



**US Army Corps  
of Engineers®**  
Portland District

**KALAMA TURNING BASIN  
(Columbia River Mile 73.9-74.8)  
SEDIMENT QUALITY EVALUATION  
REPORT  
DECEMBER 2003**



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## ACRONYMS

|       |  |
|-------|--|
| EPA   | Environmental Protection Agency            |
| USACE | U.S. Army Corps of Engineers               |
| WDOE  | Washington Department of Ecology           |
| ODEQ  | Oregon Department of Environmental Quality |
| WDNR  | Washington Department of Natural Resources |
| DMEF  | Dredge Material Evaluation Framework       |
| NES   | Newly Exposed Surface                      |
| QA/QC | Quality Assurance/Quality Control          |
| TEL   | Threshold Effects Level                    |
| TOC   | Total Organic Carbon                       |
| PAH   | Polynuclear Aromatic Hydrocarbon           |
| PCB   | Polychlorinated Biphenyl                   |
| MDL   | Method Detection Limit                     |
| PQL   | Practical Quantitation Limit               |
| MRL   | Method Reporting Limit                     |
| TVS   | Total Volatile Solids                      |
| TEF   | Toxicity Equivalent Factor                 |
| TEQ   | Toxicity Equivalent Quotient               |
| ND    | non-detect                                 |
| pptr  | parts per trillion – ng/kg                 |
| SL    | Screening level                            |
| As    | Arsenic                                    |
| Cd    | Cadmium                                    |
| Ni    | Nickel                                     |
| Cu    | Copper                                     |
| Sb    | Thallium                                   |
| Cr    | Chromium                                   |
| Pb    | Lead                                       |
| Hg    | Mercury                                    |
| Ni    | Nickel                                     |
| Ag    | Silver                                     |
| Zn    | Zinc                                       |



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## **ABSTRACT**

Kalama Turning Basin is located on the Columbia River between RM 73 and 74, which is part of the Federal Navigational Project and is being evaluated for potential deepening to 43', plus a 5' advanced maintenance to a total depth of 48'.

A total of seven (7) sediment samples were collected along both the Oregon and Washington side of the turning basin, on September 10, 2003. Five (5) samples were submitted for physical analyses, including total volatile solids. Three (3) of the samples were also analyzed for metals (9 inorganic), total organic carbon, pesticides and polychlorinated biphenyls, phenols, phthalates, miscellaneous extractables, polynuclear aromatic hydrocarbon and organotin. Two (2) samples were not submitted for analyses. These samples contained mostly large cobble and gravel.

All samples submitted were classified as "poorly graded sand". Mean grain-size for all the samples is 0.40 mm, with 0.93% gravel (0.0%-4.46% range), 98.84 % sand (95.08%-99.97% range), and 0.23% fines (0.03%-0.64% range). Mean volatile solids were 0.56% for all the samples, with a 0.52% to 0.64% range. These analyses do not include estimates of samples KR-BC-02 and KR-BC-03, which were 100% cobble and 90% cobble and gravel, with 10% coarse sand, respectively.

The chemical analyses indicated only very low levels of contamination in any of the samples, with all levels well below their respective DMEF screening levels (SLs). No semivolatile organics, organotins, organochlorine pesticides, or PCBs were detected above the method reporting limits in any of the samples. Metals were detected in all the samples but below their respective DMEF screening levels. Detection levels were sufficiently low enough to evaluate material proposed for dredging. The analytical results of this characterization are consistent with historical data.

Sediments represented by all samples in this sampling event are determined to be suitable for unconfined, in-water placement without further characterization.

## **INTRODUCTION**

The sampling and analysis objectives are stated in the Sampling and Analysis Plan (SAP September 2003), and are also listed below. This report will characterize the sediment to be dredged and outline the procedures used to accomplish these objectives.

### **Sampling and Analysis Objectives**

- To characterize sediments in accordance with the regional dredge material testing manual protocols, the Dredge Material Evaluation Framework for the Lower Columbia River Management Area (DMEF), as well as, the Evaluation of Dredged Material Proposed for



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Disposal at Island, Nearshore, or upland Confined Disposal Facilities – Testing manual (Upland Testing Manual).

- Collect, handle and analyze representative sediment, of the area to be characterized within Kalama River, in accordance with protocols and Quality Assurance/Quality Control (QA/QC) requirements.
- Analyze for full suite of Tier II a & b level DMEF – Table 8.1, Physical, Metals, TOC, Pest/PCBs, Semi-volatiles and Organotin.

## **PREVIOUS STUDIES**

Samples were taken at the Harvest States Grain Terminal and Peavey Grain Terminal in September 1998. Two sediment cores were collected at the Harvest States Grain Terminal. Sediments were determined to be suitable for unconfined open-water disposal as all detected compounds were measured at concentrations below the corresponding Lower Columbia River Management Area (LCRMA) screening levels (SLs). Two sediment cores were also collected at the Peavey Grain Terminal. Sediments were determined to be suitable for unconfined open-water disposal as all detected compounds were measured at concentrations below the corresponding LCRMA SLs.

## **CURRENT SAMPLING EVENT/DISCUSSION**

A total of seven (7) sediment samples were collected along both the Oregon and Washington side of the turning basin, on September 10, 2003 (see figure 2). Five (5) samples were submitted for physical analyses, including total volatile solids. Three (3) of the samples were also analyzed for semi-volatile organics, organotins (bulk), organochlorine pesticides, polychlorinated biphenyls, metals (9 inorganic), and total organic carbon. One sample was also analyzed for organotins in porewater. Two (2) samples were not submitted for analyses. These samples contained mostly large cobble and gravel.

All samples submitted were classified as “poorly graded sand”. Mean grain-size for all the samples is 0.40 mm, with 0.93% gravel (0.0%-4.46% range), 98.84 % sand (95.08%-99.97% range), and 0.23% fines (0.03%-0.64% range). Mean volatile solids were 0.56% for all the samples, with a 0.52% to 0.64% range. These analyses do not include estimates of samples KR-BC-02 and KR-BC-03, which were 100% cobble and 90% cobble and gravel, with 10% coarse sand, respectively.

The chemical analyses indicated only very low levels of contamination in any of the samples, with all levels well below their respective DMEF screening levels (SLs). No semivolatile organics, organotins, organochlorine pesticides, or PCBs were detected above the method reporting limits in any of the samples. Metals were detected in all the samples but below their respective DMEF screening levels. Detection levels were sufficiently low enough to evaluate material proposed for dredging. The analytical results of this characterization are consistent with historical data.

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**Table 1. Sample Location Coordinates, (NAD 83, Oregon State Plane North)**

|           |   |
|-----------|---|
| KR-BC-01  | 46 <sup>0</sup> 01' 30.2"<br>122 <sup>0</sup> 52' 4.1"  |
| KR-BC-02  | 46 <sup>0</sup> 01' 38.4"<br>122 <sup>0</sup> 52' 13.5" |
| KR-BC-03  | 46 <sup>0</sup> 01' 43.7"<br>122 <sup>0</sup> 52' 19.2" |
| KR-BC-04  | 46 <sup>0</sup> 01' 25.8"<br>122 <sup>0</sup> 52' 17.3" |
| KR-BC-04A | 46 <sup>0</sup> 01' 24.4"<br>122 <sup>0</sup> 52' 19.1" |
| KR-BC-05  | 46 <sup>0</sup> 01' 31.3"<br>122 <sup>0</sup> 52' 19.1" |
| KR-BC-06  | 46 <sup>0</sup> 01' 43.1"<br>122 <sup>0</sup> 52' 37.5" |

**RESULTS**

**Physical and Volatile Solids (ASTM methods)**

Five (5) boxcore samples were submitted for physical analysis, including total volatile solids. All samples submitted were classified as “poorly graded sand”. Mean grain-size for all the samples is 0.40 mm, with 0.93% gravel (0.0%-4.46% range), 98.84 % sand (95.08%-99.97% range), and 0.23% fines (0.03%-0.64% range). Mean volatile solids were 0.56% for all the samples, with a 0.52% to 0.64% range. These analyses do not include estimates of samples KR-BC-02 and KR-BC-03, which were 100% cobble and 90% cobble and gravel, with 10% coarse sand, respectively.

**Metals (EPA method 6020/7471), Total Organic Carbon (EPA method 9060)**

Three (3) box core sediment samples were submitted for testing, with data presented in Table 3. The TOC ranged from 547 to 578 mg/kg in the samples.



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Low levels of As, Cu, Pb, Hg, Ni and Zn were detected in all samples, but no levels approach their respective DMEF SLs. MRLs were sufficiently below screening levels for good evaluation of material tested.

**Pesticides/PCBs (EPA method 8081A/8082), Semivolatile Organics (EPA method 8270)**

Three (3) box core sediment samples were submitted for testing, with data presented in Table 4. No pesticides/ PCBs or semivolatile organics were found at the MRL in any of the samples. MRLs were sufficiently below screening levels for good evaluation of material tested.

**Tributyltin [Total (Bulk) & Pore-Water]**

Three (3) box core sediment samples were submitted for total TBT testing and one sediment sample was submitted for pore-water testing, with data presented in Table 5. No tributyltin was detected at low detection levels. MDLs were sufficiently below screening levels for good evaluation of material tested.

**CONCLUSION**

Collection and evaluation of the sediment data was completed using guidelines from the 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 guidance for implementing the Clean Water Act (40 CFR 230), Section 404 (b)(1). The screening levels used are those adopted for use in the DMEF, final November 1998. The DMEF uses a tiered testing approach that requires 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.

A total of seven (7) sediment samples were collected along both the Oregon and Washington side of the turning basin, on September 10, 2003 (see figure 2). Five (5) samples were submitted for physical analyses, including total volatile solids. Three (3) of the samples were also analyzed for semi-volatile organics, organotins (bulk), organochlorine pesticides, polychlorinated biphenyls, metals (9 inorganic), and total organic carbon. One sample was also analyzed for organotins in porewater. Two (2) samples were not submitted for analyses. These samples contained mostly large cobble and gravel.

All samples submitted were classified as "poorly graded sand". Mean grain-size for all the samples is 0.40 mm, with 0.93% gravel (0.0%-4.46% range), 98.84 % sand (95.08%-99.97% range), and 0.23% fines (0.03%-0.64% range). Mean volatile solids were 0.56% for all the samples, with a 0.52% to 0.64% range. These analyses do not include estimates of samples KR-BC-02 and KR-BC-03, which were 100% cobble and 90% cobble and gravel, with 10% coarse sand, respectively.

The chemical analyses indicated only very low levels of contamination in any of the samples, with all levels well below their respective DMEF screening levels (SLs). No semivolatile organics, organotins, organochlorine pesticides, or PCBs were detected above the method reporting limits in



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any of the samples. Metals were detected in all the samples but below their respective DMEF screening levels. Detection levels were sufficiently low enough to evaluate material proposed for dredging. The analytical results of this characterization are consistent with historical data.

Sediments represented by all samples in this sampling event are determined to be suitable for unconfined, in-water placement without further characterization.



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**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. U.S. Army Corps of Engineers. January 2003. Evaluation of Dredged Material Proposed for Disposal at Island, Nearshore, or Upland Confined Disposal Facilities - Testing Manual (referred to as the "Upland Testing Manual").
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5. PSDDA. 1996. Puget Sound Dredged Disposal Analysis, Technical Information Memorandum, Testing, Reporting and Evaluation of Dioxin/furan Data in PSDDA Programs.
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**Table 2. Physical Analysis & Volatile Solids**

| Sample I.D.          | Grain Size (mm) |      | Percent    |       |           |                 |
|----------------------|-----------------|------|------------|-------|-----------|-----------------|
|                      | Median          | Mean | Gravel & > | Sand  | Silt/Clay | Volatile Solids |
| KR-BC-01             | 1.2             | 1.0  | 4.64       | 95.08 | 0.28      | 0.56            |
| KR-BC-02 (estimate)  | -               | -    | 100        | 0     | 0         | -               |
| KR-BC-03 (estimate)  | -               | -    | 90         | 10    | 0         | -               |
| KR-BC-04             | 0.29            | 0.21 | 0.00       | 99.90 | 0.10      | 0.64            |
| KR-BC-04A            | 0.30            | 0.26 | 0.00       | 99.80 | 0.20      | 0.56            |
| KR-BC-05             | 0.30            | 0.24 | 0.00       | 99.97 | 0.03      | 0.53            |
| KR-BC-06             | 0.39            | 0.30 | 0.00       | 99.46 | 0.54      | 0.52            |
| Mean (without 02&03) | 0.50            | 0.40 | 0.93       | 98.84 | 0.23      | 0.56            |
| Minimum              | 0.29            | 0.21 | 0.00       | 95.08 | 0.03      | 0.52            |
| Maximum              | 1.2             | 1.0  | 4.46       | 99.97 | 0.54      | 0.64            |

Symbol (>) = greater than  
 Symbol (-) = not analyzed or estimated



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**Table 3. Inorganic Metals and TOC**

| Sample I.D.   | As          | Sb    | Cd     | Cu   | Pb   | Hg      | Ni   | Ag     | Zn    | TOC |
|---|-------------|-------|--------|------|------|---------|------|--------|-------|-----|
|   | mg/kg (ppm) |       |        |      |      |         |      |        |       |     |
| KR-BC-01  | 2.02        | <1.62 | <0.27  | 6.26 | 2.52 | <0.0103 | 6.6  | <0.27  | 33.7  | 547 |
| KR-BC-04  | 1.78        | <1.77 | <0.296 | 5.86 | 3.29 | <0.0119 | 12.8 | <0.296 | 46.8  | 578 |
| KR-BC-04A   | 1.82        | <1.87 | <0.311 | 7.52 | 2.84 | <0.0125 | 9.14 | <0.311 | 36.1  | 552 |
| Mean  | 1.87        | ND    | ND     | 6.55 | 2.88 | ND      | 9.51 | ND     | 38.87 | 559 |
| Screening level (SL)  | 57          | 150   | 5.1    | 390  | 450  | 0.41    | 140  | 6.1    | 410   |     |
| Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit). Symbol (-) = no screening level established. |             |       |        |      |      |         |      |        |       |     |



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**Table 4. Pesticides, \*PCBs, \*Semi-Volatile Organics**

| Sample I.D.  | Pesticides   |              |          |           |
|--|--------------|--------------|----------|-----------|
|  | ug/kg (ppb)  |              |          |           |
|  | 4,4'-<br>DDD | 4,4'-<br>DDE | 4,4'-DDT | Total DDT |
| KR-BC-01   | <0.709       | <0.709       | <0.709   | ND        |
| KR-BC-04   | <0.862       | <0.862       | <0.862   | ND        |
| KR-BC-04A  | <1.01        | <1.01        | <1.01    | ND        |
| Screen level (SL)  |              |              |          | 6.9       |
| <p>*No <b>PCB</b> Aroclors were detected above MRLs, (SL for total PCBs = 130 ppb).<br/>           *No <b>Phenols, Phthalates or Misc. Extractables</b> were detected at very low detection limits.<br/>           Symbol (&lt;) = Non-detect (ND) at the value listed (Method Reporting Limit).</p> |              |              |          |           |



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**Table 5: Total and Pore-water Organotin**

| <b>Total &amp; Pore-Water Tributyltin</b>                                  |   |  |
|--|---|--|
| <b>Sample I.D.</b>   | <b>Total (Bulk)<br/>Tributyltin ug/kg</b> | <b>Pore-water<br/>Tributyltin ug/L</b> |
| KR-BC-01   | <0.995                                    | <0.0146                                |
| KR-BC-04   | <1.12                                     |  |
| KR-BC-04A  | <1.22                                     |  |
| Screen level (SL)  | 73  | 0.15                                   |
| Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit). |   |  |





### Kalama Turning Basin, Sediment Sampling Pictures

