CENWS-ODS-DM

MEMORANDUM FOR RECORD July 16, 2018

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM THE BOISE WHITE PAPER BARGE CHANNEL, TURNING BASIN AND SLIP, WALLULA, WASHINGTON – EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT – FOR UNCONFINED IN-WATER DISPOSAL.

1. Introduction. This memorandum reflects the consensus determination of the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers, Washington Departments of Ecology and Natural Resources, and the Environmental Protection Agency) regarding the suitability of 262,903 cubic yards (cy) of dredged material from the Boise White Paper (BWP) barge channel and slip for in-water disposal.

2. Background. The site is located at the Port of Walla Walla's Attalia Industrial Area on the McNary Pool of the Columbia River, just north of Wallula (Figure 1). The BWP facility processes pulp to manufacture paper products including labels, white paper and cardboard. Raw materials (wood chips and sawdust) are transported to BWP on barges, which access the plant via a barge channel that connects to the main navigation channel of the Columbia River. Due to economic factors, the slip and barge channel have been unused since approximately 2000. BWP plans to restore shipping operations by dredging the slip and barge channel (APA, 2017).

   A Tier 1 evaluation was provided in the sampling and analysis plan (SAP) and includes a site history and documentation of past characterization data (APA, 2017).

3. Project Summary. Table 1 includes project summary and tracking information.

Table 1. Project Summary

Project ranking: - slip and turning basin - barge channel	 Moderate (heterogeneous) Low (homogeneous)
Characterized volume, including a 10% contingency factor	Total: 262,903 cy Slip/Turning Basin: 133,717 cy Barge Channel: 129,186 cy
Design depth (feet) relative to the National Geodetic Vertical Datum of 1929 (NGVD29), with overdepth elevation in parentheses	Slip/Turning Basin: 323 (321) Barge Channel: 323 (321)
Draft SAP received	October 20, 2017
Draft SAP returned for revisions	November 7, 2017
Revised SAP received	November 17, 2017
Revised SAP returned for revisions	November 22, 2017
Final SAP received	November 27, 2017

Final SAP approved	November 27, 2017
Sampling dates	November 29-December 6, 2017
Draft data report received	March 21, 2018
Draft report returned for revisions	April 5, 2018
Revised data report received	June 18, 2018
Revised report returned for revisions	June 28, 2018
Final report received	July 11, 2018
DMMO Tracking number	BOIWP-1-A-F-390
EIM Study ID	BOIWP17
USACE Permit Application Number	TBD
Recency Determination - moderate rank = 5 years - low rank = 7 years	 December 2022 December 2024

4. Project Ranking and Sampling Requirements. The DMMP agencies consider the BWP slip to be a ship berthing facility. Under the DMMP general ranking guidelines (DMMP, 2016), ship berthing facilities are ranked as "moderate" for sediment characterization. Given its adjacency to the slip, the DMMP agencies also assigned a rank of "moderate" to the turning basin. Sediment in the slip and turning basin was considered to be heterogeneous, due to the length of time since it was last characterized and its proximity to potential sources of contamination. The barge channel is considered an entrance channel and was ranked "low" in accordance with the DMMP ranking guidelines for projects on the Columbia River. Material in the barge channel was considered to be homogeneous because infill is likely relatively uniform sediment from the Columbia River. The minimum numbers of field samples and dredged material management units (DMMUs) were calculated using the following guidelines for projects on the Upper Columbia River (DMMP, 2016):

Slip and Turning Basin (moderate rank; heterogeneous):

- Maximum volume of sediment represented by each field sample = 4,000 cubic yards
- Maximum volume of sediment represented by each surface DMMU = 16,000 cubic yards.
- Maximum volume of sediment represented by each subsurface DMMU = 24,000 cubic yards.

Barge Channel (low rank; homogeneous):

- Maximum volume of sediment represented by each field sample = 8,000 cubic yards
- Maximum volume of sediment represented by each DMMU = 60,000 cubic yards.

Based on these guidelines, the following numbers of field samples and DMMUs were required:

Table 2. Minimum sampling and testing requirements and actual sampling and testing

Dredging Area	Stratum	Volume (cy)	required		actual	
			field samples	DMMUs	field samples	DMMUs
Slip/Turning Basin	surface	57,464	15	4	17	5
Slip/Turning Basin	subsurface	76,253	20	4	21	4
Barge Channel	---	129,186	17	3	42	3
Total	---	262,903	52	11	70	12

The sampling and analysis plan met the minimum requirements for field samples and DMMUs (APA, 2017), with an individual field sample defined as a 4-ft core section. Partial core sections longer than 2 feet were counted as individual field samples.

5. Sampling. Sampling took place November 29 - December 6, 2017 using a vibracore sampler. Figures 2A, 2B and 2C show the sampling locations and Table 3 provides the sampling data. Cores were collected from 35 stations. The SAP included a total of 43 possible sampling stations, but several of these were contingency stations that could be used in the event that an insufficient volume of material was collected at the primary target stations. Use or non-use of the contingency cores is addressed below in the discussion for individual DMMUs.

Several problems were encountered during sampling that required application of best professional judgment on the part of the DMMP agencies. The first issue encountered was sampling refusal in the slip and turning basin due to gravel and cobble. The second issue was the logistical challenge of collecting long cores in shallow water. A third, more minor, issue was recovery that failed to meet the 75% acceptance criterion at some sampling stations. These difficulties were communicated in a timely manner by contractor Anderson Perry & Associates to the Dredged Material Management Office, which in turn coordinated with the other DMMP agencies. The sediment characterization report (APA, 2018) fully documents the problems encountered and their resolution.

Regarding the challenges posed by shallow water depths, cores as long as 18 feet were planned. However, when working in very shallow water (less than three feet in places), the sampling frame was not tall enough to deploy 18-ft core tubes off the bow of the vessel (see Figure 3 for a photo of the sampling vessel). Sampling through the vessel's moon pool was attempted, but the shallow water resulted in a slack deployment cable, which created unsafe conditions when the vibracore motor was energized. In addition, the one long core that was collected under these conditions took three hours to retrieve and process. The DMMP agencies were consulted and a decision was made to allow use of 15-ft core tubes where necessary. Because shorter cores would be inadequate to collect Z-samples from many of the planned stations, the agencies had the contractor collect sediment from the bottom of recovered cores for use as proxy Z-samples.

Following is a summary of dredged material and Z-layer sampling for each DMMU. Figures 4A through 4H show the sample recovery information included in this summary.

DMMU 1A (inner slip). Sediment accumulation in the inner slip was not enough to justify splitting the dredged material into surface and subsurface DMMUs. Therefore, per the SAP, all material was included in a single surface DMMU. Four cores were collected (Stations 1-4), with three coring attempts needed at each station. Refusal was encountered during 10 of the 12 attempts due to cobble or gravel. The recovered cores spanned 47% to 96% (average = 67%) of the dredge prism (including overdepth). The core from Station 2 was the only one with recovered sediment from the overdepth layer. This core also penetrated into the Z-layer, but material from the sampling shoe was lost during retrieval of the core barrel. Because no material was recovered from the Z-layer in any of the cores, no Z-samples were collected. The DMMP agencies were consulted and made the determination that given the layer of gravel and cobble encountered at depth, the lack of a Z-sample would not be an issue as long as the dredged material was found to be suitable for unconfined in-water disposal. Cores in DMMU 1A were collected before a decision was made to collect proxy Z-samples from the bottom of cores when true Z-samples could not be collected.

DMMUs 2A/2B (northwest half of outer slip and inner turning basin). Five cores were collected (Stations 5, 6, 8, 9, 10). Contingency Station 7 was not needed. Refusal was encountered at Stations 5 (gravel) and 8 (unspecified reason). Sediment from the upper four feet from all five cores was successfully collected and composited to represent surface DMMU 2A. For subsurface DMMU 2B, no sediment from deeper than four feet below mudline was collected at Station 5 due to refusal. The recovered subsurface core lengths (i.e. from deeper than four feet below mudline) from the other four cores (Stations 6, 8, 9 and 10) spanned 37% to 88% (average = 65%) of the full vertical extent of DMMU 2B (including overdepth). Proxy Z-samples were collected from the deepest 0.9 to 1.2 feet of those four cores and composited as BWP-2Z.

DMMUs 3A/3B (southeast half of outer slip and inner turning basin). Three cores were collected (Stations 11, 13, 14). Contingency Stations 12 and 15 were not needed. Sediment from the upper four feet from all three cores was successfully collected and composited to represent surface DMMU 3A. For subsurface DMMU 3B, the recovered subsurface core lengths spanned 65% to 100% (average = 77%) of the full vertical extent of the DMMU (including overdepth). Proxy Z-samples were collected from the deepest 1.0 to 1.5 feet of the three cores and composited as BWP-3Z.

DMMUs 4A/4B (east half of outer turning basin). Three cores were collected (Stations 16, 18, 20). Contingency Stations 17, 19 and 21 were not needed. Sediment from the upper four feet from all three cores was successfully collected and composited to represent surface DMMU 4A. For subsurface DMMU 4B, the recovered subsurface core lengths spanned 50% to 80% (average = 69%) of the full vertical extent of the DMMU (including overdepth). Proxy Z-samples were collected from the deepest 1.5 feet of the three cores and composited as BWP-4Z.

DMMUs 5A/5B (west half of outer turning basin). Two cores were collected (Stations 23, 24). Contingency Stations 22 and 25 were not needed. Sediment from the upper four feet from both cores was successfully collected and composited to represent surface DMMU 5A. For subsurface DMMU 5B, the recovered subsurface core lengths spanned 60% to 68% (average = 64%) of the full vertical extent of the DMMU (including overdepth). Proxy Z-samples were collected from the deepest 1.6 feet of the two cores and composited as BWP-5Z.

DMMU 6 (barge channel – inner Baseline B). Eight cores were collected (Stations 26-33). There were no contingency stations. Sediment in this DMMU was considered homogeneous, so there was no distinction between surface and subsurface material. The recovered core lengths spanned 70% to 95% (average = 88%) of the dredge prism (including overdepth). None of the recovered cores extended into the true Z-layer, so proxy Z-samples were collected. These were collected from the deepest 1.0 to 1.6 feet of the eight cores and composited as BWP-6Z.

DMMU 7 (barge channel – middle Baseline B). Eight cores were collected (Stations 34-41). There were no contingency stations. Sediment in this DMMU was considered homogeneous, so there was no distinction between surface and subsurface material. The recovered core lengths spanned 93% to 100% (average = 98%) of the dredge prism (including overdepth). In five of the eight cores, the recovered material included sediment from the Z-layer. True Z-samples were collected from those five cores and composited as BWP-7Z.

DMMU 8 (barge channel – outer Baseline B and all of Baseline A). Two cores were collected (Stations 42, 43). There were no contingency stations. Sediment in this DMMU was considered homogeneous, so there was no distinction between surface and subsurface material. The recovered

core lengths both spanned 100% of the dredge prism (including overdepth) and included sediment from the Z-layer. True Z-samples were collected from the cores and composited as BWP-8Z.

6. Grain Size, Sediment Conventional and Chemical Analysis. The grain-size, sediment conventional and chemical results are presented in Table 4. The grain-size data show that the physical characteristics of the dredged material collected from various parts of the project varied considerably. The inner slip (DMMU 1A) was predominantly silt and clay, with a fines content of 82.1%. DMMUs in the outer slip and turning basin (DMMUs 2-5) included a diverse mix of material, with the fines content ranging from only 14.2% in DMMU 3A to as high as 81.4% in DMMU 5A. DMMUs 6 and 7 in Baseline B were predominantly silt, while DMMU 8 from Baseline A and the outer portion of Baseline B contained approximately equal parts of coarse and fine-grained sediment.

   Only one dredged material sample – that for DMMU 2B – contained a significant gravel content (4.3%). Not reflected in the grain-size results, however, is the composition of the material that resulted in refusal at five of the sampling stations in DMMUs 1 and 2. Gravel and cobble were reported at these stations, but because samples could not be collected, the grain-size data from those stations are biased toward a higher fines content.

   Despite the wide variability in grain size, the total organic carbon content (TOC) was universally low, ranging from 0.1 to 1.0% in the dredged material samples. Total solids ranged from 57.9 to 82.8%. Total volatile solids ranged from 1.3 to 4.1%. Ammonia ranged from 37.3 to 167 mg/kg, while sulfides ranged from undetected to a high of 398 mg/kg.

   Chemical of concern (COC) concentrations in the dredged material samples were compared to the DMMP freshwater guidelines. There were no detected exceedances of the Screening Level 1 (SL1) values for any of the chemicals. Detection limits for undetected COCs were all below SL1 as well. Dioxin/furan concentrations in the dredged material samples were all low, ranging from 0.53 to 1.82 ng/kg toxic equivalents (TEQ), with non-detects set equal to half the estimated detection limit.

7. Biological Testing. Based on the evaluation of the chemical data, biological testing was not required for the dredged material.

8. Sediment Exposed by Dredging. For this project, the sediment to be exposed by dredging was represented by true Z-samples in the case of DMMUs 7A and 8A, and by proxy Z-samples for the other DMMUs. Chemical concentrations in the Z-samples were all below SL1. Dioxin/furan concentrations were also low. The Z-sample associated with DMMU 7 had the highest concentration, at 3.3 ng/kg TEQ. The other Z-samples ranged from 0.64 to 1.63 ng/kg TEQ.

9. Suitability and Antidegradation Determination. This memorandum documents the evaluation of the suitability of sediment proposed for dredging from the Boise White Paper barge channel, turning basin and slip for unconfined in-water disposal, as well as compliance of the sediment to be exposed by dredging with the State's antidegradation policy.

   A basic assumption underlying the evaluation is that the samples collected are representative of the dredged material and post-dredge surface being characterized. Given the sampling difficulties and resulting deviations from the sampling plan discussed previously, best professional judgment was required in determining the representativeness of collected samples. The following factors were considered:

a) In the inner slip, gravel and cobbles were encountered near the design depth. Because organic contaminants are typically associated with fine-grained sediment, not coarse-grained sediment, the likelihood of finding elevated concentrations in sediment deeper than what could be collected is low.

b) In the outer slip and turning basin, samples were collected from three different depths: A, B and proxy Z. There was no indication of increasing contamination with depth, and no contamination present overall in the characterized dredge prism.

c) While the core tubes used were not long enough to collect the deepest sediment from sampling stations in the outer slip and turning basin, at least some of the recovered cores were long enough to include sediment from deeper than the design depth (e.g. Station 9; Figure 4B). If high levels of contamination were present at depth, composites that included these deeper cores would have shown some evidence of this, which they did not.

d) The majority of the cores taken from the barge channel included material from deeper than the design depth, therefore DMMUs in the barge channel were well represented by the collected samples.

e) Material in the barge channel was considered homogeneous. Therefore, the samples taken were, by definition, representative of the material to be dredged.

Based on these considerations, the DMMP agencies determined that the samples collected were sufficient for decision-making.

Suitability determination. There were no SL1 exceedances for the standard DMMP COCs. For dioxins/furans, an SL1 has not been established for freshwater sediments. Case-by-case evaluations are needed instead. One benchmark for the Columbia River that has been used for past evaluations is the range of background values for sediment samples taken downstream of Puget Island, which ranged from 0.65 to 2.89 ng/kg TEQ as of 2009 (DMMP, 2016). The dioxin/furan concentrations in the dredged material composites were all within (or below) this range. *Based on the results of the chemical testing, all* 262,903 *cubic yards proposed for dredging are suitable for unconfined in-water disposal.*

Antidegradation determination. Sediment exposed by dredging must either meet the State of Washington Sediment Quality Standards (SQS) (Ecology, 2013) or the State's antidegradation standard (DMMP, 2008). The DMMP freshwater SL1 concentrations are equivalent to the Sediment Cleanup Objectives (SCOs) under the Sediment Management Standards (SMS). The SCOs are functionally equivalent to SQS. For this project, chemical concentrations in the Z-samples were all below SL1. Regarding dioxins/furans, all concentrations were within the range of Puget Island background concentrations with the exception of the Z-sample associated with DMMU 7, which had a concentration of 3.3 ng/kg TEQ and was slightly above this background range. However, the average concentration in the Z-samples was only 1.6 ng/kw TEQ, which is well within the background range. Another consideration is the practical quantitation limit (PQL), which has been set at 5 ng/kg TEQ by the Department of Ecology. The dioxin/furan concentration for the Z-sample associated with DMMU 7 was below the PQL. *Based on these considerations for dioxin/furan and the lack of SL1 exceedances for the standard COCs, the DMMP agencies agreed that the sediment to be exposed by dredging meets the State of Washington antidegradation policy.*

This suitability and antidegradation determination does *not* constitute final agency approval of the project. During the public comment period that follows a public notice, the resource agencies will provide input on

the overall project. 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.

If a decision is made by the project proponent to dispose any or all of the dredged material at an upland location or use the material beneficially in the uplands, the project proponent must contact the local health district with jurisdiction over the placement site. For in-water beneficial use proposals, it is recommended that the project proponent coordinate early with the Washington Department of Fish and Wildlife, the U.S. Fish and Wildlife Service and National Marine Fisheries Service.

A pre-dredge conference call with DNR, Ecology and the Corps of Engineers will be required. A dredging quality control plan must be developed and submitted to the Corps of Engineers Regulatory Branch Project Manager for this project at least 7 days prior to the pre-dredge conference call. This plan must include: the equipment and vessels to be used, operational controls to ensure dredging accuracy, disposal location, spill control and response measures, water quality monitoring, contingency plans in the event water quality standards are exceeded, debris management, personnel and responsibilities, dredging and disposal schedule, report submittals, agency contact information and coordination procedures. Debris is to be disposed at an upland location. The dredging and disposal quality control plan must be approved by the U.S. Army Corps of Engineers, Washington State Department of Natural Resources and the Washington State Department of Ecology prior to commencement of unconfined in-water disposal.

10. References.

APA, 2017. *Sampling and Analysis Plan – Wallula Barge Channel and Slip Dredging, Permitting, and Design*. Prepared by Anderson Perry & Associates, Inc. for Boise White Paper, LLC (a subsidiary of Packaging Corporation of America), November 2017.

APA, 2018. *Sediment Characterization Report – Wallula Barge Channel and Slip Dredging, Permitting, and Design*. Prepared by Anderson Perry & Associates, Inc. for Boise White Paper, LLC (a subsidiary of Packaging Corporation of America), July 2018.

DMMP, 2008a. *Quality of Post-Dredge Sediment Surfaces (Updated)*. A Clarification Paper Prepared by David Fox (USACE), Erika Hoffman (EPA) and Tom Gries (Ecology) for the Dredged Material Management Program, June 2008.

DMMP, 2016. *Dredged Material Evaluation and Disposal Procedures (User Manual)*. Dredged Material Management Program, August 2016.

Ecology, 2013. *Sediment Management Standards – Chapter 173-204 WAC*. Washington State Department of Ecology, Revised February 2013.

11. Agency Signatures.

Concur:

The signed copy is on file in the Dredged Material Managment Office.

_____ _____
Date David Fox, P.E. - Seattle District Corps of Engineers

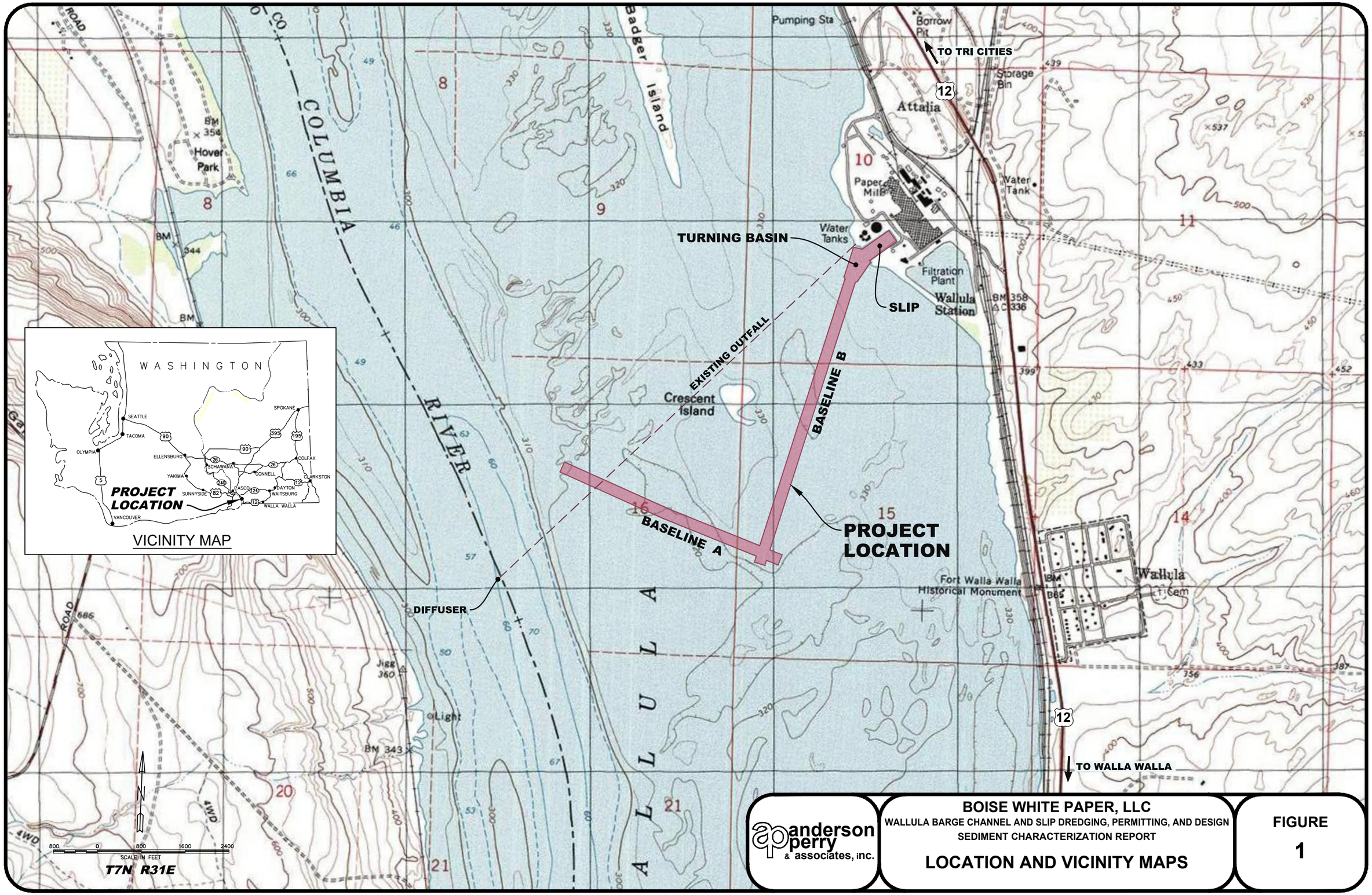
_____ _____
Date Justine Barton - Environmental Protection Agency

_____ _____
Date Laura Inouye, Ph.D. - Washington Department of Ecology

_____ _____
Date Celia Barton - Washington Department of Natural Resources

Copies furnished:

DMMP signatories
Corps Regulatory
Dana Kurtz, Anderson Perry & Associates, Inc.


TURNING BASIN
SLIP
BASELINE B
BASELINE A
EXISTING OUTFALL
PROJECT LOCATION
DIFFUSER
TO TRI CITIES
TO WALLA WALLA
Attalia
Wallula
Wallula Station
Filtration Plant
Water Tanks
Paper Mill
Storage Bin
Borrow Pit
Pumping Sta
Badger Island
Crescent Island
Hover Park
Fort Walla Walla Historical Monument
COLUMBIA RIVER
WALLULA
WASHINGTON
SEATTLE
TACOMA
OLYMPIA
SPOKANE
ELLENSBURG
YAKIMA
SUNNYSIDE
PASCO
COLFAX
CLARKSTON
DAYTON
WAITSBURG
WALLA WALLA
VANCOUVER
PROJECT LOCATION
VICINITY MAP
SCALE IN FEET
T7N R31E
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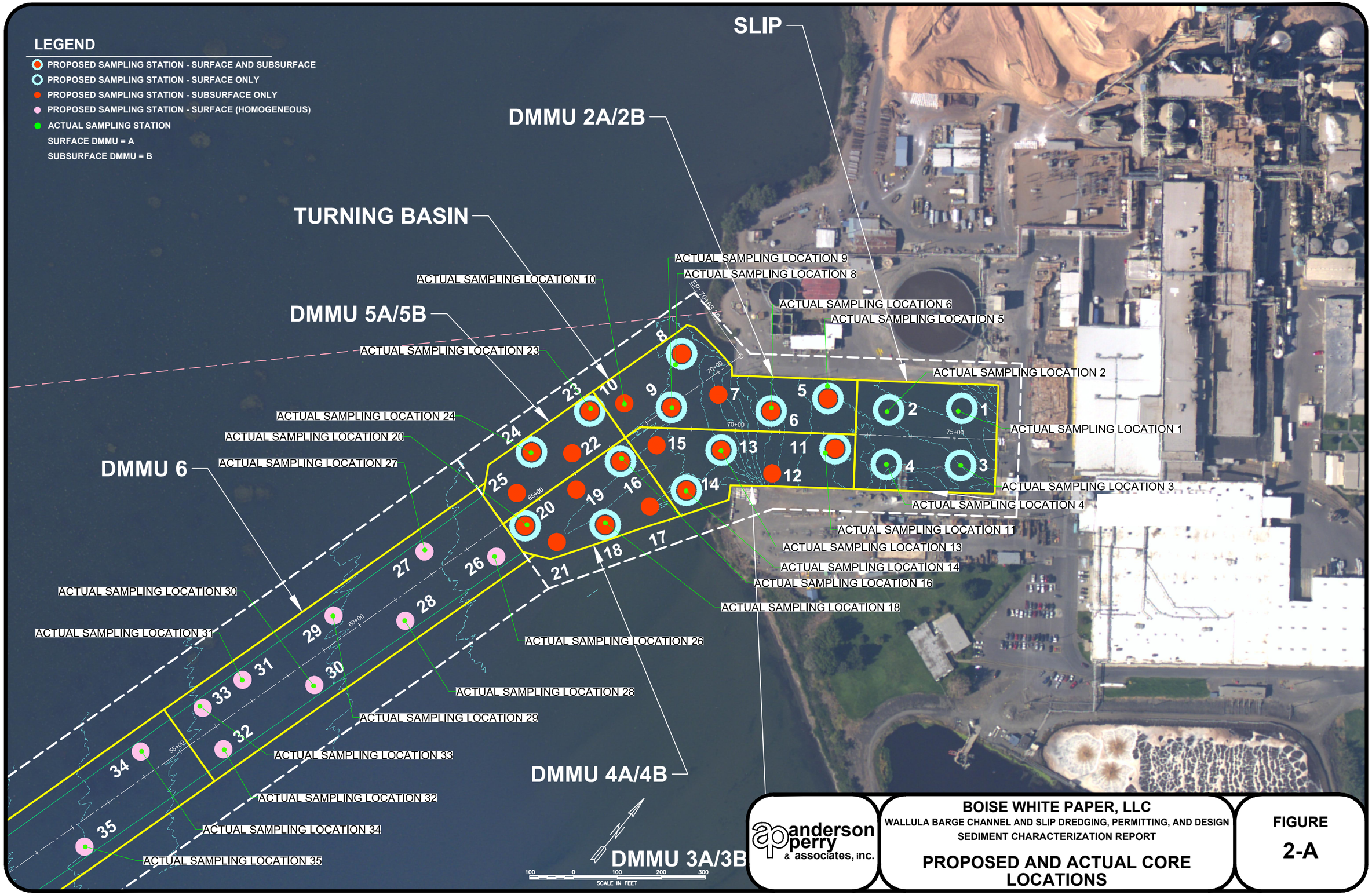
BOISE WHITE PAPER, LLC
WALLULA BARGE CHANNEL AND SLIP DREDGING, PERMITTING, AND DESIGN
SEDIMENT CHARACTERIZATION REPORT
LOCATION AND VICINITY MAPS
FIGURE
1



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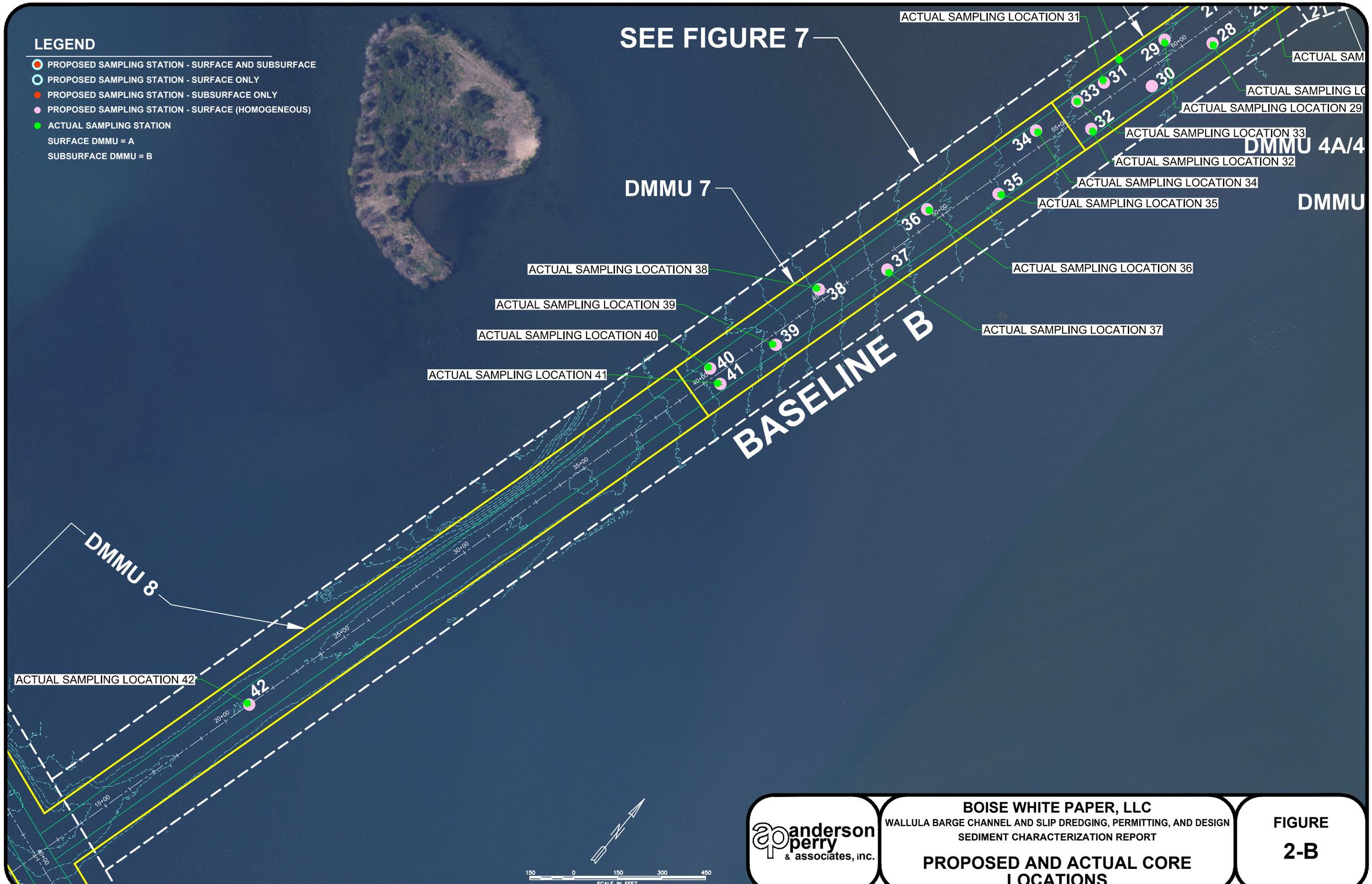
BOISE WHITE PAPER, LLC

WALLULA BARGE CHANNEL AND SLIP DREDGING, PERMITTING, AND DESIGN

SEDIMENT CHARACTERIZATION REPORT

PROPOSED AND ACTUAL CORE LOCATIONS

FIGURE 2-A



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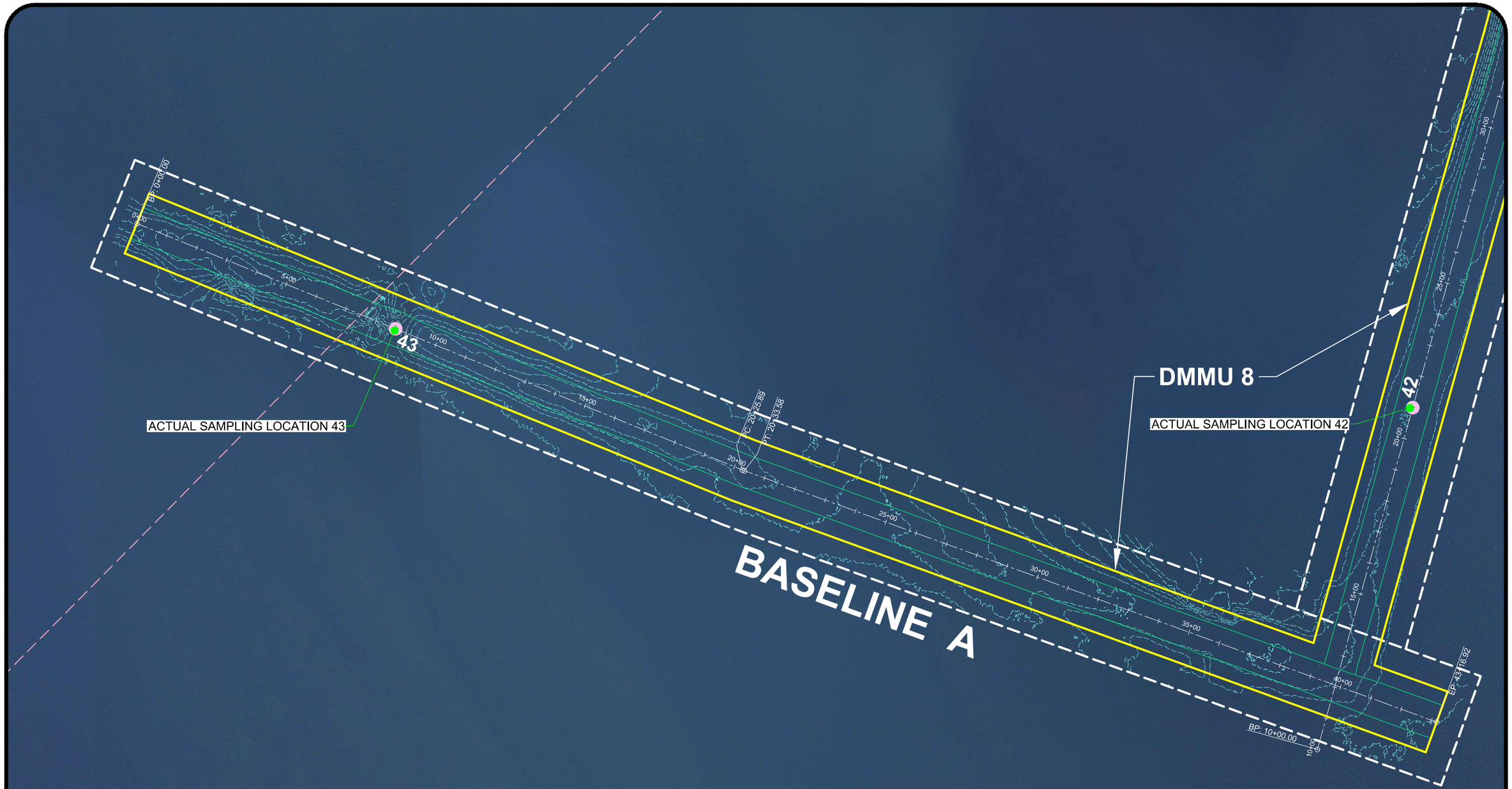
WALLULA BARGE CHANNEL AND SLIP DREDGING, PERMITTING, AND DESIGN

SEDIMENT CHARACTERIZATION REPORT

PROPOSED AND ACTUAL CORE LOCATIONS

FIGURE 2-B



LEGEND

- PROPOSED SAMPLING STATION - SURFACE AND SUBSURFACE
- PROPOSED SAMPLING STATION - SURFACE ONLY
- PROPOSED SAMPLING STATION - SUBSURFACE ONLY
- PROPOSED SAMPLING STATION - SURFACE (HOMOGENEOUS)
- ACTUAL SAMPLING STATION

SURFACE DMMU = A

SUBSURFACE DMMU = B

N

150 0 150 300 450

SCALE IN FEET

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WALLULA BARGE CHANNEL AND SLIP DREDGING, PERMITTING, AND DESIGN

SEDIMENT CHARACTERIZATION REPORT

PROPOSED AND ACTUAL CORE LOCATIONS

FIGURE 2-C

Figure 3 - The Sampling Vessel, R/V Carolyn Dow

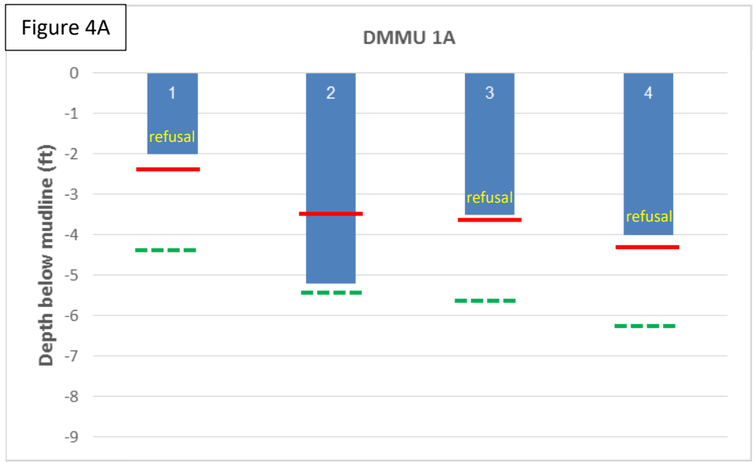


Figure 4A
DMMU 1A
Depth below mudline (ft)
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
1
2
3
4
refusal
refusal
refusal

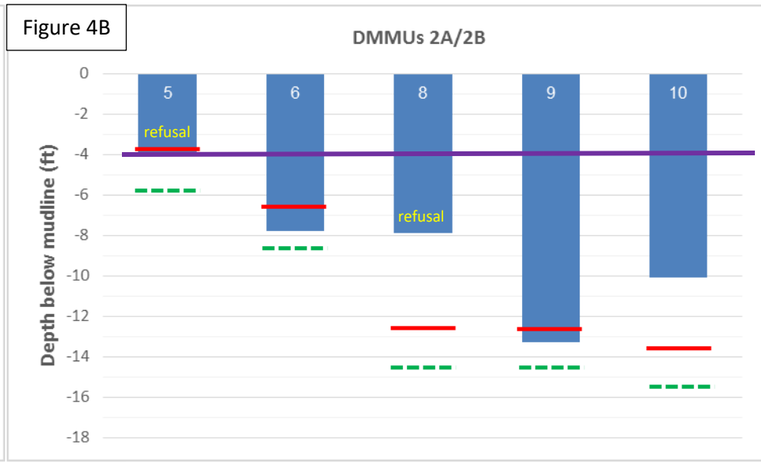


Figure 4B
DMMUs 2A/2B
Depth below mudline (ft)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
5
6
8
9
10
refusal
refusal

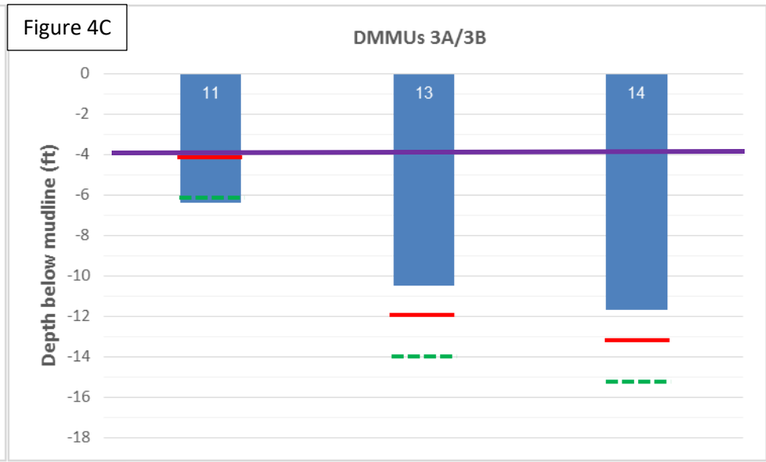


Figure 4C
DMMUs 3A/3B
Depth below mudline (ft)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
11
13
14

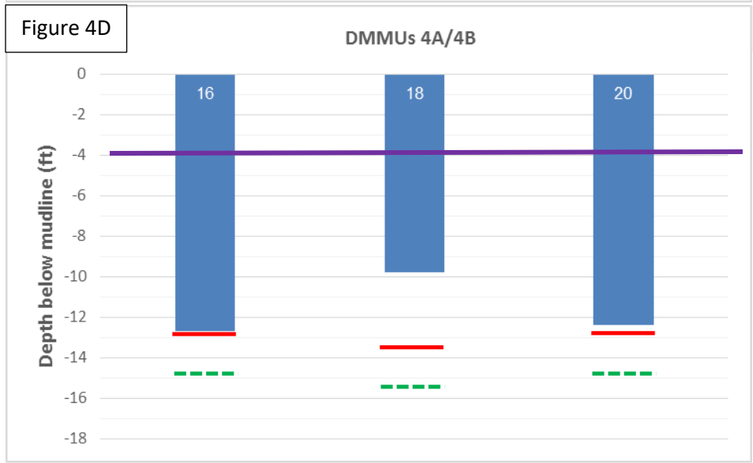


Figure 4D
DMMUs 4A/4B
Depth below mudline (ft)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
16
18
20

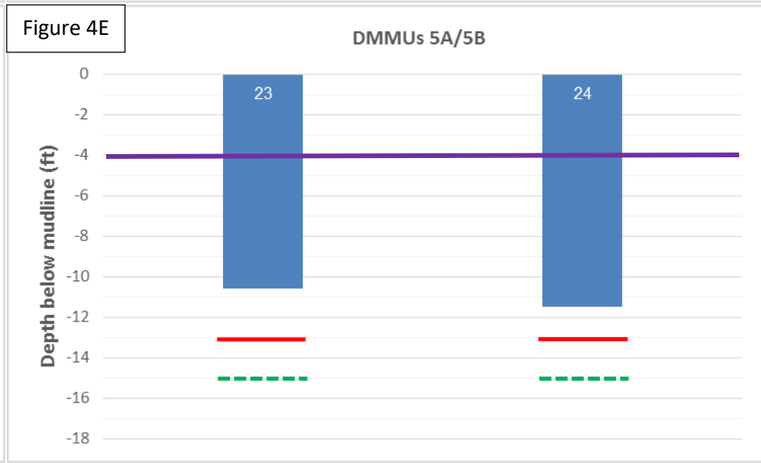


Figure 4E
DMMUs 5A/5B
Depth below mudline (ft)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
23
24

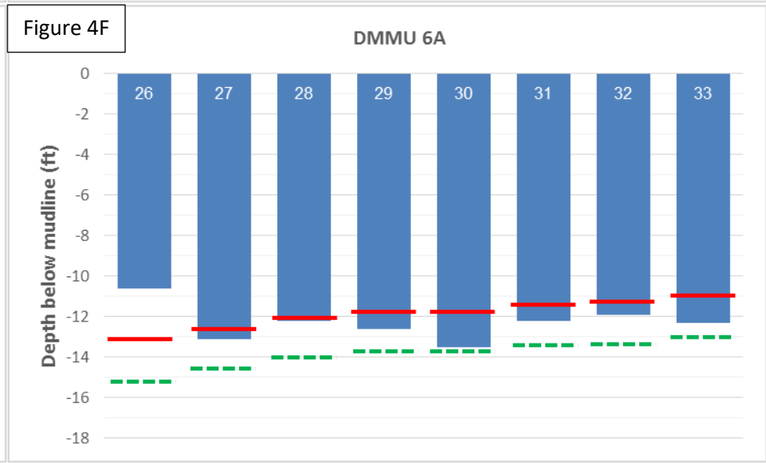


Figure 4F
DMMU 6A
Depth below mudline (ft)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
26
27
28
29
30
31
32
33

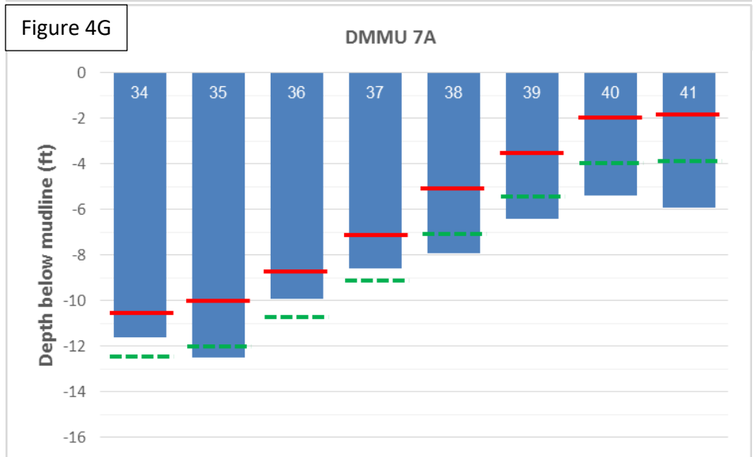


Figure 4G
DMMU 7A
Depth below mudline (ft)
0
-2
-4
-6
-8
-10
-12
-14
-16
34
35
36
37
38
39
40
41

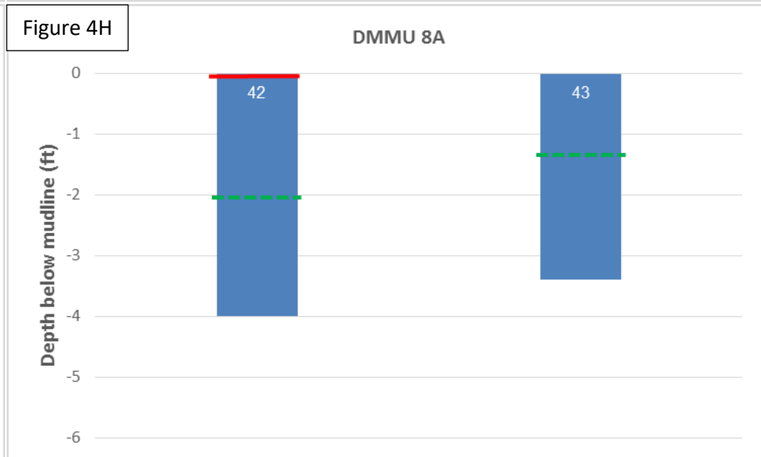
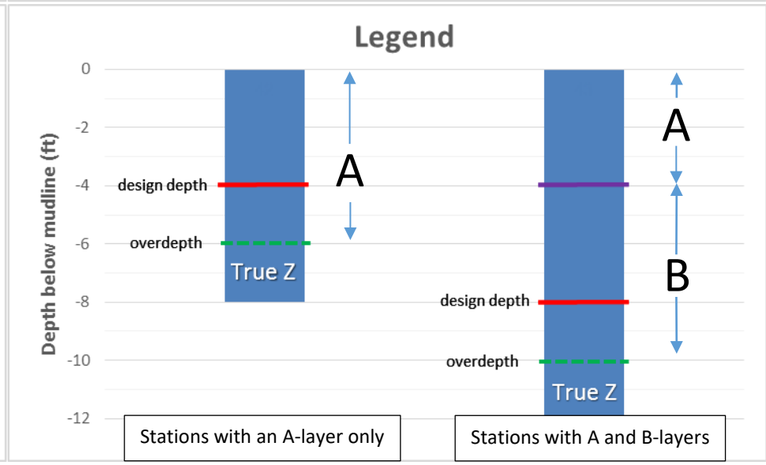


Figure 4H
DMMU 8A
Depth below mudline (ft)
0
-1
-2
-3
-4
-5
-6
42
43


Legend
Depth below mudline (ft)
0
-2
-4
-6
-8
-10
-12
design depth
overdepth
True Z
A
design depth
overdepth
True Z
A
B
Stations with an A-layer only
Stations with A and B-layers

CORE COLLECTION SUMMARY AND COMPOSITING SCHEME

Core Location	1	2	3	4	5	6	8	9	10
DMMU Number	1	1	1	1	2	2	2	2	2
Attempt Number Accepted	2 of 3	3 of 3	2 of 3	2 of 3	3 of 3	1 of 1	2 of 2	1 of 1	1 of 1
Measured Water Surface Elevation (NGVD29)	338.6	338.6	338.9	338.9	339.3	339.2	338.9	338.9	339.1
Mudline Elevation (NGVD29)	325.3	326.4	326.7	327.2	326.8	329.6	335.6	335.6	336.6
Actual Penetration (ft)	3.2	7.4	4.3	5.5	5.4	10.6	9.8	14.9	11
Target Penetration (ft) (including 2 feet for Z)	6.3	7.4	7.7	8.2	7.8	10.6	16.6	16.6	17.6
Recovery (ft)	2.2	6.2	4	4.2	4.1	7.5	7.9	13.3	10
Percent Recovery (field recovered from core collection log)	69%	84%	93%	76%	76%	71%	81%	89%	91%
Length to Process (ft) (actual; from sediment processing log)	2.0	5.2	3.5	4	4	7.8	7.9	13.3	10.1
Compositing Scheme (ft)	BWP-1A = 0.0 to 2.0	BWP-1A = 0.0 to 5.2	BWP-1A = 0.0 to 3.5	BWP-1A = 0.0 to 4.0	BWP-2A = 0.0 to 4.0	BWP-2A = 0.0 to 4.0 BWP-2B = 4.0 to 7.8 BWP-2Z = 6.8 to 7.8	BWP-2A = 0.0 to 4.0 BWP-2B = 4.1 to 7.9 BWP-2Z = 6.9 to 7.9	BWP-2A = 0.0 to 4.0 BWP-2B = 4.0 to 13.3 BWP-2Z = 12.1 to 13.3	BWP-2A = 0.0 to 4.0 BWP-2B = 4.0 to 10.1 BWP-2Z = 9.2 to 10.1
Accepted?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Actual Sampling Coordinate, Y (NAD83)	46.101571550	46.101296933	46.101314531	46.101033250	46.101132267	46.100870528	46.100712267	46.100487189	46.100323061
Actual Sampling Coordinate, X (NAD83)	-118.920731389	-118.921232692	-118.920414600	-118.920945400	-118.921722900	-118.922070792	-118.922988358	-118.922776436	-118.923132097
Target Sampling Coordinate, Y (NAD83)	46.101600000	46.101311111	46.101313889	46.101033333	46.101133333	46.100852778	46.100788889	46.100486111	46.100325000
Target Sampling Coordinate, X (NAD83)	-118.920722222	-118.921230556	-118.920413889	-118.920944444	-118.921722222	-118.922055556	-118.923005556	-118.922783333	-118.923136111
Distance from Target Location (ft)	6.0	2.6	0.3	0.4	0.3	6.4	14.9	2.5	1.5
Drive and Processing Notes	Target core penetration changed for water depth, 6.3 ft, moved 1.2 ft away from station due to initial early refusal.	Full target penetration. Moderate advancement. Material lost from shoe.	Moderate driving 0-4.0. Difficult driving 4.0-4.3. Termination caused by layer of gravels.	Termination at refusal, gravels.	Moderate driving 0-4.9. Difficult driving 4.9-5.4. Termination at refusal, gravel layer.	Termination at target core. Moderate driving.	Adjusted target core 14.1 because shoe accounted for 0.9 ft. Termination at refusal.	Adjusted target core 14.1. Layers of moderate driving throughout termination beyond adjusted core target.	Adjusted target core 11.0. Termination at target core (adjusted). Moderate driving throughout.
Field Description of Sediment in Core	Fine sand, no obvious odor or sheen. Large cobbles and rounded at bottom 0.2 ft, material at cap location moist, dark grey	Shoe material = fine sandy clay, no observed odor or sheen.	Medium, well-graded sand. Rare angular gravels ;no visible sheet or detectable odors. Sediment is moist. Sediment is dark grey.	Fine & medium well-graded sand. Rare, small-angular gravels; no visible sheen or detectable odors. Sediment is moist. Sediment is dark grey.	Gravels, fine & medium sand & silt in drivers shoe. Sediment is moist and dark grey. Sediment is mostly silt & fine sand with rare gravels.	Sediment is moist & dark grey. Medium/fine well-graded sand & silt with rare gravel. No odor or sheen detected.	Sediment is moist & dark grey. Fine sand & silt. No sheen or odor detected.	Sediment is moist and dark grey. Fine sand & silt.	Sediment is moist & dark grey. Fine & medium well-graded sand & silt. No detectable odors or sheen.

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BOISE WHITE PAPER, LLC

WALLULA BARGE CHANNEL AND SLIP DREDGING, PERMITTING, AND DESIGN
SEDIMENT CHARACTERIZATION REPORT

CORE COLLECTION SUMMARY AND COMPOSITING SCHEME

TABLE 3

CORE COLLECTION SUMMARY AND COMPOSITING SCHEME

Core Location	11	13	14	16	18	20	23	24	26	27
DMMU Number	3	3	3	4	4	4	5	5	6	6
Attempt Number Accepted	2 of 2	1 of 1	1 of 1	1 of 1	1 of 2	2 of 2	2 of 2	2 of 2	1 of 1	1 of 2
Measured Water Surface Elevation (NGVD29)	339.0	339.1	339.1	339.1	339.1	339.0	338.9	338.9	339.0	338.6
Mudline Elevation (NGVD29)	327.2	335.0	336.2	335.9	336.5	335.9	336.1	336.1	336.2	335.6
Actual Penetration (ft)	8.2	14.6	14.4	15.1	14	14.1	14.1	14.1	14.1	15.4
Target Penetration (ft) (including 2 feet for Z)	8.2	16.0	17.2	16.9	17.5	16.9	17.1	17.1	17.2	16.6
Recovery (ft)	6.4	10.5	11.7	12.7	9.8	12.4	10.6	11.5	10.5	13.9
Percent Recovery (field recovered from core collection log)	78%	72%	81%	84%	70%	88%	75%	81%	74%	90%
Length to Process (ft) (actual; from sediment processing log)	6.4	10.5	11.7	12.7	9.8	12.4	10.6	11.5	10.6	13.1
Compositing Scheme (ft)	BWP-3A = 0.0 to 4.0 BWP-3B = 4.0 to 6.4 BWP-3Z = 5.0 to 6.4	BWP-3A = 0.0 to 4.0 BWP-3B = 4.0 to 10.5 BWP-3Z = 9.0 to 10.5	BWP-3A = 0.0 to 4.0 BWP-3B = 4.0 to 11.7 BWP-3Z = 10.7 to 11.7	BWP-4A = 0.0 to 4.0 BWP-4B = 4.0 to 12.7 BWP-4Z = 11.2 to 12.7	BWP-4A = 0.0 to 4.0 BWP-4B = 4.0 to 9.8 BWP-4Z = 8.3 to 9.8	BWP-4A = 0.0 to 4.0 BWP-4B = 4.0 to 12.4 BWP-4Z = 10.9 to 12.4	BWP-5A = 0.0 to 4.0 BWP-5B = 4.0 to 10.6 BWP-5Z = 9.0 to 10.6	BWP-5A = 0.0 to 4.0 BWP-5B = 4.0 to 11.5 BWP-5Z = 10.9 to 11.5	BWP-6A and BWP-6A-MS/MSD = 0.0 to 10.6 BWP-6Z and BWP-6A-MS/MSD = 9.6 to 10.6	BWP-6A and BWP-6A-MS/MSD = 0.0 to 13.1 BWP-6Z and BWP-6A-MS/MSD = 11.5 to 13.1
Accepted?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Actual Sampling Coordinate, Y (NAD83)	46.100854408	46.100464739	46.100132122	46.100044083	46.099663303	46.099352992	46.100170250	46.099723219	46.099071550	46.098835028
Actual Sampling Coordinate, X (NAD83)	-118.921440269	-118.922190731	-118.922215208	-118.922851039	-118.922608211	-118.923152772	-118.923345194	-118.923522800	-118.923206447	-118.923735861
Target Sampling Coordinate, Y (NAD83)	46.100916667	46.100469444	46.100136111	46.100025000	46.099652778	46.099341667	46.100155556	46.099735100	46.099077778	46.098827778
Target Sampling Coordinate, X (NAD83)	-118.921394444	-118.922191667	-118.922216667	-118.922841667	-118.922600000	-118.923163889	-118.923338889	-118.923476597	-118.923194444	-118.923730556
Distance from Target Location (ft)	20.0	0.9	0.9	4.8	3.5	4.5	3.5	0.8	4.5	2.3
Drive and Processing Notes	Termination at target core. Moderate driving throughout.	Adjusted target core 14.1. Termination beyond target core (adjusted). Moderate driving throughout.	Adjusted target core 14.1. Termination at target core (adjusted). Easy driving.	Adjusted target core 14.4. Termination beyond target core. Sediment from shoe lost, recovery measurement adjusted from 12.7 to 11.9.	14.0 adjusted target core. Termination at target core. Easy driving.	Adjusted target core 14.1. Easy driving. Termination at target core (adjusted).	Adjusted target core to 14.1. Easy driving 0-12.5. Moderate driving 12.5-14.1. Termination at target core (adjusted).	Adjusted target core to 14.1. Moderate driving 0 to 14.1.	Adjusted target core 14.1. Termination at target core (adjusted). Easy driving.	Adjusted target core 14.1. Termination beyond target core (adjusted). Lost sediment from shoe. Portion of Z-layer lost. Recovery now 13.1
Field Description of Sediment in Core	Gravel, sand and silt in shoe. Sediment is dark grey; medium/light well-graded sand, gravel, & silt. No odor or sheen detected.	Sediment is moist & dark grey. Mix of fine/medium well-graded sand, gravel, and silt. No detectable odor or sheen.	Sediment is moist & dark grey. Contains fine & medium well-graded sands, some silt, rare gravels, rare shells, and wood debris. No detectable odors or sheen.	Sediment is moist & dark grey. Fine & medium well-graded sand & silt. No detected odors or sheen.	Sediment is moist & dark grey. Light & medium well-graded sand & silt, with clay & rare gravels. No odors or sheen detected.	Sediment is moist & dark grey. Fine & medium well-graded sand, silt, rare clay. No odor or sheen detected.	Sediment is moist. Dark grey. Fine & medium well-graded sand. Even mixture of silt and sand. No sheen or odor detected.	Sediment is moist & dark grey. Some coarse sand. Sediment is mostly silt. No sheen or odor detected.	Sediment is moist & dark grey. Fine well-graded sand & silt. No detectable sheen or odors.	Sediment is most and dark grey. Fine & medium well-graded sand & silt. No detectable odors or sheen.

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BOISE WHITE PAPER, LLC
WALLULA BARGE CHANNEL AND SLIP DREDGING, PERMITTING, AND DESIGN
SEDIMENT CHARACTERIZATION REPORT
CORE COLLECTION SUMMARY AND COMPOSITING SCHEME

TABLE
3
CONT'D

CORE COLLECTION SUMMARY AND COMPOSITING SCHEME

Core Location	28	29	30	31	32	33	34	35	36	37
DMMU Number	6	6	6	6	6	6	7	7	7	7
Attempt Number Accepted	1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	2 of 2
Measured Water Surface Elevation (NGVD29)	338.5	338.4	338.4	338.3	338.8	338.8	338.8	338.8	338.8	339.4
Mudline Elevation (NGVD29)	335.0	334.7	334.7	334.4	334.3	334.0	333.5	333.0	331.7	330.1
Actual Penetration (ft)	14.4	15.3	15.3	15.4	14.4	14.4	14.4	14.4	12.7	11.1
Target Penetration (ft) (including 2 feet for Z)	16.0	15.7	15.7	15.4	15.3	15.0	14.5	14.0	12.7	11.1
Recovery (ft)	12.2	12.6	13.5	12.2	11.9	12.3	11.6	13.1	9.9	8.6
Percent Recovery (field recovered from core collection log)	85%	82%	88%	79%	83%	85%	81%	91%	78%	77%
Length to Process (ft) (actual; from sediment processing log)	12.2	12.6	13.5	12.2	11.9	12.3	11.6	12.5	9.9	8.6
Compositing Scheme (ft)	BWP-6A and BWP-6A-MS/MSD = 0 to 12.2 BWP-6Z and BWP-6A-MS/MSD = 11.2 to 12.2	BWP-6A and BWP-6A-MS/MSD = 0.0 to 12.6 BWP-6Z and BWP-6A-MS/MSD = 11.6 to 12.6	BWP-6A and BWP-6A-MS/MSD = 0.0 to 13.5 BWP-6Z and BWP-6A-MS/MSD = 11.4 to 13.5	BWP-6A and BWP-6A-MS/MSD = 0.0 to 12.2 BWP-6Z and BWP-6A-MS/MSD = 11.2 to 12.2	BWP-6A and BWP-6A-MS/MSD = 0.0 to 11.9 BWP-6Z and BWP-6A-MS/MSD = 10.9 to 11.9	BWP-6A and BWP-6A-MS/MSD = 0.0 to 12.3 BWP-6Z and BWP-6A-MS/MSD= 11.3 to 12.3	BWP-7A = 0.0 to 10.6 BWP-7Z = 10.6 to 11.6	BWP-7A = 0.0 to 12.0 BWP-7Z = 12.0 to 12.5	BWP-7A = 0.0 to 9.9	BWP-7A = 0.0 to 8.6
Accepted?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Actual Sampling Coordinate, Y (NAD83)	46.098410561	46.098156950	46.097739089	46.097492144	46.097079675	46.097200597	46.096754422	46.096067739	46.095544147	46.094849519
Actual Sampling Coordinate, X (NAD83)	-118.923486653	-118.924019844	-118.923769672	-118.924307136	-118.924048789	-118.924461058	-118.924623750	-118.924493850	-118.925128980	-118.925037839
Target Sampling Coordinate, Y (NAD83)	46.098411111	46.098161111	46.097744444	46.097494444	46.097080556	46.097202778	46.096750000	46.096063889	46.095538889	46.094863889
Target Sampling Coordinate, X (NAD83)	-118.923480556	-118.924019444	-118.923769444	-118.924305556	-118.924058333	-118.924433333	-118.924627778	-118.924500000	-118.925130556	-118.925052778
Distance from Target Location (ft)	2.2	0.8	0.9	0.7	3.5	10.1	0.6	2.3	1.1	6.0
Drive and Processing Notes	Adjusted target core 14.1. Easy drive. Termination at target core (adjusted).	Adjusted target core is 14.1. Easy drive. Termination beyond target core (adjusted).	Adjusted target core 14.1. Easy driving. Termination beyond target core (adjusted).	Adjusted target core 14.1. Termination beyond target core (adjusted). Easy driving.	Adjusted target core 14.4. Easy drive. Termination at adjusted target core.	Adjusted target core 14.4. Termination at adjusted target core. Easy drive.	Adjusted target core 14.4. Moderate drive. Termination at adjusted target core.	Easy drive. Termination beyond target core.	Easy drive. Termination at target core.	Easy drive. Termination at target core.
Field Description of Sediment in Core	Sediment is moist & dark grey. Light & medium well-graded sand, silt, and some clay. No detectable odors or sheen.	Sediment is moist & dark grey. Light & medium well-graded sand, silt, and some clay. No detectable odors or sheen.	Sediment is moist & dark grey. Light & medium well-graded sand, silt, and some clay. No detectable odors or sheen.	Sediment is moist & dark gray. Fine & medium well-graded sand, silt, and clay. No detectable odors or sheen.	Sediment is moist & dark grey. Fine well-graded sand, silt, and some clay. No detectable odors or sheen.	Sediment is moist & dark grey. Fine & medium well-graded sand, silt, & some clay. No detectable odors or sheen.	Sediment is moist & dark grey. Light and medium well-graded sand, silt, and some clay. No detectable odors or sheen.	Sediment Is moist & dark grey. Light & medium well-graded sand, silt, and some clay. No detectable odors or sheen.	Sediment is moist & dark grey. Light & medium well-graded sand, silt, and some clay. No detectable odors or sheen.	Sediment is moist & dark grey. Light well-graded sand & silt, with some clay. No detectable odors or sheen.

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WALLULA BARGE CHANNEL AND SLIP DREDGING, PERMITTING, AND DESIGN
SEDIMENT CHARACTERIZATION REPORT
CORE COLLECTION SUMMARY AND COMPOSITING SCHEME

TABLE
3
CONT'D

CORE COLLECTION SUMMARY AND COMPOSITING SCHEME

Core Location	38	39	40	41	42	43
DMMU Number	7	7	7	7	8	8
Attempt Number Accepted	1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	1 of 1
Measured Water Surface Elevation (NGVD29)	339.5	339.5	339.4	339.3	339.4	339.4
Mudline Elevation (NGVD29)	328.1	326.5	325.0	324.9	323.1	322.4
Actual Penetration (ft)	9.3	7.7	6	6.8	4.5	3.9
Target Penetration (ft) (including 2 feet for Z)	9.1	7.5	6.0	5.9	4.1	3.4
Recovery (ft)	7.9	6.4	5.4	5.9	4	4
Percent Recovery (field recovered from core collection log)	85%	83%	90%	87%	89%	103%
Length to Process (ft) (actual; from sediment processing log)	7.9	6.4	5.4	5.9	4	3.8
Compositing Scheme (ft)	BWP-7A = 0.0 to 7.1 BWP-7Z = 7.1 to 7.9	BWP-7A = 0.0 to 6.4 BWP-7Z = 5.5 to 6.4	BWP-7A = 0.0 to 4.0 BWP-7Z = 4.0 to 5.4	BWP-7A = 0.0 to 3.9 BWP-7Z = 3.9 to 5.9	BWP-8A = 0.0 to 2.0 BWP-8Z = 2.0 to 4.0	BWP-8A = 0.0 to 1.4 BWP-8Z = 1.4 to 3.4
Accepted?	Yes	Yes	Yes	Yes	Yes	Yes
Actual Sampling Coordinate, Y (NAD83)	46.094328692	46.093657972	46.093112519	46.093060569	46.087975083	46.088820097
Actual Sampling Coordinate, X (NAD83)	-118.925619022	-118.925619953	-118.926112342	-118.925878558	-118.928212228	-118.940614689
Target Sampling Coordinate, Y (NAD83)	46.094325000	46.093666667	46.093113889	46.093058333	46.087972222	46.088813889
Target Sampling Coordinate, X (NAD83)	-118.925613889	-118.925611111	-118.926108333	-118.925875000	-118.928208333	-118.940616667
Distance from Target Location (ft)	2.0	3.6	1.5	1.4	1.5	1.3
Drive and Processing Notes	Moderate drive. Termination beyond target core.	Termination beyond target core. Moderate drive.	Termination at target core. Easy driving.	Termination beyond target core. Easy driving.	Termination beyond target core. Easy drive.	Termination beyond target core. Easy drive. Material expanded during drive, exceeding the measurement of penetration.
Field Description of Sediment in Core	Sediment is moist & dark grey. Light (with some medium) well-graded sand, silt, & rare clay. No detectable odors and sheen.	Sediment Is moist & dark grey. Light well-graded sand & silt. No detectable odors or sheen.	Sediment is moist & dark grey. Light, well-graded sand and silt. No detectable odors or sheen.	Sediment is moist & dark grey. Light, well-graded sand & silt. No detectable odors or sheen.	Sediment is moist & dark grey. Light, well-graded sand & silt. No detectable odor or sheen.	Sediment is moist & olive gray, lighter relative to all other cores. Sediment is light sand that is not well-graded and silt. Sediment is softer than the other core samples.

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SEDIMENT CHARACTERIZATION REPORT
CORE COLLECTION SUMMARY AND COMPOSITING SCHEME

TABLE
3
CONT'D

Chemical Parameter	ECY BENTHIC SLs SL1	SL2	Toxic Equivalency Factors	Analytical (Extraction Method)	Reference	Reporting Limit*	Detection Limit*	Result Reporting Limit* BWP-1A	Result Detection Limit* BWP-1A	Result BWP-1A	Qualifier BWP-1A	Result Reporting Limit* BWP-2A	Result Detection Limit* BWP-2A	Result BWP-2A	Qualifier BWP 2A	Result Reporting Limit* BWP-2B	Result Detection Limit* BWP-2B	Result BWP-2B	Qualifier BWP 2B	Result Reporting Limit* BWP-2Z	Result Detection Limit* BWP-2Z	Result BWP-2Z	Qualifier BWP-2Z	Result Reporting Limit* BWP-3A	Result Detection Limit* BWP-3A	Result BWP-3A
Metals (mg/kg)																										
Arsenic	14.0	120	-	ICP-AES or ICP-	6010C/6020	5.00	0.333	0.340	0.0500	**4.46**		0.300	0.0400	**3.46**		0.250	0.0400	**2.43**		0.240	0.0400	**2.22**		0.250	0.0400	**1.94**
Cadmium	2.10	5.40	-	ICP-AES or ICP-	6010C/6020	0.200	0.0180	0.170	0.0100	**0.290**		0.150	0.0100	**0.190**		0.120	0.00900	**0.0800**	J	0.120	0.00800	**0.100**	J	0.130	0.00900	**0.0600**
Chromium	72.0	88.0	-	ICP-AES or ICP-	6010C/6020	0.500	0.124	0.840	0.120	**19.0**		0.740	0.100	**15.2**		0.620	0.0900	**12.2**		0.590	0.0800	**10.4**		0.630	0.0900	**10.8**
Copper	400	1200	-	ICP-AES or ICP-	6010C/6020	0.200	0.0920	0.840	0.060	**25.8**		0.740	0.0500	**17.7**		0.620	0.0500	**11.2**		0.590	0.0400	**12.1**		0.630	0.0500	**7.97**
Lead	360	>1300	-	ICP-AES or ICP-	6010C/6020	2.00	0.155	0.170	0.010	**10.8**		0.150	0.0100	**7.66**		0.120	0.0100	**4.76**		0.120	0.0100	**4.71**		0.130	0.0100	**4.39**
Mercury	0.660	0.800	-	CVAA	7471A	0.0250	0.00210	0.0325	0.00273	**0.0422**		0.0291	0.00244	0.0291	U	0.0328	0.00276	0.0328	U	0.0288	0.00242	0.0288	U	0.0278	0.00233	0.0278
Nickel	38.0	110	-	ICP-AES or ICP-	6010C/6020	1.00	0.386	0.840	0.030	**17.9**		0.740	0.0200	**14.4**		0.620	0.0200	**10.5**		0.590	0.0200	**9.99**		0.630	0.0200	**8.95**
Selenium	11.0	>20	-	ICP-MS	6010C/6020	0.500	0.127	0.840	0.660	**1.46**		0.74	0.58	**1.05**		0.620	0.490	**0.780**		0.590	0.460	**0.990**		0.630	0.490	**0.590**
Silver	0.570	1.70	-	ICP-AES or ICP-	6010C/6020	0.300	0.043	0.340	0.00500	**0.220**	J	0.300	0.00500	**0.110**	J	0.250	0.00400	**0.0700**	J	0.240	0.00400	**0.0900**	J	0.250	0.00400	**0.0500**
Zinc	3200	>4200	-	ICP-AES or ICP-	6010C/6020	1.00	0.145	6.70	0.500	**83.1**		5.90	0.400	**62.7**		5.00	0.400	**46.2**		4.80	0.300	**46.3**		5.00	0.400	**38.7**
organometallic compounds (µg/kg)																										
Tributyltin ion (bulk)	47	320	-	GC/MS	8270D-SIM	3.86	0.450	3.53	0.411	3.53	U	3.76	0.438	3.76	U	3.43	0.400	3.43	U	3.36	0.392	3.36	U	3.62	0.422	3.62
Monobutyltin ion (bulk; ug/kg) (butyltin)	540	>4,800	-	GC/MS	8270D-SIM	4.08	1.890	3.73	1.73	3.73	U	3.97	1.84	3.97	U	3.62	1.68	3.62	U	3.55	1.65	3.55	U	3.83	1.77	3.83
Dibutyltin ion (bulk; ug/kg)	910	130,000	-	GC/MS	8270D-SIM	5.78	1.730	5.28	1.58	5.28	U	5.63	1.69	5.63	U	5.13	1.54	5.13	U	5.03	1.51	5.03	U	5.42	1.62	5.42
Tetrabutyltin ion (bulk; ug/kg)	97	>97	-	GC/MS	8270D-SIM	5.00	5.000	4.57	4.57	4.57	U	4.87	4.87	4.87	U	4.44	4.44	4.44	U	4.35	4.35	4.35	U	4.69	4.69	4.69
Organic Contaminants (µg/kg)																										
PAHs (µg/kg dry weight)																										
1-Methylnaphthalene	-	-	-	GC/MS	8270D	-	-	19.5	5.80	19.5	U	19.8	5.90	19.8	U	19.0	5.70	19.0	U	19.1	5.70	19.1	U	19.0	5.70	19.0
2-Methylnaphthalene	-	-	-	GC/MS	8270D	-	-	19.5	5.50	19.5	U	19.8	5.60	19.8	U	19.0	5.40	19.0	U	19.1	5.40	19.1	U	19.0	5.40	19.0
Acenaphthene	-	-	-	GC/MS	8270D	-	-	19.5	5.00	19.5	U	19.8	5.10	19.8	U	19.0	4.90	19.0	U	19.1	4.90	19.1	U	19.0	4.90	19.0
Acenaphthylene	-	-	-	GC/MS	8270D	-	-	19.5	4.60	19.5	U	19.8	4.70	19.8	U	19.0	4.50	19.0	U	19.1	4.60	19.1	U	19.0	4.50	19.0
Anthracene	-	-	-	GC/MS	8270D	-	-	19.5	5.80	19.5	U	19.8	5.90	19.8	U	19.0	5.60	19.0	U	19.1	5.70	19.1	U	19.0	5.60	19.0
Benz[a]anthracene	-	-	-	GC/MS	8270D	-	-	19.5	5.00	**10.9**	J	19.8	5.10	**8.30**	J	19.0	4.90	19.0	U	19.1	4.90	19.1	U	19.0	4.90	19.0
Benzo(a)pyrene	-	-	-	GC/MS	8270D	-	-	19.5	6.30	**7.60**	J	19.8	6.40	19.8	U	19.0	6.20	19.0	U	19.1	6.20	19.1	U	19.0	6.20	19.0
Benzo(ghi)perylene	-	-	-	GC/MS	8270D	-	-	19.5	5.70	**7.50**	J	19.8	5.80	**6.00**	J	19.0	5.50	19.0	U	19.1	5.60	19.1	U	19.0	5.50	19.0
Chrysene	-	-	-	GC/MS	8270D	-	-	19.5	5.10	**19.1**	J	19.8	5.20	**13.6**	J	19.0	5.00	**8.60**	J	19.1	5.00	19.1	U	19.0	5.00	19.0
Dibenzo(a,h)anthracene	-	-	-	GC/MS	8270D	-	-	19.5	6.00	19.5	U	19.8	6.10	19.8	U	19.0	5.90	19.0	U	19.1	5.90	19.1	U	19.0	5.90	19.0
Fluoranthene	-	-	-	GC/MS	8270D	-	-	19.5	4.40	**34.3**		19.8	4.50	**16.0**	J	19.0	4.30	**8.3**	J	19.1	4.30	19.1	U	19.0	4.30	19.0
Fluorene	-	-	-	GC/MS	8270D	-	-	19.5	4.80	**9.20**	J	19.8	4.90	19.8	U	19.0	4.70	19.0	U	19.1	4.70	19.1	U	19.0	4.70	19.0
Indeno(1,2,3-cd)pyrene	-	-	-	GC/MS	8270D	-	-	19.5	5.80	**6.40**	J	19.8	5.90	19.8	U	19.0	5.70	19.0	U	19.1	5.70	19.1	U	19.0	5.70	19.0
Naphthalene	-	-	-	GC/MS	8270D	-	-	19.5	5.10	**6.20**	J	19.8	5.20	19.8	U	19.0	5.00	19.0	U	19.1	5.00	19.1	U	19.0	5.00	19.0
Phenanthrene	-	-	-	GC/MS	8270D	-	-	19.5	4.60	**19.9**		19.8	4.60	**12.7**	J	19.0	4.50	19.0	U	19.1	4.50	19.1	U	19.0	4.50	19.0
Pyrene	-	-	-	GC/MS	8270D	-	-	19.5	5.40	**26.2**		19.8	5.50	**14.4**	J	19.0	5.30	**7.2**	J	19.1	5.30	19.1	U	19.0	5.30	19.0
Benzofluoranthenes (b,j,k)	-	-	-	GC/MS	8270D	-	-	38.9	9.90	**24.2**	J	39.6	10.1	**16.7**	J	38.1	9.70	**14.6**	J	38.2	9.70	38.2	U	38	9.70	38.0
Total PAHs	17000	30000	-	GC/MS	8270D	40.0**	10.2**			**171.5**	J			**87.7**	J			**38.7**	J			38.2	U			38.0
4-Methylphenol (p-cresol)	260	2000	-	GC/MS	8270D	20.0	14.7	19.5	14.3	19.5	U	19.8	14.5	19.8	U	19.0	14.0	19.0	U	19.1	14.00	19.1	U	19.0	14.0	19.0
Benzoic acid	2900	3800	-	GC/MS	8270D	200	59.1	195	57.5	**334**		198	58.5	**225**		190	56.3	**89.9**	J	191	56.4	191	U	190	56.2	190
beta-Hexachlorocyclohexane (BHC)	7.20	11.0	-	GC/ECD	8081	0.0915	0.500	0.490	0.090	0.490	U	0.480	0.0900	0.480	U	0.480	0.0900	0.480	U	0.480	0.090	0.480	U	0.490	0.0900	0.490
bis(2)-Ethylhexyl)phthalate	500	22000	-	GC/MS	8270D	50.0	28.8	48.6	28.0	48.6	U	49.5	28.5	49.5	U	47.6	27.4	47.6	U	47.8	27.5	47.8	U	47.5	27.4	47.5
Carbazole	900	1100	-	GC/MS	8270D	20.0	7.37	19.5	7.20	19.5	U	19.8	7.30	19.8	U	19.0	7.00	19.0	U	19.1	7.00	19.1	U	19.0	7.00	19.0
Dibenzofuran	200	680	-	GC/MS	8270D	20.0	4.61	19.5	4.50	19.5	U	19.8	4.60	19.8	U	19.0	4.40	19.0	U	19.1	4.40	19.1	U	19.0	4.40	19.0
Dieldrin	4.90	9.30	-	GC/ECD	8081B	0.115	1.00	0.970	0.110	0.970	U	0.970	0.110	0.970	U	0.970	0.110	0.970	U	0.970	0.110	0.970	U	0.970	0.110	0.970
Di-n-butyl-phthalate	380	1000	-	GC/MS	8270D	20.0	5.31	19.5	5.20	19.5	U	19.8	5.30	19.8	U	19.0	5.10	19.0	U	19.1	5.10	19.1	U	19.0	5.00	19.0
Di-n-octyl-phthalate	39.0	>1100	-	GC/MS	8270D	20.0	8.72	19.5	8.50	19.5	U	19.8	8.60	19.8	U	19.0	8.30	19.0	U	19.1	8.30	19.1	U	19.0	8.30	19.0
Endrin ketone	8.50	>8.5	-	GC/ECD	8081B	1.00	0.282	0.970	0.270	0.970	U	0.970	0.270	0.970	U	0.970	0.270	0.970	U	0.970	0.270	0.970	U	0.970	0.270	0.970
Pentachlorophenol	1200	>1200	-	GC/MS	8270D	100	31.3	97.3	30.4	97.3	U	99.0	31.0	99.0	U	95.2	29.8	95.2	U	95.5	29.9	95.5	U	95.0	29.7	95.0
Phenol	120	210	-	GC/MS	8270D	20.0	8.23	19.5	8.00	**39.4**		19.8	8.10	**8.40**	J	19.0	7.80	**10.9**	J	19.1	7.90	19.1	U	19.0	7.80	19.0
DDDs	310	860	-	GC/ECD	8081B	-	-	-	-	**1.82**		-	-	**1.72**	J	-	-	0.970	U	-	-	0.970	U	-	-	0.970
DDEs	21.0	33.0	-	GC/ECD	8081B	-	-	-	-	**7.57**		-	-	**4.06**		-	-	**1.53**		-	-	**0.96**	J	-	-	**1.49**
DDTs*	100	8100	-	GC/ECD	8081B	-	-	-	-	0.970	U	-	-	0.970	U	-	-	0.970	U	-	-	0.970	U	-	-	0.970
4,4'-DDE	-	-	-	GC/ECD	8081B	1.00	0.135	0.970	0.130	**7.57**		0.970	0.130	**4.06**		0.970	0.130	**1.53**		0.970	0.130	**0.960**	J	0.970	0.130	**1.49**
4,4'-DDD	-	-	-	GC/ECD	8081B	1.00	0.32	0.970	0.310	**1.82**		0.970	0.310	**1.72**	J	0.970	0.310	0.970	U	0.970	0.310	0.970	U	0.970	0.310	0.970
4,4'-DDT	-	-	-	GC/ECD	8081B	1.00	0.325	0.970	0.320	0.970	U	0.970	0.310	0.970	U	0.970	0.310	0.970	U	0.970	0.320	0.970	U	0.970	0.320	0.970
2,4'-DDE	-	-	-	GC/ECD	8081B	1.00	0.249	0.970	0.240	0.970	U	0.970	0.240	0.970	U	0.970	0.240	0.970	U	0.970	0.240	0.970	U	0.970	0.240	0.970
2,4'-DDD	-	-	-	GC/ECD	8081B	1.00	0.195	0.970	0.190	0.970	U	0.970	0.190	0.970	U	0.970	0.190	0.970	U	0.970	0.190	0.970	U	0.970	0.190	0.970
2,4'-DDT	-	-	-	GC/ECD	8081B	1.00	0.187	0.970	0.180	0.970	U	0.970	0.180	0.970	U	0.970	0.180	0.970	U	0.970	0.180	0.970	U	0.970	0.180	0.970
PCB-aroclor 1016	-	-	-	GC/ECD	8082	-	-	3.90	1.50	3.90	U	3.90	1.50	3.90	UJ	3.90	1.50	3.90	UJ	3.90	1.50	3.90	UJ	3.90	1.50	3.90
PCB-aroclor 1221	-	-	-	GC/ECD	8082	-	-	3.90	1.50	3.90	U	3.90	1.50	3.90	UJ	3.90	1.50	3.90	UJ	3.90	1.50	3.90	UJ	3.90	1.50	3.90
PCB-aroclor 1232	-	-	-	GC/ECD	8082	-	-	3.90	1.50	3.90	U	3.90	1.50	3.90	UJ	3.90	1.50	3.90	UJ	3.90	1.50	3.90	UJ	3.90	1.50	3.90
PCB-aroclor 1242	-	-	-	GC/ECD	8082	-	-	3.90	1.50	3.90	U	3.90	1.50	3.90	UJ	3.90	1.50	3.90	UJ	3.90	1.50	3.90	UJ	3.90	1.50	3.90
PCB-aroclor 1248	-	-	-	GC/ECD	8082	-	-	3.90	1.50	3.90	U	3.90	1.50	3.90	UJ	3.90	1.50	3.90	UJ	3.90	1.50	3.90	UJ	3.90	1.50	3.90
PCB-aroclor 1254	-	-	-	GC/ECD	8082	-	-	3.90	1.50	**10.1**		3.90	1.50	**32.2**	J	3.90	1.50	**3.20**	J	3.90	1.50	3.90	UJ	3.90	1.50	3.90
PCB-aroclor 1260	-	-	-	GC/ECD	8082	-	-	3.90	0.600	**16.0**	J	3.90	0.600	**25.6**	J	3.90	0.600	**3.40**	J	3.90	0.600	**5.10**	J	3.90	0.60	**2.40**
PCB-aroclor 1262	-	-	-	GC/ECD	8082	-	-	3.90	0.600	3.90	U	3.90	0.600	3.90	UJ	3.90	0.600	3.90	UJ	3.90	0.600	3.90	UJ	3.90	0.600	3.90
PCB-aroclor 1268	-	-	-	GC/ECD	8082	-	-	3.90	0.600	3.90	U	3.90	0.600	3.90	UJ	3.90	0.600	3.90	UJ	3.90	0.600	3.90	UJ	3.90	0.600	3.90
Total PCB Aroclors	**110**	**2,500**	-	**GC/ECD**	**8082**	**20.0**	**8.00**			**26.1**	J			**57.8**	J			**6.60**	J			**5.10**	J			**2.40**

anderson perry & associates, inc.

BOISE WHITE PAPER, LLC
WALLULA BARGE CHANNEL AND SLIP DREDGING, PERMITTING, AND DESIGN
SEDIMENT CHARACTERIZATION REPORT
CHEMISTRY RESULTS COMPARED TO DMMP EVALUATION CRITERIA

TABLE
4

Chemical Parameter	ECY BENTHIC SLs SL1	SL2	Toxic Equivalency Factors	Analytical (Extraction Method)	Reference	Reporting Limit*	Detection Limit*	Result Reporting Limit* BWP-1A	Result Detection Limit* BWP-1A	Result BWP-1A	Qualifier BWP-1A	Result Reporting Limit* BWP-2A	Result Detection Limit* BWP-2A	Result BWP-2A	Qualifier BWP 2A	Result Reporting Limit* BWP-2B	Result Detection Limit* BWP-2B	Result BWP-2B	Qualifier BWP 2B	Result Reporting Limit* BWP-2Z	Result Detection Limit* BWP-2Z	Result BWP-2Z	Qualifier BWP-2Z	Result Reporting Limit* BWP-3A	Result Detection Limit* BWP-3A	Result BWP-3A
Dioxins/Furans (ng/kg)																										
2,3,7,8-TCDF	-	-	0.1	HRGS/HRMS	1613B	1.00	0.12	0.995	0.119	**7.31**		0.986	0.118	**1.33**		0.987	0.118	**0.803**	J	0.995	0.119	**0.455**	J	0.996	0.120	**0.513**
2,3,7,8-TCDD	-	-	1	HRGS/HRMS	1613B	1.00	0.17	0.995	0.169	**0.488**	*, J	0.986	0.168	0.986	U	0.987	0.168	**0.118**	*, J	0.995	0.169	**0.126**	*, J	0.996	0.169	0.996
1,2,3,7,8-PeCDF	-	-	0.03	HRGS/HRMS	1613B	1.00	0.69	0.995	0.686	0.995	U	0.986	0.68	0.986	U	0.987	0.681	**0.0890**	*, J , B	0.995	0.686	**0.0720**	*, J , B	0.996	0.687	0.996
2,3,4,7,8-PeCDF	-	-	0.3	HRGS/HRMS	1613B	1.00	0.57	0.995	0.567	**0.223**	*, J	0.986	0.562	**0.111**	*, J	0.987	0.563	0.987	U	0.995	0.567	0.995	U	0.996	0.568	0.996
1,2,3,7,8-PeCDD	-	-	1	HRGS/HRMS	1613B	1.00	0.50	0.995	0.497	**0.268**	*, J , B	0.986	0.493	**0.0990**	J	0.987	0.494	**0.0990**	J	0.995	0.497	0.995	U	0.996	0.498	**0.0850**
1,2,3,4,7,8-HxCDF	-	-	0.1	HRGS/HRMS	1613B	1.00	0.81	0.995	0.806	**0.352**	J	0.986	0.799	**0.404**	*, J	0.987	0.800	**0.117**	*, J	0.995	0.806	0.995	U	0.996	0.807	**0.0520**
1,2,3,6,7,8-HxCDF	-	-	0.1	HRGS/HRMS	1613B	1.00	0.66	0.995	0.657	**0.304**	*, J	0.986	0.651	**0.156**	*, J	0.987	0.652	**0.0970**	J	0.995	0.656	**0.0550**	*, J	0.996	0.657	**0.0490**
2,3,4,6,7,8-HxCDF	-	-	0.1	HRGS/HRMS	1613B	1.00	0.68	0.995	0.676	**0.238**	*, J	0.986	0.670	**0.131**	*, J	0.987	0.671	**0.0890**	*, J	0.995	0.676	0.995	U	0.996	0.677	0.996
1,2,3,7,8,9-HxCDF	-	-	0.1	HRGS/HRMS	1613B	1.00	0.59	0.995	0.587	**0.163**	J	0.986	0.582	**0.107**	*, J	0.987	0.582	0.987	U	0.995	0.587	0.995	U	0.996	0.588	0.996
1,2,3,4,7,8-HxCDD	-	-	0.1	HRGS/HRMS	1613B	1.00	0.54	0.995	0.537	0.995	U	0.986	0.532	**0.258**	*, J , B	0.987	0.533	**0.117**	J,B	0.995	0.537	0.995	U	0.996	0.538	**0.116**
1,2,3,6,7,8-HxCDD	-	-	0.1	HRGS/HRMS	1613B	1.00	0.56	0.995	0.557	**0.974**	J,B	0.986	0.552	**0.701**	J,B	0.987	0.553	**0.262**	*, J , B	0.995	0.557	**0.231**	J,B	0.996	0.558	**0.212**
1,2,3,7,8,9-HxCDD	-	-	0.1	HRGS/HRMS	1613B	1.00	0.89	0.995	0.885	**0.729**	*, J , B	0.986	0.877	**0.436**	J,B	0.987	0.879	**0.316**	J,B	0.995	0.885	**0.241**	*, J , B	0.996	0.887	**0.253**
1,2,3,4,6,7,8-HpCDF	-	-	0.01	HRGS/HRMS	1613B	1.00	1.00	0.995	0.995	**4.38**		0.986	0.986	**2.76**	B	0.987	0.987	**1.18**	B	0.995	0.995	**0.659**	J,B	0.996	0.996	**0.564**
1,2,3,4,7,8,9-HpCDF	-	-	0.01	HRGS/HRMS	1613B	1.00	0.88	0.995	0.875	**0.241**		0.986	0.868	**0.398**	*, J	0.987	0.869	**0.124**	*, J	0.995	0.875	0.995	U	0.996	0.877	**0.0350**
1,2,3,4,6,7,8-HpCDD	-	-	0.01	HRGS/HRMS	1613B	2.50	1.20	2.49	1.19	**28.7**	B	2.46	1.18	**19.8**	B	2.47	1.18	**7.90**	B	2.49	1.19	**4.47**	B	2.49	1.20	**4.91**
OCDF	-	-	0.0003	HRGS/HRMS	1613B	2.00	2.00	1.99	1.99	**18.0**	B	1.97	1.97	**14.8**	B	1.97	1.97	**4.85**	B	1.99	1.99	**2.75**	B	1.99	1.99	**1.78**
OCDD	-	-	0.0003	HRGS/HRMS	1613B	10.00	2.70	9.95	2.69	**302**	B	9.86	2.66	**167**	B	9.87	2.67	**78.7**	B	9.95	2.69	**39.9**	B	9.96	2.69	**41.5**
Total HpCDD	-	-	-	-	-	-	-	0.995		**69.6**		0.986		**46.3**		0.987		**19.8**		0.995		**10.9**		0.996		**12.5**
Total HpCDF	-	-	-	-	-	-	-	0.995		**12.8**		0.986		**8.62**		0.987		**3.63**		0.995		**1.73**		0.996		**1.62**
Total HxCDD	-	-	-	-	-	-	-	0.995		**11.7**		0.986		**9.71**		0.987		**3.67**		0.995		**2.54**		0.996		**3.09**
Total HxCDF	-	-	-	-	-	-	-	0.995		**6.09**		0.986		**4.11**		0.987		**1.76**		0.995		**0.856**		0.996		**0.829**
Total PeCDD	-	-	-	-	-	-	-	0.995		**2.38**		0.986		**1.79**		0.987		**0.532**		0.995		**0.362**		0.996		**0.303**
Total PeCDF	-	-	-	-	-	-	-	0.995		**2.39**		0.986		**1.71**		0.987		**0.650**		0.995		**0.445**		0.996		**0.343**
Total TCDD	-	-	-	-	-	-	-	0.995		**1.73**		0.986		**0.797**		0.987		**0.622**		0.995		**0.393**		0.996		**0.240**
Total TCDF	-	-	-	-	-	-	-	0.995		**17.5**		0.986		**4.17**		0.987		**2.19**		0.995		**1.05**		0.996		**1.17**
Dioxins/Furans (total TEQ ppt dry weight) U=1/2	-	-	-							**1.82**	J			**0.951**	J			**0.531**	J			**0.637**	J			**0.596**
Dioxins/Furans (total TEQ ppt dry weight) U=0	-	-	-		1613B	-	-			**1.31**	J			**0.626**	J			**0.348**	J			**0.133**	J			**0.157**
Bulk Petroleum Hydrocarbons (mg/kg) (NW-TPH method)																										
Diesel Range Organics (TPH-Diesel)	340	510	-	GC/FID	NWTPH-Dx	5.00	1.35	8.24	3.86	**20.2**		7.01	3.28	**21.7**		6.17	2.89	**7.98**		6.18	2.89	6.18	U	6.65	3.11	6.65
Lube Oil (TPH-Residual)	3,600	4,400	-	GC/FID	NWTPH-Dx	10.0	2.48	16.5	4.93	**115**		14.00	4.19	**88.6**		12.3	3.69	**39.0**		12.4	3.70	**25.8**		13.3	3.97	**31.7**
Ammonia and Sulfides, listed below, are only used to inform bioassay testing.																										
Conventionals (mg/kg)																										
Ammonia (Ammonia (NH3) as Nitrogen (N))	-	-	-	GC/FID	PSEP/350.3	5.00	0.130	12.9	12.9	**125**	D	5.84	5.84	**113**	D	5.33	5.33	**68.6**	D	4.92	4.92	**51.7**	D	2.52	2.52	**37.3**
Total sulfides	-	-	-	GC/FID	PSEP/376.2	1.00	0.0800	33.1	33.1	**398**	D	13.3	13.3	**64.7**		6.26	6.26	**73.7**		5.79	5.79	**49.8**		2.49	2.49	**30.1**
Grain Size (%)	-	-	-	Sieve/hydrometer	PSEP-PS	0.100	-																			
Particle/Grain Size, Phi Scale <-1	-	-	-	Sieve/hydrometer	PSEP-PS	0.1	-	0.1	0.1	**0.1**		0.1	0.1	**0**		0.1	0.1	**4.3**		0.1	0.1	**10.5**		0.1	0.1	**0.7**
Particle/Grain Size, Phi Scale -1 to 0	-	-	-	Sieve/hydrometer	PSEP-PS	0.1	-	0.1	0.1	**1.8**		0.1	0.1	**0.7**		0.1	0.1	**4**		0.1	0.1	**8.4**		0.1	0.1	**0.6**
Particle/Grain Size, Phi Scale 0 to 1	-	-	-	Sieve/hydrometer	PSEP-PS	0.1	-	0.1	0.1	**1.1**		0.1	0.1	**0.7**		0.1	0.1	**1.5**		0.1	0.1	**3.2**		0.1	0.1	**1.4**
Particle/Grain Size, Phi Scale 1 to 2	-	-	-	Sieve/hydrometer	PSEP-PS	0.1	-	0.1	0.1	**1.6**		0.1	0.1	**1.4**		0.1	0.1	**10.1**		0.1	0.1	**10.5**		0.1	0.1	**22.7**
Particle/Grain Size, Phi Scale 2 to 3	-	-	-	Sieve/hydrometer	PSEP-PS	0.1	-	0.1	0.1	**5.1**		0.1	0.1	**9.4**		0.1	0.1	**26.6**		0.1	0.1	**17.5**		0.1	0.1	**41.2**
Particle/Grain Size, Phi Scale 3 to 4	-	-	-	Sieve/hydrometer	PSEP-PS	0.1	0.1	0.1	0.1	**8.2**		0.1	0.1	**27.2**		0.1	0.1	**26.8**		0.1	0.1	**27.3**		0.1	0.1	**19.2**
Particle/Grain Size, Phi Scale 4 to 5	-	-	-	Sieve/hydrometer	PSEP-PS	0.1	0.1	0.1	0.1	**16.1**		0.1	0.1	**26.4**		0.1	0.1	**11.6**		0.1	0.1	**7**		0.1	0.1	**3.3**
Particle/Grain Size, Phi Scale 5 to 6	-	-	-	Sieve/hydrometer	PSEP-PS	0.1	0.1	0.1	0.1	**24**		0.1	0.1	**15.9**		0.1	0.1	**6.7**		0.1	0.1	**9.8**		0.1	0.1	**4.3**
Particle/Grain Size, Phi Scale 6 to 7	-	-	-	Sieve/hydrometer	PSEP-PS	0.1	0.1	0.1	0.1	**20.5**		0.1	0.1	**8.3**		0.1	0.1	**3.6**		0.1	0.1	**2.6**		0.1	0.1	**3**
Particle/Grain Size, Phi Scale 7 to 8	-	-	-	Sieve/hydrometer	PSEP-PS	0.1	0.1	0.1	0.1	**10.1**		0.1	0.1	**4.2**		0.1	0.1	**1.6**		0.1	0.1	**1.4**		0.1	0.1	**1.6**
Particle/Grain Size, Phi Scale 8 to 9	-	-	-	Sieve/hydrometer	PSEP-PS	0.1	0.1	0.1	0.1	**3.5**		0.1	0.1	**2.4**		0.1	0.1	**1.1**		0.1	0.1	**0.8**		0.1	0.1	**0.9**
Particle/Grain Size, Phi Scale 9 to 10	-	-	-	Sieve/hydrometer	PSEP-PS	0.1	0.1	0.1	0.1	**2.6**		0.1	0.1	**1.4**		0.1	0.1	**0.7**		0.1	0.1	**0.6**		0.1	0.1	**0.5**
Particle/Grain Size, Phi Scale >10	-	-	-	Sieve/hydrometer	PSEP-PS	0.1	0.1	0.1	0.1	**5.2**		0.1	0.1	**2.1**		0.1	0.1	**1.3**		0.1	0.1	**0.4**		0.1	0.1	**0.5**
Particle/Grain Size, Fines (Silt/Clay)	-	-	-	Sieve/hydrometer	PSEP-PS	0.1	0.1	0.1	0.1	**82.1**		0.1	0.1	**60.6**		0.1	0.1	**26.8**		0.1	0.1	**22.6**		0.1	0.1	**14.2**
Total Organic Carbon (%)	-	-	-	Combustion	Plumb 1981	0.0200	0.00300	0.02	0.02	**1.01**	UJ	0.02	0.02	**0.45**		0.02	0.02	**0.27**		0.02	0.02	**0.16**		0.02	0.02	**0.17**
'Preserved Total Solids	-	-	-	Oven-dried	PSEP/SM2540 G	0.0100	-	0.04	0.04	**55.8**		0.04	0.04	**67.7**		0.04	0.04	**75.7**		0.04	0.04	**81.4**		0.04	0.04	**76.7**
Total Solids	-	-	-	Oven-dried	PSEP/SM2540 G	-	-	0.04	0.04	**57.9**		0.04	0.04	**66.38**		0.04	0.04	**74.65**		0.04	0.04	**78.24**		0.04	0.04	**77.22**
Total Volatile Solids (%)	-	-	-	Oven-dried	PSEP/SM2540 G	0.0100	-	0.01	0.01	**4.13**		0.01	0.01	**2.83**		0.01	0.01	**1.51**		0.01	0.01	**1.28**		0.01	0.01	**1.29**

SL1 - Screening level 1
SL2 - Screening level 2
Above SL 1
*Estimated maximum possible concentration qualifier for high resolution gas chromatography-mass spectrometry dioxin (treated as U in sum)
**No summary levels available
Bold = Detected Result
Totals are calculated as the sum of all detected results (U=1/2). Half of the detection limit is included in the sum of results. If all results are not detected, the highest reporting limit value is reported as the sum.
J = Estimated value
U = Compound analyzed but not detected above detection limit
B = This analyte was detected in the method blank
D = The reported value is from a dilution
UJL = Analyte was not detected at or above the reported estimate with likely high bias
UJ = Non-detect estimated; potentially low bias.
TEQ = Toxic equivalents
DDDs is the sum of 4,4'-DDD and 2,4'-DDD (U=0)
DDTs is the sum of 4,4'-DDT and 2,4'-DDT (U=0)
DDEs is the sum of 4,4'-DDE and 2,4'-DDE (U=0)
- Results not reported or not applicable; limit not provided by the Dredged Material Management Program
Polychlorinated biphenyls (PCBs) Aroclors is the sum of Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260, Aroclor 1262, and Aroclor 1268. (U=0). If all results are not detected, the highest reporting limit value is reported as the sum. Qualifier for sum is the U if all Aroclor results were non-detect, J if at least one Aroclor result was estimated, and none if at least one Aroclor result was detected.
ng/kg = nanograms per kilogram (parts per trillion)
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
Total polycyclic aromatic hydrocarbons (PAHs) is the sum of the 18 PAHs analyzed by the lab (naphthalene, acenaphthene, acenaphthylene, fluorene, phenanthrene, anthracene, hexachlorobenzene, hexachlorobutadiene, fluoranthene, 2-methylnaphthalene, pyrene, benzo(a)anthracene, chrysene, total benzofluoranthenes , benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, benzo(g,h,i)perylene) (U=1/2)

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BOISE WHITE PAPER, LLC
WALLULA BARGE CHANNEL AND SLIP DREDGING, PERMITTING, AND DESIGN
SEDIMENT CHARACTERIZATION REPORT
CHEMISTRY RESULTS COMPARED TO DMMP EVALUATION CRITERIA

TABLE 4 CONT'D

Chemical Parameter	Qualifier BWP 3A	Result Reporting Limit* BWP-3B	Result Detection Limit* BWP-3B	Result BWP-3B	Qualifier BWP-3B	Result Reporting Limit* BWP-3Z	Result Detection Limit* BWP-3Z	Result BWP-3Z	Qualifier BWP-3Z	Result Reporting Limit* BWP-4A	Result Detection Limit* BWP-4A	Result BWP-4A	Qualifier BWP-4A	Result Reporting Limit* BWP-4B	Result Detection Limit* BWP-4B	Result BWP-4B	Qualifier BWP-4B	Result Reporting Limit* BWP-4Z	Result Detection Limit* BWP-4Z	Result BWP-4Z	Qualifier BWP 4Z	Result Reporting Limit* BWP-5A	Result Detection Limit* BWP-5A	Result BWP-5A
Metals (mg/kg)																								
Arsenic		0.270	0.0400	**2.55**		0.240	0.0400	**3.14**		0.240	0.0400	**1.88**		0.260	0.0400	**3.16**		0.270	0.0400	**3.77**		0.290	0.0400	**4.00**
Cadmium	J	0.130	0.0100	**0.130**	J	0.120	0.00900	**0.160**		0.120	0.00900	**0.0700**	J	0.130	0.00900	**0.160**		0.140	0.0100	**0.160**		0.140	0.0100	**0.230**
Chromium		0.670	0.0900	**11.1**		0.610	0.0800	**13.9**		0.600	0.0800	**9.20**		0.640	0.0900	**14.0**		0.690	0.0900	**16.0**		0.720	0.100	**16.0**
Copper		0.670	0.0500	**11.7**		0.610	0.0500	**16.6**		0.600	0.0400	**6.93**		0.640	0.0500	**14.5**		0.690	0.0500	**18.0**		0.720	0.0500	**17.9**
Lead		0.130	0.0100	**5.26**		0.120	0.0100	**7.34**		0.120	0.0100	**3.44**		0.130	0.0100	**6.58**		0.140	0.0100	**8.05**		0.140	0.0100	**8.66**
Mercury	U	0.0321	0.0027	0.0321	U	0.0324	0.00272	0.0324	U	0.0278	0.00234	0.0278	U	0.0314	0.00264	0.0314	U	0.0305	0.00256	**0.0336**		0.0274	0.00230	**0.0357**
Nickel		0.670	0.0200	**10.3**		0.610	0.0200	**12.5**		0.600	0.0200	**8.01**		0.640	0.0200	**13.0**		0.690	0.0200	**14.4**		0.720	0.0200	**14.0**
Selenium	J	0.670	0.530	**0.700**		0.610	0.470	**1.03**		0.600	0.470	**0.650**		0.640	0.500	**0.910**		0.690	0.540	**1.19**		0.720	0.560	**1.16**
Silver	J	0.270	0.00400	**0.0700**	J	0.240	0.00400	**0.130**	J	0.240	0.00400	**0.0500**	J	0.260	0.00400	**0.110**	J	0.270	0.00400	**0.140**	J	0.290	0.00400	**0.170**
Zinc		5.40	0.400	**46.0**		4.80	0.300	**58.5**		4.80	0.300	**35.0**		5.10	0.400	**56.7**		5.50	0.400	**63.9**		5.80	0.400	**64.6**
organometallic compounds (ug/kg)																								
Tributyltin ion (bulk)	U	3.75	0.437	3.75	U	3.70	0.431	3.70	U	3.77	0.439	3.77	U	3.68	0.429	3.68	U	3.79	0.442	3.79	U	3.44	0.401	3.44
Monobutyltin ion (bulk; ug/kg) (butyltin)	U	3.96	1.84	3.96	U	3.91	1.81	3.91	U	3.98	1.84	3.98	U	3.89	1.80	3.89	U	4.01	1.86	4.01	U	3.63	1.68	3.63
Dibutyltin ion (bulk; ug/kg)	U	5.62	1.68	5.62	U	5.54	1.66	5.54	U	5.64	1.69	5.64	U	5.52	1.65	5.52	U	5.68	1.70	5.68	U	5.15	1.54	5.15
Tetrabutyltin ion (bulk; ug/kg)	U	4.86	4.86	4.86	U	4.79	4.79	4.79	U	4.88	4.88	4.88	U	4.77	4.77	4.77	U	4.91	4.91	4.91	U	4.45	4.45	4.45
PAHs (ug/kg dry weight)																								
1-Methylnaphthalene	U	19.5	5.80	19.5	U	19.1	5.70	19.1	U	18.7	5.60	18.7	U	19.1	5.70	19.1	U	19.5	5.80	19.5	U	19.2	5.70	19.2
2-Methylnaphthalene	U	19.5	5.50	19.5	U	19.1	5.40	19.1	U	18.7	5.30	18.7	U	19.1	5.40	19.1	U	19.5	5.50	19.5	U	19.2	5.40	19.2
Acenaphthene	U	19.5	5.00	19.5	U	19.1	4.90	19.1	U	18.7	4.80	18.7	U	19.1	4.90	19.1	U	19.5	5.00	19.5	U	19.2	4.90	19.2
Acenaphthylene	U	19.5	4.70	19.5	U	19.1	4.60	19.1	U	18.7	4.50	18.7	U	19.1	4.50	19.1	U	19.5	4.70	19.5	U	19.2	4.60	19.2
Anthracene	U	19.5	5.80	19.5	U	19.1	5.70	19.1	U	18.7	5.50	18.7	U	19.1	5.70	19.1	U	19.5	5.80	19.5	U	19.2	5.70	19.2
Benz[a]anthracene	U	19.5	5.10	**15.4**	J	19.1	4.90	**8.00**	J	18.7	4.80	18.7	U	19.1	4.90	19.1	U	19.5	5.10	19.5	U	19.2	5.00	**11.2**
Benzo(a)pyrene	U	19.5	6.30	**11.0**	J	19.1	6.20	**9.60**	J	18.7	6.10	18.7	U	19.1	6.20	19.1	U	19.5	6.30	19.5	U	19.2	6.20	**9.50**
Benzo(ghi)perylene	U	19.5	5.70	**6.70**	J	19.1	5.60	19.1	U	18.7	5.40	18.7	U	19.1	5.50	19.1	U	19.5	5.70	19.5	U	19.2	5.60	**8.00**
Chrysene	U	19.5	5.10	**31.7**		19.1	5.00	**16.7**	J	18.7	4.90	**5.10**	J	19.1	5.00	19.1	U	19.5	5.10	19.5	U	19.2	5.00	**22.0**
Dibenzo(a,h)anthracene	U	19.5	6.00	19.5	U	19.1	5.90	19.1	U	18.7	5.80	18.7	U	19.1	5.90	19.1	U	19.5	6.00	19.5	U	19.2	5.90	19.2
Fluoranthene	U	19.5	4.40	**23.6**		19.1	4.30	**21.1**		18.7	4.20	**4.70**	J	19.1	4.30	**5.30**	J	19.5	4.40	5.70	J	19.2	4.30	**20.8**
Fluorene	U	19.5	4.80	19.5	U	19.1	4.70	19.1	U	18.7	4.60	18.7	U	19.1	4.70	19.1	U	19.5	4.80	19.5	U	19.2	4.80	19.2
Indeno(1,2,3-cd)pyrene	U	19.5	5.90	**7.10**	J	19.1	5.70	19.1	U	18.7	5.60	18.7	U	19.1	5.70	19.1	U	19.5	5.80	19.5	U	19.2	5.80	**7.60**
Naphthalene	U	19.5	5.10	19.5	U	19.1	5.00	19.1	U	18.7	4.90	18.7	U	19.1	5.00	19.1	U	19.5	5.10	19.5	U	19.2	5.00	19.2
Phenanthrene	U	19.5	4.60	**12.6**	J	19.1	4.50	**10.9**	J	18.7	4.40	18.7	U	19.1	4.50	19.1	U	19.5	4.60	19.5	U	19.2	4.50	**14.5**
Pyrene	U	19.5	5.40	**21.6**		19.1	5.30	**18.2**	J	18.7	5.20	18.7	U	19.1	5.30	19.1	U	19.5	5.40	19.5	U	19.2	5.30	**15.8**
Benzofluoranthenes (b,j,k)	U	39.1	10.0	**32.5**	J	38.2	9.70	**22.1**	J	37.4	9.50	37.4	U	38.1	9.70	38.1	U	39.0	9.90	39.0	J	38.4	9.80	**25.6**
Total PAHs	U			**162**	**J**			**89.9**	J			**9.80**	**J**			**5.30**	J			**5.70**	**J**			**135**
4-Methylphenol (p-cresol)	U	19.5	14.4	19.5	U	19.1	14.0	19.1	U	18.7	13.7	18.7	U	19.1	14.0	19.1	U	19.5	14.3	19.5	U	19.2	14.1	19.2
Benzoic acid	U	195	57.7	**70.9**	J	191	56.5	**78.6**	J	187	55.3	187	U	191	56.3	191	U	195	57.6	195	U	192	56.8	**137**
beta-Hexachlorocyclohexane (BHC)	U	0.48	0.0900	0.480	U	0.480	0.090	0.480	U	0.480	0.0900	0.480	U	0.490	0.0900	0.490	U	0.470	0.0900	0.470	U	0.500	0.0900	0.500
bis(2)-Ethylhexyl)phthalate	U	48.9	28.1	48.9	U	47.8	27.5	47.8	U	46.8	26.9	46.8	U	47.6	27.4	47.6	U	48.7	28.1	48.7	U	48.0	27.7	48.0
Carbazole	U	19.5	7.20	19.5	U	19.1	7.00	19.1	U	18.7	6.90	18.7	U	19.1	7.00	19.1	U	19.5	7.20	19.5	U	19.2	7.10	19.2
Dibenzofuran	U	19.5	4.50	19.5	U	19.1	4.40	19.1	U	18.7	4.30	18.7	U	19.1	4.40	19.1	U	19.5	4.50	19.5	U	19.2	4.40	19.2
Dieldrin	U	0.960	0.110	0.960	U	0.960	0.110	0.960	U	0.960	0.110	0.960	U	0.980	0.110	0.980	U	0.950	0.110	0.950	U	0.990	0.110	0.990
Di-n-butyl-phthalate	U	19.5	5.20	19.5	U	19.1	5.10	19.1	U	18.7	5.00	18.7	U	19.1	5.10	19.1	U	19.5	5.20	19.5	U	19.2	5.10	19.2
Di-n-octyl-phthalate	U	19.5	8.50	19.5	U	19.1	8.30	19.1	U	18.7	8.20	18.7	U	19.1	8.30	19.1	U	19.5	8.50	19.5	U	19.2	8.40	19.2
Endrin ketone	U	0.960	0.270	0.960	U	0.960	0.270	0.960	U	0.960	0.270	0.960	U	0.980	0.280	0.980	U	0.950	0.270	0.950	U	0.990	0.280	0.990
Pentachlorophenol	U	97.7	30.6	97.7	U	95.5	29.9	95.5	U	93.5	29.3	93.5	U	95.3	29.8	95.3	U	97.5	30.5	97.5	U	96.1	30.1	96.1
Phenol	U	19.5	8.00	19.5	U	19.1	7.90	**10.3**	J	18.7	7.70	18.7	U	19.1	7.80	**10.2**	J	19.5	8.00	9.50	J	19.2	7.90	**18.0**
DDDs	U	-	-	**0.91**	J	-	-	**1.21**	J	-	-	0.960	U	-	-	**0.89**	J	-	-	**1.16**	J	-	-	**1.93**
DDEs		-	-	**2.23**		-	-	**5.47**		-	-	**1.33**		-	-	**4.0**		-	-	**4.52**		-	-	**5.08**
DDTs*	U	-	-	0.960	U	-	-	0.960	U	-	-	0.960	U	-	-	0.980	U	-	-	0.950	U	-	-	0.990
4,4'-DDE		0.960	0.130	**2.23**		0.960	0.130	**5.47**		0.960	0.130	**1.33**		0.980	0.130	**4.00**		0.950	0.130	4.52		0.990	0.130	**5.08**
4,4'-DDD	U	0.960	0.310	**0.910**	J	0.960	0.310	**1.21**	J	0.960	0.310	0.960	U	0.980	0.310	**0.890**	J	0.950	0.300	1.16	J	0.990	0.320	**1.93**
4,4'-DDT	U	0.960	0.310	0.960	U	0.960	0.310	0.960	U	0.960	0.310	0.960	U	0.980	0.320	0.980	U	0.950	0.310	0.950	U	0.990	0.320	0.990
2,4'-DDE	U	0.960	0.240	0.960	U	0.960	0.240	0.960	U	0.960	0.240	0.960	U	0.980	0.240	0.980	U	0.950	0.240	0.950	U	0.990	0.250	0.990
2,4'-DDD	U	0.960	0.190	0.960	U	0.960	0.190	0.960	U	0.960	0.190	0.960	U	0.980	0.190	0.980	U	0.950	0.180	0.950	U	0.990	0.190	0.990
2,4'-DDT	U	0.960	0.180	0.960	U	0.960	0.180	0.960	U	0.960	0.180	0.960	U	0.980	0.180	0.980	U	0.950	0.180	0.950	U	0.990	0.190	0.990
PCB-aroclor 1016	UJ	3.80	1.50	3.80	UJ	3.80	1.50	3.80	UJ	3.80	1.50	3.80	UJ	3.90	1.50	3.90	UJ	3.80	1.50	3.80	UJ	4.00	1.50	4.00
PCB-aroclor 1221	UJ	3.80	1.50	3.80	UJ	3.80	1.50	3.80	UJ	3.80	1.50	3.80	UJ	3.90	1.50	3.90	UJ	3.80	1.50	3.80	UJ	4.00	1.50	4.00
PCB-aroclor 1232	UJ	3.80	1.50	3.80	UJ	3.80	1.50	3.80	UJ	3.80	1.50	3.80	UJ	3.90	1.50	3.90	UJ	3.80	1.50	3.80	UJ	4.00	1.50	4.00
PCB-aroclor 1242	UJ	3.80	1.50	3.80	UJ	3.80	1.50	3.80	UJ	3.80	1.50	3.80	UJ	3.90	1.50	3.90	UJ	3.80	1.50	3.80	UJ	4.00	1.50	4.00
PCB-aroclor 1248	UJ	3.80	1.50	3.80	UJ	3.80	1.50	3.80	UJ	3.80	1.50	3.80	UJ	3.90	1.50	3.90	UJ	3.80	1.50	3.80	UJ	4.00	1.50	4.00
PCB-aroclor 1254	UJ	3.80	1.50	3.80	UJ	3.80	1.50	**5.30**	J	3.80	1.50	3.80	UJ	3.90	1.50	**3.70**	J	3.80	1.50	**9.20**	J	4.00	1.50	**42.1**
PCB-aroclor 1260	J	3.80	0.600	**2.20**	J	3.80	0.600	**9.20**	J	3.80	0.600	3.80	UJ	3.90	0.600	**5.50**	J	3.80	0.600	12.4	J	4.00	0.600	**29.7**
PCB-aroclor 1262	UJ	3.80	0.600	3.80	UJ	3.80	0.600	3.80	UJ	3.80	0.600	3.80	UJ	3.90	0.600	3.90	UJ	3.80	0.600	3.80	UJ	4.00	0.600	4.00
PCB-aroclor 1268	UJ	3.80	0.600	3.80	UJ	3.80	0.600	3.80	UJ	3.80	0.600	3.80	UJ	3.90	0.600	3.90	UJ	3.80	0.600	3.80	UJ	4.00	0.600	4.00
Total PCB Aroclors	J			**2.20**	J			**14.5**	J			**3.80**	U			**9.20**	J			**21.6**	**J**			**71.8**

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BOISE WHITE PAPER, LLC
WALLULA BARGE CHANNEL AND SLIP DREDGING, PERMITTING, AND DESIGN
SEDIMENT CHARACTERIZATION REPORT
CHEMISTRY RESULTS COMPARED TO DMMP EVALUATION CRITERIA

TABLE
4
CONT'D

Chemical Parameter	Qualifier BWP 3A	Result Reporting Limit* BWP-3B	Result Detection Limit* BWP-3B	Result BWP-3B	Qualifier BWP-3B	Result Reporting Limit* BWP-3Z	Result Detection Limit* BWP-3Z	Result BWP-3Z	Qualifier BWP-3Z	Result Reporting Limit* BWP-4A	Result Detection Limit* BWP-4A	Result BWP-4A	Qualifier BWP-4A	Result Reporting Limit* BWP-4B	Result Detection Limit* BWP-4B	Result BWP-4B	Qualifier BWP-4B	Result Reporting Limit* BWP-4Z	Result Detection Limit* BWP-4Z	Result BWP-4Z	Qualifier BWP 4Z	Result Reporting Limit* BWP-5A	Result Detection Limit* BWP-5A	Result BWP-5A
2,3,7,8-TCDF	J	0.981	0.118	**1.02**		0.994	0.119	**3.54**		0.993	0.119	**0.299**	J	0.993	0.119	**1.87**		0.987	0.118	7.43		0.987	0.118	**1.77**
2,3,7,8-TCDD	U	0.981	0.167	**0.155**	* , J	0.994	0.169	**0.272**	* , J	0.993	0.169	**0.0860**	* , J	0.993	0.169	**0.174**	* , J	0.987	0.168	0.435		0.987	0.168	**0.266**
1,2,3,7,8-PeCDF	U	0.981	0.677	**0.125**	* , J , B	0.994	0.686	**0.146**	J,B	0.993	0.685	0.993	U	0.993	0.685	**0.0950**		0.987	0.681	0.135	J,B	0.987	0.681	**0.177**
2,3,4,7,8-PeCDF	U	0.981	0.559	**0.102**	J	0.994	0.566	**0.150**	J	0.993	0.566	0.993	U	0.993	0.566	**0.0950**	* , J	0.987	0.563	0.987	U	0.987	0.562	0.987
1,2,3,7,8-PeCDD	* , J	0.981	0.490	0.981	U	0.994	0.497	**0.217**	* , J	0.993	0.496	0.993	U	0.993	0.497	**0.0740**	* , J	0.987	0.494	0.084	* , J	0.987	0.493	**0.222**
1,2,3,4,7,8-HxCDF	* , J	0.981	0.794	**0.362**	* , J	0.994	0.805	**0.222**	* , J	0.993	0.804	0.993	U	0.993	0.805	**0.132**	J	0.987	0.800	0.147	* , J	0.987	0.799	**0.347**
1,2,3,6,7,8-HxCDF	J	0.981	0.647	**0.133**	J	0.994	0.656	**0.202**	* , J	0.993	0.655	0.993	U	0.993	0.656	**0.119**	J	0.987	0.652	0.187	J	0.987	0.651	**0.305**
2,3,4,6,7,8-HxCDF	U	0.981	0.667	0.981	U	0.994	0.676	**0.234**	J	0.993	0.675	0.993	U	0.993	0.676	**0.102**	* , J	0.987	0.671	0.169	J	0.987	0.671	**0.138**
1,2,3,7,8,9-HxCDF	U	0.981	0.579	**0.164**	* , J	0.994	0.586	**0.110**	J	0.993	0.586	0.993	U	0.993	0.586	0.993	U	0.987	0.583	0.181	J	0.987	0.582	**0.214**
1,2,3,4,7,8-HxCDD	J,B	0.981	0.530	**0.326**	J,B	0.994	0.537	**0.364**	* , J , B	0.993	0.536	0.993	U	0.993	0.536	**0.159**	* , J , B	0.987	0.533	0.987	U	0.987	0.533	**0.383**
1,2,3,6,7,8-HxCDD	J,B	0.981	0.549	**0.871**	J,B	0.994	0.556	**0.920**	J,B	0.993	0.556	**0.114**	* , J , B	0.993	0.556	**0.453**	* , J , B	0.987	0.553	0.439	J,B	0.987	0.553	**0.948**
1,2,3,7,8,9-HxCDD	* , J , B	0.981	0.873	**0.495**	* , J , B	0.994	0.884	**0.650**	J,B	0.993	0.883	**0.140**	* , J , B	0.993	0.884	**0.316**	J,B	0.987	0.879	0.399	J,B	0.987	0.878	**0.658**
1,2,3,4,6,7,8-HpCDF	J,B	0.981	0.981	**2.43**	B	0.994	0.994	**3.35**	B	0.993	0.993	**0.477**	J,B	0.993	0.993	**1.95**	B	0.987	0.987	2.83	B	0.987	0.987	**3.21**
1,2,3,4,7,8,9-HpCDF	* , J	0.981	0.863	**0.148**	J	0.994	0.874	**0.235**	J	0.993	0.874	**0.0490**	* , J	0.993	0.874	**0.119**	J	0.987	0.869	0.160	* , J	0.987	0.868	**0.243**
1,2,3,4,6,7,8-HpCDD	B	2.45	1.18	**24.5**	B	2.48	1.19	**28.1**	B	2.48	1.19	**2.91**	B	2.48	1.19	**8.74**	B	2.47	1.18	10.2	B	2.47	1.18	**25.0**
OCDF	J,B	1.96	1.96	**8.99**	B	1.99	1.99	**17.0**	B	1.99	1.99	**1.97**	J,B	1.99	1.99	**10.5**	B	1.97	1.97	15.3	B	1.97	1.97	**13.4**
OCDD	B	9.81	2.65	**215**	B	9.94	2.68	**247**	B	9.93	2.68	**26.7**	B	9.93	2.68	**92.1**	B	9.87	2.67	98.3	B	9.87	2.66	**213**
Total HpCDD		0.981		**61.0**		0.994		**71.9**		0.993		**6.70**		0.993		**20.1**		0.987		24.7		0.987		**57.8**
Total HpCDF		0.981		**8.62**		0.994		**10.9**		0.993		**1.17**		0.993		**5.90**		0.987		7.77		0.987		**9.82**
Total HxCDD		0.981		**11.2**		0.994		**11.7**		0.993		**1.52**		0.993		**4.20**		0.987		5.80		0.987		**12.7**
Total HxCDF		0.981		**5.65**		0.994		**4.60**		0.993		**0.363**		0.993		**2.31**		0.987		2.77		0.987		**5.41**
Total PeCDD		0.981		**1.73**		0.994		**2.23**		0.993		0.993	U	0.993		**0.535**		0.987		1.10		0.987		**2.63**
Total PeCDF		0.981		**2.01**		0.994		**1.99**		0.993		**0.256**		0.993		**0.810**		0.987		1.41		0.987		**2.45**
Total TCDD		0.981		**0.891**		0.994		**1.36**		0.993		**0.392**		0.993		**0.949**		0.987		1.34		0.987		**1.44**
Total TCDF		0.981		**3.14**		0.994		**9.70**		0.993		**0.652**		0.993		**5.16**		0.987		17.3		0.987		**6.58**
Dioxins/Furans (total TEQ ppt dry weight) U=1/2	J			**1.00**	J			**1.27**	J			**0.583**	J			**0.559**	J			**1.63**	J			**1.03**
Dioxins/Furans (total TEQ ppt dry weight) U=0	J			**0.604**	J			**0.99**	J			**0.184**	J			**0.434**	J			**1.48**	J			**0.597**
Bulk Petroleum Hydrocarbons (mg/kg) (NW-TPH method)																								
Diesel Range Organics (TPH-Diesel)	U	6.87	3.21	**15.2**		7.67	3.59	**26.3**		6.04	2.83	6.04	U	6.58	3.08	**7.92**		6.85	3.21	15.3		7.21	3.37	**13.8**
Lube Oil (TPH-Residual)		13.7	4.11	**74.7**		15.3	4.59	**106**		12.1	3.61	**23.0**		13.2	3.93	**41.3**		13.7	4.10	59.4		14.4	4.31	**77.5**
Ammonia and Sulfides, listed below, are only used to inform bioassay testing.																								
Conventionals (mg/kg)																								
	D	5.41	5.41	**78.9**	D	10.2	10.2	**179**	D	2.33	2.33	**42.1**	D	10.9	10.9	**112**	D	11	11	129	D	10.6	10.6	**167**
		1.25	1.25	**13.5**		7.2	7.2	**55.4**		1.19	1.19	1.19	U	2.18	2.18	**28.8**		2.58	2.58	25.7		7.45	7.45	**77.2**
Grain Size (%)																								
Particle/Grain Size, Phi Scale <-1		0.1	0.1	**0**		0.1	0.1	**0.2**		0.1	0.1	**0.1**		0.1	0.1	**0.1**		0.1	0.1	0.2		0.1	0.1	**0**
Particle/Grain Size, Phi Scale -1 to 0		0.1	0.1	**0.5**		0.1	0.1	**0.4**		0.1	0.1	**0.1**		0.1	0.1	**0.2**		0.1	0.1	0.6		0.1	0.1	**0.3**
Particle/Grain Size, Phi Scale 0 to 1		0.1	0.1	**1.1**		0.1	0.1	**0.6**		0.1	0.1	**0.2**		0.1	0.1	**0.3**		0.1	0.1	0.5		0.1	0.1	**0.3**
Particle/Grain Size, Phi Scale 1 to 2		0.1	0.1	**15.7**		0.1	0.1	**1.1**		0.1	0.1	**13.2**		0.1	0.1	**3.5**		0.1	0.1	1.2		0.1	0.1	**0.4**
Particle/Grain Size, Phi Scale 2 to 3		0.1	0.1	**37.2**		0.1	0.1	**7.3**		0.1	0.1	**53.4**		0.1	0.1	**15.5**		0.1	0.1	9.2		0.1	0.1	**2.9**
Particle/Grain Size, Phi Scale 3 to 4		0.1	0.1	**24**		0.1	0.1	**19.8**		0.1	0.1	**17.9**		0.1	0.1	**18.4**		0.1	0.1	16.1		0.1	0.1	**14.7**
Particle/Grain Size, Phi Scale 4 to 5		0.1	0.1	**5.1**		0.1	0.1	**18.8**		0.1	0.1	**8.8**		0.1	0.1	**31.8**		0.1	0.1	24.4		0.1	0.1	**32**
Particle/Grain Size, Phi Scale 5 to 6		0.1	0.1	**6.9**		0.1	0.1	**25.5**		0.1	0.1	**2.8**		0.1	0.1	**11.8**		0.1	0.1	23.6		0.1	0.1	**24.4**
Particle/Grain Size, Phi Scale 6 to 7		0.1	0.1	**4**		0.1	0.1	**9.5**		0.1	0.1	**1.5**		0.1	0.1	**8.5**		0.1	0.1	12.2		0.1	0.1	**12**
Particle/Grain Size, Phi Scale 7 to 8		0.1	0.1	**2.4**		0.1	0.1	**7.8**		0.1	0.1	**0.6**		0.1	0.1	**3.3**		0.1	0.1	4.8		0.1	0.1	**4.3**
Particle/Grain Size, Phi Scale 8 to 9		0.1	0.1	**1.2**		0.1	0.1	**3**		0.1	0.1	**0.6**		0.1	0.1	**2.7**		0.1	0.1	3.1		0.1	0.1	**3.1**
Particle/Grain Size, Phi Scale 9 to 10		0.1	0.1	**0.7**		0.1	0.1	**2.1**		0.1	0.1	**0.4**		0.1	0.1	**1.4**		0.1	0.1	1.6		0.1	0.1	**1.6**
Particle/Grain Size, Phi Scale >10		0.1	0.1	**1.2**		0.1	0.1	**3.9**		0.1	0.1	**0.5**		0.1	0.1	**2.4**		0.1	0.1	2.7		0.1	0.1	**4.1**
Particle/Grain Size, Fines (Silt/Clay)		0.1	0.1	**21.6**		0.1	0.1	**70.6**		0.1	0.1	**15.2**		0.1	0.1	**62**		0.1	0.1	72.3		0.1	0.1	**81.4**
Total Organic Carbon (%)		0.02	0.02	**0.64**		0.02	0.02	**0.56**		0.02	0.02	**0.64**		0.02	0.02	**0.08**		0.02	0.02	0.34		0.02	0.02	**0.61**
'Preserved Total Solids		0.04	0.04	**71**		0.04	0.04	**64.3**		0.04	0.04	**81.8**		0.04	0.04	**87.7**		0.04	0.04	72.5		0.04	0.04	**70.4**
Total Solids		0.04	0.04	**72.72**		0.04	0.04	**76.13**		0.04	0.04	**82.84**		0.04	0.04	**71.95**		0.04	0.04	70.92		0.04	0.04	**66.51**
Total Volatile Solids (%)		0.01	0.01	**2.46**		0.01	0.01	**2.28**		0.01	0.01	**1.96**		0.01	0.01	**2.41**		0.01	0.01	2.9		0.01	0.01	**3.49**

SL1 - Screening level 1
SL2 - Screening level 2
Above SL 1
*Estimated maximum possible concentration qualifier for high resolution gas chromatography-mass spectrometry dioxin (treated as U in sum)
**No summary levels available
Bold = Detected Result
Totals are calculated as the sum of all detected results (U=1/2). Half of the detection limit is included in the sum of results. If all results are not detected, the highest reporting limit value is reported as the sum.
J = Estimated value
U = Compound analyzed but not detected above detection limit
B = This analyte was detected in the method blank
D = The reported value is from a dilution
UJL = Analyte was not detected at or above the reported estimate with likely high bias
UJ = Non-detect estimated; potentially low bias.
TEQ = Toxic equivalents
DDDs is the sum of 4,4'-DDD and 2,4'-DDD (U=0)
DDTs is the sum of 4,4'-DDT and 2,4'-DDT (U=0)
DDEs is the sum of 4,4'-DDE and 2,4'-DDE (U=0)
- Results not reported or not applicable; limit not provided by the Dredged Material Management Program
Polychlorinated biphenyls (PCBs) Aroclors is the sum of Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260, Aroclor 1262, and Aroclor 1268. (U=0). If all results are not detected, the highest reporting limit value is reported as the sum. Qualifier for sum is the U if all Aroclor results were non-detect, J if at least one Aroclor result was estimated, and none if at least one Aroclor result was detected.
ng/kg = nanograms per kilogram (parts per trillion)
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
Total polycyclic aromatic hydrocarbons (PAHs) is the sum of the 18 PAHs analyzed by the lab (naphthalene, acenaphthene, acenaphthylene, fluorene, phenanthrene, anthracene, hexachlorobenzene, hexachlorobutadiene, fluoranthene, 2-methylnaphthalene, pyrene, benzo(a)anthracene, chrysene, total benzofluoranthenes , benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene,

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SEDIMENT CHARACTERIZATION REPORT
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TABLE
4
CONT'D

Chemical Parameter	Qualifier BWP-5A	Result Reporting Limit* BWP-5B	Result Detection Limit* BWP-5B	Result BWP-5B	Qualifier BWP-5B	Result Reporting Limit* BWP-5Z	Result Detection Limit* BWP-5Z	Result BWP-5Z	Qualifier BWP-5Z	Result Reporting Limit* BWP-6A	Result Detection Limit* BWP-6A	Result BWP-6A	Qualifier BWP-6A	Result Reporting Limit* BWP-6Z	Result Detection Limit* BWP-6Z	Result BWP-6Z	Qualifier BWP-6Z	Result Reporting Limit* BWP-7A	Result Detection Limit* BWP-7A	Result BWP-7A	Qualifier BWP-7A	Result Reporting Limit* BWP-7Z	Result Detection Limit* BWP-7Z	Result BWP-7Z	Qualifier BWP-7Z	Result Reporting Limit* BWP-8A	Result Detection Limit* BWP-8A	Result BWP-8A	Qualifier BWP-8A	Result Reporting Limit* BWP-8Z	Result Detection Limit* BWP-8Z	Result BWP-8Z	Qualifier BWP-8Z
Arsenic		0.260	0.0400	**2.48**		0.280	0.0400	**2.73**		0.280	0.0400	**3.30**		0.290	0.0400	**3.89**		0.300	0.0500	**3.94**		0.270	0.0400	**5.18**		0.280	0.040	**3.61**		0.260	0.0400	**4.63**	
Cadmium		0.130	0.00900	**0.110**	J	0.140	0.0100	**0.110**	J	0.140	0.0100	**0.140**		0.140	0.0100	**0.230**		0.150	0.0100	**0.220**		0.140	0.0100	**0.750**		0.140	0.0100	**0.200**		0.130	0.00900	**0.420**	
Chromium		0.650	0.0900	**12.2**		0.690	0.0900	**13.2**		0.690	0.0900	**12.0**		0.720	0.100	**15.3**		0.760	0.100	**13.7**		0.680	0.0900	**18.2**		0.690	0.0900	**15.7**		0.650	0.0900	**16.0**	
Copper		0.650	0.0500	**11.3**		0.690	0.0500	**12.0**		0.690	0.0500	**14.8**		0.720	0.0500	**19.0**		0.760	0.0600	**17.6**		0.680	0.0500	**20.0**		0.690	0.0500	**19.1**		0.650	0.0500	**22.2**	
Lead		0.130	0.0100	**5.66**		0.140	0.0100	**6.10**		0.140	0.0100	**6.51**		0.140	0.0100	**8.07**		0.150	0.0100	**7.53**		0.140	0.0100	**10.9**		0.140	0.0100	**7.62**		0.130	0.0100	**8.86**	
Mercury		0.0248	0.00209	0.0248	U	0.0340	0.00285	0.0340	U	0.0276	0.00232	**0.0387**		0.0256	0.00215	**0.0384**		0.0335	0.00281	**0.0435**		0.0297	0.00249	**0.110**		0.0308	0.00259	**0.0493**		0.0309	0.00260	**0.0835**	
Nickel		0.650	0.0200	**11.1**		0.690	0.0200	**11.2**		0.690	0.0200	**11.6**		0.720	0.0200	**14.1**		0.760	0.0300	**13.4**		0.680	0.0200	**15.1**		0.690	0.0200	**15.5**		0.650	0.0200	**16.5**	
Selenium		0.650	0.510	**0.790**		0.690	0.540	**0.870**		0.690	0.540	**0.870**		0.720	0.560	**0.970**		0.760	0.590	**1.06**		0.680	0.540	**0.920**		0.690	0.540	**1.05**		0.650	0.510	**1.14**	
Silver	J	0.260	0.00400	**0.100**	J	0.280	0.00400	**0.120**	J	0.280	0.00400	**0.110**	J	0.290	0.00400	**0.150**	J	0.300	0.00500	**0.130**	J	0.270	0.00400	**0.140**	J	0.280	0.00400	**0.100**	J	0.260	0.00400	**0.120**	J
Zinc		5.20	0.400	**49.9**		5.50	0.400	**51.4**		5.50	0.400	**55.3**		5.70	0.400	**66.9**		6.10	0.400	**66.6**		5.50	0.400	**96.4**		5.50	0.400	**70.0**		5.20	0.400	**74.7**	
organometallic compounds (ug/kg)																																	
Tributyltin ion (bulk)	U	3.45	0.402	3.45	U	3.67	0.427	3.67	U	3.81	0.444	3.81	U	3.50	0.408	3.50	U	3.59	0.418	3.59	U	3.80	0.443	3.80	U	3.80	0.443	3.80	U	3.67	0.428	3.67	U
Monobutyltin ion (bulk; ug/kg) (butyltin)	U	3.64	1.69	3.64	U	3.88	1.80	3.88	UJ	4.03	1.87	4.03	UJ	3.70	1.71	3.70	U	3.79	1.76	3.79	U	4.02	1.86	4.02	U	4.02	1.86	4.02	U	3.88	1.80	3.88	U
Dibutyltin ion (bulk; ug/kg)	U	5.16	1.54	5.16	U	5.49	1.64	5.49	U	5.71	1.71	5.71	UJ	5.24	1.57	5.24	U	5.37	1.61	5.37	U	5.69	1.70	5.69	U	5.69	1.70	5.69	U	5.50	1.65	5.50	U
Tetrabutyltin ion (bulk; ug/kg)	U	4.46	4.46	4.46	U	4.75	4.75	4.75	U	4.94	4.94	4.94	U	4.53	4.53	4.53	U	4.65	4.65	4.65	U	4.92	4.92	4.92	U	4.92	4.92	4.92	U	4.76	4.76	4.76	U
PAHs (ug/kg dry weight)																																	
1-Methylnaphthalene	U	19.6	5.80	19.6	U	18.7	5.60	18.7	U	19.6	5.80	19.6	U	19.3	5.80	19.3	U	19.8	5.90	19.8	U	19.0	5.60	19.0	U	18.9	5.60	18.9	U	19.5	5.80	19.5	U
2-Methylnaphthalene	U	19.6	5.60	19.6	U	18.7	5.30	18.7	U	19.6	5.50	19.6	U	19.3	5.50	19.3	U	19.8	5.60	19.8	U	19.0	5.40	19.0	U	18.9	5.40	18.9	U	19.5	5.50	19.5	U
Acenaphthene	U	19.6	5.00	19.6	U	18.7	4.80	18.7	U	19.6	5.00	19.6	U	19.3	5.00	19.3	U	19.8	5.10	19.8	U	19.0	4.90	19.0	U	18.9	4.80	18.9	U	19.5	5.00	19.5	U
Acenaphthylene	U	19.6	4.70	19.6	U	18.7	4.50	18.7	U	19.6	4.70	19.6	U	19.3	4.60	19.3	U	19.8	4.70	19.8	U	19.0	4.50	19.0	U	18.9	4.50	18.9	U	19.5	4.70	19.5	U
Anthracene	U	19.6	5.80	19.6	U	18.7	5.60	18.7	U	19.6	5.80	19.6	U	19.3	5.70	19.3	U	19.8	5.90	19.8	U	19.0	5.60	19.0	U	18.9	5.60	18.9	U	19.5	5.80	19.5	U
Benz[a]anthracene	J	19.6	5.10	19.6	U	18.7	4.90	18.7	U	19.6	5.10	19.6	U	19.3	5.00	19.3	U	19.8	5.10	19.8	U	19.0	4.90	**12.4**	J	18.9	4.90	18.9	U	19.5	5.10	19.5	U
Benzo(a)pyrene	J	19.6	6.30	19.6	U	18.7	6.10	18.7	U	19.6	6.30	19.6	U	19.3	6.30	19.3	U	19.8	6.40	19.8	U	19.0	6.10	**12.7**	J	18.9	6.10	18.9	U	19.5	6.30	19.5	U
Benzo(ghi)perylene	J	19.6	5.70	19.6	U	18.7	5.50	18.7	U	19.6	5.70	19.6	U	19.3	5.60	19.3	U	19.8	5.80	19.8	U	19.0	5.50	**11.2**	J	18.9	5.50	18.9	U	19.5	5.70	19.5	U
Chrysene		19.6	5.10	19.6	U	18.7	4.90	18.7	U	19.6	5.10	19.6	U	19.3	5.00	**5.30**	J	19.8	5.20	**5.60**	J	19.0	4.90	**19.2**		18.9	4.90	18.9	U	19.5	5.10	19.5	U
Dibenzo(a,h)anthracene	U	19.6	6.00	19.6	U	18.7	5.80	18.7	U	19.6	6.00	19.6	U	19.3	6.00	19.3	U	19.8	6.10	19.8	U	19.0	5.80	19.0	U	18.9	5.80	18.9	U	19.5	6.00	19.5	U
Fluoranthene		19.6	4.40	**6.10**	J	18.7	4.20	**6.40**	J	19.6	4.40	19.6	U	19.3	4.40	**6.50**	J	19.8	4.50	**5.80**	J	19.0	4.30	**23.9**		18.9	4.30	18.9	U	19.5	4.40	19.5	U
Fluorene	U	19.6	4.80	19.6	U	18.7	4.60	18.7	U	19.6	4.80	19.6	U	19.3	4.80	19.3	U	19.8	4.90	19.8	U	19.0	4.70	19.0	U	18.9	4.70	18.9	U	19.5	4.80	19.5	U
Indeno(1,2,3-cd)pyrene	J	19.6	5.90	19.6	U	18.7	5.60	18.7	U	19.6	5.90	19.6	U	19.3	5.80	19.3	U	19.8	5.90	19.8	U	19.0	5.70	19.0	U	18.9	5.70	18.9	U	19.5	5.80	19.5	U
Naphthalene	U	19.6	5.10	19.6	U	18.7	4.90	18.7	U	19.6	5.10	19.6	U	19.3	5.10	19.3	U	19.8	5.20	19.8	U	19.0	5.00	19.0	U	18.9	5.00	18.9	U	19.5	5.10	19.5	U
Phenanthrene	J	19.6	4.60	19.6	U	18.7	4.40	**5.00**	J	19.6	4.60	19.6	U	19.3	4.50	**5.00**	J	19.8	4.60	19.8	U	19.0	4.40	**12.3**	J	18.9	4.40	18.9	U	19.5	4.60	19.5	U
Pyrene	J	19.6	5.40	19.6	U	18.7	5.20	**5.90**	J	19.6	5.40	19.6	U	19.3	5.40	**6.30**	J	19.8	5.50	19.8	U	19.0	5.30	**24.2**		18.9	5.20	18.9	U	19.5	5.40	19.5	U
Benzofluoranthenes (b,j,k)	J	39.2	10.0	39.2	U	37.5	9.60	**10.0**	J	39.1	10.0	39.1	U	38.7	9.90	**11.4**	J	39.6	10.1	39.6	U	37.9	9.70	**24.0**	J	37.8	9.60	37.8	U	39.1	10.0	39.1	U
Total PAHs	J			**6.10**	J			**27.3**	J			39.1	U			**34.5**	J			**11.4**	J			**139.9**	J			37.8	U			39.1	U
4-Methylphenol (p-cresol)	U	19.6	14.4	19.6	U	18.7	13.8	18.7	U	19.6	14.4	19.6	U	19.3	14.2	19.3	U	19.8	14.5	19.8	U	19.0	13.9	19.0	U	18.9	13.9	18.9	U	19.5	14.4	19.5	U
Benzoic acid	J	196	57.9	**118**	J	187	55.3	**96.8**	J	196	57.8	196	U	193	57.1	**96.5**	J	198	58.5	**74.2**	J	190	56.0	190	U	189	55.8	189	U	195	57.7	195	U
beta-Hexachlorocyclohexane (BHC)	U	0.490	0.0900	0.490	U	0.490	0.0900	0.490	U	0.480	0.090	0.480	UJL	0.500	0.0900	0.500	U	0.490	0.0900	0.490	U	0.490	0.090	0.490	U	0.490	0.090	0.490	U	0.500	0.0900	0.500	U
bis(2)-Ethylhexyl)phthalate	U	49.0	28.2	49.0	U	46.8	27.0	46.8	U	48.9	28.2	48.9	U	48.3	27.8	48.3	U	49.5	28.5	49.5	U	47.4	27.3	47.4	U	47.2	27.2	47.2	U	48.8	28.1	48.8	U
Carbazole	U	19.6	7.20	19.6	U	18.7	6.90	18.7	U	19.6	7.20	19.6	U,J,Q	19.3	7.10	19.3	U,J,Q	19.8	7.30	19.8	U,J,Q	19.0	7.00	19.0	U,J,Q	18.9	7.00	18.9	U,J,Q	19.5	7.20	19.5	U,J,Q
Dibenzofuran	U	19.6	4.50	19.6	U	18.7	4.30	18.7	U	19.6	4.50	19.6	U	19.3	4.50	19.3	U	19.8	4.60	19.8	U	19.0	4.40	19.0	U	18.9	4.40	18.9	U	19.5	4.50	19.5	U
Dieldrin	U	0.990	0.110	0.990	U	0.980	0.110	0.980	U	0.960	0.110	0.960	U	0.990	0.110	0.990	U	0.990	0.110	0.990	U	0.980	0.110	0.980	U	0.980	0.110	0.980	U	0.990	0.110	0.990	U
Di-n-butyl-phthalate	U	19.6	5.20	19.6	U	18.7	5.00	18.7	U	19.6	5.20	19.60	U	19.3	5.10	19.3	U	19.8	5.30	19.8	U	19.0	5.00	19.0	U	18.9	5.00	18.9	U	19.5	5.20	19.5	U
Di-n-octyl-phthalate	U	19.6	8.50	19.6	U	18.7	8.20	18.7	U	19.6	8.50	19.60	U	19.3	8.40	19.3	U	19.8	8.60	19.8	U	19.0	8.30	19.0	U	18.9	8.20	18.9	U	19.5	8.50	19.5	U
Endrin ketone	U	0.990	0.280	0.990	U	0.980	0.280	0.980	U	0.960	0.270	0.960	U	0.990	0.280	0.990	U	0.990	0.280	0.990	U	0.980	0.280	0.980	U	0.980	0.280	0.980	U	0.990	0.280	0.990	U
Pentachlorophenol	U	97.9	30.7	97.9	U	93.7	29.3	93.7	U	97.8	30.6	97.8	U	96.7	30.3	96.7	U	98.9	31.0	98.9	U	94.8	29.7	94.8	U	94.5	29.6	94.5	U	97.6	30.6	97.6	U
Phenol	J	19.6	8.10	**22.3**		18.7	7.70	**11.8**	J	19.6	8.00	**12.0**	J	19.3	8.00	19.3	U	19.8	8.10	**9.20**	J	19.0	7.80	**10.6**	J	18.9	7.80	**8.70**	J	19.5	8.00	19.5	U
DDDs	J	-	-	**0.51**	J	-	-	**0.68**	J	-	-	**1.18**		-	-	**1.20**		-	-	**1.14**		-	-	**4.49**		-	-	0.980	U	-	-	**1.24**	J
DDEs		-	-	**1.65**		-	-	**2.89**		-	-	**5.48**		-	-	**6.07**		-	-	**4.83**		-	-	**4.05**		-	-	**1.52**		-	-	**1.93**	
DDTs*	U	-	-	0.990	U	-	-	0.980	U	-	-	0.000	U	-	-	0.990	U	-	-	0.990	U	-	-	0.980	U	-	-	0.980	U	-	-	0.990	U
4,4'-DDE		0.990	0.130	**1.65**		0.980	0.130	**2.89**		0.960	0.130	**5.48**		0.990	0.130	**6.07**		0.990	0.130	**4.83**		0.980	0.130	**4.05**		0.980	0.130	**1.52**		0.990	0.130	**1.93**	
4,4'-DDD	J	0.990	0.320	**0.510**	J	0.980	0.310	**0.680**	J	0.960	0.310	**1.18**		0.990	0.320	**1.20**		0.990	0.320	**1.14**		0.980	0.320	**4.49**		0.980	0.310	0.980	U	0.990	0.320	**1.24**	J
4,4'-DDT	U	0.990	0.320	0.990	U	0.980	0.320	0.980	U	0.960	0.310	0.960	U	0.990	0.320	0.990	U	0.990	0.320	0.990	U	0.980	0.320	0.980	U	0.980	0.320	0.980	U	0.990	0.320	0.990	U
2,4'-DDE	U	0.990	0.250	0.990	U	0.980	0.240	0.980	U	0.960	0.240	0.960	U	0.990	0.250	0.990	U	0.990	0.250	0.990	U	0.980	0.250	0.980	U	0.980	0.240	0.980	U	0.990	0.250	0.990	U
2,4'-DDD	U	0.990	0.190	0.990	U	0.980	0.190	0.980	U	0.960	0.190	0.960	U	0.990	0.190	0.990	U	0.990	0.190	0.990	U	0.980	0.190	0.980	U	0.980	0.190	0.980	U	0.990	0.190	0.990	U
2,4'-DDT	U	0.990	0.180	0.990	U	0.980	0.180	0.980	U	0.960	0.180	0.960	U	0.990	0.190	0.990	U	0.990	0.180	0.990	U	0.980	0.180	0.980	U	0.980	0.180	0.980	U	0.990	0.190	0.990	U
PCB-aroclor 1016	U	4.00	1.50	4.00	U	3.90	1.50	3.90	U	3.90	1.50	3.90	UJ	4.00	1.60	4.00	UJ	3.90	1.50	3.90	UJ	4.00	1.50	4.00	UJ	3.90	1.50	3.90	UJ	4.00	1.50	4.00	UJ
PCB-aroclor 1221	U	4.00	1.50	4.00	U	3.90	1.50	3.90	U	3.90	1.50	3.90	UJ	4.00	1.60	4.00	UJ	3.90	1.50	3.90	UJ	4.00	1.50	4.00	UJ	3.90	1.50	3.90	UJ	4.00	1.50	4.00	UJ
PCB-aroclor 1232	U	4.00	1.50	4.00	U	3.90	1.50	3.90	U	3.90	1.50	3.90	UJ	4.00	1.60	4.00	UJ	3.90	1.50	3.90	UJ	4.00	1.50	4.00	UJ	3.90	1.50	3.90	UJ	4.00	1.50	4.00	UJ
PCB-aroclor 1242	U	4.00	1.50	4.00	U	3.90	1.50	3.90	U	3.90	1.50	3.90	UJ	4.00	1.60	4.00	UJ	3.90	1.50	3.90	UJ	4.00	1.50	4.00	UJ	3.90	1.50	3.90	UJ	4.00	1.50	4.00	UJ
PCB-aroclor 1248	U	4.00	1.50	4.00	U	3.90	1.50	3.90	U	3.90	1.50	3.90	UJ	4.00	1.60	4.00	UJ	3.90	1.50	3.90	UJ	4.00	1.50	4.00	UJ	3.90	1.50	3.90	UJ	4.00	1.50	4.00	UJ
PCB-aroclor 1254		4.00	1.50	4.00	U	3.90	1.50	3.90	U	3.90	1.50	3.90	UJ	4.00	1.60	**3.40**	J	3.90	1.50	3.90	UJ	4.00	1.50	**11.7**	J	3.90	1.50	3.90	UJ	4.00	1.50	**7.80**	J
PCB-aroclor 1260		4.00	0.600	**1.70**	J	3.90	0.600	**4.00**		3.90	0.600	2.00	J	4.00	0.600	**7.60**	J	3.90	0.600	**3.30**	J	4.00	0.600	**17.1**	J	3.90	0.600	3.20	J	4.00	0.600	**17.4**	J
PCB-aroclor 1262	U	4.00	0.600	4.00	U	3.90	0.600	3.90	U	3.90	0.600	3.90	UJ	4.00	0.600	4.00	UJ	3.90	0.600	3.90	UJ	4.00	0.600	4.00	U	3.90	0.600	3.90	UJ	4.00	0.600	4.00	UJ
PCB-aroclor 1268	U	4.00	0.600	4.00	U	3.90	0.600	3.90	U	3.90	0.600	3.90	UJ	4.00	0.600	4.00	UJ	3.90	0.600	3.90	UJ	4.00	0.600	4.00	U	3.90	0.600	3.90	UJ	4.00	0.600	4.00	UJ
Total PCB Aroclors				**1.70**	J			**4.00**				**2.00**	J			**11.0**	J			**3.30**	J			**28.8**	J			**3.20**	J			**25.2**	J

anderson perry & associates, inc.

BOISE WHITE PAPER, LLC

WALLULA BARGE CHANNEL AND SLIP DREDGING, PERMITTING, AND DESIGN

SEDIMENT CHARACTERIZATION REPORT

CHEMISTRY RESULTS COMPARED TO DMMP EVALUATION CRITERIA

TABLE

4

CONT'D

Chemical Parameter	Qualifier BWP-5A	Result Reporting Limit* BWP-5B	Result Detection Limit* BWP-5B	Result BWP-5B	Qualifier BWP-5B	Result Reporting Limit* BWP-5Z	Result Detection Limit* BWP-5Z	Result BWP-5Z	Qualifier BWP-5Z	Result Reporting Limit* BWP-6A	Result Detection Limit* BWP-6A	Result BWP-6A	Qualifier BWP-6A	Result Reporting Limit* BWP-6Z	Result Detection Limit* BWP-6Z	Result BWP-6Z	Qualifier BWP-6Z	Result Reporting Limit* BWP-7A	Result Detection Limit* BWP-7A	Result BWP-7A	Qualifier BWP-7A	Result Reporting Limit* BWP-7Z	Result Detection Limit* BWP-7Z	Result BWP-7Z	Qualifier BWP-7Z	Result Reporting Limit* BWP-8A	Result Detection Limit* BWP-8A	Result BWP-8A	Qualifier BWP-8A	Result Reporting Limit* BWP-8Z	Result Detection Limit* BWP-8Z	Result BWP-8Z	Qualifier BWP-8Z
2,3,7,8-TCDF	*	0.990	0.119	**0.398**	* , J	0.982	0.118	**0.466**	J	0.995	0.119	**1.09**		0.999	0.120	**4.92**		0.995	0.119	**2.94**		0.995	0.119	**17.5**		0.998	0.120	**0.696**	J	0.985	0.118	**2.43**	
2,3,7,8-TCDD	* , J	0.990	0.168	0.990	U	0.982	0.167	0.982	U	0.995	0.169	**0.140**	* , J	0.999	0.170	**0.346**	* , J	0.995	0.169	**0.193**	* , J	0.995	0.169	**0.816**	J	0.998	0.170	0.998	U	0.985	0.167	**0.256**	* , J
1,2,3,7,8-PeCDF	* , J	0.990	0.683	0.990	U	0.982	0.678	0.982	U	0.995	0.687	**0.109**	* , J , B	0.999	0.689	**0.123**	J,B	0.995	0.686	0.995	U	0.995	0.687	**0.276**	* , J , B	0.998	0.688	0.998	U	0.985	0.68	0.985	U
2,3,4,7,8-PeCDF	U	0.990	0.564	0.990	U	0.982	0.560	0.982	U	0.995	0.567	0.995	U	0.999	0.569	**0.125**	* , J	0.995	0.567	**0.127**	J	0.995	0.567	**0.289**	J	0.998	0.569	**0.0460**	* , J	0.985	0.562	0.985	U
1,2,3,7,8-PeCDD	* , J , B	0.990	0.495	0.990	U	0.982	0.491	0.982	U	0.995	0.498	**0.158**	* , J	0.999	0.499	**0.126**	* , J	0.995	0.497	**0.115**	* , J	0.995	0.498	**0.226**	J	0.998	0.499	**0.0500**	* , J	0.985	0.493	0.985	U
1,2,3,4,7,8-HxCDF	J	0.990	0.802	**0.0990**	* , J	0.982	0.796	**0.130**	J	0.995	0.806	**0.129**	* , J	0.999	0.809	**0.126**	J	0.995	0.806	**0.161**	* , J	0.995	0.806	**0.181**	* , J	0.998	0.808	0.998	U	0.985	0.798	0.985	U
1,2,3,6,7,8-HxCDF	J	0.990	0.653	0.990	U	0.982	0.648	0.982	U	0.995	0.657	**0.157**	J	0.999	0.659	**0.165**	J	0.995	0.656	**0.134**	J	0.995	0.657	**0.236**	* , J	0.998	0.658	**0.0640**	* , J	0.985	0.650	0.985	U
2,3,4,6,7,8-HxCDF	* , J	0.990	0.673	0.990	U	0.982	0.668	0.982	U	0.995	0.677	**0.137**	J	0.999	0.679	0.999	U	0.995	0.676	**0.0940**	* , J	0.995	0.677	0.995	U	0.998	0.678	0.998	U	0.985	0.670	0.985	U
1,2,3,7,8,9-HxCDF	J	0.990	0.584	**0.0880**	* , J	0.982	0.579	0.982	U	0.995	0.587	**0.111**	J	0.999	0.589	**0.102**	* , J	0.995	0.587	**0.0760**	* , J	0.995	0.587	0.995	U	0.998	0.589	0.998	U	0.985	0.581	0.985	U
1,2,3,4,7,8-HxCDD	* , J	0.990	0.535	**0.139**	J	0.982	0.530	**0.161**	J	0.995	0.538	**0.220**	J,B	0.999	0.539	**0.209**	J,B	0.995	0.537	**0.208**	* , J , B	0.995	0.537	**0.224**	J,B	0.998	0.539	**0.215**	J,B	0.985	0.532	0.985	U
1,2,3,6,7,8-HxCDD	J,B	0.990	0.554	**0.289**	* , J , B	0.982	0.550	**0.332**	* , J , B	0.995	0.557	**0.474**	* , J , B	0.999	0.559	**0.465**	J,B	0.995	0.557	**0.524**	J,B	0.995	0.557	**0.707**	J,B	0.998	0.559	**0.361**	J,B	0.985	0.552	**0.396**	J,B
1,2,3,7,8,9-HxCDD	J,B	0.990	0.881	**0.210**	* , J , B	0.982	0.874	**0.301**	J,B	0.995	0.886	**0.392**	* , J , B	0.999	0.889	**0.401**	J,B	0.995	0.885	**0.490**	J,B	0.995	0.886	**0.583**	J,B	0.998	0.888	**0.379**	J,B	0.985	0.877	**0.372**	J,B
1,2,3,4,6,7,8-HpCDF		0.990	0.990	**0.943**	J	0.982	0.982	**1.58**	J, *	0.995	0.995	**2.47**	B	0.999	0.999	**2.84**	B	0.995	0.995	**2.59**	B	0.995	0.995	**2.31**	B	0.998	0.998	**1.14**	B	0.985	0.985	**1.40**	* , B
1,2,3,4,7,8,9-HpCDF	* , J	0.990	0.871	0.990	U	0.982	0.864	0.982	U	0.995	0.876	**0.244**	J	0.999	0.879	**0.212**	J	0.995	0.875	**0.135**	* , J	0.995	0.876	**0.186**	* , J	0.998	0.878	**0.0490**	* , J	0.985	0.867	**0.0600**	* , J
1,2,3,4,6,7,8-HpCDD	B	2.48	1.19	**7.34**	B	2.46	1.18	**13.6**	B	2.49	1.19	**10.3**	B	2.50	1.20	**9.34**	B	2.49	1.19	**10.8**	B	2.49	1.19	**13.7**	B	2.49	1.20	**8.15**	B	2.46	1.18	**7.55**	B
OCDF	B	1.98	1.98	**5.08**	* , B	1.96	1.96	**6.90**	B	1.99	1.99	**13.5**	B	2.00	2.00	**16.3**	B	1.99	1.99	**13.7**	B	1.99	1.99	**8.83**	B	2.00	2.00	**3.99**	B	1.97	1.97	**4.73**	B
OCDD	B	9.90	2.67	**58.0**	B	9.82	2.65	**116**	B	9.95	2.69	**94.8**		9.99	2.70	**95.0**	B	9.95	2.69	**110**	B	9.95	2.69	**107**	B	9.98	2.69	**76.8**	B	9.85	2.66	**68.8**	B
Total HpCDD		0.990		**17.0**		0.982		**36.6**		0.995		**23.3**		0.999		**22.1**		0.995		**24.5**		0.995		**29.8**		0.998		**19.4**		0.985		**18.2**	
Total HpCDF		0.990		**2.58**		0.982		**4.82**		0.995		**6.53**		0.999		**7.59**		0.995		**6.86**		0.995		**5.95**		0.998		**2.99**		0.985		**3.36**	
Total HxCDD		0.990		**3.89**		0.982		**6.00**		0.995		**5.13**		0.999		**5.09**		0.995		**5.53**		0.995		**8.18**		0.998		**4.63**		0.985		**5.14**	
Total HxCDF		0.990		**1.10**		0.982		**2.18**		0.995		**2.71**		0.999		**2.69**		0.995		**2.91**		0.995		**2.63**		0.998		**1.05**		0.985		**1.24**	
Total PeCDD		0.990		**0.315**		0.982		**0.609**		0.995		**0.653**		0.999		**1.09**		0.995		**1.09**		0.995		**1.39**		0.998		**0.56**		0.985		**0.570**	
Total PeCDF		0.990		**0.269**		0.982		**0.443**		0.995		**1.33**		0.999		**2.05**		0.995		**2.03**		0.995		**2.85**		0.998		**0.643**		0.985		**0.600**	
Total TCDD		0.990		**0.371**		0.982		**0.642**		0.995		**1.18**		0.999		**1.50**		0.995		**1.44**		0.995		**1.53**		0.998		**0.512**		0.985		**0.631**	
Total TCDF		0.990		**0.755**		0.982		**1.61**		0.995		**4.38**		0.999		**12.2**		0.995		**8.78**		0.995		**40.4**		0.998		**1.63**		0.985		**6.04**	
Dioxins/Furans (total TEQ ppt dry weight) U=1/2	J			**0.798**	J			**0.951**	J			**0.581**	J			**1.07**	J			**0.794**	J			**3.30**	J			**0.649**	J			**1.00**	J
Dioxins/Furans (total TEQ ppt dry weight) U=0	J			**0.114**	J			**0.279**	J			**0.306**	J			**0.79**	J			**0.618**	J			**3.22**	J			**0.282**	J			**0.417**	J
Bulk Petroleum Hydrocarbons (mg/kg) (NW-TPH method)																																	
Diesel Range Organics (TPH-Diesel)		6.38	2.99	6.38	U	6.58	3.08	6.58	U	6.91	3.23	**10.3**		7.14	3.34	**7.52**		7.53	3.52	**16.4**		7.06	3.30	**24.5**		7.08	3.31	**9.16**		6.76	3.16	**9.14**	
Lube Oil (TPH-Residual)		12.8	3.81	**20.5**		13.2	3.93	**24.1**		13.8	4.13	**50.7**		14.3	4.27	**43.8**		15.1	4.50	**77.9**		14.1	4.22	**88.5**		14.2	4.23	**43.6**		13.5	4.04	**43.0**	
Ammonia and Sulfides, listed below, are only used to inform bioassay testing.																																	
Conventionals (mg/kg)																																	
	D	5.4	5.4	**79.6**	D	9.63	9.63	**92.3**	D	11.8	11.8	**127**	D	11.6	11.6	**166**	D	12.3	12.3	**128**	D	11.5	11.5	**108**	D	2.81	2.81	**44.6**	D	2.81	2.81	**50.3**	D
	D	1.25	1.25	**22.2**		2.5	2.5	**34.4**		1.45	1.45	**15.1**	UJ	1.5	1.5	**4.72**		2.77	2.77	**52.1**	D	7.02	7.02	**87.2**	D	6.25	6.25	**76.9**	D	6.54	6.54	**69.3**	D
Grain Size (%)																																	
Particle/Grain Size, Phi Scale <-1		0.1	0.1	**0**		0.1	0.1	**0.1**		0.1	0.1	**0.2**		0.1	0.1	**0.2**		0.1	0.1	**0.3**		0.1	0.1	**0.3**		0.1	0.1	**0.1**		0.1	0.1	**0.3**	
Particle/Grain Size, Phi Scale -1 to 0		0.1	0.1	**0**		0.1	0.1	**0.1**		0.1	0.1	**0.2**		0.1	0.1	**0.8**		0.1	0.1	**0.3**		0.1	0.1	**0.4**		0.1	0.1	**0.2**		0.1	0.1	**0.3**	
Particle/Grain Size, Phi Scale 0 to 1		0.1	0.1	**0.2**		0.1	0.1	**0.2**		0.1	0.1	**0.3**		0.1	0.1	**0.5**		0.1	0.1	**0.2**		0.1	0.1	**0.4**		0.1	0.1	**0.3**		0.1	0.1	**0.4**	
Particle/Grain Size, Phi Scale 1 to 2		0.1	0.1	**5.8**		0.1	0.1	**0.3**		0.1	0.1	**0.3**		0.1	0.1	**0.5**		0.1	0.1	**0.2**		0.1	0.1	**1.6**		0.1	0.1	**3.1**		0.1	0.1	**1.4**	
Particle/Grain Size, Phi Scale 2 to 3		0.1	0.1	**26.4**		0.1	0.1	**2.9**		0.1	0.1	**2**		0.1	0.1	**4.2**		0.1	0.1	**1**		0.1	0.1	**8.6**		0.1	0.1	**20.2**		0.1	0.1	**10.9**	
Particle/Grain Size, Phi Scale 3 to 4		0.1	0.1	**24.6**		0.1	0.1	**25**		0.1	0.1	**9.3**		0.1	0.1	**5.7**		0.1	0.1	**4**		0.1	0.1	**22.4**		0.1	0.1	**21.3**		0.1	0.1	**21.9**	
Particle/Grain Size, Phi Scale 4 to 5		0.1	0.1	**23.3**		0.1	0.1	**47.9**		0.1	0.1	**38.2**		0.1	0.1	**23.6**		0.1	0.1	**32.1**		0.1	0.1	**21.4**		0.1	0.1	**20.3**		0.1	0.1	**14.2**	
Particle/Grain Size, Phi Scale 5 to 6		0.1	0.1	**11.4**		0.1	0.1	**13**		0.1	0.1	**30.3**		0.1	0.1	**39.5**		0.1	0.1	**29.6**		0.1	0.1	**22.9**		0.1	0.1	**17.5**		0.1	0.1	**28.1**	
Particle/Grain Size, Phi Scale 6 to 7		0.1	0.1	**3.5**		0.1	0.1	**4.3**		0.1	0.1	**8.9**		0.1	0.1	**12.8**		0.1	0.1	**20.1**		0.1	0.1	**10.5**		0.1	0.1	**7.2**		0.1	0.1	**10.6**	
Particle/Grain Size, Phi Scale 7 to 8		0.1	0.1	**1.9**		0.1	0.1	**2.4**		0.1	0.1	**3.1**		0.1	0.1	**3.9**		0.1	0.1	**4.5**		0.1	0.1	**4.1**		0.1	0.1	**3.2**		0.1	0.1	**4.8**	
Particle/Grain Size, Phi Scale 8 to 9		0.1	0.1	**1.3**		0.1	0.1	**1.6**		0.1	0.1	**2.3**		0.1	0.1	**2.8**		0.1	0.1	**2.3**		0.1	0.1	**2.3**		0.1	0.1	**2**		0.1	0.1	**2.4**	
Particle/Grain Size, Phi Scale 9 to 10		0.1	0.1	**0.9**		0.1	0.1	**1.1**		0.1	0.1	**1.8**		0.1	0.1	**1.9**		0.1	0.1	**1.9**		0.1	0.1	**1.8**		0.1	0.1	**1.6**		0.1	0.1	**2.1**	
Particle/Grain Size, Phi Scale >10		0.1	0.1	**0.8**		0.1	0.1	**1.1**		0.1	0.1	**3.1**		0.1	0.1	**3.6**		0.1	0.1	**3.5**		0.1	0.1	**3.4**		0.1	0.1	**3.1**		0.1	0.1	**2.6**	
Particle/Grain Size, Fines (Silt/Clay)		0.1	0.1	**43**		0.1	0.1	**71.4**		0.1	0.1	**87.7**		0.1	0.1	**88.1**		0.1	0.1	**94**		0.1	0.1	**66.4**		0.1	0.1	**54.8**		0.1	0.1	**64.9**	
Total Organic Carbon (%)		0.02	0.02	**0.28**		0.02	0.02	**0.35**		0.02	0.02	**0.54**		0.02	0.02	**0.81**		0.02	0.02	**0.63**		0.02	0.02	**0.69**		0.02	0.02	**0.39**		0.02	0.02	**0.22**	
'Preserved Total Solids		0.04	0.04	**76.5**		0.04	0.04	**65.1**		0.04	0.04	**68.3**		0.04	0.04	**66**		0.04	0.04	**62.7**		0.04	0.04	**67.1**		0.04	0.04	**71**		0.04	0.04	**71.1**	
Total Solids		0.04	0.04	**73.75**		0.04	0.04	**71.14**		0.04	0.04	**67.74**		0.04	0.04	**66.28**		0.04	0.04	**64.13**		0.04	0.04	**67.08**		0.04	0.04	**70.01**		0.04	0.04	**70.59**	
Total Volatile Solids (%)		0.01	0.01	**1.74**		0.01	0.01	**2.23**		0.01	0.01	**3.02**		0.01	0.01	**3.46**		0.01	0.01	**3.45**		0.01	0.01	**3.01**		0.01	0.01	**2.24**		0.01	0.01	**2.36**	

SL1 - Screening level 1
SL2 - Screening level 2
Above SL 1
*Estimated maximum possible concentration qualifier for high resolution gas chromatography-mass spectrometry dioxin (treated as U in sum)
**No summary levels available
Bold = Detected Result
Totals are calculated as the sum of all detected results (U=1/2). Half of the detection limit is included in the sum of results. If all results are not detected, the highest reporting limit value is reported as the sum.
J = Estimated value
U = Compound analyzed but not detected above detection limit
B = This analyte was detected in the method blank
D = The reported value is from a dilution
UJL = Analyte was not detected at or above the reported estimate with likely high bias
UJ = Non-detect estimated; potentially low bias.
TEQ = Toxic equivalents
DDDs is the sum of 4,4'-DDD and 2,4'-DDD (U=0)
DDTs is the sum of 4,4'-DDT and 2,4'-DDT (U=0)
DDEs is the sum of 4,4'-DDE and 2,4'-DDE (U=0)
- Results not reported or not applicable; limit not provided by the Dredged Material Management Program
Polychlorinated biphenyls (PCBs) Aroclors is the sum of Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260, Aroclor 1262, and Aroclor 1268. (U=0). If all results are not detected, the highest reporting limit value is reported as the sum. Qualifier for sum is the U if all Aroclor results were non-detect, J if at least one Aroclor result was estimated, and none if at least one Aroclor result was detected.
ng/kg = nanograms per kilogram (parts per trillion)
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
Total polycyclic aromatic hydrocarbons (PAHs) is the sum of the 18 PAHs analyzed by the lab (naphthalene, acenaphthene, acenaphthylene, fluorene, phenanthrene, anthracene, hexachlorobenzene, hexachlorobutadiene, fluoranthene, 2-methylnaphthalene, pyrene, benzo(a)anthracene, chrysene, total benzofluoranthenes , benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, benzo(g,h,i)perylene) (U=1/2)

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