Prepared by:
Dredged Material Management Office
Seattle District, US Army Corps of Engineers

MEMORANDUM FOR RECORD **April 30, 2020**

SUBJECT: DETERMINATION ON THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM LOWER SNAKE/CLEARWATER RIVER MAINTENANCE DREDGING FOR OPEN-WATER DISPOSAL IN THE SNAKE RIVER OR AT AN APPROVED BENEFICIAL USE OR UPLAND SITE.

1. **INTRODUCTION**. This memorandum reflects the consensus determination of the Dredged Material Management Program (DMMP) agencies (US Army Corps of Engineers, Washington Departments of Ecology and Natural Resources, and the Environmental Protection Agency) regarding the suitability of approximately **451,591 cubic yards (cy)** of dredged material from the lower Snake/Clearwater federal navigation channel and from locations at the Ports of Clarkston, Washington and Lewiston, Idaho, for open-water disposal. USACE currently proposes a location in the Lower Granite reservoir, Snake River Mile (RM) 118 near Bishop Bar, as the preferred in-water discharge site for the dredged materials. The Corps proposes to use the dredged material to create shallow-water habitat for juvenile salmonids. There is currently no proposed date for project construction; the public notice and other permitting procedures will take place when plans are developed.

Table 1. Characterization Details and Timeline

Sampling and Analysis Plan	1st draft SAP received	November 7, 2018
	1st draft SAP amended	November 19, 2018
	DMMP SAP comments provided	November 29, 2018
	2nd draft SAP received	April 2, 2019
	SAP approved	April 8, 2019
	Sampling dates	September 16-22, 2019 October 4-6, 2019
Data Report received		February 11, 2020
DMMP Data Report comments provided		February 28, 2020
Final Data Report received		March 26, 2020
DMMP Tracking ID		SNCLW-1-B-F-414
EIM Study ID		SNCLW19

2. **PROJECT**. The area proposed for dredging includes the federal navigation channel and associated port facilities. The US Army Corps of Engineers (USACE) proposes to complete maintenance dredging to provide a 14-foot-deep navigation channel (plus two feet over-dredge) within the Lower Snake and Lower Clearwater Rivers in Washington and Idaho (Figures 1 and 2). Port of Clarkston and Port of Lewiston berthing areas would also be dredged to a depth of 16 feet as measured from MOP[1] elevation, except for the Recreation Dock at the Port of Clarkston. The Recreation Dock would be dredged to a depth of 8 feet from the MOP elevation.

   The proposed open-water disposal site for all suitable material is a location in the Lower Granite reservoir, Snake RM 118 near Bishop Bar. USACE proposes to use the dredged material to create a shallow-water habitat bench for juvenile salmonids. Sediments at the proposed placement location were also sampled and tested as part of this characterization, and these results are reported in the

[1] Minimum operating pool (MOP) is identified as 733 feet National Geodetic Vertical Datum of 1929 [NGVD29]

data tables. This information is important for other permitting and construction reasons but is not discussed as part of the suitability determination for proposed dredged material.

Since the last navigation channel maintenance dredging in January-February 2015, ongoing shoaling has led to sediment accumulation within the channel and port berthing areas, impacting access to port facilities. Though permitting procedures are different for these entities, the projects will be dredged as a whole and were characterized together. This Suitability Determination covers the entire project area, with subareas summarized below.

- ***Confluence of Snake and Clearwater Rivers (Federal navigation channel).*** About 433,418 cy of material would be removed from the Federal navigation channel at the confluence of the Snake and Clearwater Rivers. Only the areas less than 14 feet deep at MOP within the navigation channel limits would be dredged.
- ***Port of Clarkston.*** About 13,226 cy of material would be removed from four berthing areas at the Port of Clarkston: the Crane Dock at RM 137.9, the Lewis-Clark Grain Terminal (aka Port of Clarkston Grain Elevator) at RM 138.2, the Recreation Dock at RM 138.3, and the upstream Cruise Dock at RM 139. The berthing area is defined as a zone extending 50 feet out into the river from the port facilities and running the length of the port facilities.
- ***Port of Lewiston***. About 3,697 cy of material would be removed from the berthing area at the Port of Lewiston. The berthing area is defined as a zone extending 50 feet out into the river from the port facilities and running the length of the port facilities.
- ***Ice Harbor Downstream Navigation Lock Approach.*** Approximately 1,251 cy of material would be removed from the navigation channel at the downstream side of the navigation lock entrance. The materials interfering with navigation in this area are riverbed cobbles pushed into the lock approach by vessels and water flow. This subarea is considered part of this project but no sampling was required during this round of testing based on a Tier 1 evaluation (Figure 4).

Table 2. Snake/Clearwater Project Volumes, Rank and Sampling

	Reach	***Estimated volume (cy)***	***DMMP Rank***	***DMMUs***	***Sample Type***
Federal Navigation Channel (FNC)	Ice Harbor Navigation Lock Approach	1,251	Very Low	NA	NA
	Clarkston West	173,535	Low/Moderate	1A, 1B, 2A, 2B, 3A, 3B, 4A	Grab
	Clarkston East	131,747	Low/Moderate	4B, 5A, 5B, 6	Grab
	Clearwater	24,638	Low	7, 8	Grab
	Lewiston	103,498	Low	9, 10, 11	Grab
Ports	Port of Clarkston Crane Dock	1,552	Low/Moderate	Crane Dock	Grab
	Port of Clarkston Grain Elevator	2,549	Low/Moderate	Grain Elevator	Core
	Port of Clarkston Recreation Dock	747	Low/Moderate	Rec Dock	Core
	Port of Clarkston Cruise Dock	8,378	Low/Moderate	Cruise Dock	Core
	Port of Lewiston	3,697	Low	POL	Grab
TOTAL		***451,591***			

3. **TIER 1 – PROJECT RANKING AND SAMPLING REQUIREMENTS**. As was done for the 2014 characterization, five general reaches of the proposed dredging prism were considered separately for Tier 2 (chemical analysis) sampling and characterization purposes. These areas were identified based on apparent shoaling patterns and sediment characteristics, with details summarized in Table 2.

   Most of the project reaches were considered to have homogenous material, based on rapid accumulation of river bed sediment, and were sampled with grab samples. Three Port of Clarkston locations closer to the river bank (Grain Elevator, Recreation Dock and Cruise Dock) were considered to have heterogeneous material, with uneven accumulation of material, and were sampled with core samples.

   Project reaches were ranked, per DMMP guidelines, based on potential risk of elevated levels of chemicals of concern. The Snake/Clearwater project ranks include Very Low, Low, and Low-Moderate areas, with sampling density defined by those ranks as follows:

Table 3. Maximum Sediment Volumes for each DMMU

PROJECT RANK	*HETEROGENEOUS SEDIMENT*		*HOMOGENEOUS SEDIMENT (well mixed)*
	SURFACE	**SUBSURFACE**	
Very Low	Not applicable	Not applicable	100,000 CY
Low	48,000 CY	72,000 CY	60,000 CY
Low-moderate	32,000 CY	48,000 CY	40,000 CY
Moderate	16,000 CY	24,000 CY	20,000 CY
High	4,000 CY	12,000 CY	8,000 CY

Table 4. Maximum Sediment Volumes for Individual Samples

PROJECT RANK	*SURFACE*	*SUBSURFACE*
Very Low	Project specific	Project specific
Low	8,000	8,000
Low-moderate	8,000	8,000
Moderate	4,000	4,000
High	4,000	4,000

   The Ice Harbor Lock Approach is ranked “Very Low” due to the very coarse grain sizes found in that location. The DMMP required no further testing in this subarea; existing information is sufficient for determining that this material is suitable for in-water disposal (Tier 1 suitability).

4. **SAMPLING.** Personnel from Shannon & Wilson, Science, Engineering & the Environment (SEE), and Marine Sampling Systems (MSS) conducted the sampling effort aboard the RV Peter R. Sampling took place during two separate field mobilizations: first from September 16-22, 2019, and then from October 4-6, 2019. For the first few days of the first mobilization, the field crew was working with NAD27 coordinates plotted in NAD85—resulting in samples collected approximately 200 ft. east of their target locations. Once discovered, the samples taken to date were assessed to see whether any could still be used for the project. Some samples and composites could be used and these were re-labeled to represent actual coordinates. Some locations had to be resampled. All final samples and composites were determined to be representative of their respective DMMUs and acceptable for decision-making.

Grab samples were collected with a hydraulic power grab sampler and composited and processed on board the sampling vessel. Core samples were collected with MSS's vibracore system, which uses 4" diameter aluminum tubes. Core samples were stored per the approved SAP and processed at a USACE facility in Clarkston, Washington. ***All sample locations are summarized in Table 7.***

Table 5. Sampling and Compositing Scheme

Area to be Dredged	*DMMU*	*Quantity at 8/16 ft* [1,3]	*# of Grab Samples*	*# of Core Samples*	*# of Lab Samples*
FNC Ice Harbor Nav Lock Appr.	Same as Area[2]	1,251	NA		NA
FNC Clarkston West	1a	27,847	4		6
	1b	30,575	4		
	2a	27,600	4		
	2b	29,852	4		
	3a	29,807	4		
	3b	27,854	4		
FNC Clarkston East	4a	28,323	4		6[4]
	4b	31,169	5		
	5a	23,175	4		
	5b	19,511	3		
	6	29,571	5		
FNC Clearwater	7	13,297	2		2
	8	11,341	2		
FNC Lewiston	9	35,718	7		3
	10	45,318	7		
	11	22,462	3		
Port of Clarkston Crane Dock	Same as Area[2]	1,552	2		1
Port of Clarkston Grain Elevator	Same as Area[2]	2,549		2	1
Port of Clarkston Rec. Dock	Same as Area[2]	747		1	1
Port of Clarkston Cruise Dock	Same as Area[2]	8,378		2	1
Port of Lewiston	Same as Area[2]	3,697	2		1
	TOTAL	**451,591**	**70**	**5**	**22**

Notes:
(1) Based on removal to 16 feet below MOP using survey data from September 2018.
(2) Because each Port area constitutes a DMMU, the names of the DMMU and the Port facility are the same.
(3) Port of Clarkston Recreation Dock volume based on dredge depth of 8 ft below MOP.
(4) Includes duplicate sample.

5. **TIER 2 – CONVENTIONAL & CHEMICAL ANALYSES.** DMMP freshwater chemicals of concern, as listed in the 2018 User Manual (DMMP 2018) were used for this characterization. Two project-specific modifications were made to the basic list:

   - **TBT:** no analysis required. In the past, TBT was most frequently used in anti-fouling paints on ocean-going vessels, which do not routinely visit this inland port. There are no marinas, shipyards or boat maintenance facilities in the project area, nor other reason-to-believe indicators for testing TBT.
   - **Dioxins/Furans:** analysis required. Due to presence of an outfall from the Clearwater Paper Company directly upstream of the Snake/Clearwater confluence, testing for dioxins/furans was required for this round of testing. This outfall is permitted under NPDES Permit Number ID0001163 (EPA 2019). The effluent is treated and some watershed sediments and resident fish have been tested for dioxins/furans in the past, with no elevated results. However, no testing had been done in the past on project sediments, and the DMMP wanted to confirm that dioxins/furans are not of concern in this location.

   Data Analysis & Validation. Laboratory analyses were conducted by Analytical Resources, Inc. (ARI) in Tukwila, Washington, except for the grain-size analyses which were conducted at Shannon & Wilson's Seattle laboratory. EcoChem provided data validation services, with Stage 2B validation on 100% of the chemistry data and Stage 4 validation on the dioxin/furan data. All data, as validated, were considered useable for decision-making. ***Full chemical results are summarized in Table 8.***

   Grain Size and TOC. All samples consisted primarily of sand. Most samples from the federal navigation channel DMMUs consisted of less than 6% fines (silt + clay), with the exception of DMMU 6, which had a fines content of 16%. The Port of Clarkston locations had slightly higher fines content, ranging from 7% to 36% fines, with the maximum at the POC Recreation Dock. Total organic carbon (TOC) content followed the same pattern, with all navigation channel samples ≤ 0.5% TOC, except for DMMU 6, with 1.7% TOC. DMMU 6 is located at the bend in the Snake River where it meets the Clearwater River, so it's likely finer material may settle preferentially at that location. TOC in POC locations ranged from 1.5 to 3.6% TOC. The Port of Lewiston sample was similar in grain size and TOC to navigation channel samples.

   Ammonia and Sulfide Levels. Results for sulfide levels were elevated in many of the same DMMUs with more fines and higher TOC (DMMU 6 and the Port of Clarkston DMMUs). Ammonia also was elevated at the POC Recreation Dock. Levels of these compounds were similar to results found in 2014. Elevated levels of ammonia and sulfides above DMMP guidelines are not used for suitability decisions but are considered advisory for any subsequent biological testing.

   Chemical Results. Chemical analyses for the most part showed non-detects or low detections of most chemicals of concern. PAHs were mostly non-detected except for low detections in the POC DMMUs, well below the DMMP freshwater SLs. The only SL exceedances were for 4-methylphenol in the POC Crane Dock and Cruise Dock DMMUs, and those DMMUs were subjected to Tier 3 bioassay testing. This same chemical drove the need for bioassays in the last round of testing.

   Dioxins/Furans. Only very low detections were found in the project sediments, all an order of magnitude below DMMP guidance of 4 ng/kg TEQ (U=1/2 RL). This result confirms that dioxins/furans are not currently a chemical of concern for this project.

6. **TIER 3 – BIOASSAY ANALYSES**. Screening level exceedances in chemical analysis results do not indicate that a given project sediment will be toxic to benthic organisms. Rather, they indicate that additional biological testing is needed for decision-making and to determine whether proposed dredged sediments can be safely placed in-water. Bioassays are performed to estimate the potential toxicity of the project sediments to benthic/epibenthic organisms. Bioassays were performed by EcoAnalysts, in Port Gamble, Washington and validation of results was performed by SEE. ***Full bioassay results are summarized in Table 10.***

   Standard freshwater bioassays were conducted on the two DMMUs with 4-methylphenol screening level exceedances: Port of Clarkston Crane Dock and Cruise Dock. 4-methylphenol also triggered bioassays in the last round of testing in 2014. The likely source of 4-methylphenol is the NPDES-permitted discharge from the Clearwater Paper Company, which enters the Snake River via an outfall directly upstream of the Snake/Clearwater confluence (Figure 3).

   As was done in 2014, a reference sediment sample from Snake River Mile 144.5, upstream of the project area, was collected for comparison to test samples. The reference sample was analyzed for all DMMP chemicals of concern to confirm that it was a suitable background reference. Control sediment was retail silica sand screened through a 30-70 micron mesh, supplemented with sphagnum moss.

   A suite of three tests were conducted per guidance from the DMMP User Manual (DMMP 2018):

   - *Hyalella azteca* (amphipod): 10-day survival
   - *Chironomus dilutus* (midge larvae): 20-day survival
   - *C. dilutus*: 20-day growth

   For each test, the two test sediments, one reference sediment and one laboratory control sediment were run concurrently, each with eight laboratory replicates. Reference and control sediments for all tests met acceptability criteria as defined by the Sediment Management Standards, Chapter 173-204 WAC (Ecology 2013). All data were considered valid and suitable for decision-making. All test sediments passed the relative interpretive guidelines and are thus suitable for open-water disposal. (Table 10).

7. **SUITABILITY DETERMINATION.** This memorandum documents the evaluation of the suitability of sediment proposed for dredging from the Lower Snake and Clearwater Rivers for open-water disposal in the Snake River or at an approved beneficial use or upland site. The approved sampling and analysis plan was adequately followed, and the data gathered were deemed sufficient and acceptable for regulatory decision-making under the DMMP program.

   Based on the results of the previously described testing, the DMMP agencies concluded that all 451,591 cy are suitable for open-water disposal.

   Results from the placement site confirm no exceedances of DMMP chemicals of concern. These results may also help inform design of the site and potential sequencing of placement, and are included in all data tables.

   This suitability determination does ***not*** constitute final agency approval of the project. Any given beneficial use may also need to consider factors outside those considered for this DMMP suitability, such as appropriateness of grain size for the desired benefit, or the presence of organic layers in some areas of the prism. Any final decision will be made by regulatory entities after full consideration of agency and stakeholder input, and after an alternatives analysis is done under Section 404(b)(1) of the Clean Water Act.

Table 6. Suitability Determination and Recency Expiration

	Reach	Est. Vol. (cy)	DMMUs	DMMP Rank	Decision Basis	Recency Expires
Federal Navigation Channel (FNC)	Ice Harbor Navigation Lock Approach	1,251	NA	VL	Tier 1	Sept 2029
	Clarkston West	173,535	1A, 1B, 2A, 2B, 3A, 3B, 4A	LM	Tier 2	Sept 2025
	Clarkston East	131,747	4B, 5A, 5B, 6	LM	Tier 2	Sept 2025
	Clearwater	24,638	7, 8	L	Tier 2	Sept 2026
	Lewiston	103,498	9, 10, 11	L	Tier 2	Sept 2026
Ports	Port of Clarkston Crane Dock	1,552	Crane Dock	LM	Tier 3	Sept 2025
	Port of Clarkston Grain Elevator	2,549	Grain Elevator	LM	Tier 2	Sept 2025
	Port of Clarkston Recreation Dock	747	Rec Dock	LM	Tier 2	Sept 2025
	Port of Clarkston Cruise Dock	8,378	Cruise Dock	LM	Tier 3	Sept 2025
	Port of Lewiston	3,697	POL	L	Tier 2	Sept 2026
	TOTAL SUITABLE	***451,591***				

Tier 1 - sufficient information available
Tier 2 - chemical evaluation
Tier 3 - biological evaluation

8. REFERENCES

DMMP 2018. *Dredged Material Evaluation and Disposal Procedures (User Manual)*. Prepared by the Seattle District Dredged Material Management Office for the Dredged Material Management Program, December 2018.

DMMP 2014. *Determination on the Suitability of Proposed Dredged Material from Lower Snake/Clearwater River Maintenance Dredging for Open Water Disposal in the Snake River or at an Approved Beneficial Use or Upland Site.* February 18, 2014 (as updated 3/15/2018).

EPA 2019. *Biological Evaluation for the National Pollutant Discharge Elimination System Permit for Clearwater Paper Lewiston Mill NPDES Permit Number ID0001163.* U.S. EPA Region 10 Office of Water and Watersheds. March 2019.

Shannon/Wilson 2020. *Sampling and Analysis Results: Lower Snake/Clearwater River, 2019 Channel Maintenance Report*. Submitted to US Army Corps of Engineers, Walla Walla District. February 10, 2020.

9. AGENCY SIGNATURES

SUBJECT: DETERMINATION ON THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM LOWER SNAKE/CLEARWATER RIVER MAINTENANCE DREDGING FOR OPEN-WATER DISPOSAL IN THE SNAKE RIVER OR AT AN APPROVED BENEFICIAL USE OR UPLAND SITE.

Concur:

April 30, 2020

Date — Lauran Cole Warner - Seattle District Corps of Engineers

April 30, 2020 — Justine S. Barton

Date — Justine Barton - Environmental Protection Agency

04/30/2020 — Laura Inouye

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

Shannon Soto

04/30/2020

Date — Shannon Soto - Washington Department of Natural Resources

Copies furnished:

DMMP signatories
Steve Juul, NWW
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Table 7. Sampling Locations and Elevations.

DMMU Name	Sample Key	Sample ID	Sample Type	Latitude (degrees, minutes) (NAD83)	Longitude (degrees, minutes) (NAD83)	Elevation of Water Surface (NGVD29) (ft amsl)	Height of Water Surface Above MOP (ft)	Elevation of Mudline (NGVD29) (ft amsl)	Depth to Mudline from MOP (ft)
FNC Clarkston West									
1A	1	LGR138.4E	Grab	46 25.697	-117 3.267	737.0	4.0	720.3	12.7
	2	LGR138.4F	Grab	46 25.657	-117 3.277	737.0	4.0	722.1	10.9
	5	LGR138.3E	Grab	46 25.672	-117 3.376	736.9	3.9	718.8	14.2
	6	LGR138.3F	Grab	46 25.645	-117 3.381	737.1	4.1	720.3	12.7
1B	4	LGR138.5G	Grab	46 25.671	-117 3.216	736.9	3.9	724.0	9.0
	7	LGR138.5D	Grab	46 25.707	-117 3.179	736.9	3.9	720.7	12.3
	8	LGR138.5E	Grab	46 25.676	-117 3.18	736.9	3.9	723.5	9.5
	9	LGR138.5F	Grab	46 25.641	-117 3.181	736.9	3.9	726.0	7.0
2A	10	LGR138.6D	Grab	46 25.706	-117 3.123	736.8	3.8	720.4	12.6
	11	LGR138.6F	Grab	46 25.687	-117 3.123	736.8	3.8	722.1	10.9
	12	LGR138.6I	Grab	46 25.666	-117 3.124	736.8	3.8	724.1	8.9
	100	LGR138.6D	Grab	46 25.647	-117 3.123	736.8	3.8	725.8	7.2
2B	13	LGR138.6E	Grab	46 25.713	-117 3.064	737.4	4.4	719.1	13.9
	14	LGR138.6G	Grab	46 25.694	-117 3.063	737.4	4.4	721.8	11.2
	15	LGR138.6H	Grab	46 25.673	-117 3.064	737.4	4.4	723.5	9.5
	16	LGR138.6J	Grab	46 25.653	-117 3.063	737.4	4.4	724.8	8.2
3A	17	LGR138.7	Grab	46 25.712	-117 3.004	737.4	4.4	720.3	12.7
	18	LGR138.7A	Grab	46 25.69	-117 3.005	737.4	4.4	721.4	11.6
	19	LGR138.7B	Grab	46 25.672	-117 3.006	737.4	4.4	723.0	10.0
	20	LGR138.7C	Grab	46 25.639	-117 3.005	737.4	4.4	724.9	8.1
3B	21	LGR138.7D	Grab	46 25.711	-117 2.953	737.5	4.5	718.2	14.8
	22	LGR138.7F	Grab	46 25.689	-117 2.953	737.5	4.5	721.6	11.4
	3	LGR138.7E	Grab	46 25.671	-117 2.956	737.4	4.4	722.2	10.8
	101	LGR138.7G	Grab	46 25.638	-117 2.956	737.5	4.5	723.5	9.5
FNC Clarkston East									
4A	23	LGR138.8A	Grab	46 25.709	-117 2.881	737.4	4.4	717.1	15.9
	24	LGR138.8B	Grab	46 25.685	-117 2.879	737.4	4.4	720.3	12.7
	25	LGR138.8C	Grab	46 25.664	-117 2.886	737.5	4.5	721.9	11.1
	102	LGR138.8J	Grab	46 25.641	-117 2.894	737.5	4.5	722.8	10.2
4B	26	LGR138.8D	Grab	46 25.681	-117 2.82	737.0	4.0	719.6	13.4
	27	LGR138.8E	Grab	46 25.659	-117 2.828	737.0	4.0	721.7	11.3
	28	LGR138.8F	Grab	46 25.631	-117 2.836	736.9	3.9	721.8	11.2
	29	LGR138.8G	Grab	46 25.666	-117 2.766	736.9	3.9	719.4	13.6
	30	LGR138.8H	Grab	46 25.629	-117 2.781	736.9	3.9	721.3	11.7
5A	31	LGR138.9	Grab	46 25.651	-117 2.717	736.8	3.8	719.0	14.0
	32	LGR138.9A	Grab	46 25.631	-117 2.727	736.8	3.8	721.4	11.6
	33	LGR138.9L	Grab	46 25.622	-117 2.691	736.8	3.8	721.5	11.5
	35	LGR138.9B	Grab	46 25.613	-117 2.736	736.8	3.8	722.1	10.9
5B	34	LGR138.9M	Grab	46 25.603	-117 2.638	737.3	4.3	721.0	12.0
	36	LGR138.9H	Grab	46 25.626	-117 2.659	737.3	4.3	719.9	13.1
	37	LGR138.9X	Grab	46 25.597	-117 2.67	737.3	4.3	722.4	10.6
6	38	LGR138.9C	Grab	46 25.604	-117 2.595	737.3	4.3	718.6	14.4
	39	LGR138.9D	Grab	46 25.578	-117 2.608	737.3	4.3	721.2	11.8
	41	LGR139.1A	Grab	46 25.566	-117 2.546	737.3	4.3	720.0	13.0
	42	LGR139.1B	Grab	46 25.542	-117 2.492	737.3	4.3	719.6	13.4
	72	LGR139.1I	Grab	46 25.518	-117 2.446	737.3	4.3	719.8	13.2
FNC Clearwater									
7	43	CLW0.1A	Grab	46 25.554	-117 2.101	737.3	4.3	722.4	10.6
	44	CLW0.2A	Grab	46 25.544	-117 1.967	737.3	4.3	719.5	13.5

Table 7. Sampling Locations and Elevations.

DMMU Name	Sample Key	Sample ID	Sample Type	Latitude (degrees, minutes) (NAD83)	Longitude (degrees, minutes) (NAD83)	Elevation of Water Surface (NGVD29) (ft amsl)	Height of Water Surface Above MOP (ft)	Elevation of Mudline (NGVD29) (ft amsl)	Depth to Mudline from MOP (ft)
8	45	CLW0.5A	Grab	46 25.522	-117 1.603	737.3	4.3	718.9	14.1
	46	CLW0.5C	Grab	46 25.52	-117 1.509	737.3	4.3	719.1	13.9
FNC Lewiston									
9	73	CLW1.1C	Grab	46 25.41	-117 1.023	737.3	4.3	718.9	14.1
	47	CLW1.1D	Grab	46 25.403	-117 0.935	737.3	4.3	719.1	13.9
	48	CLW1.1E	Grab	46 25.375	-117 0.951	737.3	4.3	719.1	13.9
	49	CLW1.2D	Grab	46 25.38	-117 0.862	737.1	4.1	719.5	13.5
	50	CLW1.2E	Grab	46 25.352	-117 0.879	737.3	4.3	720.6	12.4
	51	CLW1.2B	Grab	46 25.363	-117 0.808	737.2	4.2	720.3	12.7
	52	CLW1.2.C	Grab	46 25.335	-117 0.829	737.1	4.1	720.7	12.3
10	53	CLW1.3C	Grab	46 25.33	-117 0.774	737.2	4.2	720.7	12.3
	54	CLW1.3B	Grab	46 25.362	-117 0.747	737.2	4.2	719.1	13.9
	56	CLW1.3D	Grab	46 25.337	-117 0.664	737.2	4.2	719.8	13.2
	57	CLW1.3E	Grab	46 25.312	-117 0.681	737.2	4.2	720.1	12.9
	58	CLW1.3F	Grab	46 25.285	-117 0.699	737.2	4.2	719.2	13.8
	59	CLW1.3G	Grab	46 25.312	-117 0.592	737.2	4.2	719.6	13.4
	60	CLW1.3H	Grab	46 25.288	-117 0.607	737.1	4.1	719.2	13.8
11	55	CLW1.4	Grab	46 25.288	-117 0.522	737.2	4.2	720.6	12.4
	61	CLW1.4D	Grab	46 25.243	-117 0.374	737.2	4.2	719.0	14.0
	62	CLW1.5A	Grab	46 25.205	-117 0.21	737.2	4.2	720.4	12.6
Port of Clarkston									
Crane Dock	85	LGR137.8A	Grab	46 25.579	-117 3.88	736.7	3.7	718.7	14.3
	86	LGR137.8B	Grab	46 25.591	-117 3.822	736.7	3.7	719.6	13.4
Grain Elevator	68	LGR138.4G	Core	46 25.632	-117 3.278	737.0	4.0	720.9	12.1
	69	LGR138.4I	Core	46 25.631	-117 3.216	737.0	4.0	722.4	10.6
Rec Dock	64	LGR138.6Y	Core	46 25.617	-117 3.074	737.0	4.0	728.6	4.4
				46 25.617	-117 3.073	737.0	4.0	728.5	4.5
Cruise Dock	65	LGR138.9J	Core	46 25.586	-117 2.709	737.1	4.1	721.4	11.6
	66	LGR138.9K	Core	46 25.566	-117 2.643	737.0	4.0	720.2	12.8
Port of Lewiston									
POL	70	CLW1.15A	Grab	46 25.488	-117 1.011	737.3	4.3	719.1	13.9
	71	CLW1.25A	Grab	46 25.38	-117 0.734	737.3	4.3	719.3	13.7
RM 144.5 Reference Sample									
--	74	SR144-R-G	Grab	46 21.239	-117 3.641	737.3	4.3	733.4	-0.4
In-Water Disposal Site Near RM 118									
--	93	LGR-118.8A	Grab	46 33.83	-117 6.764	737.4	4.4	665.8	67.2
	94	LGR-118.8B	Grab	46 33.732	-117 6.712	737.2	4.2	677.6	55.4
	95	LGR-118.9A	Grab	46 33.818	-117 6.695	737.3	4.3	695.1	37.9
	96	LGR-118.9B	Grab	46 33.766	-117 6.715	737.2	4.2	667.1	65.9
	97	LGR-119A	Grab	46 33.744	-117 6.633	737.3	4.3	689.3	43.7
	98	LGR-119B	Grab	46 33.687	-117 16.65	737.2	4.2	662.4	70.6

Notes:
- MOP (minimum operating pool) elevation is 733 feet amsl (NGVD29)
- amsl = above mean sea level
- DT = degrees true
- NAD27 = North American Datum of 1927
- NAD83 = North American Datum of 1983
- NGVD29 = National Geodetic Vertical Datum of 1929

Table 8 - Results of Chemical Analyses

	Sample Location SQL	Sample Location SL1	DMMU 1A Result Q	DMMU 1B Result Q	DMMU 2A Result Q	DMMU 2B Result Q	DMMU 3A Result Q	DMMU 3B Result Q	DMMU 4A Result Q	DMMU 4B Result Q	DMMU 5A Result Q	DMMU 5B Result Q	DMMU 6 Result Q	DMMU 6 - DUP Result Q	DMMU 7 Result Q	DMMU 8 Result Q	DMMU 9 Result Q	DMMU 10 Result Q	DMMU 11 Result Q	POC Crane Dock Result Q	core POC Cruise Dock Result Q	core POC Grain Elev Result Q	core POC Rec. Dock Result Q	POL DMMU Result Q	RM 118 Placement Site Result Q	RM 144.5 Reference Site Result Q
Conventionals			100.3	99.9	100.3	100.5	99.9	100.2	100.1	100.1	99.9	100.4	100	100	99.9	99.7	100.1	99.9	100.4	100	100.2	100	100	99.9	0	100.0
% Gravel	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0.3		0
% Sand	--	--	98	98	98	99	97	96	95	98	97	95	84	84	99	99	99	99	95	72	93	90	64	97		75
% Fines (<3.9 µm)	--	--	2.3	1.9	2.3	1.5	2.9	4.2	5.1	2.1	2.9	5.4	16	16	0.9	0.7	1.1	0.9	5.4	21	7.2	10	36	2.6		25
Total Solids (%)	0.1	--	64.84	69.55	71.07	74.75	71.39	68.41	70.18	69.43	68.15	68.87	49.35	52.33	67.96	70.91	71.2	67.45	70.84	49.26	63.64	66.09	50.98	67.48	62.36	65.51
Sulfide (mg/kg dry)	1.0	39	4.93	1.31 U	3.15	6.74 J	8.74 J	12.3 J	20 J	13.5	13.5	35.7 J	57.6 J	67.6 J	1.21 UJ	1.26 U	1.44 U	1.3 U	1.42 U	136	11.7 J	49.4 J	231 J	1.25 U	47.9	79.8 J
Ammonia-N (mg/kg NH3-N)	0.1	230	8.77	6.15	5.8	4.36 J	10 J	15 J	13.6 J	6.35	9.03	11.6 J	50 J	55.5 J	0.82 J	4.96	8.54	6.61	16.9	145	163 J	153 J	424 J	15.1	15	32.7 J
Total Organic Carbon (% dry)	0.1	--	0.38	0.11	0.17	0.11	0.25	0.4	0.44	0.13	0.26	0.51	1.61	1.73	0.16	0.1	0.34	0.12	0.31	3.3	2.79	1.54	3.55	0.43	0.98	0.71
Metals (mg/kg dry)																										
Arsenic	5	14	1.89	1.53	1.59	1.75	1.62	1.51	1.58	1.33	1.66	1.52	2.4	2.61	0.73	0.6	0.66	0.88	0.69	2.32	2.74 J	3.18 J	4.89 J	0.75	4.32	1.88
Cadmium	0.5	2.1	0.15 U	0.14 U	0.14 U	0.13 U	0.13 U	0.14 U	0.05 J	0.14 U	0.14 U	0.14 U	0.11 J	0.2 U	0.13 U	0.13 U	0.13 U	0.15 U	0.13 U	0.09 J	0.09 J	0.07 J	0.19	0.14 U	0.1 J	0.06 J
Chromium	5	72	9.22	7.22	8.07	7.97	6.25	6.15	8.46	7.46	8.55	7.32	10.4	13.3	5.31	4.58	6	7.18	6.94	11.3	11.5	12.6	17.9	8.65	13.7	11.2
Copper	5	400	6.76	5.27	5.73	7.01	6.54	6.02	7.99	6.21	6.06	6.64	12.7	14	4.44	3.25	4.63	4.93	4.87	12.4	10.7 J	11.1 J	19.1 J	5.85	11.3	11.6
Lead	5	360	3.04 J	2.24 J	2.67 J	2.38	2.16	2.3	2.46	2.49 J	2.81 J	2.58	4.4	4.86	1.7	1.48 J	1.73 J	2.5 J	1.91 J	4.99 J	4 J	5.76 J	9.86 J	2.06 J	4.95 J	4.09
Mercury	0.05	0.66	0.0308 U	0.0255 U	0.0264 U	0.0195 J	0.007 UJ	0.0124 J	0.011 J	0.0286 U	0.0281 U	0.0348 J	0.0217 J	0.0223 J	0.00939 J	0.027 U	0.0241 U	0.0303 U	0.0287 U	0.0155 J	0.0227 J	0.0223 J	0.0467 J	0.0355 U	0.022 J	0.0301 J
Nickel	5	26	6.34	5.19	5.7	6.21	6.04	5.3	5.93	5.66	5.81	5.52	8.58	10.4	4.6	3.22	4.12	4.89	4.85	7.92	9.13	9.23	13.2	5.61	9.83	9.05
Selenium	1	11	1.02	0.79	1	0.76	0.7	0.72 U	0.77	0.69 U	0.62 J	0.7 U	1.07 J	0.98 U	0.66 U	0.65 U	0.72	0.74 U	0.72	1.39	2.07 J	2.28 J	4.83 J	0.72 U	1.24	0.73 U
Silver	0.5	0.57	0.04 J	0.03 J	0.03 J	0.04 J	0.05 J	0.05 J	0.04 J	0.03 J	0.05 J	0.04 J	0.08 J	0.09 J	0.03 J	0.03 J	0.03 J	0.03	0.03 J	0.08 J	0.09 J	0.11 J	0.17 J	0.03 J	0.09 J	0.08 J
Zinc	5	3200	30.1 J	23.7 J	28.3 J	26.3	24.3	24.7	27.3	23.8 J	25.3 J	27.5	40.3	46.3	23.9	18.3 J	20.2 J	36.7 J	21.2 J	37.4 J	41.7 J	46.3 J	79.6 J	26.2 J	44 J	41.3
Polynuclear Aromatic Hydrocarbons (PAHs) (µg/kg dry)																										
1-Methylnaphthalene	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	7.7 J	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
Acenaphthene	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	26.8	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
Acenaphthylene	--	--	19.7 UJ	20 UJ	19.7 UJ	19.9 U	20 U	20 U	20 U	19.8 UJ	19.9 UJ	20 U	20 U	20 U	20 U	19.7 UJ	19.6 UJ	19.7 UJ	19.8 UJ	19.9 UJ	19.8 UJ	19.9 UJ	19.9 UJ	19.7 UJ	19.8 UJ	20 U
Anthracene	--	--	19.7 UJ	20 UJ	19.7 UJ	19.9 UJ	20 UJ	20 UJ	20 UJ	19.8 UJ	19.9 UJ	20 UJ	20 UJ	20 UJ	20 UJ	19.7 UJ	19.6 UJ	19.7 UJ	19.8 UJ	7.5 J	19.8 UJ	19.9 UJ	19.9 UJ	19.7 UJ	19.8 UJ	20 UJ
Benzo(a)anthracene	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	17 J	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
Benzo(a)pyrene	--	--	19.7 UJ	20 UJ	19.7 UJ	19.9 U	20 U	20 U	20 U	19.8 UJ	19.9 UJ	20 U	20 U	20 U	20 U	19.7 UJ	19.6 UJ	19.7 UJ	19.8 UJ	15.5 J	19.8 U	19.9 U	19.9 U	19.7 UJ	19.8 UJ	20 U
Benzo(g,h,i)perylene	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	7.8 J	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
Benzofluoranthenes, Total	--	--	39.5 U	39.9 U	39.4 U	39.8 U	40 U	39.9 U	40 U	39.5 U	39.7 U	39.9 U	40 U	40 U	40 U	39.4 U	39.3 U	39.5 U	39.6 U	45	39.7 U	39.7 U	39.8 U	39.5 U	39.6 U	40 U
Chrysene	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	21.4	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
Dibenzo(a,h)anthracene	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	19.9 U	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
Fluoranthene	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	28.9	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
Fluorene	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	28.7	19.8 U	19.9 U	5.4 J	19.7 U	19.8 U	20 U
Indeno(1,2,3-cd)pyrene	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	19.9 U	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
Naphthalene	--	--	19.7 UJ	20 UJ	19.7 UJ	19.9 U	20 U	20 U	20 U	19.8 UJ	19.9 UJ	20 U	20 U	20 U	20 U	19.7 UJ	19.6 UJ	19.7 UJ	19.8 UJ	8.3 J	6.3 J	11 J	14.7 J	19.7 UJ	19.8 UJ	20 U
Phenanthrene	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	49.2	19.8 U	19.9 U	9.2 J	19.7 U	19.8 U	20 U
Pyrene	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	25	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
Total PAHs	20	17000	39.5 U	39.9 U	39.4 U	39.8 U	40 U	39.9 U	40 U	39.5 U	39.7 U	39.9 U	40 U	40 U	40 U	39.4 U	39.3 U	39.5 U	39.6 U	300.1 J	6.3 J	11 J	29.3 J	39.5 U	39.6 U	40 U
Other Semivolatile Organic Compounds (SVOCs) (µg/kg dry)																										
2-Methylnaphthalene	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	11.3 J	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
Benzyl Alcohol	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	19.9 U	79.5	17.8 J	46.6	19.7 U	19.8 U	20 U
Butylbenzylphthalate	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	19.9 U	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
Diethyl phthalate	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	19.9 U	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
Dimethylphthalate	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	19.9 U	19.8 U	19.9 U	7.7 J	19.7 U	19.8 U	20 U
Hexachlorobenzene	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	19.9 U	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
Hexachlorobutadiene	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	19.9 U	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
N-Nitrosodiphenylamine	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	19.9 U	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
Phthalates (µg/kg dry)																										
Di-n-Butylphthalate	20	380	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	19.9 U	37.7	42.3	34.4	19.7 U	19.8 U	20 U
bis(2-Ethylhexyl)phthalate	100	500	49.3 U	49.9 U	49.2 U	49.8 U	50 U	49.9 U	50 U	49.4 U	49.7 U	49.9 U	50 U	50 U	50 U	49.2 U	49.1 U	49.4 U	49.5 U	49.7 U	49.6 U	49.7 U	49.8 U	49.3 U	49.4 U	50 U
Di-n-Octylphthalate	20	39	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	19.9 U	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
Phenols (µg/kg dry)																										
Phenol	20	120	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	9.2 J	10.6 J	20 U	8.3 J	8.3 J	20 U	19.7 U	19.6 U	19.7 U	19.8 U	43.2	75.1	8.2	16.4 J	11.1 J	13.2 J	20 U
2-Methylphenol	--	--	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	9.8 J	70	19.9 U	19.9 U	19.7 U	19.8 U	20 U
4-Methylphenol	20	260	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	118 J	68.8 J	20 U	19.7 U	19.6 U	19.7 U	17.6 J	300	2680	85.5	191	104	19.8 U	17.4 J
Pentachlorophenol	100	1200	98.7 U	99.8 U	98.4 U	99.6 U	99.9 U	99.8 U	99.9 U	98.8 U	99.4 U	99.8 U	100 U	100 U	100 U	98.5 U	98.2 U	98.7 U	99 U	99.4 U	99.1 U	99.3 U	99.6 U	98.6 U	98.9 U	100 U
Miscellaneous Extractables (µg/kg dry)																										
Benzoic acid	100	2900	197 U	200 U	197 U	199 U	200 U	200 U	200 U	198 U	199 U	200 U	107 J	91.6 J	200 U	197 U	196 U	197 U	198 U	282	787	104 J	233	197 U	198 U	200 U
Carbazole	500	900	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	8.1 J	19.8 U	19.9 U	19.9 U	19.7 U	19.8 U	20 U
Dibenzofuran	20	200	19.7 U	20 U	19.7 U	19.9 U	20 U	20 U	20 U	19.8 U	19.9 U	20 U	20 U	20 U	20 U	19.7 U	19.6 U	19.7 U	19.8 U	16.6 J	19.8 U	19.9 U	6.1 J	19.7 U	19.8 U	20 U

Table 8 - Results of Chemical Analyses

Sample Location	SQL	SL1	DMMU 1A Result Q	DMMU 1B Result Q	DMMU 2A Result Q	DMMU 2B Result Q	DMMU 3A Result Q	DMMU 3B Result Q	DMMU 4A Result Q	DMMU 4B Result Q	DMMU 5A Result Q	DMMU 5B Result Q	DMMU 6 Result Q	DMMU 6 - DUP Result Q	DMMU 7 Result Q	DMMU 8 Result Q	DMMU 9 Result Q	DMMU 10 Result Q	DMMU 11 Result Q	POC Crane Dock Result Q	core POC Cruise Dock Result Q	core POC Grain Elev Result Q	core POC Rec. Dock Result Q	POL DMMU Result Q	RM 118 Placement Site Result Q	RM 144.5 Reference Site Result Q
Chlorinated Pesticides (µg/kg dry)																										
2,4'-DDD	2	310	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4,4'-DDD	2	310	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,4'-DDE	2	21	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4,4'-DDE	2	21	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**0.62** J	1 U	1 U	1 U	1 U	**0.92** J	**1.04**	1 U	**1.35**	**0.75** J	1 U	**0.82** J	1 U
2,4'-DDT	2	100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4,4'-DDT	2	100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dieldrin	2	4.9	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Endrin Ketone	2	8.5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
beta-BHC	--	7.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.55**	0.5 U	0.5 U	0.5 U	0.5 U
Polychlorinated Biphenyls (µg/kg dry)																										
Aroclor 1016	--	--	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Aroclor 1221	--	--	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Aroclor 1232	--	--	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Aroclor 1242	--	--	4 U	**2.9** J	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Aroclor 1248	--	--	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Aroclor 1254	--	--	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	**2** J	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Aroclor 1260	--	--	4 U	**2.7** J	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Total PCB Aroclors	10	110	4 U	**5.6** J	4 U	4 U	4 U	4 U	4 U	4 U	**2** J	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Total Petroleum (mg/kg dry)																										
Diesel Range Organics (C12-C24)	25	340	6.57 U	**12.1**	6.37 U	7.05 U	6.62 U	**7.31**	**8.91**	6.43 U	6.52 U	**9.63**	**28.7**	**32.8**	6.72 U	6.38 U	6.44 U	6.48 U	6.56 U	**21.9**	**46**	**10.6**	**17.8**	**16.9**	6.95 U	**10.2**
Motor Oil Range Organics (C24-C38	50	3600	**14.9**	12.7 U	12.7 U	**21.5**	**23**	**36.4**	**42.2**	**13.7**	13 U	**37.9**	**112**	**110**	**15.1**	12.8 U	12.9 U	**13.4**	**26.8**	**127**	**313**	**83.8**	**166**	**43.5**	**24**	**38.3**
Dioxins/Furans (ng/kg dry)																										
2,3,7,8-TCDD	--	--	0.129 UJ	0.14 UJ	0.105 UJ	0.162 UJ	0.175 UJ	0.155 U	0.184 U	0.108 UJ	0.138 UJ	0.123 U	0.133 U	0.13 U	0.141 U	0.152 UJ	0.129 UJ	0.158 UJ	0.128 UJ	0.125 UJ	0.184 UJ	0.112 UJ	0.121 UJ	0.121 UJ	0.069 UJ	0.142 U
1,2,3,7,8-PeCDD	--	--	0.085 UJ	0.083 UJ	0.081 UJ	0.098 UJ	0.103 UJ	0.114 U	0.152 U	0.089 UJ	0.104 UJ	0.107 U	0.092 U	0.092 U	0.102 U	0.095 UJ	0.081 UJ	0.087 UJ	0.093 UJ	0.111 UJ	0.115 UJ	0.084 UJ	0.136 UJ	0.075 UJ	0.096 UJ	0.154 U
1,2,3,4,7,8-HxCDD	--	--	0.089 UJ	0.081 UJ	0.085 UJ	0.102 UJ	0.104 UJ	0.129 U	0.125 U	0.077 UJ	0.091 UJ	0.095 U	0.116 U	0.125 U	0.13 U	0.11 UJ	0.095 UJ	0.094 UJ	0.074 UJ	0.122 UJ	0.14 UJ	0.089 UJ	0.116 UJ	0.092 UJ	0.079 UJ	0.117 U
1,2,3,6,7,8-HxCDD	--	--	0.081 UJ	0.069 UJ	0.075 UJ	0.099 UJ	0.096 UJ	0.115 U	0.12 U	0.069 UJ	0.08 UJ	0.086 U	0.133 U	0.099 U	0.117 U	0.099 UJ	0.087 UJ	0.085 UJ	0.07 UJ	0.114 UJ	0.129 UJ	0.081 UJ	**0.301** J	0.083 UJ	0.07 UJ	0.099 U
1,2,3,7,8,9-HxCDD	--	--	0.087 UJ	0.077 UJ	0.082 UJ	0.103 UJ	0.102 UJ	0.125 U	0.126 U	0.074 UJ	0.088 UJ	0.093 U	0.11 U	0.123 U	0.126 U	0.107 UJ	0.093 UJ	0.092 UJ	0.133 UJ	0.121 UJ	**0.16** J	0.09 UJ	0.288 UJ	0.09 UJ	0.104 UJ	0.126 U
1,2,3,4,6,7,8-HpCDD	--	--	0.717 UJ	0.434 UJ	0.389 UJ	0.909 UJ	0.567 J	0.878 J	0.925 U	0.636 UJ	0.664 UJ	**1.63** J	**3.47**	**4.27**	0.703 U	0.7 UJ	**2.35** J	**1.2** J	**1.13** J	**6.02** J	2.79 UJ	**3.29** J	**7.86** J	**1.67** J	0.07 UJ	0.069 U
OCDD	--	--	8.01 UJ	3.42 UJ	3.41 UJ	7.1 UJ	5.14 UJ	7.37 U	7.71 U	4.5 UJ	4.69 UJ	**10.5**	**27.2**	**35.5**	7.66 U	5.62 UJ	**40.8** J	9.7 UJ	**11** J	**46.4** J	**22.5** J	**30.7** J	**60.3** J	**16.4** J	0.066 UJ	0.071 U
2,3,7,8-TCDF	--	--	0.1 UJ	0.106 UJ	0.088 UJ	0.145 UJ	0.174 UJ	0.165 U	0.181 U	0.081 UJ	0.097 UJ	0.11 U	0.127 U	0.139 U	0.164 U	0.134 UJ	0.086 UJ	0.104 UJ	0.103 UJ	0.149 UJ	0.153 UJ	0.111 UJ	0.139 UJ	0.093 UJ	0.061 UJ	0.068 U
1,2,3,7,8-PeCDF	--	--	0.098 UJ	0.092 UJ	0.084 UJ	0.113 UJ	0.139 UJ	0.123 U	0.143 U	0.081 UJ	0.082 UJ	0.114 U	0.138 U	0.114 U	0.108 U	0.116 UJ	0.082 UJ	0.082 UJ	0.079 UJ	0.127 UJ	0.136 UJ	0.09 UJ	0.115 UJ	0.091 UJ	0.065 UJ	0.076 U
2,3,4,7,8-PeCDF	--	--	0.085 UJ	0.083 UJ	0.072 UJ	0.098 UJ	0.116 UJ	0.101 U	0.119 U	0.077 UJ	0.073 UJ	0.096 U	0.107 U	0.095 U	0.093 U	0.098 UJ	0.073 UJ	0.072 UJ	0.067 UJ	0.108 UJ	0.11 UJ	0.076 UJ	0.098 UJ	0.082 UJ	0.084 UJ	0.125 U
1,2,3,4,7,8-HxCDF	--	--	0.054 UJ	0.055 UJ	0.068 UJ	0.073 UJ	0.071 UJ	0.077 U	0.082 U	0.077 UJ	0.065 UJ	0.062 U	0.069 U	0.079 U	0.071 U	0.066 UJ	0.06 UJ	0.056 UJ	0.056 UJ	0.08 UJ	0.065 UJ	**0.086** J	**0.167** J	0.061 UJ	0.176 UJ	0.112 U
1,2,3,6,7,8-HxCDF	--	--	0.055 UJ	0.055 UJ	0.066 UJ	0.075 UJ	0.067 UJ	0.079 U	0.082 U	0.07 UJ	0.06 UJ	0.063 U	0.066 U	0.078 U	0.069 U	0.067 UJ	0.061 UJ	0.058 UJ	0.057 UJ	0.078 UJ	0.066 UJ	0.044 UJ	**0.136** J	0.062 UJ	0.081 UJ	0.122 U
2,3,4,6,7,8-HxCDF	--	--	0.057 UJ	0.054 UJ	0.063 UJ	0.073 UJ	0.067 UJ	0.078 U	0.08 U	0.076 UJ	0.06 UJ	0.06 U	0.064 U	0.075 U	0.071 U	0.063 UJ	0.055 UJ	0.054 UJ	0.053 UJ	0.073 UJ	0.072 UJ	0.046 UJ	**0.192** J	0.058 UJ	**0.746** J	0.455 U
1,2,3,7,8,9-HxCDF	--	--	0.065 UJ	0.064 UJ	0.073 UJ	0.08 UJ	0.077 UJ	0.088 U	0.099 U	0.087 UJ	0.074 UJ	0.068 U	0.074 U	0.087 U	0.075 U	0.073 UJ	0.045 UJ	0.055 UJ	0.051 UJ	0.086 UJ	0.082 UJ	0.058 UJ	0.096 UJ	0.054 UJ	0.046 UJ	0.073 U
1,2,3,4,6,7,8-HpCDF	--	--	0.252 UJ	0.119 UJ	0.068 UJ	0.202 UJ	0.183 UJ	0.215 U	0.064 U	0.116 UJ	0.063 UJ	**0.599** J	**0.646** J	**0.823** J	**0.174** J	0.107 UJ	0.286 UJ	**0.201** J	0.252 UJ	1.42 UJ	**0.6** J	0.593 UJ	**1.99** J	**0.431** J	**3.44** J	**2.35** J
1,2,3,4,7,8,9-HpCDF	--	--	0.124 UJ	0.101 UJ	0.11 UJ	0.093 UJ	0.087 UJ	0.132 U	0.09 U	0.108 UJ	0.102 UJ	0.076 U	0.084 U	0.106 U	0.079 U	0.107 UJ	0.062 UJ	0.048 UJ	0.077 UJ	0.115 UJ	0.093 UJ	0.075 UJ	0.132 UJ	0.05 UJ	**1.34** J	**0.798** J
OCDF	--	--	**0.507** J	0.177 UJ	0.168 UJ	0.493 UJ	0.241 UJ	**0.696** J	0.254 U	0.206 UJ	0.138 UJ	**1.33** J	1.69 U	**2.03**	0.246 U	**0.38** J	**0.972** J	**0.372** J	**0.768** J	**3.48** J	**1.23** J	1.92 UJ	**3.98** J	**0.659** J	**27** J	**34.6**
Dioxins/Furans TEQ (U=1/2 EDL)	--	--	**0.16**	**0.16**	**0.14**	**0.19**	**0.21**	**0.21**	**0.24**	**0.15**	**0.17**	**0.19**	**0.22**	**0.23**	**0.19**	**0.18**	**0.18**	**0.18**	**0.17**	**0.26**	**0.25**	**0.19**	**0.37**	**0.17**	**0.19**	**0.23**
Dioxins/Furans TEQ (U=0)	--	--	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.03**	**0.05**	**0.06**	**0.00**	**0.00**	**0.04**	**0.01**	**0.02**	**0.08**	**0.03**	**0.05**	**0.20**	**0.03**	**0.05**	**0.03**

NOTES:

Bold text indicates detected analyte.

green-shaded cell indicates detected concentration exceeds SL1.

orange-shaded DMMUs underwent bioassay testing

DMMU = dredged material management unit;

J = estimated concentration value detected below the reporting limit;

MDL = method detection limit;

MRL = method reporting limit;

mg/kg = milligrams per kilogram;

µg/kg = micrograms per kilogram;

ng/kg = nanogram per kilogram;

SQL = sample quantitation level;

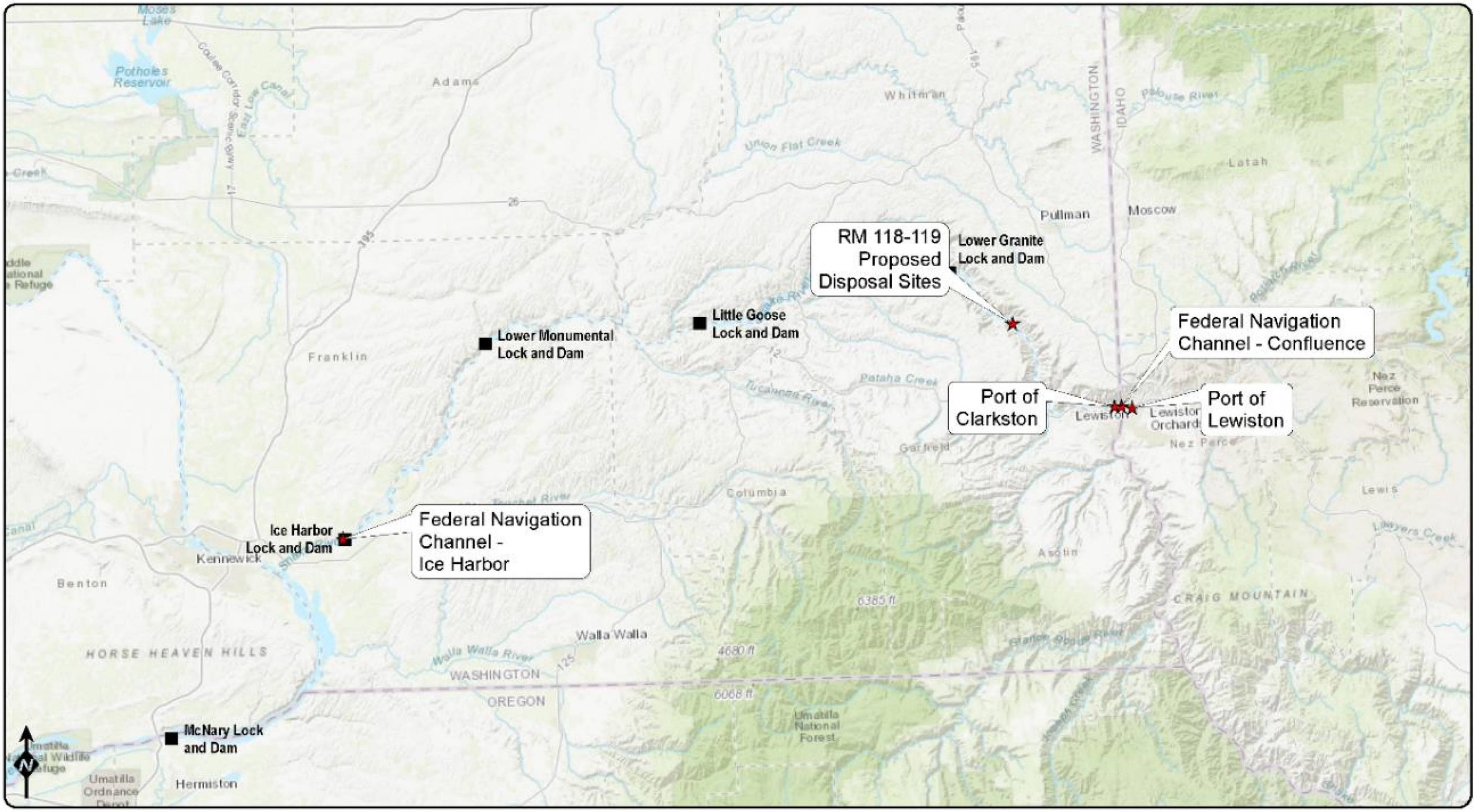
U = this analyte is not detected, reported at the limit of quantitation

Table 9. Bioassay Performance Standards and Interpretation Guidelines

Test	Performance Standard		Screening Level 1 (SL1)	Screening Level 2 (SL2)
	Control	Reference		
Hyalella azteca **10-day mortality**	Mortality ≤ 20%	Mortality ≤ 25%	Mortality >15% over reference **and** M_C vs M_T significantly different ($p = 0.05$)	Mortality >25% over reference **and** M_C vs M_T significantly different ($p = 0.05$)
Chironomus dilutus **20-day mortality**	Mortality ≤ 32%	Mortality ≤ 35%	Mortality >15% over reference **and** M_C vs M_T significantly different ($p = 0.05$)	Mortality >25% over reference **and** M_C vs M_T significantly different ($p = 0.05$)
Chironomus dilutus **20-day growth**	MIG ≥ 0.60 mg/day	MIG ≥ 80 percent of the control sediment	MIG_R-MIG_T/MIG_R >25% **and** MIG_R vs MIT_T significantly different ($p = 0.05$)	MIG_R-MIG_T/MIG_R >40% **and** MIG_R vs MIT_T significantly different ($p = 0.05$)

Table 10. Bioassay Performance and Results

***Hyallela azteca 10-day* mortality results**						
Sample	**% fines**	**Mean mortality (%)**	**Control Performance Standard C ≤ 20%**	**Reference Performance Standard R ≤ 25%**	**SL1: T-R >15% *and* T vs. R SS**	**SL2: T-R >25% *and* T vs. R SS**
Lab Control (C)	NA	10.0	acceptable			
Reference (SR mile 144.5)	25	2.5		acceptable		
POC Crane Dock	21	7.5			5.0%	5.0%
POC Cruise Dock	7.2	16.2			13.7%	13.7%
***Chironomus dilutus* 20-day mortality results**						
Sample	**% fines**	**Mean mortality (%)**	**Control Performance Standard C ≤ 32%**	**Reference Performance Standard R ≤ 35%**	**SL1: T-R >15% *and* T vs. R SS**	**SL2: T-R >25% *and* T vs. R SS**
Lab Control (C)	NA	10.4	acceptable			
Reference (SR mile 144.5)	25	21.9		acceptable		
POC Crane Dock	21	20.8			-1.1%	-1.1%
POC Cruise Dock	7.2	25.0			3.1%	3.1%
***Chironomus dilutus* 20-day growth results**						
Sample	**% fines**	**Growth - mean AFDW per survivor (mg)**	**Control Performance Standard C ≥ 0.60 mg/ind**	**Reference Performance Standard R/C ≥ 0.8**	**SL1: (R-T)/R >25% *and* T vs. R SS**	**SL2: R-T/C >40% *and* T vs. R SS**
Lab Control (C)	NA	1.827	acceptable			
Reference (SR mile 144.5)	25	2.641		1.4		
POC Crane Dock	21	2.058			22.1%	22.1%
POC Cruise Dock	7.2	2.792			-5.7%	-5.7%



Project Overview

Vicinity of the Lower Snake River

Channel Maintenance

DATE	9/19/2018
DESIGNED	REDAR
DRAWN	REDAR
CHECKED	(who reviewed this map product)

U.S. Army Corps of Engineers
Northwest Division
Walla Walla District

SCALE

LEGEND

★ Maintenance Locations

■ Lower Snake River Projects

Figure 1. Project Overview

N
W E
S

0 2 4
Miles

Lower Snake/Clearwater River 2019 Channel Maintenance Report
Sampling and Analysis Results

VICINITY MAP

March 2020

103230-005

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 1

Figure 2. Project vicinity including reference site and proposed dredged material placement site.

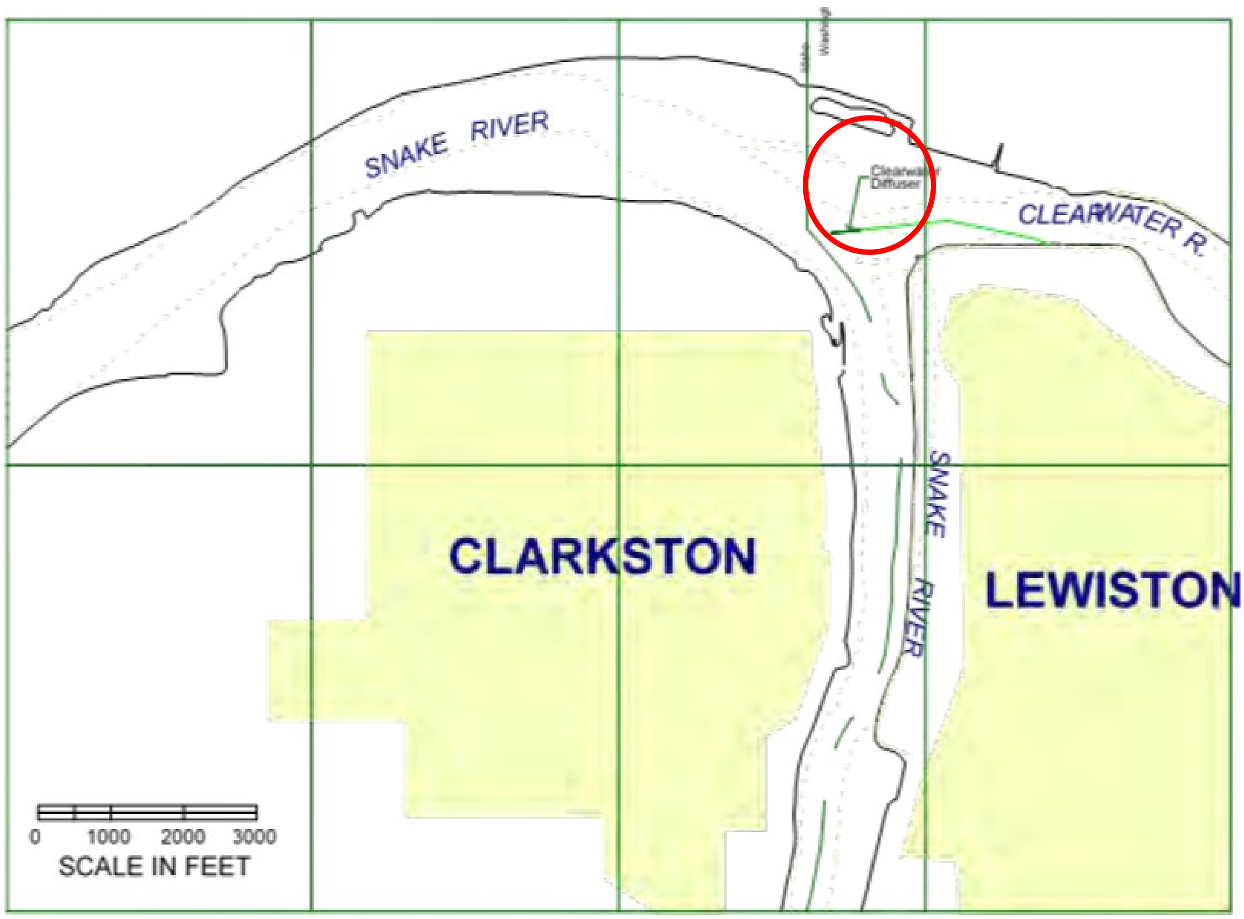


Figure 3. Location of Clearwater Paper outfall. Modified from EPA 2019.

Federal Navigation Channel
Ice Harbor Maintenance Area

Vicinity of the Lower Snake River

DATE	9/26/2016
DESIGNED	REDAR
DRAWN	REDAR
CHECKED	(who reviewed this map product)

U.S. Army Corps of Engineers
Northwest Division
Walla Walla District

SCALE

LEGEND

Maintenance Area

Figure 4. Ice Harbor DMMU.

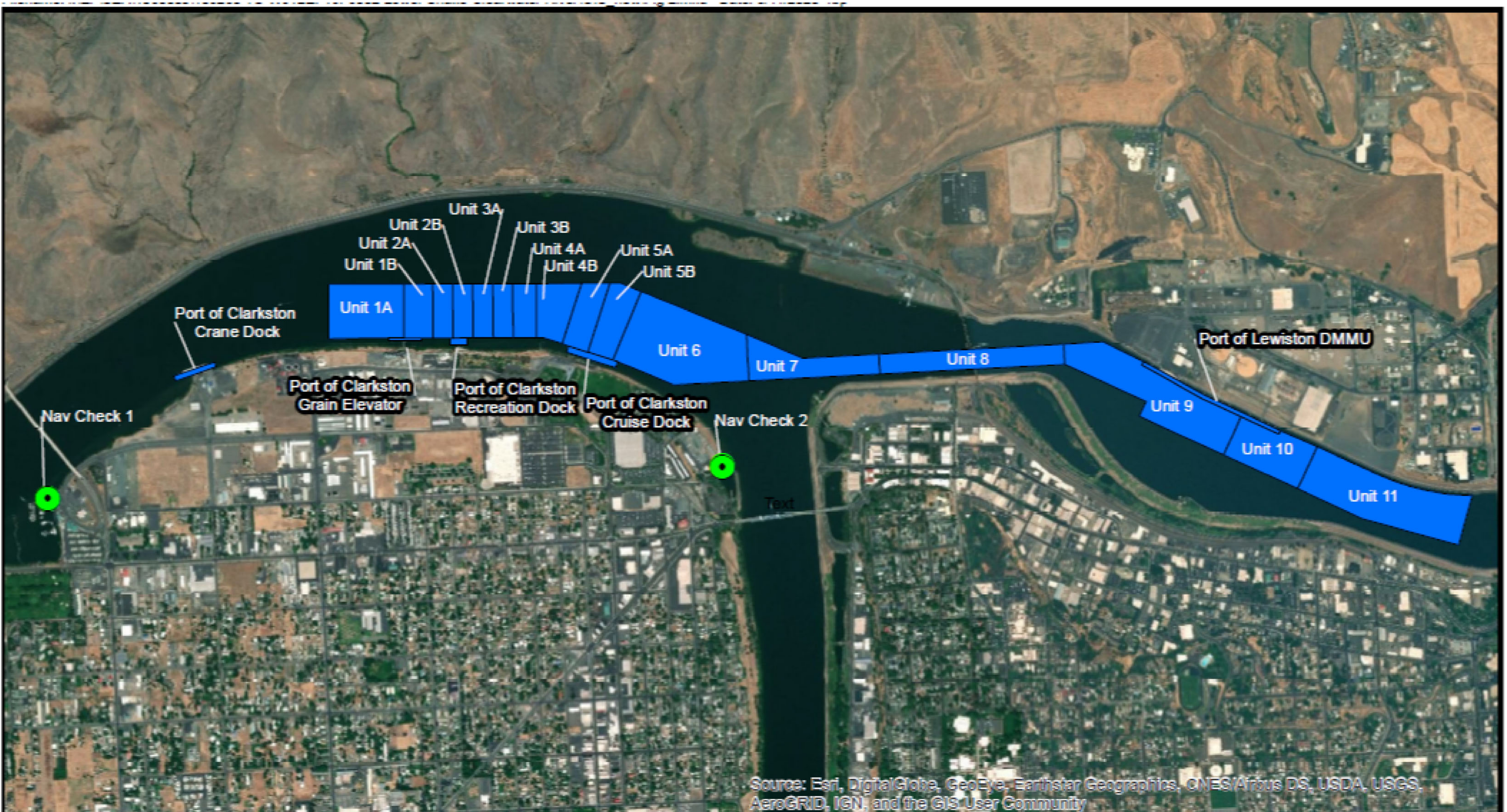


Figure 5. Overview of DMMUs (except Ice Harbor).

Legend

Dredge Units

N W E S

0 1,000 2,000

Feet

Lower Snake/Clearwater River 2019 Channel Maintenance Report
Sampling and Analysis Results

OVERVIEW OF DREDGE UNITS

March 2020

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FIG. 2