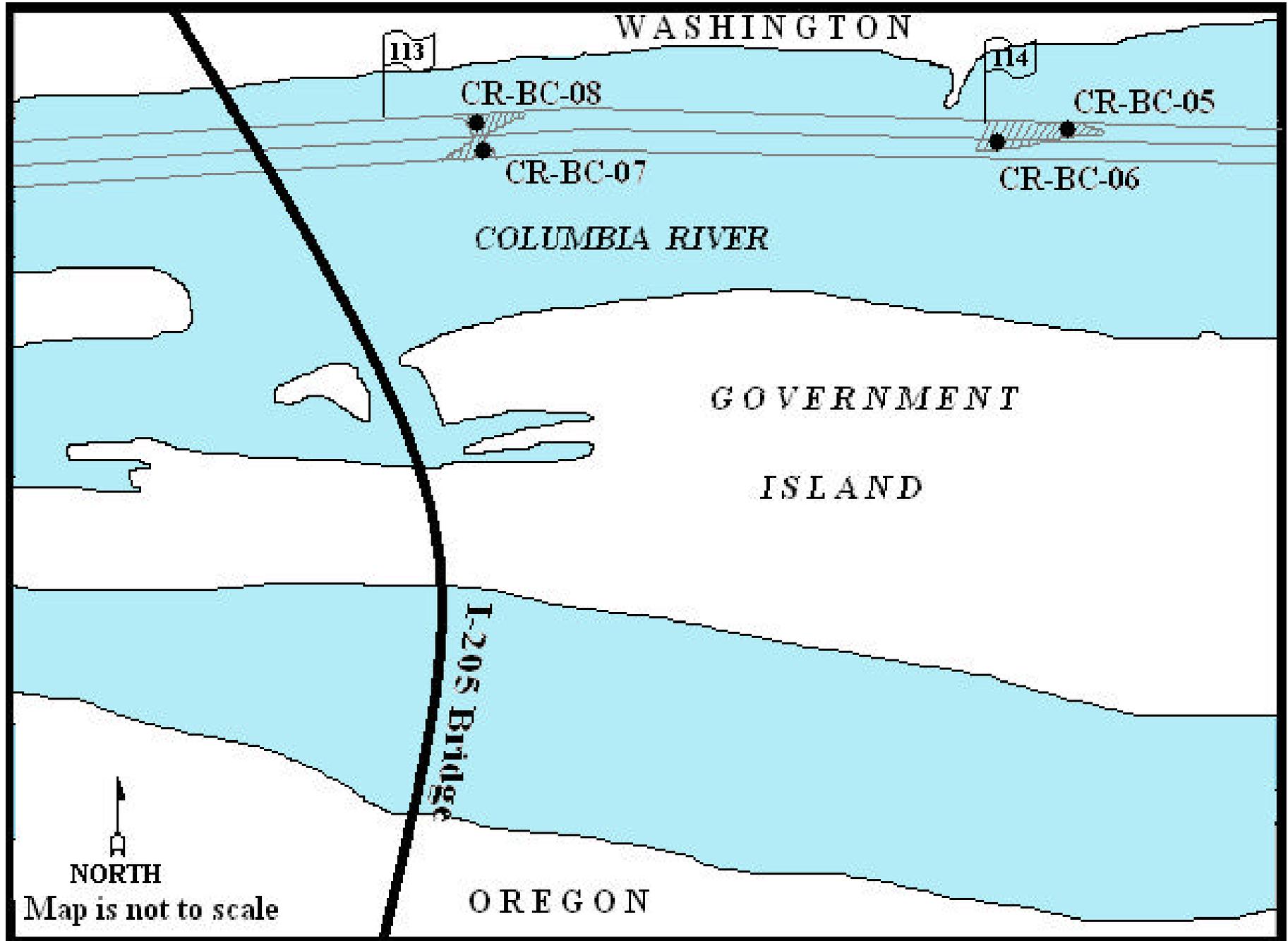
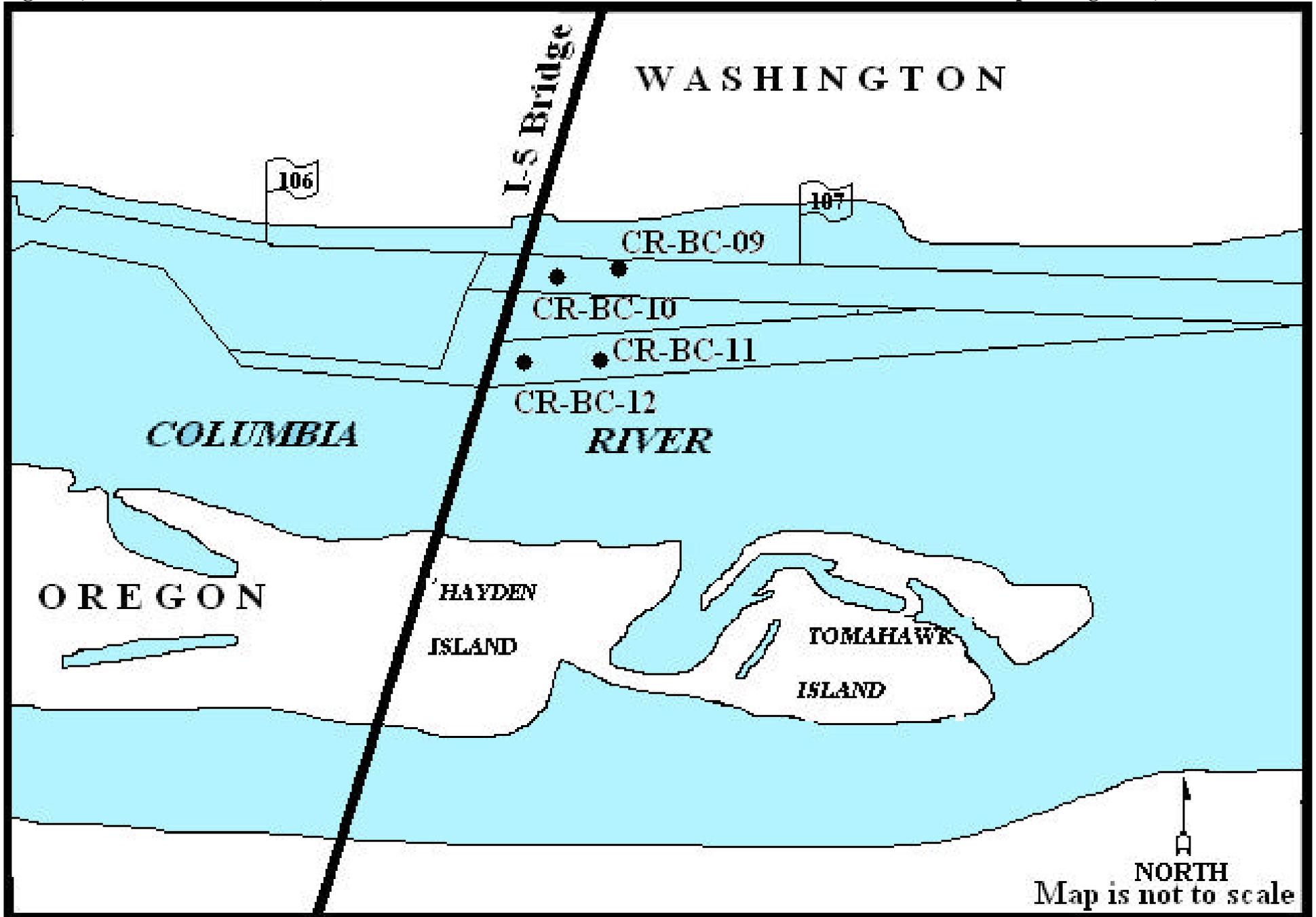


Figure 5, Vancouver to The Dalles, RM 105-108

Sampled August 25, 1999



SEDIMENT  
SAMPLING & ANALYSIS PLAN  
FOR THE  
COLUMBIA RIVER REACH  
VANCOUVER TO THE DALLES

August 1999

Prepared by:

Portland District  
Corps of Engineers

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## 1.0 PROJECT DESCRIPTION, SITE HISTORY AND ASSESSMENT

1.1 Project Site Description and Location: The Columbia River reach, main navigational channel between Vancouver, Washington and The Dalles, Oregon is 84.5 miles long and maintained to a depth of 27 feet and 300 feet in width. An alternate barge channel under the wide span of the I-5 Bridge, which connects to the main channel 7,500 feet upstream is currently maintained at 15 feet deep and 300 feet wide. Sampling is to occur at the I-5 crossing main channel and the alternate barge channel (RM 106+30) and from shoals at RM 113+00, 114+00, 118+20 and 125+00. Two samples will be taken from each of these shoals, for a total of 12 samples.

1.2 Site History: The Dredge Material Evaluation Framework (DMEF) for the Lower Columbia River Management Area has characterized the sediment in this reach of the Columbia River as “exclusionary”. The exclusionary characterization is given to sediment that is > 80% sand and < 5% volatile solids and has no potential influence of an active point source of contamination. Visual and laboratory physical analyses will be conducted to confirm the exclusionary ranking.

1.3 Previous Sediment Sampling: In 1985 samples were taken at Day Beacons (dolphins) number 11, 13 and 15 in the channel with an average density of 1907 gm/L a specific gravity of 2.71, a void ratio of 1.483 and a volatile solids content of 0.6 percent. The sediment was classified as poorly graded sand.

In 1992 three surface samples were taken upstream of the Glen Jackson Bridge adjacent to Day Beacons 11, 13 and 14. The samples were subjected to physical analyses that included dredge tests, gradations and volatile solids. The samples averaged 96.2 % poorly graded sand with a median grain size in the range of coarse sand (0.82 mm). Volatile solids were 0.4 % indicating a low organic content. With > 80% sand and <5% volatile solids and no known contaminant sources nearby these sediments were characterized as “exclusionary”, no further testing was required for in-water or upland placement.

## 2.0 SAMPLING AND ANALYSIS OBJECTIVES

The sediment characterization program objectives and constraints are summarized below:

- To confirm characterization of sediments (exclusionary) in accordance with the regional dredge material testing manual, the Dredge Material Evaluation Framework (DMEF) for the Lower Columbia River Management Area.
- Collect, handle and analyze representative sediment, of the purposed 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 characterization only, for this sediment evaluation, unless fine-grained material in the sediment sample exceeds 20% and volatile solids exceed 5%.

## 3.0 SAMPLING AND ANALYSIS REQUIREMENTS

3.1 Project Ranking: The purpose of this sampling event is to confirm the exclusionary characterization of the Columbia River main channel shoals within the study area. This report will outline the procedures used to accomplish these goals.

3.2 Sampling and Analysis Requirements: Material to be dredged from the Columbia River reach Vancouver to The Dalles will be sampled using a box core sampling devise, which collects a surface sediment sample. All samples will be subjected to physical analyses, to include volatile solid content.

#### 4.0 SAMPLE COLLECTION AND HANDLING PROCEDURES

4.1 Sampling Locations and Numbering: Figure 1 shows the project area and sample locations. Sampling sites are located for the best characterization of the material within the dredging area as possible. Potential sources of contamination and uniform coverage of the study area are factors in sample location. Proper QA/QC procedures as outlined in this section will be followed. Any deviation from these procedures shall be noted in the field log. Sample identification shall adhere to the following convention:

CR-XX-YY

Where, CR denotes samples collected from Columbia River, "XX" denotes the type of sampling device such as BC box corer; "YY" denotes the numeric sample number and will consist of two digits for all samples (i.e. 01, 05, 15, etc.).

4.2 Field Sampling Schedule: Sampling is planned for August 25, 1999.

4.3 Field Notes: Field notes will be maintained during sampling and compositing operations. Included in the field notes will be the following:

- Names of the person(s) collecting and logging in the samples.
- Weather conditions.
- Depth of each station sampled as measured from the water surface. This will be accomplished using a leadline or corrected depth recorder.
- Date and time of collection of each sediment sample.
- The sample station number and individual designation numbers assigned for each individual sample.
- Descriptions of sediment.
- Any deviation from the approved sampling plan.

4.4 Positioning: Sampling locations will be recorded in the field. Horizontal coordinates will be referenced to the Oregon Coordinate System for proper North or South Zones NAD 83 (North American Datum 1983). Horizontal coordinates will be identified as latitude and longitude to the nearest 0.1 second.

4.5 Decontamination: All sampling devices and utensils will be thoroughly cleaned prior to use according to the following procedure:

- Wash with brush and Alconox soap
- Rinse with distilled water
- Rinse with 10% HCl acid solution
- Rinse with distilled water

Utensils used to collect physical samples only or sampling devices such as the box corer will be washed down before each sampling event. However, they will not require the cleaning procedure listed above as long as samples collected for chemical analyses are not in contact with the core walls. All utensils used to collect chemical samples will require decontamination prior to each use. All hand work for chemical analyses will be conducted with disposable latex gloves which will be rinsed with distilled water before

and after handling each individual sample, as appropriate, to prevent sample contamination. Gloves will be disposed of between samples or composites to prevent cross contamination between samples.

4.6 Field Replicates: Field replicates will not be taken.

4.7 Sample Transport and Chain-of-Custody Procedures: Chain-of-custody procedures will commence in the field and will track delivery of the samples. Sample holding times and storage requirements are presented in Table 1. Specific procedures are as follows:

- Samples will be packaged and shipped in accordance with U.S. Department of Transportation regulations as specified in 49 CFR 173.6 and 49 CFR 173.24 or delivered directly to the testing laboratory.
- The coolers will be clearly labeled with sufficient information (i.e. name of project, time and date container was sealed, person sealing the cooler and office name and address) to enable positive identification.
- A sealed envelope containing chain-of-custody forms will be enclosed in a plastic bag and taped to the inside lid of the cooler.
- Custody seals shall be signed and dated, by the person relinquishing the chain of custody, and placed over cooler lid seal if cooler is out of their custody.

Upon transfer of sample possession to the laboratory, the persons transferring custody of the coolers will sign the chain-of-custody form. Upon receipt of samples at the laboratory, the coolers will be inspected and the receiver will record the condition of the samples.

**Table 1, Sample Volume and Storage**

Sample Type	Holding Time	Sample Size (a)	Temperature(b)	Container
Particle Size	6 Months	200 g	No Special Requirements	1-1 Quart Plastic Bag

a. Required sample sizes for one laboratory analysis. Actual volumes to be collected have been increased to provide a margin of error and allow for retest.

## 5.0 LABORATORY PHYSICAL AND CHEMICAL SEDIMENT ANALYSIS

5.1 Laboratory Analyses Protocols. Laboratory testing procedures will be conducted in accordance with the Dredge Material Evaluation Framework Manual (DMEF) for the Lower Columbia River Management Area. The samples will be analyzed for all the parameters requested on the chain-of-custody record. Private contract analytical chemical laboratories will conduct all physical analyses.

5.1.1 Chain-of-Custody: A chain-of-custody record for each set of samples will be maintained throughout all sampling activities and will accompany samples and shipment to the laboratory. Information tracked by the chain-of-custody records in the laboratory include sample identification number, date and time of sample receipt, analytical parameters required, location and conditions of storage, date and time of removal from and return to storage, signature of person removing and returning the sample, reason for removing from storage, and final disposition of the sample.

5.1.2 Limits of Detection: Non-applicable.

5.1.3 Sediment Chemistry: No chemical analysis will be run.

5.1.4 Sediment Conventional: The private analytical laboratories will analyze physical parameters. Particle grain size distribution for each sample will be determined. Sieve analysis will use a geological sieve series, which will include the sieve sizes U.S. NO. 5, 10, 18, 35, 60, 120, and 230. Hydrogen peroxide will not be used in preparations for grain-size analysis. Hydrometer analysis will use for particle sizes finer than the 230 mesh. Water content will be determined using ASTM D 2216. Sediment classification designation will be made in accordance with U.S. Soil Classification System, ASTM D 2487.

5.1.5 Holding Times: Six months.

5.1.6 Quality Assurance/Quality Control: The physical QA/QC procedures will consist of lab duplicate analysis.

5.2 Laboratory Written Report: The analytical laboratory documenting all the activities associated with sample analyses will prepare a written report. As a minimum, the following will be included in the report:

- Results of the laboratory analyses and duplicate results.
- All protocols used during analyses.
- Chain of custody procedures, including explanation of any deviation from those identified herein.
- Any protocol deviations from the approved sampling plan.
- Location and availability of data.

## 6.0 BIOLOGICAL TESTING

6.1 Biological Testing: No biological testing will be conducted under this study, however the need for biological testing will be assessed per the DMEF.

## 7.0 REPORTING

7.1 QA Report: Applies only when Chemical analysis is completed.

7.2 Sediment Evaluation Report: A written discussion of findings shall be prepared documenting the physical character of potential material to be dredged. As a minimum, the following will be included in the report.

- Previous sampling and analyses.
- Locations where the sediment samples were collected.
- A plan view of the project showing the actual sampling location.
- Description of sampling.
- Physical testing data, with comparisons to screening levels guideline.

Figure 1, Vancouver to The Dalles, Sampling Sites

