PRELIMINARY ASSESSMENT FOR MAINTENANCE DREDGING SEARSPORT HARBOR FEDERAL NAVIGATION PROJECT - SEARSPORT, MAINE

APPENDIX C

SUITABILITY DETERMINATIONS

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

5 POST OFFICE SQUARE SUITE 100

BOSTON, MASSACHUSETTS 02109-3912

May 23, 2022

Mr. Joseph B. Mackay
U.S. Army Corps of Engineers
New England District
696 Virginia Road, Concord, MA
01742-2751

Re: Section 404 Evaluation of the Final Suitability Determination for the Maintenance Dredging of the Searsport Harbor Federal Navigation Project (FNP) and Construction of a Confined Aquatic Disposal (CAD) Cell, Searsport ME

Dear Mr. Mackay,

I am writing in response to your submittal of the Final Suitability Determination (SD) transmitted on May 20, 2022 for the above referenced project. The EPA Ocean Dumping Program has reviewed the evaluation and testing requirements for the proposed dredged material disposal project pursuant to Section 404 of the Clean Water Act (CWA).

Project Summary: The USACE is proposing to perform maintenance dredging of the Searsport Harbor FNP in the upper portion of Penobscot Bay. A 2015 suitability determination identified the approximately 22,000 cubic yards of maintenance material as unsuitable for unconfined open water disposal. Additional sampling and analysis of the material was performed in 2017 to provide additional information in anticipation that the dredged material would be disposed at an upland location. Since that time, the USACE has expanded the disposal alternatives in the project Preliminary Assessment to include construction of/disposal into a CAD cell within Searsport Harbor which is the subject of this current 2022 suitability determination.

The proposed CAD cell is located just west of the upper portion of the FNP. Approximately 50,000 cubic yards of material would be mechanically dredged to construct the CAD cell to a depth of approximately 75 ft MLLW. Sampling and testing performed in 2021 identified limited elevated concentrations of mercury and PAHs in the upper 1 to 2 ft of sediment with low concentrations in the underlying silty sand that is considered native material. The USACE is proposing to conservatively strip off the upper 3 ft over the CAD cell and hold it as unsuitable for later disposal into the completed CAD cell. The potential for water column impacts from disposal of this material into the CAD cell was evaluated along with the CAD cell disposal of unsuitable maintenance material from the FNP. Disposal of the underlying suitable material dredged during CAD construction is proposed at the Rockland Disposal Site.

EPA has completed an evaluation of the project in accordance with CWA Section 404. This included a review of the physical and chemical sediment data collected from the four locations across the CAD cell footprint as well as the data for the maintenance dredged material collected in previous sampling and testing. Based on this evaluation, EPA concurs with the findings of NAE's May 16, 2022 Final SD that the upper 3 ft of material over the CAD cell footprint be considered unsuitable for unconfined open water disposal but that this material along with the FNP maintenance material could be disposed into the constructed CAD cell and effectively isolated as

specified in 40 CFR 230.72. Additionally, the underlying subsurface material dredged during construction of the CAD cell is suitable for unconfined open water disposal at the Rockland Disposal Site. However, given the high quality of the subsurface material, EPA strongly encourages evaluation of potential beneficial use alternatives for this material.

If you have additional questions, please contact Steve Wolf of my staff at (617) 918-1617.

Sincerely,

Lyons, Regina Digitally signed by Lyons, Regina
Date: 2022.05.23 15:32:30 -04'00'

Regina Lyons, Chief
National Estuary Program and Marine Protection Section

cc: Aaron Hopkins, USACE NAE
Steve Wolf, USEPA

CENAE-PDE **16 May 2022**

FINAL Supplemental Suitability Determination for Maintenance Dredging of the Searsport Harbor Federal Navigation Project and Construction of a Confined Aquatic Disposal Cell, Searsport, Maine

Summary:
This determination addresses the suitability of shoaled sediments within the Searsport Harbor Federal Navigation Project (FNP) for disposal into a proposed confined aquatic disposal (CAD) cell in Searsport, Maine. Additionally, this document addresses the suitability of sediments within the proposed CAD cell footprint for unconfined open water placement at the Rockland Disposal Site (RDS). Based on the field and laboratory data presented for this project, the New England District (NAE) of the US Army Corps of Engineers (USACE) finds that only the subsurface sediments in the vicinity of the proposed CAD cell are suitable for unconfined open water placement at RDS. The surficial three feet of sediments within the CAD cell footprint are unsuitable for unconfined open water disposal at RDS, however, this material and the shoaled sediments from the FNP are suitable for disposal into the proposed CAD cell based on Clean Water Act (CWA) 404(b)(1) guidelines.

1. Project Description:

USACE is proposing to dredge approximately 22,000 cubic yards of mixed sand and fine grained sediments from shoaled areas totaling six acres within the entrance channel and turning basin of the Searsport Harbor FNP located in Searsport, Maine (Figure 1). These areas will be dredged to the authorized project depth of 35 feet at mean lower low water (MLLW) plus allowable overdepth.

In 2015 USACE prepared a supplementary suitability determination for a proposed navigation improvement project for Searsport Harbor that found areas of the surficial sediment within the dredge footprint to be unsuitable for unconfined open water disposal in Penobscot Bay (USACE, 2015). Because the shoals to be dredged during the upcoming maintenance cycle are located within the area that was identified as unsuitable in 2015, a 2017 sampling and analysis plan (SAP) for the maintenance material anticipated that the sediments would be placed at one of several upland sites within the town of Searsport. Since that time USACE has expanded the disposal alternatives in the project Preliminary Assessment (PA) to include a CAD cell within the harbor.

The proposed CAD cell alternative involves the removal of approximately 50,000 cubic yards of sand and silt from a two acre footprint located to the northwest of the FNP (Figure 1). The CAD cell would be mechanically excavated to a depth of

75 feet (MLLW). Suitable sediments from the excavated footprint would be placed at RDS. Any unsuitable material from the CAD cell footprint would be retained on scows and placed into the CAD cell along with the maintenance material from the FNP.

2. Conceptual Site Model:

USACE reviewed historic testing data, previous environmental assessments, water quality data, and adjacent land use information to develop a conceptual site model (CSM) for the Searsport Harbor maintenance dredging project (Figure 2). This CSM was used to characterize the system and to identify potential sources of contamination, site-specific contaminants of concern, exposure pathways, and biological receptors in order to inform this suitability determination.

Searsport Harbor is located at the mouth of the Penobscot River in the northern portion of Penobscot Bay. The FNP in Searsport Harbor consists of an entrance channel and turning basin that is 500-foot wide, 3,500 feet long, and 35 feet deep (MLLW). The entrance channel flares out to form a turning basin that is 1,500 feet wide and 35 feet deep (MLLW) in the inner harbor adjacent to Mack Point. Searsport Harbor is the largest deep draft commercial port north of Portland, Maine. The State Pier at Mack Point handles aggregates, forest products and other bulk cargos. The Sprague Energy terminal is located immediately to the west of the State Pier and handles petroleum and other liquid bulk products. Land use adjacent to the harbor is primarily commercial with the exception of the largely undeveloped Sears Island located to the east. No maintenance dredging has been required in Searsport Harbor since the construction of the FNP in 1964 when 487,500 cubic yards of material was mechanically removed and placed at the Belfast Bay Disposal Site (BDS).

Water quality in Searsport Harbor is dictated primarily by tidal exchange with Penobscot Bay with freshwater input from the Penobscot River to the northeast. The State of Maine classifies the waters of Searsport Harbor as Class SC. Class SC waters are suitable for recreation in and on the water, fishing, aquaculture, propagation and restricted harvesting of shellfish, industrial process and cooling water supply, hydroelectric power generation, navigation, and as habitat for fish and other estuarine and marine life. Shellfish harvesting is prohibited in Searsport Harbor, except for a small area just west of the Sears Island causeway which is classified as "Restricted". "Restricted" areas require a special permit from the Department of Marine Resources (DMR Regulation 95.08 D, Closed Area No. 33, Searsport).

Potential sources of contamination in the harbor include releases of petroleum products from the terminal facility at Mack Point, dioxins from papermills located

along the Penobscot River, and mercury from the HoltraChem superfund site located approximately 18 miles upstream. A search of the Maine Department of Environmental Protection (MEDEP) spill database (www.maine.gov/dep/maps-data/egad/index.html) and communication with local officials documented multiple releases of petroleum products in the vicinity of Mack Point prior to 2008 but found no spills after that date. Elevated dioxin concentrations are a general concern in regions with a history of paper manufacturing due to the use of chlorine as a wood pulp bleaching agent. Dioxin is listed as an impairment for the Penobscot River in the in MEDEP § 303(d) list published in 2018.

The HoltraChem plant in Orrington, ME was responsible for the discharge of 6 to 12 metric tons of mercury into the Penobscot River in the late 1960s and early 1970's. An independent study of the mercury contamination known as the Penobscot River Mercury Study (PRMS) was conducted as a result of the 2003 trial between HoltraChem and the Maine People's Alliance with the Natural Resources Defense Council (PRMSP, 2013). The study concluded that mercury contamination was widespread within the surficial sediments in the upper portion of Penobscot Bay with the peak concentrations generally limited to the upper one foot of sediment. The study found that mercury concentrations decreased significantly by a depth of two feet below the water-sediment interface and recommended a target total mercury cleanup concentration of 0.450 mg/kg for sediments in the upper estuary.

In 2000 USACE began studying the feasibility of constructing a navigation improvement project that would enable larger cargo vessels to access the berths at Mack Point. This study resulted in multiple rounds of sediment sampling and testing to evaluate the dredge material for multiple placement sites in Penobscot Bay including BDS, RDS, and the Penobscot Bay Disposal Site (PBDS).

An initial suitability determination prepared by USACE in 2009 found the sediments from the proposed improvement project to be suitable for placement at BDS, RDS, and PBDS (USACE, 2009). This finding was based on a comparison of data from surficial sediment samples collected at each disposal area reference site, and four composite samples collected from 10 locations within the proposed improvement project footprint (Figure 3). A second round of sampling and testing was performed in 2015 based on concerns about the extent of mercury contamination in Penobscot Bay following the release of the Penobscot River Mercury Study in 2013 (Rudd, 2013). This effort also involved the collection of sediment cores from 10 locations within the improvement project footprint (Figure 3) but with discrete analysis of sediments from subsamples taken from the top foot and underlying dredge interval within each core. The resulting supplemental suitability determination found that sediments from the surficial

interval at a subset of core locations (A, F, and J on Figure 3) were unsuitable for unconfined open water placement in Penobscot Bay based on elevated concentrations of individual metals and polycyclic aromatic hydrocarbons (PAHs) relative to the concentrations measured at the proposed disposal area reference sites and the most conservative sediment quality guidelines (USACE, 2015). It should be noted that all of the project area mercury concentrations were well below the target total mercury cleanup concentration of 0.450 mg/kg recommended by the PRMS. A summary of the bulk sediment chemistry data used to support the 2009 and 2015 suitability determinations is presented in Table 1.

As part of the 2015 effort USACE also collected sediment and water from a subset of the sample locations for elutriate preparation and metals analysis. The concentrations of all analyzed metals in the elutriate samples were below the state water quality criteria with the exception of arsenic at two stations (F and J), which would require only minimal mixing to attain compliance with the state water quality criteria. A summary of the 2015 elutriate chemistry is presented in Table 2.

The Rockland Disposal site is regularly monitored by the NAE Disposal Area Monitoring System (DAMOS) Program. The most recent DAMOS report on RDS was based on a 2016 survey of the site (Guarinello et al 2017).

Based on the site characteristics and the available testing data outlined above, the Searsport Harbor maintenance dredging project was given a moderate risk ranking according to the following matrix.

Project Risk Ranking

Rank	Guidelines
Low	Few or no sources of contamination. Data available to verify no significant potential for adverse biological effects.
Low-Moderate	Few or no sources of contamination but existing data is insufficient to confirm ranking.
Moderate	Contamination sources exist within the vicinity of the project with the potential to produce chemical concentrations that may cause adverse biological effects.
High	Known sources of contamination within the project area and historical data exists that has previously failed biological testing.

Table 1: Summary of 2008 and 2015 Bulk Sediment Chemistry

Sample ID	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total LMW PAHs	Total HMW PAHs	Total PCBs	Total DDX
2008 Samples												
A, B, C	15.8	0.091	81.8	17.0	18.3	0.129	36.9	97.7	88.3	491	12.6	0.77
D, F	18.0	0.172	75.7	16.2	15.7	0.110	34.0	89.0	151	723	12.8	0.73
E, G, H, I	14.9	0.118	63.3	15.8	11.4	0.044	30.5	65.0	35.1	161	10.2	0.69
J	17.0	0.159	47.4	8.76	10.1	0.042	19.8	48.4	121	446	8.12	0.67
2015 Samples												
A 0-1.0'	11.5	0.081	39.6	15.8	17.7	0.216	28.2	70.3	233	1073	-	-
B 0-1.0'	10.8	0.071	34.9	12.7	13.7	0.068	28.3	66.6	215	879	-	-
B 1.0-3.0'	8.94	0.067	32.1	9.71	7.89	0.026 (U)	25.2	59.4	24.7	41.2	-	-
C 0-1.0'	10.8	0.075	34.2	12.0	11.8	0.059	27.4	64.0	51.1	319	-	-
C 3.0-5.0'	11.6	0.093	37.1	11.2	11.6	0.031 (U)	29.8	68.5	23.3	38.9	-	-
E 0-1.0'	8.73	0.146	19.5	8.86	5.58	0.019 (U)	17.6	34.6	20.3	33.9	-	-
E 1.0-3.0'	8.62	0.037	20.1	11.9	6.27	0.02 (U)	18.4	32.5	31.8	53.0	-	-
F 0-1.0'	12.4	0.187	37.7	16.8	17.4	0.244	26.6	70.3	356	1788	-	-
F 3.0-4.0'	18.6	0.069	27.2	11.8	7.61	0.025 (U)	26.1	49.4	18.2	40.4	-	-
G 0-1.0'	9.25	0.038	23.3	13.6	9.22	0.017 (U)	27.0	45.9	27.2	228	-	-
G 3.0-5.0'	10.6	0.033	27.8	16.2	10.9	0.018 (U)	32.1	51.4	27.0	45.0	-	-
I 0-1.0'	11.4	0.107	33.4	12.7	13.0	0.038	27.2	63.1	70.7	352	-	-
J 0-1.0'	10.4	0.314	26.8	24.2	28.4	0.185	20.4	71.2	1668	5081	-	-
J 2.0-2.6'	5.79	0.142	15.5	7.11	6.14	0.020	12.1	34.5	84.8	326	-	-
L 0-1.0'	12.8	0.085	37.0	12.6	11.9	0.065	29.7	66.8	59.8	297	-	-
L 1.0-3.0'	11.8	0.089	37.0	11.6	9.11	0.025 (U)	29.5	67.4	26.9	40.3	-	-
L 3.0-5.0'	9.59	0.072	28.5	9.17	7.34	0.025 (U)	24.0	54.0	22.1	36.9	-	-
P 0-1.0'	12.5	0.125	32.3	11.4	8.90	0.028 (U)	25.2	58.2	69.0	293	-	-
P 1.0-5.7'	12.0	0.084	26.7	11.4	6.76	0.019 (U)	24.9	46.6	17.1	28.6	-	-
P 5.7-6.7'	5.89	0.018	32.0	17.2	9.96	0.016 (U)	33.6	56.2	29.3	48.8	-	-
Sediment Quality Guidelines												
ERL	8.2	1.2	81	34	46.7	0.15	20.9	150	552	1700	22.7	1.58
ERM	70	9.6	370	270	218	0.71	51.6	410	3160	9600	180	46.1

Units of measure are mg/kg for metals and ug/kg for organic compounds
ERL: Effects Range Low (Yellow highlight indicates an exceedance of the ERL)
ERM: Effects Range Median (Red highlight indicates an exceedance of the ERM)
U: Analyte not detected above project reporting limits (RL), reported as the RL and qualified with a "U"

Table 2: Summary of 2015 Elutriate Chemistry

Station Name	A	F	G	J	L
Arsenic	0.012	0.08	0.007	0.015	0.084
Cadmium	0.002 (U)	0.002 (U)	0.003 (U)	0.002 (U)	0.002 (U)
Chromium IV	0.01 (U)	0.01 (U)	0.01 (U)	0.01 (U)	0.01 (U)
Copper	0.01 (U)	0.01 (U)	0.01 (U)	0.01 (U)	0.01 (U)
Lead	0.01 (U)	0.01 (U)	0.01 (U)	0.01 (U)	0.01 (U)
Mercury	0.018	0.009	0.001	0.014	0.001
Nickel	0.005 (U)	0.005 (U)	0.007 (U)	0.005 (U)	0.005 (U)
Selenium	0.001 (U)	0.001 (U)	0.001 (U)	0.001 (U)	0.001 (U)
Silver	0.004 (U)	0.005 (U)	0.005 (U)	0.004 (U)	0.004 (U)
Zinc	0.1 (U)	0.1 (U)	0.1 (U)	0.1 (U)	0.1 (U)

Units of measure are mg/l for all samples
All elutriate samples were analyzed in triplicate; values reported are the average result
U: Not detected; all replicates below sample specific MDL, value reported is the adjusted project reporting limit

3. Sampling, Testing, and Analysis:

2017 Sampling Effort

On 5 October 2017 USACE collected sediment core samples from six locations (Figure 1) within the proposed maintenance dredging footprint to evaluate the material for placement at an upland site in the town of Searsport. This effort was coordinated with the MEDEP Solid Waste Division and included an expanded suite of analytes to meet the requirements of the State's Chapter 418 solid waste management rules. Each core was examined and logged in accordance with ASTM D 2488 before the material from the proposed dredge interval was subsampled for physical and chemical analysis. A composite of the entire dredge interval within each core was sampled for grain size, total organic carbon, total metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides, dioxins, and toxicity characteristic leaching procedure (TCLP) testing with metals analysis. Additionally, subsamples for total mercury analysis were collected in one foot intervals along the length of the dredge interval within each core.

All samples were analyzed in accordance with the project sampling and analysis plan with the exception of the dioxin analysis. Dioxin samples from three core locations were selected for analysis at a MEDEP approved laboratory. Based on the levels measured in these samples, USACE and MEDEP decided to forego analysis of the three remaining dioxin samples and to remove dioxin as a contaminant of concern for the project. TCLP testing was not required because the total metals concentrations in the project area sediments were all below the theoretical concentrations at which TCLP criteria might be exceeded.

While the 2017 sampling effort was conducted to support the upland placement alternatives under consideration at that time; these data are also appropriate for evaluating the proposed CAD cell disposal alternative for the FNP maintenance material. To examine the sediment concentrations in an ecologically meaningful context, USACE used Sediment Quality Guidelines (SQGs) to screen the chemical concentrations found in the sediment samples from the Searsport Harbor FNP. Applicable SQG screening values for marine and estuarine sediments are the NOAA ERL and ERM. It is important to understand that these values were not derived as toxicity pass-fail thresholds. Rather, ERL and ERM values are empirically derived guidelines based on a large number of studies nationwide that identify contaminant levels that indicate probability of toxic

effects to inform decision making (Long et al., 1998). Effects are considered unlikely at concentrations below the ERL with an increased probability of toxic effects as concentrations increase. At concentrations above the ERM, toxic effects are considered likely. For samples with sediment concentrations that fall between the ERL and ERM levels, consideration is given to both the number of contaminants that exceed ERL values and where the concentrations fall in the range between ERL and ERM values in assessing the probability of toxic effects and the potential need for additional testing.

Arsenic and nickel were detected at concentrations greater than the ERL, but well below the ERM, in all sample stations. Mercury was not detected above the method reporting limit in the composite samples or any of the one-foot subsamples collected from stations A or E. Mercury was detected above the reporting limit, but below the ERL, in the station B composite sample but was not detected above the method reporting limit in any of the one-foot subsamples from that station. At stations C, D, and F, mercury was detected above the ERL, but below the ERM, in the composite samples and the subsamples collected within three feet of the sediment surface. The peak mercury concentration was in the 2-3 foot interval at stations C and D and in the 0-1 foot interval at station F. Mercury concentrations in these subsamples exceeded the PRMS target cleanup level in the 2-3 foot interval from station C and as well as the 1-2 and 2-3 foot intervals from station D. Mercury was either not detected or was detected at concentrations below the ERL in the deeper subsamples collected from more than three feet below the sediment surface at these stations. All other metals were either not detected or were detected at concentrations less than the ERL.

All PAHs were detected at concentrations less than the ERL with the exception of fluorene at station D which was just above the ERL. Total low molecular weight (LMW) PAHs and high molecular weight (HMW) PAHs were below the ERL at all sample locations. PCBs were not detected above the method reporting limits in any sample. The concentration of total DDx, the sum of the pesticides 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT, was greater than the ERL but not approaching the ERM at stations C, D, and F. In addition, 4,4'-DDT was detected at concentrations just above the ERL in stations D and F and dieldrin was also above the ERL at station F. All other pesticides were either not detected or detected at concentrations less than the ERL.

Core logs and photos are provided in Appendix A and the complete bulk sediment chemistry results, including mercury subsampling, can be found in Appendix B.

2021 Sampling Effort

On 13 October 2021 USACE completed a sampling and analysis effort to characterize the material in the vicinity of the proposed CAD cell footprint for placement at RDS. This effort was conducted to evaluate the feasibility of CAD cell construction in the area to the northwest of the FNP.

To support this study sediment cores from six locations within the proposed CAD cell footprint (stations SPC-A through SPC-F on Figure 1) were collected to a maximum depth of eight feet below the water-sediment interface. This length was determined to be sufficient because the previous coring efforts to support the navigation improvement project, and the results of a USACE sub-bottom profiler survey conducted in 2007, indicated that the transition to native sediments beyond the extent of anthropogenic influence occurs within this depth range. As in 2017, each core was examined and logged in accordance with ASTM D 2488 before being subsampled based on lithology and physical properties. Subsamples of the surficial interval within each core consisting of unconsolidated organic silt and the more consolidated underlying material were analyzed separately for the standard suite of contaminants specified in the *Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters* (RIM) (USEPA/USACE, 2004).

The cores collected from the southern portion of the preliminary CAD cell footprint (SPC-E and SPC-F) met shallow refusal due to the presence of coal slag. As a result of this sampling effort, the CAD cell footprint was refined to cover a smaller area characterized by stations SPC-A through SPC-D (Figure 1) so the results from stations SPC-E and SPC-F are not included in this evaluation.

Similar to the samples collected in 2017, arsenic and nickel were detected at concentrations above the ERL, but well below the ERM, at all CAD cell sample locations. Mercury was detected at concentrations below the ERL in all subsurface samples and the surficial sample from station SPC-A. Mercury was detected in concentrations above the ERL, but below both the ERM and the PRMS target cleanup level, in the surficial samples at stations SPC-B, SPC-C, and SPC-D. All other analyzed metals were less than the ERL at all locations.

Fluorene was detected at concentrations up to 2 times the ERL in the surface samples taken at stations SPC-B, SPC-C, and SPC-D but was an order of magnitude lower than the ERM. Total HMW PAHs were also slightly greater than

the ERL in the surface sample at station SPC-C. All other PAHs were either not detected or were detected at concentrations less than the ERL at all locations. PCBs and pesticides were not detected at concentrations above the reporting limit in any sample from the proposed CAD cell area.

Core logs and photos are provided in Appendix A and the complete bulk sediment chemistry results can be found in Appendix B.

Evaluating Impacts to the Water Column

Following the methodology outlined in the Inland Testing Manual (USEPA/USACE, 1998), USACE evaluated the potential impacts to the water column from the discharge of dredged material at RDS and into the proposed CAD cell. To determine if the discharge would comply with the State of Maine's Water Quality Criteria (WQC), USACE utilized the Short-Term Fate (STFATE) numerical model to analyze the disposal cloud as it descends through the water column after release from a scow.

Based on the 2021 bulk sediment chemistry results for the subsurface material in the revised CAD cell footprint, the water column modeling showed that all COCs comply with the WQC and no adverse impacts to the water column are expected during disposal of this material at RDS. Based on the 2017 bulk sediment chemistry concentrations in the FNP maintenance material, and the 2021 bulk sediment chemistry concentrations in the surficial material from the revised CAD cell footprint, the discharge of this material into the CAD cell also complies with the WQC with the exception of arsenic and mercury. However, arsenic concentrations measured in the 2017 and 2021 samples were lower than arsenic concentrations measured during the 2015 sampling event. In 2015 the samples were used to create elutriates and subsequent STFATE modeling based on the maximum arsenic elutriate concentration complies with the WQC and serve as a conservative estimate of potential arsenic impacts from the 2017 and 2021 samples.

The maximum mercury concentrations measured in the FNP maintenance material in 2017 and measured in the surficial material from the revised CAD cell footprint in 2021, exceeded the concentrations measured in 2015. However, using the relationship of bulk sediment mercury concentration to elutriate concentration from the 2015 data as an indicator, the predicted mercury elutriate concentrations based on the 2017 and 2021 results are expected to attain WQC during discharge into the proposed CAD cell.

4. Suitability Determination:

Based on the weight of evidence including the conceptual site model, the results of previous investigations, bulk sediment chemistry data, and subsequent water column modeling, the subsurface material (deeper than three feet) tested in 2021 from the proposed CAD cell area is considered suitable for unconfined open water placement at RDS according to the testing and evaluation requirements set forth in Section 404 of the CWA. The deeper underlying material in the vicinity of the Searsport Harbor FNP, and therefore also in the adjacent CAD cell area, consists of native material that has not been exposed to anthropogenic sources of contamination, with contaminant concentrations at or below the proposed disposal site, and is also acceptable for open water placement at RDS (USACE, 2015).

The surficial three feet of sediments within the proposed CAD cell area is not suitable for unconfined open water placement at RDS. USACE made this determination based on the weight of evidence from the 2021 CAD cell sediment samples and depth of the peak mercury concentrations in the 2017 mercury analysis subsamples from the adjacent FNP. This material, along with the maintenance material from the Searsport Harbor FNP, can be effectively isolated according to 40 CFR 230.72 through disposal and containment in the proposed CAD cell. The discharge of this dredged material is expected to comply with the State WQC during disposal into the CAD cell based on existing data, however, elutriate samples will be prepared from these areas for confirmation prior to dredging.

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Helen A. Jones
Technical Specialist
Dredged Material Management Team
USACE-New England District

Joseph B. Mackay
Chief
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USACE-New England District

5. References:

Guarinello, M., Lefkovitz, L.F, Pala, S.L. 2017. Monitoring Survey at the Rockland Disposal Site, September 2016. DAMOS Contribution No. 204. U.S. Army Corps of Engineers, New England District, Concord, MA, 147 pp.

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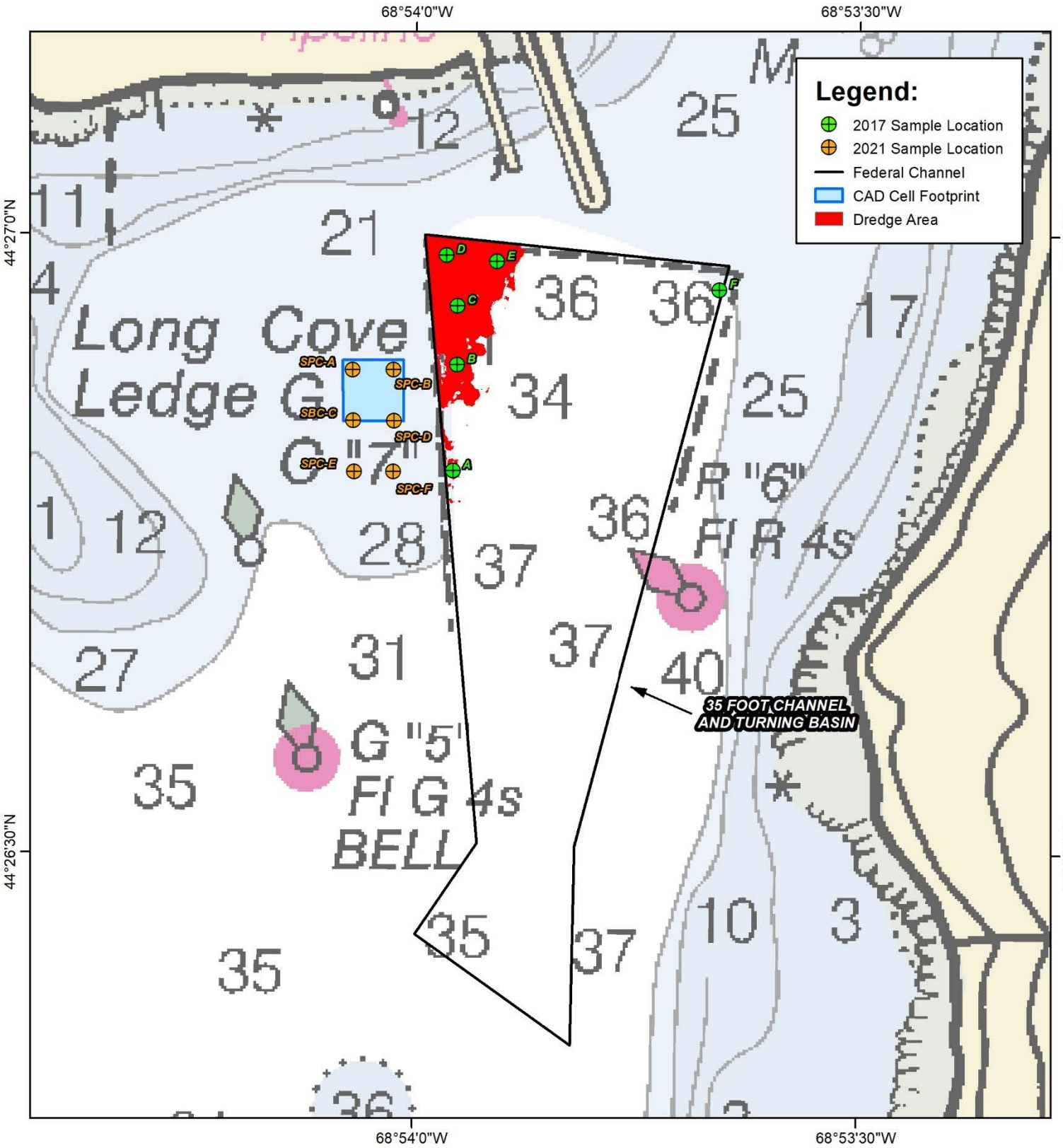


US Army Corps of Engineers
New England District

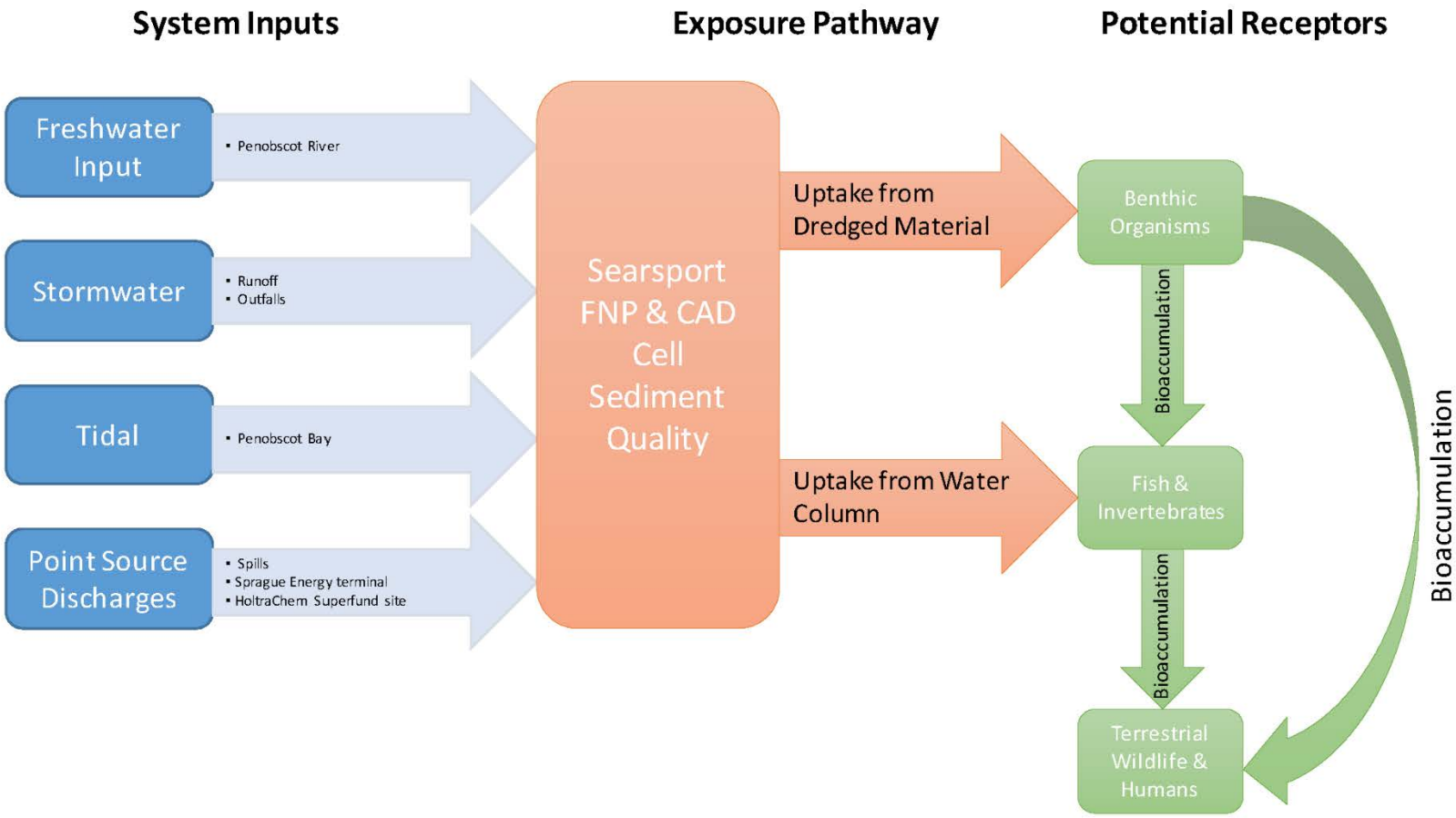
FIGURE 1:
SEARSPORT HARBOR, SEARSPORT, ME
2017-2021 SAMPLE LOCATIONS

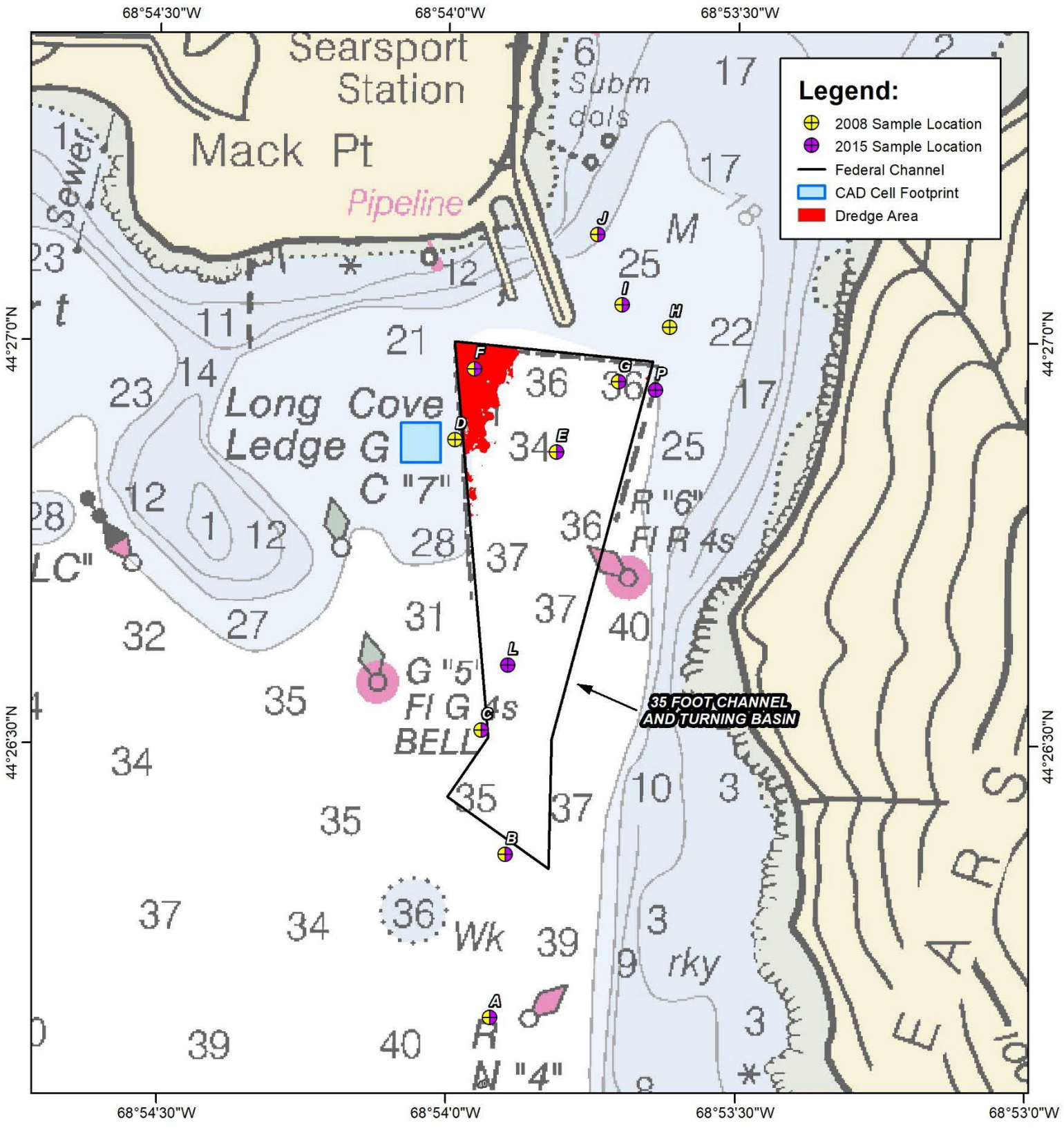
0 500 1,000 1,500 Feet
0 100 200 300 400 500 Meters
1:8,000

NOAA CHART 13309

GCS NAD 1983

Figure 2 Conceptual Site Model





US Army Corps of Engineers
New England District

FIGURE 3:
SEARSPORT HARBOR, SEARSPORT, ME
2008-2014 SAMPLE LOCATIONS

0 500 1,000 1,500 2,000 Feet
0 250 500 750 Meters
1:12,000

NOAA CHART 13309

GCS NAD 1983

Appendix A
Core Logs and Photographs

PROJECT: Searsport, ME DATE: 10/5/17

SAMPLING PERSONNEL: RBL, ADH, MJN

SEA STATE: Light chop WEATHER CODE: Sunny

LOCATION METHOD: DGPS

SAMPLE ID: A SAMPLER TYPE: VC

TIME: 11:56

SOUNDING: - CORRECTED DEPTH: -32.0' MLLW

COORDINATES: N 44.446819 E -68.899270

PENETRATION/RECOVERY: 5.5' NO. OF ATTEMPTS: 1

MATERIAL DESCRIPTION: Grey sandy silt

CORE PHOTO:	NOTES:
	0-5.5': medium gray sandy silt with scattered shell frags throughout, soft 0-0.5' is less consolidated with more shell fragments Sample intervals: 0-3.0' composited for bulk chemical analysis 0-1.0', 1.0-2.0', 2.0-3.0' individually composited for mercury analysis

PROJECT: Searsport, ME DATE: 10/5/17

SAMPLING PERSONNEL: RBL, ADH, MJN

SEA STATE: Light chop WEATHER CODE: Sunny

LOCATION METHOD: DGPS

SAMPLE ID: B SAMPLER TYPE: VC

TIME: 12:11

SOUNDING: - CORRECTED DEPTH: -31.0' MLLW

COORDINATES: N 44.448248 E -68.899198

PENETRATION/RECOVERY: 4.0' NO. OF ATTEMPTS: 1

MATERIAL DESCRIPTION: Black silt over grey silt

CORE PHOTO:	NOTES:
	0-0.5': black silt, very soft 0.5-4.0': medium grey silt. Small lenses of shell fragments at 2.0' and 3.3' Sample intervals: 0-4.0' composited for bulk chemical analysis 0-1.0', 1.0-2.0', 2.0-3.0', 3.0-4.0' individually composited for mercury analysis

PROJECT: Searsport, ME DATE: 10/5/17

SAMPLING PERSONNEL: RBL, ADH, MJN

SEA STATE: Light chop WEATHER CODE: Sunny

LOCATION METHOD: DGPS

SAMPLE ID: C SAMPLER TYPE: VC

TIME: 12:26

SOUNDING: - CORRECTED DEPTH: -31.0' MLLW

COORDINATES: N 44.449039 E -68.899196

PENETRATION/RECOVERY: 6.0' NO. OF ATTEMPTS: 1

MATERIAL DESCRIPTION: Black silt over grey silt

CORE PHOTO:	NOTES:
	0-2.8': black silt, soft and moist, 0-0.7 is very loose/unconsolidated. Some mottling with grey silt at bottom of interval 2.8-6.0': medium grey silt, soft, some sand Sample intervals: 0-4.0' composited for bulk chemical analysis 0-1.0', 1.0-2.0', 2.0-3.0', 3.0-4.0' individually composited for mercury analysis

PROJECT: Searsport, ME DATE: 10/5/17

SAMPLING PERSONNEL: RBL, ADH, MJN

SEA STATE: Light chop WEATHER CODE: Sunny

LOCATION METHOD: DGPS

SAMPLE ID: D SAMPLER TYPE: VC

TIME: 12:38

SOUNDING: - CORRECTED DEPTH: -30.2' MLLW

COORDINATES: N 44.449722 E -68.899406

PENETRATION/RECOVERY: 4.8' NO. OF ATTEMPTS: 1

MATERIAL DESCRIPTION: Black silt over grey silt

CORE PHOTO:	NOTES:
	0-2.7': black silt, soft and moist 2.7-4.8': medium grey silt, soft. Lens of lighter blue-grey silt from 4.8-4.9' Sample intervals: 0-4.8' composited for bulk chemical analysis 0-1.0', 1.0-2.0', 2.0-3.0', 3.0-4.0', 4.0-4.8' individually composited for mercury analysis

PROJECT: Searsport, ME DATE: 10/5/17

SAMPLING PERSONNEL: RBL, ADH, MJN

SEA STATE: Light chop WEATHER CODE: Sunny

LOCATION METHOD: DGPS

SAMPLE ID: E SAMPLER TYPE: VC

TIME: 12:59

SOUNDING: - CORRECTED DEPTH: -32.0' MLLW

COORDINATES: N 44.449637 E -68.898460

PENETRATION/RECOVERY: 4.1' NO. OF ATTEMPTS: 1

MATERIAL DESCRIPTION: Green-grey silt

CORE PHOTO:	NOTES:
	0-0.7': mixed black and grey silt, very soft 0.7-4.1': light greenish grey silt, soft. Some mottling with small lenses of lighter grey silt at ~2.1' and ~3.7' Sample intervals: 0-3.0' composited for bulk chemical analysis 0-1.0', 1.0-2.0', 2.0-3.0' individually composited for mercury analysis

PROJECT: Searsport, ME DATE: 10/5/17

SAMPLING PERSONNEL: RBL, ADH, MJN

SEA STATE: Light Chop WEATHER CODE: Sunny

LOCATION METHOD: DGPS

SAMPLE ID: F SAMPLER TYPE: VC

TIME: 13:13

SOUNDING: - CORRECTED DEPTH: -32.6' MLLW

COORDINATES: N 44.449266 E -68.894280

PENETRATION/RECOVERY: 2.4' NO. OF ATTEMPTS: 1

MATERIAL DESCRIPTION: Black silt over grey silt

CORE PHOTO:	NOTES:
	0-0.8: black silt, soft, slightly mottled. 0-0.2' is very loose 0.8-2.4: medium grey silt, soft Sample intervals: 0-2.4' composited for bulk chemical analysis 0-1.0', 1.0-2.0', 2.0-2.4' individually composited for mercury analysis

PROJECT NAME: *Searsport CAD Cell* DATE: *10/13/21*

PROJECT LOCATION: *Searsport, ME* SEA STATE: *Calm*

VESSEL: *R/V Gloria H.* POSITIONING EQUIPMENT: *VS330-RTK*

SAMPLING EQUIPMENT: *BH-4 w/ 3" OD Liners*

SAMPLING PERSONNEL: *RBL, HAJ, TAR, SBT* LOGGED BY: *HAJ*

CORE ID: ***SPC-A*** TIME: *10:40*

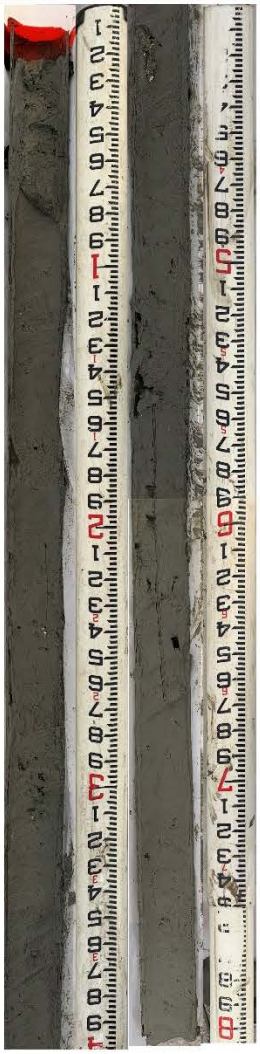
LATITUDE: *44.448172* LONGITUDE: *-68.901156* POSITION ACCURACY:

MEASURED WATER DEPTH: *27.0'* CORRECTED WATER DEPTH: *-27.0= 25.7' MLLW*

TARGET PENETRATION: *8.0'* ACTUAL PENETRATION: *8.0'* RECOVERY: *8.0'*

COMMENTS:

SAMPLE INTERVAL(S): *A (0-1.0), A(1.0-8.0)*

CORE PHOTO:	CORE DESCRIPTION:
	*0-8.0': Olive-grey SILT, trace shells and organics, soft, wet to moist, not plastic, moderate H_2S-like odor.* *Trace medium subangular gravel at surface.*

PROJECT NAME: *Searsport CAD Cell* DATE: *10/13/21*

PROJECT LOCATION: *Searsport, ME* SEA STATE: *Calm*

VESSEL: *R/V Gloria H.* POSITIONING EQUIPMENT: *VS330-RTK*

SAMPLING EQUIPMENT: *BH-4 w/ 3" OD Liners*

SAMPLING PERSONNEL: *RBL, HAJ, TAR, SBT* LOGGED BY: *HAJ*

CORE ID: ***SPC-B*** TIME: *11:01*

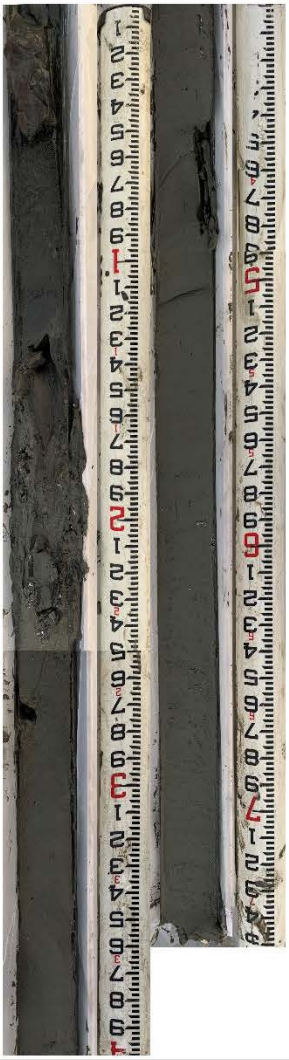
LATITUDE: *44.448173* LONGITUDE: *-68.900391* POSITION ACCURACY:

MEASURED WATER DEPTH: *28.0'* CORRECTED WATER DEPTH: *-28.0= 26.9' MLLW*

TARGET PENETRATION: *8.0'* ACTUAL PENETRATION: *8.0'* RECOVERY: *8.0'*

COMMENTS: *Settled to 7.5 ft*

SAMPLE INTERVAL(S): *B(0-1.5), B(1.5-7.5)*

CORE PHOTO:	CORE DESCRIPTION:
	*0-1.5': Dark brown/olive-grey mottled SILT, trace shells and organics, very soft, wet, not plastic, slight H_2S-like odor.* *1.5-7.5': Olive-grey SILT, trace shells and organics, soft, moist, not plastic, moderate H_2S-like odor.* *Wood fragments at 2.1 ft bgs.*

PROJECT NAME: *Searsport CAD Cell* DATE: *10/13/21*

PROJECT LOCATION: *Searsport, ME* SEA STATE: *Calm*

VESSEL: *R/V Gloria H.* POSITIONING EQUIPMENT: *VS330-RTK*

SAMPLING EQUIPMENT: *BH-4 w/ 3" OD Liners*

SAMPLING PERSONNEL: *RBL, HAJ, TAR, SBT* LOGGED BY: *HAJ*

CORE ID: ***SPC-C*** TIME: *11:16*

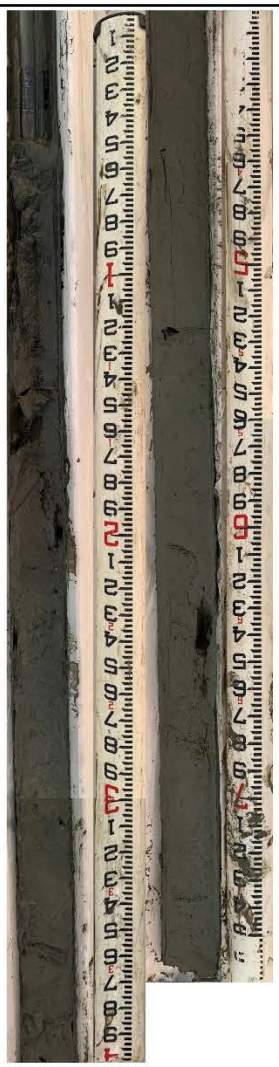
LATITUDE: *44.447486* LONGITUDE: *-68.901140* POSITION ACCURACY:

MEASURED WATER DEPTH: *28.3'* CORRECTED WATER DEPTH: *-28.3= 27.2' MLLW*

TARGET PENETRATION: *8.0'* ACTUAL PENETRATION: *8.0'* RECOVERY: *8.0'*

COMMENTS: *Settled to 7.6 ft*

SAMPLE INTERVAL(S): *C (0-2.0),C(2.0-7.6)*

CORE PHOTO:	CORE DESCRIPTION:
	*0-2.0': Dark brown/olive-grey mottled SILT, trace organics, very soft, saturated, not plastic, slight H_2S-like odor.* *2.0-7.6': Olive-grey SILT, trace organics, soft, wet to moist, not plastic, moderate H_2S-like odor.*

PROJECT NAME: *Searsport CAD Cell* DATE: *10/13/21*

PROJECT LOCATION: *Searsport, ME* SEA STATE: *Calm*

VESSEL: *R/V Gloria H.* POSITIONING EQUIPMENT: *VS330-RTK*

SAMPLING EQUIPMENT: *BH-4 w/ 3" OD Liners*

SAMPLING PERSONNEL: *RBL, HAJ, TAR, SBT* LOGGED BY: *HAJ*

CORE ID: ***SPC-D*** TIME: *11:28*

LATITUDE: *44.447486* LONGITUDE: *-68.900374* POSITION ACCURACY: _____

MEASURED WATER DEPTH: *29.8'* CORRECTED WATER DEPTH: *-29.8= 28.7' MLLW*

TARGET PENETRATION: _____ ACTUAL PENETRATION: *5.2'* RECOVERY: *4.4'*

COMMENTS: *7 attempts/repositions*

SAMPLE INTERVAL(S): *D (0-1.0), D(1.0-4.4)*

CORE PHOTO:	CORE DESCRIPTION:
	*0-1.0': Dark brown/olive-grey mottled SILT, trace organics, very soft, wet, not plastic, slight H_2S-like odor.* *1.0-4.4': Olive-grey SILT, trace shells and organics, soft, moist, not plastic, moderate H_2S-like odor.*

PROJECT NAME: *Searsport CAD Cell* DATE: *10/13/21*

PROJECT LOCATION: *Searsport, ME* SEA STATE: *Calm*

VESSEL: *R/V Gloria H.* POSITIONING EQUIPMENT: *VS330-RTK*

SAMPLING EQUIPMENT: *BH-4 w/ 3" OD Liners*

SAMPLING PERSONNEL: *RBL, HAJ, TAR, SBT* LOGGED BY: *HAJ*

CORE ID: ***SPC-E*** TIME: *12:15*

LATITUDE: *44.446798* LONGITUDE: *-68.901122* POSITION ACCURACY: _____

MEASURED WATER DEPTH: *30.4'* CORRECTED WATER DEPTH: *-30.4= 28.7' MLLW*

TARGET PENETRATION: _____ ACTUAL PENETRATION: *4.0'* RECOVERY: *3.5'*

COMMENTS: *6 attempts, poor penetration*

SAMPLE INTERVAL(S): *E (0-1.0), E(1.0-3.5)*

CORE PHOTO:	CORE DESCRIPTION:
	*0-3.1': Olive-grey SILT, trace coal slag, very soft, wet, not plastic, slight H_2S-like odor.* *3.1-3.5': Dark brown SILT, little to some coal slag, very soft, wet, not plastic, no odor.*

PROJECT NAME: *Searsport CAD Cell* DATE: *10/13/21*

PROJECT LOCATION: *Searsport, ME* SEA STATE: *Calm*

VESSEL: *R/V Gloria H.* POSITIONING EQUIPMENT: *VS330-RTK*

SAMPLING EQUIPMENT: *BH-4 w/ 3" OD Liners*

SAMPLING PERSONNEL: *RBL, HAJ, TAR, SBT* LOGGED BY: *HAJ*

CORE ID: ***SPC-F*** TIME: *12:41*

LATITUDE: *44.446803* LONGITUDE: *-68.900384* POSITION ACCURACY: _____

MEASURED WATER DEPTH: *31.7'* CORRECTED WATER DEPTH: *-31.7= 29.6' MLLW*

TARGET PENETRATION: _____ ACTUAL PENETRATION: *1.5'* RECOVERY: *0.8'*

COMMENTS: *4 attempts, poor penetration*

SAMPLE INTERVAL(S): *No samples collected*

CORE PHOTO:	CORE DESCRIPTION:
	*0-0.8': Dark brown/olive-grey mottled SILT, little coal slag, very soft, wet, not plastic.*

Appendix B
Bulk Sediment Chemistry Results

2017 Bulk Chemistry and Grain Size Results

		SAMPLE ID:	A		B		C		D		E		F	
	ERL	ERM												
ANALYTE			Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
GRAIN SIZE ANALYSIS	(%)													
% Total Gravel			0.7		0.3		1.6		0.6		<NA	U	<NA	U
% Coarse Sand			2.5		1.3		7.5		1.6		0.7		1.2	
% Medium Sand			4		3.2		3		1.3		1.5		3.1	
% Fine Sand			7.8		3.1		3.3		1.9		2.6		5.2	
% Total Fines			85		92.1		84.6		94.6		95.2		90.5	
GENERAL CHEMISTRY	(%)													
Moisture			44		50		61		59		24		47	
Solids, Total			50.7		53.2		40.3		42.8		74.7		54.7	
TOTAL ORGANIC CARBON	(%)													
Total Organic Carbon (Rep1)			1.67		1.94		2.88		2.28		0.175		1.54	
Total Organic Carbon (Rep2)			1.73		1.93		2.56		2.3		0.182		1.69	
TOTAL METALS	(mg/kg)													
Arsenic, Total	8.2	70	14.6		16.7		17.5		15.5		15		15.3	
Cadmium, Total	1.2	9.6	0.128		0.313		0.251		0.229		<54	U	0.174	
Chromium, Total	81	370	38		35.4		42.5		41.8		32		36.2	
Copper, Total	34	270	12.7		14.4		17.6		19.4		17.1		17.5	
Lead, Total	46.7	218	12.8		14.2		21.5		27.2		12.9		19.8	
Mercury, Total	0.15	0.71	0.028	U	0.032		0.268		0.326		0.016	U	0.183	
Nickel, Total	20.9	51.6	31.6		28.9		30		31.4		36.9		29.2	
Zinc, Total	150	410	68.6		62.1		74.4		76.9		60.9		64.7	
RIM PAHS CONGENERS BY GC/MS	(ug/kg)													
Acenaphthene	16	500	<9.45	U	<8.59	U	<11.4	U	12.2		<6.66	U	<8.86	U
Acenaphthylene	44	640	<9.45	U	<8.59	U	27.4		37.1		<6.66	U	29.5	
Anthracene	85.3	1100	<9.45	U	<8.59	U	33		42.4		<6.66	U	33.4	
Fluorene	19	540	<9.45	U	<8.59	U	16.3		20		<6.66	U	13.4	
Naphthalene	160	2100	<9.45	U	<8.59	U	42		46.4		<6.66	U	33.6	
Phenanthrene	240	1500	<9.45	U	13.1		103		126		<6.66	U	77.9	
Total LMW PAHs	*552*	*3160*	*28.4*	*U*	*34.6*		*227*		*284*		*19.98*	*U*	*192*	
Benz(a)anthracene			<9.45	U	21.9		116		143		<6.66	U	119	
Benzo(a)pyrene	430	1600	<9.45	U	18.4		113		145		<6.66	U	123	
Benzo(b)fluoranthene			<9.45	U	25.2		148		206		<6.66	U	180	
Benzo(ghi)perylene			<9.45	U	13.8		91.6		118		<6.66	U	81.8	
Benzo(k)fluoranthene			<9.45	U	15.8		94.3		100		<6.66	U	93	
Chrysene	384	2800	<9.45	U	18		120		136		<6.66	U	114	
Dibenz(a,h)anthracene			<9.45	U	<8.59	U	21.7		27.2		<6.66	U	20.6	
Fluoranthene	600	5100	<9.45	U	28.4		177		219		7.63		177	
Indeno(1,2,3-cd)Pyrene			34.3		42.6		118		145		25.8		104	
Pyrene	665	2600	<9.45	U	34.4		224		298		8.56		209	
Total HMW PAHs	*1700*	*9600*	*76.8*		*223*		*1224*		*1537*		*65.3*		*1221*	
RIM PCB CONGENERS BY GC/MS	(ug/kg)													
Cl2-BZ#8			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl3-BZ#18			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl3-BZ#28			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl4-BZ#44			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
(Cl4-BZ#49)			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl4-BZ#52			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl4-BZ#66			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
(Cl5-BZ#87)			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl5-BZ#101			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl5-BZ#105			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl5-BZ#118			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl6-BZ#128			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl6-BZ#138			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl6-BZ#153			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl7-BZ#170			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl7-BZ#180			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
(Cl7-BZ#183)			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
(Cl7-BZ#184)			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl7-BZ#187			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl8-BZ#195			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl9-BZ#206			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Cl10-BZ#209			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Total PCBs	*22.7*	*180*	*4.25*	*U*	*3.87*	*U*	*5.13*	*U*	*4.95*	*U*	*3.00*	*U*	*3.99*	*U*
RIM ORGANOCHLORINE PESTICIDES	(ug/kg)													
4,4'-DDD	2	20	<0.472	U	<0.43	U	0.758		1.64		<0.333	U	1.02	
4,4'-DDE	2.2	27	<0.472	U	<0.43	U	0.633		1.18		<0.333	U	0.644	
4,4'-DDT	1	7	<0.472	U	<0.43	U	0.686	P	1.25	P	<0.333	U	1.07	P
Total DDx	*1.58*	*46.1*	*0.708*	*U*	*0.645*	*U*	*2.08*		*4.07*		*0.500*	*U*	*2.73*	
Aldrin			<0.472	U	<0.43	U	<0.569	U	<0.552	U	0.879	P	<0.443	U
cis-Chlordane			<0.472	U	<0.43	U	<0.569	U	<0.552	U	<0.333	U	<0.443	U
cis-Nonachlor			<0.472	U	2.23	P	2.47	P	0.659	IP	<0.333	U	<0.443	U
Dieldrin	0.02	8	<0.472	U	<0.43	U	<0.569	U	<0.552	U	<0.333	U	0.514	P
Endosulfan I			<0.472	U	<0.43	U	<0.569	U	<0.552	U	<0.333	U	<0.443	U
Endosulfan II			<0.472	U	<0.43	U	<0.569	U	1.49		<0.333	U	1.64	P
Endrin			1.17	IP	0.555		1.45	P	2.6	P	0.677	P	1.23	P
gamma-BHC			<0.472	U	<0.43	U	<0.569	U	<0.552	U	1.1	P	<0.443	U
Heptachlor			<0.472	U	<0.43	U	<0.569	U	<0.552	U	<0.333	U	<0.443	U
Heptachlor epoxide			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Hexachlorobenzene			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Methoxychlor			<4.72	U	<4.3	U	<5.69	U	<5.52	U	<3.33	U	<4.43	U
Oxychlordane			<0.945	U	<0.859	U	<1.14	U	<1.1	U	<0.666	U	<0.886	U
Toxaphene			<23.7	U	<21.6	U	<28.5	U	<27.7	U	<16.7	U	<22.2	U
trans-Chlordane			<0.472	U	<0.43	U	<0.569	U	<0.552	U	<0.333	U	<0.443	U
trans-Nonachlor			<0.472	U	<0.43	U	<0.569	U	<0.552	U	<0.333	U	<0.443	U
Total Chlordanes	*0.5*	*6*	*1.42*	*U*	*2.19*		*1.52*		*1.71*		*1.00*	*U*	*1.33*	*U*

Yellow indicates exceedance of the ERL
Red indicates an exceedance of the ERM
U: Compound was analyzed for but was not detected (non-detect)
J: Indicates an estimated value
I: The lower value for the two columns has been reported due to obvious interference
P: The RPD between the results for the two columns exceeds the method-specified criteria
Total PCBs were calculated using the NOAA 18 method
Half the MDL was used for U-qualified values to calculate summary values
Total Chlordane is a sum of alpha and gamma chlordane, cis and trans nonachlor, and oxychlordane

2017 Mercury Results

SAMPLE ID:			A0-1		A1-2		A2-3		B0-1		B1-2		B2-3		B3-4		C0-1		C1-2		C2-3		C3-4		D0-1		D1-2		D2-3		D3-4		D4-4.8		E0-1		E1-2		E2-3		F0-1		F1-2		F2-2.4	
	ERL	ERM																																											
ANALYTE			Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
TOTAL METALS	(mg/kg)																																												
Mercury, Total	0.15	0.71	0.025	U	0.029	U	0.021	U	0.138		0.028	U	0.023	U	0.023	U	0.227		0.344		0.498		0.026	U	0.369		0.457		0.573		0.034		0.022	U	0.034		0.018	U	0.019	U	0.258		0.019	U	0.018	U

Yellow indicates exceedance of the ERL
Red indicates an exceedance of the ERM
U: Compound was analyzed for but was not detected (non-detect)

2021 Bulk Chemistry and Grain Size Results

Sample IDs A-D Refer to Samples SPC A - SPC D

		SAMPLE ID:	A (0-1.0')		A (1.0-8.0')		B (0-1.5')		B (1.5-7.5')		C (0-2.0')		C (2.0-7.6')		D (0-1.0')		D (1.0-.4.4')	
	ERL	ERM																
ANALYTE			Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
GRAIN SIZE ANALYSIS																		
% Total Gravel			6.2		NA	U	0.8		0.2		0.3		NA	U	NA	U	0.9	
% Coarse Sand			20.1		4.6		2.2		8.7		4.3		0.7		2.1		12.8	
% Medium Sand			25.3		31.8		30.7		35.8		33.9		32.2		31		31.9	
% Fine Sand			14.6		20.1		18		19.2		20.4		21.4		21.1		18.3	
% Total Fines			33.8		43.5		48.3		36.1		41.1		45.7		45.8		36.1	
GENERAL CHEMISTRY																		
Moisture			59.9		55.3		63.1		53.1		59.1		57.7		60		54.6	
Solids, Total			40.1		44.7		36.9		46.9		40.9		42.3		40		45.4	
TOTAL ORGANIC CARBON																		
Total Organic Carbon (Average)			2.25		1.95		3.04		1.97		3.22		2.3		3.33		2.23	
Total Organic Carbon (Rep1)			2.29		2.04		3.04		2.05		3.21		2.31		2.95		2.24	
Total Organic Carbon (Rep2)			2.22		1.87		3.04		1.89		3.22		2.3		3.71		2.22	
TOTAL METALS	(mg/kg)	(mg/kg)																
Arsenic, Total	8.2	70	11.7		10.8		13.7		11.2		13.7		12.1		13.1		13	
Cadmium, Total	1.2	9.6	0.097	J	0.102		0.162		0.107		0.147		0.156		0.159		0.103	
Chromium, Total	81	370	28.1		28.2		34.3		29		35.8		30.4		34		31.8	
Copper, Total	34	270	9.83		9.5		24.2		9.78		16.7		10.8		14.6		10.5	
Lead, Total	46.7	218	11.5		10.6		23.1		11.2		26.2		22.4		23.7		12.5	
Mercury, Total	0.15	0.71	0.046		0.029		0.292		0.035		0.34		0.08		0.337		0.041	
Nickel, Total	20.9	51.6	23		22.7		25.3		23.1		25.6		24.5		23.4		25.7	
Zinc, Total	150	410	51.1		50.2		62		50.9		69.1		62.8		60.9		56.2	
RIM PAHS BY GC/MS	(ug/kg)	(ug/kg)																
Acenaphthene	16	500	9.38	U	8.66	U	13.7		7.87	U	14		2.08	J	9.54	J	8.28	U
Acenaphthylene	44	640	1.3	J	8.66	U	33.3		7.87	U	37.2		4.67	J	29.6		8.28	U
Anthracene	85.3	1100	1.96	J	8.66	U	52.3		7.87	U	55.1		8.86	J	40.7		1.12	J
Fluorene	19	540	1.58	J	8.66	U	25.6		0.887	J	35.2		5.63	J	25.9		1.13	J
Naphthalene	160	2100	5.27	J	3.42	J	64.1		2.92	J	59.5		11.6		40.5		3.03	J
Phenanthrene	240	1500	7.45	J	2.42	J	122		3.09	J	145		30.1		114		4.16	J
Total LMW PAHs	*552*	*3160*	*18.5*		*8.20*		*311*		*8.62*		*346*		*62.9*		*260*		*10.7*	
Benz(a)anthracene			8.25	J	8.66	U	179		7.87	U	191		38.6		142		2.2	J
Benzo(a)pyrene	430	1600	6.64	J	8.66	U	183		7.87	U	196		30.6		146		8.28	U
Benzo(b)fluoranthene			8.23	J	8.66	U	217		7.87	U	197		37.2		168		3.15	J
Benzo(ghi)perylene			5.7	J	1.08	J	130		1.63	J	133		22		103		2.43	J
Benzo(k)fluoranthene			6.55	J	8.66	U	113		1.3	J	135		21		105		1.64	J
Chrysene	384	2800	7.98	J	8.66	U	183		7.87	U	203		38.2		149		2.54	J
Dibenz(a,h)anthracene			1.29	J	8.66	U	36.5		7.87	U	37.4		6.02	J	26.1		8.28	U
Fluoranthene	600	5100	14.9		8.66	U	248		2.45	J	275		41.6		216		4.18	J
Indeno(1,2,3-cd)Pyrene			4.48	J	8.66	U	119		7.87	U	126		21.1		98.5		2.08	J
Pyrene	665	2600	14.1		8.66	U	279		2.77	J	298		52.2		262		5.04	J
Total HMW PAHs	*1700*	*9600*	*78.1*		*10.8*		*1688*		*14.5*		*1791*		*309*		*1418*		*25.6*	
RIM PCB CONGENERS BY GC/MS	(ug/kg)	(ug/kg)																
Cl2-BZ#8			0.938	U	0.866	U	1.02	U	0.787	U	0.911	U	0.914	U	0.986	U	0.828	U
Cl3-BZ#18			0.938	U	0.866	U	1.02	U	0.787	U	0.911	U	0.914	U	0.986	U	0.828	U
Cl3-BZ#28			0.938	U	0.866	U	1.02	U	0.787	U	0.911	U	0.914	U	0.986	U	0.828	U
Cl4-BZ#44			0.938	U	0.866	U	1.02	U	0.787	U	0.911	U	0.914	U	0.986	U	0.828	U
Cl4-BZ#49			0.938	U	0.866	U	1.02	U	0.787	U	0.911	U	0.914	U	0.986	U	0.828	U
Cl4-BZ#52			0.208	J	0.866	U	1.02	U	0.787	U	0.911	U	0.914	U	0.986	U	0.828	U
Cl4-BZ#66			0.154	J	0.866	U	1.02	U	0.787	U	0.911	U	0.914	U	0.986	U	0.828	U
Cl5-BZ#87			0.164	J	0.866	U	0.202	J	0.787	U	0.911	U	0.914	U	0.986	U	0.828	U
Cl5-BZ#101			0.239	J	0.866	U	0.369	J	0.787	U	0.319	J	0.914	U	0.619	J	0.828	U
Cl5-BZ#105			0.938	U	0.866	U	1.02	U	0.787	U	0.911	U	0.914	U	0.986	U	0.828	U
Cl5-BZ#118			0.282	J	0.866	U	0.322	J	0.787	U	0.911	U	0.914	U	0.426	J	0.828	U
Cl6-BZ#128			0.938	U	0.866	U	1.02	U	0.787	U	0.911	U	0.914	U	0.986	U	0.828	U
Cl6-BZ#138			0.205	J	0.866	U	0.524	J	0.787	U	0.739	J	0.914	U	0.822	J	0.828	U
Cl6-BZ#153			0.938	U	0.866	U	0.443	J	0.787	U	0.597	J	0.914	U	0.664	J	0.828	U
Cl7-BZ#170			0.158	J	0.866	U	1.02	U	0.787	U	0.177	J	0.914	U	0.273	J	0.828	U
Cl7-BZ#180			0.137	J	0.866	U	0.209	J	0.787	U	0.277	J	0.914	U	0.374	J	0.828	U
Cl7-BZ#183			0.171	J	0.866	U	0.103	J	0.787	U	0.081	J	0.914	U	0.092	J	0.828	U
Cl7-BZ#184			0.262	J	0.866	U	0.146	J	0.787	U	0.911	U	0.914	U	0.986	U	0.828	U
Cl7-BZ#187			0.191	J	0.866	U	0.218	J	0.787	U	0.225	J	0.914	U	0.298	J	0.828	U
Cl8-BZ#195			0.938	U	0.866	U	1.02	U	0.787	U	0.911	U	0.914	U	0.986	U	0.828	U
Cl9-BZ#206			0.938	U	0.866	U	1.02	U	0.787	U	0.911	U	0.914	U	0.986	U	0.828	U
Cl10-BZ#209			0.938	U	0.866	U	1.02	U	0.787	U	0.911	U	0.914	U	0.986	U	0.828	U
Total PCBs	*22.7*	*180*	*5.46*		*3.31*	U	*6.75*		*3.01*	U	*7.06*		*3.50*	U	*9.33*		*3.17*	U
RIM ORGANOCHLORINE PESTICIDES	(ug/kg)	(ug/kg)																
4,4'-DDD	2	20	0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
4,4'-DDE	2.2	27	0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
4,4'-DDT	1	7	0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
Total DDx	*1.58*	*46.1*	*0.104*	*U*	*0.094*	*U*	*0.569*	*U*	*0.086*	*U*	*0.527*	*U*	*0.096*	*U*	*0.541*	*U*	*0.094*	*U*
Aldrin			0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
Alpha-BHC			0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
Beta-BHC			0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
cis-Chlordane			0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
cis-Nonachlor			0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
Delta-BHC			0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
Dieldrin	0.02	8	0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
Endosulfan I			0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
Endosulfan II			0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
Endosulfan sulfate			0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
Endrin			0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
gamma-BHC			0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
Heptachlor			0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
Heptachlor epoxide			1.89	U	1.7	U	10.4	U	1.57	U	9.61	U	1.75	U	9.86	U	1.71	U
Hexachlorobenzene			1.89	U	1.7	U	10.4	U	1.57	U	9.61	U	1.75	U	9.86	U	1.71	U
Methoxychlor			0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
Oxychlordane			1.89	U	1.7	U	10.4	U	1.57	U	9.61	U	1.75	U	9.86	U	1.71	U
Toxaphene			47.4	U	42.6	U	261	U	39.4	U	241	U	43.8	U	248	U	43	U
trans-Chlordane			0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
trans-Nonachlor			0.945	U	0.848	U	5.19	U	0.785	U	4.8	U	0.873	U	4.93	U	0.856	U
Total Chlordanes	*0.5*	*6*	*0.391*	*U*	*0.352*	*U*	*2.15*	*U*	*0.324*	*U*	*1.98*	*U*	*0.361*	*U*	*2.04*	*U*	*0.354*	*U*

Yellow indicates exceedance of the ERL
Red indicates an exceedance of the ERM
U: Compound was analyzed for but was not detected (non-detect)
J: Indicates an estimated value
Total PCBs were calculated using the NOAA 18 method
Half the MDL was used for U-qualified values to calculate summary values
Total Chlordane is a sum of alpha and gamma chlordane, cis and trans nonachlor, and oxychlordane

CENAE–R-P 14 April 2015

Memorandum Thru:

Ruth M. Ladd, Chief, Policy Analysis and Technical Support Branch

Digitally signed by DESISTA.ROBERT.J.1229271241
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=DESISTA.ROBERT.J.1229271241
Date: 2015.04.15 11:05:27 -04'00'

FOR: Barbara Blumeris, Project Manager, CENAE-EP-PS

Subject: Supplementary Suitability Determination for Searsport Harbor Federal Navigation Maintenance and Improvement Project, Penobscot Bay, Searsport, Maine.

1. **Summary**:

This memorandum addresses the suitability of dredged material from the proposed Searsport Harbor Federal Navigation Maintenance and Improvement Project for disposal in accordance with applicable regulations. The determination represents a 2015 re-sampling and testing of the sediment chemistry within the project footprint. This re-testing of the project sediments using depth-stratified, individual cores was performed to supplement the testing that was performed on composite samples in 2008 to provide more recent data and to better characterize the areal and vertical distribution of chemical constituents within the sediment of the dredging project footprint. The USACE finds that the data provide sufficient information to satisfy the evaluation and testing requirements of the appropriate regulations.

The sediment chemistry data from the proposed dredge area were evaluated using the following three sets of comparisons: 1) comparison with the sediment quality guidelines (SQG) developed as part of NOAA's National Status and Trends Program; 2) comparison with screening level criteria developed in the State of Washington by the USACE Seattle District in cooperation with the Environmental Protection Agency Region 10, the Washington State Department of Natural Resources and the Washington State Department of Ecology; 3) comparison with reference data from the proposed disposal site.

The results of the 2015 re-testing confirmed the previous assumptions about the deeper sediments planned for dredging within the project footprint; deeper sediments consist of native material that has not been exposed to anthropogenic sources of contamination, with contaminant concentrations at or below those of the proposed disposal site. This native material and the surficial material containing low contaminant concentrations together represent over 80% of the dredged volume from the project and is fully suitable for unconfined, open-water placement. It also should be noted that all of the project mercury concentrations were well below the target total mercury concentration of 0.450 mg/kg recommended in the Penobscot River Mercury Study for the upper estuary.

Contaminant concentrations in some of the surficial, more recently deposited sediments were higher than those found in the other project material. At three core locations, represented by the tops of Cores A, F, and J the surficial concentrations were sufficiently elevated above the reference data from the disposal site and above the most conservative sediment quality guideline to classify the material as unsuitable for open-water placement without the prescribed level of management to limit long-term exposure of the sediment to the benthic environment. Given that this unsuitable material represents less than 20% of the overall project volume and the relatively low levels of chemical concentrations, effective long-term management can be achieved through sequential dredging and placement of the unsuitable material first in the elevational depressions within the disposal site, then covering this unsuitable material with the subsequent disposal of the large volume of suitable material to be dredged as part of the project. The suitable project materials will provide sufficient volume of clean material to allow the more contaminated portion of the projects to be managed by sequential dredging and disposal. This will fulfill the disposal management requirement for the more contaminated project materials. When the dredging project is completed, the surficial levels at both the dredging footprint and the disposal site will have notably lower contaminant level than current conditions, approaching those associated with the cleaner underlying material.

2. **Project Description:**

The CENAE and the Maine Department of Transportation are proposing maintenance and improvement dredging of the Searsport Harbor Federal Navigation Project in upper Penobscot Bay (see Figure 1). The dredging area covers approximately 111 acres which will produce a volume of approximately 929,000 cubic yards of silty, clayey, and sandy material. The project area will be dredged to -40 feet MLLW, plus 2 feet of allowable over-depth. The material is principally improvement dredging material (approximately 892,000 cubic yards) associated with the proposed deepening and widening of the channel, the extension of the project footprint adjacent to the municipal pier and the turning basin. A lesser amount of overlying material (approximately 37,000 cubic yards) represents maintenance dredging of sediment accumulated since the last dredging occurred in 1964 that would also be removed. All this material is proposed to be mechanically dredged and disposed of at the Penobscot Bay Disposal Site (PBDS).

The 2009 determination stated that the approximate project area was 101 acres and the approximate volume was 760,000 cubic yards. Since that time, detailed calculations have increased the areal estimate to 111

acres and the total project volume to 929,000 cubic yards. It must be noted that, despite the change in calculated area, the actual footprint has not changed. Therefore, the basis of comparison will stand for both determinations.

The PBDS is a deep area in upper Penobscot Bay within the general area identified on NOAA nautical charts as a discontinued disposal area. In 1964, the USACE dredged about 487,000 cy of material to create the 35 foot deep Federal navigation channel to the Mack Point area of Searsport Harbor and the dredged material from this project was disposed in upper Penobscot Bay. Although the specific location was not recorded, it was likely within a 2 mile zone in the central portion of upper Penobscot Bay extending from east of Steel's Ledge to west of Isleboro in the vicinity of the proposed PBDS. Seafloor depths at the PBDS range from 86 feet to 196 feet deep, MLLW. The bottom has many crater-shaped depressions known as "pockmarks", some of which are deeper than -150 feet MLLW. The present project will dispose of the material in the immediate vicinity of the area sampled for the PBDS reference values (see Figure 2).

3. **Sampling and Testing:**

a. The 2008 Sampling Effort

A sampling plan for this project was prepared on 9 August 2007. The plan was coordinated with the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the Maine Department of Environmental Protection. These agencies concurred with the plan as proposed.

The sampling plan called for eleven cores to be taken from the project area and three surface grabs from PBDS. The project area cores were composited into four composite samples for bulk sediment chemistry analysis. The three surface grabs from the disposal site were individually analyzed for bulk sediment chemistry in 2008. The 18 February 2009 Suitability Determination for this project found the sediments suitable for unconfined disposal as proposed based upon sediment contaminant levels.

b. The 2015 Sampling Effort

Ten cores were collected at the locations specified in Table 1. Core samples were collected by Vibracore to the proposed dredge depth of -40 feet MLLW plus 2 feet of allowable over depth (-42 feet MLLW) or refusal. The cores were inspected, layers noted, and sub-sampled as indicated

below. In addition, three grab samples were taken from the PBDS at the locations specified in Table 1.

Stations A, B, C, I, J, and P are located outside of the existing Federal Navigation Project limits. Stations E, G, F, and L are located within the existing Federal Navigation project limits. Bulk sediment chemistry analyses were performed on each top, middle (where applicable), and bottom core layer sample in accordance with the "Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters" (April 2004). Metals and Polycyclic Aromatic Hydrocarbons (PAHs) were measured in all core segments and PBDS reference samples.

Notes on mercury analysis. Although the 4 December 2014 sampling plan for this work called for EPA analytical method 7471 or 7473 for analysis of total mercury, the contracted laboratory used method 7474. All three are well established, EPA approved methods, and can provide accurate determination of Hg in sediments and environmental matrices with comparable detection limits. The laboratory chosen to conduct these analyses routinely conducts Method 7474 following written standard operating procedures (Lisa Lefkovitz, Battelle, personal communication).

c. Inventory of Contaminants of Concern

For this discussion, refer to the attached spreadsheets for the inventory of project contaminants of concern. The Marine Analysis Section of NAE Regulatory (MAS) employed three standards for the basis of comparison. We first compared contaminants directly to the means plus two standard deviations measured at PBDS (hereafter referred to as PBDS reference values). In addition, we employed NOAA's Sediment Quality Guidelines that establish ERL and ERM levels based on data sets collected by NOAA's National Status and Trends Program[1]. Finally, we compared the contaminant concentrations to the screening level (SL) standard employed by USACE Seattle District for evaluating dredged material suitability[2].

Three of measured PAHs did not have ERL and ERM standards (total benzofluoranthenes, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene). For these PAHs comparisons were made to the screening level. In the case of total benzofluoranthenes, the USACE Seattle District screening level standard is comprised of the sum of three benzofluoranthenes while the project consisted

[1] 1999, NOAA. Sediment Quality Guidelines developed for the National Status and Trends
[2] 2014, USACE-NWS. Dredged material evaluation and disposal procedures – User manual. Dredged Material Management Program.

of the sum of two benzofluoranthenes.

Metals: In 12 out of the 20 samples, some of the contaminant concentrations in the project sediments were above the mean concentrations plus twice the standard deviations of the contaminant concentrations found at the PBDS reference site. Of note are the tops of Core A, F, and J which had elevated cadmium and/or mercury concentrations that exceeded the reference site values. See the attached spreadsheets for details and discussion below. No metal values exceeded the ERM or SL.

Arsenic: Both the PBDS reference value and sample values exceeded the ERL for arsenic (8.2 mg/kg) and were well below the ERM (70 mg/kg). (See below for description of ERL and ERM.) New England has naturally occurring elevated arsenic levels due to the local geological processes and higher arsenic values are common in marine sediments throughout the region.

Cadmium: Both the PBDS reference value and the sample values were well below the ERL for cadmium (1.2 mg/kg). The **top of core J** had the highest observed cadmium value (0.314 mg/kg) and was above the PBDS reference value of 0.08 mg/kg.

Chromium: Both the PBDS reference value and sample values were well below the ERL for chromium (81 mg/kg). All project chromium values were all below the reference site value.

Copper: Both the PBDS reference value and the sample values were well below the ERL for copper (34 mg/kg). The **top of core J** had the highest observed copper value (24.2 mg/kg) and was above the PBDS reference value (16.67 mg/kg).

Lead: Both the PBDS reference value and the sample values were well below the ERL for lead (46.7 mg/kg). The **top of core J** had the highest observed lead value (28.4 mg/kg) and was above the PBDS reference value (16.67 mg/kg).

Mercury: Both the PBDS reference value and the sample values were below the ERL for mercury (0.150 mg/kg) except for the **tops of cores A, F, and J** (0.216, 0.244, and 0.185 mg/kg, respectively). These samples were well below the ERM (0.71 mg/kg) but above the reference value of (0.91 mg/kg) and the ERL (0.150). All of the project mercury concentrations are well below the target total mercury concentration of 0.450 mg/kg recommended in the Penobscot

River Mercury Study for the upper estuary.[3]

Nickel: Both the PBDS reference value and the sample values exceeded the ERL for nickel (20.9 mg/kg) and were well below the ERM for nickel (51.6). All sample values were below the PBDS reference value for nickel (37.9 mg/kg). Nickel values were similar to those previously found at Rockland, Belfast and Penobscot Bay disposal sites.

Zinc: Both the reference site values and the sample values were well below the ERL for zinc (150 mg/kg). All project zinc values were all below the reference site value.

PAHs: In all samples, PAHs were below the ERM and SL values. In thirteen out of the 20 samples, the PAH values were below the PBDS reference values. The remaining seven samples had individual PAH values that exceeded the PBDS reference value. Those that also exceeded the ERL are discussed below.

The **top of core A** had one PAH (acenaphthylene) that exceeded the ERL and was well below the ERM and SL.

The **top of core F** had two PAHs (acenaphthene and fluorene) that exceeded the ERL and were below the ERM and SL.

The **top of Core J** had twelve PAHs that exceeded the ERL and was below the ERM and SL.

These results are similar to those found in 2008 except for the top of cores A, F, and J. These three cores had contaminant levels exceeding the PBDS reference values and the ERL values but were below the ERM and SL values. As these cores are representing sediments that were previously composited in the 2008 survey, it is not surprising that no exceedences were observed in the earlier determination.

When looking at the project the results delineate those portions that will need disposal management. Results indicate that the sediments represented by the top of Core A, F, and J were unsuitable for unconfined open water disposal. These portions of the material would only be suitable for open water

[3] 2013. Penobscot River Mercury Study, Final Report, Mercury Contamination of the Penobscot River Estuary: Current Situation, Remediation Targets and Possible Remediation Procedures. Submitted to Judge John Woodcock, United States District Court (District of Maine), April 2013, by: The Penobscot River Mercury Study Panel.

placement if managed through sequential dredging and disposal followed with the disposal of cleaner material placed on top.

4. **Regulations governing the determination of the suitability of dredged material for open-water disposal:**

The disposal of dredged material seaward of the high tide line in Penobscot Bay is regulated under Section 404 of the Clean Water Act (CWA). Subpart G of the Section 404(b)(1) guidelines (40 CFR Section 230.60 and 230.61) describes the procedures for determining the suitability of this material for open-water disposal, including any relevant testing that may be required.

40 CFR 230.60 General Evaluation of Dredged or Fill Material

This section of the 404(b)(1) Guidelines describes situations in which chemical and biological testing of dredged material may not be required. Here, chemical testing of the materials was performed.

(a) This subsection states that further testing may not be necessary if it could be determined with the evaluation under paragraph (b) that the sediment is not a carrier of contaminants. Dredged or fill material is most likely to be free from pollutants when it is composed primarily of sand, gravel or other naturally occurring inert material.

Based upon our Tier 1 review, the proposed dredge sediment is not predominantly sand, gravel or other inert material so this subsection does not apply. Also, our Tier 1 review evaluation under paragraph (b) below indicates the proposed dredge sediment is a carrier of contaminants so this subsection does not apply.

(b) This subsection states that the site should be evaluated to determine whether it is sufficiently removed from sources of pollution. These factors include records of spills or potential routes of contamination, like outfall pipes. The project area is a working port area with outfalls and prior spills.

(c) This subsection states that further testing may not be necessary if certain conditions and circumstances make it unlikely that the dredged material would degrade the disposal site. For the project to meet this exclusion, the material to be dredged and the material at the disposal site must be adjacent to each other and composed of the same materials and subject to the same sources of contaminants. As the project site is not adjacent to the disposal site, this exclusion does not apply to this project.

(d) This subsection states that further testing may not be necessary if the material to be dredged is constrained, both to reduce contamination within the disposal site and to prevent transport of contaminants beyond the boundaries of the disposal site. As such constraints in handling are not proposed, this subsection does not apply.

40 CFR 230.61 Chemical, Biological and Physical Evaluation and Testing

(a) This subsection describes the purpose of Part 230.61 and does not give any criteria for the evaluation of sediments.

(b) This subsection states that dredged material may be excluded from testing for water column effects and benthic bioassays if it is determined, by evaluation under 40 CFR Part 230.60, that the likelihood of contamination levels that could exert ecological impacts (as defined in Part 230.1) is acceptably low. For this project, the exclusions from testing in Part 230.60 were not applicable. This subsection further states that elutriate tests and benthic bioassays may be used for the evaluation of dredged material. These tests were not deemed necessary or appropriate in light of the relatively low levels of contaminants found through chemical testing.

(c) This subsection states that an inventory of the concentrations of the contaminants of concern may be performed when it would be of value in an environmental assessment of the impact of their disposal on the designated disposal site. For this project, the Corps determined such an inventory would allow such an assessment, and an inventory was performed at the dredge site. See Section 3 above and the attached spreadsheets for details. The dredged materials should have minimal impact at the disposal site.

This subsection also states that an analysis of the biological community structure may be performed when it would be of value to assess impacts at the proposed disposal site. Based on past experience at and monitoring of dredged material disposal sites through the DAMOS program as well as U.S. Environmental Protection Agency guidance, the contaminant levels for even the most elevated samples in this project are well below those expected to adversely impact ecological habitats or food web dynamics. The small fraction of the project with the most elevated levels will be isolated from the benthic community with the required disposal management option. In light of these conclusions, CENAE and the federal agencies concluded an analysis of biological community structure was not needed for this project.

(d) This subsection states the importance of the disposal of dredged materials on the characteristics of the physical substrate. MAS determined that the likelihood of physical effects from the disposal of the dredged material

at the disposal site should be minimal. Although some benthic marine organisms will be buried by the disposal of the project materials, the disposal site should be rapidly re-colonized.

5. Copies of this determination were sent to the USEPA and the MEDEP. The EPA concurred with the determination as proposed. The MEDEP acknowledged receipt of the determination.

6. If you have any questions, please contact me at (978) 318-8336 or charles.n.farris@usace.army.mil.

Charles N Farris

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CHARLES N. FARRIS
Project Manager,
Marine Analysis Section

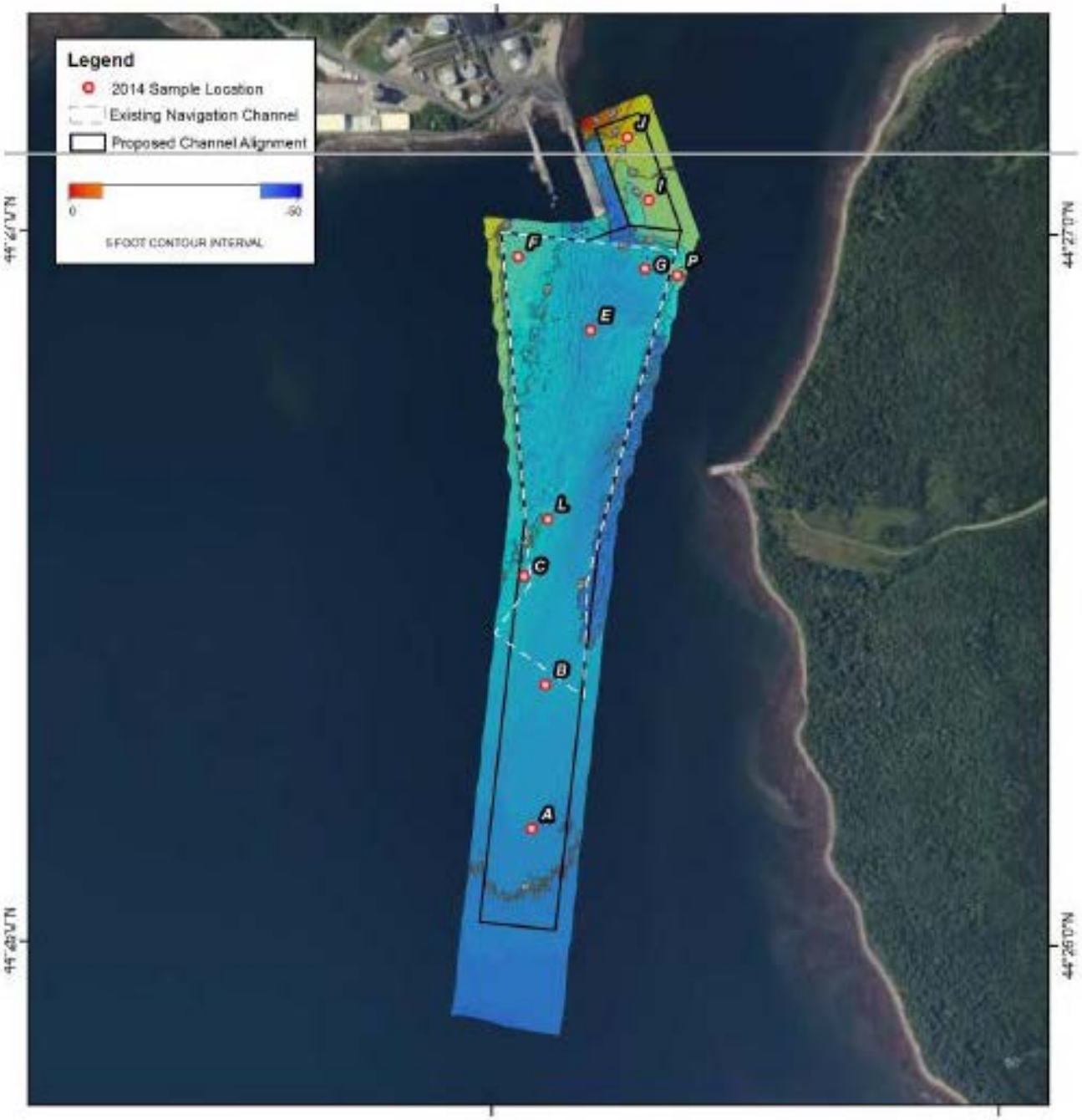

Figure 1. Map Showing the Sampling Locations in Searsport Federal Navigation Project
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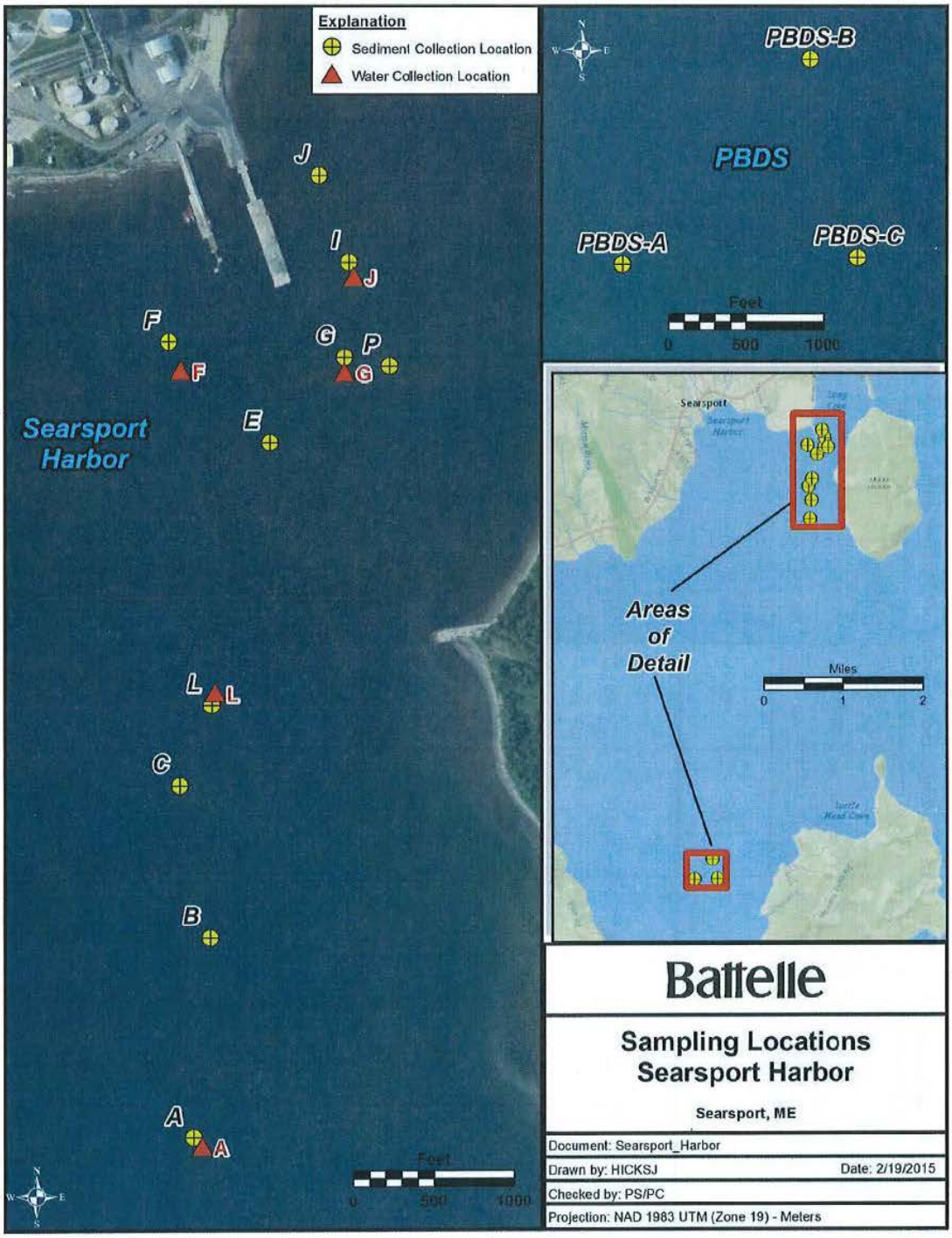

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Figure 2. Map Showing the Sampling Locations in Searsport Harbor (Inset Shows Location of Penobscot Bay Disposal Site [reference site].)

Table 1. Sediment Core, Grab, and Water Samples Collected in Searsport Harbor and at the Penobscot Bay Disposal Site

Sample Location	Expected Depth[1] (FT MLLW)	Actual Depth[1] (FT MLLW)	Penetration (FT)	Recovery (FT)	Sample Elevation (FT MLLW)	Sample Interval (FT)	Sediment for Bulk Chemistry	Site Water Elutriate Preparation and Chemistry Analysis	Archive
A	39	39.3	5.2	3.4	39.3 - 40.3	0.0 - 1.0	X	X	X
					40.3 - 41.3	1.0 - 2.0	-	-	X
B	37	39.1	6.0	4.9	39.1 - 40.1	0.0 - 1.0	X	-	X
					40.1 - 42.1	1.0 - 3.0	X	-	X
C	35	37.6	10.0	8.9	37.6 - 38.6	0.0 - 1.0	X	-	X
					38.6 - 40.6	1.0 - 3.0	-	-	X
					40.6 - 42.6	3.0 - 5.0	X	-	X
E	37	38.9	6.0	5.4	38.9 - 39.9	0.0 - 1.0	X	-	X
					39.9 - 41.9	1.0 - 3.0	X	-	X
F	32	34	6.0	4.0	34 - 35	0.0 - 1.0	X	X	X
					35 - 36	1.0 - 2.0	-	-	X
					36 - 37	2.0 - 3.0	-	-	X
					37 - 38	3.0 - 4.0	X	-	X
G	37	38.3	7.5	7.0	38.3 - 39.3	0.0 - 1.0	X	X	X
					39.3 - 40.3	1.0 - 2.0	-	-	X
					40.3 - 41.3	2.0 - 3.0	-	-	X
					41.3 - 43.3	3.0 - 5.0	X		X
I	26	29.6	6.2	5.9	29.6 - 30.6	0.0 - 1.0	X	-	X
					30.6 - 32.6	1.0 - 3.0	-	-	X
					32.6 - 33.6	3.0 - 4.0	-	--	X
J	19	19.6	4.0	2.6	19.6 - 20.6	0.0 - 1.0	X	X	X
					20.6 - 21.6	1.0 - 2.0	-	-	X

Sample Location	Expected Depth[1] (FT MLLW)	Actual Depth[1] (FT MLLW)	Penetration (FT)	Recovery (FT)	Sample Elevation (FT MLLW)	Sample Interval (FT)	Sediment for Bulk Chemistry	Site Water Elutriate Preparation and Chemistry Analysis	Archive
					21.6 - 22.2	2.0 - 2.6	X	-	X
L	35	37.9	10.0	9.6	37.9 - 38.9	0.0 - 1.0	X	X	X
					38.9 - 40.9	1.0 - 3.0	X	-	X
					40.9 - 42.9	3.0 - 5.0	X	-	X
P	30	33.6	7.0	6.7	33.6 - 34.6	0.0 - 1.0	X		X
					34.6 - 39.3	1.0 - 5.7	X		X
					39.3 - 40.3	5.7 - 6.7	X		X

Maintenance Material | Improvement Material | Improvement Overdepth

[1] Estimated depth based on 2012 and 2013 USACE surveys
[2] Target penetration of -42 ft, MLLW based on the proposed project depth of -40 ft + 2 ft of allowable overdepth
[3] Expected penetration based on Battelle 2007 sediment coring
Key: MLLW: Mean Lower Low Water; NA: Not applicable

APPENDICES

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1			**2015 Sediment Samples compared to 2015 PBDS samples**																								
2	Station_Name	MEAN +2SD	ERL	ERM	SL (screening level)	A 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	B 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	B 10-30	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	C 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	C 30-50	Compare to reference
3	Naphthalene	25.1	160	2100	2100	28.1	1.12	OK	OK	OK	23.5	OK	OK	OK	OK	4.12	OK	OK	OK	OK	12.60	OK	OK	OK	OK	3.89	OK
4	Acenaphthylene	7.56	44	640	560	56.5	7.47	1.28	OK	OK	11.7	1.55	OK	OK	OK	4.12	OK	OK	OK	OK	4.19	OK	OK	OK	OK	3.89	OK
5	Acenaphthene	7.56	16	500	500	10.2	1.35	OK	OK	OK	11.1	1.47	OK	OK	OK	4.12	OK	OK	OK	OK	4.19	OK	OK	OK	OK	3.89	OK
6	Fluorene	7.56	19	540	540	18.3	2.42	OK	OK	OK	13.3	1.76	OK	OK	OK	4.12	OK	OK	OK	OK	4.19	OK	OK	OK	OK	3.89	OK
7	Anthracene	7.56	85	1100	960	26.3	3.48	OK	OK	OK	31.7	4.19	OK	OK	OK	4.12	OK	OK	OK	OK	4.19	OK	OK	OK	OK	3.89	OK
8	Phenanthrene	52.18	240	1500	1500	93.3	1.79	OK	OK	OK	124	2.38	OK	OK	OK	4.12	OK	OK	OK	OK	30.20	OK	OK	OK	OK	3.89	OK
9	Fluoranthene	110.50	600	5100	1700	202	1.83	OK	OK	OK	178	1.61	OK	OK	OK	4.12	OK	OK	OK	OK	54.40	OK	OK	OK	OK	3.89	OK
10	Pyrene	90.35	665	2600	2600	158	1.75	OK	OK	OK	167	1.85	OK	OK	OK	4.12	OK	OK	OK	OK	55.00	OK	OK	OK	OK	3.89	OK
11	Benzo(a)anthracene	60.04	261	1600	1300	96.7	1.61	OK	OK	OK	92.2	1.54	OK	OK	OK	4.12	OK	OK	OK	OK	31.90	OK	OK	OK	OK	3.89	OK
12	Chrysene	54.43	384	2800	1400	103	1.89	OK	OK	OK	79.8	1.47	OK	OK	OK	4.12	OK	OK	OK	OK	33.40	OK	OK	OK	OK	3.89	OK
13	Benzo(b)fluoranthene	63.40				102	1.61				77.1	1.22				4.12	OK				34.10	OK				3.89	OK
14	Benzo(k)fluoranthene	73.28				108	1.47				67.2	OK				4.12	OK				26.20	OK				3.89	OK
15	total benzofluroanthenes	136.68			3200	210.00	1.54			OK	144.30	1.06			OK	8.24	OK			OK	60.30	OK			OK	7.77	OK
16	Benzo(a)pyrene	58.88	430	1600	1600	108	1.83	OK	OK	OK	86.4	1.47	OK	OK	OK	4.12	OK	OK	OK	OK	31.20	OK	OK	OK	OK	3.89	OK
17	Indeno(1,2,3-cd)pyrene	61.63			600	94.4	1.53			OK	61.2	OK			OK	4.12	OK			OK	25.60	OK			OK	3.89	OK
18	Dibenzo(a,h)anthracene	7.56	63.4	260	230	19.1	2.53	OK	OK	OK	13.0	1.72	OK	OK	OK	4.12	OK	OK	OK	OK	4.19	OK	OK	OK	OK	3.89	OK
19	Benzo(g,h,i)perylene	54.78			670	82.0	1.50			OK	57.3	1.05			OK	4.12	OK			OK	26.70	OK			OK	3.89	OK
20																											
21	total PAH calculated	742				1306					1095					66					382					62	
22	Units of Measure: ug/kg																										
23																											
24	Note: undetected values are reported as one-half RL values																										
25	Note: ERL and ERM as defined in 1999, NOAA. Sediment Quality Guidelines developed for the National Status and Trends Program.																										
26	Note: SL as defined in 2014, USACE-NWS. Dredged material evaluation and disposal procedures – User manual. Dredged Material Management Program.																										
27																											
28																											
29			**2015 Sediment Samples compared to 2015 PBDS samples**																								
30	Station_Name	mean + 2SD	ERL	ERM	SL (screening level)	A 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	B 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	B 10-30	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	C 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	C 30-50	Compare to reference
31	Arsenic	11.99	8.2	70	57	11.5	OK	1.4	OK	OK	10.8	OK	1.32	OK	OK	8.94	OK	1.09	OK	OK	10.8	OK	1.32	OK	OK	11.6	OK
32	Cadmium	0.08	1.2	9.6	5.1	0.081	OK	OK	OK	OK	0.071	OK	OK	OK	OK	0.067	OK	OK	OK	OK	0.075	OK	OK	OK	OK	0.093	1.1
33	Chromium	49.81	81	370	260	39.6	OK	OK	OK	OK	34.9	OK	OK	OK	OK	32.1	OK	OK	OK	OK	34.2	OK	OK	OK	OK	37.1	OK
34	Copper	16.67	34	270	390	15.8	OK	OK	OK	OK	12.7	OK	OK	OK	OK	9.71	OK	OK	OK	OK	12.0	OK	OK	OK	OK	11.2	OK
35	Lead	20.11	46.7	218	450	17.7	OK	OK	OK	OK	13.7	OK	OK	OK	OK	7.89	OK	OK	OK	OK	11.8	OK	OK	OK	OK	11.6	OK
36	Mercury	0.091	0.15	0.71	0.41	0.216	2.37	1.44	OK	OK	0.068	OK	OK	OK	OK	0.026	OK	OK	OK	OK	0.059	OK	OK	OK	OK	0.031	OK
37	Nickel	37.90	20.9	51.6		28.2	OK	1.35	OK		28.3	OK	1.35	OK		25.2	OK	1.21	OK		27.4	OK	1.31	OK		29.8	OK
38	Zinc	97.24	150	410	410	70.3	OK	OK	OK	OK	66.6	OK	OK	OK	OK	59.4	OK	OK	OK	OK	64.0	OK	OK	OK	OK	68.5	OK
39																											
40	Units of measure: mg/kg																										
41																											
42	Note: undetected values are reported as one-half RL values																										
43	Note: ERL and ERM as defined in 1999, NOAA. Sediment Quality Guidelines developed for the National Status and Trends Program.																										
44	Note: SL as defined in 2014, USACE-NWS. Dredged material evaluation and disposal procedures – User manual. Dredged Material Management Program.																										
45																											
46																											

	A	B	C	D	E	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW
1			**2015 Sediment Samples compared**																								
2	Station_Name	MEAN +2SD	ERL	ERM	SL (screening level)	Compare to ERL	Compare to ERM	Compare to SL	E 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	E 10-30	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	F 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	F 30-40	Compare to reference	Compare to ERL	Compare to ERM
3	Naphthalene	25.1	160	2100	2100	OK	OK	OK	3.39	OK	OK	OK	OK	5.30	OK	OK	OK	OK	90.6	3.61	OK	OK	OK	3.04	OK	OK	OK
4	Acenaphthylene	7.56	44	640	560	OK	OK	OK	3.39	OK	OK	OK	OK	5.30	OK	OK	OK	OK	36.4	4.81	OK	OK	OK	3.04	OK	OK	OK
5	Acenaphthene	7.56	16	500	500	OK	OK	OK	3.39	OK	OK	OK	OK	5.30	OK	OK	OK	OK	18.4	2.43	1.15	OK	OK	3.04	OK	OK	OK
6	Fluorene	7.56	19	540	540	OK	OK	OK	3.39	OK	OK	OK	OK	5.30	OK	OK	OK	OK	25.8	3.41	1.36	OK	OK	3.04	OK	OK	OK
7	Anthracene	7.56	85	1100	960	OK	OK	OK	3.39	OK	OK	OK	OK	5.30	OK	OK	OK	OK	49.8	6.59	OK	OK	OK	3.04	OK	OK	OK
8	Phenanthrene	52.18	240	1500	1500	OK	OK	OK	3.39	OK	OK	OK	OK	5.30	OK	OK	OK	OK	135	2.59	OK	OK	OK	3.04	OK	OK	OK
9	Fluoranthene	110.50	600	5100	1700	OK	OK	OK	3.39	OK	OK	OK	OK	5.30	OK	OK	OK	OK	249	2.25	OK	OK	OK	6.37	OK	OK	OK
10	Pyrene	90.35	665	2600	2600	OK	OK	OK	3.39	OK	OK	OK	OK	5.30	OK	OK	OK	OK	342	3.79	OK	OK	OK	9.66	OK	OK	OK
11	Benzo(a)anthracene	60.04	261	1600	1300	OK	OK	OK	3.39	OK	OK	OK	OK	5.30	OK	OK	OK	OK	226	3.76	OK	OK	OK	3.04	OK	OK	OK
12	Chrysene	54.43	384	2800	1400	OK	OK	OK	3.39	OK	OK	OK	OK	5.30	OK	OK	OK	OK	199	3.66	OK	OK	OK	3.04	OK	OK	OK
13	Benzo(b)fluoranthene	63.40							3.39	OK				5.30	OK				205	3.23				3.04	OK		
14	Benzo(k)fluoranthene	73.28							3.39	OK				5.30	OK				136	1.86				3.04	OK		
15	total benzofluroanthenes	136.68			3200			OK	6.78	OK			OK	10.60	OK			OK	341	2.49			OK	6.08	OK		
16	Benzo(a)pyrene	58.88	430	1600	1600	OK	OK	OK	3.39	OK	OK	OK	OK	5.30	OK	OK	OK	OK	168	2.85	OK	OK	OK	3.04	OK	OK	OK
17	Indeno(1,2,3-cd)pyrene	61.63			600			OK	3.39	OK			OK	5.30	OK			OK	116	1.88			OK	3.04	OK		
18	Dibenzo(a,h)anthracene	7.56	63.4	260	230	OK	OK	OK	3.39	OK	OK	OK	OK	5.30	OK	OK	OK	OK	35.7	4.72	OK	OK	OK	3.04	OK	OK	OK
19	Benzo(g,h,i)perylene	54.78			670			OK	3.39	OK			OK	5.30	OK			OK	111	2.03			OK	3.04	OK		
20																											
21	total PAH calculated	742							54					85					2144					59			
22	Units of Measure: ug/kg																										
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27																											
28																											
29			**2015 Sediment Samples compared**																								
30	Station_Name	mean + 2SD	ERL	ERM	SL (screening level)	Compare to ERL	Compare to ERM	Compare to SL	E 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	E 10-30	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	F 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	F 30-40	Compare to reference	Compare to ERL	Compare to ERM
31	Arsenic	11.99	8.2	70	57	1.41	OK	OK	8.73	OK	1.06	OK	OK	8.62	OK	1.05	OK	OK	12.4	1.03	1.51	OK	OK	18.6	1.55	2.27	OK
32	Cadmium	0.08	1.2	9.6	5.1	OK	OK	OK	0.146	1.72	OK	OK	OK	0.037	OK	OK	OK	OK	0.187	2.21	OK	OK	OK	0.069	OK	OK	OK
33	Chromium	49.81	81	370	260	OK	OK	OK	19.5	OK	OK	OK	OK	20.1	OK	OK	OK	OK	37.7	OK	OK	OK	OK	27.2	OK	OK	OK
34	Copper	16.67	34	270	390	OK	OK	OK	8.86	OK	OK	OK	OK	11.9	OK	OK	OK	OK	16.8	1.01	OK	OK	OK	11.8	OK	OK	OK
35	Lead	20.11	46.7	218	450	OK	OK	OK	5.58	OK	OK	OK	OK	6.27	OK	OK	OK	OK	17.4	OK	OK	OK	OK	7.61	OK	OK	OK
36	Mercury	0.091	0.15	0.71	0.41	OK	OK	OK	0.019	OK	OK	OK	OK	0.02	OK	OK	OK	OK	0.244	2.68	1.63	OK	OK	0.025	OK	OK	OK
37	Nickel	37.90	20.9	51.6		1.43	OK		17.6	OK	OK	OK		18.4	OK	OK	OK		26.6	OK	1.27	OK		26.1	OK	1.25	OK
38	Zinc	97.24	150	410	410	OK	OK	OK	34.6	OK	OK	OK	OK	32.5	OK	OK	OK	OK	70.3	OK	OK	OK	OK	49.4	OK	OK	OK
39																											
40	Units of measure: mg/kg																										
41																											
42	Note: undetected values are reported as one-half RL values																										
43	Note: ERL and ERM as defined in 1999, NOAA. Sediment Quality Guidelines dev																										
44	Note: SL as defined in 2014, USACE-NWS. Dredged material evaluation and disp																										
45																											
46																											

	A	B	C	D	E	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS
1			**2015 Sediment Samples compared**																								
2	Station_Name	MEAN +2SD	ERL	ERM	SL (screening level)	Compare to SL	G 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	G 30-50	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	I 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	J 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	J 20-26
3	Naphthalene	25.1	160	2100	2100	OK	4.53	OK	OK	OK	OK	4.50	OK	OK	OK	OK	17.10	OK	OK	OK	OK	264	10.52	1.65	OK	OK	11
4	Acenaphthylene	7.56	44	640	560	OK	4.53	OK	OK	OK	OK	4.50	OK	OK	OK	OK	4.48	OK	OK	OK	OK	69	9.13	1.57	OK	OK	5.00
5	Acenaphthene	7.56	16	500	500	OK	4.53	OK	OK	OK	OK	4.50	OK	OK	OK	OK	4.48	OK	OK	OK	OK	120	15.87	7.50	OK	OK	5.00
6	Fluorene	7.56	19	540	540	OK	4.53	OK	OK	OK	OK	4.50	OK	OK	OK	OK	4.48	OK	OK	OK	OK	154	20.37	8.11	OK	OK	5.00
7	Anthracene	7.56	85	1100	960	OK	4.53	OK	OK	OK	OK	4.50	OK	OK	OK	OK	9.24	1.22	OK	OK	OK	252	33.33	2.95	OK	OK	14.5
8	Phenanthrene	52.18	240	1500	1500	OK	4.53	OK	OK	OK	OK	4.50	OK	OK	OK	OK	30.9	OK	OK	OK	OK	809	15.50	3.37	OK	OK	44.3
9	Fluoranthene	110.50	600	5100	1700	OK	46.2	OK	OK	OK	OK	4.50	OK	OK	OK	OK	59.9	OK	OK	OK	OK	943	8.53	1.57	OK	OK	51.3
10	Pyrene	90.35	665	2600	2600	OK	48.9	OK	OK	OK	OK	4.50	OK	OK	OK	OK	69.4	OK	OK	OK	OK	1070	11.84	1.61	OK	OK	61.9
11	Benzo(a)anthracene	60.04	261	1600	1300	OK	30.6	OK	OK	OK	OK	4.50	OK	OK	OK	OK	37.6	OK	OK	OK	OK	658	10.96	2.52	OK	OK	35.7
12	Chrysene	54.43	384	2800	1400	OK	23.3	OK	OK	OK	OK	4.50	OK	OK	OK	OK	31.2	OK	OK	OK	OK	532	9.77	1.39	OK	OK	40.4
13	Benzo(b)fluoranthene	63.40					20.8	OK				4.50	OK				37.4	OK				440	6.94				37.4
14	Benzo(k)fluoranthene	73.28					13.9	OK				4.50	OK				30.2	OK				400	5.46				25.2
15	total benzofluroanthenes	136.68			3200	OK	34.70	OK			OK	8.99	OK			OK	67.60	OK			OK	840.00	6.15			OK	62.60
16	Benzo(a)pyrene	58.88	430	1600	1600	OK	16.0	OK	OK	OK	OK	4.50	OK	OK	OK	OK	32.2	OK	OK	OK	OK	444	7.54	1.03	OK	OK	30.8
17	Indeno(1,2,3-cd)pyrene	61.63			600	OK	9.92	OK			OK	4.50	OK			OK	26.4	OK			OK	271	4.40			OK	24.2
18	Dibenzo(a,h)anthracene	7.56	63.4	260	230	OK	4.53	OK	OK	OK	OK	4.50	OK	OK	OK	OK	4.48	OK	OK	OK	OK	79	10.44	1.24	OK	OK	5.00
19	Benzo(g,h,i)perylene	54.78			670	OK	9.29	OK			OK	4.50	OK			OK	23.6	OK			OK	244	4.45			OK	19.1
20																											
21	total PAH calculated	742					251					72					423					6749					416
22	Units of Measure: ug/kg																										
23																											
24	Note: undetected values are reported as one-half RL values																										
25	Note: ERL and ERM as defined in 1999, NOAA. Sediment Quality Guidelines dev																										
26	Note: SL as defined in 2014, USACE-NWS. Dredged material evaluation and disp																										
27																											
28																											
29			**2015 Sediment Samples compared**																								
30	Station_Name	mean + 2SD	ERL	ERM	SL (screening level)	Compare to SL	G 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	G 30-50	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	I 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	J 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	J 20-26
31	Arsenic	11.99	8.2	70	57	OK	9.25	OK	1.13	OK	OK	10.6	OK	1.29	OK	OK	11.4	OK	1.39	OK	OK	10.4	OK	1.27	OK	OK	5.79
32	Cadmium	0.08	1.2	9.6	5.1	OK	0.038	OK	OK	OK	OK	0.033	OK	OK	OK	OK	0.107	1.26	OK	OK	OK	0.314	3.71	OK	OK	OK	0.142
33	Chromium	49.81	81	370	260	OK	23.3	OK	OK	OK	OK	27.8	OK	OK	OK	OK	33.4	OK	OK	OK	OK	26.8	OK	OK	OK	OK	15.5
34	Copper	16.67	34	270	390	OK	13.6	OK	OK	OK	OK	16.2	OK	OK	OK	OK	12.7	OK	OK	OK	OK	24.2	1.45	OK	OK	OK	7.11
35	Lead	20.11	46.7	218	450	OK	9.22	OK	OK	OK	OK	10.9	OK	OK	OK	OK	13.0	OK	OK	OK	OK	28.4	1.41	OK	OK	OK	6.14
36	Mercury	0.091	0.15	0.71	0.41	OK	0.017	OK	OK	OK	OK	0.018	OK	OK	OK	OK	0.038	OK	OK	OK	OK	0.185	2.03	1.23	OK	OK	0.02
37	Nickel	37.90	20.9	51.6			27.0	OK	1.29	OK		32.1	OK	1.54	OK		27.2	OK	1.3	OK		20.4	OK	OK	OK		12.1
38	Zinc	97.24	150	410	410	OK	45.9	OK	OK	OK	OK	51.4	OK	OK	OK	OK	63.1	OK	OK	OK	OK	71.2	OK	OK	OK	OK	34.5
39																											
40	Units of measure: mg/kg																										
41																											
42	Note: undetected values are reported as one-half RL values																										
43	Note: ERL and ERM as defined in 1999, NOAA. Sediment Quality Guidelines dev																										
44	Note: SL as defined in 2014, USACE-NWS. Dredged material evaluation and disp																										
45																											
46																											

	A	B	C	D	E	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO
1			**2015 Sediment Samples compared**																								
2	Station_Name	MEAN +2SD	ERL	ERM	SL (screening level)	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	L 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	L 10-30	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	L 30-50	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	P 00-10	Compare to reference	Compare to ERL
3	Naphthalene	25.1	160	2100	2100	OK	OK	OK	OK	12.7	OK	OK	OK	OK	4.48	OK	OK	OK	OK	3.69	OK	OK	OK	OK	10	OK	OK
4	Acenaphthylene	7.56	44	640	560	OK	OK	OK	OK	4.56	OK	OK	OK	OK	4.48	OK	OK	OK	OK	3.69	OK	OK	OK	OK	4.43	OK	OK
5	Acenaphthene	7.56	16	500	500	OK	OK	OK	OK	4.56	OK	OK	OK	OK	4.48	OK	OK	OK	OK	3.69	OK	OK	OK	OK	4.43	OK	OK
6	Fluorene	7.56	19	540	540	OK	OK	OK	OK	4.56	OK	OK	OK	OK	4.48	OK	OK	OK	OK	3.69	OK	OK	OK	OK	4.43	OK	OK
7	Anthracene	7.56	85	1100	960	1.92	OK	OK	OK	4.56	OK	OK	OK	OK	4.48	OK	OK	OK	OK	3.69	OK	OK	OK	OK	10.2	1.35	OK
8	Phenanthrene	52.18	240	1500	1500	OK	OK	OK	OK	28.9	OK	OK	OK	OK	4.48	OK	OK	OK	OK	3.69	OK	OK	OK	OK	35.5	OK	OK
9	Fluoranthene	110.50	600	5100	1700	OK	OK	OK	OK	55.0	OK	OK	OK	OK	4.48	OK	OK	OK	OK	3.69	OK	OK	OK	OK	67.0	OK	OK
10	Pyrene	90.35	665	2600	2600	OK	OK	OK	OK	50.7	OK	OK	OK	OK	4.48	OK	OK	OK	OK	3.69	OK	OK	OK	OK	49.5	OK	OK
11	Benzo(a)anthracene	60.04	261	1600	1300	OK	OK	OK	OK	33.4	OK	OK	OK	OK	4.48	OK	OK	OK	OK	3.69	OK	OK	OK	OK	35.4	OK	OK
12	Chrysene	54.43	384	2800	1400	OK	OK	OK	OK	26.6	OK	OK	OK	OK	4.48	OK	OK	OK	OK	3.69	OK	OK	OK	OK	39.2	OK	OK
13	Benzo(b)fluoranthene	63.40				OK				31.2	OK				4.48	OK				3.69	OK				28.0	OK	
14	Benzo(k)fluoranthene	73.28				OK				25.7	OK				4.48	OK				3.69	OK				22.1	OK	
15	total benzofluroanthenes	136.68			3200	OK			OK	56.90	OK			OK	8.95	OK			OK	7.38	OK			OK	50.10	OK	
16	Benzo(a)pyrene	58.88	430	1600	1600	OK	OK	OK	OK	26.9	OK	OK	OK	OK	4.48	OK	OK	OK	OK	3.69	OK	OK	OK	OK	21.3	OK	OK
17	Indeno(1,2,3-cd)pyrene	61.63			600	OK			OK	23.4	OK			OK	4.48	OK			OK	3.69	OK			OK	13.5	OK	
18	Dibenzo(a,h)anthracene	7.56	63.4	260	230	OK	OK	OK	OK	4.56	OK	OK	OK	OK	4.48	OK	OK	OK	OK	3.69	OK	OK	OK	OK	4.43	OK	OK
19	Benzo(g,h,i)perylene	54.78			670	OK			OK	20.0	OK			OK	4.48	OK			OK	3.69	OK			OK	12.5	OK	
20																											
21	total PAH calculated	742								357					72					59					362		
22	Units of Measure: ug/kg																										
23																											
24	Note: undetected values are reported as one-half RL values																										
25	Note: ERL and ERM as defined in 1999, NOAA. Sediment Quality Guidelines dev																										
26	Note: SL as defined in 2014, USACE-NWS. Dredged material evaluation and disp																										
27																											
28																											
29			**2015 Sediment Samples compared**																								
30	Station_Name	mean + 2SD	ERL	ERM	SL (screening level)	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	L 00-10	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	L 10-30	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	L 30-50	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	P 00-10	Compare to reference	Compare to ERL
31	Arsenic	11.99	8.2	70	57	OK	OK	OK	OK	12.8	1.07	1.56	OK	OK	11.8	OK	1.44	OK	OK	9.59	OK	1.17	OK	OK	12.5	1.04	1.52
32	Cadmium	0.08	1.2	9.6	5.1	1.68	OK	OK	OK	0.085	1.	OK	OK	OK	0.089	1.05	OK	OK	OK	0.072	OK	OK	OK	OK	0.125	1.48	OK
33	Chromium	49.81	81	370	260	OK	OK	OK	OK	37.0	OK	OK	OK	OK	37.0	OK	OK	OK	OK	28.5	OK	OK	OK	OK	32.3	OK	OK
34	Copper	16.67	34	270	390	OK	OK	OK	OK	12.6	OK	OK	OK	OK	11.6	OK	OK	OK	OK	9.17	OK	OK	OK	OK	11.4	OK	OK
35	Lead	20.11	46.7	218	450	OK	OK	OK	OK	11.9	OK	OK	OK	OK	9.11	OK	OK	OK	OK	7.34	OK	OK	OK	OK	8.9	OK	OK
36	Mercury	0.091	0.15	0.71	0.41	OK	OK	OK	OK	0.065	OK	OK	OK	OK	0.025	OK	OK	OK	OK	0.025	OK	OK	OK	OK	0.028	OK	OK
37	Nickel	37.90	20.9	51.6		OK	OK	OK		29.7	OK	1.42	OK		29.5	OK	1.41	OK		24.0	OK	1.15	OK		25.2	OK	1.21
38	Zinc	97.24	150	410	410	OK	OK	OK	OK	66.8	OK	OK	OK	OK	67.4	OK	OK	OK	OK	54.0	OK	OK	OK	OK	58.2	OK	OK
39																											
40	Units of measure: mg/kg																										
41																											
42	Note: undetected values are reported as one-half RL values																										
43	Note: ERL and ERM as defined in 1999, NOAA. Sediment Quality Guidelines dev																										
44	Note: SL as defined in 2014, USACE-NWS. Dredged material evaluation and disp																										
45																											
46																											

	A	B	C	D	E	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ	DA	DB	DC	DD	DE	DF	DG
1			**2015 Sediment Samples compared**																				
2	Station_Name	MEAN +2SD	ERL	ERM	SL (screening level)	Compare to ERM	Compare to SL	P 10-57	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	P 57-67	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	PBDS-A	PBDS-B	PBDS-C		MEAN	SD
3	Naphthalene	25.1	160	2100	2100	OK	OK	2.86	OK	OK	OK	OK	4.88	OK	OK	OK	OK	19	6.60	4.97		10.1	7.50
4	Acenaphthylene	7.56	44	640	560	OK	OK	2.86	OK	OK	OK	OK	4.88	OK	OK	OK	OK	6.10	6.60	4.97		5.9	0.84
5	Acenaphthene	7.56	16	500	500	OK	OK	2.86	OK	OK	OK	OK	4.88	OK	OK	OK	OK	6.10	6.60	4.97		5.9	0.84
6	Fluorene	7.56	19	540	540	OK	OK	2.86	OK	OK	OK	OK	4.88	OK	OK	OK	OK	6.10	6.60	4.97		5.9	0.84
7	Anthracene	7.56	85	1100	960	OK	OK	2.86	OK	OK	OK	OK	4.88	OK	OK	OK	OK	6.10	6.60	4.97		5.9	0.84
8	Phenanthrene	52.18	240	1500	1500	OK	OK	2.86	OK	OK	OK	OK	4.88	OK	OK	OK	OK	38.4	44.6	30.2		37.7	7.22
9	Fluoranthene	110.50	600	5100	1700	OK	OK	2.86	OK	OK	OK	OK	4.88	OK	OK	OK	OK	82.1	96.4	68.1		82.2	14.15
10	Pyrene	90.35	665	2600	2600	OK	OK	2.86	OK	OK	OK	OK	4.88	OK	OK	OK	OK	76.4	79.2	62.8		72.8	8.77
11	Benzo(a)anthracene	60.04	261	1600	1300	OK	OK	2.86	OK	OK	OK	OK	4.88	OK	OK	OK	OK	50.4	48.6	36.8		45.3	7.39
12	Chrysene	54.43	384	2800	1400	OK	OK	2.86	OK	OK	OK	OK	4.88	OK	OK	OK	OK	44.9	44.9	33.3		41.0	6.70
13	Benzo(b)fluoranthene	63.40						2.86	OK				4.88	OK				52.5	55.3	42.7		50.2	6.62
14	Benzo(k)fluoranthene	73.28						2.86	OK				4.88	OK				50.5	54.7	27.8		44.3	14.47
15	total benzofluroanthenes	136.68			3200		OK	5.71	OK			OK	9.76	OK			OK						
16	Benzo(a)pyrene	58.88	430	1600	1600	OK	OK	2.86	OK	OK	OK	OK	4.88	OK	OK	OK	OK	45.1	49.6	34.1		42.9	7.97
17	Indeno(1,2,3-cd)pyrene	61.63			600		OK	2.86	OK			OK	4.88	OK			OK	46.9	51	34.1		44.0	8.82
18	Dibenzo(a,h)anthracene	7.56	63.4	260	230	OK	OK	2.86	OK	OK	OK	OK	4.88	OK	OK	OK	OK	6.10	6.60	4.97		5.9	0.84
19	Benzo(g,h,i)perylene	54.78			670		OK	2.86	OK			OK	4.88	OK			OK	41.9	45.2	30.3		39.1	7.83
20																							
21	total PAH calculated	742						46					78										
22	Units of Measure: ug/kg																						
23																							
24	Note: undetected values are reported as one-half RL values																						
25	Note: ERL and ERM as defined in 1999, NOAA. Sediment Quality Guidelines dev																						
26	Note: SL as defined in 2014, USACE-NWS. Dredged material evaluation and disp																						
27																							
28																							
29			**2015 Sediment Samples compared**																				
30	Station_Name	mean + 2SD	ERL	ERM	SL (screening level)	Compare to ERM	Compare to SL	P 10-57	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	P 57-67	Compare to reference	Compare to ERL	Compare to ERM	Compare to SL	PBDS-A	PBDS-B	PBDS-C		mean	SD
31	Arsenic	11.99	8.2	70	57	OK	OK	12.0	1.001	1.463	OK	OK	5.89	OK	OK	OK	OK	11.0	9.12	10.2		10.1	0.943
32	Cadmium	0.08	1.2	9.6	5.1	OK	OK	0.084	OK	OK	OK	OK	0.018	OK	OK	OK	OK	0.077	0.064	0.073		0.1	0.007
33	Chromium	49.81	81	370	260	OK	OK	26.7	OK	OK	OK	OK	32.0	OK	OK	OK	OK	46.3	38.7	41.2		42.1	3.873
34	Copper	16.67	34	270	390	OK	OK	11.4	OK	OK	OK	OK	17.2	1.03	OK	OK	OK	15.6	13.3	13.6		14.2	1.250
35	Lead	20.11	46.7	218	450	OK	OK	6.76	OK	OK	OK	OK	9.96	OK	OK	OK	OK	18.9	16.6	17.9		17.8	1.153
36	Mercury	0.091	0.15	0.71	0.41	OK	OK	0.019	OK	OK	OK	OK	0.016	OK	OK	OK	OK	0.081	0.078	0.087		0.082	0.005
37	Nickel	37.90	20.9	51.6		OK		24.9	OK	1.191	OK		33.6	OK	1.61	OK		35.1	29.6	32.5		32.4	2.751
38	Zinc	97.24	150	410	410	OK	OK	46.6	OK	OK	OK	OK	56.2	OK	OK	OK	OK	90.2	74.9	77.5		80.9	8.187
39																							
40	Units of measure: mg/kg																						
41																							
42	Note: undetected values are reported as one-half RL values																						
43	Note: ERL and ERM as defined in 1999, NOAA. Sediment Quality Guidelines dev																						
44	Note: SL as defined in 2014, USACE-NWS. Dredged material evaluation and disp																						
45																							
46																							