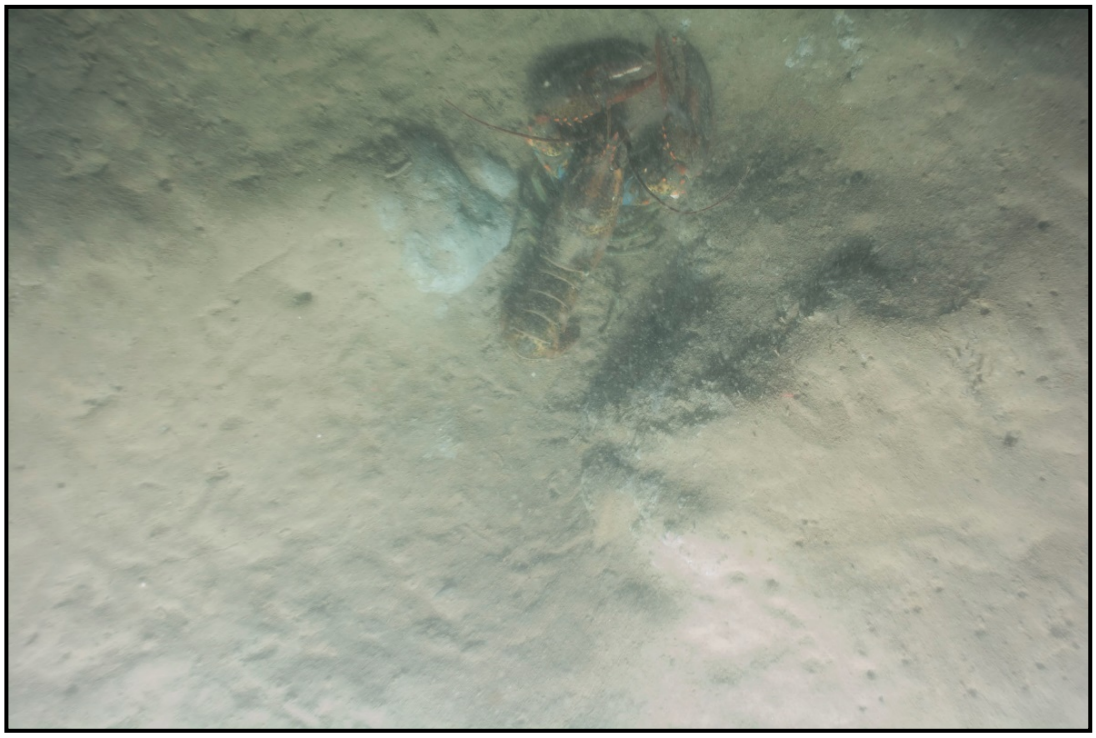
Monitoring Survey at the Rockland Disposal Site
September 2016

Disposal Area Monitoring System DAMOS



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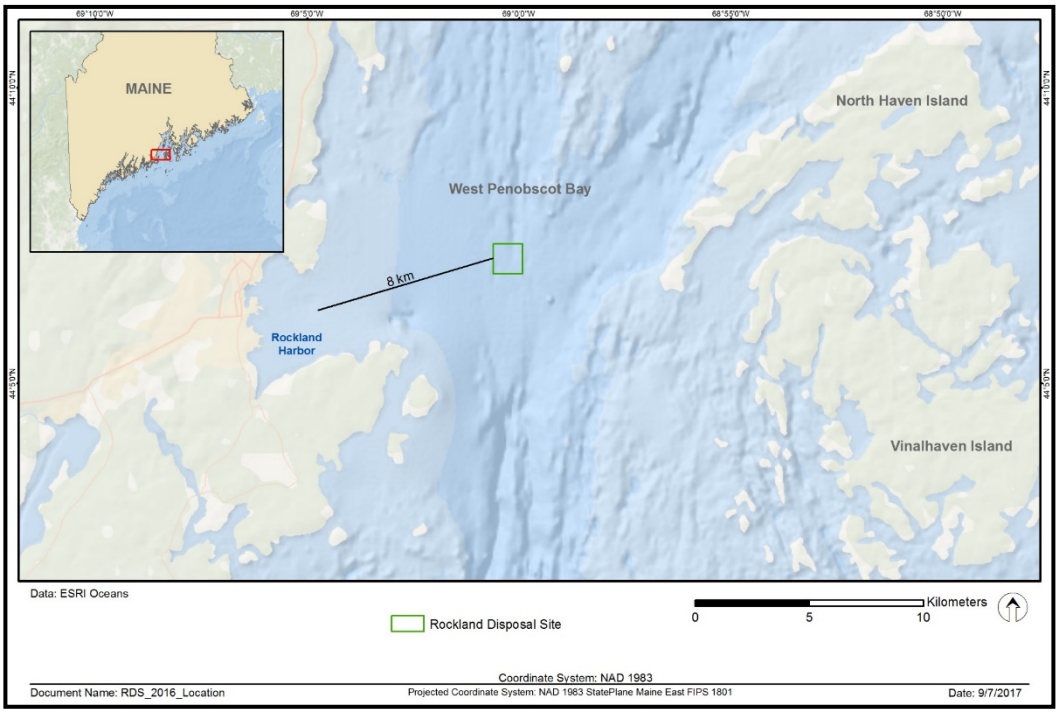

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13. ABSTRACT

A monitoring survey was conducted in September 2016 at the Rockland Disposal Site (RDS) as part of the Disposal Area Monitoring System (DAMOS) Program. RDS is a regional dredged material disposal site in Maine State Waters that only periodically receives dredged material. Since the previous DAMOS survey in 2003, just over 25,000 m^3 of dredged material had been placed at the site at the time of the 2016 monitoring effort. The 2016 monitoring effort involved a high-resolution acoustic survey to characterize seafloor topography and dredged material distribution, as well as a combined sediment-profile imaging (SPI)/plan-view imaging (PV) survey and benthic grab sampling to provide additional physical and chemical characterization and to assess benthic recolonization and associated in situ tissue chemical concentrations. The results of the 2016 survey were used to assess current conditions and to evaluate changes at RDS since the previous monitoring survey conducted in 2003.

The high-resolution acoustic survey consisted of multibeam bathymetric, acoustic backscatter, and side-scan sonar data acquisition. The survey was conducted at the full RDS as well as surrounding outer areas that received historical dredged material placement. Both RDS and these outer areas were evaluated in previous monitoring efforts. Acoustic data were also collected at each of three reference sites to the north, east, and south of RDS (NREF, EREF, SREF, respectively). The bathymetric data indicated that depths were relatively uniform across the site (~70 m) with a gradual trend of increasing depths from north to south. A trough extended from near the midpoint of RDS to north of the site and reached ~80 m depth; regional bathymetry indicated this feature continued north of the site. A rocky outcrop was present on the western edge of the site; a few shallow troughs were visible on the eastern side. Two disposal target areas were evident and matched the locations of those first identified in the acoustic survey conducted at RDS in 2000.

Acoustic results indicate that the texture and roughness of surficial sediments in the primary areas which received dredged materials were harder and rougher than surrounding native sediments. Dredged material was observed throughout the disposal area, and nearly all observations were of older, weathered dredged material that had been heavily reworked into the sediment matrix. A spatial gradient of dredged material presence was evident within the site. This gradient began with clasts of cohesive dredged material near the most recent target placement location and extended outward from there through stages of weathering and reworking to the edges of the disposal area where it was difficult to optically distinguish between heavily weathered dredged material and ambient sediments. No evidence of large-scale dredged material transport was observed.

The 2016 monitoring survey results supported the conclusion that surface sediments at RDS have been recolonized by a benthic community that is ecologically equivalent to reference areas. Results of sediment chemistry, benthic community, and tissue analyses all support this finding. Sediment-profile and plan-view images were collected within and surrounding RDS and within three reference areas. Evidence of healthy advanced Stage 3 successional status was present in at least one replicate image from all 36 stations surveyed. Mean apparent redox potential discontinuity depths were statistically equivalent at disposal areas (4.1 cm) compared to the reference locations (4.2 cm) and all were deeper than those observed in the 2003 survey.

Lobster fishing gear was prevalent at RDS with higher observations of surface marker buoys observed in the western and southern portions of the survey area and within the southern reference area. This use of the area by the lobster fishery and the presence of large numbers of lobster burrows might lead to frequent disturbance of surface sediments and contribute to the prevalence of Stage 1 taxa observed and the somewhat patchy distribution of apparent redox potential discontinuity depths over small spatial scales. A 2003 study found that dredged material at RDS had no significant effects on lobster populations sampled there (Wahle et al. 2004). The presence of high densities of fixed fishing gear can make surveying challenging, but there is no evidence that the fishing activity is inconsistent with management of the site for disposal of dredged material.

Overall the 2016 survey at RDS showed that the site was stable, the benthic community healthy, and that the benthic community has reworked dredged material into the sediment matrix and recolonized areas of dredged material placement. Areas that received dredged materials were different in sediment textural properties (harder and rougher) but were ecologically equivalent to reference areas in terms of benthic habitat, with all stations exhibiting mature Stage 3 taxa and deep well-developed aRPDs.

Based on the findings of the 2016 survey, our recommendations are:

R1. The presence of stable mounds and normal benthic recolonization indicate that the site could accommodate additional dredged material placement utilizing an approach similar to approaches used in the past.

R2. Monitoring efforts should continue in a manner consistent with Tiered Monitoring Protocols based on volume placed at site.

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Note on units of this report: As a scientific data summary, information and data are presented in the metric system. However, given the prevalence of English units in the dredging industry of the United States, conversions to English units are provided for general information in Section 1. A table of common conversions can be found in Appendix A.

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LIST OF ACRONYMS

ACSM	American Congress on Surveying and Mapping
aRPD	Apparent redox potential discontinuity
ASCII	American Standard Code for Information Interchange
BCA	Benthic Community Analysis
CI	Confidence interval
CLT	Central Limit Theorem
DAMOS	Disposal Area Monitoring System
DGPS	Digital Global Positioning System
DO	Dissolved oxygen
Eh	Redox potential (the potential generated between a platinum electrode and a standard hydrogen electrode when placed into the medium being tested, where hydrogen is considered the reference electrode)
ER-L	Effects range low
ER-M	Effect range medium
FDA	Food and Drug Administration
GIS	Geographic information system
GPS	Global Positioning System
GRD	Gridded data
MBES	Multibeam echo sounder
MLLW	Mean Lower Low Water
MRU	Motion reference unit
NAD83	North American Datum of 1983
NAE	USACE, New England Division
NEF	Nikon Electronic Format
NOAA	National Oceanic and Atmospheric Association
NOS	National Ocean Service
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PSD	Photoshop Document
PV	Plan-View

QAPP	Quality Assurance Project Plan
RDS	Rockland Disposal Site
RDSO	RDS-Outer
RTK	Real time kinematic GPS - vertical accuracy is approximately 2 cm, enabling use for tide corrections in some circumstances. RTK GPS is suitable for both horizontal and centimeter level vertical positioning, including tide corrections
R/V	Research vessel
SLR	Single-lens reflex
SD	Standard deviation
SOD	Sediment oxygen demand
SOP	Standard Operating Procedures
SPI	Sediment-Profile Imaging
TIF	Tagged image file
TOC	total organic carbon
UNH/NOAA CCOM	University of New Hampshire's NOAA Center for Coastal and Ocean Mapping
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VDATUM	Vertical Datum Transformation

EXECUTIVE SUMMARY

A monitoring survey was conducted in September 2016 at the Rockland Disposal Site (RDS) as part of the Disposal Area Monitoring System (DAMOS) Program. RDS is a regional dredged material disposal site in Maine State Waters that only periodically receives dredged material. Since the previous DAMOS survey in 2003, just over 25,000 m^3 of dredged material had been placed at the site at the time of the 2016 monitoring effort. The 2016 monitoring effort involved a high-resolution acoustic survey to characterize seafloor topography and dredged material distribution, as well as a combined sediment-profile imaging (SPI)/plan-view imaging (PV) survey and benthic grab sampling to provide additional physical and chemical characterization and to assess benthic recolonization and associated in situ tissue chemical concentrations. The results of the 2016 survey were used to assess current conditions and to evaluate changes at RDS since the previous monitoring survey conducted in 2003.

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Based on the findings of the 2016 survey, our recommendations are:

R1. The presence of stable mounds and normal benthic recolonization indicate that the site could accommodate additional dredged material placement utilizing an approach similar to approaches used in the past.

R2. Monitoring efforts should continue in a manner consistent with Tiered Monitoring Protocols based on volume placed at site.

1.0 INTRODUCTION

A monitoring survey was conducted at the Rockland Disposal Site (RDS) as part of the U.S. Army Corps of Engineers (USACE) New England District (NAE) Disposal Area Monitoring System (DAMOS) Program. DAMOS is a comprehensive monitoring and management program designed and conducted to address environmental concerns associated with use of aquatic disposal sites throughout the New England region. An introduction to the DAMOS Program and RDS, including a brief description of previous dredged material disposal activities and previous monitoring surveys, is provided below.

1.1 Overview of the DAMOS Program

The DAMOS Program features a tiered management protocol designed to ensure that any potential adverse environmental impacts associated with dredged material disposal are promptly identified and addressed (Germano et al. 1994). For over 40 years, the DAMOS Program has collected and evaluated disposal site data throughout New England. Based on these data, patterns of physical, chemical, and biological responses of seafloor environments to dredged material disposal activity have been documented (Fredette and French 2004).

DAMOS monitoring surveys fall into two general categories: confirmatory studies and focused studies. The data collected and evaluated during these studies provide answers to strategic management questions in determining next steps in the disposal site management process. DAMOS monitoring results guide the management of disposal activities at existing sites, support planning for use of future sites, and evaluate the long-term status of historical sites (Wolf et al. 2012).

Confirmatory studies are designed to test hypotheses related to expected physical and ecological response patterns following placement of dredged material on the seafloor at established, active disposal sites. Two primary goals of DAMOS confirmatory monitoring surveys are to document the physical location and stability of dredged material placed into the aquatic environment and to evaluate the biological recovery of the benthic community following placement of dredged material. Several survey techniques are employed in order to characterize these responses to dredged material placement. Sequential acoustic monitoring surveys (including bathymetric, acoustic backscatter, and side-scan sonar data collection) are performed to characterize the height and spread of discrete dredged material deposits or mounds created at open water sites as well as the accumulation/consolidation of dredged material into confined aquatic disposal cells.

Sediment-profile (SPI) and plan-view (PV) imaging surveys are performed in confirmatory studies to provide further physical characterization of the material and to support evaluation of seafloor (benthic) habitat conditions and recovery over time. Each type of data collection activity is conducted periodically at disposal sites, and the conditions found after a defined period of disposal activity are compared with the long-term data set at specific

sites to determine the next step in the disposal site management process (Germano et al. 1994).

Focused studies are periodically undertaken within the DAMOS Program to evaluate candidate sites, as baseline surveys at new sites, to evaluate inactive or historical disposal sites and contribute to the development of dredged material placement and monitoring techniques. Focused DAMOS monitoring surveys may also feature additional types of data collection activities as deemed appropriate to achieve specific survey objectives, such as grab sampling of sediment for physical and biological analysis, subbottom profiling, towed video, or sediment coring.

The September 2016 survey at RDS was designed as a focused survey to provide full coverage of the limited-use site and reference areas using multibeam acoustic data, SPI/PV images, enumeration of the infaunal community, and chemical analysis of sediment and infaunal tissue to provide characterization of surficial sediment quality to aid in management of the site. The focused study was also conducted to provide characterization of surficial sediments and benthic habitat quality to aid in management of the site.

1.2 Introduction to the Rockland Disposal Site

The Rockland Disposal Site (RDS) is a regional dredged material disposal site located in the waters of central coastal Maine (Figure 1-1). RDS is situated in West Penobscot Bay, approximately 8 km (4.3 nmi) east of Rockland Harbor and is exposed to the Gulf of Maine to the south. RDS is defined as a 930 x 930 m area on the seafloor centered at coordinates 44º 07.105' N, 69º00.269' W (NAD 83).

Water depths within RDS range from 66 to 72 m (216 ft. to 236 ft.), except for a deeper trough situated within the northeastern quadrant of the site, where water depths reach 80 m (262 ft.) (Figure 1-2). Water depths in the area immediately surrounding RDS generally increase both to the south and within the trough to the north. To the east and west, water depths in areas immediately adjacent to RDS are generally similar to depths within the site (i.e., 66 - 72 m), except for a rock outcrop to the west (minimum depth of 56 m [183 ft.]).

Two dredged material disposal mounds were identified previously within RDS (SAIC 2001, Contribution 131) and are designated as target placement locations A and B (Figure 1-2). A brief description of the origin of the RDS mounds is provided in the 2003 Monitoring Survey at the Rockland Disposal Site (ENSR 2004, Contribution 156). One buoy, the US Coast Guard, Class-A Special Purposes buoy designated “DG”, was located at RDS prior to and during the September 2003 survey period (Figure 1-2 and Table 1-1).

1.3 Historical Dredged Material Disposal Activity

Recorded dredged material placement at and near RDS began during the 1973 – 1974 dredged material disposal season (October 1973 – February 1974) and the most recent recorded disposal event was in April 2006 (Table 1-1). Disposal events records show that in

the 1980s and 1990s disposals were predominantly located in areas adjacent to the RDS boundary; these areas are considered in this and previous surveys as RDS-Outer (RDSO). Approximately 27,000 m^3 (35,300 yd^3) of dredged material was placed at the site between 1990 and 2000. Between 2000 and 2002 the dredged material placement target shifted eastward from target placement location A to target placement location B. All subsequent disposal events were near target placement location B. From January to April of 2003, a large volume, approximately 190,000 m^3 (248,500 yd^3), of dredged material was placed at target placement location B, approximately 40% of this disposal, 78,900 m^3 (103,200 yd^3), originated in Belfast Harbor, one of the larger small-town harbors in coastal Maine. The survey conducted in September 2003 monitored the site for effects of those recent large volume disposal events (ENSR 2004, Contribution 156). The RDS 2016 survey documents all dredged material placement that has occurred since September 2003; these events are discussed below in Section 1.5.

1.4 Previous Monitoring Events

Confirmatory surveys were performed at RDS in 1989, 2000, 2003, and a number of additional surveys were conducted from 1974 to 2002, ranging from baseline surveys performed in the 1970s and 1980s to focused studies of physical oceanographic conditions and of lobster populations (Table 1-2).

In 2003, a single-beam bathymetric survey at RDS and a SPI survey at RDS and associated reference areas were conducted (ENSR 2004, Contribution 156). A volume of ~263,000 m^3 (~344,000 yd^3) of dredged material was placed at the site between September 2000 and when these surveys were conducted in September 2003. Only a small portion (~10,000 m^3 [13,000 yd^3]) of this material was placed at the site before the 2002 – 2003 disposal season. Therefore, at the time of the September 2003 survey, dredged material had been recently placed at the site.

The 2003 bathymetric data identified a mound at target placement location B near the DG buoy that extended to approximately 4 m (13 ft.) above the seafloor with the thickest accumulations of dredged material over an approximately 220-m (720-ft.) diameter area. The mound appeared to be relatively stable with an average slope of 3% and a maximum slope near the top of 6%. A thinner layer of dredged material extended outward to form an apron around the mound center with an approximate diameter of 900 m (2,950 ft.) (ENSR 2004, Contribution 156).

The September 2003 SPI survey was performed within the designated boundary of RDS (30 stations), in the area immediately outside RDS (RDSO, 12 stations), and at three reference areas (NREF, 5 stations; EREF, 4 stations; SREF, 4 stations). Advanced benthic recolonization was observed across the site, with mature, Stage 3 communities found at all stations; often presenting as Stage 1 on 3. Mean apparent redox potential discontinuity (aRPD) depths were 2.9 cm within RDS, 3.4 cm within RDS-Outer, and 3.5 cm within the reference areas; these depths were approximately one centimeter deeper than those measures

during the 2000 survey outside RDS and within the reference areas. The disposal areas (inner and outer) were found to have successional status and mean aRPD depths consistent with reference areas (ENSR 2004, Contribution 156).

Thick layers of dredged material were reported throughout RDS and RDSO in 2000. At the time of the 2000 survey much of the dredged material at RDS had been placed there for over ten years. All observations of dredged material in 2000 were of old, weathered dredged material that was difficult to distinguish from ambient sediments. Presence of dredged material, either recent or older and weathered, was observed in the 2003 SPI images at 23 of the 30 stations within the RDS boundary. No dredged material was observed in the RDSO stations, and weathered dredged material was observed at the north and perhaps south reference areas. The thickest layers of recent dredged material were observed near target placement location B and decreased from there to the north and east. The clear distinction between observations of weathered and recent dredged material was made and discussed in the September 2003 monitoring report (ENSR 2004, Contribution 156).

1.5 Recent Dredged Material Disposal Activity

At the time of the 2016 survey, dredged material had not been placed at RDS for over ten years. Dredged material from Camden Harbor, Castine Harbor, and Lassell Island totaling 25,219 m^3 (32,985 yd^3, Table 1-3) was placed at RDS since the previous monitoring survey conducted in September 2003. Most disposal events from December 2003 to April 2006 occurred at target placement location B (Figure 1-3), with a few disposals from Camden Harbor occurring near target placement location A in 2006 (Table 1-3). All disposal events in the 2003 – 2004 disposal season occurred at target placement location B, totaled 15,081 m^3 (19,725 yd^3), and originated in the harbors mentioned above, with the largest contribution (11,942 m^3) (15,620 yd^3) coming from Lassell Island. Dredged material placement in 2006 totaled 10,138 m^3 (13,260 yd^3) and came entirely from Camden Harbor (Table 1-3); these represent the most recent disposal events at RDS.

A detailed record of barge disposal activity at RDS for the period from December 2003 to April 2006, including the origin of dredged material, the volume deposited, and the disposal location, is provided in Appendix B.

1.6 2016 Survey Objectives

The September 2016 survey at RDS was designed as a focused survey to provide full coverage of the limited-use site and reference areas using multibeam technology and to provide characterization of surficial sediment quality to aid in management of the site. The September 2016 survey was designed to:

- Characterize seafloor topography and surficial features over the full site and three reference areas (NREF, SREF, and EREF) by completing a multibeam bathymetric survey.

- Use SPI and PV imaging to further define the physical characteristics of surficial sediment and to assess the benthic community of the site and reference areas and benthic recolonization status of the area relative to past disposal activity.

- Provide an initial characterization of the surficial sediment quality over the site and reference areas through the collection of sediment for laboratory analysis of sediment chemistry, benthic community structure, and tissue chemistry of non-motile organisms.

Table 1-1.

Historical Disposal Activity at RDS

Disposal Area	Years of Disposal Activity
Buoy at 44° 07.5'N, 69° 00.4'W	1973 – 1974
Buoy at 44° 07.180'N, 69° 00.364'W	1984 – 1985
RDS – Outer (SE of designated site)	March 1985; 1986 – 1988; 1990 – 1993[+]
RDS - SE quadrant	1989 - 1990
Target placement location A	March 1990; 1994 -1995; 1999 – 2000; 2006
Target placement location B (North of DG Buoy)	2001 – 2004; 2006

[+] GPS coordinates for 1991 are not available, assumed to be the same as 1990 and 1992

Table 1-2.

Overview of Survey Activities at RDS

Date	Purpose of Survey	Bathymetry Area	SPI Stations (location - #)	Additional Studies	DAMOS Report/Contribution No.	Reference
1973, 1974	Pre-DAMOS sampling	Unknown	---	Sediment samples	Summarized in DAMOS Annual Report	NUSC 1979--
December 1977	Baseline Survey	Single-beam * 1135 x 1135 m	---	[+]Side-scan sonar; Sediment samples (5 total, site, reference, harbor) – metals analysis, tissue analysis of M. modiolus, benthic macrofauna; [+]Observed fisheries activities	DAMOS Annual Data Report – 1978; Supplement A	NUSC 1979
May 1978	Baseline Survey	1335 x 1535 m	---	---	DAMOS Annual Data Report – 1978; Supplement A	NUSC 1979
September 1984	Baseline Survey	Single-beam * 1200 x 1200 m	Site: 33 Ref: 1	Chemical and physical sediment characterization; Side-scan sonar	46	Morton et al. 1984
May 1985	Monitoring	Single beam 1200 x 1200 m	---	Vertical temperature and salinity profiles, plume study; Side-scan sonar	50	SAIC 1988
June 1989	Confirmatory Monitoring	Single-beam 1400 x 1200 m	Site: 43 Ref Areas: 39	Side-scan sonar	83	SAIC 1992
September 2000	Confirmatory Monitoring	Single-beam 2100 x 2100 m	Site: 30 Ref Areas: 12	Lobster habitat assessment via underwater video	131	SAIC 2001
May 2001	Follow on survey from September 2000	---	---	Side-scan sonar	131	SAIC 2001

Table 1-2. (continued)

Overview of Survey Activities at RDS

Date	Purpose of Survey	Bathymetry Area	SPI Stations (location - #)	Additional Studies	DAMOS Report/ Contribution No.	Reference
August 2001	Focused Physical oceanographic characterization	---	---	Acoustic Doppler current profile (ADCP), acoustic Doppler current meter, optical backscatter sensor; Water samples (total suspended solids)	145	SAIC 2003
November to December 2002	Focused Impact of DM on lobster/crab abundance	---	---	Impact on local lobster catch Side-scan sonar	154	Wahle et al. 2004
September 2003	Confirmatory Monitoring	Single-beam 2100 x 2100 m	Site: 30 inner Site: 12 outer Ref Areas: 13	Side-scan sonar	156	ENSR 2004

* Technology used not specified in report, use of single-beam assumed

+ Mentioned in report Supplement but year of survey not provided; appears that the May 1978 was bathymetry addition only

Table 1-3.

Disposal Activity at RDS since September 2003 (per Scow Logs provided by USACE, December 2016)

Disposal Season	Project Name	Target Site Code	Permittee Total (m^3)	Permittee Total (yd^3)
2003-2004 Disposal Season				
	Camden Harbor	Target placement location B	2,221	2,905
	Castine Harbor	Target placement location B	918	1,200
	Lassell Island	Target placement location B	11,942	15,620
Total			**15,081**	**19,725**
2006 Disposal Season				
	Camden Harbor	Target placement location A; Target placement location B	10,138	13,260
Total			**10,138**	**13,260**
TOTAL since Sept. 2003			**25,219**	**32,985**

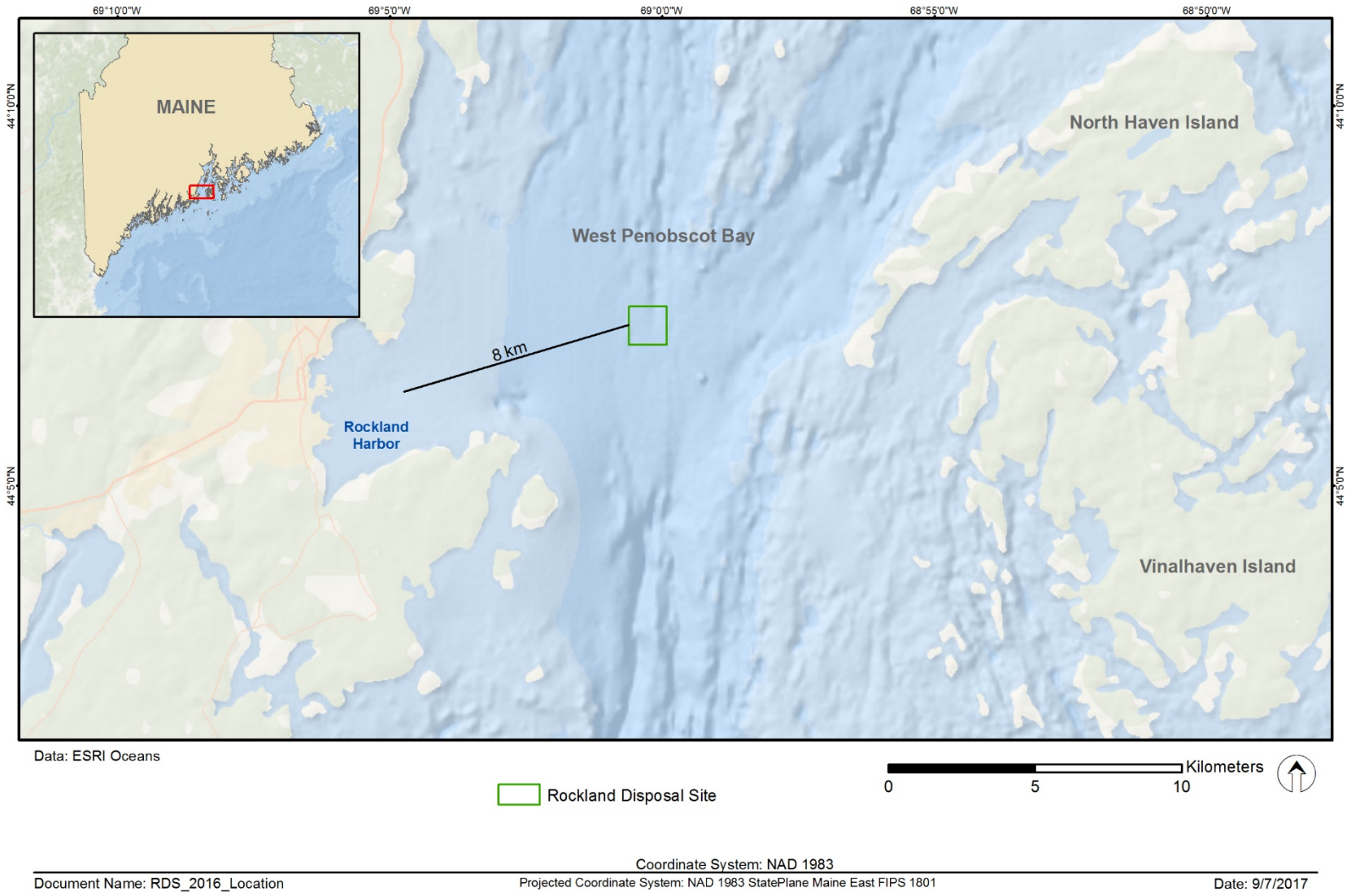


Figure 1-1. Location of the Rockland Disposal Site (RDS)

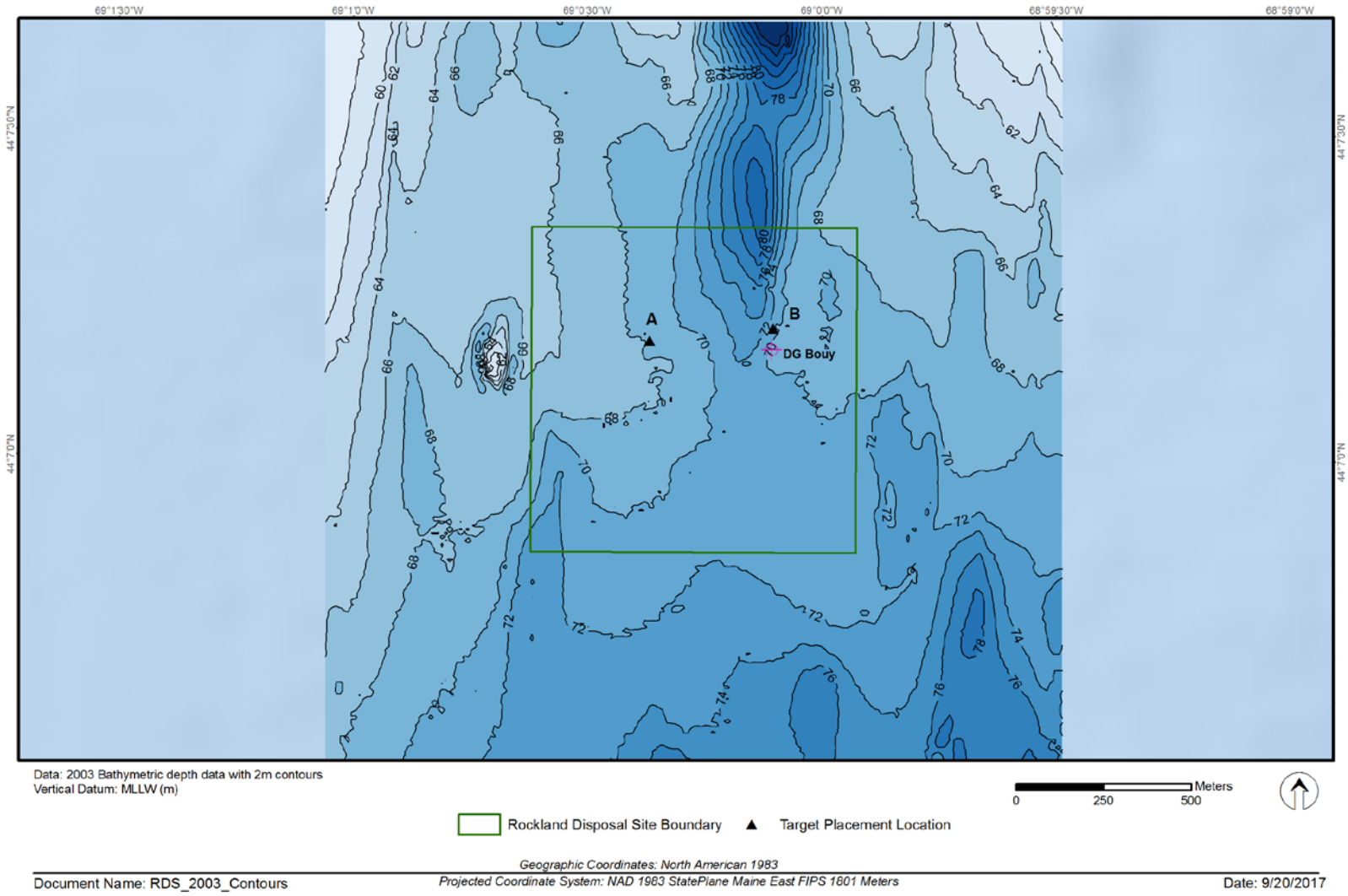


Figure 1-2. Overview of RDS on 2003 bathymetry with target placement locations and position of the DG buoy during the 2003 survey

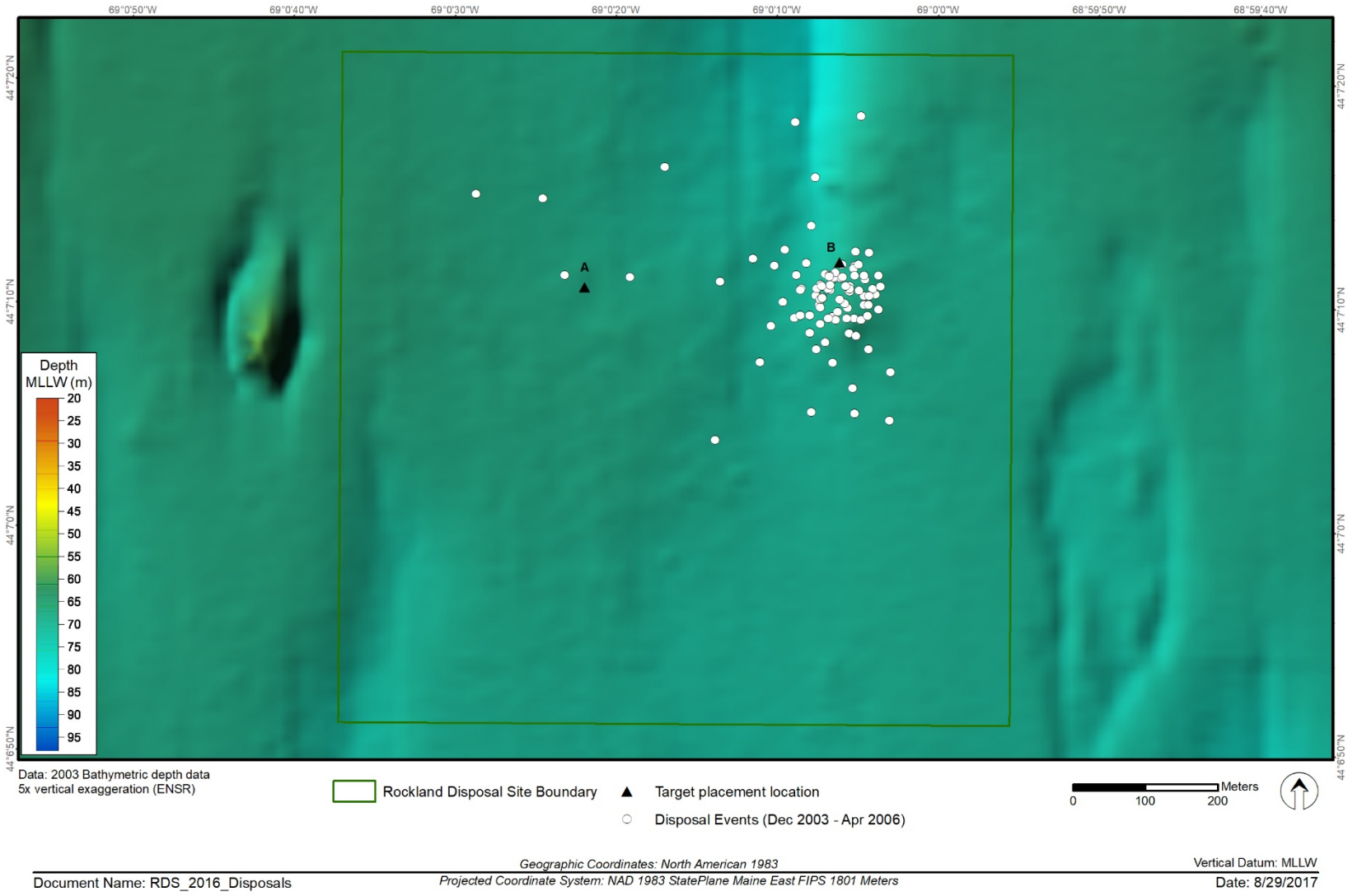


Figure 1-3. Location of reported disposal events at RDS since the September 2003 survey

2.0 METHODS

The September 2016 survey at RDS was conducted by a team of investigators from INSPIRE Environmental and Battelle including ACSM certified hydrographer Christopher Wright (#266) aboard the 55-foot *R/V Jamie Hanna*. The acoustic survey was conducted 9-10 September 2016. The sediment-profile/plan-view (SPI/PV) imaging survey was conducted 12-14 September 2016 and the sediment grab sampling 14-15 September 2016. Detailed Standard Operating Procedures (SOPs) for data collection and processing are available in the Quality Assurance Project Plan (QAPP) for the DAMOS Program (Battelle 2015) and QAPP Addendum 1 (Battelle 2016).

2.1 Navigation and On-Board Data Acquisition

Navigation for the acoustic survey was accomplished using a Hemisphere VS-330 Real Time Kinematic Global Positioning System (RTK GPS) which received base station correction through the Keynet NTRIP broadcast. Horizontal position accuracy in fixed RTK mode was approximately 2 cm. A dual-antennae Hemisphere VS110 differential GPS (DGPS) was available if necessary as a backup. The GPS system was interfaced to a desktop computer running HYPACK hydrographic survey software. HYPACK continually recorded vessel position and GPS satellite quality and provided a steering display for the vessel captain to accurately maintain the position of the vessel along pre-established survey transects and targets. Vessel heading measurements were provided by an IxBlue Octans III fiber optic gyrocompass.

Navigation for the sediment grab sampling and SPI survey was accomplished using a Hemisphere R110 DGPS capable of sub-meter horizontal accuracy. Navigation data were recorded using HYPACK software.

2.2 Acoustic Survey

The acoustic survey included bathymetric, backscatter, and side-scan sonar data collection. The bathymetric data provided measurements of water depth that, when processed, were used to map the seafloor topography. Backscatter and side-scan sonar data provided images that supported characterization of surface sediment texture and roughness. Each of these acoustic data types is useful for assessing dredged material placement and surface sediment features.

2.2.1 Acoustic Survey Planning

The acoustic survey featured a high spatial resolution survey over the full site (2100 × 2100 m) and over three 600 x 600 m reference areas (NREF, SREF, and EREF). INSPIRE hydrographers coordinated with USACE NAE scientists and reviewed alternative survey

designs. Hydrographers obtained site coordinates, imported them into geographic information system (GIS) software, and created maps to aid design of a survey that would provide greater than 100-percent coverage within the survey area. Base bathymetric data were obtained from the National Ocean Service Hydrographic Data Base to estimate the transect separation required to obtain full bottom coverage using an assumed beam angle limit of 90-degrees (45 degrees to port, 45 degrees to starboard). Transects spaced 100 m apart and cross-lines spaced 300-500 m apart were created to meet conservative beam angle constraints (Figure 2-1). The proposed survey area and design were then reviewed and approved by NAE scientists.

2.2.2 Acoustic Data Collection

The 2016 multibeam bathymetric survey of RDS was conducted 9-10 September 2016. Data layers generated by the survey included bathymetry, acoustic backscatter, and side-scan sonar and were collected using an R2Sonic 2022 broadband multibeam echo sounder (MBES). This 200-400 kHz system forms up to 256 1- to 2-degree beams (frequency dependent) distributed equiangularly or equidistantly across a 10- to 160-degree swath. For this survey, a frequency of 200 kHz and pulse length of 0.08 msec was selected to maximize the resolution of bathymetric data without compromising the quality of acoustic backscatter data. The MBES transducer was mounted amidships to the port rail of the survey vessel using a high strength adjustable boom. The primary GPS antenna was mounted atop the transducer boom. The transducer depth below the water surface (draft) and antenna height were checked and recorded at the beginning and end of data acquisition, and draft was confirmed using the “bar check” method.

An IxBlue Octans III motion reference unit (MRU) was interfaced to the MBES topside processor and to the acquisition computer. Precise linear offsets between the MRU and MBES were recorded and applied during acquisition. Depth and backscatter data were synchronized using pulse per second timing and transmitted to the HYPACK MAX® acquisition computer via Ethernet communications. Several patch tests were conducted during the survey to allow computation of angular offsets between the MBES system components.

The system was calibrated for local water mass speed of sound by performing sound velocity profile (SVP) casts at frequent intervals throughout the survey day using an AML, Inc. MinosX sound velocity profiler.

2.2.3 Bathymetric Data Processing

Bathymetric data were processed using HYPACK HYSWEEP® software. Processing components are described below and included:

- Adjustment of data for tidal elevation fluctuations
- Correction of ray bending (refraction) due to density variation in the water column

- Removal of spurious points associated with water column interference or system errors
- Development of a grid surface representing depth solutions
- Statistical estimation of sounding solution uncertainty
- Generation of data visualization products

Tidal adjustments were accomplished using RTK GPS. Water surface elevations derived using RTK were adjusted to Mean Lower Low Water (MLLW) elevations using NOAA's VDATUM Model. Correction of sounding depth and position (range and azimuth) for refraction due to water column stratification was conducted using a series of eighteen sound-velocity profiles acquired by the survey team. Data artifacts associated with refraction remain in the bathymetric surface model at a relatively fine scale (generally less than 5 to 10 cm) relative to the survey depth.

Bathymetric data were filtered to accept only beams falling within an angular limit of 45° to minimize refraction artifacts. Spurious sounding solutions were rejected based on the careful examination of data on a sweep-specific basis.

The R2Sonics 2022 MBES system was operated at 200 kHz. At this frequency, the system has a published beam width of 2.0°. Assuming an average depth of 69.7 m and a maximum beam angle of 45°, the average diameter of the beam footprint mid-swath was calculated at approximately 2.9 × 2.6 m (~7.6 m^2). Data were reduced to a cell (grid) size of 3.0 × 3.0 m, acknowledging the system's fine range resolution while accommodating beam position uncertainty. This data reduction was accomplished by calculating and exporting the average elevation for each cell in accordance with USACE recommendations (USACE 2013).

Statistical analysis of data as summarized on Table 2-1 showed negligible tide bias and vertical uncertainty substantially lower than values recommended by USACE (2013) or NOAA (2015). Note that the most stringent National Ocean Service (NOS) standard for this project depth (Special Order 1A) would call for a 95th percentile confidence interval (95% CI) of 0.77 m at the maximum observed depth (97.7 m) and 0.58 m at the average observed depth (69.7 m).

Reduced data were exported in ASCII text format with fields for Easting, Northing, and MLLW Elevation (meters). All data were projected to the Maine State Plane East FIPS 1802, NAD83 (metric). A variety of data visualizations were generated using a combination of ESRI ArcMap (V.10.1) and Golden Software Surfer (V.13.6). Visualizations and data products included:

- ASCII data files of all processed soundings including MLLW depths and elevations

- Contours of seabed elevation (25-cm, 50-cm and 1.0-m intervals) in a geospatial data file format suitable for plotting using GIS and computer-aided design software
- 3-dimensional surface maps of the seabed created using 2× vertical exaggeration and artificial illumination to highlight fine-scale features not visible on contour layers delivered in grid and tagged image file (TIF) formats, and
- An acoustic relief map of the survey area created using 2× vertical exaggeration, delivered in georeferenced TIF format.

2.2.4 Backscatter Data Processing

Backscatter data were extracted from cleaned MBES TruePix formatted files then used to provide an estimation of surface sediment texture based on seabed surface roughness. Mosaics of backscatter data were created using HYPACK's implementation of GeoCoder software developed by scientists at the University of New Hampshire's NOAA Center for Coastal and Ocean Mapping (UNH/NOAA CCOM). A seamless mosaic of unfiltered backscatter data was developed and exported in grayscale TIF format. Backscatter data were also exported in ASCII format with fields for Easting, Northing, and backscatter (dB). A Gaussian filter was applied to backscatter data to minimize nadir artifacts, and the filtered data were used to develop backscatter values on a 3-m grid. The grid was exported in ESRI binary GRD format to facilitate comparison with other data layers.

2.2.5 Side-Scan Sonar Data Processing

Side-scan sonar data were processed using Chesapeake Technology, Inc. Sonar Wiz software and GeoCoder software to generate a database of images that maximized both textural information and structural detail.

Seamless mosaics of side-scan sonar data were developed using SonarWiz and exported in grayscale TIF format using a resolution of 0.20-m per pixel. Data were adjusted using automatic and manual gain adjustment methods to minimize nadir artifacts and facilitate visualization of fine seabed structures.

2.2.6 Acoustic Data Analysis

The processed bathymetric grids were converted to rasters, and bathymetric contour lines and acoustic relief models were generated and displayed using GIS. The backscatter mosaics and filtered backscatter grid were combined with acoustic relief models in GIS to facilitate visualization of relationships between acoustic datasets. This was done by rendering images and color-coded grids with sufficient transparency allowing a three-dimensional acoustic relief model to be visible underneath.

2.3 Sediment-Profile and Plan-View Imaging

Sediment-profile and plan-view imaging is a monitoring technique used to provide data on the physical characteristics of the seafloor and the status of the benthic biological community (Germano et al. 2011).

A 36-station SPI/PV survey was performed within the area of the Rockland disposal site, including 12 stations located within the designated boundary of RDS, 12 just outside the site boundaries (RDSO) and four stations located within each of three reference areas (NREF, EREF, and SREF; Figure 2-2). SPI/PV station target locations are provided in Table 2-2 and SPI/PV station replicate locations are provided in Appendix C. The methodology for data acquisition and analysis for these images was consistent with the sampling methods described in detail in the Quality Assurance Project Plan (QAPP) for the Disposal Area Monitoring Study (DAMOS) Program (Version 2.0) (Battelle 2015) and INSPIRE standard operating procedures (SOPs).

2.3.1 Sediment-Profile Imaging

The SPI technique involves deploying an underwater camera system to photograph a cross-section of the sediment-water interface. High-resolution SPI images were acquired using a Nikon® D7100 digital single-lens reflex (SLR) camera mounted inside an Ocean Imaging® Model 3731 pressure housing. The pressure housing sat atop a wedge-shaped steel prism with a glass front faceplate and a back mirror, mounted at a 45° angle. The camera lens looked down at the mirror, which reflected the image from the faceplate. The prism had an internal strobe mounted inside at the back of the wedge to provide illumination for the image; this chamber was filled with distilled water, so the camera always had an optically clear path. As the prism penetrated the seafloor, a trigger activated a time-delay circuit that fired an internal strobe to obtain a cross-sectional image of the upper 15–20 cm of the sediment column (Figure 2-3). The camera remained on the seafloor for approximately 20 seconds to ensure that successful images were obtained.

Test exposures of a X-Rite Color Checker Classic Color Calibration Target were made on deck at the beginning of the survey to verify that all internal electronic systems were working to design specifications and to provide a color standard against which final images could be checked for proper color balance. Test images were also captured to confirm proper camera settings for site conditions. Images were checked periodically throughout the survey to confirm that the initial camera settings were still resulting in the highest possible quality images. All camera settings were recorded in the field log (Appendix D). For this survey, the ISO-equivalent was set at 640, shutter speed was 1/250, f-stop was f9, and storage was in compressed raw Nikon Electronic Format (NEF) files (approximately 30 MB each). Additional camera settings used were: white balance set to flash, color mode set to Adobe RGB, sharpening set to none, noise reduction off. Details of the camera settings for each digital image also are available in the associated parameters file embedded in each electronic image file.

Whenever the camera was brought back on board (typically after every third to fifth station), the frame counter was checked to ensure that the requisite number of replicates had been obtained. In addition, a prism penetration depth indicator on the camera frame was checked to verify that the optical prism had penetrated the bottom to a sufficient depth. If images were missed or the penetration depth was insufficient, the camera frame stop collars were adjusted and/or weights were added or removed, and additional replicate images were taken. Frame counts, time of image acquisition, water depth in feet, frame stop-collar positions, and the number of weights used were recorded in the field log for each replicate image (Appendix D). The use of mud doors is also recorded in the field log if their use was necessitated. Visual checks and hand tightening checks of all nuts/bolts on the SPI/PV camera frame were conducted periodically to make sure nothing vibrated loose during the survey.

Prior to field operations, the internal clock in the digital SPI system was synchronized with the vessel's GPS navigation system. Each image was assigned a unique time stamp in the digital file attributes by the camera's data logger and cross-checked with the time stamp in the navigational system's computer data file. Images were downloaded periodically to verify successful sample acquisition and/or to assess the type(s) of sediment/depositional layers present at a given station. Digital image files were renamed with the appropriate station names immediately after downloading as a further quality assurance step.

2.3.2 Plan-View Imaging

An Ocean Imaging® Model DSC16000 plan-view underwater camera (PV) system with two Ocean Imaging® Model 400-37 Deep Sea Scaling lasers was attached to the sediment-profile camera frame and used to collect plan-view photographs of the seafloor surface. Both SPI and PV images were collected during each "drop" of the system. The PV system consisted of a Nikon® D-7100 SLR camera encased in an aluminum housing, a 24 VDC autonomous power pack, a 500 W strobe, and a bounce trigger. A weight was attached to the bounce trigger with a stainless-steel cable so that the weight hung below the camera frame; the scaling lasers projected two red dots that were separated by a constant distance (26 cm) regardless of the field-of-view of the PV system. The field-of-view can be varied by increasing or decreasing the length of the trigger wire and, thereby, the camera height above the bottom when the picture is taken. As the SPI/PV camera system was lowered to the seafloor, the weight attached to the bounce trigger contacted the seafloor prior to the camera frame reaching the seafloor and triggered the PV camera (Figure 2-3).

During set up and testing of the PV camera, the positions of lasers on the PV camera were checked and calibrated to ensure separation of 26 cm. Test images were also captured to confirm proper camera settings for site conditions. Images were checked periodically throughout the survey to confirm that the initial camera settings were still resulting in the highest possible quality images. All camera settings were recorded in the field log (Appendix D). For this survey, the ISO-equivalent was set at 400, shutter speed was 1/30, f-stop was f8, and storage was in compressed raw Nikon Electronic Format (NEF) files

(approximately 30 MB each). Additional camera settings used were: white balance set to flash, color mode set to Adobe RGB, sharpening set to none, noise reduction off. Details of the camera settings for each digital image also are available in the associated parameters file embedded in each electronic image file.

Prior to field operations, the internal clock in the digital PV system was synchronized with the vessel's GPS navigation system and the SPI camera. Each image was assigned a unique time stamp in the digital file attributes by the camera's data logger and cross-checked with the time stamp in the navigational system's computer data file. In addition, the field crew kept redundant written sample logs (Appendix D). Throughout the survey, PV images were downloaded at the same time as SPI images and were evaluated for successful image acquisition and image clarity. Digital image files were renamed with the appropriate station names immediately after downloading as a further quality assurance step.

The ability of the PV system to collect usable images is dependent on the clarity of the water column. Water conditions during this survey allowed use of a 0.6 m (2 ft.) trigger wire, resulting in approximate image widths of 0.37 m.

2.3.3 SPI and PV Data Collection

The SPI/PV survey was conducted at RDS from September 12-14, 2016 aboard the *R/V Jamie Hanna*. At each station, the vessel was positioned at the target coordinates and the camera was deployed within a defined station tolerance of 10 m. Four replicate SPI and PV images were collected at each of the stations (Appendix D). The three replicates with the best quality images from each station were chosen for analysis (Appendix E).

The DGPS described above was interfaced to HYPACK® software via laptop serial ports to provide a method to locate and record sampling locations. Throughout the survey, the HYPACK® data acquisition system received DGPS data. The incoming data stream was digitally integrated and stored on the PC's hard drive. The system provided a steering display to enable the vessel captain to navigate to the pre-established survey target locations. The navigator electronically recorded the vessel's position when the equipment contacted the seafloor and the winch wire went slack. Each replicate SPI/PV position was recorded and time stamped. Actual SPI/PV sampling locations were recorded using this system.

2.3.4 Image Conversion and Calibration

Following completion of the field operations, the raw image files were color calibrated in Adobe Camera Raw® by synchronizing the raw color profiles to an X-Rite Color Checker Classic Color Calibration Target that was photographed prior to field operations with the SPI camera. The raw images were then converted to high-resolution Photoshop Document (PSD) format files, using a lossless conversion file process, maintaining an Adobe RGB (1998) color profile. The PSD images were then calibrated and analyzed in Adobe Photoshop®. Image calibration was achieved by measuring the pixel length of a 5-cm scale bar printed on the X-Rite Color Checker Target, providing a pixel per

centimeter calibration. This calibration information was applied to all SPI images analyzed. Linear and area measurements were recorded as the number of pixels and converted to scientific units using the calibration information.

2.3.5 SPI and PV Data Analysis

Computer-aided analysis of SPI/PV images provided a set of standard measurements to allow comparisons among different locations and surveys. The DAMOS Program has successfully used this technique for over 30 years to map the distribution of disposed dredged material and to monitor benthic recolonization at disposal sites.

Measured parameters for SPI and PV images were recorded in Microsoft Excel© spreadsheets. These data were subsequently checked by one of INSPIRE's senior scientists as an independent quality assurance/quality control review before final interpretation was performed. Spatial distributions of SPI/PV parameters were mapped using ArcGIS.

2.3.5.1 Sediment-Profile Image Analysis Parameters

The parameters discussed below were assessed and/or measured for each replicate SPI image. Descriptive comments were also made for each replicate image.

Sediment Type – The sediment grain size major mode and range were estimated visually using a visual grain size comparator created at a similar scale. Results were reported using the phi scale. A cross-walk between phi size classes, mm size ranges, and Udden-Wentworth size classes is provided in Appendix F. The presence and thickness of dredged material were also assessed.

Penetration Depth – The depth to which the camera penetrated the seafloor was measured to provide an indication of the sediment bearing capacity and shear strength. The penetration depth can range from a minimum of 0 cm (i.e., no penetration on hard substrata) to a maximum of 20 cm (full penetration of very soft substrata).

Surface Boundary Roughness – Surface boundary roughness is a measure of the vertical relief of features at the sediment-water interface. Surface boundary roughness was determined by measuring the vertical distance between the highest and lowest points of the sediment-water interface. The surface boundary roughness measured over the width of sediment-profile images typically ranges from 0 to 4 cm and may be related to physical structures (e.g., ripples, rip-up structures) or biogenic features (e.g., burrow openings, fecal mounds, foraging depressions).

Mud Clasts – When fine-grained, cohesive sediments are disturbed, either by physical bottom scour or faunal activity (e.g., decapod foraging) intact clumps of sediment are often scattered across the seafloor. The number of clasts observed at the sediment-water interface were counted and their oxidation state assessed. The detection of reduced mud clasts in an obviously aerobic setting suggests a recent origin (Germano 1983). Mud clasts that are

artifacts of SPI sampling (mud clots can fall off the back of the prism or wiper blade) are not recorded in the analysis sheet, but may be noted in the "Comments" field.

Apparent Redox Potential Discontinuity (aRPD) Depth – The aRPD depth provides a measure of the integrated time history of the balance between near-surface oxygen conditions and biological reworking of sediments. Oxidized surface sediments contain particles coated with ferric hydroxide (an olive or tan color when associated with particles) (Fenchel 1969; Lyle 1983). As the particles are buried or moved down by biological activity they are exposed to reducing oxygen concentrations in subsurface porewaters and their oxic coating slowly changes color to dark gray or black (Fenchel 1969; Lyle 1983). The aRPD serves as a proxy for the RPD, the boundary between positive Eh and negative Eh regions of the sediment column (where Eh=0) that indicates a switch from dominantly aerobic to dominantly anaerobic processes. The mean aRPD measured in SPI has been shown to be a suitable proxy for the RPD with the depth of the actual Eh = 0 horizon generally either equal to or slightly shallower than the depth of the optical reflectance boundary (Rosenberg et al. 2001; Simone and Grant 2017). When biological activity is high, the aRPD depth increases; when it is low or absent, the aRPD depth decreases. The aRPD depth was measured by visually assessing color and reflectance boundaries within the images and, for each image, a mean aRPD was calculated.

Measures related to Organic Enrichment

Sediment Oxygen Demand – Sediment oxygen demand (SOD) represents the overall rate of oxygen consumption, biologically and chemically, by the sediment column. Organic loading to a system results in increased SOD and results in reduced sediments. The relative amount of organic enrichment is indicated by sediment color; darker coloration indicates that sediment is more reduced and has greater organic loading (Fenchel 1969; Rhoads 1974; Lyle 1983; Bull and Williamson 2001). SOD levels (i.e., none, low, medium, and high) were assessed for all images.

Low Dissolved Oxygen – Images in which dark gray or black reduced sediments were in contact with the water column across the entire length of the sediment-water interface were recorded as having low dissolved oxygen condition.

Sedimentary Methane – If organic loading is extremely high, porewater sulfate is depleted and methanogenesis occurs. The process of methanogenesis is indicated by the appearance of methane bubbles in the sediment column. These gas-filled voids are readily discernable in SPI images because of their irregular, generally circular aspect and glassy texture (due to the reflection of the strobe off the gas bubble).

Thiophilic Bacteria (*Beggiatoa*) – The presence of sulfur-oxidizing bacterial colonies indicates hypoxic dissolved oxygen concentrations in the water column at the benthic boundary-layer (Rosenberg and Diaz 1993). The presence and extent (e.g., threads, trace, patches, mat) of the *Beggiatoa* or *Beggiatoa*-like colonies were noted.

Infaunal Successional Stage – Infaunal successional stage is a measure of the biological community inhabiting the seafloor. Current theory holds that organism-sediment interactions in fine-grained sediments follow a predictable sequence of development after a major disturbance (e.g., dredged material disposal) (Pearson and Rosenberg 1978; Rhoads and Germano 1982, 1986; Rhoads and Boyer 1982). This continuum has been divided subjectively into four stages: Stage 0, indicative of a sediment column that is largely devoid of macrofauna, occurs immediately following a physical disturbance or in close proximity to an organic enrichment source; Stage 1 is the initial community of tiny, densely populated polychaete assemblages; Stage 2 is the start of the transition to head-down deposit feeders; and Stage 3 is the mature, equilibrium community of deep-dwelling, head-down deposit feeders (Figure 2-4). In dynamic environments, it is simplistic to assume that benthic communities always progress completely and sequentially through all four stages in accordance with the idealized conceptual model (Figure 2-4). Various combinations of these basic successional stages are possible. For example, secondary succession can occur (Horn 1974) in response to additional labile carbon input to surface sediments, with surface-dwelling Stage 1 or 2 organisms co-existing at the same time and place with Stage 3, resulting in the assignment of a "Stage 1 on 3" or "Stage 2 on 3" designation. If both Stage 1 and Stage 2 organisms exists in an image with Stage 3 fauna, the Stage 1 on 3 designation is used because it is more important to document the presence of recruiting organisms than intermediate Stage 2 fauna. Additionally, "Stage 2 -> 3" is used to indicate that Stage 2 appears to be progressing to Stage 3; for example, evidence of deep burrowing resembles Stage 3 but not overt signs of Stage 3 taxa are present in the image. Successional stage was assigned by assessing the types of species or organism-related activities apparent in the images. Additional variables related to the infaunal community and their role in bioturbation are often important to consider as bioturbation is related not only to sediment oxygen dynamics, but also nutrient and contaminant fluxes (Reible and Thibodeaux 1999). In this study, the minimum and maximum linear distance from the sediment surface to feeding voids were measured.

2.3.5.2 Plan-View Analysis Parameters

Plan-view images provide a much larger field-of-view than SPI images and provide valuable information about the landscape ecology and sediment topography in the area where the pinpoint "optical core" of the sediment profile was taken (Figure 2-5). Unusual surface sediment layers, textures, or structures detected in any of the sediment-profile images can be interpreted considering the larger context of surface sediment features; i.e., is a surface layer or topographic feature a regularly occurring feature and typical of the seafloor in this general vicinity or an isolated anomaly? The scale information provided by the underwater lasers allows accurate density counts of attached epifaunal colonies, sediment burrow openings, or larger macrofauna or fish which may have been missed in the sediment-profile cross section, as well as measurements of the percent cover of *Beggiatoa* colonies and other features of interest observable on the seafloor at the sampling location. Information on sediment transport dynamics and bedform wavelength was also available from PV image analysis.

For each replicate PV image, the field-of-view was calculated and the sediment type, oxidation state of surface sediment, presence and type of bedforms; presence and notes related to dredged material; estimations of the relative percent cover of burrows, tubes, tracks; types of epifauna, flora, and debris; number of fish; and descriptive comments were recorded.

2.3.6 Statistical Methods

The objective of this survey was to assess the status of benthic community recolonization of the sediment at a disposal area relative to reference area conditions. Statistical analyses were conducted to compare key SPI variables between the sampled designated RDS disposal site and surrounding outer areas (Note – For statistical calculations and results, these areas are referred to collectively as the disposal area) and reference areas (NREF, EREF, and SREF). The aRPD depth and successional stage measured in each image are the best indicators of infaunal activity measured by SPI and were, therefore, used in this comparative analysis. Standard boxplots were generated for visual assessment of the central tendency and variation in each of these variables within each disposal area and each reference area. Tests rejecting the inequivalence between the reference and disposal areas were conducted, as described in detail below.

The objective to look for differences has conventionally been addressed using a point null hypothesis of the form, "There is no significant difference in benthic conditions between the reference area and the disposal target areas." However, there is always some difference (perhaps only to a very small decimal place) between groups, but the statistical significance of this difference may or may not be ecologically meaningful. On the other hand, differences may not be detected due to insufficient statistical power. Without a power analysis and specification of what constitutes an ecologically meaningful difference, the results of conventional point null hypothesis testing often provide inadequate information for ecological assessments (Germano 1999). An approach using an inequivalence null hypothesis will identify when groups are statistically similar, within a specified interval; this approach is better suited to meet the objectives of the DAMOS monitoring program.

For an inequivalence test, the null hypothesis presumes the difference is great; this is recognized as a "proof of safety" approach because rejection of the inequivalence null hypothesis requires sufficient proof that the difference was actually small (McBride 1999). The null and alternative hypotheses for the inequivalence hypothesis test are:

$$H_0: \ d < -\delta \text{ or } d > \delta \text{ (presumes the difference is great)}$$

$$H_A: \ -\delta < d < \delta \text{ (requires proof that the difference is small)}$$

where d is the difference between a reference mean and a site mean.

The test of this inequivalence (interval) hypothesis can be divided into two one-sided tests (TOST) (McBride 1999, Schuirmann 1987). Assuming a symmetric distribution, the inequivalence hypothesis is rejected at α of 0.05 if the 90% confidence interval for the measured difference (or, equivalently, the 95% upper limit and the 95% lower limit for the difference) is wholly contained within the equivalence interval [-δ, +δ]. The size of δ should be determined from historical data, and/or professional judgment, to identify the bounds that are within background variability and are, therefore, not ecologically meaningful. Previously established δ values of 1 cm for aRPD depth and 0.5 for successional stage rank (on the 0 to 3 scale) are used.

The statistics used to test the interval hypotheses shown here are based on the Central Limit Theorem (CLT) and basic statistical properties of random variables. A simplification of the CLT states that the mean of any random variable is normally distributed. Linear combinations of normal random variables are also normally distributed such that a linear function of means is also normally distributed. When a linear function of means is divided by its standard error the ratio follows a t-distribution with degrees of freedom associated with the variance estimate. Hence, the t-distribution can be used to construct a confidence interval around any linear function of means.

In this survey, four distinct locations were sampled; three were categorized as reference areas (NREF, EREF, and SREF) and one as the disposal location (RDS/RDSO). The difference equation of interest was the linear contrast of the average of the three reference means minus the disposal area mean, or

$$\hat{d} = [1/3 \times (\text{Mean}_{\text{EREF}} + \text{Mean}_{\text{NREF}} + \text{Mean}_{\text{SREF}}) - (\text{Mean}_{\text{Disposal}})] \qquad \text{[Eq. 1]}$$

The three reference areas collectively represented ambient conditions, but if the means were different among these three areas, then pooling them into a single reference group would inflate the variance estimate because it would include the variability between areas rather than only the variability between stations within each single homogeneous area. Keeping the three reference areas separate had no effect on the grand reference mean when sample size was equal among these areas, but doing so ensured that the variance was truly the residual variance within a single population with a constant mean.

The difference equation, $\hat{d}$, for the comparison of interest was specified in Eq. 1 and the standard error of each difference equation used the fact that the variance of a sum is the sum of the variances for independent variables, or:

$$SE(\hat{d}) = \sqrt{\sum_j \left(S_j^2 c_j^2 / n_j\right)} \qquad \text{[Eq. 2]}$$

where:

c_j = coefficients for the j means in the difference equation, $\hat{d}$ [Eq. 1] (i.e., for equation 1 shown above, the coefficients were 1/3 for each of the 3 reference areas, and -1 for the disposal area).

S_j^2 = variance for the j_{th} area. If equal variances are assumed, the pooled residual variance estimate equal to the mean square error from an *ANOVA* based on all groups involved, can be used for each S_j^2.

n_j = number of stations for the j_{th} area.

The inequivalence null hypothesis was rejected (and equivalence concluded) if the confidence interval on the difference of means, $\hat{d}$, was fully contained within the interval [–δ, + δ]. Thus, the decision rule was to reject H_0 (the two groups were inequivalent) if:

$$D_L = \hat{d} - t_{\alpha,\upsilon} SE(\hat{d}) \geq -\delta \qquad \text{and} \qquad D_U = \hat{d} + t_{\alpha,\upsilon} SE(\hat{d}) \leq \delta \qquad \text{[Eq. 3]}$$

where:

$\hat{d}$ = observed difference in means between the reference and disposal areas.

$t_{\alpha,\upsilon}$ = upper $(1-\alpha)*100_{th}$ percentile of a Student's t-distribution with υ degrees of freedom ($\alpha = 0.05$)

$SE(\hat{d})$ = standard error of the difference ([Eq. 2])

υ = degrees of freedom for the standard error. If a pooled residual variance estimate was used, the residual degrees of freedom from an ANOVA on all groups (total number of stations minus the number of groups) was used; if separate variance estimates were used, degrees of freedom were calculated based on the Welch-Satterthwaite estimation (Satterthwaite 1946, Zar 1996).

Validity of normality and equal variance assumptions were tested using Shapiro-Wilk's test for normality on area residuals ($\alpha = 0.05$) and Levene's test for equality of variances among areas ($\alpha = 0.05$). If normality was not rejected but equality of variances was, then normal parametric confidence bounds were calculated, using separate variance estimates for each group. If normality was rejected, then non-parametric bootstrapped estimates of the confidence bounds were calculated.

2.4 Sediment Grab Collection and Analysis

Surficial sediment samples were collected from 12 stations for analysis of grain size, total organic carbon (TOC), metals, PAHs, pesticides, and PCBs. At a subset of 6 of these stations, additional material was collected for analysis of benthic community structure.

Sediment grab target locations are provided in Table 2-2 and Figure 2-2 and actual station locations and coordinates are provided in Figures 2-6, 2-7, and Appendix C. Navigation for the sediment grab collection was as described for the SPI methods above. All sediment sample collection and subsequent analyses were conducted in accordance with the Quality Assurance Project Plan for the DAMOS Program (Battelle 2015) and its Addendum (Battelle 2016).

Sediment samples for analytical chemistry and grain size analysis were collected using a 0.1 m^2 Van Veen sampler. Samples for benthic community structure analysis (BCA) were collected using a 0.04 m^2 Van Veen sampler.

Surficial sediment samples collected for analysis of grain size, total organic carbon (TOC), metals, PAHs, pesticides, and PCBs were stored chilled in appropriate containers and hand delivered to Battelle's Norwell, MA facility for later delivery to the appropriate laboratories for chemical analyses as noted in Table 2-3.

The sediment grab samples for benthic community analysis (BCA) were sieved in the field and fixed with formalin at the time of collection. The fixed samples were stored at room temperature and hand delivered to Battelle's Norwell, MA facility for later shipment to the benthic sorting lab, Barry Vittor and Associates, as noted in Table 2-3.

2.5 Tissue Collection and Analysis

Samples for tissue analytical analysis were collected from multiple trawls targeting a subset of 6 sediment stations using a clam rake with a 0.25-inch net. The primary target species for tissue chemistry analysis was *Nephtys incisa*. Sediment tissue target locations are provided in Table 2-2 and Figure 2-2 and actual trawl locations and coordinates are provided in Figures 2-6, 2-7, and Appendix C.

All tissue sample collection and subsequent analyses were conducted in accordance with the Quality Assurance Project Plan for the DAMOS Program (Battelle 2015) and its Addendum (Battelle 2016). This included depuration of the worm samples by oxygenating chilled in glass jars for 24 hours after collection. The samples were hand delivered to Battelle's Norwell, MA facility for homogenization and splitting. Homogenized samples were later sent to the appropriate laboratories by Battelle for chemical analyses as noted in Table 2-3.

2.6 Fishing Gear Assessment via Surface Marker Buoy

During the RDS acoustic survey each time a surface buoy marking fishing gear was observed alongside the vessel in and around the acoustic survey area, the location was time-stamped as a GPS fix within HYPACK. Each surface buoy was labeled based on its port/starboard position relative to the vessel's course and the marker buoy's color patterns. Real-time viewing of previously recorded buoys on the navigation system minimized

duplicate records of individual marker buoys. A file of marker buoy GPS locations was created and was used to generate a map of surface marker buoy locations throughout RDS.

Table 2-1.

Accuracy and Uncertainty Analysis of Bathymetric Data

Survey Date(s)	Quality Control Metric	Results (m) Mean	95% Uncertainty	Range
9/9-10/2016	Cross-Line Swath Comparisons	0.00	0.23	
	Within Cell Uncertainty	0.08	0.16	0.00 - 0.69
	Beam Angle Uncertainty (0 - 55d)	-0.01	0.22	0.17 - 0.47

Notes:
1. The mean of cross-line nadir and full swath comparisons are indicators of tide bias.
2. 95% uncertainty values were calculated using the sums of mean differences and standard deviations expressed at the 2-sigma level.
3. Within cell uncertainty values include biases and random errors.
4. Beam angle uncertainty was assessed by comparing cross-line data (55-degree swath limit) with a reference surface created using mainstay transect data.
5. Swath and cell based comparisons were conducted using 3 m x 3 m cell averages. These analyses do not exclude sounding variability associated with extreme (near vertical) terrain slopes.

Table 2-2.

RDS 2016 SPI, Sediment Grab, BCA, and Tissue Chemistry Station IDs, Sample IDs, and Target Coordinates

Station ID	Sample ID	X	Y	Latitude	Longitude	SPI	Sediment Grab (Physical and Chemical)	Biological Community Analysis (BCA)	Tissue Chemistry
RDS-01	RDS_16B1_SPI_RDS-01	259632.9	49921.9	44.1149000	-69.0043160	√			
RDS-02	RDS_16B1_SPI_RDS-02	259446.8	50575.4	44.1207710	-69.0066910	√			
RDS-03	RDS_16B1_SPI_RDS-03	259346.4	50290.2	44.1181990	-69.0079230	√			
RDS-04	RDS_16B1_SPI_RDS-04	259610.7	50412.2	44.1193110	-69.0046300	√	√	√	√
RDS-05	RDS_16B1_SPI_RDS-05	259978.7	50560.9	44.1206700	-69.0000450	√			
RDS-06	RDS_16B1_SPI_RDS-06	259658.5	50581.0	44.1208330	-69.0040460	√			
RDS-07	RDS_16B1_SPI_RDS-07	259349.7	50026.4	44.1158240	-69.0078620	√			
RDS-08	RDS_16B1_SPI_RDS-08	259727.0	50130.8	44.1167850	-69.0031570	√			
RDS-09	RDS_16B1_SPI_RDS-09	259628.5	50677.0	44.1216960	-69.0044290	√	√	√	√
RDS-10	RDS_16B1_SPI_RDS-10	259257.6	50576.9	44.1207740	-69.0090550	√			
RDS-11	RDS_16B1_SPI_RDS-11	259829.6	50342.7	44.1186980	-69.0018910	√	√	√	√
RDS-12	RDS_16B1_SPI_RDS-12	259752.0	50692.8	44.1218440	-69.0028860	√			
RDSO-13	RDS_16B1_SPI_RDSO-13	259566.2	49600.2	44.1120000	-69.0051240	√			
RDSO-14	RDS_16B1_SPI_RDSO-14	260256.3	50118.2	44.1167010	-68.9965430	√			
RDSO-15	RDS_16B1_SPI_RDSO-15	260134.8	49565.9	44.1117230	-68.9980190	√	√		
RDSO-16	RDS_16B1_SPI_RDSO-16	260140.6	50772.6	44.1225840	-68.9980380	√			
RDSO-17	RDS_16B1_SPI_RDSO-17	258898.4	50719.9	44.1220410	-69.0135540	√			
RDSO-18	RDS_16B1_SPI_RDSO-18	260141.5	50225.8	44.1176620	-68.9979850	√	√		
RDSO-19	RDS_16B1_SPI_RDSO-19	259740.8	51040.0	44.1249680	-69.0030530	√			
RDSO-20	RDS_16B1_SPI_RDSO-20	260279.1	50610.6	44.1211340	-68.9962950	√			
RDSO-21	RDS_16B1_SPI_RDSO-21	259602.9	49790.4	44.1137140	-69.0046810	√			
RDSO-22	RDS_16B1_SPI_RDSO-22	260374.7	50120.9	44.1167310	-68.9950630	√	√		
RDSO-23	RDS_16B1_SPI_RDSO-23	259657.6	49669.6	44.1126300	-69.0039880	√			
RDSO-24	RDS_16B1_SPI_RDSO-24	259312.6	49745.4	44.1132930	-69.0083040	√			
EREF-01	RDS_16B1_SPI_EREF-01	261736.9	50482.7	44.1200600	-68.9780720	√	√	√	√
EREF-02	RDS_16B1_SPI_EREF-02	261749.1	50256.7	44.1180260	-68.9779020	√			
EREF-03	RDS_16B1_SPI_EREF-03	261490.3	50220.2	44.1176850	-68.9811340	√	√	√	√

Station ID	Sample ID	X	Y	Latitude	Longitude	SPI	Sediment Grab (Physical and Chemical)	Biological Community Analysis (BCA)	Tissue Chemistry
EREF-04	RDS_16B1_SPI_EREF-04	261841.2	50028.8	44.1159800	-68.9767350	√	√	√	√
SREF-05	RDS_16B1_SPI_SREF-05	259522.7	48385.0	44.1010610	-69.0055750	√			
SREF-06	RDS_16B1_SPI_SREF-06	259641.4	48116.6	44.0986520	-69.0040710	√			
SREF-07	RDS_16B1_SPI_SREF-07	259562.6	48432.4	44.1014900	-69.0050790	√			
SREF-08	RDS_16B1_SPI_SREF-08	259798.7	48358.1	44.1008340	-69.0021260	√			
NREF-09	RDS_16B1_SPI_NREF-09	259546.1	52377.3	44.1369940	-69.0055890	√	√		
NREF-10	RDS_16B1_SPI_NREF-10	259677.9	52173.0	44.1351630	-69.0039260	√			
NREF-11	RDS_16B1_SPI_NREF-11	259846.8	52085.1	44.1343810	-69.0018080	√	√		
NREF-12	RDS_16B1_SPI_NREF-12	259697.2	52364.7	44.1368890	-69.0037000	√	√		

Notes
1. Grid coordinates are NAD_1983_StatePlane_Maine_East_FIPS_1801_Meters
2. Geographic coordinates are NAD83 decimal degrees

Table 2-3.

Sample Containers, Sample Sizes, Preservative Requirements, and Holding Times for RDS Samples

Sample Type	Compound Class	Minimum Sample Size[1]	Container[2]	Preservation	Holding Time[3]	Total # of Samples (*not including QC samples*)	Ship to (Laboratory)
Sediment	Grain size	200 / 200 g	8 oz G [4]	Chill: 4°±2°C	6 months	12	Katahdin
Sediment	TOC	10 / 30 g	4 oz G	Chill: 4°±2°C	28 days	12	Katahdin
Sediment	Percent moisture	10 / 30 g	From TOC jar	Chill: 4°±2°C	14 days	12	Katahdin
Sediment	Metals	10 /30 g	4 oz G.	Chill: 4°±2°C or Freeze -20°	6 months; Hg – 28 days	12	ESI
Sediment	PCB Congeners, Pesticides, PAHs	30 / 90 g	8 oz G	Chill: 4°±2°C or Freeze -20°	14 days chilled; 1 year frozen/ 40 days	12	Battelle
Rinsate Blank	PCB Congeners, Pesticides, PAH	2 L	1-L Amber Glass	Chill: 4°±2°C	7 days/40 days	1	Battelle
Rinsate Blank	Metals	100 mL	500 mL P or G	HNO_3: 4°±2°C	6 months	1	ESI
Tissue	PCB Congeners, Pesticides, PAH, Total Lipids	20/60 g	8 oz G	Chill: 4°±2°C	14 days chilled; 1 year frozen/ 40 days	6	Battelle
Tissue	Metals	10/30 g	From organics jar (prior to compositing)	Chill: 4°±2°C	6 months; Hg – 28 days	6	Battelle (Homogenization – Battelle will split for metals and send to ESI)
Sediment	Benthic Invertebrate Taxonomy	Entire grab	Plastic	10% concentrated formalin.	N/A	6	BVA

[1] "x"/"y" = minimum sample size for each sample / minimum sample size for each QC sample (matrix spike/matrix spike duplicate/analytical duplicate)
[2] Container Types: G = Glass/Teflon-lined lid. P = Plastic. All sample bottles will be provided by the respective laboratory and will be pre-cleaned and certified.
[3] "x" days/"y" days = maximum days from sampling to extraction/maximum days from extraction to analysis.
[4] If large rocks or significant quantities of gravel are in the sample, then additional sediment is required for analysis.

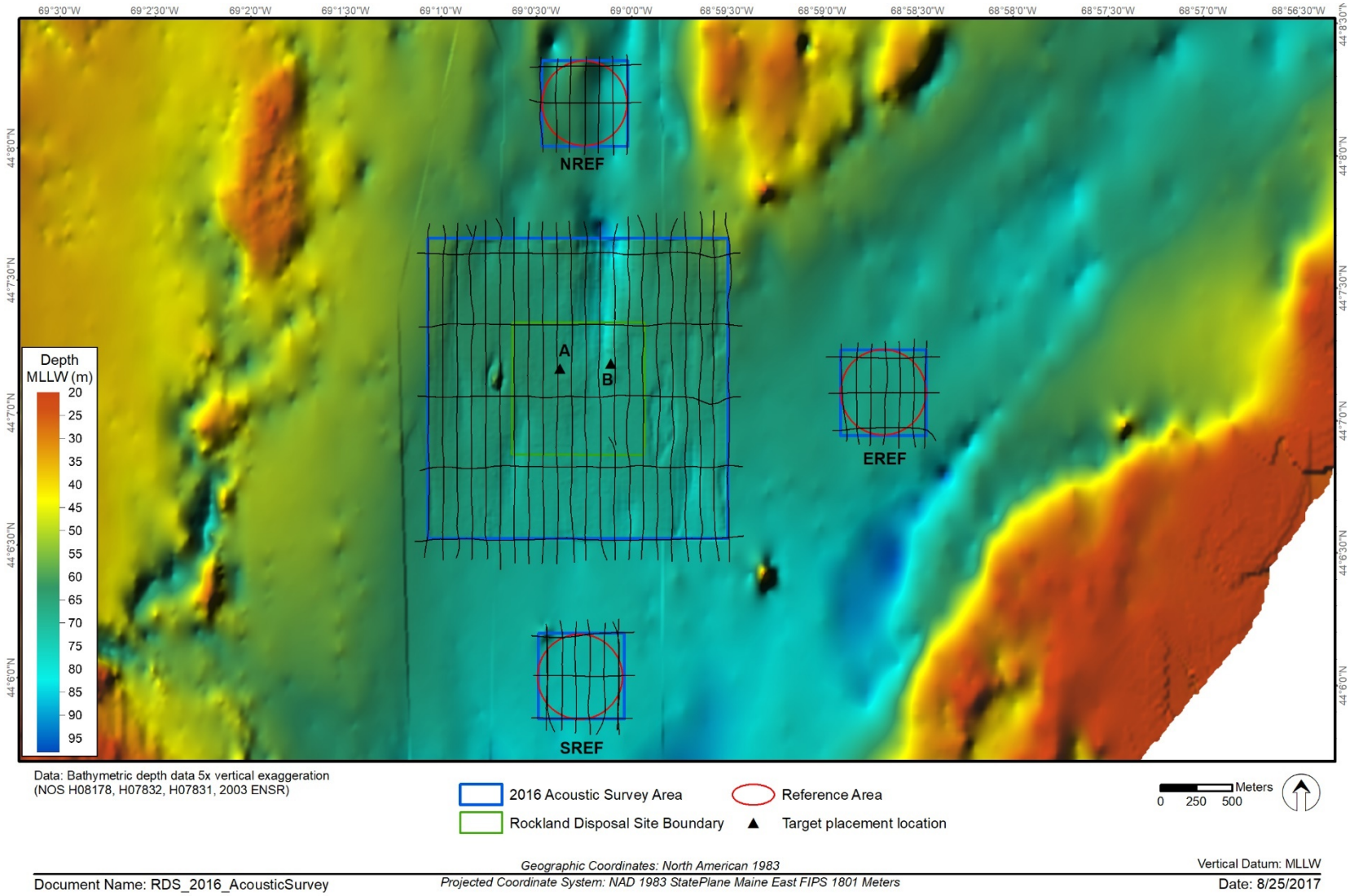


Figure 2-1. RDS 2016 acoustic survey area and tracklines

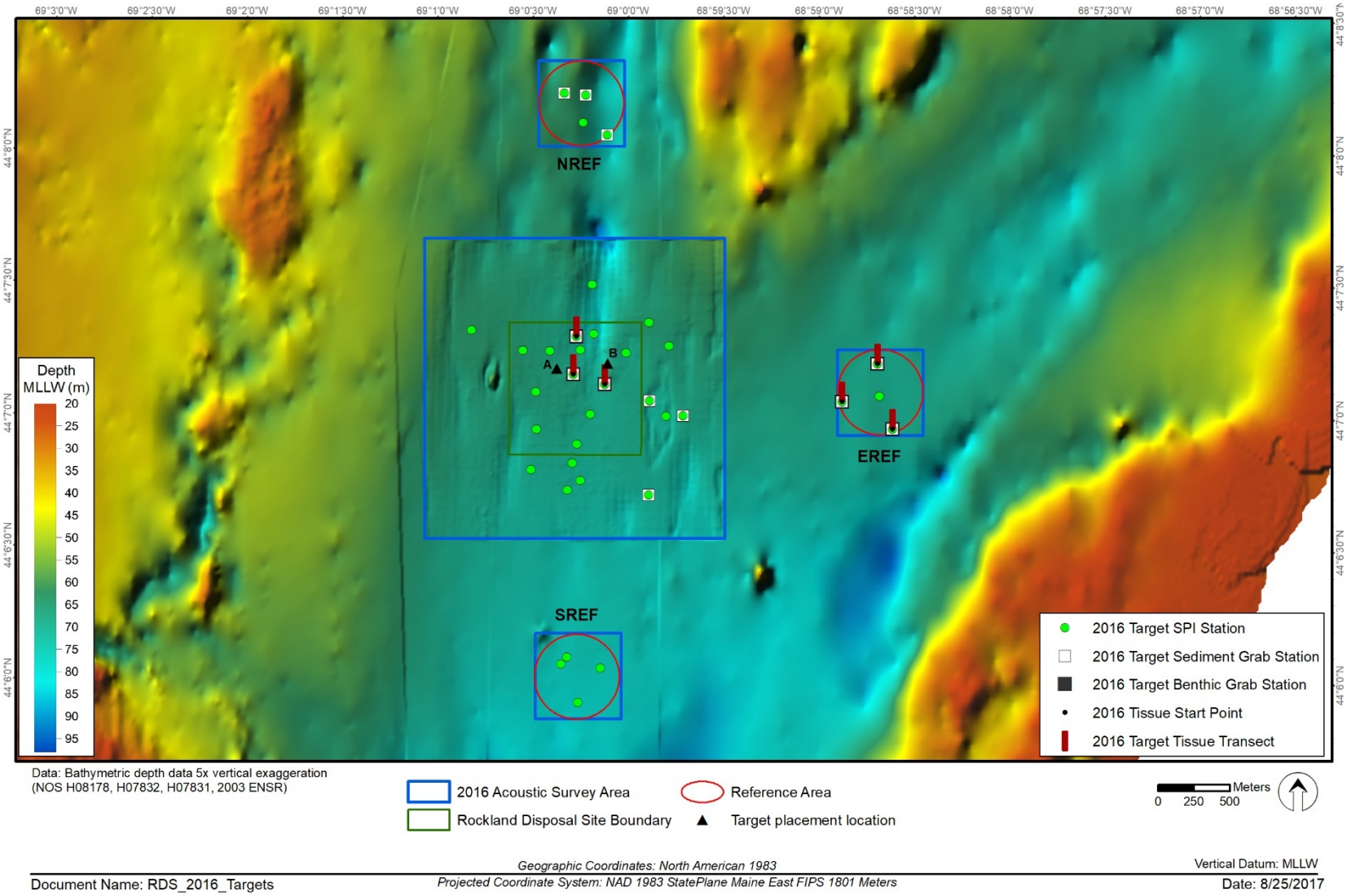


Figure 2-2. RDS 2016 target station locations for SPI, tissue, benthic, and sediment sampling

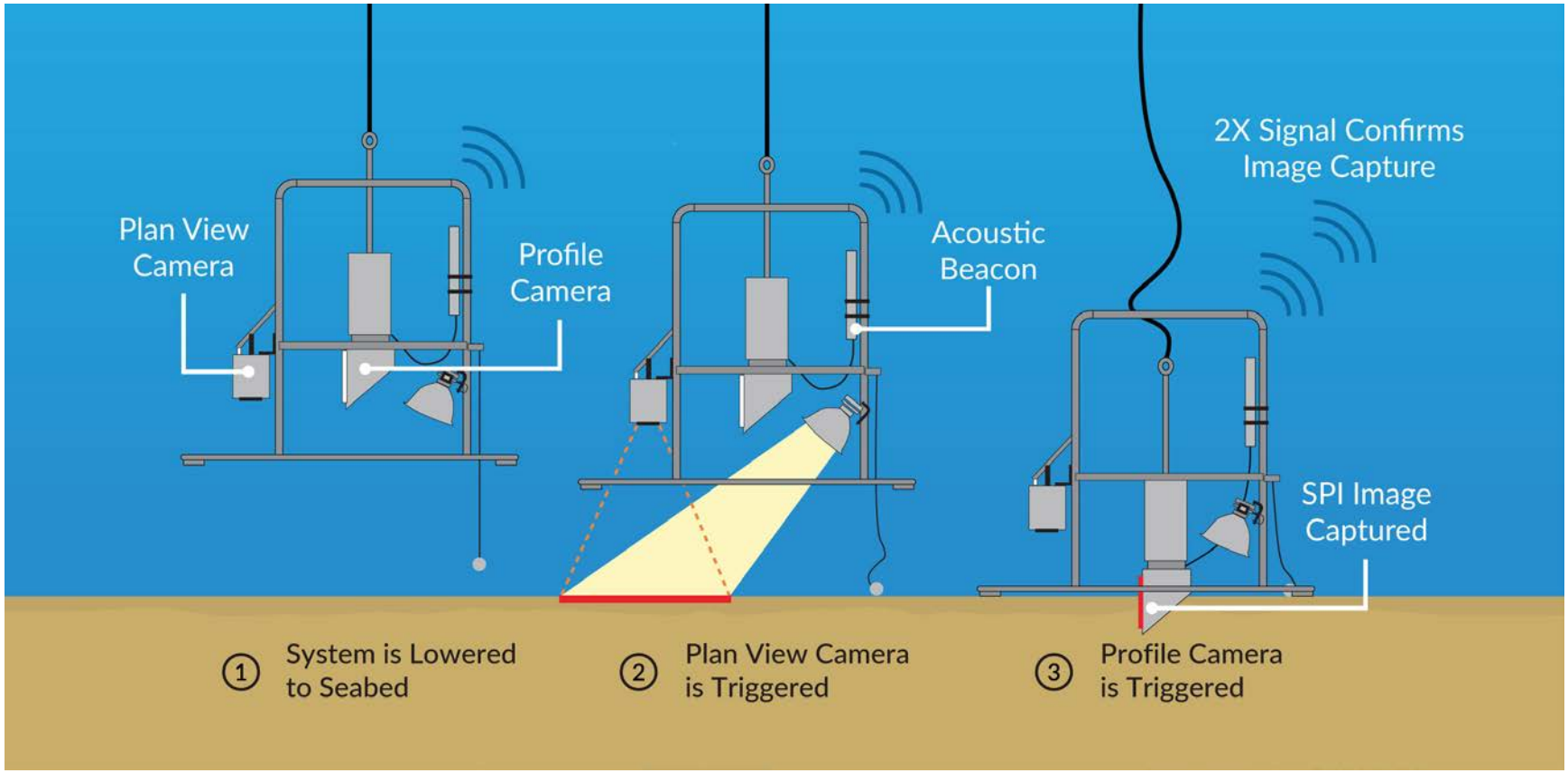


Figure 2-3. Operation of the sediment-profile and plan-view camera imaging system

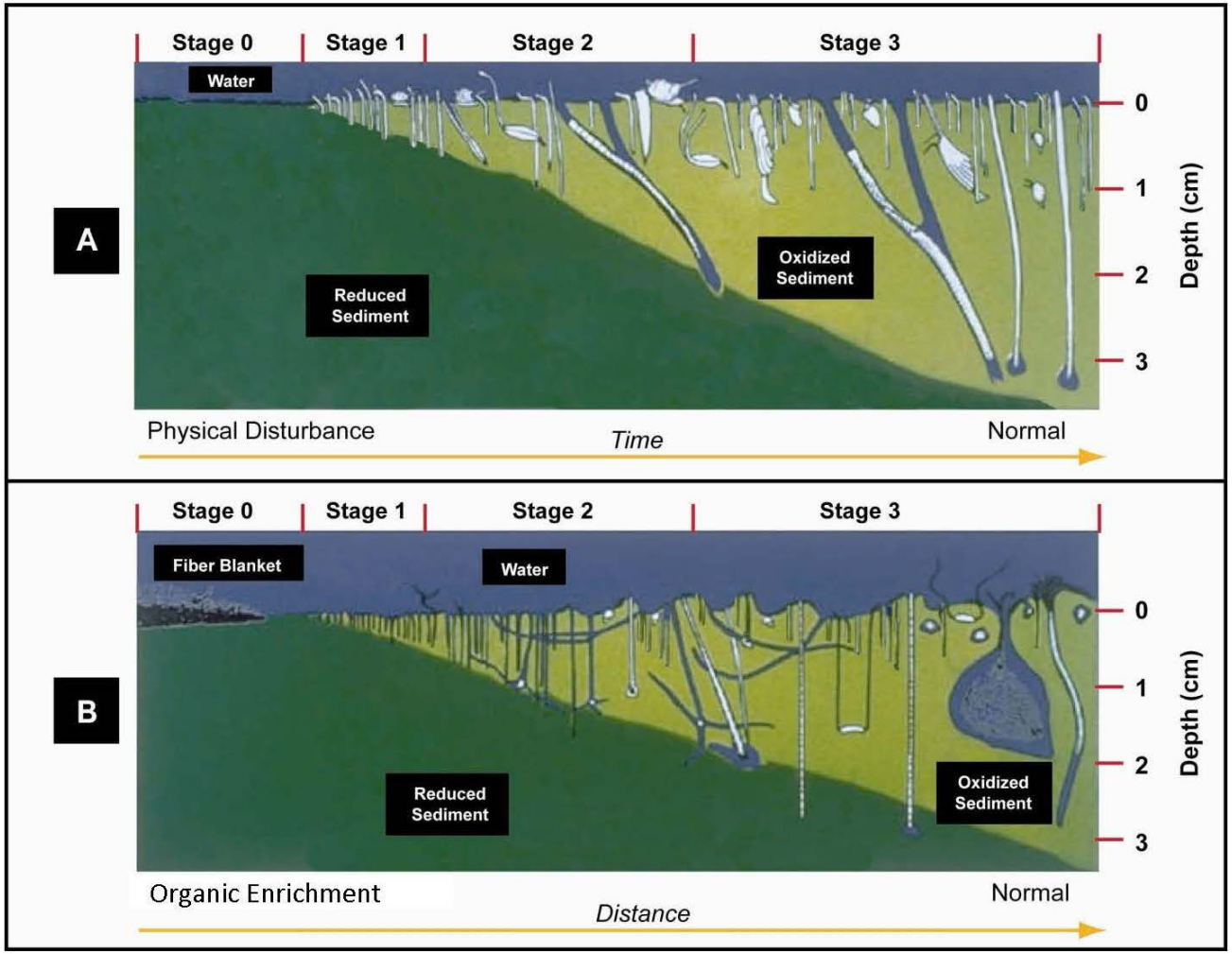


Figure 2-4. The stages of infaunal succession as a response of soft-bottom benthic communities to (A) physical disturbance or (B) organic enrichment; from Rhoads and Germano (1982)

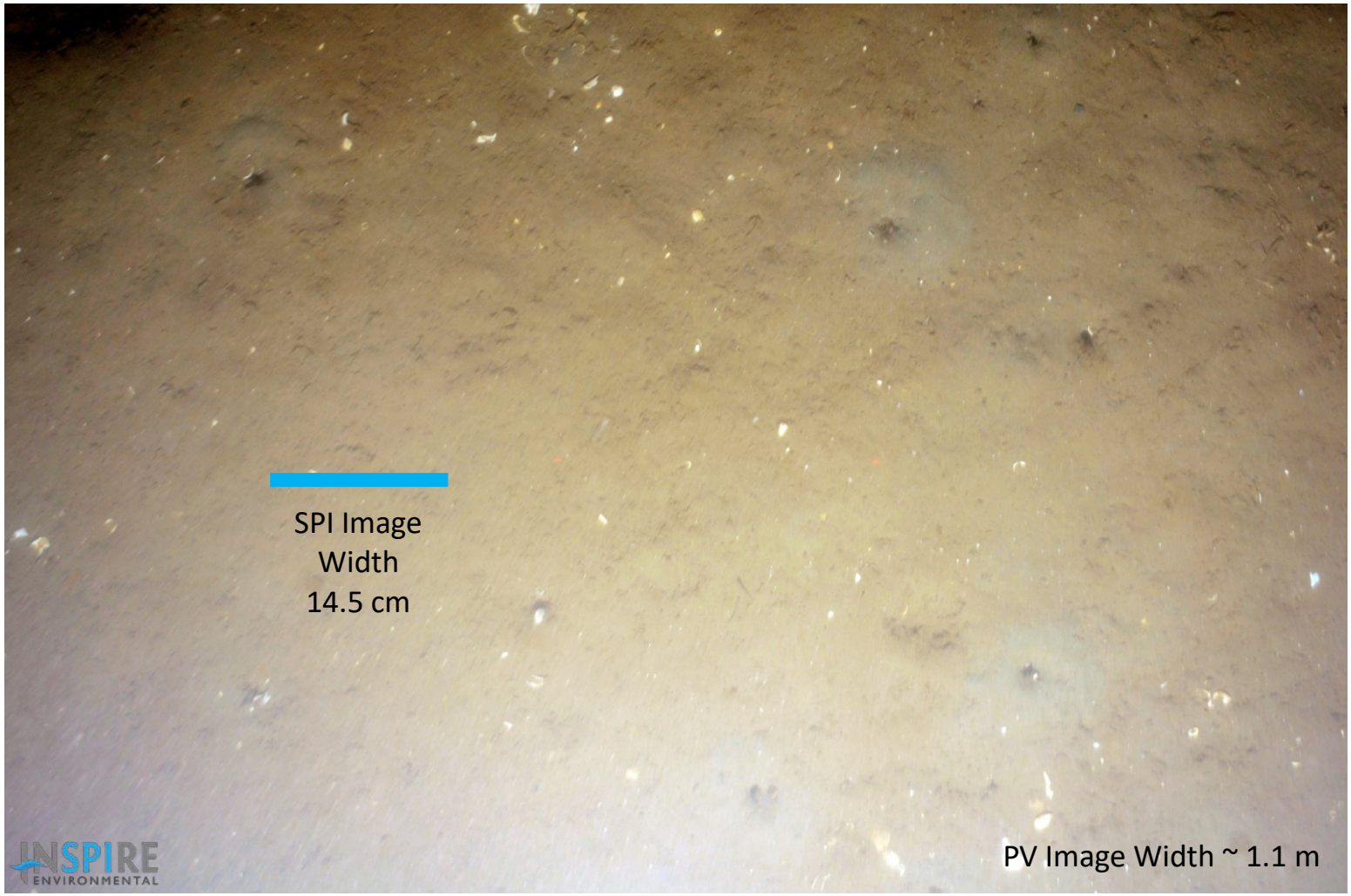


Figure 2-5. The blue scaling line on this representative plan-view image shows the sampling relationship between plan-view and sediment-profile images. Note: plan-view images differ between surveys and stations and the area covered by each image may vary between images and stations.

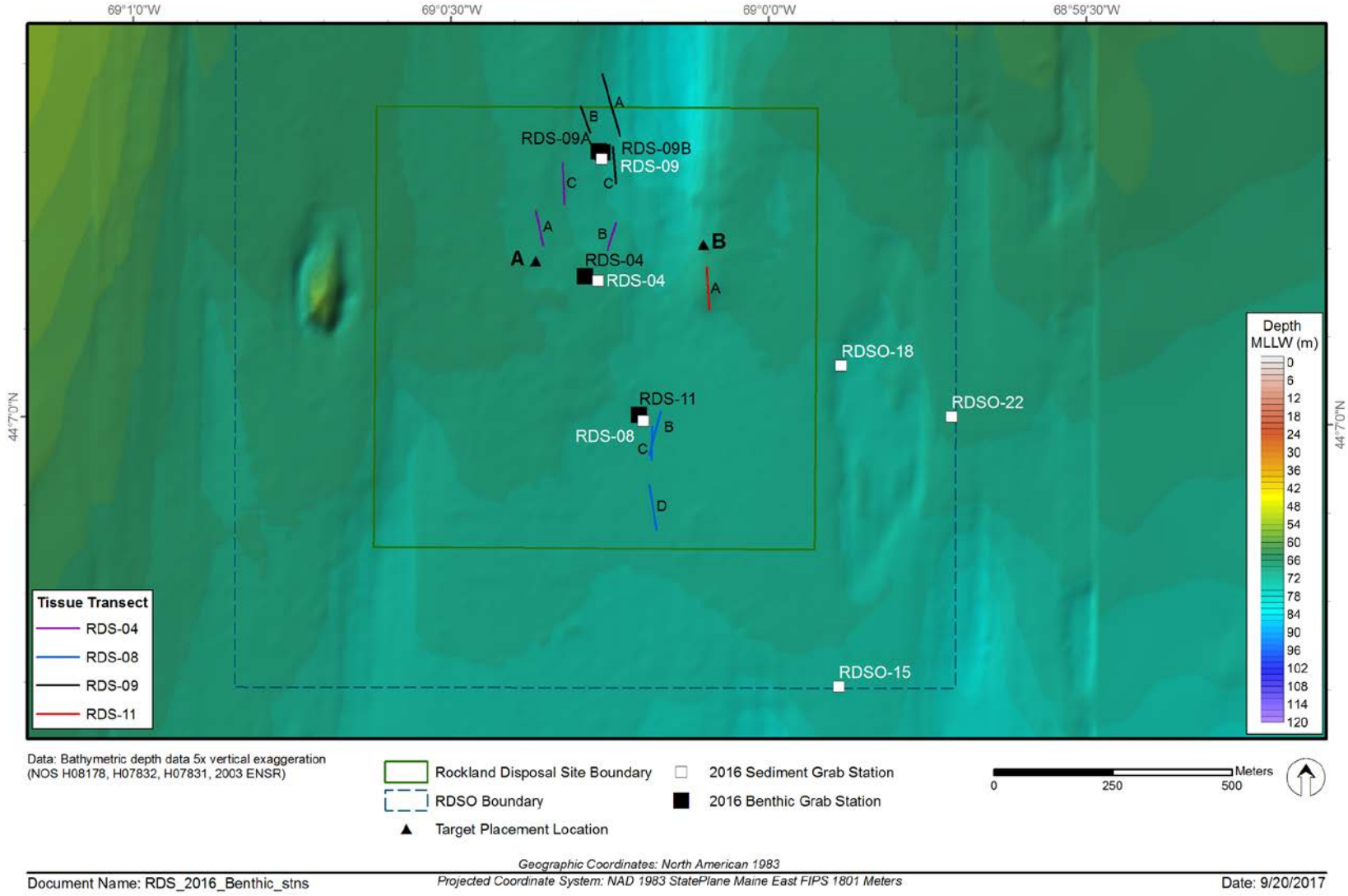


Figure 2-6. Surficial sediment grab and tissue trawl station locations at the RDS disposal areas

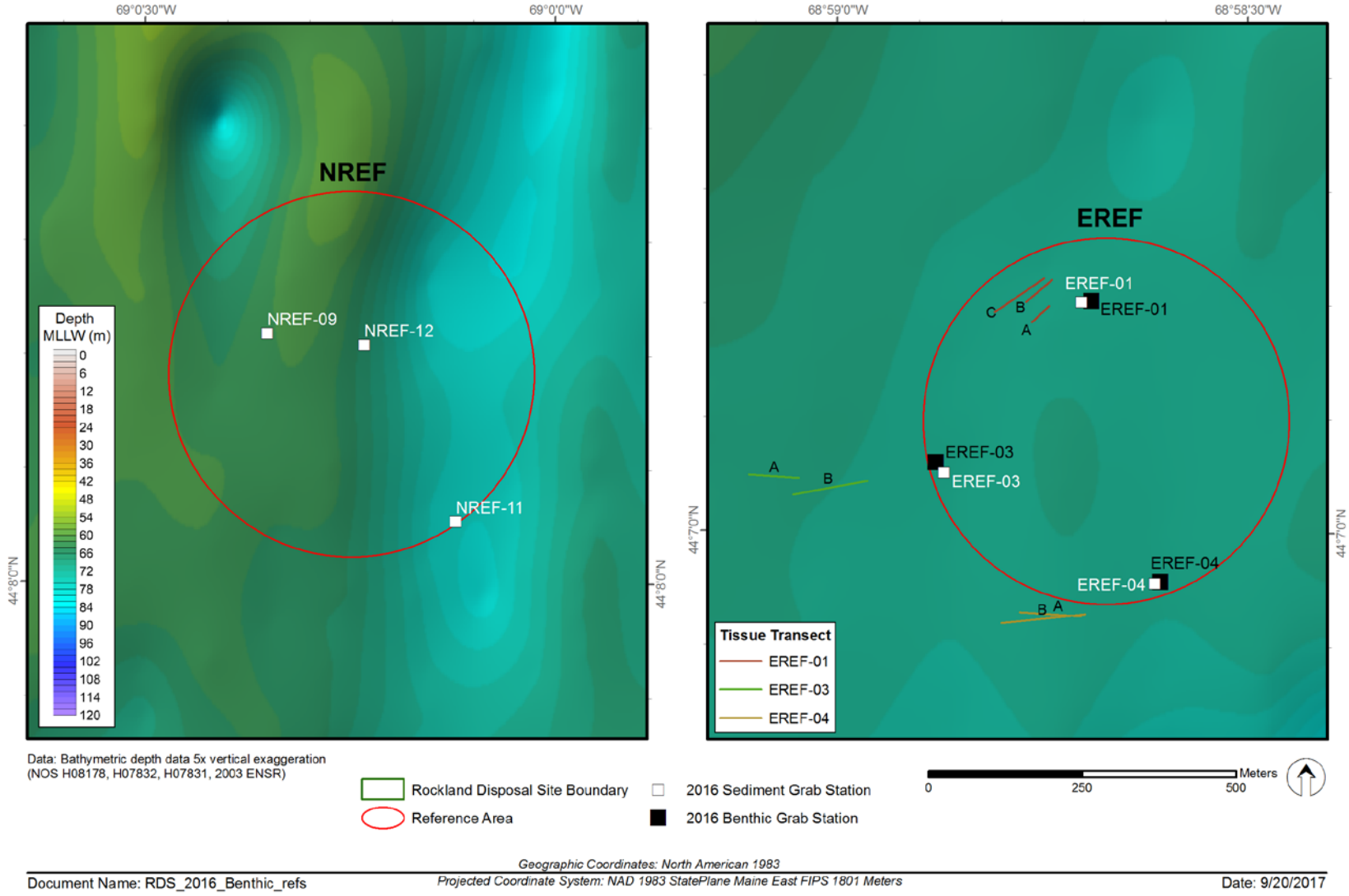


Figure 2-7. Surficial sediment grab and tissue trawl station locations at the RDS reference areas

3.0 RESULTS

3.1 Acoustic Survey

The acoustic survey included bathymetric, backscatter, and side-scan sonar data collection. The bathymetric data provided measurements of water depth that, when processed, were used to map the seafloor topography. Backscatter and side-scan sonar data provided images that supported characterization of surface sediment texture and roughness. Each of these acoustic data types is useful for assessing dredged material placement and surface sediment features.

3.1.1 Existing Bathymetry

Water depths at RDS range from 66 to 72 m MLLW, except for a deeper trough situated within the northeastern quadrant of the site, where water depths reached 80 m (Figure 3-1). Water depths in the area immediately surrounding RDS generally increased both to the south and within the trough to the north. To the east and west, water depths in areas immediately adjacent to RDS are generally similar to depths within the site (i.e., 66 - 72 m), except for a rock outcrop to the west (minimum depth of 56 m). Two dredged material disposal mounds were identified previously within RDS (SAIC 2001, Contribution 131) and are designated as target placement location A and target placement location B (Figure 3-1). The trough found at the northern edge of RDS was also visible in the eastern side of the north reference area. Topography at the eastern and southern reference areas was relatively flat and at depths following the south and east gradient observed at RDS; depths SREF were approximately 75 m and at EREF were approximately 68 -70 m.

Acoustic surveys were previously conducted at RDS (Table 1-2) but reference areas were not included in the survey area. Single-beam echo sounders were used in the previous surveys (Table 1-2). The 2016 acoustic survey was the first time multibeam acoustic technology was used at RDS and the first time the reference areas were surveyed. These data rendered as a depth-scaled acoustic relief model (color scale with hillshading) provide a detailed representation of survey area topography at RDS (Figure 3-2a) and at reference areas (Figure 3-2b); such full coverage representations are not possible with single-beam data, which can only be used to produce contour maps. These data revealed a shallow depression on the eastern edge of the site as well as small circular craters consistent with dredged material placement visible within NREF and visible within RDS, with general correspondence to recorded disposal event locations.

3.1.2 Acoustic Backscatter and Side-Scan Sonar

Acoustic backscatter and side-scan sonar data were collected in concert with bathymetric data and provide valuable information about sediment textures and rugosity, i.e., surface roughness.

Unfiltered acoustic backscatter data revealed strong returns, indicating hard or coarse sediments, within RDS (Figure 3-3a) in comparison to reference areas (Figure 3-3b). The strongest returns were in the vicinity of both target placement locations and on the rock outcrop just to the west of the designated site boundary. Weaker returns were recorded in NREF and EREF and medium strength returns were recorded in SREF.

Filtered acoustic backscatter, which presents a quantitative assessment of surface characteristics independent of slope effects, draped over an acoustic relief model of the site (Figure 3-4a) showed that the strongest backscatter returns (-35 to -33 dB) occurred at target placement locations A and B. Strong returns also occurred at the rock outcrop to the west of this site boundary, two outcrops at the southeastern corner of the main survey area, and a topographic rise at the northeastern corner of the main survey area. The weakest returns (-52 to -45 dB) occurred in the northward trending trough that begins at the northern edge of the RDS boundary and within depressions located primarily in the southeastern corner of the main survey area. Weak returns in this range were also recorded at NREF and EREF (Figure 3-4b). Medium returns (-44 to -39 dB) occurred in SREF and throughout the remainder of RDS and surrounding areas (Figure 3-4b, Figure 3-4a).

The strongest returns at target placement location B corresponded to the locations of most recent disposal events (Figure 3-5). The strong returns recorded near target placement locations and at the center of RDS appear to correspond to roughness of the seafloor in these areas. This pattern can be seen more clearly in side-scan sonar data, which have a higher resolution and are more responsive to minor surface textural features and slope than backscatter results at RDS (Figure 3-6a) and reference areas (Figure 3-6b). Side-scan results confirmed observations from backscatter results.

3.1.3 Comparison with Previous Acoustic Data Collections

Depth contours and general bathymetric descriptions of RDS are similar to those of the previous survey conducted in 2003. Whereas the 2016 acoustic survey used multibeam acoustic technology, the 2003 survey, as well as all prior bathymetric surveys, used single-beam acoustic technology. Therefore, it is only possible to compare contour maps of the site (Figure 1-2 and Figure 3-1). DAMOS monitoring reports often include a depth-difference comparison between previous and current bathymetric data sets. A depth-difference was not calculated for RDS due to the disparities in data resolution between the single-beam bathymetry collected in previous surveys and the multibeam bathymetry collected in the 2016 survey. If future multibeam acoustic surveys are conducted at RDS, then a depth-difference surface can be generated for the site using the 2016 data as the “before” data set.

The 2016 survey is the first time acoustic backscatter data were collected at RDS. Side-scan sonar, however, was collected during several previous surveys at RDS including the September 2003 survey (Table 1-2). The 2003 survey also recorded areas of high reflectance centered around recent disposal events and attributed this pattern to the generally coarser texture of dredged materials compared to ambient sediments. The same rock

outcrops as those observed in 2016 were recorded by side-scan sonar in 2003 (ENSR 2004, Contribution 156).

3.2 Sediment-Profile and Plan-View Imaging

Detailed SPI and PV image analysis results are provided in Appendix E. The following sections summarize the results for the three reference areas (NREF, EREF, SREF) and for the disposal area (inclusive of RDS and RDSO). Comparisons between reference areas and the disposal area, as well as to surveys from 2003 are also provided. Key ecological measures (aRPD and successional stage) were evaluated for statistically significant ecological equivalence between reference and disposal areas sampled during the 2016 survey. All locations were surveyed 12-14 September 2016. SPI and PV images were collected at 12 stations within the designated RDS disposal site, 12 stations within the outer area (RDSO), and 4 stations per reference area (Figure 2-2). The PV system captured images of the seafloor that ranged in width from 0.26 to 0.68 m.

3.2.1 Reference Area Stations

3.2.1.1 Physical Sediment Characteristics

Reference areas represented slightly different depth ranges. Mean depths at NREF stations were 70 m and ranged from 63 to 81 m. Mean depths at EREF stations were 74 and varied little with all stations at either 73 or 74 m. Mean depths at SREF stations were also relatively uniform, ranging from 80 to 82 m with a mean of 81 m (Table 3-1). Sediments at all reference areas were soft silt/clays (Figure 3-7) with grain size major modes of >4 (Table 3-1, Figure 3-8) and moderate to deep camera prism penetration depths (Table 3-1, Figure 3-9). Penetration depths were shallower at SREF, with a mean of 13.8 cm; means at NREF and EREF were 19.5 cm and 18.2 cm, respectively. Penetration depth can be a good indicator of the bearing strength or compaction of the sediment when the stop and weight settings on the camera frame are the same for all stations; such was not the case for this survey (Appendix E). Therefore, penetration depths should be compared relatively not absolutely. However, settings were held consistent within NREF (stop collar at 13 inches, 0 weight per side) and within EREF (stop collar at 14 inches, 1 weight per side); at SREF, settings for Stations 5 and 7 matched those of NREF and Stations 6 and 8 matched those of EREF. Therefore, differences shown on the map (Figure 3-9) in prism penetration depth within EREF are likely more reflective of a camera frame set-up with a greater ability to penetrate the seafloor at Stations 6 and 8 than to any meaningful differences in substrata properties. Nevertheless, the shear strength and bearing capacity of sediment did vary, at least between NREF and SREF, as evidenced by three images from those reference areas that varied from moderate to deep penetration depths and all were captured using the same stop collar and weight settings (Figure 3-10).

Small-scale boundary roughness at reference area stations ranged from 0.7 to 2.5 cm with a mean of 1.3 cm (SD±0.5) (Table 3-1, Figure 3-11). Small-scale topography observed

at all reference area stations was attributed to the surface and sub-surface activity of benthic organisms, evidenced as small burrow openings, pits, and mounds (Figure 3-12). Mean boundary roughness was approximately similar between stations in NREF (1.0 cm) and EREF (1.2 cm); whereas the mean at SREF was 1.7 cm, mostly attributable to one station (SREF-05), which had a mean boundary roughness of 2.5 cm due to one replicate (C) with a large boundary roughness of 4.46 cm (Table 3-1, Appendix E).

There was no evidence of organic enrichment (e.g., no Beggiatoa, low dissolved oxygen (DO) conditions, or sedimentary methane) (Appendix E). Trace amounts of dredged material were observed at SREF-06 as small inclusions of white/gray clay streaks at depth (Figure 3-13).

3.2.1.2 Biological Conditions

Deep and well-developed aRPDs were observed across all three reference areas, with an overall mean of 4.2 cm (SD±1.1) (Table 3-1, Figure 3-14). Station mean aRPD values were relatively uniform within both EREF and SREF with low standard deviations of 0.3 and 0.5 cm, respectively; but, mean depths were deep at EREF, 5.0 cm, and moderate at SREF, 3.1 cm. At NREF, the aRPD could not be determined for one station due to over-penetration of the camera, two stations had similar mean aRPD depths below 4 cm, and one station had a very deep aRPD mean of 6.3 cm. Therefore, the standard deviation at NREF was higher at 1.4 cm than the other reference areas and the mean was 4.6 cm (Table 3-1). Deep aRPD values are indicative of low sediment oxygen demand and active bioturbation; for the most part these are the types of aRPDs that were observed at the reference areas (Figure 3-15A). Several replicate images had low to moderate aRPD depths indicative of medium sediment oxygen demand (Appendix E, Figure 3-15B).

Stage 3 infauna were present at all reference area stations. Most images were classified as Stage 1 on 3 with several classifying as Stage 2 on 3 or 3 (Table 3-1, Figure 3-16). In scenarios where evidence of both Stage 1 and Stage 2 taxa were present along with Stage 3 taxa, the Stage 1 on 3 designator was used because Stage 1 taxa indicate important secondary production properties of the system. Evidence for the presence of Stage 3 fauna included deep subsurface burrows and/or deep feeding voids. Stage 2 fauna are smaller than Stage 3 taxa and are active in the 2 - 4 cm zone below the sediment-water interface; their presence is also indicated by medium to large tubes at the sediment-water interface. Stage 1 taxa are indicated by the presence of very small tubes at the sediment-water interface that can respond to minor short-term perturbations of the surface sediment (physical, biological, or chemical) (Figure 3-17). The mean number of subsurface feeding voids, indicating Stage 3 fauna, ranged from 0.0 to 2.3 voids per station with an overall mean of 1.2 voids per station (Table 3-1, Figure 3-18). Although no voids were seen in profile images at NREF-12, burrow openings visible in the PV indicated the presence of Stage 3 taxa (Appendix E). When present, voids at the reference area stations generally were found deep within the sediment column, with a shallow void found at 2.3 cm at NREF-09 (Table 3-1, Figure 3-19).

Further indications of subsurface faunal activity from Stage 3 taxa were observed in the PV images as the presence of burrows (Figure 3-20). Generally, sparse (<10% image coverage) to abundant (25-75% image coverage) burrows were observed in all PV images analyzed across the three reference areas. Additionally, tracks across the seafloor, often created by epifauna (crabs, gastropods), were observed in all three reference areas and were documented in approximately one-third of the images (Figure 3-20, Appendix E). No fish, flora, debris, bedforms, or *Beggiatoa* colonies were present in the PV images from any of the reference areas (Appendix E).

3.2.2 Disposal Area Stations

Locations both within the formal RDS designated boundary and the area surrounding this boundary (RDS-Outer, or RDSO) were sampled and for this study are considered together as disposal area stations. SPI/PV imagery was collected at 12 stations within and 12 stations outside the designated RDS boundary.

3.2.2.1 Physical Sediment Characteristics

Station depths were similar between RDS and RDSO. Station depths ranged from 62 to 74 m, with a mean depth of 70 m at RDS, and from 62 to 76 m, with a mean depth of 71 m, at RDSO (Table 3-2). Sediments at all disposal area stations were soft silt/clays (Figure 3-21) with grain size major modes of >4 (Table 3-2, Figure 3-22) and moderate to deep camera prism penetration depths (Table 3-2, Figure 3-23). Penetration depths were similar at RDS and RDSO with means of 17.4 cm (SD±2.5) and 16.3 cm (SD±1.7), respectively (Table 3-2). Penetration depths can be a good indicator of the bearing strength or compaction of the sediment when the stop and weight settings on the camera frame are the same for all stations; such was not the case for this survey (Appendix E). Therefore, penetration depths should be compared relatively not absolutely. Nevertheless, the shear strength and bearing capacity of sediment did vary to some degree within the disposal area, as evidenced by three images that varied from moderate to deep penetration depths and all were captured using the same stop collar and weight settings (Figure 3-24). These differences were more likely due to small scale variability in sediment consolidation (e.g., related to proximity to lobster burrows) than to ecologically meaningful differences in physical properties. With soft fine sediments and penetration depths near the limit of the camera's capacity, even with zero weights on the frame, the margin of error was small and small-scale adjustments to the frame configuration were made throughout the course of the survey (Appendix D).

Small-scale boundary roughness at disposal area stations were similar at RDS and RDSO, with means of 1.2 cm (SD±0.3) and 1.4 cm (SD±0.5), respectively (Table 3-2, Figure 3-25). Small-scale topography observed at all disposal area stations was attributed to the surface and sub-surface activity of benthic organisms, evidenced as small burrow openings, pits, and mounds (Figure 3-26). There was no evidence of organic enrichment (e.g., no Beggiatoa, low dissolved oxygen (DO) conditions, or sedimentary methane) (Appendix E).

Dredged material was observed throughout the disposal area, and nearly all observations were of older, weathered dredged material that had been heavily reworked into the sediment matrix (Figure 3-27). A spatial gradient of dredged material presence was evident beginning with clasts of cohesive dredged material near target placement location B and moving outward from there through stages of weathering and reworking until sediment at the edges of the disposal area where it was difficult to optically distinguish between heavily weathered dredged material and ambient sediments (Figure 3-27). Distinct, cohesive light gray clasts of dredged material (Figure 3-28) were observed near target placement location B and at RDSO-24 just outside the southwestern corner of the disposal site boundary (Figure 3-27). At RDSO-24, large dredged material clasts were visible on the surface of the seafloor and within the subsurface sediment matrix (Figure 3-29). At several stations within the designated RDS boundary, dredged material was observed as gray clay partially reworked into the sediment column (Figure 3-30). Heavily weathered and reworked sediments within RDS and RDSO presented as an organically enriched sediment inventory and complexity of sediment textures at depth (Figure 3-31). At most of the stations within RDSO and at those most distant from the designated site boundary, heavily reworked historical dredged materials were almost completely incorporated into the sediment matrix and were difficult to distinguish from native sediments (Figure 3-32).

3.2.2.2 Biological Conditions

Deep and well-developed aRPDs were observed across the disposal area, with an overall mean of 4.1 cm (SD±0.8) (Table 3-2, Figure 3-33). Station mean aRPD values were slightly deeper on average within RDS, with a maximum of 5.5 cm, a minimum of 3.2 cm, and a mean of 4.4 cm compared to a maximum of 4.5 cm, a minimum of 2.5 cm, and a mean of 4.1 cm at RDSO (Table 3-2). Deep aRPD values are indicative of low sediment oxygen demand and active bioturbation; for the most part these are the types of aRPDs that were observed at the disposal area (Figure 3-34). A few replicate images had low to moderate aRPD depths indicative of medium sediment oxygen demand (Appendix E).

Stage 3 infauna were present at all disposal area stations. Most images were classified as Stage 1 on 3 with several classifying as Stage 2 -> 3 or 3 (Table 3-2, Figure 3-35). One replicate image at Station RDSO-20 classified at Stage 1; however, it was noted that this was likely Stage 1 on 3 but no deep burrowing features were captured in the SPI image and the presence of burrows could not be confirmed in the PV image due to water column turbidity (Appendix E). In scenarios where evidence of both Stage 1 and Stage 2 taxa were present along with Stage 3 taxa, the Stage 1 on 3 designator was used because Stage 1 taxa indicate important secondary production properties of the system.

Evidence for the presence of Stage 3 fauna included deep subsurface burrows and/or deep feeding voids. Stage 2 fauna are smaller than Stage 3 taxa and are active in the 2 - 4 cm zone below the sediment-water interface; their presence is also indicated by medium to large tubes at the sediment-water interface. Stage 1 taxa are indicated by the presence of very

small tubes at the sediment-water interface that can respond to minor short-term perturbations of the surface sediment (physical, biological, or chemical) (Figure 3-36). The mean number of subsurface feeding voids, indicating Stage 3 fauna, ranged from 0.0 to 3.0 voids per station with an overall mean of 1.5 voids per station (Table 3-2, Figure 3-37). Although no voids were seen in profile images at RDS-1, burrow openings visible in the PV indicated the presence of Stage 3 taxa (Appendix E). When present, voids at the disposal area stations generally were found at moderate to deep subsurface depths within the sediment column (Table 3-2, Figure 3-38).

Further indications of subsurface faunal activity from Stage 3 taxa were observed in the PV images as the presence of burrows (Figure 3-39). Within most images, present (10-25% image coverage) to abundant (25-75% image coverage) burrows were observed at the disposal area. Additionally, sparse (<10% image coverage) to present tubes were observed. Tracks across the seafloor, often created by epifauna (crabs, gastropods), also were observed in approximately 40% of the images (Figure 3-20, Appendix E). No fish, flora, or *Beggiatoa* colonies were present in the PV images from the disposal area. A rope was observed in one image and a ripple in another; otherwise no debris or bedform were observed (Appendix E). A lobster was observed next to large dredged material clasts at RDSO-24 (Figure 3-29).

3.2.3 Comparison to Reference Areas

3.2.3.1 Mean aRPD Variable

Mean aRPD depths at the disposal area (RDS and RDSO) and all reference areas were greater than 3.0 cm (Figure 3-40) and, therefore, are considered to reflect overall healthy benthic environments. Area mean aRPD depths were lower at the disposal area compared to the grand mean of the reference areas. The mean aRPD depth at the disposal area was 4.1 cm and the grand mean aRPD depth of reference areas was 4.2 cm (Table 3-3). The standard deviation among stations for aRPD depths across all sampling areas ranged from 0.34 to 1.43 cm (Table 3-3). Values for the aRPD ranged more widely at NREF, from 3.7 to 6.3 cm, than at the other two reference areas (Table 3-1, Figure 3-40).

A test was performed to determine whether the differences observed in mean aRPD values between the three reference areas and disposal area were statistically significant. The station mean aRPD data from all four locations were combined to assess normality and estimate pooled variance. Results for the normality test indicated that the area residuals (i.e., each observation minus the area mean) were not significantly different from a normal distribution (Shapiro-Wilk's test p-value = 0.89, alpha = 0.05). Levene's test for equality for variances was rejected (p-value = 0.051, alpha = 0.05). The confidence interval for the difference equation was constructed using normal theory equations with separate variance estimates for the five groups and the appropriate Welch-Satterthwaite degrees of freedom.

The confidence region for the difference between the reference areas versus disposal area means was fully contained within the interval [-1, +1] (Table 3-4). The conclusion was that the three reference and disposal area had ecologically equivalent aRPD values in the 2016 survey, with a difference in means of approximately 0.1 cm, with reference areas having deeper aRPD values than the disposal area (Table 3-4).

3.2.3.2 Successional Stage Rank Variable

Across RDS and all reference areas, Stage 3 fauna were consistently found, often along with Stage 1 fauna (Table 3-1, Table 3-2, Figure 3-16, Figure 3-30). To evaluate these successional stages numerically, a successional stage rank variable was applied to each image. A value of 3 was assigned to Stage 3, 2 on 3, or 1 on 3 designations; a value of 2 was applied to Stage 2 or 1 on 2; a value of 1 was applied to Stage 1; and images from which the stage could not be determined were excluded from calculations. The maximum successional stage rank among replicates was used to represent the station value.

The successional stage rank variable was uniformly 3 across all three reference areas and the disposal area; no statistics are required to conclude that these areas are ecologically equivalent.

3.2.4 Temporal Comparisons

3.2.4.1 Mean aRPD Variable

Area mean aRPDs in all areas measured in 2016 were deeper than the previous monitoring survey conducted in 2003. In that year, the reference area mean was 3.5 cm, the RDS mean was 2.9 cm, and the RDSO mean was 3.4 cm (ENSR 2004, Contribution 156). In 2016, there was an increase of 0.7 cm for an area mean of 4.2 cm at the reference areas, an increase of 1.5 cm to 4.4 cm at RDS, and an increase of 0.3 cm to 3.7 cm at RDSO (Table 3-1, Table 3-2). Because all 2003 and 2016 area aRPD mean depths were indicative of healthy benthic environments and because all increased in depth between the two surveys, no statistical tests were performed to compare 2003 and 2016 results.

3.3 Sediment and Tissue Samples

Results for sediment grain size, TOC, total PCB, total PAH, and selected pesticides and metals and for tissue lipids, total PCB, total PAH, and selected pesticides and metals are provided below. Summary statistics for each of these parameters were calculated for samples collected from the disposal site and from the reference areas and are provided in tables at the end of this section. Individual sediment and tissue sample results from each station are presented in figures and show the associated effects range low (ER-L) and effects range medium (ER-M) values (Long et al. 1995) if available. Tissue figures include Food and Drug Administration (FDA) levels if available, which reflect tolerance levels in the

edible portion of fish. Full results and laboratory reports for all parameters are provided in Appendices G and H.

3.3.1 Grain Size and Total Organic Carbon

Grain size results for sediment collected inside and outside RDS and the two reference locations are summarized in Table 3-5 and presented in Figure 3-41. Percent fines, defined as the sum of the silt and clay fractions, ranged from 75.9 to 99.4% at all locations. The lowest percent fines were observed within the boundary of the RDS and percent fines were, on average, higher in sediment collected from the two reference locations. Total organic carbon results are summarized in Table 3-6 and presented in Figure 3-42. TOC content was similar across all stations (average 2.02%).

3.3.2 Sediment Chemistry

Total PAH and total PCB in RDS sediments are summarized in Table 3-7. Total PAH and total PCB concentrations for individual stations are shown in Figures 3-43 and 3-44, respectively. Total PAHs were detected in all sediment samples. The highest concentrations were found in sediment from within RDS ranging from 619 to 1495 ug/kg. Total PAH concentrations in sediments collected from outside RDS, ranging from 225 to 269 ug/kg and were similar to those collected in the reference areas, ranging from 175 to 298 ug/kg. Total PCBs were only detected above the detection limit in sediment collected from within RDS; Low levels of PCBs, below the reporting limit, but above the method detection limit, were detected in sediment from RDSO and from NREF. No PCBs were detected at EREF. Overall, both Total PAH and Total PCB concentrations for all samples were well below the ER-L values. Normalization of PAHs and PCBs to TOC did not change relative concentrations.

Chlorinated pesticides in RDS sediments are summarized in Table 3-8, and individual results for selected pesticides are shown in Figures 3-45 a-b. Of the 20 chlorinated pesticides analyzed, 7 pesticides (4,4'-DDD, DDE, DDT; aldrin, alpha-BHC, dieldrin, and endosulfan II) were detected in at least one sediment sample collected from within RDS. Only 4,4'DDT was detected outside RDS and at NREF. No pesticides were detected at EREF. The sum of the DDTs slightly exceeded the ER-L value in two of the three sediment samples from within RDS. The sums of the DDTs were below the ER-L in all sediment collected from outside RDS and at the reference areas. Dieldrin detection limits exceeded the ER-L values, but dieldrin was only detected in two samples from within RDS and at levels well below the ER-M. Normalization of pesticides to TOC did not change the relative concentrations.

The eight metals analyzed (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn) were detected in all sediment samples. Metals concentrations are summarized in Table 3-9, and individual results for each metal are shown in Figures 3-46 a-h. All metals concentrations were below ER-M values and were found at similar levels within and outside RDS and at the reference areas. As, and Ni concentrations slightly exceeded the ER-L value at all locations including

the reference areas. However, concentrations were well below the ER-M values. Normalization of metals to percent fines did not change the relative concentrations.

3.3.3 Tissue Chemistry

The primary target species for tissue chemistry analysis was *Nephtys incisa,* which was found in sufficient abundance to collect the requisite minimum of 30 g of tissue at all stations. Tissue lipids results are summarized in Table 3-10 and in Figure 3-47. Percent lipids in the worm samples collected from in and around RDS and the reference location were similar and ranged from 1.4 to 1.8%.

Total PAH and PCBs in tissues are summarized in Table 3-11 and in Figures 3-48 and 3-49, respectively. PAHs were detected in all tissue samples ranging from 15.3 ug/kg in worms collected from the reference location to 46.7 ug/kg in worms from RDS. At least one PCB congener was detected in all worm samples with total PCB concentrations ranging from 1.34 ug/kg to 3.69 ug/kg. Total PCBs in both worms and clams were well below FDA fish consumption limit of 2,000 ug/kg. As a more relative point of reference total PCB concentrations in worms collected from RDS were also more than an order of magnitude below the Historic Area Remediation Site (HARS)-specific worm bioaccumulation tissue PCB criterion of 113 ug/kg, which was established for determining the suitability of proposed dredged material for use as Remediation Material (USEPA 2003) at the offshore dredged material disposal site.

Chlorinated pesticides detected in tissue from the disposal area and the reference areas are summarized in Table 3-12 and individual results for selected pesticides are shown in Figures 3-50 a-c (total DDX, chlordane and dieldrin). Of the 20 chlorinated pesticides analyzed, 5 pesticides (4,4'-DDD, 4,4'-DDE, chlordane, alpha chlordane, and dieldrin) were detected in at least one tissue sample from the disposal site, and only 2 pesticides (4,4' DDE and dieldrin) were detected in tissue from the reference area. When detected, pesticide concentrations from the reference area were generally lower than concentrations found at the disposal site. All concentrations were two to three orders of magnitude below FDA limits.

The eight metals analyzed (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn) were detected in all tissue samples collected from both the disposal site and the reference area. Metals concentrations are summarized in Table 3-13 and individual results for each metal are shown in Figures 3-51 a-h. Metals concentrations in worms from the disposal site were variable but within the range of concentrations found in at the reference area. The only FDA action level available is for Hg in the edible portion of fish, and tissue concentrations are well below the limit of 1 mg/kg.

3.4 Benthic Community Analysis

Benthic community characterization results can provide additional insight into the recovery of the benthic system. Species richness, abundance, density, and diversity metrics are provided along with dominant taxa in terms of abundance and biomass in Table 3-14;

biomass by phylum are provided in Table 3-15. Species richness was measured as the number of unique taxa identified, abundance was measured as the total number of individuals found at each location, density as the number of individuals per square meter, and the Shannon-Wiener Diversity Index (H') and the Pielou Evenness Index (J') were used to assess overall diversity. Dominant taxa are those found in the highest abundance in each location; dominant phyla in biomass are the phyla that contributed the most to total biomass.

A total of 58 species were found over all stations (reference + site) with a mean species richness of 30 species per station (Appendix I). Total abundance overall was 4463, with a mean of 744 individuals per station. Mean density was 18,596 ind/m^2, diversity 1.8, and evenness 0.5. All average measures of the benthic community were similar between disposal and reference areas sampled (Table 3-15).

3.5 Fishing Gear Assessment

A total of 191 lobster trap-style surface marker buoys were observed during the RDS multibeam survey (Figure 3-52). Surface buoys were observed within or near all three references areas with a high density of buoys in SREF where 31 buoys were counted compared to 13 and 6 at EREF and NREF, respectively. A total of 141 surface buoys were observed throughout the disposal area, both within the designated disposal site boundary (32 buoys) and in the adjacent outer area (109 buoys); more were located in the western and southern portions of the area than in the eastern and northern portions. The coordinates and a notation of buoy colors were recorded for each observed buoy (Appendix J).

Table 3-1.

Summary of RDS Reference Station Sediment-Profile Imaging Results (Station Means), September 2016

Area	Station	Water Depth (m)	Grain Size Major Mode (phi) [a]	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	Dominant Type of Boundary Roughness	Mean aRPD Depth (cm)	Mean Dredged Material Thickness (cm)	Mean # of Subsurface Feeding Voids	Mean of Maximum Feeding Void Depth (cm)	Methane Present?	Successional Stages Present [b]		
NREF	9	63	>4	17.6	1.0	Biological	3.7	none	0.3	2.3	No	1 on 3	1 on 3	1 on 3
NREF	10	67	>4	18.6	1.1	Biological	6.3	none	1.3	10.8	No	1 on 3	1 on 3	1 on 3
NREF	11	81	>4	21.8	IND	IND	IND	none	0.7	IND	No	3[c]	3[c]	IND
NREF	12	69	>4	20.1	1.0	Biological	3.9	none	0.0	-	No	2 on 3	2 on 3	1 on 3
NREF	**Mean**	**70**		**19.5**	**1.0**		**4.6**		**0.6**	**6.5**				
	Standard Deviation			**1.8**	**0.1**		**1.4**							
EREF	1	73	>4	17.4	1.9	Biological	4.6	none	0.7	16.3	No	2 on 3	2 on 3	1 on 3
EREF	2	73	>4	19.5	1.1	Biological	5.0	none	1.3	11.4	No	1 on 3	1 on 3	1 on 3
EREF	3	74	>4	17.1	0.7	Biological	4.9	none	2.3	15.0	No	1 on 3	1 on 3	1 on 3
EREF	4	74	>4	18.9	1.0	Biological	5.4	none	2.0	15.7	No	1 on 3	2 on 3	1 on 3
EREF	**Mean**	**74**		**18.2**	**1.2**		**5.0**		**1.6**	**14.6**				
	Standard Deviation			**1.2**	**0.5**		**0.3**							
SREF	5	80	>4	12.4	2.5	Biological	2.4	none	1.7	10.6	No	1 on 3	1 on 3	1 on 3
SREF	6	82	>4	16.9	1.0	Biological	3.5	trace	2.0	9.7	No	1 on 3	1 on 3	1 on 3
SREF	7	80	>4	11.0	1.4	Biological	3.1	none	0.3	8.7	No	1 on 3	1 on 3	1 on 3
SREF	8	81	>4	15.1	1.8	Biological	3.6	none	1.7	12.1	No	1 on 3	1 on 3	1 on 3
SREF	**Mean**	**81**		**13.8**	**1.7**		**3.1**		**1.4**	**10.3**				
	Standard Deviation			**2.6**	**0.6**		**0.5**							
ALL REF AREAS	**Max**	**82**		**21.8**	**2.5**		**6.3**		**2.3**	**16.3**				
	Min	**63**		**11.0**	**0.7**		**2.4**		**0.0**	**2.3**				
	Mean	**75**		**17.2**	**1.3**		**4.2**		**1.2**	**11.3**				
	Standard Deviation			**3.1**	**0.5**		**1.1**							

IND = Indeterminate

a Grain Size: "/" indicates layer of one phi size range over another (see Appendix F)

b Successional Stage: "on" indicates one Stage is found on top of another Stage (i.e., 1 on 3); "->" indicates one Stage is progressing to another Stage (i.e., 2 -> 3)

c Surface features, such as tubes protruding above the sediment-water interface, used to identify Stage 1 and 2 taxa could not be determined due to over- or near over-penetration of the camera prism, obscuring the sediment-water interface from view

Table 3-2.

Summary of RDS Disposal and RDS Outside Disposal Areas Sediment-Profile Imaging Results (Station Means), September 2016

Area	Station	Water Depth (m)	Grain Size Major Mode (phi) [a]	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	Dominant Type of Boundary Roughness	Mean aRPD Depth (cm)	Mean Dredged Material Thickness (cm)[d]	Mean # of Subsurface Feeding Voids	Mean of Maximum Feeding Void Depth (cm)	Methane Present?	Successional Stages Present [b]		
RDS	1	71	>4	17.4	1.1	Biological	5.4	trace	0.0	-	No	1 on 3	1 on 3	1 on 3
RDS	2	69	>4	18.2	1.9	Biological	5.3	12.6	1.3	15.9	No	1 on 3	1 on 3	1 on 3
RDS	3	62	>4	13.5	1.0	Biological	3.2	9.7	1.3	8.5	No	1 on 3	1 on 3	1 on 3
RDS	4	71	>4	18.0	0.8	Biological	4.5	14.5	2.3	12.6	No	1 on 3	1 on 3	1 on 3
RDS	5	unk	>4	19.8	1.1	Biological	4.9	15.2	1.3	9.8	No	1 on 3	1 on 3	1 on 3
RDS	6	73	>4	13.4	0.9	Biological	3.9	10.1	2.0	9.0	No	1 on 3	1 on 3	1 on 3
RDS	7	69	>4	20.6	1.1	Biological	4.8	15.1	3.0	10.0	No	3[c]	1 on 3	1 on 3
RDS	8	72	>4	17.4	1.4	Biological	3.3	14.5	2.7	10.5	No	1 on 3	1 on 3	1 on 3
RDS	9	74	>4	18.7	1.1	Biological	5.2	13.5	1.0	6.6	No	1 on 3	1 on 3	1 on 3
RDS	10	67	>4	17.3	0.9	Biological	3.8	12.2	1.0	13.2	No	1 on 3	1 on 3	1 on 3
RDS	11	70	>4	13.9	1.7	Biological	3.7	10.4	2.3	11.0	No	1 on 3	1 on 3	1 on 3
RDS	12	66	>4	20.2	1.2	Biological	5.5	15.2	1.7	13.0	No	3[c]	1 on 3	1 on 3
RDS	**Max**	**74**		**20.6**	**1.9**		**5.5**	**15.2**	**3.0**	**15.9**				
	Min	**62**		**13.4**	**0.8**		**3.2**	**9.7**	**0.0**	**6.6**				
	Mean	**70**		**17.4**	**1.2**		**4.4**	**13.0**	**1.7**	**10.9**				
	Standard Deviation			**2.5**	**0.3**		**0.8**	**2.1**						

IND = Indeterminate

a Grain Size: "/" indicates layer of one phi size range over another (see Appendix F)

b Successional Stage: "on" indicates one Stage is found on top of another Stage (i.e., 1 on 3); "->" indicates one Stage is progressing to another Stage (i.e., 2 -> 3)

c Surface features, such as tubes protruding above the sediment-water interface, used to identify Stage 1 and 2 taxa could not be determined due to over- or near over-penetration of the camera prism, obscuring the sediment-water interface from view.

d Dredged material extends below prism penetration depth (in each value other than 'trace' or 'none')

Table 3-2. (continued)

Summary of RDS Disposal and RDS Outside Disposal Areas Sediment-Profile Imaging Results (Station Means), September 2016

Area	Station	Water Depth (m)	Grain Size Major Mode (phi) [a]	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	Dominant Type of Boundary Roughness	Mean aRPD Depth (cm)	Mean Dredged Material Thickness (cm)[d]	Mean # of Subsurface Feeding Voids	Mean of Maximum Feeding Void Depth (cm)	Methane Present?	Successional Stages Present [b]		
RDSO	13	73	>4	15.3	1.7	Biological	3.0	none	1.3	10.9	No	1 on 3	1 on 3	1 on 3
RDSO	14	73	>4	19.6	1.6	Biological	3.6	11.0	1.0	15.7	No	1 on 3	1 on 3	IND
RDSO	15	73	>4	16.7	0.7	Biological	3.7	8.3	1.0	6.1	No	1 on 3	2 -> 3	1 on 3
RDSO	16	64	>4	14.6	0.7	Biological	4.5	9.6	0.7	8.4	No	1 on 3	1 on 3	1 on 3
RDSO	17	65	>4	16.3	1.7	Biological	4.0	none	1.0	9.5	No	1 on 3	1 on 3	1 on 3
RDSO	18	72	>4	14.3	1.8	Biological	4.4	9.9	1.3	7.7	No	1 on 3	1 on 3	1 on 3
RDSO	19	76	>4	18.8	2.1	Biological	3.7	13.2	0.7	4.5	No	1 on 3	1 on 3	1 on 3
RDSO	20	69	>4	18.1	1.2	Biological	4.2	13.0	1.0	10.2	No	1 on 3	1 on 3	1
RDSO	21	72	>4	15.7	0.9	Biological	3.7	12.6	2.3	6.7	No	1 on 3	1 on 3	1 on 3
RDSO	22	69	>4	15.7	1.3	Biological	2.8	11.7	1.3	8.1	No	1 on 3	1 on 3	1 on 3
RDSO	23	73	>4	15.7	0.8	Biological	4.4	12.3	1.0	12.8	No	1 on 3	1 on 3	1 on 3
RDSO	24	73	>4	15.1	1.9	Biological	2.5	9.3	2.7	10.8	No	1 on 3	1 on 3	1 on 3
RDSO	**Max**	**76**		**19.6**	**2.1**		**4.5**	**13.2**	**2.7**	**15.7**				
	Min	**64**		**14.3**	**0.7**		**2.5**	**8.3**	**0.7**	**4.5**				
	Mean	**71**		**16.3**	**1.4**		**3.7**	**11.1**	**1.3**	**9.3**				
	Standard Deviation			**1.7**	**0.5**		**0.7**	**1.7**						
ALL AREAS	**Max**	**76**		**20.6**	**2.1**		**5.5**	**15.2**	**3.0**	**15.9**				
	Min	**62**		**13.4**	**0.7**		**2.5**	**8.3**	**0.0**	**4.5**				
	Mean	**70**		**16.8**	**1.3**		**4.1**	**12.1**	**1.5**	**10.1**				
	Standard Deviation			**2.2**	**0.4**		**0.8**	**2.1**						

IND = Indeterminate

a Grain Size: "/" indicates layer of one phi size range over another (see Appendix F)

b Successional Stage: "on" indicates one Stage is found on top of another Stage (i.e., 1 on 3); "->" indicates one Stage is progressing to another Stage (i.e., 2 -> 3)

c Surface features, such as tubes protruding above the sediment-water interface, used to identify Stage 1 and 2 taxa could not be determined due to over- or near over-penetration of the camera prism, obscuring the sediment-water interface from view.

d Dredged material extends below prism penetration depth (in each value other than 'trace' or 'none')

Table 3-3.

Summary of Station Means by Sampling Location

		Mean aRPD Depth (cm)		Maximum Successional Stage Rank		Number of Feeding Voids			Mean Maximum Feeding Void Depth	
Site	**N[1]**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**	**N[2]**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
2016										
Reference Areas										
EREF	4	5.0	0.34	3.0	0.00	4	1.6	0.74	14.6	2.2
SREF	4	3.1	0.53	3.0	0.00	4	1.4	0.74	10.3	1.4
NREF	4[1]	4.6	1.43	3.0	0.00	2	0.6	0.57	6.5	6.1
Mean		4.2		3.0			1.2		11.3	
Disposal Areas										
RDS	24	4.1	0.83	3.0	0.00	23	1.5	0.75	10.1	2.9

[1] Number of stations surveyed per area, including any stations which had no penetration (and indeterminate results). Useable N was 3 for NREF
[2] The number of feeding voids observed, useable N to determine means and standard deviations

Table 3-4.

Summary Statistics and Results of Inequivalence Hypothesis Testing for aRPD Values

Difference Equation	Observed Difference ($\hat{d}$)	SE $\hat{d}$	*df* for SE	Confidence Bounds (D_L to D_U)[1]	Results[2]
$Mean_{REF} - Mean_{RDS}$	-0.20	0.68	31	-0.35 to 0.68	s

[1] D_L and D_U as defined in [Eq. 3]

[2] s = Reject the null hypothesis of inequivalence: the two group means are significantly equivalent, within ± 1 cm.
d = Fail to reject the null hypothesis of inequivalence between the two group means, the two group means are different.

Table 3-5.

Grain Size Data for RDS 2016 Sediments

	Gravel (>4.75 mm) %					Course Sand (2.00-4.75 mm) %					Medium Sand (0.425-2.00 mm) %					Fine Sand (0.075-0.425 mm) %				
Areas	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site																				
RDS	3	0.00	0.200	0.0667	0.115	3	0.00	2.43	1.55	1.34	3	0.820	3.04	2.29	1.28	3	6.33	18.4	13.6	6.42
RDSO	3	0.00	0.00	0.00	0.00	3	0.00	0.00	0.00	0.00	3	0.200	1.22	0.540	0.589	3	5.91	7.26	6.72	0.712
Disposal Site Total	**6**	**0.00**	**0.200**	**0.0333**	**0.0816**	**6**	**0.00**	**2.43**	**0.77**	**1.20**	**6**	**0.200**	**3.0**	**1.42**	**1.31**	**6**	**5.91**	**18.4**	**10.2**	**5.56**
Reference																				
EREF	3	0.00	0.00	0.00	0.00	3	0.00	0.00	0.00	0.00	3	0.00	0.00	0.00	0.00	3	5.63	9.03	7.47	1.72
NREF	3	0.00	0.00	0.00	0.00	3	0.00	0.00	0.00	0.00	3	0.00	0.200	0.133	0.115	3	0.590	0.590	0.590	0.00
Reference Total	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**6**	**0.00**	**0.200**	**0.0667**	**0.103**	**6**	**0.590**	**9.03**	**4.03**	**3.92**

	Sand (0.075-4.75 mm) %					Silt (0.005-0.075 mm) %					Clay (<0.005 mm) %					Fines (Silt + Clay) %				
Areas	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site																				
RDS	3	7.15	23.9	17.5	9.02	3	61.1	79.2	68.1	9.72	3	13.6	14.8	14.4	0.632	3	75.9	92.9	82.5	9.09
RDSO	3	7.13	7.46	7.26	0.178	3	80.5	82.4	81.5	0.989	3	10.4	12.1	11.2	0.829	3	92.5	92.9	92.7	0.184
Disposal Site Total	**6**	**7.13**	**23.9**	**12.4**	**7.98**	**6**	**61.1**	**82.4**	**74.8**	**9.61**	**6**	**10.4**	**14.8**	**12.8**	**1.86**	**6**	**75.9**	**92.9**	**87.6**	**8.04**
Reference																				
EREF	3	5.63	9.03	7.47	1.72	3	79.5	82.1	80.4	1.47	3	11.5	12.6	12.1	0.564	3	91.0	94.4	92.5	1.72
NREF	3	0.590	0.790	0.723	0.115	3	86.0	87.2	86.7	0.618	3	12.2	13.2	12.6	0.539	3	99.2	99.4	99.3	0.113
Reference Total	**6**	**0.590**	**9.03**	**4.10**	**3.85**	**6**	**79.5**	**87.2**	**83.5**	**3.58**	**6**	**11.5**	**13.2**	**12.4**	**0.559**	**6**	**91.0**	**99.4**	**95.9**	**3.85**

Table 3-6.

Percent Total Organic Carbon in RDS 2016 Sediments

	Total Organic Carbon %				
Row Labels	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site					
RDS	3	2.10%	2.10%	2.10%	0.00%
RDSO	3	1.90%	2.00%	1.93%	0.06%
Disposal Site Total	**6**	1.90%	2.10%	2.02%	0.10%
Reference					
EREF	6	1.80%	2.00%	1.90%	0.09%
NREF	3	2.10%	2.40%	2.27%	0.15%
Reference Total	9	2.40%	2.02%	2.02%	0.21%

Table 3-7.

Total PAH and Total PCB in RDS 2016 Sediments

	Total PAH[1]						Total PCB[2]					
	µg/kg dry wt.					Mean % Detected	µg/kg dry wt.					Mean % Detected
Areas	**n**	**MIN**	**MAX**	**Mean**	**StdDev**		**n**	**MIN**	**MAX**	**Mean**	**StdDev**	
Disposal Site												
RDS	3	619	1,495	1,096	443	100	3	1.79 U	9.0	4.28	4.1	22
RDSO	3	225	269	243	23	100	3	1.62 U	2.02 J	1.8	0.2	2
Disposal Site Total	**6**	**225**	**1,495**	**670**	**545**	**100**	**6**	**1.62**	**9.0**	**3.0**	**2.9**	**12**
Reference												
EREF	3	175	182	178	3.7	98	3	1.71 U	1.75 U	NA	NA	0
NREF	3	240	298	267	29	100	3	2.01 U	2.50 J	2.18	0.276	4
Reference Total	**6**	**175**	**298**	**222**	**52**	**99**	**6**	**1.71 U**	**2.50 J**	**1.96**	**0.305**	**2**

[1] Total PAH is the sum of the 18 PAH compounds analyzed (naphthalene, 2-methylnaphthalene, 1-methylnaphthalene, acenaphthylene, acenaphthene, fluorene, anthracene, phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene). Non-detected compounds were summed using ½ the MDL.

[2] Total PCB is the sum of the 18 NOAA NS&T congeners multiplied by 2. Non-detected congeners were summed using ½ the MDL.

U not detected above MDL; J detected between MDL and RL(value is an estimate); NA not applicable.

Table 3-8.

Chlorinated Pesticides Detected in RDS 2016 Sediments

	4,4'-DDD µg/kg dry wt.					4,4'-DDE µg/kg dry wt.					4,4'-DDT µg/kg dry wt.				
Area	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site															
RDS	3	0.117 U	2.49	1.07	1.25	3	0.108 U	0.437	0.291	0.168	3	0.635	0.836	0.724	0.102
RDSO	3	0.106 U	0.112 U	0.11 U	N/A	3	0.0984 U	0.104 U	0.102 U	N/A	3	0.162 U	0.591	0.308	0.245
Disposal Site Total	**6**	**0.106 U**	**2.49**	**0.590**	**0.951**	**6**	**0.0984 U**	**0.437**	**0.197**	**0.148**	**6**	**0.162 U**	**0.836**	**0.516**	**0.283**
Reference															
EREF	3	0.112 U	0.115 U	0.113 U	N/A	3	0.104 U	0.106 U	0.105 U	N/A	3	0.170 U	0.175 U	0.172 U	N/A
NREF	3	0.127 U	0.134 U	0.131 U	N/A	3	0.117 U	0.124 U	0.121 U	N/A	3	0.200 U	0.664	0.356	0.267
Reference Total	**6**	**0.112 U**	**0.134 U**	**0.122 U**	**N/A**	**6**	**0.104 U**	**0.124 U**	**0.113 U**	**N/A**	**6**	**0.170 U**	**0.664**	**0.264**	**0.197**

	aldrin µg/kg dry wt.					alpha-BHC µg/kg dry wt.					dieldrin µg/kg dry wt.				
Area	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site															
RDS	3	0.0647 U	1.30	0.482	0.708	3	0.0658 U	0.190 J	0.111	0.0685	3	0.0824 U	0.272 J	0.168	0.0960
RDSO	3	0.0750 U	0.0791 U	0.0777 U	N/A	3	0.0710 U	0.0749 U	0.0736 U	N/A	3	0.0750 U	0.0791 U	0.0777 U	N/A
Disposal Site Total	**6**	**0.0647**	**1.30**	**0.280**	**0.500**	**6**	**0.0658 U**	**0.190 J**	**0.0924**	**0.0480**	**6**	**0.0750 U**	**0.272 J**	**0.123**	**0.0785**
Reference															
EREF	3	0.0791 U	0.0810 U	0.0798 U	N/A	3	0.0748 U	0.0767 U	0.0755 U	N/A	3	0.0791 U	0.0810 U	0.0798 U	N/A
NREF	3	0.0893 U	0.0942 U	0.0921 U	N/A	3	0.0877 U	0.221 J	0.133	0.0766	3	0.0893 U	0.0942 U	0.0921 U	N/A
Reference Total	**6**	**0.0791 U**	**0.0942 U**	**0.0859 U**	**N/A**	**6**	**0.0748 U**	**0.221 J**	**0.104**	**0.0576**	**6**	**0.0791 U**	**0.0942 U**	**0.0859 U**	**N/A**

U not detected above MDL; J detected between MDL and RL (value is an estimate); NA not applicable.
There were no detects in any of the sediment samples analyzed for alpha-chlordane, beta-BHC, chlordane, delta-BHC, endosulfan I, endosulfan sulfate, endrin, gamma-chlordane, heptachlor, heptachlor epoxide, gamma HCH, methoxychlor, and toxaphene.

Table 3-8. (continued)

Chlorinated Pesticides Detected in RDS 2016 Sediments

		Endosulfan II µg/kg dry wt.			
Areas	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site					
RDS	3	0.0737 U	0.451	0.262	0.189
RDSO	3	0.0670 U	0.0708 U	0.0695 U	N/A
Disposal Site Total	**6**	**0.0670 U**	**0.451**	**0.166**	**0.159**
Reference					
EREF	3	0.0707 U	0.0724 U	0.0713 U	N/A
NREF	3	0.0799 U	0.0842 U	0.0823 U	N/A
Reference Total	**6**	**0.0707 U**	**0.0842 U**	**0.0768 U**	**N/A**

U not detected above MDL; J detected between MDL and RL (value is an estimate); NA not applicable.
There were no detects in any of the sediment samples analyzed for alpha-chlordane, beta-BHC, chlordane, delta-BHC, endosulfan I, endosulfan sulfate, endrin, gamma-chlordane, heptachlor, heptachlor epoxide, gamma HCH, methoxychlor, and toxaphene.

Table 3-9.

Metals Detected in RDS 2016 Sediments

	Arsenic mg/kg dry wt.					Cadmium mg/kg dry wt.					Chromium mg/kg dry wt.					Copper mg/kg dry wt.				
Areas	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site																				
RDS	3	10.0	11.4	10.6	0.72	3	0.100	0.190	0.140	0.0458	3	30.5	32.8	31.4	1.21	3	12.1	12.9	12.6	0.416
RDSO	3	9.08	10.7	9.73	0.86	3	0.090	0.100	0.0967	0.00577	3	30.2	30.3	30.2	0.0577	3	11.0	11.3	11.1	0.153
Disposal Site Total	**6**	**9.08**	**11.4**	**10.2**	**0.85**	**6**	**0.090**	**0.190**	**0.118**	**0.0376**	**6**	**30.2**	**32.8**	**30.8**	**1.01**	**6**	**11.0**	**12.9**	**11.9**	**0.834**
Reference																				
EREF	3	8.85	9.45	9.11	0.308	3	0.090	0.100	0.0933	0.00577	3	30.4	31.0	30.7	0.306	3	10.7	11.3	10.9	0.321
NREF	3	9.96	10.9	10.5	0.480	3	0.100	0.110	0.107	0.00577	3	35.5	37.3	36.2	0.964	3	13.5	14.3	13.8	0.462
Reference Total	**6**	**8.85**	**10.9**	**9.80**	**0.836**	**6**	**0.090**	**0.110**	**0.100**	**0.00894**	**6**	**30.4**	**37.3**	**33.4**	**3.10**	**6**	**10.7**	**14.3**	**12.4**	**1.59**

	Lead mg/kg dry wt.					Mercury mg/kg dry wt.					Nickel mg/kg dry wt.					Zinc mg/kg dry wt.				
Areas	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site																				
RDS	3	17.9	20.3	19.1	1.20	3	0.0620	0.0910	0.0727	0.0159	3	22.4	25.7	23.5	1.91	3	60.0	68.4	62.9	4.77
RDSO	3	17.3	18.6	18.0	0.666	3	0.0480	0.0510	0.0497	0.00153	3	23.9	24.1	24.0	0.115	3	63.1	64.2	63.6	0.557
Disposal Site Total	**6**	**17.3**	**20.3**	**18.6**	**1.04**	**6**	**0.0480**	**0.0910**	**0.0612**	**0.0162**	**6**	**22.4**	**25.7**	**23.7**	**1.23**	**6**	**60.0**	**68.4**	**63.3**	**3.06**
Reference																				
EREF	3	17.5	18.3	17.9	0.404	3	0.0450	0.0520	0.0487	0.00351	3	24.0	24.6	24.2	0.321	3	63.7	65.4	64.5	0.862
NREF	3	20.8	21.7	21.1	0.493	3	0.0630	0.100	0.0767	0.0203	3	28.0	29.7	28.6	0.954	3	75.2	79.9	76.8	2.71
Reference Total	**6**	**17.5**	**21.7**	**19.5**	**1.80**	**6**	**0.0450**	**0.100**	**0.0627**	**0.0201**	**6**	**24.0**	**29.7**	**26.4**	**2.48**	**6**	**63.7**	**79.9**	**70.6**	**6.97**

Table 3-10.

Lipids Data for RDS 2016 Tissue

	Lipids % Wet weight				
Areas	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site					
RDS	3	1.37	1.55	1.43	0.101
Reference					
EREF	3	1.72	1.82	1.78	0.0513

Table 3-11.

Total PAH and Total PCB in RDS 2016 Tissue

	Total PAH[1] µg/kg wet wt.						Total PCB[2] µg/kg wet wt.					
Areas	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**Mean % Detected**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**Mean % Detected**
Disposal Site												
RDS	3	18.0	46.7	28.0	16.2	74	3	2.72	3.69	3.28	0.500	22
Reference												
EREF	3	15.3	19.4	17.1	2.11	69	3	1.34	2.57	1.75	0.710	6

[1] Total PAH is the sum of the 18 PAH compounds analyzed (naphthalene, 2-methylnaphthalene, 1-methylnaphthalene, acenaphthylene, acenaphthene, fluorene, anthracene, phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene). Non-detected compounds were summed using ½ the MDL.

[2] Total PCB is the sum of the 18 NOAA NS&T congeners multiplied by 2. Non-detected congeners were summed using ½ the MDL.

Table 3-12.

Pesticides Detected in RDS 2016 Tissue

	4,4'-DDD µg/kg wet weight					4,4'-DDE µg/kg wet weight					alpha-chlordane µg/kg wet weight				
Areas	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site															
RDS	3	0.176	0.504	0.311	0.172	3	0.230	0.262	0.248	0.0163	3	0.0420 U	0.113 J	0.0786	0.0355
Reference															
EREF	3	0.0421 U	0.0528 U	0.0490 U	N/A	3	0.180	0.222	0.201	0.0210	3	0.0421 U	0.0528 U	0.0490 U	N/A

	chlordane µg/kg wet weight					dieldrin µg/kg wet weight				
Areas	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site										
RDS	3	U	0.578	N/A	N/A	3	0.0588 J	0.108 J	0.0797	0.0254
Reference										
EREF	3	U	U	U	N/A	3	0.0447 U	0.0477 J	0.0459	0.00157

U not detected above MDL; J detected between MDL and RL (value is an estimate); NA not applicable.
There were no detects in any of the tissue samples analyzed for 4,4'-DDT, aldrin, alpha-BHC, beta-BHC, delta-BHC, endosulfan I, endosulfan II, endosulfan sulfate, endrin, gamma-chlordane, heptachlor, heptachlor epoxide, gamma HCH, methoxychlor, and toxaphene.

Table 3-13.

Metals in RDS 2016 Tissue

	Arsenic mg/kg wet wt.					Cadmium mg/kg wet wt.					Chromium mg/kg wet wt.					Copper mg/kg wet wt.				
Areas	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site																				
RDS	3	5.91	7.36	6.63	0.725	3	0.0490	0.0570	0.0530	0.00400	3	0.0760	0.110	0.0877	0.0193	3	0.580	0.630	0.610	0.0265
Reference																				
EREF	3	6.97	7.63	7.40	0.373	3	0.0610	0.0750	0.0683	0.00702	3	0.0500	0.0700	0.0573	0.0110	3	0.530	0.610	0.580	0.0436

	Lead mg/kg wet wt.					Mercury mg/kg wet wt.					Nickel mg/kg wet wt.					Zinc mg/kg wet wt.				
Areas	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site																				
RDS	3	0.270	0.290	0.277	0.0115	3	0.008	0.008	0.008	0.00	3	0.460	0.510	0.490	0.0265	3	17.8	19.7	18.6	0.971
Reference																				
EREF	3	0.260	0.310	0.277	0.0289	3	0.008	0.009	0.00833	0.000577	3	0.370	0.420	0.397	0.0252	3	20.1	20.8	20.3	0.404

Table 3-14.

Benthic Community Abundance and Diversity Metrics for RDS 2016

Area	Station	Richness (S)	Abundance (N)	Mean Density (ind/m^2)	Mean Diversity (H')	Mean Evenness (J')	Dominant Species in Abundance	Dominant Phylum in Biomass
RDS	9	27	632	15,800	1.84	0.56	*Nucula proxima*	Annelida
RDS	4	33	802	20,050	1.86	0.53	*Nucula proxima*	Annelida
RDS	8	32	788	19,700	2.10	0.60	*Nucula proxima*	Mollusca
EREF	3	27	719	17,975	1.86	0.56	*Nucula proxima*	Annelida
EREF	1	30	811	20,275	1.38	0.41	*Nucula proxima*	Annelida
EREF	4	31	711	17,775	1.66	0.48	*Nucula proxima*	Annelida
Mean - RDS		31	741	18,517	1.9	0.6		
Mean - EREF		29	747	18,675	1.6	0.5		
Mean across all samples		30	744	18,596	1.8	0.5		

Table 3-15.

Benthic Community Biomass by Phylum for RDS 2016

		Biomass (g)					
Area	**Station**	**Annelida**	**Mollusca**	**Arthropoda**	**Echinodermata**	**Miscellaneous**	**Total**
RDS	9	0.84	0.16	0.09	0.00	0.02	1.11
RDS	4	1.42	1.23	0.01	0.00	0.00	2.67
RDS	8	1.78	2.01	0.01	0.00	0.01	3.80
EREF	3	1.30	0.89	0.58	0.00	0.61	3.38
EREF	1	0.91	0.90	0.55	0.00	0.55	2.90
EREF	4	1.18	0.79	0.53	0.00	0.56	3.06

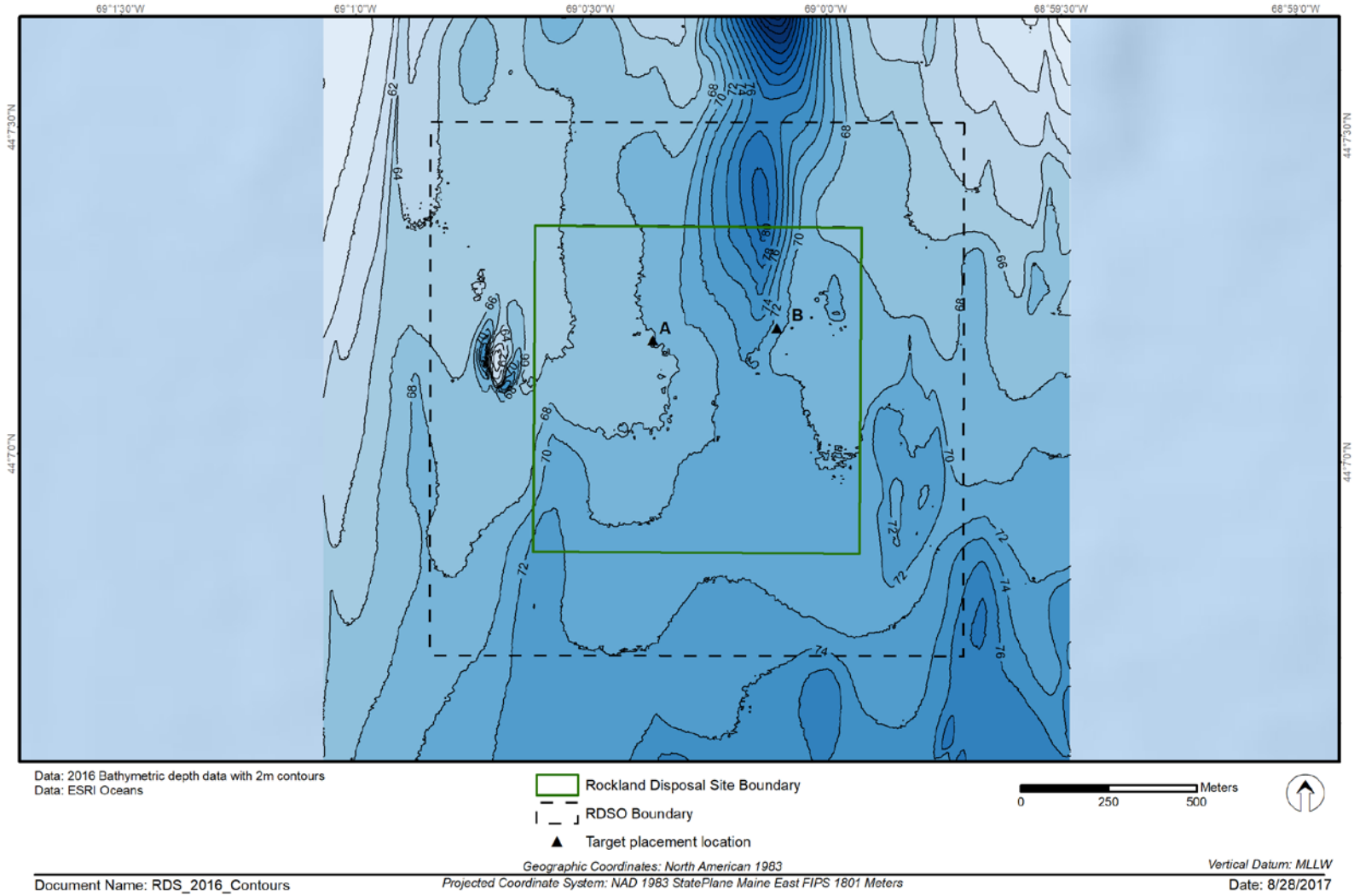


Figure 3-1. Bathymetric contour map of RDS and outlines for the designated site and the area considered to be RDS-Outer (RDSO) – September 2016

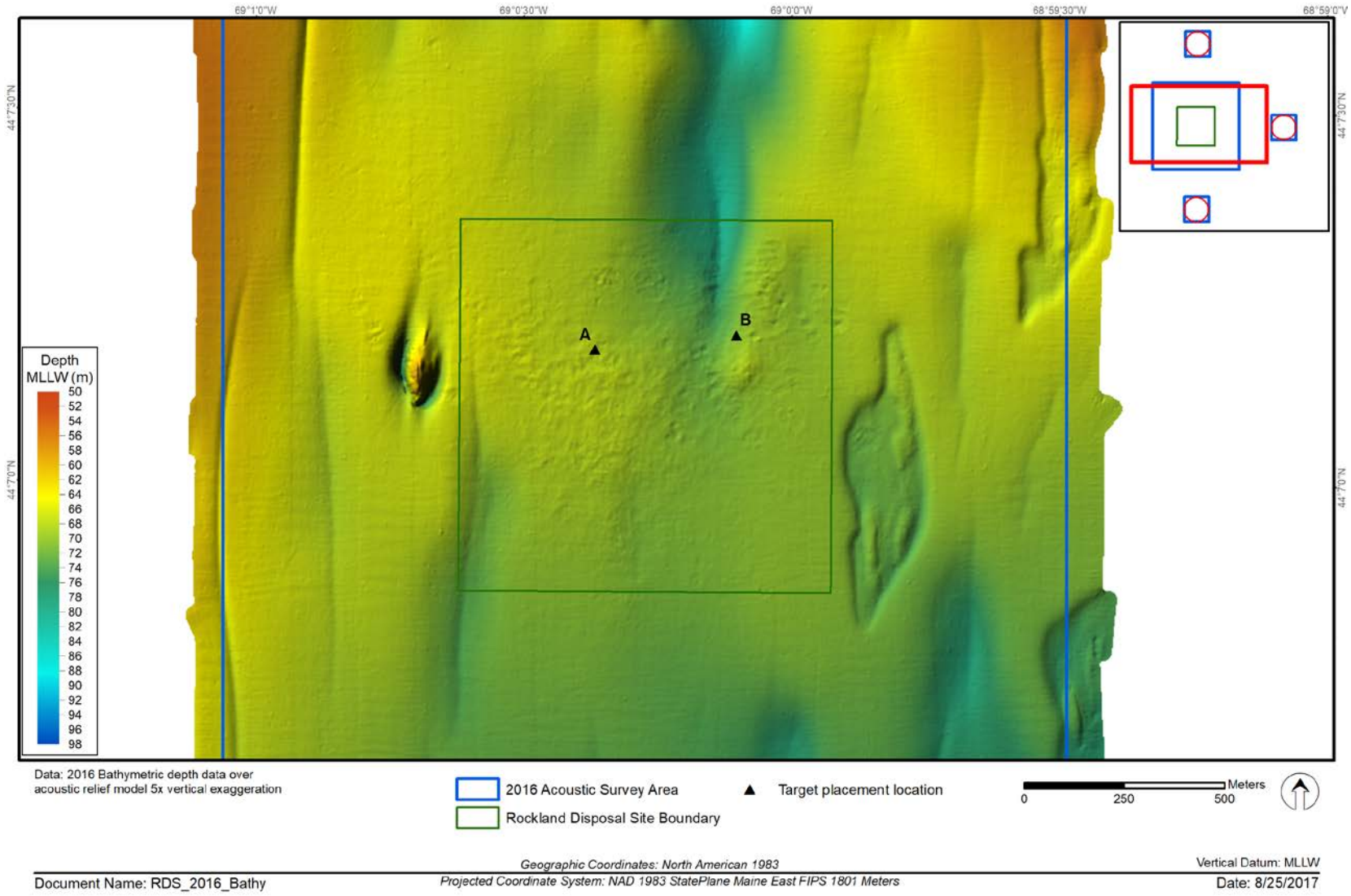


Figure 3-2a. Bathymetric depth data over acoustic relief model of RDS– September 2016

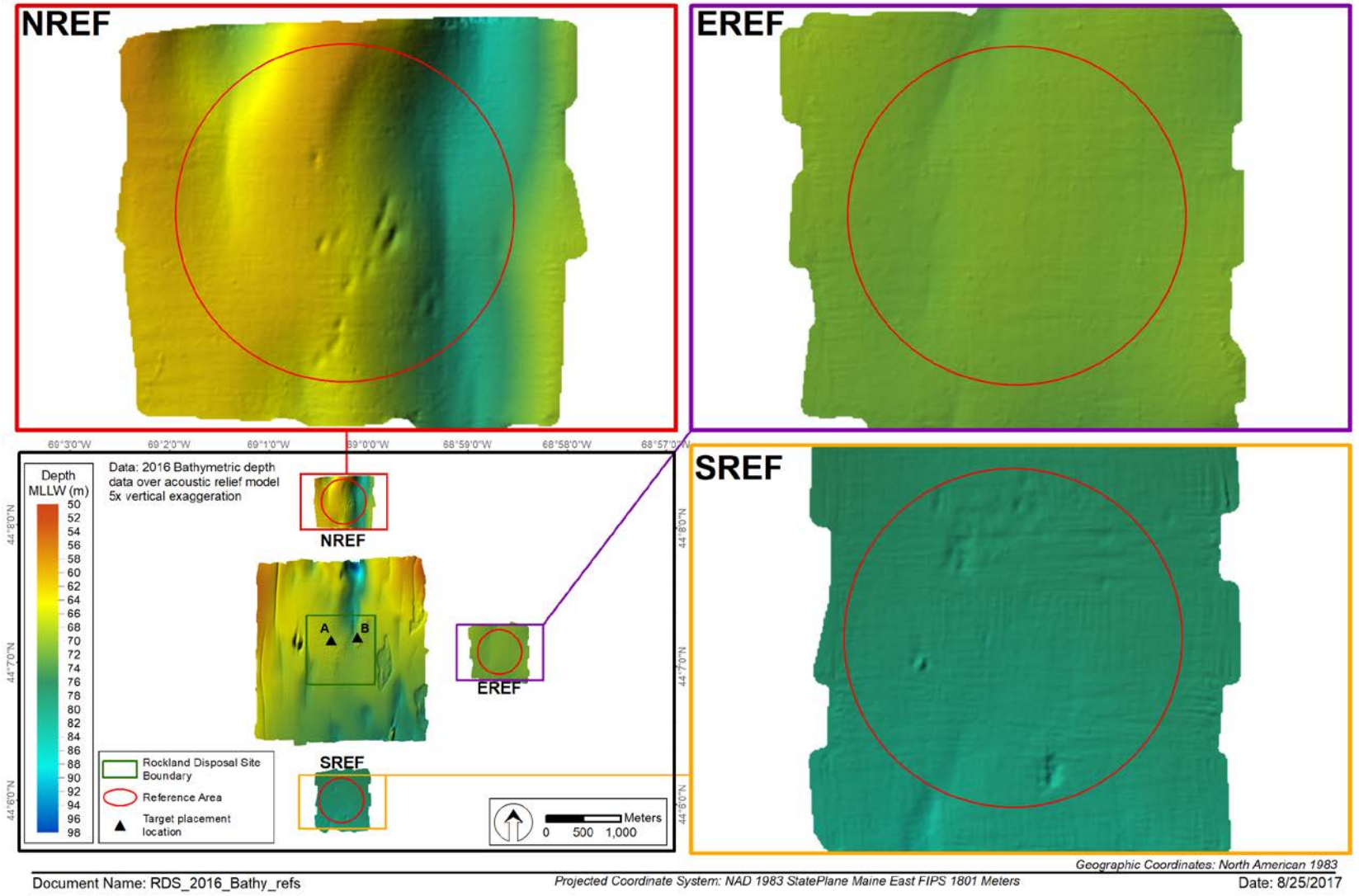


Figure 3-2b. Bathymetric depth data over acoustic relief model of RDS reference areas – September 2016

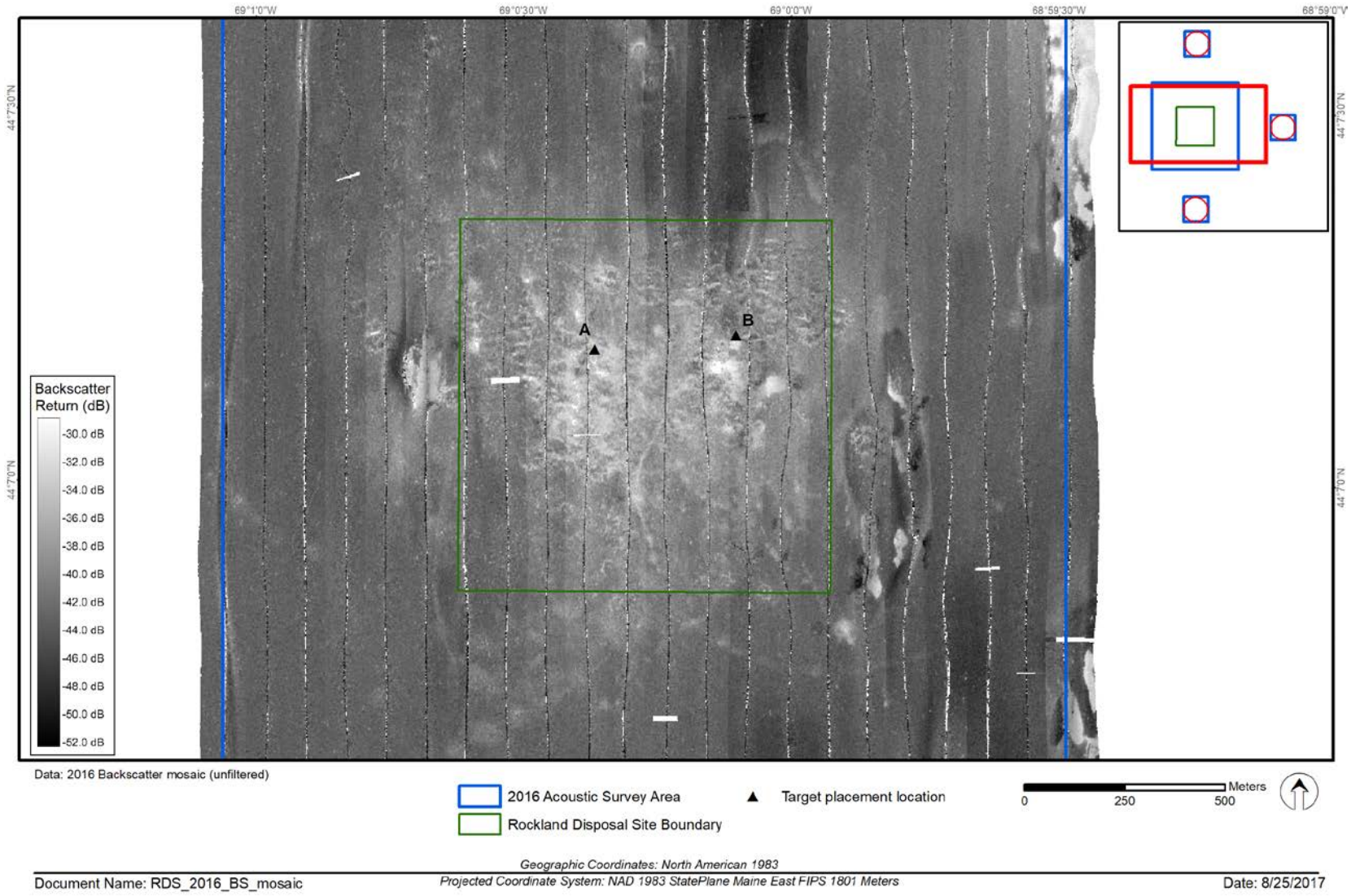


Figure 3-3a. Mosaic of unfiltered backscatter data of RDS – September 2016

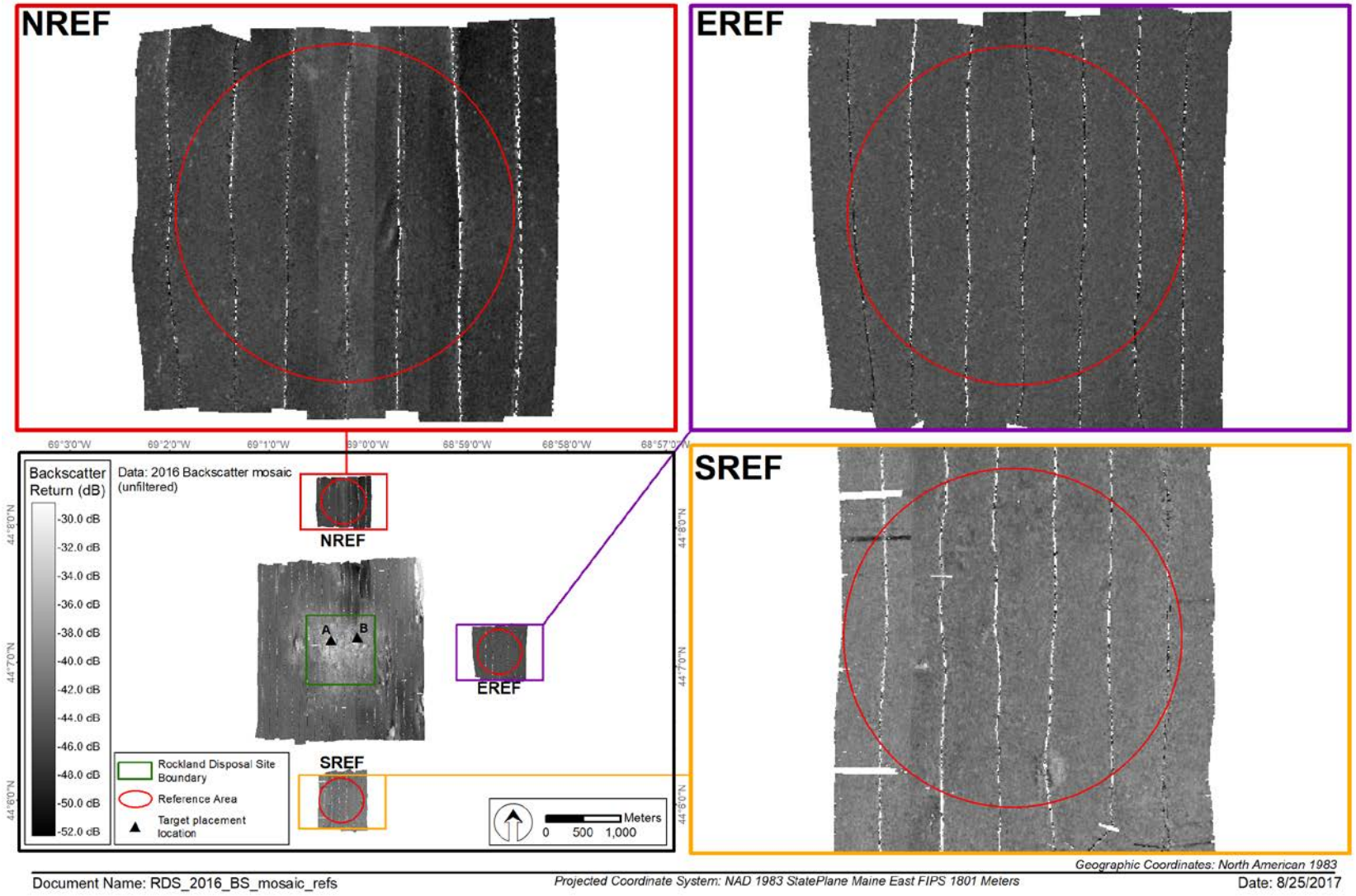


Figure 3-3b. Mosaic of unfiltered backscatter data of RDS reference areas – September 2016

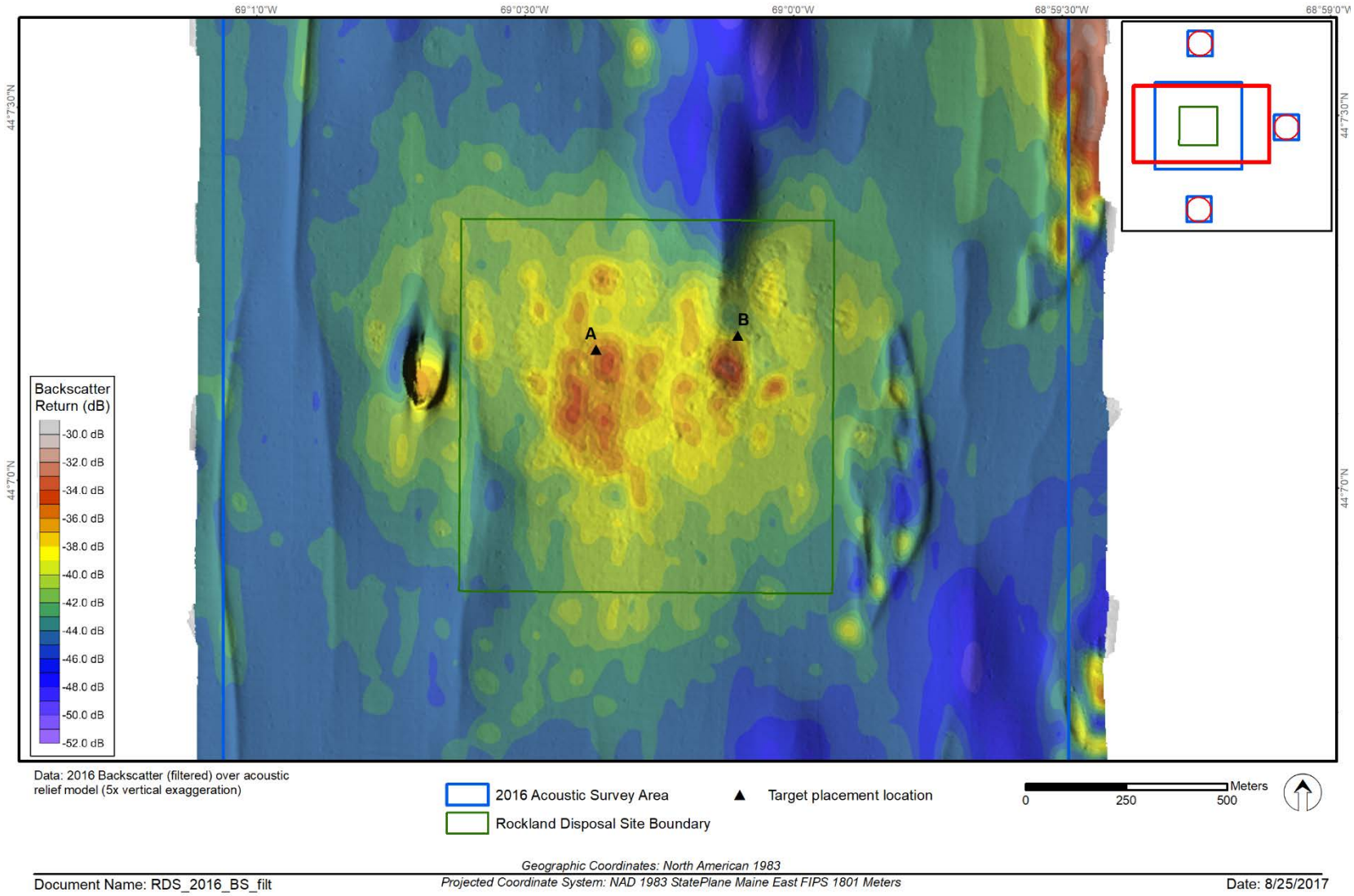


Figure 3-4a. Filtered backscatter over acoustic relief model of RDS – September 2016

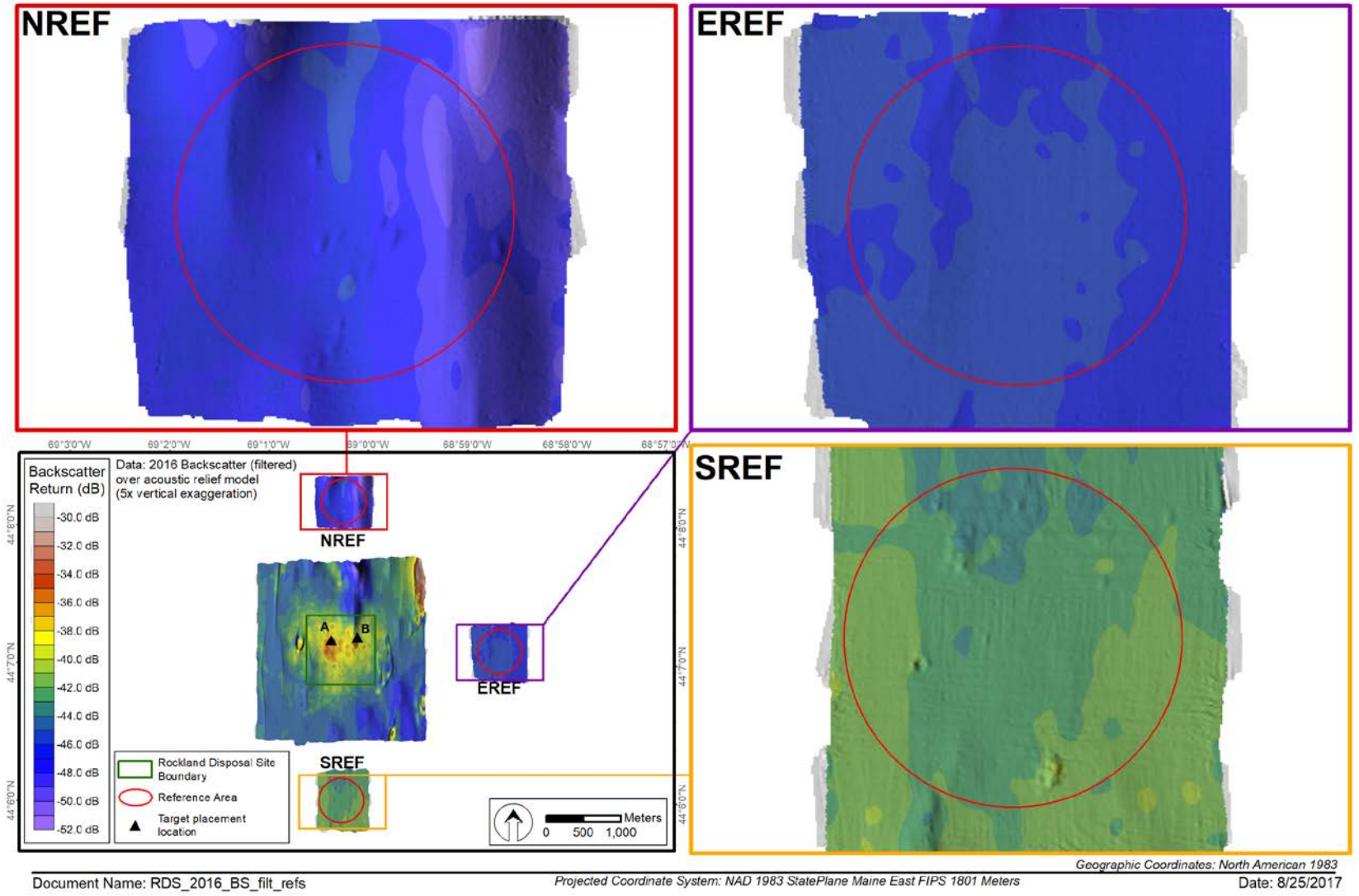


Figure 3-4b. Filtered backscatter over acoustic relief model of RDS reference areas – September 2016

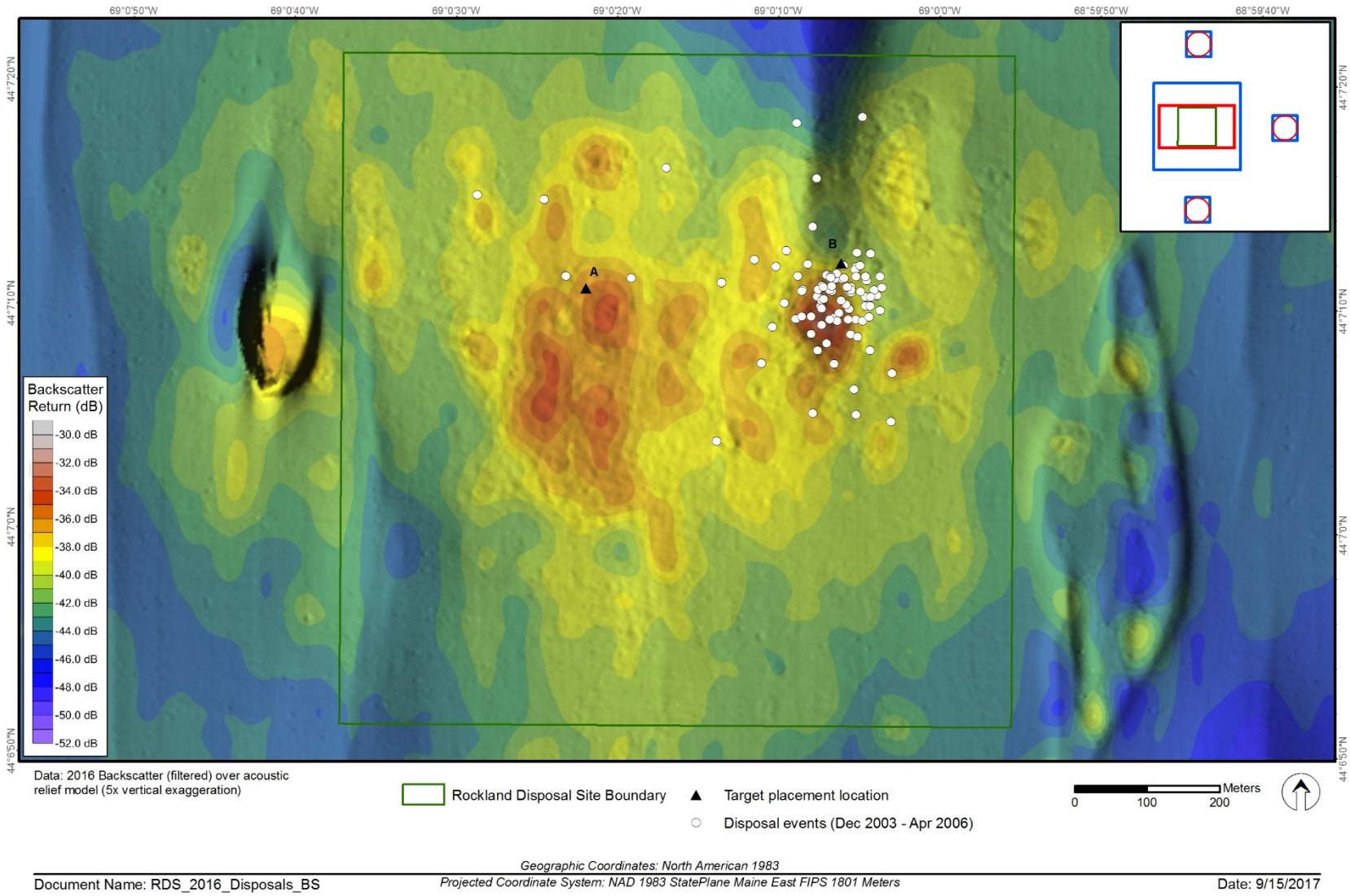


Figure 3-5. Filtered backscatter and reported December 2003 – April 2006 disposal events at RDS

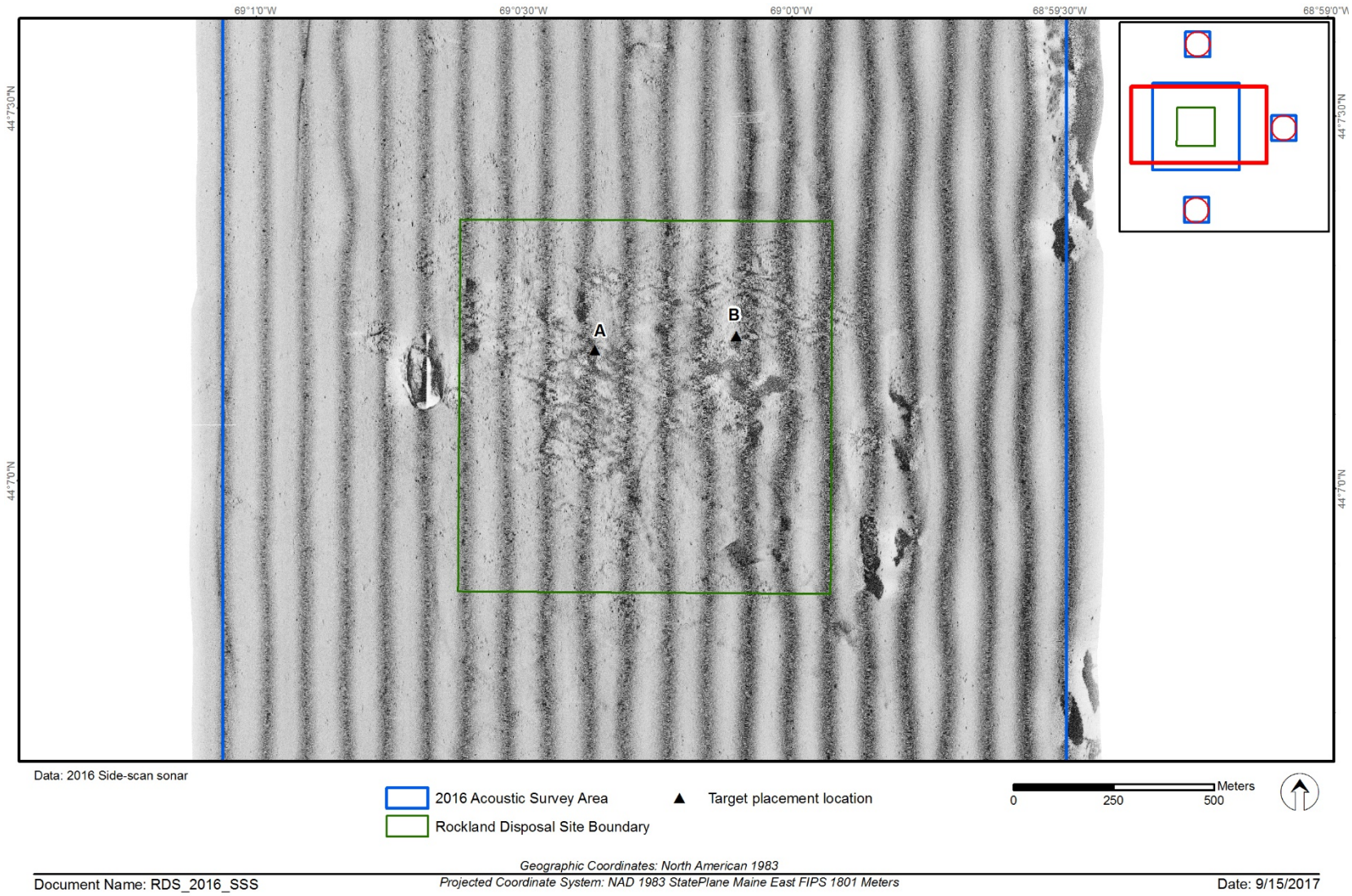


Figure 3-6a. Side-scan sonar mosaic of RDS – September 2016

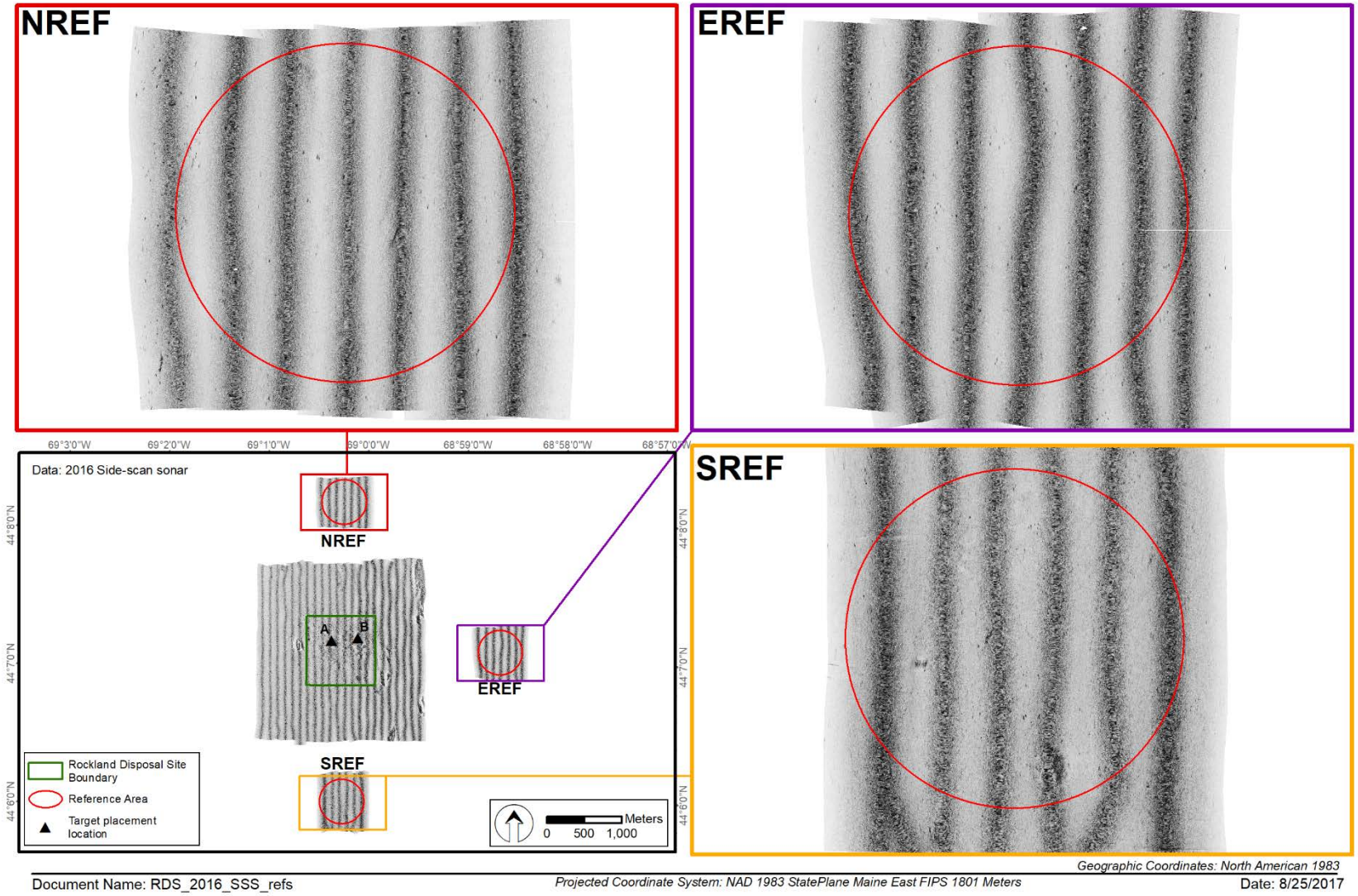
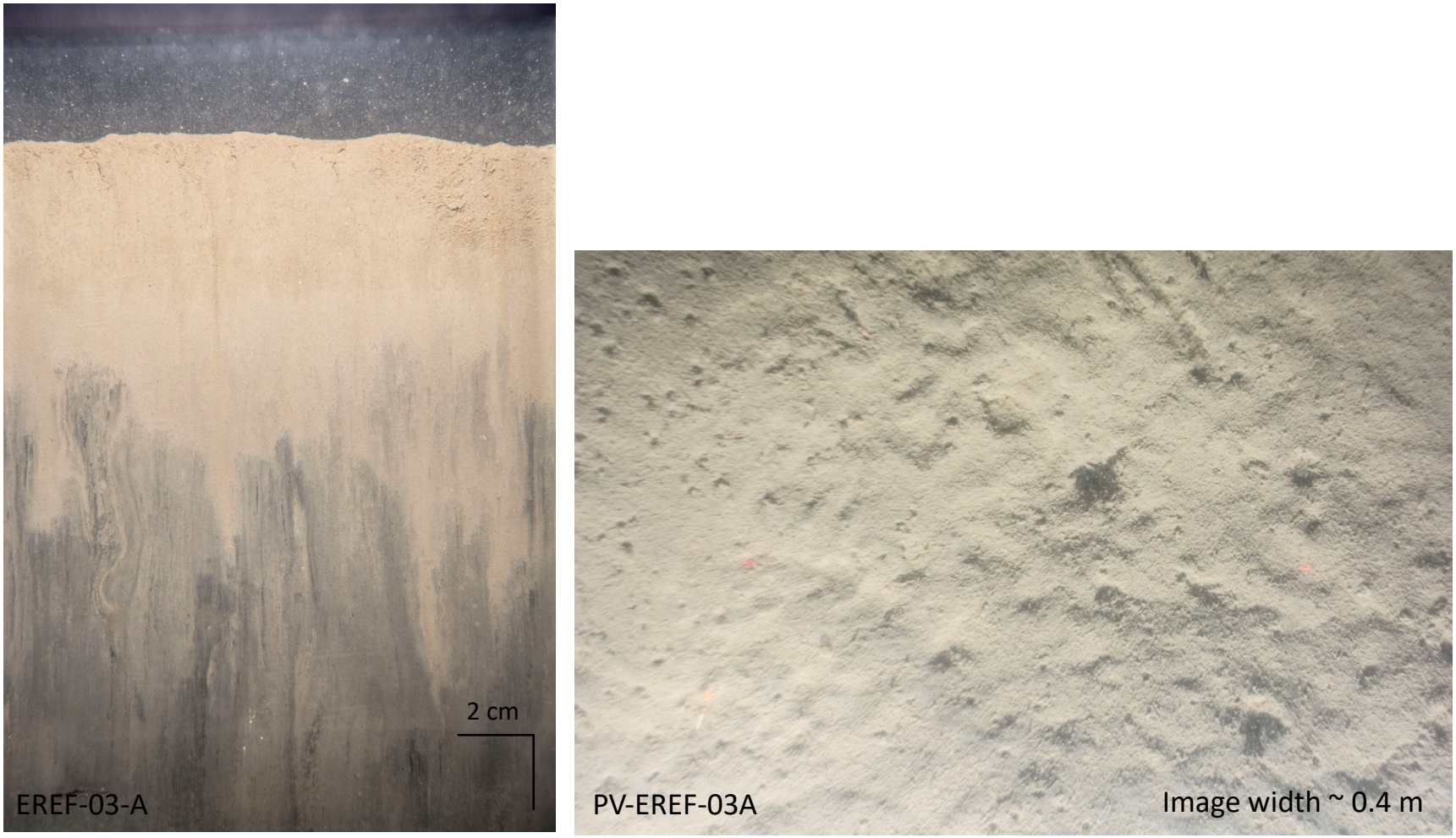


Figure 3-6b. Side-scan sonar mosaic of RDS reference areas – September 2016



(A) **(B)**

Figure 3-7. (A) Sediment-profile image and (B) plan-view image from Station EREF-03 depicting the soft silt/clay sediments found throughout all three reference areas

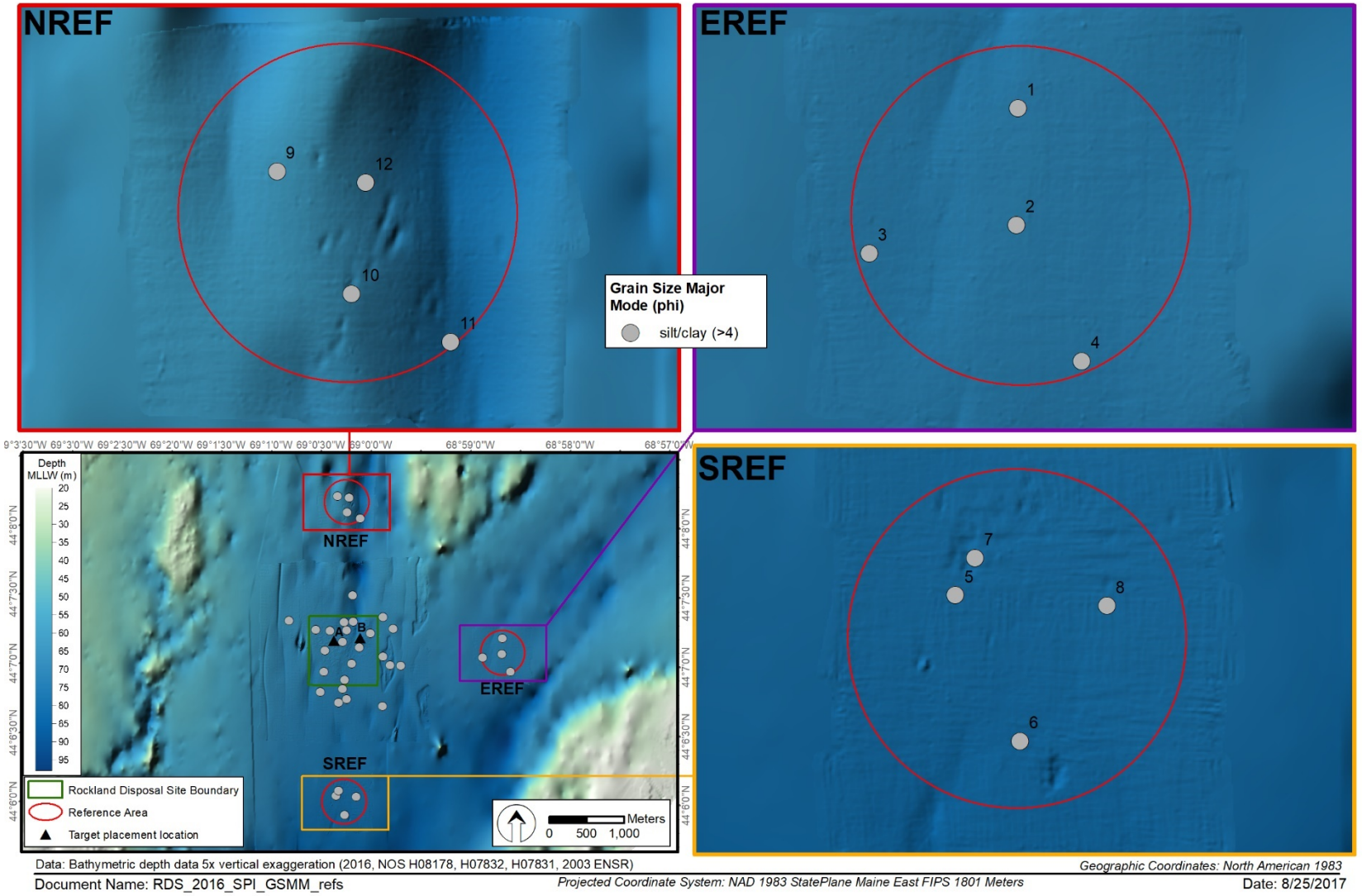


Figure 3-8. Sediment grain size major mode (phi units) at the RDS reference area stations

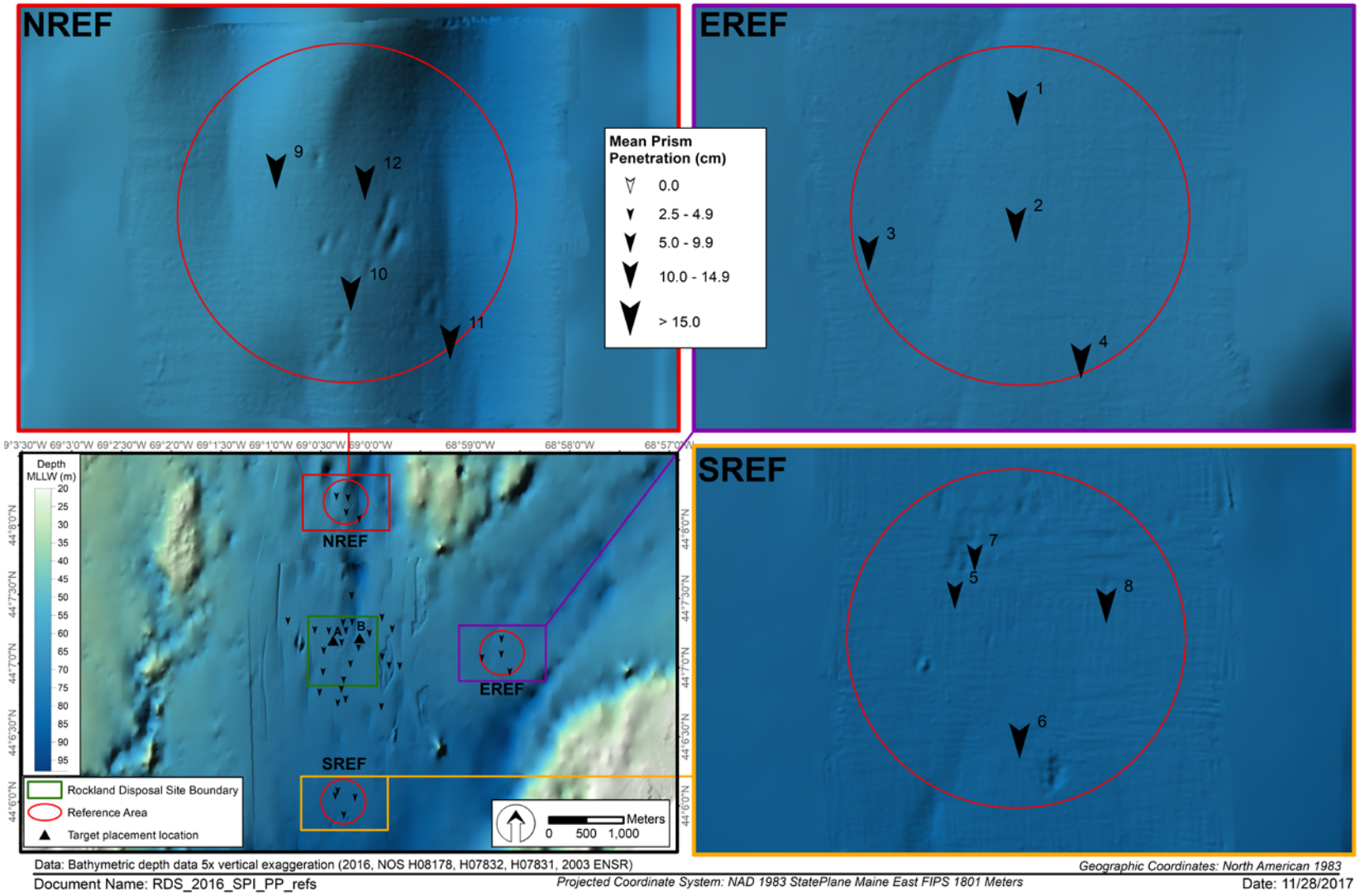
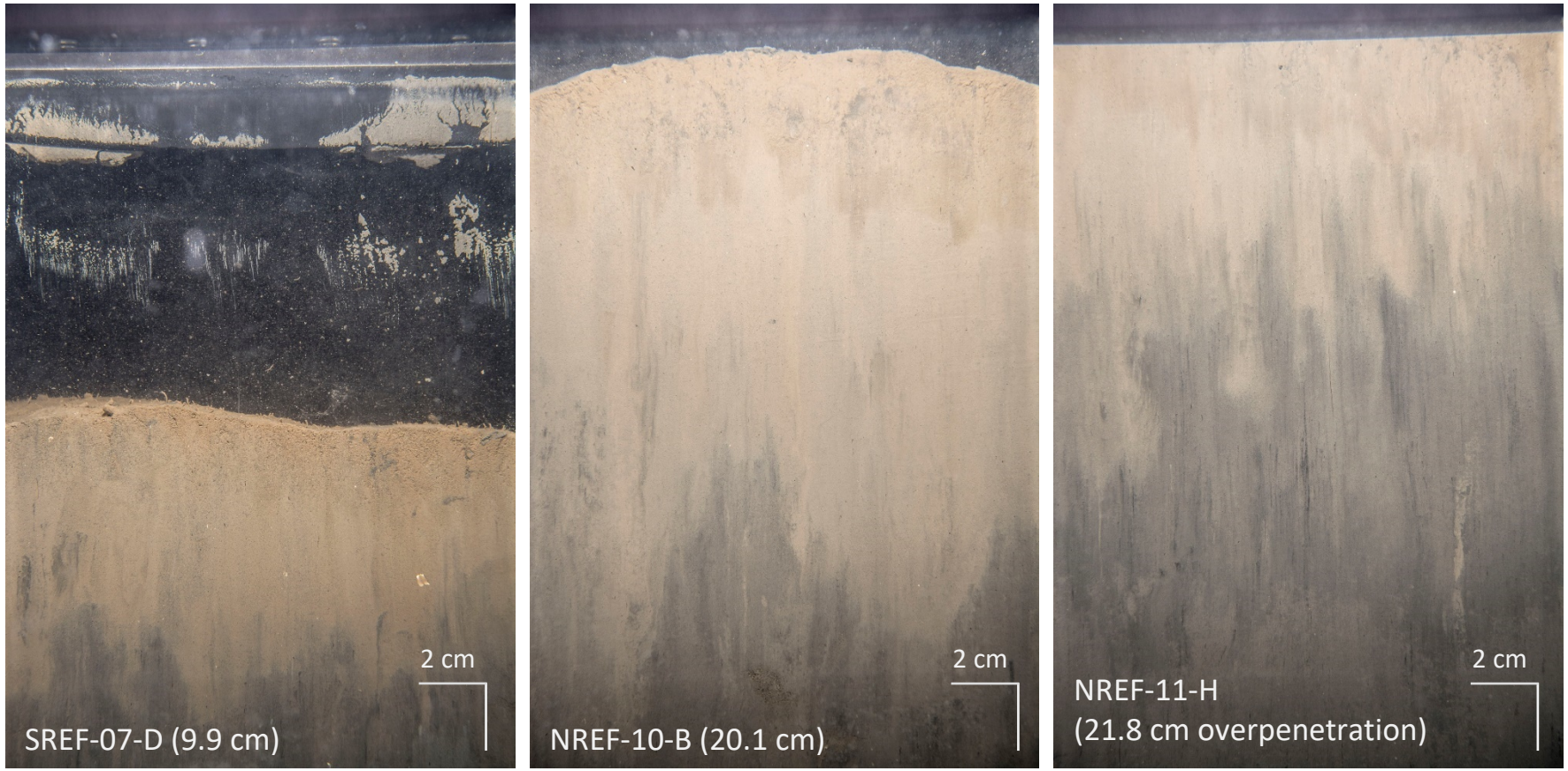


Figure 3-9. Mean station camera prism penetration depths (cm) at the RDS reference area stations



(A) **(B)** **(C)**

Figure 3-10. Profile images from (A) SREF-07, (B) NREF-10, and (C) NREF-11 depicting the range of camera prism penetration depths (mean values in cm) observed at RDS reference areas

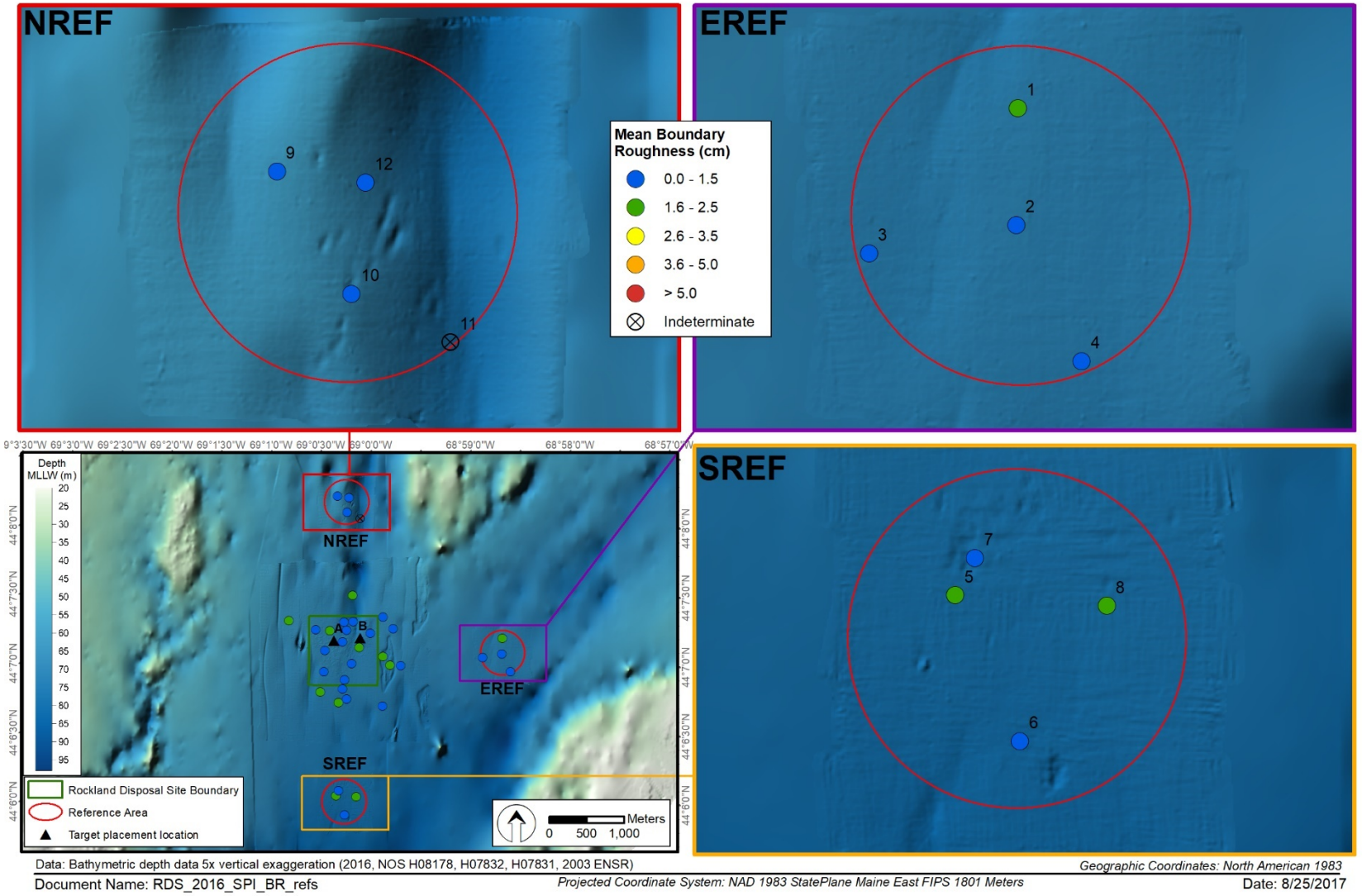


Figure 3-11. Mean station small-scale boundary roughness values (cm) at the RDS reference area stations



Figure 3-12. Sediment-profile image from Station SREF-05 depicting small scale boundary roughness (value in cm) associated with biological activity at the RDS reference areas



Figure 3-13. Profile image from Station SREF-06 showing trace inclusions (arrows) and reworked dredged material at depth

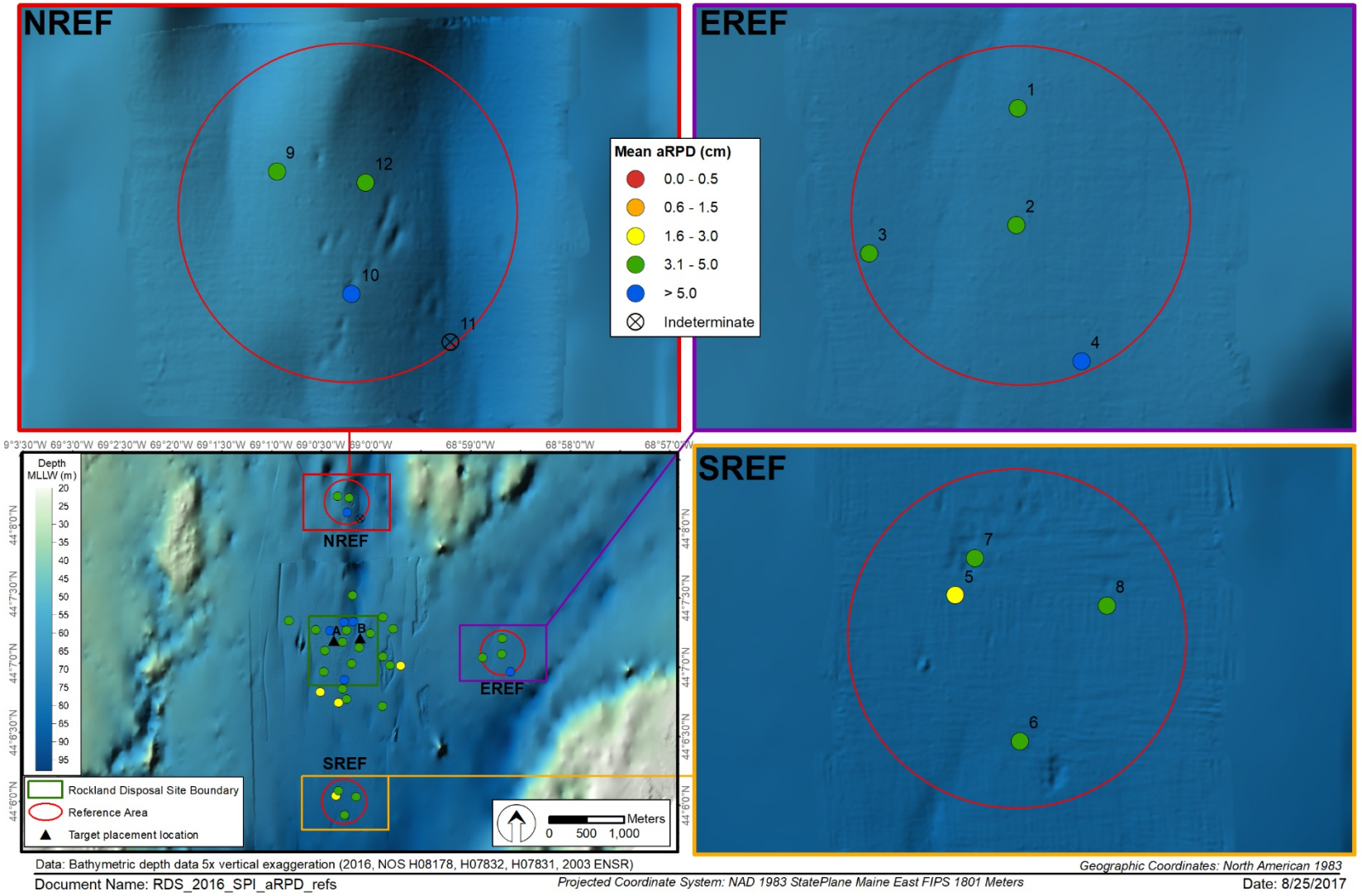
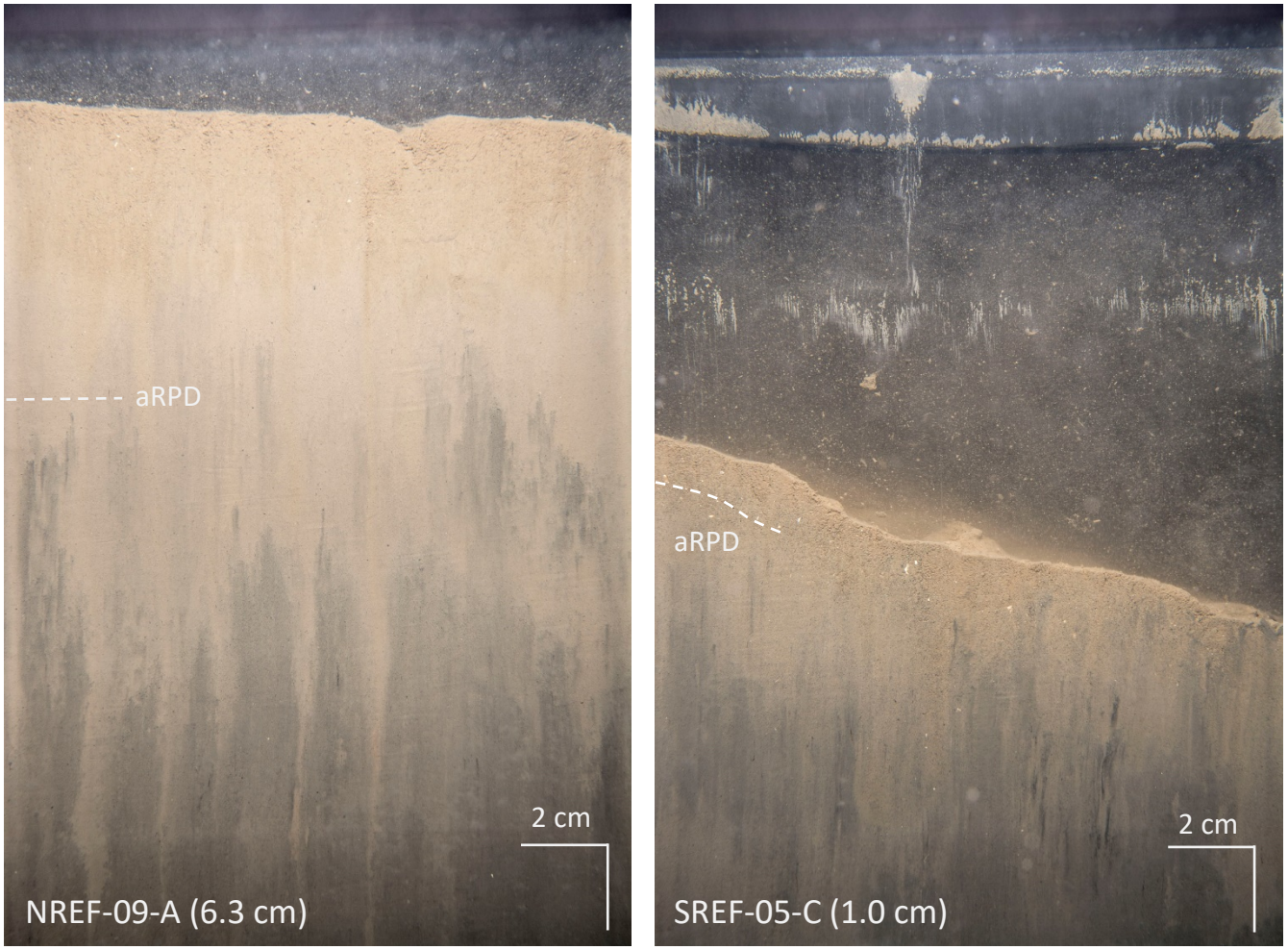


Figure 3-14. Mean station aRPD depth values (cm) at the RDS reference area stations



(A) **(B)**

Figure 3-15. Profile images depicting (A) a deep well-developed aRPD indicating low sediment oxygen demand and active bioturbation at Station NREF-09 that is exemplary of most sediments observed in the RDS reference areas; and (B) SREF-05 where a shallower aRPD indicative of medium sediment oxygen demand was observed (mean values in cm)

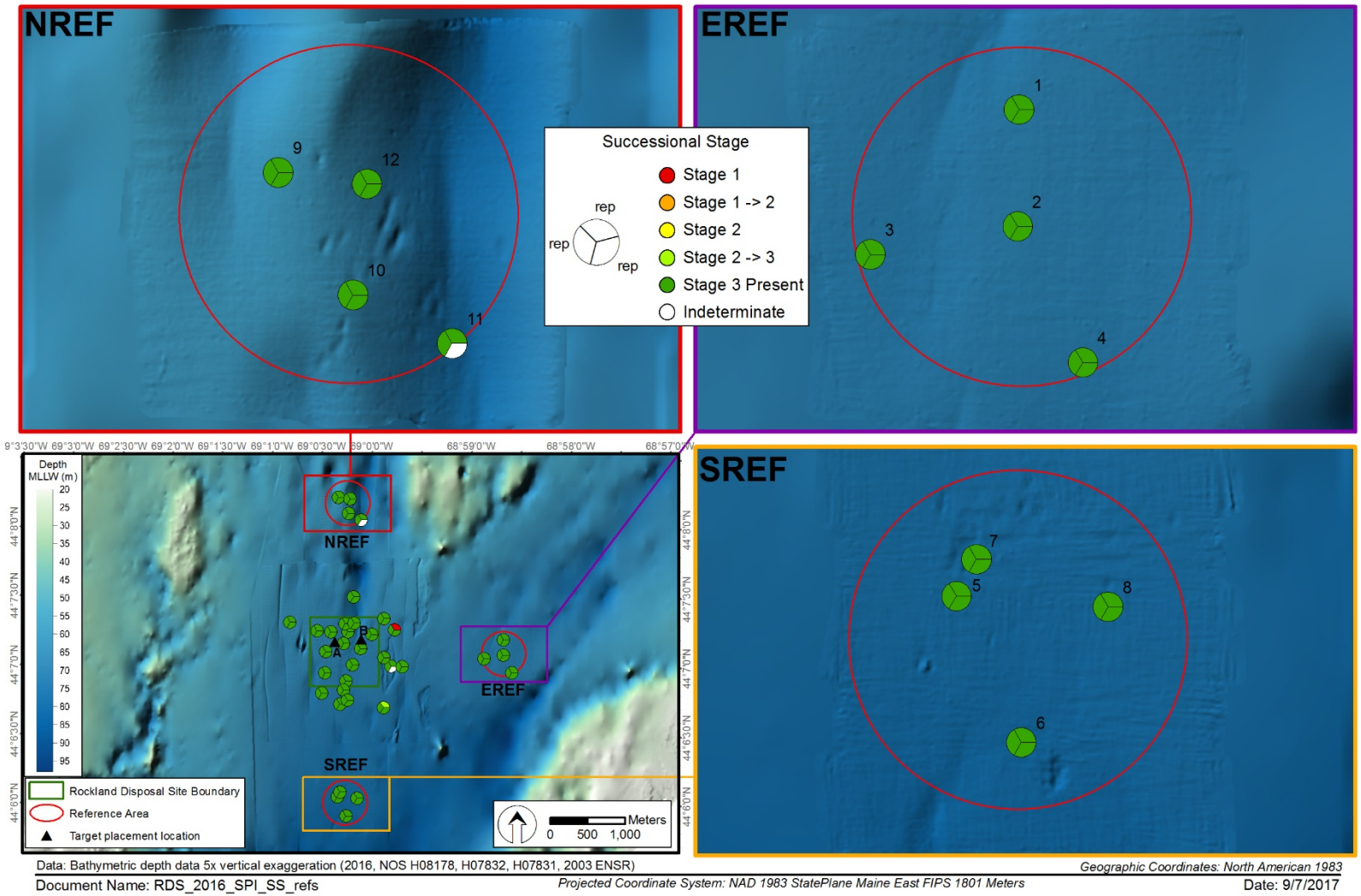


Figure 3-16. Infaunal successional stages found at the RDS reference area stations. Results shown provide a value for each of three replicate images for each sampling station.

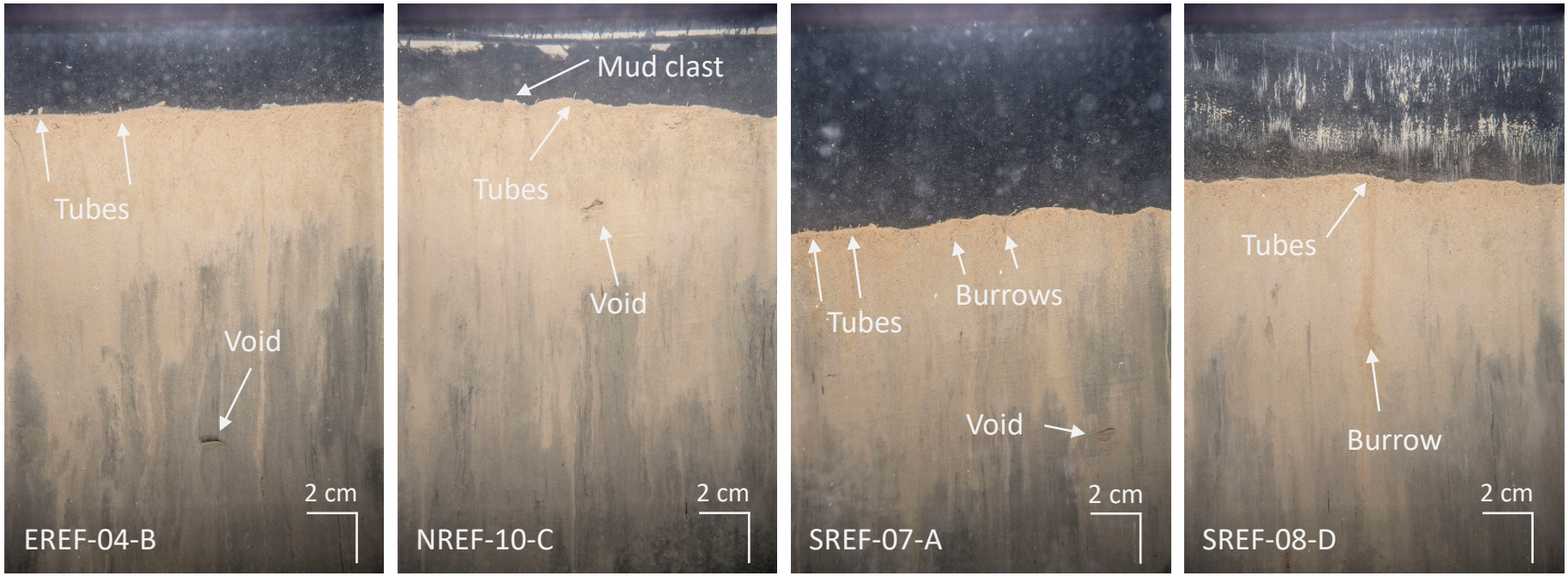


Figure 3-17. Profile images depicting Stage 1, 2, and 3 taxa at RDS reference stations. (A) Stage 1 and 2 tubes at the sediment-water interface and a Stage 3 feeding void at depth; (B) Stage 1 tubes and mud clasts at sediment-water interface and small Stage 3 feeding void near base of aRPD; (C) Stage 1 tubes at sediment-water interface, shallow burrows in upper centimeters and Stage 3 feeding void at depth; and (D) few Stage 1 tubes at sediment-water interface and burrow halo extending through upper half of visible sediment column.

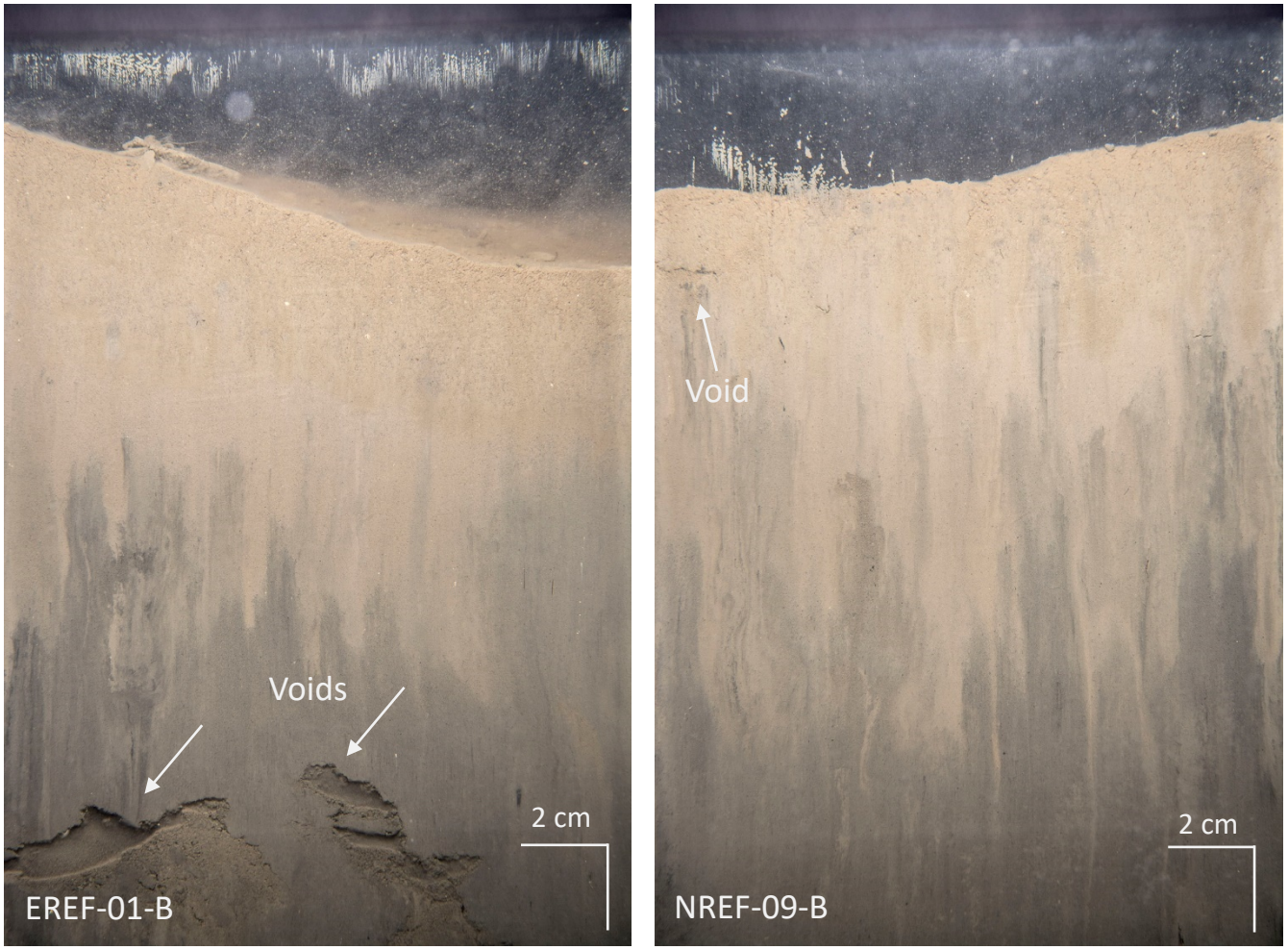


Figure 3-18. Profile images showing range of feeding voids observed at RDS reference areas, from (A) a large void deep in the sediment column to (B) a small void near the sediment-water interface

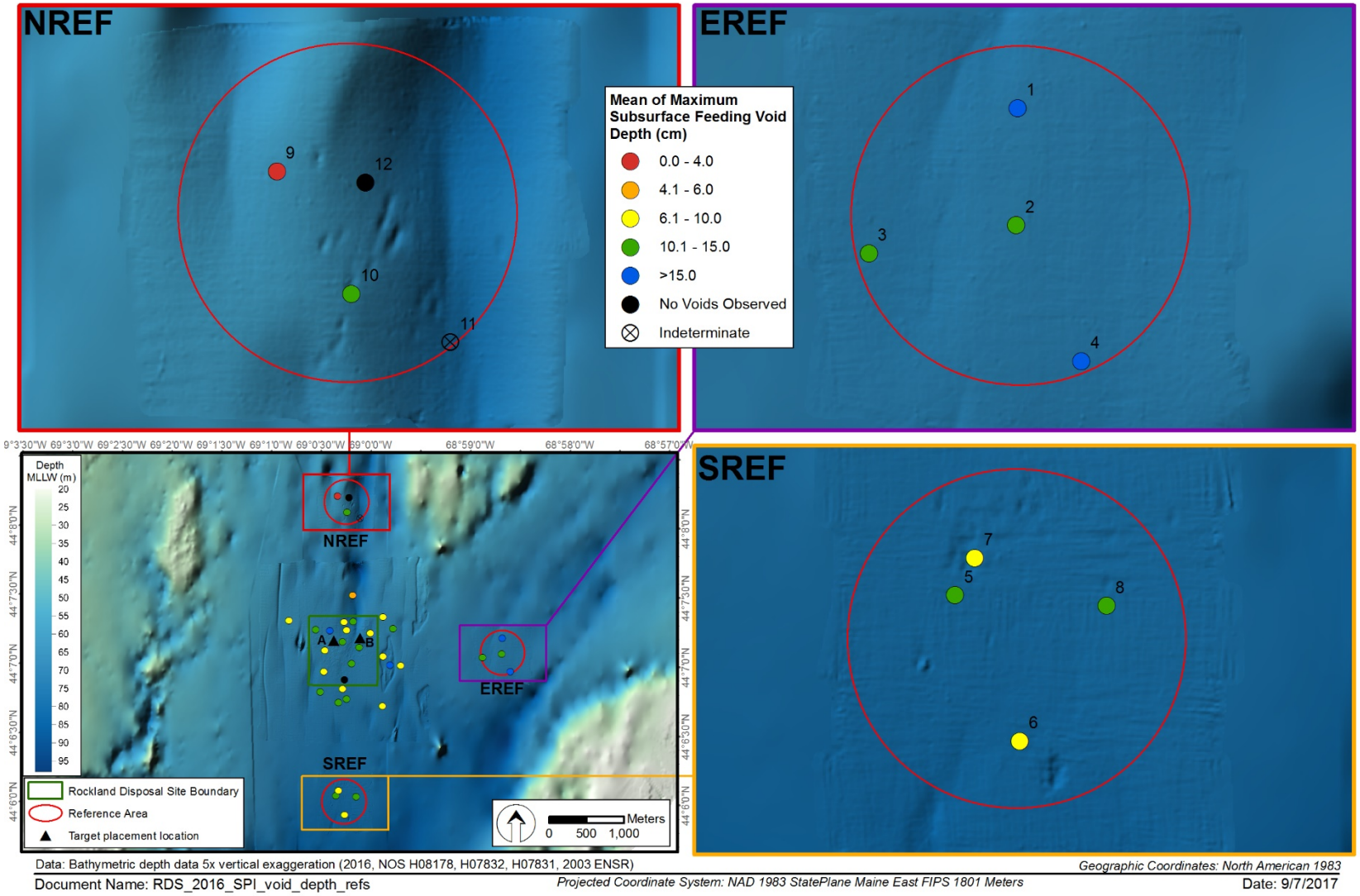
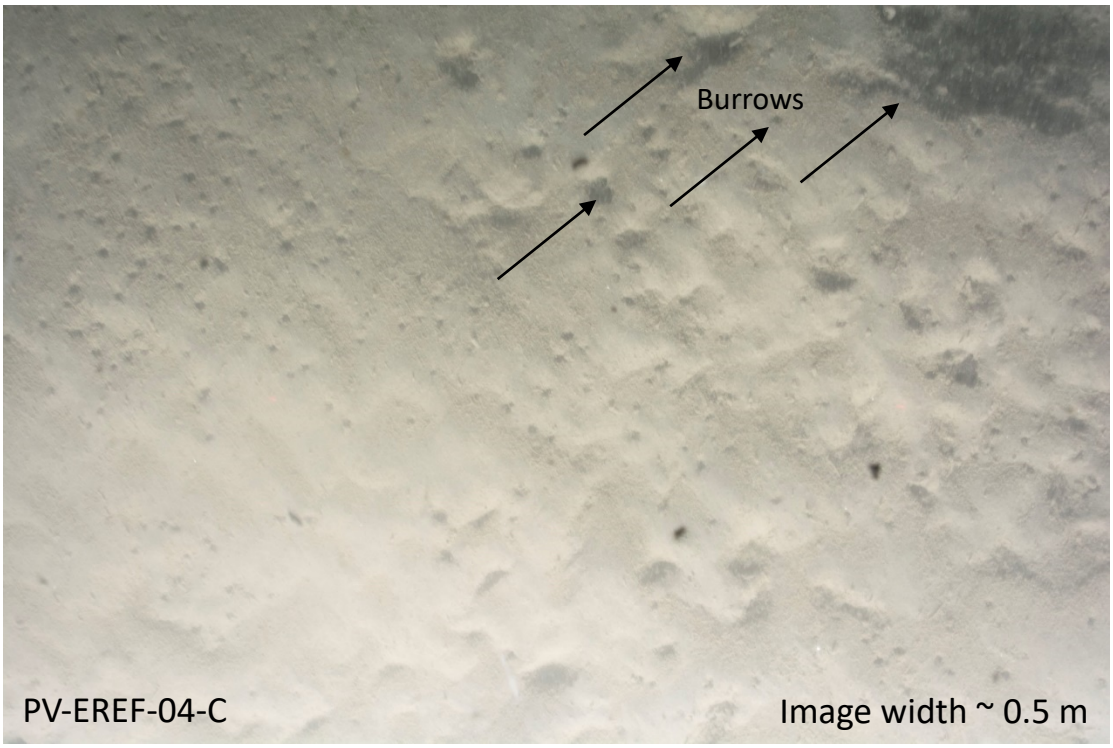
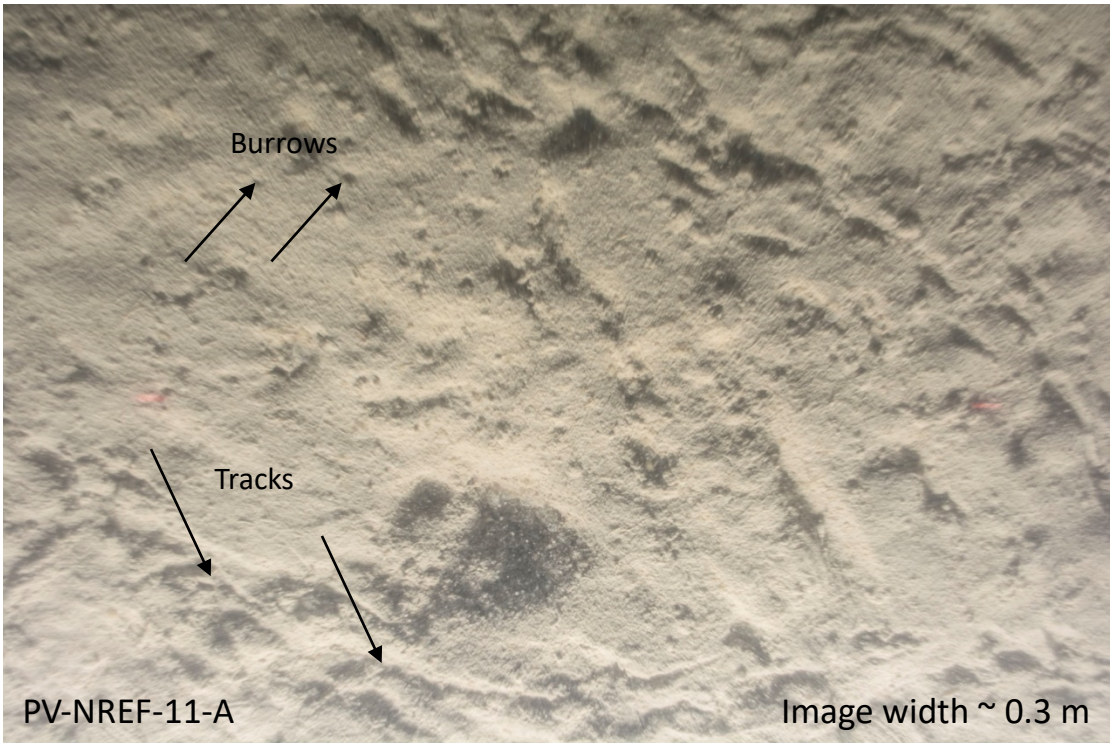


Figure 3-19. Mean depth (cm) of subsurface feeding voids at the RDS reference area stations

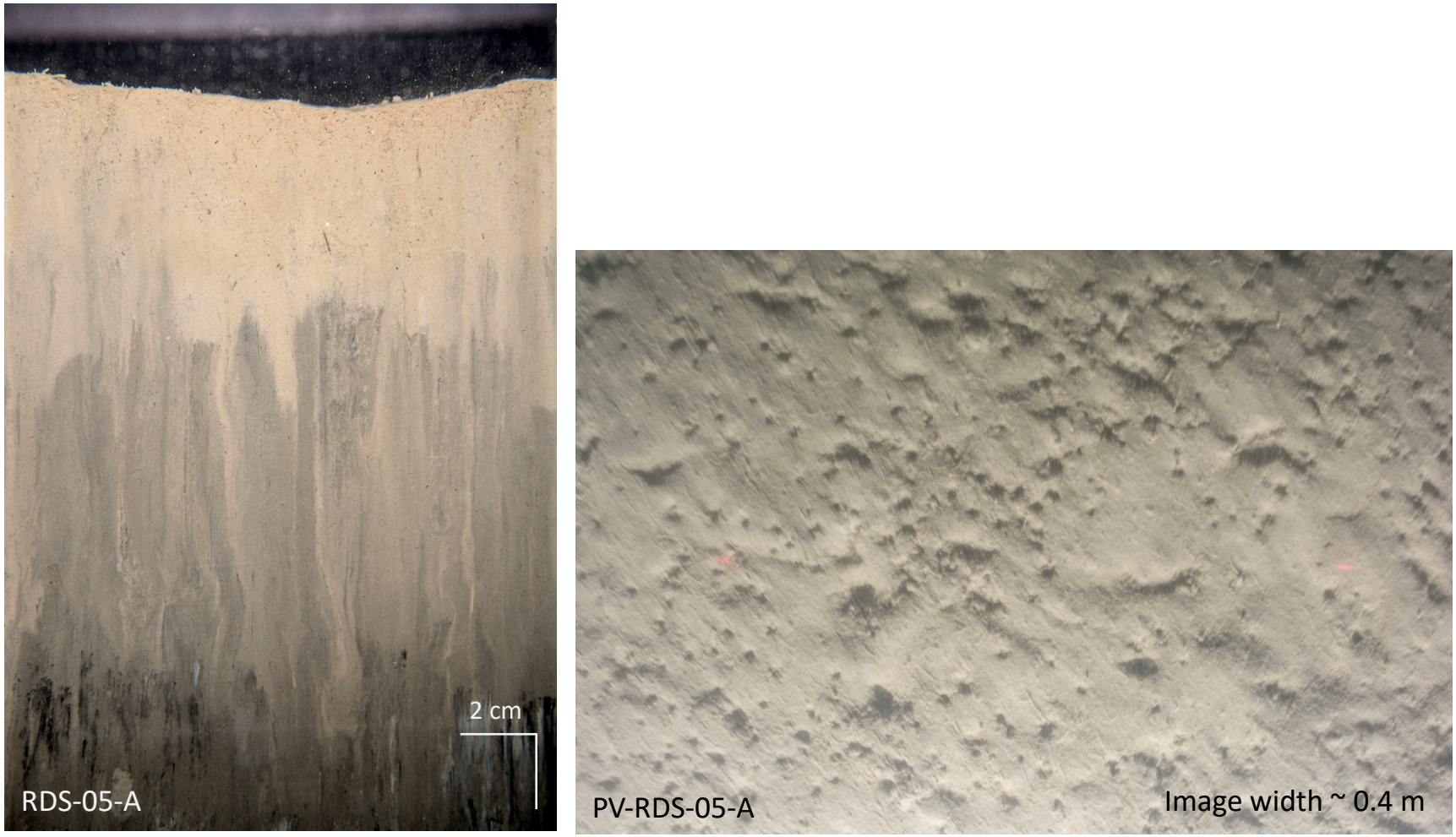


(A)



(B)

Figure 3-20. Plan-view images at (A) Station EREF-04 depicting small, medium, and large burrow openings and (B) Station NREF-11 depicting small burrow openings and epifauna tracks at RDS reference areas



(A) **(B)**

Figure 3-21. (A) Sediment-profile image and (B) plan-view image from Station RDS-05 depicting the soft silt/clay sediments found throughout RDS and RDSO

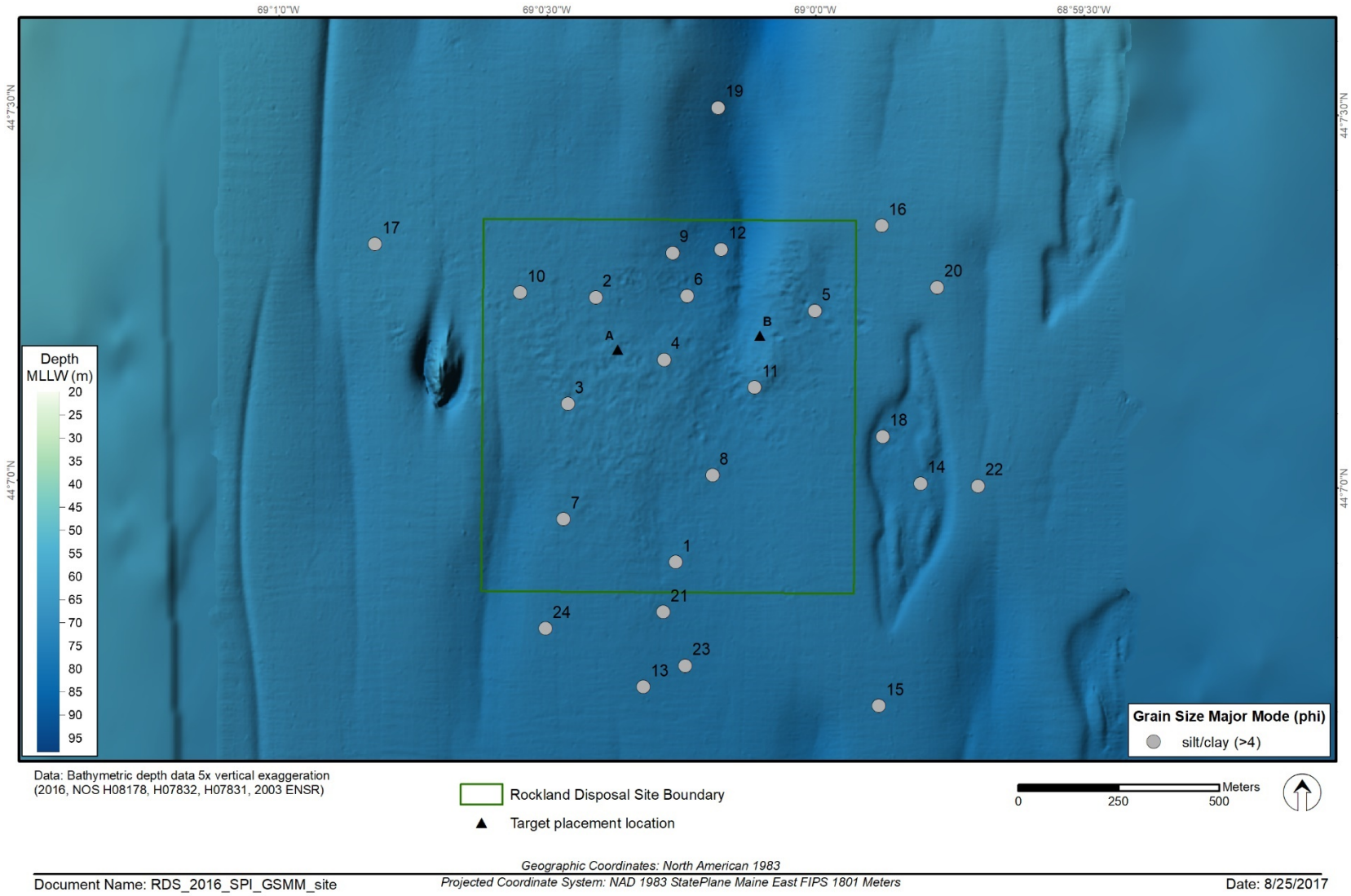


Figure 3-22. Sediment grain size major mode (phi units) at the RDS and RDSO disposal and near-disposal area stations

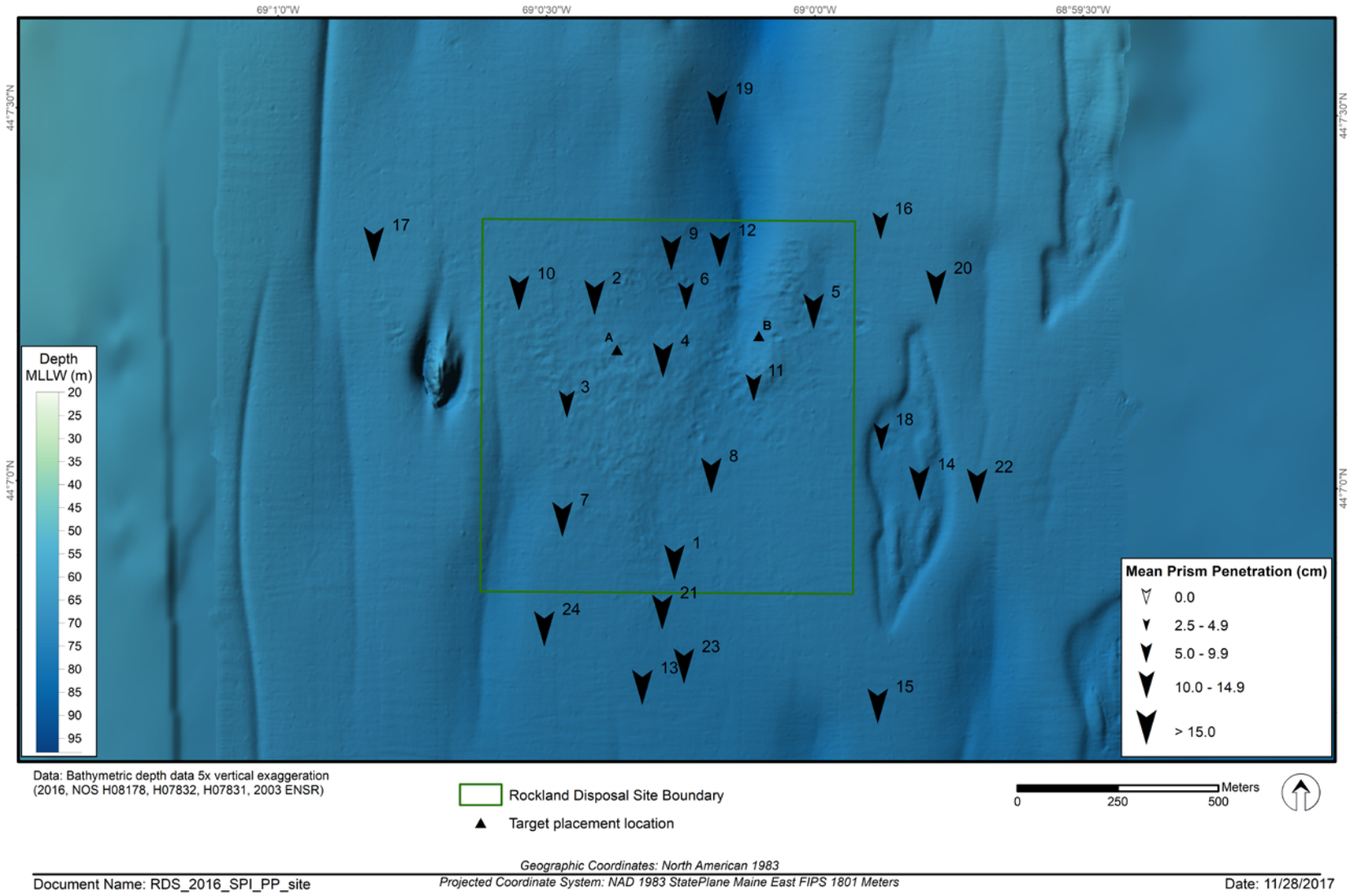
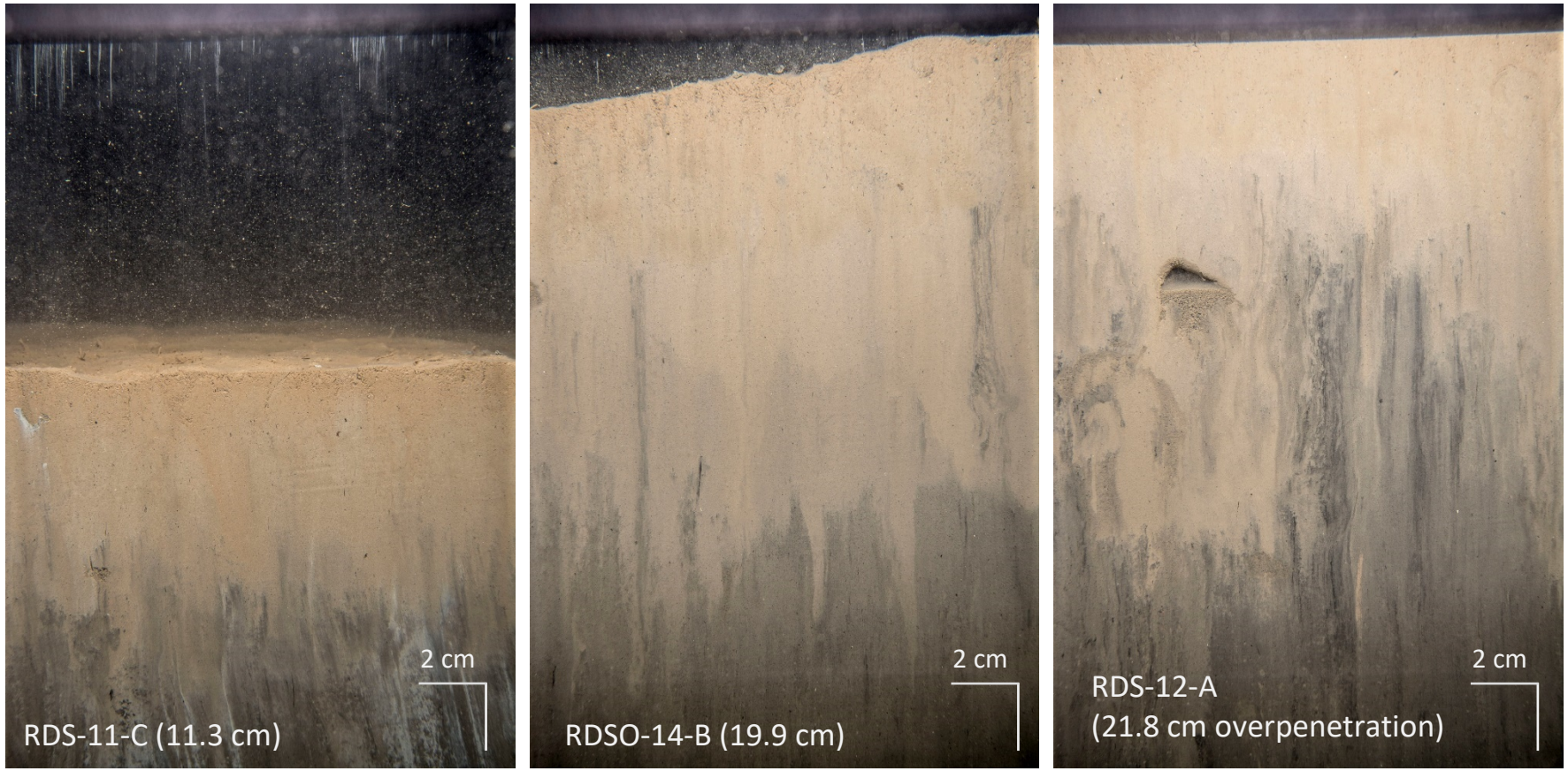


Figure 3-23. Mean station prism penetration depth (cm) at RDS and RDSO disposal and near-disposal area stations



(A) **(B)** **(C)**

Figure 3-24. Profile images from (A) Station RDS-11, (B) Station RDSO-14, and (C) Station RDS-12 depicting the range of camera prism penetration depths observed at RDS and RDSO

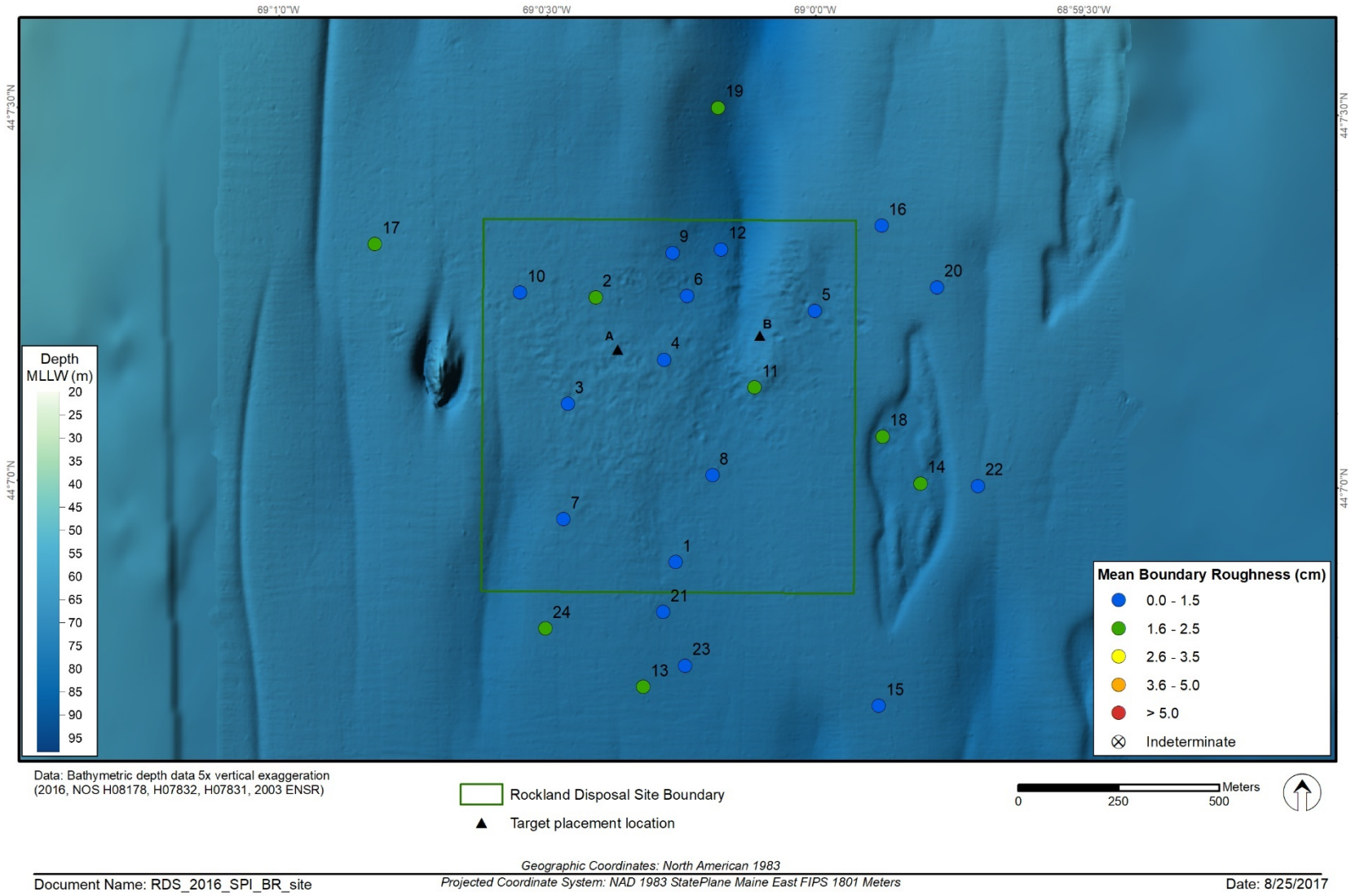


Figure 3-25. Mean station small scale boundary roughness (cm) at RDS and RDSO disposal and near-disposal area stations



Figure 3-26. Profile image from Station RDSO-22 depicting small scale boundary roughness associated with biological activity at RDS and RDSO

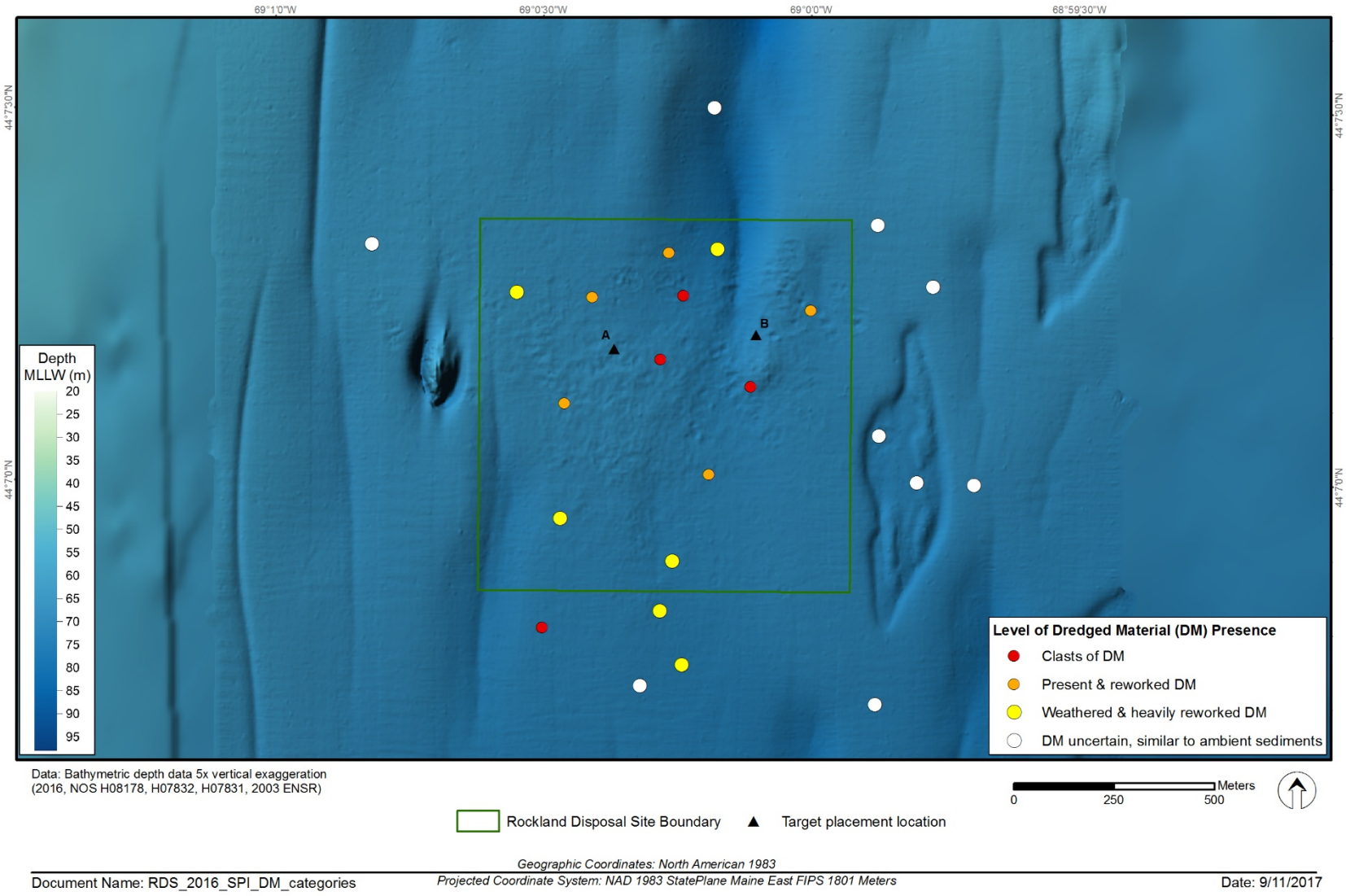
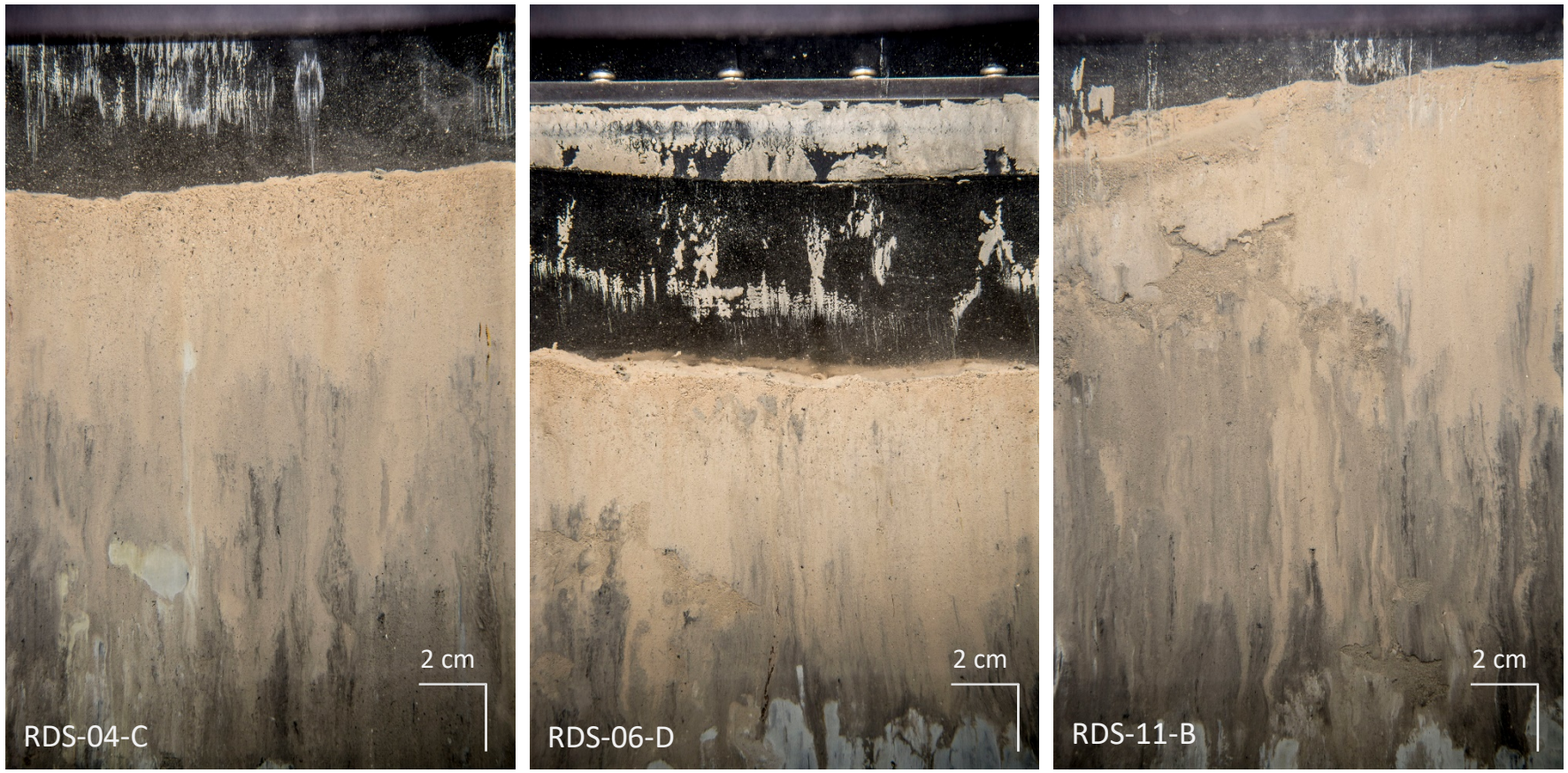


Figure 3-27. Categories of dredged material presence at RDS and RDSO



(A) **(B)** **(C)**

Figure 3-28. Profile images from stations close to Mound B and recent disposal activities showing cohesive dredged material clasts

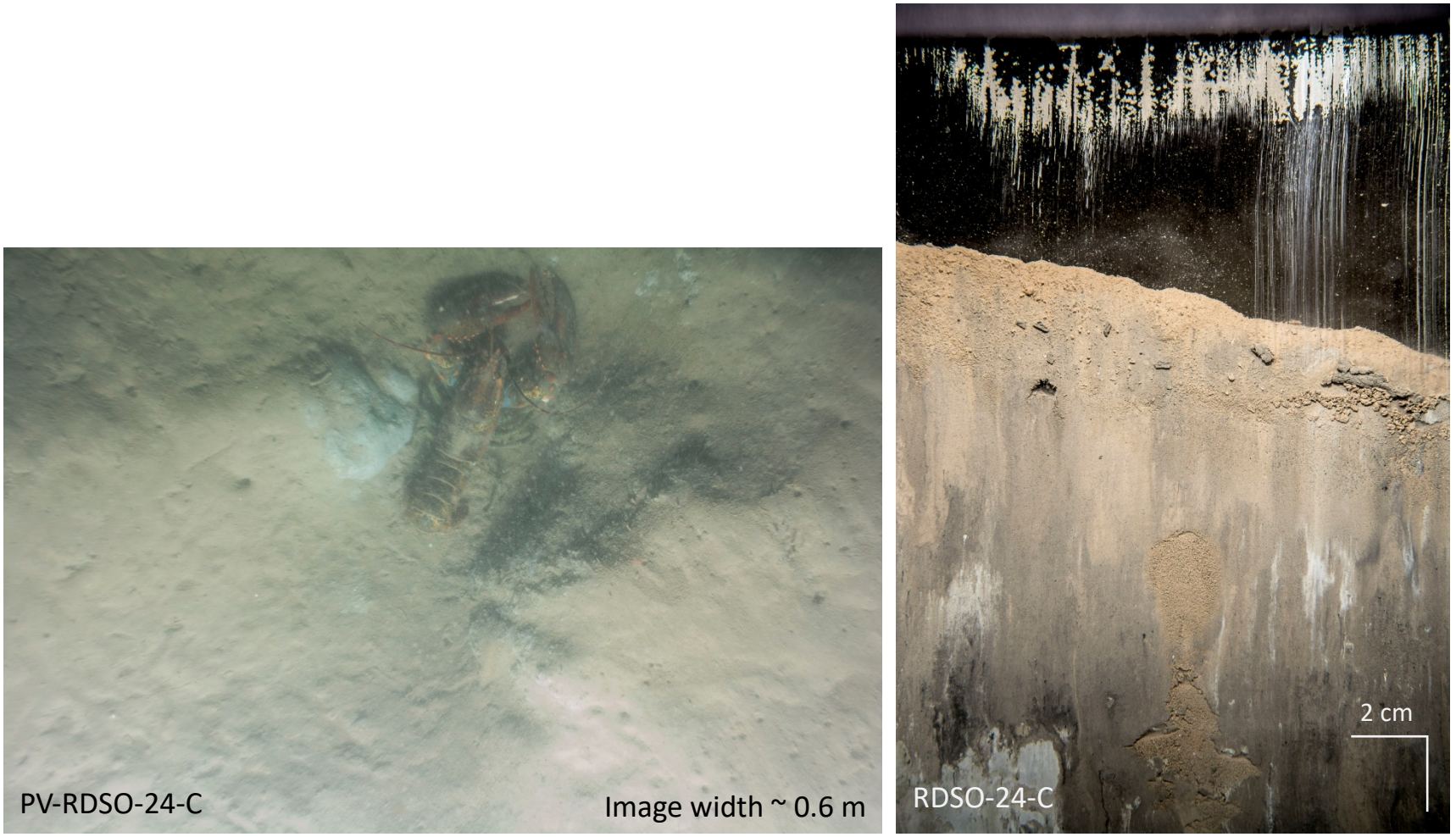
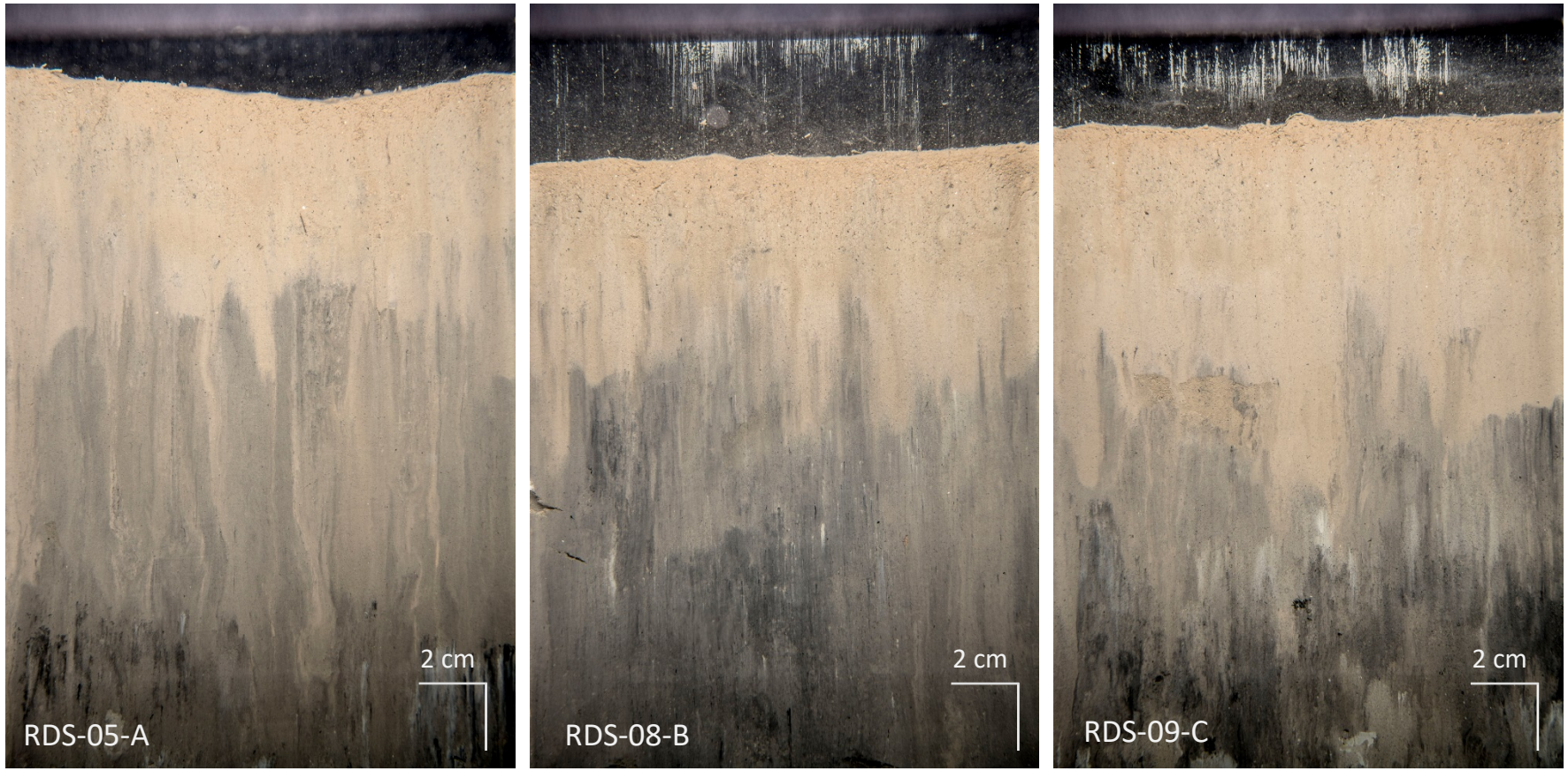


Figure 3-29. (A) Plan-view image and (B) sediment-profile image from RDSO-24 showing dredged material clasts above and below the sediment surface



(A) **(B)** **(C)**

Figure 3-30. Profile images from stations within RDS where dredged materials were present and reworked into the sediment column

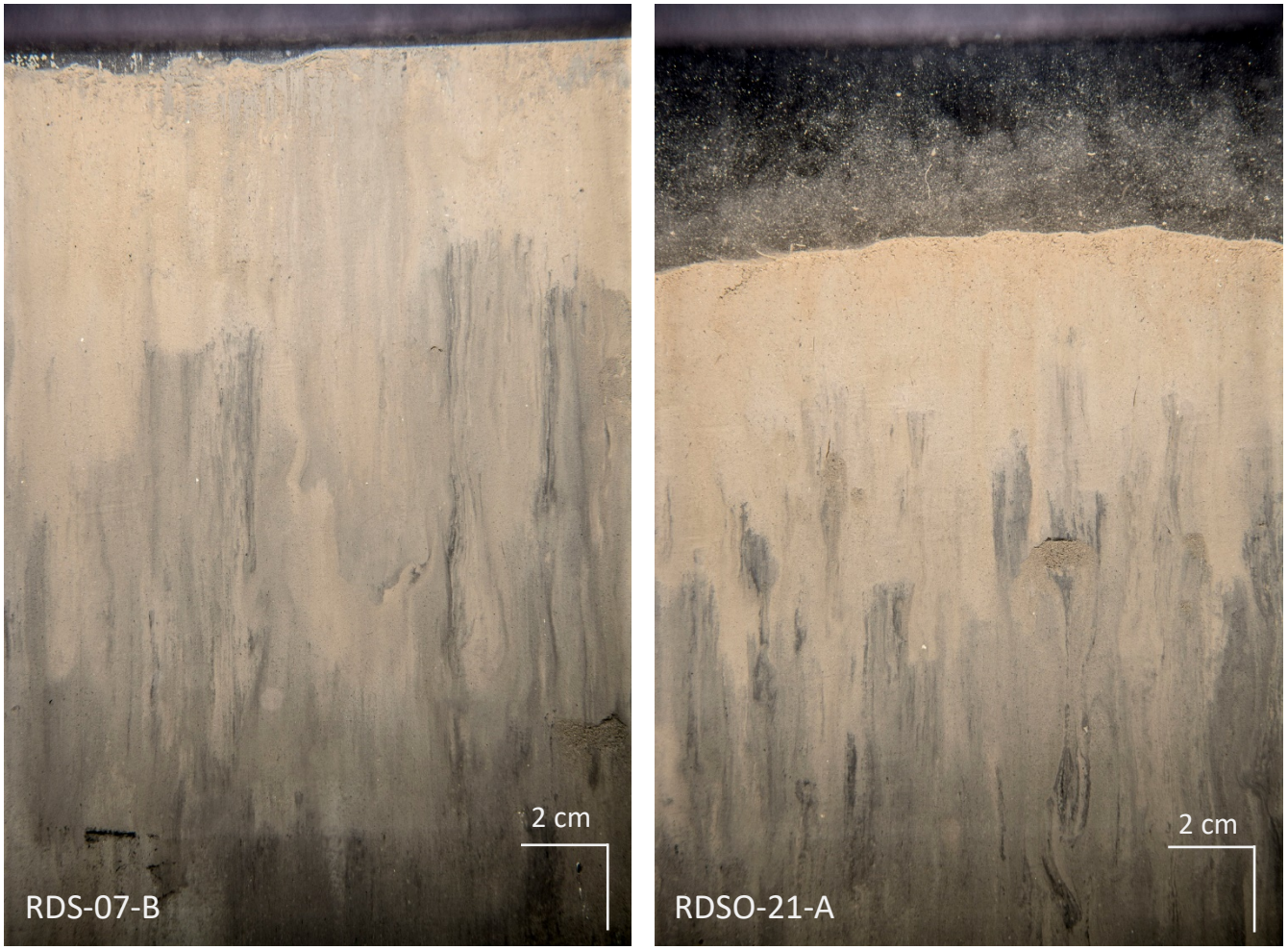


Figure 3-31. Profile images from stations at RDS and RDSO with weathered and heavily reworked dredged material



Figure 3-32. Profile image from RDSO where heavily reworked dredged material was difficult to distinguish from native sediments

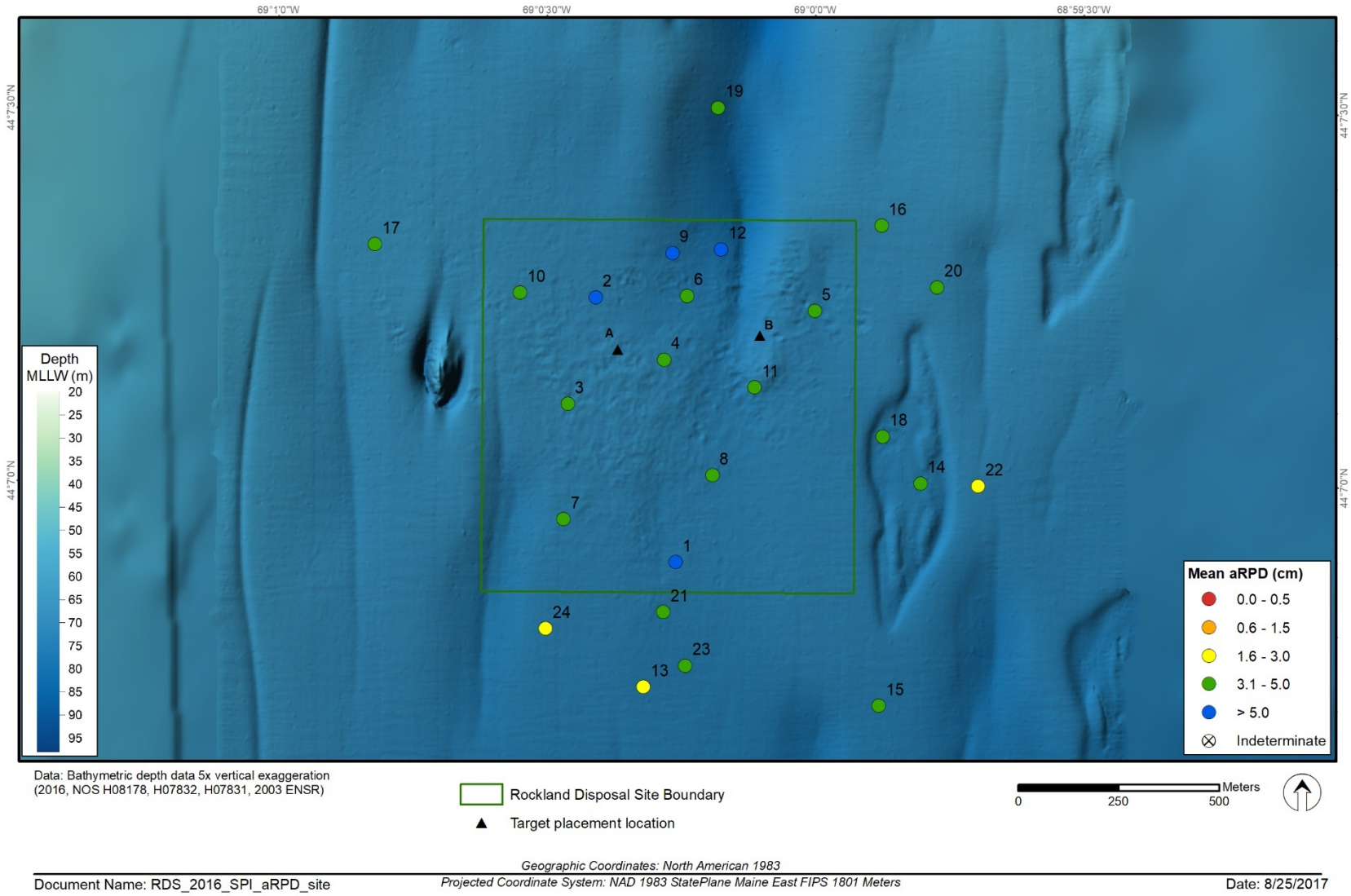


Figure 3-33. Mean station aRPD depth (cm) at RDS and RDSO disposal and near-disposal area stations

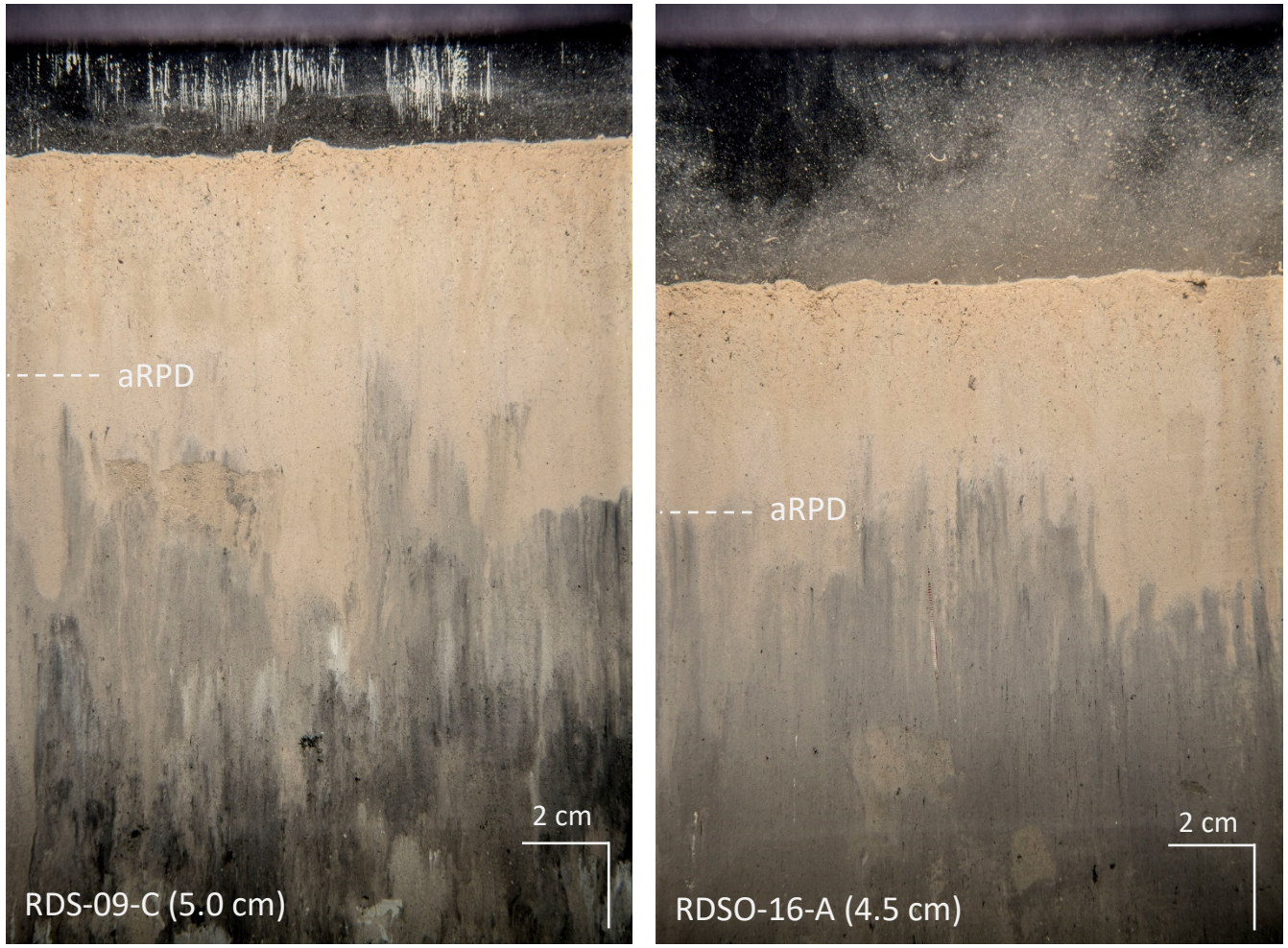


Figure 3-34. Profile images depicting well-developed aRPDs at RDS and RDSO (mean values in cm)

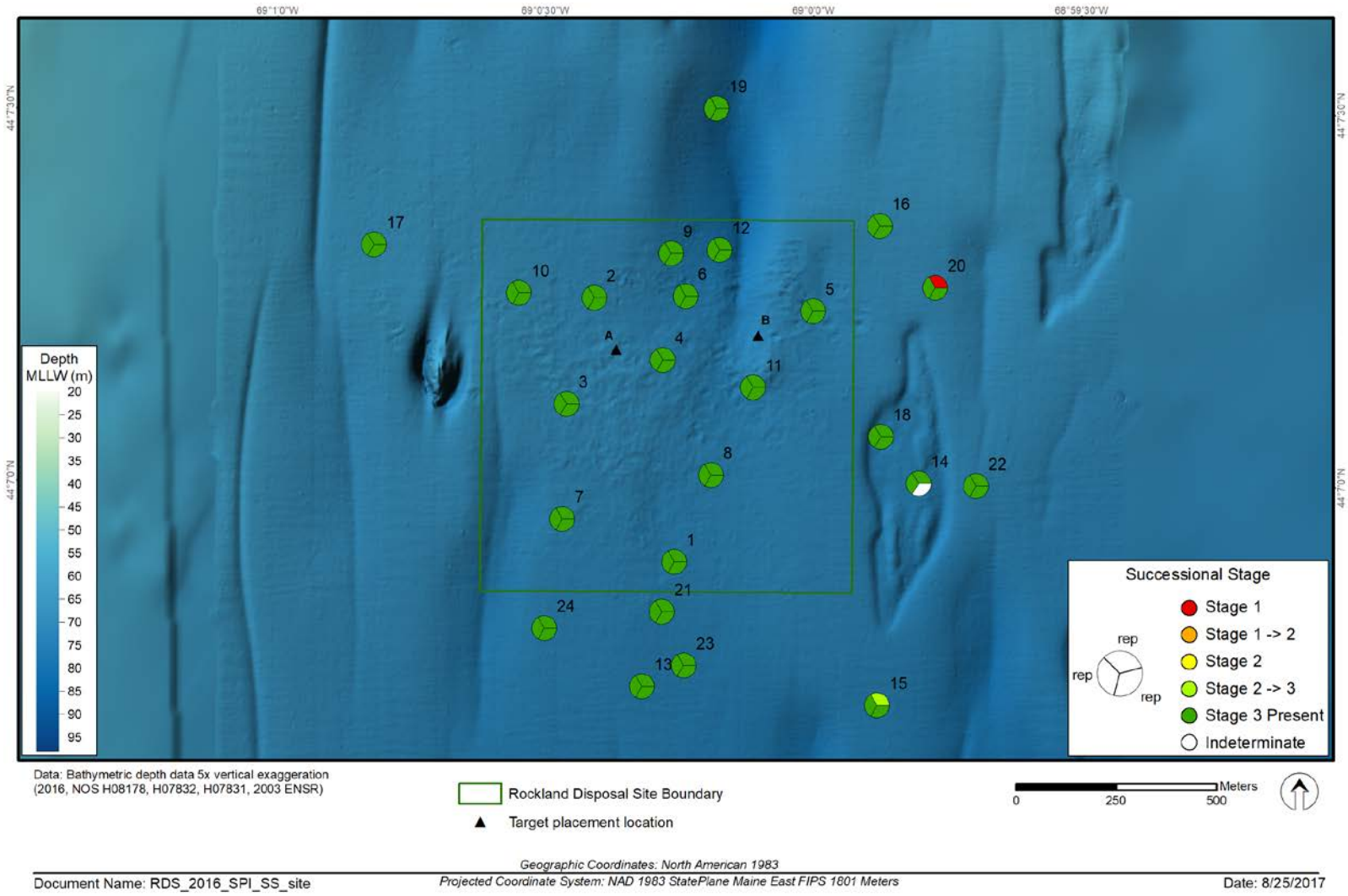


Figure 3-35. Infaunal successional stages at RDS and RDSO disposal and near-disposal area stations. Results shown provide a value for each of three replicate images for each sampling station.

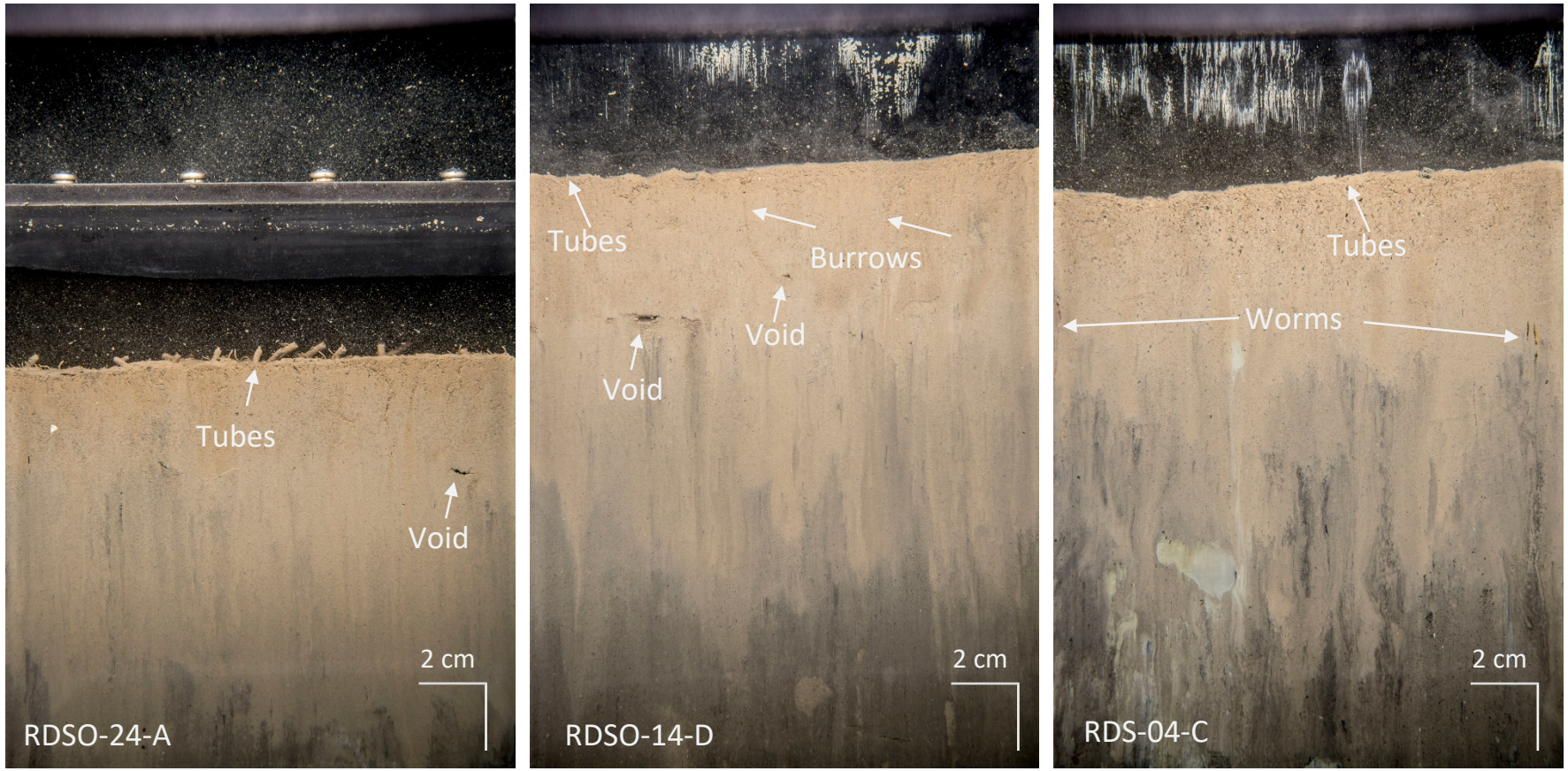
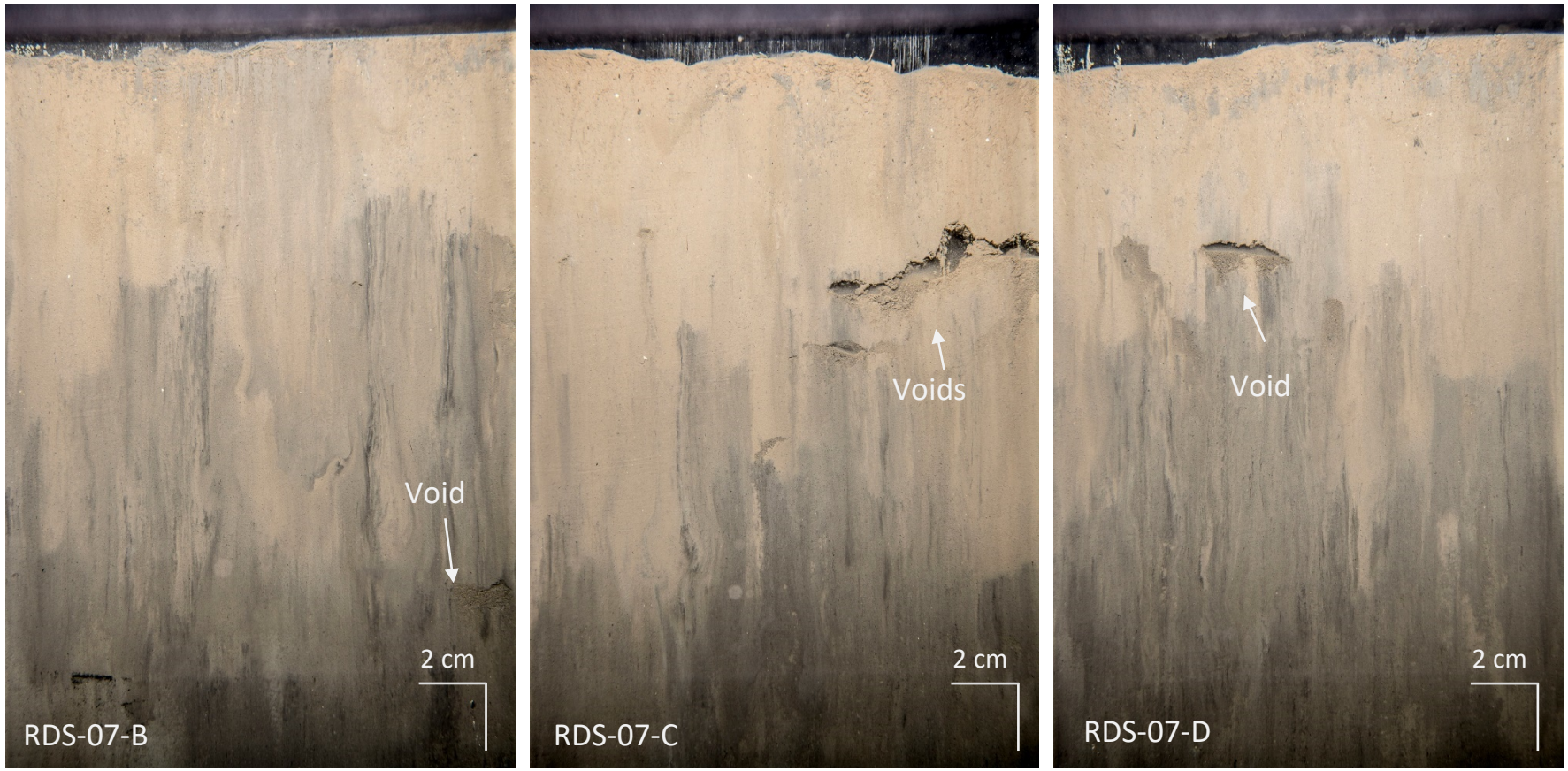


Figure 3-36. Profile images depicting Stage 1, 2, and 3 taxa at RDS and RDSO stations: (A) Stage 1 and 2 tubes at the sediment-water interface and small feeding void near base of aRPD, (B) Stage 1 tubes at sediment-water interface, burrow halos extending through aRPD and small feeding voids near base of aRPD, (C) Few small Stage 1 tubes at sediment-water interface, small polychaetes (worms) near base of aRPD with dredged material inclusions at depth



(A) **(B)** **(C)**

Figure 3-37. Replicate profile images from RDS-07 depicting the range of feeding voids observed, from (A) small voids at depth to (B) large and (C) medium voids near base of aRPD

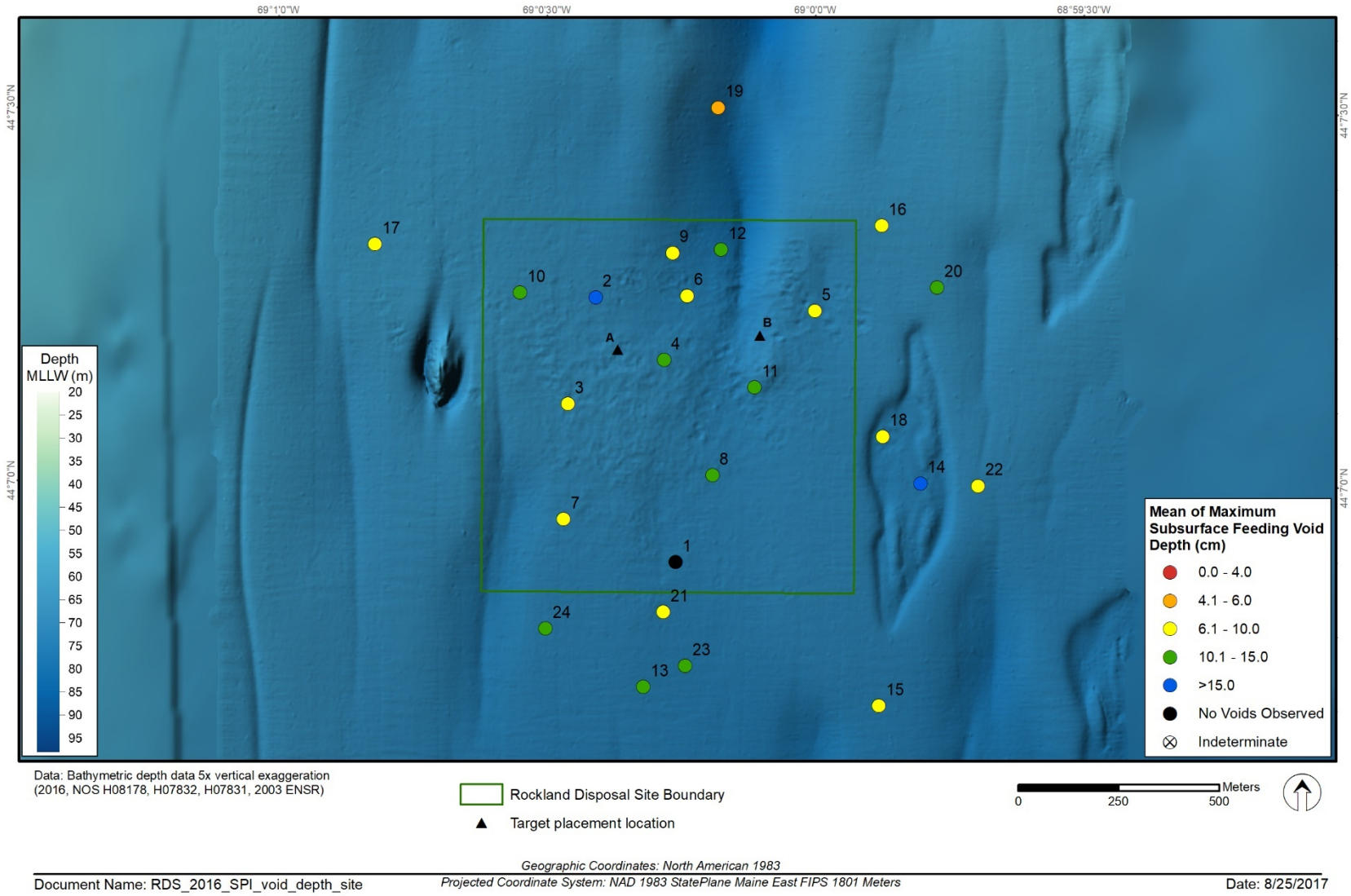
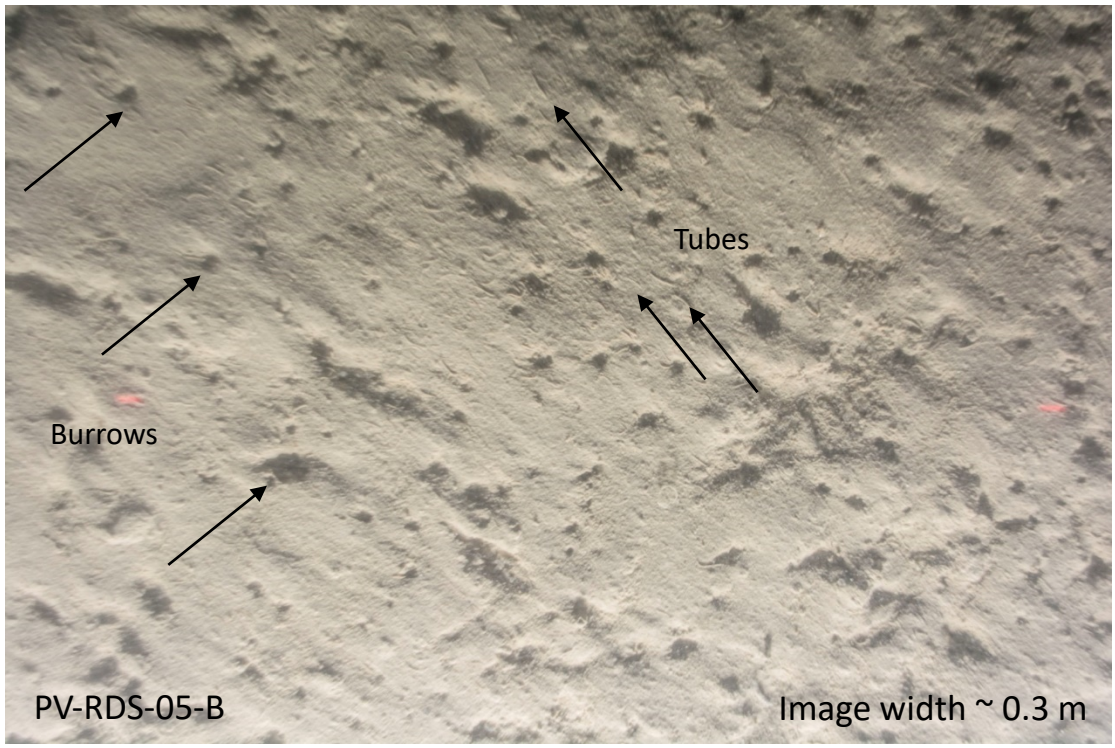
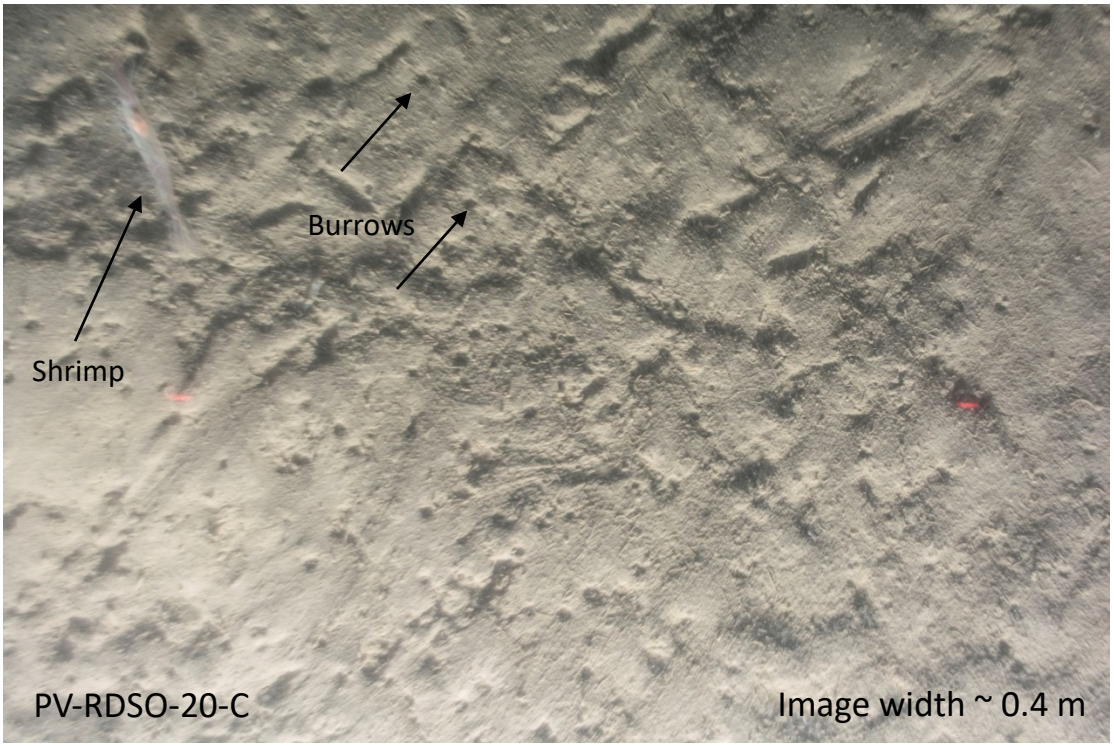


Figure 3-38. Mean station maximum feeding void depth (cm) at RDS and RDSO disposal and near-disposal area stations



(A)



(B)

Figure 3-39. Plan-view images depicting (A) small and medium burrow openings and small tubes at Station RDS-05, and (B) small burrow openings and a shrimp at Station RDSO-20

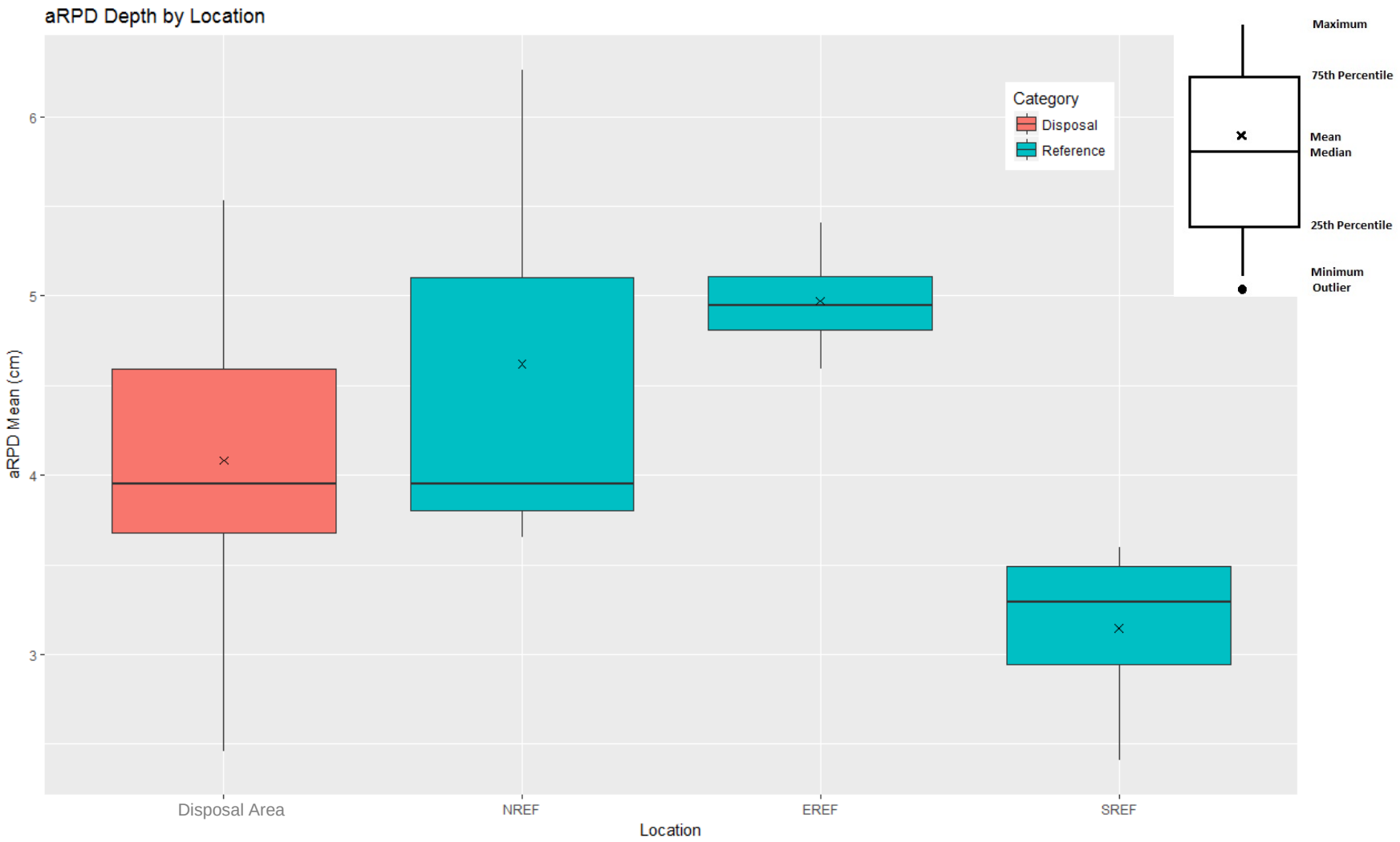


Figure 3-40. plots showing the distribution of mean aRPD depths measured at disposal area (RDS and RDSO) and reference area stations in the 2016 survey

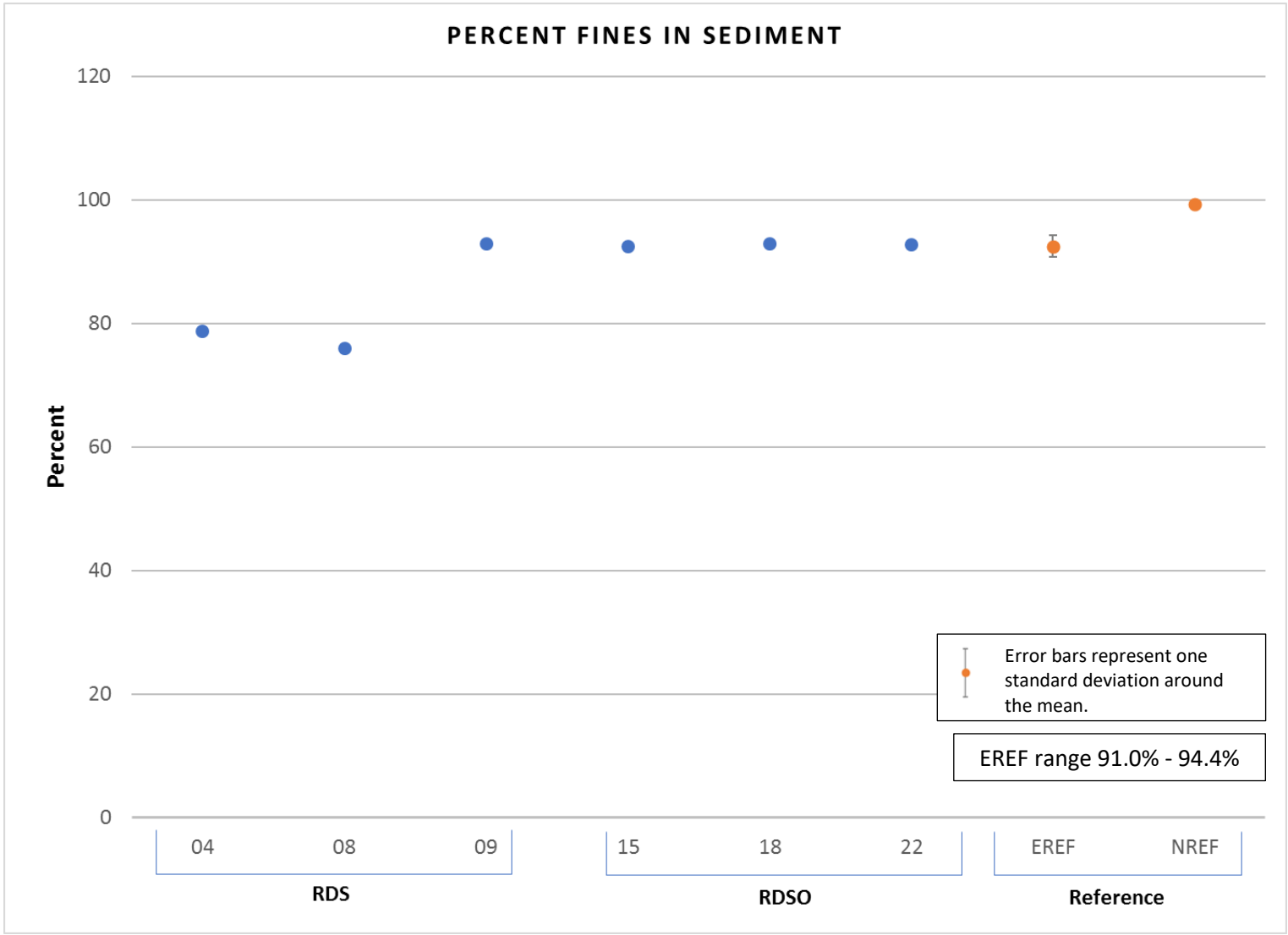


Figure 3-41. Percent fines in sediments from RDS 2016

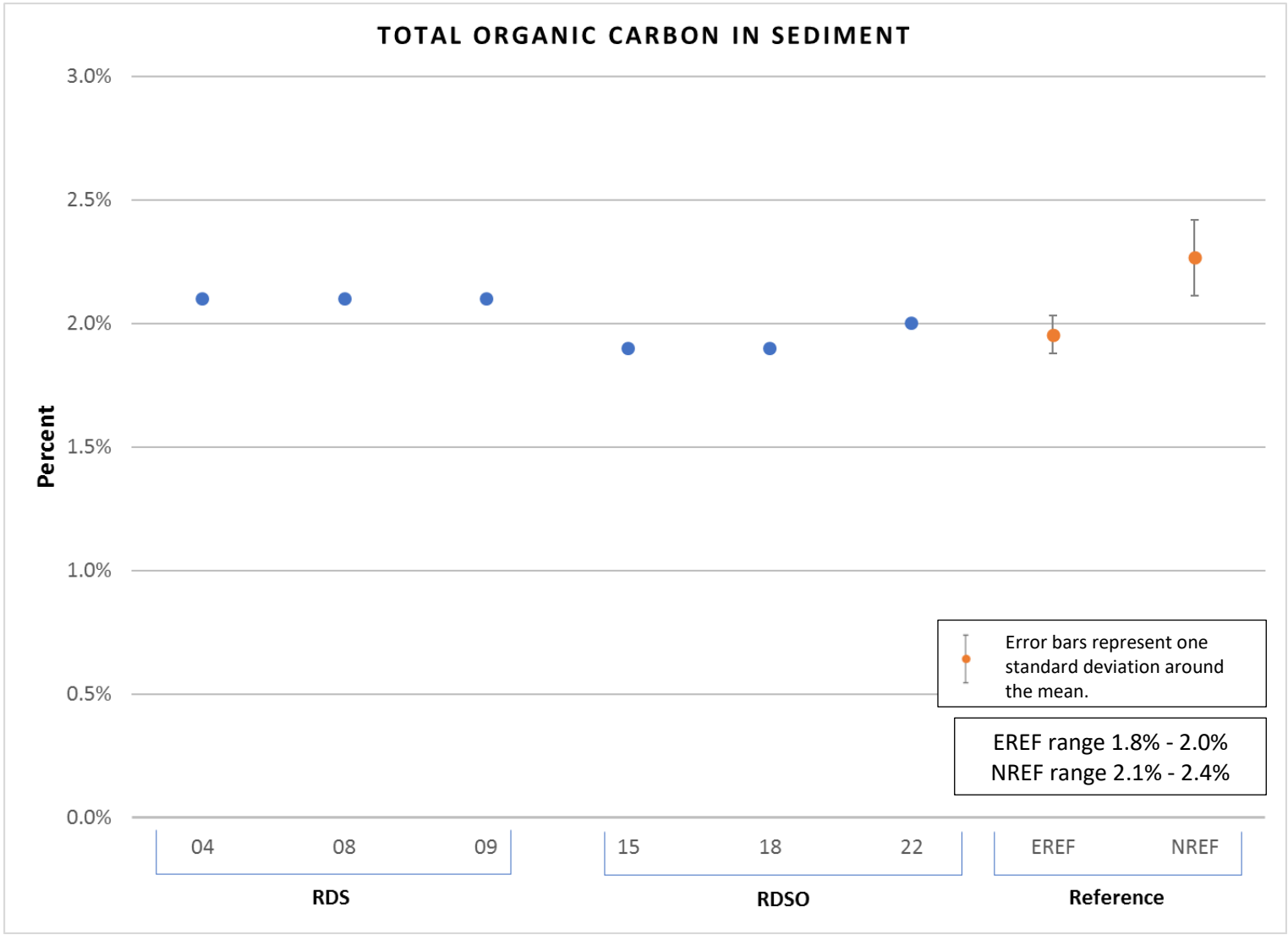


Figure 3-42. Percent total organic carbon in sediments from RDS 2016

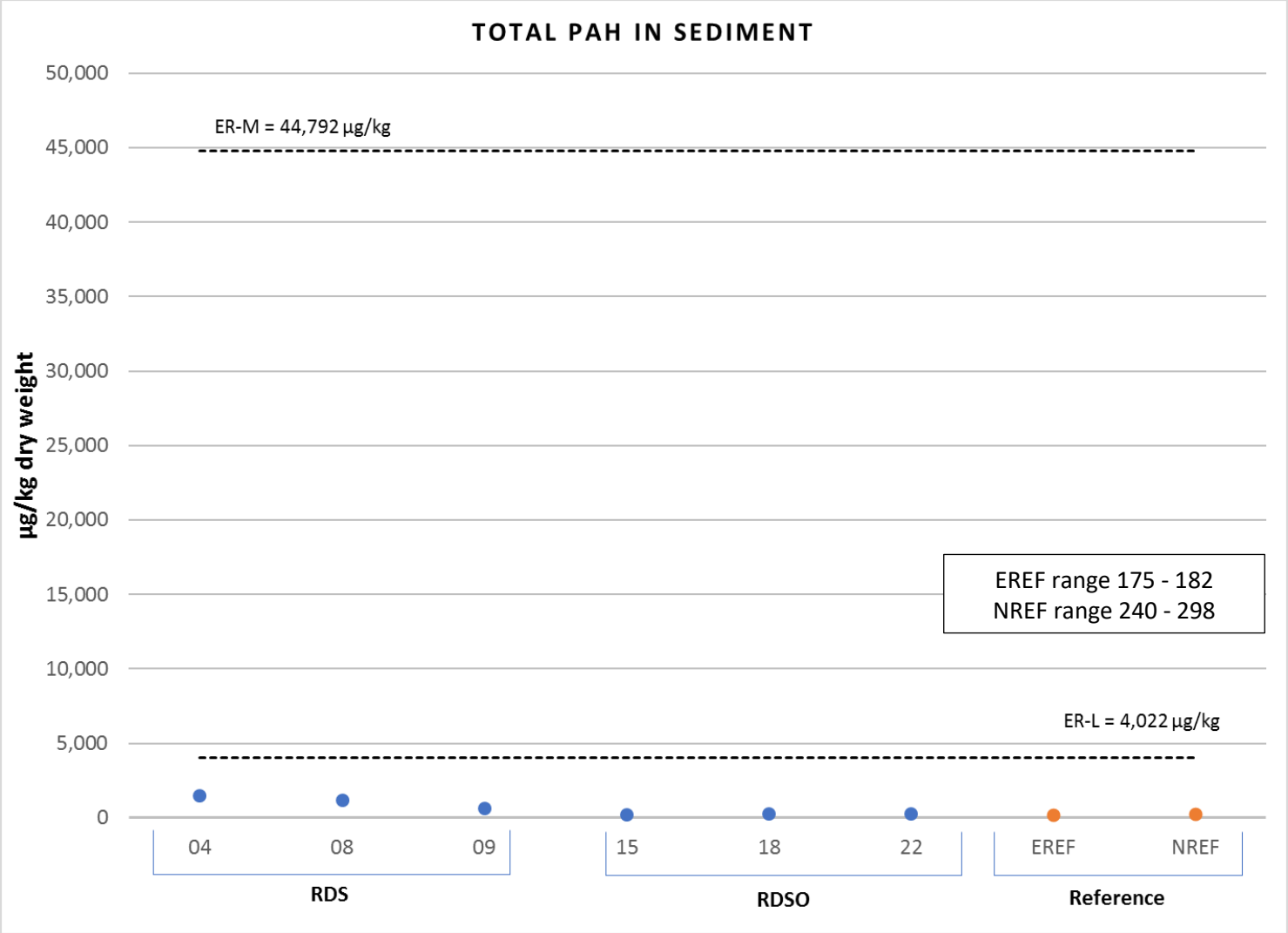


Figure 3-43. Total PAH (μ g/kg dry-wt.) in sediments from RDS 2016

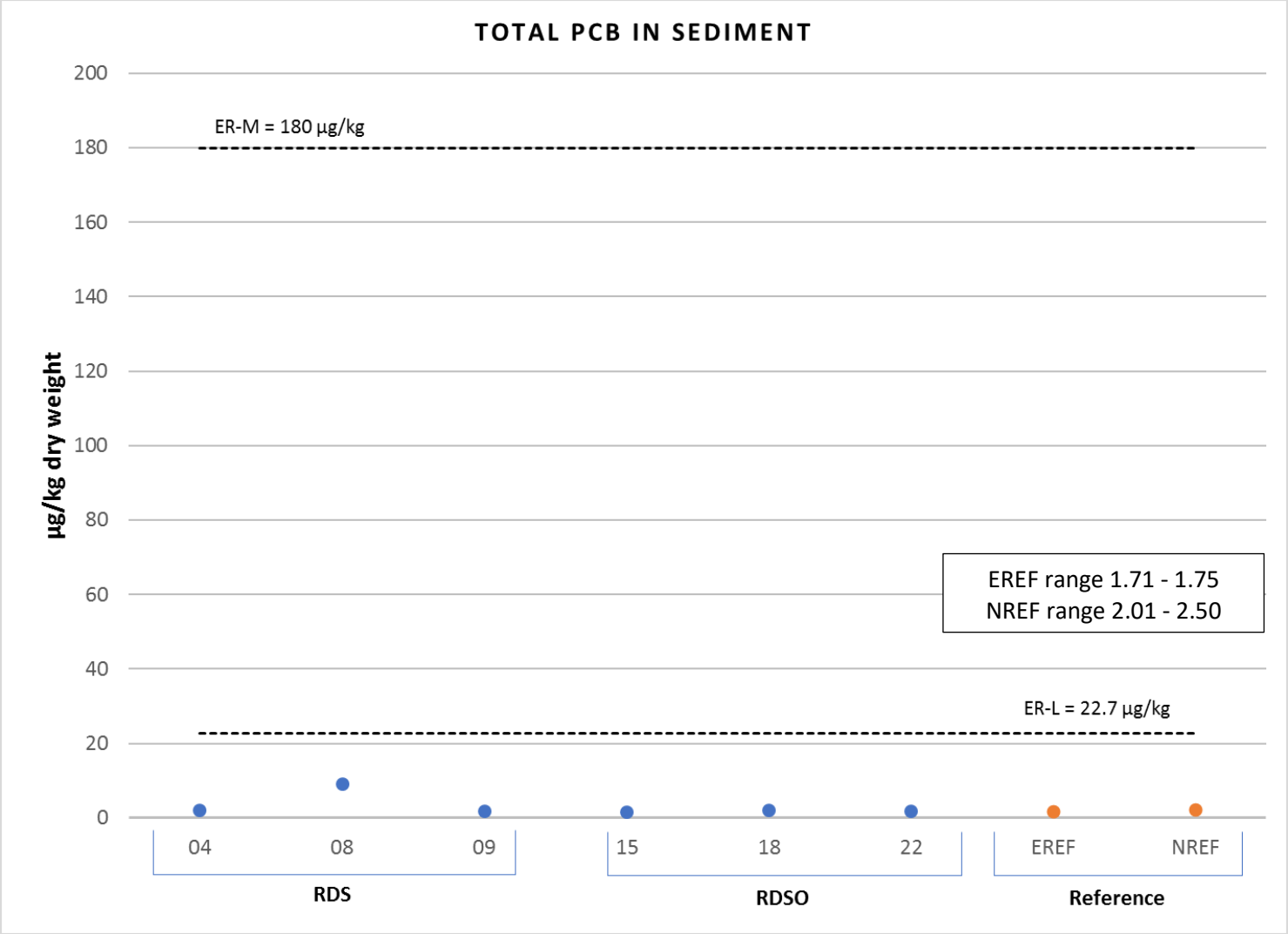


Figure 3-44. Total PCB (μ g/kg dry-wt.) in sediments from RDS 2016

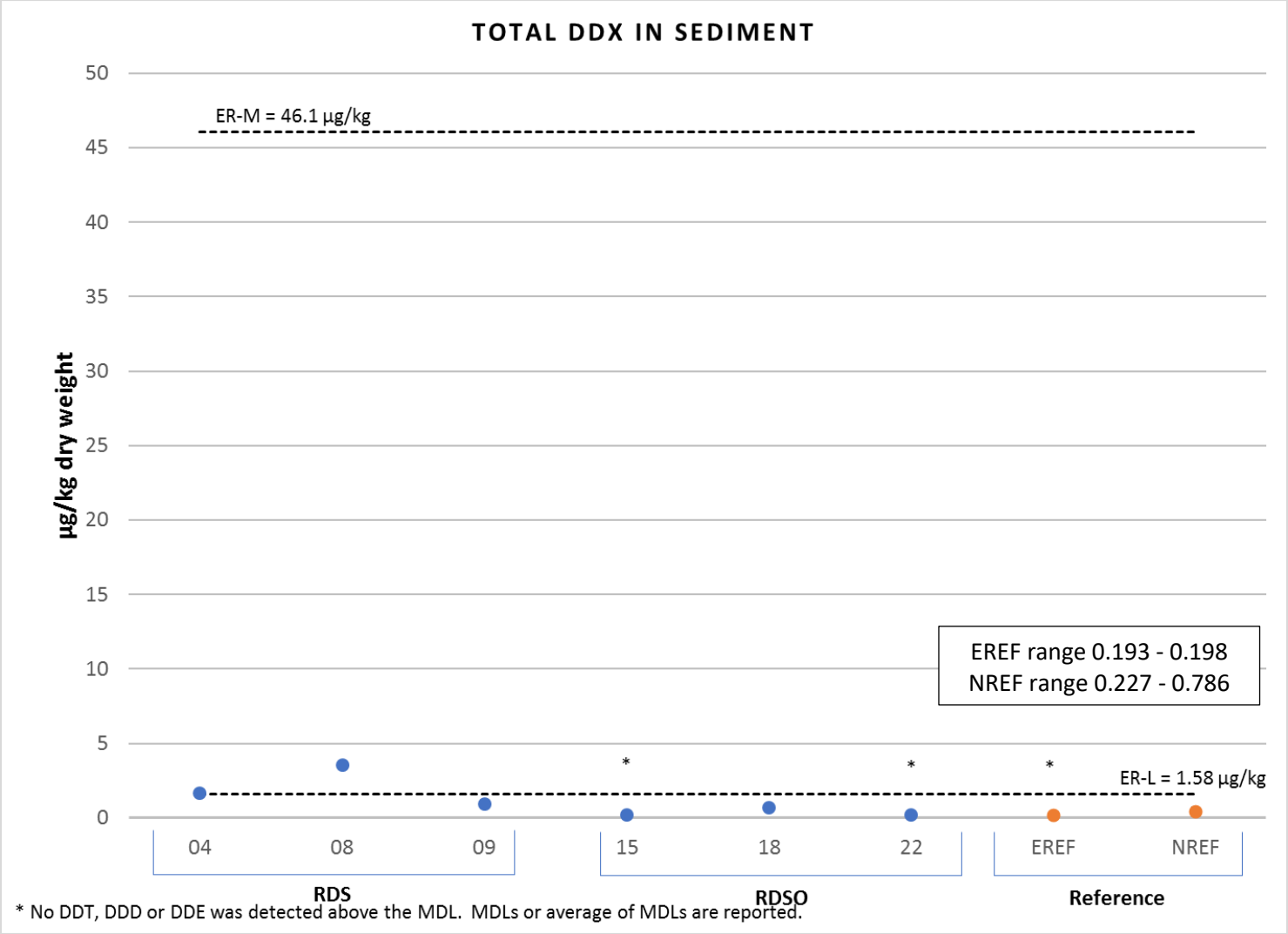


Figure 3-45a. Total DDX (μ g/kg dry-wt.) in sediments from RDS 2016

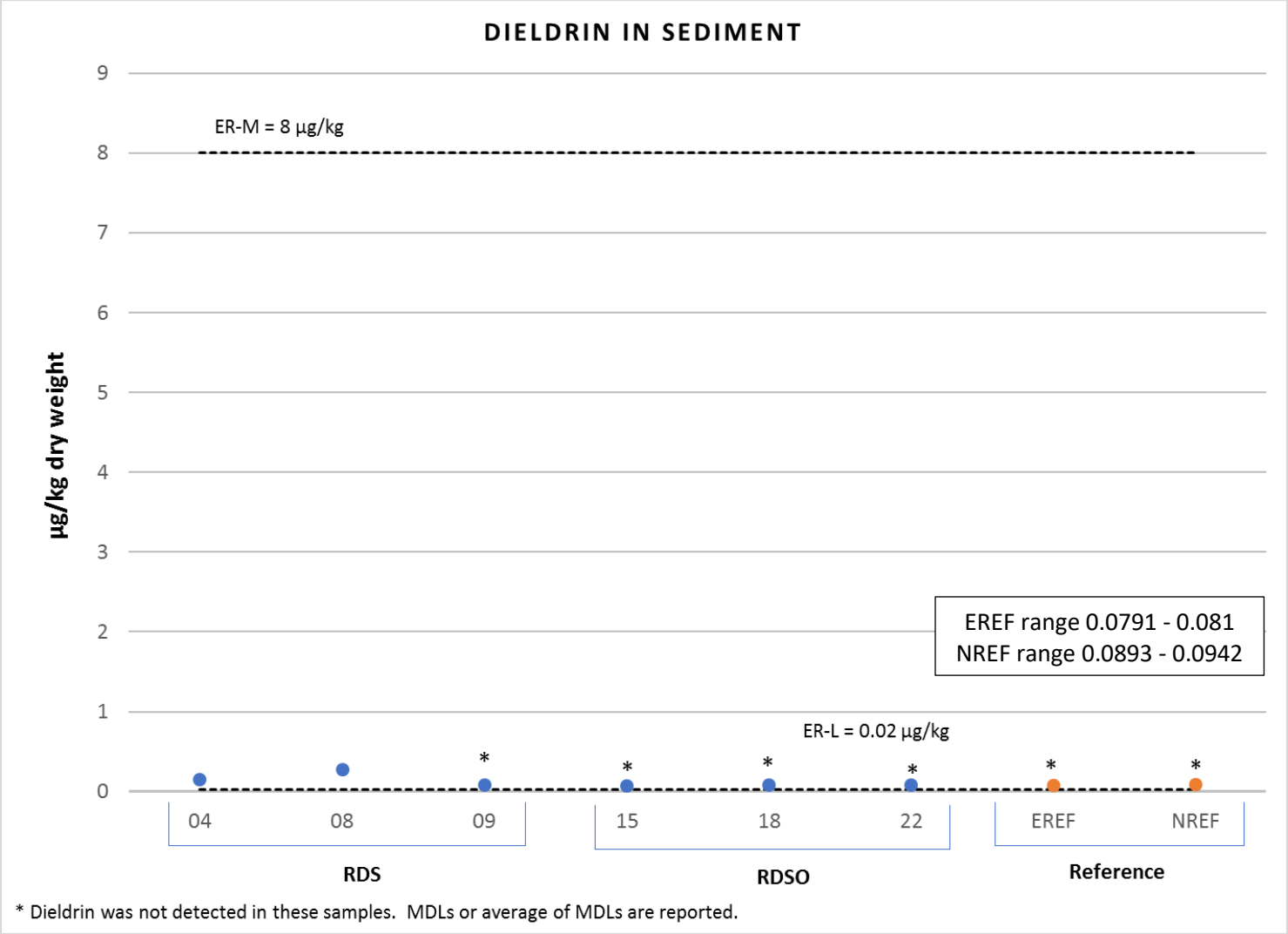


Figure 3-45b. Dieldrin (μ g/kg dry-wt.) in sediments from RDS 2016

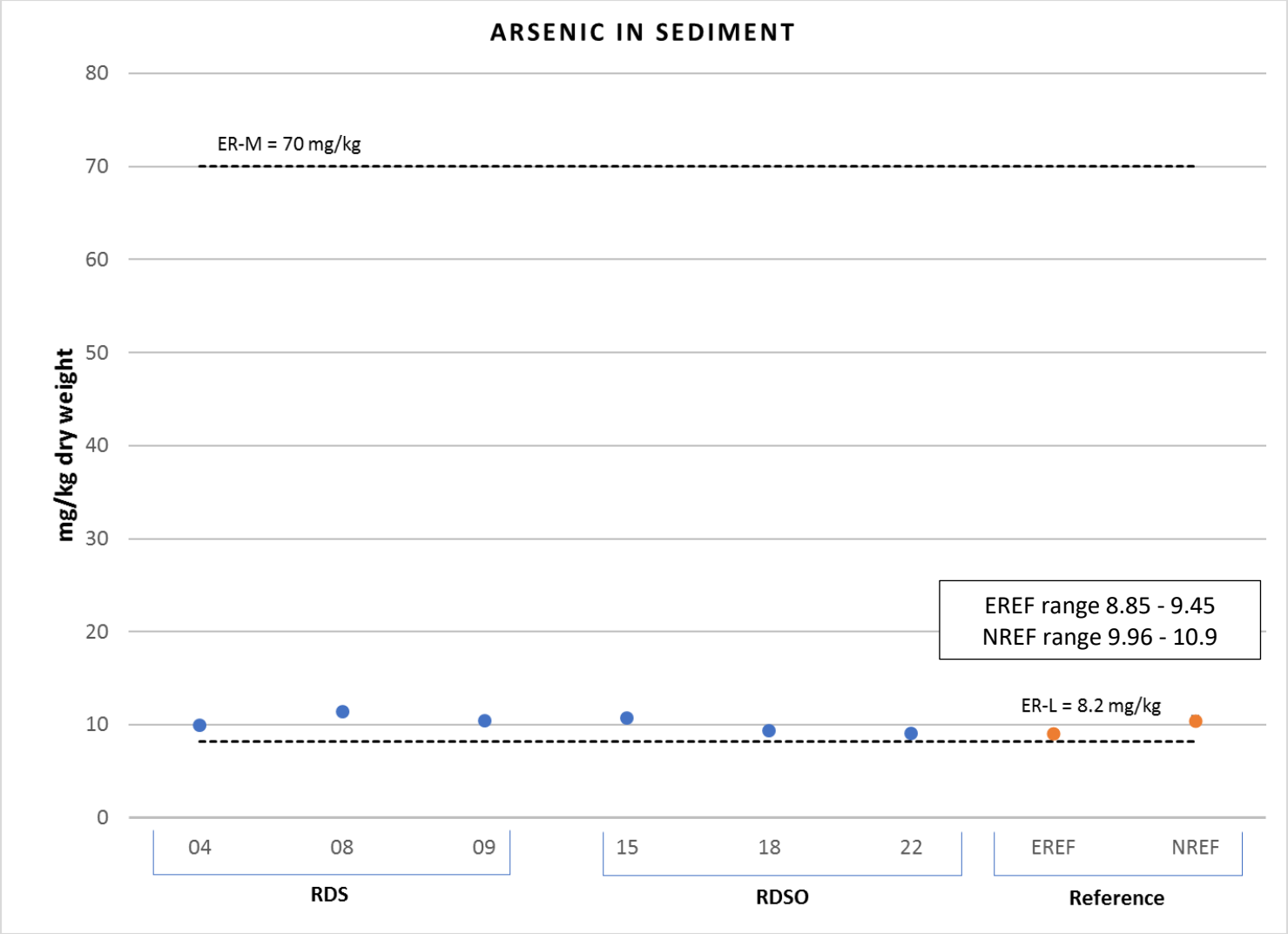


Figure 3-46a. Arsenic (mg/kg dry-wt.) in sediments from RDS 2016

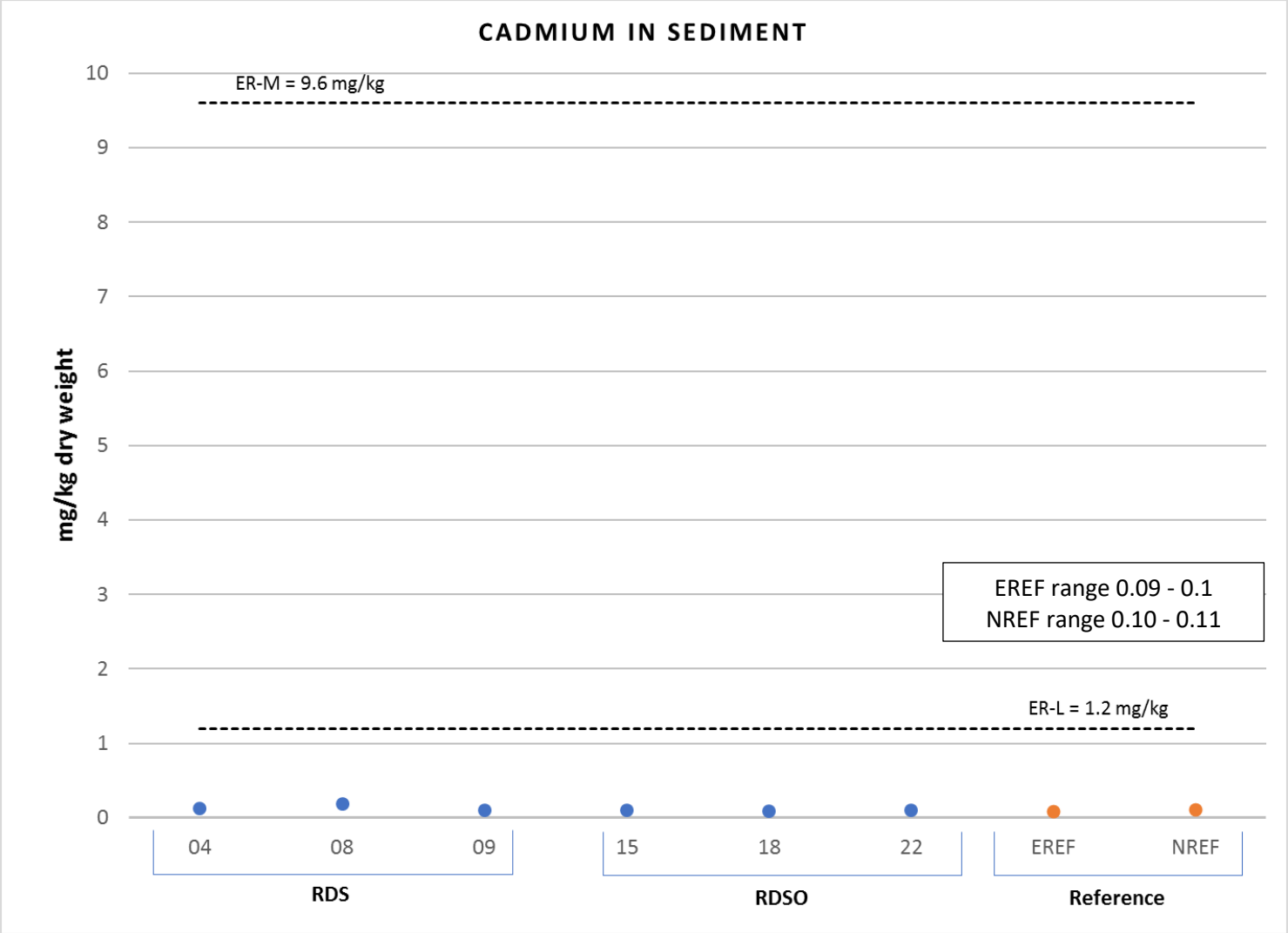


Figure 3-46b. Cadmium (mg/kg dry-wt.) in sediments from RDS 2016

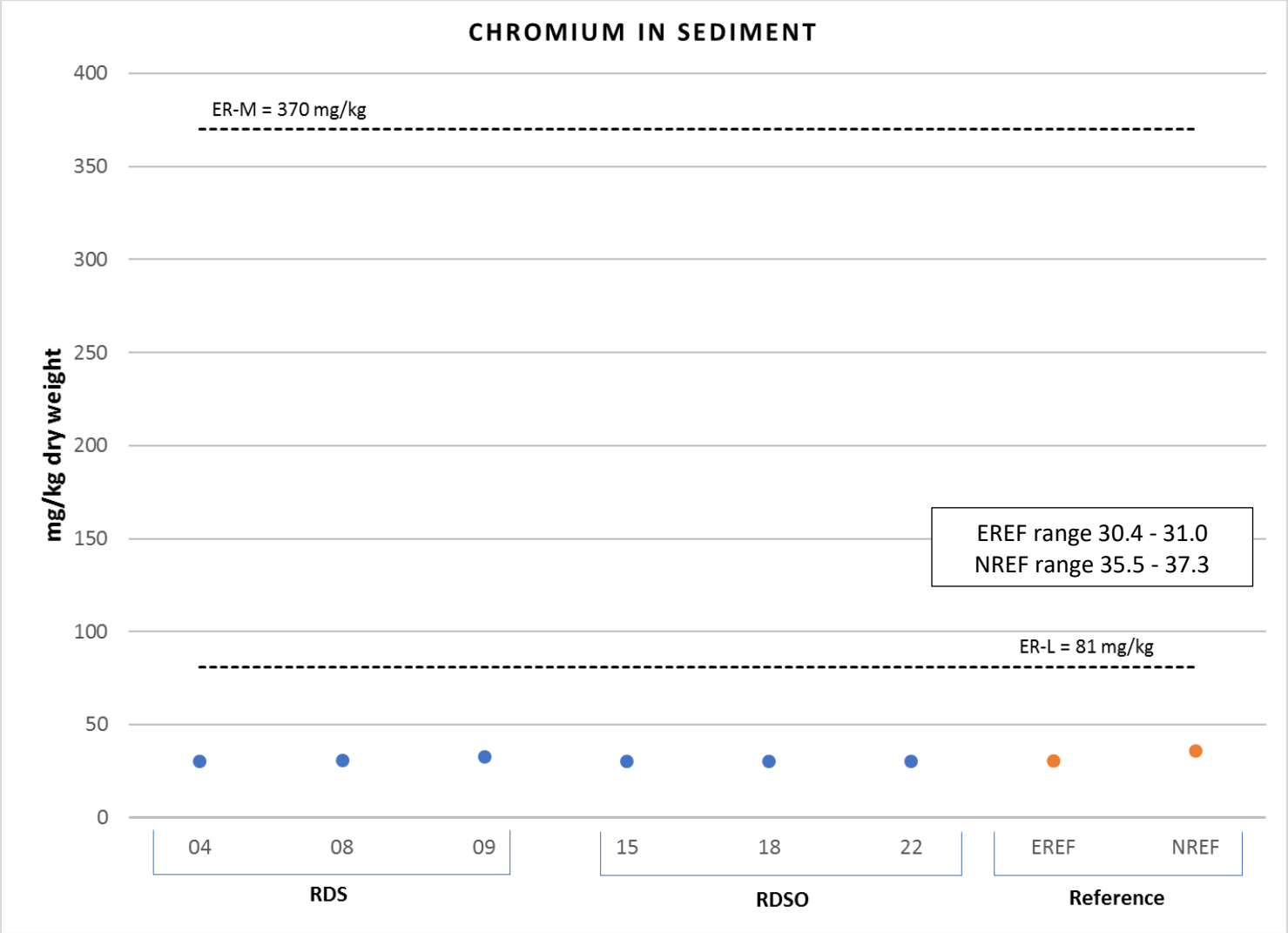


Figure 3-46c. Chromium (mg/kg dry-wt.) in sediments from RDS 2016

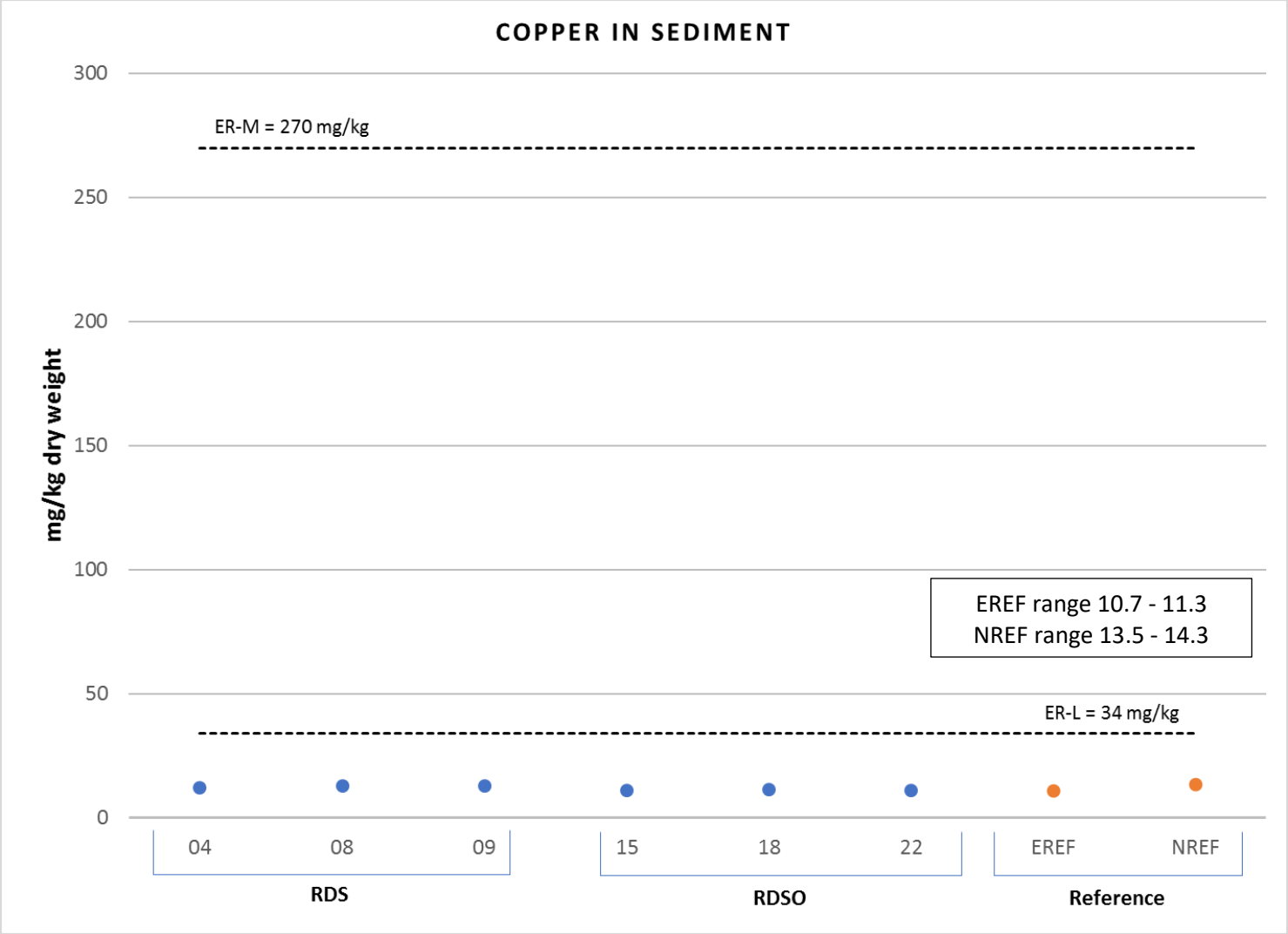


Figure 3-46d. Copper (mg/kg dry-wt.) in sediments from RDS 2016

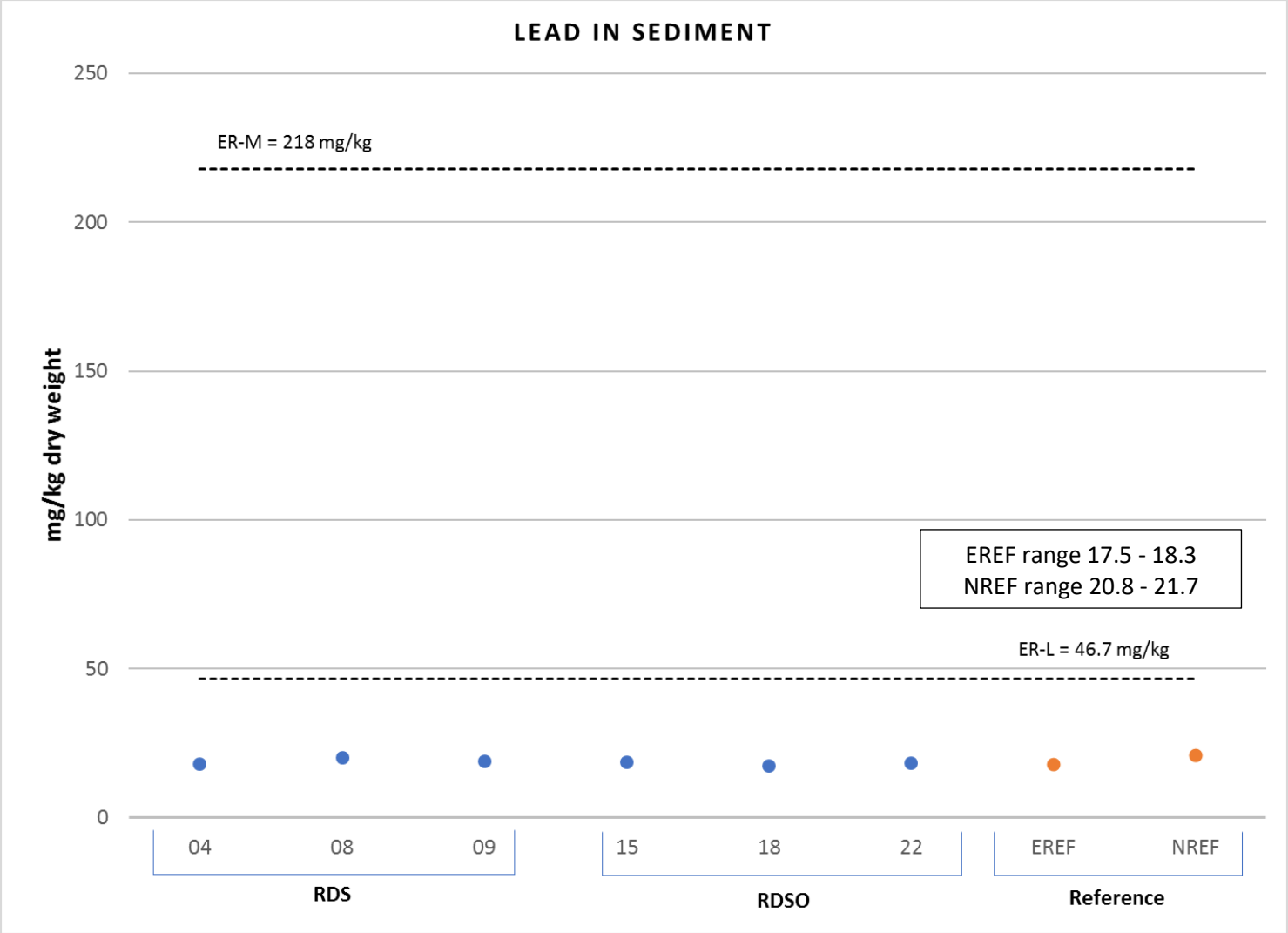


Figure 3-46e. Lead (mg/kg dry-wt.) in sediments from RDS 2016

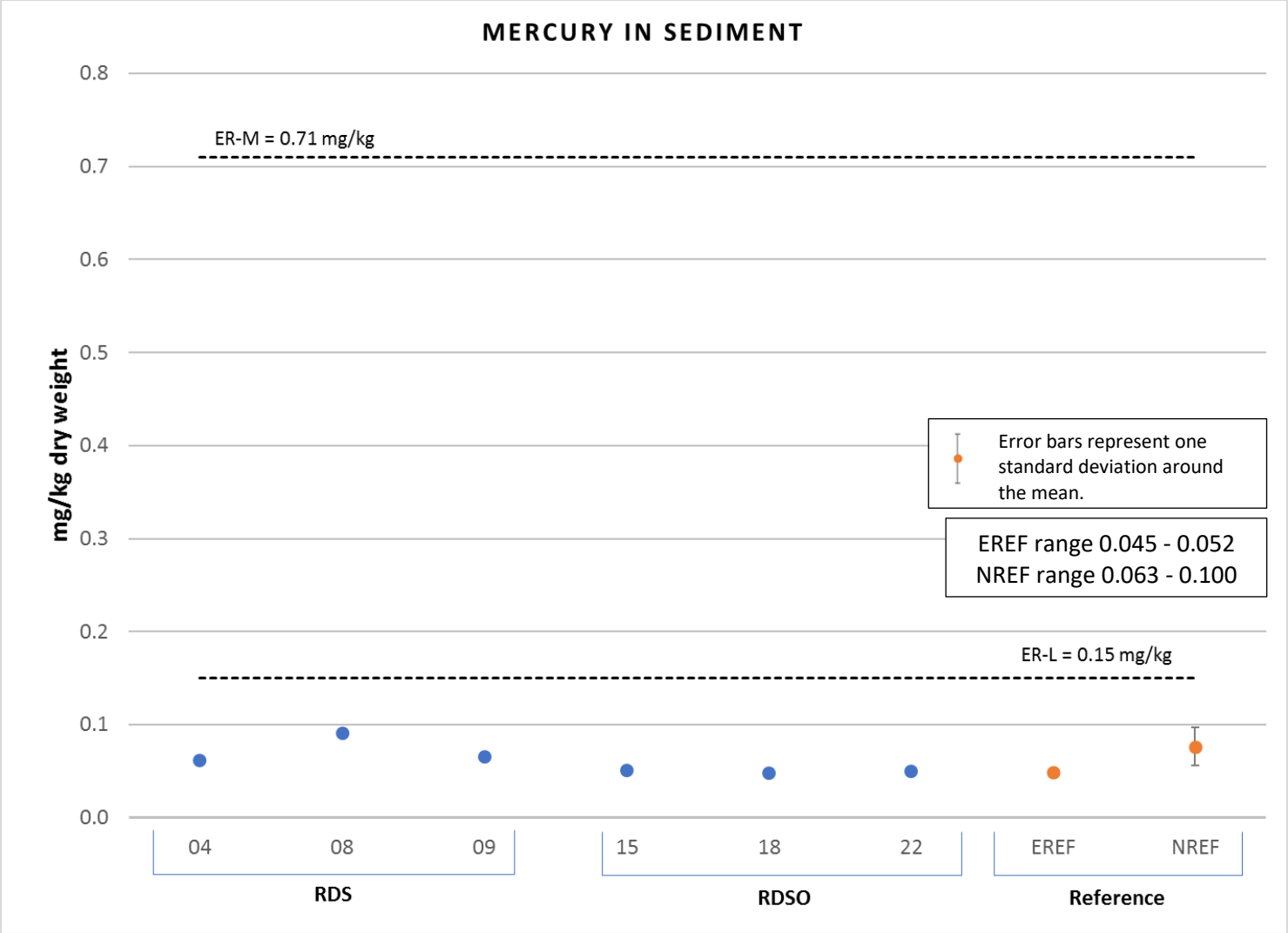


Figure 3-46f. Mercury (mg/kg dry-wt.) in sediments from RDS 2016

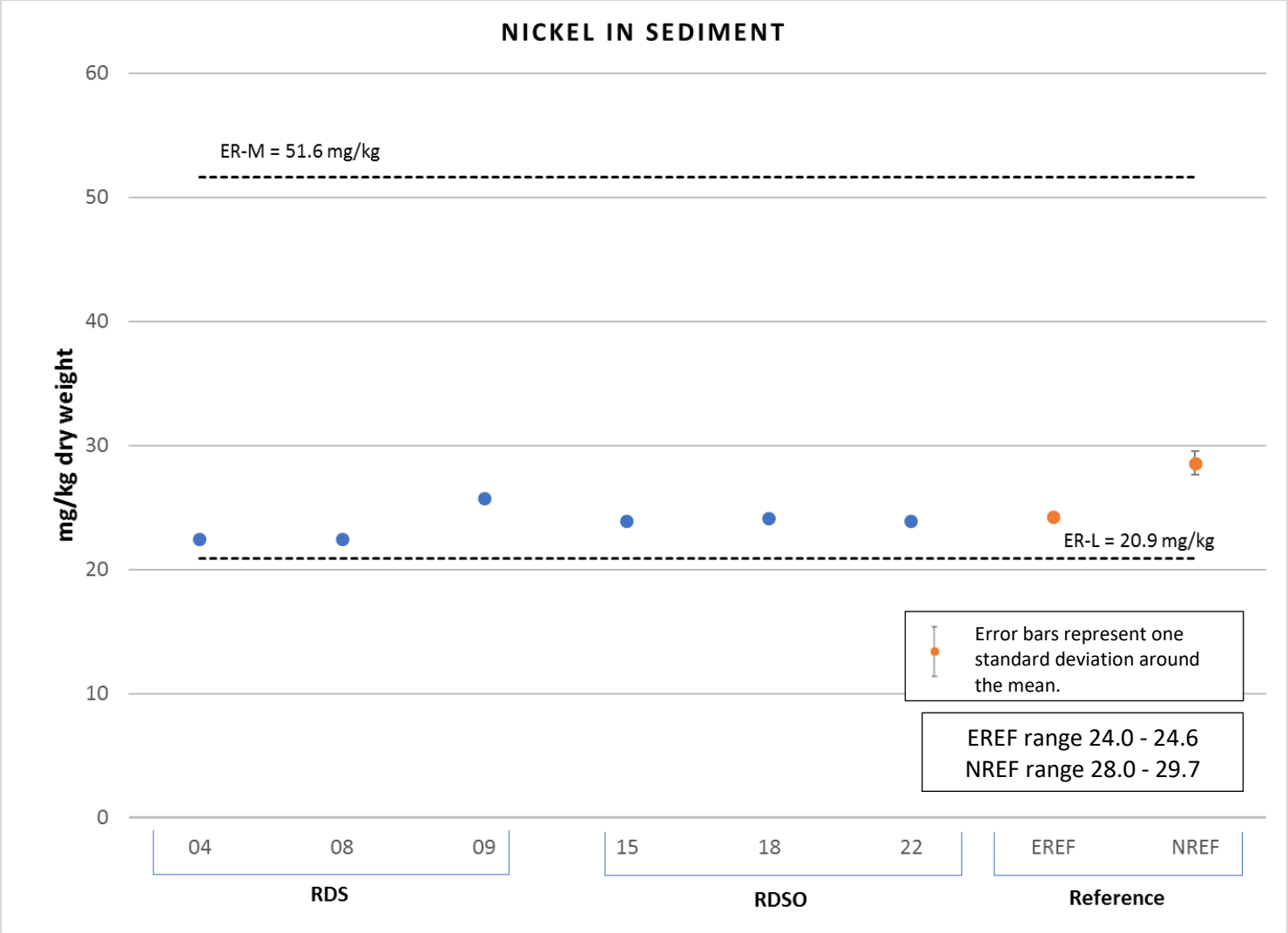


Figure 3-46g. Nickel (mg/kg dry-wt.) in sediments from RDS 2016

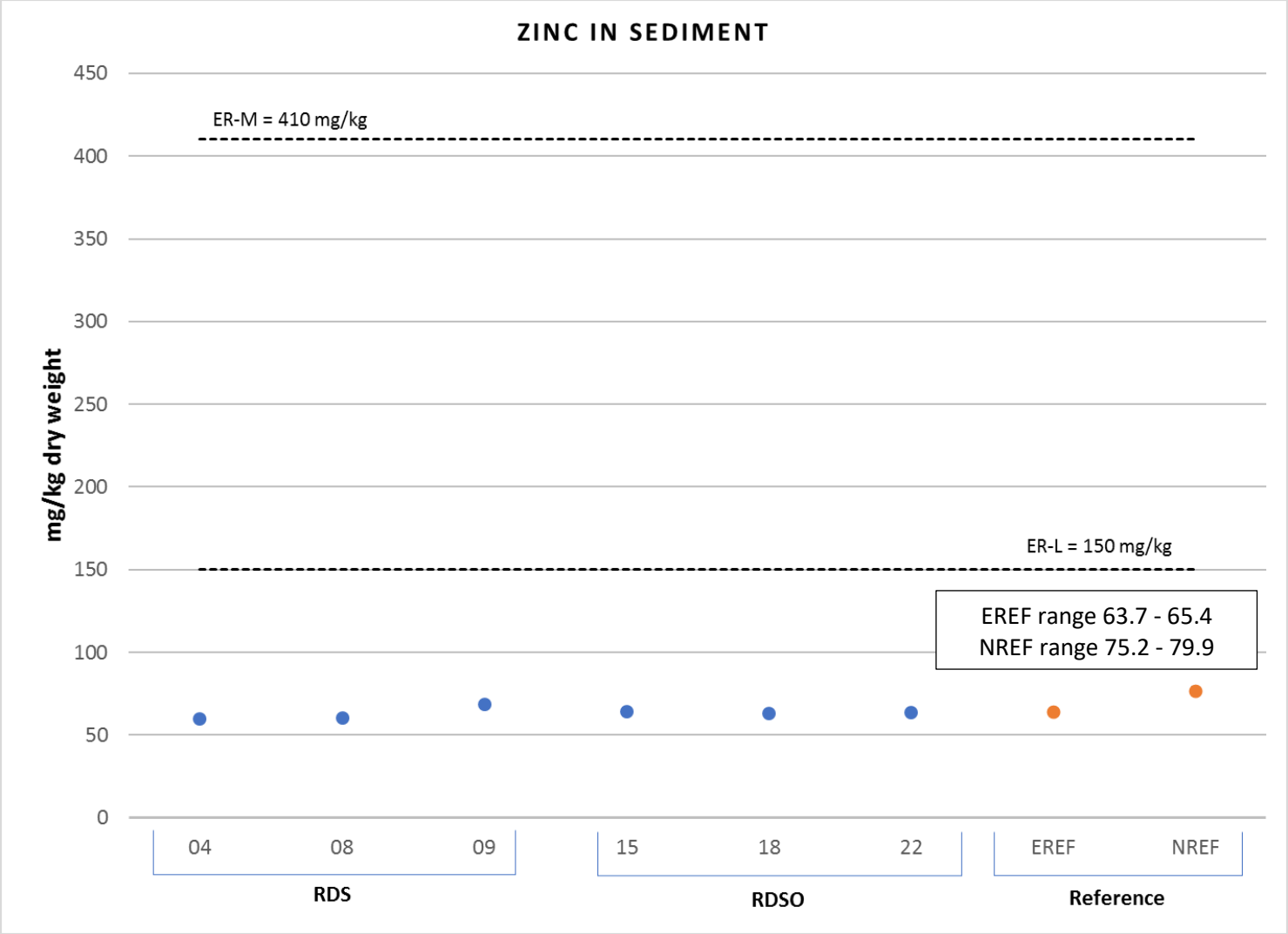


Figure 3-46h. Zinc (mg/kg dry-wt.) in sediments from RDS 2016

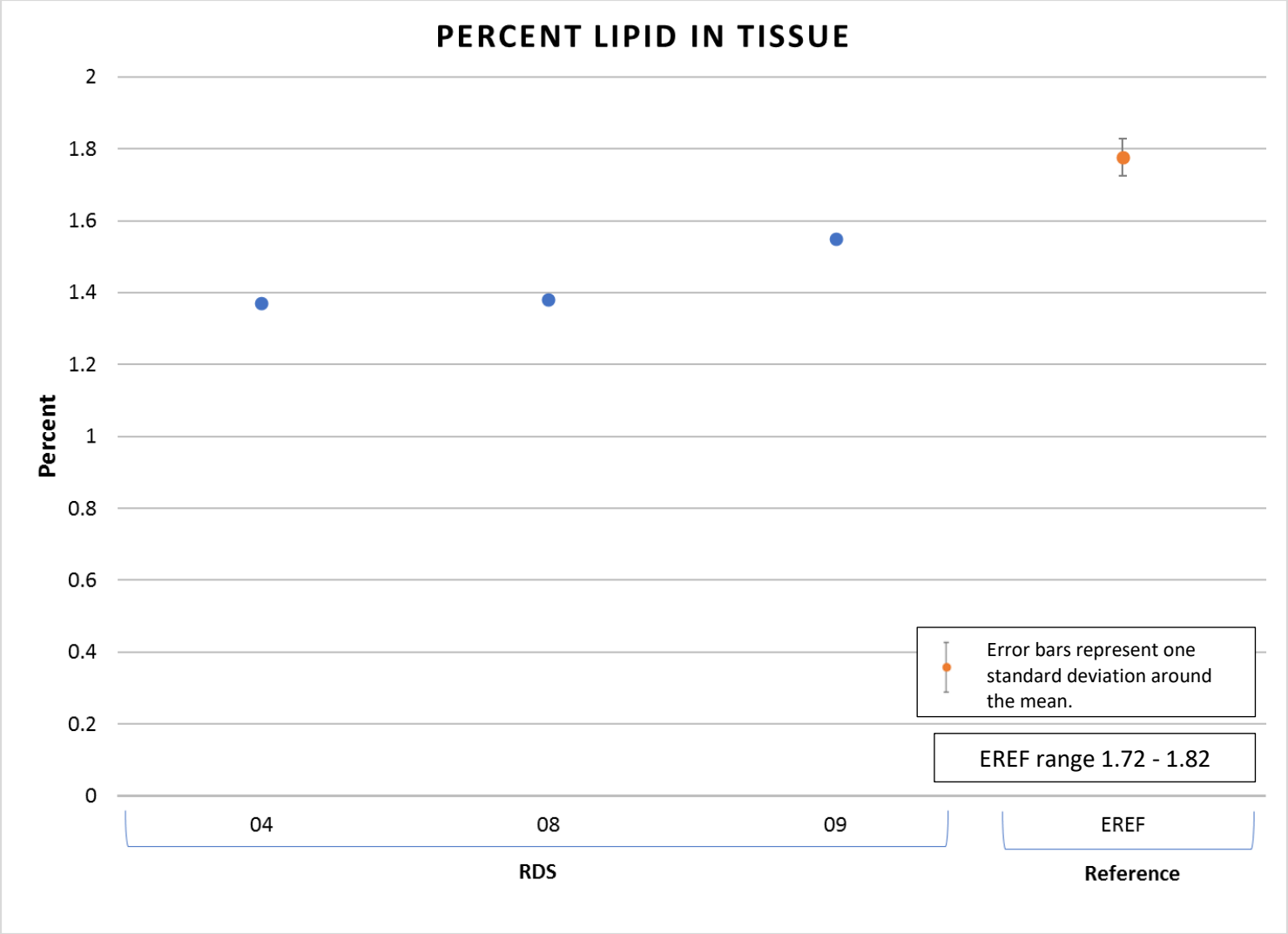


Figure 3-47. Percent lipids in tissue from RDS 2016

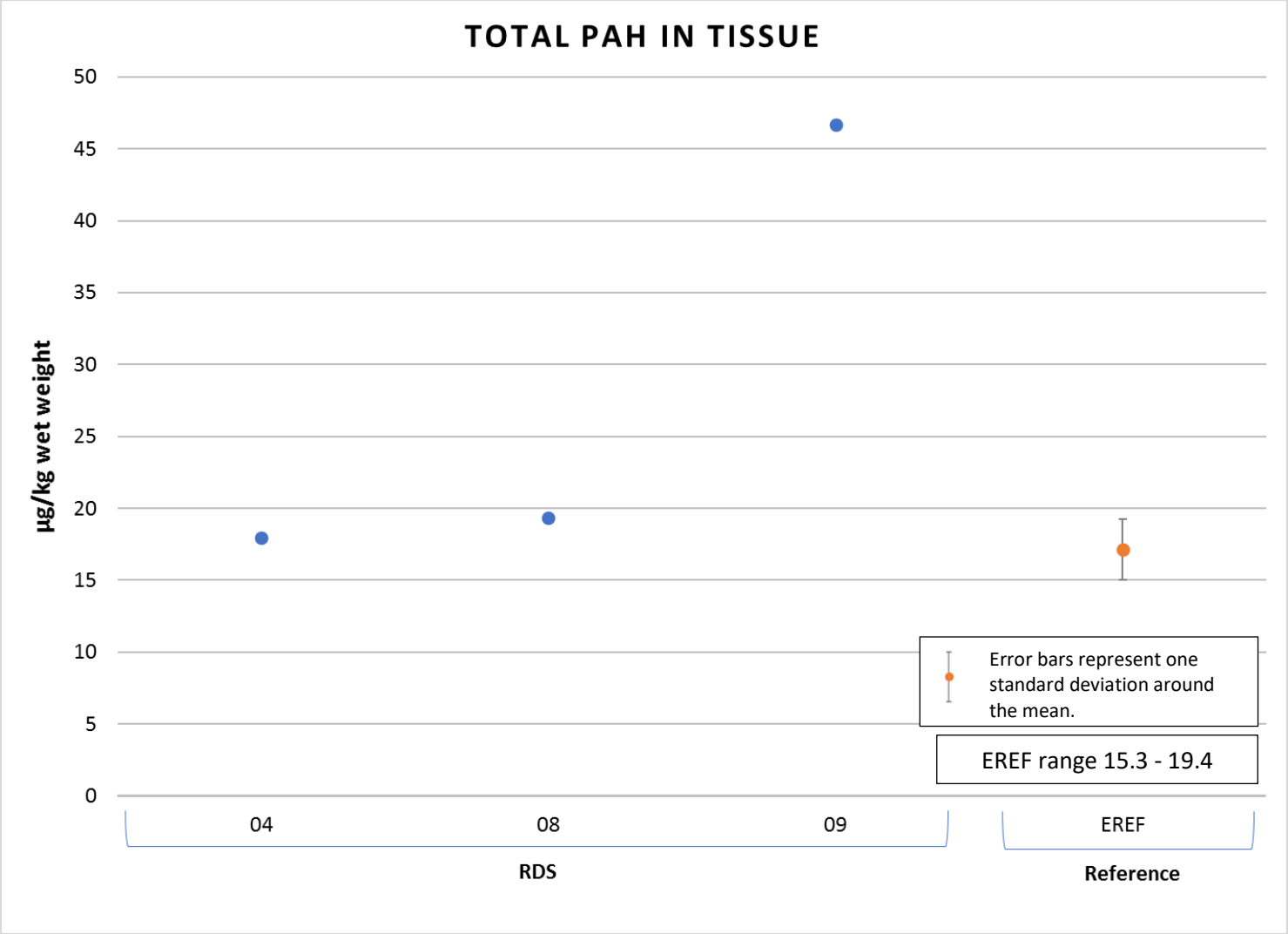


Figure 3-48. Total PAH (μ g/kg wet-wt.) in tissue from RDS 2016

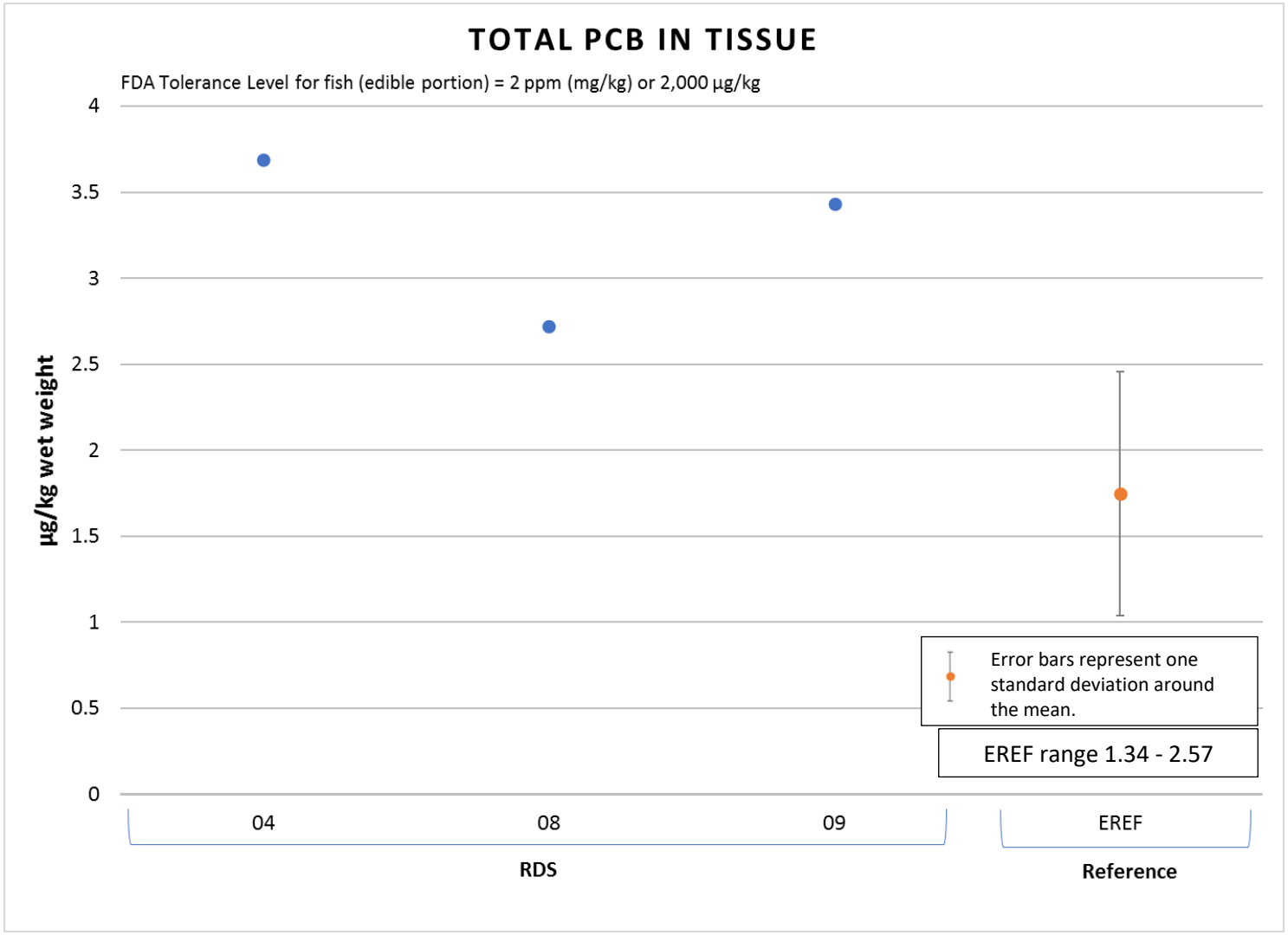


Figure 3-49. Total PCB (μ g/kg wet-wt.) in tissue from RDS 2016

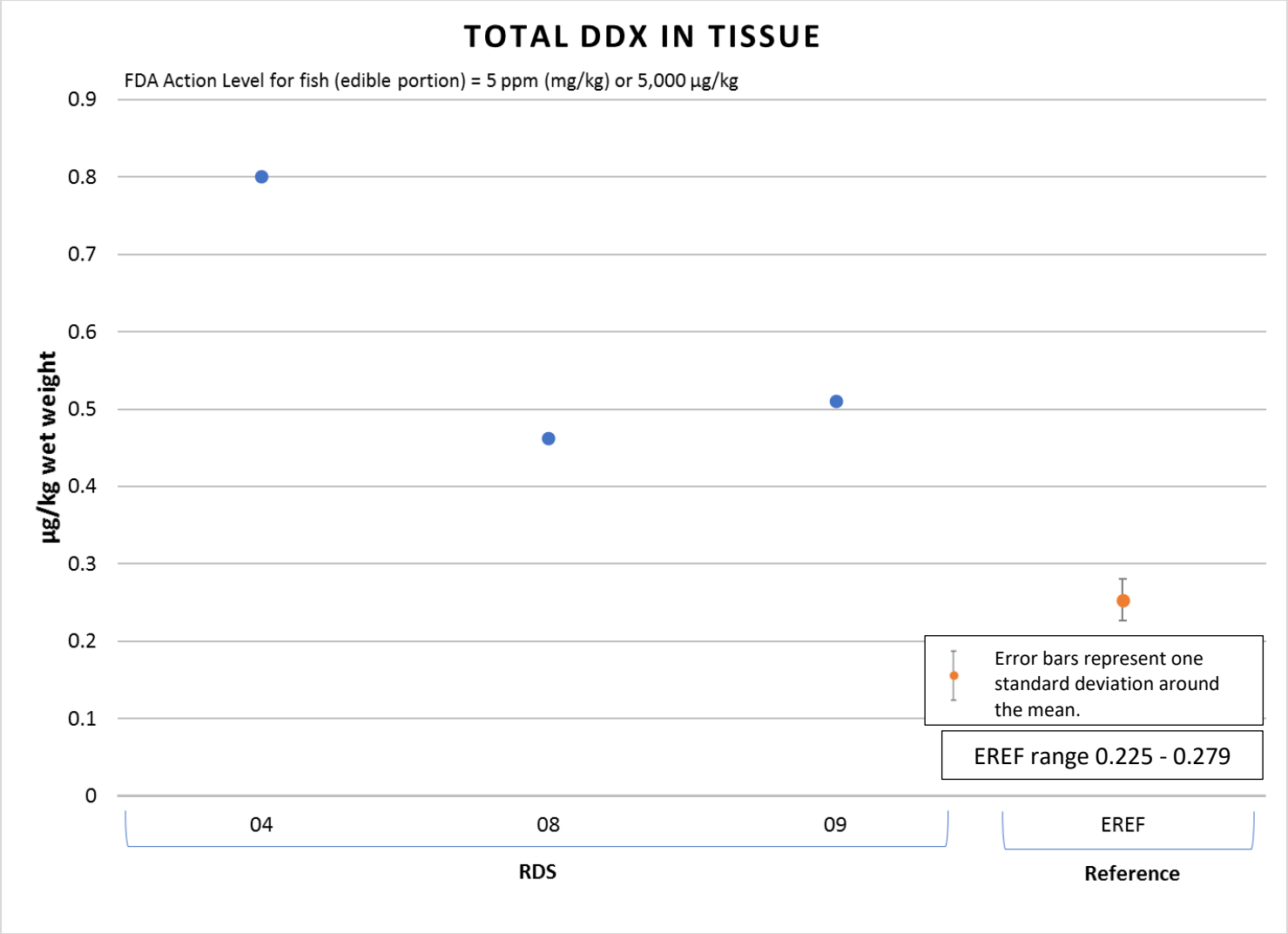


Figure 3-50a. Total DDX (μ g/kg wet-wt.) in tissue from RDS 2016

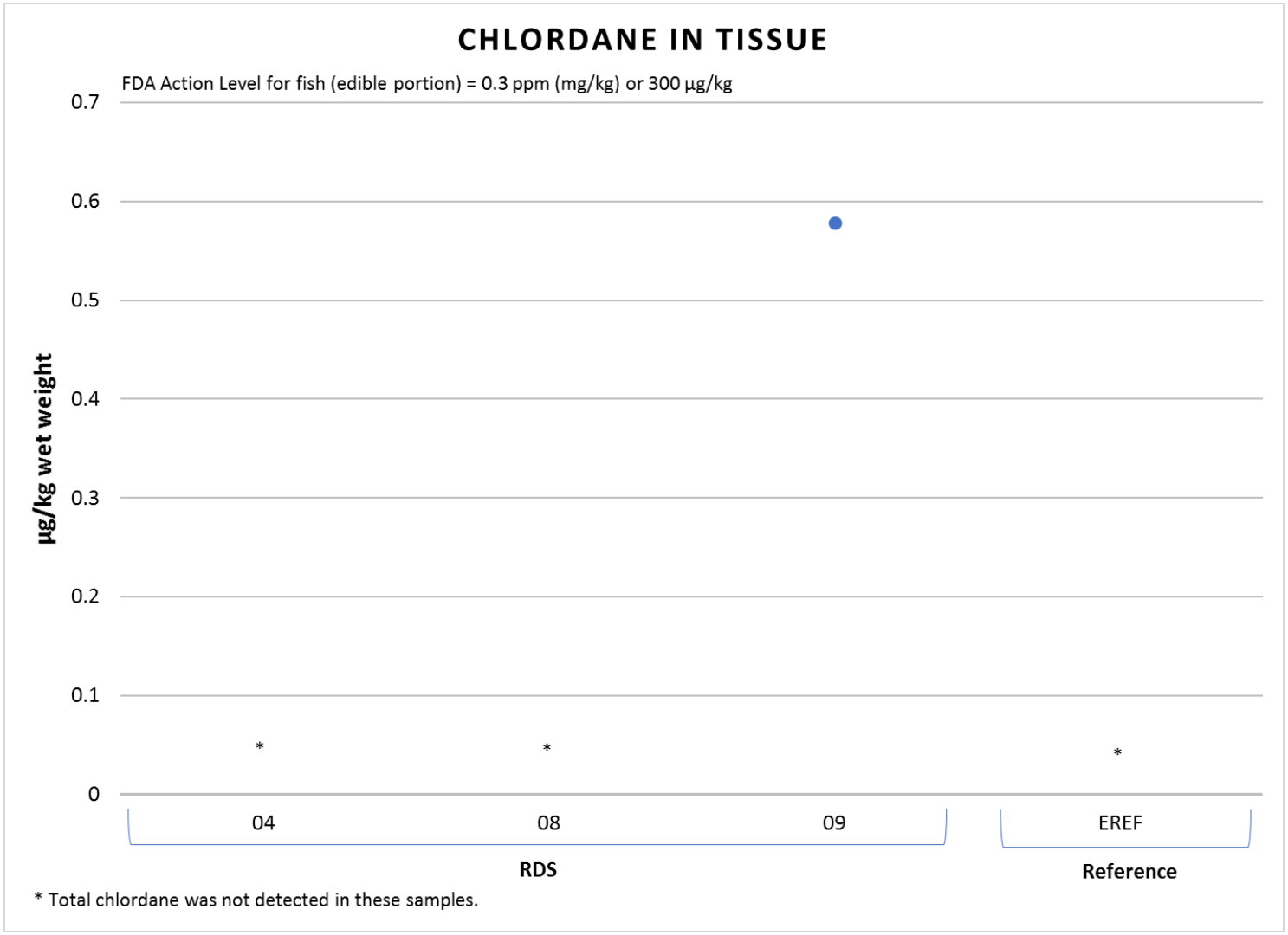


Figure 3-50b. Chlordane (μ g/kg wet-wt.) in tissue from RDS 2016

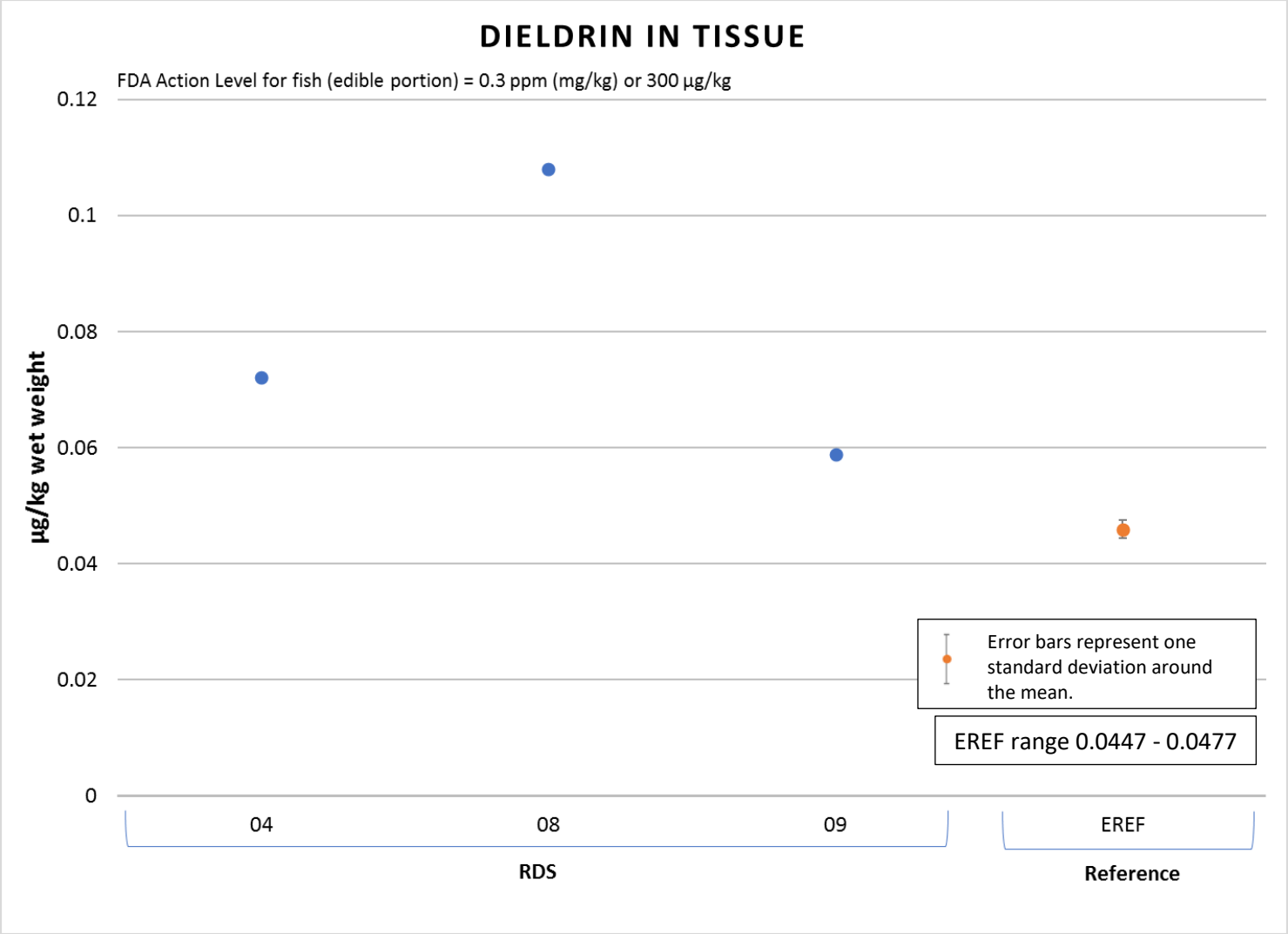


Figure 3-50c. Dieldrin (μ g/kg wet-wt.) in tissue from RDS 2016

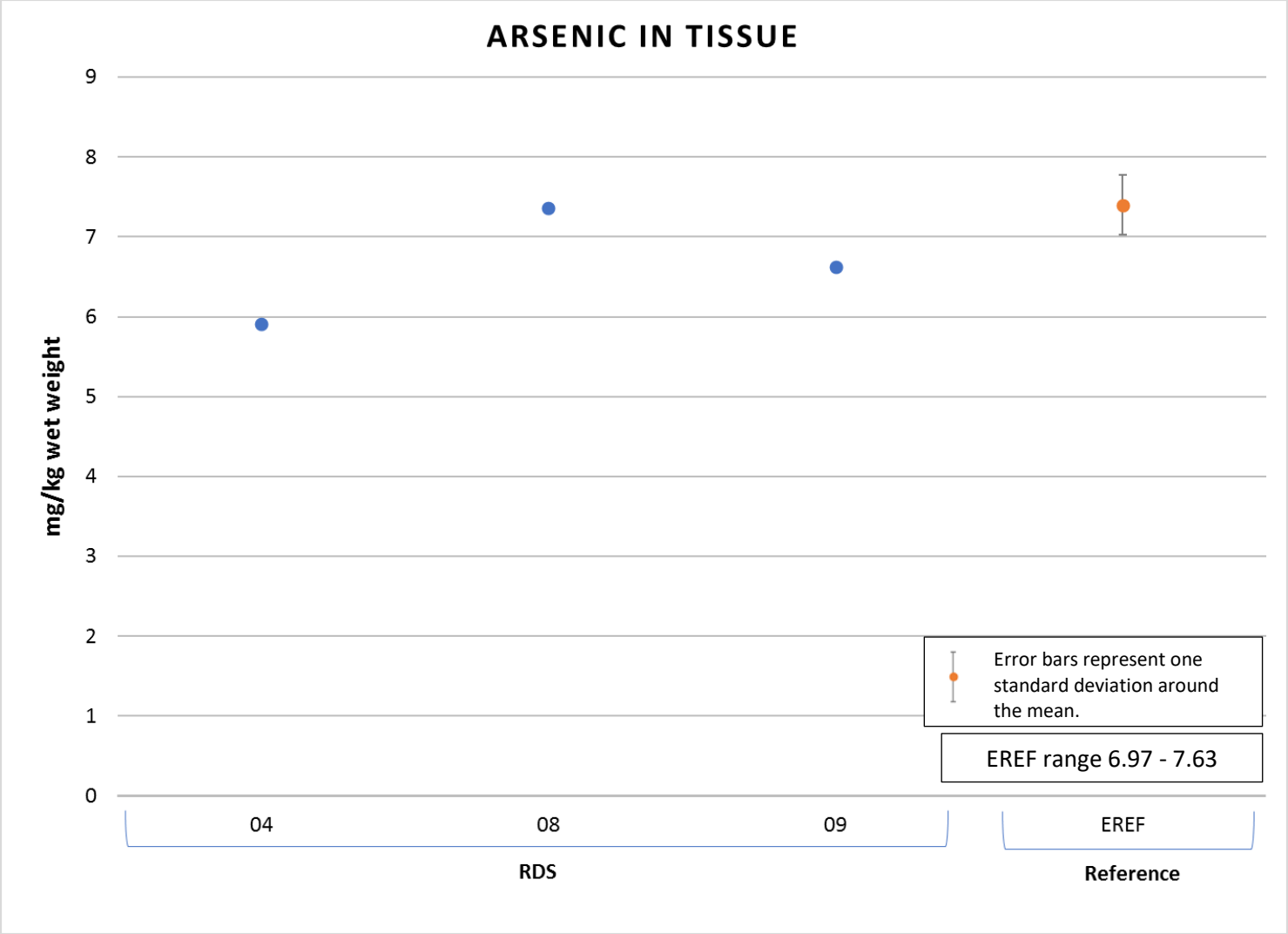


Figure 3-51a. Arsenic (mg/kg wet-wt.) in tissue from RDS 2016

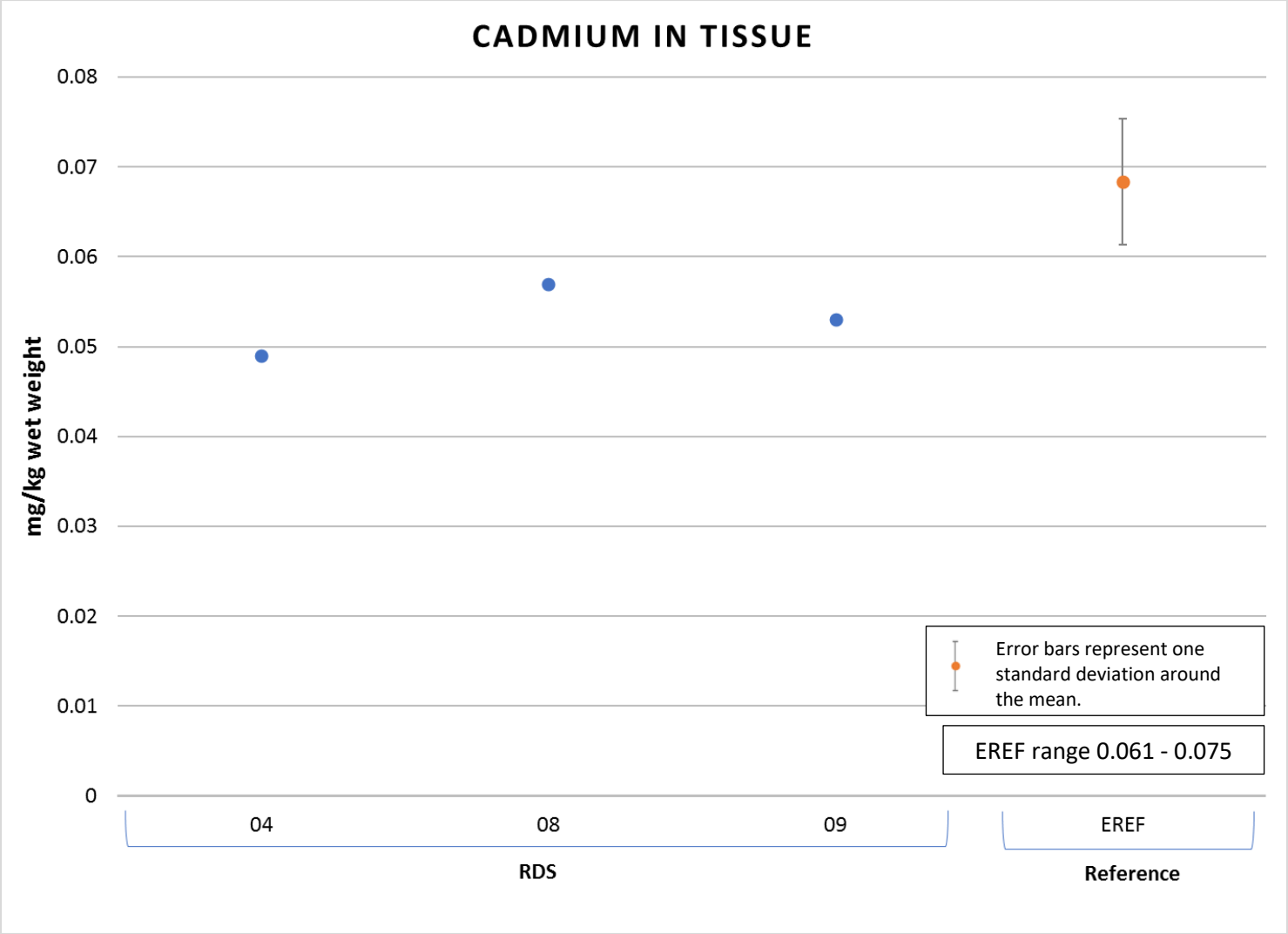


Figure 3-51b. Cadmium (mg/kg wet-wt.) in tissue from RDS 2016

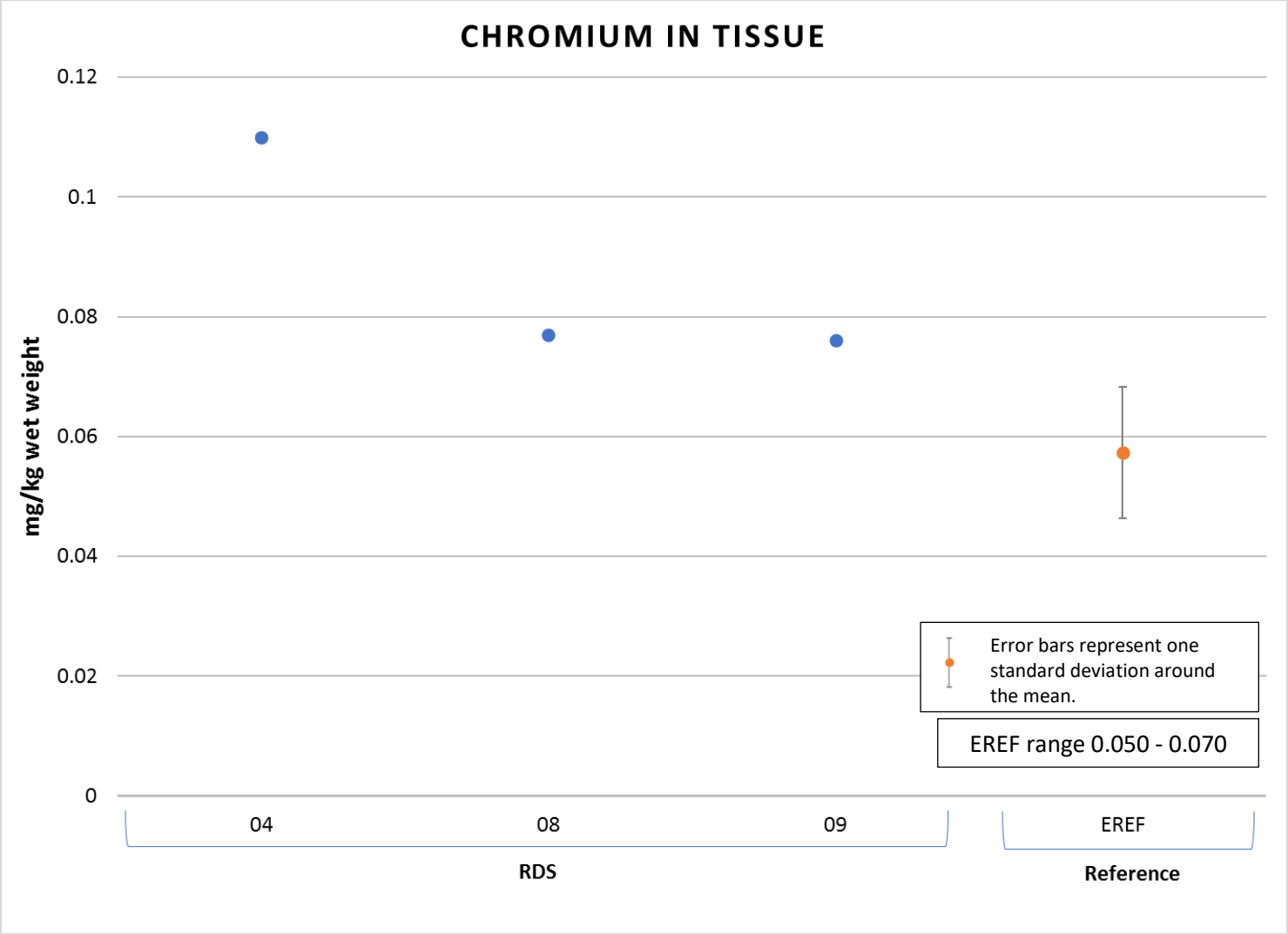


Figure 3-51c. Chromium (mg/kg wet-wt.) in tissue from RDS 2016

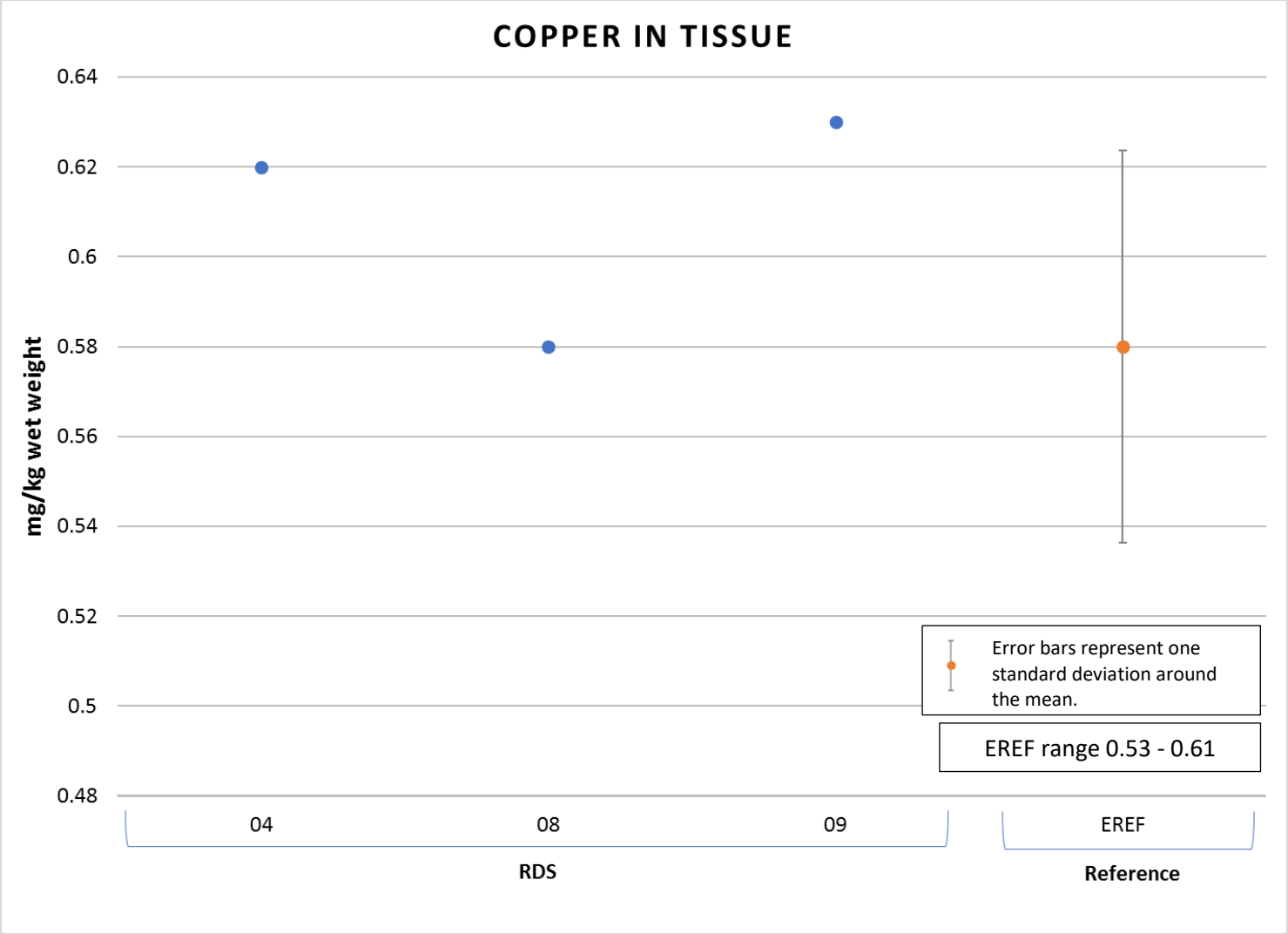


Figure 3-51d. Copper (mg/kg wet-wt.) in tissue from RDS 2016

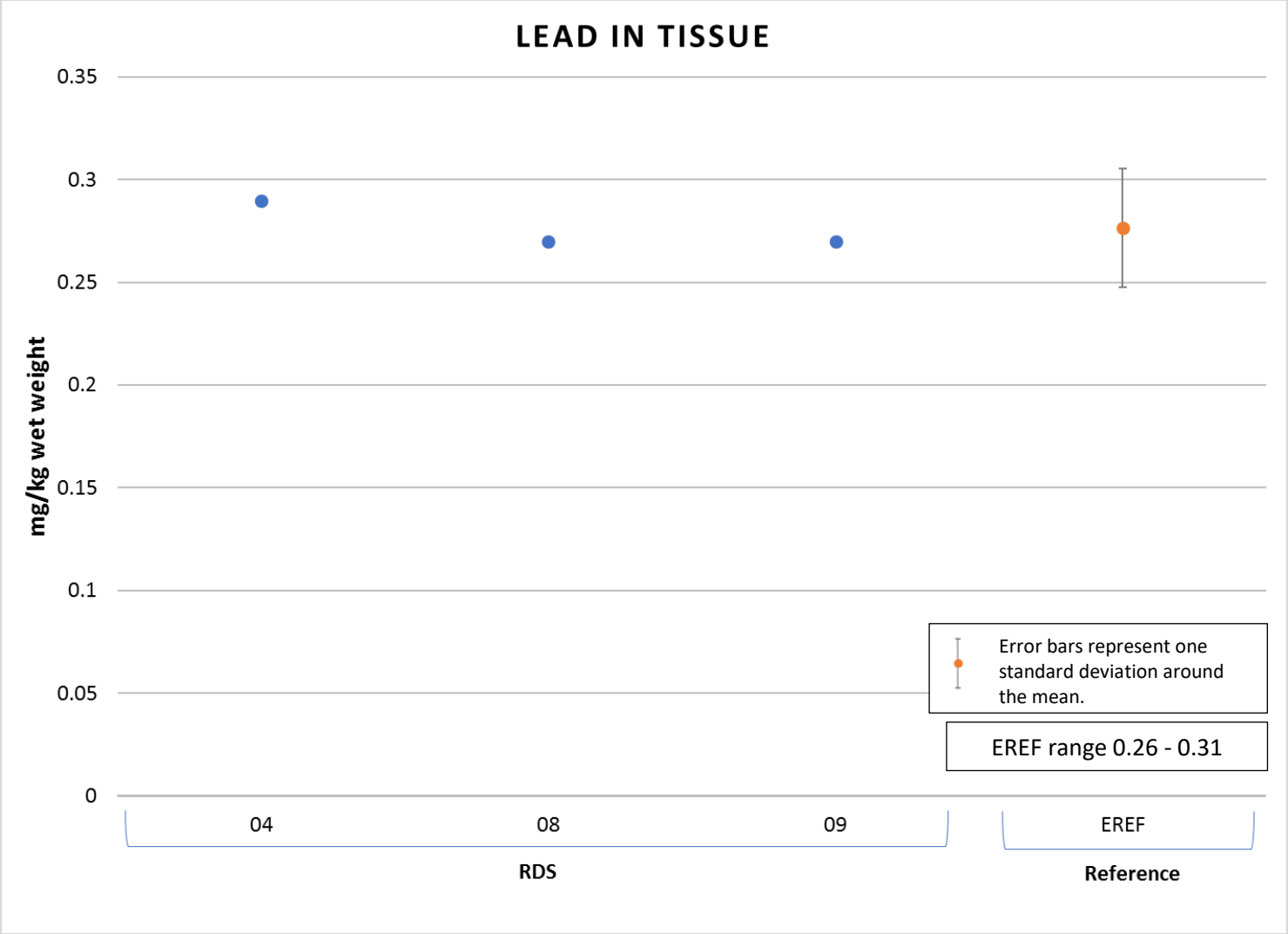


Figure 3-51e. Lead (mg/kg wet-wt.) in tissue from RDS 2016

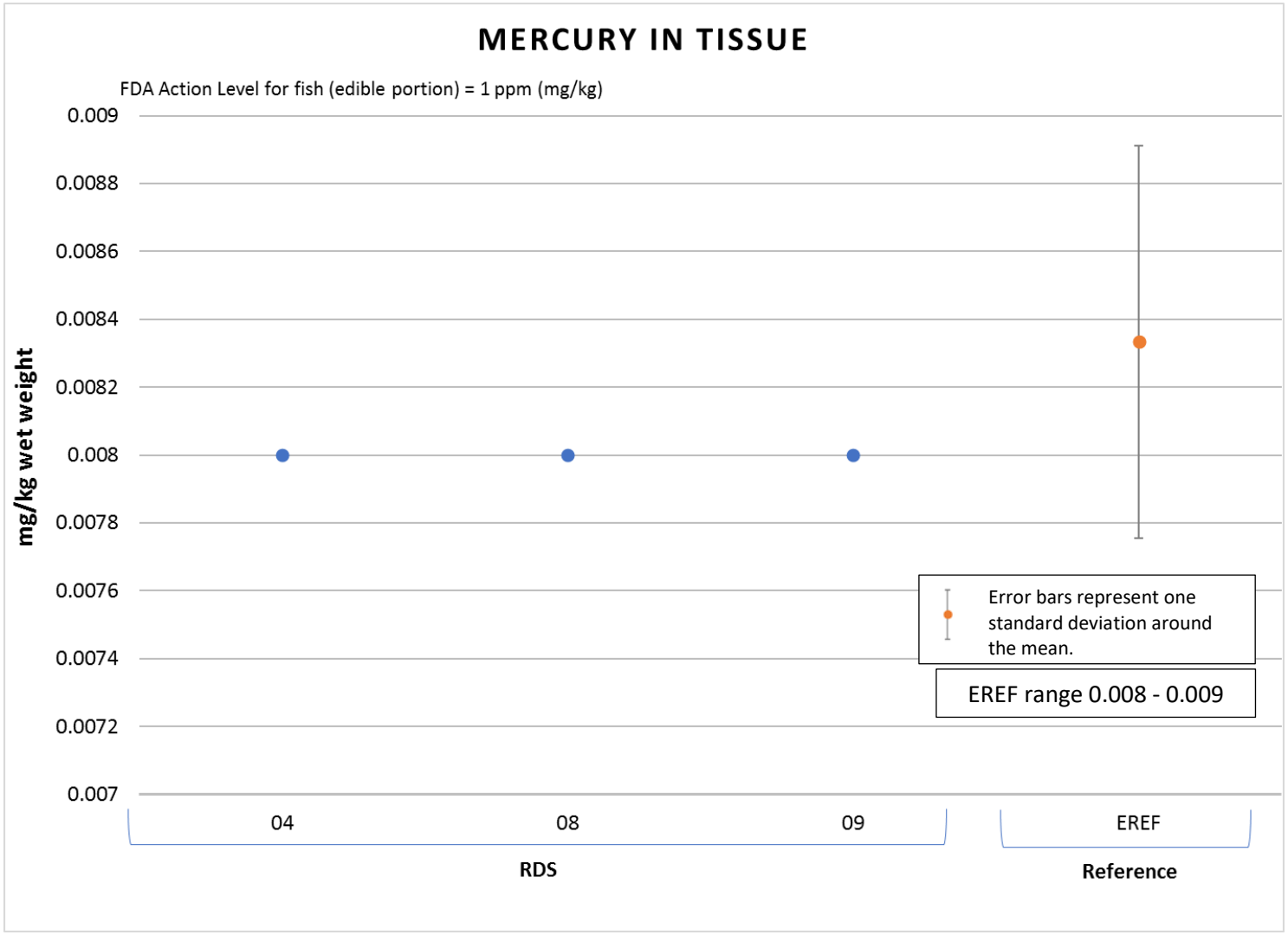


Figure 3-51f. Mercury (mg/kg wet-wt.) in tissue from RDS 2016

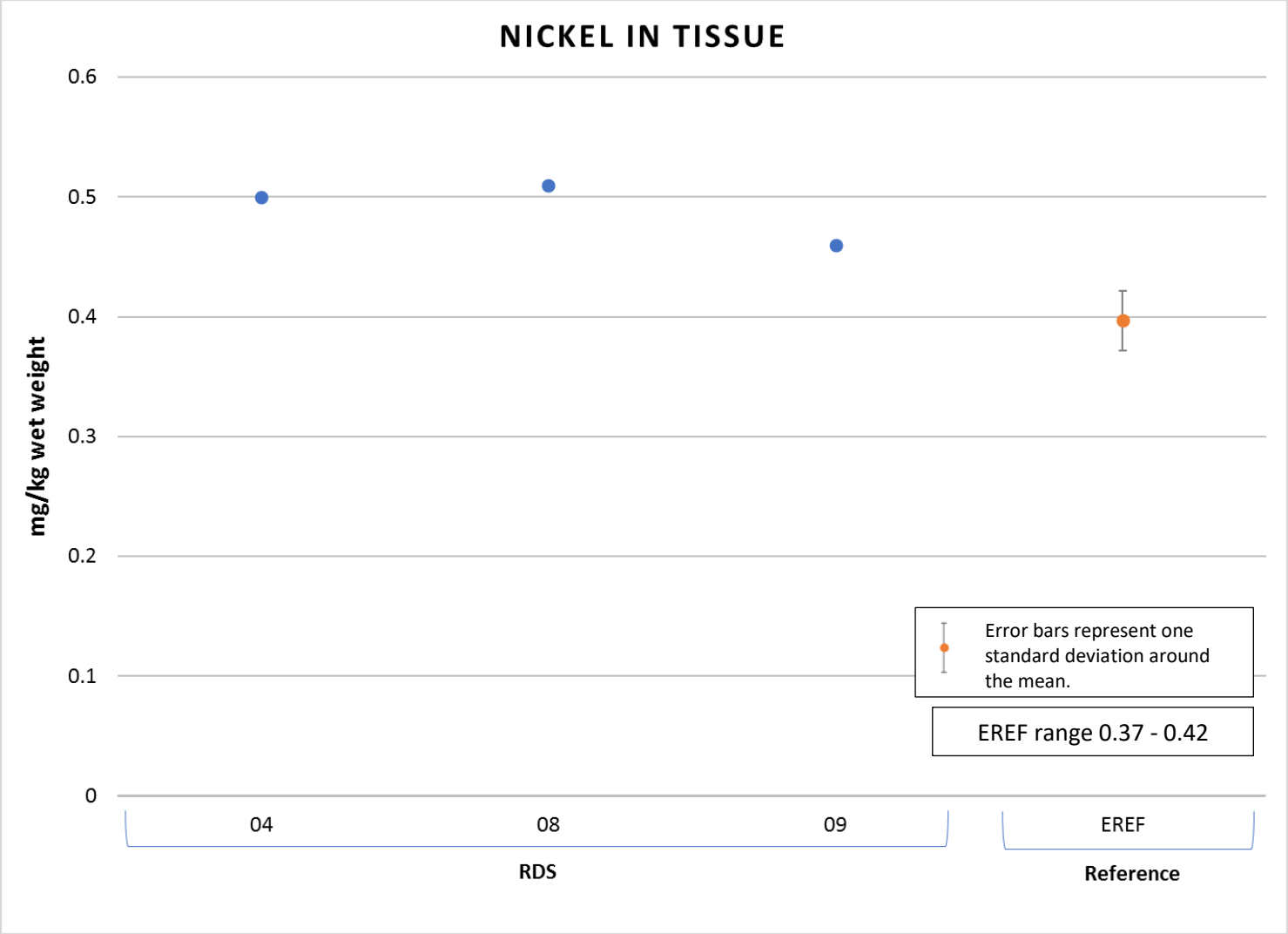


Figure 3-51g. Nickel (mg/kg wet-wt.) in tissue from RDS 2016

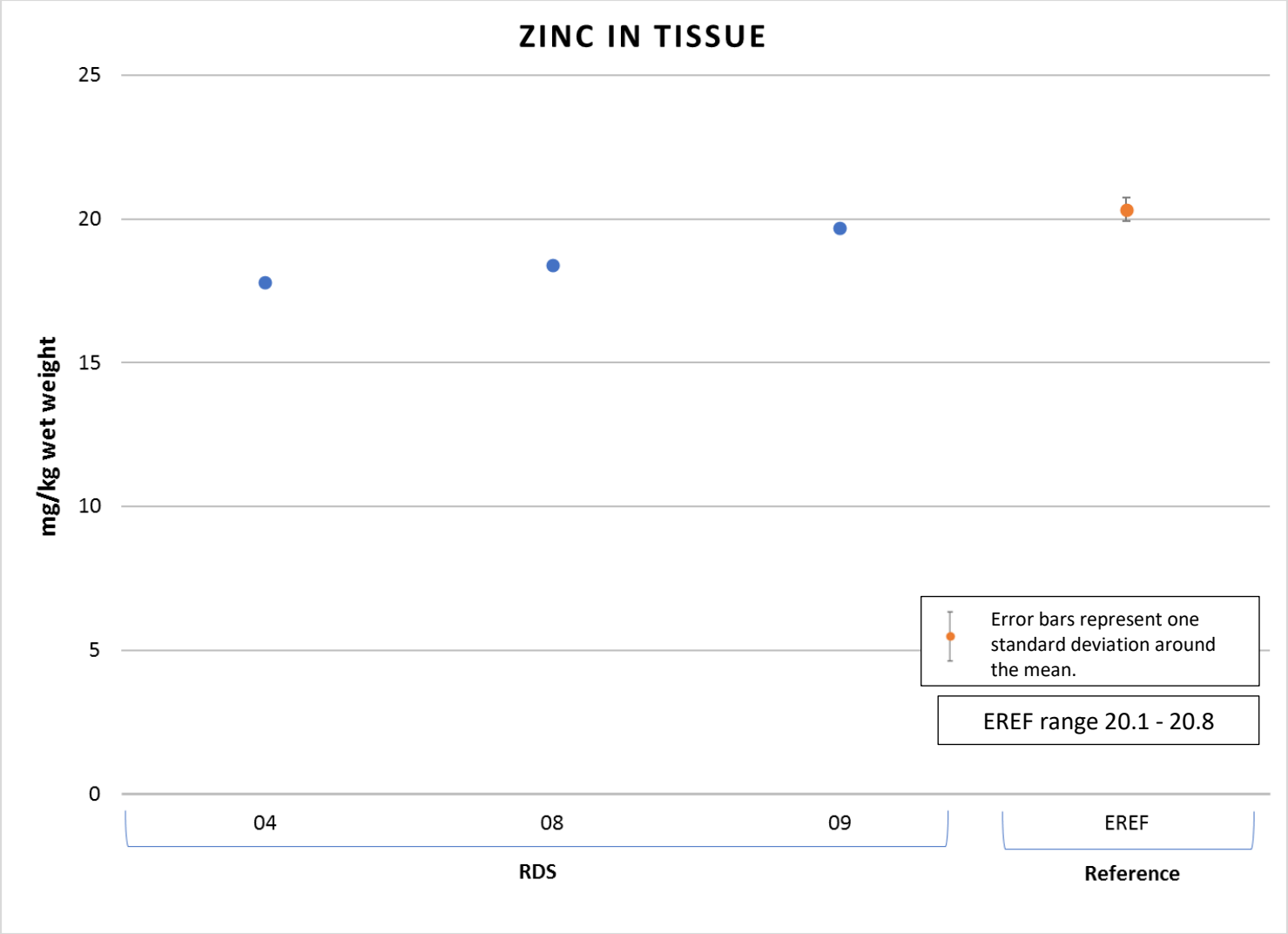


Figure 3-51h. Zinc (mg/kg wet-wt.) in tissue from RDS 2016

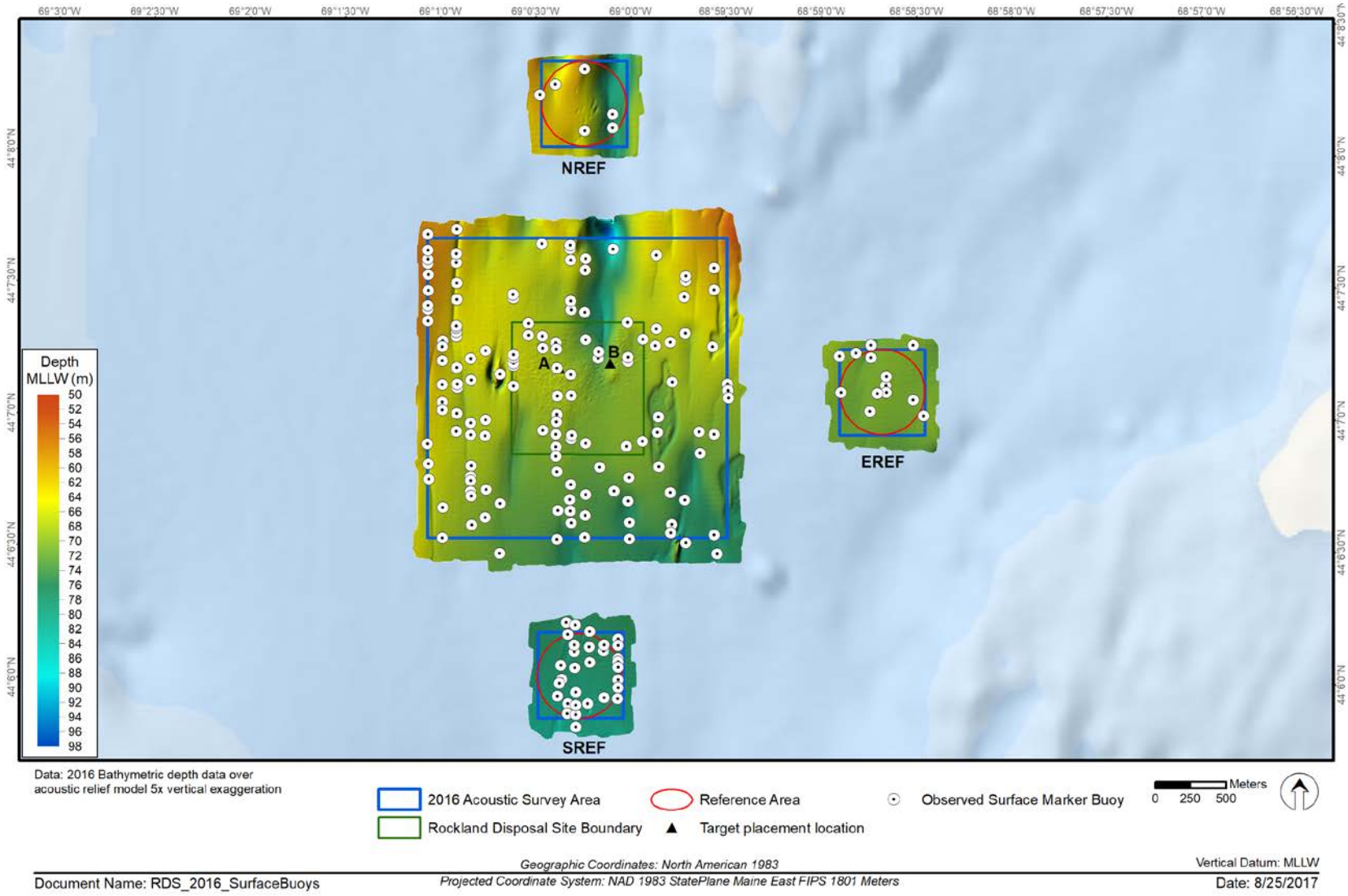


Figure 3-52. Location of surface buoys, indicating lobster trap presence, observed during the September 2016 survey

4.0 DISCUSSION

The September 2016 survey at RDS was designed as a focused survey to provide full coverage of the limited-use site and reference areas using multibeam acoustic data, SPI/PV images, enumeration of the infaunal community, and chemical analysis of sediment and infaunal tissue to provide characterization of surficial sediment quality to aid in management of the site. The focused study was also conducted to provide characterization of surficial sediments and benthic habitat quality to aid in management of the site. The September 2016 survey was designed to:

- Characterize seafloor topography and surficial features over the full site and three reference areas (NREF, SREF, and EREF) by completing a multibeam bathymetric survey;

- Use SPI and PV imaging to further define the physical characteristics of surficial sediment and to assess the benthic community of the site and reference areas and benthic recolonization status of the area relative to past disposal activity;

- Provide an initial characterization of the surficial sediment quality over the site and reference areas through the collection of sediment for laboratory analysis of sediment chemistry, benthic community structure, and tissue chemistry of non-motile organisms.

4.1 Accuracy of Dredged Material Placement

Relatively small volumes of dredged material were placed at RDS in the time period since the previous 2003 monitoring survey and contribution (ENSR 2004, Contribution 156), with the most recent placement over ten years ago. Approximately 25,200 m^3 of dredged material were placed at RDS from December 2003 to April 2006. These dredged material placement events all occurred within the designated site boundaries with most placement events centered around target placement location B (Figure 1-3). Acoustic results indicated the continued presence of two small disposal mounds and that the sediment texture and roughness of the primary areas at which dredged materials were placed was harder and rougher than surrounding native sediments (Figure 3-5, Figure 3-6a).

Dredged material was observed throughout the disposal area and nearly all observations were of older, weathered dredged material that had been heavily reworked into the sediment matrix (Figure 3-27). A spatial gradient of dredged material presence was evident beginning with clasts of cohesive dredged material near target placement location B (Figure 3-38) and moving outward from there through stages of weathering and reworking until sediment at the edges of the disposal area where it was difficult to optically distinguish between heavily weathered dredged material and ambient sediments (Figure 3-32).

4.2 Long-Term Stability of Placed Sediment

Acoustic results and comparison to previous monitoring surveys indicate that the placed dredged material and site depositional conditions appear stable. Evidence of historical dredged material does not extend beyond the surveyed disposal area (RDS/RDSO), with the exception of trace inclusions observed at SREF. Dredged material placed at RDS appears to have remained in the vicinity of the site and has been slowly incorporated into the sediment matrix by the benthic community. Therefore, it is reasonable to expect that RDS could accommodate additional placement of dredged material.

Existing bathymetry at RDS showed an elevation range of 15.8 m. Hypothetical extents of future disposals were estimated assuming a maximum slope between the deposited sediment and the ambient seafloor of 3-degrees (rise/run of 1/19). The relationships between buffer zone width, remaining site area and hypothetical deposit thickness were evaluated using rectangular and ellipsoidal models and suggested maximal capacity at a deposit thickness of approximately 8 m (well below the elevation range of the site). A digital model of a deposit conforming to these constraints was constructed and suggested a remaining capacity of approximately 5.46 million m^3 assuming coverage of the site with a thickness of 8 m.

4.3 Biological Recovery of the Benthic Community

The results supported the conclusion that surface sediments at RDS have been recolonized by a benthic community that is ecologically equivalent to reference areas. Results of sediment chemistry, benthic community, and tissue analyses all support this finding. SPI and PV images were collected within and surrounding RDS and within three reference areas. Evidence of healthy advanced Stage 3 successional status was present in at least one replicate image from all 36 stations surveyed. Mean aRPD depths were statistically equivalent at disposal areas (4.1 cm) compared to the reference locations (4.2 cm) and all were deeper than those observed in the 2003 survey. The seafloor at and near RDS is used by the lobster fishery and the presence of large numbers of lobster burrows might have led to frequent disturbance of surface sediments and contributed to the prevalence of Stage 1 taxa observed and the somewhat patchy distribution of aRPD depths over small spatial scales.

Results of sediment and tissue chemistry also support lack of an effect of placement of dredged material on the biological community. Sediment concentrations at the disposal sites were generally similar to, or below, the concentrations found at the reference locations and generally at, or below, the ER-L values. The exceptions were As and Ni, which were elevated above ER-L values in all samples, including the reference areas. These two metals, however, are naturally occurring in upland soils and sediments. Tissue concentrations from worms collected within the disposal area were also low and similar to concentrations found in worms collected at the reference areas and were well below FDA action levels for edible fish tissue.

4.4 Management Considerations

Lobster fishing gear was prevalent at RDS with higher observations of surface marker buoys observed in the western and southern portions of the survey area and within the southern reference area. A 2003 study found that dredged material at RDS had no significant effects on lobster populations sampled there (Wahle et al. 2004). The presence of high densities of fixed fishing gear can make surveying challenging but there is no evidence that the fishing activity is inconsistent with management of the site for disposal of dredged material.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Overall the 2016 survey at RDS showed that the site is stable, the benthic community healthy, and that over time the benthic community reworks dredged material into the sediment matrix and recolonizes areas of dredged material placement. Areas that received dredged materials were different in sediment textural properties (harder and rougher) but were ecologically equivalent to reference areas in terms of benthic habitat, with all stations exhibiting mature Stage 3 taxa and deep well-developed aRPDs.

Based on the findings of the 2016 survey, our recommendations are:

R1. The presence of stable mounds and normal benthic recolonization indicate that the site could accommodate additional dredged material placement utilizing a similar approach to what has been used in the past.

R2. Monitoring efforts should continue consistent with Tiered Monitoring Protocols based on volume placed at site.

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APPENDIX A

TABLE OF COMMON CONVERSIONS

APPENDIX A

TABLE OF COMMON CONVERSIONS

Metric Unit Conversion to English Unit		**English Unit Conversion to Metric Unit**	
1 meter	3.2808 ft	1 foot	0.3048 m
1 m		1 ft	
1 square meter	10.7639 ft^2	1 square foot	0.0929 m^2
1 m^2		1 ft^2	
1 kilometer	0.6214 mi	1 mile	1.6093 km
1 km		1 mi	
1 cubic meter	1.3080 yd^3	1 cubic yard	0.7646 m^3
1 m^3		1 yd^3	
1 centimeter	0.3937 in	1 inch	2.54 cm
1 cm		1 in	

APPENDIX B

RDS DISPOSAL LOG DATA FROM DEC 2003 TO APRIL 2006

Target Site Code	Placement site name	Project name	Placement date/time	Load volume (cubic meters)	Load volume (cubic yards)	Placement latitude	Placement longitude	Permit number	Placement ID
RDS	RDS	CAMDEN HARBOR	19-Dec-03	294	385	44.11958333	-69.00116667	200202167	47764
RDS	RDS	CAMDEN HARBOR	22-Dec-03	306	400	44.1197	-69.00156667	200202167	47765
RDS	RDS	CAMDEN HARBOR	23-Dec-03	237	310	44.11998333	-69.00225	200202167	47766
RDS	RDS	CAMDEN HARBOR	29-Dec-03	229	300	44.11955	-69.00196667	200202293	47758
RDS	RDS	CAMDEN HARBOR	29-Dec-03	153	200	44.11955	-69.00196667	200202167	47767
RDS	RDS	CAMDEN HARBOR	30-Dec-03	268	350	44.11983333	-69.00141667	200202167	47768
RDS	RDS	CAMDEN HARBOR	06-Jan-04	229	300	44.11933333	-69.00235	200202324	47761
RDS	RDS	CAMDEN HARBOR	07-Jan-04	229	300	44.11908333	-69.00138333	200202324	47762
RDS	RDS	CAMDEN HARBOR	09-Jan-04	229	300	44.11996667	-69.00135	200202293	47759
RDS	RDS	CAMDEN HARBOR	09-Jan-04	46	60	44.11966667	-69.0015	200202324	47760
RDS	RDS	LASSELL ISLAND	21-Jan-04	229	300	44.11983333	-69.00125	200103135	47793
RDS	RDS	LASSELL ISLAND	21-Jan-04	229	300	44.11955	-69.00196667	200103135	47794
RDS	RDS	LASSELL ISLAND	22-Jan-04	229	300	44.11983333	-69.00241667	200103135	47795
RDS	RDS	LASSELL ISLAND	27-Jan-04	229	300	44.1197	-69.00198333	200103135	47927
RDS	RDS	LASSELL ISLAND	27-Jan-04	229	300	44.11978333	-69.00123333	200103135	47928
RDS	RDS	LASSELL ISLAND	28-Jan-04	229	300	44.1197	-69.0015	200103135	47929
RDS	RDS	LASSELL ISLAND	28-Jan-04	229	300	44.11943333	-69.002	200103135	47930
RDS	RDS	LASSELL ISLAND	29-Jan-04	229	300	44.11875	-69.00178333	200103135	47931
RDS	RDS	LASSELL ISLAND	30-Jan-04	229	300	44.1197	-69.00096667	200103135	47932
RDS	RDS	LASSELL ISLAND	30-Jan-04	229	300	44.11983333	-69.001	200103135	47933
RDS	RDS	LASSELL ISLAND	02-Feb-04	229	300	44.11981667	-69.00161667	200103135	47934
RDS	RDS	LASSELL ISLAND	02-Feb-04	229	300	44.11966667	-69.00206667	200103135	47935
RDS	RDS	LASSELL ISLAND	03-Feb-04	229	300	44.11996667	-69.00163333	200103135	47936
RDS	RDS	LASSELL ISLAND	03-Feb-04	229	300	44.11981667	-69.00185	200103135	47937
RDS	RDS	LASSELL ISLAND	03-Feb-04	153	200	44.11983333	-69.00185	200103135	47938
RDS	RDS	LASSELL ISLAND	06-Feb-04	229	300	44.11986667	-69.00175	200103135	47967
RDS	RDS	LASSELL ISLAND	06-Feb-04	229	300	44.11953333	-69.002	200103135	47968
RDS	RDS	LASSELL ISLAND	06-Feb-04	229	300	44.11971667	-69.002	200103135	47969
RDS	RDS	LASSELL ISLAND	06-Feb-04	153	200	44.11971667	-69.00183333	200103135	47970
RDS	RDS	LASSELL ISLAND	09-Feb-04	229	300	44.1198	-69.00178333	200103135	47971
RDS	RDS	LASSELL ISLAND	09-Feb-04	229	300	44.11933333	-69.00118333	200103135	47972
RDS	RDS	LASSELL ISLAND	10-Feb-04	229	300	44.11966667	-69.0011	200103135	47973
RDS	RDS	LASSELL ISLAND	10-Feb-04	229	300	44.11965	-69.00133333	200103135	47974
RDS	RDS	LASSELL ISLAND	11-Feb-04	306	400	44.11946667	-69.00116667	200103135	47975
RDS	RDS	LASSELL ISLAND	11-Feb-04	306	400	44.11966667	-69.0015	200103135	47976
RDS	RDS	LASSELL ISLAND	12-Feb-04	298	390	44.11983333	-69.00125	200103135	47977
RDS	RDS	LASSELL ISLAND	12-Feb-04	229	300	44.11991667	-69.00143333	200103135	47978
RDS	RDS	LASSELL ISLAND	12-Feb-04	382	500	44.12013333	-69.0014	200103135	47979
RDS	RDS	LASSELL ISLAND	13-Feb-04	229	300	44.11953333	-69.00166667	200103135	47980
RDS	RDS	LASSELL ISLAND	13-Feb-04	291	380	44.11963333	-69.0015	200103135	47981

Target Site Code	Placement site name	Project name	Placement date/time	Load volume (cubic meters)	Load volume (cubic yards)	Placement latitude	Placement longitude	Permit number	Placement ID
RDS	RDS	LASSELL ISLAND	13-Feb-04	191	250	44.11965	-69.00151667	200103135	47982
RDS	RDS	LASSELL ISLAND	13-Feb-04	344	450	44.11958333	-69.00125	200103135	47983
RDS	RDS	LASSELL ISLAND	14-Feb-04	191	250	44.11946667	-69.00201667	200103135	47984
RDS	RDS	LASSELL ISLAND	14-Feb-04	268	350	44.11923333	-69.002	200103135	47985
RDS	RDS	LASSELL ISLAND	14-Feb-04	191	250	44.11995	-69.00141667	200103135	47986
RDS	RDS	LASSELL ISLAND	16-Feb-04	268	350	44.11958333	-69.00208333	200103135	47987
RDS	RDS	LASSELL ISLAND	16-Feb-04	229	300	44.1196	-69.00105	200103135	47988
RDS	RDS	LASSELL ISLAND	17-Feb-04	344	450	44.1198	-69.00165	200103135	48009
RDS	RDS	LASSELL ISLAND	17-Feb-04	229	300	44.11966667	-69.00186667	200103135	48010
RDS	RDS	LASSELL ISLAND	18-Feb-04	229	300	44.11956667	-69.00196667	200103135	48008
RDS	RDS	LASSELL ISLAND	20-Feb-04	229	300	44.12011667	-69.00116667	200103135	48006
RDS	RDS	LASSELL ISLAND	20-Feb-04	229	300	44.11965	-69.00183333	200103135	48007
RDS	RDS	LASSELL ISLAND	25-Feb-04	229	300	44.11811667	-69.0014	200103135	48013
RDS	RDS	LASSELL ISLAND	25-Feb-04	229	300	44.119	-69.00191667	200103135	48014
RDS	RDS	LASSELL ISLAND	27-Feb-04	229	300	44.11891667	-69.00116667	200103135	48015
RDS	RDS	LASSELL ISLAND	28-Feb-04	229	300	44.11911667	-69.0015	200103135	48016
RDS	RDS	LASSELL ISLAND	01-Mar-04	229	300	44.11941667	-69.001	200103135	48053
RDS	RDS	LASSELL ISLAND	02-Mar-04	229	300	44.1198	-69.00175	200103135	48054
RDS	RDS	LASSELL ISLAND	05-Mar-04	229	300	44.11946667	-69.00125	200103135	48055
RDS	RDS	LASSELL ISLAND	09-Mar-04	229	300	44.11891667	-69.00206667	200103135	48056
RDS	RDS	CASTINE HARBOR	06-Apr-04	421	550	44.11803333	-69.0008	200202598	48777
RDS	RDS	CASTINE HARBOR	08-Apr-04	497	650	44.12181667	-69.00131667	200202598	48778
RDS	RDS	CAMDEN HARBOR	02-Feb-06	229	300	44.12116667	-69.0047	199901904	49966
RDS	RDS	CAMDEN HARBOR	08-Feb-06	229	300	44.1195	-69.00265	199901904	49967
RDS	RDS	CAMDEN HARBOR	09-Feb-06	229	300	44.12173333	-69.00245	199901904	49968
RDS	RDS	CAMDEN HARBOR	22-Feb-06	352	460	44.12045	-69.00216667	199901904	51003
RDS	RDS	CAMDEN HARBOR	23-Feb-06	413	540	44.11975	-69.00373333	199901904	51004
RDS	RDS	CAMDEN HARBOR	24-Feb-06	321	420	44.1198	-69.00528333	199901904	51022
RDS	RDS	CAMDEN HARBOR	28-Feb-06	306	400	44.1192	-69.00285	199901904	51023
RDS	RDS	CAMDEN HARBOR	01-Mar-06	275	360	44.12105	-69.0021	199901904	51024
RDS	RDS	CAMDEN HARBOR	07-Mar-06	382	500	44.12003333	-69.00316667	199901904	51083
RDS	RDS	CAMDEN HARBOR	08-Mar-06	413	540	44.11863333	-69.00078333	199901904	51084
RDS	RDS	CAMDEN HARBOR	09-Mar-06	367	480	44.1193	-69.00245	199901904	51085
RDS	RDS	CAMDEN HARBOR	15-Mar-06	325	425	44.11928333	-69.0013	199901904	51086
RDS	RDS	CAMDEN HARBOR	15-Mar-06	191	250	44.11813333	-69.00215	199901904	51087
RDS	RDS	CAMDEN HARBOR	15-Mar-06	325	425	44.12015	-69.00261667	199901904	51088
RDS	RDS	CAMDEN HARBOR	16-Mar-06	229	300	44.11948333	-69.00158333	199901904	51089
RDS	RDS	CAMDEN HARBOR	16-Mar-06	344	450	44.11933333	-69.00218333	199901904	51090
RDS	RDS	CAMDEN HARBOR	16-Mar-06	199	260	44.12076667	-69.0068	199901904	51091
RDS	RDS	CAMDEN HARBOR	17-Mar-06	325	425	44.11943333	-69.00153333	199901904	51092

Target Site Code	Placement site name	Project name	Placement date/time	Load volume (cubic meters)	Load volume (cubic yards)	Placement latitude	Placement longitude	Permit number	Placement ID
RDS	RDS	CAMDEN HARBOR	17-Mar-06	191	250	44.11995	-69.0028	199901904	51093
RDS	RDS	CAMDEN HARBOR	20-Mar-06	363	475	44.11965	-69.00235	199901904	51094
RDS	RDS	CAMDEN HARBOR	20-Mar-06	229	300	44.12081667	-69.00795	199901904	51095
RDS	RDS	CAMDEN HARBOR	20-Mar-06	344	450	44.11981667	-69.00641667	199901904	51096
RDS	RDS	CAMDEN HARBOR	21-Mar-06	210	275	44.1193	-69.00155	199901904	51097
RDS	RDS	CAMDEN HARBOR	22-Mar-06	363	475	44.11778333	-69.0038	199901904	51098
RDS	RDS	CAMDEN HARBOR	22-Mar-06	325	425	44.1193	-69.00186667	199901904	49986
RDS	RDS	CAMDEN HARBOR	23-Mar-06	344	450	44.11928333	-69.00173333	199901904	51099
RDS	RDS	CAMDEN HARBOR	23-Mar-06	325	425	44.11843333	-69.00143333	199901904	51100
RDS	RDS	CAMDEN HARBOR	27-Mar-06	344	450	44.11938333	-69.0017	199901904	51101
RDS	RDS	CAMDEN HARBOR	28-Mar-06	344	450	44.11985	-69.00191667	199901904	51102
RDS	RDS	CAMDEN HARBOR	28-Mar-06	229	300	44.11931667	-69.0018	199901904	51103
RDS	RDS	CAMDEN HARBOR	29-Mar-06	306	400	44.11966667	-69.00233333	199901904	51163
RDS	RDS	CAMDEN HARBOR	30-Mar-06	229	300	44.11875	-69.00303333	199901904	51164
RDS	RDS	CAMDEN HARBOR	03-Apr-06	306	400	44.11911667	-69.00218333	199901904	51165
RDS	RDS	CAMDEN HARBOR	05-Apr-06	229	300	44.1193	-69.00141667	199901904	51166

APPENDIX C

ACTUAL SPI/PV AND SEDIMENT GRAB REPLICATE LOCATIONS

RDS 2016 ACTUAL SPI/PV STATION IDS/COORDINATES							
Station ID	**Replicate**	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
RDS-01	A	9/13/2016	13:33:11	259639.04	49924.76	44.1149257	-69.00423946
RDS-01	B	9/13/2016	13:33:54	259631.88	49927.54	44.11495033	-69.00432912
RDS-01	C	9/13/2016	13:34:41	259638.21	49941.99	44.11508073	-69.00425115
RDS-01	D	9/13/2016	13:35:25	259644.62	49934.04	44.11500953	-69.00417046
RDS-02	A	9/13/2016	10:32:30	259440.2	50582.15	44.1208314	-69.00677409
RDS-02	B	9/13/2016	10:33:20	259443.31	50582.8	44.12083742	-69.00673529
RDS-02	C	9/13/2016	10:34:09	259447.26	50585.47	44.12086167	-69.00668614
RDS-02	D	9/13/2016	10:34:57	259450.73	50590.59	44.12090794	-69.00664318
RDS-03	A	9/13/2016	15:02:32	259371.15	50317.64	44.11844691	-69.00761642
RDS-03	B	9/13/2016	15:03:16	259367.87	50317.26	44.11844331	-69.00765737
RDS-03	C	9/13/2016	15:04:10	259382.39	50320.86	44.11847651	-69.00747624
RDS-03	D	9/13/2016	15:05:02	259389.47	50325.18	44.11851579	-69.00738812
RDS-04	A	9/13/2016	10:05:26	259610.51	50427.16	44.11944587	-69.00463436
RDS-04	B	9/13/2016	10:07:01	259622.53	50413.6	44.11932449	-69.00448315
RDS-04	C	9/13/2016	10:07:42	259615.9	50414.45	44.11933177	-69.00456605
RDS-04	D	9/13/2016	10:08:25	259623.51	50419.22	44.11937512	-69.00447134
RDS-05	A	9/13/2016	11:38:08	259984.47	50548.18	44.12055562	-68.9999714
RDS-05	B	9/13/2016	11:39:06	259988.18	50548.76	44.12056104	-68.99992509
RDS-05	C	9/13/2016	11:39:55	259986.09	50555.79	44.1206242	-68.99995173
RDS-05	D	9/13/2016	11:40:37	259990.74	50561.07	44.12067198	-68.99989404
RDS-06	A	9/13/2016	10:13:55	259661.8	50575.87	44.12078712	-69.00400494
RDS-06	B	9/13/2016	10:14:36	259667.65	50585.9	44.12087772	-69.00393262
RDS-06	C	9/13/2016	10:15:19	259668.14	50586.72	44.12088513	-69.00392656
RDS-06	D	9/13/2016	10:16:09	259655.18	50590.09	44.12091474	-69.00408874
RDS-07	A	9/13/2016	13:43:26	259362.29	50022.45	44.11578963	-69.00770436
RDS-07	B	9/13/2016	13:44:13	259360.48	50031.49	44.11587089	-69.00772767
RDS-07	C	9/13/2016	13:44:55	259355.02	50037.17	44.11592171	-69.00779632
RDS-07	D	9/13/2016	13:45:44	259363.75	50045.58	44.11599788	-69.00768791
RDS-08	A	9/13/2016	13:51:59	259734.58	50132.3	44.11679888	-69.00306175
RDS-08	B	9/13/2016	13:52:45	259730.46	50140.47	44.11687219	-69.00311385
RDS-08	C	9/13/2016	13:53:32	259734.22	50142.86	44.1168939	-69.00306706
RDS-08	D	9/13/2016	13:54:26	259743.23	50132.15	44.11679801	-69.00295367
RDS-09	A	9/13/2016	10:22:41	259633.91	50681.72	44.12173826	-69.0043615
RDS-09	B	9/13/2016	10:23:27	259631.11	50692.61	44.12183612	-69.00439732
RDS-09	C	9/13/2016	10:24:20	259644.31	50682.26	44.1217437	-69.0042316
RDS-09	D	9/13/2016	10:25:05	259640.75	50680.95	44.12173171	-69.00427598
RDS-10	A	9/13/2016	10:42:03	259274.93	50566.94	44.12068533	-69.0088378
RDS-10	B	9/13/2016	10:42:48	259270.95	50564.13	44.12065981	-69.00888731
RDS-10	C	9/13/2016	10:43:32	259259.63	50570.94	44.12072048	-69.00902927
RDS-10	D	9/13/2016	10:44:18	259264.59	50580	44.12080229	-69.008968
RDS-10	E	9/13/2016	15:18:11	259269.39	50587.74	44.12087222	-69.00890863
RDS-10	F	9/13/2016	15:18:58	259272.52	50578.6	44.12079014	-69.00886881
RDS-10	G	9/13/2016	15:19:56	259274.03	50583.72	44.1208363	-69.00885034
RDS-10	H	9/13/2016	15:20:45	259266.09	50597.45	44.12095943	-69.00895061
RDS-10	I	9/13/2016	16:37:29	259259.89	50587	44.12086503	-69.00902726
RDS-10	J	9/13/2016	16:38:15	259252.74	50593.87	44.12092647	-69.00911712

RDS 2016 ACTUAL SPI/PV STATION IDS/COORDINATES							
Station ID	**Replicate**	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
RDS-10	K	9/13/2016	16:38:59	259254	50589.54	44.12088757	-69.00910105
RDS-10	L	9/13/2016	16:39:39	259255.63	50600.03	44.12098207	-69.00908149
RDS-11	A	9/13/2016	14:32:45	259835.26	50358.55	44.11884073	-69.00182117
RDS-11	B	9/13/2016	14:34:05	259840.72	50354.41	44.11880376	-69.00175264
RDS-11	C	9/13/2016	14:34:57	259850.63	50350.67	44.11877065	-69.00162855
RDS-11	D	9/13/2016	14:36:51	259842.43	50337.67	44.11865319	-69.00173
RDS-12	A	9/13/2016	15:41:03	259751.92	50701.17	44.12191982	-69.00288855
RDS-12	B	9/13/2016	15:41:46	259754.64	50695.04	44.1218648	-69.00285409
RDS-12	C	9/13/2016	15:42:40	259772.86	50688.83	44.12180991	-69.00262597
RDS-12	D	9/13/2016	15:43:34	259763.43	50688.98	44.12181074	-69.00274381
RDSO-13	A	9/13/2016	9:02:32	259550.91	49591.14	44.11191816	-69.00531486
RDSO-13	B	9/13/2016	9:03:28	259549.93	49603.97	44.11203358	-69.00532809
RDSO-13	C	9/13/2016	9:04:26	259557.05	49605.23	44.11204532	-69.00523924
RDSO-13	D	9/13/2016	9:05:09	259547.45	49606.53	44.11205649	-69.00535927
RDSO-13	E	9/13/2016	16:51:16	259566.88	49613.61	44.11212128	-69.00511709
RDSO-13	F	9/13/2016	16:52:08	259558.71	49614.6	44.11212974	-69.00521922
RDSO-13	G	9/13/2016	16:52:48	259557.28	49620.8	44.11218546	-69.00523756
RDSO-13	H	9/13/2016	16:53:36	259578.13	49618.6	44.11216682	-69.00497693
RDSO-14	A	9/13/2016	14:02:08	260247.29	50119.99	44.11671611	-68.99665545
RDSO-14	B	9/13/2016	14:02:58	260253.7	50128.82	44.11679593	-68.99657603
RDSO-14	C	9/13/2016	14:03:48	260262.13	50122.43	44.11673888	-68.99647023
RDSO-14	D	9/13/2016	14:04:32	260273.35	50128.98	44.11679844	-68.99633055
RDSO-15	A	9/13/2016	13:11:39	260144.01	49567.77	44.11174036	-68.99790401
RDSO-15	B	9/13/2016	13:12:20	260144.91	49572.35	44.11178163	-68.99789311
RDSO-15	C	9/13/2016	13:13:09	260145.01	49584.12	44.11188757	-68.99789275
RDSO-15	D	9/13/2016	13:13:50	260137.16	49585.46	44.1118992	-68.99799092
RDSO-16	A	9/13/2016	11:16:44	260150.51	50760.49	44.12247553	-68.99791295
RDSO-16	B	9/13/2016	11:17:29	260152.6	50763.99	44.12250714	-68.9978871
RDSO-16	C	9/13/2016	11:18:23	260150.62	50768.52	44.12254781	-68.99791218
RDSO-16	D	9/13/2016	11:19:13	260144.91	50774.23	44.12259889	-68.99798395
RDSO-16	E	9/13/2016	15:52:07	260138.84	50792.94	44.12276695	-68.99806121
RDSO-16	F	9/13/2016	15:52:50	260148.04	50787.5	44.12271849	-68.99794585
RDSO-16	G	9/13/2016	15:53:39	260142.54	50789.21	44.12273358	-68.9980147
RDSO-17	A	9/13/2016	10:52:13	258894.4	50705.15	44.12190798	-69.01360291
RDSO-17	B	9/13/2016	10:52:56	258889.01	50702.9	44.12188742	-69.01367008
RDSO-17	C	9/13/2016	10:53:46	258891.9	50714.24	44.12198965	-69.01363485
RDSO-17	D	9/13/2016	10:54:25	258890.35	50712.88	44.12197732	-69.01365411
RDSO-17	E	9/13/2016	15:30:50	258907.49	50734.46	44.12217251	-69.01344164
RDSO-17	F	9/13/2016	15:31:34	258898.26	50740.71	44.12222824	-69.01355745
RDSO-18	A	9/13/2016	14:22:24	260152.9	50236.72	44.11776158	-68.9978435
RDSO-18	B	9/13/2016	14:23:19	260142.39	50245.39	44.11783904	-68.99797546
RDSO-18	C	9/13/2016	14:23:59	260130.57	50246.75	44.11785064	-68.99812323
RDSO-18	D	9/13/2016	14:24:51	260150.53	50245.2	44.11783778	-68.99787375
RDSO-19	A	9/13/2016	11:05:52	259749.83	51034.14	44.12491652	-69.00294008
RDSO-19	B	9/13/2016	11:06:39	259749.49	51044.66	44.12501119	-69.00294514
RDSO-19	C	9/13/2016	11:07:20	259741.3	51046.71	44.12502919	-69.00304763

RDS 2016 ACTUAL SPI/PV STATION IDS/COORDINATES							
Station ID	**Replicate**	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
RDSO-19	D	9/13/2016	11:08:08	259745.4	51056.97	44.12512176	-69.00299718
RDSO-19	E	9/13/2016	16:02:49	259742.81	51053.21	44.12508777	-69.00302925
RDSO-19	F	9/13/2016	16:03:38	259744.67	51053.28	44.1250885	-69.00300602
RDSO-19	G	9/13/2016	16:04:24	259749.37	51059.28	44.12514276	-69.00294775
RDSO-19	H	9/13/2016	16:05:13	259757.36	51060.68	44.1251558	-69.00284802
RDSO-20	A	9/13/2016	11:26:40	260289.1	50607.25	44.12110386	-68.99616981
RDSO-20	B	9/13/2016	11:27:28	260289.11	50618.89	44.12120862	-68.99617056
RDSO-20	C	9/13/2016	11:28:14	260286.93	50617.37	44.12119483	-68.99619768
RDSO-20	D	9/13/2016	11:29:12	260290.75	50615.57	44.12117883	-68.99614982
RDSO-21	A	9/13/2016	13:23:52	259608.54	49800.92	44.11380943	-69.00461101
RDSO-21	B	9/13/2016	13:24:31	259613.82	49796.24	44.1137676	-69.00454469
RDSO-21	C	9/13/2016	13:25:11	259615.59	49808.73	44.11388011	-69.00452353
RDSO-21	D	9/13/2016	13:25:51	259617.11	49804.18	44.11383924	-69.0045042
RDSO-22	A	9/13/2016	14:11:43	260390.74	50113.56	44.11666602	-68.99486282
RDSO-22	B	9/13/2016	14:12:31	260389.02	50126.69	44.1167841	-68.9948853
RDSO-22	C	9/13/2016	14:13:23	260393.25	50125.88	44.11677704	-68.99483239
RDSO-22	D	9/13/2016	14:14:13	260389.05	50129.43	44.11680876	-68.99488513
RDSO-23	A	9/13/2016	13:02:16	259662.5	49667.54	44.11261194	-69.00392671
RDSO-23	B	9/13/2016	13:03:04	259670.2	49668.83	44.11262398	-69.00383062
RDSO-23	C	9/13/2016	13:03:46	259661.53	49675.88	44.11268695	-69.00393946
RDSO-23	D	9/13/2016	13:04:26	259676.5	49678.59	44.11271217	-69.00375266
RDS-24	A	9/12/2016	17:55:21	259315.51	49760.02	44.11342509	-69.00826854
RDS-24	B	9/12/2016	17:56:30	259320.49	49756.72	44.11339566	-69.00820607
RDS-24	C	9/12/2016	17:57:23	259323.63	49753.94	44.11337082	-69.00816663
RDS-24	D	9/12/2016	17:58:19	259327.08	49759.29	44.11341916	-69.00812394
EREF-01	A	9/14/2016	9:25:13	261757.27	50482.25	44.12005702	-68.97781726
EREF-01	B	9/14/2016	9:25:52	261750.67	50475.44	44.11999538	-68.97789923
EREF-01	C	9/14/2016	9:26:36	261758.09	50477.97	44.12001854	-68.97780671
EREF-01	D	9/14/2016	9:27:57	261754.72	50472.3	44.11996733	-68.9778484
EREF-02	A	9/14/2016	9:17:14	261748.26	50269.98	44.11814605	-68.97791443
EREF-02	B	9/14/2016	9:17:58	261755.19	50265.79	44.1181087	-68.97782755
EREF-02	C	9/14/2016	9:18:42	261754.44	50266.39	44.11811406	-68.97783696
EREF-02	D	9/14/2016	9:19:24	261762.67	50273.05	44.11817443	-68.97773462
EREF-03	A	9/14/2016	9:07:51	261489.5	50220.58	44.11768787	-68.98114364
EREF-03	B	9/14/2016	9:08:31	261491.53	50218.37	44.11766808	-68.98111812
EREF-03	C	9/14/2016	9:09:12	261486.57	50226.35	44.11773964	-68.98118067
EREF-03	D	9/14/2016	9:09:53	261488.73	50232.1	44.11779151	-68.9811541
EREF-04	A	9/14/2016	8:58:21	261854.44	50042.48	44.11610402	-68.97657141
EREF-04	B	9/14/2016	8:59:09	261862.79	50031.17	44.11600266	-68.97646628
EREF-04	C	9/14/2016	8:59:53	261859.43	50026.19	44.11595766	-68.9765079
EREF-04	D	9/14/2016	9:00:36	261849.94	50031.32	44.11600334	-68.97662683
SREF-05	A	9/14/2016	7:52:47	259525.14	48373.29	44.10095574	-69.00554336
SREF-05	B	9/14/2016	7:53:44	259520.66	48375.89	44.10097889	-69.00559951
SREF-05	C	9/14/2016	7:54:34	259516.24	48373.61	44.10095813	-69.00565454
SREF-05	D	9/14/2016	7:55:25	259518.46	48375.2	44.10097256	-69.00562694
SREF-06	A	9/14/2016	8:11:55	259630.74	48112.94	44.09861834	-69.00420452

RDS 2016 ACTUAL SPI/PV STATION IDS/COORDINATES							
Station ID	**Replicate**	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
SREF-06	B	9/14/2016	8:12:55	259631.23	48115.02	44.09863709	-69.00419856
SREF-06	C	9/14/2016	8:13:38	259638.21	48111.2	44.09860309	-69.00411109
SREF-06	D	9/14/2016	8:14:21	259634.01	48109.61	44.09858855	-69.00416342
SREF-06	E	9/14/2016	8:25:01	259641.37	48113.5	44.09862396	-69.0040718
SREF-06	F	9/14/2016	8:25:46	259639.16	48116.85	44.09865399	-69.00409966
SREF-06	G	9/14/2016	8:26:31	259637.72	48125	44.09872727	-69.00411826
SREF-06	H	9/14/2016	8:27:11	259636.81	48130.89	44.09878023	-69.00413008
SREF-07	A	9/14/2016	7:47:52	259560.17	48438.42	44.10154386	-69.00511083
SREF-07	B	9/14/2016	7:48:38	259555.44	48443.27	44.10158725	-69.00517028
SREF-07	C	9/14/2016	7:49:27	259564.06	48434.25	44.10150655	-69.00506192
SREF-07	D	9/14/2016	7:50:11	259557	48427.5	44.1014454	-69.00514959
SREF-08	A	9/14/2016	8:34:30	259791.33	48354.58	44.10080201	-69.00221726
SREF-08	B	9/14/2016	8:35:10	259793.82	48354.15	44.10079827	-69.00218613
SREF-08	C	9/14/2016	8:35:53	259790.97	48358.51	44.10083736	-69.00222206
SREF-08	D	9/14/2016	8:36:38	259797.41	48364.13	44.10088829	-69.00214205
NREF-09	A	9/14/2016	10:44:22	259541.26	52381.66	44.13703304	-69.00564961
NREF-09	B	9/14/2016	10:45:06	259541.86	52388.63	44.1370958	-69.00564264
NREF-09	C	9/14/2016	10:45:46	259535.78	52378.62	44.13700537	-69.00571786
NREF-09	D	9/14/2016	10:46:29	259530.81	52375.03	44.13697279	-69.00577969
NREF-10	A	9/14/2016	10:21:33	259672.76	52166.62	44.13510489	-69.00398973
NREF-10	B	9/14/2016	10:22:12	259669.16	52159.14	44.13503737	-69.00403415
NREF-10	C	9/14/2016	10:22:54	259662.37	52164.56	44.13508577	-69.00411942
NREF-10	D	9/14/2016	10:23:39	259660.51	52173.55	44.13516658	-69.00414335
NREF-11	A	9/14/2016	9:56:28	259836.55	52075.24	44.13429146	-69.00193588
NREF-11	B	9/14/2016	9:57:10	259839.08	52076.69	44.13430465	-69.00190437
NREF-11	C	9/14/2016	9:57:53	259832.36	52079.86	44.13433281	-69.00198859
NREF-11	D	9/14/2016	9:58:33	259836.14	52078.88	44.1343242	-69.00194128
NREF-11	E	9/14/2016	10:11:32	259847.1	52079.3	44.13432858	-69.00180435
NREF-11	F	9/14/2016	10:12:16	259846.89	52081.53	44.13434864	-69.00180714
NREF-11	G	9/14/2016	10:13:06	259846.23	52085.41	44.13438352	-69.00181568
NREF-11	H	9/14/2016	10:13:47	259845.2	52087.94	44.13440623	-69.00182875
NREF-12	A	9/14/2016	10:36:27	259697.44	52361.64	44.13686148	-69.00369623
NREF-12	B	9/14/2016	10:37:05	259702.93	52363.47	44.13687825	-69.00362776
NREF-12	C	9/14/2016	10:37:49	259703.37	52359.68	44.13684416	-69.00362197
NREF-12	D	9/14/2016	10:38:29	259697.39	52360.56	44.13685175	-69.00369677

Notes

1. Grid coordinates are NAD_1983_StatePlane_Maine_East_FIPS_1801_Meters
2. Geographic coordinates are NAD83 decimal degrees

RDS 2016 ACTUAL GRAB STATION IDS/COORDINATES FOR SEDIMENT CHEMISTRY ANALYSIS

Station ID	Date	Time	X	Y	Latitude	Longitude
Sed-RDS-04a	9/15/2016	13:32:56	259626.8	50412.1	44.11931122	-69.00442969
Sed-RDS-08a	9/15/2016	13:41:26	259721.92	50117.45	44.11666453	-69.00321878
Sed-RDS-09a	9/15/2016	13:23:34	259634.47	50667.4	44.12160942	-69.00435342
Sed-RDSO-18a	9/15/2016	13:50:18	260137.61	50233.33	44.11773024	-68.99803427
Sed-RDSO-22a	9/15/2016	14:00:40	260369.35	50126.37	44.11678015	-68.99513101
Sed-RDSO-15b	9/15/2016	14:15:48	260132.22	49560.01	44.11166989	-68.99805069
Sed-EREF-01a	9/15/2016	12:05:28	261715.99	50479.96	44.12003425	-68.97833284
Sed-EREF-03a	9/15/2016	11:52:05	261492.65	50203.27	44.11753224	-68.98110302
Sed-EREF-04a	9/15/2016	11:39:15	261834.57	50022.46	44.1159228	-68.9768182
Sed-NREF-09a	9/15/2016	13:10:25	259528.63	52375.02	44.13697258	-69.00580694
Sed-NREF-11a	9/15/2016	12:50:37	259834.96	52068.89	44.13423422	-69.00195526
Sed-NREF-12a	9/15/2016	13:01:05	259685.98	52356.16	44.13681152	-69.00383903

Notes

1. Grid coordinates are NAD_1983_StatePlane_Maine_East_FIPS_1801_Meters
2. Geographic coordinates are NAD83 decimal degrees

RDS 2016 ACTUAL GRAB STATION IDS/COORDINATES FOR BENTHIC COMMUNITY STRUCTURE ANALYSIS (BCA)

Station ID	Date	Time	X	Y	Latitude	Longitude
BCA-RDS-04a	9/15/2016	10:04:36	259600	50420.38	44.11938426	-69.00476515
BCA-RDS-09a	9/15/2016	9:41:52	259636.67	50681.18	44.12173356	-69.00432698
BCA-RDS-09b	9/15/2016	9:54:48	259628.38	50683.14	44.12175074	-69.0044307
BCA-RDS-11a	9/15/2016	10:20:08	259712.82	50130.4	44.11678058	-69.00333346
BCA-EREF-01a	9/15/2016	10:56:00	261731.65	50482.12	44.12005451	-68.97813735
BCA-EREF-03a	9/15/2016	10:39:44	261478.53	50219.92	44.11768135	-68.98128064

Notes

1. Grid coordinates are NAD_1983_StatePlane_Maine_East_FIPS_1801_Meters
2. Geographic coordinates are NAD83 decimal degrees

RDS 2016 ACTUAL TRAWL STATION IDS/COORDINATES FOR TISSUE CHEMISTRY ANALYSIS						
Station ID	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
Tis-RDS-04a-sol	9/14/2016	13:56:01	259512.3	50484.97	44.11996	-69.0059
Tis-RDS-04a-eol	9/14/2016	13:58:09	259496.1	50556.61	44.1206	-69.0061
Tis-RDS-04b-sol	9/14/2016	14:13:28	259646.2	50475.68	44.11988	-69.0042
Tis-RDS-04b-eol	9/14/2016	14:15:36	259664.2	50533.08	44.1204	-69.004
Tis-RDS-04c-sol	9/14/2016	14:34:34	259556.1	50571.4	44.12074	-69.0053
Tis-RDS-04c-eol	9/14/2016	14:36:37	259552.5	50659.77	44.12154	-69.0054
Tis-RDS-08b-sol	9/14/2016	15:57:44	259733.9	50045.69	44.11602	-69.0031
Tis-RDS-08b-eol	9/14/2016	16:00:23	259758.1	50137.07	44.11684	-69.0028
Tis-RDS-08c-sol	9/14/2016	16:13:44	259738.4	50036.27	44.11593	-69.003
Tis-RDS-08c-eol	9/14/2016	16:15:52	259740.1	50105.56	44.11656	-69.003
Tis-RDS-08d-sol	9/14/2016	16:27:28	259750.1	49887.91	44.1146	-69.0028
Tis-RDS-08d-eol	9/14/2016	16:29:43	259733.9	49983.06	44.11546	-69.0031
Tis-RDS-09a-sol	9/14/2016	12:43:12	259672.9	50715.38	44.12204	-69.0039
Tis-RDS-09a-eol	9/14/2016	12:48:18	259635.7	50844.82	44.12321	-69.0044
Tis-RDS-09b-sol	9/14/2016	13:16:42	259609.8	50721.8	44.1221	-69.0047
Tis-RDS-09b-eol	9/14/2016	13:19:15	259590.3	50777.05	44.12259	-69.0049
Tis-RDS-09c-sol	9/14/2016	13:35:49	259664.4	50616.52	44.12115	-69.004
Tis-RDS-09c-eol	9/14/2016	13:37:52	259658.2	50692.89	44.12184	-69.0041
Tis-RDS-11a-sol	9/14/2016	15:08:17	259859.5	50349.3	44.11876	-69.0015
Tis-RDS-11a-eol	9/14/2016	15:10:27	259854.6	50439.5	44.11957	-69.0016
Tis EREF-01a sol	9/15/2016	14:38:10	261662.6	50473.91	44.11998	-68.979
Tis-EREF-01a-eol	9/15/2016	14:40:16	261635	50447.34	44.11974	-68.9793
Tis-EREF-01b sol	9/15/2016	14:53:30	261667.6	50516.4	44.12036	-68.9789
Tis-EREF-01b-eol	9/15/2016	14:56:13	261624.9	50480.11	44.12003	-68.9795
Tis EREF-01c-sol	9/15/2016	15:09:10	261654.5	50518.36	44.12038	-68.9791

RDS 2016 ACTUAL TRAWL STATION IDS/COORDINATES FOR TISSUE CHEMISTRY ANALYSIS						
Tis-EREF-01c-eol	9/15/2016	15:11:12	261574.3	50464.27	44.11989	-68.9801
Tis-EREF-03a-sol	9/15/2016	15:48:02	261256.2	50194.7	44.11744	-68.9841
Tis-EREF-03a-eol	9/15/2016	15:50:17	261174.8	50200.34	44.11749	-68.9851
Tis-EREF-03b sol	9/15/2016	16:08:04	261367.2	50189.32	44.1174	-68.9827
Tis-EREF-03b-eol	9/15/2016	16:10:09	261247	50167.87	44.1172	-68.9842
Tis-EREF-04a-sol	9/15/2016	16:30:50	261714.3	49969.45	44.11544	-68.9783
Tis-EREF-04a-eol	9/15/2016	16:32:56	261615.2	49975.7	44.11549	-68.9796
Tis-EREF-04b-sol	9/15/2016	16:53:21	261722.1	49972.85	44.11547	-68.9782
Tis-EREF-04b-eol	9/15/2016	16:55:31	261585	49959.05	44.11534	-68.9799

Notes

1. Grid coordinates are NAD_1983_StatePlane_Maine_East_FIPS_1801_Meters
2. Geographic coordinates are NAD83 decimal degrees
3. sol = Start of Line; eol = End of Line

APPENDIX D

SPI/PV FIELD LOG

StationID	Replicate	Date	Time	Frame	Stops_inches	Weights_ per_side	Depth_ft	Comments	QC_Notes
RDSO-24	A	9/12/2016	17:55:22	15	14	2	238	Frame count = 14, color card shot, focus good; 2' trigger wire on PV	
RDSO-24	B	9/12/2016	17:56:30	16	14	2	238	SPI Camera s/n 2621653, lens s/n 341587: f9, 1/250 ISO 640	
RDSO-24	C	9/12/2016	17:57:22	17	14	2	238	PV Camera: s/n 27069619, lens s/n 532303: f8 ISO 400, 1/30 shutter, 2ft trigger	
RDSO-24	D	9/12/2016	17:58:17	18	14	2	238		
PV test 1	A	9/12/2016	18:27:07	19	14	2	230	On deck, download. PV images poor, apperature changed to f14	
PV test 1	B	9/12/2016	18:28:18	20	14	2	230		
PV test 1	C	9/12/2016	18:28:45		14	2	230		
PV test 2	A	9/12/2016	18:48:49		14	2	163	On deck, PV only download, PV out of focus, trigger adjusted to 2'4"	
PV test 2	B	9/12/2016	18:48:54		14	2	163		
PV test 2	C	9/12/2016	18:49:15		14	2	163		
PV test 3	A	9/12/2016	19:12:19		14	2	180	On deck, download. PV out of focus, trigger adjusted to 1'8"	
PV test 3	B	9/12/2016	19:12:36		14	2	180		
PV test 3	C	9/12/2016	19:13:04		14	2	180		
RDSO-13	A	9/13/2016	9:07:32	21	14	2	245	0700 arrive at boat. Ken has new CPU for Nav system. Winch cable very slow, so cable is switched to starboard winch.	
RDSO-13	B	9/13/2016	9:03:27	22	14	2	245	0800 winch fix complete, headed to site. Nav still down.	
RDSO-13	C	9/13/2016	9:04:27	23	14	2	245	0900 Nav back up	
RDSO-13	D	9/13/2016	9:05:10	24	14	2	245	Navigation values may not be accurate for RDS-13	
RDS-04	A	9/13/2016	10:05:30	25	14	2	233	0907 Nav not working, survey halted	
RDS-04	B	9/13/2016	10:07:01	26	14	2	233	1002 Nav might be working, survey restarted	
RDS-04	C	9/13/2016	10:07:42	27	14	2	233		
RDS-04	D	9/13/2016	10:08:24	28	14	2	233		
RDS-06	A	9/13/2016	10:13:56	29	14	2	240		EB20170228: Updated time from 10:03
RDS-06	B	9/13/2016	10:14:37	30	14	2	240		
RDS-06	C	9/13/2016	10:15:19	31	14	2	240		
RDS-06	D	9/13/2016	10:16:09	32	14	2	240		
RDS-09	A	9/13/2016	10:22:30	33	14	2	242		
RDS-09	B	9/13/2016	10:23:16	34	14	2	242		
RDS-09	C	9/13/2016	10:24:20	35	14	2	242		
RDS-09	D	9/13/2016	10:25:04	36	14	2	242		
RDS-02	A	9/13/2016	10:32:31	37	14	2	228		
RDS-02	B	9/13/2016	10:33:21	38	14	2	228		
RDS-02	C	9/13/2016	10:34:10	39	14	2	228		
RDS-02	D	9/13/2016	10:34:58	40	14	2	228		
RDS-10	A	9/13/2016	10:42:05	41	14	2	222		
RDS-10	B	9/13/2016	10:42:50	42	14	2	222		
RDS-10	C	9/13/2016	10:43:33	43	14	2	222		
RDS-10	D	9/13/2016	10:44:19	44	14	2	222		
RDSO-17	A	9/13/2016	10:52:14	45	14	2	216		
RDSO-17	B	9/13/2016	10:52:57	46	14	2	216		JRJ20170518: Updated Station Prefix
RDSO-17	C	9/13/2016	10:53:44	47	14	2	216		JRJ20170518: Updated Station Prefix
RDSO-17	D	9/13/2016	10:54:29	48	14	2	216		JRJ20170518: Updated Station Prefix
RDSO-19	A	9/13/2016	11:05:53	49	14	2	254		JRJ20170518: Updated Station Prefix
RDSO-19	B	9/13/2016	11:06:45	50	14	2	254		JRJ20170518: Updated Station Prefix
RDSO-19	C	9/13/2016	11:07:21	51	14	2	254		JRJ20170518: Updated Station Prefix
RDSO-19	D	9/13/2016	11:08:08	52	14	2	254		JRJ20170518: Updated Station Prefix
RDSO-16	A	9/13/2016	11:16:45	53	14	2	190		
RDSO-16	B	9/13/2016	11:17:30	54	14	2	190		
RDSO-16	C	9/13/2016	11:18:25	55	14	2	190		
RDSO-16	D	9/13/2016	11:19:15	56	14	2	190		
RDSO-20	A	9/13/2016	11:26:41	57	14	2	225		
RDSO-20	B	9/13/2016	11:27:30	58	14	2	225		
RDSO-20	C	9/13/2016	11:28:15	59	14	2	225		
RDSO-20	D	9/13/2016	11:29:12	60	14	2	225		

StationID	Replicate	Date	Time	Frame	Stops_inches	Weights_per_side	Depth_ft	Comments	QC_Notes
RDS-05	A	9/13/2016	11:38:09	61	14	2			
RDS-05	B	9/13/2016	11:39:07	62	14	2			
RDS-05	C	9/13/2016	11:39:55	63	14	2			
RDS-05	D	9/13/2016	11:40:38	64	14	2		Download, weights removed to 14 and 0 due to over-penetration	
RDSO-23	A	9/13/2016	13:02:16	65	14	0	240		
RDSO-23	B	9/13/2016	13:03:04	66	14	0	240		
RDSO-23	C	9/13/2016	13:03:47	67	14	0	240		
RDSO-23	D	9/13/2016	13:04:27	68	14	0	240		
RDSO-15	A	9/13/2016	13:11:41	69	14	0	240		
RDSO-15	B	9/13/2016	13:12:21	70	14	0	240		
RDSO-15	C	9/13/2016	13:13:10	71	14	0	240		
RDSO-15	D	9/13/2016	13:13:52	72	14	0	240		
RDSO-21	A	9/13/2016	13:23:33	73	14	0	235		
RDSO-21	B	9/13/2016	13:24:32	74	14	0	235		
RDSO-21	C	9/13/2016	13:25:11	75	14	0	235		
RDSO-21	D	9/13/2016	13:25:51	76	14	0	235	Snagged lobster pot. On deck, Frame count 76. Added weight to 14 and 1	
RDS-01	A	9/13/2016	13:33:12	77	14	1	233		
RDS-01	B	9/13/2016	13:33:55	78	14	1	233		
RDS-01	C	9/13/2016	13:34:40	79	14	1	233		
RDS-01	D	9/13/2016	13:35:25	80	14	1	233		
RDS-07	A	9/13/2016	13:43:28	81	14	1	228		
RDS-07	B	9/13/2016	13:44:10	82	14	1	228		
RDS-07	C	9/13/2016	13:44:57	83	14	1	228		
RDS-07	D	9/13/2016	13:45:45	84	14	1	228		
RDS-08	A	9/13/2016	13:52:00	85	14	1	235		
RDS-08	B	9/13/2016	13:52:46	86	14	1	235		
RDS-08	C	9/13/2016	13:53:35	87	14	1	235		
RDS-08	D	9/13/2016	13:54:26	88	14	1	235		
RDSO-14	A	9/13/2016	14:02:09	89	14	1	238		
RDSO-14	B	9/13/2016	14:03:00	90	14	1	238		
RDSO-14	C	9/13/2016	14:03:50	91	14	1	238		
RDSO-14	D	9/13/2016	14:04:34	92	14	1	238		
RDSO-22	A	9/13/2016	14:11:45	93	14	1	227		
RDSO-22	B	9/13/2016	14:12:32	94	14	1	227		
RDSO-22	C	9/13/2016	14:13:24	95	14	1	227		
RDSO-22	D	9/13/2016	14:14:15	96	14	1	227		
RDSO-18	A	9/13/2016	14:22:26	97	14	1	236		
RDSO-18	B	9/13/2016	14:23:20	98	14	1	236		
RDSO-18	C	9/13/2016	14:24:01	99	14	1	236		
RDSO-18	D	9/13/2016	14:24:51	100	14	1	236		
RDS-11	A	9/13/2016	14:32:45	101	14	1	231		
RDS-11	B	9/13/2016	14:34:06	102	14	1	231		
RDS-11	C	9/13/2016	14:34:58	103	14	1	231		
RDS-11	D	9/13/2016	14:36:52	104	14	1	231	On deck, download	
RDS-03	A	9/13/2016	15:02:30	105	14	1	202		
RDS-03	B	9/13/2016	15:03:16	106	14	1	202		
RDS-03	C	9/13/2016	15:04:11	107	14	1	202		
RDS-03	D	9/13/2016	15:05:04	108	14	1	202		
RDS-10	E	9/13/2016	15:18:12	109	14	1	188		
RDS-10	F	9/13/2016	15:18:58	110	14	1	188		
RDS-10	G	9/13/2016	15:19:57	111	14	1	188		
RDS-10	H	9/13/2016	15:20:47	112	14	1	188		
RDSO-17	E	9/13/2016	15:30:51	113	14	1	210		
RDSO-17	F	9/13/2016	15:31:35	114	14	1	210		
RDS-12	A	9/13/2016	15:41:07	115	14	1	217		
RDS-12	B	9/13/2016	15:41:47	116	14	1	217		
RDS-12	C	9/13/2016	15:42:41	117	14	1	217		
RDS-12	D	9/13/2016	15:43:35	118	14	1	217		
RDSO-16	E	9/13/2016	15:52:07	119	14	1	218		
RDSO-16	F	9/13/2016	15:52:53	120	14	1	218		
RDSO-16	G	9/13/2016	15:53:41	121	14	1	218	On deck, frame count 122	
RDSO-19	E	9/13/2016	16:02:50	123	14	1	250		
RDSO-19	F	9/13/2016	16:03:38	124	14	1	250		
RDSO-19	G	9/13/2016	16:04:20	125	14	1	250		
RDSO-19	H	9/13/2016	16:05:16	126	14	1	250		
RDS-10	I	9/13/2016	16:37:30	127	13	0	220		
RDS-10	J	9/13/2016	16:38:15	128	13	0	220		
RDS-10	K	9/13/2016	16:39:00	129	13	0	220		

StationID	Replicate	Date	Time	Frame	Stops_inches	Weights_per_side	Depth_ft	Comments	QC_Notes
RDS-10	L	9/13/2016	16:39:40	130	13	0	220		
RDSO-13	E	9/13/2016	16:51:16	131	13	0	240		
RDSO-13	F	9/13/2016	16:52:05	132	13	0	240		
RDSO-13	G	9/13/2016	16:52:48	133	13	0	240		
RDSO-13	H	9/13/2016	16:53:37	134	13	0	240	On deck, Download, End of Day. 1730 back at dock.	
SREF-07	A	9/14/2016	7:47:53	136	13	0	264	9/14/16 0700 leave dock, frame cound 135	
SREF-07	B	9/14/2016	7:48:38	137	13	0	264		
SREF-07	C	9/14/2016	7:49:27	138	13	0	264		
SREF-05	A	9/14/2016	7:52:47	140	13	0	262		
SREF-05	B	9/14/2016	7:53:44	141	13	0	262		
SREF-05	C	9/14/2016	7:54:35	142	13	0	262		
SREF-05	D	9/14/2016	7:55:24	143	13	0	262	On deck, stops and weights moved to14 and 0	
SREF-06	A	9/14/2016	8:11:56	144	14	0	268		
SREF-06	B	9/14/2016	8:12:55	145	14	0	268		
SREF-06	C	9/14/2016	8:13:38	146	14	0	268		
SREF-06	D	9/14/2016	8:14:20	147	14	0	268	PV trigger ball stuck on frame, stops and weights moved to 14 and 1	
SREF-06	E	9/14/2016	8:25:04	148	14	1	270		
SREF-06	F	9/14/2016	8:25:47	149	14	1	270		
SREF-06	G	9/14/2016	8:26:33	150	14	1	270		
SREF-06	H	9/14/2016	8:27:12	151	14	1	270		
SREF-08	A	9/14/2016	8:34:31	152	14	1	265		
SREF-08	B	9/14/2016	8:35:11	153	14	1	265		
SREF-08	C	9/14/2016	8:35:54	154	14	1	265		
SREF-08	D	9/14/2016	8:36:39	155	14	1	265	On deck, download	
EREF-04	A	9/14/2016	8:58:22	156	14	1	243		
EREF-04	B	9/14/2016	8:59:09	157	14	1	243		
EREF-04	C	9/14/2016	8:59:53	158	14	1	243		
EREF-04	D	9/14/2016	9:00:12	159	14	1	243		
EREF-03	A	9/14/2016	9:07:52	160	14	1	242		
EREF-03	B	9/14/2016	9:08:12	161	14	1	242		EB20170228: Updated time from 8:08
EREF-03	C	9/14/2016	9:09:12	162	14	1	242		
EREF-03	D	9/14/2016	9:09:55	163	14	1	242		
EREF-02	A	9/14/2016	9:17:16	164	14	1	240		
EREF-02	B	9/14/2016	9:18:00	165	14	1	240		
EREF-02	C	9/14/2016	9:18:42	166	14	1	240		
EREF-02	D	9/14/2016	9:19:25	167	14	1	240		
EREF-01	A	9/14/2016	9:25:14	168	14	1	240		
EREF-01	B	9/14/2016	9:25:53	169	14	1	240		
EREF-01	C	9/14/2016	9:26:37	170	14	1	240		
EREF-01	D	9/14/2016	9:27:58	171	14	1	240	On deck, download	
NREF-11	A	9/14/2016	9:56:30	172	14	1	266		
NREF-11	B	9/14/2016	9:57:11	173	14	1	266		
NREF-11	C	9/14/2016	9:57:54	174	14	1	266		
NREF-11	D	9/14/2016	9:58:34	175	14	1	266	On deck, download, OP. stops and weights set to 13 and 0	EB20170228: Updated time from 8:58
NREF-11	E	9/14/2016	10:11:32	176	13	0	265		
NREF-11	F	9/14/2016	10:13:17	177	13	0	265		
NREF-11	G	9/14/2016	10:13:07	178	13	0	265		
NREF-11	H	9/14/2016	10:13:48	179	13	0	265		
NREF-10	A	9/14/2016	10:21:34	180	13	0	220		
NREF-10	B	9/14/2016	10:22:13	181	13	0	220		
NREF-10	C	9/14/2016	10:22:55	182	13	0	220		
NREF-10	D	9/14/2016	10:23:40	183	13	0	220	On deck, download	
NREF-12	A	9/14/2016	10:36:28	184	13	0	225		
NREF-12	B	9/14/2016	10:37:06	185	13	0	225		
NREF-12	C	9/14/2016	10:37:49	186	13	0	225		
NREF-12	D	9/14/2016	10:38:30	187	13	0	225		
NREF-09	A	9/14/2016	10:44:24	188	13	0	207		
NREF-09	B	9/14/2016	10:45:07	189	13	0	207		ACR20170912: Stop collar and weight settings incorrect (change from 14/5to 13/0); see written field log
NREF-09	C	9/14/2016	10:45:47	190	13	0	207		ACR20170912: Stop collar and weight settings incorrect (change from 14/5 to 13/0); see written field log

StationID	Replicate	Date	Time	Frame	Stops_inches	Weights_ per_side	Depth_ft	Comments	QC_Notes
NREF-09	D	9/14/2016	10:46:28	191	13	0	207		ACR20170912: Stop collar and weight settings incorrect (change from 14/5 to 13/0); see written field log

DAMOS 2016

"Rite in the Rain®"

ALL-WEATHER WRITING PAPER

LEVEL

All-Weather Notebook

No. 311

Rockland RDS 12-14 Sep 2016
Portland PDS 17-19 Sep 2016

4 5/8" x 7" - 48 Numbered Pages

"Rite in the Rain"®
ALL-WEATHER WRITING PAPER

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Yellow Polyethylene Protective Slipcovers (Item #31) are available for this style of notebook.
Helps protect your notebook from wear & tear. Contact your dealer or the J. L. Darling Corporation.

Rockland Disposal Site 09/12/2016

PV/SPI Survey CONTENTS

PAGE	REFERENCE	DATE
	35mm cam — serial no. 2621653	
	35 mm lens — serial no. 341587	
	SPI	
	20 mm cam serial no. 27069619	
	20 mm lens serial no. 532303	

06:00 start of Day 9/12/2016

loading + SPI assembly

~~Tuesday 1:00pm~~

SPI settings

1/250, ISO 640, f9

PV settings

1/30, ISO ~~800~~ 400, f8, 2' trigger

Leave Dock 17:15

STA	REP	FRAME	14+2	TIME	DEPTH (FT)
RDS0-24	A	15		17:55:22	238
	B	16		17:56:30	
	C	17		17:57:22	
	D	18		17:58:17	

on Deck Download / PV images pass; Aperture changed to f14

~~OK~~ SAS-PV-Test	A	19	Navigation crashed testing PV	18:27:07	230
	B	20	no	18:28:18	
	C	21		18:28:45	
	~~D~~	~~22~~		~~18:~~	

on deck PV only download

PV out of focus, 4" added to trigger

STA	REP	FRAME	14+2'4"	TIME	DEPTH (FT)
PV Test 2	A			18:48:47	230
	B			18:48:59	
	C			18:49:15	

on deck download; PV out of focus, trigger adjusted

PV Test 3	A		14+1'8"	19:12:19	220
	B			19:12:36	
	C			19:13:04	

07:00 start of day 9/13/2016

Ken has new CPU for Nav system. Winch cable slow, Jack working to resolve winch not fixed. switching winches - 07:27 - requires unreeling cable from bad winch + add. eq to secondary winch

08:00 - winch fix complete, headed out to site... Nav still down (=-)

09:00 - Nav back working

STA	REP	FRAME	TIME	DEPTH (FT)
RDS0-13	A	21	09:02:32	245
	B	22	09:03:27	
	C	23	09:04:27	
	D	24	09:05:10	

Navigation values might be shot for RDS-13

-09:07 Nav not working, survey halted until resolved

-10:02 Nav maybe working survey restart

STA	REP	FRAME		TIME	DEPTH (FT)
RDS-04	A	25		10:05:30	233
	B	26		10:07:01	
	C	27		10:07:42	
	D	28		10:08:29	
RDS-06	A	29		10:13:56	240
	B	30		10:14:37	
	C	31		10:15:19	
	D	32		10:16:09	
RDS-09	A	33		10:22:30	242
	B	34		10:23:16	
	C	35		10:24:20	
	D	36		10:25:04	
RDS-02	A	37		10:32:31	228
	B	38		10:33:21	
	C	39		10:34:10	
	D	40	OP	10:34:58	
RDS-10	A	41	OP	10:42:05	222
	B	42	OP	10:42:50	
	C	43	OP	10:43:33	
	D	44	OP	10:44:19	

STA	REP	FRAME		TIME	DEPTH (FT)
RDS-17	A	45	OP	10:52:14	216
	B	46	OP	10:52:57	
	C	47		10:53:44	
	D	48		10:54:29	
RDS-19	A	49	OP	11:05:53	254
	B	50	OP	11:06:39	
	C	51	OP	11:07:21	
	D	52	OP	11:08:08	
RDS-16	A	53		11:16:45	222
	B	54	OP	11:17:30	
	C	55	OP	11:18:25	
	D	56	OP	11:19:15	
RDS-20	A	57		11:26:41	225
	B	58		11:27:30	
	C	59	OP	11:28:15	
	D	60		11:29:12	
RDS-05	A	61		11:38:09	
	B	62		11:39:07	
	C	63	OP	11:39:55	
	D	64		11:40:38	

ON DECK DOWNLOAD; Number of stations w/ over-penetrated (OP) reps
12:05 - removed 2 wgts from each carriage

STA	REP	FRAME	14 & 0	TIME	DEPTH (ft)
RDSO-23	A	65		13:02:16	240
	B	66		13:03:04	
	C	67		13:03:47	
	D	68		13:04:27	
RDSO-15	A	69		13:11:41	240
	B	70		13:12:21	
	C	71		13:13:10	
	D	72		13:13:52	
RDSO-21	A	73		13:23:53	235
	B	74		13:24:32	
	C	75		13:25:11	
	D	76		13:25:51	

snagged bubbler pt. on deck. Frame count. added overlaps

RDS-01	A	77	14 & 1	13:33:12	233
	B	78		13:33:55	
	C	79		13:34:40	
	D	80		13:35:25	
RDS-07	A	81		13:43:28	228
	B	82		13:44:10	
	C	83		13:44:57	
	D	84		13:45:45	

STA	REP	FRAME	TIME	DEPTH(M)
RDS-08	A	85	13:52:00	235
	B	86	13:52:46	
	C	87	13:53:35	
	D	88	13:54:26	
RDSO-14	A	89	14:02:09	238
	B	90	14:03:00	
	C	91	14:03:50	
	D	92	14:04:34	
RDS-22	A	93	14:11:45	227
	B	94	14:12:32	
	C	95	14:13:24	
	D	96	14:14:15	
RDSO-18	A	97	14:22:26	236
	B	98	14:23:20	
	C	99	14:24:01	
	D	100	14:24:51	
RDS-11	A	101	14:32:45	231
	B	102	14:34:06	
	C	103	14:34:58	
	D	104	14:36:52	

ON DECK DOWNLOAD

STA	REP	FRAME		TIME	DEPTH(ft)
RDS-03	A	105		15:02:30	220
	B	106		15:03:16	
	C	107		15:04:11	
	D	108		15:05:04	
RDS-10	E	109	or	15:18:12	218
	F	110	sh:t	15:18:58	
	G	111	op	15:19:57	
	H	112	op	15:20:47	
RDSO-17	E	113	op	15:30:51	211
	F	114		15:31:35	
RDS-12	A	115	op	15:41:07	250
	B	116		15:41:47	
	C	117	op	15:42:41	
	D	118		15:43:35	
RDSO-16	E	119		15:52:07	218
	F	120	bad	15:52:53	
	G	121		15:53:41	
On Deck Frame count check					
RDSO-19	E	123		16:02:50	250
	F	124		16:03:38	
	G	125		16:04:26	
	H	126		16:05:16	

On Deck Downloads ← STOPS Lowered

STA	REP	FRAME		TIME	DEPTH(ft)
RDS-10	I	127	13+0	16:37:30	220
	J	128		16:38:15	
	K	1129		16:39:00	
	L	130		16:39:46	
On Deck Frame count					
RDSO-13	E	131		16:51:16	240
	F	132		16:52:05	
	G	133		16:52:48	
	H	134		16:53:37	

On Deck Download

E.O.D. 17:30 back @ dock

9/14/2016

07:00 At dock on boat, transit to Reference areas

Frame count 135

STA	REP	FRAME	TIME	DEPTH(ft)
SREF-07	A	136	07:47:53	264
	B	137	07:48:38	
	C	138	07:49:27	
	D	139	07:50:11	
SREF-05	A	140	07:52:47	262
	B	141	07:53:44	
	C	142	07:54:35	
	D	143	07:55:24	

On Deck Download. stops moved

STA	REP	FRAME		TIME	DEPTH (ft)
SREF-06	A	144	14+0	08:11:56	268
	B	145		08:12:55	
	C	146		08:13:38	
	D	147		08:14:20	
PV Trigger ball on base frame, + SPI pen inadequate; REDO					
SREF-08	E	148	14+1	08:25:04	270
	F	149		08:25:47	
	G	156		08:26:33	
	H	151		08:27:12	
SREF-08	A	152		08:34:31	265
	B	153		08:35:11	
	C	154		08:35:54	
	D	155		08:36:39	
mortadella break. Yummy! In my tummy! ON DECK DOWNLOAD					
EREF-04	A	156		08:58:22	243
	B	157		08:59:09	
	C	158		08:59:53	
	D	159		09:00:36	
EREF-03	A	160		09:07:52	242
	B	161		09:08:31	
	C	162		09:09:12	
	D	163		09:09:55	

STA	REP	FRAME		TIME	DEPTH (ft)
EREF-02	A	164		09:17:16	240
	B	165		09:18:00	
	C	166		09:18:42	
	D	167		09:19:25	
EREF-01	A	168		09:25:14	240
	B	169		09:25:53	
	C	170		09:26:37	
	D	171		09:27:58	
ON DECK DOWNLOAD					
NREF-11	A	172		09:56:30	266
	B	173		09:57:11	
	C	174		09:57:54	
	D	175		09:58:34	
ON DECK DOWNLOAD; OP, STOPS + wgts adjusted					
	E	176	13+0	10:11:32	265
	F	~~177~~ 177		10:12:17	
	G	178		10:13:07	
	H	179		10:13:48	
NREF-10	A	180		10:21:34	220
	B	181		10:22:13	
	C	182		10:22:55	
	D	183		10:23:40	
on DECK DOWNLOAD					

STA	REP	FRAME	TIME	DEPTH (FT)
NREF - 12	A	184	10:36:28	225
	B	185	10:37:06	
	C	186	10:37:49	
	D	187	10:38:30	
NREF - 09	A	188	10:44:24	207
	B	189	10:45:07	
	C	190	10:45:47	
	D	191	10:46:28	

ON DECK DOWNLOAD

Portland Disposal Site (PDS) SPI/PV Survey

9/17/2016

SPI cam serial no. - 2621653
35mm lens serial no. - 341587

PV cam serial no. - 27069619
20 mm lens serial no. - 532303

SETTINGS

SPI	PV
1/250	1/30
ISO 640	ISO 400
f9	f14

06:00 start of day @ dock
06:30 leave dock after prep

STA	REP	FRAME		TIME	DEP
PDSF06	A	193	13+0	07:30:54	18
	B	194		07:31:46	
	C	195		07:32:35	
	D	196		07:33:29	
	E	197		07:46:18	175
	F	198		07:47:06	
	G	199		07:47:57	
	H	200		07:48:57	
PDS-11	A	201	14+3	08:07:34	17
	B	202		08:08:16	
	C	203		08:09:03	
	D	204		08:10:05	

top cotter pin on piston lost. piston top hanging against dock

PDS-16	A	205		08:29:42	16
	B	206		08:30:18	
	C	207		08:31:00	
	D	208		08:31:45	
PDS-17	A	209		08:38:37	180
	B	210		08:39:18	
	C	211		08:40:04	
	D	212		08:40:51	

APPENDIX E

SEDIMENT-PROFILE AND PLAN-VIEW IMAGE ANALYSIS RESULTS

Area	Location	StationID	Replicate	Date	Time	Water Depth (m)	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)
Disposal	RDS	RDS-01	A	9/13/2016	13:33:27	71	14	1	14.51	>4	>4	2	>4 to 2	18.57	17.88	19.01
Disposal	RDS	RDS-01	C	9/13/2016	13:34:57	71	14	1	14.51	>4	>4	2	>4 to 2	15.91	15.26	16.31
Disposal	RDS	RDS-01	D	9/13/2016	13:35:41	71	14	1	14.51	>4	>4	2	>4 to 2	17.60	17.13	18.35
Disposal	RDS	RDS-02	A	9/13/2016	10:32:46	69	14	2	14.51	>4	>4	2	>4 to 2	18.85	18.62	19.04
Disposal	RDS	RDS-02	B	9/13/2016	10:33:36	69	14	2	14.51	>4	>4	1	>4 to 1	17.68	14.35	19.38
Disposal	RDS	RDS-02	C	9/13/2016	10:34:25	69	14	2	14.51	>4	>4	2	>4 to 2	18.07	17.92	18.27
Disposal	RDS	RDS-03	A	9/13/2016	15:02:44	62	14	1	14.51	>4	>4	2	>4 to 2	13.17	12.28	13.53
Disposal	RDS	RDS-03	B	9/13/2016	15:03:32	62	14	1	14.51	>4	>4	2	>4 to 2	12.69	12.37	12.88
Disposal	RDS	RDS-03	C	9/13/2016	15:04:27	62	14	1	14.51	>4	>4	2	>4 to 2	14.55	13.94	15.18
Disposal	RDS	RDS-04	A	9/13/2016	10:05:41	71	14	2	14.51	>4	>4	1	>4 to 1	18.69	18.36	18.82
Disposal	RDS	RDS-04	C	9/13/2016	10:07:58	71	14	2	14.51	>4	>4	2	>4 to 2	16.74	16.18	17.29
Disposal	RDS	RDS-04	D	9/13/2016	10:08:40	71	14	2	14.51	>4	>4	2	>4 to 2	18.59	18.19	18.94
Disposal	RDS	RDS-05	A	9/13/2016	11:38:24		14	2	14.51	>4	>4	2	>4 to 2	19.41	18.91	19.96
Disposal	RDS	RDS-05	B	9/13/2016	11:39:23		14	2	14.51	>4	>4	2	>4 to 2	20.41	20.21	20.58
Disposal	RDS	RDS-05	D	9/13/2016	11:40:53		14	2	14.51	>4	>4	2	>4 to 2	19.55	18.74	20.52
Disposal	RDS	RDS-06	B	9/13/2016	10:14:52	73	14	2	14.51	>4	>4	2	>4 to 2	18.82	18.21	19.14
Disposal	RDS	RDS-06	C	9/13/2016	10:15:35	73	14	2	14.51	>4	>4	1	>4 to 1	10.13	9.67	10.64
Disposal	RDS	RDS-06	D	9/13/2016	10:16:24	73	14	2	14.51	>4	>4	2	>4 to 2	11.21	10.83	11.73
Disposal	RDS	RDS-07	B	9/13/2016	13:44:24	69	14	1	14.51	>4	>4	2	>4 to 2	21.02	20.13	21.77
Disposal	RDS	RDS-07	C	9/13/2016	13:45:12	69	14	1	14.51	>4	>4	2	>4 to 2	20.15	19.58	20.51
Disposal	RDS	RDS-07	D	9/13/2016	13:46:01	69	14	1	14.51	>4	>4	2	>4 to 2	20.53	19.74	21.06

Area	Location	StationID	Replicate	Date	Time	Water Depth (m)	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)
Disposal	RDS	RDS-08	B	9/13/2016	13:53:02	72	14	1	14.51	>4	>4	2	>4 to 2	17.48	17.14	17.72
Disposal	RDS	RDS-08	C	9/13/2016	13:53:49	72	14	1	14.51	>4	>4	2	>4 to 2	16.51	14.30	17.12
Disposal	RDS	RDS-08	D	9/13/2016	13:54:43	72	14	1	14.51	>4	>4	2	>4 to 2	18.25	17.75	18.61
Disposal	RDS	RDS-09	B	9/13/2016	10:23:31	74	14	2	14.51	>4	>4	2	>4 to 2	19.41	19.17	19.87
Disposal	RDS	RDS-09	C	9/13/2016	10:24:36	74	14	2	14.51	>4	>4	1	>4 to 1	18.40	18.17	18.65
Disposal	RDS	RDS-09	D	9/13/2016	10:25:20	74	14	2	14.51	>4	>4	2	>4 to 2	18.23	16.87	18.86
Disposal	RDS	RDS-10	J	9/13/2016	16:38:31	67	13	0	14.51	>4	>4	2	>4 to 2	17.06	16.79	17.30
Disposal	RDS	RDS-10	K	9/13/2016	16:39:17	67	13	0	14.51	>4	>4	2	>4 to 2	17.20	16.67	17.54
Disposal	RDS	RDS-10	L	9/13/2016	16:39:56	67	13	0	14.51	>4	>4	2	>4 to 2	17.55	16.71	17.94
Disposal	RDS	RDS-11	A	9/13/2016	14:33:00	70	14	1	14.51	>4	>4	1	>4 to 1	11.42	10.49	11.79
Disposal	RDS	RDS-11	B	9/13/2016	14:34:22	70	14	1	14.51	>4	>4	2	>4 to 2	19.02	17.30	20.26
Disposal	RDS	RDS-11	C	9/13/2016	14:35:14	70	14	1	14.51	>4	>4	2	>4 to 2	11.32	10.92	11.64
Disposal	RDS	RDS-12	A	9/13/2016	15:41:20	66	14	1	14.51	>4	>4	2	>4 to 2	21.77	21.77	21.77
Disposal	RDS	RDS-12	B	9/13/2016	15:42:04	66	14	1	14.51	>4	>4	2	>4 to 2	19.43	18.20	20.12
Disposal	RDS	RDS-12	D	9/13/2016	15:43:51	66	14	1	14.51	>4	>4	2	>4 to 2	19.32	19.20	19.67
Disposal-Outer	RDSO	RDSO-13	F	9/13/2016	16:52:22	73	13	0	14.51	>4	>4	2	>4 to 2	13.46	13.12	13.92
Disposal-Outer	RDSO	RDSO-13	G	9/13/2016	16:53:06	73	13	0	14.51	>4	>4	2	>4 to 2	15.82	15.26	16.36
Disposal-Outer	RDSO	RDSO-13	H	9/13/2016	16:53:54	73	13	0	14.51	>4	>4	2	>4 to 2	16.53	14.74	17.88
Disposal-Outer	RDSO	RDSO-14	A	9/13/2016	14:02:24	73	14	1	14.51	>4	>4	2	>4 to 2	21.77	21.77	21.77
Disposal-Outer	RDSO	RDSO-14	B	9/13/2016	14:03:15	73	14	1	14.51	>4	>4	2	>4 to 2	19.92	18.77	21.09
Disposal-Outer	RDSO	RDSO-14	D	9/13/2016	14:04:49	73	14	1	14.51	>4	>4	2	>4 to 2	17.15	16.80	17.65

Area	Location	StationID	Replicate	Date	Time	Water Depth (m)	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)
Disposal-Outer	RDSO	RDSO-15	A	9/13/2016	13:11:58	73	14	0	14.51	>4	>4	2	>4 to 2	17.13	16.69	17.42
Disposal-Outer	RDSO	RDSO-15	B	9/13/2016	13:12:38	73	14	0	14.51	>4	>4	2	>4 to 2	19.99	19.94	20.49
Disposal-Outer	RDSO	RDSO-15	D	9/13/2016	13:14:08	73	14	0	14.51	>4	>4	2	>4 to 2	13.10	12.70	13.52
Disposal-Outer	RDSO	RDSO-16	A	9/13/2016	11:17:01	58	14	2	14.51	>4	>4	1	>4 to 1	15.37	15.11	15.58
Disposal-Outer	RDSO	RDSO-16	E	9/13/2016	15:52:23	66	14	1	14.51	>4	>4	1	>4 to 1	15.30	14.68	15.73
Disposal-Outer	RDSO	RDSO-16	G	9/13/2016	15:53:57	66	14	1	14.51	>4	>4	1	>4 to 1	13.21	13.01	13.73
Disposal-Outer	RDSO	RDSO-17	C	9/13/2016	10:53:59	66	14	2	14.51	>4	>4	2	>4 to 2	19.73	18.94	20.12
Disposal-Outer	RDSO	RDSO-17	D	9/13/2016	10:54:41	66	14	2	14.51	>4	>4	2	>4 to 2	15.38	13.38	16.64
Disposal-Outer	RDSO	RDSO-17	F	9/13/2016	15:31:51	64	14	1	14.51	>4	>4	2	>4 to 2	13.65	13.41	14.03
Disposal-Outer	RDSO	RDSO-18	A	9/13/2016	14:22:41	72	14	1	14.51	>4	>4	1	>4 to 1	8.85	8.59	9.04
Disposal-Outer	RDSO	RDSO-18	C	9/13/2016	14:24:17	72	14	1	14.51	>4	>4	2	>4 to 2	13.74	11.89	15.85
Disposal-Outer	RDSO	RDSO-18	D	9/13/2016	14:25:07	72	14	1	14.51	>4	>4	2	>4 to 2	20.35	19.79	20.86
Disposal-Outer	RDSO	RDSO-19	F	9/13/2016	16:03:55	76	14	1	14.51	>4	>4	2	>4 to 2	21.77	19.75	21.77
Disposal-Outer	RDSO	RDSO-19	G	9/13/2016	16:04:42	76	14	1	14.51	>4	>4	2	>4 to 2	15.37	14.46	16.63
Disposal-Outer	RDSO	RDSO-19	H	9/13/2016	16:05:30	76	14	1	14.51	>4	>4	2	>4 to 2	19.40	18.27	20.32
Disposal-Outer	RDSO	RDSO-20	A	9/13/2016	11:26:56	69	14	2	14.51	>4	>4	2	>4 to 2	20.67	19.21	21.77
Disposal-Outer	RDSO	RDSO-20	B	9/13/2016	11:27:44	69	14	2	14.51	>4	>4	2	>4 to 2	14.69	13.95	15.53
Disposal-Outer	RDSO	RDSO-20	D	9/13/2016	11:29:28	69	14	2	14.51	>4	>4	2	>4 to 2	19.01	18.59	19.51
Disposal-Outer	RDSO	RDSO-21	A	9/13/2016	13:24:09	72	14	0	14.51	>4	>4	2	>4 to 2	16.25	15.47	16.60
Disposal-Outer	RDSO	RDSO-21	B	9/13/2016	13:24:48	72	14	0	14.51	>4	>4	2	>4 to 2	17.64	17.47	17.90
Disposal-Outer	RDSO	RDSO-21	C	9/13/2016	13:25:28	72	14	0	14.51	>4	>4	2	>4 to 2	13.30	12.57	13.72

Area	Location	StationID	Replicate	Date	Time	Water Depth (m)	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)
Disposal-Outer	RDSO	RDSO-22	A	9/13/2016	14:11:59	69	14	1	14.51	>4	>4	2	>4 to 2	13.73	13.05	14.48
Disposal-Outer	RDSO	RDSO-22	B	9/13/2016	14:12:48	69	14	1	14.51	>4	>4	2	>4 to 2	17.21	16.64	17.53
Disposal-Outer	RDSO	RDSO-22	C	9/13/2016	14:13:39	69	14	1	14.51	>4	>4	2	>4 to 2	16.20	15.50	16.94
Disposal-Outer	RDSO	RDSO-23	A	9/13/2016	13:02:32	73	14	0	14.51	>4	>4	2	>4 to 2	15.96	15.75	16.19
Disposal-Outer	RDSO	RDSO-23	B	9/13/2016	13:03:21	73	14	0	14.51	>4	>4	2	>4 to 2	17.94	17.04	18.32
Disposal-Outer	RDSO	RDSO-23	C	9/13/2016	13:04:03	73	14	0	14.51	>4	>4	2	>4 to 2	13.20	12.89	13.46
Disposal-Outer	RDSO	RDSO-24	A	9/12/2016	17:55:38	73	14	2	14.51	>4	>4	2	>4 to 2	11.53	11.22	11.71
Disposal-Outer	RDSO	RDSO-24	B	9/12/2016	17:56:47	73	14	2	14.51	>4	>4	2	>4 to 2	19.76	18.84	20.81
Disposal-Outer	RDSO	RDSO-24	C	9/12/2016	17:57:40	73	14	2	14.51	>4	>4	2	>4 to 2	14.10	12.38	15.46
Reference	EREF	EREF-01	B	9/14/2016	9:26:08	73	14	1	14.51	>4	>4	2	>4 to 2	16.98	15.59	19.07
Reference	EREF	EREF-01	C	9/14/2016	9:26:52	73	14	1	14.51	>4	>4	2	>4 to 2	18.03	17.58	18.22
Reference	EREF	EREF-01	D	9/14/2016	9:28:14	73	14	1	14.51	>4	>4	2	>4 to 2	17.32	16.31	17.84
Reference	EREF	EREF-02	A	9/14/2016	9:17:29	73	14	1	14.51	>4	>4	2	>4 to 2	20.89	20.42	21.11
Reference	EREF	EREF-02	B	9/14/2016	9:18:14	73	14	1	14.51	>4	>4	2	>4 to 2	18.37	17.46	18.84
Reference	EREF	EREF-02	D	9/14/2016	9:19:40	73	14	1	14.51	>4	>4	2	>4 to 2	19.33	18.54	19.84
Reference	EREF	EREF-03	A	9/14/2016	9:08:07	74	14	1	14.51	>4	>4	2	>4 to 2	18.18	17.93	18.33
Reference	EREF	EREF-03	B	9/14/2016	9:08:47	74	14	1	14.51	>4	>4	2	>4 to 2	15.09	14.71	15.65
Reference	EREF	EREF-03	C	9/14/2016	9:09:28	74	14	1	14.51	>4	>4	2	>4 to 2	17.94	17.55	18.24
Reference	EREF	EREF-04	B	9/14/2016	8:59:25	74	14	1	14.51	>4	>4	2	>4 to 2	17.69	17.39	18.04
Reference	EREF	EREF-04	C	9/14/2016	9:00:09	74	14	1	14.51	>4	>4	2	>4 to 2	18.87	18.16	19.44
Reference	EREF	EREF-04	D	9/14/2016	9:00:52	74	14	1	14.51	>4	>4	2	>4 to 2	20.15	19.44	20.64
Reference	SREF	SREF-05	A	9/14/2016	7:53:04	80	13	0	14.51	>4	>4	2	>4 to 2	12.45	11.68	12.75

Area	Location	StationID	Replicate	Date	Time	Water Depth (m)	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)
Reference	SREF	SREF-05	B	9/14/2016	7:54:03	80	13	0	14.51	>4	>4	2	>4 to 2	15.48	14.51	16.43
Reference	SREF	SREF-05	C	9/14/2016	7:54:51	80	13	0	14.51	>4	>4	2	>4 to 2	9.40	7.31	11.77
Reference	SREF	SREF-06	F	9/14/2016	8:26:03	82	14	1	14.51	>4	>4	2	>4 to 2	16.84	16.17	17.47
Reference	SREF	SREF-06	G	9/14/2016	8:26:47	82	14	1	14.51	>4	>4	2	>4 to 2	14.75	14.14	15.57
Reference	SREF	SREF-06	H	9/14/2016	8:27:25	82	14	1	14.51	4 to 3 / >4	>4	1	>4 to 1	19.02	18.80	19.20
Reference	SREF	SREF-07	A	9/14/2016	7:48:09	80	13	0	14.51	>4	>4	2	>4 to 2	13.52	12.93	13.96
Reference	SREF	SREF-07	C	9/14/2016	7:49:43	80	13	0	14.51	>4	>4	2	>4 to 2	9.47	8.52	10.66
Reference	SREF	SREF-07	D	9/14/2016	7:50:27	80	13	0	14.51	>4	>4	2	>4 to 2	9.87	9.55	10.50
Reference	SREF	SREF-08	A	9/14/2016	8:34:45	81	14	1	14.51	>4	>4	2	>4 to 2	16.99	16.26	17.34
Reference	SREF	SREF-08	C	9/14/2016	8:36:09	81	14	1	14.51	>4	>4	2	>4 to 2	13.26	11.19	14.94
Reference	SREF	SREF-08	D	9/14/2016	8:36:54	81	14	1	14.51	>4	>4	2	>4 to 2	15.00	14.76	15.24
Reference	NREF	NREF-09	A	9/14/2016	10:44:39	63	13	0	14.51	>4	>4	2	>4 to 2	19.18	18.77	19.52
Reference	NREF	NREF-09	B	9/14/2016	10:45:22	63	13	0	14.51	>4	>4	2	>4 to 2	17.98	17.37	19.09
Reference	NREF	NREF-09	C	9/14/2016	10:46:04	63	13	0	14.51	>4	>4	2	>4 to 2	15.55	15.24	15.74
Reference	NREF	NREF-10	A	9/14/2016	10:21:50	67	13	0	14.51	>4	>4	2	>4 to 2	17.78	17.43	18.62
Reference	NREF	NREF-10	B	9/14/2016	10:22:29	67	13	0	14.51	>4	>4	2	>4 to 2	20.09	19.20	20.46
Reference	NREF	NREF-10	C	9/14/2016	10:23:11	67	13	0	14.51	>4	>4	2	>4 to 2	17.91	17.30	18.07
Reference	NREF	NREF-11	F	9/14/2016	10:12:33	81	13	0	14.51	>4	>4	2	>4 to 2	21.77	21.77	21.77
Reference	NREF	NREF-11	G	9/14/2016	10:13:23	81	13	0	14.51	>4	>4	2	>4 to 2	21.77	21.77	21.77
Reference	NREF	NREF-11	H	9/14/2016	10:14:04	81	13	0	14.51	>4	>4	2	>4 to 2	21.77	21.77	21.77
Reference	NREF	NREF-12	A	9/14/2016	10:36:44	69	13	0	14.51	>4	>4	2	>4 to 2	21.05	20.75	21.32
Reference	NREF	NREF-12	B	9/14/2016	10:37:22	69	13	0	14.51	>4	>4	2	>4 to 2	21.77	19.90	21.77
Reference	NREF	NREF-12	D	9/14/2016	10:38:46	69	13	0	14.51	>4	>4	2	>4 to 2	17.45	17.11	18.10

Area	Location	StationID	Replicate	Boundary Roughness (cm)	Boundary Roughness Type	aRPD Mean (cm)	aRPD > Pen	Mud Clast Number	Mud Clast State	Methane Present?	Number of Methane Bubbles	Dredged Material Present?	Mean depth below Sediment Surface of top of Dredged Material Layer (cm)	Dredged Material Layer Mean Thickness (cm)	Dredged Material > Pen
Disposal	RDS	RDS-01	A	1.12	Biological	5.94		0		No		Yes	0.00	0.00	
Disposal	RDS	RDS-01	C	1.04	Biological	5.46		0		No		IND	IND	IND	
Disposal	RDS	RDS-01	D	1.22	Biological	4.75		0		No		IND	IND	IND	
Disposal	RDS	RDS-02	A	0.42	Biological	5.45		0		No		Yes	5.48	13.38	TRUE
Disposal	RDS	RDS-02	B	5.02	Biological	4.90		1	ox	No		Yes	6.84	10.84	TRUE
Disposal	RDS	RDS-02	C	0.35	Biological	5.43		0		No		Yes	4.50	13.56	TRUE
Disposal	RDS	RDS-03	A	1.25	Biological	3.14		0		No		Yes	4.39	8.78	TRUE
Disposal	RDS	RDS-03	B	0.51	Biological	4.22		0		No		Yes	3.89	8.79	TRUE
Disposal	RDS	RDS-03	C	1.23	Biological	2.18		0		No		Yes	3.05	11.50	TRUE
Disposal	RDS	RDS-04	A	0.46	Biological	4.42		0		No		Yes	2.55	16.15	TRUE
Disposal	RDS	RDS-04	C	1.11	Biological	4.98		0		No		Yes	4.91	11.83	TRUE
Disposal	RDS	RDS-04	D	0.75	Biological	4.09		0		No		Yes	0.00	15.48	TRUE
Disposal	RDS	RDS-05	A	1.04	Biological	4.06		3	ox	No		Yes	2.32	17.09	TRUE
Disposal	RDS	RDS-05	B	0.36	Biological	5.43		1	ox	No		Yes	5.74	14.67	TRUE
Disposal	RDS	RDS-05	D	1.78	Biological	5.09		7	red	No		Yes	5.78	13.76	TRUE
Disposal	RDS	RDS-06	B	0.93	Biological	5.56		0		No		Yes	4.80	14.02	TRUE
Disposal	RDS	RDS-06	C	0.97	Biological	2.82		0		No		Yes	1.91	8.23	TRUE
Disposal	RDS	RDS-06	D	0.90	Biological	3.36		0		No		Yes	3.29	7.92	TRUE
Disposal	RDS	RDS-07	B	IND	Biological	IND		IND		No		Yes	IND	16.05	TRUE
Disposal	RDS	RDS-07	C	0.93	Biological	5.60		0		No		Yes	7.12	13.03	TRUE
Disposal	RDS	RDS-07	D	1.32	Biological	3.93		0		No		Yes	4.34	16.19	TRUE

Area	Location	StationID	Replicate	Boundary Roughness (cm)	Boundary Roughness Type	aRPD Mean (cm)	aRPD > Pen	Mud Clast Number	Mud Clast State	Methane Present?	Number of Methane Bubbles	Dredged Material Present?	Mean depth below Sediment Surface of top of Dredged Material Layer (cm)	Dredged Material Layer Mean Thickness (cm)	Dredged Material > Pen
Disposal	RDS	RDS-08	B	0.58	Biological	3.37		0		No		Yes	3.21	14.26	TRUE
Disposal	RDS	RDS-08	C	2.82	Biological	4.07		0		No		Yes	3.36	13.15	TRUE
Disposal	RDS	RDS-08	D	0.85	Biological	2.59		0		No		Yes	2.06	16.18	TRUE
Disposal	RDS	RDS-09	B	0.69	Biological	5.57		0		No		Yes	6.40	13.01	TRUE
Disposal	RDS	RDS-09	C	0.48	Biological	4.97		0		No		Yes	5.16	13.24	TRUE
Disposal	RDS	RDS-09	D	2.00	Biological	5.00		2	ox	No		Yes	3.84	14.38	TRUE
Disposal	RDS	RDS-10	J	0.51	Biological	4.43		IND		No		Yes	4.38	12.68	TRUE
Disposal	RDS	RDS-10	K	0.88	Biological	3.37		1	ox	No		Yes	5.93	11.28	TRUE
Disposal	RDS	RDS-10	L	1.23	Biological	3.54		0		No		Yes	4.78	12.77	TRUE
Disposal	RDS	RDS-11	A	1.30	Biological	3.54		4	ox	No		Yes	3.40	8.01	TRUE
Disposal	RDS	RDS-11	B	2.96	Biological	3.47		IND		No		Yes	3.95	15.06	TRUE
Disposal	RDS	RDS-11	C	0.72	Biological	4.11		4	red/ox	No		Yes	3.31	8.01	TRUE
Disposal	RDS	RDS-12	A	IND	IND	IND		IND		No		Yes	IND	17.00	TRUE
Disposal	RDS	RDS-12	B	1.92	Biological	4.22		0		No		Yes	3.27	16.16	TRUE
Disposal	RDS	RDS-12	D	0.47	Biological	6.84		2	ox	No		Yes	6.90	12.41	TRUE
Disposal-Outer	RDSO	RDSO-13	F	0.80	Biological	3.20		0		No		No			
Disposal-Outer	RDSO	RDSO-13	G	1.10	Biological	2.74		0		No		No			
Disposal-Outer	RDSO	RDSO-13	H	3.15	Biological	IND		0		No		No			
Disposal-Outer	RDSO	RDSO-14	A	IND	IND	IND		IND		No		Yes	IND	10.97	TRUE
Disposal-Outer	RDSO	RDSO-14	B	2.32	Biological	3.18		0		No		No			
Disposal-Outer	RDSO	RDSO-14	D	0.86	Biological	4.09		0		No		No			

Area	Location	StationID	Replicate	Boundary Roughness (cm)	Boundary Roughness Type	aRPD Mean (cm)	aRPD > Pen	Mud Clast Number	Mud Clast State	Methane Present?	Number of Methane Bubbles	Dredged Material Present?	Mean depth below Sediment Surface of top of Dredged Material Layer (cm)	Dredged Material Layer Mean Thickness (cm)	Dredged Material > Pen
Disposal-Outer	RDSO	RDSO-15	A	0.73	Biological	3.95		0		No		No			
Disposal-Outer	RDSO	RDSO-15	B	0.55	Biological	4.14		0		No		IND	IND	IND	
Disposal-Outer	RDSO	RDSO-15	D	0.82	Biological	3.06		0		No		Yes	4.81	8.29	TRUE
Disposal-Outer	RDSO	RDSO-16	A	0.48	Biological	4.46		0		No		Yes	4.75	10.62	TRUE
Disposal-Outer	RDSO	RDSO-16	E	1.05	Biological	5.04		0		No		Yes	5.08	10.22	TRUE
Disposal-Outer	RDSO	RDSO-16	G	0.72	Biological	4.10		0		No		Yes	5.32	7.89	TRUE
Disposal-Outer	RDSO	RDSO-17	C	1.18	Biological	5.44		0		No		No			
Disposal-Outer	RDSO	RDSO-17	D	3.25	Biological	0.99		0		No		No			
Disposal-Outer	RDSO	RDSO-17	F	0.62	Biological	5.55		0		No		No			
Disposal-Outer	RDSO	RDSO-18	A	0.45	Biological	3.72		4	ox	No		Yes	5.36	3.49	TRUE
Disposal-Outer	RDSO	RDSO-18	C	3.97	Biological	2.31		2	red	No		Yes	3.03	10.71	TRUE
Disposal-Outer	RDSO	RDSO-18	D	1.07	Biological	7.28		0		No		Yes	4.89	15.45	TRUE
Disposal-Outer	RDSO	RDSO-19	F	IND	Biological	IND		IND		No		Yes	IND	IND	TRUE
Disposal-Outer	RDSO	RDSO-19	G	2.18	Biological	4.77		0		No		Yes	5.50	9.87	TRUE
Disposal-Outer	RDSO	RDSO-19	H	2.05	Biological	2.71		0		No		Yes	2.94	16.46	TRUE
Disposal-Outer	RDSO	RDSO-20	A	IND	Biological	IND		0		No		Yes	IND	13.97	TRUE
Disposal-Outer	RDSO	RDSO-20	B	1.58	Biological	5.12		0		No		Yes	3.60	11.09	TRUE
Disposal-Outer	RDSO	RDSO-20	D	0.91	Biological	3.38		0		No		Yes	5.02	13.99	TRUE
Disposal-Outer	RDSO	RDSO-21	A	1.12	Biological	3.42		0		No		Yes	3.79	12.47	TRUE
Disposal-Outer	RDSO	RDSO-21	B	0.43	Biological	4.34		0		No		Yes	3.64	14.01	TRUE
Disposal-Outer	RDSO	RDSO-21	C	1.15	Biological	3.31		2	ox	No		Yes	2.11	11.18	TRUE

Area	Location	StationID	Replicate	Boundary Roughness (cm)	Boundary Roughness Type	aRPD Mean (cm)	aRPD > Pen	Mud Clast Number	Mud Clast State	Methane Present?	Number of Methane Bubbles	Dredged Material Present?	Mean depth below Sediment Surface of top of Dredged Material Layer (cm)	Dredged Material Layer Mean Thickness (cm)	Dredged Material > Pen
Disposal-Outer	RDSO	RDSO-22	A	1.43	Biological	1.91		0		No		Yes	2.63	11.09	TRUE
Disposal-Outer	RDSO	RDSO-22	B	0.89	Biological	1.91		0		No		Yes	5.39	11.82	TRUE
Disposal-Outer	RDSO	RDSO-22	C	1.44	Biological	4.57		0		No		Yes	4.03	12.18	TRUE
Disposal-Outer	RDSO	RDSO-23	A	0.45	Biological	5.15		0		No		Yes	3.04	12.92	TRUE
Disposal-Outer	RDSO	RDSO-23	B	1.28	Biological	5.12		0		No		Yes	3.97	13.97	TRUE
Disposal-Outer	RDSO	RDSO-23	C	0.57	Biological	2.85		0		No		Yes	3.28	9.92	TRUE
Disposal-Outer	RDSO	RDSO-24	A	0.49	Biological	2.64		0		No		Yes	11.37	0.15	
Disposal-Outer	RDSO	RDSO-24	B	1.97	Biological	2.28		0		No		Yes	4.94	14.83	TRUE
Disposal-Outer	RDSO	RDSO-24	C	3.08	Biological	IND		IND		No		Yes	1.19	12.91	TRUE
Reference	EREF	EREF-01	B	3.48	Biological	4.58		3	ox	No		No			
Reference	EREF	EREF-01	C	0.64	Biological	5.69		0		No		No			
Reference	EREF	EREF-01	D	1.53	Biological	3.51		0		No		No			
Reference	EREF	EREF-02	A	0.69	Biological	4.16		IND		No		No			
Reference	EREF	EREF-02	B	1.38	Biological	5.05		0		No		No			
Reference	EREF	EREF-02	D	1.31	Biological	5.81		0		No		No			
Reference	EREF	EREF-03	A	0.40	Biological	5.84		0		No		No			
Reference	EREF	EREF-03	B	0.94	Biological	4.76		2	ox	No		No			
Reference	EREF	EREF-03	C	0.69	Biological	4.04		0		No		No			
Reference	EREF	EREF-04	B	0.64	Biological	5.59		1	red/ox	No		No			
Reference	EREF	EREF-04	C	1.29	Biological	5.12		0		No		No			
Reference	EREF	EREF-04	D	1.20	Biological	5.51		0		No		No			
Reference	SREF	SREF-05	A	1.06	Biological	2.76		0		No		IND	IND	IND	

Area	Location	StationID	Replicate	Boundary Roughness (cm)	Boundary Roughness Type	aRPD Mean (cm)	aRPD > Pen	Mud Clast Number	Mud Clast State	Methane Present?	Number of Methane Bubbles	Dredged Material Present?	Mean depth below Sediment Surface of top of Dredged Material Layer (cm)	Dredged Material Layer Mean Thickness (cm)	Dredged Material > Pen
Reference	SREF	SREF-05	B	1.92	Biological	3.43		2	ox	No		No			
Reference	SREF	SREF-05	C	4.46	Biological	1.03		2	ox	No		No			
Reference	SREF	SREF-06	F	1.31	Biological	4.57		0		No		No			
Reference	SREF	SREF-06	G	1.43	Biological	1.80		0		No		Yes	0.00	0.00	
Reference	SREF	SREF-06	H	0.41	Biological	4.00		0		No		No			
Reference	SREF	SREF-07	A	1.03	Biological	2.57		0		No		No			
Reference	SREF	SREF-07	C	2.14	Biological	2.70		0		No		No			
Reference	SREF	SREF-07	D	0.95	Biological	4.10		0		No		No			
Reference	SREF	SREF-08	A	1.09	Biological	3.38		0		No		No			
Reference	SREF	SREF-08	C	3.75	Biological	2.77		0		No		No			
Reference	SREF	SREF-08	D	0.48	Biological	4.64		1	ox	No		No			
Reference	NREF	NREF-09	A	0.76	Biological	6.27		0		No		No			
Reference	NREF	NREF-09	B	1.72	Biological	3.76		0		No		No			
Reference	NREF	NREF-09	C	0.50	Biological	0.92		0		No		No			
Reference	NREF	NREF-10	A	1.20	Biological	4.47		0		No		No			
Reference	NREF	NREF-10	B	1.26	Biological	8.42		0		No		No			
Reference	NREF	NREF-10	C	0.78	Biological	5.89		2	ox	No		No			
Reference	NREF	NREF-11	F	IND	IND	IND		IND		No		No			
Reference	NREF	NREF-11	G	IND	IND	IND		IND		No		No			
Reference	NREF	NREF-11	H	IND	IND	IND		IND		No		No			
Reference	NREF	NREF-12	A	IND	IND	3.46		IND		No		No			
Reference	NREF	NREF-12	B	IND	Biological	IND		IND		No		No			
Reference	NREF	NREF-12	D	0.99	Biological	4.44		3	ox	No		No			

Area	Location	StationID	Replicate	Dredged Material Notes	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?	Beggiatoa Type/Extent	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)
Disposal	RDS	RDS-01	A	Trace reworked dredged material	No	Low	No		0		
Disposal	RDS	RDS-01	C	Possible trace reworked dredged material in sediment column at depth - not clearly distinct from ambient sediment	No	Low	No		0		
Disposal	RDS	RDS-01	D	Possible trace reworked dredged material in sediment column at depth - not clearly distinct from ambient sediment	No	Low	No		0		
Disposal	RDS	RDS-02	A	Reworked dredged material to penetration- mostly mixed into sediment column	No	Low	No		0		
Disposal	RDS	RDS-02	B	Reworked dredged material to penetration- mostly mixed into sediment column	No	Low	No		3	1.34	14.00
Disposal	RDS	RDS-02	C	Reworked dredged material to penetration, mostly mixed into sediment column, except for one isolated spot near base on aRPD on left.	No	Low	No		1	16.40	17.74
Disposal	RDS	RDS-03	A	Partially reworked dredged material to penetration- mostly incorporated into sediment column. Small white clay chunks just below SWI on left - could be from RDS-11 which was sampled previously and cohesive DM.	No	Low	No		1	10.93	12.87
Disposal	RDS	RDS-03	B	Reworked dredged material to penetration; mostly mixed into sediment column	No	Low	No		2	4.01	7.37
Disposal	RDS	RDS-03	C	Partially reworked dredged material to penetration- mostly incorporated into sediment column.	No	Medium	No		1	3.83	5.30
Disposal	RDS	RDS-04	A	Dredged material, reworked into most of sediment column- white-gray streaks at depth; black reduced weathered DM at depth	No	Low	No		4	4.18	8.15
Disposal	RDS	RDS-04	C	Partially reworked dredged material mostly incorporated into sediment column with the exception of large and small inclusions of white clay on left side of image.	No	Low	No		0		
Disposal	RDS	RDS-04	D	Dredged material, reworked, mostly incorporated into sediment column until depth - where there were black and white clastic inclusions and streaks.	No	Low	No		3	4.24	17.09
Disposal	RDS	RDS-05	A	Dredged material, reworked in most sediment column; lowest several cm are heavily gray and black streaked.	No	Low	No		0		
Disposal	RDS	RDS-05	B	Dredged material, reworked in most of sediment column; at base of image few patches of black weathered DM.	No	Low	No		3	9.40	15.60
Disposal	RDS	RDS-05	D	Partially reworked dredged material to penetration, mostly incorporated into sediment column, few black streaks at depth.	No	Low	No		1	3.70	4.09
Disposal	RDS	RDS-06	B	Partially reworked dredged material to penetration, mostly incorporated into sediment column, gray and black streaks at depth	No	Low	No		3	4.67	8.20
Disposal	RDS	RDS-06	C	Partially reworked dredged material to penetration, mostly incorporated into sediment column, gray and black streaks at depth	No	Low	No		0		
Disposal	RDS	RDS-06	D	Partially reworked dredged material over white clay clastic DM at depth, center and right (last 3-4 cm)	No	Low	No		3	3.79	9.72
Disposal	RDS	RDS-07	B	Partially reworked dredged material to penetration, mostly incorporated into sediment, black streaks	No	Low	No		1	IND	IND
Disposal	RDS	RDS-07	C	Partially reworked dredged material to penetration, mostly incorporated into sediment column, gray and black streaks	No	Low	No		5	4.43	11.50
Disposal	RDS	RDS-07	D	Partially reworked dredged material to penetration, mostly incorporated into sediment column, with gray streaks	No	Low	No		3	4.76	8.56

Area	Location	StationID	Replicate	Dredged Material Notes	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?	Beggiatoa Type/Extent	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)
Disposal	RDS	RDS-08	B	Partially reworked dredged material to penetration, gray with white clay streaks and black streaks.	No	Low	No		4	9.18	17.50
Disposal	RDS	RDS-08	C	Partially reworked dredged material to penetration, mostly incorporated into sediment, gray with a few black streaks	No	Low	No		2	4.25	5.62
Disposal	RDS	RDS-08	D	Partially reworked dredged material to penetration, mostly incorporated into sediment, gray and black streaks at depth	No	Low	No		2	5.42	8.47
Disposal	RDS	RDS-09	B	Partially reworked dredged material to penetration, mostly incorporated in sediment, more gray at depth with black streaks	No	Low	No		0		
Disposal	RDS	RDS-09	C	Dredged material, reworked in upper portion of DM layer. Lower 8-10 cm are mottled clay with a few white cohesive clasts at near base of image, black streaks through this section	No	Low	No		1	6.94	8.63
Disposal	RDS	RDS-09	D	Dredged material, reworked and incorporated through most of sediment column, more gray at depth, black streaks mid-depth on right and at depth.	No	Low	No		2	1.99	4.56
Disposal	RDS	RDS-10	J	Reworked dredged material, mostly incorporated into sediment; few black streaks at depth	No	Low	No		2	5.33	16.06
Disposal	RDS	RDS-10	K	Dredged material mostly incorporated into sediment column, some gray and black steaks	No	Low	No		0		
Disposal	RDS	RDS-10	L	Reworked dredged material, mostly incorporated into sediment, gray with black streaks near large void mid-depth	No	Low	No		1	5.45	10.27
Disposal	RDS	RDS-11	A	Dredged material, reworked into most of sediment column with white and black streaks, few cohesive clasts near penetration depth	No	Low	No		2	5.74	9.26
Disposal	RDS	RDS-11	B	Dredged material, reworked in upper portion of sediment column; larger white-gray clastic DM near penetration maximum; some DM also near SWI from wiper blade artifact	No	Low	No		4	3.21	18.17
Disposal	RDS	RDS-11	C	Dredged material, reworked in upper portion of sediment column, heavily streaked with white-gray at depth	No	Low	No		1	5.28	5.66
Disposal	RDS	RDS-12	A	Dredged material, reworked into sediment column, more gray at depth	No	Low	No		2	IND	IND
Disposal	RDS	RDS-12	B	Reworked dredged material to penetration- mostly mixed into sediment column	No	Low	No		3	2.99	13.01
Disposal	RDS	RDS-12	D	Reworked dredged material to penetration- mostly mixed into sediment column	No	Low	No		0		
Disposal-Outer	RDSO	RDSO-13	F		No	Low	No		1	10.16	10.53
Disposal-Outer	RDSO	RDSO-13	G		No	Low	No		0		
Disposal-Outer	RDSO	RDSO-13	H		No	Low	No		3	1.39	11.22
Disposal-Outer	RDSO	RDSO-14	A	Small area in sediment featuring coarse grain size and abundance of black particles; also reworked DM mostly incorporated into sediment column at depth	No	Low	No		0		
Disposal-Outer	RDSO	RDSO-14	B		No	Low	No		0		
Disposal-Outer	RDSO	RDSO-14	D		No	Low	No		3	3.06	15.69

Area	Location	StationID	Replicate	Dredged Material Notes	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?	Beggiatoa Type/Extent	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)
Disposal-Outer	RDSO	RDSO-15	A		No	Low	No		2	3.78	7.98
Disposal-Outer	RDSO	RDSO-15	B	Band of grayish sediment with black flecks at mid-depth, may be reworked DM	No	Low	No		0		
Disposal-Outer	RDSO	RDSO-15	D	Reworked dredged material, mostly incorporated into sediment, small black flecks throughout	No	Low	No		1	3.05	4.26
Disposal-Outer	RDSO	RDSO-16	A	Light gray DM with fine streaks and abundant refractory organic particles; mostly incorporated into sediment column	No	Low	No		1	11.72	12.08
Disposal-Outer	RDSO	RDSO-16	E	Light gray DM with fine streaks and abundant refractory organic particles; mostly incorporated into sediment column	No	Low	No		0		
Disposal-Outer	RDSO	RDSO-16	G	Light gray DM with fine streaks and abundant refractory organic particles; mostly incorporated into sediment column	No	Low	No		1	4.51	4.64
Disposal-Outer	RDSO	RDSO-17	C		No	Low	No		1	5.94	6.80
Disposal-Outer	RDSO	RDSO-17	D		No	Medium	No		1	8.14	8.45
Disposal-Outer	RDSO	RDSO-17	F		No	Low	No		1	10.90	13.35
Disposal-Outer	RDSO	RDSO-18	A	Black streaks near penetration maximum and gray DM mixed into sediment above.	No	Low	No		2	5.39	7.96
Disposal-Outer	RDSO	RDSO-18	C	Streaky dark and black sediment- DM mostly reworked into sediment column.	No	Low	No		2	7.46	7.48
Disposal-Outer	RDSO	RDSO-18	D	Streaky dark and black sediment- DM mostly reworked into sediment column.	No	Low	No		0		
Disposal-Outer	RDSO	RDSO-19	F	Light gray DM with fine streaks and refractory organic particles; mostly incorporated into sediment column	No	Low	No		1	IND	IND
Disposal-Outer	RDSO	RDSO-19	G	Light gray DM with fine streaks and refractory organic particles; mostly incorporated into sediment column	No	Low	No		1	4.31	4.54
Disposal-Outer	RDSO	RDSO-19	H	Light gray DM with fine streaks and refractory organic particles; mostly incorporated into sediment column	No	Low	No		0		
Disposal-Outer	RDSO	RDSO-20	A	Light gray DM with refractory organic particles at mid-depths, darker gray at depth, few black streaks throughout; mostly incorporated into sediment column	No	Low	No		2	5.77	18.04
Disposal-Outer	RDSO	RDSO-20	B	Light gray DM with fine black streaks with black refractory particles, mostly incorporated into sediment column	No	Low	No		1	1.94	2.31
Disposal-Outer	RDSO	RDSO-20	D	Light gray DM mostly incorporated into sediment column, streaked black and pale gray in lower portion of sediment column.	No	Low	No		0		
Disposal-Outer	RDSO	RDSO-21	A	Streaked black and pale gray in lower portion of sediment column, mostly incorporated into sediment column	No	Low	No		3	4.72	7.72
Disposal-Outer	RDSO	RDSO-21	B	Streaked black and pale gray in lower portion of sediment column, mostly incorporated into sediment column	No	Low	No		2	4.73	8.56
Disposal-Outer	RDSO	RDSO-21	C	Streaked black and pale gray in lower portion of sediment column, mostly incorporated into sediment column	No	Low	No		2	1.72	3.76

Area	Location	StationID	Replicate	Dredged Material Notes	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?	Beggiatoa Type/Extent	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)
Disposal-Outer	RDSO	RDSO-22	A	Light gray DM mostly incorporated into sediment column, black streaks and small black refractory particles	No	Medium	No		1	4.65	4.83
Disposal-Outer	RDSO	RDSO-22	B	Light gray DM mostly incorporated into sediment column, small black refractory particles, black streaks near penetration maximum	No	Medium	No		2	11.02	14.68
Disposal-Outer	RDSO	RDSO-22	C	Light gray DM mostly incorporated into sediment column, black streaks and small black refractory particles	No	Low	No		1	3.98	4.66
Disposal-Outer	RDSO	RDSO-23	A	Light gray DM mostly incorporated into sediment column, black streaks, mostly on right from mid-depth to penetration maximum	No	Low	No		1	13.09	14.45
Disposal-Outer	RDSO	RDSO-23	B	Gray DM with gray - lighter at mid-depths- darker toward penetration max; black streaks from mid-depth down.	No	Low	No		0		
Disposal-Outer	RDSO	RDSO-23	C	Gray DM with very dark irregular streaks in sediment column, mostly DM incorporated into sediment column	No	Low	No		2	6.86	11.17
Disposal-Outer	RDSO	RDSO-24	A	Small amount of white clay near penetration maximum.	No	Low	No		2	2.65	3.40
Disposal-Outer	RDSO	RDSO-24	B	Large white and black clay clasts buried deep in sediment. Throughout much of rest of sediment column DM is relatively well mixed in with sediment.	No	Low	No		3	3.61	15.07
Disposal-Outer	RDSO	RDSO-24	C	Large white and black clay clasts at near SWI on right; mid-depths, buried deep in sediment.	No	Medium	No		3	2.93	13.98
Reference	EREF	EREF-01	B		No	Low	No		2	12.59	16.29
Reference	EREF	EREF-01	C		No	Low	No		0		
Reference	EREF	EREF-01	D		No	Low	No		0		
Reference	EREF	EREF-02	A		No	Low	No		1	5.86	5.90
Reference	EREF	EREF-02	B		No	Low	No		3	4.26	16.92
Reference	EREF	EREF-02	D		No	Low	No		0		
Reference	EREF	EREF-03	A		No	Low	No		1	16.93	17.28
Reference	EREF	EREF-03	B		No	Low	No		2	8.42	9.88
Reference	EREF	EREF-03	C		No	Low	No		4	1.40	17.90
Reference	EREF	EREF-04	B		No	Low	No		1	12.62	12.82
Reference	EREF	EREF-04	C		No	Low	No		4	2.64	17.66
Reference	EREF	EREF-04	D		No	Low	No		1	5.28	16.65
Reference	SREF	SREF-05	A	Trace reworked dredged material- two areas of like streaked white-gray clay at depth on right. Could be artifact from gray clay on wiper blade (previous site was SREF-07)	No	Low	No		2	1.53	6.42

Area	Location	StationID	Replicate	Dredged Material Notes	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?	Beggiatoa Type/Extent	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)
Reference	SREF	SREF-05	B		No	Low	No		3	2.02	14.77
Reference	SREF	SREF-05	C		No	Medium	No		0		
Reference	SREF	SREF-06	F		No	Low	No		0		
Reference	SREF	SREF-06	G	Two small streaks of dredged material- gray clay- near pen depth on right	No	Medium	No		3	2.56	12.56
Reference	SREF	SREF-06	H		No	Medium	No		3	5.51	6.89
Reference	SREF	SREF-07	A		No	Low	No		1	8.09	8.74
Reference	SREF	SREF-07	C		No	Low	No		0		
Reference	SREF	SREF-07	D		No	Low	No		0		
Reference	SREF	SREF-08	A		No	Low	No		4	3.54	16.95
Reference	SREF	SREF-08	C		No	Low	No		1	6.60	7.21
Reference	SREF	SREF-08	D		No	Low	No		0		
Reference	NREF	NREF-09	A		No	Low	No		0		
Reference	NREF	NREF-09	B		No	Low	No		1	1.87	2.27
Reference	NREF	NREF-09	C		No	Medium	No		0		
Reference	NREF	NREF-10	A		No	Low	No		2	3.47	9.66
Reference	NREF	NREF-10	B		No	Low	No		1	17.49	18.42
Reference	NREF	NREF-10	C		No	Low	No		1	3.51	4.40
Reference	NREF	NREF-11	F		No	Low	No		1	IND	IND
Reference	NREF	NREF-11	G		No	Low	No		1	IND	IND
Reference	NREF	NREF-11	H		No	Low	No		0		
Reference	NREF	NREF-12	A		No	Low	No		0		
Reference	NREF	NREF-12	B		No	Low	No		0		
Reference	NREF	NREF-12	D		No	Low	No		0		

Area	Location	StationID	Replicate	Successional Stage	Comment
Disposal	RDS	RDS-01	A	1 on 3	Light brown silt clay over slightly darker brown silt/clay and thin streaks of white DM at depth. Small Stage 1 tubes and pellets at SWI. Small burrows extend into upper few cm of sediment. Small infauna visible in aRPD and medium one just below.
Disposal	RDS	RDS-01	C	1 on 3	Light brown silt clay over slightly darker brown silt/clay. Possible weathered re-worked DM in sediment column at depth - not clearly different from ambient sediments. Small Stage 1 tubes and pellets at SWI. Small burrows extend into upper few cm of sediment. Small thin infauna visible within aRPD. Mud clasts on surface are camera artifact. Burrows in PV.
Disposal	RDS	RDS-01	D	1 on 3	Light brown silt clay over mottled brown silt/clay. Stage 1 tubes in dragdown. Burrows in PV. Clasts at surface and smeared on faceplate are camera artifacts. Possible reworked DM at depth but not clearly different from ambient sediments
Disposal	RDS	RDS-02	A	1 on 3	Light brown silt/clay over reworked dredged material. Underlying DM layer is streaked with black and gray, mostly mixed into sediment column. Small Stage 1 tubes and 1 Stage 2 tube at SWI. Burrowing throughout aRPD and burrow with fecal material just below aRPD on right.
Disposal	RDS	RDS-02	B	1 on 3	Light brown silt/clay over reworked dredged material. Underlying DM layer is streaked with black and gray and is mostly mixed into sediment column. Stage 1 and 2 tubes at SWI. Mostly infilled voids visible in sediment column.
Disposal	RDS	RDS-02	C	1 on 3	Light brown silt/clay over reworked dredged material. Underlying DM layer is streaked with black and gray with 1 white clay inclusion just below aRPD on left. Stage 1 tubes at SWI. Shallow burrowing. Small infauna visible just below aRPD at left. Large void deep in sediment column.
Disposal	RDS	RDS-03	A	1 on 3	Light brown silt/clay over partially reworked dredged material. Underlying DM layer is streaked with black, gray, and white clay, mostly incorporated into sediment matrix. White clay chunks near SWI could be from RDS-11 which was sampled just before and had cohesive DM. Stage 1 tubes at SWI. Shallow burrowing. Large void deep in sediment column. Large polychaete visible just below aRPD- segments clearly visible- Capitellid?.
Disposal	RDS	RDS-03	B	1 on 3	Light brown silt/clay over reworked dredged material. Underlying DM layer is streaked with black and gray clay and is mostly incorporated into sediment matrix. Couple Stage 1 tubes visible at SWI. Shallow burrowing. Small infauna visible just below aRPD. Two small voids visible in sediment column.
Disposal	RDS	RDS-03	C	1 on 3	Light brown silt/clay over reworked dredged material. Underlying DM layer is streaked with black, white and gray clay and is mostly incorporated into sediment column. Couple Stage 1 tubes at SWI. Shallow burrowing. Small infauna visible below aRPD and mid column. Large infilled vid.
Disposal	RDS	RDS-04	A	1 on 3	Light brown silt/clay over reworked dredged material, small white clay inclusions at depth along with black reduced weathered DM. Small infauna visible below aRPD and at depth. Infilled voids. Stage 1 and couple Stage 2 tubes at SWI.
Disposal	RDS	RDS-04	C	1 on 3	Light brown silt/clay over reworked dredged material with black and gray streaks, mostly incorporated into sediment column with the exception of large and small inclusions of white clay on left half. Stage 1 tubes at SWI. Shallow burrowing. Several medium-sized polychaetes below aRPD at mid-sediment column - segments visible in a few (maybe Capitellids).
Disposal	RDS	RDS-04	D	1 on 3	Light brown silt/clay over reworked dredged material mostly incorporated into sediment column. White and black clastic inclusions and streaks at depth. Stage 1 small tubes at SWI, in dragdown. Three voids visible in sediment- 2 near base of aRPD, 1 right by DM inclusions at depth.
Disposal	RDS	RDS-05	A	1 on 3	Light brown silt/clay over reworked dredged material, mostly incorporated into sediment column, lowest several cms is heavily streaked with gray and black DM. Stage 1 tubes at SWI. Shallow burrowing and 1 small-medium infauna within aRPD. Small thin infauna at depth.
Disposal	RDS	RDS-05	B	1 on 3	Light brown silt/clay over reworked dredged material, mostly incorporated into sediment column; few gray streaks and a couple patches of black weathered DM at depth. Few Stage 1 tubes at SWI. Shallow burrowing. Two voids at depth are filled in.
Disposal	RDS	RDS-05	D	1 on 3	Light brown silt/clay over reworked dredged material, mostly incorporated into sediment column, at depth is streaked with black, white, and gray clay. Small Stage 1 tubes at SWI. Burrows in aRPD - one is hook-shaped. Small void is at base of aRPD. Small reduced mud clasts at SWI could be camera artifacts but at least a few of them are rounded.
Disposal	RDS	RDS-06	B	1 on 3	Light brown silt/clay over partially reworked dredged material, mostly incorporated into sediment column with a few black and gray streaks at depth. Small Stage 1 tubes at SWI, in dragdown. Several small voids in upper portion of sediment column.
Disposal	RDS	RDS-06	C	1 on 3	Light brown silt/clay over partially reworked dredged material, mostly incorporated into sediment column, streaks of black and one gray at depth. Small Stage 1 tubes at SWI, in dragdown. Burrows in PV. Reduced clasts are camera artifacts
Disposal	RDS	RDS-06	D	1 on 3	Light brown silt/clay over partially reworked dredged material, mostly incorporated into sediment column in upper portion of DM, last 3-4 cm center right is white clay clastic DM. Small Stage 1 and a couple Stage 2 tubes at SWI. Shallow burrowing. Voids partially filled in. Infauna visible- small to medium sized.
Disposal	RDS	RDS-07	B	3	Overpenetration on right side. Reworked dredged material mostly incorporated into sediment column with black streaks throughout, think black line (debris?) in lower area of image. Single void.
Disposal	RDS	RDS-07	C	1 on 3	Light brown silt/clay over partially reworked dredged material, mostly incorporated into sediment column, with gray and black streaks. Small Stage 1 tubes and one Stage 2 tube at SWI. Burrowing in upper cms. Many voids visible in sediment. Small thin infauna visible near base of aRPD.
Disposal	RDS	RDS-07	D	1 on 3	Light brown silt/clay over partially reworked dredged material, mostly incorporated into sediment, with gray streaks. Couple small Stage 1 tubes at SWI. Few think infauna visible in aRPD. Few voids visible mid-depth. Line of DM/clay bits ~1 cm below SWI from wiper blade- camera artifact.

Area	Location	StationID	Replicate	Successional Stage	Comment
Disposal	RDS	RDS-08	B	1 on 3	Light brown silt/clay over partially reworked dredged material. White and black streaks in gray DM. Small Stage 1 tubes at SWI. Large voids in sediment column.
Disposal	RDS	RDS-08	C	1 on 3	Light brown silt/clay over partially reworked dredged material, mostly incorporated into sediment, gray with black streaks. Couple small Stage 1 tubes at SWI and in dragdown. Shallow burrowing. Small infauna in aRPD and below. Two burrows with fecal pellets - one mid depth, one at depth. Couple voids in sediment column near base of aRPD. Large gray clay clast from camera on surface - artifact.
Disposal	RDS	RDS-08	D	1 on 3	Light brown silt/clay over partially reworked dredged material, mostly incorporated into sediment. Mottled and streaked gay and black clay in DM layer. Small Stage 1 tubes at SWI. Small voids in sediment column. Small and medium infauna mid-depth. Large gray clay clasts from camera on surface - artifact.
Disposal	RDS	RDS-09	B	1 on 3	Light brown silt/clay over partially reworked dredged material, mostly incorporated into sediment. Mottled gray with black streaks at base of DM layer. Small Stage 1 tubes in dragdown. Shallow burrowing and through aRPD. Thin infauna in and below aRPD. Burrows in PV
Disposal	RDS	RDS-09	C	1 on 3	Light brown silt/clay over reworked dredged material, terminating at mottled clay. Lower part of DM layer is streaked with black, white, and gray clay. Small Stage 1 tubes at SWI. Large void visible in sediment. Thin infauna at depth.
Disposal	RDS	RDS-09	D	1 on 3	Light brown silt/clay over reworked dredged material, mostly incorporated into sediment column; more gray at depth; black streaks. Small Stage 1 tubes at SWI. Shallow burrowing. Voids are very small and closed from camera action.
Disposal	RDS	RDS-10	J	1 on 3	Light brown silt/clay over reworked dredged material, mostly incorporated into sediment column, few black streaks at depth. Couple small Stage 1 tubes at SWI and in dragdown. Shallow burrowing. Burrows in PV. Small thin infauna visible in aRPD. Gray clay smeared on faceplate at SWI - camera artifact.
Disposal	RDS	RDS-10	K	1 on 3	Light brown silt/clay over slightly darker silt/clay, reworked dredged material, mostly incorporated into sediment column. Small Stage 1 tubes in dragdown. Burrowing through aRPD, indicating Stage 2 presence as well.. Burrow openings in PV. Small-medium infauna visible throughout sediment column.
Disposal	RDS	RDS-10	L	1 on 3	Light brown silt/clay over slightly darker silt/clay with dredged material incorporated, gray and black streaks near void mid-depth. Shallow burrowing. Small Stage 1 tubes in suspension and dragdown. Burrow openings in PV. Large void network in center of sediment column.
Disposal	RDS	RDS-11	A	1 on 3	Light brown silt/clay over slightly darker, streaky, gray and white silt/clay dredged material mostly reworked into sediment column. Stage 1 and 2 tubes visible at SWI. Burrowing throughout aRPD. Small thin infauna visible in aRPD. Single void visible in sediment at right edge of image. Infilled void near penetration maximum.
Disposal	RDS	RDS-11	B	1 on 3	Light brown silt/clay over slightly darker, streaky, gray and white silt/clay dredged material, reworked into sediment column, several large cohesive clastic DM inclusions near penetration depth; some DM streaked near SWI- wiper blade artifact. Small Stage 1 tubes visible in suspension and dragdown. Extensive void network near aRPD, effecting boundary roughness on left; another void at depth.
Disposal	RDS	RDS-11	C	1 on 3	Light brown silt/clay over slightly darker dredged material, reworked into sediment column, lots of white-gray streaks at depth. Stage 1 tubes visible at SWI, Stage 2 tubes in farfield. Shallow burrowing. Small thin infauna throughout aRPD. One small void. Small white clay clasts in dragdown on left.
Disposal	RDS	RDS-12	A	3	Overpenetration. Silt/clay over gray dredged material incorporated into sediment column, gray and black streaks. Large void near base of aRPD, infilled void at depth.
Disposal	RDS	RDS-12	B	1 on 3	Light brown silt/clay over DM that has been mostly worked into sediment column, grayish sediment with black streaks at depth is primary sign of DM. Stage 1 and 2 tubes visible at SWI. Several large voids in sediment column. Polychaete w/ segments visible below aRPD at center.
Disposal	RDS	RDS-12	D	1 on 3	Light brown silt/clay over DM that has been mostly worked into sediment column, graying sediment with black streaks at depth as primary sign of DM. Stage 1 tubes visible in suspension and dragdown. Burrow forming 'U' shape in upper portion of sediment column (possibly Chaetopteras). Small thin infauna visible in aRPD. Small gray clasts at SWI are camera artifact.
Disposal-Outer	RDSO	RDSO-13	F	1 on 3	Pale brown sediment under SWI over slightly darker layer with few streaks of dark gray material. Small void in sediment. Stage 1 tubes at SWI and in suspension. Shallow burrowing. Several infauna visible. Small black particles mixed into sediment.
Disposal-Outer	RDSO	RDSO-13	G	1 on 3	Pale brown sediment under SWI over slightly darker layer with few streaks of dark gray material. Stage 1 tubes in suspension and in dragdown. Shallow burrowing. Several small thin infauna visible. Burrow transected with stack of fecal pellets. Small black particles mixed into sediment.
Disposal-Outer	RDSO	RDSO-13	H	1 on 3	Pale brown sediment under SWI over slightly darker layer with few streaks of dark gray material. Small voids visible in upper portion of sediment column. Large infilled void networks deep in sediment. SWI disturbed- sloughing toward faceplate- makes aRPD IND. Small Stage 1 tubes visible in dragdown
Disposal-Outer	RDSO	RDSO-14	A	IND	Overpenetration. Pale brown sediment in upper portion of penetration area. Deeper sediment features streaked light and dark clays indicated reworked DM that is mostly incorporated into sediment column; also small inclusion of coarse sediment.
Disposal-Outer	RDSO	RDSO-14	B	1 on 3	Pale brown sediment under SWI over slightly darker grayish layer with few streaks of dark gray-black. Small infilled voids deep in sediment. Small Stage 1 tubes at SWI and in dragdown. Couple small thin infauna visible near base of aRPD. Shallow burrowing. Burrows in PV.
Disposal-Outer	RDSO	RDSO-14	D	1 on 3	Pale brown sediment under SWI over slightly darker gray layer w some black flecks. Several small voids visible. Small Stage 1 tubes at SWI. Burrowing visible through aRPD.

Area	Location	StationID	Replicate	Successional Stage	Comment
Disposal-Outer	RDSO	RDSO-15	A	1 on 3	Pale brown sediment under SWI over slightly darker grayish layer. Several small voids visible. Small Stage 1 tubes at SWI. Few medium sized Infauna visible in sediment, below aRPD and at depth.
Disposal-Outer	RDSO	RDSO-15	B	2 -> 3	Pale brown sediment under SWI over slightly darker layer, band of grayish sediment with small black flecks throughout at mid-depth- could be reworked DM. Burrow textures visible deep in sediment. Deep aRPD. Burrow openings visible in PV. SWI is very close to top of image and smear on faceplate there make some SWI difficult to see - there may be Stage 1 tubes here but can't determine for sure.
Disposal-Outer	RDSO	RDSO-15	D	1 on 3	Pale brown sediment under SWI over grayish sediment with lighter gray patches and black streaks throughout indicating reworked DM mostly incorporated into sediment column. Large horizontal void in sediment. Small Stage 1 tubes at SWI. Shallow burrowing. Medium sized infauna at depth. Gray clasts at surface are camera artifact.
Disposal-Outer	RDSO	RDSO-16	A	1 on 3	Pale brown sediment under SWI over gray DM with fine streaks and abundant black refractory particles, mostly reworked into sediment column. Small void at depth. Small Stage 1 tubes at SWI. Shallow burrowing. Polychaete below aRPD at center - appears to be Capitellid.
Disposal-Outer	RDSO	RDSO-16	E	1 on 3	Pale brown sediment under SWI over gray DM with fine streaks and abundant black refractory particles in sediment. Small Stage 1 and few Stage 2 tubes at SWI. Several small to medium infauna visible just below aRPD- one next to burrow filled with fecal material.
Disposal-Outer	RDSO	RDSO-16	G	1 on 3	Pale brown sediment under SWI over gray DM with fine streaks and abundant black refractory particles in sediment. Small void infilled just below aRPD. Small Stage 1 tubes at SWI, in dragdown. Few small thin infauna visible in sediment below aRPD and at depth. Small gray clasts on surface are camera artifacts
Disposal-Outer	RDSO	RDSO-17	C	1 on 3	Pale brown sediment under SWI over slightly darker streaky layer. Couple small tubes at SWI. And in dragdown. Very thick aRPD. Infilled void. Small gray clasts at surface and smeared on faceplate are camera artifacts.
Disposal-Outer	RDSO	RDSO-17	D	1 on 3	Pale brown sediment under SWI over two layers of progressively darker sediment. Small Stage 1 tubes at SWI and in suspension. Very thin aRPD. Small void.
Disposal-Outer	RDSO	RDSO-17	F	1 on 3	Pale brown sediment under SWI over slightly darker streaky layer. Small Stage 1 tubes at SWI, in dragdown and in suspension. Very thick aRPD. Few small thin infauna near base of aRPD. Large, partially infilled void near penetration maximum, with polychaete visible just above.
Disposal-Outer	RDSO	RDSO-18	A	1 on 3	Pale brown sediment under SWI over darker, non-uniform gray DM layer with black streaks. Small Stage 1 tubes at SWI. Very thick aRPD. Burrowing through aRPD. Two small partially infilled voids.
Disposal-Outer	RDSO	RDSO-18	C	1 on 3	Pale brown sediment under SWI over gray darker, non-uniform DM layer with black streaks, mostly incorporated into sediment column. Small Stage 1 and 2 tubes at SWI. Very thick aRPD. Two small partially infilled voids. Small and medium gray reduced mud clasts in farfield - could be DM on surface
Disposal-Outer	RDSO	RDSO-18	D	1 on 3	Pale brown sediment under SWI over darker, non-uniform gray DM layer with black and white streaks, DM mostly incorporated into sediment column. Very thick aRPD. Some of SWI not visible due to very deep penetration. Few small Stage 1 tubes visible at SWI, in dragdown. Burrows extending from SWI into aRPD and deep borrows visible. Small thin infauna visible near base of aRPD.
Disposal-Outer	RDSO	RDSO-19	F	1 on 3	Partial overpenetration. Pale brown sediment under SWI over gray DM with black refractory particles and streaks, mostly incorporated into sediment column. Small closed void in sediment. Small Stage 1 tubes at SWI., possible Stage 2 tube.
Disposal-Outer	RDSO	RDSO-19	G	1 on 3	Pale brown sediment under SWI over gray DM with black refractory particles and streaks, mostly incorporated into sediment column. Small void in sediment. Stage 1 tubes dragged into sediment and in suspension. Small thin infauna in aRPD. Reduced clasts on surface are camera artifacts
Disposal-Outer	RDSO	RDSO-19	H	1 on 3	Pale brown sediment under SWI over gray DM with black refractory particles and streaks, mostly incorporated into sediment column. Stage 1 tubes at SWI. Possible small bivalve dislodged by camera just below SWI to right of center. Few gray clasts in smear/dragdown on right. Burrows in PV
Disposal-Outer	RDSO	RDSO-20	A	1 on 3	Partial overpenetration. Pale brown sediment under SWI over gray DM that has been mostly incorporated into sediment column, lighter gray with black refractory particles at mid-depths and darker gray at depth; black streaks throughout. Two voids in sediment. Small Stage 1 tubes dragged under SWI. Shallow burrowing. Few small thin infauna below aRPD.
Disposal-Outer	RDSO	RDSO-20	B	1 on 3	Pale brown sediment under SWI over gray DM mostly incorporated into sediment column with black streaks and black refractory particles. Small void in sediment in aRPD. Small Stage 1 tubes dragged under SWI. Few gray clasts at SWI are camera artifacts. Few thin small infauna.
Disposal-Outer	RDSO	RDSO-20	D	1	Pale brown sediment under SWI over gray DM with streaks of black, DM is mostly incorporated into sediment column. Small Stage 1 tubes dragged under SWI. Shallow burrowing. Gray clay smeared on faceplate at SWI. Likely 1 on 3 but PV is cloudy so can't confirm.
Disposal-Outer	RDSO	RDSO-21	A	1 on 3	Pale brown sediment under SWI over darker, non-uniform layer with black streaks- DM mostly incorporated into sediment. Small Stage 1 tubes at SWI. Shallow burrowing. Few small thin infauna near base of aRPD. Three small partially infilled voids.
Disposal-Outer	RDSO	RDSO-21	B	1 on 3	Pale brown sediment under SWI over darker, non-uniform layer with black streaks- DM mostly incorporated into sediment. Small Stage 1 tubes at SWI, in dragdown. Shallow burrowing. Few small thin infauna near base of aRPD. Burrow filled with stack of fecal pellets below aRPD near center. Two small partially infilled voids. Small gray clasts at SWI and in dragdown are camera artifact.
Disposal-Outer	RDSO	RDSO-21	C	1 on 3	Pale brown sediment under SWI over darker, non-uniform layer with black streaks plus two white/gray clay streaks- DM that is mostly incorporated into sediment column. Small Stage 1 tubes at SWI, few Stage 2 tubes in farfield. Shallow burrowing. One small infilled void and one large partially infilled voids- both near base of aRPD. Couple gray clasts in dragdown that are camera artifacts

Area	Location	StationID	Replicate	Successional Stage	Comment
Disposal-Outer	RDSO	RDSO-22	A	1 on 3	Pale brown sediment under SWI over light gray DM mostly incorporated into sediment column, black streaks. Small void just below aRPD on right. Stage 1 tubes at SWI. Shallow burrowing, transected.
Disposal-Outer	RDSO	RDSO-22	B	1 on 3	Pale brown sediment under SWI over light gray DM mostly incorporated into sediment, black streaks at depth. Two very large voids. Few small visible infauna near base of aRPD and one at depth. Stage 1 tubes at SWI. Gray mud clasts and streaks on faceplate are camera artifacts
Disposal-Outer	RDSO	RDSO-22	C	1 on 3	Pale brown sediment under SWI over light gray DM mostly incorporated into sediment, black streaks. Small void near base of aRPD on left. Few small infauna visible- include one at depth that appears to be a Capitellid. Stage 1 tubes dragged into sediment. Shallow burrowing. Burrow below aRPD at mid-depths with stack of fecal pellets. SWI disturbed on left- sloughed toward faceplate. Small gray clasts are camera artifact.
Disposal-Outer	RDSO	RDSO-23	A	1 on 3	Pale brown sediment under SWI over light gray DM with black streaks. Small void- filled in at depth. Several small thin infauna near base of aRPD. Burrow with stack of fecal pellets. Stage 1 tubes at SWI.
Disposal-Outer	RDSO	RDSO-23	B	1 on 3	Pale brown sediment under SWI over light gray and then dark gray DM, mostly incorporated into sediment column with black streaks. Stage 1 tubes at SWI and in dragdown. Medium infauna on left at mid-depth. Burrows in PV image.
Disposal-Outer	RDSO	RDSO-23	C	1 on 3	Pale brown sediment under SWI over darker underlying layer streaked with black and white clay, DM mostly incorporated into sediment column. Stage 1 tubes dragged into sediment and is suspension. Partially infilled voids in sediment. Gray clasts in dragdown are camera artifacts
Disposal-Outer	RDSO	RDSO-24	A	1 on 3	Pale brown sediment under SWI over darker underlying layer. Small streaks of white DM near penetration maximum. Two small voids just below aRPD. Stage 1 and 2 tubes across SWI. Burrowing through aRPD.
Disposal-Outer	RDSO	RDSO-24	B	1 on 3	Pale brown sediment under SWI over white, and black streaked dredged material, small white/gray chunks in upper couple cm. Stage 1 tubes in drawdown. Shallow burrowing. Couple of the voids are connected. One large void just below aRPD and connected to SWI by burrow.
Disposal-Outer	RDSO	RDSO-24	C	1 on 3	Pale brown sediment under SWI over dark brown and gray dredged material streaked with white. Large DM area at depth at depth, mid depth, and near SWI on right.
Reference	EREF	EREF-01	B	2 on 3	Light brown silt clay over slightly darker brown silt/clay. Small infauna and burrowing visible throughout aRPD. Two large voids deep in sediment column. Thick aRPD.
Reference	EREF	EREF-01	C	2 on 3	Light brown silt clay over slightly darker brown silt/clay. Small infauna visible within aRPD and penetration maximum. Thick aRPD. Small burrows visible in PV. Reduced clasts on surface are artifacts from camera.
Reference	EREF	EREF-01	D	1 on 3	Light brown silt clay over slightly darker brown silt/clay. Small infauna visible in aRPD and near penetration maximum. Stage 1 and 2 tubes visible at SWI. Small burrows visible in PV.
Reference	EREF	EREF-02	A	1 on 3	Light brown silt clay over slightly darker brown silt/clay. Near over penetration. Thick aRPD. Thin infauna in aRPD. Burrow transected with line of oblate fecal pellets. Indication of U-shaped burrow near SWI just to the right of the burrow with fecal pellets. Small void below aRPD at right edge of images. Stage 1 tube visible at SWI at far right. Small and medium sized burrows in PV
Reference	EREF	EREF-02	B	1 on 3	Light brown silt clay over slightly darker brown silt/clay. Few small voids visible in sediment column. Very small burrows extending from SWI into sediment.
Reference	EREF	EREF-02	D	1 on 3	Light brown silt clay over slightly darker brown silt/clay. Burrow textures visible throughout sediment column. Very small burrows extending from SWI into sediment. Small thin infauna in aRPD.
Reference	EREF	EREF-03	A	1 on 3	Light brown silt clay over slightly darker brown silt/clay. Void deep in sediment column. Small thin infauna visible in aRPD and just below at left. Thick aRPD. Small burrow s extend into upper few cm of sediment. Stage 1 tubes visible in sediments sloughing toward prism disturbed by prism entering sediment.
Reference	EREF	EREF-03	B	1 on 3	Light brown silt clay over slightly darker brown silt/clay. Voids deep in sediment column. Small infauna visible in aRPD and just below. Thick aRPD. Small burrows extend into upper few cm of sediment. Stage 1 tubes visible at SWI
Reference	EREF	EREF-03	C	1 on 3	Light brown silt clay over slightly darker brown silt/clay. Voids throughout sediment column. Thick aRPD. Small burrows extend into upper few cm of sediment. Small thin infauna visible in aRPD and just below, to left and center.
Reference	EREF	EREF-04	B	1 on 3	Light brown silt clay over slightly darker brown silt/clay. Single small void mid-sediment column; burrow to the right and down from void with fecal pellet. Thick aRPD. Small burrows extend into upper few cm of sediment. Small Stage 1 and Stage 2 tubes at SWI. Small thin infauna in aRPD. Mud clast on surface may or may not be artifact from camera.
Reference	EREF	EREF-04	C	2 on 3	Light brown silt clay over slightly darker brown silt/clay. Several large voids and one transected burrow in sediment column. Thick aRPD. Small burrows extend into upper few cm of sediment. Small infauna visible within aRPD. Mud clasts on surface are artifacts from camera.
Reference	EREF	EREF-04	D	1 on 3	Light brown silt clay over slightly darker brown silt/clay. Single void in sediment column. Thick aRPD. Small burrows extend into upper few cm of sediment. Small Stage 1 tubes at SWI. Small thin infauna visible in aRPD. Clasts on surface are artifacts from camera.
Reference	SREF	SREF-05	A	1 on 3	Pale brown sediment under SWI over slightly darker gray sediment with white streaks. Stage 1 tubes at SWI. Shallow burrowing. Two small and medium infauna visible at depth. Two large partially infilled voids- one within aRPD.

Area	Location	StationID	Replicate	Successional Stage	Comment
Reference	SREF	SREF-05	B	1 on 3	Pale brown sediment under SWI over slightly darker gray sediment with white streaks. Stage 1 tubes at SWI. Shallow burrowing. Small thin infauna visible within aRPD. Three partially infilled voids- two in aRPD.
Reference	SREF	SREF-05	C	1 on 3	Irregular SWI. Very thin aRPD. Streaky gray and black silt/clay with thin layer of pale gray silt/clay near SWI. Stage 1 tubes at SWI. Shallow burrowing. Small burrow with fecal material visible a couple cm below aRPD on left. Burrows in PV.
Reference	SREF	SREF-06	F	1 on 3	Pale brown sediment under SWI over darker underlying layer streaked with black clay. Stage 1 tubes at SWI and dragged into sediment. Shallow burrowing. Very thick aRPD. Burrows in PV.
Reference	SREF	SREF-06	G	1 on 3	Pale brown sediment under SWI over darker underlying layer streaked with white and black clay. Stage 1 tubes in suspension and dragdown. Shallow burrowing. Several small infilled voids. Trace streaks of DM at depth on right
Reference	SREF	SREF-06	H	1 on 3	Pale brown sediment under SWI over darker underlying layer streaked with white and black clay. Patch of reduced black sed below mid-depth on left. Stage 1 tubes dragged into sediment. Thin infauna near base of aRPD and deep in sediment column. Sediment near SWI is slightly coarser than underlying material. Infilled voids. Burrows in PV.
Reference	SREF	SREF-07	A	1 on 3	Pale brown sediment under SWI over darker underlying layer streaked with white and black clay. Stage 1 tubes at SWI. Shallow burrowing. Three medium-sized infauna just below aRPD. Small void.
Reference	SREF	SREF-07	C	1 on 3	Pale brown sediment under SWI over darker underlying layer streaked with white and black clay. Stage 1 tubes at SWI. Deep burrow halos and infauna visible. Single oxidized clast. Burrows in PV
Reference	SREF	SREF-07	D	1 on 3	Pale brown sediment under SWI over gray sediment. Stage 1 tubes at SWI; couple possible Stage 2 tubes. Burrowing and few thin infauna visible in aRPD. Burrows in PV
Reference	SREF	SREF-08	A	1 on 3	Pale brown sediment under SWI over darker underlying layer streaked with pale gray and dark gray. Stage 1 tubes at SWI and dragged into sediment. Shallow burrowing and a few deep burrow halos. Medium sized infauna visible just below aRPD on right. Partially infilled voids- 3 near base of aRPD.
Reference	SREF	SREF-08	C	1 on 3	Pale brown sediment under SWI over darker underlying layer streaked with pale gray and dark gray. Stage 1 tubes dragged into sediment. Cluster of oblate fecal pellets just below SWI. Deep burrow halos and infauna visible. Small mostly infilled void. Eggs seen in PV are in suspension and at SWI at left - disturbed by camera action.
Reference	SREF	SREF-08	D	1 on 3	Pale brown sediment under SWI over darker underlying layer streaked with pale gray and dark gray. Stage 1 tubes at SWI. Shallow burrowing. One long burrow halo from SWI to below aRPD. Few infauna visible at depth.
Reference	NREF	NREF-09	A	1 on 3	Light brown silt clay over slightly darker brown silt/clay. Stage 1 tubes at SWI. Long burrow halos visible through aRPD. Small burrow openings in PV.
Reference	NREF	NREF-09	B	1 on 3	Light brown silt clay over slightly darker brown silt/clay. Single small void in sediment column. Small burrows extend into upper few cm of sediment.
Reference	NREF	NREF-09	C	1 on 3	Thin layer of light brown silt/clay over pale gray sediment. Thin aRPD. Small burrows and evidence of fecal pellets in upper 1-2 cms. Stage 1 tube visible at SWI near center. Evidence of Stage 3 burrowing fauna at depth on right edge.
Reference	NREF	NREF-10	A	1 on 3	Light brown silt clay over slightly darker brown silt/clay. Small void near base of aRPD, large void at depth. Small Stage 1 tubes and pellets at SWI. Small burrows extend into upper few cm of sediment. Small thin infauna visible between aRPD and void.
Reference	NREF	NREF-10	B	1 on 3	Light brown silt clay over slightly darker brown silt/clay. Pellet filled void deep in sediment. Small burrows extend into upper few cm of sediment. Clasts on surface and in dragdown are camera artifact. Burrows in PV
Reference	NREF	NREF-10	C	1 on 3	Light brown silt clay over slightly darker brown silt/clay. Small void near base of aRPD. Small Stage 1 tubes and pellets at SWI. Small burrows extend into upper few cm of sediment. Small infauna visible just below aRPD and at depth.
Reference	NREF	NREF-11	F	3	Overpenetrated. Light brown silt/clay over slightly darker sediment. Infilled void visible in sediment column. Small infauna visible in deep aRPD. Burrows in PV
Reference	NREF	NREF-11	G	3	Overpenetrated. Light brown silt/clay over slightly darker sediment. Large void visible in sediment. Thick aRPD. Burrows in PV
Reference	NREF	NREF-11	H	IND	Overpenetrated. Light brown silt/clay over slightly darker sediment. Deep aRPD. Thin infauna visible at depth. Burrows in PV.
Reference	NREF	NREF-12	A	2 on 3	Near overpenetration. Light brown silt/clay over pale gray sediment. Shallow burrows in upper cms. Possible indication of old void at depth. Small burrows in PV
Reference	NREF	NREF-12	B	2 on 3	Partial overpenetration. Light tan silt/clay over pale gray sediment. Deep aRPD. Thin burrows and infauna visible through aRPD. Long burrow halos visible.
Reference	NREF	NREF-12	D	1 on 3	Light brown silt clay over slightly darker brown silt/clay. Small Stage 1 tubes and pellets at SWI. Small burrows extend into upper few cm of sediment. Small burrows in PV. Irregular shaped oxidized mud clasts across much of SWI.

Area	Location	StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View	Sediment Type	Surface Oxidation	Beggiatoa Present?	Beggiatoa Type/Extent	Dredged Material Present?
Reference	EREF	EREF-01	A	9/14/2016	9:25:08	33.87	22.58	0.08	Silt/clay	Ox	No		No
Reference	EREF	EREF-01	C	9/14/2016	9:26:31	34.31	22.87	0.08	Silt/clay	Ox	No		No
Reference	EREF	EREF-01	D	9/14/2016	9:27:54	37.60	25.07	0.09	Silt/clay	Ox	No		No
Reference	EREF	EREF-02	A	9/14/2016	9:17:10	35.09	23.39	0.08	Silt/clay	Ox	No		No
Reference	EREF	EREF-02	D	9/14/2016	9:19:21	28.66	19.10	0.05	Silt/clay	Ox	No		No
Reference	EREF	EREF-03	A	9/14/2016	9:07:48	41.06	27.38	0.11	Silt/clay	Ox	No		No
Reference	EREF	EREF-03	C	9/14/2016	9:09:09	32.76	21.84	0.07	Silt/clay	Ox	No		No
Reference	EREF	EREF-03	D	9/14/2016	9:09:49	44.76	29.84	0.13	Silt/clay	Ox	No		No
Reference	EREF	EREF-04	A	9/14/2016	8:58:17	36.19	24.12	0.09	Silt/clay	Ox	No		No
Reference	EREF	EREF-04	C	9/14/2016	8:59:49	45.90	30.60	0.14	Silt/clay	Ox	No		No
Reference	EREF	EREF-04	D	9/14/2016	9:00:33	32.18	21.46	0.07	Silt/clay	Ox	No		No
Reference	SREF	SREF-05	A	9/14/2016	7:52:44	41.71	27.81	0.12	Silt/clay	Ox	No		No
Reference	SREF	SREF-05	B	9/14/2016	7:53:42	33.99	22.66	0.08	Silt/clay	Ox	No		No
Reference	SREF	SREF-05	C	9/14/2016	7:54:31	32.79	21.86	0.07	Silt/clay	Ox	No		No
Reference	SREF	SREF-06	E	9/14/2016	8:24:58	33.53	22.36	0.07	Silt/clay	Ox	No		No
Reference	SREF	SREF-06	G	9/14/2016	8:26:28	33.45	22.30	0.07	Silt/clay	Ox	No		No
Reference	SREF	SREF-06	H	9/14/2016	8:27:06	28.54	19.03	0.05	Silt/clay	Ox	No		No
Reference	SREF	SREF-07	A	9/14/2016	7:47:50	38.43	25.62	0.10	Silt/clay	Ox	No		No
Reference	SREF	SREF-07	C	9/14/2016	7:49:23	40.63	27.08	0.11	Silt/clay	Ox	No		No
Reference	SREF	SREF-07	D	9/14/2016	7:50:07	37.38	24.92	0.09	Silt/clay	Ox	No		No
Reference	SREF	SREF-08	A	9/14/2016	8:34:27	35.90	23.93	0.09	Silt/clay	Ox	No		No
Reference	SREF	SREF-08	B	9/14/2016	8:35:08	33.59	22.39	0.08	Silt/clay	Ox	No		No
Reference	SREF	SREF-08	C	9/14/2016	8:35:50	35.99	23.99	0.09	Silt/clay	Ox	No		No
Reference	NREF	NREF-09	A	9/14/2016	10:44:19	35.21	23.48	0.08	Silt/clay	Ox	No		No
Reference	NREF	NREF-10	A	9/14/2016	10:21:30	36.45	24.30	0.09	Silt/clay	Ox	No		No
Reference	NREF	NREF-10	B	9/14/2016	10:22:09	40.48	26.98	0.11	Silt/clay	Ox	No		No
Reference	NREF	NREF-10	D	9/14/2016	10:23:37	34.44	22.96	0.08	Silt/clay	Ox	No		No
Reference	NREF	NREF-11	A	9/14/2016	9:56:25	34.43	22.95	0.08	Silt/clay	Ox	No		No
Reference	NREF	NREF-11	E	9/14/2016	10:11:29	IND	IND	IND	Silt/clay	Ox	No		No
Reference	NREF	NREF-11	G	9/14/2016	10:13:03	31.80	21.20	0.07	Silt/clay	Ox	No		No
Reference	NREF	NREF-12	A	9/14/2016	10:36:23	45.02	30.01	0.14	Silt/clay	Ox	No		No
Disposal	RDS	RDS-01	A	9/13/2016	13:33:08	27.32	18.21	0.05	Silt/clay	Ox	No		No
Disposal	RDS	RDS-01	B	9/13/2016	13:33:50	31.93	21.29	0.07	Silt/clay	Ox	No		No
Disposal	RDS	RDS-01	C	9/13/2016	13:34:37	32.68	21.78	0.07	Silt/clay	Ox	No		No
Disposal	RDS	RDS-02	A	9/13/2016	10:32:27	32.86	21.90	0.07	Silt/clay	Ox	No		No
Disposal	RDS	RDS-02	B	9/13/2016	10:33:17	29.97	19.98	0.06	Silt/clay	Ox	No		No
Disposal	RDS	RDS-02	C	9/13/2016	10:34:06	26.49	17.66	0.05	Silt/clay	Ox	No		No
Disposal	RDS	RDS-03	A	9/13/2016	15:02:25	31.45	20.96	0.07	Silt/clay	Ox	No		No
Disposal	RDS	RDS-03	C	9/13/2016	15:04:08	32.39	21.59	0.07	Silt/clay	Ox	No		No
Disposal	RDS	RDS-03	D	9/13/2016	15:05:00	IND	IND	IND	Silt/clay	Ox	No		No

Area	Location	StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View	Sediment Type	Surface Oxidation	Beggiatoa Present?	Beggiatoa Type/Extent	Dredged Material Present?
Disposal	RDS	RDS-04	A	9/13/2016	10:05:23	29.21	19.48	0.06	Silt/clay	Ox	No		No
Disposal	RDS	RDS-04	B	9/13/2016	10:06:58	34.78	23.19	0.08	Silt/clay	Ox	No		No
Disposal	RDS	RDS-05	A	9/13/2016	11:38:05	37.05	24.70	0.09	Silt/clay	Ox	No		No
Disposal	RDS	RDS-05	B	9/13/2016	11:39:04	31.27	20.85	0.07	Silt/clay	Ox	No		No
Disposal	RDS	RDS-05	C	9/13/2016	11:39:52	38.59	25.72	0.10	Silt/clay	Ox	No		No
Disposal	RDS	RDS-06	A	9/13/2016	10:13:52	32.68	21.79	0.07	Silt/clay	Ox	No		No
Disposal	RDS	RDS-06	C	9/13/2016	10:15:16	44.93	29.95	0.13	Gravel on Silt/clay	Ox	No		No
Disposal	RDS	RDS-06	D	9/13/2016	10:16:06	IND	IND	IND	Silt/clay	Ox	No		No
Disposal	RDS	RDS-07	A	9/13/2016	13:43:24	30.18	20.12	0.06	Silt/clay	Ox	No		No
Disposal	RDS	RDS-07	B	9/13/2016	13:44:04	34.08	22.72	0.08	Silt/clay	Ox	No		No
Disposal	RDS	RDS-07	C	9/13/2016	13:44:53	29.91	19.94	0.06	Silt/clay	Ox	No		No
Disposal	RDS	RDS-08	B	9/13/2016	13:52:43	34.87	23.25	0.08	Silt/clay	Ox	No		No
Disposal	RDS	RDS-08	D	9/13/2016	13:54:23	40.63	27.08	0.11	Silt/clay	Ox	No		No
Disposal	RDS	RDS-09	B	9/13/2016	10:23:13	34.24	22.83	0.08	Silt/clay	Ox	No		No
Disposal	RDS	RDS-09	C	9/13/2016	10:24:17	39.03	26.02	0.10	Silt/clay	Ox	No		No
Disposal	RDS	RDS-09	D	9/13/2016	10:25:02	IND	IND	IND	Silt/clay	Ox	No		No
Disposal	RDS	RDS-10	J	9/13/2016	16:38:12	33.61	22.41	0.08	Silt/clay	Ox	No		No
Disposal	RDS	RDS-10	K	9/13/2016	16:38:57	28.78	19.19	0.06	Silt/clay	Ox	No		No
Disposal	RDS	RDS-10	L	9/13/2016	16:39:36	27.16	18.11	0.05	Silt/clay	Ox	No		No
Disposal	RDS	RDS-11	A	9/13/2016	14:32:40	36.57	24.38	0.09	Silt/clay	Ox	No		No
Disposal	RDS	RDS-11	B	9/13/2016	14:34:03	34.96	23.31	0.08	Silt/clay	Ox	No		No
Disposal	RDS	RDS-11	D	9/13/2016	14:36:49	35.46	23.64	0.08	Silt/clay	Ox	No		No
Disposal	RDS	RDS-12	A	9/13/2016	15:41:00	31.75	21.16	0.07	Silt/clay	Ox	No		No
Disposal	RDS	RDS-12	B	9/13/2016	15:41:44	32.69	21.79	0.07	Silt/clay	Ox	No		No
Disposal	RDS	RDS-12	C	9/13/2016	15:42:38	35.14	23.43	0.08	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-13	F	9/13/2016	16:52:02	37.09	24.73	0.09	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-13	G	9/13/2016	16:52:46	36.50	24.33	0.09	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-13	H	9/13/2016	16:53:34	35.86	23.91	0.09	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-14	B	9/13/2016	14:02:55	34.95	23.30	0.08	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-14	C	9/13/2016	14:03:45	35.59	23.73	0.08	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-14	D	9/13/2016	14:04:30	31.68	21.12	0.07	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-15	A	9/13/2016	13:11:37	34.62	23.08	0.08	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-15	B	9/13/2016	13:12:18	IND	IND	IND	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-15	D	9/13/2016	13:13:48	37.87	25.25	0.10	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-16	E	9/13/2016	15:52:04	34.40	22.93	0.08	Silt/clay	Ox	No		No

Area	Location	StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View	Sediment Type	Surface Oxidation	Beggiatoa Present?	Beggiatoa Type/Extent	Dredged Material Present?
Disposal-Outer	RDSO	RDSO-16	F	9/13/2016	15:52:46	37.36	24.90	0.09	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-16	G	9/13/2016	15:53:37	32.18	21.46	0.07	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-17	D	9/13/2016	10:54:23	40.78	27.19	0.11	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-17	E	9/13/2016	15:30:47	40.89	27.26	0.11	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-17	F	9/13/2016	15:31:30	34.70	23.13	0.08	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-18	A	9/13/2016	14:22:20	38.91	25.94	0.10	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-18	B	9/13/2016	14:23:16	30.68	20.45	0.06	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-18	C	9/13/2016	14:23:58	37.94	25.29	0.10	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-19	A	9/13/2016	11:05:49	29.31	19.54	0.06	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-19	B	9/13/2016	11:06:37	33.18	22.12	0.07	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-19	D	9/13/2016	11:08:05	35.02	23.34	0.08	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-20	A	9/13/2016	11:26:38	28.01	18.67	0.05	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-20	B	9/13/2016	11:27:26	37.13	24.76	0.09	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-20	C	9/13/2016	11:28:12	36.41	24.28	0.09	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-21	A	9/13/2016	13:23:49	38.28	25.52	0.10	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-21	B	9/13/2016	13:24:28	34.36	22.91	0.08	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-21	C	9/13/2016	13:25:08	35.14	23.42	0.08	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-22	A	9/13/2016	14:11:40	30.13	20.09	0.06	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-22	B	9/13/2016	14:12:29	38.90	25.94	0.10	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-22	C	9/13/2016	14:13:20	26.20	17.47	0.05	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-23	A	9/13/2016	13:02:13	31.76	21.17	0.07	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-23	B	9/13/2016	13:03:02	IND	IND	IND	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-23	C	9/13/2016	13:03:44	34.67	23.11	0.08	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-24	A	9/12/2016	17:55:19	62.75	41.83	0.26	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-24	B	9/12/2016	17:56:28	59.02	39.35	0.23	Silt/clay	Ox	No		No
Disposal-Outer	RDSO	RDSO-24	C	9/12/2016	17:57:19	68.06	45.38	0.31	Silt/clay	Ox	No		Yes

Area	Location	StationID	Replicate	Dredged Material Notes	Debris	Bedforms	Tubes	Burrows	Tracks	Epifauna	Flora	Number of Fish
Reference	EREF	EREF-01	A		None	None	Present (10-25%)	Present (10-25%)	None	None	None	0
Reference	EREF	EREF-01	C		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Reference	EREF	EREF-01	D		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Reference	EREF	EREF-02	A		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Reference	EREF	EREF-02	D		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Reference	EREF	EREF-03	A		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Reference	EREF	EREF-03	C		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Reference	EREF	EREF-03	D		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Reference	EREF	EREF-04	A		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Reference	EREF	EREF-04	C		None	None	Sparse (<10%)	Abundant (25-75%)	None	None	None	0
Reference	EREF	EREF-04	D		None	None	Sparse (<10%)	Abundant (25-75%)	None	None	None	0
Reference	SREF	SREF-05	A		None	None	Present (10-25%)	Present (10-25%)	Sparse (<10%)	None	None	0
Reference	SREF	SREF-05	B		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Reference	SREF	SREF-05	C		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Reference	SREF	SREF-06	E		None	None	Sparse (<10%)	Abundant (25-75%)	Sparse (<10%)	None	None	0
Reference	SREF	SREF-06	G		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Reference	SREF	SREF-06	H		None	None	Sparse (<10%)	Abundant (25-75%)	None	None	None	0
Reference	SREF	SREF-07	A		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Reference	SREF	SREF-07	C		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Reference	SREF	SREF-07	D		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Reference	SREF	SREF-08	A		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Reference	SREF	SREF-08	B		None	None	Sparse (<10%)	Present (10-25%)	None	IND	None	0
Reference	SREF	SREF-08	C		None	None	Sparse (<10%)	Abundant (25-75%)	None	None	None	0
Reference	NREF	NREF-09	A		None	None	Sparse (<10%)	Sparse (<10%)	None	None	None	0
Reference	NREF	NREF-10	A		None	None	Sparse (<10%)	Abundant (25-75%)	None	None	None	0
Reference	NREF	NREF-10	B		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Reference	NREF	NREF-10	D		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Reference	NREF	NREF-11	A		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Reference	NREF	NREF-11	E		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Reference	NREF	NREF-11	G		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Reference	NREF	NREF-12	A		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	Shrimp	None	0
Disposal	RDS	RDS-01	A		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal	RDS	RDS-01	B		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal	RDS	RDS-01	C		None	None	Sparse (<10%)	Abundant (25-75%)	None	None	None	0
Disposal	RDS	RDS-02	A		None	None	Sparse (<10%)	Abundant (25-75%)	Sparse (<10%)	Shrimp	None	0
Disposal	RDS	RDS-02	B		None	None	Sparse (<10%)	Abundant (25-75%)	None	None	None	0
Disposal	RDS	RDS-02	C		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal	RDS	RDS-03	A		None	None	Sparse (<10%)	Abundant (25-75%)	Sparse (<10%)	None	None	0
Disposal	RDS	RDS-03	C		None	None	Sparse (<10%)	Abundant (25-75%)	Sparse (<10%)	None	None	0
Disposal	RDS	RDS-03	D		None	None	Sparse (<10%)	Abundant (25-75%)	Sparse (<10%)	None	None	0

Area	Location	StationID	Replicate	Dredged Material Notes	Debris	Bedforms	Tubes	Burrows	Tracks	Epifauna	Flora	Number of Fish
Disposal	RDS	RDS-04	A		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal	RDS	RDS-04	B		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal	RDS	RDS-05	A		None	None	Present (10-25%)	Abundant (25-75%)	None	None	None	0
Disposal	RDS	RDS-05	B		None	None	Present (10-25%)	Abundant (25-75%)	None	None	None	0
Disposal	RDS	RDS-05	C		None	None	Present (10-25%)	Dense (>75%)	None	None	None	0
Disposal	RDS	RDS-06	A		None	None	Present (10-25%)	Present (10-25%)	Sparse (<10%)	None	None	0
Disposal	RDS	RDS-06	C		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	Barnacles; Bryozoans?	None	0
Disposal	RDS	RDS-06	D		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Disposal	RDS	RDS-07	A		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Disposal	RDS	RDS-07	B		None	None	Sparse (<10%)	Abundant (25-75%)	None	None	None	0
Disposal	RDS	RDS-07	C		Rope	None	Sparse (<10%)	Present (10-25%)	None	Bryozoans?	None	0
Disposal	RDS	RDS-08	B		None	None	Present (10-25%)	Abundant (25-75%)	None	None	None	0
Disposal	RDS	RDS-08	D		None	None	Abundant (25-75%)	Abundant (25-75%)	None	None	None	0
Disposal	RDS	RDS-09	B		None	None	Sparse (<10%)	Abundant (25-75%)	None	None	None	0
Disposal	RDS	RDS-09	C		None	None	Present (10-25%)	Abundant (25-75%)	None	None	None	0
Disposal	RDS	RDS-09	D		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal	RDS	RDS-10	J		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal	RDS	RDS-10	K		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal	RDS	RDS-10	L		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal	RDS	RDS-11	A		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Disposal	RDS	RDS-11	B		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Disposal	RDS	RDS-11	D		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Disposal	RDS	RDS-12	A		None	None	Present (10-25%)	Present (10-25%)	None	None	None	0
Disposal	RDS	RDS-12	B		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal	RDS	RDS-12	C		None	None	Present (10-25%)	Abundant (25-75%)	None	None	None	0
Disposal-Outer	RDSO	RDSO-13	F		None	None	Sparse (<10%)	Abundant (25-75%)	None	None	None	0
Disposal-Outer	RDSO	RDSO-13	G		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal-Outer	RDSO	RDSO-13	H		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal-Outer	RDSO	RDSO-14	B		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal-Outer	RDSO	RDSO-14	C		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal-Outer	RDSO	RDSO-14	D		None	None	Present (10-25%)	Present (10-25%)	None	None	None	0
Disposal-Outer	RDSO	RDSO-15	A		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal-Outer	RDSO	RDSO-15	B		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal-Outer	RDSO	RDSO-15	D		None	None	Sparse (<10%)	Present (10-25%)	Present (10-25%)	None	None	0
Disposal-Outer	RDSO	RDSO-16	E		None	None	Sparse (<10%)	Abundant (25-75%)	None	None	None	0

Area	Location	StationID	Replicate	Dredged Material Notes	Debris	Bedforms	Tubes	Burrows	Tracks	Epifauna	Flora	Number of Fish
Disposal-Outer	RDSO	RDSO-16	F		None	None	Sparse (<10%)	Abundant (25-75%)	None	None	None	0
Disposal-Outer	RDSO	RDSO-16	G		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal-Outer	RDSO	RDSO-17	D		None	None	Sparse (<10%)	Abundant (25-75%)	Sparse (<10%)	None	None	0
Disposal-Outer	RDSO	RDSO-17	E		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal-Outer	RDSO	RDSO-17	F		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	IND
Disposal-Outer	RDSO	RDSO-18	A		None	None	Sparse (<10%)	Abundant (25-75%)	Sparse (<10%)	None	None	0
Disposal-Outer	RDSO	RDSO-18	B		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Disposal-Outer	RDSO	RDSO-18	C		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Disposal-Outer	RDSO	RDSO-19	A		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Disposal-Outer	RDSO	RDSO-19	B		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Disposal-Outer	RDSO	RDSO-19	D		None	None	Sparse (<10%)	Sparse (<10%)	Sparse (<10%)	None	None	0
Disposal-Outer	RDSO	RDSO-20	A		None	None	Sparse (<10%)	Sparse (<10%)	IND	None	None	0
Disposal-Outer	RDSO	RDSO-20	B		None	None	Sparse (<10%)	Abundant (25-75%)	Sparse (<10%)	None	None	0
Disposal-Outer	RDSO	RDSO-20	C		None	None	Sparse (<10%)	Abundant (25-75%)	Sparse (<10%)	Shrimp	None	0
Disposal-Outer	RDSO	RDSO-21	A		None	None	Present (10-25%)	Sparse (<10%)	Sparse (<10%)	None	None	0
Disposal-Outer	RDSO	RDSO-21	B		None	None	Present (10-25%)	Present (10-25%)	Sparse (<10%)	None	None	0
Disposal-Outer	RDSO	RDSO-21	C		None	None	Sparse (<10%)	Sparse (<10%)	IND	None	None	0
Disposal-Outer	RDSO	RDSO-22	A		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal-Outer	RDSO	RDSO-22	B		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Disposal-Outer	RDSO	RDSO-22	C		None	None	Sparse (<10%)	Present (10-25%)	None	None	None	0
Disposal-Outer	RDSO	RDSO-23	A		None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	None	None	0
Disposal-Outer	RDSO	RDSO-23	B		None	None	Sparse (<10%)	Abundant (25-75%)	None	None	None	0
Disposal-Outer	RDSO	RDSO-23	C		None	None	Sparse (<10%)	Abundant (25-75%)	None	Shrimp	None	0
Disposal-Outer	RDSO	RDSO-24	A		None	Ripple	Present (10-25%)	Abundant (25-75%)	Present (10-25%)	None	None	0
Disposal-Outer	RDSO	RDSO-24	B		None	None	Abundant (25-75%)	Abundant (25-75%)	None	None	None	0
Disposal-Outer	RDSO	RDSO-24	C	Clay clasts- large one exposed near lobster, other dredged material visible immediately under sediment	None	None	Sparse (<10%)	Present (10-25%)	Sparse (<10%)	Lobster	None	0

Area	Location	StationID	Replicate	Comments
Reference	EREF	EREF-01	A	Pale tan silt/clay with many small burrows visible. Few tubes.
Reference	EREF	EREF-01	C	Pale tan silt/clay with many small burrows visible. Few tubes.
Reference	EREF	EREF-01	D	Pale tan silt/clay with many small burrows visible. Few tubes.
Reference	EREF	EREF-02	A	Pale tan silt/clay with many small burrows visible, single large burrow. Few tubes.
Reference	EREF	EREF-02	D	Pale tan silt/clay with many small burrows visible. Few tubes.
Reference	EREF	EREF-03	A	Pale tan silt/clay with many small burrows visible. Few tubes.
Reference	EREF	EREF-03	C	Pale tan silt/clay with many small burrows visible. One large burrow. Few tubes.
Reference	EREF	EREF-03	D	Pale tan silt/clay with many small burrows visible. Few tubes.
Reference	EREF	EREF-04	A	Pale tan silt/clay with many small burrows visible. Few tubes. Small tracks near right laser.
Reference	EREF	EREF-04	C	Pale tan silt/clay with many small burrows visible. Few tubes. One large burrow in upper right corner.
Reference	EREF	EREF-04	D	Pale tan silt/clay with many small burrows visible. Few tubes. Single large burrow opening.
Reference	SREF	SREF-05	A	Pale tan silt/clay with small tubes and many small burrows.
Reference	SREF	SREF-05	B	Pale tan silt/clay with small tubes and many small burrows.
Reference	SREF	SREF-05	C	Pale tan silt/clay with small tubes and many small burrows.
Reference	SREF	SREF-06	E	Pale tan silt/clay with small tubes and many small burrows. Cluster of eggs in upper right.
Reference	SREF	SREF-06	G	Pale tan silt/clay with small tubes and many small burrows. Cluster of eggs in upper right.
Reference	SREF	SREF-06	H	Pale tan silt/clay with small tubes and many small burrows. Few small eggs in upper right.
Reference	SREF	SREF-07	A	Pale tan silt/clay with small tubes and many small burrows.
Reference	SREF	SREF-07	C	Pale tan silt/clay with small tubes and many small burrows.
Reference	SREF	SREF-07	D	Pale tan silt/clay with small tubes and many small burrows.
Reference	SREF	SREF-08	A	Pale tan silt/clay with small tubes and many small burrows.
Reference	SREF	SREF-08	B	Pale tan silt/clay with small tubes and many small burrows. Cluster of eggs to right edge of image. Object in upper left corner - could be a sand dollar.
Reference	SREF	SREF-08	C	Pale tan silt/clay with small tubes and many small burrows.
Reference	NREF	NREF-09	A	Pale tan silt/clay with few small burrows visible. Few tubes.
Reference	NREF	NREF-10	A	Pale tan silt/clay with many small burrows visible. Few tubes.
Reference	NREF	NREF-10	B	Pale tan silt/clay with many small burrows visible. Few tubes. Few tracks visible
Reference	NREF	NREF-10	D	Pale tan silt/clay with many small burrows visible. Few tubes. Few tracks visible
Reference	NREF	NREF-11	A	Pale tan silt/clay with many small burrows visible. Few tubes. Few tracks visible
Reference	NREF	NREF-11	E	Pale tan silt/clay with many small burrows visible. Few tubes. Few tracks visible Single large burrow with laser casting into it.
Reference	NREF	NREF-11	G	Pale tan silt/clay with many small burrows visible. Few tubes.
Reference	NREF	NREF-12	A	Pale tan silt/clay with many small burrows visible. Few tubes. Two shrimp.
Disposal	RDS	RDS-01	A	Pale tan silt/clay with many small burrows visible. Few tubes. Image taken very close to sediment.
Disposal	RDS	RDS-01	B	Pale tan silt/clay with many small burrows visible. Few tubes.
Disposal	RDS	RDS-01	C	Pale tan silt/clay with many small burrows visible. Few tubes.
Disposal	RDS	RDS-02	A	Pale tan silt/clay with many small burrows visible. Few tubes. Single small shrimp.
Disposal	RDS	RDS-02	B	Pale tan silt/clay with many small burrows visible. Few tubes.
Disposal	RDS	RDS-02	C	Pale tan silt/clay with many small burrows visible. Few tubes. Image taken very close to sediment. Single large burrow.
Disposal	RDS	RDS-03	A	Pale tan silt/clay with many small burrows visible. Few tubes.
Disposal	RDS	RDS-03	C	Pale tan silt/clay with many small burrows visible. Few tubes.
Disposal	RDS	RDS-03	D	Pale tan silt/clay with many small burrows visible. Few tubes. Lasers not visible.

Area	Location	StationID	Replicate	Comments
Disposal	RDS	RDS-04	A	Pale tan silt/clay with many small burrows visible. Few tubes.
Disposal	RDS	RDS-04	B	Pale tan silt/clay with many small burrows visible. Few tubes.
Disposal	RDS	RDS-05	A	Pale tan silt/clay with many small burrows visible. Small tubes visible.
Disposal	RDS	RDS-05	B	Pale tan silt/clay with many small burrows visible. Small tubes visible.
Disposal	RDS	RDS-05	C	Pale tan silt/clay with many small burrows visible. Small tubes visible.
Disposal	RDS	RDS-06	A	Pale tan silt/clay with small burrows visible. Small tubes visible. Few short tracks
Disposal	RDS	RDS-06	C	Pale tan silt/clay with small burrows visible. Small tubes visible. Few short tracks. Large angular cobble in view, encrusted with barnacles on the side, possible bryozoans on top of cobble. Smaller cobble with barnacles too. Edge of possible infauna in upper right corner (reddish in color). Some kind of infauna in upper left.
Disposal	RDS	RDS-06	D	Pale tan silt/clay with small burrows visible. Small tubes visible. Few short tracks Image width < 26cm; right laser not visible.
Disposal	RDS	RDS-07	A	Pale tan silt/clay with many small burrows visible. Small tubes visible.
Disposal	RDS	RDS-07	B	Pale tan silt/clay with many small burrows visible. Small tubes visible.
Disposal	RDS	RDS-07	C	Pale tan silt/clay with many small burrows visible. Small tubes visible. Long rope with attached growth, possibly bryozoans
Disposal	RDS	RDS-08	B	Pale tan silt/clay with many small burrows visible. Small tubes visible. Large burrow at center.
Disposal	RDS	RDS-08	D	Pale tan silt/clay with many small burrows visible. Small tubes visible.
Disposal	RDS	RDS-09	B	Pale tan silt/clay with many small burrows visible. Small tubes visible. Large burrow in center of image. Few larger tubes.
Disposal	RDS	RDS-09	C	Pale tan silt/clay with many small burrows visible. Small tubes visible.
Disposal	RDS	RDS-09	D	Pale tan silt/clay with many small burrows visible. Small tubes visible. Resuspended sediment in water column clouds view of lasers.
Disposal	RDS	RDS-10	J	Pale tan silt/clay with many small burrows visible. Few small tubes visible.
Disposal	RDS	RDS-10	K	Pale tan silt/clay with many small burrows visible. Few small tubes visible.
Disposal	RDS	RDS-10	L	Pale tan silt/clay with many small burrows visible. Few small tubes visible.
Disposal	RDS	RDS-11	A	Pale tan silt/clay with many small burrows visible. Few small tubes visible. Few short tracks
Disposal	RDS	RDS-11	B	Pale tan silt/clay with many small burrows visible. Few small tubes visible.
Disposal	RDS	RDS-11	D	Pale tan silt/clay with many small burrows visible. Few small tubes visible.
Disposal	RDS	RDS-12	A	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal	RDS	RDS-12	B	Pale tan silt/clay with large burrows visible. Few small tubes visible.
Disposal	RDS	RDS-12	C	Pale tan silt/clay with small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-13	F	Pale tan silt/clay with many small burrows visible. Few small tubes visible. Possible infauna laying on surface near center.
Disposal-Outer	RDSO	RDSO-13	G	Pale tan silt/clay with small to large burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-13	H	Pale tan silt/clay with many small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-14	B	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-14	C	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-14	D	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-15	A	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-15	B	Field of view width < 26cm; lasers not visible. Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-15	D	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-16	E	Pale tan silt/clay with few small burrows visible. Few small tubes visible.

Area	Location	StationID	Replicate	Comments
Disposal-Outer	RDSO	RDSO-16	F	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-16	G	Pale tan silt/clay with few small burrows visible. Few small tubes visible. Single large burrow.
Disposal-Outer	RDSO	RDSO-17	D	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-17	E	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-17	F	Pale tan silt/clay with few small burrows visible. Few small tubes visible. Possible fish swimming out of frame, could also be squid.
Disposal-Outer	RDSO	RDSO-18	A	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-18	B	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-18	C	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-19	A	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-19	B	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-19	D	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-20	A	Pale tan silt/clay with few small burrows visible. Few small tubes visible. Image taken very close to sediment.
Disposal-Outer	RDSO	RDSO-20	B	Pale tan silt/clay with few small burrows visible. Few small tubes visible. Large burrow in center of image.
Disposal-Outer	RDSO	RDSO-20	C	Pale tan silt/clay with few small burrows visible. Few small tubes visible. Shrimp in view.
Disposal-Outer	RDSO	RDSO-21	A	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-21	B	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-21	C	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-22	A	Pale tan silt/clay with few small burrows visible. Few small tubes visible. Image taken very close to sediment.
Disposal-Outer	RDSO	RDSO-22	B	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-22	C	Pale tan silt/clay with few small burrows visible. Few small tubes visible. Image taken very close to sediment.
Disposal-Outer	RDSO	RDSO-23	A	Pale tan silt/clay with few small burrows visible. Few small tubes visible.
Disposal-Outer	RDSO	RDSO-23	B	Pale tan silt/clay with few small burrows visible. Few small tubes visible. Right laser is out of view. Image taken very close to sediment.
Disposal-Outer	RDSO	RDSO-23	C	Pale tan silt/clay with few small burrows visible. Few small tubes visible. Couple large voids. Shrimp.
Disposal-Outer	RDSO	RDSO-24	A	Pale tan silt/clay with few small tubes and many small burrows. One ripple across left side of image. Lobster track crossing visible area. Discoloration at lower edge of image, visible in all replicates at this station, appears to be an artifact.
Disposal-Outer	RDSO	RDSO-24	B	Pale tan silt/clay with many small tubes and many small, medium, and a few large burrows. Small mud clasts on surface near a large burrow. Discoloration at lower edge of image, visible in all replicates at this station, appears to be an artifact.
Disposal-Outer	RDSO	RDSO-24	C	Pale tan silt/clay with few small tubes and many small to medium burrows. Large lobster visible in frame. Large gray clay DM clasts partially buried in sediment. Discoloration at lower edge of image, visible in all replicates at this station, appears to be an artifact.

APPENDIX F

GRAIN SIZE SCALE FOR SEDIMENTS

APPENDIX F

GRAIN SIZE SCALE FOR SEDIMENTS

Phi (Φ) Size	**Size Range (mm)**	**Size Class (Wentworth Class)**
<-1	>2	Gravel
0 to –1	1 to 2	Very coarse sand
1 to 0	0.5 to 1	Coarse sand
2 to 1	0.25 to 0.5	Medium sand
3 to 2	0.125 to 0.25	Fine sand
4 to 3	0.0625 to 0.125	Very fine sand
>4	<0.0625	Silt/clay

APPENDIX G

SEDIMENT CHEMISTRY LAB RESULTS

DAMOS 2016 - Rockland Disposal Site Sample ID Summary - SEDIMENT

STUDY ID	SURVEY ID	STATION ID	SAMPLE ID	MATRIX	LAB	LAB SAMPLE ID
DAMOS16	RDS	QC_BLK	RAH-901	Equipment BLK	Battelle	K2628-P
DAMOS16	RDS	QC_BLK	RAH-901	Equipment BLK	ESI	28183-004
DAMOS16	RDS	QC_BLK	RAH-901	Equipment BLK	ESI	28183-004D
DAMOS16	RDS	QC_BLK	RAH-901	Equipment BLK	ESI	28183-004S
DAMOS16	RDS	QC_BLK	RAH-901	Equipment BLK	ESI	28183-004SD
DAMOS16	RDS	QC_BLK	RAH-901	Equipment BLK	ESI	28183-005
DAMOS16	RDS	QC_BLK	RAH-901	Equipment BLK	ESI	28183-005D
DAMOS16	RDS	QC_BLK	RAH-901	Equipment BLK	ESI	28183-005S
DAMOS16	RDS	QC_BLK	RAH-901	Equipment BLK	ESI	28183-005SD
DAMOS16	RDS	EREF-01	RAH-015	SED	Battelle	K2612-P
DAMOS16	RDS	EREF-01	RAH-015	SED	ESI	28183-003
DAMOS16	RDS	EREF-01	RAH-015	SED	Katahdin	SJ7451-4
DAMOS16	RDS	EREF-03	RAH-014	SED	Battelle	K2611MSD-P
DAMOS16	RDS	EREF-03	RAH-014	SED	Battelle	K2611MS-P
DAMOS16	RDS	EREF-03	RAH-014	SED	Battelle	K2611-P
DAMOS16	RDS	EREF-03	RAH-014	SED	ESI	28183-002
DAMOS16	RDS	EREF-03	RAH-014	SED	ESI	28183-002D
DAMOS16	RDS	EREF-03	RAH-014	SED	ESI	28183-002S
DAMOS16	RDS	EREF-03	RAH-014	SED	ESI	28183-002SD
DAMOS16	RDS	EREF-03	RAH-014	SED	Katahdin	SJ7451-2
DAMOS16	RDS	EREF-03	RAH-014	SED	Katahdin	SJ7451-3
DAMOS16	RDS	EREF-04	RAH-013	SED	Battelle	K2610DUP-P
DAMOS16	RDS	EREF-04	RAH-013	SED	Battelle	K2610-P
DAMOS16	RDS	EREF-04	RAH-013	SED	ESI	28183-001
DAMOS16	RDS	EREF-04	RAH-013	SED	Katahdin	SJ7451-1
DAMOS16	RDS	NREF-09	RAH-018	SED	Battelle	K2615-P
DAMOS16	RDS	NREF-09	RAH-018	SED	ESI	28183-008
DAMOS16	RDS	NREF-09	RAH-018	SED	Katahdin	SJ7451-7
DAMOS16	RDS	NREF-11	RAH-016	SED	Battelle	K2613-P
DAMOS16	RDS	NREF-11	RAH-016	SED	ESI	28183-006
DAMOS16	RDS	NREF-11	RAH-016	SED	Katahdin	SJ7451-5
DAMOS16	RDS	NREF-12	RAH-017	SED	Battelle	K2614-P
DAMOS16	RDS	NREF-12	RAH-017	SED	ESI	28183-007
DAMOS16	RDS	NREF-12	RAH-017	SED	Katahdin	SJ7451-6
DAMOS16	RDS	RDS-04	RAH-020	SED	Battelle	K2617-P
DAMOS16	RDS	RDS-04	RAH-020	SED	ESI	28183-010
DAMOS16	RDS	RDS-04	RAH-020	SED	Katahdin	SJ7451-9
DAMOS16	RDS	RDS-08	RAH-021	SED	Battelle	K2618-P
DAMOS16	RDS	RDS-08	RAH-021	SED	ESI	28183-011
DAMOS16	RDS	RDS-08	RAH-021	SED	Katahdin	SJ7451-10
DAMOS16	RDS	RDS-09	RAH-019	SED	Battelle	K2616-P
DAMOS16	RDS	RDS-09	RAH-019	SED	ESI	28183-009
DAMOS16	RDS	RDS-09	RAH-019	SED	Katahdin	SJ7451-8
DAMOS16	RDS	RDS-15	RAH-024	SED	Battelle	K2621-P

DAMOS 2016 - Rockland Disposal Site Sample ID Summary - SEDIMENT

STUDY ID	SURVEY ID	STATION ID	SAMPLE ID	MATRIX	LAB	LAB SAMPLE ID
DAMOS16	RDS	RDS-15	RAH-024	SED	ESI	28183-014
DAMOS16	RDS	RDS-15	RAH-024	SED	Katahdin	SJ7451-13
DAMOS16	RDS	RDS-18	RAH-022	SED	Battelle	K2619-P
DAMOS16	RDS	RDS-18	RAH-022	SED	ESI	28183-012
DAMOS16	RDS	RDS-18	RAH-022	SED	Katahdin	SJ7451-11
DAMOS16	RDS	RDS-22	RAH-023	SED	Battelle	K2620-P
DAMOS16	RDS	RDS-22	RAH-023	SED	ESI	28183-013
DAMOS16	RDS	RDS-22	RAH-023	SED	Katahdin	SJ7451-12

		Study Id	DAMOS16	DAMOS	DAMOS16	DAMOS	DAMOS16	DAMOS	DAMOS16	DAM
		Survey Id	RDS	RDS	RDS	RDS	RDS	RDS	RDS	RDS
		Station Id	EREF-01		EREF-03		EREF-03		EREF-04	
		Sample Id	RAH-015	RAH-01	RAH-014	RAH-01	RAH-014	RAH-01	RAH-013	RAH
		Lab Qc Code	SA	SA	SA	SA	DUP	DUP	SA	SA
Class	Param Name	Unit	Result	Lab Qua	Result	Lab Qu	Result	Lab Qu	Result	Lab
MISC	Total Organic Carbon	UG/G	20000		20000		19000		19000	
MISC	Percent Solids (BDO)	PCT	38.53		39.47		39.4		39.81	
MISC	Total Solids (ESI)	PCT	38.1		40.3				38.6	
MISC	Total Solids (KASI)	PCT	36		39		39		38	
GS	Gravel (>2.00 mm)	PCT	0		0		0		0	
GS	Sand (0.0625-2.00 mm)	PCT	5.63		7.75		8.54		9.03	
GS	Course Sand (0.50-1.00 mm)	PCT	0		0		0		0	
GS	Fine Sand (0.125-0.25 mm)	PCT	5.63		7.75		8.34		9.03	
GS	Medium Sand (0.25-0.50 mm)	PCT	0		0		0.2		0	
GS	Silt (0.0039-0.0625 mm)	PCT	82.08		79.63		79.3		79.45	
GS	Clay (<0.00391 mm)	PCT	12.29		12.62		12.16		11.52	
MET	Lead	MG/KG_DRYWT	18.3		18		18		17.5	
MET	Mercury	MG/KG_DRYWT	0.052		0.049		0.049		0.045	
MET	Nickel	MG/KG_DRYWT	24.6		24.1		24.3		24	
MET	Arsenic	MG/KG_DRYWT	9.45		8.85		8.74		9.03	
MET	Cadmium	MG/KG_DRYWT	0.09		0.1		0.091		0.09	
MET	Chromium	MG/KG_DRYWT	31		30.6		30.8		30.4	
MET	Copper	MG/KG_DRYWT	11.3		10.7		10.9		10.8	
MET	Zinc	MG/KG_DRYWT	65.4		64.3		64.7		63.7	
CONG	2,3',4,4',5-Pentachlorobiphenyl	UG/KG_DRYWT	0.132	U	0.129	U			0.129	U
CONG	2,3',4,4'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.0933	U	0.0911	U			0.0914	U
CONG	2,3,3',4,4'-Pentachlorobiphenyl	UG/KG_DRYWT	0.0767	U	0.0748	U			0.075	U
CONG	2,4'-Dichlorobiphenyl	UG/KG_DRYWT	0.111	U	0.108	U			0.108	U
CONG	2,2',4,4',5,5'-Hexachlorobiphenyl	UG/KG_DRYWT	0.281	U	0.274	U			0.275	U
CONG	2,2',3,4,4',5'-Hexachlorobiphenyl	UG/KG_DRYWT	0.0977	U	0.0954	U			0.0956	U
CONG	2,2',3,4,4',5,5'-Heptachlorobiphenyl	UG/KG_DRYWT	0.0933	U	0.0911	U			0.0914	U
CONG	2,2',3,3',4,4',5-Heptachlorobiphenyl	UG/KG_DRYWT	0.081	U	0.0791	U			0.0793	U
CONG	2,2',5,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.106	U	0.104	U			0.104	U
CONG	2,2',5-Trichlorobiphenyl	UG/KG_DRYWT	0.081	U	0.0791	U			0.0793	U
CONG	2,2',4,5,5'-Pentachlorobiphenyl	UG/KG_DRYWT	0.081	U	0.0791	U			0.0793	U
CONG	2,2',3,4,5'-Pentachlorobiphenyl	UG/KG_DRYWT	0.0724	U	0.0707	U			0.0709	U
CONG	2,2',3,3',4,4'-Hexachlorobiphenyl	UG/KG_DRYWT	0.0724	U	0.0707	U			0.0709	U
CONG	2,2',3,3',4,4',5,5',6-Nonachlorobipheny	UG/KG_DRYWT	0.0724	U	0.0707	U			0.0709	U
CONG	2,2',3,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.0767	U	0.0748	U			0.075	U
CONG	2,2',4,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.0767	U	0.0748	U			0.075	U
CONG	2,2',3,4',5,5',6-Heptachlorobiphenyl	UG/KG_DRYWT	0.0767	U	0.0748	U			0.075	U
CONG	2,2',3,4,4',5',6-Heptachlorobiphenyl	UG/KG_DRYWT	0.0639	U	0.0624	U			0.0625	U
CONG	2,2',3,3',4,4',5,6-Octachlorobiphenyl	UG/KG_DRYWT	0.0767	U	0.0748	U			0.075	U
CONG	2,4,4'-Trichlorobiphenyl	UG/KG_DRYWT	0.0639	U	0.0624	U			0.0625	U
CONG	2,2',3,4,4',6,6'-Heptachlorobiphenyl	UG/KG_DRYWT	0.175	U	0.17	U			0.171	U
CONG	Decachlorobiphenyl - Congener	UG/KG_DRYWT	0.081	U	0.0791	U			0.0793	U
	Total NS&T PCB *2 (ND as 1/2 MDL)	UG/KG_DRYWT	1.7538	U	1.712	U			1.7159	U
PEST	heptachlor epoxide	UG/KG_DRYWT	0.0852	U	0.0832	U			0.0834	U
PEST	Endosulfan sulfate	UG/KG_DRYWT	0.115	U	0.112	U			0.112	U
PEST	aldrin	UG/KG_DRYWT	0.081	U	0.0791	U			0.0793	U
PEST	alpha-BHC	UG/KG_DRYWT	0.0767	U	0.0748	U			0.075	U
PEST	beta-BHC	UG/KG_DRYWT	0.115	U	0.112	U			0.112	U
PEST	delta-BHC	UG/KG_DRYWT	0.0852	U	0.0832	U			0.0834	U
PEST	Endosulfan II	UG/KG_DRYWT	0.0724	U	0.0707	U			0.0709	U
PEST	4,4'-DDT	UG/KG_DRYWT	0.175	U	0.17	U			0.171	U
PEST	alpha-chlordane	UG/KG_DRYWT	0.0852	U	0.0832	U			0.0834	U
PEST	gamma-chlordane	UG/KG_DRYWT	0.0767	U	0.0748	U			0.075	U
PEST	chlordane	UG/KG_DRYWT								
PEST	hexachlorocyclohexane, gamma	UG/KG_DRYWT	0.124	U	0.121	U			0.121	U
PEST	dieldrin	UG/KG_DRYWT	0.081	U	0.0791	U			0.0793	U
PEST	endrin	UG/KG_DRYWT	0.0933	U	0.0911	U			0.0914	U
PEST	methoxychlor	UG/KG_DRYWT	0.336	U	0.328	U			0.329	U
PEST	4,4'-DDD	UG/KG_DRYWT	0.115	U	0.112	U			0.112	U
PEST	4,4'-DDE	UG/KG_DRYWT	0.106	U	0.104	U			0.104	U
PEST	heptachlor	UG/KG_DRYWT	0.141	U	0.138	U			0.138	U
PEST	Toxaphene	UG/KG_DRYWT	34.6	U	33.8	U			33.8	U
PEST	Endosulfan I	UG/KG_DRYWT	0.0899	U	0.0878	U			0.088	U

		Study Id	DAMOS16	DAMOS	DAMOS16	DAMOS	DAMOS16	DAMOS	DAMOS16	DAM
		Survey Id	RDS	RDS	RDS	RDS	RDS	RDS	RDS	RDS
		Station Id	EREF-01		EREF-03		EREF-03		EREF-04	
		Sample Id	RAH-015	RAH-01	RAH-014	RAH-01	RAH-014	RAH-01	RAH-013	RAH
		Lab Qc Code	SA	SA	SA	SA	DUP	DUP	SA	SA
Class	**Param Name**	**Unit**	**Result**	**Lab Qua**	**Result**	**Lab Qua**	**Result**	**Lab Qu**	**Result**	**Lab**
SVOC	Anthracene	UG/KG_DRYWT	1.88		2.14				2.08	
SVOC	Pyrene	UG/KG_DRYWT	24.4		25.2				25.6	
SVOC	Benzo(G,H,I)Perylene	UG/KG_DRYWT	12.4		12.5				12.8	
SVOC	Indeno(1,2,3-Cd)Pyrene	UG/KG_DRYWT	11.9		12.5				12.9	
SVOC	Benzo(B)Fluoranthene	UG/KG_DRYWT	13.8		13.9				14.9	
SVOC	Fluoranthene	UG/KG_DRYWT	28.1		29.2				29.6	
SVOC	Benzo(K)Fluoranthene	UG/KG_DRYWT	16.6		14.3				16.2	
SVOC	Acenaphthylene	UG/KG_DRYWT	1.82		1.87				1.98	
SVOC	Chrysene	UG/KG_DRYWT	16		14.5				15.1	
SVOC	Benzo(A)Pyrene	UG/KG_DRYWT	16.3		14				15.1	
SVOC	Dibenz(A,H)Anthracene	UG/KG_DRYWT	2.05		2.46				2.46	
SVOC	Benzo(A)Anthracene	UG/KG_DRYWT	10.9		10.8				11.2	
SVOC	Acenaphthene	UG/KG_DRYWT	0.747	J	0.25	U			0.7	J
SVOC	Phenanthrene	UG/KG_DRYWT	13		14.4				14.1	
SVOC	Fluorene	UG/KG_DRYWT	1.16	J	1.25	J			1.23	J
SVOC	1-Methylnaphthalene	UG/KG_DRYWT	1.46	J	1.5	J			1.6	J
SVOC	2-Methylnaphthalene	UG/KG_DRYWT	1.95		1.84				1.99	
EPH	Naphthalene	UG/KG_DRYWT	2.34		2.31				2.44	
	Total PAH (ND as 1/2 MDL)	UG/KG_DRYWT	176.807		174.795				181.98	

J value reported above MDL but below RL

U not detected above MDL; MDL value reported.

		Study Id	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16
		Survey Id	RDS	RDS	RDS	RDS	RDS	RDS	RDS
		Station Id	EREF-04	EREF-04	EREF-04	NREF-09		NREF-11	
		Sample Id	RAH-013	RAH-013	RAH-013	RAH-018	RAH-018	RAH-016	RAH-016
		Lab Qc Code	DUP	TRIP	QUAD	SA	SA	SA	SA
Class	Param Name	Unit	Result	Result	Result	Result	Lab Qual	Result	Lab Qual
MISC	Total Organic Carbon	UG/G	18000	19000	18000	21000		24000	
MISC	Percent Solids (BDO)	PCT	34.91			34.91		33.2	
MISC	Total Solids (ESI)	PCT				34.7		32.3	
MISC	Total Solids (KASI)	PCT				33		32	
GS	Gravel (>2.00 mm)	PCT				0		0	
GS	Sand (0.0625-2.00 mm)	PCT				0.79		0.79	
GS	Course Sand (0.50-1.00 mm)	PCT				0		0	
GS	Fine Sand (0.125-0.25 mm)	PCT				0.59		0.59	
GS	Medium Sand (0.25-0.50 mm)	PCT				0.2		0.2	
GS	Silt (0.0039-0.0625 mm)	PCT				86.83		85.97	
GS	Clay (<0.00391 mm)	PCT				12.39		13.24	
MET	Lead	MG/KG_DRYWT				20.9		21.7	
MET	Mercury	MG/KG_DRYWT				0.067		0.1	
MET	Nickel	MG/KG_DRYWT				28		29.7	
MET	Arsenic	MG/KG_DRYWT				10.9		10.6	
MET	Cadmium	MG/KG_DRYWT				0.1		0.11	
MET	Chromium	MG/KG_DRYWT				35.8		37.3	
MET	Copper	MG/KG_DRYWT				13.5		14.3	
MET	Zinc	MG/KG_DRYWT				75.2		79.9	
CONG	2,3',4,4',5-Pentachlorobiphenyl	UG/KG_DRYWT				0.146	U	0.154	U
CONG	2,3',4,4'-Tetrachlorobiphenyl	UG/KG_DRYWT				0.103	U	0.108	U
CONG	2,3,3',4,4'-Pentachlorobiphenyl	UG/KG_DRYWT				0.216	J	0.0891	U
CONG	2,4'-Dichlorobiphenyl	UG/KG_DRYWT				0.122	U	0.129	U
CONG	2,2',4,4',5,5'-Hexachlorobiphenyl	UG/KG_DRYWT				0.31	U	0.327	U
CONG	2,2',3,4,4',5'-Hexachlorobiphenyl	UG/KG_DRYWT				0.164	J	0.114	U
CONG	2,2',3,4,4',5,5'-Heptachlorobiphenyl	UG/KG_DRYWT				0.103	U	0.108	U
CONG	2,2',3,3',4,4',5-Heptachlorobiphenyl	UG/KG_DRYWT				0.0893	U	0.0942	U
CONG	2,2',5,5'-Tetrachlorobiphenyl	UG/KG_DRYWT				0.117	U	0.124	U
CONG	2,2',5-Trichlorobiphenyl	UG/KG_DRYWT				0.0893	U	0.0942	U
CONG	2,2',4,5,5'-Pentachlorobiphenyl	UG/KG_DRYWT				0.0893	U	0.0942	U
CONG	2,2',3,4,5'-Pentachlorobiphenyl	UG/KG_DRYWT				0.0799	U	0.0842	U
CONG	2,2',3,3',4,4'-Hexachlorobiphenyl	UG/KG_DRYWT				0.0799	U	0.0842	U
CONG	2,2',3,3',4,4',5,5',6-Nonachlorobipheny	UG/KG_DRYWT				0.0799	U	0.0842	U
CONG	2,2',3,5'-Tetrachlorobiphenyl	UG/KG_DRYWT				0.0846	U	0.0891	U
CONG	2,2',4,5'-Tetrachlorobiphenyl	UG/KG_DRYWT				0.0846	U	0.0891	U
CONG	2,2',3,4',5,5',6-Heptachlorobiphenyl	UG/KG_DRYWT				0.0846	U	0.0891	U
CONG	2,2',3,4,4',5',6-Heptachlorobiphenyl	UG/KG_DRYWT				0.0704	U	0.0743	U
CONG	2,2',3,3',4,4',5,6-Octachlorobiphenyl	UG/KG_DRYWT				0.0846	U	0.0891	U
CONG	2,4,4'-Trichlorobiphenyl	UG/KG_DRYWT				0.0704	U	0.0743	U
CONG	2,2',3,4,4',6,6'-Heptachlorobiphenyl	UG/KG_DRYWT				0.193	U	0.203	U
CONG	Decachlorobiphenyl - Congener	UG/KG_DRYWT				0.0893	U	0.0942	U
	Total NS&T PCB *2 (ND as 1/2 MDL)	UG/KG_DRYWT				2.5022		2.0399	U
PEST	heptachlor epoxide	UG/KG_DRYWT				0.094	U	0.0991	U
PEST	Endosulfan sulfate	UG/KG_DRYWT				0.127	U	0.134	U
PEST	aldrin	UG/KG_DRYWT				0.0893	U	0.0942	U
PEST	alpha-BHC	UG/KG_DRYWT				0.221	J	0.0891	U
PEST	beta-BHC	UG/KG_DRYWT				0.127	U	0.134	U
PEST	delta-BHC	UG/KG_DRYWT				0.094	U	0.0991	U
PEST	Endosulfan II	UG/KG_DRYWT				0.0799	U	0.0842	U
PEST	4,4'-DDT	UG/KG_DRYWT				0.664		0.203	U
PEST	alpha-chlordane	UG/KG_DRYWT				0.094	U	0.0991	U
PEST	gamma-chlordane	UG/KG_DRYWT				0.0846	U	0.0891	U
PEST	chlordane	UG/KG_DRYWT							
PEST	hexachlorocyclohexane, gamma	UG/KG_DRYWT				0.136	U	0.144	U
PEST	dieldrin	UG/KG_DRYWT				0.0893	U	0.0942	U
PEST	endrin	UG/KG_DRYWT				0.103	U	0.108	U
PEST	methoxychlor	UG/KG_DRYWT				0.371	U	0.391	U
PEST	4,4'-DDD	UG/KG_DRYWT				0.127	U	0.134	U
PEST	4,4'-DDE	UG/KG_DRYWT				0.117	U	0.124	U
PEST	heptachlor	UG/KG_DRYWT				0.155	U	0.164	U
PEST	Toxaphene	UG/KG_DRYWT				38.1	U	40.2	U
PEST	Endosulfan I	UG/KG_DRYWT				0.0991	U	0.104	U

		Study Id	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16
		Survey Id	RDS	RDS	RDS	RDS	RDS	RDS	RDS
		Station Id	EREF-04	EREF-04	EREF-04	NREF-09		NREF-11	
		Sample Id	RAH-013	RAH-013	RAH-013	RAH-018	RAH-018	RAH-016	RAH-016
		Lab Qc Code	DUP	TRIP	QUAD	SA	SA	SA	SA
Class	**Param Name**	**Unit**	**Result**	**Result**	**Result**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
SVOC	Anthracene	UG/KG_DRYWT				3.88		3.38	
SVOC	Pyrene	UG/KG_DRYWT				44.1		38.6	
SVOC	Benzo(G,H,I)Perylene	UG/KG_DRYWT				18.5		17.2	
SVOC	Indeno(1,2,3-Cd)Pyrene	UG/KG_DRYWT				16.6		17.7	
SVOC	Benzo(B)Fluoranthene	UG/KG_DRYWT				20.6		20	
SVOC	Fluoranthene	UG/KG_DRYWT				51.4		43.8	
SVOC	Benzo(K)Fluoranthene	UG/KG_DRYWT				25.2		22.4	
SVOC	Acenaphthylene	UG/KG_DRYWT				2.79		2.6	
SVOC	Chrysene	UG/KG_DRYWT				26.4		22.2	
SVOC	Benzo(A)Pyrene	UG/KG_DRYWT				25.8		23	
SVOC	Dibenz(A,H)Anthracene	UG/KG_DRYWT				3.51		2.91	
SVOC	Benzo(A)Anthracene	UG/KG_DRYWT				19.1		16.6	
SVOC	Acenaphthene	UG/KG_DRYWT				1.48	J	1.24	J
SVOC	Phenanthrene	UG/KG_DRYWT				27.6		22.2	
SVOC	Fluorene	UG/KG_DRYWT				2.35		1.94	J
SVOC	1-Methylnaphthalene	UG/KG_DRYWT				2.08		1.93	J
SVOC	2-Methylnaphthalene	UG/KG_DRYWT				2.75		2.66	
EPH	Naphthalene	UG/KG_DRYWT				3.46		3.24	
	Total PAH (ND as 1/2 MDL)	UG/KG_DRYWT				297.6		263.6	

J value reported above MDL but below RL

U not detected above MDL; MDL value reported.

		Study Id	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS
		Survey Id	RDS	RDS	RDS	RDS	RDS	RDS
		Station Id	NREF-12		RDS-04		RDS-08	
		Sample Id	RAH-017	RAH-017	RAH-020	RAH-020	RAH-021	RAH-02
		Lab Qc Code	SA	SA	SA	SA	SA	SA
Class	Param Name	Unit	Result	Lab Qual	Result	Lab Qual	Result	Lab Qua
MISC	Total Organic Carbon	UG/G	23000		21000		21000	
MISC	Percent Solids (BDO)	PCT	33.64		44.88		48.2	
MISC	Total Solids (ESI)	PCT	33.4		45.4		48.5	
MISC	Total Solids (KASI)	PCT	32		43		49	
GS	Gravel (>2.00 mm)	PCT	0		0		0.2	
GS	Sand (0.0625-2.00 mm)	PCT	0.59		21.31		23.9	
GS	Course Sand (0.50-1.00 mm)	PCT	0		2.21		2.43	
GS	Fine Sand (0.125-0.25 mm)	PCT	0.59		16.08		18.43	
GS	Medium Sand (0.25-0.50 mm)	PCT	0		3.02		3.04	
GS	Silt (0.0039-0.0625 mm)	PCT	87.17		64.02		61.11	
GS	Clay (<0.00391 mm)	PCT	12.24		14.67		14.79	
MET	Lead	MG/KG_DRYWT	20.8		17.9		20.3	
MET	Mercury	MG/KG_DRYWT	0.063		0.062		0.091	
MET	Nickel	MG/KG_DRYWT	28.1		22.4		22.4	
MET	Arsenic	MG/KG_DRYWT	9.96		10		11.4	
MET	Cadmium	MG/KG_DRYWT	0.11		0.13		0.19	
MET	Chromium	MG/KG_DRYWT	35.5		30.5		31	
MET	Copper	MG/KG_DRYWT	13.5		12.1		12.9	
MET	Zinc	MG/KG_DRYWT	75.2		60		60.3	
CONG	2,3',4,4',5-Pentachlorobiphenyl	UG/KG_DRYWT	0.151	U	0.114	U	0.537	
CONG	2,3',4,4'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.107	U	0.0801	U	0.46	
CONG	2,3,3',4,4'-Pentachlorobiphenyl	UG/KG_DRYWT	0.0877	U	0.0658	U	0.462	
CONG	2,4'-Dichlorobiphenyl	UG/KG_DRYWT	0.127	U	0.095	U	0.0884	U
CONG	2,2',4,4',5,5'-Hexachlorobiphenyl	UG/KG_DRYWT	0.322	U	0.241	U	0.331	J
CONG	2,2',3,4,4',5'-Hexachlorobiphenyl	UG/KG_DRYWT	0.112	U	0.0838	U	0.452	
CONG	2,2',3,4,4',5,5'-Heptachlorobiphenyl	UG/KG_DRYWT	0.107	U	0.137	J	0.282	J
CONG	2,2',3,3',4,4',5-Heptachlorobiphenyl	UG/KG_DRYWT	0.0927	U	0.0695	U	0.0647	U
CONG	2,2',5,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.122	U	0.0912	U	0.388	
CONG	2,2',5-Trichlorobiphenyl	UG/KG_DRYWT	0.0927	U	0.0695	U	0.0647	U
CONG	2,2',4,5,5'-Pentachlorobiphenyl	UG/KG_DRYWT	0.0927	U	0.0695	U	0.595	
CONG	2,2',3,4,5'-Pentachlorobiphenyl	UG/KG_DRYWT	0.0829	U	0.0622	U	0.107	J
CONG	2,2',3,3',4,4'-Hexachlorobiphenyl	UG/KG_DRYWT	0.0829	U	0.0622	U	0.0579	U
CONG	2,2',3,3',4,4',5,5',6-Nonachlorobipheny	UG/KG_DRYWT	0.0829	U	0.0622	U	0.0579	U
CONG	2,2',3,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.0877	U	0.0658	U	0.314	J
CONG	2,2',4,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.0877	U	0.0658	U	0.137	J
CONG	2,2',3,4',5,5',6-Heptachlorobiphenyl	UG/KG_DRYWT	0.0877	U	0.0658	U	0.0613	U
CONG	2,2',3,4,4',5',6-Heptachlorobiphenyl	UG/KG_DRYWT	0.0731	U	0.0548	U	0.051	U
CONG	2,2',3,3',4,4',5,6-Octachlorobiphenyl	UG/KG_DRYWT	0.0877	U	0.0658	U	0.0613	U
CONG	2,4,4'-Trichlorobiphenyl	UG/KG_DRYWT	0.0731	U	0.0548	U	0.051	U
CONG	2,2',3,4,4',6,6'-Heptachlorobiphenyl	UG/KG_DRYWT	0.2	U	0.15	U	0.14	U
CONG	Decachlorobiphenyl - Congener	UG/KG_DRYWT	0.0927	U	0.209	J	0.427	
	Total NS&T PCB *2 (ND as 1/2 MDL)	UG/KG_DRYWT	2.0085	U	2.048		9.0032	
PEST	heptachlor epoxide	UG/KG_DRYWT	0.0975	U	0.0732	U	0.0681	U
PEST	Endosulfan sulfate	UG/KG_DRYWT	0.132	U	0.0987	U	0.0918	U
PEST	aldrin	UG/KG_DRYWT	0.0927	U	1.3		0.0647	U
PEST	alpha-BHC	UG/KG_DRYWT	0.0877	U	0.0658	U	0.19	J
PEST	beta-BHC	UG/KG_DRYWT	0.132	U	0.0987	U	0.0918	U
PEST	delta-BHC	UG/KG_DRYWT	0.0975	U	0.0732	U	0.0681	U
PEST	Endosulfan II	UG/KG_DRYWT	0.0829	U	0.262	J	0.451	
PEST	4,4'-DDT	UG/KG_DRYWT	0.2	U	0.701		0.635	
PEST	alpha-chlordane	UG/KG_DRYWT	0.0975	U	0.0732	U	0.0681	U
PEST	gamma-chlordane	UG/KG_DRYWT	0.0877	U	0.0658	U	0.0613	U
PEST	chlordane	UG/KG_DRYWT						
PEST	hexachlorocyclohexane, gamma	UG/KG_DRYWT	0.141	U	0.106	U	0.0988	U
PEST	dieldrin	UG/KG_DRYWT	0.0927	U	0.151	J	0.272	J
PEST	endrin	UG/KG_DRYWT	0.107	U	0.0801	U	0.0746	U
PEST	methoxychlor	UG/KG_DRYWT	0.385	U	0.289	U	0.269	U
PEST	4,4'-DDD	UG/KG_DRYWT	0.132	U	0.601		2.49	
PEST	4,4'-DDE	UG/KG_DRYWT	0.122	U	0.329	J	0.437	
PEST	heptachlor	UG/KG_DRYWT	0.161	U	0.121	U	0.113	U
PEST	Toxaphene	UG/KG_DRYWT	39.6	U	29.7	U	27.6	U
PEST	Endosulfan I	UG/KG_DRYWT	0.103	U	0.0772	U	0.0718	U

		Study Id	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS
		Survey Id	RDS	RDS	RDS	RDS	RDS	RDS
		Station Id	NREF-12		RDS-04		RDS-08	
		Sample Id	RAH-017	RAH-017	RAH-020	RAH-020	RAH-021	RAH-02
		Lab Qc Code	SA	SA	SA	SA	SA	SA
Class	Param Name	Unit	Result	Lab Qual	Result	Lab Qual	Result	Lab Qua
SVOC	Anthracene	UG/KG_DRYWT	3.33		33.4		21.3	
SVOC	Pyrene	UG/KG_DRYWT	35.4		204		182	
SVOC	Benzo(G,H,I)Perylene	UG/KG_DRYWT	15.5		83.8		68.9	
SVOC	Indeno(1,2,3-Cd)Pyrene	UG/KG_DRYWT	14.2		89.1		70.8	
SVOC	Benzo(B)Fluoranthene	UG/KG_DRYWT	17.1		128		85.8	
SVOC	Fluoranthene	UG/KG_DRYWT	40.4		226		190	
SVOC	Benzo(K)Fluoranthene	UG/KG_DRYWT	21.6		131		95.6	
SVOC	Acenaphthylene	UG/KG_DRYWT	2.31		12.7		12.3	
SVOC	Chrysene	UG/KG_DRYWT	21.5		150		102	
SVOC	Benzo(A)Pyrene	UG/KG_DRYWT	20.6		125		103	
SVOC	Dibenz(A,H)Anthracene	UG/KG_DRYWT	2.71		19.4		16	
SVOC	Benzo(A)Anthracene	UG/KG_DRYWT	15.5		115		85.7	
SVOC	Acenaphthene	UG/KG_DRYWT	0.958	J	9.9		5.74	
SVOC	Phenanthrene	UG/KG_DRYWT	20		126		101	
SVOC	Fluorene	UG/KG_DRYWT	1.86	J	12		9.46	
SVOC	1-Methylnaphthalene	UG/KG_DRYWT	1.73	J	7.53		5.77	
SVOC	2-Methylnaphthalene	UG/KG_DRYWT	2.3		9.58		7.92	
EPH	Naphthalene	UG/KG_DRYWT	2.85		12.8		11.7	
	Total PAH (ND as 1/2 MDL)	UG/KG_DRYWT	239.848		1495.21		1174.99	

J value reported above MDL but below RL

U not detected above MDL; MDL value reported.

		Study Id	DAMOS16	DAMOS1	DAMOS16	DAMOS	DAMOS16	DAMOS1	DAMOS16	
		Survey Id	RDS	RDS	RDS	RDS	RDS	RDS	RDS	RDS
		Station Id	RDS-09		RDS-15		RDS-18		RDS-22	
		Sample Id	RAH-019	RAH-019	RAH-024	RAH-02	RAH-022	RAH-022	RAH-023	
		Lab Qc Code	SA	SA	SA	SA	SA	SA	SA	SA
Class	Param Name	Unit	Result	Lab Qual	Result	Lab Qu	Result	Lab Qual	Result	
MISC	Total Organic Carbon	UG/G	21000		19000		19000		20000	
MISC	Percent Solids (BDO)	PCT	37.81		41.69		39.45		39.46	
MISC	Total Solids (ESI)	PCT	37.5		41.2		41.5		38.6	
MISC	Total Solids (KASI)	PCT	36		42		41		38	
GS	Gravel (>2.00 mm)	PCT	0		0		0		0	
GS	Sand (0.0625-2.00 mm)	PCT	7.15		7.46		7.13		7.18	
GS	Course Sand (0.50-1.00 mm)	PCT	0		0		0		0	
GS	Fine Sand (0.125-0.25 mm)	PCT	6.33		7.26		5.91		6.98	
GS	Medium Sand (0.25-0.50 mm)	PCT	0.82		0.2		1.22		0.2	
GS	Silt (0.0039-0.0625 mm)	PCT	79.21		80.46		81.76		82.4	
GS	Clay (<0.00391 mm)	PCT	13.64		12.07		11.11		10.42	
MET	Lead	MG/KG_DRYWT	19		18.6		17.3		18.2	
MET	Mercury	MG/KG_DRYWT	0.065		0.051		0.048		0.05	
MET	Nickel	MG/KG_DRYWT	25.7		23.9		24.1		23.9	
MET	Arsenic	MG/KG_DRYWT	10.4		10.7		9.41		9.08	
MET	Cadmium	MG/KG_DRYWT	0.1		0.1		0.09		0.1	
MET	Chromium	MG/KG_DRYWT	32.8		30.3		30.2		30.2	
MET	Copper	MG/KG_DRYWT	12.7		11.1		11.3		11	
MET	Zinc	MG/KG_DRYWT	68.4		64.2		63.1		63.5	
CONG	2,3',4,4',5-Pentachlorobiphenyl	UG/KG_DRYWT	0.135	U	0.122	U	0.129	U	0.129	U
CONG	2,3',4,4'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.095	U	0.0864	U	0.0912	U	0.0911	U
CONG	2,3,3',4,4'-Pentachlorobiphenyl	UG/KG_DRYWT	0.078	U	0.071	U	0.192	J	0.0748	U
CONG	2,4'-Dichlorobiphenyl	UG/KG_DRYWT	0.113	U	0.102	U	0.108	U	0.108	U
CONG	2,2',4,4',5,5'-Hexachlorobiphenyl	UG/KG_DRYWT	0.286	U	0.26	U	0.274	U	0.274	U
CONG	2,2',3,4,4',5'-Hexachlorobiphenyl	UG/KG_DRYWT	0.0994	U	0.0904	U	0.0954	U	0.0954	U
CONG	2,2',3,4,4',5,5'-Heptachlorobiphenyl	UG/KG_DRYWT	0.095	U	0.0864	U	0.0912	U	0.0911	U
CONG	2,2',3,3',4,4',5-Heptachlorobiphenyl	UG/KG_DRYWT	0.0824	U	0.075	U	0.0791	U	0.0791	U
CONG	2,2',5,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.108	U	0.0984	U	0.104	U	0.104	U
CONG	2,2',5-Trichlorobiphenyl	UG/KG_DRYWT	0.0824	U	0.075	U	0.0791	U	0.0791	U
CONG	2,2',4,5,5'-Pentachlorobiphenyl	UG/KG_DRYWT	0.0824	U	0.075	U	0.0791	U	0.0791	U
CONG	2,2',3,4,5'-Pentachlorobiphenyl	UG/KG_DRYWT	0.0737	U	0.067	U	0.0708	U	0.0707	U
CONG	2,2',3,3',4,4'-Hexachlorobiphenyl	UG/KG_DRYWT	0.0737	U	0.067	U	0.0708	U	0.0707	U
CONG	2,2',3,3',4,4',5,5',6-Nonachlorobipheny	UG/KG_DRYWT	0.0737	U	0.067	U	0.0708	U	0.0707	U
CONG	2,2',3,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.078	U	0.071	U	0.0749	U	0.0748	U
CONG	2,2',4,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.078	U	0.071	U	0.0749	U	0.0748	U
CONG	2,2',3,4',5,5',6-Heptachlorobiphenyl	UG/KG_DRYWT	0.078	U	0.071	U	0.0749	U	0.0748	U
CONG	2,2',3,4,4',5',6-Heptachlorobiphenyl	UG/KG_DRYWT	0.065	U	0.0591	U	0.0624	U	0.0624	U
CONG	2,2',3,3',4,4',5,6-Octachlorobiphenyl	UG/KG_DRYWT	0.078	U	0.071	U	0.0749	U	0.0748	U
CONG	2,4,4'-Trichlorobiphenyl	UG/KG_DRYWT	0.065	U	0.0591	U	0.0624	U	0.0624	U
CONG	2,2',3,4,4',6,6'-Heptachlorobiphenyl	UG/KG_DRYWT	0.178	U	0.162	U	0.171	U	0.17	U
CONG	Decachlorobiphenyl - Congener	UG/KG_DRYWT	0.0824	U	0.075	U	0.0791	U	0.0791	U
	Total NS&T PCB *2 (ND as 1/2 MDL)	UG/KG_DRYWT	1.7854	U	1.6227	U	2.0219		1.712	U
PEST	heptachlor epoxide	UG/KG_DRYWT	0.0867	U	0.0789	U	0.0833	U	0.0832	U
PEST	Endosulfan sulfate	UG/KG_DRYWT	0.117	U	0.106	U	0.112	U	0.112	U
PEST	aldrin	UG/KG_DRYWT	0.0824	U	0.075	U	0.0791	U	0.0791	U
PEST	alpha-BHC	UG/KG_DRYWT	0.078	U	0.071	U	0.0749	U	0.0748	U
PEST	beta-BHC	UG/KG_DRYWT	0.117	U	0.106	U	0.112	U	0.112	U
PEST	delta-BHC	UG/KG_DRYWT	0.0867	U	0.0789	U	0.0833	U	0.0832	U
PEST	Endosulfan II	UG/KG_DRYWT	0.0737	U	0.067	U	0.0708	U	0.0707	U
PEST	4,4'-DDT	UG/KG_DRYWT	0.836		0.162	U	0.591		0.17	U
PEST	alpha-chlordane	UG/KG_DRYWT	0.0867	U	0.0789	U	0.0833	U	0.0832	U
PEST	gamma-chlordane	UG/KG_DRYWT	0.078	U	0.071	U	0.0749	U	0.0748	U
PEST	chlordane	UG/KG_DRYWT								
PEST	hexachlorocyclohexane, gamma	UG/KG_DRYWT	0.126	U	0.114	U	0.121	U	0.121	U
PEST	dieldrin	UG/KG_DRYWT	0.0824	U	0.075	U	0.0791	U	0.0791	U
PEST	endrin	UG/KG_DRYWT	0.095	U	0.0864	U	0.0912	U	0.0911	U
PEST	methoxychlor	UG/KG_DRYWT	0.342	U	0.311	U	0.328	U	0.328	U
PEST	4,4'-DDD	UG/KG_DRYWT	0.117	U	0.106	U	0.112	U	0.112	U
PEST	4,4'-DDE	UG/KG_DRYWT	0.108	U	0.0984	U	0.104	U	0.104	U
PEST	heptachlor	UG/KG_DRYWT	0.143	U	0.13	U	0.138	U	0.138	U
PEST	Toxaphene	UG/KG_DRYWT	35.2	U	32	U	33.8	U	33.8	U
PEST	Endosulfan I	UG/KG_DRYWT	0.0915	U	0.0832	U	0.0878	U	0.0878	U

		Study Id	DAMOS16	DAMOS1	DAMOS16	DAMOS	DAMOS16	DAMOS1	DAMOS16	
		Survey Id	RDS	RDS	RDS	RDS	RDS	RDS	RDS	RDS
		Station Id	RDS-09		RDS-15		RDS-18		RDS-22	
		Sample Id	RAH-019	RAH-019	RAH-024	RAH-02	RAH-022	RAH-022	RAH-023	
		Lab Qc Code	SA	SA	SA	SA	SA	SA	SA	SA
Class	Param Name	Unit	Result	Lab Qual	Result	Lab Qu	Result	Lab Qual	Result	
SVOC	Anthracene	UG/KG_DRYWT	18.3		2.76		4.23		3.36	
SVOC	Pyrene	UG/KG_DRYWT	93.1		33.2		39.6		36.5	
SVOC	Benzo(G,H,I)Perylene	UG/KG_DRYWT	29.2		15.7		16.5		13.1	
SVOC	Indeno(1,2,3-Cd)Pyrene	UG/KG_DRYWT	30.2		14.1		17.3		13.5	
SVOC	Benzo(B)Fluoranthene	UG/KG_DRYWT	38.5		16.6		20		16.7	
SVOC	Fluoranthene	UG/KG_DRYWT	106		38.8		43.8		40.4	
SVOC	Benzo(K)Fluoranthene	UG/KG_DRYWT	43.8		19.4		22		18.8	
SVOC	Acenaphthylene	UG/KG_DRYWT	3.72		2.42		2.9		2.31	
SVOC	Chrysene	UG/KG_DRYWT	53.6		20.5		22.6		20.6	
SVOC	Benzo(A)Pyrene	UG/KG_DRYWT	47.2		17.5		23.2		18.5	
SVOC	Dibenz(A,H)Anthracene	UG/KG_DRYWT	6.17		2.68		3.15		2.53	
SVOC	Benzo(A)Anthracene	UG/KG_DRYWT	43.1		14.3		18.2		15.2	
SVOC	Acenaphthene	UG/KG_DRYWT	5.85		0.763	J	1.3	J	1.11	J
SVOC	Phenanthrene	UG/KG_DRYWT	75.2		18.6		22.1		23.3	
SVOC	Fluorene	UG/KG_DRYWT	9.51		1.54	J	2.22		1.92	
SVOC	1-Methylnaphthalene	UG/KG_DRYWT	4.28		1.65		2.21		1.86	
SVOC	2-Methylnaphthalene	UG/KG_DRYWT	5.15		2.09		3.03		2.46	
EPH	Naphthalene	UG/KG_DRYWT	6.24		2.76		4.69		3.16	
	Total PAH (ND as 1/2 MDL)	UG/KG_DRYWT	619.12		225.363		269.03		235.31	

J value reported above MDL but below RL

U not detected above MDL; MDL value reported.

DAMOS 2016

Rockland Disposal Site

Sediment PCB and Pesticides Results

Battelle Norwell

QA/QC Summary
Batch 16-0252

Project:	USACE/NAE – DAMOS Program
Parameters:	Pesticides and PCBs
Laboratory:	Battelle, Norwell, MA
Matrix:	Water - Equipment Blank
Data Set:	DP-16-0238
Analytical SOP:	5-128
Method Reference:	EPA 8081B/8082A modified

Sample Custody

Collection Date	Receipt Date	Temp (°C)
9/15/2016	9/16/2016	1.9

Corrective Actions	NA
Sample Storage	The water sample was stored refrigerated until extraction.
Related samples	NA

METHOD SUMMARIES

Sample Preparation	Water samples were extracted for PCB and pesticides analysis according to Battelle SOP 5-200, *Water Extraction for Trace Level Semi-Volatile Organic Contaminant Analysis.* Approximately 1 liter of water was spiked with surrogates and extracted three times with dichloromethane using separatory funnel techniques. The combined extract was dried over anhydrous sodium sulfate, concentrated, and solvent exchanged into hexane and fortified with internal standard (IS) compounds prior to analysis by GC/ECD. Note: An unrelated water sample (K2629) was processed and analyzed with this sample batch. It will not be reported in the EDD.
Prep comments	No comments.

Analysis	PCB and pesticides were analyzed by gas chromatography electron capture detection (GC/ECD). An initial calibration consisting of target analytes was analyzed prior to sample analysis to demonstrate the linear range. Calibration verification was performed at the beginning and end of each 24-hr period in which samples were analyzed. Concentrations of target compounds were calculated versus internal standards using the average response factors (RF) generated from the initial calibration.
Analysis Comments	See comment regarding LCS recoveries.

Holding Times	Extraction Date(s)	Analysis Date(s)
	9/21/2016	9/23/2016; 9/28/2016

QA/QC Summary
Batch 16-0252

Procedural Blank (PB)	A PB was prepared with this analytical batch to ensure the sample extraction and analysis methods are free of contamination.
≤5 X MDL Samples ≥5X PB	No exceedances noted.
	No comments.

Laboratory Control Spike (LCS)	A LCS was prepared with this analytical batch. The percent recoveries of target analytes were calculated to measure accuracy.
40-120% recovery	No exceedances noted.
	The LCS was fortified with the GCMS LCS solution. As such, several target analytes are not represented in the LCS on the data tables, and the LCS required a dilution. The GCMS spike also includes several analytes which co-elute with 5-128 analytes, specifically PCB 205 which co-elutes with PCB 195, and PCB 31 which co-elutes with PCB 28. A vertical integration was performed inside peak 28 at an inflection point. As there is no inflection point in the 195/205 combination, the fortified concentrations were added together and the entire peak was integrated to achieve a percent recovery. The achieved percent recovery is 106% PCB 195 concentration = 0.5 ng/µL. PCB 205 concentration = 0.51 ng/µL. 50 µL spike yields 50.5 ng total. 53.703 ng from combined integrated peaks. 53.703/50.5*100 = 106.34%

Surrogate Recovery	Surrogate compounds were added prior to extraction. The surrogate recoveries are calculated to measure extraction efficiency.
40-120% recovery	No exceedances noted.
	No comments.

Initial Calibration (ICAL)	The GC/ECD was calibrated with six-level quadratic non-forced calibration curve for all compounds using an instrument response factor (RF).
$R^2 \geq 0.995$	No exceedances noted.
	No comments.

Independent Calibration Check (ICC)	The independent check was run after each initial calibration to verify the calibration. This standard is from a different source than the ICAL.
≤ 20% difference individual and mean	No exceedances noted.
	No comments.

Continuing Calibration Verification (CCV)	Continuing calibration standards were run every 24 hours to ensure that initial calibration is still valid.
≤ 20% difference individual; ≤15% difference mean	No exceedances noted.
	No comments.

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS Waters
Project Number: 100087718

Client ID	RAH-901
Battelle ID	K2628-P
Sample Type	SA
Collection Date	09/15/16
Extraction Date	09/21/16
Analysis Date	09/23/16
Analytical Instrument	ECD
% Moisture	NA
% Lipid	NA
Matrix	WAT
Sample Size	0.88
Size Unit-Basis	L_LIQUID
Units	UG/L_LIQUID
4,4'-DDD	0.001 U
4,4'-DDE	0.001 U
4,4'-DDT	0.001 U
aldrin	0.001 U
a-chlordane	0.001 U
g-chlordane	0.000 U
a-BHC	0.001 U
b-BHC	0.001 U
d-BHC	0.001 U
Lindane	0.001 U
dieldrin	0.001 U
endosulfan I	0.001 U
endosulfan II	0.001 U
endosulfan sulfate	0.001 U
endrin	0.000 U
heptachlor	0.001 U
heptachlor epoxide	0.001 U
methoxychlor	0.001 U
Toxaphene	0.057 U
Technical Chlordane	
Cl2(8)	0.001 U
Cl3(18)	0.000 U
Cl3(28)	0.000 U
Cl4(44)	0.001 U
Cl4(49)	0.000 U
Cl4(52)	0.001 U
Cl4(66)	0.001 U
Cl5(87)	0.001 U
Cl5(101)	0.000 U
Cl5(105)	0.001 U
Cl5(118)	0.001 U
Cl6(128)	0.000 U
Cl6(138)	0.001 U
Cl6(153)	0.001 U
Cl7(170)	0.001 U
Cl7(180)	0.001 U
Cl7(183)	0.000 U
Cl7(184)	0.001 U
Cl7(187)	0.000 U
Cl8(195)	0.000 U
Cl9(206)	0.001 U
Cl10(209)	0.001 U

Surrogate Recoveries (%)

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS Waters
Project Number: 100087718

Client ID	RAH-901
Battelle ID	K2628-P
Sample Type	SA
Collection Date	09/15/16
Extraction Date	09/21/16
Analysis Date	09/23/16
Analytical Instrument	ECD
% Moisture	NA
% Lipid	NA
Matrix	WAT
Sample Size	0.88
Size Unit-Basis	L_LIQUID
Units	UG/L_LIQUID
Cl3(34)	80
Cl6(152)	72

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS Waters
Project Number: 100087718

Client ID	Procedural Blank
Battelle ID	CJ656PB-P
Sample Type	PB
Collection Date	09/21/16
Extraction Date	09/21/16
Analysis Date	09/23/16
Analytical Instrument	ECD
% Moisture	NA
% Lipid	NA
Matrix	WATER
Sample Size	1.00
Size Unit-Basis	L_LIQUID
Units	UG/L_LIQUID
4,4'-DDD	0.00053 U
4,4'-DDE	0.00045 U
4,4'-DDT	0.00063 U
aldrin	0.00053 U
a-chlordane	0.00044 U
g-chlordane	0.0004 U
a-BHC	0.00047 U
b-BHC	0.00055 U
d-BHC	0.00051 U
Lindane	0.00067 U
dieldrin	0.00054 U
endosulfan I	0.00053 U
endosulfan II	0.00053 U
endosulfan sulfate	0.00044 U
endrin	0.00041 U
heptachlor	0.00053 U
heptachlor epoxide	0.00044 U
methoxychlor	0.00076 U
Toxaphene	0.05 U
Technical Chlordane	
Cl2(8)	0.00057 U
Cl3(18)	0.00037 U
Cl3(28)	0.00042 U
Cl4(44)	0.00053 U
Cl4(49)	0.00039 U
Cl4(52)	0.0005 U
Cl4(66)	0.0006 U
Cl5(87)	0.00046 U
Cl5(101)	0.00039 U
Cl5(105)	0.0006 U
Cl5(118)	0.00058 U
Cl6(128)	0.00042 U
Cl6(138)	0.00049 U
Cl6(153)	0.00049 U
Cl7(170)	0.00045 U
Cl7(180)	0.00046 U
Cl7(183)	0.00041 U
Cl7(184)	0.00058 U
Cl7(187)	0.00042 U
Cl8(195)	0.00043 U
Cl9(206)	0.00046 U
Cl10(209)	0.00045 U

Surrogate Recoveries (%)

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS Waters
Project Number: 100087718

Client ID	Procedural Blank
Battelle ID	CJ656PB-P
Sample Type	PB
Collection Date	09/21/16
Extraction Date	09/21/16
Analysis Date	09/23/16
Analytical Instrument	ECD
% Moisture	NA
% Lipid	NA
Matrix	WATER
Sample Size	1.00
Size Unit-Basis	L_LIQUID
Units	UG/L_LIQUID
Cl3(34)	91
Cl6(152)	85

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS Waters
Project Number: 100087718

Client ID	
Battelle ID	
Sample Type	
Collection Date	
Extraction Date	
Analysis Date	
Analytical Instrument	
% Moisture	
% Lipid	
Matrix	
Sample Size	
Size Unit-Basis	
Units	
4,4'-DDD	
4,4'-DDE	
4,4'-DDT	
aldrin	
a-chlordane	
g-chlordane	
a-BHC	
b-BHC	
d-BHC	
Lindane	
dieldrin	
endosulfan I	
endosulfan II	
endosulfan sulfate	
endrin	
heptachlor	
heptachlor epoxide	
methoxychlor	
Toxaphene	
Technical Chlordane	
Cl2(8)	
Cl3(18)	
Cl3(28)	
Cl4(44)	
Cl4(49)	
Cl4(52)	
Cl4(66)	
Cl5(87)	
Cl5(101)	
Cl5(105)	
Cl5(118)	
Cl6(128)	
Cl6(138)	
Cl6(153)	
Cl7(170)	
Cl7(180)	
Cl7(183)	
Cl7(184)	
Cl7(187)	
Cl8(195)	
Cl9(206)	
Cl10(209)	

Surrogate Recoveries (%)

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS Waters
Project Number: 100087718

Client ID
Battelle ID
Sample Type
Collection Date
Extraction Date
Analysis Date
Analytical Instrument
% Moisture
% Lipid
Matrix
Sample Size
Size Unit-Basis
Units
Cl3(34)
Cl6(152)

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS Waters
Project Number: 100087718

Client ID	Laboratory Control Sample		Target	% Recovery	Qualifier
Battelle ID	CJ657LCS-P				
Sample Type	LCS				
Collection Date	09/21/16				
Extraction Date	09/21/16				
Analysis Date	09/23/16				
Analytical Instrument	ECD				
% Moisture	NA				
% Lipid	NA				
Matrix	WATER				
Sample Size	1.00				
Size Unit-Basis	L_LIQUID				
Units	UG/L_LIQUID				
4,4'-DDD	0.119	D	0.13	95	
4,4'-DDE	0.0772	D	0.13	62	
4,4'-DDT	0.0802	D	0.13	64	
aldrin	0.00053	U			
a-chlordane	0.075	D	0.13	60	
g-chlordane	0.0732	D	0.13	58	
a-BHC	0.00047	U			
b-BHC	0.00055	U			
d-BHC	0.00051	U			
Lindane	0.00067	U			
dieldrin	0.0797	D	0.13	64	
endosulfan I	0.00053	U			
endosulfan II	0.00053	U			
endosulfan sulfate	0.00044	U			
endrin	0.00041	U			
heptachlor	0.00053	U			
heptachlor epoxide	0.00044	U			
methoxychlor	0.00076	U			
Toxaphene	0.05	U			
Technical Chlordane	0.758				
Cl2(8)	0.0248		0.03	99	
Cl3(18)	0.0219		0.03	88	
Cl3(28)	0.0257		0.03	103	
Cl4(44)	0.0256		0.03	102	
Cl4(49)	0.0239		0.03	96	
Cl4(52)	0.0257		0.03	103	
Cl4(66)	0.0289		0.03	116	
Cl5(87)	0.0265		0.03	106	
Cl5(101)	0.0264		0.03	106	
Cl5(105)	0.0275		0.03	110	
Cl5(118)	0.0272		0.03	109	
Cl6(128)	0.0268		0.03	107	
Cl6(138)	0.0258		0.03	103	
Cl6(153)	0.023		0.03	92	
Cl7(170)	0.0274		0.03	110	
Cl7(180)	0.0253		0.03	101	
Cl7(183)	0.027		0.03	108	
Cl7(184)	0.00058	U			
Cl7(187)	0.025		0.03	100	
Cl8(195)	0.0537		0.03	215	N
Cl9(206)	0.0271		0.03	108	
Cl10(209)	0.0262		0.03	105	

Surrogate Recoveries (%)

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS Waters
Project Number: 100087718

Client ID	Laboratory Control Sample		
Battelle ID	CJ657LCS-P		
Sample Type	LCS		
Collection Date	09/21/16		
Extraction Date	09/21/16		
Analysis Date	09/23/16		
Analytical Instrument	ECD		
% Moisture	NA		
% Lipid	NA		
Matrix	WATER		
Sample Size	1.00		
Size Unit-Basis	L_LIQUID		
Units	UG/L_LIQUID	Target % Recovery	Qualifier
Cl3(34)	84		
Cl6(152)	81		

QA/QC Summary
Batch 16-0252

Project:	USACE/NAE – DAMOS Program
Parameters:	PAH
Laboratory:	Battelle, Norwell, MA
Matrix:	Water – Equipment Blank
Data Set:	DP-16-0237
Analytical SOP:	5-157
Method Reference:	EPA 8270D modified

Sample Custody

Collection Date	Receipt Date	Temp (°C)
9/15/2016	9/16/2016	1.9

Corrective Actions	NA
Sample Storage	The water sample was stored refrigerated until extraction.
Related samples	NA

METHOD SUMMARIES

Sample Preparation	Water samples were extracted for PCB and pesticides analysis according to Battelle SOP 5-200, *Water Extraction for Trace Level Semi-Volatile Organic Contaminant Analysis.* Approximately 1 liter of water was spiked with surrogates and extracted three times with dichloromethane using separatory funnel techniques. The combined extract was dried over anhydrous sodium sulfate, concentrated, and solvent exchanged into hexane and fortified with internal standard (IS) compounds prior to analysis by GC/MS. Note: An unrelated water sample (K2629) was processed and analyzed with this sample batch. It will not be reported in the EDD.
Prep comments	No comments.

Analysis	PAH were measured by gas chromatography-mass spectrometry (GC/MS) in the selected ion mode (SIM). An initial calibration consisting of representative target analytes was analyzed prior to analysis to demonstrate the linear range of analysis. Calibration verification was performed at the beginning and end of each 24-hour period. Target PAH were quantified using the average response factors (RF) generated from the initial calibration.
Analysis Comments	No comments related to project samples.

Holding Times	Extraction Date(s)	Analysis Date(s)
	9/21/2016	9/22/2016

QA/QC Summary
Batch 16-0252

Procedural Blank (PB)	A PB was prepared with this analytical batch to ensure the sample extraction and analysis methods are free of contamination.
≤5 X MDL Samples >5X PB	No exceedances noted. No comments.

Laboratory Control Spike (LCS)	A LCS was prepared with this analytical batch. The percent recoveries of target analytes were calculated to measure accuracy.
40-120% recovery	No exceedances noted. No comments.

Surrogate Recovery	Surrogate compounds were added prior to extraction. The surrogate recoveries are calculated to measure extraction efficiency.
40-120% recovery	No exceedances noted. No comments.

Initial Calibration (ICAL)	The GC/MS was calibrated with seven-level calibration curve for all compounds using an instrument response factor (RF).
Mean ≤ 15% Indiv ≤ 25%	No exceedances noted. No comments.

Independent Calibration Check (ICC)	The independent check was run after each initial calibration to verify the calibration. This standard is from a different source than the ICAL.
≤ 25% difference individual and mean	No exceedances noted. No comments.

Continuing Calibration Verification (CCV)	Continuing calibration standards were run every 24 hours to ensure that initial calibration is still valid.
≤ 25% difference individual; ≤15% difference mean	No exceedances noted. No comments.

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS Waters
Project Number: 100087718

Client ID	RAH-901
Battelle ID	K2628-P
Sample Type	SA
Collection Date	09/15/16
Extraction Date	09/21/16
Analysis Date	09/22/16
Analytical Instrument	MS
% Moisture	NA
% Lipid	NA
Matrix	WAT
Sample Size	0.88
Size Unit-Basis	L_LIQUID
Units	UG/L_LIQUID
Naphthalene	0.008
2-Methylnaphthalene	0.004
1-Methylnaphthalene	0.004 U
Acenaphthylene	0.001 U
Acenaphthene	0.002 U
Fluorene	0.003
Anthracene	0.001 U
Phenanthrene	0.007
Fluoranthene	0.002 U
Pyrene	0.002 U
Benzo(a)anthracene	0.002 U
Chrysene	0.002 U
Benzo(b)fluoranthene	0.002 U
Benzo(k)fluoranthene	0.001 U
Benzo(a)pyrene	0.002 U
Indeno(1,2,3-cd)pyrene	0.002 U
Dibenz(a,h)anthracene	0.002 U
Benzo(g,h,i)perylene	0.001 U

Surrogate Recoveries (%)

Naphthalene-d8	68
Acenaphthene-d10	77
Phenanthrene-d10	88
Benzo(a)pyrene-d12	82

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS Waters
Project Number: 100087718

Client ID	Procedural Blank
Battelle ID	CJ656PB-P
Sample Type	PB
Collection Date	09/21/16
Extraction Date	09/21/16
Analysis Date	09/22/16
Analytical Instrument	MS
% Moisture	NA
% Lipid	NA
Matrix	WATER
Sample Size	1.00
Size Unit-Basis	L_LIQUID
Units	UG/L_LIQUID
Naphthalene	0.00508 U
2-Methylnaphthalene	0.00285 U
1-Methylnaphthalene	0.00358 U
Acenaphthylene	0.00119 U
Acenaphthene	0.00137 U
Fluorene	0.00117 U
Anthracene	0.00117 U
Phenanthrene	0.0024 U
Fluoranthene	0.00152 U
Pyrene	0.00139 U
Benzo(a)anthracene	0.00134 U
Chrysene	0.00138 U
Benzo(b)fluoranthene	0.00135 U
Benzo(k)fluoranthene	0.00126 U
Benzo(a)pyrene	0.0015 U
Indeno(1,2,3-cd)pyrene	0.00176 U
Dibenz(a,h)anthracene	0.0014 U
Benzo(g,h,i)perylene	0.0012 U

Surrogate Recoveries (%)

Naphthalene-d8	95
Acenaphthene-d10	99
Phenanthrene-d10	106
Benzo(a)pyrene-d12	96

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS Waters
Project Number: 100087718

Client ID	Laboratory Control Sample			
Battelle ID	CJ657LCS-P			
Sample Type	LCS			
Collection Date	09/21/16			
Extraction Date	09/21/16			
Analysis Date	09/22/16			
Analytical Instrument	MS			
% Moisture	NA			
% Lipid	NA			
Matrix	WATER			
Sample Size	1.00			
Size Unit-Basis	L_LIQUID			
Units	UG/L_LIQUID	Target	% Recovery	Qualifier
Naphthalene	0.224	0.25	89	
2-Methylnaphthalene	0.225	0.25	90	
1-Methylnaphthalene	0.226	0.25	90	
Acenaphthylene	0.213	0.25	85	
Acenaphthene	0.229	0.25	91	
Fluorene	0.228	0.25	91	
Anthracene	0.225	0.25	90	
Phenanthrene	0.248	0.25	99	
Fluoranthene	0.257	0.25	102	
Pyrene	0.255	0.25	102	
Benzo(a)anthracene	0.238	0.25	95	
Chrysene	0.247	0.25	99	
Benzo(b)fluoranthene	0.244	0.25	97	
Benzo(k)fluoranthene	0.256	0.25	102	
Benzo(a)pyrene	0.236	0.25	94	
Indeno(1,2,3-cd)pyrene	0.23	0.25	92	
Dibenz(a,h)anthracene	0.252	0.25	101	
Benzo(g,h,i)perylene	0.248	0.25	99	

Surrogate Recoveries (%)

Naphthalene-d8	84
Acenaphthene-d10	86
Phenanthrene-d10	91
Benzo(a)pyrene-d12	81

QA/QC Summary
Batch 16-0254

Project:	USACE/NAE – DAMOS Program (Rockland Disposal Site)
Parameters:	PCB and Pesticides
Laboratory:	Battelle-Norwell, MA
Matrix:	Sediment
Data Set:	DP-16-0241
Analytical SOP:	5-128
Method Reference:	EPA 8081B/8082A modified

Sample Custody

Collection Date	Receipt Date	Temp (°C)
9/15/2016	9/16/2016	1.9

Corrective Actions	No comments.
Sample Storage	Samples were stored frozen upon receipt.
Related Samples	NA

METHOD SUMMARIES

Sample Preparation	Approximately 30 grams of sediment sample was spiked with surrogates and serially extracted three times with dichloromethane using an orbital shaker table. The combined extracts were concentrated by Kuderna-Danish and nitrogen evaporation techniques. Sample concentrates were further processed by alumina, activated copper cleanup, followed by size-exclusion HPLC. The final cleaned extracts were concentrated, spiked with internal standards and submitted for PCB and pesticide analyses by GC/ECD.
Prep comments	

Analysis	PCB and pesticides were analyzed by gas chromatography electron capture detection (GC/ECD). An initial calibration consisting of target analytes was analyzed prior to sample analysis to demonstrate the linear range. Calibration verification was performed at the beginning and end of 10 injections or each 24-hour period (whichever is more frequent). Concentrations of target compounds were calculated versus internal standards using the average response factors (RF) generated from the initial calibration.
Analysis Comments	Matrix interference in the SRM on the primary column near PCBs 170 and 209 necessitated reporting these analytes from the secondary column for this batch.

	Extraction Date(s)	Analysis Date(s)
Holding Times	9/26/2016	9/29-30/2016; 10/7-8/2016

QA/QC Summary
Batch 16-0254

Procedural Blank (PB)	A PB was prepared with this analytical batch to ensure the sample extraction and analysis methods are free of contamination.
PB <5x MDL; Samples must be >5 X PB	No exceedances noted.
	No comments.

Laboratory Control Spike (LCS)	A LCS was prepared with this analytical batch. The percent recoveries of target analytes were calculated to measure accuracy.
40-120% recovery	No exceedances noted.
	No comments.

Surrogate Recovery	Surrogate compounds were added prior to extraction. The surrogate recoveries are calculated to measure extraction efficiency.
40-120% recovery	No exceedances noted.
	No comments.

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)	A matrix spike set was prepared with this analytical batch. The percent recoveries of target analytes were calculated to measure data quality in terms of accuracy. The relative percent difference (RPD) between the two samples was calculated to measure data quality in terms of precision.
40-120% recovery ≤30% RPD Analyte conc. >5x background	No exceedances noted.
	No comments.

Analytical Duplicate	A sample was prepared in duplicate with this analytical batch. The relative percent difference (RPD) between the two samples was calculated to measure data quality in terms of precision.
≤30% RPD Analyte conc. >10x MDL	No exceedances noted.
	No comments.

Standard Reference Material (SRM)	A standard reference material was prepared with this batch to measure data in terms of analytical accuracy.
≤30% difference on average Analyte >5x MDL	No exceedances noted.
	Matrix interference in the SRM on the primary column near PCBs 170 and 209 necessitated reporting these analytes from the secondary column for this batch.

QA/QC Summary
Batch 16-0254

Initial Calibration (ICAL)	The GC/ECD was calibrated with six-level quadratic non-forced calibration curve for all compounds using an instrument response factor (RF).
$R^2 \geq 0.995$	No exceedances noted.
	No comments.

Independent Calibration Check (ICC)	The independent check was run after each initial calibration to verify the calibration. This standard is from a different source than the ICAL.
≤ 20% difference individual and mean	No exceedances noted.
	No comments.

Continuing Calibration Verification (CCV)	Continuing calibration standards were performed at the beginning and end of 10 injections or each 24-hour period (whichever is more frequent).
≤ 20% difference individual and ≤ 15% mean	No exceedances noted.
	No comments.

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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	RAH-013	RAH-014	RAH-015	RAH-016
Battelle ID	K2610-P	K2611-P	K2612-P	K2613-P
Sample Type	SA	SA	SA	SA
Collection Date	09/15/16	09/15/16	09/15/16	09/15/16
Extraction Date	09/26/16	09/26/16	09/26/16	09/26/16
Analysis Date	09/29/16	09/29/16	09/30/16	09/30/16
Analytical Instrument	ECD	ECD	ECD	ECD
% Moisture	60.6	60.53	61.47	66.8
% Lipid	NA	NA	NA	NA
Matrix	SED	SED	SED	SED
Sample Size	11.82	11.85	11.57	9.95
Size Unit-Basis	G_DRY	G_DRY	G_DRY	G_DRY
Units	UG/KG_DRY	UG/KG_DRY	UG/KG_DRY	UG/KG_DRY
4,4'-DDD	0.112 U	0.112 U	0.115 U	0.134 U
4,4'-DDE	0.104 U	0.104 U	0.106 U	0.124 U
4,4'-DDT	0.171 U	0.170 U	0.175 U	0.203 U
aldrin	0.079 U	0.079 U	0.081 U	0.094 U
a-chlordane	0.083 U	0.083 U	0.085 U	0.099 U
g-chlordane	0.075 U	0.075 U	0.077 U	0.089 U
a-BHC	0.075 U	0.075 U	0.077 U	0.089 U
b-BHC	0.112 U	0.112 U	0.115 U	0.134 U
d-BHC	0.083 U	0.083 U	0.085 U	0.099 U
Lindane	0.121 U	0.121 U	0.124 U	0.144 U
dieldrin	0.079 U	0.079 U	0.081 U	0.094 U
endosulfan I	0.088 U	0.088 U	0.090 U	0.104 U
endosulfan II	0.071 U	0.071 U	0.072 U	0.084 U
endosulfan sulfate	0.112 U	0.112 U	0.115 U	0.134 U
endrin	0.091 U	0.091 U	0.093 U	0.108 U
heptachlor	0.138 U	0.138 U	0.141 U	0.164 U
heptachlor epoxide	0.083 U	0.083 U	0.085 U	0.099 U
methoxychlor	0.329 U	0.328 U	0.336 U	0.391 U
Toxaphene	33.800 U	33.800 U	34.600 U	40.200 U
Technical Chlordane				
Cl2(8)	0.108 U	0.108 U	0.111 U	0.129 U
Cl3(18)	0.079 U	0.079 U	0.081 U	0.094 U
Cl3(28)	0.063 U	0.062 U	0.064 U	0.074 U
Cl4(44)	0.075 U	0.075 U	0.077 U	0.089 U
Cl4(49)	0.075 U	0.075 U	0.077 U	0.089 U
Cl4(52)	0.104 U	0.104 U	0.106 U	0.124 U
Cl4(66)	0.091 U	0.091 U	0.093 U	0.108 U
Cl5(87)	0.071 U	0.071 U	0.072 U	0.084 U
Cl5(101)	0.079 U	0.079 U	0.081 U	0.094 U
Cl5(105)	0.075 U	0.075 U	0.077 U	0.089 U
Cl5(118)	0.129 U	0.129 U	0.132 U	0.154 U
Cl6(128)	0.071 U	0.071 U	0.072 U	0.084 U
Cl6(138)	0.096 U	0.095 U	0.098 U	0.114 U
Cl6(153)	0.275 U	0.274 U	0.281 U	0.327 U
Cl7(170)	0.079 U	0.079 U	0.081 U	0.094 U
Cl7(180)	0.091 U	0.091 U	0.093 U	0.108 U
Cl7(183)	0.063 U	0.062 U	0.064 U	0.074 U
Cl7(184)	0.171 U	0.170 U	0.175 U	0.203 U
Cl7(187)	0.075 U	0.075 U	0.077 U	0.089 U
Cl8(195)	0.075 U	0.075 U	0.077 U	0.089 U
Cl9(206)	0.071 U	0.071 U	0.072 U	0.084 U
Cl10(209)	0.079 U	0.079 U	0.081 U	0.094 U
Surrogate Recoveries (%)				
Cl3(34)	66	69	69	64
Cl6(152)	60	69	66	64

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	RAH-017	RAH-018	RAH-019	RAH-020
Battelle ID	K2614-P	K2615-P	K2616-P	K2617-P
Sample Type	SA	SA	SA	SA
Collection Date	09/15/16	09/15/16	09/15/16	09/15/16
Extraction Date	09/26/16	09/26/16	09/26/16	09/26/16
Analysis Date	09/30/16	09/30/16	09/30/16	09/30/16
Analytical Instrument	ECD	ECD	ECD	ECD
% Moisture	66.36	65.09	62.19	55.12
% Lipid	NA	NA	NA	NA
Matrix	SED	SED	SED	SED
Sample Size	10.11	10.49	11.37	13.48
Size Unit-Basis	G_DRY	G_DRY	G_DRY	G_DRY
Units	UG/KG_DRY	UG/KG_DRY	UG/KG_DRY	UG/KG_DRY
4,4'-DDD	0.132 U	0.127 U	0.117 U	0.601
4,4'-DDE	0.122 U	0.117 U	0.108 U	0.329 J
4,4'-DDT	0.200 U	0.664	0.836	0.701
aldrin	0.093 U	0.089 U	0.082 U	1.300
a-chlordane	0.098 U	0.094 U	0.087 U	0.073 U
g-chlordane	0.088 U	0.085 U	0.078 U	0.066 U
a-BHC	0.088 U	0.221 J	0.078 U	0.066 U
b-BHC	0.132 U	0.127 U	0.117 U	0.099 U
d-BHC	0.098 U	0.094 U	0.087 U	0.073 U
Lindane	0.141 U	0.136 U	0.126 U	0.106 U
dieldrin	0.093 U	0.089 U	0.082 U	0.151 J
endosulfan I	0.103 U	0.099 U	0.092 U	0.077 U
endosulfan II	0.083 U	0.080 U	0.074 U	0.262 J
endosulfan sulfate	0.132 U	0.127 U	0.117 U	0.099 U
endrin	0.107 U	0.103 U	0.095 U	0.080 U
heptachlor	0.161 U	0.155 U	0.143 U	0.121 U
heptachlor epoxide	0.098 U	0.094 U	0.087 U	0.073 U
methoxychlor	0.385 U	0.371 U	0.342 U	0.289 U
Toxaphene	39.600 U	38.100 U	35.200 U	29.700 U
Technical Chlordane				
Cl2(8)	0.127 U	0.122 U	0.113 U	0.095 U
Cl3(18)	0.093 U	0.089 U	0.082 U	0.070 U
Cl3(28)	0.073 U	0.070 U	0.065 U	0.055 U
Cl4(44)	0.088 U	0.085 U	0.078 U	0.066 U
Cl4(49)	0.088 U	0.085 U	0.078 U	0.066 U
Cl4(52)	0.122 U	0.117 U	0.108 U	0.091 U
Cl4(66)	0.107 U	0.103 U	0.095 U	0.080 U
Cl5(87)	0.083 U	0.080 U	0.074 U	0.062 U
Cl5(101)	0.093 U	0.089 U	0.082 U	0.070 U
Cl5(105)	0.088 U	0.216 J	0.078 U	0.066 U
Cl5(118)	0.151 U	0.146 U	0.135 U	0.114 U
Cl6(128)	0.083 U	0.080 U	0.074 U	0.062 U
Cl6(138)	0.112 U	0.164 J	0.099 U	0.084 U
Cl6(153)	0.322 U	0.310 U	0.286 U	0.241 U
Cl7(170)	0.093 U	0.089 U	0.082 U	0.070 U
Cl7(180)	0.107 U	0.103 U	0.095 U	0.137 J
Cl7(183)	0.073 U	0.070 U	0.065 U	0.055 U
Cl7(184)	0.200 U	0.193 U	0.178 U	0.150 U
Cl7(187)	0.088 U	0.085 U	0.078 U	0.066 U
Cl8(195)	0.088 U	0.085 U	0.078 U	0.066 U
Cl9(206)	0.083 U	0.080 U	0.074 U	0.062 U
Cl10(209)	0.093 U	0.089 U	0.082 U	0.209 J
Surrogate Recoveries (%)				
Cl3(34)	65	61	66	66
Cl6(152)	65	59	65	67

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	RAH-021	RAH-022	RAH-023	RAH-024
Battelle ID	K2618-P	K2619-P	K2620-P	K2621-P
Sample Type	SA	SA	SA	SA
Collection Date	09/15/16	09/15/16	09/15/16	09/15/16
Extraction Date	09/26/16	09/26/16	09/26/16	09/26/16
Analysis Date	09/30/16	09/30/16	09/30/16	09/30/16
Analytical Instrument	ECD	ECD	ECD	ECD
% Moisture	51.8	60.55	60.54	58.31
% Lipid	NA	NA	NA	NA
Matrix	SED	SED	SED	SED
Sample Size	14.48	11.84	11.85	12.50
Size Unit-Basis	G_DRY	G_DRY	G_DRY	G_DRY
Units	UG/KG_DRY	UG/KG_DRY	UG/KG_DRY	UG/KG_DRY
4,4'-DDD	2.490	0.112 U	0.112 U	0.106 U
4,4'-DDE	0.437	0.104 U	0.104 U	0.098 U
4,4'-DDT	0.635	0.591	0.170 U	0.162 U
aldrin	0.065 U	0.079 U	0.079 U	0.075 U
a-chlordane	0.068 U	0.083 U	0.083 U	0.079 U
g-chlordane	0.061 U	0.075 U	0.075 U	0.071 U
a-BHC	0.190 J	0.075 U	0.075 U	0.071 U
b-BHC	0.092 U	0.112 U	0.112 U	0.106 U
d-BHC	0.068 U	0.083 U	0.083 U	0.079 U
Lindane	0.099 U	0.121 U	0.121 U	0.114 U
dieldrin	0.272 J	0.079 U	0.079 U	0.075 U
endosulfan I	0.072 U	0.088 U	0.088 U	0.083 U
endosulfan II	0.451	0.071 U	0.071 U	0.067 U
endosulfan sulfate	0.092 U	0.112 U	0.112 U	0.106 U
endrin	0.075 U	0.091 U	0.091 U	0.086 U
heptachlor	0.113 U	0.138 U	0.138 U	0.130 U
heptachlor epoxide	0.068 U	0.083 U	0.083 U	0.079 U
methoxychlor	0.269 U	0.328 U	0.328 U	0.311 U
Toxaphene	27.600 U	33.800 U	33.800 U	32.000 U
Technical Chlordane				
Cl2(8)	0.088 U	0.108 U	0.108 U	0.102 U
Cl3(18)	0.065 U	0.079 U	0.079 U	0.075 U
Cl3(28)	0.051 U	0.062 U	0.062 U	0.059 U
Cl4(44)	0.314 J	0.075 U	0.075 U	0.071 U
Cl4(49)	0.137 J	0.075 U	0.075 U	0.071 U
Cl4(52)	0.388	0.104 U	0.104 U	0.098 U
Cl4(66)	0.460	0.091 U	0.091 U	0.086 U
Cl5(87)	0.107 J	0.071 U	0.071 U	0.067 U
Cl5(101)	0.595	0.079 U	0.079 U	0.075 U
Cl5(105)	0.462	0.192 J	0.075 U	0.071 U
Cl5(118)	0.537	0.129 U	0.129 U	0.122 U
Cl6(128)	0.058 U	0.071 U	0.071 U	0.067 U
Cl6(138)	0.452	0.095 U	0.095 U	0.090 U
Cl6(153)	0.331 J	0.274 U	0.274 U	0.260 U
Cl7(170)	0.065 U	0.079 U	0.079 U	0.075 U
Cl7(180)	0.282 J	0.091 U	0.091 U	0.086 U
Cl7(183)	0.051 U	0.062 U	0.062 U	0.059 U
Cl7(184)	0.140 U	0.171 U	0.170 U	0.162 U
Cl7(187)	0.061 U	0.075 U	0.075 U	0.071 U
Cl8(195)	0.061 U	0.075 U	0.075 U	0.071 U
Cl9(206)	0.058 U	0.071 U	0.071 U	0.067 U
Cl10(209)	0.427	0.079 U	0.079 U	0.075 U
Surrogate Recoveries (%)				
Cl3(34)	68	68	71	67
Cl6(152)	68	67	68	64

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	Procedural Blank
Battelle ID	CJ660PB-P
Sample Type	PB
Collection Date	09/26/16
Extraction Date	09/26/16
Analysis Date	09/29/16
Analytical Instrument	ECD
% Moisture	60.78
% Lipid	NA
Matrix	SEDIMENT
Sample Size	11.76
Size Unit-Basis	G_DRY
Units	UG/KG_DRY
4,4'-DDD	0.113 U
4,4'-DDE	0.105 U
4,4'-DDT	0.172 U
aldrin	0.0797 U
a-chlordane	0.0838 U
g-chlordane	0.0754 U
a-BHC	0.0754 U
b-BHC	0.113 U
d-BHC	0.0838 U
Lindane	0.122 U
dieldrin	0.0797 U
endosulfan I	0.0884 U
endosulfan II	0.0713 U
endosulfan sulfate	0.113 U
endrin	0.0918 U
heptachlor	0.139 U
heptachlor epoxide	0.0838 U
methoxychlor	0.331 U
Toxaphene	34 U
Technical Chlordane	
Cl2(8)	0.109 U
Cl3(18)	0.0797 U
Cl3(28)	0.0628 U
Cl4(44)	0.0754 U
Cl4(49)	0.0754 U
Cl4(52)	0.105 U
Cl4(66)	0.0918 U
Cl5(87)	0.0713 U
Cl5(101)	0.0797 U
Cl5(105)	0.0754 U
Cl5(118)	0.13 U
Cl6(128)	0.0713 U
Cl6(138)	0.0961 U
Cl6(153)	0.276 U
Cl7(170)	0.0797 U
Cl7(180)	0.0918 U
Cl7(183)	0.0628 U
Cl7(184)	0.172 U
Cl7(187)	0.0754 U
Cl8(195)	0.0754 U
Cl9(206)	0.0713 U
Cl10(209)	0.0797 U

Surrogate Recoveries (%)

Cl3(34)	77
Cl6(152)	83

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	Laboratory Control Sample				
Battelle ID	CJ661LCS-P				
Sample Type	LCS				
Collection Date	09/26/16				
Extraction Date	09/26/16				
Analysis Date	09/29/16				
Analytical Instrument	ECD				
% Moisture	60.78				
% Lipid	NA				
Matrix	SEDIMENT				
Sample Size	11.76				
Size Unit-Basis	G_DRY				
Units	UG/KG_DRY		Target	% Recovery	Qualifier
4,4'-DDD	14.1		12.76	111	
4,4'-DDE	12.2		12.76	96	
4,4'-DDT	11.9		12.76	93	
aldrin	11.1		12.76	87	
a-chlordane	10.9		12.78	85	
g-chlordane	9.8		12.76	77	
a-BHC	11.4		12.77	89	
b-BHC	12		12.77	94	
d-BHC	12.3		12.76	96	
Lindane	11.8		12.76	92	
dieldrin	10.9		12.76	85	
endosulfan I	12		12.77	94	
endosulfan II	11.7		12.79	91	
endosulfan sulfate	11.3		12.77	88	
endrin	10.1		12.76	79	
heptachlor	12.7		12.76	100	
heptachlor epoxide	10.6		12.77	83	
methoxychlor	10.3		12.76	81	
Toxaphene	34	U			
Technical Chlordane	171				
Cl2(8)	10.3		12.78	81	
Cl3(18)	9.62		12.81	75	
Cl3(28)	11.1		12.81	87	
Cl4(44)	10.6		12.81	83	
Cl4(49)	10.3		12.76	81	
Cl4(52)	10.6		12.77	83	
Cl4(66)	11.5		12.78	90	
Cl5(87)	10.1		12.72	79	
Cl5(101)	11.1		12.78	87	
Cl5(105)	11.8		12.79	92	
Cl5(118)	11.4		12.81	89	
Cl6(128)	11.2		12.81	87	
Cl6(138)	11		12.81	86	
Cl6(153)	10.9		12.81	85	
Cl7(170)	11.7		12.81	91	
Cl7(180)	11.4		12.81	89	
Cl7(183)	11		12.74	86	
Cl7(184)	11.5		12.78	90	
Cl7(187)	10.9		12.81	85	
Cl8(195)	11.6		12.81	91	
Cl9(206)	11.7		12.78	92	
Cl10(209)	10.9		12.81	85	

Surrogate Recoveries (%)

Cl3(34)	78
Cl6(152)	75

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	160826-03: SRM 1944					
Battelle ID	CJ662SRM-P					
Sample Type	SRM					
Collection Date	09/26/16					
Extraction Date	09/26/16					
Analysis Date	09/29/16					
Analytical Instrument	ECD					
% Moisture	1.3					
% Lipid	NA					
Matrix	SEDIMENT					
Sample Size	1.00					
Size Unit-Basis	G_DRY	Certified		Passing	Actual	
Units	UG/KG_DRY	Value	+/-	%Difference	%Difference	Qualifier
4,4'-DDD	195					
4,4'-DDE	133					
4,4'-DDT	206					
aldrin	0.937 U					
a-chlordane	21.8	16.51	0.83	35.03	32	
g-chlordane	99.8					
a-BHC	0.887 U					
b-BHC	1.33 U					
d-BHC	0.986 U					
Lindane	1.43 U					
dieldrin	28.2					
endosulfan I	23.2					
endosulfan II	64.5					
endosulfan sulfate	1.33 U					
endrin	1.08 U					
heptachlor	1.63 U					
heptachlor epoxide	0.986 U					
methoxychlor	3.89 U					
Toxaphene	400 U					
Technical Chlordane	622					
Cl2(8)	26.4	22.3	2.30	40.31	18.4	
Cl3(18)	52.4	51	2.60	35.1	2.7	
Cl3(28)	88.3	80.8	2.70	33.34	9.3	
Cl4(44)	70.2	60.2	2.00	33.32	16.6	
Cl4(49)	55	53	1.70	33.21	3.8	
Cl4(52)	103	79.4	2.00	32.52	29.7	
Cl4(66)	77.3	71.9	4.30	35.98	7.5	
Cl5(87)	25.6	29.9	4.30	44.38	14.4	
Cl5(101)	85	73.4	2.50	33.41	15.8	
Cl5(105)	32.3	24.5	1.10	34.49	31.8	
Cl5(118)	64.6	58	4.30	37.41	11.4	
Cl6(128)	7.53	8.47	0.28	33.31	11.1	
Cl6(138)	74	62.1	3.00	34.83	19.2	
Cl6(153)	80.6	74	2.90	33.92	8.9	
Cl7(170)	23.6	22.6	1.40	36.19	4.4	
Cl7(180)	50.5	44.3	1.20	32.71	14	
Cl7(183)	14	12.19	0.57	34.68	14.8	
Cl7(184)	2.02 U					
Cl7(187)	23.8	25.1	1.00	33.98	5.2	
Cl8(195)	7.31	3.75	0.39	40.4	94.9	n
Cl9(206)	9.64	9.21	0.51	35.54	4.7	
Cl10(209)	8.6	6.81	0.33	34.85	26.3	

Surrogate Recoveries (%)

Cl3(34)	82
Cl6(152)	72

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	RAH-013	RAH-013			
Battelle ID	K2610-P	K2610DUP-P			
Sample Type	SA	QADU			
Collection Date	09/15/16	9/15/2016			
Extraction Date	09/26/16	9/26/2016			
Analysis Date	09/29/16	9/29/2016			
Analytical Instrument	ECD	ECD			
% Moisture	60.6	60.19			
% Lipid	NA	NA			
Matrix	SED	SED			
Sample Size	11.82	11.95			
Size Unit-Basis	G_DRY	G_DRY			
Units	UG/KG_DRY	UG/KG_DRY		RPD	Qualifier
4,4'-DDD	0.112 U	0.111	U	NA	
4,4'-DDE	0.104 U	0.103	U	NA	
4,4'-DDT	0.171 U	0.169	U	NA	
aldrin	0.0793 U	0.078	U	NA	
a-chlordane	0.0834 U	0.083	U	NA	
g-chlordane	0.075 U	0.074	U	NA	
a-BHC	0.075 U	0.074	U	NA	
b-BHC	0.112 U	0.111	U	NA	
d-BHC	0.0834 U	0.083	U	NA	
Lindane	0.121 U	0.120	U	NA	
dieldrin	0.0793 U	0.078	U	NA	
endosulfan I	0.088 U	0.087	U	NA	
endosulfan II	0.0709 U	0.070	U	NA	
endosulfan sulfate	0.112 U	0.111	U	NA	
endrin	0.0914 U	0.090	U	NA	
heptachlor	0.138 U	0.136	U	NA	
heptachlor epoxide	0.0834 U	0.083	U	NA	
methoxychlor	0.329 U	0.326	U	NA	
Toxaphene	33.8 U	33.500	U	NA	
Technical Chlordane				NA	
Cl2(8)	0.108 U	0.107	U	NA	
Cl3(18)	0.0793 U	0.078	U	NA	
Cl3(28)	0.0625 U	0.062	U	NA	
Cl4(44)	0.075 U	0.074	U	NA	
Cl4(49)	0.075 U	0.074	U	NA	
Cl4(52)	0.104 U	0.103	U	NA	
Cl4(66)	0.0914 U	0.090	U	NA	
Cl5(87)	0.0709 U	0.070	U	NA	
Cl5(101)	0.0793 U	0.078	U	NA	
Cl5(105)	0.075 U	0.074	U	NA	
Cl5(118)	0.129 U	0.128	U	NA	
Cl6(128)	0.0709 U	0.070	U	NA	
Cl6(138)	0.0956 U	0.095	U	NA	
Cl6(153)	0.275 U	0.272	U	NA	
Cl7(170)	0.0793 U	0.078	U	NA	
Cl7(180)	0.0914 U	0.090	U	NA	
Cl7(183)	0.0625 U	0.062	U	NA	
Cl7(184)	0.171 U	0.169	U	NA	
Cl7(187)	0.075 U	0.074	U	NA	
Cl8(195)	0.075 U	0.074	U	NA	
Cl9(206)	0.0709 U	0.070	U	NA	
Cl10(209)	0.0793 U	0.078	U	NA	

Surrogate Recoveries (%)

Cl3(34)	66	72
Cl6(152)	60	73

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	RAH-014	RAH-014			
Battelle ID	K2611-P	K2611MS-P			
Sample Type	SA	MS			
Collection Date	09/15/16	9/15/2016			
Extraction Date	09/26/16	9/26/2016			
Analysis Date	09/29/16	9/29/2016			
Analytical Instrument	ECD	ECD			
% Moisture	60.53	59.62			
% Lipid	NA	NA			
Matrix	SED	SED			
Sample Size	11.85	6.07			
Size Unit-Basis	G_DRY	G_DRY			
Units	UG/KG_DRY	UG/KG_DRY		Target	% Recovery	Qualifier
4,4'-DDD	0.112 U	21.500		24.73	87	
4,4'-DDE	0.104 U	23.100		24.72	93	
4,4'-DDT	0.17 U	21.500		24.72	87	
aldrin	0.0791 U	20.800		24.72	84	
a-chlordane	0.0832 U	20.700		24.76	84	
g-chlordane	0.0748 U	18.300		24.72	74	
a-BHC	0.0748 U	20.700		24.73	84	
b-BHC	0.112 U	22.000		24.73	89	
d-BHC	0.0832 U	22.700		24.72	92	
Lindane	0.121 U	21.500		24.72	87	
dieldrin	0.0791 U	21.000		24.72	85	
endosulfan I	0.0878 U	21.700		24.73	88	
endosulfan II	0.0707 U	22.000		24.78	89	
endosulfan sulfate	0.112 U	21.100		24.74	85	
endrin	0.0911 U	20.800		24.73	84	
heptachlor	0.138 U	23.300		24.73	94	
heptachlor epoxide	0.0832 U	19.900		24.74	80	
methoxychlor	0.328 U	18.500		24.72	75	
Toxaphene	33.8 U	65.900	U			
Technical Chlordane		319.000				
Cl2(8)	0.108 U	18.400		24.76	74	
Cl3(18)	0.0791 U	17.400		24.81	70	
Cl3(28)	0.0624 U	21.100		24.81	85	
Cl4(44)	0.0748 U	20.000		24.81	81	
Cl4(49)	0.0748 U	19.600		24.71	79	
Cl4(52)	0.104 U	20.000		24.74	81	
Cl4(66)	0.0911 U	21.200		24.76	86	
Cl5(87)	0.0707 U	19.400		24.64	79	
Cl5(101)	0.0791 U	21.100		24.76	85	
Cl5(105)	0.0748 U	20.600		24.79	83	
Cl5(118)	0.129 U	20.900		24.81	84	
Cl6(128)	0.0707 U	20.400		24.81	82	
Cl6(138)	0.0954 U	20.100		24.81	81	
Cl6(153)	0.274 U	19.200		24.81	77	
Cl7(170)	0.0791 U	22.200		24.81	89	
Cl7(180)	0.0911 U	20.900		24.81	84	
Cl7(183)	0.0624 U	20.700		24.69	84	
Cl7(184)	0.17 U	23.000		24.76	93	
Cl7(187)	0.0748 U	20.400		24.81	82	
Cl8(195)	0.0748 U	21.200		24.81	85	
Cl9(206)	0.0707 U	21.200		24.76	86	
Cl10(209)	0.0791 U	21.600		24.81	87	

Surrogate Recoveries (%)

Cl3(34)	69	76
Cl6(152)	69	74

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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	RAH-014						
Battelle ID	K2611MSD-P						
Sample Type	MSD						
Collection Date	9/15/2016						
Extraction Date	9/26/2016						
Analysis Date	9/30/2016						
Analytical Instrument	ECD						
% Moisture	59.27						
% Lipid	NA						
Matrix	SED						
Sample Size	6.12						
Size Unit-Basis	G_DRY						
Units	UG/KG_DRY		Target	% Recovery	Qualifier	RPD (%)	Qualifier
4,4'-DDD	23.800		24.53	97		10.9	
4,4'-DDE	22.000		24.52	90		3.3	
4,4'-DDT	21.500		24.52	88		1.1	
aldrin	20.300		24.52	83		1.2	
a-chlordane	20.200		24.56	82		2.4	
g-chlordane	18.200		24.52	74		0.0	
a-BHC	21.600		24.53	88		4.7	
b-BHC	23.100		24.53	94		5.5	
d-BHC	23.400		24.52	95		3.2	
Lindane	22.600		24.52	92		5.6	
dieldrin	20.200		24.52	82		3.6	
endosulfan I	21.600		24.53	88		0.0	
endosulfan II	21.700		24.58	88		1.1	
endosulfan sulfate	21.400		24.54	87		2.3	
endrin	19.800		24.52	81		3.6	
heptachlor	23.000		24.52	94		0.0	
heptachlor epoxide	19.700		24.53	80		0.0	
methoxychlor	18.600		24.52	76		1.3	
Toxaphene	65.400	U					
Technical Chlordane	314.000						
Cl2(8)	18.800		24.56	77		4.0	
Cl3(18)	17.300		24.61	70		0.0	
Cl3(28)	20.400		24.61	83		2.4	
Cl4(44)	19.600		24.61	80		1.2	
Cl4(49)	19.100		24.51	78		1.3	
Cl4(52)	19.300		24.53	79		2.5	
Cl4(66)	21.400		24.56	87		1.2	
Cl5(87)	18.200		24.44	74		6.5	
Cl5(101)	20.400		24.56	83		2.4	
Cl5(105)	20.700		24.58	84		1.2	
Cl5(118)	20.700		24.61	84		0.0	
Cl6(128)	19.900		24.61	81		1.2	
Cl6(138)	19.700		24.61	80		1.2	
Cl6(153)	16.900		24.61	69		11.0	
Cl7(170)	21.400		24.61	87		2.3	
Cl7(180)	20.300		24.61	82		2.4	
Cl7(183)	20.000		24.49	82		2.4	
Cl7(184)	20.800		24.56	85		9.0	
Cl7(187)	19.700		24.61	80		2.5	
Cl8(195)	20.400		24.61	83		2.4	
Cl9(206)	20.400		24.56	83		3.6	
Cl10(209)	21.100		24.61	86		1.2	

Surrogate Recoveries (%)

Cl3(34)	76
Cl6(152)	72

QA/QC Summary
Batch 16-0254

Project:	USACE/NAE – DAMOS Program (Rockland Disposal Site)
Parameters:	PAH
Laboratory:	Battelle, Norwell, MA
Matrix:	Sediment
Data Set:	DP-16-0242
Analytical SOP:	5-157
Method Reference:	EPA 8270D modified

Sample Custody

Collection Date	Receipt Date	Temp (°C)
9/15/2016	9/16/2016	1.9

Corrective Actions	NA
Sample Storage	The sediments were stored frozen until extraction.
Related samples	NA

METHOD SUMMARIES

Sample Preparation	Approximately 30 grams of sediment sample was spiked with surrogates and serially extracted three times with dichloromethane using an orbital shaker table. The combined extracts were concentrated by Kuderna-Danish and nitrogen evaporation techniques. Sample concentrates were further processed by alumina, activated copper cleanup, followed by size-exclusion HPLC. The final cleaned extracts were concentrated, spiked with internal standards and submitted for PAH analysis by GC/MS.
Prep comments	No comments.

Analysis	PAH were measured by gas chromatography-mass spectrometry (GC/MS) in the selected ion mode (SIM). An initial calibration consisting of representative target analytes was analyzed prior to analysis to demonstrate the linear range of analysis. Calibration verification was performed the beginning and end of 10 injections or each 24-h period (whichever is more frequent). Target PAH were quantified using the average response factors (RF) generated from the initial calibration.
Analysis Comments	No comments.

Holding Times	Extraction Date(s)	Analysis Date(s)
	9/26/2016	9/29-30/2016

Procedural Blank (PB)	A PB was prepared with this analytical batch to ensure the sample extraction and analysis methods are free of contamination.
≤5 X MDL	No exceedances noted.
Samples >5X PB	No comments.

QA/QC Summary
Batch 16-0254

Laboratory Control Spike (LCS)	A LCS was prepared with this analytical batch. The percent recoveries of target analytes were calculated to measure accuracy.
40-120% recovery	No exceedances noted.
	No comments.

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)	A matrix spike/matrix spike duplicate pair of sample was prepared with this analytical batch. The percent recoveries of target analytes were calculated to measure data quality in terms of accuracy. The relative percent difference (RPD) between the MS/MSD was calculated to measure data quality in terms of precision.
40-120% recovery; RPD $\leq$30%; Concentration in MS/MSD must be >5x background	No exceedances noted.
	No comments.

Laboratory Duplicate (DUP)	Duplicate extractions/analyses of one test sediment were prepared with this analytical batch. The (RPD) between the two samples was calculated to measure data quality in terms of precision.
$\leq$ 30% RPD; conc >10xMDL	No exceedances noted.
	No comments.

Standard Reference Material (SRM)	A standard reference material was prepared with this batch to measure data in terms of analytical accuracy.
$\leq$30% difference Analyte >5xMDL	No exceedances noted.
	No comments.

Surrogate Recovery	Surrogate compounds were added prior to extraction. The surrogate recoveries are calculated to measure extraction efficiency.
40-120% recovery	No exceedances noted.
	No comments.

Initial Calibration (ICAL)	The GC/MS was calibrated with six-level calibration curve for all compounds using an instrument response factor (RF).
Mean ≤ 15% Indiv. ≤ 25%	No exceedances noted.
	No comments.

Independent Calibration Check (ICC)	The independent check was run after each initial calibration to verify the calibration. This standard is from a different source than the ICAL.
≤ 25% difference individual and mean	No exceedances noted.
	No comments.

Continuing Calibration Verification (CCV)	Continuing calibration standards were run at the beginning and end of 10 injections or each 24-h period (whichever is more frequent) to ensure that initial calibration is still valid.
≤ 25% difference individual; ≤15% difference mean	No exceedances noted.
	No comments.

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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	RAH-013	RAH-014	RAH-015	RAH-016
Battelle ID	K2610-P	K2611-P	K2612-P	K2613-P
Sample Type	SA	SA	SA	SA
Collection Date	09/15/16	09/15/16	09/15/16	09/15/16
Extraction Date	09/26/16	09/26/16	09/26/16	09/26/16
Analysis Date	09/29/16	09/30/16	09/30/16	09/30/16
Analytical Instrument	MS	MS	MS	MS
% Moisture	60.6	60.53	61.47	66.8
% Lipid	NA	NA	NA	NA
Matrix	SED	SED	SED	SED
Sample Size	11.82	11.85	11.57	9.95
Size Unit-Basis	G_DRY	G_DRY	G_DRY	G_DRY
Units	UG/KG_DRY	UG/KG_DRY	UG/KG_DRY	UG/KG_DRY
Naphthalene	2.440	2.310	2.340	3.240
2-Methylnaphthalene	1.990	1.840	1.950	2.660
1-Methylnaphthalene	1.600 J	1.500 J	1.460 J	1.930 J
Acenaphthylene	1.980	1.870	1.820	2.600
Acenaphthene	0.700 J	0.250 U	0.747 J	1.240 J
Fluorene	1.230 J	1.250 J	1.160 J	1.940 J
Anthracene	2.080	2.140	1.880	3.380
Phenanthrene	14.100	14.400	13.000	22.200
Fluoranthene	29.600	29.200	28.100	43.800
Pyrene	25.600	25.200	24.400	38.600
Benzo(a)anthracene	11.200	10.800	10.900	16.600
Chrysene	15.100	14.500	16.000	22.200
Benzo(b)fluoranthene	14.900	13.900	13.800	20.000
Benzo(k)fluoranthene	16.200	14.300	16.600	22.400
Benzo(a)pyrene	15.100	14.000	16.300	23.000
Indeno(1,2,3-cd)pyrene	12.900	12.500	11.900	17.700
Dibenz(a,h)anthracene	2.460	2.460	2.050	2.910
Benzo(g,h,i)perylene	12.800	12.500	12.400	17.200
Surrogate Recoveries (%)				
Naphthalene-d8	59	60	59	59
Acenaphthene-d10	72	70	69	67
Phenanthrene-d10	75	74	74	70
Benzo(a)pyrene-d12	64	69	69	60

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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	RAH-017	RAH-018	RAH-019	RAH-020
Battelle ID	K2614-P	K2615-P	K2616-P	K2617-P
Sample Type	SA	SA	SA	SA
Collection Date	09/15/16	09/15/16	09/15/16	09/15/16
Extraction Date	09/26/16	09/26/16	09/26/16	09/26/16
Analysis Date	09/30/16	09/30/16	09/30/16	09/30/16
Analytical Instrument	MS	MS	MS	MS
% Moisture	66.36	65.09	62.19	55.12
% Lipid	NA	NA	NA	NA
Matrix	SED	SED	SED	SED
Sample Size	10.11	10.49	11.37	13.48
Size Unit-Basis	G_DRY	G_DRY	G_DRY	G_DRY
Units	UG/KG_DRY	UG/KG_DRY	UG/KG_DRY	UG/KG_DRY
Naphthalene	2.850	3.460	6.240	12.800
2-Methylnaphthalene	2.300	2.750	5.150	9.580
1-Methylnaphthalene	1.730 J	2.080	4.280	7.530
Acenaphthylene	2.310	2.790	3.720	12.700
Acenaphthene	0.958 J	1.480 J	5.850	9.900
Fluorene	1.860 J	2.350	9.510	12.000
Anthracene	3.330	3.880	18.300	33.400
Phenanthrene	20.000	27.600	75.200	126.000
Fluoranthene	40.400	51.400	106.000	226.000
Pyrene	35.400	44.100	93.100	204.000
Benzo(a)anthracene	15.500	19.100	43.100	115.000
Chrysene	21.500	26.400	53.600	150.000
Benzo(b)fluoranthene	17.100	20.600	38.500	128.000
Benzo(k)fluoranthene	21.600	25.200	43.800	131.000
Benzo(a)pyrene	20.600	25.800	47.200	125.000
Indeno(1,2,3-cd)pyrene	14.200	16.600	30.200	89.100
Dibenz(a,h)anthracene	2.710	3.510	6.170	19.400
Benzo(g,h,i)perylene	15.500	18.500	29.200	83.800
Surrogate Recoveries (%)				
Naphthalene-d8	53	62	55	61
Acenaphthene-d10	62	68	66	67
Phenanthrene-d10	70	71	72	71
Benzo(a)pyrene-d12	64	55	68	71

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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	RAH-021	RAH-022	RAH-023	RAH-024
Battelle ID	K2618-P	K2619-P	K2620-P	K2621-P
Sample Type	SA	SA	SA	SA
Collection Date	09/15/16	09/15/16	09/15/16	09/15/16
Extraction Date	09/26/16	09/26/16	09/26/16	09/26/16
Analysis Date	09/30/16	09/30/16	09/30/16	09/30/16
Analytical Instrument	MS	MS	MS	MS
% Moisture	51.8	60.55	60.54	58.31
% Lipid	NA	NA	NA	NA
Matrix	SED	SED	SED	SED
Sample Size	14.48	11.84	11.85	12.50
Size Unit-Basis	G_DRY	G_DRY	G_DRY	G_DRY
Units	UG/KG_DRY	UG/KG_DRY	UG/KG_DRY	UG/KG_DRY
Naphthalene	11.700	4.690	3.160	2.760
2-Methylnaphthalene	7.920	3.030	2.460	2.090
1-Methylnaphthalene	5.770	2.210	1.860	1.650
Acenaphthylene	12.300	2.900	2.310	2.420
Acenaphthene	5.740	1.300 J	1.110 J	0.763 J
Fluorene	9.460	2.220	1.920	1.540 J
Anthracene	21.300	4.230	3.360	2.760
Phenanthrene	101.000	22.100	23.300	18.600
Fluoranthene	190.000	43.800	40.400	38.800
Pyrene	182.000	39.600	36.500	33.200
Benzo(a)anthracene	85.700	18.200	15.200	14.300
Chrysene	102.000	22.600	20.600	20.500
Benzo(b)fluoranthene	85.800	20.000	16.700	16.600
Benzo(k)fluoranthene	95.600	22.000	18.800	19.400
Benzo(a)pyrene	103.000	23.200	18.500	17.500
Indeno(1,2,3-cd)pyrene	70.800	17.300	13.500	14.100
Dibenz(a,h)anthracene	16.000	3.150	2.530	2.680
Benzo(g,h,i)perylene	68.900	16.500	13.100	15.700
Surrogate Recoveries (%)				
Naphthalene-d8	61	56	63	59
Acenaphthene-d10	70	67	72	67
Phenanthrene-d10	75	72	75	71
Benzo(a)pyrene-d12	75	70	65	63

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	Procedural Blank
Battelle ID	CJ660PB-P
Sample Type	PB
Collection Date	09/26/16
Extraction Date	09/26/16
Analysis Date	09/29/16
Analytical Instrument	MS
% Moisture	60.78
% Lipid	NA
Matrix	SEDIMENT
Sample Size	11.76
Size Unit-Basis	G_DRY
Units	UG/KG_DRY
Naphthalene	0.293 U
2-Methylnaphthalene	0.239 U
1-Methylnaphthalene	0.319 U
Acenaphthylene	0.528 U
Acenaphthene	0.252 U
Fluorene	0.285 U
Anthracene	0.369 U
Phenanthrene	0.373 U
Fluoranthene	0.595 U
Pyrene	0.834 U
Benzo(a)anthracene	0.511 U
Chrysene	0.884 U
Benzo(b)fluoranthene	0.658 U
Benzo(k)fluoranthene	0.893 U
Benzo(a)pyrene	1.4 U
Indeno(1,2,3-cd)pyrene	0.708 U
Dibenz(a,h)anthracene	0.662 U
Benzo(g,h,i)perylene	0.859 U

Surrogate Recoveries (%)

Naphthalene-d8	81
Acenaphthene-d10	83
Phenanthrene-d10	84
Benzo(a)pyrene-d12	62

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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	Laboratory Control Sample			
Battelle ID	CJ661LCS-P			
Sample Type	LCS			
Collection Date	09/26/16			
Extraction Date	09/26/16			
Analysis Date	09/29/16			
Analytical Instrument	MS			
% Moisture	60.78			
% Lipid	NA			
Matrix	SEDIMENT			
Sample Size	11.76			
Size Unit-Basis	G_DRY			
Units	UG/KG_DRY	Target	% Recovery	Qualifier
Naphthalene	102	127.91	80	
2-Methylnaphthalene	102	127.91	80	
1-Methylnaphthalene	102	127.88	80	
Acenaphthylene	96.7	127.96	76	
Acenaphthene	100	127.90	78	
Fluorene	100	128.00	78	
Anthracene	97.3	127.87	76	
Phenanthrene	106	127.83	83	
Fluoranthene	107	127.96	84	
Pyrene	106	127.90	83	
Benzo(a)anthracene	104	127.93	81	
Chrysene	106	127.83	83	
Benzo(b)fluoranthene	106	128.06	83	
Benzo(k)fluoranthene	109	127.88	85	
Benzo(a)pyrene	102	127.74	80	
Indeno(1,2,3-cd)pyrene	104	127.90	81	
Dibenz(a,h)anthracene	109	127.79	85	
Benzo(g,h,i)perylene	110	127.97	86	

Surrogate Recoveries (%)

Naphthalene-d8	75
Acenaphthene-d10	79
Phenanthrene-d10	83
Benzo(a)pyrene-d12	76

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	160826-03: SRM 1944					
Battelle ID	CJ662SRM-P					
Sample Type	SRM					
Collection Date	09/26/16					
Extraction Date	09/26/16					
Analysis Date	09/29/16					
Analytical Instrument	MS					
% Moisture	1.3					
% Lipid	NA					
Matrix	SEDIMENT					
Sample Size	1.00					
Size Unit-Basis	G_DRY	Certified		Passing	Actual	
Units	UG/KG_DRY	Value	+/-	%Difference	%Difference	Qualifier
Naphthalene	936					
2-Methylnaphthalene	496					
1-Methylnaphthalene	376					
Acenaphthylene	558					
Acenaphthene	226					
Fluorene	201					
Anthracene	764					
Phenanthrene	4800	5270	219.76	34.17	8.9	
Fluoranthene	8400	8920	320.23	33.59	5.8	
Pyrene	8520	9700	420.01	34.33	12.2	
Benzo(a)anthracene	3670	4720	109.98	32.33	22.2	
Chrysene	5120	5900	369.99	36.27	13.2	
Benzo(b)fluoranthene	3530	3870	419.90	40.85	8.8	
Benzo(k)fluoranthene	3840	4390	640.06	44.58	12.5	
Benzo(a)pyrene	3190	4300	129.99	33.02	25.8	
Indeno(1,2,3-cd)pyrene	2600	2780	100.08	33.6	6.5	
Dibenz(a,h)anthracene	794	759	81.97	40.8	4.6	
Benzo(g,h,i)perylene	2860	2840	99.97	33.52	0.7	

Surrogate Recoveries (%)

Naphthalene-d8	74
Acenaphthene-d10	80
Phenanthrene-d10	85
Benzo(a)pyrene-d12	82

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	RAH-013	RAH-013		
Battelle ID	K2610-P	K2610DUP-P		
Sample Type	SA	QADU		
Collection Date	09/15/16	9/15/2016		
Extraction Date	09/26/16	9/26/2016		
Analysis Date	09/29/16	9/30/2016		
Analytical Instrument	MS	MS		
% Moisture	60.6	60.19		
% Lipid	NA	NA		
Matrix	SED	SED		
Sample Size	11.82	11.95		
Size Unit-Basis	G_DRY	G_DRY		
Units	UG/KG_DRY	UG/KG_DRY	RPD	Qualifier
Naphthalene	2.44	2.370	2.9	
2-Methylnaphthalene	1.99	1.990	0.0	
1-Methylnaphthalene	1.6 J	1.560 J	NA	
Acenaphthylene	1.98	1.840	7.3	
Acenaphthene	0.7 J	0.599 J	NA	
Fluorene	1.23 J	1.210 J	NA	
Anthracene	2.08	1.890	9.6	
Phenanthrene	14.1	13.300	5.8	
Fluoranthene	29.6	27.200	8.5	
Pyrene	25.6	23.600	8.1	
Benzo(a)anthracene	11.2	10.300	8.4	
Chrysene	15.1	14.300	5.4	
Benzo(b)fluoranthene	14.9	14.100	5.5	
Benzo(k)fluoranthene	16.2	14.900	8.4	
Benzo(a)pyrene	15.1	14.100	6.8	
Indeno(1,2,3-cd)pyrene	12.9	11.700	9.8	
Dibenz(a,h)anthracene	2.46	2.360	4.1	
Benzo(g,h,i)perylene	12.8	12.100	5.6	
Surrogate Recoveries (%)				
Naphthalene-d8	59	66		
Acenaphthene-d10	72	74		
Phenanthrene-d10	75	78		
Benzo(a)pyrene-d12	64	73		

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	RAH-014	RAH-014			
Battelle ID	K2611-P	K2611MS-P			
Sample Type	SA	MS			
Collection Date	09/15/16	9/15/2016			
Extraction Date	09/26/16	9/26/2016			
Analysis Date	09/30/16	9/30/2016			
Analytical Instrument	MS	MS			
% Moisture	60.53	59.62			
% Lipid	NA	NA			
Matrix	SED	SED			
Sample Size	11.85	6.07			
Size Unit-Basis	G_DRY	G_DRY			
Units	UG/KG_DRY	UG/KG_DRY	Target	% Recovery	Qualifier
Naphthalene	2.31	178.000	247.81	71	
2-Methylnaphthalene	1.84	182.000	247.81	73	
1-Methylnaphthalene	1.5 J	183.000	247.76	73	
Acenaphthylene	1.87	181.000	247.91	72	
Acenaphthene	0.25 U	185.000	247.78	75	
Fluorene	1.25 J	187.000	247.98	75	
Anthracene	2.14	186.000	247.73	74	
Phenanthrene	14.4	215.000	247.66	81	
Fluoranthene	29.2	237.000	247.91	84	
Pyrene	25.2	231.000	247.78	83	
Benzo(a)anthracene	10.8	208.000	247.86	80	
Chrysene	14.5	209.000	247.66	79	
Benzo(b)fluoranthene	13.9	210.000	248.11	79	
Benzo(k)fluoranthene	14.3	216.000	247.76	81	
Benzo(a)pyrene	14	216.000	247.49	82	
Indeno(1,2,3-cd)pyrene	12.5	199.000	247.78	75	
Dibenz(a,h)anthracene	2.46	196.000	247.59	78	
Benzo(g,h,i)perylene	12.5	217.000	247.93	82	
Surrogate Recoveries (%)					
Naphthalene-d8	60	66			
Acenaphthene-d10	70	73			
Phenanthrene-d10	74	80			
Benzo(a)pyrene-d12	69	76			

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
Project Number: 100087718

Client ID	RAH-014
Battelle ID	K2611MSD-P
Sample Type	MSD
Collection Date	9/15/2016
Extraction Date	9/26/2016
Analysis Date	9/30/2016
Analytical Instrument	MS
% Moisture	59.27
% Lipid	NA
Matrix	SED
Sample Size	6.12
Size Unit-Basis	G_DRY

Units	UG/KG_DRY	Target	% Recovery	Qualifier	RPD (%)	Qualifier
Naphthalene	175.000	245.78	70		1.4	
2-Methylnaphthalene	178.000	245.78	72		1.4	
1-Methylnaphthalene	179.000	245.74	72		1.4	
Acenaphthylene	175.000	245.88	70		2.8	
Acenaphthene	180.000	245.76	73		2.7	
Fluorene	182.000	245.96	73		2.7	
Anthracene	182.000	245.71	73		1.4	
Phenanthrene	210.000	245.64	80		1.2	
Fluoranthene	232.000	245.88	82		2.4	
Pyrene	227.000	245.76	82		1.2	
Benzo(a)anthracene	205.000	245.83	79		1.3	
Chrysene	210.000	245.64	80		1.3	
Benzo(b)fluoranthene	206.000	246.08	78		1.3	
Benzo(k)fluoranthene	213.000	245.74	81		0.0	
Benzo(a)pyrene	217.000	245.47	83		1.2	
Indeno(1,2,3-cd)pyrene	193.000	245.76	73		2.7	
Dibenz(a,h)anthracene	202.000	245.56	81		3.8	
Benzo(g,h,i)perylene	214.000	245.91	82		0.0	

Surrogate Recoveries (%)

Naphthalene-d8	65
Acenaphthene-d10	73
Phenanthrene-d10	79
Benzo(a)pyrene-d12	76

DAMOS 2016

Rockland Disposal Site

Sediment Metals Results

Envirosystems Inc (ESI)

CHEMICAL ANALYSIS
OF A MARINE SEDIMENT:

Tier III Sediment Evaluation
DAMOS Rockland Disposal Site (RDS) Survey

New England District Corps of Engineers
Application Number:_____

Prepared For:

Lisa Lefkovitz
Battelle
141 Longwater Dr.
Suite 202
Norwell, MA 02061

Prepared By:

EnviroSystems, Incorporated
One Lafayette Road
Hampton, New Hampshire 03842

EnviroSystems, Inc. Sample Delivery Group Reference 28183

LABORATORY STANDARDS STATEMENT

This study was performed by EnviroSystems, Incorporated at its facility in Hampton, New Hampshire. EnviroSystems' laboratory is accredited by the State of New Hampshire under the National Environmental Laboratory Accreditation (NELAC) program. Additionally, ESI is accredited under the Department of Defense (DoD) ELAP program, ISO/IEC 17025:2005, Certificate Number L2340. All testing conducted by EnviroSystems as part of this program was compliant with NELAC guidelines and standards. Additionally, this study was conducted in accordance with guidelines presented in the 2004 version of the New England District's Regional Implementation Manual (RIM) for Evaluation of Dredged Material Proposed for Disposal In New England Waters. Any deviations from specific elements of the RIM are detailed in the Protocol Deviation Section of this Report.

For EnviroSystems, Inc.  October 31, 2016

Kenneth A. Simon
Technical Director

Date

CHEMICAL ANALYSIS
OF A MARINE SEDIMENT:

Rockland Disposal Site (RDS) Survey
Tier III Sediment Evaluation

1.0 SAMPLE COLLECTION, PRESERVATION AND STORAGE

Sediment samples and equipment blanks for chemical analysis were collected and provided by Battelle of Norwell, Massachusetts from locations specified within the project's proposed footprint. Samples were received under chain of custody in sample containers appropriate for the specified analysis. Upon arrival at the laboratory, all samples received an internal sample control number and were logged into the project sample control system. Samples were placed in a secure sample holding location and stored at a temperature of 4±2°C until analysis.

2.0 ANALYSIS

Sample analysis was carried out following methods and protocol specified in the RIM by EnviroSystems, Inc. at its Hampton, NH facility. Review of the data report document showed that all sample holding times were met, unless otherwise qualified, that the analytical methods used in the analysis were appropriate for the parameter and sample matrix and met New England District Regional Implementation Manual requirements. Review of supporting quality assurance data documented that, ecept where qualified, all data collected meet all of the requirements of NELAC, for all NELAC accredited parameters.

3.0 RESULTS

Analytical methods used in the analysis of sediment samples were analyzed using protocol recommended in Tables 2 and 3 of the New England District RIM document with appropriate updates related to current methods. Analytical methods used in the analysis of water samples were analyzed using protocol recommended in Table 5 of the New England District RIM document with appropriate updates related to current methods. Trace metals were evaluated using EPA Method 6020, Inductively Coupled Plasma - Mass Spectrometry (ICP-MS), mercury was evaluated using EPA Method 245.7, Cold Vapor Atomic Fluorescence Spectrometry. In cases where dilution of the sample extract was required the final reporting limit remained below the RIM document specified limits and did not result in artificial "Non Detects."

A full copy of the analytical report is included in the following data appendix

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Report No: 28183 SDG:
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey

Sample ID: RAH-013
Matrix: Solid
Sampled: 09/15/16 1139

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28183-001	38.6	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28183-001	9.03	0.6	ug/g dry wt	10/12/16 1200	10/13/16 2331	JLH/SW846 3rd Ed. 6020
Cadmium, total	28183-001	0.09	0.06	ug/g dry wt	10/12/16 1200	10/13/16 2331	JLH/SW846 3rd Ed. 6020
Chromium, total	28183-001	30.4	0.6	ug/g dry wt	10/12/16 1200	10/13/16 2331	JLH/SW846 3rd Ed. 6020
Copper, total	28183-001	10.8	0.6	ug/g dry wt	10/12/16 1200	10/13/16 2331	JLH/SW846 3rd Ed. 6020
Lead, total	28183-001	17.5	0.6	ug/g dry wt	10/12/16 1200	10/13/16 2331	JLH/SW846 3rd Ed. 6020
Mercury, total	28183-001	0.045	0.02	ug/g dry wt	10/12/16 1200	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28183-001	24.0	1	ug/g dry wt	10/12/16 1200	10/13/16 2331	JLH/SW846 3rd Ed. 6020
Zinc, total	28183-001	63.7	2	ug/g dry wt	10/12/16 1200	10/13/16 2331	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28183 SDG:
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey

Sample ID: RAH-014
Matrix: Solid
Sampled: 09/15/16 1152

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28183-002	40.3	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28183-002	8.85	0.6	ug/g dry wt	10/12/16 1200	10/13/16 2256	JLH/SW846 3rd Ed. 6020
Cadmium, total	28183-002	0.10	0.06	ug/g dry wt	10/12/16 1200	10/13/16 2256	JLH/SW846 3rd Ed. 6020
Chromium, total	28183-002	30.6	0.6	ug/g dry wt	10/12/16 1200	10/13/16 2256	JLH/SW846 3rd Ed. 6020
Copper, total	28183-002	10.7	0.6	ug/g dry wt	10/12/16 1200	10/13/16 2256	JLH/SW846 3rd Ed. 6020
Lead, total	28183-002	18.0	0.6	ug/g dry wt	10/12/16 1200	10/13/16 2256	JLH/SW846 3rd Ed. 6020
Mercury, total	28183-002	0.049	0.02	ug/g dry wt	10/12/16 1200	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28183-002	24.1	1	ug/g dry wt	10/12/16 1200	10/13/16 2256	JLH/SW846 3rd Ed. 6020
Zinc, total	28183-002	64.3	2	ug/g dry wt	10/12/16 1200	10/13/16 2256	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28183 SDG:
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey

Sample ID: RAH-015
Matrix: Solid
Sampled: 09/15/16 1205

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28183-003	38.1	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28183-003	9.45	0.6	ug/g dry wt	10/12/16 1200	10/13/16 2349	JLH/SW846 3rd Ed. 6020
Cadmium, total	28183-003	0.09	0.06	ug/g dry wt	10/12/16 1200	10/13/16 2349	JLH/SW846 3rd Ed. 6020
Chromium, total	28183-003	31.0	0.6	ug/g dry wt	10/12/16 1200	10/13/16 2349	JLH/SW846 3rd Ed. 6020
Copper, total	28183-003	11.3	0.6	ug/g dry wt	10/12/16 1200	10/13/16 2349	JLH/SW846 3rd Ed. 6020
Lead, total	28183-003	18.3	0.6	ug/g dry wt	10/12/16 1200	10/13/16 2349	JLH/SW846 3rd Ed. 6020
Mercury, total	28183-003	0.052	0.02	ug/g dry wt	10/12/16 1200	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28183-003	24.6	1	ug/g dry wt	10/12/16 1200	10/13/16 2349	JLH/SW846 3rd Ed. 6020
Zinc, total	28183-003	65.4	2	ug/g dry wt	10/12/16 1200	10/13/16 2349	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28183 SDG:
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey

Sample ID: RAH-901
Matrix: Water
Sampled: 09/15/16 1241

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Arsenic, total	28183-004	ND	0.001	mg/L	10/14/16 0800	10/14/16 1031	JLH/EPA 200.8
Cadmium, total	28183-004	ND	0.0001	mg/L	10/14/16 0800	10/14/16 1031	JLH/EPA 200.8
Chromium, total	28183-004	ND	0.001	mg/L	10/14/16 0800	10/14/16 1031	JLH/EPA 200.8
Copper, total	28183-004	ND	0.0005	mg/L	10/14/16 0800	10/14/16 1031	JLH/EPA 200.8
Lead, total	28183-004	0.0006	0.0002	mg/L	10/14/16 0800	10/14/16 1031	JLH/EPA 200.8
Mercury, total	28183-005	ND	0.01	ug/L	09/22/16 1415	09/22/16 1530	JLH/EPA 245.7
Nickel, total	28183-004	0.0013	0.001	mg/L	10/14/16 0800	10/14/16 1031	JLH/EPA 200.8
Zinc, total	28183-004	0.0026	0.002	mg/L	10/14/16 0800	10/14/16 1031	JLH/EPA 200.8

Notes:

ND = Not Detected

Report No: 28183 SDG:
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey

Sample ID: RAH-016
Matrix: Solid
Sampled: 09/15/16 1250

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28183-006	32.3	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28183-006	10.6	0.7	ug/g dry wt	10/12/16 1200	10/13/16 2355	JLH/SW846 3rd Ed. 6020
Cadmium, total	28183-006	0.11	0.07	ug/g dry wt	10/12/16 1200	10/13/16 2355	JLH/SW846 3rd Ed. 6020
Chromium, total	28183-006	37.3	0.7	ug/g dry wt	10/12/16 1200	10/13/16 2355	JLH/SW846 3rd Ed. 6020
Copper, total	28183-006	14.3	0.7	ug/g dry wt	10/12/16 1200	10/13/16 2355	JLH/SW846 3rd Ed. 6020
Lead, total	28183-006	21.7	0.7	ug/g dry wt	10/12/16 1200	10/13/16 2355	JLH/SW846 3rd Ed. 6020
Mercury, total	28183-006	0.10	0.03	ug/g dry wt	10/12/16 1200	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28183-006	29.7	1	ug/g dry wt	10/12/16 1200	10/13/16 2355	JLH/SW846 3rd Ed. 6020
Zinc, total	28183-006	79.9	3	ug/g dry wt	10/12/16 1200	10/13/16 2355	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28183 SDG:
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey

Sample ID: RAH-017
Matrix: Solid
Sampled: 09/15/16 1301

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28183-007	34.0	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28183-007	9.96	0.6	ug/g dry wt	10/12/16 1200	10/14/16 0000	JLH/SW846 3rd Ed. 6020
Cadmium, total	28183-007	0.11	0.06	ug/g dry wt	10/12/16 1200	10/14/16 0000	JLH/SW846 3rd Ed. 6020
Chromium, total	28183-007	35.5	0.6	ug/g dry wt	10/12/16 1200	10/14/16 0000	JLH/SW846 3rd Ed. 6020
Copper, total	28183-007	13.5	0.6	ug/g dry wt	10/12/16 1200	10/14/16 0000	JLH/SW846 3rd Ed. 6020
Lead, total	28183-007	20.8	0.6	ug/g dry wt	10/12/16 1200	10/14/16 0000	JLH/SW846 3rd Ed. 6020
Mercury, total	28183-007	0.063	0.02	ug/g dry wt	10/12/16 1200	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28183-007	28.1	1	ug/g dry wt	10/12/16 1200	10/14/16 0000	JLH/SW846 3rd Ed. 6020
Zinc, total	28183-007	75.2	2	ug/g dry wt	10/12/16 1200	10/14/16 0000	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28183 SDG:
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey

Sample ID: RAH-018
Matrix: Solid
Sampled: 09/15/16 1310

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28183-008	34.7	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28183-008	10.9	0.6	ug/g dry wt	10/12/16 1200	10/14/16 0006	JLH/SW846 3rd Ed. 6020
Cadmium, total	28183-008	0.10	0.06	ug/g dry wt	10/12/16 1200	10/14/16 0006	JLH/SW846 3rd Ed. 6020
Chromium, total	28183-008	35.8	0.6	ug/g dry wt	10/12/16 1200	10/14/16 0006	JLH/SW846 3rd Ed. 6020
Copper, total	28183-008	13.5	0.6	ug/g dry wt	10/12/16 1200	10/14/16 0006	JLH/SW846 3rd Ed. 6020
Lead, total	28183-008	20.9	0.6	ug/g dry wt	10/12/16 1200	10/14/16 0006	JLH/SW846 3rd Ed. 6020
Mercury, total	28183-008	0.067	0.02	ug/g dry wt	10/12/16 1200	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28183-008	28.0	1	ug/g dry wt	10/12/16 1200	10/14/16 0006	JLH/SW846 3rd Ed. 6020
Zinc, total	28183-008	75.2	2	ug/g dry wt	10/12/16 1200	10/14/16 0006	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28183 SDG:
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey

Sample ID: RAH-019
Matrix: Solid
Sampled: 09/15/16 1323

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28183-009	37.5	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28183-009	10.4	0.5	ug/g dry wt	10/12/16 1200	10/14/16 0012	JLH/SW846 3rd Ed. 6020
Cadmium, total	28183-009	0.10	0.05	ug/g dry wt	10/12/16 1200	10/14/16 0012	JLH/SW846 3rd Ed. 6020
Chromium, total	28183-009	32.8	0.5	ug/g dry wt	10/12/16 1200	10/14/16 0012	JLH/SW846 3rd Ed. 6020
Copper, total	28183-009	12.7	0.5	ug/g dry wt	10/12/16 1200	10/14/16 0012	JLH/SW846 3rd Ed. 6020
Lead, total	28183-009	19.0	0.5	ug/g dry wt	10/12/16 1200	10/14/16 0012	JLH/SW846 3rd Ed. 6020
Mercury, total	28183-009	0.065	0.02	ug/g dry wt	10/12/16 1200	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28183-009	25.7	1	ug/g dry wt	10/12/16 1200	10/14/16 0012	JLH/SW846 3rd Ed. 6020
Zinc, total	28183-009	68.4	2	ug/g dry wt	10/12/16 1200	10/14/16 0012	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28183 SDG:
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey

Sample ID: RAH-020
Matrix: Solid
Sampled: 09/15/16 1332

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28183-010	45.4	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28183-010	10.0	0.4	ug/g dry wt	10/12/16 1200	10/14/16 0018	JLH/SW846 3rd Ed. 6020
Cadmium, total	28183-010	0.13	0.04	ug/g dry wt	10/12/16 1200	10/14/16 0018	JLH/SW846 3rd Ed. 6020
Chromium, total	28183-010	30.5	0.4	ug/g dry wt	10/12/16 1200	10/14/16 0018	JLH/SW846 3rd Ed. 6020
Copper, total	28183-010	12.1	0.4	ug/g dry wt	10/12/16 1200	10/14/16 0018	JLH/SW846 3rd Ed. 6020
Lead, total	28183-010	17.9	0.4	ug/g dry wt	10/12/16 1200	10/14/16 0018	JLH/SW846 3rd Ed. 6020
Mercury, total	28183-010	0.062	0.02	ug/g dry wt	10/12/16 1200	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28183-010	22.4	0.9	ug/g dry wt	10/12/16 1200	10/14/16 0018	JLH/SW846 3rd Ed. 6020
Zinc, total	28183-010	60.0	2	ug/g dry wt	10/12/16 1200	10/14/16 0018	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28183 SDG:
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey

Sample ID: RAH-021
Matrix: Solid
Sampled: 09/15/16 1341

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28183-011	48.5	0.1	%	10/12/16 0850	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28183-011	11.4	0.4	ug/g dry wt	10/12/16 1200	10/14/16 0024	JLH/SW846 3rd Ed. 6020
Cadmium, total	28183-011	0.19	0.04	ug/g dry wt	10/12/16 1200	10/14/16 0024	JLH/SW846 3rd Ed. 6020
Chromium, total	28183-011	31.0	0.4	ug/g dry wt	10/12/16 1200	10/14/16 0024	JLH/SW846 3rd Ed. 6020
Copper, total	28183-011	12.9	0.4	ug/g dry wt	10/12/16 1200	10/14/16 0024	JLH/SW846 3rd Ed. 6020
Lead, total	28183-011	20.3	0.4	ug/g dry wt	10/12/16 1200	10/14/16 0024	JLH/SW846 3rd Ed. 6020
Mercury, total	28183-011	0.091	0.03	ug/g dry wt	10/12/16 1200	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28183-011	22.4	0.7	ug/g dry wt	10/12/16 1200	10/14/16 0024	JLH/SW846 3rd Ed. 6020
Zinc, total	28183-011	60.3	2	ug/g dry wt	10/12/16 1200	10/14/16 0024	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28183 SDG:
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey

Sample ID: RAH-022
Matrix: Solid
Sampled: 09/15/16 1350

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28183-012	41.5	0.1	%	10/12/16 0850	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28183-012	9.41	0.5	ug/g dry wt	10/12/16 1200	10/14/16 0030	JLH/SW846 3rd Ed. 6020
Cadmium, total	28183-012	0.09	0.05	ug/g dry wt	10/12/16 1200	10/14/16 0030	JLH/SW846 3rd Ed. 6020
Chromium, total	28183-012	30.2	0.5	ug/g dry wt	10/12/16 1200	10/14/16 0030	JLH/SW846 3rd Ed. 6020
Copper, total	28183-012	11.3	0.5	ug/g dry wt	10/12/16 1200	10/14/16 0030	JLH/SW846 3rd Ed. 6020
Lead, total	28183-012	17.3	0.5	ug/g dry wt	10/12/16 1200	10/14/16 0030	JLH/SW846 3rd Ed. 6020
Mercury, total	28183-012	0.048	0.02	ug/g dry wt	10/12/16 1200	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28183-012	24.1	1	ug/g dry wt	10/12/16 1200	10/14/16 0030	JLH/SW846 3rd Ed. 6020
Zinc, total	28183-012	63.1	2	ug/g dry wt	10/12/16 1200	10/14/16 0030	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28183 SDG:
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey

Sample ID: RAH-023
Matrix: Solid
Sampled: 09/15/16 1400

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28183-013	38.6	0.1	%	10/12/16 0850	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28183-013	9.08	0.4	ug/g dry wt	10/12/16 1200	10/14/16 0036	JLH/SW846 3rd Ed. 6020
Cadmium, total	28183-013	0.10	0.04	ug/g dry wt	10/12/16 1200	10/14/16 0036	JLH/SW846 3rd Ed. 6020
Chromium, total	28183-013	30.2	0.4	ug/g dry wt	10/12/16 1200	10/14/16 0036	JLH/SW846 3rd Ed. 6020
Copper, total	28183-013	11.0	0.4	ug/g dry wt	10/12/16 1200	10/14/16 0036	JLH/SW846 3rd Ed. 6020
Lead, total	28183-013	18.2	0.4	ug/g dry wt	10/12/16 1200	10/14/16 0036	JLH/SW846 3rd Ed. 6020
Mercury, total	28183-013	0.05	0.02	ug/g dry wt	10/12/16 1200	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28183-013	23.9	0.8	ug/g dry wt	10/12/16 1200	10/14/16 0036	JLH/SW846 3rd Ed. 6020
Zinc, total	28183-013	63.5	2	ug/g dry wt	10/12/16 1200	10/14/16 0036	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28183 SDG:
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey

Sample ID: RAH-024
Matrix: Solid
Sampled: 09/15/16 1415

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28183-014	41.2	0.1	%	10/12/16 0850	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28183-014	10.7	0.5	ug/g dry wt	10/12/16 1200	10/14/16 0042	JLH/SW846 3rd Ed. 6020
Cadmium, total	28183-014	0.10	0.05	ug/g dry wt	10/12/16 1200	10/14/16 0042	JLH/SW846 3rd Ed. 6020
Chromium, total	28183-014	30.3	0.5	ug/g dry wt	10/12/16 1200	10/14/16 0042	JLH/SW846 3rd Ed. 6020
Copper, total	28183-014	11.1	0.5	ug/g dry wt	10/12/16 1200	10/14/16 0042	JLH/SW846 3rd Ed. 6020
Lead, total	28183-014	18.6	0.5	ug/g dry wt	10/12/16 1200	10/14/16 0042	JLH/SW846 3rd Ed. 6020
Mercury, total	28183-014	0.051	0.02	ug/g dry wt	10/12/16 1200	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28183-014	23.9	1	ug/g dry wt	10/12/16 1200	10/14/16 0042	JLH/SW846 3rd Ed. 6020
Zinc, total	28183-014	64.2	2	ug/g dry wt	10/12/16 1200	10/14/16 0042	JLH/SW846 3rd Ed. 6020

Notes:

Quality Control Summary

Parameter: Arsenic, total
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey
Matrix: Solid
QC Batch No: 469S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28183-001	RAH-013	28183-013	RAH-023
28183-002	RAH-014	28183-014	RAH-024
28183-003	RAH-015		
28183-006	RAH-016		
28183-007	RAH-017		
28183-008	RAH-018		
28183-009	RAH-019		
28183-010	RAH-020		
28183-011	RAH-021		
28183-012	RAH-022		

	Control Limit +/-	Preparation Blank Result ug/g dry wt	Q		M
PB469S	0.05	0.05	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g dry wt	True Value ug/g dry wt	%R	Lab Control Dup Sample Result ug/g dry wt	True Value ug/g dry wt	%R	
LCS	85-115	24.4	25.0	98	24.7	25.0	99	Pass
SRM	70-130	16.3	18.9	86				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g dry wt	Q	Sample Result ug/g dry wt	Q	RPD	Q	
28183-002	20	8.74		8.85		1		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g dry wt	Spike Added ug/g dry wt	Sample Result ug/g dry wt	Q	%R	Q	
28183-002S	80-120	62.5	58.6	8.85		92		Pass
28183-002SD	80-120	62.7	58.0	8.85		93		Pass

Quality Control Summary

Parameter: Cadmium, total
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey
Matrix: Solid
QC Batch No: 469S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28183-001	RAH-013	28183-013	RAH-023
28183-002	RAH-014	28183-014	RAH-024
28183-003	RAH-015		
28183-006	RAH-016		
28183-007	RAH-017		
28183-008	RAH-018		
28183-009	RAH-019		
28183-010	RAH-020		
28183-011	RAH-021		
28183-012	RAH-022		

	Control Limit +/-	Preparation Blank Result ug/g dry wt	Q		M
PB469S	0.005	0.005	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g dry wt	True Value ug/g dry wt	%R	Lab Control Dup Sample Result ug/g dry wt	True Value ug/g dry wt	%R	
LCS	85-115	12.6	12.5	101	12.8	12.5	102	Pass
SRM	70-130	8.29	8.80	94				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g dry wt	Q	Sample Result ug/g dry wt	Q	RPD	Q	
28183-002	20	0.091		0.096		5		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g dry wt	Spike Added ug/g dry wt	Sample Result ug/g dry wt	Q	%R	Q	
28183-002S	80-120	28.6	29.3	0.096		97		Pass
28183-002SD	80-120	28.7	29.0	0.096		99		Pass

Quality Control Summary

Parameter: Chromium, total
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey
Matrix: Solid
QC Batch No: 469S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28183-001	RAH-013	28183-013	RAH-023
28183-002	RAH-014	28183-014	RAH-024
28183-003	RAH-015		
28183-006	RAH-016		
28183-007	RAH-017		
28183-008	RAH-018		
28183-009	RAH-019		
28183-010	RAH-020		
28183-011	RAH-021		
28183-012	RAH-022		

	Control Limit +/-	Preparation Blank Result ug/g dry wt	Q		M
PB469S	0.05	0.05	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g dry wt	True Value ug/g dry wt	%R	Lab Control Dup Sample Result ug/g dry wt	True Value ug/g dry wt	%R	
LCS	85-115	19.9	20.0	100	20.0	20.0	100	Pass
SRM	70-130	188	266	71				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g dry wt	Q	Sample Result ug/g dry wt	Q	RPD	Q	
28183-002	20	30.8		30.6		1		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g dry wt	Spike Added ug/g dry wt	Sample Result ug/g dry wt	Q	%R	Q	
28183-002S	80-120	71.4	46.8	30.6		87		Pass
28183-002SD	80-120	72.6	46.4	30.6		91		Pass

Quality Control Summary

Parameter: Copper, total
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey
Matrix: Solid
QC Batch No: 469S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28183-001	RAH-013	28183-013	RAH-023
28183-002	RAH-014	28183-014	RAH-024
28183-003	RAH-015		
28183-006	RAH-016		
28183-007	RAH-017		
28183-008	RAH-018		
28183-009	RAH-019		
28183-010	RAH-020		
28183-011	RAH-021		
28183-012	RAH-022		

	Control Limit +/-	Preparation Blank Result ug/g dry wt	Q		M
PB469S	0.05	0.05	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g dry wt	True Value ug/g dry wt	%R	Lab Control Dup Sample Result ug/g dry wt	True Value ug/g dry wt	%R	
LCS	85-115	24.8	25.0	99	24.9	25.0	100	Pass
SRM	70-130	335	380	88				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g dry wt	Q	Sample Result ug/g dry wt	Q	RPD	Q	
28183-002	20	10.9		10.7		2		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g dry wt	Spike Added ug/g dry wt	Sample Result ug/g dry wt	Q	%R	Q	
28183-002S	80-120	61.0	58.6	10.7		86		Pass
28183-002SD	80-120	61.4	58.0	10.7		87		Pass

Quality Control Summary

Parameter: Lead, total
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey
Matrix: Solid
QC Batch No: 469S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28183-001	RAH-013	28183-013	RAH-023
28183-002	RAH-014	28183-014	RAH-024
28183-003	RAH-015		
28183-006	RAH-016		
28183-007	RAH-017		
28183-008	RAH-018		
28183-009	RAH-019		
28183-010	RAH-020		
28183-011	RAH-021		
28183-012	RAH-022		

	Control Limit +/-	Preparation Blank Result ug/g dry wt	Q		M
PB469S	0.05	0.05	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g dry wt	True Value ug/g dry wt	%R	Lab Control Dup Sample Result ug/g dry wt	True Value ug/g dry wt	%R	
LCS	85-115	24.9	25.0	100	25.1	25.0	100	Pass
SRM	70-130	284	330	86				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g dry wt	Q	Sample Result ug/g dry wt	Q	RPD	Q	
28183-002	20	18.0		18.0		0		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g dry wt	Spike Added ug/g dry wt	Sample Result ug/g dry wt	Q	%R	Q	
28183-002S	80-120	73.9	58.6	18.0		95		Pass
28183-002SD	80-120	74.5	58.0	18.0		97		Pass

Quality Control Summary

Parameter: Mercury, total
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey
Matrix: Solid
QC Batch No: 178S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28183-001	RAH-013	28183-013	RAH-023
28183-002	RAH-014	28183-014	RAH-024
28183-003	RAH-015		
28183-006	RAH-016		
28183-007	RAH-017		
28183-008	RAH-018		
28183-009	RAH-019		
28183-010	RAH-020		
28183-011	RAH-021		
28183-012	RAH-022		

	Control Limit +/-	Preparation Blank Result ug/g dry wt	Q		M
PB178S	0.01	0.01	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g dry wt	True Value ug/g dry wt	%R	Lab Control Dup Sample Result ug/g dry wt	True Value ug/g dry wt	%R	
LCS	75-125	1.38	1.60	86	1.39	1.60	87	Pass
SRM	70-130	3.29	3.40	97				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g dry wt	Q	Sample Result ug/g dry wt	Q	RPD	Q	
28183-002	20	0.049		0.049		NC		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g dry wt	Spike Added ug/g dry wt	Sample Result ug/g dry wt	Q	%R	Q	
28183-002S	75-125	3.21	3.75	0.049		84		Pass
28183-002SD	75-125	3.20	3.75	0.049		84		Pass

Quality Control Summary

Parameter: Nickel, total
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey
Matrix: Solid
QC Batch No: 469S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28183-001	RAH-013	28183-013	RAH-023
28183-002	RAH-014	28183-014	RAH-024
28183-003	RAH-015		
28183-006	RAH-016		
28183-007	RAH-017		
28183-008	RAH-018		
28183-009	RAH-019		
28183-010	RAH-020		
28183-011	RAH-021		
28183-012	RAH-022		

	Control Limit +/-	Preparation Blank Result ug/g dry wt	Q		M
PB469S	0.1	0.1	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g dry wt	True Value ug/g dry wt	%R	Lab Control Dup Sample Result ug/g dry wt	True Value ug/g dry wt	%R	
LCS	85-115	50.7	50.0	101	51.0	50.0	102	Pass
SRM	70-130	58.9	76.1	77				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g dry wt	Q	Sample Result ug/g dry wt	Q	RPD	Q	
28183-002	20	24.3		24.1		1		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g dry wt	Spike Added ug/g dry wt	Sample Result ug/g dry wt	Q	%R	Q	
28183-002S	80-120	126.0	117.0	24.1		87		Pass
28183-002SD	80-120	127.0	116.0	24.1		89		Pass

Quality Control Summary

Parameter: Zinc, total
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey
Matrix: Solid
QC Batch No: 469S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28183-001	RAH-013	28183-013	RAH-023
28183-002	RAH-014	28183-014	RAH-024
28183-003	RAH-015		
28183-006	RAH-016		
28183-007	RAH-017		
28183-008	RAH-018		
28183-009	RAH-019		
28183-010	RAH-020		
28183-011	RAH-021		
28183-012	RAH-022		

	Control Limit +/-	Preparation Blank Result ug/g dry wt	Q		M
PB469S	0.2	0.2	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g dry wt	True Value ug/g dry wt	%R	Lab Control Dup Sample Result ug/g dry wt	True Value ug/g dry wt	%R	
LCS	85-115	51.2	50.0	102	51.3	50.0	103	Pass
SRM	70-130	562	656	86				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g dry wt	Q	Sample Result ug/g dry wt	Q	RPD	Q	
28183-002	20	64.7		64.3		1		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g dry wt	Spike Added ug/g dry wt	Sample Result ug/g dry wt	Q	%R	Q	
28183-002S	80-120	168	117	64.3		89		Pass
28183-002SD	80-120	170	116	64.3		91		Pass

Metals by ICPMS and Mercury by CVAF
EPA 200.8 SW846 6020 and EPA 245.7

Lab Number: MDL2016
Sample Designation: Solid
Date Analyzed: 07/07/16
Date Analyzed: 07/19/16 Mercury EPA 245.7
Matrix: Solid
Sample Amount (g): 1
Final Volume (mL) 50

	True Value ug/g	Rep 1 ug/g	Rep 2 ug/g	Rep 3 ug/g	Rep 4 ug/g	Rep 5 ug/g	Rep 6 ug/g	Rep 7 ug/g
Aluminum, total	0.5	0.493	0.478	0.506	0.502	0.479	0.468	0.507
Antimony, total	0.01	0.0109	0.0101	0.00975	0.0099	0.0096	0.0106	0.0096
Arsenic, total	0.025	0.0245	0.0233	0.0245	0.0249	0.0248	0.0258	0.0251
Barium, total	0.2	0.19	0.195	0.192	0.19	0.198	0.193	0.198
Beryllium, total	0.0125	0.0119	0.0125	0.0129	0.0118	0.0124	0.0126	0.0124
Boron, total	0.05	0.0424	0.0419	0.0473	0.011	0.011	0.0428	0.0446
Cadmium, total	0.0125	0.0123	0.0122	0.0127	0.0124	0.0124	0.0123	0.0122
Calcium, total	1.25	1.4	1.25	1.35	1.5	1.25	1.25	1.35
Chromium, total	0.02	0.0196	0.0196	0.0195	0.019	0.0201	0.0199	0.0197
Cobalt, total	0.05	0.0479	0.0493	0.0497	0.0501	0.0494	0.0488	0.0496
Copper, total	0.025	0.0242	0.0254	0.0249	0.0258	0.0253	0.0247	0.0258
Iron, total	0.25	0.249	0.247	0.258	0.251	0.256	0.244	0.251
Lead, total	0.025	0.0239	0.0246	0.0246	0.0243	0.0253	0.024	0.0246
Magnesium, total	1.25	1.2	1.2	1.3	1.25	1.3	1.2	1.25
Manganese, total	0.05	0.0488	0.0489	0.049	0.0499	0.0501	0.048	0.0493
Mercury, total	0.005	0.00455	0.0046	0.00455	0.0049	0.0046	0.00445	0.0056
Mercury, total (EPA 245.7)	0.05	0.0051	0.0049	0.0047	0.0047	0.00485	0.0052	0.00495
Molybdenum, total	0.02	0.0177	0.0193	0.0193	0.0188	0.0172	0.0182	0.0191
Nickel, total	0.05	0.0489	0.0506	0.0494	0.0484	0.0495	0.0483	0.0507
Potassium, total	1.25	1.1	1.05	1.3	1.25	1.35	1.05	1.2
Selenium, total	0.025	0.0215	0.0307	0.0285	0.0222	0.0276	0.0243	0.024
Silver, total	0.025	0.0224	0.0234	0.0235	0.0234	0.0236	0.0232	0.0232
Sodium, total	1.25	1.1	0.95	1.15	1.15	1.3	1.1	1.25
Strontium, total	0.025	0.0268	0.0253	0.0275	0.0254	0.0248	0.0233	0.0254
Thallium, total	0.025	0.0212	0.0206	0.0198	0.0227	0.0222	0.0206	0.0207
Tin, total	0.025	0.0245	0.0243	0.0257	0.0243	0.024	0.0236	0.0239
Vanadium, total	0.05	0.0467	0.048	0.0475	0.0491	0.049	0.0464	0.0459
Zinc, total	0.05	0.0487	0.0498	0.0509	0.0498	0.0473	0.0462	0.0486

Quality Control Summary

Parameter: Arsenic, total
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey
Matrix: Water
QC Batch No: 498W

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28183-004	RAH-901		

	Control Limit +/-	Preparation Blank Result mg/L	Q		M
PB498W	0.001	0.001	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result mg/L	True Value mg/L	%R	Lab Control Dup Sample Result mg/L	True Value mg/L	%R	
LCS	85-115	0.0252	0.025	101	0.0254	0.025	102	Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result mg/L	Q	Sample Result mg/L	Q	RPD	Q	
28183-004	20	0.001	U	0.001	U	NC		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result mg/L	Spike Added mg/L	Sample Result mg/L	Q	%R	Q	
28183-004S	80-120	0.0516	0.050	0.001	U	103		Pass
28183-004SD	80-120	0.0519	0.050	0.001	U	104		Pass

Quality Control Summary

Parameter: Cadmium, total
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey
Matrix: Water
QC Batch No: 498W

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28183-004	RAH-901		

	Control Limit +/-	Preparation Blank Result mg/L	Q		M
PB498W	0.0001	0.0001	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result mg/L	True Value mg/L	%R	Lab Control Dup Sample Result mg/L	True Value mg/L	%R	
LCS	85-115	0.0125	0.0125	100	0.0126	0.0125	101	Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result mg/L	Q	Sample Result mg/L	Q	RPD	Q	
28183-004	20	0.0001	U	0.0001	U	NC		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result mg/L	Spike Added mg/L	Sample Result mg/L	Q	%R	Q	
28183-004S	80-120	0.0245	0.0250	0.0001	U	98		Pass
28183-004SD	80-120	0.0247	0.0250	0.0001	U	99		Pass

Quality Control Summary

Parameter: Chromium, total
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey
Matrix: Water
QC Batch No: 498W

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28183-004	RAH-901		

	Control Limit +/-	Preparation Blank Result mg/L	Q		M
PB498W	0.001	0.001	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result mg/L	True Value mg/L	%R	Lab Control Dup Sample Result mg/L	True Value mg/L	%R	
LCS	85-115	0.0202	0.020	101	0.0203	0.020	102	Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result mg/L	Q	Sample Result mg/L	Q	RPD	Q	
28183-004	20	0.001	U	0.001	U	NC		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result mg/L	Spike Added mg/L	Sample Result mg/L	Q	%R	Q	
28183-004S	80-120	0.040	0.040	0.001	U	100		Pass
28183-004SD	80-120	0.040	0.040	0.001	U	99		Pass

Quality Control Summary

Parameter: Copper, total
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey
Matrix: Water
QC Batch No: 498W

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28183-004	RAH-901		

	Control Limit +/-	Preparation Blank Result mg/L	Q		M
PB498W	0.0005	0.0005	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result mg/L	True Value mg/L	%R	Lab Control Dup Sample Result mg/L	True Value mg/L	%R	
LCS	85-115	0.0249	0.025	100	0.0252	0.025	101	Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result mg/L	Q	Sample Result mg/L	Q	RPD	Q	
28183-004	20	0.0005	U	0.0005	U	NC		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result mg/L	Spike Added mg/L	Sample Result mg/L	Q	%R	Q	
28183-004S	80-120	0.0478	0.050	0.0005	U	96		Pass
28183-004SD	80-120	0.0472	0.050	0.0005	U	94		Pass

Quality Control Summary

Parameter: Lead, total
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey
Matrix: Water
QC Batch No: 498W

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28183-004	RAH-901		

	Control Limit +/-	Preparation Blank Result mg/L	Q		M
PB498W	0.0002	0.0002	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result mg/L	True Value mg/L	%R	Lab Control Dup Sample Result mg/L	True Value mg/L	%R	
LCS	85-115	0.0252	0.025	101	0.025	0.0250	101	Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result mg/L	Q	Sample Result mg/L	Q	RPD	Q	
28183-004	20	0.0006		0.0006		NC		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result mg/L	Spike Added mg/L	Sample Result mg/L	Q	%R	Q	
28183-004S	80-120	0.0499	0.050	0.0006		99		Pass
28183-004SD	80-120	0.0498	0.050	0.0006		98		Pass

Quality Control Summary

Parameter: Mercury, total
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey
Matrix: Water
QC Batch No: 175W

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28183-005	RAH-901		

	Control Limit +/-	Preparation Blank Result ug/L	Q		M
PB175W	0.01	0.01	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/L	True Value ug/L	%R	Lab Control Dup Sample Result ug/L	True Value ug/L	%R	
LCS	85-115	0.027	0.025	108	0.026	0.025	104	Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/L	Q	Sample Result ug/L	Q	RPD	Q	
28183-005	20	0.01	U	0.01	U	NC		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/L	Spike Added ug/L	Sample Result ug/L	Q	%R	Q	
28183-005S	80-120	0.027	0.025	0.01	U	108		Pass
28183-005SD	80-120	0.027	0.025	0.01	U	108		Pass

Quality Control Summary

Parameter: Nickel, total
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey
Matrix: Water
QC Batch No: 498W

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28183-004	RAH-901		

	Control Limit +/-	Preparation Blank Result mg/L	Q		M
PB498W	0.001	0.001	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result mg/L	True Value mg/L	%R	Lab Control Dup Sample Result mg/L	True Value mg/L	%R	
LCS	85-115	0.0504	0.050	101	0.0510	0.050	102	Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result mg/L	Q	Sample Result mg/L	Q	RPD	Q	
28183-004	20	0.0013		0.0013		NC		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result mg/L	Spike Added mg/L	Sample Result mg/L	Q	%R	Q	
28183-004S	80-120	0.098	0.100	0.0013		97		Pass
28183-004SD	80-120	0.097	0.100	0.0013		96		Pass

Quality Control Summary

Parameter: Zinc, total
Project: USACE DAMOS Rockland Disposal Site (RDS) Survey
Matrix: Water
QC Batch No: 498W

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28183-004	RAH-901		

	Control Limit +/-	Preparation Blank Result mg/L	Q		M
PB498W	0.002	0.002	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result mg/L	True Value mg/L	%R	Lab Control Dup Sample Result mg/L	True Value mg/L	%R	
LCS	85-115	0.0509	0.050	102	0.0507	0.050	101	Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result mg/L	Q	Sample Result mg/L	Q	RPD	Q	
28183-004	20	0.0027		0.0026		NC		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result mg/L	Spike Added mg/L	Sample Result mg/L	Q	%R	Q	
28183-004S	80-120	0.103	0.100	0.0026		100		Pass
28183-004SD	80-120	0.102	0.100	0.0026		99		Pass

TASK: Trace Metals
METHOD: EPA 200.8 SW846 6020 / EPA 245.7
INSTRUMENT: Agilent 7800
Lab Number: MDL2016
Sample Designation: Freshwater Water
Date Analyzed: 03/08/16
Matrix: Water
Sample Amount (mL): 50
Final Volume (mL): 50

Compound	True Value (ug/L)	Rep 1 (ug/L)	Rep 2 (ug/L)	Rep 3 (ug/L)	Rep 4 (ug/L)	Rep 5 (ug/L)	Rep 6 (ug/L)	Rep 7 (ug/L)	MDL (ug/L)
Aluminum	2	1.828	2.005	1.919	1.908	1.9	2.102	1.814	0.292
Antimony	0.1	0.097	0.095	0.098	0.093	0.101	0.096	0.093	0.008
Arsenic	0.25	0.237	0.243	0.221	0.243	0.226	0.235	0.235	0.024
Barium	2	2.088	1.968	1.95	1.924	2.002	1.977	1.931	0.162
Beryllium	0.05	0.046	0.05	0.048	0.053	0.047	0.053	0.045	0.009
Boron	2	2.082	1.963	1.912	1.964	2.004	1.97	1.995	0.152
Cadmium	0.125	0.128	0.128	0.128	0.123	0.125	0.124	0.123	0.007
Calcium	50	47	50	48	48	48	51	51	4.747
Chromium	0.2	0.192	0.205	0.189	0.193	0.2	0.213	0.197	0.024
Cobalt	0.5	0.501	0.505	0.496	0.498	0.509	0.517	0.51	0.022
Copper	0.25	0.207	0.21	0.198	0.2	0.195	0.197	0.197	0.017
Iron	1	0.955	0.985	0.963	0.973	0.99	0.978	1.034	0.075
Lead	0.25	0.252	0.252	0.251	0.253	0.247	0.252	0.252	0.006
Magnesium	50	52	52	51	52	50	52	51	2.287
Manganese	0.05	0.491	0.488	0.487	0.49	0.483	0.493	0.483	0.011
Mercury - EPA 6020	0.05	0.052	0.045	0.049	0.053	0.048	0.05	0.048	0.008
Mercury - 245.7	0.01	0.0086	0.0086	0.0094	0.0088	0.0099	0.0084	0.0084	0.0016
Nickel	0.5	0.487	0.471	0.488	0.488	0.474	0.483	0.487	0.021
Potassium	50	49	49	47	49	46	48	48	3.357
Selenium	0.25	0.231	0.188	0.191	0.213	0.238	0.188	0.243	0.071
Silver	0.25	0.252	0.247	0.248	0.244	0.237	0.249	0.25	0.014
Sodium	50	50	49	49	50	50	52	50	2.907
Thallium	0.25	0.298	0.275	0.265	0.266	0.258	0.265	0.257	0.041
Tin	0.2	0.194	0.197	0.198	0.19	0.184	0.175	0.185	0.024
Vanadium	0.5	0.505	0.482	0.479	0.481	0.47	0.487	0.483	0.031
Zinc	0.5	0.512	0.524	0.5	0.528	0.514	0.511	0.541	0.039

Table II-1: Completeness Checklis

Quality Assurance/Quality Control Questions	Yes/No? Comments?
1. Was the report signed by the responsible applicant approved representative?	Yes
2. Were the methods for sampling, chemical and biological testing described in the Sampling and Analysis Plan (SAP) and the Laboratory QA Plan (LQAP) followed?	Yes
3. If not, were deviations documented?	NA
4. Was the SAP approved by the New England District?	Yes
5. Did the applicant use a laboratory with a LQAP on file at the New England District?	Yes
6. Did the samples adequately represent the physical/chemical variability in the dredging area?	Yes
7. Were the correct stations sampled (include the precision of the navigation method used)?	Yes
8. Were the preservation and storage requirements in Chapter 8 of the EPA/Corps QA/QC Manual (EPA/USACE 1995) and EPA (2001d) followed?	Yes
9. Were the samples properly labeled?	Yes
10. Were all the requested data included?	Yes
11. Were the reporting limits met?	Yes
12. Were the chain-of-custody forms properly processed?	Yes
13. Were the method blanks run and were the concentration below the acceptance criteria?	Yes
14. Was the MDL study performed on each matrix (with this data submission) or within the last 12 months?	Yes
15. Were the SRM/CRM analyses within acceptance criteria?	Yes
16. Were the matrix spike/matrix spike duplicates run at the required frequency and was the percent recovery/RPD within the acceptance criteria?	Yes
17. Were the duplicate samples analyzed and were the RPDs within the required acceptance criteria?	Yes
18. For each analytical fraction of organic compounds, were recoveries for the internal standard within the acceptance criteria?	NA
19. Were surrogate recoveries within the required acceptance criteria?	NA
20. Were corrective action forms provided for all non-conforming data?	NA
21. Were all the species-specific test conditions in Appendix V met?	NA
22. Were the test-specific age requirements met for each test species?	NA
23. Was the bulk physical/chemical testing performed on the sediments/composites that were biologically tested?	NA
24. Were the mortality acceptance criteria met for the water column and sediment toxicity tests?	NA
25. Were the test performance requirements in Table 11.3 of EPA (1994a) met?	NA

Table II-5: Quality Control Summary for Analyses of Metals in Sediments, Tissue and Water Matrices

Method Reference Numbers: Various Reference Numbers

Quality Control (QC) Element	Acceptance Criteria*	Criteria Met? Yes/No	List results outside criteria (Cross-reference results table in data report)	Location of Results (Retained at Lab or in Data Package)
Linear Range Determination for ICP	Performed Quarterly	Yes		Retained at Lab
Initial Calibration for AA, Hg	Performed Daily (Correlation Coefficient ▲0.995)	Yes		Retained at Lab
Calculation of Method Detection Limits (MDLs)	For each matrix, analyzed once per 12 month period (see Section 5.2 for MDL procedure)	Yes		in Data Package
Initial Calibration Verification/ Continuing Calibration Verification	Hg: 80 to 120% recovery Other metals: 90 to 110% recovery	Yes		Retained at Lab
Initial Calibration Blank/ Continuing Calibration Blank	No target analytes > Instrument Detection Limit (IDL)	Yes		Retained at Lab
Standard Reference Materials	Within the limits provided by vendor	Yes		in Data Package
Method Blank	No target analytes > RL	Yes		in Data Package
Sample Spike/ Sample Duplicate	One set per group of field samples. Must contain all target analytes. Recovery Limits (75 to 125%; RPD < 20% or < 35%)	Yes		in Data Package
Analytical Replicates	Analyze one sample in duplicate for each group of field samples (RPD < 30%)	Yes		in Data Package

* The Quality Control Acceptance Criteria are general guidelines. If alternate criteria are used, they must be documented in this table.

Analytical Report Review Checklist

STUDY #: 28183 **TASK:**

CLIENT: battelle **ELEMENT:**

PROJECT: DAMOS rockland disposal site

DATE IN: 09/1~~9~~6/16 (E3 EP 09/16/16) **DATE DUE:** 10/16/16

EDD Required Yes No **QC Report Pages Required:** Yes No

Analyst Data Review	Date	Initials	Comments
Chains of Custody Complete	09/16/16	EP	
Sample Receipt Complete	↓	↓	
Bench Sheets Complete (dates, times, initials, etc...)	10/22/16	VLK	
Analytical Components Complete	↓	↓	
QC Reports Generated	↓	↓	
EDD Generated	↓	↓	
Data Acceptability Review	↓	↓	

Technical Report Review	Date	Initials	Comments
Analytical Reports Generated	10/22/16	VLK	
Analytical Reports Reviewed	10/24/16	EP	
Analytical Reports Printed To PDF	↓	↓	
All Elements of QC Reports Incorporated, MDL, etc.	↓	↓	
EDD Checked and Results Saved	10/25/16	EP	prelim EDD sent 10/27/16
Draft Report	10/26/16	EP	EDD updated · reviewed 10/28/16
QA Audit / Review Complete	10/28/16	EP	
Data Appendix Compiled	NA		
Tables Completed	10/26/16	EP	
Table Of Contents Complete / Accurate	↓	↓	
Apply Footer To Data Appendix	↓	↓	
Convert Text To PDF, Print	↓	↓	
Merge And Secure Document	11/01/16	EP	
Review Final Report	11/01/16	JH	
Send / E-Mail Hard Copy To Client			
Send Invoice			
Report scanned to archive			

Quality Assurance Statement

Project Name: USACE DAMOS Rockland Disposal Site (RDS) Survey

SDG Number: 28183

I. **Description of Audit and Review Activities:** Audit and review activities related to the metals analysis of sediment and equipment blank samples as summarized in ESI's "Review Checklist", copy included in the report data appendix include reviews of chains of custody, sample receipt records, log books, prep records, instrument calibration, data, software calculations, report pages and electronic deliverable correctness and completeness.

II. Accuracy:

Yes	1. Custody of all samples were transferred properly and maintained.
Yes	2. All of the samples on the COC were received and all required testing performed as defined in the QAPP.
Yes	3. QC samples and calibration standards were analyzed according to the QAPP and the acceptance criteria were met. Corrective action for exceedances was taken.
Yes	4. Samples were analyzed according to the procedures specified in the QAPP.
NA	5. 100% hand-entered and/or calculated data were checked for accuracy.
Yes	6. Calculations performed by software are verified at a frequency sufficient to ensure that the formulas are correct, appropriate, and consistent.
NA	7. For each cut and paste function, the first and last data value was verified vs. the source data.
Yes	8. Data are reported in the units specified in the QAPP.
Yes	9. Data qualifiers are assigned properly. Definitions for qualifiers are included with the data.
Yes	10. Results of QC data and activities defined in QAPP are included in the hard copy report and EDD. Percent recoveries and RPDs or percent differences are reported.
Yes	11. If QAPP acceptance criteria were not achieved, the corrective action defined in the QAPP was taken.

III. Completeness:

Yes	12. All samples received are reported.
Yes	13. All parameters specified in the QAPP for this task are reported.

IV. Reporting:

Yes	14. The data package is complete; contains all samples and QC samples and reporting data.
Yes	15. The EDD is complete, contains all sample and QC sample data with appropriate qualifiers. EDD data are traceable to the data package.

V. Description of outstanding issues or deficiencies noted above that may affect data quality.

No deficiencies impacting data quality were noted.

Lyclith penta 10/31/16
Signature of Reviewer/Date

10/31/16
Signature of Task Leader/Date

SAMPLE RECEIPT AND CONDITION DOCUMENTATION

STUDY NO:	28183		
SDG No:			
Project:	USACE DAMOS Rockland Disposal Site (RDS) Survey		
Delivered via:	Client		
Date and Time Received:	09/16/16 1100	Date and TIme Logged into Lab:	09/16/16 1325
Received By:	EP	Logged into Lab by:	EP
Air bill / Way bill:	No	Air bill included in folder if received?	NA
Cooler on ice/packs:	Yes	Custody Seals present?	NA
Cooler Blank Temp (C) at arrival:	3	Custody Seals intact?	NA
Number of COC Pages:	1		
COC Serial Number(s):	NA		
COC Complete:		Does the info on the COC match the samples?	Yes
Sampled Date:	Yes	Were samples received within holding time?	Yes
Field ID complete:	Yes	Were all samples properly labeled?	Yes
Sampled Time:	Yes	Were proper sample containers used?	Yes
Analysis request:	Yes	Were samples received intact? (none broken or leaking)	Yes
COC Signed and dated:	Yes	Were sample volumes sufficient for requested analysis?	Yes
Were all samples received?	Yes	Were VOC vials free of headspace?	NA
Client notification/authorization:	Not required	pH Test strip ID number:	A-4412

Field ID	Lab ID	Mx	Analysis Requested	Bottle	Req'd Pres'n	Verified Pres'n
RAH-013	28183-001	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAH-014	28183-002	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAH-015	28183-003	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAH-901	28183-004	W	Total Metals As,Cd,Cr,Cu,Pb,Ni,Zn;	250mL P	HNO3	Yes
RAH-901	28183-005	W	Total Metals Hg;	125mL G	HCl	Yes
RAH-016	28183-006	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAH-017	28183-007	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAH-018	28183-008	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAH-019	28183-009	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAH-020	28183-010	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAH-021	28183-011	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAH-022	28183-012	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAH-023	28183-013	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAH-024	28183-014	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes

Notes and qualifications:

Battelle
The Business of Innovation

Chain of Custody

28183

Project: USACE DAMOS
Rockland Disposal Site (RDS) Survey
Project Manager: Lisa Lefkovitz
Phone: 781-681-5521

Ship to:
ESI **(Attn: Elizabeth Penta)**
1 Lafayette Road, PO Box 778
Hampton, NH 03843-0778

Samplers Signature:

Sampler Contact: Matt Fitzpatrick
Mobile: (781)733-6797

Date	Time (Central Time)	Field ID	Lab ID(s)	Matrix	Station	Analyses (Record No. of containers / Preservative)						
						PCB Congeners, Pesticides, PAHs	4° C (ice)	Grain Size	TOC	4° C (ice)	Metals	4° C (ice)
9/15/2016	11:39	RAH-013	28183-001	SED	EREF-04						1	X
9/15/2016	11:52	RAH-014	-002	SED	EREF-03						2	X
9/15/2016	12:05	RAH-015	-003	SED	EREF-01						1	X
9/15/2016	12:41	RAH-901	-004, -005 (E10)	WAT	EB-1						2	X
9/15/2016	12:50	RAH-016	-006	SED	NREF-11						1	X
9/15/2016	13:01	RAH-017	-007	SED	NREF-12						1	X
9/15/2016	13:10	RAH-018	-008	SED	NREF-09						1	X
9/15/2016	13:23	RAH-019	-009	SED	RDS-09						1	X
9/15/2016	13:32	RAH-020	-010	SED	RDS-04						1	X
9/15/2016	13:41	RAH-021	-011	SED	RDS-08						1	X
9/15/2016	13:50	RAH-022	-012	SED	RDS-18						1	X
9/15/2016	14:00	RAH-023	-013	SED	RDS-22						1	X
9/15/2016	14:15	RAH-024	↓ -014	SED	RDS-15						1	X

Sufficient volume was provided for MS/MSD and Lab duplicate for samples RAH-014
Note the water sample is preserved with Nitric for metals and HCL for Mercury.

(E10) 28183-004 t-metals preserved with HNO_3
28183-005 Hg preserved with HCl

Relinquished By (name/date/time):
9/16/16 1100

Received By(name/date/time):
09/16/16 1100

Page: 1 of 1

DAMOS Rockland Disposal Site Survey. Sediment Analysis.
US Army Corps of Engineers Application Number _____. ESI Study 28183.

DAMOS 2016

Rockland Disposal Site

Sediment Grain Size and TOC Results

Katahdin Analytical

BATTELLE
USACE NAE DAMOS-ROCKLAND
SJ7451

KATAHDIN ANALYTICAL SERVICES, LLC
600 TECHNOLOGY WAY
SCARBOROUGH, ME 04074

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SAMPLE DATA PACKAGE

SDG NARRATIVE
KATAHDIN ANALYTICAL SERVICES
BATTELLE
USACE NAE DAMOS-ROCKLAND
SJ7451

Sample Receipt

The following samples were received on September 16, 2016 and were logged in under Katahdin Analytical Services work order number SJ7451 for a hardcopy due date of September 28, 2016.

KATAHDIN Sample No.	BATTELLE Sample Identification
SJ7451-1	RAH-013
SJ7451-2	RAH-014
SJ7451-3	RAH-014 DUP
SJ7451-4	RAH-015
SJ7451-5	RAH-016
SJ7451-6	RAH-017
SJ7451-7	RAH-018
SJ7451-8	RAH-019
SJ7451-9	RAH-020
SJ7451-10	RAH-021
SJ7451-11	RAH-022
SJ7451-12	RAH-023
SJ7451-13	RAH-024

The samples were logged in for the analyses specified on the chain of custody form. All non-conformances noted during sample receipt have been documented on the applicable chain of custody or laboratory cooler receipt form.

We certify that the test results provided in this report meet all the requirements of the NELAC standards unless otherwise noted in this narrative or in the Report of Analysis.

Sample analyses have been performed by the methods as noted herein.

Should you have any questions or comments concerning this Report of Analysis, please do not hesitate to contact your Katahdin Analytical Services Project Manager, **Mrs. Jennifer Obrin**. This narrative is an integral part of the Report of Analysis.

Grain Size Analysis

There were no protocol deviations or observations noted by the organics laboratory staff.

Wet Chemistry Analysis

The samples of Work Order SJ7451 were analyzed in accordance with the specific methods listed on the Report of Analysis.

Analyses for total organic carbon in soil were performed according to "Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods." SW-846. 2nd edition, 1982 (revised 1984), 3rd edition, 1986, and Updates I, II, IIA,III, IIIA and IIIB 1996, 1998 & 2004, Office of Solid Waste and Emergency Response, U.S. EPA.

Analyses for total solids were performed according to "Standard Methods for the Examination of Water and Wastewater", 15th, 16th, 17th, 18th, 19th, and 20th editions, 1980, 1985, 1989, 1992, 1995, 1999. APHA-AWWA-WPCF.

All Wet Chemistry results were evaluated to Katahdin Analytical Services' Method Detection Limits (MDL). Measured concentrations that fall between the MDL and Katahdin's Limit of Quantitation (LOQ) are flagged "J". Measured concentrations that are below the MDL are flagged "U" and reported as "U LOD", where "LOD" is the numerical value of the Limit of Detection.

All analyses were performed within analytical holding times. All quality control criteria were met.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Operations Manager or the Quality Assurance Officer as verified by the following signature.

Leslie Dimond
09.29.16

Leslie Dimond
Quality Assurance Officer

Katahdin Analytical Services, Inc.

Manual Integration Codes For GC/MS, GC, HPLC and/or IC

M1	Peak splitting.
M2	Well defined peaks on the shoulders of the other peaks.
M3	There is additional area due to a coeluting interferant.
M4	There are negative spikes in the baseline.
M5	There are rising or falling baselines.
M6	The software has failed to detect a peak or misidentified a peak.
M7	Excessive peak tailing.
M8	Analysis such as GRO, DRO and TPH require a baseline hold.
M9	Peak was not completely integrated as in GC/MS.
M10	Primary ion was correctly integrated, but secondary or tertiary ion needed manual integration as in GC/MS.
M11	For GC analysis, when a sample is diluted by 1:10 or more, the surrogate is set to undetected and then the area under the surrogate is manually integrated.
M12	Manual integration saved in method due to TurboChrom floating point error.

CCCCC04

Katahdin Analytical Services, LLC. — Sample Receipt Condition Report

Client: Battelle	KAS PM: JO	Sampled By: Client
Project:	KIMS Entry By: GW	Delivered By: Client
KAS Work Order#: 557451	KIMS Review By:	Received By: SO
SDG #:	Cooler: 1 of 1	Date/Time Rec.: 9-16-16 1030

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?				✓	
2. Chain of Custody present in cooler?	✓				
3. Chain of Custody signed by client?	✓				
4. Chain of Custody matches samples?	✓				
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.	✓				Temp (°C): 2.7
Samples received at <6 °C w/o freezing?	✓				Note: Not required for metals (except Hg soil) analysis.
Ice packs or ice present?	✓				The lack of ice or ice packs (i.e. no attempt to begin cooling process) or insufficient ice may not meet certain regulatory requirements and may invalidate certain data.
If yes, was there sufficient ice to meet temperature requirements?	✓				
If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool?				✓	Note: No cooling process required for metals (except Hg soil) analysis.
6. Volatiles:					
Aqueous: No bubble larger than a pea?				✓	
Soil/Sediment:					
Received in airtight container?				✓	
Received in methanol?				✓	
Methanol covering soil?				✓	
D.I. Water - Received within 48 hour HT?				✓	
Air: Refer to KAS COC for canister/flow controller requirements.	√ if air included				
7. Trip Blank present in cooler?				✓	
8. Proper sample containers and volume?	✓				
9. Samples within hold time upon receipt?	✓				
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2				✓	
Sulfide - >9				✓	
Cyanide – pH >12				✓	

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments.

Battelle
The Business of Innovation

Chain of Custody

SJ74531

Project: USACE DAMOS
Rockland Disposal Site (RDS) Survey
Project Manager: Lisa Lefkovitz
Phone: 781-681-5521

Ship to:
Katahdin **(Attn: Sample Custodian)**
600 Technology Way
Scarborough, ME 04074

Samplers Signature:

Sampler Contact: Matt Fitzpatrick
Mobile: (781)733-6797

Date	Time (Central Time)	Field ID	Lab ID(s)	Matrix	Station	Analyses (Record No. of containers / Preservative)						
						PCB Congeners, Pesticides, PAHs	4° C (ice)	Grain Size	TOC	4° C (ice)	Metals	4° C (ice)
9/15/2016	11:39	RAH-013		SED	EREF-04			1	1	X		
9/15/2016	11:52	RAH-014		SED	EREF-03			2	2	X		
9/15/2016	12:05	RAH-015		SED	EREF-01			1	1	X		
9/15/2016	12:50	RAH-016		SED	NREF-11			1	1	X		
9/15/2016	13:01	RAH-017		SED	NREF-12			1	1	X		
9/15/2016	13:10	RAH-018		SED	NREF-09			1	1	X		
9/15/2016	13:23	RAH-019		SED	RDS-09			1	1	X		
9/15/2016	13:32	RAH-020		SED	RDS-04			1	1	X		
9/15/2016	13:41	RAH-021		SED	RDS-08			1	1	X		
9/15/2016	13:50	RAH-022		SED	RDS-18			1	1	X		
9/15/2016	14:00	RAH-023		SED	RDS-22			1	1	X		
9/15/2016	14:15	RAH-024		SED	RDS-15			1	1	X		

Sufficient volume was provided for Lab duplicate for samples RAH-014

00006

Relinquished By (name/date/time):
16-Sep-16 1030

Page: 1 of 1

Received By(name/date/time):
16-Sep-16 1630

Katahdin
ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Sep. 20, 2016
06:24 AM

Login Number: SJ7451

Account: BATTEL001 NoWeb
Battelle

Project: BATT-DAMOS
USACE NAE DAMOS

Quote/Incoming: BATT-DAMOS

Primary Report Address:

Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Suite 202
Norwell,MA 02061

Primary Invoice Address:

Accounts Payable
Battelle
505 King Avenue

Columbus,OH 43201

Report CC Addresses:

Invoice CC Addresses:

Login Information:

ANALYSIS INSTRUCTIONS	:	ND to the LOQ. "J" flag between DL and LOQ. TOC-1 quad per batch.
CHECK NO.	:	
CLIENT PO#	:	US001-0000554493
CLIENT PROJECT MANAGE	:	
CONTRACT	:	
COOLER TEMPERATURE	:	2.7
DELIVERY SERVICES	:	Client
EDD FORMAT	:	KAS127-XLS
LOGIN INITIALS	:	GN
PM	:	JO
PROJECT NAME	:	USACE NAE DAMOS-Rockland
QC LEVEL	:	IV
REGULATORY LIST	:	
REPORT INSTRUCTIONS	:	Email PDF and EDD to Lisa, no HC.
SDG ID	:	
SDG STATUS	:	

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SJ7451-1	RAH-013	15-SEP-16 11:39	16-SEP-16			28-SEP-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	13-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	13-OCT-16	2oz Glass		
Solid	S	SW9060-TOC(2)	13-OCT-16	2oz Glass		
Solid	S	SW9060-TOC(3)	13-OCT-16	2oz Glass		
Solid	S	SW9060-TOC(4)	13-OCT-16	2oz Glass		
Solid	S	SW9060-TOC(AVG)	13-OCT-16	2oz Glass		
Solid	S	TS-ME	15-OCT-16			

SJ7451-2	RAH-014	15-SEP-16 11:52	16-SEP-16		28-SEP-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	13-OCT-16	8oz Glass		**MS/MSD for TOC**
Solid	S	SW9060-TOC(1)	13-OCT-16	2oz Glass		
Solid	S	TS-ME	15-OCT-16			

SJ7451-3	RAH-014 DUP	15-SEP-16 11:52	16-SEP-16		28-SEP-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	13-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	13-OCT-16	2oz Glass		
Solid	S	TS-ME	15-OCT-16			

SJ7451-4	RAH-015	15-SEP-16 12:05	16-SEP-16		28-SEP-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	13-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	13-OCT-16	2oz Glass		
Solid	S	TS-ME	15-OCT-16			

SJ7451-5	RAH-016	15-SEP-16 12:50	16-SEP-16		28-SEP-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	13-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	13-OCT-16	2oz Glass		
Solid	S	TS-ME	15-OCT-16			

SJ7451-6	RAH-017	15-SEP-16 13:01	16-SEP-16		28-SEP-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	13-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	13-OCT-16	2oz Glass		
Solid	S	TS-ME	15-OCT-16			

09.20.16

CCCCCC7

Login Number: SJ7451

Quote/Incoming: BATT-DAMOS

Account: BATTEL001
Battelle

NoWeb

Project: BATT-DAMOS
USACE NAE DAMOS

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SJ7451-7	RAH-018	15-SEP-16 13:10	16-SEP-16			28-SEP-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	13-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	13-OCT-16	2oz Glass		
Solid	S	TS-ME	15-OCT-16			

SJ7451-8	RAH-019	15-SEP-16 13:23	16-SEP-16			28-SEP-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	13-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	13-OCT-16	2oz Glass		
Solid	S	TS-ME	15-OCT-16			

SJ7451-9	RAH-020	15-SEP-16 13:32	16-SEP-16			28-SEP-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	13-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	13-OCT-16	2oz Glass		
Solid	S	TS-ME	15-OCT-16			

SJ7451-10	RAH-021	15-SEP-16 13:41	16-SEP-16			28-SEP-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	13-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	13-OCT-16	2oz Glass		
Solid	S	TS-ME	15-OCT-16			

SJ7451-11	RAH-022	15-SEP-16 13:50	16-SEP-16			28-SEP-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	13-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	13-OCT-16	2oz Glass		
Solid	S	TS-ME	15-OCT-16			

SJ7451-12	RAH-023	15-SEP-16 14:00	16-SEP-16			28-SEP-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	13-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	13-OCT-16	2oz Glass		
Solid	S	TS-ME	15-OCT-16			

SJ7451-13	RAH-024	15-SEP-16 14:15	16-SEP-16			28-SEP-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	13-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	13-OCT-16	2oz Glass		
Solid	S	TS-ME	15-OCT-16			

SJ7451-15	RAH-014MS	15-SEP-16 11:52	16-SEP-16			28-SEP-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	SW9060-TOC(1)	13-OCT-16			**MS charge only. Not a sample.**

SJ7451-16	RAH-014MSD	15-SEP-16 11:52	16-SEP-16			28-SEP-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	SW9060-TOC(1)	13-OCT-16			**MSD charge only. Not a sample.**

Total Samples: ***15*** ***Total Analyses:*** ***45***

09.20.16

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SAMPLE DATA SUMMARY PACKAGE

KATAHDIN ANALYTICAL SERVICES - ORGANIC DATA QUALIFIERS

The sampled date indicated on the attached Report(s) of Analysis (ROA) is the date for which a grab sample was collected or the date for which a composite sample was completed. Beginning and start times for composite samples can be found on the Chain-of-Custody.

U Indicates the compound was analyzed for but not detected above the specified level. This level may be the Limit of Quantitation (LOQ)(previously called Practical Quantitation Level (PQL)), the Limit of Detection (LOD) or Method Detection Limit (MDL) as required by the client.

Note: All results reported as "U" MDL have a 50% rate for false negatives compared to those results reported as "U" PQL/LOQ or "U" LOD, where the rate of false negatives is <1%.

* Compound recovery or percent RPD (relative percent difference) was outside of quality control limits.

D Indicates the result was obtained from analysis of a diluted sample. Surrogate recoveries may not be calculable.

E Estimated value. This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis.

J Estimated value. The analyte was detected in the sample at a concentration less than the laboratory Limit of Quantitation (LOQ)(previously called Practical Quantitation Limit (PQL)), but above the Method Detection Limit (MDL).

or

J Used for Pesticides, PCBs, Herbicides, Formaldehyde, Explosives and Method 504.1 analytes when there is a greater than 40% difference for detected concentrations between the two GC columns.

B Indicates the analyte was detected in the laboratory method blank analyzed concurrently with the sample.

C Indicates that the flagged compound did not meet DoD criteria in the corresponding daily calibration verification (CV).

L Indicates that the flagged compound did not meet DoD criteria in the corresponding Laboratory Control Sample (LCS) and/or Laboratory Control Sample Duplicate (LCSD) prepared and/or analyzed concurrently with the sample.

M Indicates that the flagged compound did not meet DoD criteria in the Matrix Spike and/or Matrix Spike Duplicate prepared and/or analyzed concurrently with the native sample.

N Presumptive evidence of a compound based on a mass spectral library search.

A Indicates that a tentatively identified compound is a suspected aldol-condensation product.

P Used for Pesticide/Aroclor analyte when there is a greater than 25% difference for detected concentrations between the two GC columns. (for CLP methods only).

KATAHDIN ANALYTICAL SERVICES – INORGANIC DATA QUALIFIERS

The sampled date indicated on the attached Report(s) of Analysis (ROA) is the date for which a grab sample was collected or the date for which a composite sample was completed. Beginning and start times for composite samples can be found on the Chain-of-Custody.

U Indicates the compound was analyzed for but not detected above the specified level. This level may be the Practical Quantitation Level (PQL) (also called Limit of Quantitation (LOQ)), the Limit of Detection (LOD) or Method Detection Limit (MDL) as required by the client.

Note: All results reported as "U" MDL have a 50% rate for false negatives compared to those results reported as "U" PQL "U" LOQ or "U" LOD, where the rate of false negatives is <1%.

E Estimated value. This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis.

J Estimated value. The analyte was detected in the sample at a concentration less than the laboratory Practical Quantitation Level (PQL) (also called Limit of Quantitation (LOQ)), but above the Method Detection Limit (MDL).

I-7 The laboratory's Practical Quantitation Level (PQL) or LOQ could not be achieved for this parameter due to sample composition, matrix effects, sample volume, or quantity used for analysis.

A-4 Please refer to cover letter or narrative for further information.

H_ Please note that the regulatory holding time for _____ is "analyze immediately". Ideally, this analysis must be performed in the field at the time of sample collection. _____ for this sample was not performed at the time of sample collection. The analysis was performed as soon as possible after receipt by the laboratory.

H1 - pH H2 - DO H3 - sulfite H4 - residual chlorine

T1 The client did not provide the full volume of at least one liter for analysis of TSS. Therefore, the PQL of 2.5 mg/L could not be achieved.

T2 The client provided the required volume of at least one liter for analysis of TSS, but the laboratory could not filter the full one liter volume due to the sample matrix. Therefore, the PQL of 2.5 mg/L could not be achieved.

M1 The matrix spike and/or matrix spike duplicate recovery performed on this sample was outside of the laboratory acceptance criteria. Sample matrix is suspected. The laboratory criteria was met for the Laboratory Control Sample (LCS) analyzed concurrently with this sample.

M2 The matrix spike and/or matrix spike duplicate recovery was outside of the laboratory acceptance criteria. The native sample concentration is greater than four times the spike added concentration so the spike added could not be distinguished from the native sample concentration.

R1 The relative percent difference (RPD) between the duplicate analyses performed on this sample was outside of the laboratory acceptance criteria (when both values are greater than ten times the PQL).

MCL	Maximum Contaminant Level	NL	No limit
NFL	No Free Liquid Present	FLP	Free Liquid Present
NOD	No Odor Detected	TON	Threshold Odor Number

D-1 As required by Method 5210B, APHA Standard Methods for the Examination of Water and Wastewater (21st edition), the BOD value reported for this sample is 'qualified' because the check standard run concurrently with the sample analysis did not meet the criteria specified in the method (198 +/- 30.5 mg/L). These results may not be reportable for compliance purposes.

D-2 The measured final dissolved oxygen concentrations of all dilutions were less than the method-specified limit of 1 mg/L. The reported BOD result was calculated assuming a final oxygen concentration equal to 1 mg/L. The reported value should be considered a minimum value.

D-3 The dilution water used to prepare this sample did not meet the method and/or regulatory criteria of less than 0.2 or 0.4 mg/L dissolved oxygen (DO) uptake over the five day period of incubation. These results may not be reportable for compliance purposes.

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-013
Lab Sample ID	SJ7451-1

Date Received	09/16/16
Start Date/Time	9/21/16:14:04
End Date/Time	9/26/16:14:19

Sample Weight	Sample (g)
Sample Weight (wet)	128
Sample Weight (oven dried)	48.74

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	61.923

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	48.74
%Passing #10	100.00

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	273.9	0	100.00	Sand	Medium
#60	250	248	248	0	100.00	Sand	Fine
#80	180	328.1	328.2	0.1	99.79	Sand	Fine
#100	150	238.6	238.6	0	99.79	Sand	Fine
#200	75	227.8	232.1	4.3	90.97	Sand	Fine

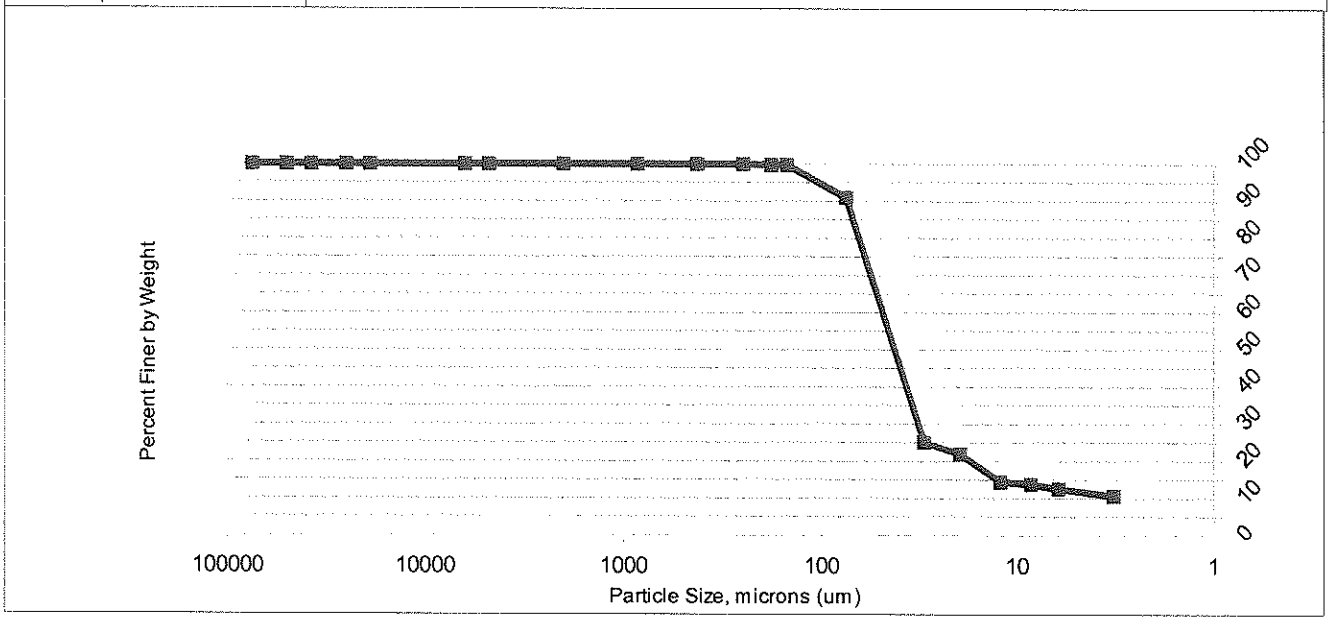
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0230	22.5	25.09	29.91	Silt
5	5	1.0205	22.5	21.96	19.65	Silt
15	15	1.0145	22.5	14.43	12.14	Silt
30	31	1.0140	22	13.80	8.49	Silt
60	61	1.0130	22	12.55	6.13	Silt
240	240	1.0115	20.5	10.67	3.21	Clay
1440	1440	1.0100	20	8.78	1.33	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.00
Sand Fine	9.03
Silt	79.45
Clay	11.52
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-013
Lab Sample ID	SJ7451-1



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	100.00
#60	250	100.00
#80	180	99.79
#100	150	99.79
#200	75	90.97
2	29.91	25.09
5	19.65	21.96
15	12.14	14.43
31	8.49	13.80
61	6.13	12.55
240	3.21	10.67
1440	1.33	8.78

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.00
Sand Fine	9.03
Silt	79.45
Clay	11.52

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-014
Lab Sample ID	SJ7451-2

Date Received	09/16/16
Start Date/Time	9/21/16:14:06
End Date/Time	9/26/16:14:27

Sample Weight	Sample (g)
Sample Weight (wet)	125.2
Sample Weight (oven dried)	49.01

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	60.851

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	49.01
%Passing #10	99.99

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	273.9	0	100.00	Sand	Medium
#60	250	248	248	0	100.00	Sand	Fine
#80	180	328.1	328.3	0.2	99.59	Sand	Fine
#100	150	238.6	238.6	0	99.59	Sand	Fine
#200	75	227.8	231.4	3.6	92.25	Sand	Fine

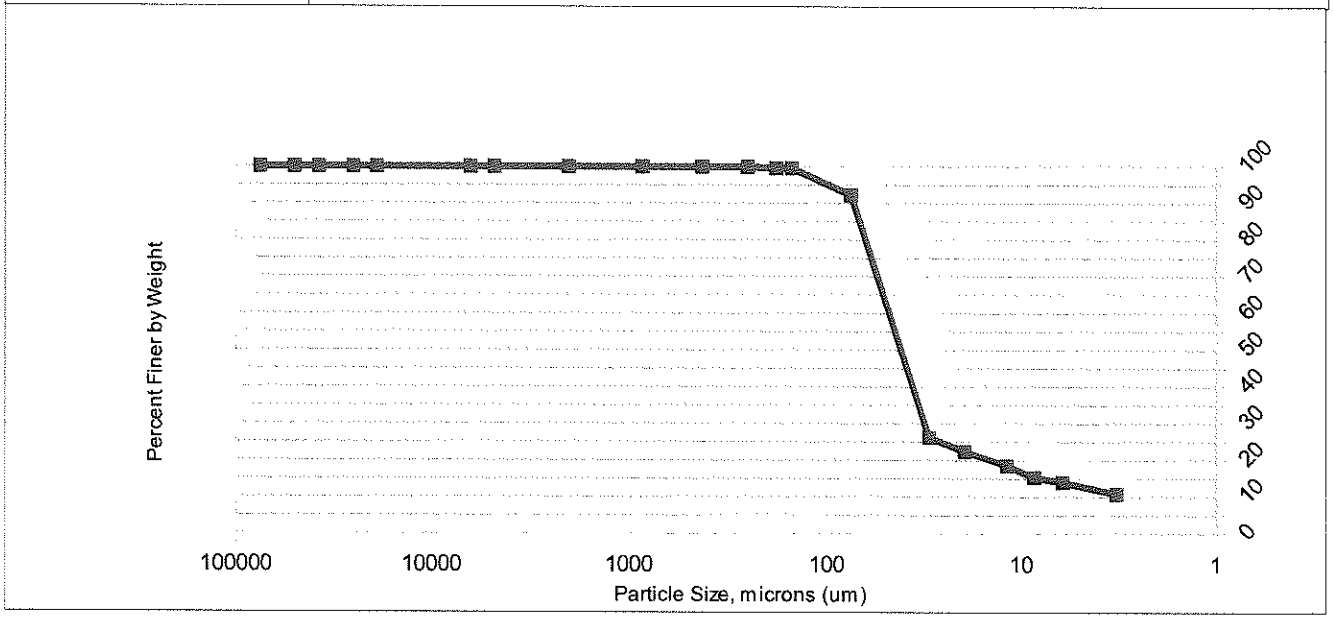
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0235	22.5	26.30	29.91	Silt
5	5	1.0205	22.5	22.45	19.65	Silt
15	15	1.0175	22	18.60	11.81	Silt
30	30	1.0150	22	15.39	8.53	Silt
60	61	1.0140	21.5	14.11	6.09	Silt
240	240	1.0115	20.5	10.90	3.21	Clay
1440	1440	1.0095	20	8.34	1.34	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.00
Sand Fine	7.75
Silt	79.63
Clay	12.62
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-014
Lab Sample ID	SJ7451-2



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	100.00
#60	250	100.00
#80	180	99.59
#100	150	99.59
#200	75	92.25
2	29.91	26.30
5	19.65	22.45
15	11.81	18.60
30	8.53	15.39
61	6.09	14.11
240	3.21	10.90
1440	1.34	8.34

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.00
Sand Fine	7.75
Silt	79.63
Clay	12.62

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-014DUP
Lab Sample ID	SJ7451-3

Date Received	09/16/16
Start Date/Time	9/21/16:14:09
End Date/Time	9/26/16:14:33

Sample Weight	Sample (g)
Sample Weight (wet)	128.2
Sample Weight (oven dried)	50.34

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	60.731

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	50.34
%Passing #10	99.99

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	274	0.1	99.80	Sand	Medium
#60	250	248	248	0	99.80	Sand	Fine
#80	180	328.1	328.2	0.1	99.60	Sand	Fine
#100	150	238.6	238.6	0	99.60	Sand	Fine
#200	75	227.8	231.9	4.1	91.46	Sand	Fine

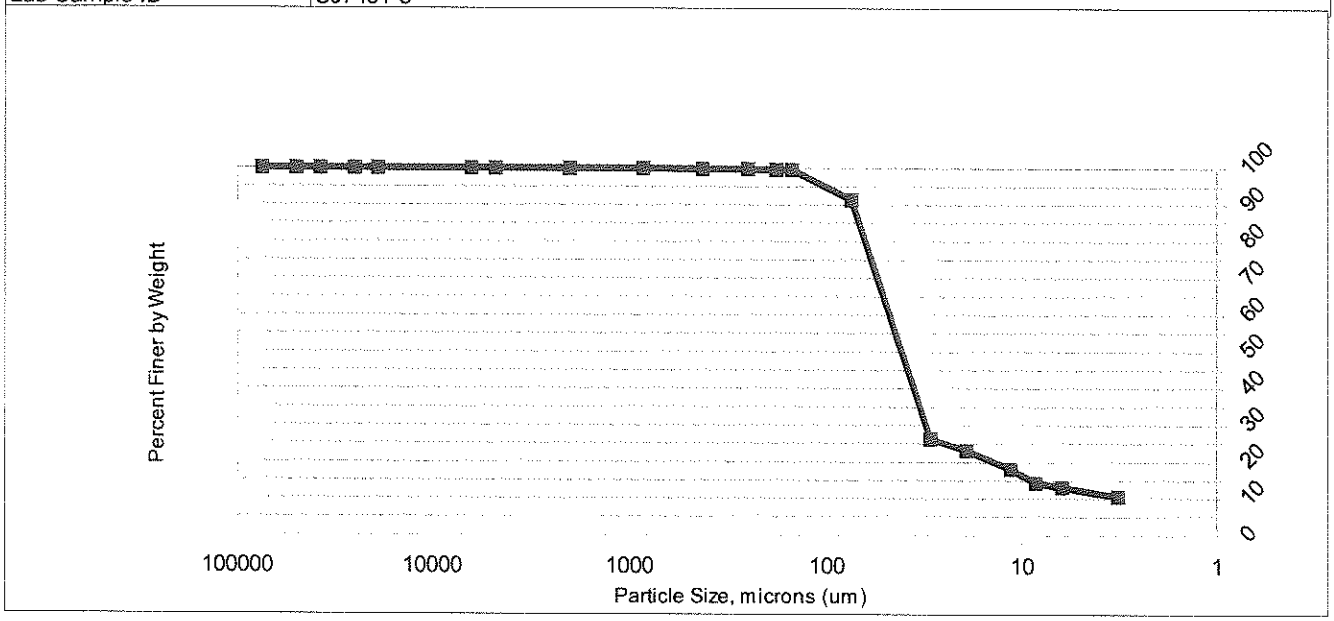
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0240	22.5	26.31	29.62	Silt
5	5	1.0215	22.5	23.18	19.38	Silt
15	16	1.0175	22	18.17	11.44	Silt
30	31	1.0145	22	14.41	8.49	Silt
60	60	1.0135	21.5	13.15	6.21	Silt
240	240	1.0115	20.5	10.65	3.21	Clay
1440	1440	1.0095	20	8.14	1.34	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	8.34
Silt	79.30
Clay	12.16
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-014DUP
Lab Sample ID	SJ7451-3



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	99.80
#60	250	99.80
#80	180	99.60
#100	150	99.60
#200	75	91.46
2	29.62	26.31
5	19.38	23.18
16	11.44	18.17
31	8.49	14.41
60	6.21	13.15
240	3.21	10.65
1440	1.34	8.14

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	8.34
Silt	79.30
Clay	12.16

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-015
Lab Sample ID	SJ7451-4

Date Received	09/16/16
Start Date/Time	9/21/16:14:10
End Date/Time	9/26/16:14:40

Sample Weight	Sample (g)
Sample Weight (wet)	136.2
Sample Weight (oven dried)	49.74

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	63.482

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	49.74
%Passing #10	100.00

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	273.9	0	100.00	Sand	Medium
#60	250	248	248	0	100.00	Sand	Fine
#80	180	328.1	328.2	0.1	99.80	Sand	Fine
#100	150	238.6	238.6	0	99.80	Sand	Fine
#200	75	227.8	230.5	2.7	94.37	Sand	Fine

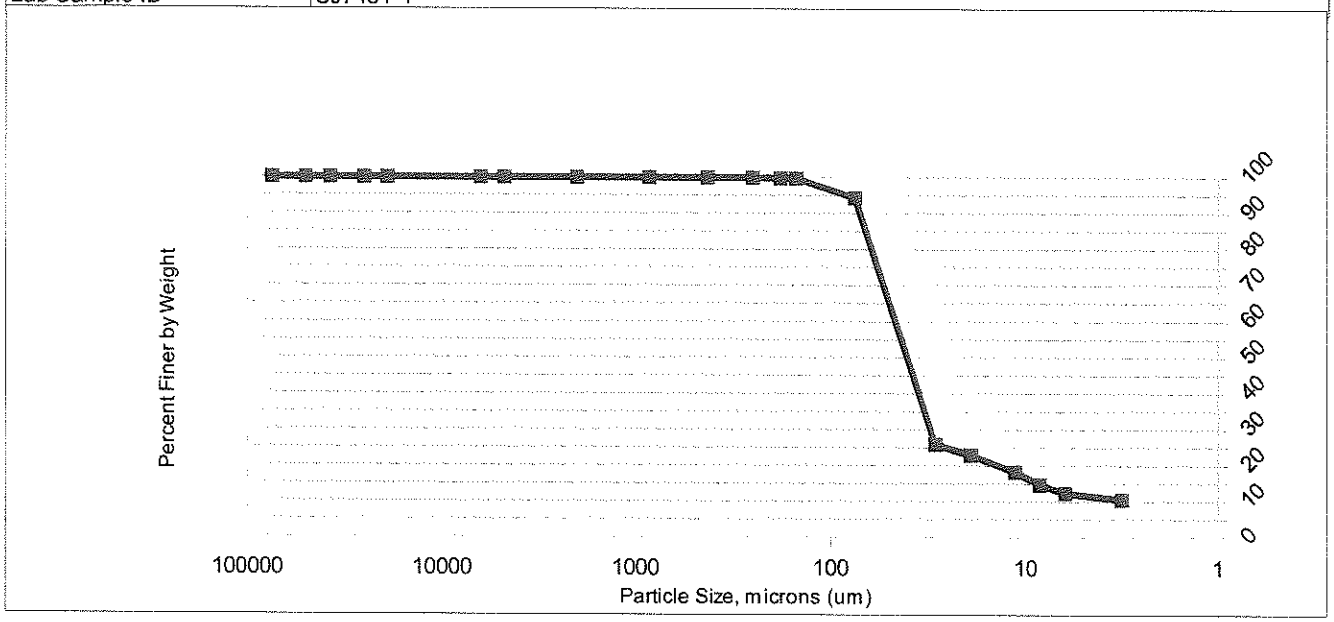
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0250	23	25.94	29.00	Silt
5	5	1.0225	23	22.99	19.09	Silt
15	16	1.0185	22.5	18.28	11.23	Silt
30	31	1.0155	22	14.74	8.39	Silt
60	60	1.0135	22	12.38	6.18	Silt
240	240	1.0120	21	10.61	3.15	Clay
1440	1440	1.0105	20	8.84	1.33	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.00
Sand Fine	5.63
Silt	82.08
Clay	12.29
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-015
Lab Sample ID	SJ7451-4



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	100.00
#60	250	100.00
#80	180	99.80
#100	150	99.80
#200	75	94.37
2	29.00	25.94
5	19.09	22.99
16	11.23	18.28
31	8.39	14.74
60	6.18	12.38
240	3.15	10.61
1440	1.33	8.84

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.00
Sand Fine	5.63
Silt	82.08
Clay	12.29

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-016
Lab Sample ID	SJ7451-5

Date Received	09/16/16
Start Date/Time	9/21/16:14:11
End Date/Time	9/26/16:14:45

Sample Weight	Sample (g)
Sample Weight (wet)	156.2
Sample Weight (oven dried)	50.59

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	67.615

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	50.59
%Passing #10	100.01

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	274	0.1	99.80	Sand	Medium
#60	250	248	248	0	99.80	Sand	Fine
#80	180	328.1	328.1	0	99.80	Sand	Fine
#100	150	238.6	238.6	0	99.80	Sand	Fine
#200	75	227.8	228.1	0.3	99.21	Sand	Fine

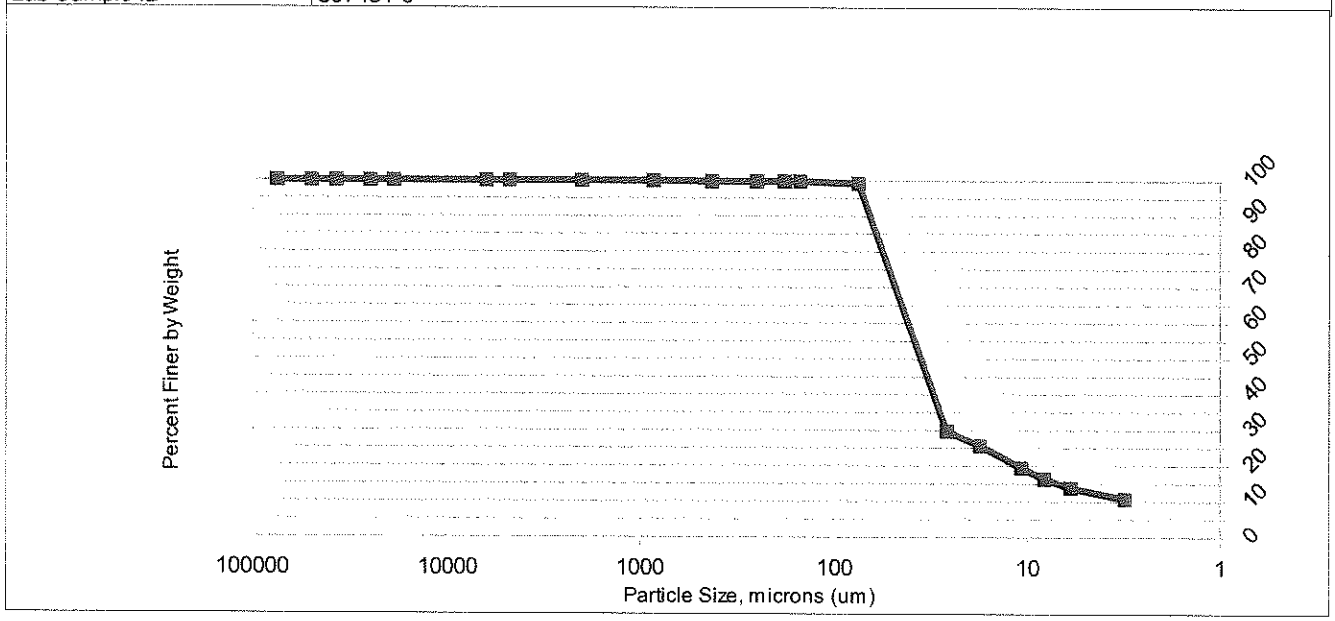
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0320	22.5	29.82	26.16	Silt
5	5	1.0280	22.5	25.71	17.67	Silt
15	16	1.0220	22.5	19.54	10.73	Silt
30	30	1.0190	22	16.45	8.17	Silt
60	60	1.0165	22	13.88	5.98	Silt
240	240	1.0135	21	10.80	3.13	Clay
1440	1440	1.0120	20	9.25	1.30	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	0.59
Silt	85.97
Clay	13.24
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-016
Lab Sample ID	SJ7451-5



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	99.80
#60	250	99.80
#80	180	99.80
#100	150	99.80
#200	75	99.21
2	26.16	29.82
5	17.67	25.71
16	10.73	19.54
30	8.17	16.45
60	5.98	13.88
240	3.13	10.80
1440	1.30	9.25

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	0.59
Silt	85.97
Clay	13.24

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-017
Lab Sample ID	SJ7451-6

Date Received	09/16/16
Start Date/Time	9/21/16:14:12
End Date/Time	9/26/16:14:48

Sample Weight	Sample (g)
Sample Weight (wet)	156.5
Sample Weight (oven dried)	50.61

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	67.662

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	50.61
%Passing #10	100.00

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	273.9	0	100.00	Sand	Medium
#60	250	248	248	0	100.00	Sand	Fine
#80	180	328.1	328.1	0	100.00	Sand	Fine
#100	150	238.6	238.6	0	100.00	Sand	Fine
#200	75	227.8	228.1	0.3	99.41	Sand	Fine

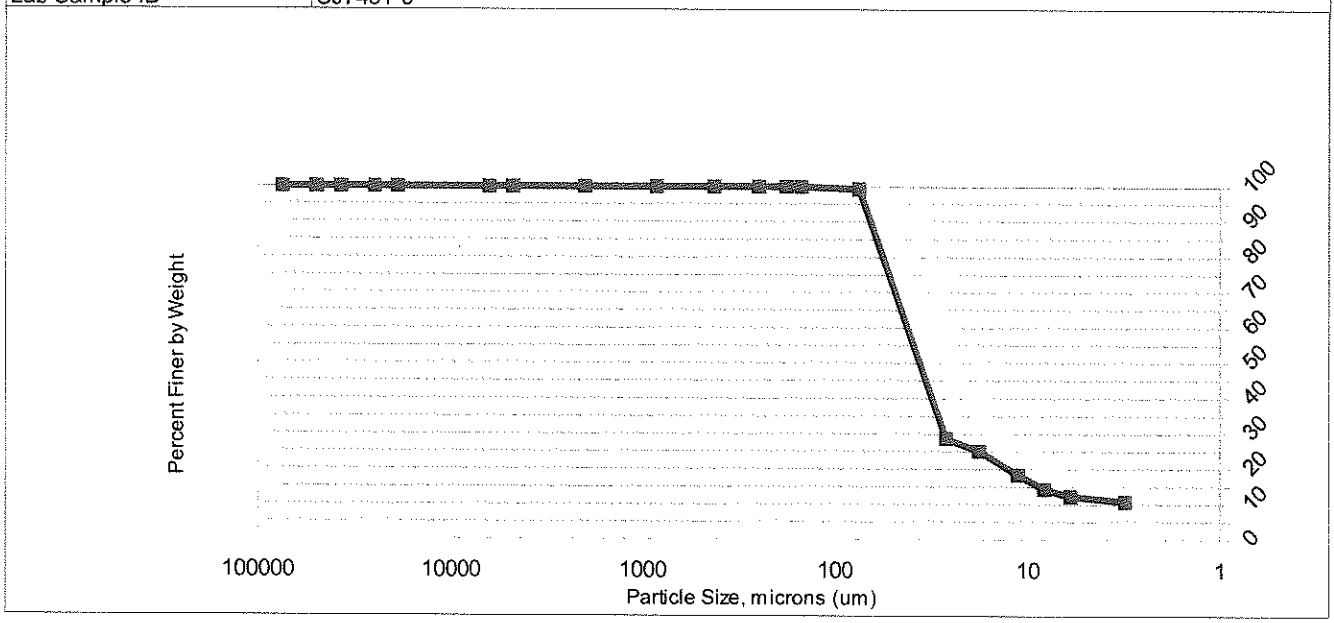
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0310	23	28.73	26.50	Silt
5	5	1.0275	23	25.14	17.86	Silt
15	15	1.0210	22.5	18.47	11.19	Silt
30	31	1.0170	22	14.37	8.22	Silt
60	60	1.0150	22	12.31	6.03	Silt
240	240	1.0135	21	10.78	3.13	Clay
1440	1440	1.0115	20	8.72	1.32	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.00
Sand Fine	0.59
Silt	87.17
Clay	12.24
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-017
Lab Sample ID	SJ7451-6



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	100.00
#60	250	100.00
#80	180	100.00
#100	150	100.00
#200	75	99.41
2	26.50	28.73
5	17.86	25.14
15	11.19	18.47
31	8.22	14.37
60	6.03	12.31
240	3.13	10.78
1440	1.32	8.72

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.00
Sand Fine	0.59
Silt	87.17
Clay	12.24

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-018
Lab Sample ID	SJ7451-7

Date Received	09/16/16
Start Date/Time	9/21/16:14:14
End Date/Time	9/26/16:14:52

Sample Weight	Sample (g)
Sample Weight (wet)	153
Sample Weight (oven dried)	50.78

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	66.808

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	50.78
%Passing #10	99.99

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	274	0.1	99.80	Sand	Medium
#60	250	248	248	0	99.80	Sand	Fine
#80	180	328.1	328.1	0	99.80	Sand	Fine
#100	150	238.6	238.6	0	99.80	Sand	Fine
#200	75	227.8	228.1	0.3	99.21	Sand	Fine

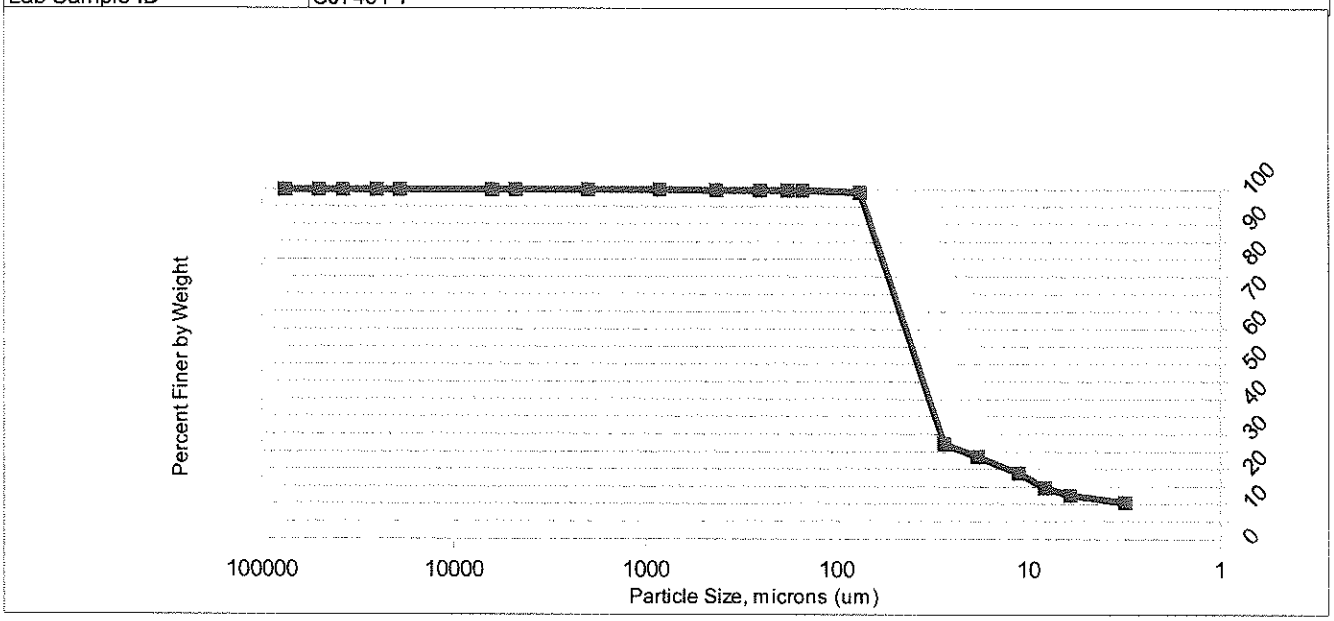
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0290	23	27.29	27.31	Silt
5	5	1.0255	23	23.62	18.34	Silt
15	15	1.0210	22.5	18.89	11.19	Silt
30	31	1.0170	22.5	14.70	8.17	Silt
60	60	1.0150	22	12.60	6.03	Silt
240	240	1.0130	21	10.50	3.13	Clay
1440	1440	1.0115	20	8.92	1.32	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	0.59
Silt	86.83
Clay	12.39
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-018
Lab Sample ID	SJ7451-7



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	99.80
#60	250	99.80
#80	180	99.80
#100	150	99.80
#200	75	99.21
2	27.31	27.29
5	18.34	23.62
15	11.19	18.89
31	8.17	14.70
60	6.03	12.60
240	3.13	10.50
1440	1.32	8.92

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	0.59
Silt	86.83
Clay	12.39

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-019
Lab Sample ID	SJ7451-8

Date Received	09/16/16
Start Date/Time	9/21/16:14:15
End Date/Time	9/26/16:14:54

Sample Weight	Sample (g)
Sample Weight (wet)	135.1
Sample Weight (oven dried)	48.93

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	63.779

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	48.93
%Passing #10	99.99

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303.2	0.2	99.59	Sand	Medium
#40	425	273.9	274.1	0.2	99.18	Sand	Medium
#60	250	248	248.3	0.3	98.57	Sand	Fine
#80	180	328.1	328.5	0.4	97.75	Sand	Fine
#100	150	238.6	238.9	0.3	97.14	Sand	Fine
#200	75	227.8	229.9	2.1	92.85	Sand	Fine

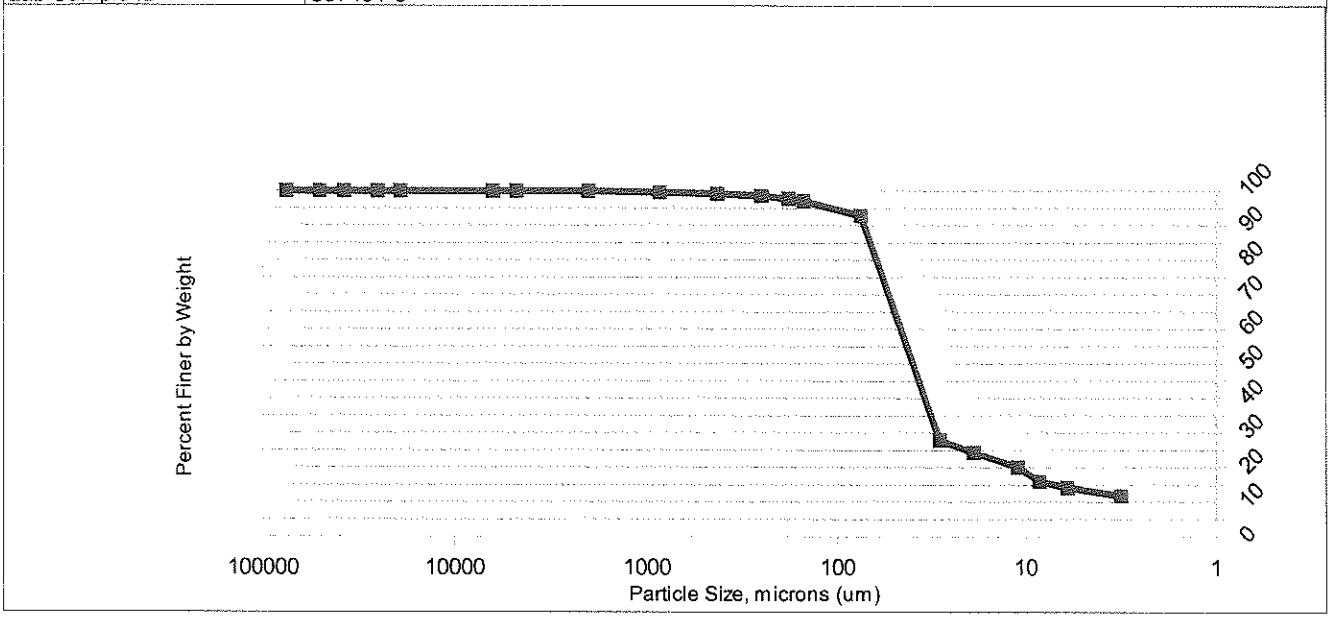
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0265	22.5	27.94	28.71	Silt
5	5	1.0235	22.5	24.37	18.92	Silt
15	16	1.0200	22.5	20.21	10.98	Silt
30	30	1.0165	22	16.05	8.46	Silt
60	60	1.0150	22	14.27	6.03	Silt
240	240	1.0130	20.5	11.89	3.14	Clay
1440	1440	1.0110	20	9.51	1.32	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.82
Sand Fine	6.33
Silt	79.21
Clay	13.64
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-019
Lab Sample ID	SJ7451-8



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	99.59
#40	425	99.18
#60	250	98.57
#80	180	97.75
#100	150	97.14
#200	75	92.85
2	28.71	27.94
5	18.92	24.37
16	10.98	20.21
30	8.46	16.05
60	6.03	14.27
240	3.14	11.89
1440	1.32	9.51

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.82
Sand Fine	6.33
Silt	79.21
Clay	13.64

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-020
Lab Sample ID	SJ7451-9

Date Received	09/16/16
Start Date/Time	9/21/16:14:16
End Date/Time	9/26/16:14:58

Sample Weight	Sample (g)
Sample Weight (wet)	114.5
Sample Weight (oven dried)	49.74

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	56.562

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.00300
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	1.1
Sample <=#10	48.64
%Passing #10	97.80

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	505.9	505.9	0	100.00	Gravel	
#4	4750	403.9	403.9	0	100.00	Gravel	
#10	2000	371.50	372.60	1.1	97.79	Sand	Coarse
#20	850	303	303.6	0.6	96.58	Sand	Medium
#40	425	273.9	274.8	0.9	94.77	Sand	Medium
#60	250	248	249.1	1.1	92.56	Sand	Fine
#80	180	328.1	329.4	1.3	89.95	Sand	Fine
#100	150	238.6	239.5	0.9	88.14	Sand	Fine
#200	75	227.8	232.5	4.7	78.69	Sand	Fine

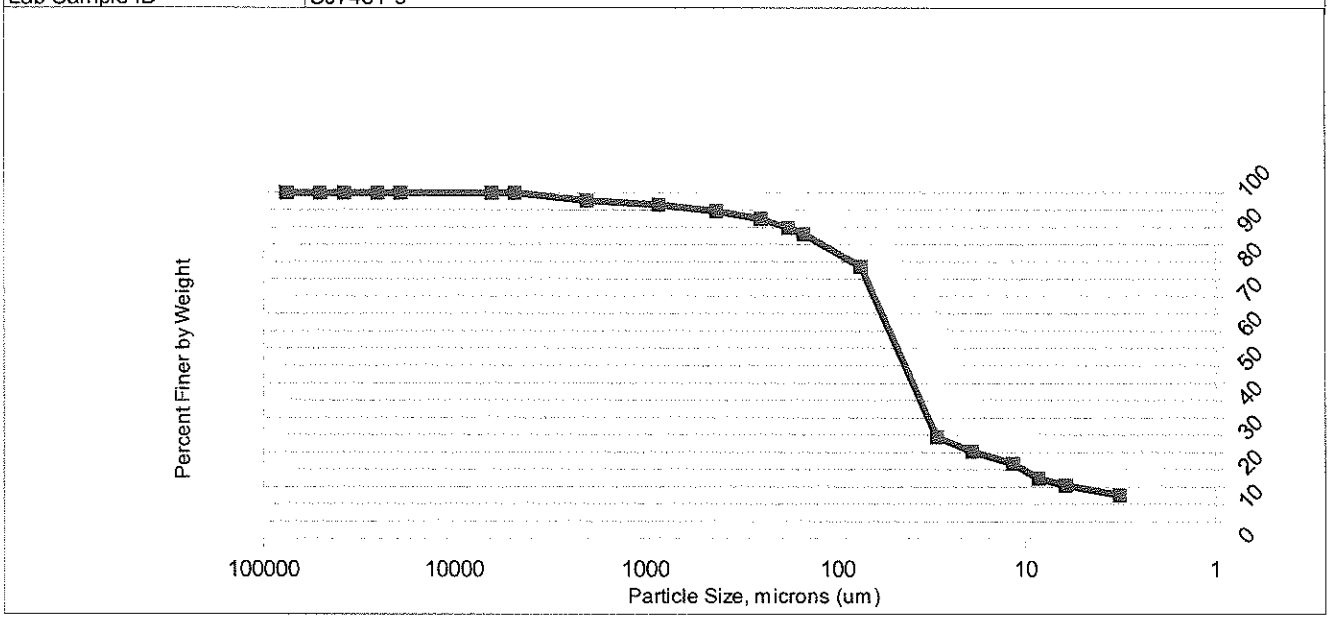
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0240	22.5	29.46	29.62	Silt
5	5	1.0210	23	25.25	19.27	Silt
15	15	1.0185	22.5	21.74	11.60	Silt
30	30	1.0155	22	17.53	8.53	Silt
60	60	1.0140	22	15.43	6.10	Silt
240	240	1.0120	20.5	12.62	3.17	Clay
1440	1440	1.0105	20	10.52	1.33	Clay

Gravel	0.00
Sand Coarse	2.21
Sand Medium	3.02
Sand Fine	16.08
Silt	64.02
Clay	14.67
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-020
Lab Sample ID	SJ7451-9



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	97.79
#20	850	96.58
#40	425	94.77
#60	250	92.56
#80	180	89.95
#100	150	88.14
#200	75	78.69
2	29.62	29.46
5	19.27	25.25
15	11.60	21.74
30	8.53	17.53
60	6.10	15.43
240	3.17	12.62
1440	1.33	10.52

Gravel	0.00
Sand Coarse	2.21
Sand Medium	3.02
Sand Fine	16.08
Silt	64.02
Clay	14.67

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-021
Lab Sample ID	SJ7451-10

Date Received	09/16/16
Start Date/Time	9/21/16:14:18
End Date/Time	9/26/16:15:04

Sample Weight	Sample (g)
Sample Weight (wet)	101.2
Sample Weight (oven dried)	49.39

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	51.2

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	1.5
Sample <=#10	47.89
%Passing #10	96.97

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	505.9	505.9	0	100.00	Gravel	
#4	4750	403.9	404	0.1	99.80	Gravel	
#10	2000	371.50	372.70	1.2	97.37	Sand	Coarse
#20	850	303	303.7	0.7	95.95	Sand	Medium
#40	425	273.9	274.7	0.8	94.33	Sand	Medium
#60	250	248	249.2	1.2	91.90	Sand	Fine
#80	180	328.1	329.5	1.4	89.07	Sand	Fine
#100	150	238.6	239.6	1	87.04	Sand	Fine
#200	75	227.8	233.3	5.5	75.90	Sand	Fine

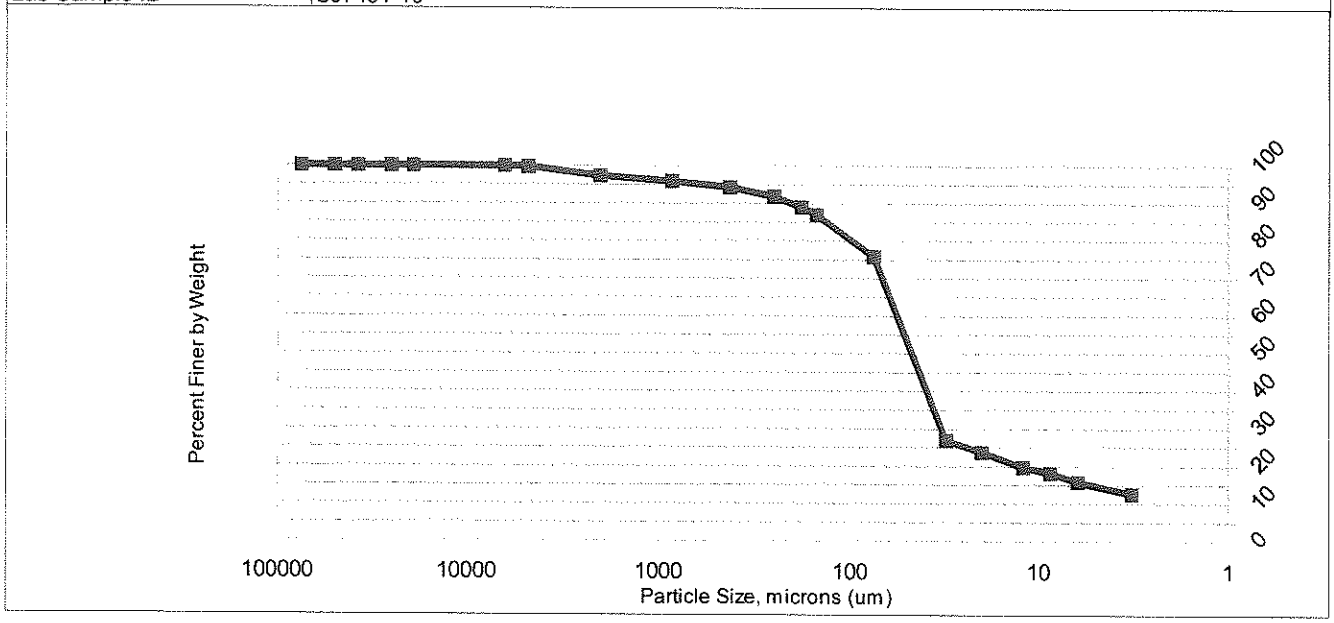
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0200	23	26.98	30.89	Silt
5	5	1.0180	23	23.81	19.97	Silt
15	15	1.0155	22.5	19.84	11.99	Silt
30	30	1.0145	22.5	18.25	8.58	Silt
60	60	1.0130	22	15.87	6.18	Silt
240	240	1.0110	20.5	12.70	3.21	Clay
1440	1440	1.0100	20	11.11	1.33	Clay

Gravel	0.20
Sand Coarse	2.43
Sand Medium	3.04
Sand Fine	18.43
Silt	61.11
Clay	14.79
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-021
Lab Sample ID	SJ7451-10



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	99.80
#10	2000	97.37
#20	850	95.95
#40	425	94.33
#60	250	91.90
#80	180	89.07
#100	150	87.04
#200	75	75.90
2	30.89	26.98
5	19.97	23.81
15	11.99	19.84
30	8.58	18.25
60	6.18	15.87
240	3.21	12.70
1440	1.33	11.11

Gravel	0.20
Sand Coarse	2.43
Sand Medium	3.04
Sand Fine	18.43
Silt	61.11
Clay	14.79

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-022
Lab Sample ID	SJ7451-11

Date Received	09/16/16
Start Date/Time	9/23/16:15:04
End Date/Time	9/28/16:

Sample Weight	Sample (g)
Sample Weight (wet)	119
Sample Weight (oven dried)	49.10

Date/Time in oven	9/27/16:14:30
Date/Time out of oven	9/28/16:7:30

% Moisture	58.736

Hydrometer Data

Serial Number	379474
Cal Date:	9/26/16:10:04
Low Temp C	19.70
Low Temp Reading	1.0030
High Temp	21.80
High Temp Reading	1.0025
Hyd Cal Slope	-0.000238
Hyd Cal Intercept	0.007690
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	49.1
%Passing #10	99.99

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303.2	0.2	99.59	Sand	Medium
#40	425	273.9	274.3	0.4	98.78	Sand	Medium
#60	250	248	248.3	0.3	98.17	Sand	Fine
#80	180	328.1	328.5	0.4	97.35	Sand	Fine
#100	150	238.6	238.8	0.2	96.95	Sand	Fine
#200	75	227.8	229.8	2	92.87	Sand	Fine

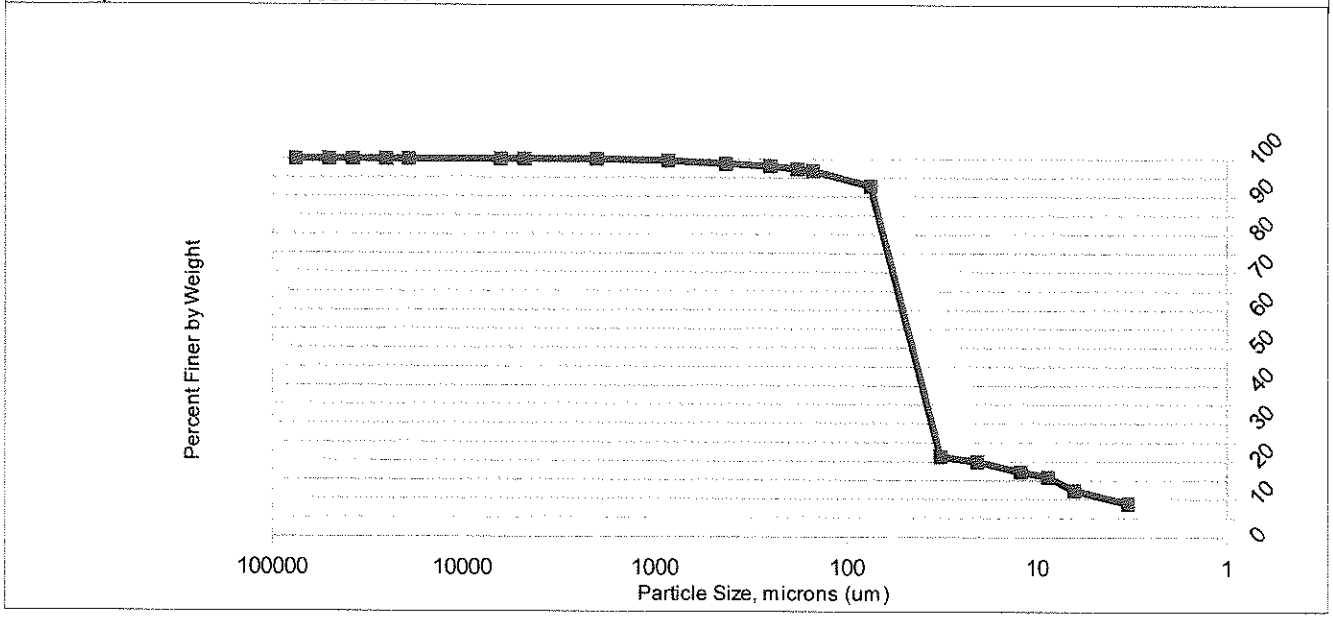
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0185	21	21.34	32.32	Silt
5	5	1.0175	21	19.99	20.71	Silt
15	15	1.0155	21	17.29	12.21	Silt
30	30	1.0145	21	15.94	8.74	Silt
60	60	1.0120	20.5	12.40	6.34	Silt
240	240	1.0095	20	8.87	3.28	Clay
1440	1440	1.0070	20	5.49	1.37	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	1.22
Sand Fine	5.91
Silt	81.76
Clay	11.11
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-022
Lab Sample ID	SJ7451-11



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	99.59
#40	425	98.78
#60	250	98.17
#80	180	97.35
#100	150	96.95
#200	75	92.87
2	32.32	21.34
5	20.71	19.99
15	12.21	17.29
30	8.74	15.94
60	6.34	12.40
240	3.28	8.87
1440	1.37	5.49

Gravel	0.00
Sand Coarse	0.00
Sand Medium	1.22
Sand Fine	5.91
Silt	81.76
Clay	11.11

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-023
Lab Sample ID	SJ7451-12

Date Received	09/16/16
Start Date/Time	9/23/16:15:06
End Date/Time	9/28/16:

Sample Weight	Sample (g)
Sample Weight (wet)	132
Sample Weight (oven dried)	50.13

Date/Time in oven	9/27/16:14:30
Date/Time out of oven	9/28/16:7:30

% Moisture	62.021

Hydrometer Data

Serial Number	379474
Cal Date:	9/26/16:10:04
Low Temp C	19.70
Low Temp Reading	1.0030
High Temp	21.80
High Temp Reading	1.0025
Hyd Cal Slope	-0.000238
Hyd Cal Intercept	0.007690
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	50.13
%Passing #10	100.00

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	274	0.1	99.80	Sand	Medium
#60	250	248	248.1	0.1	99.60	Sand	Fine
#80	180	328.1	328.2	0.1	99.40	Sand	Fine
#100	150	238.6	238.7	0.1	99.20	Sand	Fine
#200	75	227.8	231	3.2	92.82	Sand	Fine

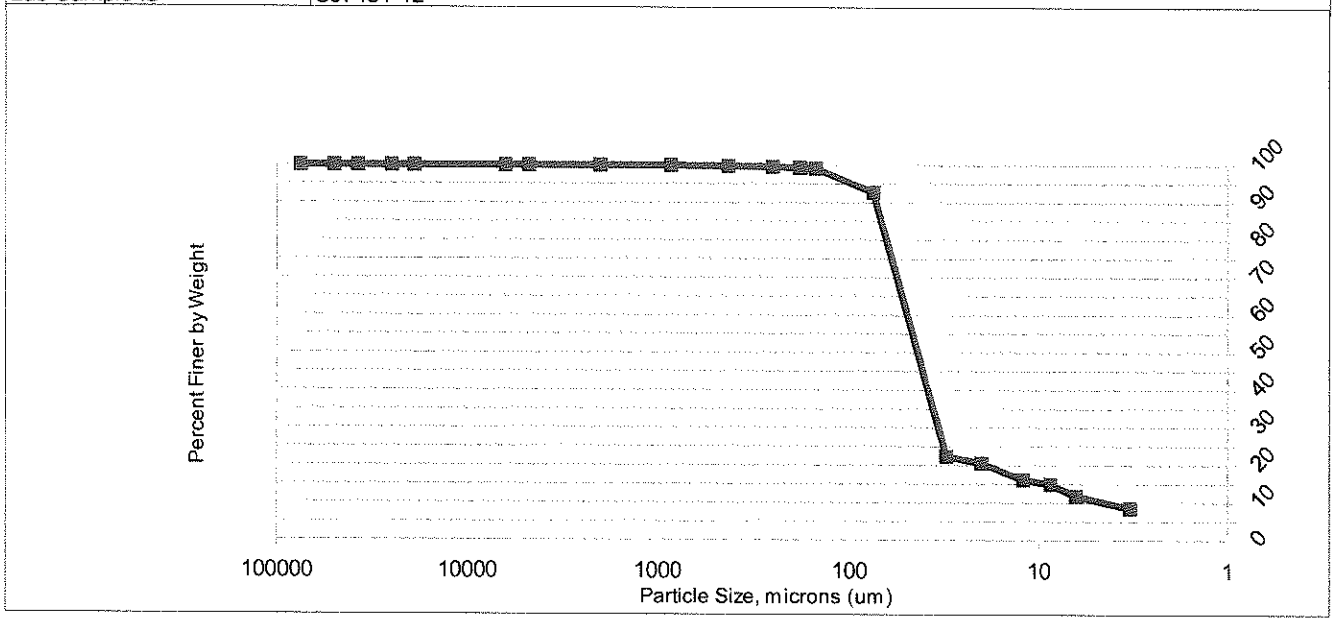
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0210	21.5	22.42	30.99	Silt
5	5	1.0195	21.5	20.60	20.14	Silt
15	15	1.0160	21	16.19	12.11	Silt
30	30	1.0150	21	14.98	8.63	Silt
60	60	1.0125	20.5	11.79	6.34	Silt
240	240	1.0100	20	8.60	3.26	Clay
1440	1440	1.0070	20	4.95	1.37	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	6.98
Silt	82.40
Clay	10.42
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-023
Lab Sample ID	SJ7451-12



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	99.80
#60	250	99.60
#80	180	99.40
#100	150	99.20
#200	75	92.82
2	30.99	22.42
5	20.14	20.60
15	12.11	16.19
30	8.63	14.98
60	6.34	11.79
240	3.26	8.60
1440	1.37	4.95

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	6.98
Silt	82.40
Clay	10.42

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-024
Lab Sample ID	SJ7451-13

Date Received	09/16/16
Start Date/Time	9/23/16:15:08
End Date/Time	9/28/16:

Sample Weight	Sample (g)
Sample Weight (wet)	119
Sample Weight (oven dried)	49.56

Date/Time in oven	9/27/16:14:30
Date/Time out of oven	9/28/16:7:30

% Moisture	58.355

Hydrometer Data

Serial Number	379474
Cal Date:	9/26/16:10:04
Low Temp C	19.70
Low Temp Reading	1.0030
High Temp	21.80
High Temp Reading	1.0025
Hyd Cal Slope	-0.000238
Hyd Cal Intercept	0.007690
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	49.56
%Passing #10	100.00

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	274	0.1	99.80	Sand	Medium
#60	250	248	248.1	0.1	99.60	Sand	Fine
#80	180	328.1	328.3	0.2	99.19	Sand	Fine
#100	150	238.6	238.7	0.1	98.99	Sand	Fine
#200	75	227.8	231	3.2	92.53	Sand	Fine

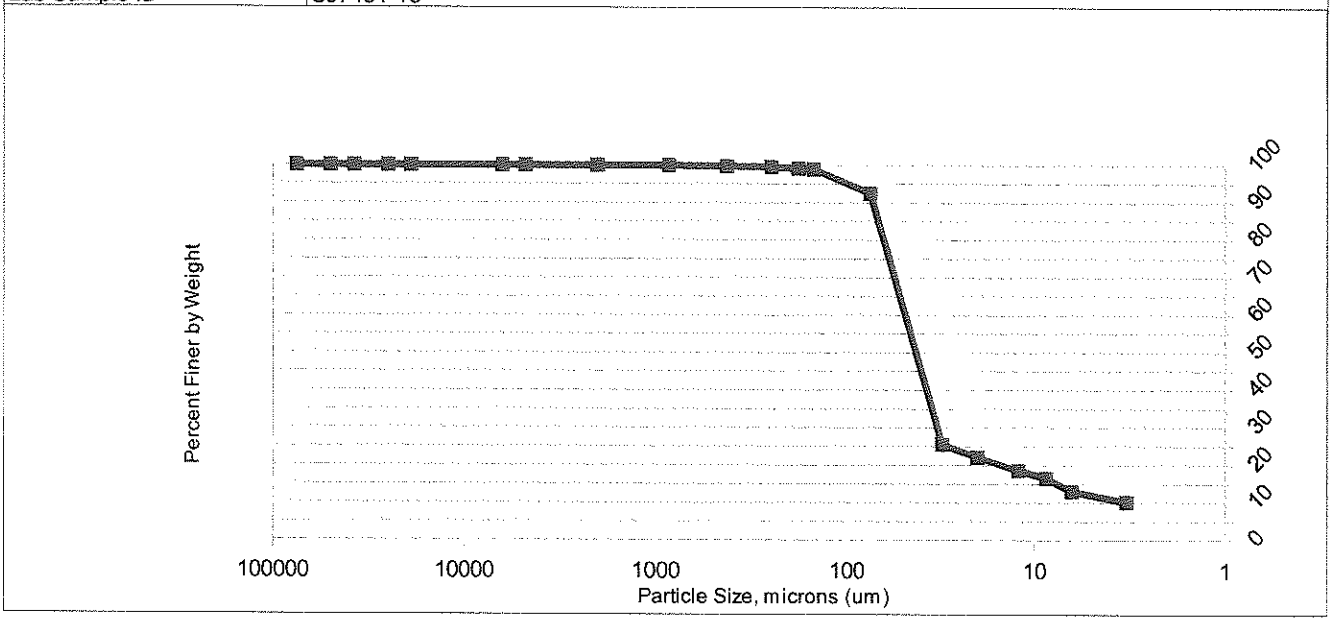
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0215	21.5	25.55	30.99	Silt
5	5	1.0190	21.5	22.17	20.14	Silt
15	15	1.0165	21	18.64	12.11	Silt
30	30	1.0150	21	16.61	8.63	Silt
60	60	1.0125	20.5	13.08	6.34	Silt
240	240	1.0105	20	10.22	3.26	Clay
1440	1440	1.0080	20	6.84	1.36	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	7.26
Silt	80.46
Clay	12.07
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-024
Lab Sample ID	SJ7451-13



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	99.80
#60	250	99.60
#80	180	99.19
#100	150	98.99
#200	75	92.53
2	30.99	25.55
5	20.14	22.17
15	12.11	18.64
30	8.63	16.61
60	6.34	13.08
240	3.26	10.22
1440	1.36	6.84

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	7.26
Silt	80.46
Clay	12.07

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-1
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-013	SL	15-SEP-16 11:39:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	19000 ug/gdrywt	1600	330	SW846 9060A Mod.	WG191518	26-SEP-16 12:15:55	N/A	N/A	ZF	
Toc In Soil(2)	18000 ug/gdrywt	1300	280	SW846 9060A Mod.	WG191518	26-SEP-16 12:26:33	N/A	N/A	ZF	
Toc In Soil(3)	19000 ug/gdrywt	1400	300	SW846 9060A Mod.	WG191518	26-SEP-16 12:39:52	N/A	N/A	ZF	
Toc In Soil(4)	18000 ug/gdrywt	1400	310	SW846 9060A Mod.	WG191518	26-SEP-16 12:54:59	N/A	N/A	ZF	
Toc In Soil(Avg)	19000 ug/gdrywt	1400	300	SW846 9060A Mod.	WG191518	26-SEP-16 12:50:00	N/A	N/A	ZF	
Total Solids	38. %	1		SM2540G	WG191091	22-SEP-16 14:53:37	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services A000030

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-2
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-014	SL	15-SEP-16 11:52:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	20000 ug/gdrywt	1400	300	SW846 9060A Mod.	WG191518	26-SEP-16 13:04:25	N/A	N/A	ZF	
Total Solids	39. %	1		SM2540G	WG191091	22-SEP-16 14:53:54	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services A000031

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-3
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-014 DUP	SL	15-SEP-16 11:52:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	19000 ug/gdrywt	1500	320	SW846 9060A Mod.	WG191518	26-SEP-16 14:22:24	N/A	N/A	ZF	
Total Solids	39. %	1		SM2540G	WG191091	22-SEP-16 14:54:14	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services A000032

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-4
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-015	SL	15-SEP-16 12:05:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	20000 ug/gdrywt	1800	370	SW846 9060A Mod.	WG191518	26-SEP-16 14:52:33	N/A	N/A	ZF	
Total Solids	36. %	1		SM2540G	WG191091	22-SEP-16 14:54:25	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services A000033

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-5
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-016	SL	15-SEP-16 12:50:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	24000 ug/gdrywt	1800	380	SW846 9060A Mod.	WG191518	26-SEP-16 15:02:54	N/A	N/A	ZF	
Total Solids	32. %	1		SM2540G	WG191091	22-SEP-16 14:54:36	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services A000034

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-6
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-017	SL	15-SEP-16 13:01:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	23000 ug/gdrywt	1600	330	SW846 9060A Mod.	WG191518	26-SEP-16 15:12:41	N/A	N/A	ZF	
Total Solids	32. %	1		SM2540G	WG191091	22-SEP-16 14:54:50	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services A000035

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-7
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-018	SL	15-SEP-16 13:10:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	21000 ug/gdrywt	1500	310	SW846 9060A Mod.	WG191518	26-SEP-16 15:25:43	N/A	N/A	ZF	
Total Solids	33. %	1		SM2540G	WG191091	22-SEP-16 14:55:00	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services A000036

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-8
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-019	SL	15-SEP-16 13:23:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	21000 ug/gdrywt	1400	290	SW846 9060A Mod.	WG191518	26-SEP-16 15:36:17	N/A	N/A	ZF	
Total Solids	36. %	1		SM2540G	WG191091	22-SEP-16 14:55:09	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services A000037

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-9
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-020	SL	15-SEP-16 13:32:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	21000 ug/gdrywt	1300	280	SW846 9060A Mod.	WG191518	26-SEP-16 16:00:42	N/A	N/A	ZF	
Total Solids	43. %	1		SM2540G	WG191091	22-SEP-16 14:55:18	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services A000038

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-10
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-021	SL	15-SEP-16 13:41:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	21000 ug/gdrywt	1200	260	SW846 9060A Mod.	WG191518	26-SEP-16 16:15:28	N/A	N/A	ZF	
Total Solids	49. %	1		SM2540G	WG191091	22-SEP-16 14:55:25	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services A000039

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-11
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-022	SL	15-SEP-16 13:50:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	19000 ug/gdrywt	1300	270	SW846 9060A Mod.	WG191518	26-SEP-16 16:25:39	N/A	N/A	ZF	
Total Solids	41. %	1		SM2540G	WG191091	22-SEP-16 14:55:34	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services A000040

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-12
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-023	SL	15-SEP-16 14:00:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	20000 ug/gdrywt	1500	320	SW846 9060A Mod.	WG191518	26-SEP-16 16:51:33	N/A	N/A	ZF	
Total Solids	38. %	1		SM2540G	WG191091	22-SEP-16 14:55:47	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services A000041

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-13
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-024	SL	15-SEP-16 14:15:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	19000 ug/gdrywt	1500	320	SW846 9060A Mod.	WG191518	26-SEP-16 17:04:40	N/A	N/A	ZF	
Total Solids	42. %	1		SM2540G	WG191091	22-SEP-16 14:55:55	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services A000042

GRAIN SIZE

Sample Data Section

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-013
Lab Sample ID	SJ7451-1

Date Received	09/16/16
Start Date/Time	9/21/16:14:04
End Date/Time	9/26/16:14:19

Sample Weight	Sample (g)
Sample Weight (wet)	128
Sample Weight (oven dried)	48.74

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	61.923

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	48.74
%Passing #10	100.00

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	273.9	0	100.00	Sand	Medium
#60	250	248	248	0	100.00	Sand	Fine
#80	180	328.1	328.2	0.1	99.79	Sand	Fine
#100	150	238.6	238.6	0	99.79	Sand	Fine
#200	75	227.8	232.1	4.3	90.97	Sand	Fine

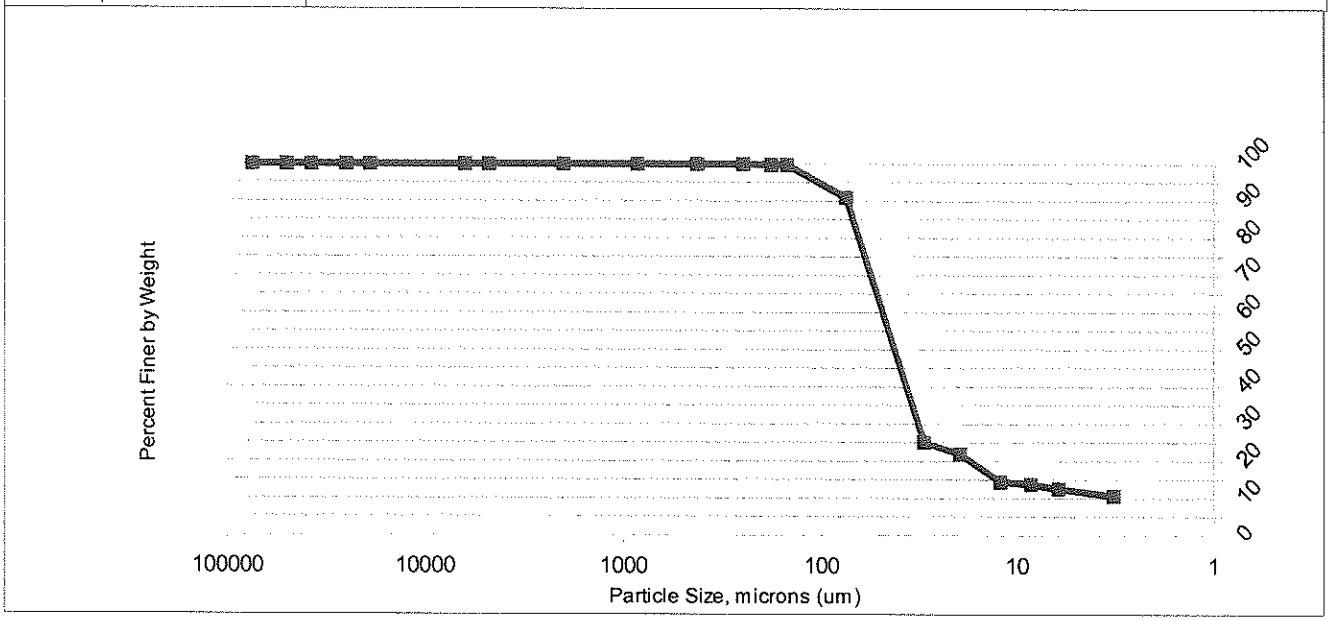
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0230	22.5	25.09	29.91	Silt
5	5	1.0205	22.5	21.96	19.65	Silt
15	15	1.0145	22.5	14.43	12.14	Silt
30	31	1.0140	22	13.80	8.49	Silt
60	61	1.0130	22	12.55	6.13	Silt
240	240	1.0115	20.5	10.67	3.21	Clay
1440	1440	1.0100	20	8.78	1.33	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.00
Sand Fine	9.03
Silt	79.45
Clay	11.52
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-013
Lab Sample ID	SJ7451-1



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	100.00
#60	250	100.00
#80	180	99.79
#100	150	99.79
#200	75	90.97
2	29.91	25.09
5	19.65	21.96
15	12.14	14.43
31	8.49	13.80
61	6.13	12.55
240	3.21	10.67
1440	1.33	8.78

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.00
Sand Fine	9.03
Silt	79.45
Clay	11.52

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-014
Lab Sample ID	SJ7451-2

Date Received	09/16/16
Start Date/Time	9/21/16:14:06
End Date/Time	9/26/16:14:27

Sample Weight	Sample (g)
Sample Weight (wet)	125.2
Sample Weight (oven dried)	49.01

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	60.851

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	49.01
%Passing #10	99.99

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	273.9	0	100.00	Sand	Medium
#60	250	248	248	0	100.00	Sand	Fine
#80	180	328.1	328.3	0.2	99.59	Sand	Fine
#100	150	238.6	238.6	0	99.59	Sand	Fine
#200	75	227.8	231.4	3.6	92.25	Sand	Fine

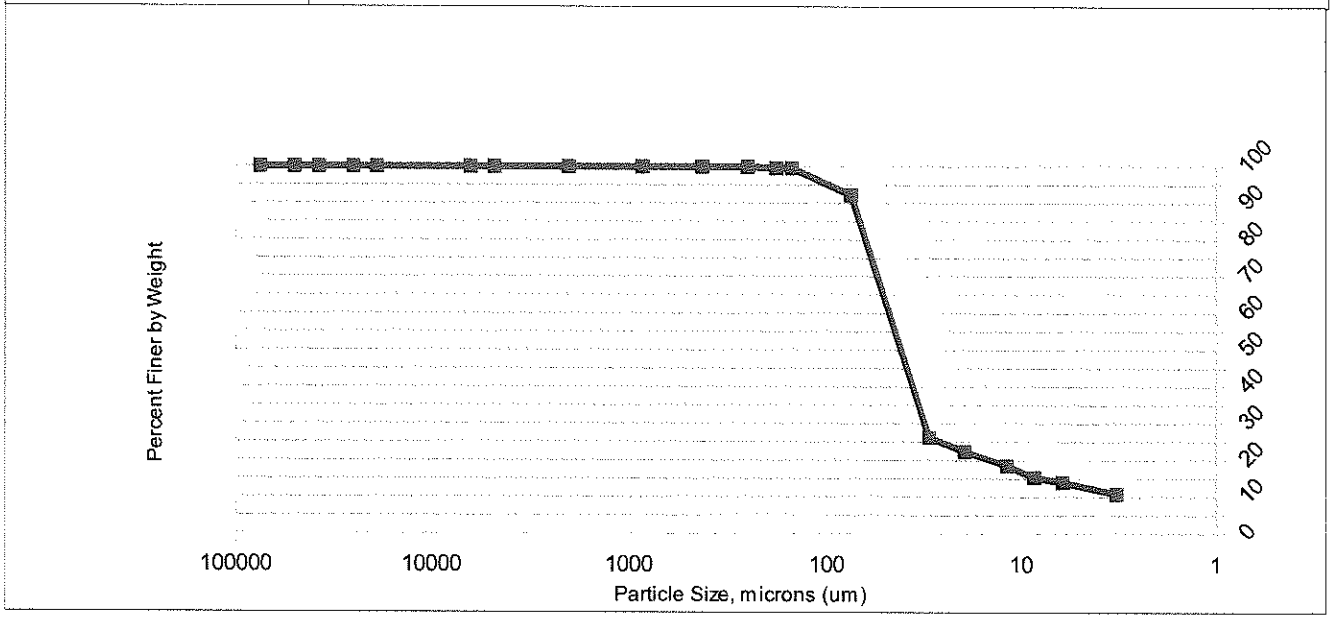
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0235	22.5	26.30	29.91	Silt
5	5	1.0205	22.5	22.45	19.65	Silt
15	15	1.0175	22	18.60	11.81	Silt
30	30	1.0150	22	15.39	8.53	Silt
60	61	1.0140	21.5	14.11	6.09	Silt
240	240	1.0115	20.5	10.90	3.21	Clay
1440	1440	1.0095	20	8.34	1.34	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.00
Sand Fine	7.75
Silt	79.63
Clay	12.62
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-014
Lab Sample ID	SJ7451-2



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	100.00
#60	250	100.00
#80	180	99.59
#100	150	99.59
#200	75	92.25
2	29.91	26.30
5	19.65	22.45
15	11.81	18.60
30	8.53	15.39
61	6.09	14.11
240	3.21	10.90
1440	1.34	8.34

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.00
Sand Fine	7.75
Silt	79.63
Clay	12.62

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-014DUP
Lab Sample ID	SJ7451-3

Date Received	09/16/16
Start Date/Time	9/21/16:14:09
End Date/Time	9/26/16:14:33

Sample Weight	Sample (g)
Sample Weight (wet)	128.2
Sample Weight (oven dried)	50.34

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	60.731

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	50.34
%Passing #10	99.99

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	274	0.1	99.80	Sand	Medium
#60	250	248	248	0	99.80	Sand	Fine
#80	180	328.1	328.2	0.1	99.60	Sand	Fine
#100	150	238.6	238.6	0	99.60	Sand	Fine
#200	75	227.8	231.9	4.1	91.46	Sand	Fine

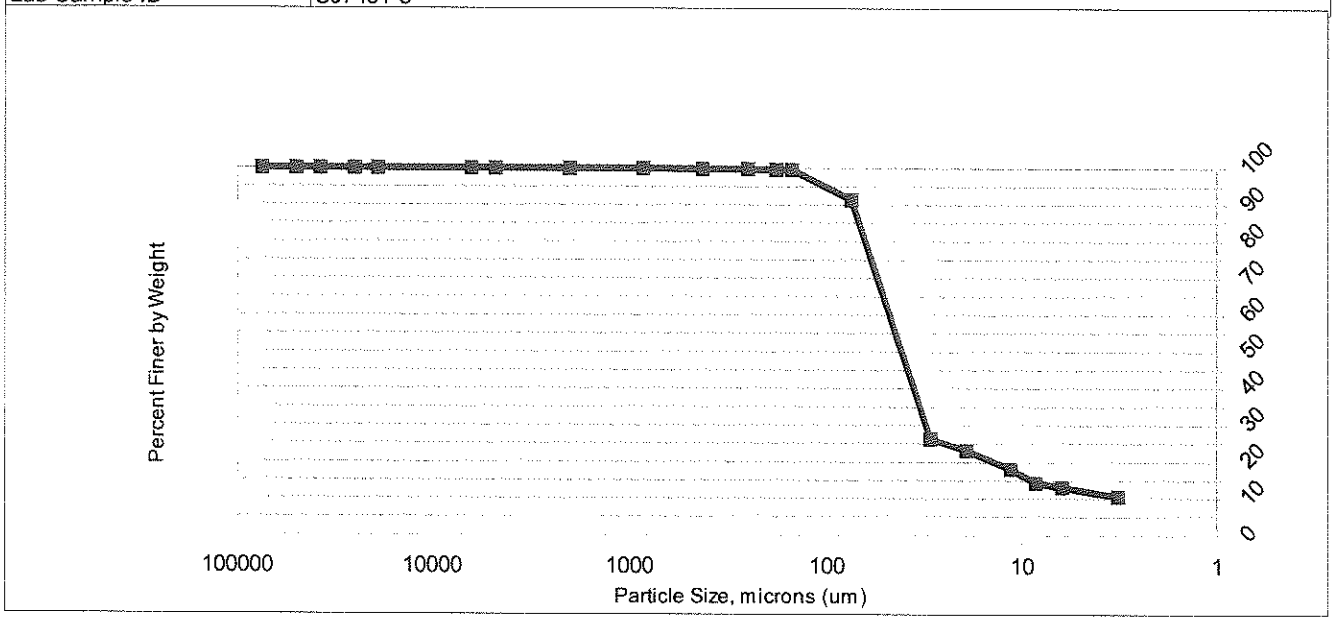
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0240	22.5	26.31	29.62	Silt
5	5	1.0215	22.5	23.18	19.38	Silt
15	16	1.0175	22	18.17	11.44	Silt
30	31	1.0145	22	14.41	8.49	Silt
60	60	1.0135	21.5	13.15	6.21	Silt
240	240	1.0115	20.5	10.65	3.21	Clay
1440	1440	1.0095	20	8.14	1.34	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	8.34
Silt	79.30
Clay	12.16
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-014DUP
Lab Sample ID	SJ7451-3



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	99.80
#60	250	99.80
#80	180	99.60
#100	150	99.60
#200	75	91.46
2	29.62	26.31
5	19.38	23.18
16	11.44	18.17
31	8.49	14.41
60	6.21	13.15
240	3.21	10.65
1440	1.34	8.14

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	8.34
Silt	79.30
Clay	12.16

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-015
Lab Sample ID	SJ7451-4

Date Received	09/16/16
Start Date/Time	9/21/16:14:10
End Date/Time	9/26/16:14:40

Sample Weight	Sample (g)
Sample Weight (wet)	136.2
Sample Weight (oven dried)	49.74

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	63.482

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	49.74
%Passing #10	100.00

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	273.9	0	100.00	Sand	Medium
#60	250	248	248	0	100.00	Sand	Fine
#80	180	328.1	328.2	0.1	99.80	Sand	Fine
#100	150	238.6	238.6	0	99.80	Sand	Fine
#200	75	227.8	230.5	2.7	94.37	Sand	Fine

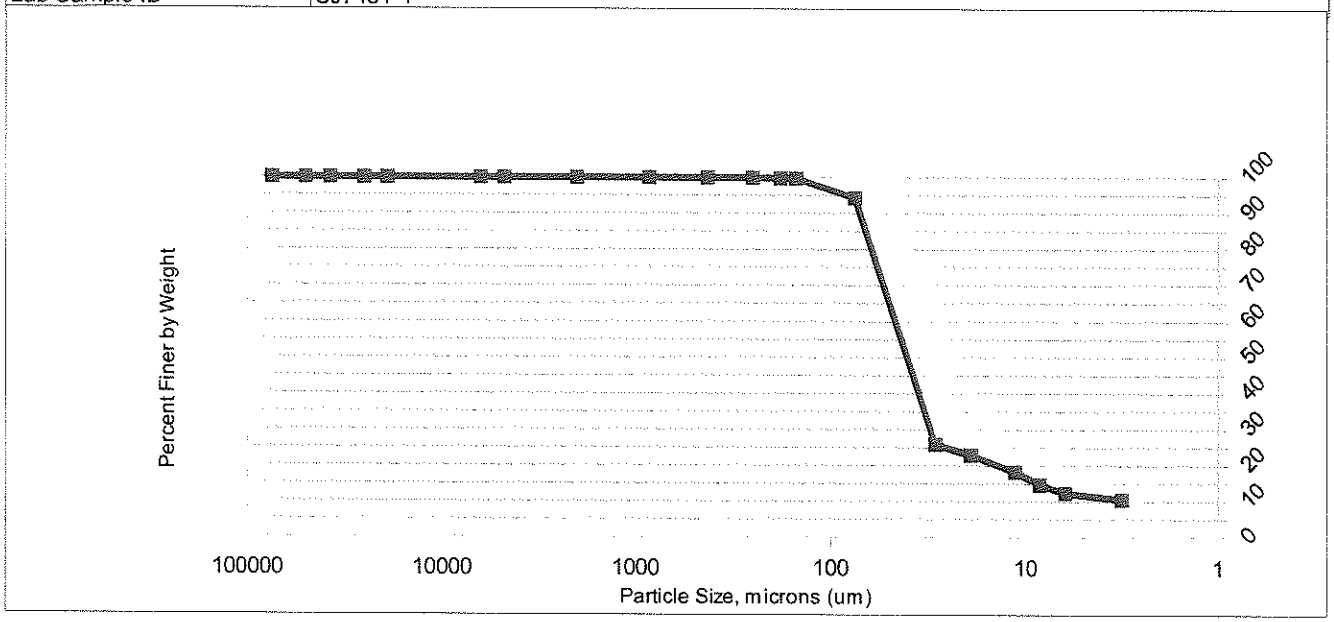
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0250	23	25.94	29.00	Silt
5	5	1.0225	23	22.99	19.09	Silt
15	16	1.0185	22.5	18.28	11.23	Silt
30	31	1.0155	22	14.74	8.39	Silt
60	60	1.0135	22	12.38	6.18	Silt
240	240	1.0120	21	10.61	3.15	Clay
1440	1440	1.0105	20	8.84	1.33	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.00
Sand Fine	5.63
Silt	82.08
Clay	12.29
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-015
Lab Sample ID	SJ7451-4



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	100.00
#60	250	100.00
#80	180	99.80
#100	150	99.80
#200	75	94.37
2	29.00	25.94
5	19.09	22.99
16	11.23	18.28
31	8.39	14.74
60	6.18	12.38
240	3.15	10.61
1440	1.33	8.84

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.00
Sand Fine	5.63
Silt	82.08
Clay	12.29

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-016
Lab Sample ID	SJ7451-5

Date Received	09/16/16
Start Date/Time	9/21/16:14:11
End Date/Time	9/26/16:14:45

Sample Weight	Sample (g)
Sample Weight (wet)	156.2
Sample Weight (oven dried)	50.59

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	67.615

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	50.59
%Passing #10	100.01

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	274	0.1	99.80	Sand	Medium
#60	250	248	248	0	99.80	Sand	Fine
#80	180	328.1	328.1	0	99.80	Sand	Fine
#100	150	238.6	238.6	0	99.80	Sand	Fine
#200	75	227.8	228.1	0.3	99.21	Sand	Fine

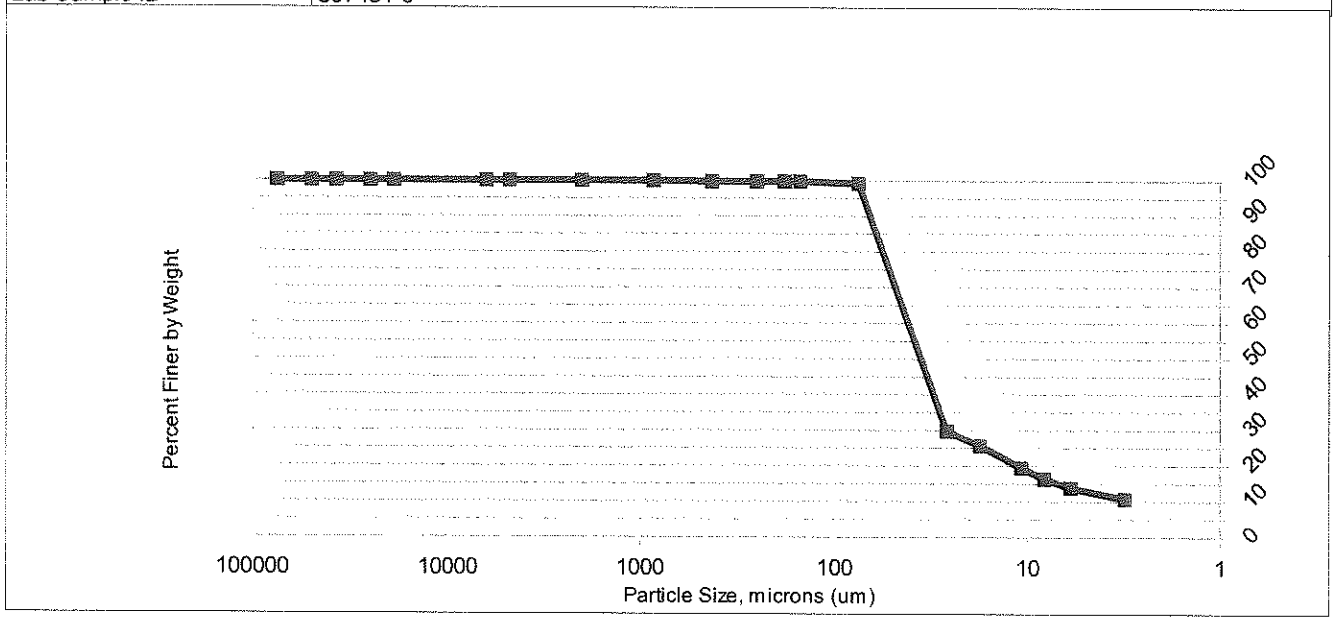
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0320	22.5	29.82	26.16	Silt
5	5	1.0280	22.5	25.71	17.67	Silt
15	16	1.0220	22.5	19.54	10.73	Silt
30	30	1.0190	22	16.45	8.17	Silt
60	60	1.0165	22	13.88	5.98	Silt
240	240	1.0135	21	10.80	3.13	Clay
1440	1440	1.0120	20	9.25	1.30	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	0.59
Silt	85.97
Clay	13.24
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-016
Lab Sample ID	SJ7451-5



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	99.80
#60	250	99.80
#80	180	99.80
#100	150	99.80
#200	75	99.21
2	26.16	29.82
5	17.67	25.71
16	10.73	19.54
30	8.17	16.45
60	5.98	13.88
240	3.13	10.80
1440	1.30	9.25

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	0.59
Silt	85.97
Clay	13.24

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-017
Lab Sample ID	SJ7451-6

Date Received	09/16/16
Start Date/Time	9/21/16:14:12
End Date/Time	9/26/16:14:48

Sample Weight	Sample (g)
Sample Weight (wet)	156.5
Sample Weight (oven dried)	50.61

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	67.662

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	50.61
%Passing #10	100.00

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	273.9	0	100.00	Sand	Medium
#60	250	248	248	0	100.00	Sand	Fine
#80	180	328.1	328.1	0	100.00	Sand	Fine
#100	150	238.6	238.6	0	100.00	Sand	Fine
#200	75	227.8	228.1	0.3	99.41	Sand	Fine

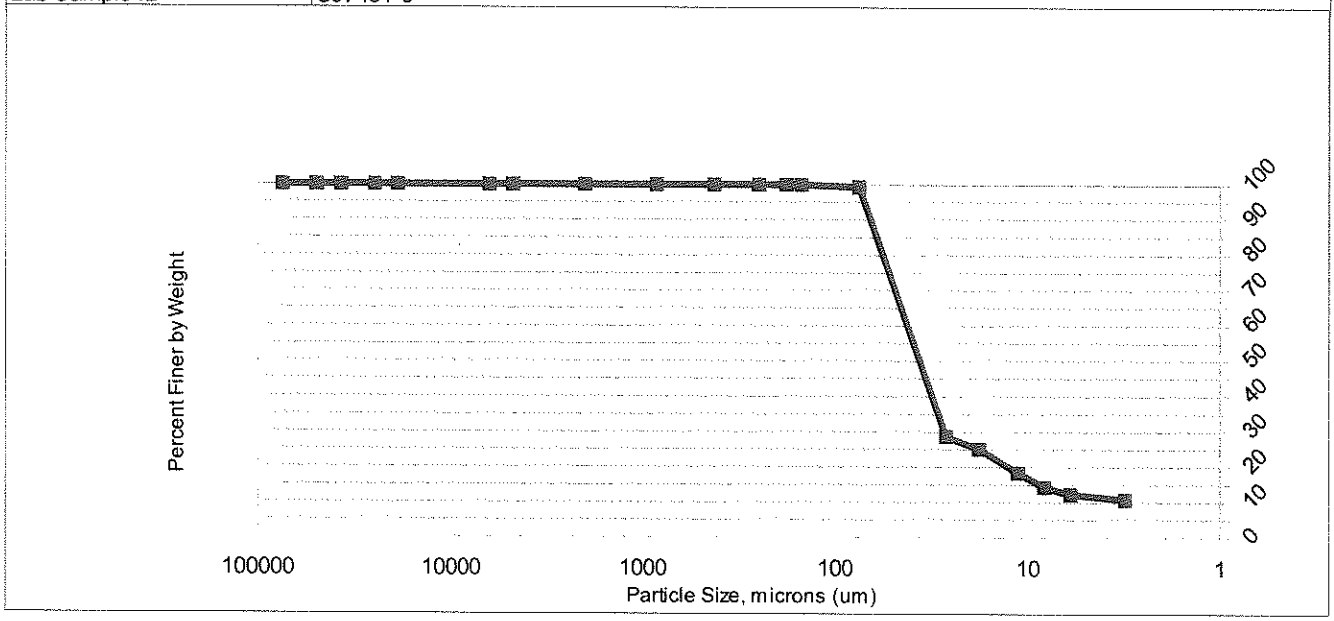
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0310	23	28.73	26.50	Silt
5	5	1.0275	23	25.14	17.86	Silt
15	15	1.0210	22.5	18.47	11.19	Silt
30	31	1.0170	22	14.37	8.22	Silt
60	60	1.0150	22	12.31	6.03	Silt
240	240	1.0135	21	10.78	3.13	Clay
1440	1440	1.0115	20	8.72	1.32	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.00
Sand Fine	0.59
Silt	87.17
Clay	12.24
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-017
Lab Sample ID	SJ7451-6



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	100.00
#60	250	100.00
#80	180	100.00
#100	150	100.00
#200	75	99.41
2	26.50	28.73
5	17.86	25.14
15	11.19	18.47
31	8.22	14.37
60	6.03	12.31
240	3.13	10.78
1440	1.32	8.72

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.00
Sand Fine	0.59
Silt	87.17
Clay	12.24

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-018
Lab Sample ID	SJ7451-7

Date Received	09/16/16
Start Date/Time	9/21/16:14:14
End Date/Time	9/26/16:14:52

Sample Weight	Sample (g)
Sample Weight (wet)	153
Sample Weight (oven dried)	50.78

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	66.808

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	50.78
%Passing #10	99.99

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	274	0.1	99.80	Sand	Medium
#60	250	248	248	0	99.80	Sand	Fine
#80	180	328.1	328.1	0	99.80	Sand	Fine
#100	150	238.6	238.6	0	99.80	Sand	Fine
#200	75	227.8	228.1	0.3	99.21	Sand	Fine

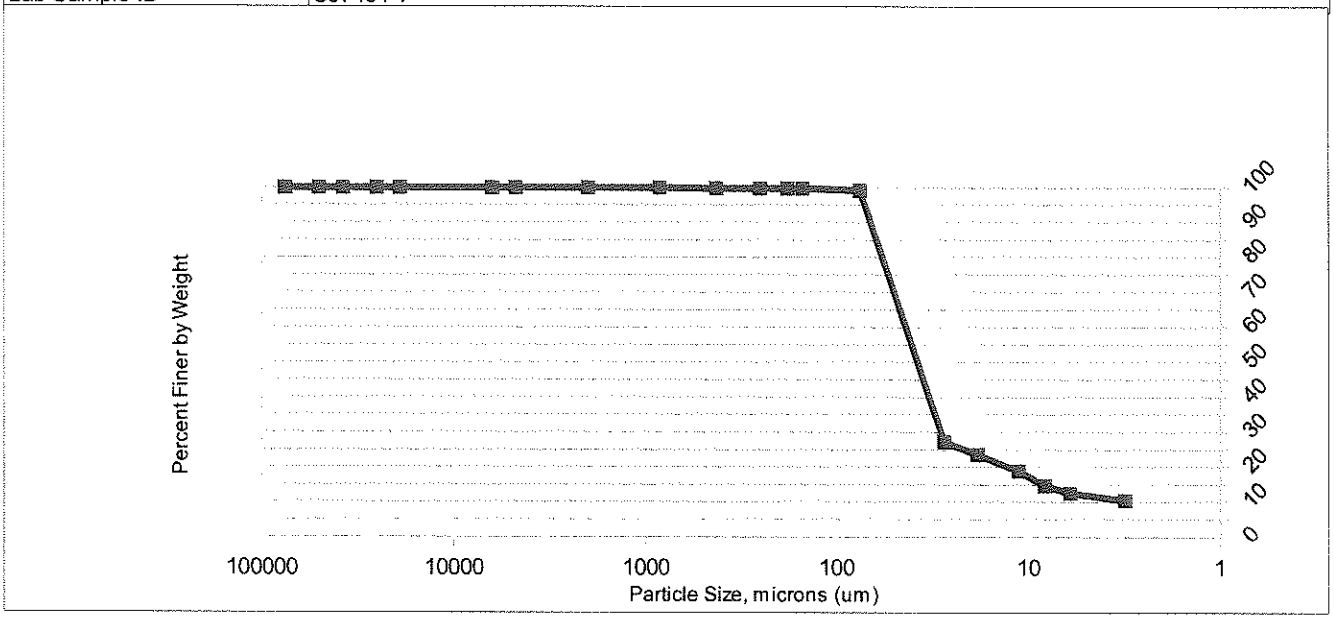
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0290	23	27.29	27.31	Silt
5	5	1.0255	23	23.62	18.34	Silt
15	15	1.0210	22.5	18.89	11.19	Silt
30	31	1.0170	22.5	14.70	8.17	Silt
60	60	1.0150	22	12.60	6.03	Silt
240	240	1.0130	21	10.50	3.13	Clay
1440	1440	1.0115	20	8.92	1.32	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	0.59
Silt	86.83
Clay	12.39
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-018
Lab Sample ID	SJ7451-7



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	99.80
#60	250	99.80
#80	180	99.80
#100	150	99.80
#200	75	99.21
2	27.31	27.29
5	18.34	23.62
15	11.19	18.89
31	8.17	14.70
60	6.03	12.60
240	3.13	10.50
1440	1.32	8.92

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	0.59
Silt	86.83
Clay	12.39

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-019
Lab Sample ID	SJ7451-8

Date Received	09/16/16
Start Date/Time	9/21/16:14:15
End Date/Time	9/26/16:14:54

Sample Weight	Sample (g)
Sample Weight (wet)	135.1
Sample Weight (oven dried)	48.93

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	63.779

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	48.93
%Passing #10	99.99

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303.2	0.2	99.59	Sand	Medium
#40	425	273.9	274.1	0.2	99.18	Sand	Medium
#60	250	248	248.3	0.3	98.57	Sand	Fine
#80	180	328.1	328.5	0.4	97.75	Sand	Fine
#100	150	238.6	238.9	0.3	97.14	Sand	Fine
#200	75	227.8	229.9	2.1	92.85	Sand	Fine

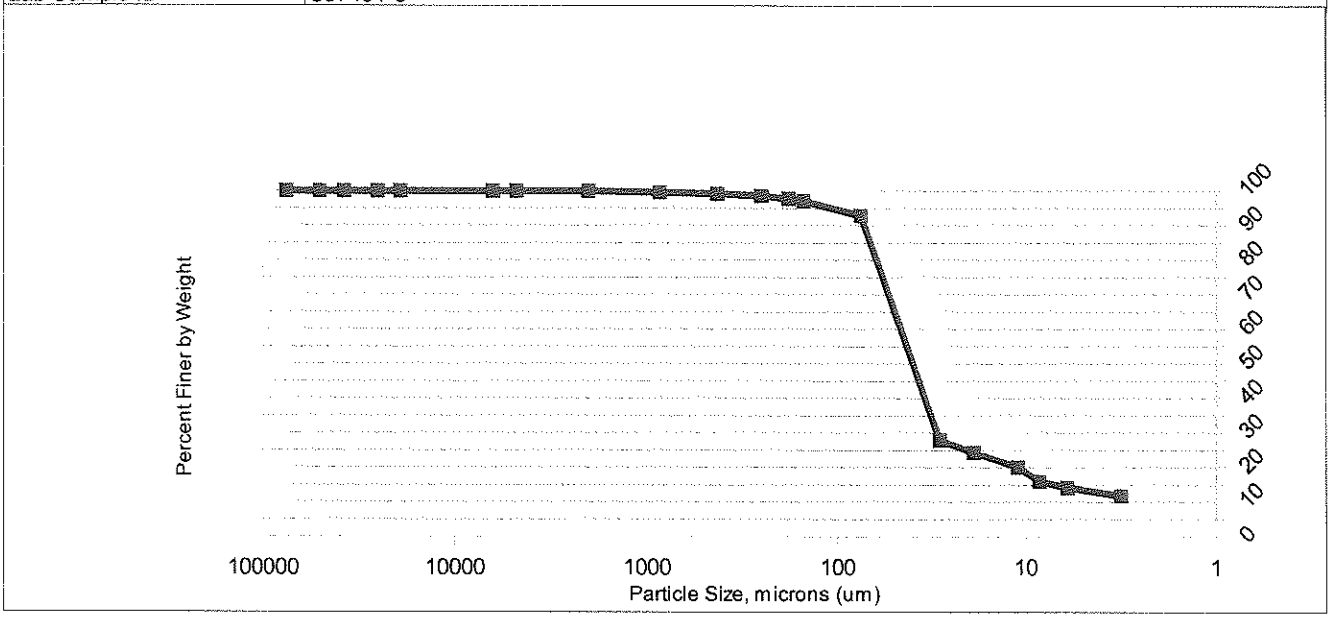
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0265	22.5	27.94	28.71	Silt
5	5	1.0235	22.5	24.37	18.92	Silt
15	16	1.0200	22.5	20.21	10.98	Silt
30	30	1.0165	22	16.05	8.46	Silt
60	60	1.0150	22	14.27	6.03	Silt
240	240	1.0130	20.5	11.89	3.14	Clay
1440	1440	1.0110	20	9.51	1.32	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.82
Sand Fine	6.33
Silt	79.21
Clay	13.64
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-019
Lab Sample ID	SJ7451-8



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	99.59
#40	425	99.18
#60	250	98.57
#80	180	97.75
#100	150	97.14
#200	75	92.85
2	28.71	27.94
5	18.92	24.37
16	10.98	20.21
30	8.46	16.05
60	6.03	14.27
240	3.14	11.89
1440	1.32	9.51

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.82
Sand Fine	6.33
Silt	79.21
Clay	13.64

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-020
Lab Sample ID	SJ7451-9

Date Received	09/16/16
Start Date/Time	9/21/16:14:16
End Date/Time	9/26/16:14:58

Sample Weight	Sample (g)
Sample Weight (wet)	114.5
Sample Weight (oven dried)	49.74

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	56.562

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	1.1
Sample <=#10	48.64
%Passing #10	97.80

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.00300
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	505.9	505.9	0	100.00	Gravel	
#4	4750	403.9	403.9	0	100.00	Gravel	
#10	2000	371.50	372.60	1.1	97.79	Sand	Coarse
#20	850	303	303.6	0.6	96.58	Sand	Medium
#40	425	273.9	274.8	0.9	94.77	Sand	Medium
#60	250	248	249.1	1.1	92.56	Sand	Fine
#80	180	328.1	329.4	1.3	89.95	Sand	Fine
#100	150	238.6	239.5	0.9	88.14	Sand	Fine
#200	75	227.8	232.5	4.7	78.69	Sand	Fine

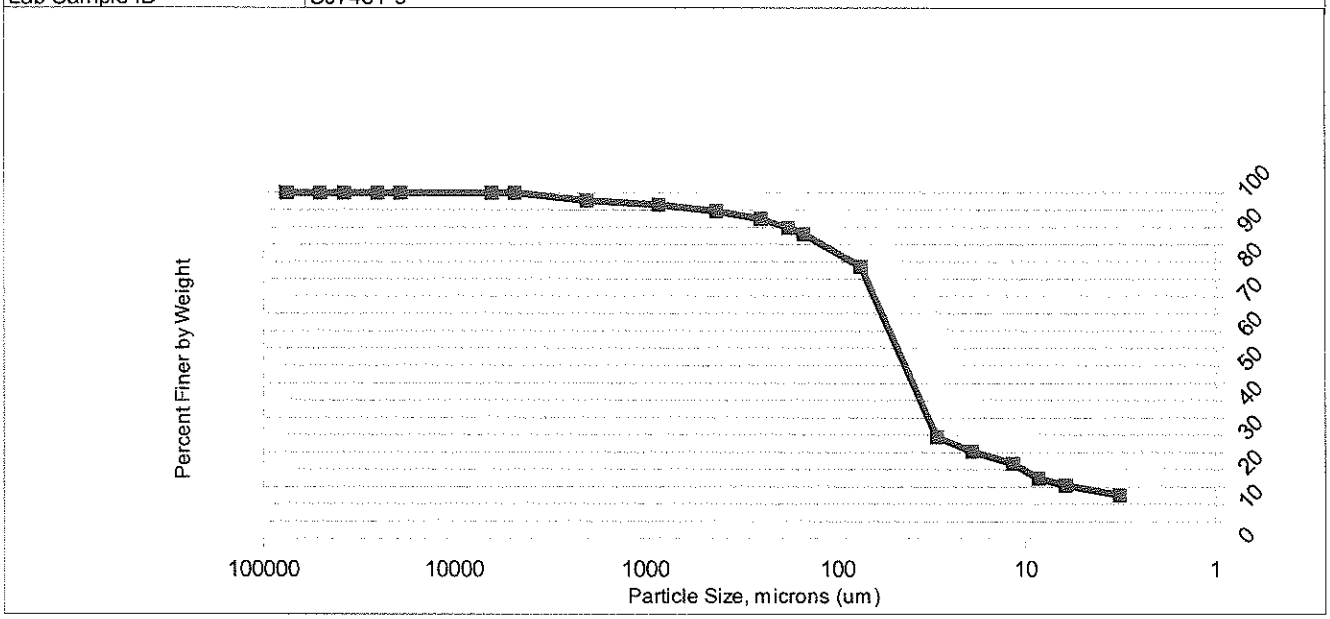
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0240	22.5	29.46	29.62	Silt
5	5	1.0210	23	25.25	19.27	Silt
15	15	1.0185	22.5	21.74	11.60	Silt
30	30	1.0155	22	17.53	8.53	Silt
60	60	1.0140	22	15.43	6.10	Silt
240	240	1.0120	20.5	12.62	3.17	Clay
1440	1440	1.0105	20	10.52	1.33	Clay

Gravel	0.00
Sand Coarse	2.21
Sand Medium	3.02
Sand Fine	16.08
Silt	64.02
Clay	14.67
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-020
Lab Sample ID	SJ7451-9



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	97.79
#20	850	96.58
#40	425	94.77
#60	250	92.56
#80	180	89.95
#100	150	88.14
#200	75	78.69
2	29.62	29.46
5	19.27	25.25
15	11.60	21.74
30	8.53	17.53
60	6.10	15.43
240	3.17	12.62
1440	1.33	10.52

Gravel	0.00
Sand Coarse	2.21
Sand Medium	3.02
Sand Fine	16.08
Silt	64.02
Clay	14.67

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-021
Lab Sample ID	SJ7451-10

Date Received	09/16/16
Start Date/Time	9/21/16:14:18
End Date/Time	9/26/16:15:04

Sample Weight	Sample (g)
Sample Weight (wet)	101.2
Sample Weight (oven dried)	49.39

Date/Time in oven	9/22/16:15:00
Date/Time out of oven	9/23/16:9:00

% Moisture	51.2

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	1.5
Sample <=#10	47.89
%Passing #10	96.97

Hydrometer Data

Serial Number	379474
Cal Date:	9/22/16:10:28
Low Temp C	20.10
Low Temp Reading	1.0030
High Temp	23.00
High Temp Reading	1.0030
Hyd Cal Slope	0.000000
Hyd Cal Intercept	0.003000
Soil Gravity	2.650000

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	505.9	505.9	0	100.00	Gravel	
#4	4750	403.9	404	0.1	99.80	Gravel	
#10	2000	371.50	372.70	1.2	97.37	Sand	Coarse
#20	850	303	303.7	0.7	95.95	Sand	Medium
#40	425	273.9	274.7	0.8	94.33	Sand	Medium
#60	250	248	249.2	1.2	91.90	Sand	Fine
#80	180	328.1	329.5	1.4	89.07	Sand	Fine
#100	150	238.6	239.6	1	87.04	Sand	Fine
#200	75	227.8	233.3	5.5	75.90	Sand	Fine

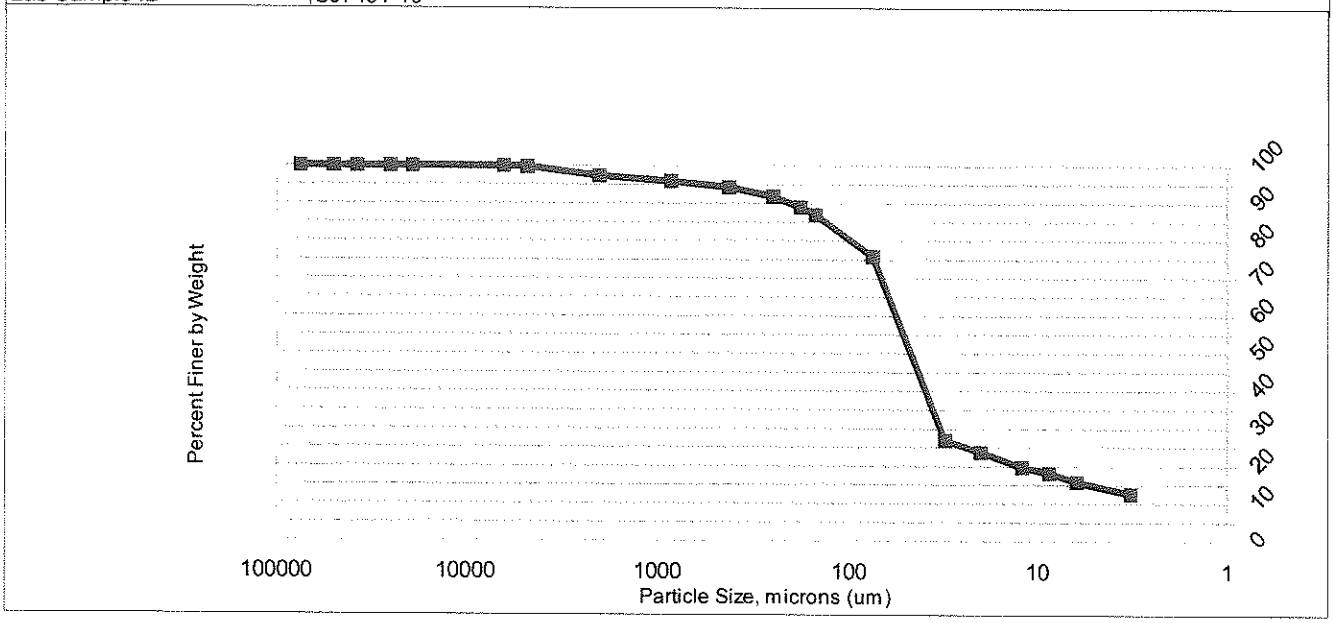
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0200	23	26.98	30.89	Silt
5	5	1.0180	23	23.81	19.97	Silt
15	15	1.0155	22.5	19.84	11.99	Silt
30	30	1.0145	22.5	18.25	8.58	Silt
60	60	1.0130	22	15.87	6.18	Silt
240	240	1.0110	20.5	12.70	3.21	Clay
1440	1440	1.0100	20	11.11	1.33	Clay

Gravel	0.20
Sand Coarse	2.43
Sand Medium	3.04
Sand Fine	18.43
Silt	61.11
Clay	14.79
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-021
Lab Sample ID	SJ7451-10



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	99.80
#10	2000	97.37
#20	850	95.95
#40	425	94.33
#60	250	91.90
#80	180	89.07
#100	150	87.04
#200	75	75.90
2	30.89	26.98
5	19.97	23.81
15	11.99	19.84
30	8.58	18.25
60	6.18	15.87
240	3.21	12.70
1440	1.33	11.11

Gravel	0.20
Sand Coarse	2.43
Sand Medium	3.04
Sand Fine	18.43
Silt	61.11
Clay	14.79

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-022
Lab Sample ID	SJ7451-11

Date Received	09/16/16
Start Date/Time	9/23/16:15:04
End Date/Time	9/28/16:

Sample Weight	Sample (g)
Sample Weight (wet)	119
Sample Weight (oven dried)	49.10

Date/Time in oven	9/27/16:14:30
Date/Time out of oven	9/28/16:7:30

% Moisture	58.736

Hydrometer Data

Serial Number	379474
Cal Date:	9/26/16:10:04
Low Temp C	19.70
Low Temp Reading	1.0030
High Temp	21.80
High Temp Reading	1.0025
Hyd Cal Slope	-0.000238
Hyd Cal Intercept	0.007690
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	49.1
%Passing #10	99.99

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303.2	0.2	99.59	Sand	Medium
#40	425	273.9	274.3	0.4	98.78	Sand	Medium
#60	250	248	248.3	0.3	98.17	Sand	Fine
#80	180	328.1	328.5	0.4	97.35	Sand	Fine
#100	150	238.6	238.8	0.2	96.95	Sand	Fine
#200	75	227.8	229.8	2	92.87	Sand	Fine

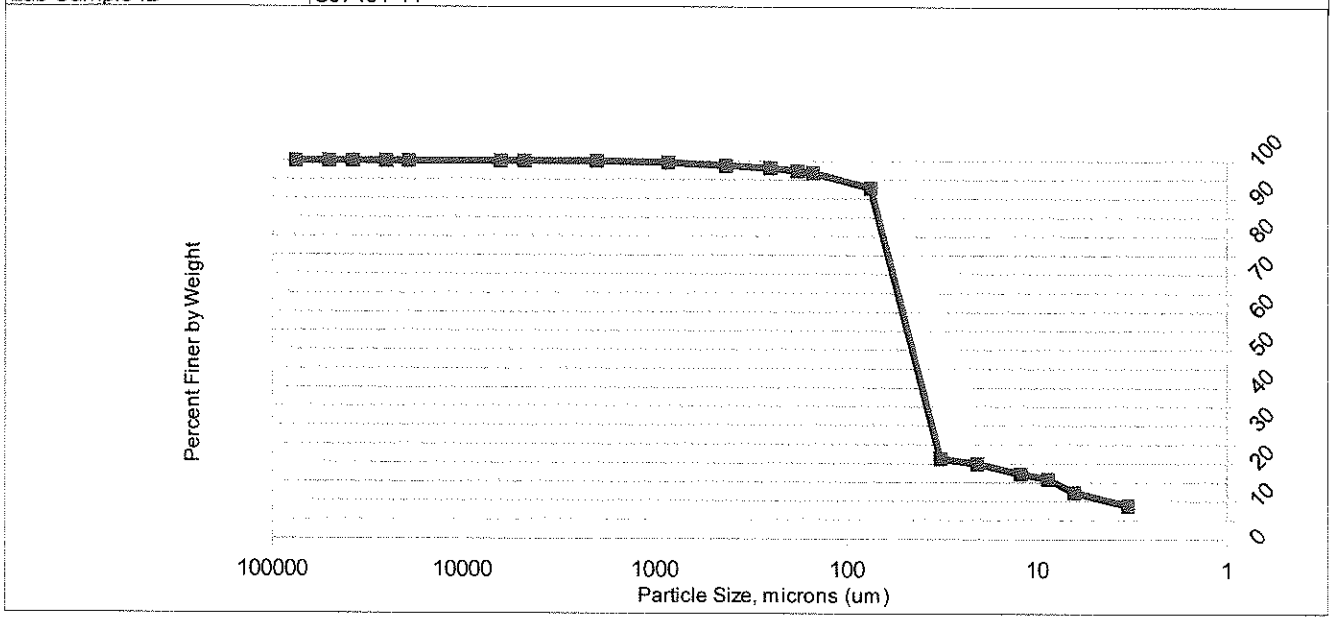
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0185	21	21.34	32.32	Silt
5	5	1.0175	21	19.99	20.71	Silt
15	15	1.0155	21	17.29	12.21	Silt
30	30	1.0145	21	15.94	8.74	Silt
60	60	1.0120	20.5	12.40	6.34	Silt
240	240	1.0095	20	8.87	3.28	Clay
1440	1440	1.0070	20	5.49	1.37	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	1.22
Sand Fine	5.91
Silt	81.76
Clay	11.11
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-022
Lab Sample ID	SJ7451-11



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	99.59
#40	425	98.78
#60	250	98.17
#80	180	97.35
#100	150	96.95
#200	75	92.87
2	32.32	21.34
5	20.71	19.99
15	12.21	17.29
30	8.74	15.94
60	6.34	12.40
240	3.28	8.87
1440	1.37	5.49

Gravel	0.00
Sand Coarse	0.00
Sand Medium	1.22
Sand Fine	5.91
Silt	81.76
Clay	11.11

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-023
Lab Sample ID	SJ7451-12

Date Received	09/16/16
Start Date/Time	9/23/16:15:06
End Date/Time	9/28/16:

Sample Weight	Sample (g)
Sample Weight (wet)	132
Sample Weight (oven dried)	50.13

Date/Time in oven	9/27/16:14:30
Date/Time out of oven	9/28/16:7:30

% Moisture	62.021

Hydrometer Data

Serial Number	379474
Cal Date:	9/26/16:10:04
Low Temp C	19.70
Low Temp Reading	1.0030
High Temp	21.80
High Temp Reading	1.0025
Hyd Cal Slope	-0.000238
Hyd Cal Intercept	0.007690
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	50.13
%Passing #10	100.00

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	274	0.1	99.80	Sand	Medium
#60	250	248	248.1	0.1	99.60	Sand	Fine
#80	180	328.1	328.2	0.1	99.40	Sand	Fine
#100	150	238.6	238.7	0.1	99.20	Sand	Fine
#200	75	227.8	231	3.2	92.82	Sand	Fine

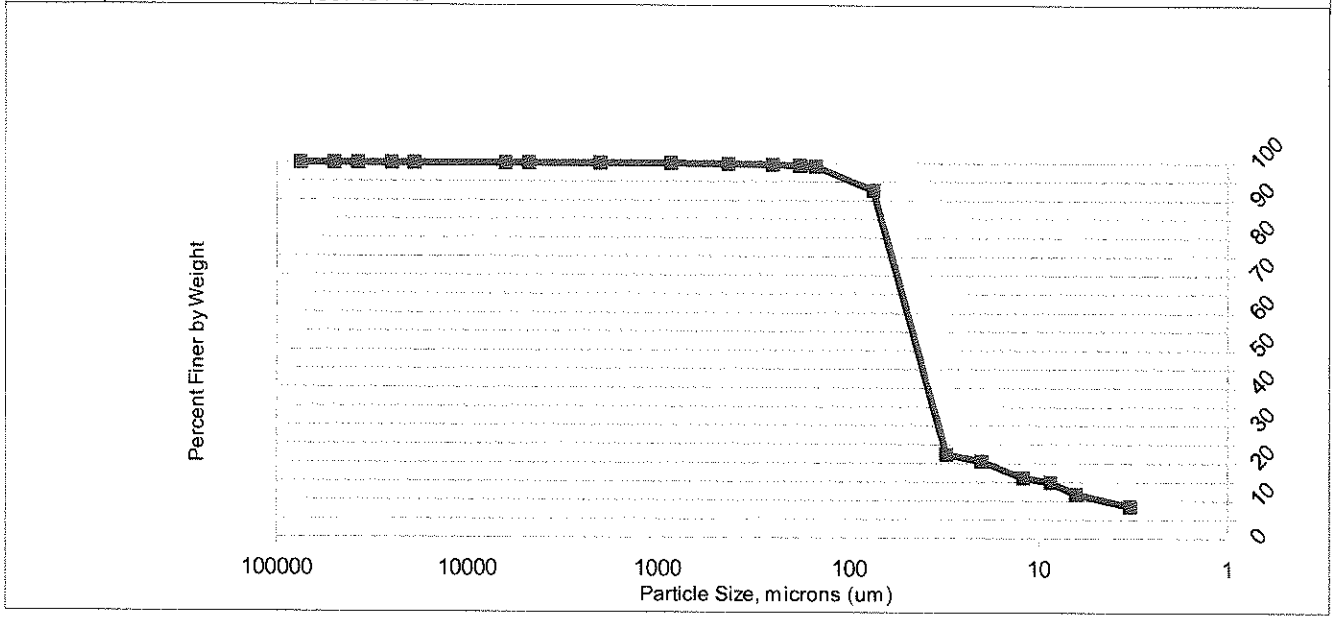
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0210	21.5	22.42	30.99	Silt
5	5	1.0195	21.5	20.60	20.14	Silt
15	15	1.0160	21	16.19	12.11	Silt
30	30	1.0150	21	14.98	8.63	Silt
60	60	1.0125	20.5	11.79	6.34	Silt
240	240	1.0100	20	8.60	3.26	Clay
1440	1440	1.0070	20	4.95	1.37	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	6.98
Silt	82.40
Clay	10.42
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-023
Lab Sample ID	SJ7451-12



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	99.80
#60	250	99.60
#80	180	99.40
#100	150	99.20
#200	75	92.82
2	30.99	22.42
5	20.14	20.60
15	12.11	16.19
30	8.63	14.98
60	6.34	11.79
240	3.26	8.60
1440	1.37	4.95

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	6.98
Silt	82.40
Clay	10.42

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-024
Lab Sample ID	SJ7451-13

Date Received	09/16/16
Start Date/Time	9/23/16:15:08
End Date/Time	9/28/16:

Sample Weight	Sample (g)
Sample Weight (wet)	119
Sample Weight (oven dried)	49.56

Date/Time in oven	9/27/16:14:30
Date/Time out of oven	9/28/16:7:30

% Moisture	58.355

Hydrometer Data

Serial Number	379474
Cal Date:	9/26/16:10:04
Low Temp C	19.70
Low Temp Reading	1.0030
High Temp	21.80
High Temp Reading	1.0025
Hyd Cal Slope	-0.000238
Hyd Cal Intercept	0.007690
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	49.56
%Passing #10	100.00

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare	Pan+Sample	Sample	%Finer	Classification	Subclass
3"	75000	0	0	0	100	Gravel	
2"	50000	0	0	0	100	Gravel	
1.5"	37500	0	0	0	100	Gravel	
1"	25000	0	0	0	100	Gravel	
3/4"	19000	0	0	0	100	Gravel	
1/4"	6300	0	0	0	100.00	Gravel	
#4	4750	0	0	0	100.00	Gravel	
#10	2000	0.00	0.00	0	100.00	Sand	Coarse
#20	850	303	303	0	100.00	Sand	Medium
#40	425	273.9	274	0.1	99.80	Sand	Medium
#60	250	248	248.1	0.1	99.60	Sand	Fine
#80	180	328.1	328.3	0.2	99.19	Sand	Fine
#100	150	238.6	238.7	0.1	98.99	Sand	Fine
#200	75	227.8	231	3.2	92.53	Sand	Fine

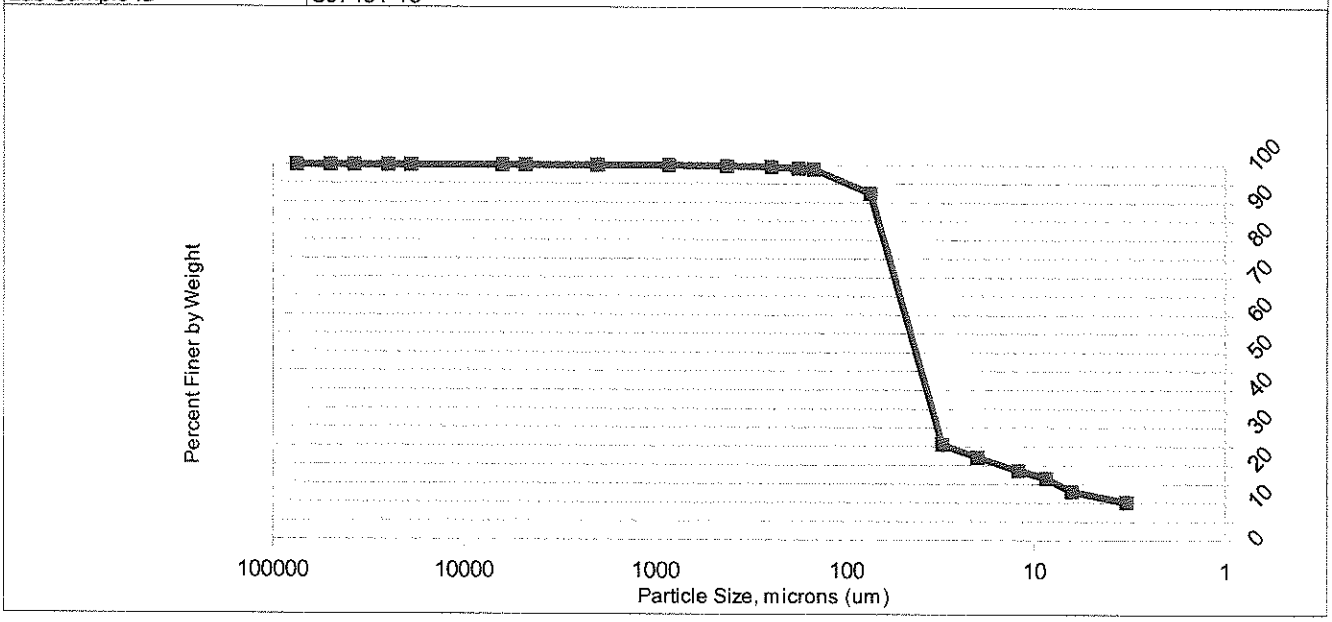
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0215	21.5	25.55	30.99	Silt
5	5	1.0190	21.5	22.17	20.14	Silt
15	15	1.0165	21	18.64	12.11	Silt
30	30	1.0150	21	16.61	8.63	Silt
60	60	1.0125	20.5	13.08	6.34	Silt
240	240	1.0105	20	10.22	3.26	Clay
1440	1440	1.0080	20	6.84	1.36	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	7.26
Silt	80.46
Clay	12.07
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAH-024
Lab Sample ID	SJ7451-13



Data		
Sample Fraction	Particle Size	%Passing
3"	75000	100
2"	50000	100
1.5"	37500	100
1"	25000	100
3/4"	19000	100
1/4"	6300	100.00
#4	4750	100.00
#10	2000	100.00
#20	850	100.00
#40	425	99.80
#60	250	99.60
#80	180	99.19
#100	150	98.99
#200	75	92.53
2	30.99	25.55
5	20.14	22.17
15	12.11	18.64
30	8.63	16.61
60	6.34	13.08
240	3.26	10.22
1440	1.36	6.84

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.20
Sand Fine	7.26
Silt	80.46
Clay	12.07

Raw Data Section

WG 191215
R3860065
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Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-16-16
Client ID	RAH-013	Start Date/Time	9.26-16: 14:04
Lab Sample ID	~~537529-4~~ SJ7451-1	End Date/Time	9.26-16: 14:19

Sample Weight	Sample (g)
Sample Weight (wet)	128.0
Sample Weight (oven dried)	48.74
% Moisture	61.923

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	48.74

Date/Time in oven	9-22-16: 15:00
Date/Time out of oven	9.23-16: 9:00

Hydrometer Data	A
Serial Number	379474
Cal Date:	9.22-16
Low Temp C	20.1
Low Temp Reading	1.0030
High Temp	23.0
High Temp Reading	1.0030
Soil Gravity	2.65

Gravel/Sand Fraction (Sieves)			
Sample Fraction	Size (um)	Pan Tare	Pan+Sample
3"	75000		
2"	50000		
1.5"	37500		
1"	25000		
3/4"	19000		
1/4"	6300		
#4	4750		
#10	2000		
#20	850	303.0	303.0
#40	425	273.9	273.9
#60	250	248.0	248.0
#80	180	328.21	328.2
#100	150	238.6	238.6
#200	75	227.8	232.1
Pan	Pan	298.8	299.X3

10:26	Silt/Clay Fraction (Hydrometer Test)			
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	10:28	10:28 (2)	22.6	1.0230
5	10:31	10:31 (5)	22.4	1.0205
15	10:41	10:41 (15)	22.3	1.0145
30	10:56	10:57 (31)	22.1	1.0140
60	11:26	11:27 (61)	21.7	1.0130
240	14:26	14:26 (240)	20.6	1.0115
1440	10:26	10:26 (1440)	20.1	1.0100

SLH/01

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-16-16
Client ID	RAH-014	Start Date/Time	9-21-16: 14:06
Lab Sample ID	SJ7451-2	End Date/Time	~~9-22-16~~ 9-26-16: 14:27

Sample Weight	Sample (g)
Sample Weight (wet)	~~1000~~ 125.2
Sample Weight (oven dried)	49.01
% Moisture	60.851

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	49.01

Date/Time in oven	9-22-16: 15:00
Date/Time out of oven	9-23-16: 9:00
Hydrometer Data	
Serial Number	379474
Cal Date:	9-22-16
Low Temp C	20.1
Low Temp Reading	1.0030
High Temp	23.0
High Temp Reading	1.0030
Soil Gravity	2.65

Gravel/Sand Fraction (Sieves)			
Sample Fraction	Size (um)	Pan Tare	Pan+Sample
3"	75000		
2"	50000		
1.5"	37500		
1"	25000		
3/4"	19000		
1/4"	6300		
#4	4750		
#10	2000		
#20	850	303.0	303.0
#40	425	273.9	273.9
#60	250	248.0	248.0
#80	180	328.1	328.3
#100	150	238.6	238.6
#200	75	227.8	231.4
Pan	Pan	298.8	299.0

10:34	Silt/Clay Fraction (Hydrometer Test)			
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	10:36	10:36 (2)	22.5	1.0235
5	10:39	10:39 (5)	22.3	1.0205
15	10:49	10:49 (15)	22.1	1.0175
30	11:04	11:04 (30)	21.9	1.0150
60	11:34	11:35 (61)	21.6	1.0140
240	14:34	14:34 (240)	20.6	1.0115
1440	10:34	10:34 (1440)	20.1	1.0095

sitch

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-16-16
Client ID	RAA-01MAP	Start Date/Time	9-21-16:14:09
Lab Sample ID	557451-3 B	End Date/Time	9-26-16: 14:33

Sample Weight	Sample (g)
Sample Weight (wet)	128.2
Sample Weight (oven dried)	50.34
% Moisture	60.731

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	50.34

Date/Time in oven	9-22-16: 15:00
Date/Time out of oven	9-23-16 : 9:00

Hydrometer Data	
Serial Number	379474
Cal Date:	9-22-16
Low Temp C	20.1
Low Temp Reading	1.0030
High Temp	23.0
High Temp Reading	1.0030
Soil Gravity	2.65

Gravel/Sand Fraction (Sieves)			
Sample Fraction	Size (um)	Pan Tare	Pan+Sample
3"	75000		
2"	50000		
1.5"	37500		
1"	25000		
3/4"	19000		
1/4"	6300		
#4	4750		
#10	2000		
#20	850	303.0	303.0
#40	425	273.9	274.0
#60	250	248.0	248.0
#80	180	328.1	328.2
#100	150	238.6	238.6
#200	75	227.8	231.9
Pan	Pan	298.8	299.2

10:43 Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	10:45	10:45 (2)	22.4	1.0240
5	10:48	10:48 (5)	22.3	1.0215
15	10:58	10:59 (16)	22.0	1.0175
30	11:13	11:14 (31)	21.7	1.0145
60	11:43	11:43 (60)	21.4	1.0135
240	14:43	14:43 (240)	20.6	1.0115
1440	10:43	10:43 (1440)	20.1	1.0095

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Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-16-16
Client ID	RAH-015	Start Date/Time	9-21-16: 14:10
Lab Sample ID	SJ7457-4	End Date/Time	9-26-16: 14:40

Sample Weight	Sample (g)
Sample Weight (wet)	136.2
Sample Weight (oven dried)	49.74

% Moisture	63.482

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	49.74

Date/Time in oven	9-22-16: 15:00
Date/Time out of oven	9-23-16: 9:00

Hydrometer Data	
Serial Number	379424
Cal Date:	9-22-16
Low Temp C	20.1
Low Temp Reading	1.0030
High Temp	23.0
High Temp Reading	1.0030
Soil Gravity	2.65

Gravel/Sand Fraction (Sieves)			
Sample Fraction	Size (um)	Pan Tare	Pan+Sample
3"	75000		
2"	50000		
1.5"	37500		
1"	25000		
3/4"	19000		
1/4"	6300		
#4	4750		
#10	2000		
#20	850	303.0	303.0
#40	425	273.9	~~274~~ 273.9
#60	250	248.0	248.0
#80	180	328.1	328.2
#100	150	238.6	238.6
#200	75	227.8	230.5
Pan	Pan	298.8	299.0

10:51 Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	10:53	10:53 (2)	22.8	1.0250
5	10:56	10:56 (5)	22.8	1.0225
15	11:06	11:07 (16)	22.3	1.0185
30	11:21	11:22 (31)	22.2	1.0155
60	11:51	11:51 (60)	22.2	1.0135
240	14:51	14:51 (240)	20.7	1.0120
1440	10:51	10:51 (1440)	20.0	1.0105

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Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-16-16
Client ID	KAH-016	Start Date/Time	9-21-16: 14:11
Lab Sample ID	SJ7451-5	End Date/Time	9-26-16: 14:45

Sample Weight	Sample (g)
Sample Weight (wet)	156.2
Sample Weight (oven dried)	50.59

Date/Time in oven	9-22-16: 15:00
Date/Time out of oven	9-23-16: 9:00

% Moisture 67.615

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	50.59

Hydrometer Data	
Serial Number	379474
Cal Date:	9-22-16
Low Temp C	20.1
Low Temp Reading	1.0030
High Temp	23.0
High Temp Reading	1.0070
Soil Gravity	2.65

Gravel/Sand Fraction (Sieves)			
Sample Fraction	Size (um)	Pan Tare	Pan+Sample
3"	75000		
2"	50000		
1.5"	37500		
1"	25000		
3/4"	19000		
1/4"	6300		
#4	4750		
#10	2000		
#20	850	303.0	303.0
#40	425	273.9	274.0
#60	250	248.0	248.0
#80	180	328.1	328.1
#100	150	238.6	238.76
#200	75	327.8	228.1
Pan	Pan	298.8	298.8

11:08

Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	11:10	11:10 (2)	22.4	1.0320
5	11:13	11:13 (5)	22.5	1.0280
15	11:23	11:24 (16)	22.3	1.0220
30	11:38	11:38 (30)	22.1	1.0190
60	12:08	12:08 (60)	21.9	1.0165
240	15:08	15:08 (240)	20.7	1.0135
1440	11:08	11:08 (1440)	20.0	1.0120

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Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-16-16
Client ID	RAH-017	Start Date/Time	9-21-16 : 14:12
Lab Sample ID	557451-6 RB	End Date/Time	9-26-16 : 14:48

Sample Weight	Sample (g)
Sample Weight (wet)	156.05
Sample Weight (oven dried)	50.61
% Moisture	67.662

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	50.61

Date/Time in oven	9-22-16 : 15:00
Date/Time out of oven	9-23-16 : 9:00

Hydrometer Data	
Serial Number	37947
Cal Date:	9-22-16
Low Temp C	20.1
Low Temp Reading	1.0030
High Temp	~~20.3~~ 23.0
High Temp Reading	1.0030
Soil Gravity	2.65

Gravel/Sand Fraction (Sieves)			
Sample Fraction	Size (um)	Pan Tare	Pan+Sample
3"	75000		
2"	50000		
1.5"	37500		
1"	25000		
3/4"	19000		
1/4"	6300		
#4	4750		
#10	2000		
#20	850	303.0	303.0
#40	425	273.9	273.9
#60	250	248.0	248.0
#80	180	328.1	328.1
#100	150	238.6	238.6
#200	75	227.8	228.1
Pan	Pan	298.8	298.8

11:16

Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	11:18	11:18 (2)	22.9	1.0310
5	11:21	11:21 (5)	22.8	1.0275
15	11:31	11:31 (15)	22.4	1.0210
30	11:46	11:47 (31)	22.2	1.0170
60	12:16	12:16 (60)	21.8	1.0150
240	15:16	15:16 (240)	20.7	1.0135
1440	11:16	11:16 (1440)	20.1	1.0115

5/11/01

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-16-16
Client ID	RAH-018	Start Date/Time	9-21-16: 14:14
Lab Sample ID	SJ7451-7 B	End Date/Time	9-26-16: 14:52

Sample Weight	Sample (g)
Sample Weight (wet)	153.0
Sample Weight (oven dried)	50.78

Date/Time in oven	9-23-16: 15:00
Date/Time out of oven	9-22-16: 9:00

% Moisture	66.808

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	50.78

Hydrometer Data	
Serial Number	379474
Cal Date:	9.22.16
Low Temp C	20.1
Low Temp Reading	1.0030
High Temp	23.0
High Temp Reading	1.0070
Soil Gravity	2.65

Gravel/Sand Fraction (Sieves)			
Sample Fraction	Size (um)	Pan Tare	Pan+Sample
3"	75000		
2"	50000		
1.5"	37500		
1"	25000		
3/4"	19000		
1/4"	6300		
#4	4750		
#10	2000		
#20	850	303.0	303.0
#40	425	273.9	274.0
#60	250	248.0	248.0
#80	180	328.1	328.1
#100	150	238.6	238.6
#200	75	227.8	228.1
Pan	Pan	298.8	298.9

11:21	Silt/Clay Fraction (Hydrometer Test)			
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	11:23	11:23 (2)	22.9	1.0290
5	11:26	11:26 (5)	22.8	1.0255
15	11:36	11:36 (15)	22.6	1.0210
30	11:51	11:52 (31)	22.5	1.0170
60	12:21	12:21 (60)	22.1	1.0150
240	15:21	15:21 (240)	20.8	1.0130
1440	11:21	11:21 (1440)	20.0	1.0115

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Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-16-16
Client ID	RAH-019	Start Date/Time	9-21-16 : 14:15
Lab Sample ID	557451-88	End Date/Time	9-26-16 : 14:54

Sample Weight	Sample (g)
Sample Weight (wet)	135.1
Sample Weight (oven dried)	48.93
% Moisture	63.779

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	48.93

Date/Time in oven	9-22-16 : 15:00
Date/Time out of oven	9-23-16 : 9100
Hydrometer Data	
Serial Number	379474
Cal Date:	9-22-16
Low Temp C	20.1
Low Temp Reading	1.0030
High Temp	23.0
High Temp Reading	1.0030
Soil Gravity	2.65

Gravel/Sand Fraction (Sieves)			
Sample Fraction	Size (um)	Pan Tare	Pan+Sample
3"	75000		
2"	50000		
1.5"	37500		
1"	25000		
3/4"	19000		
1/4"	6300		
#4	4750		
#10	2000		
#20	850	303.0	303.2
#40	425	273.9	274.1
#60	250	248.0	248.3
#80	180	328.1	328.5
#100	150	238.6	238.9
#200	75	227.8	229.9
Pan	Pan	298.8	298.9

11:32	Silt/Clay Fraction (Hydrometer Test)			
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	11:34	11:34 (2)	22.6	1.0265
5	11:37	11:37 (5)	22.5	1.0235
15	11:47	11:48 (16)	22.3	1.0200
30	12:02	12:02 (30)	22.1	1.0165
60	12:32	12:32 (60)	21.8	1.0150
240	15:32	15:32 (240)	20.6	1.0130
1440	11:32	11:32 (1440)	20.0	1.0110

S1+1a

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9.16.16
Client ID	LHA-020	Start Date/Time	9.21.16: 14:16
Lab Sample ID	557457-9A	End Date/Time	9.26.16: 14:58

Sample Weight	Sample (g)
Sample Weight (wet)	114.5
Sample Weight (oven dried)	49.74

Date/Time in oven	9.22.16: 15:00
Date/Time out of oven	9.23.16: 9:00

% Moisture 56.562

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	1.1
Sample <=#10	48.64

Hydrometer Data	
Serial Number	379424
Cal Date:	9.22.16
Low Temp C	20.1
Low Temp Reading	1.0030
High Temp	23.0
High Temp Reading	1.0030
Soil Gravity	2.65

Gravel/Sand Fraction (Sieves)			
Sample Fraction	Size (um)	Pan Tare	Pan+Sample
3"	75000		
2"	50000		
1.5"	37500		
1"	25000		
3/4"	19000		
1/4"	6300	505.9	505.9
#4	4750	403.9	403.9
#10	2000	371.5	372.6
#20	850	303.0	303.6
#40	425	273.9	274.8
#60	250	248.0	249.1
#80	180	328.1	329.4
#100	150	238.6	239.5
#200	75	227.8	232.5
Pan	Pan	298.8	299.2

11:41	Silt/Clay Fraction (Hydrometer Test)			
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	11:43	11:43 (2)	22.6	1.0240
5	11:46	11:46 (5)	22.7	1.0210
15	11:56	11:56 (15)	22.5	1.0185
30	12:11	12:11 (30)	22.0	1.0155
60	12:41	12:41 (60)	21.8	1.0140
240	15:41	15:41 (240)	20.6	1.0120
1440	11:41	11:41 (1440)	20.1	1.0105

5 of 14

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-16-16
Client ID	~~KAHO-21~~ RAH-021	Start Date/Time	9-21-16 : 14:18
Lab Sample ID	SJ7451-10	End Date/Time	9-26-16 : 15:04

Sample Weight	Sample (g)
Sample Weight (wet)	101.2
Sample Weight (oven dried)	49.39
% Moisture	51.2

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	1.5
Sample <=#10	47.89

Date/Time in oven	9-22-16 : 15:00
Date/Time out of oven	9-23-16 : 9:00
Hydrometer Data	
Serial Number	379474
Cal Date:	~~20.1~~ 9-22-16
Low Temp C	~~1.0030~~ 20.1
Low Temp Reading	~~23.0~~ 1.0030
High Temp	~~1.0030~~ 23.0
High Temp Reading	1.0030
Soil Gravity	2.65

Gravel/Sand Fraction (Sieves)			
Sample Fraction	Size (um)	Pan Tare	Pan+Sample
3"	75000		
2"	50000		
1.5"	37500		
1"	25000		
3/4"	19000		
1/4"	6300	505.9	505.9
#4	4750	403.9	404.0
#10	2000	371.5	372.7
#20	850	303.0	303.7
#40	425	272.9	274.7
#60	250	~~328.1~~ 248.0	249.2
#80	180	328.1	329.5
#100	150	238.6	239.6
#200	75	227.8	233.3
Pan	Pan	298.8	299.3

11:49 Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	11:51	11:51 (2)	22.8	1.0200
5	11:54	11:54 (5)	22.8	1.0180
15	12:04	12:04 (15)	22.6	1.0155
30	12:19	12:19 (30)	22.3	1.0145
60	12:49	12:49 (60)	21.9	1.0130
240	15:49	15:49 (240)	20.7	1.0110
1440	11:49	11:49 (1440)	20.0	1.0100

517/d

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	~~9-24~~ 9-16-16
Client ID	RAH-022	Start Date/Time	9-23-16 : 15:04
Lab Sample ID	557451-11B	End Date/Time	9-28-16 : 11:54

Sample Weight	Sample (g)
Sample Weight (wet)	~~820~~ 119.0
Sample Weight (oven dried)	49.10

Date/Time in oven	9-29-16 : ~~1200~~ 14:30
Date/Time out of oven	9-28-16 : ~~1400~~ 7:35

% Moisture	58.73%

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	49.10

Hydrometer Data	
Serial Number	379474
Cal Date:	9.26.16
Low Temp C	19.7
Low Temp Reading	1.0038
High Temp	21.8
High Temp Reading	1.0025
Soil Gravity	2.65

Gravel/Sand Fraction (Sieves)			
Sample Fraction	Size (um)	Pan Tare	Pan+Sample
3"	75000		
2"	50000		
1.5"	37500		
1"	25000		
3/4"	19000		
1/4"	6300		
#4	4750		
#10	2000		
#20	850	303.0	303.2
#40	425	273.9	274.3
#60	250	248.0	248.3
#80	180	328.1	~~238.5~~ 328.5
#100	150	238.4	238.8
#200	75	227.8	229.8
Pan	Pan	298.8	298.9

10:02 Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	10:04	10:04 (2)	21.2	1.0185
5	10:07	10:07 (5)	21.1	1.0175
15	10:17	10:17 (15)	21.1	1.0155
30	10:32	10:32 (30)	20.8	1.0145
60	11:02	11:02 (60)	20.4	1.0120
240	14:02	14:02 (240)	19.8	1.0095
1440	10:02	10:02 (1440)	19.8	1.0070

SH/CI

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9.16.16
Client ID	RAH-023	Start Date/Time	9:23-16:15:06
Lab Sample ID	SJ7451-12 B	End Date/Time	9.28-16:12:00

Sample Weight	Sample (g)	Date/Time in oven	9.27.16:14:30
Sample Weight (wet)	~~[illegible]~~ 132.0	Date/Time out of oven	9.28.16:7:30
Sample Weight (oven dried)	50.13		
		Hydrometer Data	
% Moisture	62.021	Serial Number	379474
		Cal Date:	9-26-16
Sample Split (Oven Dried)	Sample (g)	Low Temp C	19.7
Sample >=#10	Ø	Low Temp Reading	1.0030
Sample <=#10	50.13	High Temp	21.8
		High Temp Reading	1.0025
		Soil Gravity	2.65

Gravel/Sand Fraction (Sieves)			
Sample Fraction	Size (um)	Pan Tare	Pan+Sample
3"	75000		
2"	50000		
1.5"	37500		
1"	25000		
3/4"	19000		
1/4"	6300		
#4	4750		
#10	2000		
#20	850	303.0	303.0
#40	425	273.9	274.0
#60	250	248.0	248.1
#80	180	328.1	328.2
#100	150	238.6	238.7
#200	75	227.8	231.0
Pan	Pan	298.8	299.0

10:08 Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	10:10	10:10 (2)	21.3	1.0210
5	10:13	10:13 (5)	21.3	1.0195
15	10:23	10:23 (15)	21.1	1.0160
30	10:38	10:38 (30)	20.9	1.0150
60	11:08	11:08 (60)	20.6	1.0125
240	14:08	14:08 (240)	19.89	1.0100
1440	10:08	10:08 (1440)	19.8	1.0070

5/4/cl

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-16-16
Client ID	RM1-024	Start Date/Time	9-23-16: 15:08
Lab Sample ID	557451-13B	End Date/Time	9-28-16: 12:04

Sample Weight	Sample (g)
Sample Weight (wet)	119.0
Sample Weight (oven dried)	49.56

Date/Time in oven	9-22-16: 14:30
Date/Time out of oven	9-28-16: 7:30

% Moisture	58.355

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	49.56

Hydrometer Data	
Serial Number	379479
Cal Date:	9-26-16
Low Temp C	19.7
Low Temp Reading	1.0030
High Temp	21.8
High Temp Reading	1.0025
Soil Gravity	2.65

Gravel/Sand Fraction (Sieves)			
Sample Fraction	Size (um)	Pan Tare	Pan+Sample
3"	75000		
2"	50000		
1.5"	37500		
1"	25000		
3/4"	19000		
1/4"	6300		
#4	4750		
#10	2000		
#20	850	303.0	303.0
#40	425	273.9	274.0
#60	250	248.0	248.1
#80	180	328.1	328.3
#100	150	238.6	238.7
#200	75	227.8	231.8
Pan	Pan	298.8	299.0

10:16

Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	10:18	10:18 (2)	21.5	1.0215
5	10:21	10:21 (5)	21.3	1.0190
15	10:31	10:31 (15)	21.2	1.0165
30	10:46	10:46 (30)	21.1	1.0150
60	11:16	11:16 (60)	20.0	1.0125
240	14:16	14:16 (240)	19.8	1.0105
1440	10:16	10:16 (1440	19.9	1.0080

CONVENTIONAL AND PHYSICAL ANALYTICAL DATA

QC Summary Section

Quality Control Report

Blank Sample Summary Report

Toc In Soil(1)

Samp Type	QC Batch	Anal. Method	Anal. Date	Prep. Date	Result	PQL
MBLANK	WG191518	SW846 9060A Mod.	26-SEP-16	N/A	U 300 ug/gdrywt	400 ug/gdrywt

Total Solids

Samp Type	QC Batch	Anal. Method	Anal. Date	Prep. Date	Result	PQL
MBLANK	WG191091	SM2540	22-SEP-16	21-SEP-16	100 %	1 %

Quality Control Report

Laboratory Control Sample Summary Report

Toc In Soil(1)

Lab Sample Id	Samp Type	QC Batch	Analysis Date	Prep Date	Units	Spike Amt.	Result	Recovery	Acceptance Range	RPD
WG191518-2	LCS	WG191518	26-SEP-16	N/A	ug/gdrywt	400000.000	410000	102	80-120	

Total Solids

Lab Sample Id	Samp Type	QC Batch	Analysis Date	Prep Date	Units	Spike Amt.	Result	Recovery	Acceptance Range	RPD
WG191091-2	LCS	WG191091	22-SEP-16	21-SEP-16	%	90	90.	100	90-110	

Quality Control Report

Duplicate Sample Summary Report

Total Solids

Duplicate Sample ID	Original Sample ID	QC Batch	Analysis Date	Result Units	Sample Result	Duplicate Result	RPD(%)	RPD Limit
WG191091-4	SJ7451-13	WG191091	22-SEP-16	%	42.	42.	0	20

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Quality Control Report

Matrix Spike Sample Summary Report

Toc In Soil(1)

Matrix Spike Sample ID	Sample Type	Original Sample ID	QC Batch	Analysis Date	Result Units	Spike Amount	Sample Result	MS Result	Recovery (%)	Recovery Limit
WG191518-4	MSD	SJ7451-2	WG191518	26-SEP-16	ug/gdrywt	26367.42	20000	44000	93	75 - 125
WG191518-3	MS	SJ7451-2	WG191518	26-SEP-16	ug/gdrywt	30318.62	20000	50000	100	75 - 125

Sample Data Section

KATAHDIN ANALYTICAL SERVICES – INORGANIC DATA QUALIFIERS

The sampled date indicated on the attached Report(s) of Analysis (ROA) is the date for which a grab sample was collected or the date for which a composite sample was completed. Beginning and start times for composite samples can be found on the Chain-of-Custody.

U Indicates the compound was analyzed for but not detected above the specified level. This level may be the Practical Quantitation Level (PQL) (also called Limit of Quantitation (LOQ)), the Limit of Detection (LOD) or Method Detection Limit (MDL) as required by the client.

Note: All results reported as "U" MDL have a 50% rate for false negatives compared to those results reported as "U" PQL "U" LOQ or "U" LOD, where the rate of false negatives is <1%.

E Estimated value. This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis.

J Estimated value. The analyte was detected in the sample at a concentration less than the laboratory Practical Quantitation Level (PQL) (also called Limit of Quantitation (LOQ)), but above the Method Detection Limit (MDL).

I-7 The laboratory's Practical Quantitation Level (PQL) or LOQ could not be achieved for this parameter due to sample composition, matrix effects, sample volume, or quantity used for analysis.

A-4 Please refer to cover letter or narrative for further information.

H_ Please note that the regulatory holding time for _____ is "analyze immediately". Ideally, this analysis must be performed in the field at the time of sample collection. _____ for this sample was not performed at the time of sample collection. The analysis was performed as soon as possible after receipt by the laboratory.

H1 - pH H2 - DO H3 - sulfite H4 - residual chlorine

T1 The client did not provide the full volume of at least one liter for analysis of TSS. Therefore, the PQL of 2.5 mg/L could not be achieved.

T2 The client provided the required volume of at least one liter for analysis of TSS, but the laboratory could not filter the full one liter volume due to the sample matrix. Therefore, the PQL of 2.5 mg/L could not be achieved.

M1 The matrix spike and/or matrix spike duplicate recovery performed on this sample was outside of the laboratory acceptance criteria. Sample matrix is suspected. The laboratory criteria was met for the Laboratory Control Sample (LCS) analyzed concurrently with this sample.

M2 The matrix spike and/or matrix spike duplicate recovery was outside of the laboratory acceptance criteria. The native sample concentration is greater than four times the spike added concentration so the spike added could not be distinguished from the native sample concentration.

R1 The relative percent difference (RPD) between the duplicate analyses performed on this sample was outside of the laboratory acceptance criteria (when both values are greater than ten times the PQL).

MCL	Maximum Contaminant Level	NL	No limit
NFL	No Free Liquid Present	FLP	Free Liquid Present
NOD	No Odor Detected	TON	Threshold Odor Number

D-1 As required by Method 5210B, APHA Standard Methods for the Examination of Water and Wastewater (21st edition), the BOD value reported for this sample is 'qualified' because the check standard run concurrently with the sample analysis did not meet the criteria specified in the method (198 +/- 30.5 mg/L). These results may not be reportable for compliance purposes.

D-2 The measured final dissolved oxygen concentrations of all dilutions were less than the method-specified limit of 1 mg/L. The reported BOD result was calculated assuming a final oxygen concentration equal to 1 mg/L. The reported value should be considered a minimum value.

D-3 The dilution water used to prepare this sample did not meet the method and/or regulatory criteria of less than 0.2 or 0.4 mg/L dissolved oxygen (DO) uptake over the five day period of incubation. These results may not be reportable for compliance purposes.

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-1
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-013	SL	15-SEP-16 11:39:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	19000 ug/gdrywt	1600	330	SW846 9060A Mod.	WG191518	26-SEP-16 12:15:55	N/A	N/A	ZF	
Toc In Soil(2)	18000 ug/gdrywt	1300	280	SW846 9060A Mod.	WG191518	26-SEP-16 12:26:33	N/A	N/A	ZF	
Toc In Soil(3)	19000 ug/gdrywt	1400	300	SW846 9060A Mod.	WG191518	26-SEP-16 12:39:52	N/A	N/A	ZF	
Toc In Soil(4)	18000 ug/gdrywt	1400	310	SW846 9060A Mod.	WG191518	26-SEP-16 12:54:59	N/A	N/A	ZF	
Toc In Soil(Avg)	19000 ug/gdrywt	1400	300	SW846 9060A Mod.	WG191518	26-SEP-16 12:50:00	N/A	N/A	ZF	
Total Solids	38. %	1		SM2540G	WG191091	22-SEP-16 14:53:37	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services 5000009

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-2
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-014	SL	15-SEP-16 11:52:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	20000 ug/gdrywt	1400	300	SW846 9060A Mod.	WG191518	26-SEP-16 13:04:25	N/A	N/A	ZF	
Total Solids	39. %	1		SM2540G	WG191091	22-SEP-16 14:53:54	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services 5000010

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-3
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-014 DUP	SL	15-SEP-16 11:52:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	19000 ug/gdrywt	1500	320	SW846 9060A Mod.	WG191518	26-SEP-16 14:22:24	N/A	N/A	ZF	
Total Solids	39. %	1		SM2540G	WG191091	22-SEP-16 14:54:14	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services 5000011

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-4
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-015	SL	15-SEP-16 12:05:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	20000 ug/gdrywt	1800	370	SW846 9060A Mod.	WG191518	26-SEP-16 14:52:33	N/A	N/A	ZF	
Total Solids	36. %	1		SM2540G	WG191091	22-SEP-16 14:54:25	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services 5000012

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-5
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-016	SL	15-SEP-16 12:50:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	24000 ug/gdrywt	1800	380	SW846 9060A Mod.	WG191518	26-SEP-16 15:02:54	N/A	N/A	ZF	
Total Solids	32. %	1		SM2540G	WG191091	22-SEP-16 14:54:36	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services 5000013

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-6
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-017	SL	15-SEP-16 13:01:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	23000 ug/gdrywt	1600	330	SW846 9060A Mod.	WG191518	26-SEP-16 15:12:41	N/A	N/A	ZF	
Total Solids	32. %	1		SM2540G	WG191091	22-SEP-16 14:54:50	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services 5000014

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-7
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-018	SL	15-SEP-16 13:10:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	21000 ug/gdrywt	1500	310	SW846 9060A Mod.	WG191518	26-SEP-16 15:25:43	N/A	N/A	ZF	
Total Solids	33. %	1		SM2540G	WG191091	22-SEP-16 14:55:00	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services 5000015

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-8
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-019	SL	15-SEP-16 13:23:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	21000 ug/gdrywt	1400	290	SW846 9060A Mod.	WG191518	26-SEP-16 15:36:17	N/A	N/A	ZF	
Total Solids	36. %	1		SM2540G	WG191091	22-SEP-16 14:55:09	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services 5000016

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-9
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-020	SL	15-SEP-16 13:32:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	21000 ug/gdrywt	1300	280	SW846 9060A Mod.	WG191518	26-SEP-16 16:00:42	N/A	N/A	ZF	
Total Solids	43. %	1		SM2540G	WG191091	22-SEP-16 14:55:18	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services 5000017

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-10
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-021	SL	15-SEP-16 13:41:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	21000 ug/gdrywt	1200	260	SW846 9060A Mod.	WG191518	26-SEP-16 16:15:28	N/A	N/A	ZF	
Total Solids	49. %	1		SM2540G	WG191091	22-SEP-16 14:55:25	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services 5000018

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-11
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-022	SL	15-SEP-16 13:50:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	19000 ug/gdrywt	1300	270	SW846 9060A Mod.	WG191518	26-SEP-16 16:25:39	N/A	N/A	ZF	
Total Solids	41. %	1		SM2540G	WG191091	22-SEP-16 14:55:34	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services 5000019

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-12
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-023	SL	15-SEP-16 14:00:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	20000 ug/gdrywt	1500	320	SW846 9060A Mod.	WG191518	26-SEP-16 16:51:33	N/A	N/A	ZF	
Total Solids	38. %	1		SM2540G	WG191091	22-SEP-16 14:55:47	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services 5000020

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7451-13
Report Date: 28-SEP-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS-Rockland
SDG: SJ7451

Sample Description	Matrix	Date Sampled	Date Received
RAH-024	SL	15-SEP-16 14:15:00	16-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	19000 ug/gdrywt	1500	320	SW846 9060A Mod.	WG191518	26-SEP-16 17:04:40	N/A	N/A	ZF	
Total Solids	42. %	1		SM2540G	WG191091	22-SEP-16 14:55:55	SM2540G	21-SEP-16	AP	

Katahdin Analytical Services 5000021

Raw Data Section

WET CHEMISTRY BATCH REPORT
Sep 27 2016, 04:26 pm
Batch: WG191518

Parameter: Toc In Soil(1)

Prep Date: N/A

Date Analyzed: 26-SEP-16

Prep Method: N/A

Analyst Initials: ZF

Prep Chemist: N/A

Sample	Samp Type	Method	Initial Amt.	Final Amt.	Rpt. DF	Result	Rpt Result	TS(%)	PQL	MDL	Adj PQL	RPD	%Rec
SJ7451-1	SAMP	SW846 9060A	363.4mg		1	19219.35798	19000 ug/gdrywt	38.	400	330	1600		
SJ7451-10	SAMP	SW846 9060A	329.3mg		1	20970.96175	21000 ug/gdrywt	49.	400	260	1200		
SJ7451-11	SAMP	SW846 9060A	381.5mg		1	18885.52412	19000 ug/gdrywt	41.	400	270	1300		
SJ7451-12	SAMP	SW846 9060A	350.1mg		1	20050.46776	20000 ug/gdrywt	38.	400	320	1500		
SJ7451-13	SAMP	SW846 9060A	316.7mg		1	19349.49969	19000 ug/gdrywt	42.	400	320	1500		
SJ7451-2	SAMP	SW846 9060A	358.1mg		1	19523.14605	20000 ug/gdrywt	39.	400	300	1400		
SJ7451-3	SAMP	SW846 9060A	338.9mg		1	18822.89066	19000 ug/gdrywt	39.	400	320	1500		
SJ7451-4	SAMP	SW846 9060A	310.6mg		1	20013.24083	20000 ug/gdrywt	36.	400	370	1800		
SJ7451-5	SAMP	SW846 9060A	342.9mg		1	23665.40681	24000 ug/gdrywt	32.	400	380	1800		
SJ7451-6	SAMP	SW846 9060A	398.7mg		1	22903.61604	23000 ug/gdrywt	32.	400	330	1600		
SJ7451-7	SAMP	SW846 9060A	412.6mg		1	20839.69331	21000 ug/gdrywt	33.	400	310	1500		
SJ7451-8	SAMP	SW846 9060A	401.4mg		1	21328.67918	21000 ug/gdrywt	36.	400	290	1400		
SJ7451-9	SAMP	SW846 9060A	341.9mg		1	20765.64607	21000 ug/gdrywt	43.	400	280	1300		
WG191518-1	MBLANK	SW846 9060A	500mg		1	0	U300 ug/gdrywt	NA	400	85.	400		
WG191518-2	LCS	SW846 9060A	40mg		1	407475	410000 ug/gdrywt	NA	400	85.	400		102
WG191518-3	MS	SW846 9060A	337mg		1	49942.34536	50000 ug/gdrywt	NA	400	320	1500		100
WG191518-4	MSD	SW846 9060A	387.5mg		1	44079.73178	44000 ug/gdrywt	NA	400	280	1300	12	93

Comments:

SJ7451-2	MS/MSD for TOC
WG191518-1	SJ7451-2
WG191518-2	SJ7451-2
WG191518-3	SJ7451-2
WG191518-4	SJ7451-2

Entered by: SE Date: 9.27.16 Accepted by: [signature] Date: 09/27/16

Katahdin Analytical Services 5000023

WET CHEMISTRY BATCH REPORT
Sep 27 2016, 04:26 pm
Batch: WG191518

Parameter: Toc In Soil(2)

Prep Date: N/A

Date Analyzed: 26-SEP-16

Prep Method: N/A

Analyst Initials: ZF

Prep Chemist: N/A

Sample	Samp Type	Method	Initial Amt.	Final Amt.	Rpt. DF	Result	Rpt Result	TS(%)	PQL	MDL	Adj PQL	RPD	%Rec
SJ7451-1	SAMP	SW846 9060A	363.4mg		1	18072.80596	18000 ug/gdrywt	38.	400	280	1300		

Comments:

SJ7451-2	MS/MSD for TOC
WG191518-1	SJ7451-2
WG191518-2	SJ7451-2
WG191518-3	SJ7451-2
WG191518-4	SJ7451-2

Entered by: SE Date: 9.27.16 Accepted by: [signature] Date: 09/27/16

Katahdin Analytical Services 5000024

WET CHEMISTRY BATCH REPORT
Sep 27 2016, 04:26 pm
Batch: WG191518

Parameter: Toc In Soil(3)

Prep Date: N/A

Date Analyzed: 26-SEP-16

Prep Method: N/A

Analyst Initials: ZF

Prep Chemist: N/A

Sample	Samp Type	Method	Initial Amt.	Final Amt.	Rpt. DF	Result	Rpt Result	TS(%)	PQL	MDL	Adj PQL	RPD	%Rec
SJ7451-1	SAMP	SW846 9060A	363.4mg		1	19014.27456	19000 ug/gdrywt	38.	400	300	1400		

Comments:

SJ7451-2	MS/MSD for TOC
WG191518-1	SJ7451-2
WG191518-2	SJ7451-2
WG191518-3	SJ7451-2
WG191518-4	SJ7451-2

Entered by: SL Date: 9.27.16 Accepted by: Date: 09/27/16

Katahdin Analytical Services 5000025

WET CHEMISTRY BATCH REPORT
Sep 27 2016, 04:26 pm
Batch: WG191518

Parameter: Toc In Soil(4)

Prep Date: N/A

Date Analyzed: 26-SEP-16

Prep Method: N/A

Analyst Initials: ZF

Prep Chemist: N/A

Sample	Samp Type	Method	Initial Amt.	Final Amt.	Rpt. DF	Result	Rpt Result	TS(%)	PQL	MDL	Adj PQL	RPD	%Rec
SJ7451-1	SAMP	SW846 9060A	363.4mg		1	18284.06995	18000 ug/gdrywt	38.	400	310	1400		

Comments:

SJ7451-2	MS/MSD for TOC
WG191518-1	SJ7451-2
WG191518-2	SJ7451-2
WG191518-3	SJ7451-2
WG191518-4	SJ7451-2

Entered by: CC Date: 9.27.16 Accepted by: Date: 09/27/16

Katahdin Analytical Services 5000026

WET CHEMISTRY BATCH REPORT
Sep 27 2016, 04:26 pm
Batch: WG191518

Parameter: Toc In Soil(Avg)

Prep Date: N/A

Date Analyzed: 26-SEP-16

Prep Method: N/A

Analyst Initials: ZF

Prep Chemist: N/A

Sample	Samp Type	Method	Initial Amt.	Final Amt.	Rpt. DF	Result	Rpt Result	TS(%)	PQL	MDL	Adj PQL	RPD	%Rec
SJ7451-1	SAMP	SW846 9060A	363.4mg		1	18646.08197	19000 ug/gdrywt	38.	400	300	1400		

Comments:

SJ7451-2	MS/MSD for TOC
WG191518-1	SJ7451-2
WG191518-2	SJ7451-2
WG191518-3	SJ7451-2
WG191518-4	SJ7451-2

Entered by: SL Date: 9.27.16 Accepted by: Date: 09/27/16

Katahdin Analytical Services 5000027

WG1915181 R3859935

Katahdin Analytical Services, Inc.

Carbon Analysis of Solid Samples - Shimadzu TOC-V_{CPH} / SSM-5000A

Analysis Type and Method (Check One)

____Total Carbon (SW846 9060M)	____Total Inorganic Carbon (SW846 9060M)
_X_Total Organic Carbon (SW846 9060)	____Other (Specify):
____Total Organic Carbon (Lloyd Kahn)	

Spiking Information		
LCS Spike Source ID / Compound:	WI14538	TV: 16,000 mg
CCV Spike Source ID / Compound:	WI14524	TV: 16,000 mg
MS Spike Source ID / Compound:	WI14538	TV: 4000 mg

Calibration Information	
Calibration Date:	9-23-16
Calibration Analyst:	ZF

% recovery

KATAHDIN Sample Number	Sample Wt. (mg)	Sample Type * (Circle One)	~~Spike Added (mg)~~
CCV	40	Wet (Dry)	101%
CCB	500	Wet (Dry)	
LCS	46	Wet (Dry)	107%
SJ7451-1	338.2	Wet (Dry)	
-1	389.3	Wet (Dry)	
-1	367.4	Wet (Dry)	
-1	363.4	Wet (Dry)	
-2	358.1	Wet (Dry)	
-2 MS	337.0	Wet (Dry)	
-2 MSD	387.5	Wet (Dry)	
-3	338.9	Wet (Dry)	
CCV	40	Wet (Dry)	105%
CCB	500	Wet (Dry)	
-4	310.6	Wet (Dry)	
-5	342.9	Wet (Dry)	
-6	398.7	Wet (Dry)	
-7	412.6	Wet (Dry)	
-8	461.4	Wet (Dry)	
-9	341.9	Wet (Dry)	
-10	829.3	Wet (Dry)	
-11	381.5	Wet (Dry)	
-12	350.1	Wet (Dry)	

* "Wet" = field-moist sample (as received). "Dry" = oven-dried sample.

Analyst: ZF	Analysis Date: 9-26-16
Reviewer:	Review Date: 09/27/16

Katahdin Analytical Services, Inc.

Carbon Analysis of Solid Samples - Shimadzu TOC-V_{CPH} / SSM-5000A

Analysis Type and Method (Check One)

_____Total Carbon (SW846 9060M)
_____Total Inorganic Carbon (SW846 9060M)
_____Total Organic Carbon (SW846 9060)
_____Other (Specify):
_____Total Organic Carbon (Lloyd Kahn)

Spiking Information	
LCS Spike Source ID / Compound:	Cont. from pg 83
CCV Spike Source ID / Compound:	
MS Spike Source ID / Compound:	

Calibration Information	
Calibration Date:	
Calibration Analyst:	

KATAHDIN Sample Number	Sample Wt. (mg)	Sample Type * (Circle One)	~~Spike Added (mg)~~ % recovery
SJ7451-13	316.7	Wet (Dry)	
CCV	40	Wet (Dry)	107
CCB	500	Wet (Dry)	
		Wet Dry	
		Wet Dry	
		Wet Dry	
		Wet Dry	
		Wet Dry	
		Wet Dry	
		Wet Dry	
		Wet Dry	
		Wet Dry	
		Wet Dry	
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		Wet Dry	
		Wet Dry	
		Wet Dry	
		Wet Dry	
		Wet Dry	
		Wet Dry	
		Wet Dry	
		Wet Dry	
		~~Wet~~ ~~Dry~~	

9.27.16 SE

* "Wet" = field-moist sample (as received). "Dry" = oven-dried sample.

Analyst: ZF	Analysis Date: 9-26-16
Reviewer:	Review Date: 09/27/16

	Sample Name	Dilution	Result	Comment	Date / Time
1	CCV	1.000	SSM-TC:16201 ug		9/26/2016 11:39:03 AM
2	CCB	1.000	SSM-TC:0.000 ug		9/26/2016 11:46:04 AM
3	LCS	1.000	SSM-TC:16299 ug		9/26/2016 12:03:54 PM
4	SJ7451-1	1.000	SSM-TC:2475 ug		9/26/2016 12:15:55 PM
5	SJ7451-1	1.000	SSM-TC:2679 ug		9/26/2016 12:26:33 PM
6	SJ7451-1	1.000	SSM-TC:2660 ug		9/26/2016 12:39:52 PM
7	SJ7451-1	1.000	SSM-TC:2530 ug		9/26/2016 12:54:59 PM
8	SJ7451-2	1.000	SSM-TC:2737 ug		9/26/2016 1:04:25 PM
9	SJ7451-2 MS	1.000	SSM-TC:6589 ug		9/26/2016 1:13:23 PM
10	SJ7451-2 MSD	1.000	SSM-TC:6687 ug		9/26/2016 2:12:44 PM
11	SJ7451-3	1.000	SSM-TC:2505 ug		9/26/2016 2:22:24 PM
12	CCV	1.000	SSM-TC:16848 ug		9/26/2016 2:32:21 PM
13	CCB	1.000	SSM-TC:0.000 ug		9/26/2016 2:43:31 PM
14	SJ7451-4	1.000	SSM-TC:2270 ug		9/26/2016 2:52:33 PM
15	SJ7451-5	1.000	SSM-TC:2628 ug		9/26/2016 3:02:54 PM
16	SJ7451-6	1.000	SSM-TC:2953 ug		9/26/2016 3:12:41 PM
17	SJ7451-7	1.000	SSM-TC:2854 ug		9/26/2016 3:25:43 PM
18	SJ7451-8	1.000	SSM-TC:3101 ug		9/26/2016 3:36:17 PM
19	SJ7451-9	1.000	SSM-TC:3084 ug		9/26/2016 4:00:42 PM
20	SJ7451-10	1.000	SSM-TC:3370 ug		9/26/2016 4:15:28 PM
21	SJ7451-11	1.000	SSM-TC:2973 ug		9/26/2016 4:25:39 PM
22	SJ7451-12	1.000	SSM-TC:2666 ug		9/26/2016 4:51:33 PM
23	SJ7451-13	1.000	SSM-TC:2552 ug		9/26/2016 5:04:40 PM
24	CCV	1.000	SSM-TC:17081 ug		9/26/2016 5:14:08 PM
25	CCB	1.000	SSM-TC:0.000 ug		9/26/2016 5:24:04 PM
26					
27					
28					
29					
30					

Instr.Information

System	SSM-5000A
Detector	Combustion
Catalyst	Regular Sensitivity
Cell Length	short

Sample

Sample Name:	CCV
Sample ID:	<Untitled>
Origin:	tc method SOILS.met
Chk. Result	

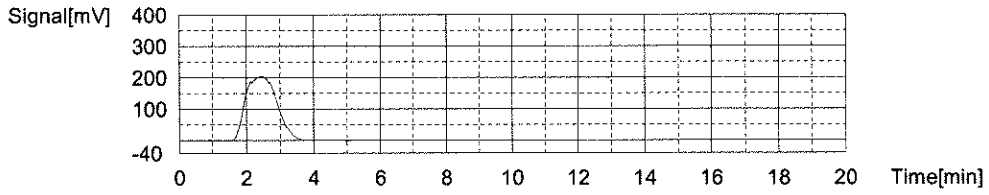
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:16201 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	1326	1326	16201ug	16201ug	40.00mg	40uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 11:39:03 AM

Mean Area	1326
Mean CNV	1326
Mean Conc.	16201ug



Sample

Sample Name:	CCB
Sample ID:	<Untitled>
Origin:	tc method SOILS.met
Chk. Result	

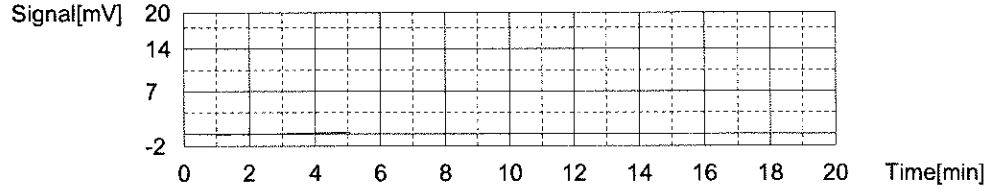
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:0.000 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	0.000	0.000	0.000ug	0.000ug	500.0mg	500uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 11:46:04 AM

Mean Area	0.000
Mean CNV	0.000
Mean Conc.	0.000ug



Katahdin Analytical Services 5000031

Sample

Sample Name: LCS
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

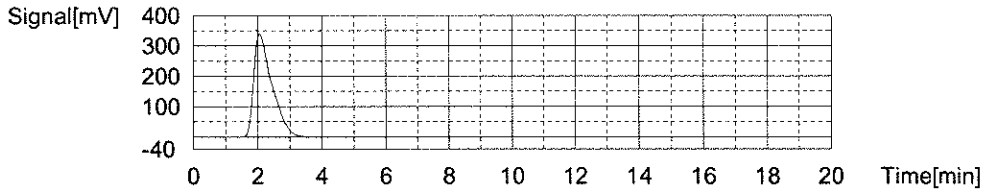
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:16299 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	1334	1334	16299ug	16299ug	40.00mg	40uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 12:03:54 PM

Mean Area 1334
Mean CNV 1334
Mean Conc. 16299ug



Sample

Sample Name: SJ7451-1
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

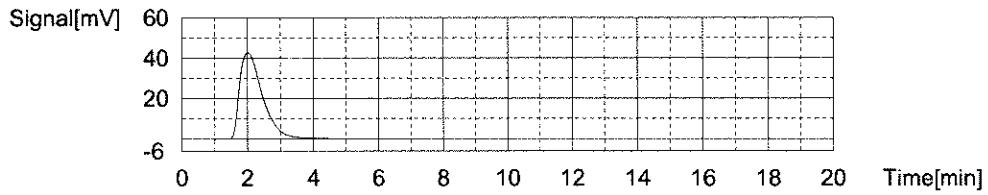
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2475 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	202.6	202.6	2475ug	2475ug	338.2mg	338uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 12:15:55 PM

Mean Area 202.6
Mean CNV 202.6
Mean Conc. 2475ug



Sample

Sample Name: SJ7451-1
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2679 ug

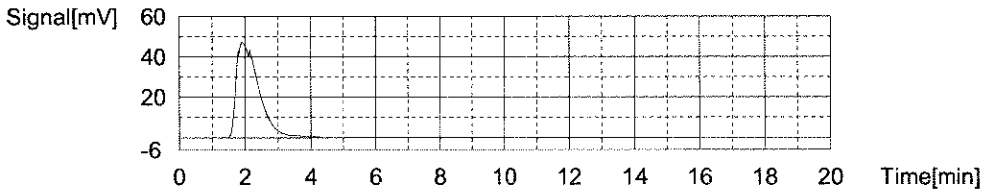
Katahdin Analytical Services 5000032

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	219.3	219.3	2679ug	2679ug	389.3mg	389uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 12:26:33 PM

Mean Area 219.3
Mean CNV 219.3
Mean Conc. 2679ug



Sample

Sample Name: SJ7451-1
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

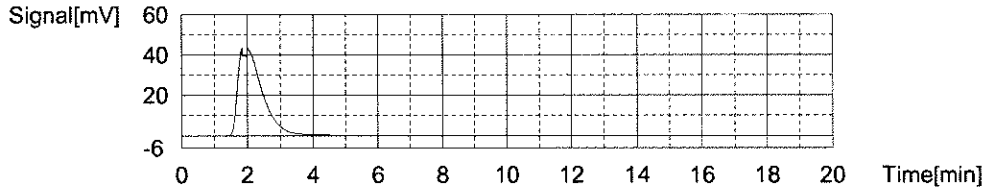
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2660 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	217.7	217.7	2660ug	2660ug	367.4mg	367uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 12:39:52 PM

Mean Area 217.7
Mean CNV 217.7
Mean Conc. 2660ug



Sample

Sample Name: SJ7451-1
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2530 ug

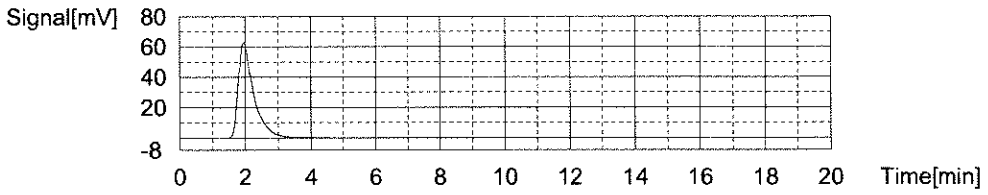
1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	207.1	207.1	2530ug	2530ug	363.4mg	363uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 12:54:59 PM

Katahdin Analytical Services 5000033

Mean Area 207.1
Mean CNV 207.1
Mean Conc. 2530ug



Sample

Sample Name: SJ7451-2
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

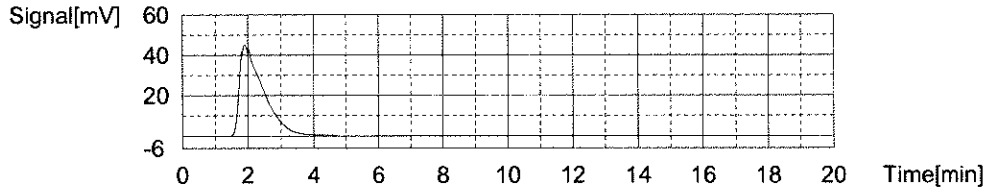
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2737 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	224.0	224.0	2737ug	2737ug	358.1mg	358uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 1:04:25 PM

Mean Area 224.0
Mean CNV 224.0
Mean Conc. 2737ug



Sample

Sample Name: SJ7451-2 MS
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

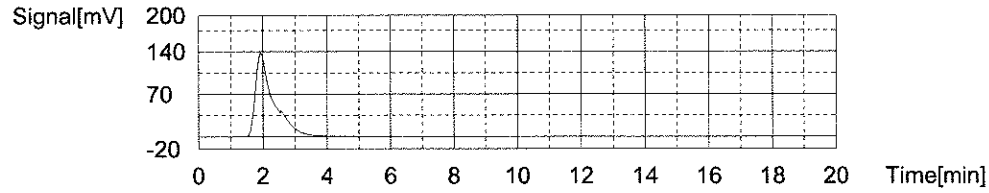
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:6589 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	539.3	539.3	6589ug	6589ug	337.0mg	337uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 1:13:23 PM

Mean Area 539.3
Mean CNV 539.3
Mean Conc. 6589ug



Katahdin Analytical Services 5000034

Sample

Sample Name: SJ7451-2 MSD
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

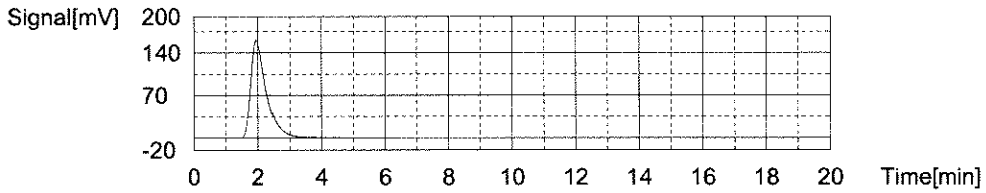
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:6687 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	547.3	547.3	6687ug	6687ug	387.5mg	387uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 2:12:44 PM

Mean Area 547.3
Mean CNV 547.3
Mean Conc. 6687ug



Sample

Sample Name: SJ7451-3
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

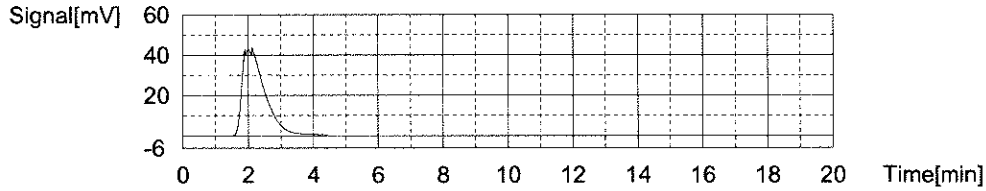
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2505 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	205.0	205.0	2505ug	2505ug	338.9mg	338uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 2:22:24 PM

Mean Area 205.0
Mean CNV 205.0
Mean Conc. 2505ug



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

Katahdin Analytical Services 5000035

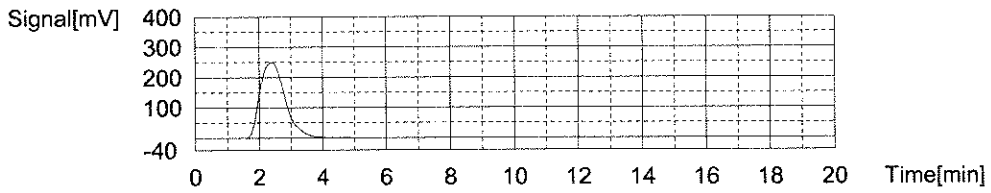
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:16848 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	1379	1379	16848ug	16848ug	40.00mg	40uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 2:32:21 PM

Mean Area 1379
Mean CNV 1379
Mean Conc. 16848ug



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

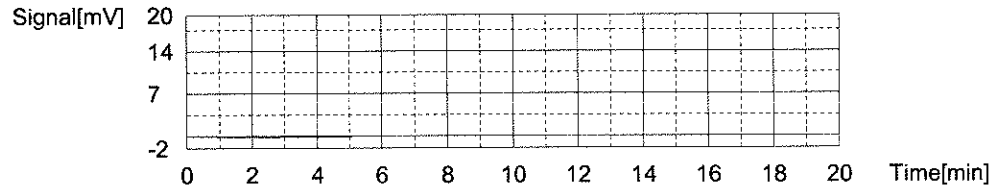
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:0.000 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	0.000	0.000	0.000ug	0.000ug	500.0mg	500uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 2:43:31 PM

Mean Area 0.000
Mean CNV 0.000
Mean Conc. 0.000ug



Sample

Sample Name: SJ7451-4
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2270 ug

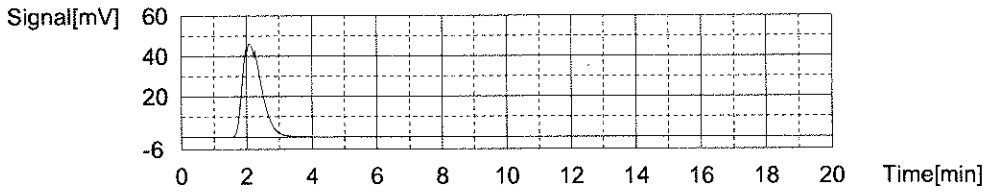
1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	185.8	185.8	2270ug	2270ug	310.6mg	310uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 2:52:33 PM

Katahdin Analytical Services 5000036

Mean Area 185.8
Mean CNV 185.8
Mean Conc. 2270ug



Sample

Sample Name: SJ7451-5
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

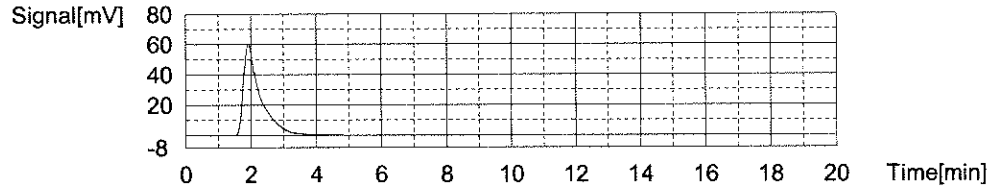
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2628 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	215.1	215.1	2628ug	2628ug	342.9mg	342uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 3:02:54 PM

Mean Area 215.1
Mean CNV 215.1
Mean Conc. 2628ug



Sample

Sample Name: SJ7451-6
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

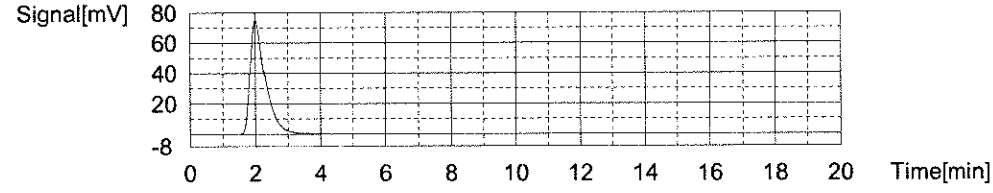
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2953 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	241.7	241.7	2953ug	2953ug	398.7mg	398uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 3:12:41 PM

Mean Area 241.7
Mean CNV 241.7
Mean Conc. 2953ug



Katahdin Analytical Services 5000037

Sample

Sample Name: SJ7451-7
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

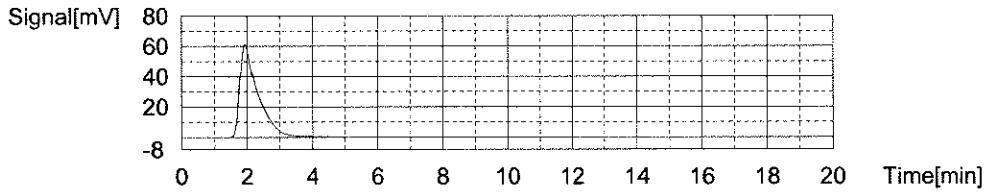
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2854 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	233.6	233.6	2854ug	2854ug	412.6mg	412uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 3:25:43 PM

Mean Area 233.6
Mean CNV 233.6
Mean Conc. 2854ug



Sample

Sample Name: SJ7451-8
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

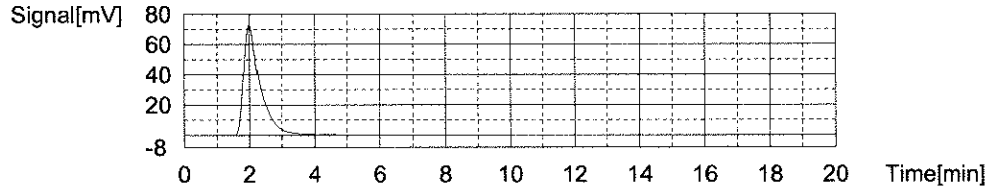
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:3101 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	253.8	253.8	3101ug	3101ug	401.4mg	401uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 3:36:17 PM

Mean Area 253.8
Mean CNV 253.8
Mean Conc. 3101ug



Sample

Sample Name: SJ7451-9
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

Katahdin Analytical Services 5000038

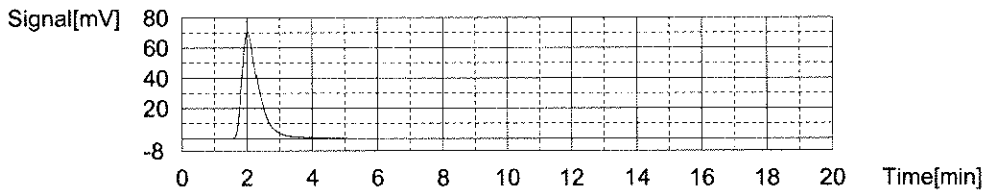
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:3084 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	252.4	252.4	3084ug	3084ug	341.9mg	341uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 4:00:42 PM

Mean Area 252.4
Mean CNV 252.4
Mean Conc. 3084ug



Sample

Sample Name: SJ7451-10
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

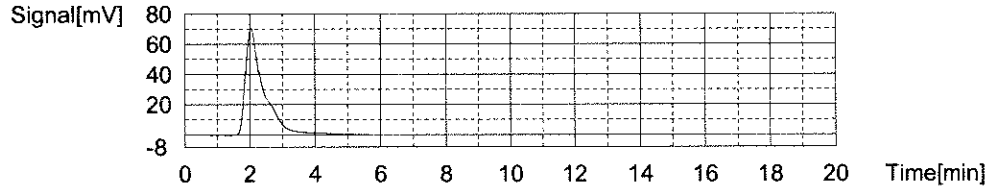
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:3370 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	275.8	275.8	3370ug	3370ug	329.3mg	329uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 4:15:28 PM

Mean Area 275.8
Mean CNV 275.8
Mean Conc. 3370ug



Sample

Sample Name: SJ7451-11
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2973 ug

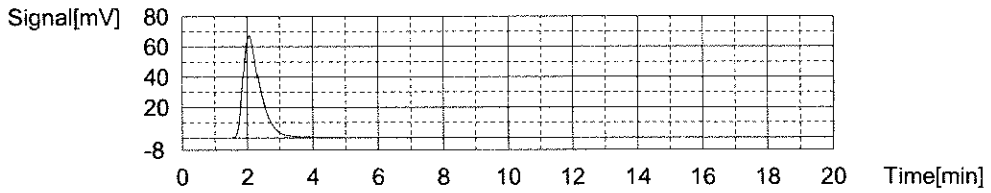
1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	243.3	243.3	2973ug	2973ug	381.5mg	381uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 4:25:39 PM

Katahdin Analytical Services 5000039

Mean Area 243.3
Mean CNV 243.3
Mean Conc. 2973ug



Sample

Sample Name: SJ7451-12
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

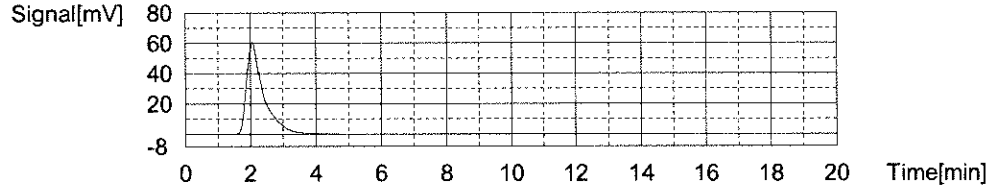
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2666 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	218.2	218.2	2666ug	2666ug	350.1mg	350uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 4:51:33 PM

Mean Area 218.2
Mean CNV 218.2
Mean Conc. 2666ug



Sample

Sample Name: SJ7451-13
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

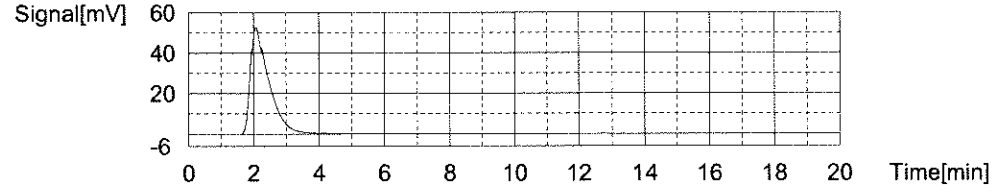
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2552 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	208.9	208.9	2552ug	2552ug	316.7mg	316uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 5:04:40 PM

Mean Area 208.9
Mean CNV 208.9
Mean Conc. 2552ug



Katahdin Analytical Services 5000040

Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

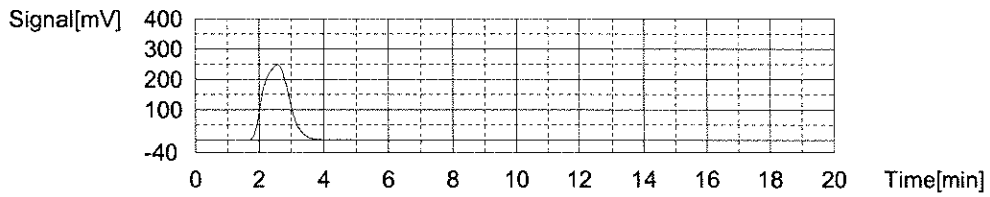
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:17081 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	1398	1398	17081ug	17081ug	40.00mg	40uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 5:14:08 PM

Mean Area 1398
Mean CNV 1398
Mean Conc. 17081ug



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

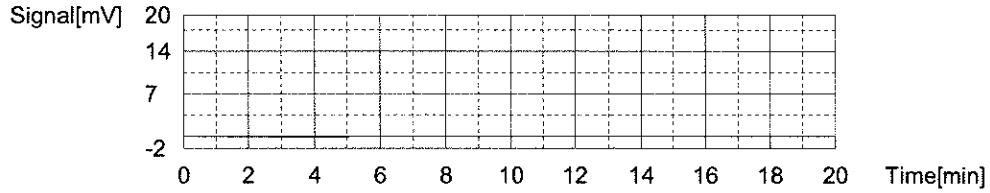
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:0.000 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	0.000	0.000	0.000ug	0.000ug	500.0mg	500uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/26/2016 5:24:04 PM

Mean Area 0.000
Mean CNV 0.000
Mean Conc. 0.000ug



Katahdin Analytical Services 5000041

Instr.Information

System	SSM-5000A
Detector	Combustion
Catalyst	Regular Sensitivity
Cell Length	short

Cal. Curve

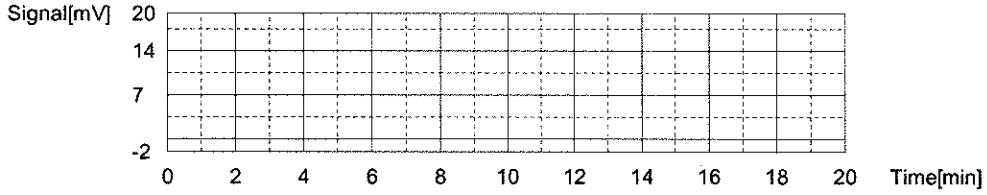
Sample Name:	Untitled
Sample ID:	Untitled
Cal. Curve:	toc sl cal 092316.2016_09_23_11_13_53.cal

Type	Anal.	Density
Standard	SSM-TC	

AbsC: 0.000ug

No.	Area	CNV	Abs C	Weight	Rem.	Ex.	Date / Time
1	0.000	0.000	0.000ug	500.0mg	********		9/23/2016 11:26:02 AM

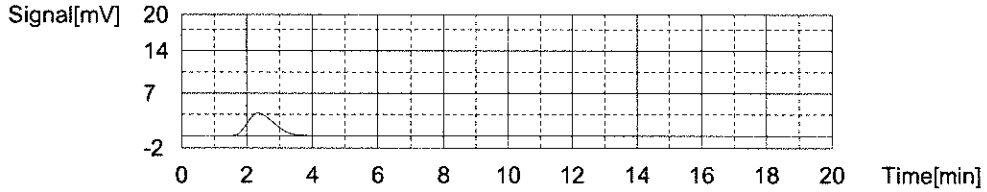
Mean Area 0.000
Mean CNV 0.000



AbsC: 200.0ug

No.	Area	CNV	Abs C	Weight	Rem.	Ex.	Date / Time
1	20.30	20.30	200.0ug	0.5000mg	********		9/23/2016 11:39:24 AM

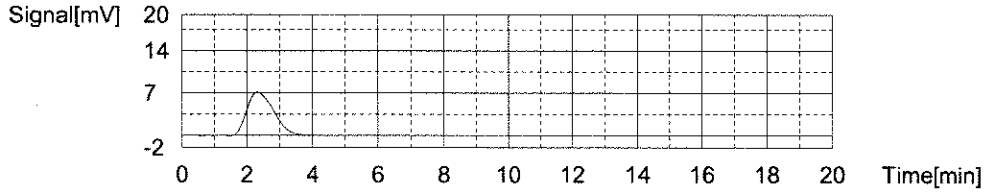
Mean Area 20.30
Mean CNV 20.30



AbsC: 400.0ug

No.	Area	CNV	Abs C	Weight	Rem.	Ex.	Date / Time
1	40.14	40.14	400.0ug	1.000mg	********		9/23/2016 11:52:17 AM

Mean Area 40.14
Mean CNV 40.14

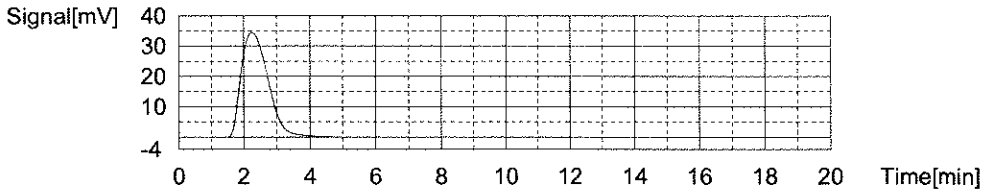


AbsC: 2000ug

No.	Area	CNV	Abs C	Weight	Rem.	Ex.	Date / Time
1	194.2	194.2	2000ug	5.000mg	********		9/23/2016 12:04:40 PM

Katahdin Analytical Services 5000042

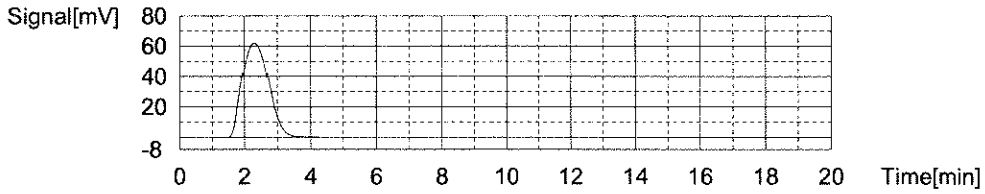
Mean Area 194.2
Mean CNV 194.2



AbsC: 4000ug

No.	Area	CNV	Abs C	Weight	Rem.	Ex.	Date / Time
1	347.2	347.2	4000ug	10.00mg	*******		9/23/2016 12:22:11 PM

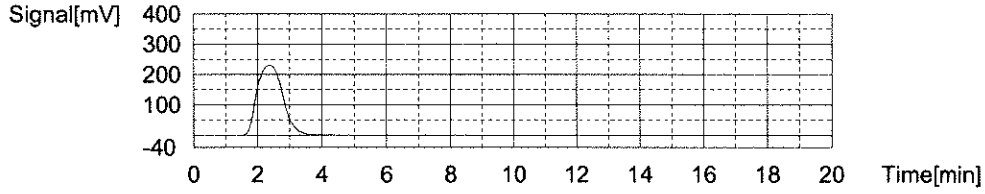
Mean Area 347.2
Mean CNV 347.2



AbsC: 16000ug

No.	Area	CNV	Abs C	Weight	Rem.	Ex.	Date / Time
1	1283	1283	16000ug	40.00mg	*******		9/23/2016 12:31:19 PM

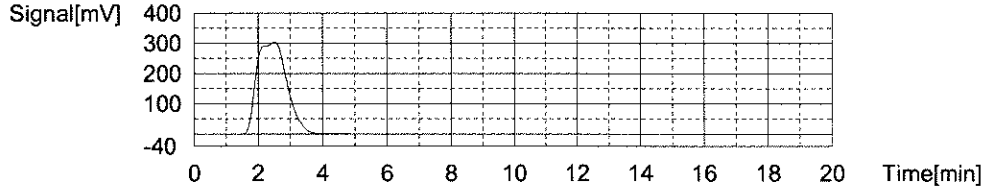
Mean Area 1283
Mean CNV 1283



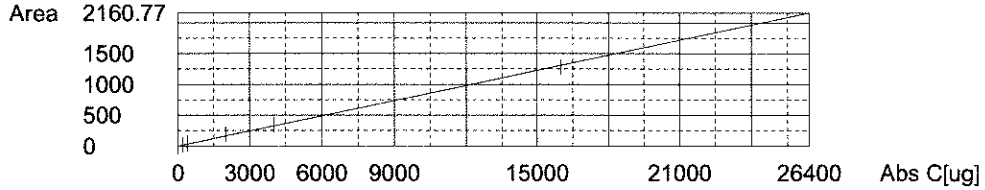
AbsC: 24000ug

No.	Area	CNV	Abs C	Weight	Rem.	Ex.	Date / Time
1	1994	1994	24000ug	60.00mg	*******		9/23/2016 12:43:04 PM

Mean Area 1994
Mean CNV 1994



Slope: 0.08185
Intercept 0.000
r^2 0.999345



Katahdin Analytical Services 5000043

TOTAL SOLIDS BATCH REPORT
Sep 22 2016, 03:22 pm
Batch: WG191091

Sample	Matrix	Type	Prep Date	Tare	Initial	Final1	Final	by	Date	Raw TS	Rep TS	Recovery	RPD
SJ7341-10	SL	SAMP	21-SEP-16	1.29 g	31.1474 g	25.48 g	25.479 g	AP	22-SEP-16	81.0150	81. %		
SJ7341-11	SL	SAMP	21-SEP-16	1.29 g	20.2368 g	19.3859 g	19.386 g	AP	22-SEP-16	95.5100	96. %		
SJ7341-12	SL	SAMP	21-SEP-16	1.29 g	28.8468 g	24.2677 g	24.2651 g	AP	22-SEP-16	83.3740	83. %		
SJ7341-13	SL	SAMP	21-SEP-16	1.29 g	21.7297 g	20.9699 g	20.9675 g	AP	22-SEP-16	96.2710	96. %		
SJ7341-14	SL	SAMP	21-SEP-16	1.29 g	5 g	5 g	5 g	AP	22-SEP-16	100.0000	100 %		
SJ7341-8	SL	SAMP	21-SEP-16	1.29 g	21.0323 g	17.7276 g	17.7246 g	AP	22-SEP-16	83.2460	83. %		
SJ7341-9	SL	SAMP	21-SEP-16	1.29 g	22.3174 g	21.0216 g	21.0204 g	AP	22-SEP-16	93.8320	94. %		
SJ7451-1	SL	SAMP	21-SEP-16	1.29 g	29.2549 g	11.942 g	11.9383 g	AP	22-SEP-16	38.0770	38. %		
SJ7451-10	SL	SAMP	21-SEP-16	1.29 g	35.065 g	17.7717 g	17.7723 g	AP	22-SEP-16	48.8000	49. %		
SJ7451-11	SL	SAMP	21-SEP-16	1.29 g	29.0087 g	12.728 g	12.7278 g	AP	22-SEP-16	41.2640	41. %		
SJ7451-12	SL	SAMP	21-SEP-16	1.29 g	23.286 g	9.6452 g	9.6439 g	AP	22-SEP-16	37.9790	38. %		
SJ7451-13	SL	SAMP	21-SEP-16	1.29 g	22.8535 g	10.2723 g	10.2702 g	AP	22-SEP-16	41.6450	42. %		
SJ7451-2	SL	SAMP	21-SEP-16	1.29 g	22.0836 g	9.4297 g	9.4305 g	AP	22-SEP-16	39.1490	39. %		
SJ7451-3	SL	SAMP	21-SEP-16	1.29 g	30.2749 g	12.6699 g	12.672 g	AP	22-SEP-16	39.2690	39. %		
SJ7451-4	SL	SAMP	21-SEP-16	1.29 g	20.5635 g	8.3287 g	8.3284 g	AP	22-SEP-16	36.5180	36. %		
SJ7451-5	SL	SAMP	21-SEP-16	1.29 g	25.2859 g	9.0611 g	9.0611 g	AP	22-SEP-16	32.3850	32. %		
SJ7451-6	SL	SAMP	21-SEP-16	1.29 g	28.0165 g	9.9337 g	9.9328 g	AP	22-SEP-16	32.3380	32. %		
SJ7451-7	SL	SAMP	21-SEP-16	1.29 g	33.782 g	12.0761 g	12.0746 g	AP	22-SEP-16	33.1920	33. %		
SJ7451-8	SL	SAMP	21-SEP-16	1.29 g	34.9181 g	13.4683 g	13.4705 g	AP	22-SEP-16	36.2210	36. %		
SJ7451-9	SL	SAMP	21-SEP-16	1.29 g	37.0985 g	16.8405 g	16.8447 g	AP	22-SEP-16	43.4380	43. %		
SJ7515-1	SL	SAMP	21-SEP-16	1.29 g	24.31 g	21.9155 g	21.9171 g	AP	22-SEP-16	89.6050	90. %		
WG191091-1	SL	MBLANK	21-SEP-16	1.29 g	5.6207 g	5.6194 g	5.6202 g	AP	22-SEP-16	99.9880	100 %		
WG191091-2	SL	LCS	21-SEP-16	1.29 g	6.2111 g	5.713 g	5.7137 g	AP	22-SEP-16	89.8920	90. %	100	
WG191091-3	SL	DUP	21-SEP-16	1.29 g	16.9449 g	15.398 g	15.4015 g	AP	22-SEP-16	90.1410	90. %		0
WG191091-4	SL	DUP	21-SEP-16	1.29 g	31.6437 g	13.9692 g	13.9689 g	AP	22-SEP-16	41.7700	42. %		0

Comments:

SJ7341-11	NASB-04-DUP01-091216
SJ7341-14	TB, no TS jar.
SJ7451-2	MS/MSD for TOC
WG191091-1	SJ7515-1
WG191091-2	SJ7515-1
WG191091-3	SJ7515-1
WG191091-4	SJ7451-13

Entered by: SC Date: 9.22.16 Accepted by: [signature] Date: 09/22/16

Katahdin Analytical Services 5000044

Katahdin
ANALYTICAL SERVICES

Katahdin Analytical Services

Work Group Report (wk02)

21-SEP-16 07:00 PM

Work Group: WG191091 R385165
Department: 100 Wetlab Prep

Operator:

Created: 21-SEP-16
Due:

Tin	Sample	Account Name	Product	Matrix	Status	UA	Workdate	PR Location
73	SJ7341-8	Tetra Tech NUS, Inc.	TS-ME	Solid	WIP	U	03-OCT-16	
74	SJ7341-9	Tetra Tech NUS, Inc.	TS-ME	Solid	WIP	U	03-OCT-16	
75	SJ7341-10	Tetra Tech NUS, Inc.	TS-ME	Solid	WIP	U	03-OCT-16	
76	SJ7341-11	Tetra Tech NUS, Inc.	TS-ME	Solid	WIP	U	03-OCT-16	
77	SJ7341-12	Tetra Tech NUS, Inc.	TS-ME	Solid	WIP	U	03-OCT-16	
78	SJ7341-13	Tetra Tech NUS, Inc.	TS-ME	Solid	WIP	U	03-OCT-16	
TB ~~79~~	SJ7341-14	Tetra Tech NUS, Inc.	TS-ME	Solid	WIP	U	03-OCT-16	
80	SJ7451-1	Battelle	TS-ME	Solid	WIP	U	28-SEP-16	
81	SJ7451-2	Battelle	TS-ME	Solid	WIP	U	28-SEP-16	
82	SJ7451-3	Battelle	TS-ME	Solid	WIP	U	28-SEP-16	
83	SJ7451-4	Battelle	TS-ME	Solid	WIP	U	28-SEP-16	
84	SJ7451-5	Battelle	TS-ME	Solid	WIP	U	28-SEP-16	
85	SJ7451-6	Battelle	TS-ME	Solid	WIP	U	28-SEP-16	
86	SJ7451-7	Battelle	TS-ME	Solid	WIP	U	28-SEP-16	
87	SJ7451-8	Battelle	TS-ME	Solid	WIP	U	28-SEP-16	
88	SJ7451-9	Battelle	TS-ME	Solid	WIP	U	28-SEP-16	
89	SJ7451-10	Battelle	TS-ME	Solid	WIP	U	28-SEP-16	
90	SJ7451-11	Battelle	TS-ME	Solid	WIP	U	28-SEP-16	
91	SJ7451-12	Battelle	TS-ME	Solid	WIP	U	28-SEP-16	
92	SJ7451-13	Battelle	TS-ME	Solid	WIP	U	28-SEP-16	
93	SJ7515-1	Tetra Tech NUS, Inc.	TS-ME	Solid	WIP	U	08-OCT-16	
94	WG191091-1	MBLANK	TS-ME	Solid	WIP	U	21-SEP-16	
95	WG191091-2	LCS	TS-ME	Solid	WIP	U	21-SEP-16	
96	WG191091-3	DUP	TS-ME	Solid	WIP	U	21-SEP-16	
97	WG191091-4	DUP	TS-ME	Solid	WIP	U	21-SEP-16	

Comments:

SJ7341-11	NASB-04-DUP01-091216
SJ7341-14	TB, no TS jar.
SJ7451-2	MS/MSD for TOC
WG191091-1	SJ7515-1
WG191091-2	SJ7515-1
WG191091-3	SJ7515-1
WG191091-4	SJ7451-13

Total Solids: SM2540 G / ASTM D2216			PQL: 0.10%	Oven ID: 107N0042		Balance Calibrated?
TS	In 1	In 2	TS	Out 1	Out 1	Y / N
ANALYST IN:	AP	AP	ANALYST OUT:	~~AP~~ SC	AP	In: ✓
DATE IN:	9/21/16	9/22/16	DATE OUT:	9/22/16	9/22/16	Out (TS): ✓
TIME IN:	1936	1030	TIME OUT:	0833	1130	Balance ID:
TEMP IN:	104	104	TEMP OUT:	101	104	S/N 1124016031

APPENDIX H

TISSUE CHEMISTRY LAB RESULTS

DAMOS 2016 - Rockland Disposal Site Sample ID Summary - TISSUE

STUDY_ID	SURVEY_ID	STATION_ID	SAMPLE_ID	MATRIX	TAXON NAME	LAB	LAB_SAMPLE_ID
DAMOS16	RDS	EREF-01	RAH-006	TS	Nephtys	Battelle	K2625-BD
DAMOS16	RDS	EREF-01	RAH-006	TS	Nephtys	Battelle	K2625-P
DAMOS16	RDS	EREF-01	RAH-006	TS	Nephtys	ESI	28411-004
DAMOS16	RDS	EREF-03	RAH-005	TS	Nephtys	Battelle	K2626-BD
DAMOS16	RDS	EREF-03	RAH-005	TS	Nephtys	Battelle	K2626-P
DAMOS16	RDS	EREF-03	RAH-005	TS	Nephtys	ESI	28411-005
DAMOS16	RDS	EREF-04	RAH-004	TS	Nephtys	Battelle	K2627-BD
DAMOS16	RDS	EREF-04	RAH-004	TS	Nephtys	Battelle	K2627-P
DAMOS16	RDS	EREF-04	RAH-004	TS	Nephtys	ESI	28411-006
DAMOS16	RDS	RDS-04	RAH-002	TS	Nephtys	Battelle	K2623-BD
DAMOS16	RDS	RDS-04	RAH-002	TS	Nephtys	Battelle	K2623-P
DAMOS16	RDS	RDS-04	RAH-002	TS	Nephtys	ESI	28411-002
DAMOS16	RDS	RDS-08	RAH-003	TS	Nephtys	Battelle	K2624-BD
DAMOS16	RDS	RDS-08	RAH-003	TS	Nephtys	Battelle	K2624-P
DAMOS16	RDS	RDS-08	RAH-003	TS	Nephtys	ESI	28411-003
DAMOS16	RDS	RDS-09	RAH-001	TS	Nephtys	Battelle	K2622-BD
DAMOS16	RDS	RDS-09	RAH-001	TS	Nephtys	Battelle	K2622-P
DAMOS16	RDS	RDS-09	RAH-001	TS	Nephtys	ESI	28411-001

			Study Id	DAMOS16	DAMOS16	DAMOS16	DAMOS16
			Survey Id	RDS	RDS	RDS	RDS
			Station Id	EREF-01	EREF-01	EREF-03	EREF-03
			Sample Id	RAH-006	RAH-006	RAH-005	RAH-005
			Field Qc Code	SA	SA	SA	SA
			Lab Qc Code	SA	SA	SA	SA
			Taxon Name	Nephtys	Nephtys	Nephtys	Nephtys
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
MISC	LIPIDS	Percent Lipids (B&D)	PCT_WETWT	1.79		1.82	
MISC	PCT_SOLIDS	Percent Solids	PCT	16.15		17	
CONG	31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	UG/KG_WETWT	0.378		0.067	U
CONG	32598-10-0	2,3',4,4'-Tetrachlorobiphenyl	UG/KG_WETWT	0.106	U	0.104	U
CONG	32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	UG/KG_WETWT	0.0606	U	0.0596	U
CONG	34883-43-7	2,4'-Dichlorobiphenyl	UG/KG_WETWT	0.151	U	0.148	U
CONG	35065-27-1	2,2',4,4',5,5'-Hexachlorobiphenyl	UG/KG_WETWT	0.083	U	0.0817	U
CONG	35065-28-2	2,2',3,4,4',5'-Hexachlorobiphenyl	UG/KG_WETWT	0.293		0.067	U
CONG	35065-29-3	2,2',3,4,4',5,5'-Heptachlorobiphenyl	UG/KG_WETWT	0.0606	U	0.0596	U
CONG	35065-30-6	2,2',3,3',4,4',5-Heptachlorobiphenyl	UG/KG_WETWT	0.068	U	0.067	U
CONG	35693-99-3	2,2',5,5'-Tetrachlorobiphenyl	UG/KG_WETWT	0.113	U	0.111	U
CONG	37680-65-2	2,2',5-Trichlorobiphenyl	UG/KG_WETWT	0.068	U	0.067	U
CONG	37680-73-2	2,2',4,5,5'-Pentachlorobiphenyl	UG/KG_WETWT	0.068	U	0.067	U
CONG	38380-02-8	2,2',3,4,5'-Pentachlorobiphenyl	UG/KG_WETWT	0.615		0.168	
CONG	38380-07-3	2,2',3,3',4,4'-Hexachlorobiphenyl	UG/KG_WETWT	0.0755	U	0.0744	U
CONG	40186-72-9	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	UG/KG_WETWT	0.0454	U	0.0447	U
CONG	41464-39-5	2,2',3,5'-Tetrachlorobiphenyl	UG/KG_WETWT	0.0606	U	0.0596	U
CONG	41464-40-8	2,2',4,5'-Tetrachlorobiphenyl	UG/KG_WETWT	0.21		0.052	U
CONG	52663-68-0	2,2',3,4',5,5',6-Heptachlorobiphenyl	UG/KG_WETWT	0.0528	U	0.052	U
CONG	52663-69-1	2,2',3,4,4',5',6-Heptachlorobiphenyl	UG/KG_WETWT	0.0528	U	0.052	U
CONG	52663-78-2	2,2',3,3',4,4',5,6-Octachlorobiphenyl	UG/KG_WETWT	0.0454	U	0.0447	U
CONG	7012-37-5	2,4,4'-Trichlorobiphenyl	UG/KG_WETWT	0.083	U	0.0817	U
CONG	74472-48-3	2,2',3,4,4',6,6'-Heptachlorobiphenyl	UG/KG_WETWT	0.121	U	0.119	U
CONG	C-2051-24-3	Decachlorobiphenyl - Congener	UG/KG_WETWT	0.083	U	0.0817	U
	TOTAL_PCB	**Total NS&T PCB *2 (ND as 1/2 MDL)**	UG/KG_WETWT	2.5659		1.3377	U
CONGSURR	CS-37680-68-5	2,3',5'-Trichlorobiphenyl	PCT_REC	93		92	
CONGSURR	CS-68194-09-2	2,2',3,5,6,6'-Hexachlorobiphenyl	PCT_REC	86		87	
PEST	1024-57-3	heptachlor epoxide	UG/KG_WETWT	0.083	U	0.0817	U
PEST	1031-07-8	Endosulfan sulfate	UG/KG_WETWT	0.0606	U	0.0596	U
PEST	309-00-2	aldrin	UG/KG_WETWT	0.068	U	0.067	U
PEST	319-84-6	alpha-BHC	UG/KG_WETWT	0.113	U	0.111	U
PEST	319-85-7	beta-BHC	UG/KG_WETWT	0.0606	U	0.0596	U
PEST	319-86-8	delta-BHC	UG/KG_WETWT	0.0528	U	0.052	U
PEST	33213-65-9	Endosulfan II	UG/KG_WETWT	0.083	U	0.0817	U
PEST	50-29-3	4,4'-DDT	UG/KG_WETWT	0.0606	U	0.0596	U
PEST	5103-71-9	alpha-chlordane	UG/KG_WETWT	0.0528	U	0.052	U
PEST	5103-74-2	gamma-chlordane	UG/KG_WETWT	0.0907	U	0.0893	U
PEST	57-74-9	chlordane	UG/KG_WETWT				
PEST	58-89-9	hexachlorocyclohexane, gamma	UG/KG_WETWT	0.083	U	0.0817	U
PEST	60-57-1	dieldrin	UG/KG_WETWT	0.0454	U	0.0447	U
PEST	72-20-8	endrin	UG/KG_WETWT	0.0606	U	0.0596	U
PEST	72-43-5	methoxychlor	UG/KG_WETWT	0.838	U	0.825	U
PEST	72-54-8	4,4'-DDD	UG/KG_WETWT	0.0528	U	0.052	U
PEST	72-55-9	4,4'-DDE	UG/KG_WETWT	0.222		0.2	
PEST	76-44-8	heptachlor	UG/KG_WETWT	0.0528	U	0.052	U
PEST	8001-35-2	Toxaphene	UG/KG_WETWT	12.9	U	12.7	U
PEST	959-98-8	Endosulfan I	UG/KG_WETWT	0.0755	U	0.0744	U
SVOC	120-12-7	Anthracene	UG/KG_WETWT	0.147	U	0.145	U
SVOC	129-00-0	Pyrene	UG/KG_WETWT	0.724		0.678	
SVOC	191-24-2	Benzo(G,H,I)Perylene	UG/KG_WETWT	0.364	J	0.318	J
SVOC	193-39-5	Indeno(1,2,3-Cd)Pyrene	UG/KG_WETWT	0.132	U	0.13	U
SVOC	205-99-2	Benzo(B)Fluoranthene	UG/KG_WETWT	0.321	J	0.278	J
SVOC	206-44-0	Fluoranthene	UG/KG_WETWT	0.858		0.782	
SVOC	207-08-9	Benzo(K)Fluoranthene	UG/KG_WETWT	0.191	J	0.14	J
SVOC	208-96-8	Acenaphthylene	UG/KG_WETWT	0.147	U	0.145	U
SVOC	218-01-9	Chrysene	UG/KG_WETWT	0.418	J	0.387	J
SVOC	50-32-8	Benzo(A)Pyrene	UG/KG_WETWT	0.291	U	0.286	U
SVOC	53-70-3	Dibenz(A,H)Anthracene	UG/KG_WETWT	0.117	U	0.115	U

			Study Id	DAMOS16	DAMOS16	DAMOS16	DAMOS16
			Survey Id	RDS	RDS	RDS	RDS
			Station Id	EREF-01	EREF-01	EREF-03	EREF-03
			Sample Id	RAH-006	RAH-006	RAH-005	RAH-005
			Field Qc Code	SA	SA	SA	SA
			Lab Qc Code	SA	SA	SA	SA
			Taxon Name	Nephtys	Nephtys	Nephtys	Nephtys
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
SVOC	56-55-3	Benzo(A)Anthracene	UG/KG_WETWT	1.58		0.342	J
SVOC	83-32-9	Acenaphthene	UG/KG_WETWT	0.147	U	0.145	U
SVOC	85-01-8	Phenanthrene	UG/KG_WETWT	0.776		0.592	J
SVOC	86-73-7	Fluorene	UG/KG_WETWT	0.239	J	0.19	J
SVOC	90-12-0	1-Methylnaphthalene	UG/KG_WETWT	0.977		0.697	
SVOC	91-57-6	2-Methylnaphthalene	UG/KG_WETWT	1.31		0.928	
EPH	91-20-3	Naphthalene	UG/KG_WETWT	11.2		10.8	
	TOTAL_PAH	**Total PAH (ND as 1/2 MDL)**	UG/KG_WETWT	19.4485		16.615	
SVOCSURR	SV-1146-65-2	Naphthalene-d8	PCT_REC	81		81	
SVOCSURR	SV-15067-26-2	Acenaphthene-d10	PCT_REC	86		84	
SVOCSURR	SV-1517-22-2	Phenanthrene-d10	PCT_REC	87		88	
SVOCSURR	SV-63466-71-7	Benzo(A)pyrene-d12	PCT_REC	94		90	
MET	7439-92-1	Lead	MG/KG_WETWT	0.31		0.26	
MET	7439-97-6	Mercury	MG/KG_WETWT	0.008		0.009	
MET	7440-02-0	Nickel	MG/KG_WETWT	0.37		0.4	
MET	7440-38-2	Arsenic	MG/KG_WETWT	7.63		7.6	
MET	7440-43-9	Cadmium	MG/KG_WETWT	0.061		0.069	
MET	7440-47-3	Chromium	MG/KG_WETWT	0.05		0.052	
MET	7440-50-8	Copper	MG/KG_WETWT	0.53		0.61	
MET	7440-66-6	Zinc	MG/KG_WETWT	20.8		20.1	
MET	NBH008	Percent Moisture - Metals	PCT_MST	84.8		84.8	

J value reported above MDL but below RL

U not detected above MDL; MDL value reported.

			Study Id	DAMOS16	DAMOS16	DAMOS16	DAMOS16
			Survey Id	RDS	RDS	RDS	RDS
			Station Id	EREF-04	EREF-04	RDS-04	RDS-04
			Sample Id	RAH-004	RAH-004	RAH-002	RAH-002
			Field Qc Code	SA	SA	SA	SA
			Lab Qc Code	SA	SA	SA	SA
			Taxon Name	Nephtys	Nephtys	Nephtys	Nephtys
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
MISC	LIPIDS	Percent Lipids (B&D)	PCT_WETWT	1.72		1.37	
MISC	PCT_SOLIDS	Percent Solids	PCT	16.75		15.08	
CONG	31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	UG/KG_WETWT	0.0542	U	0.104	U
CONG	32598-10-0	2,3',4,4'-Tetrachlorobiphenyl	UG/KG_WETWT	0.0842	U	0.56	
CONG	32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	UG/KG_WETWT	0.0483	U	0.195	
CONG	34883-43-7	2,4'-Dichlorobiphenyl	UG/KG_WETWT	0.12	U	0.23	U
CONG	35065-27-1	2,2',4,4',5,5'-Hexachlorobiphenyl	UG/KG_WETWT	0.0662	U	0.127	U
CONG	35065-28-2	2,2',3,4,4',5'-Hexachlorobiphenyl	UG/KG_WETWT	0.153		0.104	U
CONG	35065-29-3	2,2',3,4,4',5,5'-Heptachlorobiphenyl	UG/KG_WETWT	0.0483	U	0.0925	U
CONG	35065-30-6	2,2',3,3',4,4',5-Heptachlorobiphenyl	UG/KG_WETWT	0.0542	U	0.104	U
CONG	35693-99-3	2,2',5,5'-Tetrachlorobiphenyl	UG/KG_WETWT	0.0902	U	0.173	U
CONG	37680-65-2	2,2',5-Trichlorobiphenyl	UG/KG_WETWT	0.0542	U	0.104	U
CONG	37680-73-2	2,2',4,5,5'-Pentachlorobiphenyl	UG/KG_WETWT	0.0542	U	0.104	U
CONG	38380-02-8	2,2',3,4,5'-Pentachlorobiphenyl	UG/KG_WETWT	0.211		0.207	
CONG	38380-07-3	2,2',3,3',4,4'-Hexachlorobiphenyl	UG/KG_WETWT	0.0602	U	0.115	U
CONG	40186-72-9	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	UG/KG_WETWT	0.0362	U	0.212	
CONG	41464-39-5	2,2',3,5'-Tetrachlorobiphenyl	UG/KG_WETWT	0.0483	U	0.0925	U
CONG	41464-40-8	2,2',4,5'-Tetrachlorobiphenyl	UG/KG_WETWT	0.0421	U	0.528	
CONG	52663-68-0	2,2',3,4',5,5',6-Heptachlorobiphenyl	UG/KG_WETWT	0.0421	U	0.0807	U
CONG	52663-69-1	2,2',3,4,4',5',6-Heptachlorobiphenyl	UG/KG_WETWT	0.0421	U	0.0807	U
CONG	52663-78-2	2,2',3,3',4,4',5,6-Octachlorobiphenyl	UG/KG_WETWT	0.0362	U	0.0693	U
CONG	7012-37-5	2,4,4'-Trichlorobiphenyl	UG/KG_WETWT	0.0662	U	0.127	U
CONG	74472-48-3	2,2',3,4,4',6,6'-Heptachlorobiphenyl	UG/KG_WETWT	0.0964	U	0.185	U
CONG	C-2051-24-3	Decachlorobiphenyl - Congener	UG/KG_WETWT	0.0662	U	0.127	U
	TOTAL_PCB	**Total NS&T PCB *2 (ND as 1/2 MDL)**	UG/KG_WETWT	1.3354		3.688	
CONGSURR	CS-37680-68-5	2,3',5'-Trichlorobiphenyl	PCT_REC	88		84	
CONGSURR	CS-68194-09-2	2,2',3,5,6,6'-Hexachlorobiphenyl	PCT_REC	86		77	
PEST	1024-57-3	heptachlor epoxide	UG/KG_WETWT	0.0662	U	0.127	U
PEST	1031-07-8	Endosulfan sulfate	UG/KG_WETWT	0.0483	U	0.0925	U
PEST	309-00-2	aldrin	UG/KG_WETWT	0.0542	U	0.104	U
PEST	319-84-6	alpha-BHC	UG/KG_WETWT	0.0902	U	0.173	U
PEST	319-85-7	beta-BHC	UG/KG_WETWT	0.0483	U	0.0925	U
PEST	319-86-8	delta-BHC	UG/KG_WETWT	0.0421	U	0.0807	U
PEST	33213-65-9	Endosulfan II	UG/KG_WETWT	0.0662	U	0.127	U
PEST	50-29-3	4,4'-DDT	UG/KG_WETWT	0.0483	U	0.0925	U
PEST	5103-71-9	alpha-chlordane	UG/KG_WETWT	0.0421	U	0.0807	U
PEST	5103-74-2	gamma-chlordane	UG/KG_WETWT	0.0723	U	0.139	U
PEST	57-74-9	chlordane	UG/KG_WETWT				
PEST	58-89-9	hexachlorocyclohexane, gamma	UG/KG_WETWT	0.0662	U	0.127	U
PEST	60-57-1	dieldrin	UG/KG_WETWT	0.0477	J	0.0722	J
PEST	72-20-8	endrin	UG/KG_WETWT	0.0483	U	0.0925	U
PEST	72-43-5	methoxychlor	UG/KG_WETWT	0.668	U	1.28	U
PEST	72-54-8	4,4'-DDD	UG/KG_WETWT	0.0421	U	0.504	
PEST	72-55-9	4,4'-DDE	UG/KG_WETWT	0.18		0.251	
PEST	76-44-8	heptachlor	UG/KG_WETWT	0.0421	U	0.0807	U
PEST	8001-35-2	Toxaphene	UG/KG_WETWT	10.3	U	9.92	U
PEST	959-98-8	Endosulfan I	UG/KG_WETWT	0.0602	U	0.115	U
SVOC	120-12-7	Anthracene	UG/KG_WETWT	0.117	U	0.225	U
SVOC	129-00-0	Pyrene	UG/KG_WETWT	0.653		3.97	
SVOC	191-24-2	Benzo(G,H,I)Perylene	UG/KG_WETWT	0.359	J	0.7	
SVOC	193-39-5	Indeno(1,2,3-Cd)Pyrene	UG/KG_WETWT	0.113	J	0.24	J
SVOC	205-99-2	Benzo(B)Fluoranthene	UG/KG_WETWT	0.307	J	0.613	
SVOC	206-44-0	Fluoranthene	UG/KG_WETWT	0.778		1.82	
SVOC	207-08-9	Benzo(K)Fluoranthene	UG/KG_WETWT	0.183	J	0.372	J
SVOC	208-96-8	Acenaphthylene	UG/KG_WETWT	0.117	U	0.225	U
SVOC	218-01-9	Chrysene	UG/KG_WETWT	0.41	J	1.07	
SVOC	50-32-8	Benzo(A)Pyrene	UG/KG_WETWT	0.232	U	0.444	U
SVOC	53-70-3	Dibenz(A,H)Anthracene	UG/KG_WETWT	0.0932	U	0.178	U

			Study Id	DAMOS16	DAMOS16	DAMOS16	DAMOS16
			Survey Id	RDS	RDS	RDS	RDS
			Station Id	EREF-04	EREF-04	RDS-04	RDS-04
			Sample Id	RAH-004	RAH-004	RAH-002	RAH-002
			Field Qc Code	SA	SA	SA	SA
			Lab Qc Code	SA	SA	SA	SA
			Taxon Name	Nephtys	Nephtys	Nephtys	Nephtys
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
SVOC	56-55-3	Benzo(A)Anthracene	UG/KG_WETWT	0.879		0.272	U
SVOC	83-32-9	Acenaphthene	UG/KG_WETWT	0.117	U	0.225	U
SVOC	85-01-8	Phenanthrene	UG/KG_WETWT	0.411	J	0.95	
SVOC	86-73-7	Fluorene	UG/KG_WETWT	0.12	J	0.28	J
SVOC	90-12-0	1-Methylnaphthalene	UG/KG_WETWT	0.556		0.416	J
SVOC	91-57-6	2-Methylnaphthalene	UG/KG_WETWT	0.772		0.484	J
EPH	91-20-3	Naphthalene	UG/KG_WETWT	9.44		6.26	
	TOTAL_PAH	**Total PAH (ND as 1/2 MDL)**	UG/KG_WETWT	15.3191		17.9595	
SVOCSURR	SV-1146-65-2	Naphthalene-d8	PCT_REC	78		79	
SVOCSURR	SV-15067-26-2	Acenaphthene-d10	PCT_REC	83		87	
SVOCSURR	SV-1517-22-2	Phenanthrene-d10	PCT_REC	87		91	
SVOCSURR	SV-63466-71-7	Benzo(A)pyrene-d12	PCT_REC	88		98	
MET	7439-92-1	Lead	MG/KG_WETWT	0.26		0.29	
MET	7439-97-6	Mercury	MG/KG_WETWT	0.008		0.008	
MET	7440-02-0	Nickel	MG/KG_WETWT	0.42		0.5	
MET	7440-38-2	Arsenic	MG/KG_WETWT	6.97		5.91	
MET	7440-43-9	Cadmium	MG/KG_WETWT	0.075		0.049	
MET	7440-47-3	Chromium	MG/KG_WETWT	0.07		0.11	
MET	7440-50-8	Copper	MG/KG_WETWT	0.6		0.62	
MET	7440-66-6	Zinc	MG/KG_WETWT	20.1		17.8	
MET	NBH008	Percent Moisture - Metals	PCT_MST	84.3		86.3	

J value reported above MDL but below RL

U not detected above MDL; MDL value reported.

			Study Id	DAMOS16	DAMOS16	DAMOS16	DAMOS16
			Survey Id	RDS	RDS	RDS	RDS
			Station Id	RDS-08	RDS-08	RDS-09	RDS-09
			Sample Id	RAH-003	RAH-003	RAH-001	RAH-001
			Field Qc Code	SA	SA	SA	SA
			Lab Qc Code	SA	SA	SA	SA
			Taxon Name	Nephtys	Nephtys	Nephtys	Nephtys
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
MISC	LIPIDS	Percent Lipids (B&D)	PCT_WETWT	1.38		1.55	
MISC	PCT_SOLIDS	Percent Solids	PCT	16.83		16.92	
CONG	31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	UG/KG_WETWT	0.0542	U	0.0632	U
CONG	32598-10-0	2,3',4,4'-Tetrachlorobiphenyl	UG/KG_WETWT	0.722		0.347	
CONG	32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	UG/KG_WETWT	0.0482	U	0.0562	U
CONG	34883-43-7	2,4'-Dichlorobiphenyl	UG/KG_WETWT	0.12	U	0.14	U
CONG	35065-27-1	2,2',4,4',5,5'-Hexachlorobiphenyl	UG/KG_WETWT	0.092	J	0.077	U
CONG	35065-28-2	2,2',3,4,4',5'-Hexachlorobiphenyl	UG/KG_WETWT	0.108	J	0.0632	U
CONG	35065-29-3	2,2',3,4,4',5,5'-Heptachlorobiphenyl	UG/KG_WETWT	0.0482	U	0.0562	U
CONG	35065-30-6	2,2',3,3',4,4',5-Heptachlorobiphenyl	UG/KG_WETWT	0.0542	U	0.0632	U
CONG	35693-99-3	2,2',5,5'-Tetrachlorobiphenyl	UG/KG_WETWT	0.0901	U	0.105	U
CONG	37680-65-2	2,2',5-Trichlorobiphenyl	UG/KG_WETWT	0.0542	U	0.0632	U
CONG	37680-73-2	2,2',4,5,5'-Pentachlorobiphenyl	UG/KG_WETWT	0.0542	U	0.146	
CONG	38380-02-8	2,2',3,4,5'-Pentachlorobiphenyl	UG/KG_WETWT	0.183		0.0632	U
CONG	38380-07-3	2,2',3,3',4,4'-Hexachlorobiphenyl	UG/KG_WETWT	0.0601	U	0.0701	U
CONG	40186-72-9	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	UG/KG_WETWT	0.0361	U	0.477	
CONG	41464-39-5	2,2',3,5'-Tetrachlorobiphenyl	UG/KG_WETWT	0.0482	U	0.0562	U
CONG	41464-40-8	2,2',4,5'-Tetrachlorobiphenyl	UG/KG_WETWT	0.042	U	0.049	U
CONG	52663-68-0	2,2',3,4',5,5',6-Heptachlorobiphenyl	UG/KG_WETWT	0.042	U	0.0821	J
CONG	52663-69-1	2,2',3,4,4',5',6-Heptachlorobiphenyl	UG/KG_WETWT	0.042	U	0.049	U
CONG	52663-78-2	2,2',3,3',4,4',5,6-Octachlorobiphenyl	UG/KG_WETWT	0.0361	U	0.105	J
CONG	7012-37-5	2,4,4'-Trichlorobiphenyl	UG/KG_WETWT	0.0661	U	0.077	U
CONG	74472-48-3	2,2',3,4,4',6,6'-Heptachlorobiphenyl	UG/KG_WETWT	0.0962	U	0.112	U
CONG	C-2051-24-3	Decachlorobiphenyl - Congener	UG/KG_WETWT	0.0661	U	0.113	J
	TOTAL_PCB	**Total NS&T PCB *2 (ND as 1/2 MDL)**	UG/KG_WETWT	2.722		3.4307	
CONGSURR	CS-37680-68-5	2,3',5'-Trichlorobiphenyl	PCT_REC	93		83	
CONGSURR	CS-68194-09-2	2,2',3,5,6,6'-Hexachlorobiphenyl	PCT_REC	92		94	
PEST	1024-57-3	heptachlor epoxide	UG/KG_WETWT	0.0661	U	0.077	U
PEST	1031-07-8	Endosulfan sulfate	UG/KG_WETWT	0.0482	U	0.0562	U
PEST	309-00-2	aldrin	UG/KG_WETWT	0.0542	U	0.0632	U
PEST	319-84-6	alpha-BHC	UG/KG_WETWT	0.0901	U	0.105	U
PEST	319-85-7	beta-BHC	UG/KG_WETWT	0.0482	U	0.0562	U
PEST	319-86-8	delta-BHC	UG/KG_WETWT	0.042	U	0.049	U
PEST	33213-65-9	Endosulfan II	UG/KG_WETWT	0.0661	U	0.077	U
PEST	50-29-3	4,4'-DDT	UG/KG_WETWT	0.0482	U	0.0562	U
PEST	5103-71-9	alpha-chlordane	UG/KG_WETWT	0.042	U	0.113	J
PEST	5103-74-2	gamma-chlordane	UG/KG_WETWT	0.0722	U	0.0842	U
PEST	57-74-9	chlordane	UG/KG_WETWT			0.578	
PEST	58-89-9	hexachlorocyclohexane, gamma	UG/KG_WETWT	0.0661	U	0.077	U
PEST	60-57-1	dieldrin	UG/KG_WETWT	0.108	J	0.0588	J
PEST	72-20-8	endrin	UG/KG_WETWT	0.0482	U	0.0562	U
PEST	72-43-5	methoxychlor	UG/KG_WETWT	0.667	U	0.778	U
PEST	72-54-8	4,4'-DDD	UG/KG_WETWT	0.176		0.252	
PEST	72-55-9	4,4'-DDE	UG/KG_WETWT	0.262		0.23	
PEST	76-44-8	heptachlor	UG/KG_WETWT	0.042	U	0.049	U
PEST	8001-35-2	Toxaphene	UG/KG_WETWT	10.3	U	12	U
PEST	959-98-8	Endosulfan I	UG/KG_WETWT	0.0601	U	0.0701	U
SVOC	120-12-7	Anthracene	UG/KG_WETWT	0.117	U	1.14	
SVOC	129-00-0	Pyrene	UG/KG_WETWT	0.93		8.57	
SVOC	191-24-2	Benzo(G,H,I)Perylene	UG/KG_WETWT	0.434	J	0.524	J
SVOC	193-39-5	Indeno(1,2,3-Cd)Pyrene	UG/KG_WETWT	0.14	J	0.138	J
SVOC	205-99-2	Benzo(B)Fluoranthene	UG/KG_WETWT	0.387	J	0.536	J
SVOC	206-44-0	Fluoranthene	UG/KG_WETWT	0.916		19.5	
SVOC	207-08-9	Benzo(K)Fluoranthene	UG/KG_WETWT	0.229	J	0.338	J
SVOC	208-96-8	Acenaphthylene	UG/KG_WETWT	0.117	U	0.136	U
SVOC	218-01-9	Chrysene	UG/KG_WETWT	0.5	J	1.54	
SVOC	50-32-8	Benzo(A)Pyrene	UG/KG_WETWT	0.232	U	0.358	J
SVOC	53-70-3	Dibenz(A,H)Anthracene	UG/KG_WETWT	0.093	U	0.108	U

			Study Id	DAMOS16	DAMOS16	DAMOS16	DAMOS16
			Survey Id	RDS	RDS	RDS	RDS
			Station Id	RDS-08	RDS-08	RDS-09	RDS-09
			Sample Id	RAH-003	RAH-003	RAH-001	RAH-001
			Field Qc Code	SA	SA	SA	SA
			Lab Qc Code	SA	SA	SA	SA
			Taxon Name	Nephtys	Nephtys	Nephtys	Nephtys
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
SVOC	56-55-3	Benzo(A)Anthracene	UG/KG_WETWT	0.142	U	0.679	
SVOC	83-32-9	Acenaphthene	UG/KG_WETWT	0.117	U	0.307	J
SVOC	85-01-8	Phenanthrene	UG/KG_WETWT	0.713		0.973	
SVOC	86-73-7	Fluorene	UG/KG_WETWT	0.163	J	0.438	J
SVOC	90-12-0	1-Methylnaphthalene	UG/KG_WETWT	0.822		0.608	
SVOC	91-57-6	2-Methylnaphthalene	UG/KG_WETWT	1.09		0.718	
EPH	91-20-3	Naphthalene	UG/KG_WETWT	12.6		10.2	
	TOTAL_PAH	**Total PAH (ND as 1/2 MDL)**	UG/KG_WETWT	19.333		46.689	
SVOCSURR	SV-1146-65-2	Naphthalene-d8	PCT_REC	79		80	
SVOCSURR	SV-15067-26-2	Acenaphthene-d10	PCT_REC	81		83	
SVOCSURR	SV-1517-22-2	Phenanthrene-d10	PCT_REC	86		86	
SVOCSURR	SV-63466-71-7	Benzo(A)pyrene-d12	PCT_REC	88		88	
MET	7439-92-1	Lead	MG/KG_WETWT	0.27		0.27	
MET	7439-97-6	Mercury	MG/KG_WETWT	0.008		0.008	
MET	7440-02-0	Nickel	MG/KG_WETWT	0.51		0.46	
MET	7440-38-2	Arsenic	MG/KG_WETWT	7.36		6.62	
MET	7440-43-9	Cadmium	MG/KG_WETWT	0.057		0.053	
MET	7440-47-3	Chromium	MG/KG_WETWT	0.077		0.076	
MET	7440-50-8	Copper	MG/KG_WETWT	0.58		0.63	
MET	7440-66-6	Zinc	MG/KG_WETWT	18.4		19.7	
MET	NBH008	Percent Moisture - Metals	PCT_MST	83.8		84.4	

J value reported above MDL but below RL

U not detected above MDL; MDL value reported.

DAMOS 2016

Rockland Disposal Site

Tissue Lipid, PCB, Pesticides and PAH Results

Battelle Norwell

QA/QC Summary
Batch 16-0287

Project:	USACE/NAE – DAMOS Program (Rockland and Portland Disposal Sites)
Parameters:	PCB and Pesticides
Laboratory:	Battelle-Norwell, MA
Matrix:	Tissue
Data Set:	DP-16-0261
Analytical SOP:	5-128
Method Reference:	EPA 8081B/8082A modified

Sample Custody

Collection Date	Receipt Date	Temp (°C)
9/14-15/2016	9/16/2016	1.9
9/20-21/2016	9/22/2016	1.8

Corrective Actions	No corrective actions.
Sample Storage	Tissue samples were stored frozen upon receipt.
Related Samples	NA

METHOD SUMMARIES

Sample Preparation	Samples were homogenized, and approximately 10-20 g of homogenate (depending upon mass available) was spiked with surrogates, dried with sodium sulfate, and serially extracted with dichloromethane using a Tissuemizer, orbital shaker table, and centrifuge. The combined extracts were dried over sodium sulfate and concentrated. Sample concentrates were further processed by alumina cleanup, followed by size-exclusion HPLC cleanup, concentrated, and then spiked with internal standard. Extracts were submitted for PCB and pesticide analyses by GC/ECD.
Prep comments	Samples K2624 and K2644 where inadvertently combined during the first extraction. The PM was notified and directed the samples be re-weighed, spiked and caught up with the rest of the batch.

Analysis	PCB and pesticides were analyzed by gas chromatography electron capture detection (GC/ECD). An initial calibration consisting of target analytes was analyzed prior to sample analysis to demonstrate the linear range. Calibration verification was performed at the beginning and end of 10 injections or each 24-hour period (whichever is more frequent). Concentrations of target compounds were calculated versus internal standards using the average response factors (RF) generated from the initial calibration.
Analysis Comments	• Chromatographic interference on the primary column near PCBs 8, 138, and 180 necessitated the reporting of these analytes vs. the secondary column. All other target analytes are reported from the primary column. It should be noted that the secondary column is utilized for retention time confirmation only for all analytes except for PCBs 8, 138, and 180.

	• A nominal concentration of 0.2 µg/mL is used as the low standard for toxaphene. All authentic samples were analyzed for toxaphene.

Holding Times	Extraction Date(s)	Analysis Date(s)
	10/21/2016	11/11-12/2016

Procedural Blank (PB)	A PB was prepared with this analytical batch to ensure the sample extraction and analysis methods are free of contamination.
PB ≤5x MDL; Samples must be >5 X PB	No exceedances noted.
	No comments.

Laboratory Control Spike (LCS)	A LCS was prepared with this analytical batch. The percent recoveries of target analytes were calculated to measure accuracy.
40-120% recovery	No exceedances noted.
	No comments.

Surrogate Recovery	Surrogate compounds were added prior to extraction. The surrogate recoveries are calculated to measure extraction efficiency.
40-120% recovery	No exceedances noted.
	No comments.

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)	A matrix spike set was prepared with this analytical batch. The percent recoveries of target analytes were calculated to measure data quality in terms of accuracy. The relative percent difference (RPD) between the two samples was calculated to measure data quality in terms of precision.
40-120% recovery ≤30% RPD Analyte conc. >5x background	No exceedances noted.
	No comments.

Analytical Duplicate	A sample was prepared in duplicate with this analytical batch. The relative percent difference (RPD) between the two samples was calculated to measure data quality in terms of precision.
≤30% RPD Analyte conc. >5x MDL	No exceedances noted.
	No comments.

Standard Reference Material (SRM)	A standard reference material was prepared with this batch to measure data in terms of analytical accuracy.
≤30% difference on average Analyte >10x MDL	No primary exceedances noted.
	No comments.

Initial Calibration (ICAL)	The GC/ECD was calibrated with six-level calibration curve for all compounds using an instrument response factor (RF).
$R^2 \geq 0.995$	No exceedances noted.
	No comments.

Independent Calibration Check (ICC)	The independent check was run after each initial calibration to verify the calibration. This standard is from a different source than the ICAL.
≤ 20% difference individual and mean	No exceedances noted.
	No comments.

Continuing Calibration Verification (CCV)	Continuing calibration standards were performed at the beginning and end of 10 injections or each 24-hour period (whichever is more frequent) to ensure that initial calibration is still valid.
≤ 20% difference individual and ≤ 15% mean	No exceedances noted.
	No comments.

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS Tissues
Project Number: 100087718

Client ID	RAH-001	RAH-002	RAH-003	RAH-006
Battelle ID	K2622-P	K2623-P	K2624-P	K2625-P
Sample Type	SA	SA	SA	SA
Collection Date	09/14/16	09/14/16	09/14/16	09/15/16
Extraction Date	10/21/16	10/21/16	10/21/16	10/21/16
Analysis Date	11/11/16	11/12/16	11/11/16	11/11/16
Analytical Instrument	ECD	ECD	ECD	ECD
% Moisture	83.08	84.92	83.17	83.85
% Lipid	1.71	1.81	1.74	1.27
Matrix	WORM TISS	WORM TISS	WORM TISS	WORM TISS
Sample Size	17.15	10.42	20.00	15.92
Size Unit-Basis	G_WET	G_WET	G_WET	G_WET
Units	UG/KG_WET	UG/KG_WET	UG/KG_WET	UG/KG_WET
4,4'-DDD	0.252	0.504	0.176	0.053 U
4,4'-DDE	0.230	0.251	0.262	0.222
4,4'-DDT	0.056 U	0.093 U	0.048 U	0.061 U
aldrin	0.063 U	0.104 U	0.054 U	0.068 U
a-chlordane	0.113 J	0.081 U	0.042 U	0.053 U
g-chlordane	0.084 U	0.139 U	0.072 U	0.091 U
a-BHC	0.105 U	0.173 U	0.090 U	0.113 U
b-BHC	0.056 U	0.093 U	0.048 U	0.061 U
d-BHC	0.049 U	0.081 U	0.042 U	0.053 U
Lindane	0.077 U	0.127 U	0.066 U	0.083 U
dieldrin	0.059 J	0.072 J	0.108 J	0.045 U
endosulfan I	0.070 U	0.115 U	0.060 U	0.076 U
endosulfan II	0.077 U	0.127 U	0.066 U	0.083 U
endosulfan sulfate	0.056 U	0.093 U	0.048 U	0.061 U
endrin	0.056 U	0.093 U	0.048 U	0.061 U
heptachlor	0.049 U	0.081 U	0.042 U	0.053 U
heptachlor epoxide	0.077 U	0.127 U	0.066 U	0.083 U
methoxychlor	0.778 U	1.280 U	0.667 U	0.838 U
Toxaphene	12.000 U	9.920 U	10.300 U	12.900 U
Technical Chlordane	0.578			
Cl2(8)	0.140 U	0.230 U	0.120 U	0.151 U
Cl3(18)	0.063 U	0.104 U	0.054 U	0.068 U
Cl3(28)	0.077 U	0.127 U	0.066 U	0.083 U
Cl4(44)	0.056 U	0.093 U	0.048 U	0.061 U
Cl4(49)	0.049 U	0.528	0.042 U	0.210
Cl4(52)	0.105 U	0.173 U	0.090 U	0.113 U
Cl4(66)	0.347	0.560	0.722	0.106 U
Cl5(87)	0.063 U	0.207	0.183	0.615
Cl5(101)	0.146	0.104 U	0.054 U	0.068 U
Cl5(105)	0.056 U	0.195	0.048 U	0.061 U
Cl5(118)	0.063 U	0.104 U	0.054 U	0.378
Cl6(128)	0.070 U	0.115 U	0.060 U	0.076 U
Cl6(138)	0.063 U	0.104 U	0.108 J	0.293
Cl6(153)	0.077 U	0.127 U	0.092 J	0.083 U
Cl7(170)	0.063 U	0.104 U	0.054 U	0.068 U
Cl7(180)	0.056 U	0.093 U	0.048 U	0.061 U
Cl7(183)	0.049 U	0.081 U	0.042 U	0.053 U
Cl7(184)	0.112 U	0.185 U	0.096 U	0.121 U
Cl7(187)	0.082 J	0.081 U	0.042 U	0.053 U
Cl8(195)	0.105 J	0.069 U	0.036 U	0.045 U
Cl9(206)	0.477	0.212	0.036 U	0.045 U
Cl10(209)	0.113 J	0.127 U	0.066 U	0.083 U
Surrogate Recoveries (%)				
Cl3(34)	83	84	93	93
Cl6(152)	94	77	92	86

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS Tissues
Project Number: 100087718

Client ID	RAH-005	RAH-004
Battelle ID	K2626-P	K2627-P
Sample Type	SA	SA
Collection Date	09/15/16	09/15/16
Extraction Date	10/21/16	10/21/16
Analysis Date	11/11/16	11/11/16
Analytical Instrument	ECD	ECD
% Moisture	83	83.25
% Lipid	1.46	1.37
Matrix	WORM TISS	WORM TISS
Sample Size	16.17	19.97
Size Unit-Basis	G_WET	G_WET
Units	UG/KG_WET	UG/KG_WET
4,4'-DDD	0.052 U	0.042 U
4,4'-DDE	0.200	0.180
4,4'-DDT	0.060 U	0.048 U
aldrin	0.067 U	0.054 U
a-chlordane	0.052 U	0.042 U
g-chlordane	0.089 U	0.072 U
a-BHC	0.111 U	0.090 U
b-BHC	0.060 U	0.048 U
d-BHC	0.052 U	0.042 U
Lindane	0.082 U	0.066 U
dieldrin	0.045 U	0.048 J
endosulfan I	0.074 U	0.060 U
endosulfan II	0.082 U	0.066 U
endosulfan sulfate	0.060 U	0.048 U
endrin	0.060 U	0.048 U
heptachlor	0.052 U	0.042 U
heptachlor epoxide	0.082 U	0.066 U
methoxychlor	0.825 U	0.668 U
Toxaphene	12.700 U	10.300 U
Technical Chlordane		
Cl2(8)	0.148 U	0.120 U
Cl3(18)	0.067 U	0.054 U
Cl3(28)	0.082 U	0.066 U
Cl4(44)	0.060 U	0.048 U
Cl4(49)	0.052 U	0.042 U
Cl4(52)	0.111 U	0.090 U
Cl4(66)	0.104 U	0.084 U
Cl5(87)	0.168	0.211
Cl5(101)	0.067 U	0.054 U
Cl5(105)	0.060 U	0.048 U
Cl5(118)	0.067 U	0.054 U
Cl6(128)	0.074 U	0.060 U
Cl6(138)	0.067 U	0.153
Cl6(153)	0.082 U	0.066 U
Cl7(170)	0.067 U	0.054 U
Cl7(180)	0.060 U	0.048 U
Cl7(183)	0.052 U	0.042 U
Cl7(184)	0.119 U	0.096 U
Cl7(187)	0.052 U	0.042 U
Cl8(195)	0.045 U	0.036 U
Cl9(206)	0.045 U	0.036 U
Cl10(209)	0.082 U	0.066 U

Surrogate Recoveries (%)

Cl3(34)	92	88
Cl6(152)	87	86

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Project Client: USACE - North Atlantic Division
Project Name: DAMOS Tissues
Project Number: 100087718

Client ID	Procedural Blank
Battelle ID	CJ817PB-P
Sample Type	PB
Collection Date	10/21/16
Extraction Date	10/21/16
Analysis Date	11/11/16
Analytical Instrument	ECD
% Moisture	84.82
% Lipid	NA
Matrix	TISSUE
Sample Size	19.99
Size Unit-Basis	G_WET
Units	UG/KG_WET
4,4'-DDD	0.041 U
4,4'-DDE	0.041 U
4,4'-DDT	0.047 U
aldrin	0.0528 U
a-chlordane	0.041 U
g-chlordane	0.0704 U
a-BHC	0.0878 U
b-BHC	0.047 U
d-BHC	0.041 U
Lindane	0.0644 U
dieldrin	0.0352 U
endosulfan I	0.0586 U
endosulfan II	0.0644 U
endosulfan sulfate	0.047 U
endrin	0.047 U
heptachlor	0.041 U
heptachlor epoxide	0.0644 U
methoxychlor	0.651 U
Toxaphene	10 U
Technical Chlordane	
Cl2(8)	0.117 U
Cl3(18)	0.0528 U
Cl3(28)	0.0644 U
Cl4(44)	0.047 U
Cl4(49)	0.041 U
Cl4(52)	0.0878 U
Cl4(66)	0.082 U
Cl5(87)	0.0528 U
Cl5(101)	0.0528 U
Cl5(105)	0.047 U
Cl5(118)	0.0528 U
Cl6(128)	0.0586 U
Cl6(138)	0.0528 U
Cl6(153)	0.0644 U
Cl7(170)	0.0528 U
Cl7(180)	0.047 U
Cl7(183)	0.041 U
Cl7(184)	0.0938 U
Cl7(187)	0.041 U
Cl8(195)	0.0352 U
Cl9(206)	0.0352 U
Cl10(209)	0.0644 U

Surrogate Recoveries (%)

Cl3(34)	85
Cl6(152)	85

Not Surrogate Corrected

Analyzed by Restucci Jr, Richard
9/6/2017

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS Tissues
Project Number: 100087718

Client ID	160720-01: Tilapia				
Battelle ID	CJ818LCS-P				
Sample Type	LCS				
Collection Date	10/21/16				
Extraction Date	10/21/16				
Analysis Date	11/11/16				
Analytical Instrument	ECD				
% Moisture	80.12				
% Lipid	0.84				
Matrix	TISSUE				
Sample Size	20.02				
Size Unit-Basis	G_WET				
Units	UG/KG_WET		Target	% Recovery	Qualifier
4,4'-DDD	4.83		5.00	97	
4,4'-DDE	4.35		5.00	87	
4,4'-DDT	4.67		5.00	93	
aldrin	4.42		5.00	88	
a-chlordane	4.41		5.01	88	
g-chlordane	3.96		5.00	79	
a-BHC	4.71		5.00	94	
b-BHC	4.81		5.00	96	
d-BHC	4.72		5.00	94	
Lindane	4.85		5.00	97	
dieldrin	4.57		5.00	91	
endosulfan I	4.32		5.00	86	
endosulfan II	4.55		5.01	91	
endosulfan sulfate	4.3		5.00	86	
endrin	4.48		5.00	90	
heptachlor	4.84		5.00	97	
heptachlor epoxide	4.36		5.00	87	
methoxychlor	4.33		5.00	87	
Toxaphene	10.2	U			
Technical Chlordane	67.6				
Cl2(8)	4.15		5.00	83	
Cl3(18)	3.99		5.01	80	
Cl3(28)	4.22		5.01	84	
Cl4(44)	4.2		5.01	84	
Cl4(49)	4.07		5.00	81	
Cl4(52)	4.19		5.00	84	
Cl4(66)	4.23		5.00	85	
Cl5(87)	3.82		4.98	77	
Cl5(101)	4.12		5.00	82	
Cl5(105)	3.91		5.01	78	
Cl5(118)	4.01		5.01	80	
Cl6(128)	3.9		5.01	78	
Cl6(138)	3.92		5.01	78	
Cl6(153)	4.14		5.01	83	
Cl7(170)	4.05		5.01	81	
Cl7(180)	3.86		5.01	77	
Cl7(183)	3.95		4.99	79	
Cl7(184)	3.69		5.00	74	
Cl7(187)	3.85		5.01	77	
Cl8(195)	4.07		5.01	81	
Cl9(206)	4.32		5.00	86	
Cl10(209)	4.22		5.01	84	

Surrogate Recoveries (%)

Cl3(34)	80
Cl6(152)	79

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS Tissues
Project Number: 100087718

	161005-01: SRM					
Client ID	1974C					
Battelle ID	CJ819SRM-P					
Sample Type	SRM					
Collection Date	10/21/16					
Extraction Date	10/21/16					
Analysis Date	11/11/16					
Analytical Instrument	ECD					
% Moisture	90					
% Lipid	0.89					
Matrix	TISSUE					
Sample Size	9.49					
Size Unit-Basis	G_WET	Certified		Passing	Actual	
Units	UG/KG_WET	Value	+/-	%Difference	%Difference	Qualifier
4,4'-DDD	1.67	1.3	0.09	36.92	28.5	
4,4'-DDE	2.37	1.85	0.02	31.08	28.1	
4,4'-DDT	0.64					
aldrin	0.114 U					
a-chlordane	0.898	1.2	0.05	34.17	25.2	
g-chlordane	0.714	0.741	0.01	31.75	3.6	
a-BHC	0.19 U					
b-BHC	0.102 U					
d-BHC	0.0886 U					
Lindane	0.139 U					
dieldrin	0.173 J	0.285	0.02	37.37	39.3	n
endosulfan I	0.127 U					
endosulfan II	0.139 U					
endosulfan sulfate	0.102 U					
endrin	0.102 U					
heptachlor	0.196 J	0.132	0.01	34.55	48.5	n
heptachlor epoxide	0.139 U					
methoxychlor	1.41 U					
Toxaphene	21.6 U					
Technical Chlordane	9.25					
Cl2(8)	0.253 U	0.191	0.00	31.57	17.3	
Cl3(18)	0.389	0.589	0.07	41.88	34	
Cl3(28)	1.55	1.47	0.02	31.36	5.4	
Cl4(44)	1.89	1.54	0.08	35.19	22.7	
Cl4(49)	2.06	1.76	0.02	31.14	17	
Cl4(52)	3.36	2.49	0.06	32.41	34.9	N
Cl4(66)	1.88	1.65	0.02	31.21	13.9	
Cl5(87)	1.84	2.08	0.02	30.96	11.5	
Cl5(101)	5.24	6.67	0.05	30.75	21.4	
Cl5(105)	1.43	1.57	0.03	31.91	8.9	
Cl5(118)	5.14	4.08	0.09	32.21	26	
Cl6(128)	1	0.801	0.01	31.37	24.8	
Cl6(138)	4.28	4.39	0.04	30.91	2.5	
Cl6(153)	7.85	6.76	0.12	31.78	16.1	
Cl7(170)	0.114 U	0.105	0.01	38.57	22.6	
Cl7(180)	0.759	0.594	0.01	31.35	27.8	
Cl7(183)	0.832	0.848	0.01	30.71	1.9	
Cl7(184)	7.33					
Cl7(187)	1.88	2.09	0.05	32.39	10	
Cl8(195)	0.0761 U					
Cl9(206)	0.0761 U					
Cl10(209)	0.139 U					

Surrogate Recoveries (%)

Cl3(34)	87
Cl6(152)	80

Analyzed by Restucci Jr, Richard
Not Surrogate Corrected 9/6/2017 SRM: T16-0287ECD-Master_128B-Final Rockland Tissue.xlsx

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS Tissues
Project Number: 100087718

Client ID	RAJ-019	RAJ-019			
Battelle ID	K2643-P	K2643MS-P			
Sample Type	SA	MS			
Collection Date	09/20/16	9/20/2016			
Extraction Date	10/21/16	10/21/2016			
Analysis Date	11/12/16	11/12/2016			
Analytical Instrument	ECD	ECD			
% Moisture	86.94	88.73			
% Lipid	0.54	0.58			
Matrix	CLAM TISS	CLAM TISS			
Sample Size	19.99	9.95			
Size Unit-Basis	G_WET	G_WET			
Units	UG/KG_WET	UG/KG_WET		Target	% Recovery	Qualifier
4,4'-DDD	0.0421 U	10.700		10.06	106	
4,4'-DDE	0.0975 J	9.480		10.05	93	
4,4'-DDT	0.0482 U	11.300		10.05	112	
aldrin	0.0542 U	9.550		10.05	95	
a-chlordane	0.0421 U	9.370		10.07	93	
g-chlordane	0.0722 U	8.280		10.06	82	
a-BHC	0.0901 U	10.500		10.06	104	
b-BHC	0.0482 U	10.600		10.06	105	
d-BHC	0.0421 U	10.600		10.06	105	
Lindane	0.0661 U	11.200		10.05	111	
dieldrin	0.906	10.800		10.05	98	
endosulfan I	0.0601 U	10.100		10.06	100	
endosulfan II	0.0661 U	9.300		10.08	92	
endosulfan sulfate	0.0482 U	9.390		10.06	93	
endrin	0.0482 U	10.500		10.06	104	
heptachlor	0.0421 U	12.100		10.06	120	
heptachlor epoxide	0.0661 U	9.510		10.06	95	
methoxychlor	0.668 U	9.770		10.05	95	
Toxaphene	10.3 U	20.600	U			
Technical Chlordane		152.000				
Cl2(8)	0.12 U	10.400		10.07	103	
Cl3(18)	0.0542 U	8.160		10.09	81	
Cl3(28)	0.0661 U	9.420		10.09	93	
Cl4(44)	0.0482 U	8.740		10.09	87	
Cl4(49)	0.0421 U	8.540		10.05	85	
Cl4(52)	0.0901 U	8.640		10.06	86	
Cl4(66)	0.0842 U	9.490		10.07	94	
Cl5(87)	0.0542 U	8.060		10.02	80	
Cl5(101)	0.0542 U	8.590		10.07	85	
Cl5(105)	0.0482 U	8.460		10.08	84	
Cl5(118)	0.0542 U	8.620		10.09	85	
Cl6(128)	0.0601 U	8.150		10.09	81	
Cl6(138)	0.0669 J	9.580		10.09	94	
Cl6(153)	0.0661 U	9.750		10.09	97	
Cl7(170)	0.0542 U	8.260		10.09	82	
Cl7(180)	0.0516 J	7.490		10.09	74	
Cl7(183)	0.0421 U	8.130		10.04	81	
Cl7(184)	0.0963 U	8.370		10.07	83	
Cl7(187)	0.0421 U	8.170		10.09	81	
Cl8(195)	0.0581 J	8.340		10.09	82	
Cl9(206)	0.0664 J	8.630		10.07	85	
Cl10(209)	0.0716 J	8.360		10.09	82	

Surrogate Recoveries (%)

Cl3(34)	88	81
Cl6(152)	89	78

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS Tissues
Project Number: 100087718

Client ID	RAJ-019						
Battelle ID	K2643MSD-P						
Sample Type	MSD						
Collection Date	9/20/2016						
Extraction Date	10/21/2016						
Analysis Date	11/12/2016						
Analytical Instrument	ECD						
% Moisture	88.16						
% Lipid	0.61						
Matrix	CLAM TISS						
Sample Size	10.07						
Size Unit-Basis	G_WET						
Units	UG/KG_WET		Target	% Recovery	Qualifier	RPD (%)	Qualifier
4,4'-DDD	10.700		9.94	108		1.9	
4,4'-DDE	9.410		9.93	94		1.1	
4,4'-DDT	10.600		9.93	107		4.6	
aldrin	9.200		9.93	93		2.1	
a-chlordane	9.110		9.95	92		1.1	
g-chlordane	8.150		9.94	82		0.0	
a-BHC	10.300		9.94	104		0.0	
b-BHC	11.100		9.94	112		6.5	
d-BHC	10.100		9.94	102		2.9	
Lindane	10.800		9.93	109		1.8	
dieldrin	10.600		9.94	98		0.0	
endosulfan I	9.920		9.94	100		0.0	
endosulfan II	9.130		9.96	92		0.0	
endosulfan sulfate	9.180		9.94	92		1.1	
endrin	10.200		9.94	103		1.0	
heptachlor	11.200		9.94	113		6.0	
heptachlor epoxide	9.320		9.94	94		1.1	
methoxychlor	9.530		9.94	93		2.1	
Toxaphene	20.400	U					
Technical Chlordane	146.000						
Cl2(8)	10.600		9.95	107		3.8	
Cl3(18)	8.000		9.97	80		1.2	
Cl3(28)	9.080		9.97	91		2.2	
Cl4(44)	8.830		9.97	89		2.3	
Cl4(49)	8.340		9.93	84		1.2	
Cl4(52)	8.450		9.94	85		1.2	
Cl4(66)	9.110		9.95	92		2.2	
Cl5(87)	8.030		9.90	81		1.2	
Cl5(101)	8.330		9.95	84		1.2	
Cl5(105)	7.940		9.96	80		4.9	
Cl5(118)	8.510		9.97	85		0.0	
Cl6(128)	8.210		9.97	82		1.2	
Cl6(138)	9.090		9.97	91		3.2	
Cl6(153)	7.980		9.97	80		19.2	
Cl7(170)	8.400		9.97	84		2.4	
Cl7(180)	8.130		9.97	81		9.0	
Cl7(183)	8.100		9.92	82		1.2	
Cl7(184)	7.320		9.95	74		11.5	
Cl7(187)	8.230		9.97	83		2.4	
Cl8(195)	8.600		9.97	86		4.8	
Cl9(206)	9.080		9.95	91		6.8	
Cl10(209)	8.840		9.97	88		7.1	

Surrogate Recoveries (%)

Cl3(34)	79
Cl6(152)	80

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS Tissues
Project Number: 100087718

Client ID	RAJ-020	RAJ-020			
Battelle ID	K2644-P	K2644DUP-P			
Sample Type	SA	QADU			
Collection Date	09/20/16	9/20/2016			
Extraction Date	10/21/16	10/21/2016			
Analysis Date	11/12/16	11/12/2016			
Analytical Instrument	ECD	ECD			
% Moisture	88.53	88.44			
% Lipid	0.52	0.52			
Matrix	CLAM TISS	CLAM TISS			
Sample Size	19.95	20.01			
Size Unit-Basis	G_WET	G_WET			
Units	UG/KG_WET	UG/KG_WET		RPD	Qualifier
4,4'-DDD	0.0703	J	0.086	J	NA	
4,4'-DDE	0.14		0.160		13.3	
4,4'-DDT	0.0483	U	0.048	U	NA	
aldrin	0.0543	U	0.054	U	NA	
a-chlordane	0.0422	U	0.042	U	NA	
g-chlordane	0.0724	U	0.072	U	NA	
a-BHC	0.0903	U	0.090	U	NA	
b-BHC	0.0483	U	0.048	U	NA	
d-BHC	0.0422	U	0.042	U	NA	
Lindane	0.0662	U	0.066	U	NA	
dieldrin	0.996		1.040		4.3	
endosulfan I	0.0603	U	0.060	U	NA	
endosulfan II	0.0662	U	0.066	U	NA	
endosulfan sulfate	0.0483	U	0.048	U	NA	
endrin	0.0483	U	0.048	U	NA	
heptachlor	0.0422	U	0.042	U	NA	
heptachlor epoxide	0.0662	U	0.066	U	NA	
methoxychlor	0.669	U	0.667	U	NA	
Toxaphene	10.3	U	10.200	U	NA	
Technical Chlordane					NA	
Cl2(8)	0.12	U	0.120	U	NA	
Cl3(18)	0.0543	U	0.054	U	NA	
Cl3(28)	0.0662	U	0.066	U	NA	
Cl4(44)	0.0483	U	0.048	U	NA	
Cl4(49)	0.0422	U	0.042	U	NA	
Cl4(52)	0.0903	U	0.090	U	NA	
Cl4(66)	0.0843	U	0.084	U	NA	
Cl5(87)	0.0543	U	0.054	U	NA	
Cl5(101)	0.0543	U	0.054	U	NA	
Cl5(105)	0.0662	J	0.048	U	NA	
Cl5(118)	0.0671	J	0.054	U	NA	
Cl6(128)	0.0603	U	0.060	U	NA	
Cl6(138)	0.0543	U	0.054	U	NA	
Cl6(153)	0.0662	U	0.066	U	NA	
Cl7(170)	0.0543	U	0.054	U	NA	
Cl7(180)	0.0483	U	0.048	U	NA	
Cl7(183)	0.0422	U	0.042	U	NA	
Cl7(184)	0.0965	U	0.096	U	NA	
Cl7(187)	0.0422	U	0.042	U	NA	
Cl8(195)	0.0525	J	0.061	J	NA	
Cl9(206)	0.0362	U	0.036	U	NA	
Cl10(209)	0.0662	U	0.066	U	NA	

Surrogate Recoveries (%)

Cl3(34)	81	75
Cl6(152)	82	82

QA/QC Summary
Batch 16-0287

Project:	USACE/NAE – DAMOS Program (Rockland and Portland Disposal Sites)
Parameters:	PAH
Laboratory:	Battelle-Norwell, MA
Matrix:	Tissue
Data Set:	DP-16-0268
Analytical SOP:	5-157
Method Reference:	EPA 8270D modified

Sample Custody

Collection Date	Receipt Date	Temp (°C)
9/14-15/2016	9/16/2016	1.9
9/20-21/2016	9/22/2016	1.8

Corrective Actions	No C/A.
Sample Storage	Tissue samples were stored frozen upon receipt.
Related Samples	NA

METHOD SUMMARIES

Sample Preparation	Samples were homogenized, and approximately 10-20 g of homogenate (depending upon mass available) was spiked with surrogates, dried with sodium sulfate, and serially extracted with dichloromethane using a Tissuemizer, orbital shaker table, and centrifuge. The combined extracts were dried over sodium sulfate and concentrated. Sample concentrates were further processed by alumina cleanup, followed by size-exclusion HPLC cleanup, concentrated, and then spiked with internal standard. Extracts were submitted for PAH analyses by GC/MS.
Prep comments	Sample K2624 and K2644 where inadvertently combined during the first extraction. The PM was notified, and directed the samples be re-weighed, spiked and caught up with the rest of the batch.

Analysis	PAH were measured by gas chromatography-mass spectrometry (GC/MS) in the selected ion mode (SIM). An initial calibration consisting of representative target analytes was analyzed prior to analysis to demonstrate the linear range of analysis. Calibration verification was performed at the beginning and end of 10 injections or each 24-hour period (whichever is more frequent). Target PAH were quantified using the average response factors (RF) generated from the initial calibration.
Analysis Comments	No comments.

Holding Times	Extraction Date(s)	Analysis Date(s)
	10/21/2016	10/26-27/2016

QA/QC Summary
Batch 16-0287

Procedural Blank (PB)	A PB was prepared with this analytical batch to ensure the sample extraction and analysis methods are free of contamination.
PB ≤5x MDL; Samples must be >5 X PB	No exceedances noted.
	No comments.

Laboratory Control Spike (LCS)	A LCS was prepared with this analytical batch. The percent recoveries of target analytes were calculated to measure accuracy.
40-120% recovery	No exceedances noted.
	No comments.

Surrogate Recovery	Surrogate compounds were added prior to extraction. The surrogate recoveries are calculated to measure extraction efficiency.
40-120% recovery	No exceedances noted.
	No comments.

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)	A matrix spike set was prepared with this analytical batch. The percent recoveries of target analytes were calculated to measure data quality in terms of accuracy. The relative percent difference (RPD) between the two samples was calculated to measure data quality in terms of precision.
40-120% recovery ≤30% RPD Analyte conc. >5x background	No exceedances noted.
	No comments.

Analytical Duplicate	A sample was prepared in duplicate with this analytical batch. The relative percent difference (RPD) between the two samples was calculated to measure data quality in terms of precision.
≤30% RPD Analyte conc. >5x MDL	No exceedances noted.
	No comments.

Standard Reference Material (SRM)	A standard reference material was prepared with this batch to measure data in terms of analytical accuracy.
≤30% difference on average Analyte >10x MDL	No exceedances noted.
	No comments.

QA/QC Summary
Batch 16-0287

Initial Calibration (ICAL)	The GC/MS was calibrated with six-level calibration curve for all compounds using an instrument response factor (RF).
Mean ≤ 15% Indiv. ≤ 25%	No exceedances noted.
	No comments.

Independent Calibration Check (ICC)	The independent check was run after each initial calibration to verify the calibration. This standard is from a different source than the ICAL.
≤ 25% difference individual and mean	No exceedances noted.
	No comments.

Continuing Calibration Verification (CCV)	Continuing calibration standards were performed at the beginning and end of 10 injections or each 24-hour period (whichever is more frequent) to ensure that initial calibration is still valid.
≤ 25% difference individual and ≤ 15% mean	No exceedances noted.
	No comments.

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Disposal Area Monitoring Study Program
Project Number: 100087718

Client ID	RAH-001	RAH-002	RAH-003	RAH-006
Battelle ID	K2622-P	K2623-P	K2624-P	K2625-P
Sample Type	SA	SA	SA	SA
Collection Date	09/14/16	09/14/16	09/14/16	09/15/16
Extraction Date	10/21/16	10/21/16	10/21/16	10/21/16
Analysis Date	10/27/16	10/27/16	10/27/16	10/27/16
Analytical Instrument	MS	MS	MS	MS
% Moisture	83.08	84.92	83.17	83.85
% Lipid	1.71	1.81	1.74	1.27
Matrix	WORM TISS	WORM TISS	WORM TISS	WORM TISS
Sample Size	17.15	10.42	20.00	15.92
Size Unit-Basis	G_WET	G_WET	G_WET	G_WET
Units	UG/KG_WET	UG/KG_WET	UG/KG_WET	UG/KG_WET
Naphthalene	10.200	6.260	12.600	11.200
2-Methylnaphthalene	0.718	0.484 J	1.090	1.310
1-Methylnaphthalene	0.608	0.416 J	0.822	0.977
Acenaphthylene	0.136 U	0.225 U	0.117 U	0.147 U
Acenaphthene	0.307 J	0.225 U	0.117 U	0.147 U
Fluorene	0.438 J	0.280 J	0.163 J	0.239 J
Anthracene	1.140	0.225 U	0.117 U	0.147 U
Phenanthrene	0.973	0.950	0.713	0.776
Fluoranthene	19.500	1.820	0.916	0.858
Pyrene	8.570	3.970	0.930	0.724
Benzo(a)anthracene	0.679	0.272 U	0.142 U	1.580
Chrysene	1.540	1.070	0.500 J	0.418 J
Benzo(b)fluoranthene	0.536 J	0.613	0.387 J	0.321 J
Benzo(k)fluoranthene	0.338 J	0.372 J	0.229 J	0.191 J
Benzo(a)pyrene	0.358 J	0.444 U	0.232 U	0.291 U
Indeno(1,2,3-cd)pyrene	0.138 J	0.240 J	0.140 J	0.132 U
Dibenz(a,h)anthracene	0.108 U	0.178 U	0.093 U	0.117 U
Benzo(g,h,i)perylene	0.524 J	0.700	0.434 J	0.364 J
Surrogate Recoveries (%)				
Naphthalene-d8	80	79	79	81
Acenaphthene-d10	83	87	81	86
Phenanthrene-d10	86	91	86	87
Benzo(a)pyrene-d12	88	98	88	94

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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Disposal Area Monitoring Study Program
Project Number: 100087718

Client ID	RAH-005	RAH-004
Battelle ID	K2626-P	K2627-P
Sample Type	SA	SA
Collection Date	09/15/16	09/15/16
Extraction Date	10/21/16	10/21/16
Analysis Date	10/27/16	10/27/16
Analytical Instrument	MS	MS
% Moisture	83	83.25
% Lipid	1.46	1.37
Matrix	WORM TISS	WORM TISS
Sample Size	16.17	19.97
Size Unit-Basis	G_WET	G_WET
Units	UG/KG_WET	UG/KG_WET
Naphthalene	10.800	9.440
2-Methylnaphthalene	0.928	0.772
1-Methylnaphthalene	0.697	0.556
Acenaphthylene	0.145 U	0.117 U
Acenaphthene	0.145 U	0.117 U
Fluorene	0.190 J	0.120 J
Anthracene	0.145 U	0.117 U
Phenanthrene	0.592 J	0.411 J
Fluoranthene	0.782	0.778
Pyrene	0.678	0.653
Benzo(a)anthracene	0.342 J	0.879
Chrysene	0.387 J	0.410 J
Benzo(b)fluoranthene	0.278 J	0.307 J
Benzo(k)fluoranthene	0.140 J	0.183 J
Benzo(a)pyrene	0.286 U	0.232 U
Indeno(1,2,3-cd)pyrene	0.130 U	0.113 J
Dibenz(a,h)anthracene	0.115 U	0.093 U
Benzo(g,h,i)perylene	0.318 J	0.359 J
Surrogate Recoveries (%)		
Naphthalene-d8	81	78
Acenaphthene-d10	84	83
Phenanthrene-d10	88	87
Benzo(a)pyrene-d12	90	88

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Disposal Area Monitoring Study Program
Project Number: 100087718

Client ID	Procedural Blank
Battelle ID	CJ817PB-P
Sample Type	PB
Collection Date	10/21/16
Extraction Date	10/21/16
Analysis Date	10/26/16
Analytical Instrument	MS
% Moisture	84.82
% Lipid	NA
Matrix	TISSUE
Sample Size	19.99
Size Unit-Basis	G_WET
Units	UG/KG_WET
Naphthalene	0.208 U
2-Methylnaphthalene	0.179 U
1-Methylnaphthalene	0.105 U
Acenaphthylene	0.114 U
Acenaphthene	0.114 U
Fluorene	0.102 U
Anthracene	0.114 U
Phenanthrene	0.167 U
Fluoranthene	0.144 U
Pyrene	0.217 U
Benzo(a)anthracene	0.138 U
Chrysene	0.0878 U
Benzo(b)fluoranthene	0.114 U
Benzo(k)fluoranthene	0.0936 U
Benzo(a)pyrene	0.226 U
Indeno(1,2,3-cd)pyrene	0.102 U
Dibenz(a,h)anthracene	0.0908 U
Benzo(g,h,i)perylene	0.114 U
Surrogate Recoveries (%)	
Naphthalene-d8	81
Acenaphthene-d10	87
Phenanthrene-d10	89
Benzo(a)pyrene-d12	70

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Disposal Area Monitoring Study Program
Project Number: 100087718

Client ID	160720-01: Tilapia
Battelle ID	CJ818LCS-P
Sample Type	LCS
Collection Date	10/21/16
Extraction Date	10/21/16
Analysis Date	10/26/16
Analytical Instrument	MS
% Moisture	80.12
% Lipid	0.84
Matrix	TISSUE
Sample Size	20.02
Size Unit-Basis	G_WET

Units	UG/KG_WET	Target	% Recovery	Qualifier
Naphthalene	39.7	50.09	79	
2-Methylnaphthalene	40	50.09	80	
1-Methylnaphthalene	40.1	50.08	80	
Acenaphthylene	37.9	50.11	76	
Acenaphthene	39.3	50.08	78	
Fluorene	38.7	50.12	77	
Anthracene	38	50.07	76	
Phenanthrene	40.4	50.06	81	
Fluoranthene	40.4	50.11	81	
Pyrene	40.1	50.08	80	
Benzo(a)anthracene	40.9	50.10	82	
Chrysene	40.9	50.06	82	
Benzo(b)fluoranthene	40.8	50.15	81	
Benzo(k)fluoranthene	41.9	50.08	84	
Benzo(a)pyrene	39.3	50.02	79	
Indeno(1,2,3-cd)pyrene	39.4	50.08	79	
Dibenz(a,h)anthracene	40.6	50.04	81	
Benzo(g,h,i)perylene	42.1	50.11	84	

Surrogate Recoveries (%)

Naphthalene-d8	79
Acenaphthene-d10	79
Phenanthrene-d10	81
Benzo(a)pyrene-d12	77

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Disposal Area Monitoring Study Program
Project Number: 100087718

	161005-01: SRM					
Client ID	1974C					
Battelle ID	CJ819SRM-P					
Sample Type	SRM					
Collection Date	10/21/16					
Extraction Date	10/21/16					
Analysis Date	10/26/16					
Analytical Instrument	MS					
% Moisture	90					
% Lipid	0.89					
Matrix	TISSUE					
Sample Size	9.49					
Size Unit-Basis	G_WET	Certified		Passing	Actual	
Units	UG/KG_WET	Value	+/-	%Difference	%Difference	Qualifier
Naphthalene	1.09					
2-Methylnaphthalene	0.998 J					
1-Methylnaphthalene	0.848 J					
Acenaphthylene	0.388 J					
Acenaphthene	0.926 J					
Fluorene	1.62	2.31	0.04	31.73	29.9	
Anthracene	0.909 J	1.17	0.08	36.84	22.3	
Phenanthrene	17.4	19.6	0.40	32.04	11.2	
Fluoranthene	45.2	45.3	0.80	31.77	0.2	
Pyrene	25.5	23.9	1.60	36.69	6.7	
Benzo(a)anthracene	3.91	5.69	0.11	31.93	31.3	
Chrysene	16.5					
Benzo(b)fluoranthene	5.81					
Benzo(k)fluoranthene	4.48	4.82	0.03	30.62	7.1	
Benzo(a)pyrene	1.76	2.32	0.03	31.29	24.1	
Indeno(1,2,3-cd)pyrene	1.77					
Dibenz(a,h)anthracene	0.325 J					
Benzo(g,h,i)perylene	3.04	2.82	0.05	31.77	7.8	

Surrogate Recoveries (%)

Naphthalene-d8	86
Acenaphthene-d10	88
Phenanthrene-d10	89
Benzo(a)pyrene-d12	83

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Disposal Area Monitoring Study Program
Project Number: 100087718

Client ID	RAJ-019	RAJ-019			
Battelle ID	K2643-P	K2643MS-P			
Sample Type	SA	MS			
Collection Date	09/20/16	9/20/2016			
Extraction Date	10/21/16	10/21/2016			
Analysis Date	10/26/16	10/26/2016			
Analytical Instrument	MS	MS			
% Moisture	86.94	88.73			
% Lipid	0.54	0.58			
Matrix	CLAM TISS	CLAM TISS			
Sample Size	19.99	9.95			
Size Unit-Basis	G_WET	G_WET			
Units	UG/KG_WET	UG/KG_WET	Target	% Recovery	Qualifier
Naphthalene	1.64	78.400	100.78	76	
2-Methylnaphthalene	0.24 J	80.100	100.78	79	
1-Methylnaphthalene	0.155 J	79.900	100.76	79	
Acenaphthylene	0.117 U	73.500	100.82	73	
Acenaphthene	0.117 U	78.700	100.77	78	
Fluorene	0.105 U	78.600	100.85	78	
Anthracene	0.275 J	69.600	100.75	69	
Phenanthrene	0.267 J	83.500	100.72	83	
Fluoranthene	0.447 J	86.400	100.82	85	
Pyrene	0.57	85.000	100.77	84	
Benzo(a)anthracene	0.142 U	86.400	100.80	86	
Chrysene	0.299 J	84.400	100.72	83	
Benzo(b)fluoranthene	0.804	85.600	100.90	84	
Benzo(k)fluoranthene	0.733 J	89.400	100.76	88	
Benzo(a)pyrene	0.333 J	71.800	100.65	71	
Indeno(1,2,3-cd)pyrene	0.348 J	79.400	100.77	78	
Dibenz(a,h)anthracene	0.0931 U	81.400	100.69	81	
Benzo(g,h,i)perylene	0.603	87.200	100.83	86	

Surrogate Recoveries (%)

Naphthalene-d8	79	75
Acenaphthene-d10	81	78
Phenanthrene-d10	84	81
Benzo(a)pyrene-d12	69	68

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Disposal Area Monitoring Study Program
Project Number: 100087718

Client ID	RAJ-019
Battelle ID	K2643MSD-P
Sample Type	MSD
Collection Date	9/20/2016
Extraction Date	10/21/2016
Analysis Date	10/27/2016
Analytical Instrument	MS
% Moisture	88.16
% Lipid	0.61
Matrix	CLAM TISS
Sample Size	10.07
Size Unit-Basis	G_WET

Units	UG/KG_WET	Target	% Recovery	Qualifier	RPD (%)	Qualifier
Naphthalene	82.800	99.58	82		7.6	
2-Methylnaphthalene	84.100	99.58	84		6.1	
1-Methylnaphthalene	83.800	99.56	84		6.1	
Acenaphthylene	76.600	99.62	77		5.3	
Acenaphthene	82.500	99.57	83		6.2	
Fluorene	82.100	99.65	82		5.0	
Anthracene	73.900	99.55	74		7.0	
Phenanthrene	88.500	99.52	89		7.0	
Fluoranthene	92.800	99.62	93		9.0	
Pyrene	92.300	99.57	92		9.1	
Benzo(a)anthracene	93.300	99.60	94		8.9	
Chrysene	91.700	99.52	92		10.3	
Benzo(b)fluoranthene	94.400	99.70	94		11.2	
Benzo(k)fluoranthene	96.000	99.56	96		8.7	
Benzo(a)pyrene	78.000	99.45	78		9.4	
Indeno(1,2,3-cd)pyrene	85.100	99.57	85		8.6	
Dibenz(a,h)anthracene	90.000	99.49	90		10.5	
Benzo(g,h,i)perylene	94.100	99.63	94		8.9	

Surrogate Recoveries (%)

Naphthalene-d8	81
Acenaphthene-d10	82
Phenanthrene-d10	86
Benzo(a)pyrene-d12	75

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Disposal Area Monitoring Study Program
Project Number: 100087718

Client ID	RAJ-020	RAJ-020		
Battelle ID	K2644-P	K2644DUP-P		
Sample Type	SA	QADU		
Collection Date	09/20/16	9/20/2016		
Extraction Date	10/21/16	10/21/2016		
Analysis Date	10/27/16	10/27/2016		
Analytical Instrument	MS	MS		
% Moisture	88.53	88.44		
% Lipid	0.52	0.52		
Matrix	CLAM TISS	CLAM TISS		
Sample Size	19.95	20.01		
Size Unit-Basis	G_WET	G_WET		
Units	UG/KG_WET	UG/KG_WET	RPD	Qualifier
Naphthalene	2.17	2.200	1.4	
2-Methylnaphthalene	0.586	0.576	1.7	
1-Methylnaphthalene	0.385 J	0.392 J	NA	
Acenaphthylene	0.117 U	0.117 U	NA	
Acenaphthene	0.132 J	0.138 J	NA	
Fluorene	0.105 U	0.105 U	NA	
Anthracene	0.509 J	0.455 J	NA	
Phenanthrene	0.273 J	0.307 J	NA	
Fluoranthene	0.538	0.513	4.8	
Pyrene	1.33	1.300	2.3	
Benzo(a)anthracene	0.17 J	0.176 J	NA	
Chrysene	0.367 J	0.407 J	NA	
Benzo(b)fluoranthene	1.09	1.020	6.6	
Benzo(k)fluoranthene	0.945 J	0.965 J	NA	
Benzo(a)pyrene	0.478 J	0.460 J	NA	
Indeno(1,2,3-cd)pyrene	0.41 J	0.420 J	NA	
Dibenz(a,h)anthracene	0.0932 U	0.093 U	NA	
Benzo(g,h,i)perylene	0.669	0.689	2.9	
Surrogate Recoveries (%)				
Naphthalene-d8	74	72		
Acenaphthene-d10	78	75		
Phenanthrene-d10	81	78		
Benzo(a)pyrene-d12	64	66		

DAMOS 2016

Rockland Disposal Site

Tissue Metals Results

Envirosystems, Inc. (ESI)

CHEMICAL ANALYSIS
OF A MARINE SEDIMENT: Tissue Analysis

DAMOS- Disposal Area Monitoring Study Program

DAMOS 2016 (OPP202370)

Contract: W912WJ-12-D-0004

Prepared For:

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Battelle
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EnviroSystems, Inc. Sample Delivery Group Reference 28411

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LABORATORY STANDARDS STATEMENT

This study was performed by EnviroSystems, Incorporated at its facility in Hampton, New Hampshire. EnviroSystems' laboratory is accredited by the State of New Hampshire under the National Environmental Laboratory Accreditation (NELAC) program. Additionally, ESI is accredited under the Department of Defense (DoD) ELAP program, ISO/IEC 17025:2005, Certificate Number L2340. All testing conducted by EnviroSystems as part of this program was compliant with NELAC guidelines and standards. Additionally, this study was conducted in accordance with guidelines presented in the 2004 version of the New England District's Regional Implementation Manual (RIM) for Evaluation of Dredged Material Proposed for Disposal In New England Waters. Any deviations from specific elements of the RIM are detailed in the Protocol Deviation Section of this Report.

For EnviroSystems, Inc.  December 19, 2016

Kenneth A. Simon
Technical Director

Date

CHEMICAL ANALYSIS
OF A MARINE SEDIMENT:

DAMOS Disposal Area Monitoring Study
Tissue Analysis

1.0 SAMPLE COLLECTION, PRESERVATION AND STORAGE

Sediment samples and equipment blanks for chemical analysis were collected and provided by Battelle of Norwell, Massachusetts from locations specified within the project's proposed footprint. Samples were received under chain of custody in sample containers appropriate for the specified analysis. Upon arrival at the laboratory, all samples received an internal sample control number and were logged into the project sample control system. Samples were placed in a secure sample holding location and stored at a temperature of 4±2°C until analysis.

2.0 ANALYSIS

Sample analysis was carried out following methods and protocol specified in the RIM by EnviroSystems, Inc. at its Hampton, NH facility. Review of the data report document showed that all sample holding times were met, unless otherwise qualified, that the analytical methods used in the analysis were appropriate for the parameter and sample matrix and met New England District Regional Implementation Manual requirements. Review of supporting quality assurance data documented that, ecept where qualified, all data collected meet all of the requirements of NELAC, for all NELAC accredited parameters.

3.0 RESULTS

Analytical methods used in the analysis of tissue samples were analyzed using protocol recommended in Tables 8 of the New England District RIM document with appropriate updates related to current methods. Trace metals were evaluated using EPA Method 6020, Inductively Coupled Plasma - Mass Spectrometry (ICP-MS), mercury was evaluated using EPA Method 245.7, Cold Vapor Atomic Fluorescence Spectrometry. In cases where dilution of the sample extract was required the final reporting limit remained below the RIM document specified limits and did not result in artificial "Non Detects."

No deficiencies impacting data quality were noted.

A full copy of the analytical report is included in the following data appendix.

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K2622
Matrix: Solid
Sampled: 09/14/16 1245

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-001	84.4	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-001	6.62	0.03	ug/g	12/11/16 0930	12/11/16 1810	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-001	0.053	0.01	ug/g	12/11/16 0930	12/11/16 1810	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-001	0.076	0.03	ug/g	12/11/16 0930	12/11/16 1810	JLH/SW846 3rd Ed. 6020
Copper, total	28411-001	0.63	0.1	ug/g	12/11/16 0930	12/11/16 1810	JLH/SW846 3rd Ed. 6020
Lead, total	28411-001	0.27	0.03	ug/g	12/11/16 0930	12/11/16 1810	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-001	0.008	0.003	ug/g	12/11/16 0930	12/11/16 1430	JLH/EPA 245.7
Nickel, total	28411-001	0.46	0.05	ug/g	12/11/16 0930	12/11/16 1810	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-001	19.7	0.2	ug/g	12/11/16 0930	12/11/16 1810	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K2623
Matrix: Solid
Sampled: 09/14/16 1356

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-002	86.3	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-002	5.91	0.03	ug/g	12/11/16 0930	12/11/16 1828	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-002	0.049	0.01	ug/g	12/11/16 0930	12/11/16 1828	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-002	0.11	0.03	ug/g	12/11/16 0930	12/11/16 1828	JLH/SW846 3rd Ed. 6020
Copper, total	28411-002	0.62	0.1	ug/g	12/11/16 0930	12/11/16 1828	JLH/SW846 3rd Ed. 6020
Lead, total	28411-002	0.29	0.03	ug/g	12/11/16 0930	12/11/16 1828	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-002	0.008	0.003	ug/g	12/11/16 0930	12/11/16 1430	JLH/EPA 245.7
Nickel, total	28411-002	0.50	0.05	ug/g	12/11/16 0930	12/11/16 1828	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-002	17.8	0.2	ug/g	12/11/16 0930	12/11/16 1828	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K2624
Matrix: Solid
Sampled: 09/14/16 1557

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-003	83.8	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-003	7.36	0.03	ug/g	12/11/16 0930	12/11/16 1833	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-003	0.057	0.01	ug/g	12/11/16 0930	12/11/16 1833	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-003	0.077	0.03	ug/g	12/11/16 0930	12/11/16 1833	JLH/SW846 3rd Ed. 6020
Copper, total	28411-003	0.58	0.1	ug/g	12/11/16 0930	12/11/16 1833	JLH/SW846 3rd Ed. 6020
Lead, total	28411-003	0.27	0.03	ug/g	12/11/16 0930	12/11/16 1833	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-003	0.008	0.003	ug/g	12/11/16 0930	12/11/16 1430	JLH/EPA 245.7
Nickel, total	28411-003	0.51	0.05	ug/g	12/11/16 0930	12/11/16 1833	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-003	18.4	0.2	ug/g	12/11/16 0930	12/11/16 1833	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K2625
Matrix: Solid
Sampled: 09/15/16 1438

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-004	84.8	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-004	7.63	0.03	ug/g	12/11/16 0930	12/11/16 1839	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-004	0.061	0.01	ug/g	12/11/16 0930	12/11/16 1839	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-004	0.050	0.03	ug/g	12/11/16 0930	12/11/16 1839	JLH/SW846 3rd Ed. 6020
Copper, total	28411-004	0.53	0.1	ug/g	12/11/16 0930	12/11/16 1839	JLH/SW846 3rd Ed. 6020
Lead, total	28411-004	0.31	0.03	ug/g	12/11/16 0930	12/11/16 1839	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-004	0.008	0.003	ug/g	12/11/16 0930	12/11/16 1430	JLH/EPA 245.7
Nickel, total	28411-004	0.37	0.05	ug/g	12/11/16 0930	12/11/16 1839	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-004	20.8	0.2	ug/g	12/11/16 0930	12/11/16 1839	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K2626
Matrix: Solid
Sampled: 09/15/16 1548

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-005	84.8	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-005	7.60	0.03	ug/g	12/11/16 0930	12/11/16 1845	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-005	0.069	0.01	ug/g	12/11/16 0930	12/11/16 1845	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-005	0.052	0.03	ug/g	12/11/16 0930	12/11/16 1845	JLH/SW846 3rd Ed. 6020
Copper, total	28411-005	0.61	0.1	ug/g	12/11/16 0930	12/11/16 1845	JLH/SW846 3rd Ed. 6020
Lead, total	28411-005	0.26	0.03	ug/g	12/11/16 0930	12/11/16 1845	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-005	0.009	0.003	ug/g	12/11/16 0930	12/11/16 1430	JLH/EPA 245.7
Nickel, total	28411-005	0.40	0.05	ug/g	12/11/16 0930	12/11/16 1845	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-005	20.1	0.2	ug/g	12/11/16 0930	12/11/16 1845	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K2627
Matrix: Solid
Sampled: 09/15/16 1630

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-006	84.3	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-006	6.97	0.03	ug/g	12/11/16 0930	12/11/16 1851	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-006	0.075	0.01	ug/g	12/11/16 0930	12/11/16 1851	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-006	0.070	0.03	ug/g	12/11/16 0930	12/11/16 1851	JLH/SW846 3rd Ed. 6020
Copper, total	28411-006	0.60	0.1	ug/g	12/11/16 0930	12/11/16 1851	JLH/SW846 3rd Ed. 6020
Lead, total	28411-006	0.26	0.03	ug/g	12/11/16 0930	12/11/16 1851	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-006	0.008	0.003	ug/g	12/11/16 0930	12/11/16 1430	JLH/EPA 245.7
Nickel, total	28411-006	0.42	0.05	ug/g	12/11/16 0930	12/11/16 1851	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-006	20.1	0.2	ug/g	12/11/16 0930	12/11/16 1851	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K2643
Matrix: Solid
Sampled: 09/20/16 1506

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-007	89.0	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-007	2.86	0.03	ug/g	12/11/16 0930	12/11/16 1857	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-007	1.22	0.01	ug/g	12/11/16 0930	12/11/16 1857	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-007	0.091	0.03	ug/g	12/11/16 0930	12/11/16 1857	JLH/SW846 3rd Ed. 6020
Copper, total	28411-007	1.15	0.1	ug/g	12/11/16 0930	12/11/16 1857	JLH/SW846 3rd Ed. 6020
Lead, total	28411-007	0.095	0.03	ug/g	12/11/16 0930	12/11/16 1857	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-007	0.031	0.003	ug/g	12/11/16 0930	12/11/16 1430	JLH/EPA 245.7
Nickel, total	28411-007	0.63	0.05	ug/g	12/11/16 0930	12/11/16 1857	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-007	7.22	0.2	ug/g	12/11/16 0930	12/11/16 1857	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K2644
Matrix: Solid
Sampled: 09/20/16 1549

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-008	89.3	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-008	3.11	0.03	ug/g	12/11/16 0930	12/11/16 1903	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-008	1.14	0.01	ug/g	12/11/16 0930	12/11/16 1903	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-008	0.087	0.03	ug/g	12/11/16 0930	12/11/16 1903	JLH/SW846 3rd Ed. 6020
Copper, total	28411-008	1.05	0.1	ug/g	12/11/16 0930	12/11/16 1903	JLH/SW846 3rd Ed. 6020
Lead, total	28411-008	0.10	0.03	ug/g	12/11/16 0930	12/11/16 1903	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-008	0.032	0.003	ug/g	12/11/16 0930	12/11/16 1430	JLH/EPA 245.7
Nickel, total	28411-008	0.50	0.05	ug/g	12/11/16 0930	12/11/16 1903	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-008	6.72	0.2	ug/g	12/11/16 0930	12/11/16 1903	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K2645
Matrix: Solid
Sampled: 09/21/16 0804

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-009	89.2	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-009	3.74	0.03	ug/g	12/11/16 0930	12/11/16 1734	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-009	1.38	0.01	ug/g	12/11/16 0930	12/11/16 1734	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-009	0.30	0.03	ug/g	12/11/16 0930	12/11/16 1734	JLH/SW846 3rd Ed. 6020
Copper, total	28411-009	1.23	0.1	ug/g	12/11/16 0930	12/11/16 1734	JLH/SW846 3rd Ed. 6020
Lead, total	28411-009	0.14	0.03	ug/g	12/11/16 0930	12/11/16 1734	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-009	0.040	0.003	ug/g	12/11/16 0930	12/11/16 1430	JLH/EPA 245.7
Nickel, total	28411-009	0.74	0.05	ug/g	12/11/16 0930	12/11/16 1734	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-009	7.17	0.2	ug/g	12/11/16 0930	12/11/16 1734	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K2646
Matrix: Solid
Sampled: 09/21/16 1144

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-010	85.6	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-010	5.30	0.03	ug/g	12/11/16 0930	12/11/16 1909	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-010	0.11	0.01	ug/g	12/11/16 0930	12/11/16 1909	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-010	0.042	0.03	ug/g	12/11/16 0930	12/11/16 1909	JLH/SW846 3rd Ed. 6020
Copper, total	28411-010	0.67	0.1	ug/g	12/11/16 0930	12/11/16 1909	JLH/SW846 3rd Ed. 6020
Lead, total	28411-010	0.16	0.03	ug/g	12/11/16 0930	12/11/16 1909	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-010	0.005	0.003	ug/g	12/11/16 0930	12/11/16 1430	JLH/EPA 245.7
Nickel, total	28411-010	0.37	0.05	ug/g	12/11/16 0930	12/11/16 1909	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-010	19.6	0.2	ug/g	12/11/16 0930	12/11/16 1909	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K2647
Matrix: Solid
Sampled: 09/21/16 1458

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-011	82.8	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-011	6.17	0.03	ug/g	12/11/16 0930	12/11/16 1915	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-011	0.14	0.01	ug/g	12/11/16 0930	12/11/16 1915	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-011	0.070	0.03	ug/g	12/11/16 0930	12/11/16 1915	JLH/SW846 3rd Ed. 6020
Copper, total	28411-011	0.96	0.1	ug/g	12/11/16 0930	12/11/16 1915	JLH/SW846 3rd Ed. 6020
Lead, total	28411-011	0.22	0.03	ug/g	12/11/16 0930	12/11/16 1915	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-011	0.007	0.003	ug/g	12/11/16 0930	12/11/16 1430	JLH/EPA 245.7
Nickel, total	28411-011	0.50	0.05	ug/g	12/11/16 0930	12/11/16 1915	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-011	25.5	0.2	ug/g	12/11/16 0930	12/11/16 1915	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K2648
Matrix: Solid
Sampled: 09/21/16 1458

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-012	87.8	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-012	3.59	0.03	ug/g	12/11/16 0930	12/11/16 1921	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-012	1.04	0.01	ug/g	12/11/16 0930	12/11/16 1921	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-012	0.14	0.03	ug/g	12/11/16 0930	12/11/16 1921	JLH/SW846 3rd Ed. 6020
Copper, total	28411-012	1.38	0.1	ug/g	12/11/16 0930	12/11/16 1921	JLH/SW846 3rd Ed. 6020
Lead, total	28411-012	0.12	0.03	ug/g	12/11/16 0930	12/11/16 1921	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-012	0.045	0.003	ug/g	12/11/16 0930	12/11/16 1430	JLH/EPA 245.7
Nickel, total	28411-012	0.38	0.05	ug/g	12/11/16 0930	12/11/16 1921	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-012	7.64	0.2	ug/g	12/11/16 0930	12/11/16 1921	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K3515
Matrix: Solid
Sampled: 10/04/16 0857

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-013	83.2	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-013	6.01	0.03	ug/g	12/11/16 0930	12/11/16 1938	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-013	0.21	0.01	ug/g	12/11/16 0930	12/11/16 1938	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-013	0.10	0.03	ug/g	12/11/16 0930	12/11/16 1938	JLH/SW846 3rd Ed. 6020
Copper, total	28411-013	2.36	0.1	ug/g	12/11/16 0930	12/11/16 1938	JLH/SW846 3rd Ed. 6020
Lead, total	28411-013	0.75	0.03	ug/g	12/11/16 0930	12/11/16 1938	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-013	0.016	0.003	ug/g	12/11/16 0930	12/11/16 1430	JLH/EPA 245.7
Nickel, total	28411-013	0.44	0.05	ug/g	12/11/16 0930	12/11/16 1938	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-013	29.5	0.2	ug/g	12/11/16 0930	12/11/16 1938	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K3516
Matrix: Solid
Sampled: 10/04/16 1229

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-014	84.1	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-014	5.41	0.03	ug/g	12/11/16 0930	12/11/16 1944	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-014	0.16	0.01	ug/g	12/11/16 0930	12/11/16 1944	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-014	0.24	0.03	ug/g	12/11/16 0930	12/11/16 1944	JLH/SW846 3rd Ed. 6020
Copper, total	28411-014	1.64	0.1	ug/g	12/11/16 0930	12/11/16 1944	JLH/SW846 3rd Ed. 6020
Lead, total	28411-014	0.72	0.03	ug/g	12/11/16 0930	12/11/16 1944	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-014	0.007	0.003	ug/g	12/11/16 0930	12/11/16 1430	JLH/EPA 245.7
Nickel, total	28411-014	0.36	0.05	ug/g	12/11/16 0930	12/11/16 1944	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-014	26.9	0.2	ug/g	12/11/16 0930	12/11/16 1944	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K3517
Matrix: Solid
Sampled: 10/04/16 1514

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-015	83.8	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-015	5.05	0.03	ug/g	12/11/16 1215	12/11/16 2101	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-015	0.15	0.01	ug/g	12/11/16 1215	12/11/16 2101	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-015	0.10	0.03	ug/g	12/11/16 1215	12/11/16 2101	JLH/SW846 3rd Ed. 6020
Copper, total	28411-015	1.44	0.1	ug/g	12/11/16 1215	12/11/16 2101	JLH/SW846 3rd Ed. 6020
Lead, total	28411-015	0.43	0.03	ug/g	12/11/16 1215	12/11/16 2101	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-015	0.009	0.003	ug/g	12/11/16 1215	12/11/16 1530	JLH/EPA 245.7
Nickel, total	28411-015	0.35	0.05	ug/g	12/11/16 1215	12/11/16 2101	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-015	25.5	0.2	ug/g	12/11/16 1215	12/11/16 2101	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K3518
Matrix: Solid
Sampled: 10/05/16 0950

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-016	83.1	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-016	6.03	0.03	ug/g	12/11/16 1215	12/11/16 2026	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-016	0.19	0.01	ug/g	12/11/16 1215	12/11/16 2026	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-016	0.095	0.03	ug/g	12/11/16 1215	12/11/16 2026	JLH/SW846 3rd Ed. 6020
Copper, total	28411-016	2.23	0.1	ug/g	12/11/16 1215	12/11/16 2026	JLH/SW846 3rd Ed. 6020
Lead, total	28411-016	0.54	0.03	ug/g	12/11/16 1215	12/11/16 2026	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-016	0.016	0.003	ug/g	12/11/16 1215	12/11/16 1530	JLH/EPA 245.7
Nickel, total	28411-016	0.42	0.05	ug/g	12/11/16 1215	12/11/16 2026	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-016	29.4	0.2	ug/g	12/11/16 1215	12/11/16 2026	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K3519
Matrix: Solid
Sampled: 10/05/16 1435

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-017	83.1	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-017	5.98	0.03	ug/g	12/11/16 1215	12/11/16 2119	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-017	0.19	0.01	ug/g	12/11/16 1215	12/11/16 2119	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-017	0.10	0.03	ug/g	12/11/16 1215	12/11/16 2119	JLH/SW846 3rd Ed. 6020
Copper, total	28411-017	2.26	0.1	ug/g	12/11/16 1215	12/11/16 2119	JLH/SW846 3rd Ed. 6020
Lead, total	28411-017	0.43	0.03	ug/g	12/11/16 1215	12/11/16 2119	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-017	0.016	0.003	ug/g	12/11/16 1215	12/11/16 1530	JLH/EPA 245.7
Nickel, total	28411-017	0.41	0.05	ug/g	12/11/16 1215	12/11/16 2119	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-017	29.7	0.2	ug/g	12/11/16 1215	12/11/16 2119	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K3520
Matrix: Solid
Sampled: 10/05/16 1435

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-018	84.4	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-018	5.16	0.03	ug/g	12/11/16 1215	12/11/16 2125	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-018	0.18	0.01	ug/g	12/11/16 1215	12/11/16 2125	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-018	0.16	0.03	ug/g	12/11/16 1215	12/11/16 2125	JLH/SW846 3rd Ed. 6020
Copper, total	28411-018	1.58	0.1	ug/g	12/11/16 1215	12/11/16 2125	JLH/SW846 3rd Ed. 6020
Lead, total	28411-018	0.39	0.03	ug/g	12/11/16 1215	12/11/16 2125	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-018	0.008	0.003	ug/g	12/11/16 1215	12/11/16 1530	JLH/EPA 245.7
Nickel, total	28411-018	0.47	0.05	ug/g	12/11/16 1215	12/11/16 2125	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-018	25.4	0.2	ug/g	12/11/16 1215	12/11/16 2125	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K3521
Matrix: Solid
Sampled: 10/06/16 1426

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-019	83.8	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-019	4.63	0.03	ug/g	12/11/16 1215	12/11/16 2131	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-019	0.20	0.01	ug/g	12/11/16 1215	12/11/16 2131	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-019	0.076	0.03	ug/g	12/11/16 1215	12/11/16 2131	JLH/SW846 3rd Ed. 6020
Copper, total	28411-019	1.61	0.1	ug/g	12/11/16 1215	12/11/16 2131	JLH/SW846 3rd Ed. 6020
Lead, total	28411-019	0.37	0.03	ug/g	12/11/16 1215	12/11/16 2131	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-019	0.007	0.003	ug/g	12/11/16 1215	12/11/16 1530	JLH/EPA 245.7
Nickel, total	28411-019	0.33	0.05	ug/g	12/11/16 1215	12/11/16 2131	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-019	24.9	0.2	ug/g	12/11/16 1215	12/11/16 2131	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K3522
Matrix: Solid
Sampled: 10/07/16 0827

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-020	83.1	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-020	6.46	0.03	ug/g	12/11/16 1215	12/11/16 2137	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-020	0.17	0.01	ug/g	12/11/16 1215	12/11/16 2137	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-020	0.096	0.03	ug/g	12/11/16 1215	12/11/16 2137	JLH/SW846 3rd Ed. 6020
Copper, total	28411-020	2.41	0.1	ug/g	12/11/16 1215	12/11/16 2137	JLH/SW846 3rd Ed. 6020
Lead, total	28411-020	0.47	0.03	ug/g	12/11/16 1215	12/11/16 2137	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-020	0.017	0.003	ug/g	12/11/16 1215	12/11/16 1530	JLH/EPA 245.7
Nickel, total	28411-020	0.42	0.05	ug/g	12/11/16 1215	12/11/16 2137	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-020	29.1	0.2	ug/g	12/11/16 1215	12/11/16 2137	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K3523
Matrix: Solid
Sampled: 10/07/16 1105

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-021	84.4	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-021	5.65	0.03	ug/g	12/11/16 1215	12/11/16 2143	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-021	0.16	0.01	ug/g	12/11/16 1215	12/11/16 2143	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-021	0.10	0.03	ug/g	12/11/16 1215	12/11/16 2143	JLH/SW846 3rd Ed. 6020
Copper, total	28411-021	2.35	0.1	ug/g	12/11/16 1215	12/11/16 2143	JLH/SW846 3rd Ed. 6020
Lead, total	28411-021	0.41	0.03	ug/g	12/11/16 1215	12/11/16 2143	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-021	0.017	0.003	ug/g	12/11/16 1215	12/11/16 1530	JLH/EPA 245.7
Nickel, total	28411-021	0.41	0.05	ug/g	12/11/16 1215	12/11/16 2143	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-021	26.5	0.2	ug/g	12/11/16 1215	12/11/16 2143	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K3524
Matrix: Solid
Sampled: 10/11/16 1025

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-022	83.4	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-022	5.68	0.03	ug/g	12/11/16 1215	12/11/16 2148	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-022	0.16	0.01	ug/g	12/11/16 1215	12/11/16 2148	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-022	0.093	0.03	ug/g	12/11/16 1215	12/11/16 2148	JLH/SW846 3rd Ed. 6020
Copper, total	28411-022	2.24	0.1	ug/g	12/11/16 1215	12/11/16 2148	JLH/SW846 3rd Ed. 6020
Lead, total	28411-022	0.50	0.03	ug/g	12/11/16 1215	12/11/16 2148	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-022	0.019	0.003	ug/g	12/11/16 1215	12/11/16 1530	JLH/EPA 245.7
Nickel, total	28411-022	0.44	0.05	ug/g	12/11/16 1215	12/11/16 2148	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-022	28.1	0.2	ug/g	12/11/16 1215	12/11/16 2148	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K3525
Matrix: Solid
Sampled: 10/11/16 1025

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-023	83.0	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-023	5.59	0.03	ug/g	12/11/16 1215	12/11/16 2154	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-023	0.17	0.01	ug/g	12/11/16 1215	12/11/16 2154	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-023	0.17	0.03	ug/g	12/11/16 1215	12/11/16 2154	JLH/SW846 3rd Ed. 6020
Copper, total	28411-023	2.62	0.1	ug/g	12/11/16 1215	12/11/16 2154	JLH/SW846 3rd Ed. 6020
Lead, total	28411-023	0.38	0.03	ug/g	12/11/16 1215	12/11/16 2154	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-023	0.020	0.003	ug/g	12/11/16 1215	12/11/16 1530	JLH/EPA 245.7
Nickel, total	28411-023	0.47	0.05	ug/g	12/11/16 1215	12/11/16 2154	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-023	28.8	0.2	ug/g	12/11/16 1215	12/11/16 2154	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K3526
Matrix: Solid
Sampled: 10/11/16 1210

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-024	83.5	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-024	5.64	0.03	ug/g	12/11/16 1215	12/11/16 2200	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-024	0.15	0.01	ug/g	12/11/16 1215	12/11/16 2200	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-024	0.14	0.03	ug/g	12/11/16 1215	12/11/16 2200	JLH/SW846 3rd Ed. 6020
Copper, total	28411-024	2.39	0.1	ug/g	12/11/16 1215	12/11/16 2200	JLH/SW846 3rd Ed. 6020
Lead, total	28411-024	0.94	0.03	ug/g	12/11/16 1215	12/11/16 2200	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-024	0.018	0.003	ug/g	12/11/16 1215	12/11/16 1530	JLH/EPA 245.7
Nickel, total	28411-024	0.47	0.05	ug/g	12/11/16 1215	12/11/16 2200	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-024	26.1	0.2	ug/g	12/11/16 1215	12/11/16 2200	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K3527
Matrix: Solid
Sampled: 10/11/16 1424

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-025	83.5	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-025	5.71	0.03	ug/g	12/11/16 1215	12/11/16 2206	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-025	0.16	0.01	ug/g	12/11/16 1215	12/11/16 2206	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-025	0.14	0.03	ug/g	12/11/16 1215	12/11/16 2206	JLH/SW846 3rd Ed. 6020
Copper, total	28411-025	2.82	0.1	ug/g	12/11/16 1215	12/11/16 2206	JLH/SW846 3rd Ed. 6020
Lead, total	28411-025	0.84	0.03	ug/g	12/11/16 1215	12/11/16 2206	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-025	0.020	0.003	ug/g	12/11/16 1215	12/11/16 1530	JLH/EPA 245.7
Nickel, total	28411-025	0.49	0.05	ug/g	12/11/16 1215	12/11/16 2206	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-025	28.5	0.2	ug/g	12/11/16 1215	12/11/16 2206	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K3528
Matrix: Solid
Sampled: 10/12/16 0814

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-026	84.1	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-026	5.58	0.03	ug/g	12/11/16 1215	12/11/16 2212	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-026	0.19	0.01	ug/g	12/11/16 1215	12/11/16 2212	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-026	0.23	0.03	ug/g	12/11/16 1215	12/11/16 2212	JLH/SW846 3rd Ed. 6020
Copper, total	28411-026	2.93	0.1	ug/g	12/11/16 1215	12/11/16 2212	JLH/SW846 3rd Ed. 6020
Lead, total	28411-026	0.58	0.03	ug/g	12/11/16 1215	12/11/16 2212	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-026	0.016	0.003	ug/g	12/11/16 1215	12/11/16 1530	JLH/EPA 245.7
Nickel, total	28411-026	0.49	0.05	ug/g	12/11/16 1215	12/11/16 2212	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-026	27.8	0.2	ug/g	12/11/16 1215	12/11/16 2212	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K3529
Matrix: Solid
Sampled: 10/12/16 0955

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-027	86.7	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-027	4.56	0.03	ug/g	12/11/16 1215	12/11/16 2230	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-027	0.16	0.01	ug/g	12/11/16 1215	12/11/16 2230	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-027	0.079	0.03	ug/g	12/11/16 1215	12/11/16 2230	JLH/SW846 3rd Ed. 6020
Copper, total	28411-027	1.40	0.1	ug/g	12/11/16 1215	12/11/16 2230	JLH/SW846 3rd Ed. 6020
Lead, total	28411-027	0.30	0.03	ug/g	12/11/16 1215	12/11/16 2230	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-027	0.010	0.003	ug/g	12/11/16 1215	12/11/16 1530	JLH/EPA 245.7
Nickel, total	28411-027	0.30	0.05	ug/g	12/11/16 1215	12/11/16 2230	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-027	23.7	0.2	ug/g	12/11/16 1215	12/11/16 2230	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28411 SDG:
Project: DAMOS- Disposal Area Monitoring Study Program

Sample ID: K3530
Matrix: Solid
Sampled: 10/12/16 1118

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Moisture	28411-028	86.4	0.1	%	12/10/16 1215	12/12/16 1200	AC /160.3 EPA 600/4/79/020
Arsenic, total	28411-028	4.35	0.02	ug/g	12/11/16 1215	12/11/16 2236	JLH/SW846 3rd Ed. 6020
Cadmium, total	28411-028	0.13	0.009	ug/g	12/11/16 1215	12/11/16 2236	JLH/SW846 3rd Ed. 6020
Chromium, total	28411-028	0.12	0.02	ug/g	12/11/16 1215	12/11/16 2236	JLH/SW846 3rd Ed. 6020
Copper, total	28411-028	1.04	0.09	ug/g	12/11/16 1215	12/11/16 2236	JLH/SW846 3rd Ed. 6020
Lead, total	28411-028	0.31	0.02	ug/g	12/11/16 1215	12/11/16 2236	JLH/SW846 3rd Ed. 6020
Mercury, total	28411-028	0.005	0.003	ug/g	12/11/16 1215	12/11/16 1530	JLH/EPA 245.7
Nickel, total	28411-028	0.28	0.05	ug/g	12/11/16 1215	12/11/16 2236	JLH/SW846 3rd Ed. 6020
Zinc, total	28411-028	24.8	0.2	ug/g	12/11/16 1215	12/11/16 2236	JLH/SW846 3rd Ed. 6020

Notes:

Quality Control Summary

Parameter: Arsenic, total
Project: DAMOS- Disposal Area Monitoring Study Program
Matrix: Solid
QC Batch No: 494S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28411-001	K2622	28411-011	K2647
28411-002	K2623	28411-012	K2648
28411-003	K2624	28411-013	K3515
28411-004	K2625	28411-014	K3516
28411-005	K2626		
28411-006	K2627		
28411-007	K2643		
28411-008	K2644		
28411-009	K2645		
28411-010	K2646		

	Control Limit +/-	Preparation Blank Result ug/g	Q		M
PB494S	0.03	0.03	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g	True Value ug/g	%R	Lab Control Dup Sample Result ug/g	True Value ug/g	%R	
LCS	85-115	6.23	6.25	100	6.37	6.25	102	Pass
SRM	70-130	12.8	13.3	96				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g	Q	Sample Result ug/g	Q	RPD	Q	
28411-009	30	3.49		3.74		7		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g	Spike Added ug/g	Sample Result ug/g	Q	%R	Q	
28411-009S	70-130	9.88	6.13	3.74		100		Pass
28411-009SD	70-130	9.86	6.13	3.74		100		Pass

U = Below quantitation limit

Quality Control Summary

Parameter: Cadmium, total
Project: DAMOS- Disposal Area Monitoring Study Program
Matrix: Solid
QC Batch No: 494S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28411-001	K2622	28411-011	K2647
28411-002	K2623	28411-012	K2648
28411-003	K2624	28411-013	K3515
28411-004	K2625	28411-014	K3516
28411-005	K2626		
28411-006	K2627		
28411-007	K2643		
28411-008	K2644		
28411-009	K2645		
28411-010	K2646		

	Control Limit +/-	Preparation Blank Result ug/g	Q		M
PB494S	0.01	0.01	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g	True Value ug/g	%R	Lab Control Dup Sample Result ug/g	True Value ug/g	%R	
LCS	85-115	3.16	3.12	101	3.25	3.12	104	Pass
SRM	70-130	0.86	0.82	105				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g	Q	Sample Result ug/g	Q	RPD	Q	
28411-009	30	1.42		1.38		3		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g	Spike Added ug/g	Sample Result ug/g	Q	%R	Q	
28411-009S	70-130	4.68	3.06	1.38		108		Pass
28411-009SD	70-130	4.72	3.06	1.38		109		Pass

U = Below quantitation limit

Quality Control Summary

Parameter: Chromium, total
Project: DAMOS- Disposal Area Monitoring Study Program
Matrix: Solid
QC Batch No: 494S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28411-001	K2622	28411-011	K2647
28411-002	K2623	28411-012	K2648
28411-003	K2624	28411-013	K3515
28411-004	K2625	28411-014	K3516
28411-005	K2626		
28411-006	K2627		
28411-007	K2643		
28411-008	K2644		
28411-009	K2645		
28411-010	K2646		

	Control Limit +/-	Preparation Blank Result ug/g	Q		M
PB494S	0.03	0.03	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g	True Value ug/g	%R	Lab Control Dup Sample Result ug/g	True Value ug/g	%R	
LCS	85-115	4.91	5.0	98	5.06	5.0	101	Pass
SRM	70-130	0.36	0.50	72				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g	Q	Sample Result ug/g	Q	RPD	Q	
28411-009	30	0.40		0.30		27		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g	Spike Added ug/g	Sample Result ug/g	Q	%R	Q	
28411-009S	70-130	6.02	4.90	0.30		117		Pass
28411-009SD	70-130	5.51	4.90	0.30		106		Pass

U = Below quantitation limit

Quality Control Summary

Parameter: Copper, total
Project: DAMOS- Disposal Area Monitoring Study Program
Matrix: Solid
QC Batch No: 494S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28411-001	K2622	28411-011	K2647
28411-002	K2623	28411-012	K2648
28411-003	K2624	28411-013	K3515
28411-004	K2625	28411-014	K3516
28411-005	K2626		
28411-006	K2627		
28411-007	K2643		
28411-008	K2644		
28411-009	K2645		
28411-010	K2646		

	Control Limit +/-	Preparation Blank Result ug/g	Q		M
PB494S	0.1	0.1	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g	True Value ug/g	%R	Lab Control Dup Sample Result ug/g	True Value ug/g	%R	
LCS	85-115	6.06	6.25	97	6.21	6.25	99	Pass
SRM	70-130	3.80	4.02	95				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g	Q	Sample Result ug/g	Q	RPD	Q	
28411-009	30	1.25		1.23		2		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g	Spike Added ug/g	Sample Result ug/g	Q	%R	Q	
28411-009S	70-130	7.11	6.13	1.23		96		Pass
28411-009SD	70-130	7.23	6.13	1.23		98		Pass

U = Below quantitation limit

Quality Control Summary

Parameter: Lead, total
Project: DAMOS- Disposal Area Monitoring Study Program
Matrix: Solid
QC Batch No: 494S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28411-001	K2622	28411-011	K2647
28411-002	K2623	28411-012	K2648
28411-003	K2624	28411-013	K3515
28411-004	K2625	28411-014	K3516
28411-005	K2626		
28411-006	K2627		
28411-007	K2643		
28411-008	K2644		
28411-009	K2645		
28411-010	K2646		

	Control Limit +/-	Preparation Blank Result ug/g	Q		M
PB494S	0.03	0.03	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g	True Value ug/g	%R	Lab Control Dup Sample Result ug/g	True Value ug/g	%R	
LCS	85-115	6.21	6.25	99	6.51	6.25	104	Pass
SRM	70-130	1.23	1.19	103				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g	Q	Sample Result ug/g	Q	RPD	Q	
28411-009	30	0.12		0.14		NC		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g	Spike Added ug/g	Sample Result ug/g	Q	%R	Q	
28411-009S	70-130	6.37	6.13	0.14		102		Pass
28411-009SD	70-130	6.52	6.13	0.14		104		Pass

U = Below quantitation limit
NC = Not calculated due to one or both values less than five times the reporting limit.

Quality Control Summary

Parameter: Mercury, total
Project: DAMOS- Disposal Area Monitoring Study Program
Matrix: Solid
QC Batch No: 203S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28411-001	K2622	28411-011	K2647
28411-002	K2623	28411-012	K2648
28411-003	K2624	28411-013	K3515
28411-004	K2625	28411-014	K3516
28411-005	K2626		
28411-006	K2627		
28411-007	K2643		
28411-008	K2644		
28411-009	K2645		
28411-010	K2646		

	Control Limit +/-	Preparation Blank Result ug/g	Q		M
PB203S	0.003	0.003	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g	True Value ug/g	%R	Lab Control Dup Sample Result ug/g	True Value ug/g	%R	
LCS	75-125	0.105	0.10	105	0.110	0.10	110	Pass
SRM	70-130	0.053	0.061	87				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g	Q	Sample Result ug/g	Q	RPD	Q	
28411-009	25	0.038		0.040		5		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g	Spike Added ug/g	Sample Result ug/g	Q	%R	Q	
28411-009S	75-125	0.146	0.098	0.040		108		Pass
28411-009SD	75-125	0.143	0.098	0.040		105		Pass

U = Below quantitation limit

Quality Control Summary

Parameter: Nickel, total
Project: DAMOS- Disposal Area Monitoring Study Program
Matrix: Solid
QC Batch No: 494S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28411-001	K2622	28411-011	K2647
28411-002	K2623	28411-012	K2648
28411-003	K2624	28411-013	K3515
28411-004	K2625	28411-014	K3516
28411-005	K2626		
28411-006	K2627		
28411-007	K2643		
28411-008	K2644		
28411-009	K2645		
28411-010	K2646		

	Control Limit +/-	Preparation Blank Result ug/g	Q		M
PB494S	0.05	0.05	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g	True Value ug/g	%R	Lab Control Dup Sample Result ug/g	True Value ug/g	%R	
LCS	85-115	12.3	12.5	98	12.6	12.5	101	Pass
SRM	70-130	0.83	0.93	89				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g	Q	Sample Result ug/g	Q	RPD	Q	
28411-009	30	0.79		0.74		8		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g	Spike Added ug/g	Sample Result ug/g	Q	%R	Q	
28411-009S	70-130	13.0	12.3	0.74		100		Pass
28411-009SD	70-130	12.9	12.3	0.74		99		Pass

U = Below quantitation limit

Quality Control Summary

Parameter: Zinc, total
Project: DAMOS- Disposal Area Monitoring Study Program
Matrix: Solid
QC Batch No: 494S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28411-001	K2622	28411-011	K2647
28411-002	K2623	28411-012	K2648
28411-003	K2624	28411-013	K3515
28411-004	K2625	28411-014	K3516
28411-005	K2626		
28411-006	K2627		
28411-007	K2643		
28411-008	K2644		
28411-009	K2645		
28411-010	K2646		

	Control Limit +/-	Preparation Blank Result ug/g	Q		M
PB494S	0.2	0.2	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g	True Value ug/g	%R	Lab Control Dup Sample Result ug/g	True Value ug/g	%R	
LCS	85-115	12.5	12.5	100	12.9	12.5	103	Pass
SRM	70-130	139	137	101				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g	Q	Sample Result ug/g	Q	RPD	Q	
28411-009	30	7.23		7.17		1		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g	Spike Added ug/g	Sample Result ug/g	Q	%R	Q	
28411-009S	70-130	19.8	12.3	7.17		103		Pass
28411-009SD	70-130	20.1	12.3	7.17		105		Pass

U = Below quantitation limit

Quality Control Summary

Parameter: Arsenic, total
Project: DAMOS- Disposal Area Monitoring Study Program
Matrix: Solid
QC Batch No: 495S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28411-015	K3517	28411-025	K3527
28411-016	K3518	28411-026	K3528
28411-017	K3519	28411-027	K3529
28411-018	K3520	28411-028	K3530
28411-019	K3521		
28411-020	K3522		
28411-021	K3523		
28411-022	K3524		
28411-023	K3525		
28411-024	K3526		

	Control Limit +/-	Preparation Blank Result ug/g	Q		M
PB495S	0.03	0.03	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g	True Value ug/g	%R	Lab Control Dup Sample Result ug/g	True Value ug/g	%R	
LCS	85-115	6.28	6.25	100	6.31	6.25	101	Pass
SRM	70-130	13.1	13.3	98				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g	Q	Sample Result ug/g	Q	RPD	Q	
28411-016	30	6.12		6.03		1		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g	Spike Added ug/g	Sample Result ug/g	Q	%R	Q	
28411-016S	70-130	12.70	6.31	6.03		106		Pass
28411-016SD	70-130	12.70	6.25	6.03		107		Pass

U = Below quantitation limit

Quality Control Summary

Parameter: Cadmium, total
Project: DAMOS- Disposal Area Monitoring Study Program
Matrix: Solid
QC Batch No: 495S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28411-015	K3517	28411-025	K3527
28411-016	K3518	28411-026	K3528
28411-017	K3519	28411-027	K3529
28411-018	K3520	28411-028	K3530
28411-019	K3521		
28411-020	K3522		
28411-021	K3523		
28411-022	K3524		
28411-023	K3525		
28411-024	K3526		

	Control Limit +/-	Preparation Blank Result ug/g	Q		M
PB495S	0.01	0.01	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g	True Value ug/g	%R	Lab Control Dup Sample Result ug/g	True Value ug/g	%R	
LCS	85-115	3.31	3.12	106	3.33	3.12	107	Pass
SRM	70-130	0.90	0.82	110				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g	Q	Sample Result ug/g	Q	RPD	Q	
28411-016	30	0.19		0.19		2		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g	Spike Added ug/g	Sample Result ug/g	Q	%R	Q	
28411-016S	70-130	3.54	3.16	0.19		106		Pass
28411-016SD	70-130	3.51	3.12	0.19		106		Pass

U = Below quantitation limit

Quality Control Summary

Parameter: Chromium, total
Project: DAMOS- Disposal Area Monitoring Study Program
Matrix: Solid
QC Batch No: 495S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28411-015	K3517	28411-025	K3527
28411-016	K3518	28411-026	K3528
28411-017	K3519	28411-027	K3529
28411-018	K3520	28411-028	K3530
28411-019	K3521		
28411-020	K3522		
28411-021	K3523		
28411-022	K3524		
28411-023	K3525		
28411-024	K3526		

	Control Limit +/-	Preparation Blank Result ug/g	Q		M
PB495S	0.03	0.03	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g	True Value ug/g	%R	Lab Control Dup Sample Result ug/g	True Value ug/g	%R	
LCS	85-115	5.12	5.0	102	5.14	5.0	103	Pass
SRM	70-130	0.36	0.50	72				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g	Q	Sample Result ug/g	Q	RPD	Q	
28411-016	30	0.10		0.10		NC		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g	Spike Added ug/g	Sample Result ug/g	Q	%R	Q	
28411-016S	70-130	5.09	5.05	0.10		99		Pass
28411-016SD	70-130	5.10	5.00	0.10		100		Pass

U = Below quantitation limit
NC = Not calculated due to one or both values less than five times the reporting limit.

Quality Control Summary

Parameter: Copper, total
Project: DAMOS- Disposal Area Monitoring Study Program
Matrix: Solid
QC Batch No: 495S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28411-015	K3517	28411-025	K3527
28411-016	K3518	28411-026	K3528
28411-017	K3519	28411-027	K3529
28411-018	K3520	28411-028	K3530
28411-019	K3521		
28411-020	K3522		
28411-021	K3523		
28411-022	K3524		
28411-023	K3525		
28411-024	K3526		

	Control Limit +/-	Preparation Blank Result ug/g	Q		M
PB495S	0.1	0.1	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g	True Value ug/g	%R	Lab Control Dup Sample Result ug/g	True Value ug/g	%R	
LCS	85-115	6.42	6.25	103	6.38	6.25	102	Pass
SRM	70-130	3.99	4.02	99				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g	Q	Sample Result ug/g	Q	RPD	Q	
28411-016	30	2.30		2.23		3		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g	Spike Added ug/g	Sample Result ug/g	Q	%R	Q	
28411-016S	70-130	8.41	6.31	2.23		98		Pass
28411-016SD	70-130	8.38	6.25	2.23		98		Pass

U = Below quantitation limit

Quality Control Summary

Parameter: Lead, total
Project: DAMOS- Disposal Area Monitoring Study Program
Matrix: Solid
QC Batch No: 495S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28411-015	K3517	28411-025	K3527
28411-016	K3518	28411-026	K3528
28411-017	K3519	28411-027	K3529
28411-018	K3520	28411-028	K3530
28411-019	K3521		
28411-020	K3522		
28411-021	K3523		
28411-022	K3524		
28411-023	K3525		
28411-024	K3526		

	Control Limit +/-	Preparation Blank Result ug/g	Q		M
PB495S	0.03	0.03	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g	True Value ug/g	%R	Lab Control Dup Sample Result ug/g	True Value ug/g	%R	
LCS	85-115	6.51	6.25	104	6.50	6.25	104	Pass
SRM	70-130	1.25	1.19	105				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g	Q	Sample Result ug/g	Q	RPD	Q	
28411-016	30	0.56		0.54		3		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g	Spike Added ug/g	Sample Result ug/g	Q	%R	Q	
28411-016S	70-130	7.16	6.31	0.54		105		Pass
28411-016SD	70-130	6.92	6.25	0.54		102		Pass

U = Below quantitation limit

Quality Control Summary

Parameter: Mercury, total
Project: DAMOS- Disposal Area Monitoring Study Program
Matrix: Solid
QC Batch No: 204S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28411-015	K3517	28411-025	K3527
28411-016	K3518	28411-026	K3528
28411-017	K3519	28411-027	K3529
28411-018	K3520	28411-028	K3530
28411-019	K3521		
28411-020	K3522		
28411-021	K3523		
28411-022	K3524		
28411-023	K3525		
28411-024	K3526		

	Control Limit +/-	Preparation Blank Result ug/g	Q		M
PB204S	0.003	0.003	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g	True Value ug/g	%R	Lab Control Dup Sample Result ug/g	True Value ug/g	%R	
LCS	75-125	0.106	0.10	106	0.117	0.10	117	Pass
SRM	70-130	0.053	0.061	87				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g	Q	Sample Result ug/g	Q	RPD	Q	
28411-016	25	0.017		0.016		6		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g	Spike Added ug/g	Sample Result ug/g	Q	%R	Q	
28411-016S	75-125	0.121	0.101	0.016		104		Pass
28411-016SD	75-125	0.122	0.100	0.016		106		Pass

U = Below quantitation limit

Quality Control Summary

Parameter: Nickel, total
Project: DAMOS- Disposal Area Monitoring Study Program
Matrix: Solid
QC Batch No: 495S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28411-015	K3517	28411-025	K3527
28411-016	K3518	28411-026	K3528
28411-017	K3519	28411-027	K3529
28411-018	K3520	28411-028	K3530
28411-019	K3521		
28411-020	K3522		
28411-021	K3523		
28411-022	K3524		
28411-023	K3525		
28411-024	K3526		

	Control Limit +/-	Preparation Blank Result ug/g	Q		M
PB495S	0.05	0.05	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g	True Value ug/g	%R	Lab Control Dup Sample Result ug/g	True Value ug/g	%R	
LCS	85-115	13.0	12.5	104	12.9	12.5	103	Pass
SRM	70-130	0.82	0.93	88				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g	Q	Sample Result ug/g	Q	RPD	Q	
28411-016	30	0.41		0.42		2		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g	Spike Added ug/g	Sample Result ug/g	Q	%R	Q	
28411-016S	70-130	12.8	12.6	0.42		98		Pass
28411-016SD	70-130	12.9	12.5	0.42		100		Pass

U = Below quantitation limit

Quality Control Summary

Parameter: Zinc, total
Project: DAMOS- Disposal Area Monitoring Study Program
Matrix: Solid
QC Batch No: 495S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28411-015	K3517	28411-025	K3527
28411-016	K3518	28411-026	K3528
28411-017	K3519	28411-027	K3529
28411-018	K3520	28411-028	K3530
28411-019	K3521		
28411-020	K3522		
28411-021	K3523		
28411-022	K3524		
28411-023	K3525		
28411-024	K3526		

	Control Limit +/-	Preparation Blank Result ug/g	Q		M
PB495S	0.2	0.2	U		Pass

LABORATORY CONTROL SAMPLE RECOVERY

ID	Control Limit %	Lab Control Sample Result ug/g	True Value ug/g	%R	Lab Control Dup Sample Result ug/g	True Value ug/g	%R	
LCS	85-115	13.1	12.5	105	13.3	12.5	106	Pass
SRM	70-130	146	137	107				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g	Q	Sample Result ug/g	Q	RPD	Q	
28411-016	30	29.4		29.4		0		Pass

SPIKE SAMPLE ANALYSIS

ID	Control Limit %	Spiked Sample Result ug/g	Spike Added ug/g	Sample Result ug/g	Q	%R	Q	
28411-016S	70-130	43.3	12.6	29.4		110		Pass
28411-016SD	70-130	43.5	12.5	29.4		113		Pass

U = Below quantitation limit

Metals by ICPMS and Mercury by CVAF
EPA 200.8 SW846 6020 and EPA 245.7

Lab Number: MDL2016
Sample Designation: Solid
Date Analyzed: 07/07/16
Date Analyzed: 07/19/16 Mercury EPA 245.7
Matrix: Solid
Sample Amount (g): 1
Final Volume (mL) 50

	True Value ug/g	Rep 1 ug/g	Rep 2 ug/g	Rep 3 ug/g	Rep 4 ug/g	Rep 5 ug/g	Rep 6 ug/g	Rep 7 ug/g
Aluminum, total	0.5	0.493	0.478	0.506	0.502	0.479	0.468	0.507
Antimony, total	0.01	0.0109	0.0101	0.00975	0.0099	0.0096	0.0106	0.0096
Arsenic, total	0.025	0.0245	0.0233	0.0245	0.0249	0.0248	0.0258	0.0251
Barium, total	0.2	0.19	0.195	0.192	0.19	0.198	0.193	0.198
Beryllium, total	0.0125	0.0119	0.0125	0.0129	0.0118	0.0124	0.0126	0.0124
Boron, total	0.05	0.0424	0.0419	0.0473	0.011	0.011	0.0428	0.0446
Cadmium, total	0.0125	0.0123	0.0122	0.0127	0.0124	0.0124	0.0123	0.0122
Calcium, total	1.25	1.4	1.25	1.35	1.5	1.25	1.25	1.35
Chromium, total	0.02	0.0196	0.0196	0.0195	0.019	0.0201	0.0199	0.0197
Cobalt, total	0.05	0.0479	0.0493	0.0497	0.0501	0.0494	0.0488	0.0496
Copper, total	0.025	0.0242	0.0254	0.0249	0.0258	0.0253	0.0247	0.0258
Iron, total	0.25	0.249	0.247	0.258	0.251	0.256	0.244	0.251
Lead, total	0.025	0.0239	0.0246	0.0246	0.0243	0.0253	0.024	0.0246
Magnesium, total	1.25	1.2	1.2	1.3	1.25	1.3	1.2	1.25
Manganese, total	0.05	0.0488	0.0489	0.049	0.0499	0.0501	0.048	0.0493
Mercury, total	0.005	0.00455	0.0046	0.00455	0.0049	0.0046	0.00445	0.0056
Mercury, total (EPA 245.7)	0.05	0.0051	0.0049	0.0047	0.0047	0.00485	0.0052	0.00495
Molybdenum, total	0.02	0.0177	0.0193	0.0193	0.0188	0.0172	0.0182	0.0191
Nickel, total	0.05	0.0489	0.0506	0.0494	0.0484	0.0495	0.0483	0.0507
Potassium, total	1.25	1.1	1.05	1.3	1.25	1.35	1.05	1.2
Selenium, total	0.025	0.0215	0.0307	0.0285	0.0222	0.0276	0.0243	0.024
Silver, total	0.025	0.0224	0.0234	0.0235	0.0234	0.0236	0.0232	0.0232
Sodium, total	1.25	1.1	0.95	1.15	1.15	1.3	1.1	1.25
Strontium, total	0.025	0.0268	0.0253	0.0275	0.0254	0.0248	0.0233	0.0254
Thallium, total	0.025	0.0212	0.0206	0.0198	0.0227	0.0222	0.0206	0.0207
Tin, total	0.025	0.0245	0.0243	0.0257	0.0243	0.024	0.0236	0.0239
Vanadium, total	0.05	0.0467	0.048	0.0475	0.0491	0.049	0.0464	0.0459
Zinc, total	0.05	0.0487	0.0498	0.0509	0.0498	0.0473	0.0462	0.0486

Table II-1: Completeness Checklis

Quality Assurance/Quality Control Questions	Yes/No? Comments?
1. Was the report signed by the responsible applicant approved representative?	Yes
2. Were the methods for sampling, chemical and biological testing described in the Sampling and Analysis Plan (SAP) and the Laboratory QA Plan (LQAP) followed?	Yes
3. If not, were deviations documented?	NA
4. Was the SAP approved by the New England District?	Yes
5. Did the applicant use a laboratory with a LQAP on file at the New England District?	Yes
6. Did the samples adequately represent the physical/chemical variability in the dredging area?	Yes
7. Were the correct stations sampled (include the precision of the navigation method used)?	Yes
8. Were the preservation and storage requirements in Chapter 8 of the EPA/Corps QA/QC Manual (EPA/USACE 1995) and EPA (2001d) followed?	Yes
9. Were the samples properly labeled?	Yes
10. Were all the requested data included?	Yes
11. Were the reporting limits met?	Yes
12. Were the chain-of-custody forms properly processed?	Yes
13. Were the method blanks run and were the concentration below the acceptance criteria?	Yes
14. Was the MDL study performed on each matrix (with this data submission) or within the last 12 months?	Yes
15. Were the SRM/CRM analyses within acceptance criteria?	Yes
16. Were the matrix spike/matrix spike duplicates run at the required frequency and was the percent recovery/RPD within the acceptance criteria?	Yes
17. Were the duplicate samples analyzed and were the RPDs within the required acceptance criteria?	Yes
18. For each analytical fraction of organic compounds, were recoveries for the internal standard within the acceptance criteria?	NA
19. Were surrogate recoveries within the required acceptance criteria?	NA
20. Were corrective action forms provided for all non-conforming data?	NA
21. Were all the species-specific test conditions in Appendix V met?	NA
22. Were the test-specific age requirements met for each test species?	NA
23. Was the bulk physical/chemical testing performed on the sediments/composites that were biologically tested?	NA
24. Were the mortality acceptance criteria met for the water column and sediment toxicity tests?	NA
25. Were the test performance requirements in Table 11.3 of EPA (1994a) met?	NA

Table II-5: Quality Control Summary for Analyses of Metals in Sediments, Tissue and Water Matrices

Method Reference Numbers: Various Reference Numbers

Quality Control (QC) Element	Acceptance Criteria*	Criteria Met? Yes/No	List results outside criteria (Cross-reference results table in data report)	Location of Results (Retained at Lab or in Data Package)
Linear Range Determination for ICP	Performed Quarterly	Yes		Retained at Lab
Initial Calibration for AA, Hg	Performed Daily (Correlation Coefficient ▲0.995)	Yes		Retained at Lab
Calculation of Method Detection Limits (MDLs)	For each matrix, analyzed once per 12 month period (see Section 5.2 for MDL procedure)	Yes		in Data Package
Initial Calibration Verification/ Continuing Calibration Verification	Hg: 80 to 120% recovery Other metals: 90 to 110% recovery	Yes		Retained at Lab
Initial Calibration Blank/ Continuing Calibration Blank	No target analytes > Instrument Detection Limit (IDL)	Yes		Retained at Lab
Standard Reference Materials	Within the limits provided by vendor	Yes		in Data Package
Method Blank	No target analytes > RL	Yes		in Data Package
Sample Spike/ Sample Duplicate	One set per group of field samples. Must contain all target analytes. Recovery Limits (75 to 125%; RPD < 20% or < 35%)	Yes		in Data Package
Analytical Replicates	Analyze one sample in duplicate for each group of field samples (RPD < 30%)	Yes		in Data Package

* The Quality Control Acceptance Criteria are general guidelines. If alternate criteria are used, they must be documented in this table.

Analytical Report Review Checklist

STUDY #: 28411 **TASK:** metals

CLIENT: battelle **ELEMENT:** tissues

PROJECT: DAMOS - disposal area monitoring

DATE IN: 10/27/16 **DATE DUE:** 11/27/16

EDD Required (Yes) No **QC Report Pages Required:** (Yes) No

Analyst Data Review	Date	Initials	Comments
Chains of Custody Complete	10/27/16	EP	
Sample Receipt Complete	↓	↓	
Bench Sheets Complete (dates, times, initials, etc...)	12/13/16	JCH	
Analytical Components Complete			
QC Reports Generated			
EDD Generated			
Data Acceptability Review	↓	↓	

Technical Report Review	Date	Initials	Comments
Analytical Reports Generated	12/16/16	EP	
Analytical Reports Reviewed	↓	↓	
Analytical Reports Printed To PDF	12/19/16	EP	
All Elements of QC Reports Incorporated, MDL, etc.			
EDD Checked and Results Saved	↓	↓	
Draft Report	12/19/16	EP	
QA Audit / Review Complete	↓	↓	
Data Appendix Compiled	NA		
Tables Completed	NA		
Table Of Contents Complete / Accurate	12/19/16	EP	
Apply Footer To Data Appendix			
Convert Text To PDF, Print	↓	↓	
Merge And Secure Document	12/19/16	EP	
Review Final Report	12/19/16	AM	
Send / E-Mail Hard Copy To Client	12/19/16	EP	
Send Invoice	↓	↓	
Report scanned to archive	12/19/16	EP	

Quality Assurance Statement

Project Name: USACE DAMOS Disposal Area Monitoring Study Program

SDG Number: 28411

I. **Description of Audit and Review Activities:** Audit and review activities related to the metals analysis of tissue samples as summarized in ESI's "Review Checklist", copy included in the report data appendix include reviews of chains of custody, sample receipt records, log books, prep records, instrument calibration, data, software calculations, report pages and electronic deliverable correctness and completeness.

II. Accuracy:

Yes	1. Custody of all samples were transferred properly and maintained except as described in part IV.
Yes	2. All of the samples on the COC were received and all required testing performed as defined in the QAPP.
Yes	3. QC samples and calibration standards were analyzed according to the QAPP and the acceptance criteria were met. Corrective action for exceedances was taken.
Yes	4. Samples were analyzed according to the procedures specified in the QAPP.
NA	5. 100% hand-entered and/or calculated data were checked for accuracy.
Yes	6. Calculations performed by software are verified at a frequency sufficient to ensure that the formulas are correct, appropriate, and consistent.
NA	7. For each cut and paste function, the first and last data value was verified vs. the source data.
Yes	8. Data are reported in the units specified in the QAPP.
Yes	9. Data qualifiers are assigned properly. Definitions for qualifiers are included with the data.
Yes	10. Results of QC data and activities defined in QAPP are included in the hard copy report and EDD. Percent recoveries and RPDs or percent differences are reported.
Yes	11. If QAPP acceptance criteria were not achieved, the corrective action defined in the QAPP was taken.

III. Completeness:

Yes	12. All samples received are reported.
Yes	13. All parameters specified in the QAPP for this task are reported.

IV. Reporting:

Yes	14. The data package is complete; contains all samples and QC samples and reporting data.
Yes	15. The EDD is complete, contains all sample and QC sample data with appropriate qualifiers. EDD data are traceable to the data package.

V. Description of outstanding issues or deficiencies noted above that may affect data quality.

No deficiencies impacting data quality were noted.

elizabeth penta 12/19/16
Signature of Reviewer/Date

12/19/16
Signature of Task Leader/Date

Battelle

The Business of Innovation

Chain of Custody

28411

Shipment No: SHP-161026-01

DAMOS Disposal Area Monitoring Study Program. Tissue Analysis. Contract W912WJ-12-D-D0004 ESI Study 28411

Proj. No: 100087718

Proj. Name: DAMOS - Disposal Area Monitoring Study Program

SAMPLERS: Singature

ANALYSIS REQUESTED → "NUMBER OF CONTAINERS"

	DATE/TIME	BATTELLE ID	CLIENT ID	MATRIX											Total No of Containers
005	Sep 14 2016 12:45P	K2622	RAH-001	WORM TISS	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
006	Sep 14 2016 1:56P	K2623	RAH-002	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
007	Sep 14 2016 3:57P	K2624	RAH-003	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
008	Sep 15 2016 2:38P	K2625	RAH-006	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
009	Sep 15 2016 3:48P	K2626	RAH-005	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
010	Sep 15 2016 4:30P	K2627	RAH-004	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
001	Sep 20 2016 3:06P	K2643	RAJ-019	CLAM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
002	Sep 20 2016 3:49P	K2644	RAJ-020	CLAM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
003	Sep 21 2016 8:04A	K2645	RAJ-021	CLAM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
010	Sep 21 2016 11:44	K2646	RAJ-022	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
011	Sep 21 2016 2:58P	K2647	RAJ-023	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
012	Sep 21 2016 2:58P	K2648	RAJ-024	CLAM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
013	Oct 4 2016 8:57A	K3515	RAK-061	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
014	Oct 4 2016 12:29P	K3516	RAK-062	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
015	Oct 4 2016 3:14P	K3517	RAK-063	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
016	Oct 5 2016 9:50A	K3518	RAK-064	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
017	Oct 5 2016 2:35P	K3519	RAK-065	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
018	Oct 6 2016 2:26P	K3520	RAK-066	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
019	Oct 7 2016 8:27A	K3521	RAK-067	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
020	Oct 7 2016 11:05A	K3522	RAK-068	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1

Relinquished by:	Date/Time:		Received by:	Date/Time:	
Matt Schumitz	10/26/2016	03:29 PM		10/27/16	1050
Relinquished by:	**Date/Time:**		**Received by:**	**Date/Time:**	

Comments:

Battelle
The Business of Innovation

Chain of Custody

Shipment No: SHP-161026-01

Proj. No:	Proj. Name:
100087718	DAMOS - Disposal Area Monitoring Study Program

SAMPLERS: Singature

ANALYSIS REQUESTED → "NUMBER OF CONTAINERS"

DATE/TIME	BATTELLE ID	CLIENT ID	MATRIX											Total No of Containers
Oct 7 2016 1:42P	K3523	RAK-069	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
Oct 11 2016 8:10A	K3524	RAK-070	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
Oct 11 2016 10:25	K3525	RAK-071	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
Oct 11 2016 12:10P	K3526	RAK-072	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
Oct 11 2016 2:34P	K3527	RAK-073	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
Oct 12 2016 8:14A	K3528	RAK-074	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
Oct 12 2016 9:55A	K3529	RAK-075	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
Oct 12 2016 11:18	K3530	RAK-076	WORM TISS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1

Relinquished by:	Date/Time:		Received by:	Date/Time:	
Matt Schumitz	10/26/2016	03:29 PM		10/27/16	1050
Relinquished by:	**Date/Time:**		**Received by:**	**Date/Time:**	

Comments:

SAMPLE RECEIPT AND CONDITION DOCUMENTATION

STUDY NO:	28411		
SDG No:			
Project:	DAMOS- Disposal Area Monitoring Study Program		
Delivered via:	FedEx		
Date and Time Received:	10/27/16 1050	Date and TIme Logged into Lab:	10/27/16 1150
Received By:	AC	Logged into Lab by:	EP
Air bill / Way bill:	No	Air bill included in folder if received?	NA
Cooler on ice/packs:	Yes	Custody Seals present?	NA
Cooler Blank Temp (C) at arrival:	5	Custody Seals intact?	NA
Number of COC Pages:	2		
COC Serial Number(s):	NA		
COC Complete:		Does the info on the COC match the samples?	Yes
Sampled Date:	Yes	Were samples received within holding time?	Yes
Field ID complete:	Yes	Were all samples properly labeled?	Yes
Sampled Time:	Yes	Were proper sample containers used?	Yes
Analysis request:	Yes	Were samples received intact? (none broken or leaking)	Yes
COC Signed and dated:	Yes	Were sample volumes sufficient for requested analysis?	Yes
Were all samples received?	Yes	Were VOC vials free of headspace?	NA
Client notification/authorization:	Not required	pH Test strip ID number:	NA

Field ID	Lab ID	Mx	Analysis Requested	Bottle	Req'd Pres'n	Verified Pres'n
K2622	28411-001	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K2623	28411-002	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K2624	28411-003	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K2625	28411-004	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K2626	28411-005	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K2627	28411-006	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K2643	28411-007	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K2644	28411-008	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K2645	28411-009	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K2646	28411-010	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K2647	28411-011	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K2648	28411-012	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K3515	28411-013	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K3516	28411-014	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K3517	28411-015	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K3518	28411-016	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K3519	28411-017	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K3520	28411-018	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K3521	28411-019	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K3522	28411-020	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K3523	28411-021	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K3524	28411-022	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K3525	28411-023	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K3526	28411-024	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K3527	28411-025	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K3528	28411-026	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K3529	28411-027	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes
K3530	28411-028	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	4oz G	4C	Yes

Notes and qualifications:

APPENDIX I

BENTHIC COMMUNITY ANALYSIS RESULTS

BATTELLE - USACE - DAMOS RAW DATA NOVEMBER 2016						
Station Name	**Phylum**	**Class**	**Order**	**Family**	**ID**	**Number**
RAH-007/RDS-09	Annelida	Polychaeta	Terebellida	Ampharetidae	Anobothrus gracilis	117
RAH-007/RDS-09	Annelida	Polychaeta	Eunicida	Lumbrineridae	Ninoe nigripes	51
RAH-007/RDS-09	Annelida	Polychaeta	Scolecida	Paraonidae	Levinsenia gracilis	33
RAH-007/RDS-09	Annelida	Polychaeta	Scolecida	Paraonidae	Paraonidae (LPIL)	3
RAH-007/RDS-09	Annelida	Polychaeta	Terebellida	Cirratulidae	Cirratulidae (LPIL)	50
RAH-007/RDS-09	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus (LPIL)	7
RAH-007/RDS-09	Annelida	Polychaeta	Terebellida	Cirratulidae	Aphelochaeta marioni	13
RAH-007/RDS-09	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Eteone longa	3
RAH-007/RDS-09	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtyidae (LPIL)	1
RAH-007/RDS-09	Annelida	Polychaeta	Terebellida	Trichobranchidae	Terebellides stroemi	6
RAH-007/RDS-09	Annelida	Polychaeta	Spionida	Spionidae	Spionidae (LPIL)	1
RAH-007/RDS-09	Annelida	Polychaeta	Sabellida	Sabellidae	Euchone incolor	1
RAH-007/RDS-09	Annelida	Polychaeta	Terebellida	Cirratulidae	Tharyx acutus	3
RAH-007/RDS-09	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtys incisa	1
RAH-007/RDS-09	Annelida	Polychaeta	Spionida	Spionidae	Prionospio (LPIL)	1
RAH-007/RDS-09	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula proxima	300
RAH-007/RDS-09	Mollusca	Bivalvia	Veneroida	Thyasiridae	Thyasira flexuosa	2
RAH-007/RDS-09	Mollusca	Bivalvia	Veneroida	Astartidae	Astarte undata	1
RAH-007/RDS-09	Mollusca	Bivalvia	Nuculoida	Nuculanidae	Nuculanidae (LPIL)	1
RAH-007/RDS-09	Mollusca	Bivalvia			Bivalvia (LPIL)	3
RAH-007/RDS-09	Mollusca	Bivalvia	Pholadomyoida	Periplomatidae	Periploma papyratium	5
RAH-007/RDS-09	Mollusca	Gastropoda	Neotaenioglossa	Rissoidae	Onoba pelagica	5
RAH-007/RDS-09	Arthropoda	Malacostraca	Cumacea	Leuconidae	Eudorella (LPIL)	10
RAH-007/RDS-09	Nemertea	Anopla	Heteronemertea	Lineidae	Lineidae (LPIL)	5
RAH-007/RDS-09	Nemertea	Anopla	Heteronemertea	Lineidae	Micrura (LPIL)	7
RAH-007/RDS-09	Mollusca	Aplacophora			Aplacophora (LPIL)	1
RAH-007/RDS-09	Phoronida			Phoronidae	Phoronis (LPIL)	1
RAH-008/RDS-04	Mollusca	Bivalvia	Veneroida	Thyasiridae	Thyasira flexuosa	2
RAH-008/RDS-04	Mollusca	Bivalvia	Pholadomyoida	Periplomatidae	Periploma papyratium	4
RAH-008/RDS-04	Mollusca	Bivalvia	Myoida	Corbulidae	Corbula contracta	1
RAH-008/RDS-04	Mollusca	Bivalvia	Nuculoida	Yoldiidae	Yoldia limatula	6
RAH-008/RDS-04	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula proxima	412
RAH-008/RDS-04	Mollusca	Gastropoda	Neotaenioglossa	Rissoidae	Onoba pelagica	10
RAH-008/RDS-04	Mollusca	Bivalvia	Venerida	Veneridae	Veneridae (LPIL)	2
RAH-008/RDS-04	Nemertea	Anopla	Heteronemertea	Lineidae	Lineidae (LPIL)	3
RAH-008/RDS-04	Phoronida			Phoronidae	Phoronis (LPIL)	2
RAH-008/RDS-04	Arthropoda	Malacostraca	Cumacea	Leuconidae	Eudorella (LPIL)	10
RAH-008/RDS-04	Arthropoda	Malacostraca	Cumacea	Diastylidae	Leptostylis longimana	1
RAH-008/RDS-04	Arthropoda	Malacostraca	Cumacea	Diastylidae	Diastylidae (LPIL)	1
RAH-008/RDS-04	Arthropoda	Malacostraca	Amphipoda		Amphipoda (LPIL)	1
RAH-008/RDS-04	Arthropoda	Malacostraca	Amphipoda	Isaeidae	Photis macrocoxa	5
RAH-008/RDS-04	Annelida	Polychaeta	Scolecida	Paraonidae	Levinsenia gracilis	31
RAH-008/RDS-04	Annelida	Polychaeta	Terebellida	Cirratulidae	Cirratulidae (LPIL)	57
RAH-008/RDS-04	Annelida	Polychaeta	Scolecida	Paraonidae	Paraonidae (LPIL)	4
RAH-008/RDS-04	Annelida	Polychaeta	Terebellida	Cirratulidae	Aphelochaeta marioni	20
RAH-008/RDS-04	Annelida	Polychaeta	Eunicida	Lumbrineridae	Ninoe nigripes	41
RAH-008/RDS-04	Annelida	Polychaeta	Canalipalpata	Sternaspidae	Sternaspis scutata	1
RAH-008/RDS-04	Annelida	Polychaeta	Terebellida	Ampharetidae	Anobothrus gracilis	134
RAH-008/RDS-04	Annelida	Polychaeta	Cossurida	Cossuridae	Cossura soyeri	14
RAH-008/RDS-04	Annelida	Polychaeta	Terebellida	Trichobranchidae	Terebellides stroemi	10

Station Name	Phylum	Class	Order	Family	ID	Number
RAH-008/RDS-04	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	Pherusa (LPIL)	1
RAH-008/RDS-04	Annelida	Polychaeta	Terebellida	Cirratulidae	Chaetozone setosa	2
RAH-008/RDS-04	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtys incisa	5
RAH-008/RDS-04	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus (LPIL)	3
RAH-008/RDS-04	Annelida	Polychaeta	Terebellida	Cirratulidae	Tharyx acutus	6
RAH-008/RDS-04	Annelida	Polychaeta	Phyllodocida	Sphaerodoridae	Sphaerodoridium minutum	2
RAH-008/RDS-04	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtyidae (LPIL)	4
RAH-008/RDS-04	Annelida	Polychaeta	Sabellida	Sabellidae	Euchone incolor	5
RAH-008/RDS-04	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Eteone longa	1
RAH-008/RDS-04	Annelida	Polychaeta	Spionida	Spionidae	Spio setosa	1
RAH-009/RDS-08	Mollusca	Aplacophora			Aplacophora (LPIL)	1
RAH-009/RDS-08	Nemertea	Anopla	Heteronemertea	Lineidae	Micrura (LPIL)	5
RAH-009/RDS-08	Nemertea	Anopla	Heteronemertea	Lineidae	Lineidae (LPIL)	3
RAH-009/RDS-08	Arthropoda	Malacostraca	Amphipoda	Isaeidae	Photis macrocoxa	2
RAH-009/RDS-08	Arthropoda	Malacostraca	Cumacea	Leuconidae	Eudorella pusilla	12
RAH-009/RDS-08	Arthropoda	Malacostraca	Cumacea	Diastylidae	Leptostylis longimana	1
RAH-009/RDS-08	Arthropoda	Malacostraca	Cumacea	Diastylidae	Diastylis sculpta	1
RAH-009/RDS-08	Arthropoda	Malacostraca	Isopoda	Paramunnidae	Paramunnidae (LPIL)	1
RAH-009/RDS-08	Mollusca	Bivalvia	Nuculoida	Yoldiidae	Yoldia limatula	8
RAH-009/RDS-08	Mollusca	Bivalvia	Myoida	Corbulidae	Corbula contracta	6
RAH-009/RDS-08	Mollusca	Bivalvia	Veneroida	Thyasiridae	Thyasira flexuosa	1
RAH-009/RDS-08	Mollusca	Bivalvia	Pholadomyoida	Periplomatidae	Periploma papyratium	15
RAH-009/RDS-08	Mollusca	Gastropoda	Neotaenioglossa	Rissoidae	Onoba pelagica	5
RAH-009/RDS-08	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula proxima	369
RAH-009/RDS-08	Mollusca	Bivalvia	Mytiloida	Mytilidae	Mytilidae (LPIL)	1
RAH-009/RDS-08	Mollusca	Gastropoda			Gastropoda (LPIL)	1
RAH-009/RDS-08	Mollusca	Bivalvia	Venerida	Veneridae	Veneridae (LPIL)	1
RAH-009/RDS-08	Annelida	Polychaeta	Terebellida	Cirratulidae	Cirratulidae (LPIL)	54
RAH-009/RDS-08	Annelida	Polychaeta	Terebellida	Cirratulidae	Tharyx acutus	28
RAH-009/RDS-08	Annelida	Polychaeta	Terebellida	Cirratulidae	Aphelochaeta marioni	38
RAH-009/RDS-08	Annelida	Polychaeta	Scolecida	Paraonidae	Levinsenia gracilis	35
RAH-009/RDS-08	Annelida	Polychaeta	Terebellida	Ampharetidae	Anobothrus gracilis	106
RAH-009/RDS-08	Annelida	Polychaeta	Eunicida	Lumbrineridae	Ninoe nigripes	33
RAH-009/RDS-08	Annelida	Polychaeta	Canalipalpata	Sternaspidae	Sternaspis scutata	7
RAH-009/RDS-08	Annelida	Polychaeta	Cossurida	Cossuridae	Cossura soyeri	5
RAH-009/RDS-08	Annelida	Polychaeta	Terebellida	Trichobranchidae	Terebellides stroemi	13
RAH-009/RDS-08	Annelida	Polychaeta	Scolecida	Paraonidae	Paraonidae (LPIL)	10
RAH-009/RDS-08	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus (LPIL)	7
RAH-009/RDS-08	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtys incisa	6
RAH-009/RDS-08	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtyidae (LPIL)	6
RAH-009/RDS-08	Annelida	Polychaeta	Scolecida	Maldanidae	Maldanidae (LPIL)	2
RAH-009/RDS-08	Mollusca	Bivalvia	Nuculida	Nuculidae	Ennucula tenuis	5
RAH-010/EREF-03	Nemertea	Anopla	Heteronemertea	Lineidae	Lineidae (LPIL)	10
RAH-010/EREF-03	Nemertea	Anopla	Heteronemertea	Lineidae	Micrura (LPIL)	13
RAH-010/EREF-03	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula proxima	376
RAH-010/EREF-03	Mollusca	Bivalvia	Nuculida	Nuculidae	Ennucula tenuis	4
RAH-010/EREF-03	Mollusca	Bivalvia	Veneroida	Thyasiridae	Thyasira flexuosa	1
RAH-010/EREF-03	Mollusca	Bivalvia	Pholadomyoida	Periplomatidae	Periploma papyratium	4
RAH-010/EREF-03	Arthropoda	Malacostraca	Cumacea	Leuconidae	Eudorella pusilla	14
RAH-010/EREF-03	Arthropoda	Malacostraca	Cumacea	Diastylidae	Leptostylis longimana	1
RAH-010/EREF-03	Arthropoda	Malacostraca	Amphipoda	Isaeidae	Photis macrocoxa	1

Station Name	Phylum	Class	Order	Family	ID	Number
RAH-010/EREF-03	Arthropoda	Malacostraca	Amphipoda	Cheirocratidae	Casco bigelowi	1
RAH-010/EREF-03	Annelida	Polychaeta	Sabellida	Sabellidae	Euchone incolor	1
RAH-010/EREF-03	Annelida	Polychaeta	Terebellida	Cirratulidae	Tharyx acutus	9
RAH-010/EREF-03	Annelida	Polychaeta	Scolecida	Paraonidae	Levinsenia gracilis	45
RAH-010/EREF-03	Annelida	Polychaeta	Eunicida	Lumbrineridae	Ninoe nigripes	45
RAH-010/EREF-03	Annelida	Polychaeta	Terebellida	Ampharetidae	Anobothrus gracilis	89
RAH-010/EREF-03	Annelida	Polychaeta	Terebellida	Cirratulidae	Aphelochaeta marioni	31
RAH-010/EREF-03	Annelida	Polychaeta	Cossurida	Cossuridae	Cossura soyeri	5
RAH-010/EREF-03	Annelida	Polychaeta	Terebellida	Trichobranchidae	Terebellides stroemi	3
RAH-010/EREF-03	Annelida	Polychaeta	Terebellida	Cirratulidae	Cirratulidae (LPIL)	39
RAH-010/EREF-03	Annelida	Polychaeta	Scolecida	Paraonidae	Paraonidae (LPIL)	2
RAH-010/EREF-03	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtyidae (LPIL)	7
RAH-010/EREF-03	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus (LPIL)	4
RAH-010/EREF-03	Annelida	Polychaeta	Terebellida	Cirratulidae	Chaetozone setosa	5
RAH-010/EREF-03	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	Pherusa affinis	1
RAH-010/EREF-03	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtys incisa	5
RAH-010/EREF-03	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Eteone longa	2
RAH-010/EREF-03	Annelida	Polychaeta	Scolecida	Paraonidae	Aricidea quadrilobata	1
RAH-011/EREF-01	Nemertea	Anopla	Heteronemertea	Lineidae	Micrura (LPIL)	4
RAH-011/EREF-01	Nemertea	Anopla	Heteronemertea	Lineidae	Lineidae (LPIL)	6
RAH-011/EREF-01	Arthropoda	Malacostraca	Cumacea	Leuconidae	Eudorella pusilla	7
RAH-011/EREF-01	Arthropoda	Malacostraca	Cumacea	Diastylidae	Leptostylis longimana	1
RAH-011/EREF-01	Arthropoda	Malacostraca	Amphipoda	Isaeidae	Photis macrocoxa	3
RAH-011/EREF-01	Arthropoda	Malacostraca	Amphipoda	Stenothoidae	Metopella angusta	2
RAH-011/EREF-01	Arthropoda	Malacostraca	Amphipoda	Aeginellidae	Aeginellidae (LPIL)	1
RAH-011/EREF-01	Mollusca	Bivalvia	Myoida	Corbulidae	Corbula contracta	1
RAH-011/EREF-01	Mollusca	Bivalvia	Pholadomyoida	Periplomatidae	Periploma papyratium	2
RAH-011/EREF-01	Mollusca	Bivalvia	Nuculoida	Yoldiidae	Yoldia limatula	4
RAH-011/EREF-01	Mollusca	Gastropoda	Mesogastropoda	Calyptraeidae	Crepidula plana	1
RAH-011/EREF-01	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula proxima	559
RAH-011/EREF-01	Mollusca	Bivalvia	Nuculida	Nuculidae	Ennucula tenuis	1
RAH-011/EREF-01	Mollusca	Gastropoda	Neogastropoda	Nassariidae	Nassariidae (LPIL)	1
RAH-011/EREF-01	Annelida	Polychaeta	Scolecida	Paraonidae	Levinsenia gracilis	23
RAH-011/EREF-01	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Eteone longa	2
RAH-011/EREF-01	Annelida	Polychaeta	Terebellida	Cirratulidae	Cirratulidae (LPIL)	42
RAH-011/EREF-01	Annelida	Polychaeta	Terebellida	Trichobranchidae	Terebellides stroemi	8
RAH-011/EREF-01	Annelida	Polychaeta	Eunicida	Lumbrineridae	Ninoe nigripes	33
RAH-011/EREF-01	Annelida	Polychaeta	Terebellida	Ampharetidae	Anobothrus gracilis	74
RAH-011/EREF-01	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtys incisa	10
RAH-011/EREF-01	Annelida	Polychaeta	Scolecida	Paraonidae	Aricidea quadrilobata	2
RAH-011/EREF-01	Annelida	Polychaeta	Terebellida	Cirratulidae	Aphelochaeta marioni	6
RAH-011/EREF-01	Annelida	Polychaeta	Phyllodocida	Sphaerodoridae	Sphaerodoridium minutum	3
RAH-011/EREF-01	Annelida	Polychaeta	Terebellida	Cirratulidae	Chaetozone setosa	1
RAH-011/EREF-01	Annelida	Polychaeta	Cossurida	Cossuridae	Cossura soyeri	5
RAH-011/EREF-01	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	Pherusa affinis	1
RAH-011/EREF-01	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus (LPIL)	4
RAH-011/EREF-01	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtyidae (LPIL)	3
RAH-011/EREF-01	Annelida	Polychaeta	Scolecida	Paraonidae	Aricidea (LPIL)	1
RAH-012/EREF-04	Nemertea	Anopla	Heteronemertea	Lineidae	Lineidae (LPIL)	8
RAH-012/EREF-04	Nemertea	Anopla	Heteronemertea	Lineidae	Micrura (LPIL)	5
RAH-012/EREF-04	Nemertea				Nemertea (LPIL)	1

Station Name	Phylum	Class	Order	Family	ID	Number
RAH-012/EREF-04	Nemertea	Anopla	Paleonemertea	Tubulanidae	Tubulanus (LPIL)	1
RAH-012/EREF-04	Arthropoda	Malacostraca	Amphipoda	Isaeidae	Photis macrocoxa	3
RAH-012/EREF-04	Arthropoda	Malacostraca	Amphipoda	Stenothoidae	Metopella angusta	1
RAH-012/EREF-04	Arthropoda	Malacostraca	Cumacea	Leuconidae	Eudorella pusilla	10
RAH-012/EREF-04	Arthropoda	Malacostraca	Cumacea	Diastylidae	Leptostylis longimana	1
RAH-012/EREF-04	Arthropoda	Malacostraca	Cumacea	Diastylidae	Diastylis sculpta	1
RAH-012/EREF-04	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula proxima	428
RAH-012/EREF-04	Mollusca	Bivalvia	Nuculida	Nuculidae	Ennucula tenuis	1
RAH-012/EREF-04	Mollusca	Bivalvia	Pholadomyoida	Periplomatidae	Periploma papyratium	7
RAH-012/EREF-04	Mollusca	Bivalvia	Veneroida	Astartidae	Astarte undata	2
RAH-012/EREF-04	Mollusca	Bivalvia	Nuculoida	Yoldiidae	Yoldia limatula	4
RAH-012/EREF-04	Annelida	Polychaeta	Terebellida	Cirratulidae	Cirratulidae (LPIL)	34
RAH-012/EREF-04	Annelida	Polychaeta	Terebellida	Ampharetidae	Anobothrus gracilis	96
RAH-012/EREF-04	Annelida	Polychaeta	Scolecida	Paraonidae	Paraonidae (LPIL)	1
RAH-012/EREF-04	Annelida	Polychaeta	Terebellida	Cirratulidae	Tharyx acutus	5
RAH-012/EREF-04	Annelida	Polychaeta	Scolecida	Paraonidae	Aricidea quadrilobata	1
RAH-012/EREF-04	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus (LPIL)	3
RAH-012/EREF-04	Annelida	Polychaeta	Sabellida	Sabellidae	Euchone incolor	1
RAH-012/EREF-04	Annelida	Polychaeta	Terebellida	Cirratulidae	Aphelochaeta marioni	18
RAH-012/EREF-04	Annelida	Polychaeta	Terebellida	Trichobranchidae	Terebellides stroemi	6
RAH-012/EREF-04	Annelida	Polychaeta	Scolecida	Paraonidae	Levinsenia gracilis	10
RAH-012/EREF-04	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtys incisa	12
RAH-012/EREF-04	Annelida	Polychaeta	Eunicida	Lumbrineridae	Ninoe nigripes	32
RAH-012/EREF-04	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtyidae (LPIL)	2
RAH-012/EREF-04	Annelida	Polychaeta	Terebellida	Cirratulidae	Chaetozone setosa	4
RAH-012/EREF-04	Annelida	Polychaeta	Scolecida	Maldanidae	Maldanidae (LPIL)	4
RAH-012/EREF-04	Annelida	Polychaeta	Cossurida	Cossuridae	Cossura soyeri	8
RAH-012/EREF-04	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Paranaitis speciosa	1

APPENDIX J

FISHING GEAR LOCATIONS

RDS 2016 APPROXIMATE POSITION AND COLOR NOTATION OF FISHING RELATED GEAR OBSERVED DURING THE PDS 2016 MULTIBEAM SURVEY						
Buoy Description	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
white teal	9/9/2016	15:22:28	259542.73	48670.52	44.10363183	-69.00534639
port white teal	9/9/2016	15:22:43	259553.97	48585.65	44.10286867	-69.00519958
port flour yellow	9/9/2016	15:23:33	259504.45	48371.78	44.10094103	-69.00580169
starboard teal white	9/9/2016	15:23:59	259511.55	48274.78	44.10006839	-69.0057055
starboard yellow black	9/9/2016	15:24:12	259494.25	48243.99	44.09979031	-69.00591925
starboard white go deep blue halo	9/9/2016	15:24:32	259479.27	48152.89	44.0989695	-69.00609931
port black yellow	9/9/2016	15:24:47	259551.66	48100.47	44.09850175	-69.00519125
port yellow go deep	9/9/2016	15:25:02	259549.73	48030.69	44.09787358	-69.00520994
starboard yellow black halo	9/9/2016	15:26:36	259609.07	47939.22	44.09705364	-69.00446189
port yellow black halo	9/9/2016	15:26:57	259608.89	48024.88	44.09782458	-69.00447069
port 2 green white go deep	9/9/2016	15:27:13	259610.23	48090.09	44.09841156	-69.00445889
port white teal	9/9/2016	15:27:36	259608.18	48182.38	44.09924211	-69.00449158
port red yellow halo	9/9/2016	15:28:17	259603.71	48352.54	44.10077333	-69.00456042
starboard red yellow halo	9/9/2016	15:28:44	259599.32	48466.48	44.10179861	-69.00462397
starboard red yellow halo	9/9/2016	15:28:55	259599.77	48513.04	44.10221769	-69.00462192
port red yellow	9/9/2016	15:29:29	259606.39	48654.68	44.10349281	-69.00455006
starboard pink black stripe	9/9/2016	15:30:30	259707.39	48608.44	44.10308217	-69.00328503
port pink black	9/9/2016	15:30:59	259704.22	48498.04	44.10208844	-69.00331619
port pink go deep black halo	9/9/2016	15:31:27	259707.94	48391	44.10112519	-69.00326161
port candy cane	9/9/2016	15:32:58	259691.98	48100.45	44.09850928	-69.00343875
port white go deep navy blue stripe	9/9/2016	15:35:32	259806.59	48143.99	44.0989075	-69.00201061
port white green stick	9/9/2016	15:36:52	259805.49	48470.69	44.10184778	-69.00204928
starboard two bullets pink on top green bottom	9/9/2016	15:37:02	259806.9	48512.49	44.10222408	-69.00203483
port red yellow red yellow	9/9/2016	15:38:38	259905.22	48553.86	44.10260181	-69.00080997
starboard blue and pink double dob	9/9/2016	15:38:49	259907.07	48510.5	44.10221169	-69.00078358
port pink yellow dob	9/9/2016	15:39:14	259905.88	48417.1	44.10137103	-69.00079125
starboard blue and pink	9/9/2016	15:39:20	259905.38	48394.89	44.10117103	-69.00079592
port pink go deep yellow strip	9/9/2016	15:39:31	259905.04	48355.26	44.10081439	-69.00079714
port pink yellow	9/9/2016	15:39:53	259906.37	48270.58	44.10005228	-69.00077408
port pink yellow	9/9/2016	15:40:08	259905.43	48214.38	44.09954639	-69.00078153
port yellow pink	9/9/2016	15:40:29	259901.16	48136.28	44.09884331	-69.00082892
starboard pink black	9/10/2016	9:11:01	258579.43	49675.62	44.11262419	-69.01745734
starboard pink blue	9/10/2016	9:11:28	258576.51	49782.56	44.11358651	-69.01750221
starboard pink blue	9/10/2016	9:12:04	258570.33	49923.57	44.11485528	-69.0175905

RDS 2016 APPROXIMATE POSITION AND COLOR NOTATION OF FISHING RELATED GEAR OBSERVED DURING THE PDS 2016 MULTIBEAM SURVEY						
Buoy Description	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
starboard pink	9/10/2016	9:15:42	258572.47	50783.81	44.12259778	-69.01763135
starboard green orange	9/10/2016	9:16:02	258573.74	50862.8	44.12330878	-69.01762169
port pink	9/10/2016	9:16:10	258574.76	50893.49	44.12358506	-69.01761136
starboard pink	9/10/2016	9:16:36	258576.45	50997.69	44.12452298	-69.01759843
port green	9/10/2016	9:17:04	258575.03	51109.07	44.12552535	-69.01762493
starboard red green	9/10/2016	9:17:24	258573.2	51186.19	44.12621934	-69.01765386
port green	9/10/2016	9:17:31	258572.96	51215.44	44.12648259	-69.01765915
starboard pink	9/10/2016	9:17:47	258571.67	51279.21	44.12705646	-69.01768029
starboard green	9/10/2016	9:18:15	258572.26	51391.19	44.12806434	-69.01768172
port blue yellow	9/10/2016	9:22:49	258676.17	50644.69	44.12135153	-69.01632478
starboard white dob	9/10/2016	9:22:59	258675.72	50602.17	44.12096882	-69.01632707
starboard blue yellow	9/10/2016	9:23:22	258675.02	50506.67	44.12010925	-69.01632833
starboard yellow blue	9/10/2016	9:24:03	258675.98	50336.98	44.11858205	-69.01630304
starboard white red black	9/10/2016	9:24:32	258675.12	50216.45	44.1174972	-69.01630433
starboard yellow blue	9/10/2016	9:24:46	258675.05	50158.67	44.11697717	-69.01630068
port black white	9/10/2016	9:27:31	258678.61	49475.37	44.11082749	-69.01620267
port green white	9/10/2016	9:28:21	258674.24	49262.94	44.10891531	-69.01624061
port yellow black	9/10/2016	9:34:09	258772.35	50008.33	44.11562955	-69.01507334
port pink	9/10/2016	9:34:41	258774.22	50135.81	44.11677701	-69.01505994
port pink	9/10/2016	9:35:27	258777.81	50318.06	44.11841751	-69.01502934
starboard pink	9/10/2016	9:35:33	258777.68	50341.58	44.11862919	-69.01503281
starboard pink	9/10/2016	9:36:02	258777.29	50455.14	44.11965124	-69.01504656
starboard black pink	9/10/2016	9:36:57	258773.21	50675.42	44.12163358	-69.01511476
port pink black	9/10/2016	9:37:06	258772.41	50708.59	44.12193208	-69.01512735
starboard pink	9/10/2016	9:37:12	258772.22	50735.13	44.12217093	-69.0151318
starboard red	9/10/2016	9:37:16	258772.62	50749.44	44.12229975	-69.01512792
port yellow lack	9/10/2016	9:38:03	258775.68	50934.97	44.12396974	-69.01510419
starboard yellow blue	9/10/2016	9:38:32	258775.38	51050.55	44.12500997	-69.01511698
port blue yellow	9/10/2016	9:39:08	258770.6	51192.82	44.12629016	-69.01518784
starboard blue fluorescent green	9/10/2016	9:39:24	258772.93	51254.86	44.12684867	-69.01516358
port pink blue	9/10/2016	9:40:07	258776.91	51425.79	44.12838731	-69.01512721
port yellow pink	9/10/2016	9:46:58	258872.87	50518.43	44.12022624	-69.01385734
port yellow pink	9/10/2016	9:47:35	258875.12	50368.27	44.11887489	-69.01381752
starboard green	9/10/2016	9:48:48	258873.95	50067.77	44.11617024	-69.0138087
port white green	9/10/2016	9:49:08	258874.47	49987.2	44.11544512	-69.01379592
port white green	9/10/2016	9:50:01	258875.34	49768.14	44.11347357	-69.01376797
starboard white red	9/10/2016	9:50:19	258872.91	49693.99	44.11280607	-69.01379254
port green	9/10/2016	9:50:26	258872.93	49665.05	44.1125456	-69.01379003
starboard green	9/10/2016	9:50:45	258874.29	49586.91	44.1118424	-69.01376695
starboard white red	9/10/2016	9:50:52	258875.35	49555.89	44.11156327	-69.01375129
starboard green	9/10/2016	9:51:41	258881.29	49355.6	44.10976094	-69.01366148
starboard flour yellow	9/10/2016	10:01:34	258975.28	49406.63	44.11022549	-69.01249135
starboard pink blue	9/10/2016	10:02:37	258979.85	49602.83	44.1119916	-69.01244952
starboard white red	9/10/2016	10:04:17	258974.37	49979.61	44.11538242	-69.01254729

RDS 2016 APPROXIMATE POSITION AND COLOR NOTATION OF FISHING RELATED GEAR OBSERVED DURING THE PDS 2016 MULTIBEAM SURVEY						
Buoy Description	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
port black orange blue	9/10/2016	10:04:46	258976.6	50090.94	44.11638454	-69.01252809
port pink blue	9/10/2016	10:06:55	258976.62	50575.4	44.12074481	-69.01256554
starboard orange white black	9/10/2016	10:16:37	259077.64	50411.37	44.11927415	-69.01129066
starboard green pink	9/10/2016	10:20:28	259078.48	49503.11	44.11109961	-69.01120969
starboard white	9/10/2016	10:21:57	259074.28	49154.68	44.10796341	-69.01123512
starboard pink	9/10/2016	10:29:41	259173.79	50326.51	44.11851576	-69.01008282
starboard pink	9/10/2016	10:30:19	259172.26	50470.55	44.11981207	-69.01011309
starboard orange white black	9/10/2016	10:30:24	259172.53	50487.84	44.1199677	-69.01011106
port yellow	9/10/2016	10:30:34	259173.23	50524.75	44.12029994	-69.01010517
starboard pink	9/10/2016	10:30:40	259173.73	50545.85	44.12048987	-69.01010056
port pink	9/10/2016	10:32:25	259171.63	50945.73	44.12408878	-69.01015777
starboard green black	9/10/2016	10:32:30	259170.72	50967.4	44.12428376	-69.01017082
starboard red green	9/10/2016	10:39:02	259277.55	50768.32	44.12249794	-69.00882062
port orange white	9/10/2016	10:39:24	259276.88	50681.88	44.12171992	-69.00882232
starboard flour green black	9/10/2016	10:56:55	259377.67	50017.65	44.11574728	-69.00751185
port red green	9/10/2016	10:59:26	259379.35	50590.97	44.12090741	-69.00753503
starboard yellow black	9/10/2016	10:59:48	259376.73	50676.15	44.1216739	-69.00757433
starboard black white orange	9/10/2016	11:02:39	259370.68	51323.12	44.12749646	-69.00769979
port white	9/10/2016	11:08:23	259470.52	50630.03	44.12126401	-69.00639896
port white red	9/10/2016	11:08:34	259471.97	50586.5	44.12087231	-69.00637749
port white	9/10/2016	11:09:10	259476.66	50452.43	44.1196659	-69.00630859
port red yellow	9/10/2016	11:10:01	259479.5	50257.92	44.11791542	-69.00625816
port red yellow	9/10/2016	11:10:35	259475.92	50127.45	44.11674096	-69.00629286
port red yellow	9/10/2016	11:10:48	259473.1	50075.25	44.11627098	-69.00632408
port red yellow	9/10/2016	11:11:11	259469.45	49989.18	44.11549613	-69.00636306
port red yellow	9/10/2016	11:11:34	259468.1	49902.75	44.11471816	-69.00637328
port red yellow	9/10/2016	11:11:51	259470.59	49836.98	44.11412635	-69.00633712
port red yellow	9/10/2016	11:12:19	259476.76	49728.51	44.11315043	-69.00625171
port red yellow	9/10/2016	11:13:30	259482.93	49454.83	44.11068758	-69.00615361
port white green	9/10/2016	11:14:22	259477.95	49253.46	44.10887491	-69.00620035
starboard white black green	9/10/2016	11:18:15	259577.08	49367.8	44.10990949	-69.00497083
starboard white black green	9/10/2016	11:18:37	259570.28	49450.55	44.11065388	-69.00506211
port white green	9/10/2016	11:18:59	259567.64	49533.25	44.11139806	-69.00510143
port white green	9/10/2016	11:19:27	259573.81	49636.23	44.11232525	-69.00503225
port white green	9/10/2016	11:20:52	259578.49	49959	44.11523053	-69.00499852
port white green	9/10/2016	11:20:58	259580.32	49981.92	44.11543692	-69.00497742
starboard pink red	9/10/2016	11:22:12	259576.4	50262.37	44.11796083	-69.00504789
starboard pink black	9/10/2016	11:22:50	259573.2	50408.74	44.11927802	-69.00509909
starboard green black	9/10/2016	11:24:49	259577.09	50860.65	44.12334555	-69.00508514
starboard pink black	9/10/2016	11:25:06	259574.82	50923.35	44.12390974	-69.00511831

RDS 2016 APPROXIMATE POSITION AND COLOR NOTATION OF FISHING RELATED GEAR OBSERVED DURING THE PDS 2016 MULTIBEAM SURVEY						
Buoy Description	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
starboard green orange	9/10/2016	11:26:22	259574.51	51209.49	44.12648505	-69.00514413
starboard white red black	9/10/2016	11:26:43	259571.91	51291.58	44.12722374	-69.00518292
starboard green orange	9/10/2016	11:26:49	259570.51	51315.58	44.12743967	-69.00520225
starboard red	9/10/2016	11:30:01	259677.77	51221.89	44.12660239	-69.00385486
starboard black yellow	9/10/2016	11:30:22	259674.43	51140.45	44.12586917	-69.00389036
starboard black green	9/10/2016	11:31:39	259672.29	50844.69	44.12320719	-69.00389444
starboard red white	9/10/2016	11:32:30	259678.09	50650.67	44.12146128	-69.00380711
port white red	9/10/2016	11:35:39	259677.88	49925.53	44.11493475	-69.00375428
port pink black	9/10/2016	11:37:12	259677.35	49568.16	44.11171833	-69.00373358
port pink black	9/10/2016	11:37:50	259674.47	49421.22	44.11039567	-69.00375839
port pink black	9/10/2016	11:38:30	259670.94	49266	44.10899844	-69.00379053
port orange green	9/10/2016	11:46:50	259765.33	50520.92	44.12029828	-69.00270728
starboard white teal	9/10/2016	11:47:02	259768.42	50567.76	44.12072	-69.00267217
starboard blue pink	9/10/2016	11:59:46	259870.56	51284.7	44.12717822	-69.00145069
starboard black fluorescent yellow	9/10/2016	12:19:19	259876.21	49592.83	44.11195128	-69.00125125
port orange black white	9/10/2016	12:23:09	259984.32	49257.39	44.10893811	-68.99987536
port red yellow	9/10/2016	12:23:40	259986.09	49371.67	44.10996675	-68.99986183
port pink blue	9/10/2016	12:24:28	259973.89	49521.73	44.11131667	-69.00002561
starboard red yellow	9/10/2016	12:25:02	259983.94	49684.76	44.11278461	-68.99991256
starboard red yellow	9/10/2016	12:26:00	259963.48	49904.39	44.11476022	-69.00018478
port yellow blue	9/10/2016	12:28:35	259974.53	50499.63	44.12011811	-69.00009189
port yellow black	9/10/2016	12:28:43	259973.92	50529.72	44.12038889	-69.00010183
starboard blue yellow	9/10/2016	12:29:45	259971.77	50773.97	44.12258706	-69.00014717
port white green	9/10/2016	12:37:24	260079.29	50655.67	44.12152822	-68.99879481
starboard pink blue	9/10/2016	12:40:29	260077.67	49941.22	44.11509792	-68.998761
starboard white green	9/10/2016	12:48:20	260190.66	49763.93	44.11350839	-68.997336
starboard white green	9/10/2016	12:48:58	260180.22	50001.94	44.11565003	-68.99748447
port white green	9/10/2016	12:49:29	260186.84	50111.53	44.11663667	-68.99741
port red yellow	9/10/2016	12:51:42	260167.34	50608.85	44.12111164	-68.99769119
port pink yellow	9/10/2016	12:52:13	260173.59	50728.8	44.12219161	-68.99762214
port pink blue	9/10/2016	12:54:30	260174.28	51244.01	44.12682864	-68.99765244
starboard yellow black	9/10/2016	13:05:24	260273.13	50633.01	44.12133481	-68.99637133
port green white	9/10/2016	13:06:38	260287.37	50355.6	44.11883886	-68.99617253
starboard pink black	9/10/2016	13:10:08	260272.62	49580.47	44.11186169	-68.99629836
starboard yellow pink	9/10/2016	13:11:08	260280.81	49358.98	44.10986858	-68.99617931
port pink blue	9/10/2016	13:11:24	260274.41	49299.3	44.10933111	-68.99625486
port red yellow	9/10/2016	13:13:52	260378.94	49229.03	44.10870431	-68.99494378
port pink yellow	9/10/2016	13:15:10	260373.26	49529.97	44.11141258	-68.99503736
starboard pink yellow	9/10/2016	13:20:15	260376.76	50695.37	44.12190172	-68.99508119
port pink black	9/10/2016	13:21:22	260369.04	50950.64	44.12419878	-68.99519681
port pink black	9/10/2016	13:21:52	260378.3	51064.7	44.12522583	-68.99508967
starboard pink yellow	9/10/2016	13:22:01	260379.75	51099.82	44.12554203	-68.99507419
port pink black	9/10/2016	13:31:56	260472.91	50007.56	44.11571642	-68.99382833
port pink black	9/10/2016	13:32:37	260479.72	49858.05	44.11437117	-68.993732

RDS 2016 APPROXIMATE POSITION AND COLOR NOTATION OF FISHING RELATED GEAR OBSERVED DURING THE PDS 2016 MULTIBEAM SURVEY						
Buoy Description	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
port white	9/10/2016	13:37:23	260599.81	49153.13	44.10803317	-68.99217911
starboard white	9/10/2016	13:37:57	260579.98	49283.2	44.10920275	-68.99243658
starboard white black	9/10/2016	13:41:00	260578.05	49988.15	44.11554736	-68.99251331
port pink blue	9/10/2016	13:43:39	260566.81	50603.19	44.12108233	-68.99269972
port yellow black	9/10/2016	13:45:21	260579.34	51000.71	44.12466081	-68.99257297
port yellow black	9/10/2016	13:46:01	260577.03	51155.18	44.12605094	-68.99261331
starboard white green	9/10/2016	13:54:39	260671.94	50340.87	44.11872703	-68.99136672
port orange yellow	9/10/2016	13:54:51	260675.83	50296.13	44.11832458	-68.99131475
port pink yellow	9/10/2016	13:55:06	260679.99	50245.25	44.11786686	-68.99125903
port white red	9/10/2016	14:28:58	259776.57	49758.8	44.11343958	-69.00250867
starboard orange white black	9/10/2016	15:22:31	259359.5	52367.89	44.13689903	-69.00792008
port red green	9/10/2016	15:25:47	259464.53	52440.44	44.13755786	-69.00661303
port orange yellow	9/10/2016	15:33:34	259673.36	52549.62	44.13855206	-69.00401153
port orange yellow	9/10/2016	15:35:33	259671.38	52117.77	44.13466511	-69.00400328
port white green	9/10/2016	15:43:36	259868.18	52230.4	44.13568969	-69.00155236
port white green	9/10/2016	15:44:02	259867.66	52136.95	44.13484856	-69.00155183
port flour yellow blue	9/10/2016	16:16:28	261458.38	50536.41	44.12052883	-68.98155556
port yellow green	9/10/2016	16:17:41	261469.1	50282.82	44.11824697	-68.98140306
port yellow green	9/10/2016	16:23:16	261572.74	50557.16	44.12072158	-68.98012828
port yellow pink	9/10/2016	16:24:51	261677.64	50613.87	44.12123747	-68.97882169
port yellow blue	9/10/2016	16:27:04	261669.8	50149.48	44.11705739	-68.97888594
port green orange	9/10/2016	16:30:47	261780.59	50331.83	44.11870442	-68.97751506
starboard green orange	9/10/2016	16:31:03	261786.08	50392.37	44.11924958	-68.97745078
port orange yellow	9/10/2016	16:39:28	261972.22	50231.13	44.11780808	-68.97511361
port orange yellow	9/10/2016	16:41:05	261972.02	50612.39	44.12123947	-68.97514364
port yellow orange	9/10/2016	16:44:34	262048.55	50116.52	44.11678053	-68.97415172
starboard green orange	9/10/2016	16:55:07	261785.3	50282.87	44.11826397	-68.97745261
port yellow blue	9/10/2016	16:55:27	261723.5	50275.5	44.11819447	-68.97822422
port pink yellow	9/10/2016	17:01:09	261677.36	50526.03	44.12044683	-68.97881889

Notes

1. Grid coordinates are NAD_1983_StatePlane_Maine_East_FIPS_1801_Meters
2. Geographic coordinates are NAD83 decimal degrees
3. A "go deep" is a teardrop shaped buoy in comparison to a "dob" which a stubbier cylinder. A halo is a thin colored strip as opposed to half one color and half the other. This differentiation was only recorded on 9/9/16.