

Weaver's Cove Energy, LLC, (WCE) performed a Tier III Sediment Sampling and Analysis Program (T3SSAP) in accordance with a sampling and analysis plan issued by the U.S. Army Corps of Engineers (USACE). The program was conducted in support of WCE's permit application for maintenance and improvement dredging of the Mount Hope Bay - Fall River Harbor federally-designated navigation channel¹. In addition to the USACE-prescribed sediment characterization effort, WCE collected sediment samples for continued chemical and leachability testing for possible stabilization and upland placement of dredged material as engineered fill. This report summarizes the chemical sampling, compositing, and analyses².

During October 2004, 52 vibracore sample locations (approved by USACE) were completed in the Taunton River. Figure 1 shows the locations of the Tier III vibracore borings and the table in Appendix A summarizes the sampling at each vibracore location (more than one vibracore was collected in some locations in order to obtain the required volume of in-

¹ The USACE has a multi-tiered sequence of testing to characterize dredged material for dredging operations and offshore or aquatic placement.

² WCE performed a Tier I Evaluation in 2002. Weaver's Cove Energy submitted a draft Tier II Sediment Sampling and Analysis Plan (T2SAP) to COE on December 10, 2002. The T2SAP was endorsed by the Massachusetts Department of Environmental Protection on January 7, 2003. On January 30, 2003, the COE (with concurrence from the EPA) approved the T2SAP with slight modifications and Weaver's Cove performed the sediment collection and analyses in early 2003. Having completed this early effort focused on comprehensively characterizing the sediment's physical and chemical properties for upland placement, Weaver's Cove Energy submitted a draft T3SSAP for the Tier III testing to the COE in January 2004 in support of offshore disposal of the dredged material. In September 2004, the COE (with concurrence from the EPA) approved this second comprehensive SAP with slight modifications and Weaver's Cove performed the Tier III sampling and analyses, as well as the chemical sampling for this report, beginning in October 2004.

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situ sediment). These core samples were identified and classified to perform laboratory tests. See Appendix A for more details of vibracore sample locations and depths. No sediment was collected at ten of the vibracore locations because soundings collected on-location indicated that there was insufficient sediment accumulated to retrieve (less than two feet of sediment located above the proposed dredging depth).

Overall, the T3SSAP involved several sediment analyses including:

- Chemical analyses of in-situ sediment mixed with cement and lime subjected to leachability testing per Massachusetts Department of Environmental Protection (MADEP) requirements (topic covered in this report).
- Chemical analyses of in-situ sediment per U.S. Army Corps of Engineers' requirements (topic covered in a report prepared by others.)³
- Chemical analyses of liquids (elutriate waters) per U.S. Army Corps of Engineers' requirements (topic covered in a report prepared by others.)⁴
- Biological analyses of in-situ sediment per U.S. Army Corps of Engineers' requirements (topic covered in a report prepared by others.)⁵

³ The Tier I and Tier II results are reported in Section 5 of a report titled "Dredging Program," by Concept 2 Delivery, December 2003. This report is available at www.weaverscove.com under the tab "Environmental Information." The results of the Tier III Evaluation have been submitted to the USACE and EPA in support of Weaver's Cove's request for a suitability determination for offshore disposal.

⁴ See previous footnote above.

⁵ The results of the Tier III Evaluation were submitted to the USACE and EPA in support of Weaver's Cove's seeking a suitability determination for offshore disposal. The material was deemed suitable for offshore disposal in a jointly issued document issued by the USACE and USEPA in September of 2005.

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As noted above, this report addresses the environmental analyses performed in the T3SSAP relative to upland placement. The purpose of these analyses was:

- To evaluate the potential for chemical constituents to leach out of the stabilized dredged material⁶, and;
- To collect and analyze sediment per MCP requirements to support upland placement of dredged material to be removed from the sites of the West Lateral pipeline crossing (3 cores), the East Channel (3 cores) and the access channel (5 cores)⁷.

⁶ The FERC FEIS on WCE identified that WCE needed to complete this leachability testing to supplement the leachability data with regards to the unstabilized dredged material that was previously submitted to MADEP per the MCP.

⁷ At the time the original Tier II Sampling and Analysis Program was designed and executed, there were no plans to dredge in the three areas listed. In this latest sediment characterization program (Tier III), the individual testing of sediment samples from these three locations were completed and the rationale and procedures employed during the original Tier II Evaluation were executed to characterize the in-situ sediment with respect to upland placement and MCP requirements. The collection, analysis, and evaluation of these additional samples from these three areas supplements the original Tier II samples and together yields a complete data set reflective of the entire dredging limits.

During the Tier III study effort, chemical analysis of the unprocessed sediment and the stabilized dredged material were completed in accordance with MCP protocols in order to evaluate the chemistry of the sediment and potential impacts from leaching of chemicals from the engineered fill in the upland environment on the site⁸.

Forty two (42) of 52 vibracore borings were logged and described following ASTM D2488 procedures. In general, the core samples consisted of very soft and wet, fine-grained organic river sediments. Vibracore boring logs are included in Appendix B. These boring logs reflect Unified Soil Classification System (U.S.C.S.) classifications and soils descriptions. ERM analyzed the sediment chemistry from 13 of the 42 discrete vibracore borings collected during the Tier III program without any compositing of samples. In addition, sediment from 24 of these discrete vibracore locations was composited to make seven composite samples⁹ for further testing.

⁸ During the original Tier II Evaluation, a number of in-situ sediment and stabilized dredged material samples were also chemically analyzed using MCP analytical methods. The analytical results from this earlier effort were incorporated/summarized in two reports: "Dredging Program" December 2003 by Concept 2 Delivery and "Method 3 Risk Assessment for Upland Placement of Dredged Material as Upland Fill" November 2003 by ERM. Both of these reports are available at www.weaverscove.com under the tab "Environmental Information."

⁹ The compositing methodology used to create the composite samples for TCLP, SPLP, and MCP analyses were focused on producing composites that represent typical conditions with regards to grain size (e.g., organic/sand/silt content) and physical location within the dredging limits (e.g., S-bend, Turning Basin). Compositing in this manner facilitated combining physically similar sediments to yield a sufficient quantity of sediments for subsequent leachability testing. The composites subjected to leachability testing were predominantly fines (silts, clays, colloidal) and overlapped (provided redundancy) with the biological composites.

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The samples were collected from the following areas:

- Seaward of the Braga Bridge;
- The "S" Bend;
- The Turning Basin;
- The Access Channel; and
- The Western Pipeline Lateral Crossing Alignment

Tier III sediments were analyzed for volatile organic compounds (VOCs), volatile and extractable petroleum hydrocarbons (VPH/EPH), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and metals for evaluation with respect to the Massachusetts Contingency Plan (MCP) protocols and the MADEP protocols¹⁰. Laboratory reports of analytical results are included as Appendix C.

Trace levels of VOCs, VPH/EPH, SVOCs, and metals were detected in the Tier III sediment samples (Table 1). Similar to the Tier II data evaluated against the MCP thresholds, the maximum concentrations of three polyaromatic hydrocarbons (PAHs) benzo(a)anthracene, benzo(a)pyrene, and benzo(a)fluoranthene exceeded the soil Reportable Concentration (RCS-2) Standards (the appropriate RC for site soils) while the mean concentrations were below the RCS-2 standards as defined in the Massachusetts Contingency Plan regulations. Concentrations of all other detected compounds (including beryllium) were below the RCS-2 standards for Tier III sediment results (Table 2).

¹⁰ The Tier III and earlier Tier II sediment samples were evaluated for a number of chemical parameters and a variety of analytical methods. With regards to upland placement of dredged materials, the chemical parameters studied and analytical methods used were selected to satisfy MCP requirements. These methods differ from chemical parameters and analytical methods specified by the USACE in the Regional Implementation Manual for Evaluation of Dredged Materials for Disposal in New England waters. Within this report, the focus is on MCP testing and analytic standards because the results documented in this report are being used for comparison against upland screening/risk levels. Aquatic-based screening/risk concerns must be addressed using aquatic criteria and are not the focus of this report but are documented in other Weaver's Cove project reports.

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Figures 2 and 3 present the maximum concentration at each Taunton River boring location for three PAHs (benzo(a)anthracene, benzo(a)pyrene, and benzo(a)fluoranthene) and four metals (arsenic, beryllium, chromium and lead), respectively. The figures illustrate that concentrations are consistent with distance from the site and, although individual locations exceed current RCS-2 standards, all seven compounds have average concentrations below the current RCS-2 standards.

Sediment from 24 of the Tier III vibracore samples was homogenized (generally based on grain size) to create seven different composite samples. These Tier III composite samples were mixed with varying percentages (0-8%) of stabilizing compounds (cement, slag, and lime), subjected to different curing durations (7 days, 28 days) and analyzed for VPH/EPH, SVOCs, PCBs and metals as well as analyzed by the Toxicity Characteristic Leachate Procedure (TCLP) and the Synthetic Precipitation Leaching Procedure (SPLP) for metals. Analytical results for composite samples were consistent with the Tier III individual (uncomposited) sample results and detected EPH/VPH, SVOCs, and metals (Table 2). Adding stabilizing compounds to the composite samples reduced the leachable concentration of all detected compounds.

Due to its volume, Appendix C, Laboratory Reports is not reproduced here and is available upon request.