CENWS-OD-TS-DM

MEMORANDUM FOR RECORD 11 February 2004

SUBJECT: **DETERMINATION OF THE SUITABILITY OF SEDIMENT PROPOSED TO BE DREDGED FROM THE BLAIR WATERWAY BRIDGE REACH WIDENING PROJECT FOR OPEN-WATER DISPOSAL AT THE COMMENCEMENT BAY OPEN-WATER DISPOSAL SITE, AS EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT.**

1. The following summary reflects the consensus determination of the Agencies that comprise the regional Dredged Material Management Program (DMMP) for the State of Washington. The agencies include the Corps of Engineers, Department of Ecology, Department of Natural Resources, and the Environmental Protection Agency. The agencies are charged with determining the suitability of dredged material for in-water disposal and have evaluated the proposed dredging of 265,000 cubic yards from the Blair Bridge Reach Widening Project located in Blair Waterway, Commencement bay, Washington.

2. The project was ranked moderate for testing purposes. The sampling and analysis plan was approved on August 28, 2003 by the DMMP agencies for an estimated total dredged material footprint volume of 265,000 cubic yards. The sampling design called for analyzing 87,000 cy of the proposed dredging footprint represented by the fill layer down through 12 feet of the native sediment contact layer. A total of 178,000 cy of native sediment below the –12 feet MLLW contact layer were not sampled and are considered suitable for unconfined-open water disposal without testing. Sampling of the proposed dredging footprint (see figures 1-4) was conducted on November 4-5, 2003, and consisted of drilling four borings at pre-selected locations using a hollow-stem auger drilling rig. A 6-inch diameter hollow stem auger and 4-inch diameter split-spoon sampler were used to collect samples in the upper portions of the borings. The sampling intervals were 7, 14, 16 feet. Below that, a smaller diameter auger and 2-inch split-spoon sampler were used. Changing to a smaller diameter augur was necessary to control excessive heave that resulted from using the larger diameter augur in sandy material. The change was made at a depth of seven feet when refusal was encountered using the larger-diameter sampler. Compositing of the core samples was done at Analytical Resources, Inc. (ARI) in Tukwila, Washington. Compositing was accomplished in accordance with the SAP, which called for compositing horizontally by 4-foot intervals. Composites for the four dredged Material Management Units (DMMUs) in the top 8 feet of the 32-foot sampling interval were two-way composites. Samples for the other six DMMUs representing the bottom 24 feet of the sampling interval were four-way composites. Figure 4 shows a schematic of the horizontal and vertical configuration of the ten DMMUs. DMMUs 1-9 were analyzed, while DMMU-10 (representing the 28-32 foot interval) was archived at $-20^{0}$C. Samples were collected for both chemisty and potential biological testing. A tiered testing approach was used, and all samples for potential biological testing were archived at $4^{o}$C pending completion of the chemical analyses.

3. Relevant dates for regulatory tracking purposes are included in Table 1.

**Table 1. Regulatory Tracking Information and Dates**

| | |
|---|---|
| Initial SAP submittal date:<br>Revised SAP submittal date: | April 2, 2003<br>August 11, 2003 |
| Initial SAP review/response letter date:<br>Revised SAP approval letter date: | May 23, 2003<br>August 28, 2003 |
| Sampling date(s): | November 4-5, 2003 |
| Sediment data characterization report submittal date: | January 23, 2004 |
| DAIS Tracking Number | POTBB-1-A-F-193 |
| **Recency Determination Date: Moderate** (5 years) | November 2009 |

4. The Sampling and Analysis Plan approved by the Agencies for testing for the ten DMMUs was followed, and quality assurance/quality control guidelines specified by the PSDDA Users Manual were generally complied with. The data gathered were deemed sufficient and acceptable for decision-making by the DMMP agencies based on best professional judgment.

5. Table 2 provides an analysis summary of the results of the conventional parameters analyzed for the nine composited DMMUs. Chemical analysis of the nine DMMUs indicated that there were no detected and detection limit exceedances of screening level for all chemicals of concern. Table 3 provides a complete dry weight chemical analysis inventory for the nine DMMU's analyzed. Six of the nine DMMUs had low TOC concentrations less than 0.5%. Table 4 provides TOC-normalized results for comparison with SMS guidelines for the three DMMUs with TOC's greater than 0.5%. There were no bioaccumulation trigger (BT) or maximum level (ML) exceedances of COC analyzed. Based on the results for the nine composited DMMUs, the archived sample (BBW-C10SD) was not analyzed. Because there were no SL guideline exceedances, biological testing was not required.

6. The results of the chemical analysis for the nine composited DMMU and the unanalyzed archived DMMU (BBW-C10SD), representing a total of 87,000 cy of material and the 178,000 cy of unanalyzed native sediment indicate that the entire 265,000 cy of material is determined to be suitable for unconfined open-water disposal.

7. This memorandum documents the suitability of sediment to be dredged from the Blair Bridge Reach Widening Dredging Project for disposal at the Commencement Bay non-dispersive open-water disposal site. However, this suitability determination does not constitute final agency approval of the project. A dredging plan for this project must be completed as part of the final project approval process. A final decision will be made after full consideration of agency input, and after an alternatives analysis is done under Section 404(b)(1) of the Clean Water Act.

Concur:

3/10/04 — David R. Kendall
Date — David Kendall, Ph.D., Seattle District Corps of Engineers

3/4/04 — Justine Barton
Date — Justine Barton, Environmental Protection Agency

3/10/04 — Thomas H. Gries
Date — Tom Gries/Loree Randall, Washington Department of Ecology

3/4/2004 — Peter Leon
Date — Peter Leon, Washington Department of Natural Resources

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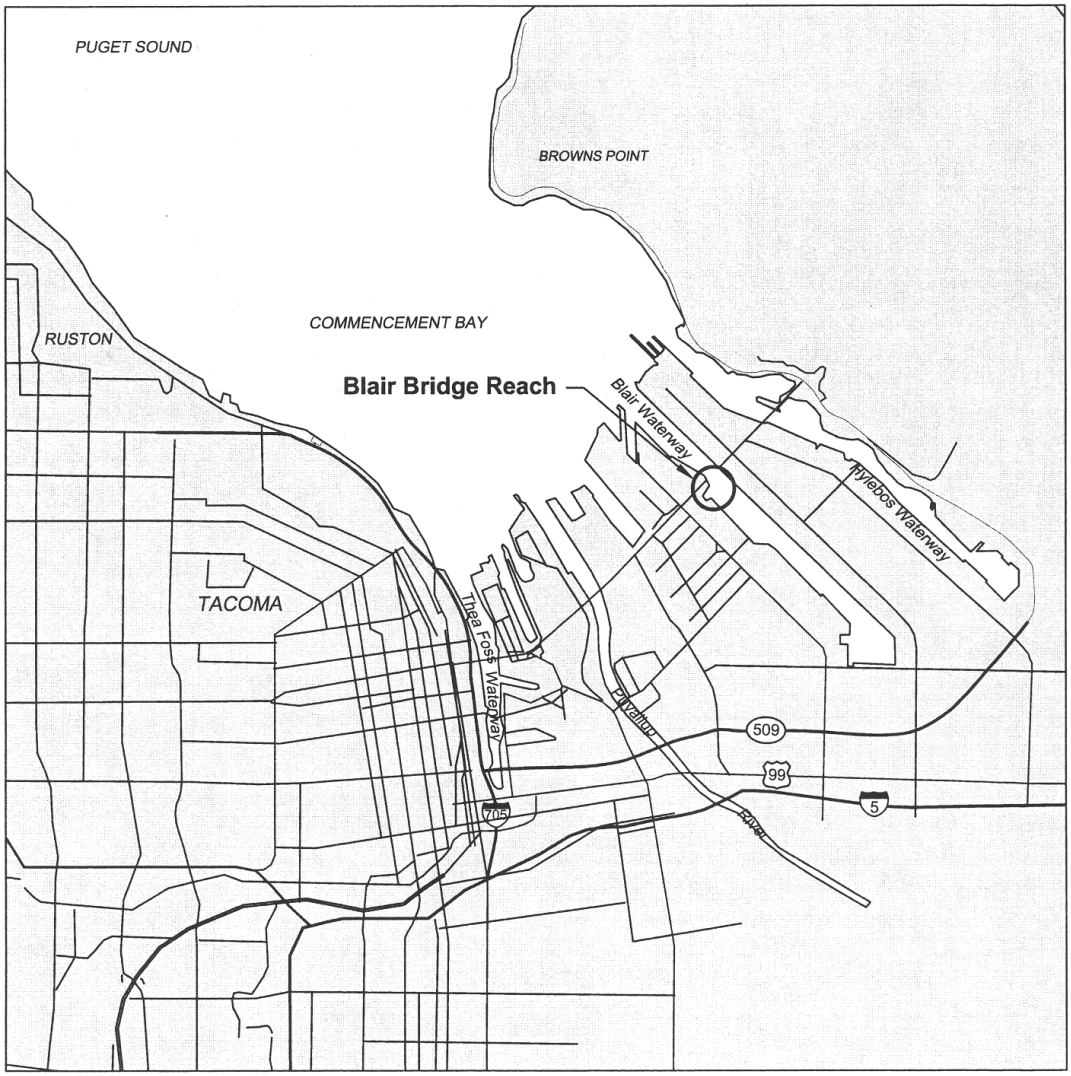


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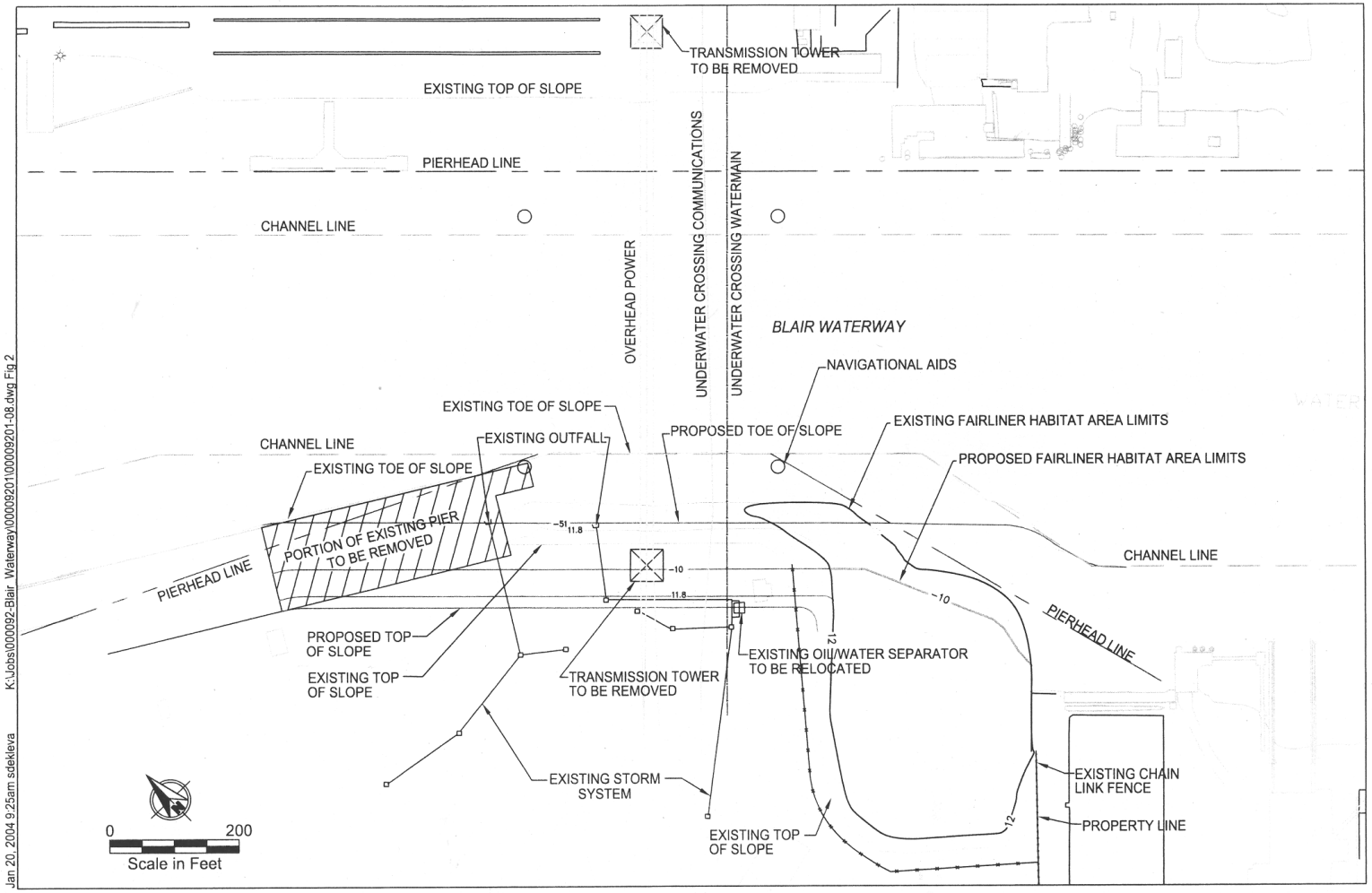
ANCHOR ENVIRONMENTAL, L.L.C.

**Figure 1**
Vicinity Map
Blair Bridge Reach Widening Project



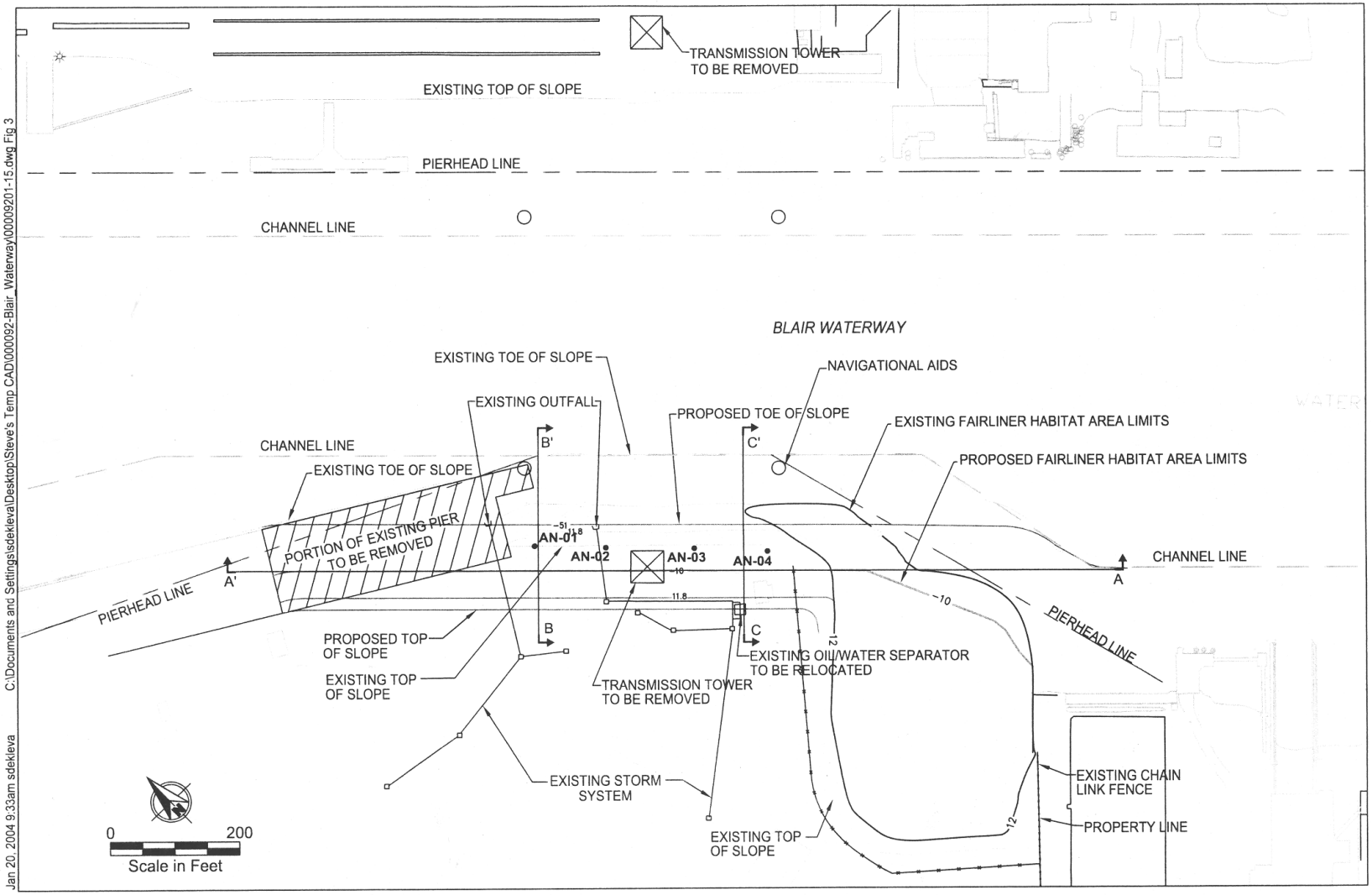

ANCHOR ENVIRONMENTAL, L.L.C.

LEGEND:

Existing Contours

Proposed Contours

**Figure 2**
Plan View
Blair Bridge Reach Widening Project

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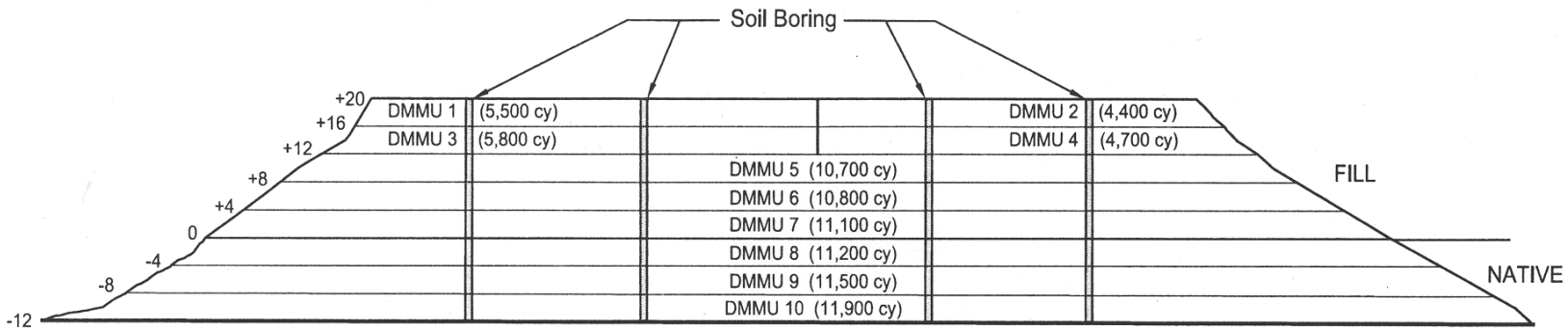
ANCHOR ENVIRONMENTAL, L.L.C.

LEGEND:

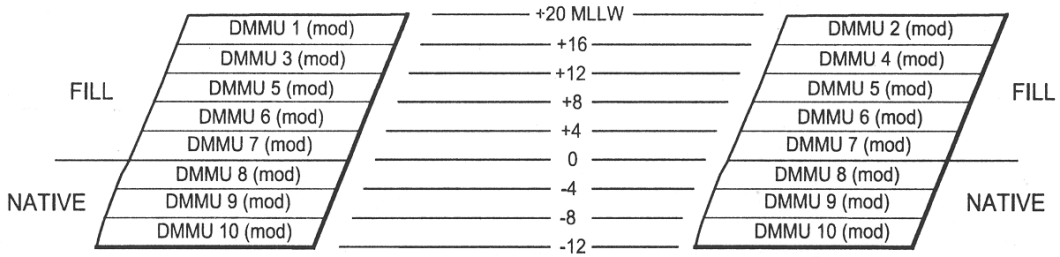
Existing Contours

Proposed Contours

**Figure 3**
Sampling Locations
Blair Bridge Reach Widening Project




Section A-A' (see Fig 3)




Section B-B' (see Fig 3)

Section C-C' (see Fig 3)

0 120
Horizontal Scale in Feet

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**Figure 4**
Dredge Material Management Unit Layout
Blair Bridge Reach Widening Project

Table 2. Blair Bridge Reach Widening Project Characterization, PSDDA Evaluation Summary

| | | | | Location ID | BBW-C01 | | BBW-C02 | | BBW-C03 | | BBW-C04 | | BBW-C05 | | BBW-C06 | | BBW-C07 | | BBW-C08 | | BBW-C09 | | BBW-C10 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Sample ID | BBW-C01SD | | BBW-C02SD | | BBW-C03SD | | BBW-C04SD | | BBW-C05SD | | BBW-C06SD | | BBW-C07SD | | BBW-C08SD | | BBW-C09SD | | BBW-C10SD | | |
| | | | | Rank: | M | | M | | M | | M | | M | | M | | M | | M | | M | | M | | |
| PARAMETER | Units | SL | BT | ML | Conc. | VQ | Conc. | VQ | Conc. | VQ | Conc. | VQ | Conc. | VQ | Conc. | VQ | Conc. | VQ | Conc. | VQ | Conc. | VQ | Conc. | VQ | |
| **Conventionals** | | | | | | | | | | | | | | | | | | | | | | | Archived | | |
| Total Solids | % | | | | 92.0 | | 90.4 | | 90.2 | | 91.7 | | 87.1 | | 78.6 | | 81.7 | | 80.9 | | 81.1 | | NA | | |
| Total Organic Carbon | % | | | | 0.78 | | 1.6 | | 0.49 | | 0.87 | | 0.3 | | 0.27 | | 0.32 | | 0.11 | | 0.21 | | NA | | |
| Total Volatile Solids | % | | | | 1.6 | | 2.4 | | 1.1 | | 2.1 | | 0.99 | | 0.99 | | 0.98 | | 0.71 | | 0.83 | | NA | | |
| Total Ammonia | mg-N/kg | | | | 0.19 | u | 0.78 | | 0.21 | u | 0.22 | | 0.21 | u | 0.21 | u | 0.63 | | 0.7 | | 0.73 | | NA | | |
| Total Sulfides | mg/kg | | | | 1.1 | u | 1.1 | u | 1.3 | | 1.1 | u | 1.3 | u | 1.2 | u | 1.2 | u | 2.4 | | 1.9 | | NA | | |
| **Grain Size** | | | | | | | | | | | | | | | | | | | | | | | Archived | | |
| Gravel | % | | | | 21.5 | | 50.2 | | 5.1 | | 33.3 | | 5.7 | | 0.7 | | 3.2 | | 2.2 | | 0.8 | | NA | | |
| Sand | % | | | | 70.6 | | 45.6 | | 85.9 | | 59.5 | | 85.2 | | 90 | | 85.8 | | 92.6 | | 87.8 | | NA | | |
| Silt | % | | | | 5.8 | | 2.7 | | 7.6 | | 5.3 | | 7.2 | | 7.3 | | 7.9 | | 4.2 | | 9.5 | | NA | | |
| Clay | % | | | | 2 | | 1.5 | | 1.5 | | 2 | | 1.8 | | 2 | | 3.1 | | 0.8 | | 1.9 | | NA | | |
| Fines (percent silt + clay) | % | | | | 7.8 | | 4.2 | | 9.1 | | 7.4 | | 9 | | 9.3 | | 11 | | 5 | | 11.4 | | NA | | |
| **Atterberg Limits** | | | | | | | | | | | | | | | | | | | | | | | Archived | | |
| Liquid limit | | | | | N-P | | N-P | | N-P | | N-P | | N-P | | N-P | | N-P | | N-P | | N-P | | NA | | |
| Plastic limit | | | | | N-P | | N-P | | N-P | | N-P | | N-P | | N-P | | N-P | | N-P | | N-P | | NA | | |
| Plasticity index | | | | | N-P | | N-P | | N-P | | N-P | | N-P | | N-P | | N-P | | N-P | | N-P | | NA | | |
| Eohaustorius estuarius hits: | | | | | NA | | NA | | NA | | NA | | NA | | NA | | NA | | NA | | NA | | NA | | |
| Mytilus galloprovincialis hits: | | | | | NA | | NA | | NA | | NA | | NA | | NA | | NA | | NA | | NA | | NA | | |
| Neanthes arenaceodentata hits: | | | | | NA | | NA | | NA | | NA | | NA | | NA | | NA | | NA | | NA | | NA | | |
| Bioassay Determination: (P/F) | | | | | NA | | NA | | NA | | NA | | NA | | NA | | NA | | NA | | NA | | NA | | |
| BTs exceeded: | | | | | no | | no | | no | | no | | no | | no | | no | | no | | no | | | | |
| Bioaccumulation conducted: | | | | | no | | no | | no | | no | | no | | no | | no | | no | | no | | | | |
| Bioaccumulation Determination: | | | | | | | | | | | | | | | | | | | | | | | | | |
| ML Rule exceeded: | | | | | no | | no | | no | | no | | no | | no | | no | | no | | no | | | | |
| PSDDA Determination: | | | | | Pass | | Pass | | Pass | | Pass | | Pass | | Pass | | Pass | | Pass | | Pass | | Pass | | **Total Vol.** |
| DMMU Volume: | cy | | | | 5,500 | | 4,400 | | 5,800 | | 4,700 | | 10,700 | | 10,800 | | 11,100 | | 11,200 | | 11,500 | | 11,900 | | 87,600 |
| **DMMU ID:** | | | | | **C1** | | **C2** | | **C3** | | **C4** | | **C5** | | **C6** | | **C7** | | **C8** | | **C9** | | **C10** | | |

~~Table 2~~ Table 3

**Summary of Dry-Weight Basis Analytical Results and Comparison with PSDDA ~~and Applicable SMS Evaluation Criteria~~**
**~~(Including OC-Normalized results for PCBs and alpha-BHC for comparison with respective PSDDA OC-Normalized criteria)~~**

| Location ID | DMMP Criteria | | SMS | BBW-C01 | BBW-C02 | BBW-C03 | BBW-C04 | BBW-C05 | BBW-C06 | BBW-C07 | BBW-C08 | BBW-C09 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | Screening Level | Bio Trigger | Sed Qual Std | BBW-C01SD | BBW-C02SD | BBW-C03SD | BBW-C04SD | BBW-C05SD | BBW-C06SD | BBW-C07SD | BBW-C08SD | BBW-C09SD |
| Sample Date | | | | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 |
| **Conventionals** | | | | | | | | | | | | |
| Preserved Total Solids (%) | --- | --- | --- | 90.1 | 89.0 | 86.8 | 89.8 | 77.5 | 80.4 | 79.7 | 81.9 | 78.7 |
| Total Organic Carbon (%) | --- | --- | --- | 0.78 | 1.6 | 0.49 | 0.87 | 0.30 | 0.27 | 0.32 | 0.11 | 0.21 |
| Total solids (%) | --- | --- | --- | 92.0 | 90.4 | 90.2 | 91.7 | 87.1 | 78.6 | 81.7 | 80.9 | 81.1 |
| Total Volatile Solids (%) | --- | --- | --- | 1.6 | 2.4 | 1.1 | 2.1 | 0.99 | 0.99 | 0.98 | 0.71 | 0.83 |
| Ammonia (mg/kg) | --- | --- | --- | 0.19 U | 0.78 | 0.21 U | 0.22 | 0.21 U | 0.21 U | 0.63 | 0.70 | 0.73 |
| Sulfide (mg/kg) | --- | --- | --- | 1.10 U | 1.10 U | 1.30 | 1.10 U | 1.30 U | 1.20 U | 1.20 U | 2.40 | 1.90 |
| **Grain Size (%)** | | | | | | | | | | | | |
| Gravel | --- | --- | --- | 21.5 | 50.2 | 5.1 | 33.3 | 5.7 | 0.7 | 3.2 | 2.2 | 0.8 |
| Sand | --- | --- | --- | 70.6 | 45.6 | 85.9 | 59.5 | 85.2 | 90 | 85.8 | 92.6 | 87.8 |
| Silt | --- | --- | --- | 5.8 | 2.7 | 7.6 | 5.3 | 7.2 | 7.3 | 7.9 | 4.2 | 9.5 |
| Clay | --- | --- | --- | 2.0 | 1.5 | 1.5 | 2.0 | 1.8 | 2.0 | 3.1 | 0.8 | 1.9 |
| Fines | --- | --- | --- | 7.8 | 4.2 | 9.1 | 7.4 | 9.0 | 9.3 | 11 | 5 | 11.4 |
| **Atterberg Limits** | | | | | | | | | | | | |
| Liquid limit | --- | --- | --- | N-P | N-P | N-P | N-P | N-P | N-P | N-P | N-P | N-P |
| Plastic limit | --- | --- | --- | N-P | N-P | N-P | N-P | N-P | N-P | N-P | N-P | N-P |
| Plasticity index | --- | --- | --- | N-P | N-P | N-P | N-P | N-P | N-P | N-P | N-P | N-P |
| **Metals (mg/kg)** | | | | | | | | | | | | |
| Antimony | 150 | --- | --- | 5 U | 5 U | 5 U | 5 U | 6 U | 6 U | 6 U | 6 U | 6 U |
| Arsenic | 57 | 507.1 | 57 | 5 U | 32 | 5 U | 10 | 6 U | 6 U | 6 U | 6 U | 6 U |
| Cadmium | 5.1 | 11.3 | 5.1 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.3 U | 0.2 U | 0.2 U | 0.2 U |
| Chromium | --- | 267 | 260 | 21.7 | 44.3 | 15.4 | 30.3 | 19.0 | 19.5 | 14.7 | 14.9 | 13.6 |
| Copper | 390 | 1027 | 390 | 29.4 | 89.4 | 27.4 | 26.4 | 19.6 | 11.3 | 15.9 | 12.8 | 11.7 |
| Lead | 450 | 975 | 450 | 36 | 37 | 9 | 34 | 9 | 3 U | 5 | 2 U | 2 U |
| Mercury | 0.41 | 1.5 | 0.41 | 0.05 U | 0.05 | 0.08 | 0.05 | 0.04 U | 0.06 U | 0.05 U | 0.06 U | 0.05 U |
| Nickel | 140 | 370 | --- | 15 | 35 | 10 | 22 | 12 | 12 | 10 | 10 | 9 |
| Selenium | --- | 3 | --- | 0.2 U | 0.5 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U |
| Silver | 6.1 | 6.1 | 6.1 | 0.3 U | 0.3 U | 0.3 U | 0.3 U | 0.3 U | 0.4 U | 0.4 U | 0.3 U | 0.4 U |
| Zinc | 410 | 2783 | 410 | 73.7 | 120 | 69.6 | 67.9 | 34.8 | 21.5 | 25.6 | 22.4 | 19.1 |
| **PCBs (µg/kg)** | | | | | | | | | | | | |
| Aroclor 1016 | --- | --- | --- | 19 U | 20 U | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| Aroclor 1221 | --- | --- | --- | 38 U | 40 U | 39 U | 38 U | 40 U | 39 U | 39 U | 39 U | 40 U |
| Aroclor 1232 | --- | --- | --- | 19 U | 20 U | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| Aroclor 1242 | --- | --- | --- | 19 U | 20 U | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| Aroclor 1248 | --- | --- | --- | 19 U | 20 U | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| Aroclor 1254 | --- | --- | --- | 19 U | 63 | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| Aroclor 1260 | --- | --- | --- | 19 U | 20 U | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| Total PCBs | --- | --- | 130 | 38 U | 63 | 39 U | 38 U | 40 U | 39 U | 39 U | 39 U | 40 U |
| **Pesticides (µg/kg)** | | | | | | | | | | | | |
| 4,4'-DDD | --- | --- | --- | 1.9 U | 2.0 U | 2.0 U | 1.9 U | 2.0 U | 1.9 U | 1.9 U | 1.9 U | 2.0 U |
| 4,4'-DDE | --- | --- | --- | 1.9 U | 6.0 | 2.0 U | 1.9 U | 2.0 U | 1.9 U | 1.9 U | 1.9 U | 2.0 U |
| 4,4'-DDT | --- | --- | --- | 5.1 | 4.8 U | 2.0 U | 1.9 U | 2.0 U | 1.9 U | 1.9 U | 1.9 U | 2.0 U |
| Aldrin | 10 | --- | --- | 0.96 U | 0.99 U | 0.99 U | 0.96 U | 0.99 U | 0.97 U | 0.96 U | 0.97 U | 0.99 U |
| alpha-BHC | --- | --- | --- | 0.96 U | 0.99 U | 0.99 U | 0.96 U | 0.99 U | 0.97 U | 0.96 U | 0.97 U | 0.99 U |
| gamma-BHC (Lindane) | 10 | --- | --- | 0.96 U | 0.99 U | 0.99 U | 0.96 U | 0.99 U | 0.97 U | 0.96 U | 0.97 U | 0.99 U |
| alpha-Chlordane | --- | --- | --- | 0.96 U | 0.99 U | 0.99 U | 0.96 U | 0.99 U | 0.97 U | 0.96 U | 0.97 U | 0.99 U |
| gamma-Chlordane | --- | --- | --- | 0.96 U | 0.99 U | 0.99 U | 0.96 U | 0.99 U | 0.97 U | 0.96 U | 0.97 U | 0.99 U |
| DDT (total) | 6.9 | 50 | --- | 5.1 | 6 | 2 U | 1.9 U | 2 U | 1.9 U | 1.9 U | 1.9 U | 2 U |

~~Table 2~~ Table 3

**Summary of Dry-Weight Basis Analytical Results and Comparison with PSDDA ~~and Applicable SMS Evaluation Criteria~~**
**~~(Including OC-Normalized results for PCBs and alpha-BHC for comparison with respective PSDDA OC-Normalized criteria)~~**

| Location ID | DMMP Criteria | | SMS | BBW-C01 | BBW-C02 | BBW-C03 | BBW-C04 | BBW-C05 | BBW-C06 | BBW-C07 | BBW-C08 | BBW-C09 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | Screening | Bio | Sed Qual | BBW-C01SD | BBW-C02SD | BBW-C03SD | BBW-C04SD | BBW-C05SD | BBW-C06SD | BBW-C07SD | BBW-C08SD | BBW-C09SD |
| Sample Date | Level | Trigger | Std | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 |
| Dieldrin | 10 | --- | --- | 1.9 U | 2.0 U | 2.0 U | 1.9 U | 2.0 U | 1.9 U | 1.9 U | 1.9 U | 2.0 U |
| Heptachlor | 10 | --- | --- | 0.96 U | 0.99 U | 0.99 U | 0.96 U | 0.99 U | 0.97 U | 0.96 U | 0.97 U | 0.99 U |
| cis-Nonachlor | --- | --- | --- | 1.9 U | 2.0 U | 2.0 U | 1.9 U | 2.0 U | 1.9 U | 1.9 U | 1.9 U | 2.0 U |
| trans-Nonachlor | --- | --- | --- | 1.9 U | 2.0 U | 2.0 U | 1.9 U | 2.0 U | 1.9 U | 1.9 U | 1.9 U | 2.0 U |
| Total chlordane (PSDDA) | 10 | 37 | --- | 1.9 U | 2 U | 2 U | 1.9 U | 2 U | 1.9 U | 1.9 U | 1.9 U | 2 U |
| **SVOCs (µg/kg)** | | | | | | | | | | | | |
| **LPAHs** | | | | | | | | | | | | |
| Naphthalene | 2100 | --- | 2100 | 19 U | 20 U | 20 U | 60 | 20 U | 19 U | 19 U | 19 U | 20 U |
| Acenaphthylene | 560 | --- | 560 | 19 U | 20 U | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| Acenaphthene | 500 | --- | 500 | 19 U | 20 U | 20 U | 58 | 20 U | 19 U | 19 U | 19 U | 20 U |
| Fluorene | 540 | --- | 540 | 19 U | 20 U | 20 U | 52 | 20 U | 19 U | 19 U | 19 U | 20 U |
| Phenanthrene | 1500 | --- | 1500 | 19 U | 72 | 20 U | 220 | 44 | 19 U | 19 U | 19 U | 20 U |
| Anthracene | 960 | --- | 960 | 19 U | 15 J | 20 U | 39 | 20 U | 19 U | 19 U | 19 U | 20 U |
| 2-Methylnaphthalene | 670 | --- | 670 | 19 U | 20 U | 20 U | 44 | 20 U | 19 U | 19 U | 19 U | 20 U |
| Total LPAH | 5200 | --- | 5200 | 19 U | 87 | 20 U | 429 | 44 | 19 U | 19 U | 19 U | 20 U |
| **HPAHs** | | | | | | | | | | | | |
| Fluoranthene | 1700 | 4600 | 1700 | 23 | 210 | 13 J | 230 | 33 | 19 U | 19 U | 19 U | 20 U |
| Pyrene | 2600 | 11980 | 2600 | 31 | 280 | 17 J | 340 | 30 | 19 U | 19 U | 19 U | 20 U |
| Benzo(a)anthracene | 1300 | --- | 1300 | 17 J | 220 | 12 J | 210 | 20 U | 19 U | 19 U | 19 U | 20 U |
| Chrysene | 1400 | --- | 1400 | 29 | 300 | 19 J | 320 | 20 U | 19 U | 19 U | 19 U | 20 U |
| Benzo(b)fluoranthene | --- | --- | --- | 34 | 510 | 17 J | 430 | 20 U | 19 U | 19 U | 19 U | 20 U |
| Benzo(k)fluoranthene | --- | --- | --- | 27 | 470 | 14 J | 440 | 20 U | 19 U | 19 U | 19 U | 20 U |
| Total benzofluoranthenes | 3200 | --- | 3200 | 61 | 980 | 31 | 870 | 20 U | 19 U | 19 U | 19 U | 20 U |
| Benzo(a)pyrene | 1600 | --- | 1600 | 21 | 460 | 20 U | 400 | 20 U | 19 U | 19 U | 19 U | 20 U |
| Indeno(1,2,3-cd)pyrene | 600 | --- | 600 | 19 U | 140 | 20 U | 190 | 20 U | 19 U | 19 U | 19 U | 20 U |
| Dibenzo(a,h)anthracene | 230 | --- | 230 | 19 U | 35 | 20 U | 50 | 20 U | 19 U | 19 U | 19 U | 20 U |
| Benzo(g,h,i)perylene | 670 | --- | 720 | 19 U | 80 | 20 U | 120 | 20 U | 19 U | 19 U | 19 U | 20 U |
| Total HPAH | 12000 | --- | 12000 | 182 | 2705 | 92 | 2730 | 63 | 19 U | 19 U | 19 U | 20 U |
| **Chlorinated Hydrocarbons** | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | 170 | --- | --- | 0.8 U | 0.8 U | 0.9 U | 0.8 U | 1.0 U | 0.9 U | 1.0 U | 0.9 U | 0.9 U |
| 1,4-Dichlorobenzene | 110 | --- | 110 | 0.8 U | 0.8 U | 0.9 U | 0.8 U | 1.0 U | 0.9 U | 1.0 U | 0.9 U | 0.9 U |
| 1,2-Dichlorobenzene | 35 | --- | 35 | 0.8 U | 0.8 U | 0.9 U | 0.8 U | 1.0 U | 0.9 U | 1.0 U | 0.9 U | 0.9 U |
| 1,2,4-Trichlorobenzene | 31 | --- | 31 | 4.2 U | 4.0 U | 4.3 U | 4.2 U | 4.8 U | 4.7 U | 4.9 U | 4.7 U | 4.7 U |
| Hexachlorobenzene | 22 | 168 | 22 | 0.96 U | 0.52 J | 0.99 U | 0.85 J | 0.99 U | 0.97 U | 0.96 U | 0.97 U | 0.99 U |
| **Phthalates** | | | | | | | | | | | | |
| Dimethylphthalate | 1400 | --- | 71 | 19 U | 59 | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| Diethylphthalate | 1200 | --- | 48 | 19 U | 20 U | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| Di-n-butylphthalate | 5100 | --- | 1400 | 19 U | 20 U | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| Butylbenzylphthalate | 970 | --- | 63 | 19 U | 20 U | 20 U | 19 | 20 U | 19 U | 19 U | 19 U | 20 U |
| bis(2-Ethylhexyl)phthalate | 8300 | --- | 1300 | 120 | 150 | 150 | 200 | 120 | 150 | 110 | 150 | 120 |
| Di-n-octylphthalate | 6200 | --- | 420 | 19 U | 20 U | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| **Phenols** | | | | | | | | | | | | |
| Phenol | 420 | --- | 420 | 19 U | 20 U | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| 2-Methylphenol | 63 | --- | 63 | 19 U | 20 U | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| 4-Methylphenol | 670 | --- | 670 | 19 U | 20 U | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| 2,4-Dimethylphenol | 29 | --- | 29 | 19 U | 20 U | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| Pentachlorophenol | 400 | 504 | 140 | 97 U | 98 U | 98 U | 95 U | 98 U | 96 U | 97 U | 97 U | 98 U |

~~Table 2~~ Table 3

**Summary of Dry-Weight Basis Analytical Results and Comparison with PSDDA ~~and Applicable SMS Evaluation Criteria~~**
**~~(Including OC-Normalized results for PCBs and alpha-BHC for comparison with respective PSDDA OC-Normalized criteria)~~**

| Location ID | DMMP Criteria | | SMS | BBW-C01 | BBW-C02 | BBW-C03 | BBW-C04 | BBW-C05 | BBW-C06 | BBW-C07 | BBW-C08 | BBW-C09 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | Screening | Bio | Sed Qual | BBW-C01SD | BBW-C02SD | BBW-C03SD | BBW-C04SD | BBW-C05SD | BBW-C06SD | BBW-C07SD | BBW-C08SD | BBW-C09SD |
| Sample Date | Level | Trigger | Std | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 | 11/04/2003 |
| **Miscellaneous** | | | | | | | | | | | | |
| Benzyl alcohol | 57 | --- | 57 | 19 U | 20 U | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| Benzoic acid | 650 | --- | 650 | 190 U | 200 U | 200 U | 190 U | 200 U | 190 U | 190 U | 190 U | 200 U |
| Dibenzofuran | 540 | --- | 540 | 19 U | 20 U | 20 U | 40 | 20 U | 19 U | 19 U | 19 U | 20 U |
| Hexachloroethane | 1400 | --- | --- | 19 U | 20 U | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| Hexachlorobutadiene | 29 | --- | 11 | 0.96 U | 0.99 U | 0.99 U | 0.96 U | 0.99 U | 0.97 U | 0.96 U | 0.97 U | 0.99 U |
| n-Nitrosodiphenylamine | 28 | --- | 28 | 19 U | 20 U | 20 U | 19 U | 20 U | 19 U | 19 U | 19 U | 20 U |
| **VOC (µg/kg)** | | | | | | | | | | | | |
| Ethylbenzene | 10 | --- | --- | 0.8 U | 0.8 U | 0.9 U | 0.8 U | 1.0 U | 0.9 U | 1.0 U | 0.9 U | 0.9 U |
| Tetrachloroethene | 57 | --- | --- | 0.8 U | 0.8 U | 0.9 U | 0.8 U | 1.0 U | 0.9 U | 1.0 U | 0.9 U | 0.9 U |
| Trichloroethene | 160 | --- | --- | 0.8 U | 0.8 U | 0.9 U | 0.8 U | 1.0 U | 0.9 U | 5.2 | 0.9 U | 0.9 U |
| m,p-Xylenes | --- | --- | --- | 0.8 U | 0.8 U | 0.9 U | 0.8 U | 1.0 U | 0.9 U | 1.0 U | 0.9 U | 0.9 U |
| o-Xylene | --- | --- | --- | 0.8 U | 0.8 U | 0.9 U | 0.8 U | 1.0 U | 0.9 U | 1.0 U | 0.9 U | 0.9 U |
| Xylene (total) | 40 | --- | --- | 0.8 U | 0.8 U | 0.9 U | 0.8 U | 1 U | 0.9 U | 1 U | 0.9 U | 0.9 U |
| **Organic Carbon Normalized (mg/kg-OC)[1]** | | | | | | | | | | | | |
| Total PCBs | --- | 38 | --- | 4.87 U | 3.94 | 7.96 U | 4.37 U | 13.3 U | 14.4 U | 12.2 U | 35.5 U | 19 U |
| alpha-BHC | --- | 10 | --- | 0.123 U | 0.0619 U | 0.202 U | 0.11 U | 0.33 U | 0.359 U | 0.3 U | 0.882 U | 0.471 U |

Notes:

**1--Note that Total PCBs and alpha-BHC are provided for comparison with PSDDA Organic Carbon Normalized Criteria (mg/kg-OC)**

J = The result is an estimated concentration less than method reporting limit (MRL) but greater than method detection limit (MDL).

U = The compound was analyzed for, but not detected at or above the MRL/MDL.

N-P = non-plastic

## Table 4
## Summary of Organic Carbon-Normalized Analytical Results and Comparison with Applicable SMS Evaluation Criteria

| Location ID<br>Sample ID<br>Sample Date | SMS<br>SQS | SMS<br>CSL | BBW-C01<br>BBW-C01SD<br>11/04/2003 | BBW-C02<br>BBW-C02SD<br>11/04/2003 | BBW-C04<br>BBW-C04SD<br>11/04/2003 |
|---|---|---|---|---|---|
| **PCBs (mg/kg-OC)** | | | | | |
| Total PCBs | 12 | 65 | 4.9 U | 3.9 | 4.4 U |
| **SVOCs (mg/kg-OC)** | | | | | |
| **LPAHs** | | | | | |
| Naphthalene | 99 | 170 | 2.4 U | 1.3 U | 6.90 |
| Acenaphthylene | 66 | 66 | 2.4 U | 1.3 U | 2.2 U |
| Acenaphthene | 16 | 57 | 2.4 U | 1.3 U | 6.7 |
| Fluorene | 23 | 79 | 2.4 U | 1.3 U | 6 |
| Phenanthrene | 100 | 480 | 2.4 U | 4.5 | 25.3 |
| Anthracene | 220 | 1200 | 2.4 U | 0.9 J | 4.5 |
| 2-Methylnaphthalene | 38 | 64 | 2.4 U | 1.3 U | 5.1 |
| Total LPAH | 370 | 780 | 2.4 U | 5.4 | 49.3 |
| **HPAHs** | | | | | |
| Fluoranthene | 160 | 1200 | 3 | 13 | 26.4 |
| Pyrene | 1000 | 1400 | 4 | 17.5 | 39.1 |
| Benzo(a)anthracene | 110 | 270 | 2.2 J | 13.8 | 24.1 |
| Chrysene | 110 | 460 | 3.7 | 18.8 | 36.8 |
| Total benzofluoranthenes | 230 | 450 | 7.8 | 61.3 | 100 |
| Benzo(a)pyrene | 99 | 210 | 2.7 | 28.8 | 46.0 |
| Indeno(1,2,3-cd)pyrene | 34 | 88 | 2.4 U | 8.8 | 21.8 |
| Dibenzo(a,h)anthracene | 12 | 33 | 2.4 U | 2.2 | 5.8 |
| Benzo(g,h,i)perylene | 31 | 78 | 2.4 U | 5 | 13.8 |
| Total HPAH | 960 | 5300 | 23.3 | 169 | 314 |
| **Chlorinated Hydrocarbons** | | | | | |
| 1,4-Dichlorobenzene | 3.1 | 9 | 0.1 U | 0.1 U | 0.1 U |
| 1,2-Dichlorobenzene | 2.3 | 2.3 | 0.1 U | 0.1 U | 0.1 U |
| 1,2,4-Trichlorobenzene | 0.81 | 1.8 | 0.54 U | 0.3 U | 0.48 U |
| Hexachlorobenzene | 0.38 | 2.3 | 0.12 U | 0.03 J | 0.10 J |
| **Phthalates** | | | | | |
| Dimethylphthalate | 53 | 53 | 2.4 U | 3.7 | 2.2 U |
| Diethylphthalate | 61 | 110 | 2.4 U | 1.3 U | 2.2 U |
| Di-n-butylphthalate | 220 | 1700 | 2.4 U | 1.3 U | 2.2 U |
| Butylbenzylphthalate | 4.9 | 64 | 2.4 U | 1.3 U | 2.2 |
| bis(2-Ethylhexyl)phthalate | 47 | 78 | 15.4 | 9.4 | 23 |
| Di-n-octylphthalate | 58 | 4500 | 2.4 U | 1.3 U | 2.2 U |
| **Miscellaneous** | | | | | |
| Dibenzofuran | 15 | 58 | 2.4 U | 1.3 U | 4.6 |
| Hexachlorobutadiene | 3.9 | 6.2 | 0.1 U | 0.1 U | 0.1 U |
| n-Nitrosodiphenylamine | 11 | 11 | 2.4 U | 1.3 U | 2.2 U |

Notes:

J = The result is an estimated concentration less than method reporting limit (MRL) but greater than method detection limit (MDL).

U = The compound was analyzed for, but not detected at or above the MRL/MDL.