Sediment Characterization Report Port of Vancouver, Gateway Expansion - Vessel Approach and Turning Basin Project

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January 2007 | 274-4523-003

CITATION

Parametrix. 2007. Sediment Characterization Report
Port of Vancouver, Gateway Expansion - Vessel Approach and Turning Basin
Project . Prepared by Parametrix, Portland, Oregon. January 2007.

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EXECUTIVE SUMMARY

The Port of Vancouver (the Port) proposes to dredge approximately 2,030,000 cubic yards of sediment material from the Columbia River in an area adjacent to the north side of the Federal Navigation Channel between River Mile (RM) 101 and 102 to accommodate a vessel approach and turning basin. The Port is proposing to maintain the turning basin at the proposed depth of 48 feet (43 feet plus 5 feet advance maintenance over dredge) below Columbia River Datum (CRD) for a period of 20 years, with approximately 260,000 cubic yards of dredge material being removed for maintenance every 4 years (i.e., 1,300,000 total cubic yards over 20-year period). The proposed project includes the construction of new berthing piers offshore of the 20 ft contour to accommodate large vessels.

Material will be removed using either a clamshell bucket dredge or a cutterhead suction dredge operated from a barge. No dredging is proposed above the -20 ft CRD, and the dredge cut slope will be 3:1 (or less) to minimize sloughing.

Dredged material will likely be disposed of as fill in an upland location at the Port of Vancouver Gateway site. This dredged material will likely be stockpiled near the Columbia River on Port of Vancouver property and will be dewatered, with return water flowing to the Columbia River.

In support of this project, Parametrix prepared, submitted, and received approval of a Draft Sediment Sampling and Analysis Plan (SAP) (Parametrix 2006) to conduct characterization of sediments proposed for removal during construction of the new vessel approach and turning basin. The SAP was developed according to the Dredged Material Evaluation Framework (DMEF) (USACE 1998).

Sediment characterization was conducted to evaluate sediment conditions and confirm that sediments and new surface material (NSM) in the dredging area are in compliance with DMEF and other relevant sediment quality criteria. In light of the sediment being disposed in an upland area on Port property, dredge material was also evaluated against applicable Model Toxics Control Act (MTCA) (WAC 173-340) criteria.

Samples were collected in October 2006, and were analyzed for the chemical and conventional sediment parameters listed in Table 8-1 of DMEF guidance (USACE 1998). A total of fifty-two sediment cores were collected as part the project. The sediment cores were processed, composited, and submitted for analysis by Severn Trent Laboratories, Inc. (STL) in Tacoma, Washington.

In response to the detection of di-n-octylphthalate in some of the dredge material samples (POV-1621, POV-3641, POV-4748) above it's Sediment Evaluation Framework freshwater screening level of 26 ug/kg, the RSET requested additional analysis of samples representing the underlying material ("z-samples"). Results of these follow-up analyses were submitted in a technical memorandum, which is included herein as Appendix D. Results of the follow-up z-sample analyses do not indicate the presence of di-n-octylphthalate in any of the z-samples at the appropriately low method reporting limits; additionally, no data were rejected as part of the data validation process.

In light of there being no detections of di-n-octylphthalate in the follow-up z-samples, exposure of sediment material underlying the proposed dredge prism does not pose a threat to aquatic and/or benthic receptors. Additionally, material to be dredged is suitable for upland disposal.

1. INTRODUCTION AND BACKGROUND INFORMATION

A Draft Sediment Sampling and Analysis Plan (SAP) (Parametrix 2006) was developed in support of permit application for dredging at the Port of Vancouver (POV), Washington. Dredging is proposed as part of the POV – Gateway Expansion, Vessel Approach and Turning Basin Project and is designed to provide access for deep-draft cargo vessels at the proposed docks at Parcel 3 (Figure 1-2). The project will require the initial removal of approximately 1,950,000 cubic yards of sediment from the Columbia River adjacent to the POV facility. It is anticipated that dredged material will be disposed in an upland area on POV property.

Sediment characterization was conducted in October 2006 to evaluate sediment conditions and confirm that sediments in the dredge prism are characterized according to the Dredged Material Evaluation Framework (DMEF) and other relevant criteria, as approved by the Regional Management Team (RMT).

1.1 PROJECT LOCATION AND DESCRIPTION

The Gateway Expansion project location is Parcel 3 in the northern undeveloped portion of the Port of Vancouver along the Columbia River, between approximately RM 101 and 102. The project site lies in Section 40, Township 2 North, Range 1 West, Vancouver, Clark County, Washington, as illustrated on the Sauvie Island Oregon – Washington Quadrangle, United States Geological Survey 7.5 Minute Series. The site is known as the Columbia Gateway property. The proposed dredge prism is located on the Washington side of the Federal Navigation Channel, opposite the Columbia River confluence of the Willamette River (Figure 1-1). The project address is:

3103 Lower River Road
Vancouver, WA 98660

The Port of Vancouver proposes to dredge material from the Columbia River in an area adjacent to the north side of the Federal Navigation Channel, generally between RM 101 and 102, to accommodate a vessel approach and turning basin. The Port is proposing to maintain the turning basin at the proposed depth of 48 feet (43 feet plus 5 feet advance maintenance over dredge) below Columbia River Datum (CRD) for a period of 20 years, with approximately 260,000 cubic yards of dredge material being removed for maintenance every 4 years (i.e., 1,300,000 total cubic yards over 20-year period). The proposed project includes the construction of new berthing piers offshore of the 20 ft contour to accommodate large vessels, as shown in Figure 1-2. Further details of the area from which material is proposed to be dredged are shown in Figures 1-3A and 1-3B, which also show the proposed sediment sampling locations.

Material will be removed using either a clamshell bucket dredge or a cutterhead suction dredge operated from a barge. No dredging is proposed above the -20 ft CRD, and the dredge cut slope will be 3:1 (or less) to minimize sloughing (Figures 1-4 and 1-5).

Dredged material will likely be disposed of as fill in an upland location at the Port of Vancouver Gateway site. This dredged material will likely be stockpiled near the Columbia River on Port of Vancouver property and will be dewatered, with return water flowing to the Columbia River.

1.2 SITE DESCRIPTION AND HISTORY

The Port of Vancouver is located on the Columbia River between RM 101 and 105 in Vancouver, Washington. The Port of Vancouver includes berths for Break Bulk, Dry Bulk, Liquid Bulk and Auto unloading facilities. The Break Bulk facility, managed by the Port, handles a wide range of commodities, including pulp, lumber, plywood, and steel. Dry bulk includes grain, fertilizer, and metal ores. The liquid bulk dock handles bulk fuels; the floating auto dock is capable of high volume automobile unloading, sorting and staging.

The Port of Vancouver is primarily zoned Heavy Industrial, and light industrial with a River Industrial overlay by the City of Vancouver. The proposed Columbia Gateway project site is located between the Columbia River and Vancouver Lake in the northern portion of the Port of Vancouver property, approximately between RM 101 and 102. The expanded area is proposed for use as a Grain/Bulk Facility, Auto Facility and Industrial area.

2. SAMPLING APPROACH

2.1 SEDIMENT INVESTIGATION OBJECTIVES AND DESIGN

The sediment monitoring objectives for work described in this report include:

- Collect sediment within the proposed dredging area and determine whether the sediments to be dredged meet the applicable screening levels.
- Collect chemical and physical information to support upland disposal or reuse decisions.
- Collect chemical and physical information for sediments below the dredge prism to determine if chemical contaminants would be present in the new surface material (NSM).

The sediment investigation followed the DMEF (USACE 1998) and the Sediment Sampling and Analysis Plan Appendix: Guidance on the Development of Sediment Sampling and Analysis Plans Meeting the Requirements of the Sediment Management Standards (Chapter 173-204 WAC) (SAPA) (PTI and McFarland 1995). The Port of Vancouver SAP was approved by the RMT on August 21, 2006. SAP approval documentation is contained in Appendix A.

Samples were collected in October 2006 and were analyzed for the chemicals and conventional sediment parameters listed in Table 8-1 of DMEF guidance, which is reproduced herein as Table 1.

2.2 NUMBER AND TYPE OF SEDIMENT SAMPLES

The DMEF guidance document describes the process by which the number of samples within a proposed dredge area is determined. Factors include river mile location in the Columbia River, type of facility, proximity to known chemical contaminant sources, and recent data from the site.

The Port of Vancouver proposed dredge area, between RM 101 and 102, is within RMs 0 to 106, which are generally considered “exclusionary” in the main stem of the Columbia River. The exclusionary ranking is based on available data that indicate that sediments within the Federal Navigation Channel of the Columbia River generally consist of coarse-grained sediment with at least 80 percent sand and a Total Volatile Solids (TVS) content of less that 5.0 percent. Sediments that are composed of greater than 80 percent sand, gravel or other naturally occurring bottom material and that have a TVS content of less than 5.0 percent, or sediments that meet this requirement and are targeted for beach nourishment or restoration, are excluded from further testing for aquatic disposal in the Lower Columbia River Management Area, provided that the sediments are not located within the likely impact zone of an active and significant contaminant source.

Sediments within the Federal Navigation Channel at RM 101 and 102 generally consist of material containing greater than 80 percent sand. However, available data from recent studies conducted in the region indicate the potential for sediments in the proposed dredge area to contain low concentrations of chemicals of concern, particularly PCBs. Table 5-2 of the DMEF indicates that those sites where available data indicate the potential for low concentrations of contaminants of concern (CoCs) to exist in the sediments will be given a low ranking. However, in addition to the project site being an area in which offshore barge staging occurs the project site is also located downstream of several potential sources of contamination. As a result, the site was given a moderate ranking by the RMT.

Table 6-1 of the DMEF indicates that for a moderate-ranked site, the number of samples to collect is one sample per 40,000 cubic yards of dredged material for homogeneous sediments. The proposed volume of sediments to be dredged is 1,950,000 cubic yards, resulting in 49 individual dredged material management units (DMMUs). Immediately prior to sediment sampling mobilization, it was determined that the proposed dredge volume may increase, pending additional engineering evaluation; the increase in dredged material volume was estimated to be 80,000 cubic yards. As a result, conservative application of the DMEF sampling intensity formula resulted in 3 additional DMMUs, for a total of 52 DMMUs (core/sample locations) and an approximate total of up to 2,030,000 cubic yards of material to be dredged.

2.3 SAMPLE STATION LOCATIONS

The locations of samples were determined based on dividing the entire dredge prism into 52 individual DMMUs, each representing approximately 40,000 cubic yards of sediment. Proposed sampling stations were located in the approximate center of each DDMU (see Figures 1-3A and 1-3B). Actual sampling locations are shown in Figures 2-1A and 2-1B. Analytical results are discussed in Section 7.

3. FIELD SAMPLING METHODS

3.1 STATION POSITIONING METHODS

Prior to mobilizing onto the river, sample location coordinates (latitude and longitude) were determined using CAD/GIS software. Once in the field, station positioning was accomplished from the sampling vessel using a differential global positioning system (DGPS). The coordinates of each sample location were entered into the on-board DGPS computer and displayed onscreen with a real-time indicator of the boat's position. The sampling vessel then set up in the pre-determined location, and, once on location, the DGPS was used to document the actual sampling position coordinates at the time the samples were collected. Actual sample coordinates were recorded on the core log sheet along with water depth measurements. For all sampling stations, latitude and longitude were recorded in the North American Datum (NAD83). Water depths recorded were later converted to elevations based on Columbia River Datum. Table 2 presents the in-field coordinates for each sampling location along with the mud line elevations and sample recovery for each location.

Prior to the sampling event, dredge prism cross-sections (from shore to toe of dredge prism) were generated such that sediment core locations could be plotted on the cross-section. This, along with record of the percent recovery (or core length) for each core, enabled field personnel to plot the core and determine which portions of the core represent material to be dredged and which portions represent NSM. The depth of the dredge prism is substantially less at the toe than it is at the shoreward edge of the prism. Appendix B includes copies of the cross-sections used in the field.

3.2 SAMPLING EQUIPMENT

Sediment cores were collected using a vibrocorer and pre-decontaminated 4-inch diameter aluminum core barrels supplied by the sampling vessel operator.

Stainless steel bowls, spoons, and other sampling utensils were used in the collection of the sediment samples and were decontaminated prior to sampling and sealed in aluminum foil unless used immediately after decontamination. The decontamination process utilized the following sequence:

- Initial wash and scrub with Alconox and site water
- Rinse and scrub with site water
- Rinse again with site water
- Rinse a final time with purified (de-ionized) water

Items such as aluminum foil upon which the sediment cores were laid was disposed of and replaced between each sample collection to ensure that the subsequent cores processed did not come in contact with residuals form the previous pair of cores.

3.3 SAMPLE COMPOSITING STRATEGY AND METHODS

3.3.1 Compositing Strategy

Sediment cores were collected from within each of the 52 DMMUs, the locations of which are shown in Figures 2-1A and 2-1B. As specified in the SAP, it was initially proposed that samples would be collected from each core in 4-foot intervals and analyzed separately, and material representing NSM, if any, would be archived and sampled pending results of chemical analysis of the overlying sediment samples. However, during SAP revision negotiations with the regulating agencies, a revised sampling scheme was suggested and approved (Appendix A). The revised sampling scheme allowed for compositing the uppermost 10 feet of core sample from two adjacent DMMUs into one sample; NSM material would still be archived as initially prescribed. This modified sampling scheme resulted in a total of 26 samples, each of which represented 2 DMMUs. One duplicate sample was also collected for a total of 27 samples.

Although samples were composited over 10-foot intervals, discrete samples were concurrently collected from every 4-foot core interval and archived separately for possible follow-up analysis should any of the analyzed composite samples prove to be contaminated. If analytical results indicated contamination in the composite samples, having the archived samples on hand would allow for additional sub-analysis and more precise determination as to where the contamination, if any, occurs. Also, and equally important, the 4-foot interval scheme is conducive to real world dredging and sediment management in which material is typically handled in 4-foot lifts (penetration of dredge clamshell bucket).

3.3.2 Compositing Method

Following retrieval of the sediment cores and placement on the deck of the sampling vessel, the percent recovery was determined for each core. The portion of core containing sediment was then cut into 4-foot increments (typically 2 or 3 sections) and capped for storage on-board until processed. Prior to capping, the nature of the sediments visible at the top of each core and at the divisions between each core section was noted on the core log sheet. The cores were removed from the sampling vessel at the end of the each work day and stored overnight in a locked 16-ft truck or immediately transported to the processing facility for storage. While in overnight storage, the cores were kept on ice and in an upright position.

Core processing was initiated on the day following collection of each core. Core sections were split longitudinally using a circular saw and then placed onto the processing table along with the core sections from an adjacent DMMU (composite pair). Once opened, the sediment was described by the project geologist and logged on the sediment core log sheets. Copies of the sediment core log sheets are presented in Appendix B.

The next processing step first required identifying whether material in the cores represented sediment to be dredged or NSM (sediment to be dredged could be composited with the adjacent core while NSM was to be archived). This determination was made by plotting the location and length of the core on the dredge prism cross-sections mentioned above (see Appendix B). This enabled personnel to graphically represent the location of the core with respect to the upper and lower limits of the dredge prism, and also indicated the depth to which the core penetrated.

Once it was determined which portions of the sediment core were to be composited for analysis, equal volumes of sediment from the core pair were placed in stainless steel bowls and thoroughly mixed. The sediment was then transferred to the sample containers in preparation for shipment to the lab.

As mentioned, composite samples were composed of sediment from adjacent DMMUs. For the most part, the pairing of cores involved adjacent DMMUs, but this was not always the case. Composite sample pairing is indicated in Table 2 (e.g., core POV-01 was composited with POV-02).

3.4 FIELD DOCUMENTATION

Field documentation included a field log, sediment core log sheets, a sample log sheet, cross-section worksheets, chain-of-custody forms, and digital photographs of each core. The field log was used to record general information, including sampling dates, sample depths, sample positions and other observations.

A sediment core log was maintained throughout the sampling event to record information pertaining to each core. The log includes station ID, core number, time, location coordinates, and depth to the mud line as measured using a weighted fiberglass tape measure and adjusted for the river stage at the time of sampling. Observations of core material in each core were also recorded at the time of core processing, including layer depths, color, sediment type, type and amount of any debris observed in the sample, and any anomalies worthy of note (e.g., odors, staining, etc). Sediment core log sheets are presented in Appendix B.

For reference, digital photographs were taken of the entire length of every sediment core; photographs are on file with Parametrix.

4. SAMPLE HANDLING PROCEDURES

Sample handling procedures were followed to ensure sample integrity between the time of collection and the time that laboratory analysis begins. These procedures included sample storage, chain-of-custody, and sample delivery.

4.1 SAMPLE STORAGE

All sediment samples were placed in sample jars, then the jars were placed on ice in a cooler until receipt by the analytical laboratory. Immediately prior to shipment to the lab, each cooler was taped shut and equipped with a signed custody seal. Upon sample receipt, the laboratories noted compliance with storage temperatures and custody procedures. No sample handling issues were noted as part of this project. Chemical analyses were done as soon as possible after sample collection; deviations from specified holding times are discussed in Section 5.3.

4.2 CHAIN-OF-CUSTODY PROCEDURES

Chain-of-custody procedures documented the transfer of all samples from the Field Operations Coordinator to the analytical laboratories. Triplicate chain-of-custody (COC) forms were used to record each sample container, sample collection dates and times, the project name, the number of sample containers, and prescribed analyses. Sample containers were delivered to the laboratory via courier or by Parametrix personnel (on the last day of each sampling week). The Field Operations Coordinator retained one copy of each COC form; copies of these are included in Appendix B.

5. LABORATORY ANALYTICAL METHODS

Laboratory analysis was conducted by Severn Trent Laboratories – Seattle (STL), and included physical and chemical analysis as specified in Section 2. In order to meet required analytical data turnaround times, a portion of the sediment samples for which grain size analyses were to be conducted was sub-contracted to Analytical Resources Incorporated (ARI), located in Tukwila, Washington.

Results of sample analysis are presented in Section 7.

5.1 CHEMICAL ANALYSIS

Sediment samples were analyzed as specified in Table 8-1 of the DMEF and as indicated in Table 1 of this report. As mentioned, archived material representing discrete core intervals and the NSM is currently archived at the lab.

5.2 PHYSICAL ANALYSIS

Grain size and other conventional sediment parameter analyses were conducted for each composite sample submitted to the lab (27 samples). Similarly, archived material representing discrete core intervals and the NSM is in storage at the lab.

5.3 LABORATORY CORRECTIVE ACTIONS

Corrective actions were required as part of sample analysis during this project and are discussed below. It should be noted, however, that none of the issues encountered resulted in the rejection of any of the data. Nonetheless, the issues are discussed separately below.

1) During preparation of samples for the analysis of interstitial tributyltin (TBT), laboratory personnel were unable to extract a supernatant from the sampling containers after centrifuging. This difficulty was attributed to the dense nature of the sediment (predominantly sand) and a lack of pore water. Hence, the lab was unable to do an analysis for interstitial TBT. As a result, it was decided that bulk sediment analysis of TBT would be an acceptable alternative. Subsequent conversation with regulatory personnel (USACE) confirmed that this approach was acceptable. In fact, for coarse-grained material, the bulk sediment analysis is actually preferred (as stated in the Interim Final Sediment Evaluation Framework, September 2006). However, the bulk sediment TBT analysis was not performed until after the holding time had expired. Nonetheless, the results are presented herein with the appropriate flag; none of the data were rejected.

2) Laboratory error during sample preparation and analysis of benzoic acid, a miscellaneous extractable reported as part of the 8270 method, resulted in method detection limits (MDL) that exceed the DMEF sediment quality screening level of 650 µg/kg. Data received from the lab typically provided a MDL for benzoic acid around 900 µg/kg. Although, none of the sample results actually indicated the detection of benzoic acid, re-analysis for benzoic acid at appropriate MDLs (<100 µg/kg) was conducted at a rate of 10 percent (3 samples); samples were selected from the archived discrete samples and were chosen based on their location within the dredge prism; one sample each was selected from the downstream, middle, and upstream portions of the dredge prism. Results of the follow-up analyses indicated benzoic acid concentrations of 89, 99 and 100 µg/kg, well

below the DMEF screening level. Laboratory data reports for the follow-up analyses are included in Appendix C.

3) Upon receipt of the final data packages, it was noted that the lab had failed to conduct total organic carbon (TOC) analysis for 3 of the 26 samples submitted (POV-2530, -2732, and -4344). However, given the highly homogenous nature of the sediments throughout the dredge prism and the low levels of TOC observed in samples analyzed (undetected in several samples), the existing weight of evidence compensates for this minor data gap.

6. QUALITY ASSURANCE AND QUALITY CONTROL REQUIREMENTS

Quality assurance and quality control (QA/QC) procedures are discussed in detail in the analytical protocols for each chemical. The recommended frequency of specific quality control procedures and associated control limits are summarized in published sediment sampling and analysis guidance (PTI and McFarland 1995).

6.1 QA/QC FOR CHEMICAL ANALYSES

Quality control procedures for chemical analyses included analytical instrument calibration, sample holding times, blank analyses to identify potential sample contamination in the laboratory, duplicate analyses to test analytical precision, and analyses of spikes and standards to test analytical accuracy.

6.2 DATA QUALITY ASSURANCE REVIEW

In addition to the quality control reviews provided by STL, the Project QA Manager conducted a quality assurance review. Data were subjected to a QA1-type review, using the USEPA Contract Laboratory Program (CLP) National Functional Guidelines for guidance. Data qualifiers were applied where necessary, based on the reviewer's judgment and experience. Data review for each analysis included evaluation of the following (where appropriate):

- Chain-of-custody documentation
- Holding times;
- Method blanks;
- Surrogate recoveries;
- Laboratory control sample (LCS) recoveries;
- Matrix spike/spike duplicate (MS/MSD) recoveries; and
- Laboratory sample or spike replicate results and relative percent differences (RPDs).

The data packages submitted by STL and ARI were sufficient for this review. They included case narrative summaries of the work performed and any problems encountered during analysis, copies of the chain-of-custody forms, summary sample results, calibration data, raw analytical data, and summary QC results.

As determined by the review, samples tested by STL and ARI were analyzed within recommended technical holding times, with exceptions noted, and following appropriate methods and procedures. The bulk sediment TBT analysis was performed outside the recommended holding time, as were some of the total sulfides, TOC, and total volatile solids analyses. Nevertheless, the analytical accuracy and precision were generally acceptable, as demonstrated by the results of the laboratory QC analyses. Although some data were qualified due to out of control QC results, and organotin data was qualified due to holding time exceedances, no data were rejected based on this review. All data reported are considered valid, representative of the samples, and acceptable for further use. Data QA/QC summaries for each sample delivery group are included in Appendix C.

7. SEDIMENT DATA RESULTS

7.1 GENERAL PHYSICAL CHARACTERISTICS

Length of sediment samples (core recovery) ranged from 6.1 ft to 10.0 ft, with an average recovery of 8.1 ft. On average the sediment observed was composed of 95 percent sand (41 percent medium, 26 percent fine, 19 percent coarse), with fines comprising approximately 1 percent of the samples. The percentage of fines in a majority of samples was less than 1 percent. The average total organic carbon (TOC) was approximately 0.12 percent. Table 3 presents the grain size, TOC, and total solids data.

Visual observation of the sediment cores indicated that the sediment was highly homogenous. Typically, the only discernible change in sediment characteristics was a gradational change in the grain size of the sand. Of the 52 cores collected, silt (fines) was observed in only 4 cores, in isolated lenses approximating 4 to 6 inches in thickness.

7.2 ANALYSIS OF SEDIMENT CHEMISTRY DATA

Table 4 lists the dry weight chemical concentrations measured for all analytes. Data qualifiers attached to chemical concentrations are discussed in the “Checklist for Data Validation” memos included in Appendix A. Method detection limits are reported for undetected analytes, with the “U” symbol to indicate that the chemical was not detected. The following documents and their respective sediment quality criteria were used in assessing the sediment samples:

- *Dredged Material Evaluation Framework*, USACE 1998.
- Washington Department of Ecology, *Phase II Report: Development and Recommendations of SQVs for Freshwater Sediments in Washington State*, Table 3-3.
- National Oceanic and Atmospheric Administration *Screening Quick Reference Tables* (SQuiRT), Freshwater Threshold Effects Levels (updated September 1999).
- *Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems*. MacDonald D.D., C.G. Ingersoll CG, and T. Berger. 2000.

For reference, these various criteria are included in Table 4. For criteria that apply to the sum of individual compounds, isomers, or groups of congeners (if detected), the sums and their applicable criteria are reported as recommended in published sediment sampling and analysis guidance (PTI and McFarland 1995). The following observations were made in comparing sample results to the above criteria.

7.3 PROJECT-SPECIFIC RESULTS AND DISCUSSION

In response to the detection of di-n-octylphthalate in some of the dredge material samples (POV-1621, POV-3641, POV-4748) above it’s Sediment Evaluation Framework freshwater screening level of 26 ug/kg, the RSET requested additional analysis of samples representing the underlying material (“z-samples”). Results of these follow-up analyses were submitted in a technical memorandum, which is included herein as Appendix D. Results of the follow-up z-sample analyses do not indicate the presence of di-n-octylphthalate in any of the z-samples at the appropriately low method reporting limits; additionally, no data were rejected as part of the data validation process.

In light of there being no detections of di-n-octylphthalate in the follow-up z-samples, exposure of sediment material underlying the proposed dredge prism does not pose a threat to aquatic and/or benthic receptors. Additionally, material to be dredged is suitable for upland disposal.

Sediment sample core logs show that the sediment material to be dredged and the NSM consist primarily of fine to coarse sand (95 percent, on average) with an average total organic carbon content of 0.12 percent. Fines (silt) were observed in only 4 of the 52 sediment cores collected, and in small amounts (4-6 inch lenses).

8. REFERENCES

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