Monitoring Survey at the Portland Disposal Site September 2016

Disposal Area Monitoring System DAMOS

DAMOS
DISPOSAL AREA MONITORING SYSTEM

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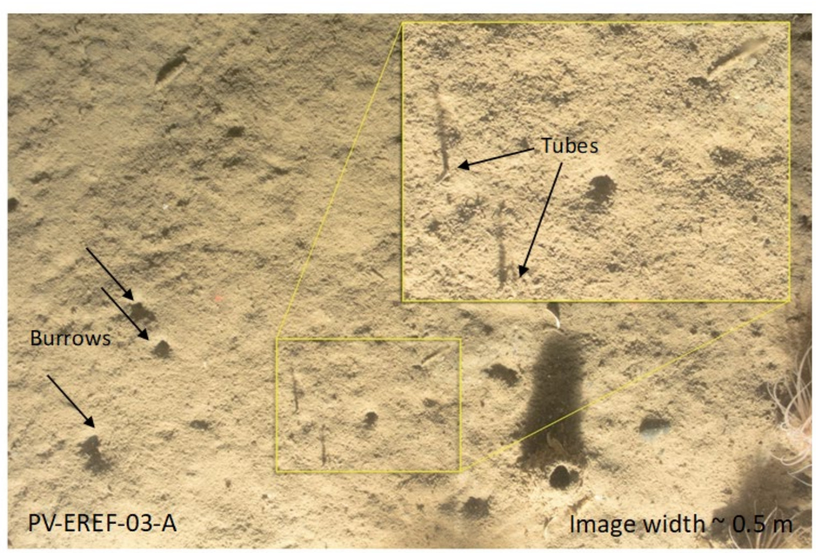
New England District



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13. ABSTRACT

A monitoring survey was conducted in September 2016 at the Portland Disposal Site (PDS) as part of the Disposal Area Monitoring System (DAMOS) Program. PDS is a U.S. Environmental Protection Agency (USEPA) designated ocean disposal site that lies east of Cape Elizabeth, Maine. 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. The results of the 2016 survey were used to document changes at PDS since the previous survey in 2014 and the subsequent placement of over 120,800 m^3 of dredged material at the site.

The high-resolution acoustic survey consisted of multibeam bathymetric, acoustic backscatter and side-scan sonar data acquisition. The bathymetric data indicated that the site displayed a highly irregular bottom topography, with a prominent northwest-southeast trending trough. Much of the site was dominated by bedrock outcrops (ledges) while the deeper areas of the site were generally smooth except for irregular relief in the areas where dredged material placement had been targeted. The 2016 acoustic survey focused on PDA 95, a target placement location in the southeast portion of PDS within the deep trough that received material since the last survey in 2014. There was a shallow mound and smoothed surface in the basin of PDA 95, between rock outcrops consistent with placement of dredged material. Existing bathymetry at PDS was evaluated in GIS and the portions of the site between apparent ledge outcrops was delineated. Hypothetical extents of future disposals were estimated assuming a maximum slope between the deposited materials and the ambient seafloor of 3 degrees (rise/run of 1/19) to leave a variable buffer zone between the mound and the site boundary. Site capacity based on placement of dredged material in the troughs was estimated to range from 6-12 million m^3 for placement depth ranging from 5-15m thick respectively.

Sediment profile images and plan view images were collected from three placement target areas within PDS: PDA 95 located in the trough in the southeastern portion of the site, PDS Inactive located in the trough in the center of the site, and PDA A located on the bedrock ledge in the northern portion of the site. PDA 95 most recently received material between 2014 and 2016. PDS Inactive last received material in 1991. PDA A received a small amount of material since the last survey in 2014 but the last significant placement was completed in 2010.

The benthic communities at the two disposal locations within the deep trough (PDA 95 and PDS Inactive) were recovering consistent with the expected recovery paradigm, with full recovery expected within one year of completion of dredged material placement. Mature benthic communities have developed at both disposal locations, including the most recently used location (PDA 95). Both of these locations were statistically similar to the reference areas in terms of aRPD and successional stage. The benthic community at PDA A, located on a rocky outcrop had no evidence of direct impairment from past dredged material placement, but due to limited camera penetration and the presence of coarse sediments, only Stage 1 and Stage 2 taxa were identified at most stations.

Chemical analyses of sediment and the tissue of benthic infauna (clams and worms) revealed concentrations that were generally low but that showed some variability between the reference and the disposal areas, attributed primarily to the difference in physical characteristics of the sediment (disposal site sediments had higher percentages of fine-grained material). Tissue concentrations still remained two orders of magnitude below FDA Action Levels. While these results are limited, they do not indicate issues with site management and provide baseline measurements for reference to future studies.

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

R1: Continue placement of dredged material at deeper, soft bottom areas of the site to support containment of material with adequate buffer to minimize impacts to existing hard bottom areas.

R2: Continue periodic confirmatory monitoring following additional placement of significant quantities of dredged material.

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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 1.0. A table of common conversions can be found in Appendix A.

TABLE OF CONTENTS

Page

Page

LIST OF TABLES

LIST OF FIGURES

Figure Page

Figure Page

Figure Page

Figure Page

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	Differential Global Positioning System
DO	Dissolved oxygen
EGN	Empirical Gain Normalization
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)
EIS	Environmental Impact Statement
ER-L	Effects range low
ER-M	Effects range median
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
ODMDS	Ocean Dredged Material Disposal Site

PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PDS	Portland Disposal Site
PSD	Photoshop Document
PV	Plan View
QAPP	Quality Assurance Project Plan
RTK	Real time kinematic GPS
R/V	Research vessel
SLR	Single-lens reflex
SMMP	Site Management and Monitoring Plan
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

A monitoring survey was conducted in September 2016 at the Portland Disposal Site (PDS) as part of the Disposal Area Monitoring System (DAMOS) Program. PDS is a U.S. Environmental Protection Agency (USEPA) designated ocean disposal site that lies east of Cape Elizabeth, Maine. 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 and plan view imaging (SPI/PV) survey and benthic grab sampling to provide additional physical and chemical characterization and to assess benthic recolonization. The results of the 2016 survey were used to document changes at PDS since the previous survey in 2014 and the subsequent placement of over 120,800 m^3 of dredged material at the site.

The high-resolution acoustic survey consisted of multibeam bathymetric, acoustic backscatter, and side-scan sonar data acquisition. The 2016 acoustic survey focused on PDA 95, a target placement location in the southeast portion of PDS within the deep trough that received material since the last survey in 2014, and also included the two reference areas. The bathymetric data indicated that the survey area within PDS displayed a highly irregular bottom topography, with a prominent northwest-southeast trending trough. Much of the survey area within PDS was dominated by bedrock outcrops (ledges) while the deeper areas were generally smooth except for irregular relief in the areas where dredged material placement had been targeted. There was a shallow mound and smoothed surface in the basin of PDA 95, between rock outcrops consistent with placement of dredged material. Existing bathymetry at PDS was evaluated in GIS, and the portion of the site between apparent ledge outcrops was delineated. With future placement focused on the trough areas between outcrops, site capacity was estimated to range between 6-12 million m^3 dependent on the assumed thickness of placement and assumed buffer to site boundaries and rock outcrops.

Sediment profile and plan view images were collected from three placement target areas within PDS: PDA 95 located in the trough in the southeastern portion of the site, PDS Inactive located in the trough in the center of the site, and PDA A located on the bedrock ledge in the northern portion of the site. PDA 95 most recently received material between 2014 and 2016. PDS Inactive last received material in 1991. PDA A received a small amount of material since the last survey in 2014, but the last significant placement was completed in 2010.

The benthic communities at the two disposal locations within the deep trough (PDA 95 and PDS Inactive) were recovering consistent with the expected recovery paradigm, with full recovery expected within one year of completion of dredged material placement. Mature benthic communities have developed at both disposal locations, including the most recently used location (PDA 95). Both of these locations were statistically similar to the reference areas in terms of aRPD and successional stage. The benthic community at PDA A, located on rocky outcrop had no evidence of direct impairment from past dredged material placement, but due to limited camera penetration and the presence of coarse sediments, only Stage 1 and Stage 2 taxa were identified at most stations.

Chemical analyses of sediment and the tissue of benthic infauna (clams and worms) revealed concentrations that were generally low but that showed some variability between the reference and the disposal areas, attributed primarily to the difference in physical characteristics of the sediment (disposal site sediments had higher percentages of fine-grained material). Tissue concentrations were two orders of magnitude below FDA Action Levels. While these results are limited, they support the current management strategy for PDS and provide baseline measurements for reference to future studies.

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

R1: Continue placement of dredged material at deeper, soft-bottom areas of the site to support containment of material with adequate buffer to minimize impacts to existing hard-bottom areas.

R2: Continue periodic confirmatory monitoring following additional placement of significant quantities of dredged material.

1.0 INTRODUCTION

Monitoring surveys were conducted at the Portland Disposal Site (PDS) as part of a joint effort of the U.S. Army Corps of Engineers (USACE) New England District (NAE) Disposal Area Monitoring System (DAMOS) Program and the U.S. Environmental Protection Agency (EPA) Ocean Dredged Material Disposal Site (ODMDS) monitoring. DAMOS is a comprehensive monitoring and management program designed and conducted to address environmental concerns associated with use of aquatic dredged material disposal sites throughout the New England region. DAMOS works collaboratively with EPA to manage and monitor EPA-designated ODMDS in New England. An introduction to the DAMOS Program and PDS, including a brief description of previous dredged material disposal activities and previous monitoring surveys, is provided below. This survey was jointly funded by the DAMOS Program and by EPA under Interagency Agreement DW-096-95829701.

1.1 Overview of the DAMOS Program and EPA Monitoring of ODMDS

The DAMOS Program features a tiered management protocol which is consistent with monitoring required by EPA at ODMDS, 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 the next step in the disposal site management process, to guide the management of disposal activities at existing sites, plan 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 to 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 EPA and USACE jointly prepare and update a Site Management and Monitoring Plan (SMMP) for PDS, as is required for all designated ODMDS (USEPA and USACE 2007). The SMMP identifies specific monitoring objectives that are reviewed in the design of survey. The 2016 PDS survey was a confirmatory study to monitor areas that had received dredged material since the last confirmatory survey of 2014 (Sturdivant and Carey 2017) and was also a focused investigation in support of the upcoming revision of the SMMP.

1.2 Introduction to the Portland Disposal Site

The Portland Disposal Site (PDS) is located in the waters off the coast of Maine. It covers a 3.4 km² (1 nmi²) area of seafloor centered at 43° 34.105' N, 70° 01.969' W (NAD 83), approximately 13.2 km (7.1 nmi) east of Dyer Point, Cape Elizabeth, Maine (Figure 1-1). Disposal operations have been documented in the PDS vicinity since 1943. In 1943 a large, irregularly shaped site was established by the War Department (now the Department of Defense) for disposal of material from Portland Harbor. Disposal activity continued at this site until the early 1970s with less regulatory oversight and record-keeping than exists today. Although the disposal site has been used intermittently since 1943, it was not until 1977 that the site was formally designated by the USEPA as an "interim" site for the disposal of dredged material with supporting monitoring. Efforts to formally designate the site for long-term use were initiated in 1980 with a draft Environmental Impact Statement (EIS); the final EIS and rulemaking to designate the site as an ODMDS were issued by USEPA in 1987 (USEPA/USACE 2007).

The topography at PDS is characterized by a rough, irregular bottom, a prominent northwest-southeast trending trough, and areas of soft sediment accumulation in the basins among bedrock outcrops (Figure 1-2). Water depths across the site range widely, from 37 to 71 m (121 to 230 ft.). The various bedrock ridges surrounding deep basins provide a measure of protection from wave energy and subsurface currents, and thus act to contain the deposited dredged material. Dredged material disposal operations have specifically targeted these natural basins to enhance containment of dredged material. Sediments deposited at PDS have originated from dredging projects in Portland Harbor, Fore River, and many of the smaller rivers and harbors within the Casco Bay region of Maine.

1.3 Historical Dredged Material Disposal Activity

Records indicate that PDS has received approximately 1.9 million m^3 (2.5 million yd^3) of dredged material since the beginning of disposal activity tracking at this site in 1982. Historically, the largest users of the site were the USACE Royal River and Portland Harbor Federal navigation projects in 1996-1997 and 1998-1999, respectively.

Five distinct disposal locations have been targeted at PDS: PDA (Portland Disposal Area) A Mound, PDA B Mound, PDA 98 Mound, PDA 95 Mound, and PDS Inactive Mound (Figure 1-2). The PDA A Mound, previously referred to as the DG Mound because it was formed by disposal at the Disposal Ground (DG) buoy, has received material from numerous dredging projects over many years (1984-1989, 1991-1992, 1995-1998, 2001-2007; Table 1-1). The PDA 98 Mound was developed in 1998 and 1999 by the placement of sediment dredged from the Federal channel and several marine terminals in the Fore River and Portland Harbor (Table 1-1). Approximately 315,700 m^3 (413,000 yd^3) of material was directed to the PDA 98 Mound, a natural seafloor containment basin in the west-central portion of the site.

The PDA 95 Mound, formerly known as the Royal River Mound, is a moderate-sized disposal mound in the southeast corner of PDS formed from the placement of 61,700 m^3 (80,700 yd^3) of material. It was formed between 1995 and 1997 in water depths of 64 m (Table 1-1) as part of a capping demonstration project. Sediment dredged from the upper reaches of the Royal River in Yarmouth, Maine, which was determined to be suitable for unconfined open water disposal, was used to simulate material requiring cover and sequestration from the overlying water column. Coarser grained sediment from the lower reaches of the same river was used as capping dredged material in the demonstration project (Morris et al. 1998, SAIC 2003). Between August 2007 and March 2014, approximately 666,600 m^3 (872,000 yd^3) of material was deposited at PDS, with most material centered on the PDA 95 Mound between 2013 and 2014 (Sturdivant and Carey 2017).

The PDA B Mound has not developed a shape that can be distinguished from the rough topography of the ambient seafloor. This location has received relatively small volumes of dredged material; from 2012 to 2013, 2,800 m^3 (3,700 yd^3) was placed at PDA B Mound (Sturdivant and Carey 2017).

The PDS Inactive Mound forms a large irregular mound of dredged material in the center of the site. This location had disposal buoys from 1979 to 1984 and from 1990 to 1991 (SAIC 2002, Table 1-1).

Placement activity from 2008 through 2010 totaled 38,000 m^3 (50,000 yd^3) and was located at the PDA A Mound.

1.4 Previous Monitoring Events

Confirmatory surveys were performed at PDS in 2000, 2001, 2007, and 2014 (Sturdivant and Carey 2017), and a series of focused studies were conducted between 1991 and 2000 (Table 1-2). In addition to typical monitoring surveys employing acoustic and sediment profile imaging technologies, the focused investigations have included mussel bioaccumulation studies, oceanographic surveys, and monitoring of capping projects. A review of these monitoring events was provided in AECOM (2009) and is summarized in Table 1-2.

In August 2014, bathymetric, sediment profile and plan view imaging surveys were conducted around recent and historical disposal locations. The survey was designed to assess changes at the site after placement of approximately 666,600 m^3 (872,000 yd^3) of dredged material since the previous survey in 2007. Bathymetric data were collected over the entire site and showed patterns indicating that containment of dredged material is supported by placement in the deepest areas of the site with soft sediments surrounded by rock outcrops.

The August 2014 sediment profile and plan view imaging survey was performed at the PDA B Mound and the historical PDA 95 Mound. Recolonization at PDA 95 had continued as expected, with mature, Stage 3 communities found at all but two stations. The PDA B Mound displayed a recolonization pattern like that of the older mound, with mature, Stage 3 communities found at all but one station. Both mounds were found to have successional status and mean aRPD depths consistent with reference areas (Sturdivant and Carey 2017).

1.5 Recent Dredged Material Disposal Activity

Since the most recent DAMOS survey in August 2014, approximately 120,800 m^3 (158,000 yd^3) of material has been deposited at PDS. The majority of this material originated from the Royal River Boat Yard (Table 1-3) and was placed centered on the PDA 95 Mound (Figure 1-3). A small amount of material totaling approximately 700 m^3 (900 yd^3) was placed at the PDA A Mound (Figure 1-3).

A detailed record of scow disposal activity at PDS for the period from August 2014 to August 2016, 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 PDS was designed as a combined confirmatory survey to track the recent placement of dredged material and a focused investigation in support of the upcoming revision of the SMMP. The September 2016 survey was designed to:

- Characterize seafloor topography and surficial features over the most active portion of PDS (PDA 95) and two reference areas (SREF and EREF) by completing a high-resolution acoustic survey.
- Use SPI and PV imaging to further define the physical characteristics of surficial sediment and to assess the benthic recolonization status (community recovery of the bottom-dwelling animals) of the areas of the site with recent disposal activity, the older disposal mounds within the site (PDA 95, PDA A, PDS Inactive) and the reference areas (SREF and EREF).
- 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 PDS

Mound Designation	Years of Disposal Activity
PDS Inactive	1979-1984; 1990-1991
PDA A (formerly DG Buoy location)	1984-1989; 1991-1992; 1995-1998; 2001-2007; 2008-2010
PDA 95	1995-1997; 2013-2014
PDA 98	1998-1999
PDA B	2012-2013

Table 1-2.

Overview of Survey Activities at PDS

Date	Purpose of Survey	Bathymetry Area	SPI Stations (location - #)	Additional Studies	DAMOS Report/Contribution No.	Reference
1977-1978	Confirmatory Monitoring	Single-beam 1900 x 2100 m	---	Currents, mussel chemistry, sediment chemistry, grabs, fisheries	Annual Data Report, Supp. B	NUSC 1979 Supp. B
1979-1981	Confirmatory Monitoring	---	---	Mussel chemistry	43	Feng 1984
January 1989	Confirmatory Monitoring	Single-beam 900 x 1100 m	PDA A - 43 REF - 39	---	78	SAIC 1990
July 1992	Capping demonstration (PDA A Area)	Single-beam 900 x 1100 m	PDA A - 42 REF - 39	Acoustic sediment density, grabs (chemistry)	108	Wiley 1996
1996	Oceanographic measurements	---	---	Tides, near-bottom currents, water temperature, turbidity, salinity	121	McDowell and Pace 1998
1995-1997	Capping demonstration (Royal River Project Area)	Single-beam 800 x 800 m (1995) Single-beam 1950 x 1000 m (1996)	PDA 95 - 33	Side-scan sonar, grabs, cores	123	Morris et al. 1998

Table 1-2. (continued)

Overview of Survey Activities at PDS

Date	Purpose of Survey	Bathymetry Area	SPI Stations (location - #)	Additional Studies	DAMOS Report/Contribution No.	Reference
1998-2000	Dredged material fate, release to water column	Multibeam 17.7 km² trapezoid (1998) Multibeam 2100 x 2100 m (2000)	PDA 98 - 28	Side-scan sonar, ADCP, sediment traps	153	SAIC 2004
July/September 2000	Confirmatory Monitoring	Multibeam 2100 x 2100 m	PDA 98 - 28 REF - 13	---	136	SAIC 2002
August 2001	Confirmatory Monitoring	---	PDA A - 25 PDA 98 - 28 PDA A - 25 REF - 13	---	140	SAIC 2003
August 2007	Confirmatory Monitoring	Multibeam 2100 x 2100 m	PDA 95 - 15 PDS 98 - 16 PDA A - 15 EREF - 7 SREF - 7 SEREF - 5	---	179	AECOM 2009
August 2014	Confirmatory Monitoring	Multibeam 2100 x 2100	PDA B – 6 PDA 95 – 18 EREF – 4 SREF – 4 SEREF – 4	---	200	Sturdivant & Carey 2017

Table 1-3.

Disposal Activity at PDS since October 2014 (per Scow Logs Provided by USACE, December 2016)

Permit Number	Project Name	Target Site Code	Permittee Total (m^3)	Permittee Total (yd^3)
2014-2015 Disposal Season				
NAE-2002-1020	Royal River Boatyard - East	PDA 95	4,962	6,490
NAE-2004-2397	Yankee Marina	PDA 95	16,270	21,280
W912WJ-14-C-0022	Royal River Boat Yard	PDA 95	61,126	79,950
NAE-2006-02255	Global Petroleum	PDA 95	19,878	26,000
NAE-2008-02244	Yarmouth Boat Club Marina	PDA 95	2,902	3,796
Total 2014-2015			**105,138**	**137,516**
2015-2016 Disposal Season				
NAE-2008-02244	Yarmouth Boat Club Marina	PDA A & PDA 95	14,518	18,989
NAE-2014-01473	Lower Falls Landing Associates	PDA 95	1,185	1,550
Total 2015-2016			**15,703**	**20,539**
Total			**120,841**	**158,057**

2.0 METHODS

The September 2016 survey at PDS was conducted by a team of investigators from INSPIRE Environmental, CR Environmental, and Battelle including ACSM-certified hydrographer Christopher Wright (#266) aboard the 55-foot *R/V Jamie Hanna*. The acoustic survey was conducted from 7- 8 September 2016. The SPI/PV imaging survey was conducted from 17-19 September 2016, and the sediment grab sampling from 20-21 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 its Addendum (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 active portion of the site at PDA 95 Mound (700 × 700 m) and over two 600 x 600 m reference areas (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 80 m apart and cross-lines spaced 250 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 PDS was conducted 7-8 September 2016. Data layers generated by the survey included bathymetric, 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 0.07 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 verified against tide data using records obtained from the National Oceanic and Atmospheric Association's (NOAA) Portland Tide Station (#8418150). 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 twelve sound-velocity profiles acquired by the survey team. Data artefacts 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 55° to minimize refraction artefacts. 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 63 m and a maximum beam angle of 55°, the average diameter of the beam footprint mid-swath was calculated at approximately 2.9 × 2.5 m (~7.45 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 0.64 m at the maximum site depth (77.9 m) and 0.54 m at the average site depth (63.3 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 West 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 (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 artefacts, 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 Empirical Gain Normalization (EGN) and manual gain adjustment methods to minimize nadir artefacts 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 is done by rendering images and color-coded grids with sufficient transparency to allow 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 45-station SPI/PV survey was performed at PDS (Figure 2-2), including 15 stations located within the boundary of the PDS 2016 survey area where recent disposal took place (PDA 95), 20 stations located over the older disposal mounds (PDS Inactive and PDA A) and five stations located at each of the two reference areas (SREF and EREF). 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) (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, which was provided in the cruise report. 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. In addition, the field crew kept redundant written sample logs (Appendix D). Images were downloaded periodically to verify successful sample acquisition and/or to assess the type(s) of sediment/depositional layer 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 f14, and storage was in compressed raw 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 0.5 m (20″) trigger wire, resulting in approximate image widths of 0.4 m.

2.3.2.1 SPI and PV Data Collection

The SPI/PV survey was conducted at PDS from 17-19 September 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 C). 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.

2.3.3 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.

2.3.4 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.

2.3.4.1 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 artefacts 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.

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; 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). 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 distances from the sediment surface to feeding voids were measured.

2.3.4.2 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 were 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, macrophytes; types of epifauna, flora, and debris; quantitative measures of *Beggiatoa* percent cover; number of fish; and descriptive comments were recorded.

2.3.5 Statistical Methods

In order to meet the objective of this survey to assess the status of benthic community recolonization of the sediment at disposal areas relative to reference area conditions, statistical analyses were conducted to compare key SPI variables between sampled disposal locations (PDA A, PDA 95, and PDS) and reference areas (SREF and EREF). 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, which is more suited to 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: $d < -\delta$ or $d > \delta$ (presumes the difference is great)

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

The test of this inequivalence (interval) hypothesis can be broken down 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 <u>and</u> the 95% lower limit for the difference) is wholly contained within the equivalence interval $[-\delta, +\delta]$. 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 normal so 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, five distinct locations were sampled; two were categorized as reference areas (EREF and SREF) and three were disposal locations (PDA A, PDA 95, and PDS). The difference equation of interest was the linear contrast of the average of the two reference means minus each disposal area mean, or

$$\hat{d} = [1/2 \times (\text{Mean}_{\text{EREF}} + \text{Mean}_{\text{SREF}}) - (\text{Mean}_{\text{Disposal}})] \qquad \text{[Eq. 1]}$$

where $\text{Mean}_{\text{Disposal}}$ was the mean for one of the disposal areas (PDA A, PDA 95, or PDS).

The two reference areas collectively represented ambient conditions, but if the means were different among these two 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. The effect of keeping the two reference areas separate had no effect on the grand reference mean when sample size was equal among these areas, but it ensured that the variance is 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:

cj = coefficients for the j means in the difference equation, $\hat{d}$ [Eq. 1] (i.e., for equation 1 shown above, the coefficients were 1/2 for each of the 2 reference areas, and -1 for the disposal area).

S_j^2 = variance for the jth 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.

nj = number of stations for the jth 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:

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

where:

$\hat{d}$ = observed difference in means between the Reference and Disposal Area.

$t_{\alpha,\upsilon}$ = upper (1-α)*100th percentile of a Student's t-distribution with υ degrees of freedom (α = 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, this was the residual degrees of freedom from an ANOVA on all groups (total number of stations minus the number of groups); 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 was tested using Shapiro-Wilk's test for normality on the area residuals (α = 0.05) and Levene's test for equality of variances among areas (α =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 structure 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 six sediment stations (Figures 2-6 and 2-7) using a clam rake with a 0.25-inch net. Attempts were made to collect a minimum of 30 g of tissue, as required for chemical analysis, within the maximum average sampling window of three hours allowed for tissue collection at each station. The primary target species for tissue chemistry analysis was the worm *Nephtys incisa*. Due to the presence of shell hash and rocks, no *Nephtys* were found at the inactive disposal location (Station PDS-16). No alternative species were found within the inactive area therefore no tissue samples were analyzed for this disposal area. These conditions were also found at stations within the reference areas. However, *Astarte* (common name chestnut clam) were found in sufficient abundance within both reference areas and were collected as a tissue alternate. Limited quantities of *Nephtys* were collected at the active disposal site stations (16 g at PDA 95-22 and 28 g at PDA 95-30) with just enough material to allow for chemical analyses. In addition, *Asarte* were found at one of the active disposal stations (PDA 95-30) and collected as a separate sample. Tissue target locations are provided in Table 2-2 and Figure 2-2 and actual station or trawl locations and coordinates are provided in Figures 2-6, 2-7, and Appendix C.

The worms and clam samples collected for tissue analysis were oxygenated and chilled in glass jars (separate jars for *Nephtys incisa* and *Astarte*) to depurate for 24 hours after collection as detailed in the DAMOS QAPP (Battelle 2015) and Addendum (Battelle 2016). The samples were hand delivered to Battelle's Norwell 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 PDS 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 PDS.

Table 2-1.

Accuracy and Uncertainty Analysis of Bathymetric Data

Survey Date(s)	Quality Control Metric	Results (m) Mean	95% Uncertainty	Range
9/8/2016	Cross-Line Swath Comparisons	-0.04	0.50	
	Within Cell Uncertainty	0.29	0.73	0.00 - 7.17
	Beam Angle Uncertainty (0 - 55d)	-0.03	0.48	0.44 - 0.67

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.

PDS 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
PDAA-01	PDS_16B1_SPI_PDAA-01	327685.3	82104.3	43.5718690	-70.0322720	√			
PDAA-02	PDS_16B1_SPI_PDAA-02	327672.1	82008.1	43.5710040	-70.0324400	√			
PDAA-03	PDS_16B1_SPI_PDAA-03	327756.6	82195.4	43.5726870	-70.0313840	√			
PDAA-04	PDS_16B1_SPI_PDAA-04	327689.3	82184.1	43.5725870	-70.0322180	√			
PDAA-05	PDS_16B1_SPI_PDAA-05	327872.9	82009.3	43.5710070	-70.0299540	√			
PDS-06	PDS_16B1_SPI_PDS-06	327530.9	81625.7	43.5675670	-70.0342080	√			
PDS-07	PDS_16B1_SPI_PDS-07	327884.0	81748.8	43.5686620	-70.0298300	√			
PDS-08	PDS_16B1_SPI_PDS-08	328011.4	81674.3	43.5679860	-70.0282570	√			
PDS-09	PDS_16B1_SPI_PDS-09	327579.8	81794.5	43.5690850	-70.0335930	√			
PDS-10	PDS_16B1_SPI_PDS-10	327755.8	81732.0	43.5685160	-70.0314170	√	√		
PDS-11	PDS_16B1_SPI_PDS-11	327637.7	81675.1	43.5680080	-70.0328820	√			
PDS-12	PDS_16B1_SPI_PDS-12	327813.1	81743.6	43.5686180	-70.0307070	√			
PDS-13	PDS_16B1_SPI_PDS-13	327902.5	81466.8	43.5661230	-70.0296160	√			
PDS-14	PDS_16B1_SPI_PDS-14	327541.5	81870.5	43.5697700	-70.0340630	√			
PDS-15	PDS_16B1_SPI_PDS-15	327759.2	81859.5	43.5696630	-70.0313690	√			
PDS-16	PDS_16B1_SPI_PDS-16	327793.4	81628.1	43.5675790	-70.0309580	√	√	√	√[3]
PDS-17	PDS_16B1_SPI_PDS-17	327846.3	81508.4	43.5665000	-70.0303090	√			
PDS-18	PDS_16B1_SPI_PDS-18	327972.9	81631.7	43.5676050	-70.0287350	√			
PDS-19	PDS_16B1_SPI_PDS-19	327526.7	81771.3	43.5688780	-70.0342510	√			
PDS-20	PDS_16B1_SPI_PDS-20	327625.2	81845.4	43.5695410	-70.0330280	√	√		
PDA95-21	PDS_16B1_SPI_PDA95-21	328484.3	81015.6	43.5620400	-70.0224380	√			
PDA95-22	PDS_16B1_SPI_PDA95-22	328361.4	80897.0	43.5609770	-70.0239650	√	√	√	√
PDA95-23	PDS_16B1_SPI_PDA95-23	328371.8	81106.8	43.5628650	-70.0238250	√	√		
PDA95-24	PDS_16B1_SPI_PDA95-24	328208.1	80867.1	43.5607130	-70.0258640	√			
PDA95-25	PDS_16B1_SPI_PDA95-25	328387.5	81262.3	43.5642640	-70.0236230	√			
PDA95-26	PDS_16B1_SPI_PDA95-26	328276.2	81114.0	43.5629340	-70.0250080	√			
PDA95-27	PDS_16B1_SPI_PDA95-27	328148.2	80987.6	43.5618010	-70.0265990	√			
PDA95-28	PDS_16B1_SPI_PDA95-28	328335.3	81397.0	43.5654790	-70.0242620	√			
PDA95-29	PDS_16B1_SPI_PDA95-29	328380.4	81157.9	43.5633250	-70.0237160	√			

Station ID	Sample ID	X	Y	Latitude	Longitude	SPI	Sediment Grab (Physical and Chemical)	Biological Community Analysis (BCA)	Tissue Chemistry
PDA95-30	PDS_16B1_SPI_PDA95-30	328279.4	81251.1	43.5641670	-70.0249610	√	√	√	√
PDA95-31	PDS_16B1_SPI_PDA95-31	328282.3	80989.6	43.5618130	-70.0249390	√			
PDA95-32	PDS_16B1_SPI_PDA95-32	328470.6	81190.9	43.5636180	-70.0225990	√			
PDA95-33	PDS_16B1_SPI_PDA95-33	328540.9	80970.3	43.5616300	-70.0217400	√			
PDA95-34	PDS_16B1_SPI_PDA95-34	328224.7	81103.6	43.5628410	-70.0256460	√			
PDA95-35	PDS_16B1_SPI_PDA95-35	328589.5	81189.1	43.5635970	-70.0211270	√			
EREF-01	PDS_16B1_SPI_EREF-01	330549.0	82376.4	43.5742060	-69.9968060	√	√		
EREF-02	PDS_16B1_SPI_EREF-02	330424.8	82230.7	43.5729000	-69.9983510	√			√
EREF-03	PDS_16B1_SPI_EREF-03	330897.0	82410.3	43.5744970	-69.9924960	√	√		
EREF-04	PDS_16B1_SPI_EREF-04	330818.6	82446.2	43.5748230	-69.9934640	√			
EREF-05	PDS_16B1_SPI_EREF-05	330733.6	82258.3	43.5731360	-69.9945280	√	√	√	
SREF-06	PDS_16B1_SPI_SREF-06	327981.1	80350.4	43.5560710	-70.0287010	√			
SREF-07	PDS_16B1_SPI_SREF-07	328107.2	80415.7	43.5566550	-70.0271360	√	√	√	√
SREF-08	PDS_16B1_SPI_SREF-08	327835.4	80119.8	43.5540020	-70.0305150	√	√		
SREF-09	PDS_16B1_SPI_SREF-09	327980.6	80228.7	43.5549770	-70.0287130	√			
SREF-10	PDS_16B1_SPI_SREF-10	327841.0	80427.2	43.5567680	-70.0304300	√	√	√	√

Notes
1. Grid coordinates are NAD_1983_StatePlane_Maine_West_FIPS_1802_Meters
2. Geographic coordinates are NAD83 decimal degrees
3. Due to the presence of shell hash and rocks, no *Nephtys* were found at the inactive disposal location Station PDS-16.

Table 2-3.

Sample Containers, Sample Sizes, Preservative Requirements, and Holding Times for PDS 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 –split for metals sent 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.

3.0 RESULTS

The objectives of the September 2016 survey of PDS were to characterize seafloor topography and surficial features, define the physical characteristics of surface sediment, evaluate the recovery of the benthic community following recent placement of dredged material, and provide an initial characterization of surficial sediment quality. The bathymetric surveys conducted during 2016 were designed to aid in management of material placement and assessment of long-term stability. Since the most recent DAMOS survey in August 2014, approximately 120,800 m^3 of material has been deposited at PDS. Survey tools included a high-resolution acoustic survey (multibeam bathymetry, acoustic backscatter, and side-scan sonar), sediment profile imaging (SPI), plan view imaging, and sediment and tissue sampling.

3.1 Acoustic Survey

3.1.1 Bathymetry

Only a portion of PDS was the target for acoustic bathymetry given that a full site survey was performed in 2014. High resolution MBES was performed around PDA 95 and the two reference areas (EREF and SREF; Figures 2-1, 3-1a, and 3-1b). Multibeam bathymetric data rendered as a depth-scaled acoustic relief model (color scale with hillshading) provided a more detailed representation of the PDA 95 topography (Figure 3-2a). The bathymetry of PDA 95 surveyed in September 2016 indicated a highly irregular bottom topography, with a prominent northwest-southeast trending trough that bifurcated in the center of the site at the edge of the survey area (Figure 3-2a). Water depths at PDA 95 ranged from approximately 36 to 78 m (Figure 3-2a). Patterns consistent with placement of dredged material were visible as a smoothed surface over underlying rock. There was a shallow mound and smoothed surface in the basin of PDA 95, between rock outcrops, at 60 m depth (Figure 3-2a).

The reference areas also had rugose bottom topography. The water depths at SREF ranged from approximately 50 to 73 m (Figure 3-1b). A deep trough transected the northwest portion of SREF in a northeast-southwest orientation (Figure 3-2b). The southeastern portion of SREF was dominated by bedrock outcrops (Figure 3-2b). At the EREF water depths ranged from 50 to 78 m (Figure 3-1b). A deep trough with a northwest-southeast trend cut through the center of EREF, bordered on either side by bedrock outcrops. The outcrop in the north of EREF contained fracture patterns with a southwest-northeast orientation (Figure 3-2b).

3.1.2 Acoustic Backscatter and Side-Scan Sonar

Unfiltered backscatter imagery of PDA 95 revealed an area with weaker backscatter returns associated with dredged material disposal (Figure 3-3a). Strong backscatter returns with sharp outlines that were consistent with rock or coarse-grained sediments were evident on the rock outcrops (light areas in Figure 3-3a). Weaker returns were found within the basin of PDA 95 indicating finer-grained sediment typical of both the dredged material placed and ambient sediment (dark areas in Figure 3-3a). At PDA 95 the pattern of weak backscatter matched the recent placement activity.

Unfiltered backscatter imagery of SREF showed an area of stronger returns in the southern portion of the area consistent with rocky outcrops (light areas in Figure 3-3b). Weaker returns were visible in the northern portion of the area indicating finer grain sediments within the trough (dark areas in Figure 3-3b). EREF showed similar return characteristics with stronger returns on the rock outcrops in the north and south while weaker returns came from the trough transecting these outcrops (Figure 3-3b).

Filtered backscatter, which presents a quantitative assessment of surface characteristics independent of slope effects, showed that the strongest backscatter returns (-10 to -16 dB) occurred along the rock platforms at PDA 95 (ledge outcrops, Figure 3-4a). The weakest backscatter returns (-30 to -38 dB) were measured in the deeper areas of PDA 95 (Figure 3-4a). Within the area of dredged material placement, patterns in the backscatter intensity reveal some circular deposits consistent with placement. In the reference areas, the strongest backscatter returns (-9 to – 21 dB) occurred along rocky outcrops with the weakest returns (-26 to -32 dB) occurring in the troughs between outcrops (Figure 3-4b).

Side-scan sonar results also provided a clear representation of disposal activity over the central and eastern portions of the survey area (faint circular patterns). Side-scan results confirmed observations from the backscatter results, but with additional detail (Figure 3-5a). The side-scan sonar results have a higher resolution and are more responsive to minor surface textural features and slope than backscatter results. Details of rock surfaces were more apparent in the detailed images from side-scan sonar results (Figure 3-5a). Similarly, in the reference areas the side-scan sonar results gave higher details of the rock surfaces (Figure 3-5b).

3.1.3 Comparison with Previous Bathymetry and Backscatter

The bathymetric results in September 2016 were consistent with earlier survey results for PDS (Table 1-1, SAIC 2002, AECOM 2009, Sturdivant and Carey 2017). An elevation difference comparison between depths measured in 2014 and 2016 revealed that dredged material accumulated within the deep basin at the center of PDA 95 (Figure 3-6). The disposal material appeared to be successfully contained within the PDA 95 boundaries inside of the basin surrounded by bedrock outcrops.

3.2 Sediment Profile and Plan View Imaging

The following sections summarize the results for the reference areas (EREF and SREF) and for each of the disposal mounds surveyed (PDA 95, PDS Inactive, and PDA A). Detailed SPI and PV image analysis results are provided in Appendix E. Comparisons between reference areas and disposal mounds, as well as to the survey from 2014 are also provided in Section 3.2.3. Key ecological measures (aRPD and successional stage) were also evaluated for statistical equivalence between reference and disposal areas sampled during the 2016 survey effort. Replicate stations for SPI and PV images were collected at the disposal mounds and reference areas (Figure 2-2). The area of seafloor captured in the PV images ranged from 0.6 to 2.4 m².

3.2.1 Reference Area Stations

3.2.1.1 Physical Sediment Characteristics

The reference area stations were similar in depth; SREF had a mean station depth of 66 m and ranged from 58 to 73 m, and stations at EREF ranged from 60 to 77 m with a mean depth of 70 m (Table 3-1). Stations at both reference areas were largely characterized by relatively soft sediments, with a predominant grain size of >4 to 4-3 (Table 3-1, Figure 3-7). Often very-fine sand was present as a depositional layer over silt-clay (Figure 3-8). At SREF it was not possible to determine grain size at Stations 6 and 9 due to poor penetration. These two stations occurred on bedrock outcrops, and were the only reference locations with poor prism penetration. Mean replicate camera prism penetration values among the reference area stations ranged from 0.0 to 12.5 cm, with a mean of 7.1 cm (standard deviation [SD] ±4.6) (Table 3-1, Figure 3-9). There was no evidence of dredged material at any of the stations sampled in the reference areas, and no evidence of low dissolved oxygen (DO) or sedimentary methane (Appendix E).

Small-scale boundary roughness ranged from 0.8 to 1.5 cm at the reference stations with a mean of 1.1 cm (SD±0.4) (Table 3-1, Figure 3-10). All of the small-scale topography observed at both reference areas was attributed to the surface and sub-surface activity of benthic organisms, evidenced as small burrow openings, pits, and mounds (Figure 3-11). Mean boundary roughness was similar between SREF (1.1 cm) and EREF (1.2 cm) (Table 3-1).

3.2.1.2 Biological Conditions

At the reference areas, aRPD depths ranged from 1.2 to 2.6 cm with a mean of 1.9 cm (SD±0.5) (Table 3-1, Figure 3-12, Figure 3-13). Mean aRPD depths were shallower at EREF (1.7 cm) compared to SREF (2.0 cm). The presence of consolidated and coarse sediments interfered with aRPD determinations at three stations in the SREF area (Stations 6, 7, and 9).

Stage 3 infauna were present at both reference areas. Most images were classified as Stage 2 -> 3 or Stage 2 on 3 (Table 3-1, Figure 3-14). Evidence for the presence of Stage 3 fauna included large-bodied infauna, deep subsurface burrows, and/or deep feeding voids (Figure 3-15). Stage 2 fauna are smaller than Stage 3 taxa and are active in the 2 - 4 cm zone below the sediment–water interface; they can coexist with the larger, deep-feeding Stage 3 organisms. The mean number of subsurface feeding voids, indicating Stage 3 fauna, ranged from 0.2 voids (SD±0.3) per station at EREF to 0.7 voids (SD±0.9) per station at SREF

(Table 3-1). When present, voids at the reference area stations were found deep within the sediment column; no voids were found shallower than 6 cm beneath the sediment–water interface (Figure 3-16).

Further indications of subsurface faunal activity from Stage 2 and 3 taxa were observed in the PV images as the presence of burrows and tubes (Figure 3-11). At EREF burrow density ranged from no burrows to abundant burrows (25-75% image coverage), and at SREF burrow density ranged from no burrows to present burrows (10-25% image coverage). Tube density on the seafloor was also variable at the reference areas. At SREF tube density ranged from no tubes to abundant tubes, and ranged from no tubes to sparse tubes (<10% image coverage) at EREF. Tracks across the seafloor, often created by epifauna (crabs, gastropods), were documented at every station in both reference areas (Figure 3-11). Shell fragments were seen in PV images at SREF but none were observed at EREF, and no fish or flora were present in the PV images at either reference area (Appendix E).

3.2.2 Disposal Site Stations

3.2.2.1 Physical Sediment Characteristics

The three disposal areas were similar in depth; PDA A had a mean station depth of 50 m ranging from 46 to 54 m, PDA 95 had a mean station depth of 63 m ranging from 57 to 69 m, and PDS Inactive had a mean station depth of 56 m ranging from 50 to 61 m (Table 3-2). Sediments at PDA 95 and PDS Inactive were primarily composed of very-fine sand layered over silt-clay with some stations containing fine sand over silt-clay (Figure 3-17, Figure 3-18). There was no discernible spatial trend for grain-size at PDS Inactive or PDA 95. The majority of stations at PDA A contained fine sand, occasionally as a depositional layer over silt-clay (Table 3-2, Figure 3-17, Figure 3-19). Mean replicate camera penetration values ranged between 13.6 to 19.4 cm, 7.7 to 20.6 cm, and 0.1 to 10.1 cm at PDA 95, PDA Inactive, and PDA A, respectively (Table 3-2, Figure 3-20). Mean camera prism penetration values were deeper at PDA 95 and PDS Inactive (16.0 and 13.5 cm, respectively) compared to PDA A at 5.1 cm. Shallow prism penetration values at PDA A were driven by sediment consolidation at Stations PDA A-01 and -02, and large shell fragments in the sediment at Station PDA A-04 (Figure 3-21).

Mean dredged material thickness varied across the three disposal areas (Figure 3-22). PDA A had a mean thickness of 6.4 cm (SD±2.6), PDA 95 had a mean of 16.0 cm (SD±1.9), and PDS Inactive had a mean of 13.0 cm (SD±1.8) (Table 3-2; Figure 3-23). At the majority of stations at each of the three disposal areas dredged material extended past the penetration depth of the prism. The exceptions were at Station 4 at PDA A where a lack of penetration resulted in an "indeterminate" designation (IND) and at Station 13 at PDS Inactive where only "trace" levels of dredged material were observed. There was no evidence of low DO or sedimentary methane at any of the three disposal mounds.

All three mounds were similar in small-scale boundary roughness values, with means of 1.2 cm (SD±0.4) at PDA A, 1.1 cm (SD±0.3) at PDA 95, and 1.4 cm (SD±0.4) at PDS Inactive (Table 3-2, Figure 3-24). Means of replicate small-scale boundary roughness ranged from 0.6 to 1.6 cm at PDA A, 0.6 to 1.9 cm at PDA 95, and 0.8 to 2.2 cm at PDS Inactive (Table 3-2). The majority of small-scale topography at each disposal mound was attributed to the surface and sub-surface activity of benthic organisms evidenced as small burrowing openings and pits (Figure 3-25).

3.2.2.2 Biological Conditions

Mean aRPD depths ranged from 1.3 to 1.4 cm at PDA A, 0.7 to 2.3 cm at PDA 95, and 0.8 to 3.3 cm at PDS Inactive (Table 3-2, Figure 3-26). Mean aRPD depths at each mound were similar; 1.4 cm (SD±0.07) at PDA A, 1.4 cm (SD±0.43) at PDA 95, and 1.5 cm (SD±1.24) at PDS Inactive (Table 3-2, Figure 3-27). Although aRPD depths at PDA A were similar to the other disposal mounds, it was not possible to optically distinguish the aRPD depth at two of the five stations at PDA A (Stations 01 and 05), and poor prism penetration prevented aRPD determination at PDA A-04 (Table 3-2) resulting in only two stations contributing to aRPD depth.

All stations at PDA 95 and PDS Inactive contained at least one replicate with evidence of Stage 3 fauna with most images being classified as Stage 2 on 3 and Stage 1 on 3 (Table 3-2, Figure 3-28, Figure 3-29). Most images at PDA A were classified as Stage 1 -> 2 or Stage 2 (Figure 3-30), with a successional designation undetermined at Station 4 due to poor prism penetration (Figure 3-20). When voids were present at PDA 95 and PDS Inactive they were typically found deep in the sediment column (>6 cm beneath the sediment–water interface) (Figure 3-31). There were only a few instances of shallow voids (<6 cm) at PDA 95 and PDS Inactive (Figure 3-31). At PDA A only one station (PDA A-03) contained subsurface feeding voids as evidence of Stage 3 fauna (Table 3-2, Figures 3-30, 3-31).

PV images documented the biological activity present on the seafloor at PDA A, PDA 95 and PDS Inactive. Burrows, indicating subsurface activity by Stage 2 and 3 fauna, were absent to abundant at PDA 95 and PDS Inactive and absent to present at PDA A (Appendix E). Sparse tubes were observed in PV images at PDA A and PDA 95, and were sparse to present at PDS Inactive. Tracks across the seafloor, often created by epifauna (crabs, gastropods), were seen at several stations at all three disposal areas. No fish or flora were present in the PV images across all three mounds (Appendix E).

3.2.3 Comparison between Disposal and Reference Areas

3.2.3.1 Mean aRPD

Area mean aRPD depths at PDA 95, PDA A, and PDS Inactive disposal areas were 1.4, 1.4, and 1.5 cm, respectively, comparable to the grand mean of the reference areas (1.8

cm; Table 3-3 and Figure 3-32). Station mean aRPD values in the reference areas ranged from 1.2 to 2.6 cm, and were deepest at SREF (2.0 cm compared to 1.7 cm at EREF; Figure 3-32). The standard deviation among stations of aRPD depths was 0.73 cm or less at all areas.

A statistical inequivalence test was performed to determine whether the differences observed in mean aRPD values between the two reference areas and each of the three disposal areas were significantly similar. The station mean aRPD data from all five locations were combined to assess normality and estimate pooled variance. Results for the normality test indicated that each area's residuals, i.e., each observation minus the area mean, was significantly different from a normal distribution (Shapiro-Wilk's test p-value = 0.002, alpha = 0.05). Levene's test for equality of variances was not rejected (p = 0.326, alpha = 0.05), so a single pooled variance estimate could be used for all groups. The confidence interval for the difference equations were constructed using non-parametric bootstrapped estimates. Reference area SREF had only two useable aRPD results, and these were within the range of aRPD values observed at EREF. Group summaries would not be reliable based on only two observations for SREF, so the following statistical evaluations combined the two reference areas and treated reference as a single group (with n=7).

The confidence regions for the difference between the mean of the reference areas versus PDA 95 disposal area and versus PDS Inactive disposal area were each contained within the interval [-1 cm, +1 cm] (Table 3-4). The conclusion was that the aRPD values from each of these two disposal areas were significantly equivalent to the pooled reference areas in the 2016 survey, i.e., there was no difference in aRPD depth between the disposal and reference areas. The difference in means between reference and PDA 95 was 0.4 cm, and between reference and PDS was 0.3 with the pooled reference areas having aRPD values roughly equivalent to PDA 95 and PDS Inactive (Table 3-4). For the PDA A disposal area which had only two useable aRPD observations, reliable statistical results could not be generated. The difference in mean aRPD values between reference and PDA A was 0.4 cm.

3.2.3.2 Successional Stage Rank

Across both reference areas and all three disposal areas examined, Stage 3 fauna were found, often along with Stage 1 and Stage 2 fauna (Table 3-1, Table 3-2, Figures 3-14 and 3-28). 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, intermediate ranks were assigned to the transitional assemblages (2.5 for Stage 2 transitioning to Stage 3, and 1.5 for 1 transition to 2), 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 either Stage 2 transitioning to Stage 3, or Stage 3 across both reference areas and disposal areas PDA 95 and PDS Inactive. Three stations from PDA A had successional stages that were Stage 2 or less: Station 1 and 2 had a successional stage transitional between Stage 1 and 2; and Station 5 had successional Stage 2. Reference area SREF had only three useable successional stage results, and these had the same range observed at EREF. Group summaries would not be reliable based on only three observations for SREF, so the following statistical evaluations combined the two reference areas and treated reference as a single group (with n=8). Bootstrapping was used to construct confidence intervals between the mean successional stage at disposal areas PDA A, PDA 95 and PDS Inactive versus the pooled reference areas.

The confidence region for the difference between the mean successional stage rank of the pooled reference areas (2.9) versus PDA 95 disposal area, and versus PDS Inactive disposal area were each contained within the interval [-0.5, +0.5 cm] (Table 3-5), which indicates that the mean successional stages at PDS Inactive and PDA 95 disposal areas were statistically equivalent to reference. The difference between the mean of the pooled reference areas and PDA A disposal area was 0.9 (Table 3-5). Bootstrapped confidence intervals would not be reliable based only on the four observations available for this area. However, when the mean itself is outside the equivalence interval of [-0.5, +0.5], we do not need statistics to conclude that the successional stage is statistically inequivalent from reference.

3.2.4 Temporal Comparisons

3.2.4.1 Mean aRPD

Area mean aRPD depths at PDA 95 disposal area in 2014 and 2016 were 1.6 and 1.4 cm, respectively; a decrease of 0.2 cm. EREF had a decrease in mean aRPD depth of 0.2 cm, from 1.9 cm in 2014 to 1.7 cm in 2016. There was an increase of 0.8 cm from 2014 to 2016 at SREF, from 1.2 to 2.0 cm (Table 3-6 and Figure 3-33).

The confidence interval for the change over time (2016 minus 2014) was calculated for disposal area PDA 95. The residuals within each time period for this area were approximately normally distributed (Shapiro-Wilk's test p-value = 0.39, alpha 0.05). Levene's test for equality of variances was not rejected so equal variances were used for PDA 95 (Levene's test, p = 0.19, alpha 0.05). Due to small sample sizes in the reference areas (3 in 2014, 5 in 2016 for EREF and 4 in 2014, 2 in 2016 for SREF), statistical evaluation of temporal change is not appropriate; refer to results presented in Table 3-3 and Figure 3-33.

The 90% confidence interval for the change over time at the disposal area PDA 95 was [-0.42 cm to 0.01 cm] (Table 3-6) indicating that the two disposal area surveys had results that were significantly equivalent within +/- 1 cm. The reference areas had sample sizes that were too small to produce reliable statistical results. EREF showed a slight decrease in aRPD values between 2014 and 2016, while SREF showed an increase of 0.8 cm in the mean aRPD values from 2014 to 2016.

3.3 Sediment and Tissue Physical and Chemical Results

Results for sediment analyses which include grain size, TOC, total PCB, total PAH, selected pesticides and metals and for tissue analyses which include lipids, total PCB, total PAH, selected pesticides and metals are provided below. Summary statistics for each of these parameters were calculated for samples collected from the active and inactive disposal areas and from the two reference areas and are provided in tables at the end of this section. Individual sediment sample results from each station are presented in figures and show the associated effects range low (ER-L) and effects range median (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. For comparisons, tissue figures include laboratory bioaccumulation results (*Nephthys* and *Macoma*) for reference sediments collected for recent nearby dredged material disposal evaluations of Pepperell Cove (PDS REF) and York Harbor (CADS REF) sediment (Figure 3-34) (USACE 2014, USACE 2015). Full results and laboratory reports for all parameters are provided in Appendices F and G.

3.3.1 Grain Size and Total Organic Carbon

Grain size results for the both the active and inactive disposal locations and the two reference locations are summarized in Table 3-7 and presented in Figure 3-35. Percent fines, defined as the sum of the silt and clay fractions, ranged from 19 to 85% at the disposal locations with values above 50% at all stations except for Station PDS-20. Percent fines in samples collected from the reference locations ranged from 14 to 39% and were generally two to three times lower than percent fines found at the disposal locations. Total organic carbon results are summarized in Table 3-8 and presented in Figure 3-36. Similar to percent fines, percent TOC at the disposal locations (average 0.77%) was about two to three times higher than that found at the reference locations (average 0.19%).

3.3.2 Sediment Chemistry

Total PAH and total PCB in PDS sediments are summarized in Table 3-9. Total PAH and total PCB concentrations for individual stations are shown in Figures 3-37 and 3-38, respectively. Total PAHs were detected in all sediment samples from the both the active and inactive disposal locations at concentrations ranging from 744 to 4760 ug/kg. PAH concentrations at the reference locations were lower, ranging from 72.9 to 628 ug/kg. About half of the 18 PCB congeners analyzed were detected in samples collected from the disposal locations with total PCB concentrations ranging from 2.21 to 57.7 ug/kg. Fewer PCB congeners were detected in the reference area samples, and total PCB concentrations ranged from 1.02 to 2.27 ug/kg. Overall, both total PAH with total PCB concentrations for all samples were below the ER-L values with the exception of a slight exceedance for both parameters at one of the inactive disposal site locations. All concentrations were well below the ER-M concentrations. Normalization of PAHs and PCBs to TOC did not change relative concentrations.

Chlorinated pesticides detected in sediments from the disposal locations and the reference areas are summarized in Table 3-10, and individual results for selected pesticides are shown in Figures 3-39 a-d. Of the 20 chlorinated pesticides analyzed, eight pesticides (4,4'-DDD, DDE, DDT; alpha chlordane, dieldrin, endosulfan II, gamma chlordane and toxaphene) were detected in at least one sediment sample from the disposal locations. Only three pesticides (4,4' DDE, 4,4' DDT and endosulfan II) were detected in sediment collected from the reference areas. Pesticides detected at both the disposal locations and reference areas were generally higher at the disposal locations, and in general results at the active and inactive disposal locations were similar. The sum of the DDTs was all well below ER-M but exceeded the ER-L values in all samples from the active disposal location and in one sample from the inactive. The sum of the DDTs was below the ER-L in sediment collected from the reference areas. Total chlordane exceeded the ER-L value at five of the six disposal locations sampled but was below the ER-M value at all locations. Chlordanes were not detected in sediment from the reference areas. Dieldrin detection limits exceeded the ER-L values but concentrations of dieldrin at the disposal locations were low, often detected below the detection limit (i.e., J flagged). Dieldrin was not detected in sediment from the reference areas. 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 collected from both the disposal locations and the reference areas. Metals concentrations are summarized in Table 3-11, and individual results for each metal are shown in Figures 3-40 a-h. All metals concentrations were well below ER-M values and most were below ER-L values. As and Ni concentrations slightly exceeded the ER-L value at one location from the active disposal location. Hg concentrations exceeded the ER-L at one location each from the active and inactive disposal locations. Metals concentrations in sediments from the reference areas were generally similar or lower than those found at the disposal locations and were always below ER-L 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 the worm, *Nephtys incisa*. However, this species was only obtained in sufficient quantities from stations within disposal area PDA95. An alternative species, the clam *Asarte,* was collected in sufficient quantities at the PDS Inactive area and at the reference areas as well as one station within PDA95. Tissue lipids results are summarized in Table 3-12 and in Figure 3-41. Percent lipids in the single worm sample analyzed from PDA 95-30 was 2.07%, and values in clams from the reference areas ranged from 0.85-1.09%. Clam tissue mass from the disposal site was insufficient for lipid analyses. No lipid data were available from the laboratory bioaccumulation tests.

Total PAH and PCBs in tissues are summarized in Table 3-13 and in Figures 3-42 and 3-43, respectively. PAHs were detected in both worm and clam tissue samples from both the disposal site and the reference areas. Total PAH concentrations ranged from 6.34 ug/kg in in clams from the reference area to 167 ug/kg in worms from the disposal site. PAHs in clams and worms from the laboratory bioaccumulation tests conducted on reference material collected nearby, as part of local dredging evaluations, were similar to PAH concentrations found in clams from the PDS disposal and reference areas and lower than the worm concentrations from the disposal site. Total PCBs ranged from a minimum of 1.32 ug/kg in clams to a maximum of 15.6 g ug/kg in worms. Total PCBs in clams and worms from the disposal site and from the reference areas followed similar trends as PAHs. However, the laboratory bioaccumulation tests showed similar PCB concentrations between the clams exposed to reference sediments in the field and clams exposed in the laboratory. PCB concentrations in worms exposed to reference sediments in the laboratory were more similar to PCB levels found in worms collected from the active disposal site and higher than PCBs found in worms collected at the reference areas. Total PCBs in both worms and clams were well below FDA fish consumption limits of 2,000 ug/kg. As another point of reference, total PCB concentrations in worms collected from the disposal site were 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 outside of New York Harbor.

Chlorinated pesticides detected in tissue from the disposal locations and the reference areas are summarized in Table 3-14 and individual results for selected pesticides are shown in Figures 3-44 a-d. Of the 20 chlorinated pesticides analyzed, seven pesticides (4,4’-DDD, DDE; alpha chlordane, dieldrin, endosulfan II, heptachlor, and methoxychlor) were detected in at least one tissue sample from the disposal site. Only three pesticides (4,4’ DDD, 4,4’ DDE and dieldrin) were detected in at least one clam sample collected from the reference areas. Concentrations of pesticides detected in clam and worm tissue from the disposal site were generally low and generally two to three orders of magnitude below FDA action limits. When detected, pesticides in the clam tissue from the reference areas were generally lower than concentrations found in clams from the disposal site and similar to concentrations found in the laboratory exposed bioaccumulation test clams and well below FDA limits. The exception was dieldrin, which was not detected in clam tissue from the disposal site but was detected in clam tissue from the both reference areas and at levels higher than observed in the laboratory exposed clams.

The eight metals analyzed (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn) were detected in all tissue samples collected from the disposal site and the reference areas. Metals concentrations are summarized in Table 3-15, and individual results for each metal are shown in figures 3-45 a-h. Metals concentrations in clams and worms from the disposal site were variable but within the range of concentrations found in clams from the reference area and clams and worms exposed to reference sediment in the laboratory. The only FDA action level available is for Hg in the edible portion of fish, and concentrations in the clams and worms were one to two orders of magnitude below the FDA fish consumption 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 3-16; biomass by Phylum are provided in Table 3-17. 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 110 species were found over all stations (reference + site) with a mean species richness of 55 species per station (Appendix I). Total abundance overall was 3,303, with a mean of 551 individuals per station. Mean density was 13,763 ind/m^2, diversity 3.1, and evenness 0.8. All average measures of the benthic community were similar between site and reference area samples (Table 3-17).

The reference area stations were dominated numerically by small bivalves (*Yoldia limulata*), tiny Rissoid snails (*Onoba pelagica,* maximum length 3 mm), and tube-building and burrowing deposit-feeding polychaete worms (Maldanids and Cirratulids). The reference area stations biomass was dominated by spoon clams (*Periploma papyratium*), wavy Astarte clams (*Astarte undata*), and polychaetes (Table 3-17).

PDS Inactive stations were dominated numerically by small deposit-feeding and suspension feeding worms (Cirratulids and Sabellids); and biomass while low, was dominated by small clams.

PDA 95 stations were dominated numerically by small polychaetes including deposit-feeders (Cirratulids, *Galathowenia oculata*, *Aricidea quadrilobate,* and spionids) and the small bivalve *Corbula contracta* (maximum length 12 mm); and biomass was dominated by the same polychaetes listed above.

While the composition of species found to dominate each location varied considerably, all stations were populated with deposit-feeding polychaetes and small suspension-feeding bivalves.

3.5 Fishing Gear Assessment

A total of 20 lobster trap-style surface marker boys were observed during the PDS multibeam survey (Figure 3-46). Fourteen were observed near and within the PDA 95 area and six were observed in the SREF reference area. The coordinates and a notation of the buoy colors were recorded (Table 3-18).

Table 3-1.

Summary of PDS 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]		
EREF	1	77	4-3/>4	10.7	0.8	Biological	1.4	0.0	0.0	-	No	2	2 -> 3	2 on 3
EREF	2	77	4-3/>4	12.5	1.8	Biological	2.6	0.0	0.7	11.1	No	2	2 on 3	2 on 3
EREF	3	63	4-3	7.6	0.9	Biological	1.7	0.0	0.0	-	No	2 -> 3	2 -> 3	2 -> 3
EREF	4	60	>4	3.5	1.4	Biological	1.2	0.0	0.0	-	No	2	2 on 3	IND
EREF	5	75	4-3/>4	10.7	0.8	Biological	1.6	0.0	0.3	8.1	No	1 on 3	1 on 3	1 on 3
EREF	**Mean**	**70**		**9.0**	**1.2**		**1.7**	**0.0**	**0.2**	**9.6**				
	Standard Deviation			**3.5**	**0.4**			**0.0**						
SREF	6	64	IND	0.0		IND		0.0		-	No	IND	IND	IND
SREF	7	69	4-3	8.6	0.8	Biological		0.0	0.3	7.8	No	2 -> 3	2 -> 3	2 on 3
SREF	8	64	4-3	5.6	1.2	Biological	1.5	0.0	0.0	-	No	2 -> 3	2 -> 3	IND
SREF	9	58	IND	0.0		IND		0.0		-	No	IND	IND	IND
SREF	10	73	4-3/>4	11.6	1.5	Biological	2.5	0.0	1.7	11.0	No	2 -> 3	2 on 3	2 on 3
SREF	**Mean**	**66**		**5.1**	**1.1**		**2.0**	**0.0**	**0.7**	**9.4**				
	Standard Deviation			**5.2**	**0.4**			**0.0**						
ALL REF AREAS	**Max**	**77**		**12.5**	**1.8**		**2.6**	**0.0**	**1.7**	**11.1**				
	Min	**58**		**0.0**	**0.8**		**1.2**	**0.0**	**0.0**	**7.8**				
	Mean	**68**		**7.1**	**1.1**		**1.8**	**0.0**	**0.4**	**9.5**				
	Standard Deviation			**4.6**	**0.4**			**0.0**						

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)

Table 3-2.

Summary of PDS Disposal Areas PDA A, PDA 95, and PDS 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)** [c]	**Mean # of Subsurface Feeding Voids**	**Mean of Maximum Feeding Void Depth (cm)**	**Methane Present?**	**Successional Stages Present** [b]		
PDA_A	1	52	3-2	4.2	1.4	Physical		4.2	0.0	-	No	1 -> 2	1 -> 2	1 -> 2
PDA_A	2	53	3-2	4.9	0.8	Physical	1.4	4.9	0.0	-	No	1 -> 2	1 -> 2	1 -> 2
PDA_A	3	46	3-2/>4	10.1	1.6	Biological	1.3	10.1	0.7	10.1	No	2	2 on 3	2 on 3
PDA_A	4	47	>4	0.1	0.6	Physical		IND			No	IND	IND	IND
PDA_A	5	54	4-3/>4	6.4	1.4	Physical		6.4	0.0	-	No	2	2	2
PDA_A	**Max**	**54**		**10.1**	**1.6**		**1.4**	**10.1**	**0.7**	**10.1**				
	Min	**46**		**0.1**	**0.6**		**1.3**	**4.2**	**0.0**	**10.1**				
	Mean	**50**		**5.1**	**1.2**		**1.4**	**6.4**	**0.2**	**10.1**				
	Standard Deviation			**3.6**	**0.4**			**2.6**						
PDA_95	21	63	4-3/>4	13.7	1.0	Biological	1.5	13.7	1.0	9.6	No	2 -> 3	2 on 3	2 on 3
PDA_95	22	69	3-2/>4	18.3	0.8	Biological	2.3	18.3	1.0	14.5	No	1 on 3	1 on 3	2 on 3
PDA_95	23	64	4-3/>4	14.3	0.9	Biological	1.7	14.3	2.7	11.9	No	1 on 3	1 on 3	2 on 3
PDA_95	24	63	3-2/>4	15.1	0.8	Biological	1.8	15.1	0.0	-	No	2	2 -> 3	2 -> 3
PDA_95	25	62	4-3/>4	16.2	0.6	Biological	0.9	16.2	0.0	-	No	2	2	1 on 3
PDA_95	26	62	4-3/>4	15.6	0.7	Biological	0.9	15.6	1.3	14.1	No	2	2	1 on 3
PDA_95	27	61	3-2/>4	17.3	0.9	Biological	1.3	17.3	0.3	19.2	No	2 -> 3	1 on 3	2 on 3
PDA_95	28	58	3-2/>4	19.4	1.3	Biological	1.3	19.4	1.0	9.5	No	1 on 3	1 on 3	IND
PDA_95	29	66	4-3/>4	14.6	1.1	Biological	0.7	14.6	0.3	12.9	No	1 on 3	1 on 3	2 on 3
PDA_95	30	63	4-3/>4	13.6	1.6	Biological	1.3	13.6	0.0	-	No	2	2	2 -> 3
PDA_95	31	62	4-3/>4	17.0	1.3	Biological	1.6	17.0	0.0	-	No	2 -> 3	1 on 3	2 on 3
PDA_95	32	64	4-3/>4	15.9	1.9	Physical	1.3	15.9	1.3	7.8	No	2 -> 3	1 on 3	2 on 3
PDA_95	33	69	4-3/>4	18.7	1.4	Biological	1.7	18.7	1.0	8.0	No	2 -> 3	1 on 3	1 on 3
PDA_95	34	61	3-2/>4	14.0	1.0	Biological	0.8	14.0	1.0	4.7	No	1 on 3	1 on 3	2 on 3
PDA_95	35	57	4-3/>4	17.0	1.1	Biological	1.4	17.0	1.0	9.0	No	1 -> 2	1 on 3	1 on 3
PDA_95	**Max**	**69**		**19.4**	**1.9**		**2.3**	**19.4**	**2.7**	**19.2**				
	Min	**57**		**13.6**	**0.6**		**0.7**	**13.6**	**0.0**	**4.7**				
	Mean	**63**		**16.0**	**1.1**		**1.4**	**16.0**	**0.8**	**11.0**				
	Standard Deviation			**1.9**	**0.3**			**1.9**						

Table 3-2. (continued)

Summary of PDS Disposal Areas PDA A, PDA 95, and PDS 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) [c]	Mean # of Subsurface Feeding Voids	Mean of Maximum Feeding Void Depth (cm)	Methane Present?	Successional Stages Present [b]		
PDS	6	53	4-3/>4	18.5	0.9	Biological	3.3	18.5	2.3	15.8	No	2 on 3	2 on 3	2 on 3
PDS	7	60	4-3/>4	13.3	1.6	Biological	1.4	13.3	0.3	4.9	No	2 -> 3	2 -> 3	2 on 3
PDS	8	55	4-3/>4	9.2	1.2	Biological	1.2	9.2	0.7	8.9	No	2	2 -> 3	1 on 3
PDS	9	55	4-3/>4	9.8	1.7	Physical	1.2	9.8	1.3	5.8	No	2 -> 3	1 on 3	2 on 3
PDS	10	57	4-3/>4	13.2	0.8	Biological	0.9	13.2	1.7	12.4	No	1 on 3	1 on 3	2 on 3
PDS	11	53	3-2/>4	14.5	1.5	Biological	1.6	14.5	2.3	10.2	No	1 on 3	2 on 3	2 on 3
PDS	12	55	4-3/>4	14.0	1.3	Biological	1.5	14.0	0.3	10.1	No	1 on 3	1 on 3	2 on 3
PDS	13	61	4-3/>4	20.6	1.6	Biological	2.5	trace	3.7	15.2	No	1 on 3	1 on 3	1 on 3
PDS	14	54	3-2/>4	12.7	1.8	Biological	2.1	12.7	1.3	12.1	No	2	1 on 3	2 on 3
PDS	15	58	3-2/>4	7.7	1.6	Biological	1.1	7.7	1.7	8.3	No	2	1 on 3	2 on 3
PDS	16	50	4-3/>4	14.1	2.2	Physical	0.8	14.1	4.3	11.3	No	1 on 3	1 on 3	1 on 3
PDS	17	58	4-3/>4	17.9	1.3	Biological	0.9	17.9	3.7	12.9	No	1 on 3	1 on 3	1 on 3
PDS	18	60	4-3/>4	14.1	0.8	Biological	0.9	14.1	1.3	7.4	No	1 on 3	1 on 3	1 on 3
PDS	19	58	4-3/>4	14.5	1.2	Biological	1.8	14.6	1.0	11.2	No	1 on 3	1 on 3	2 on 3
PDS	20	55	4-3/>4	7.8	1.0	Biological	0.9	7.8	1.0	7.0	No	1 on 3	1 on 3	1 on 3
	Max	**61**		**20.6**	**2.2**		**3.3**	**18.5**	**4.3**	**15.8**				
PDS	**Min**	**50**		**7.7**	**0.8**		**0.8**	**7.7**	**0.3**	**4.9**				
	Mean	**56**		**13.5**	**1.4**		**1.5**	**13.0**	**1.8**	**10.2**				
	Standard Deviation			**3.7**	**0.4**			**3.3**						

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 Dredged material extends below penetration depth

Table 3-3.

Summary of Station Means by Sampling Location

	Mean aRPD Depth (cm)			Maximum Successional Stage Rank		Number of Feeding Voids			Maximum Feeding Void Depth (cm)	
Site	N[1]	Mean	Standard Deviation	Mean	Standard Deviation	N[2]	Mean	Standard Deviation	Mean (n)²	Standard Deviation
2016										
Reference Areas										
EREF	5	1.7	0.53	2.9	0.22	2	0.2	0.30	9.6	2.1
SREF	5[1]	2.0	0.73	2.8	0.29	2	0.7	0.88	9.4	2.2
Mean		1.8		2.9			0.4		9.5	
Disposal Areas										
PDA A	5[1]	1.4	0.07	2.0	0.71	1	0.2	0.33	10.1	n/c
PDA 95	15	1.4	0.43	2.9	0.18	11	0.8	0.72	11.0	4.0
PDS	15	1.5	0.70	3.0	0	15	1.8	1.24	10.2	3.2
Mean		1.5		3.0			0.9		10.5	
2014										
Reference Areas										
EREF	4[1]	1.9	0.06	3.0	0	1	0.7	1.15	12.1	n/c
SEREF	4	1.7	0.16	3.0	0	4	1.0	0.47	10.9	3.2
SREF	4	1.2	0.51	3.0	0	2	1.3	1.89	10.2	2.4
Mean		1.6		3.0			1.0		10.9	
Disposal Areas										
PDA B	6[1]	2.2	0.48	3.0	0	5	1.3	0.93	11.8	2.6
PDA 95	18	1.6	0.30	2.9	0.26	12	0.6	0.64	9.7	3.6
Mean		1.9		3.0			1.0		10.3	

[1] Number of stations surveyed per area, including any stations which had no penetration (and indeterminate results). Useable N was 2 for SREF, 2 for PDA A, 3 for EREF, and 5 for PDA B

[2] The number of feeding voids observed, useable N to determine means and standard deviations (applies to all column entries)

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]
$Mean_{REF} - Mean_{PDA\ A}$	0.41	n/c[3]			
$Mean_{REF} - Mean_{PDA\ 95}$	0.43	0.22	20	-0.11 to 0.78	s
$Mean_{REF} - Mean_{PDS}$	0.32	0.26	20	-0.16 to 0.77	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.
[3] n/c = not calculable, insufficient data to calculate reliable statistical results for PDA A (where n = 2).

Table 3-5.

Summary Statistics and Results of Inequivalence Hypothesis Testing for Successional Stage Values

Difference Equation	Observed Difference ($\hat{d}$)	SE $\hat{d}$	*df* for SE	Confidence Bounds (D_L to D_U)[1]	Results[2]
$Mean_{REF} - Mean_{PDA\ A}$	0.875	n/c[3]			d
$Mean_{REF} - Mean_{PDA\ 95}$	-0.06	0.09	21	-0.2 to 0.2	s
$Mean_{REF} - Mean_{PDS}$	-0.125	0.08	21	-0.2 to -0.05	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 ± 0.5.
d = Fail to reject the null hypothesis of inequivalence between the two group means, the two group means are different.
[3] Insufficient data to calculate reliable statistical results for PDA A (where n = 4). However, the observed difference is greater than 0.5, so the two group means could never be significantly equivalent and we conclude that the group means are different.

Table 3-6.

Summary Statistics and Results of Inequivalence Hypothesis Testing for Temporal Change in aRPD Values

Difference Equation	Observed Difference ($\hat{d}$)	SE $\hat{d}$	*df* for SE	Confidence Bounds (D_L to D_U)[1]	Results[2]
PDA 95_{2016} – PDA 95_{2014}	-0.21	0.13	31	-0.42 to 0.01	s
$EREF_{2016}$ – $EREF_{2014}$	-0.16	n/c[3]			
$SREF_{2016}$ – $SREF_{2014}$	0.83				

[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.
[3] Insufficient data to calculate reliable statistical results for EREF (where n = 3 and 5), or for SREF (where n = 4 and 2).

Table 3-7.

Grain Size Data for PDS 2016 Sediments

	Gravel (>4.75 mm) %					Coarse Sand (2.00-4.75 mm) %					Medium Sand (0.425-2.00 mm) %					Fine Sand (0.075-0.425 mm) %				
Area	**n**	**MIN**	**MAX**	**n**	**n**	**n**	**n**	**n**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site																				
PDA 95 - Active	3	0	2.06	3	3	3	3	3	1.34	1.24	3	0.6	16.7	7.86	8.16	3	14.1	15.8	14.8	0.846
PDS Inactive	3	0.13	2.27	3	3	3	3	3	1.18	1.42	3	4.7	7.91	6.16	1.62	3	9.39	74.3	39.1	32.8
Disposal Site Total	**6**	**0**	**2.27**	**6**	**6**	**6**	**6**	**6**	**1.26**	**1.20**	**6**	**0.6**	**16.7**	**7.01**	**5.34**	**6**	**9.39**	**74.3**	**27.0**	**24.6**
Reference																				
EREF	3	0	16.0	3	3	3	3	3	2.31	3.78	3	0.91	10.9	4.29	5.76	3	52.6	72.0	61.4	9.85
SREF	3	0.27	7.07	3	3	3	3	3	7.59	3.74	3	11.6	17.2	14.3	2.83	3	37.4	52.5	44.6	7.56
Reference Total	**6**	**0**	**16.0**	**6**	**6**	**6**	**6**	**6**	**4.95**	**4.43**	**6**	**0.91**	**17.2**	**9.3**	**6.84**	**6**	**37.4**	**72.0**	**53.0**	**12.1**

	Sand (0.075-4.75 mm) %					Silt (0.005-0.075 mm) %					Clay (<0.005 mm) %					Fines (Silt + Clay %				
Area	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site																				
PDA 95 - Active	3	14.7	34.9	24.0	10.2	3	56.3	75.9	66.2	9.79	3	6.79	11.2	9.14	2.21	3	63.1	85.3	75.3	11.3
PDS Inactive	3	20.1	80.5	46.5	30.9	3	13.7	49.6	37.3	20.4	3	5.35	30.2	15.3	13.1	3	19.1	79.8	52.6	30.8
Disposal Site Total	**6**	**14.7**	**80.5**	**35.2**	**24.0**	**6**	**13.7**	**75.9**	**51.7**	**21.3**	**6**	**5.35**	**30.2**	**12.2**	**9.07**	**6**	**19.1**	**85.3**	**64.0**	**24.2**
Reference																				
EREF	3	60.7	73.6	68.1	6.70	3	7.28	30.3	18.2	11.5	3	6.57	9.07	7.96	1.27	3	13.9	39.4	26.1	12.8
SREF	3	63.0	68.9	66.6	3.18	3	18.1	21.7	20.0	1.81	3	8.06	10.2	9.31	1.11	3	26.2	31.9	29.3	2.92
Reference Total	**6**	**60.7**	**73.6**	**67.4**	**4.77**	**6**	**7.28**	**30.3**	**19.1**	**7.46**	**6**	**6.57**	**10.2**	**8.64**	**1.30**	**6**	**13.9**	**39.4**	**27.70**	**8.47**

Table 3-8.

Percent Total Organic Carbon in PDS 2016 Sediments

	Total Organic Carbon Percent (%)				
Area	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site					
PDA 95 - Active	3	1.60%	2.40%	2.07%	0.42%
PDS Inactive	3	0.50%	2.00%	1.11%	0.79%
Disposal Site Total	**6**	0.50%	2.40%	1.59%	0.77%
Reference					
EREF	3	0.51%	0.94%	0.78%	0.24%
SREF	3	1.00%	1.00%	1.00%	0.00%
Reference Total	**6**	0.51%	1.00%	0.89%	0.19%

Table 3-9.

Total PAH and Total PCB in PDS 2016 Sediments

	Total PAH[1]						Total PCB[2]					
	µg/kg dry wt.					Mean %	µg/kg dry wt.					Mean %
Area	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**Detected**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**Detected**
Disposal Site												
PDA 95 - Active	3	1,470	3,000	2,050	832	100	3	2.53	21.8	9.46	10.7	55.6
PDS Inactive	3	744	4,760	2,890	2,020	100	3	2.21	57.7	23.3	30.0	57.4
Disposal Site Total	**6**	**744**	**4,760**	**2,470**	**1,460**	**100**	**6**	**2.21**	**57.7**	**16.4**	**21.5**	**56.5**
Reference												
EREF	3	72.9	174	121	50.9	100	3	1.02	1.21	1.10	0.099	5.56
SREF	3	189	628	467	242	100	3	1.04	2.27	1.67	0.620	22.2
Reference Total	**6**	**73**	**628**	**294**	**246**	**100**	**6**	**1.02**	**2.27**	**1.38**	**0.505**	**13.9**

[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 3-10.

Chlorinated Pesticides Detected in PDS 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															
PDA 95 - Active	3	1.63	6.68	3.33	2.90	3	0.924	2.32	1.51	0.725	3	0.947	1.20	1.07	0.127
PDS Inactive	3	0.171 J	5.73	2.25	3.03	3	0.0998 J	1.18	0.585	0.548	3	*0.101 U*	1.19	0.535	0.577
Disposal Site Total	**6**	**0.171 J**	**6.68**	**2.79**	**2.72**	**6**	**0.0998 J**	**2.32**	**1.05**	**0.766**	**6**	***0.101 U***	**1.20**	**0.804**	**0.476**
Reference															
EREF	3	*0.0589 U*	*0.0696 U*	*0.0635 U*	*N/A*	3	*0.0544 U*	*0.0644 U*	*0.0587 U*	*N/A*	3	0.288	0.355	0.316	0.0350
SREF	3	*0.0582 U*	*0.07 U*	*0.0653 U*	*N/A*	3	0.0817 J	0.128 J	0.112 J	0.0262	3	0.307	0.412	0.373	0.0575
Reference Total	**6**	***0.0582 U***	***0.07 U***	***0.0644 U***	***N/A***	**6**	***0.0544 U***	**0.128 J**	**0.0853**	**0.0337**	**6**	**0.288**	**0.412**	**0.344**	**0.0529**

	alpha-chlordane µg/kg dry wt.					Total chlordane[1] 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															
PDA 95 - Active	3	0.103 J	0.188 J	0.138 J	0.0444	3	1.01	2.00	1.36	0.561	3	*0.0547 U*	0.291 J	0.137	0.134
PDS Inactive	3	*0.0429 U*	0.163 J	0.0851	0.0675	2	0.0762	1.66	0.954	0.806	3	*0.0408 U*	0.27 J	0.119	0.131
Disposal Site Total	**6**	***0.0429 U***	**0.188 J**	**0.112**	**0.0588**	**5**	**0.0762**	**2.00**	**1.15**	**0.659**	**6**	***0.0408 U***	**0.291 J**	**0.128**	**0.119**
Reference															
EREF	3	*0.0436 U*	*0.0516 U*	*0.0471 U*	*N/A*	3	*U*	*U*	*U*	*N/A*	3	*0.0415 U*	*0.049 U*	*0.0447 U*	*N/A*
SREF	3	*0.0432 U*	*0.0519 U*	*0.0484 U*	*N/A*	3	*U*	*U*	*U*	*N/A*	3	*0.041 U*	*0.0493 U*	*0.046 U*	*N/A*
Reference Total	**6**	***0.0432 U***	***0.0519 U***	***0.0478 U***	***N/A***		***U***	***U***	***U***	***N/A***	**6**	***0.041 U***	***0.0493 U***	***0.0454 U***	***N/A***

Table 3-10. (continued)

Chlorinated Pesticides Detected in PDS 2016 Sediments

	Endosulfan II µg/kg dry wt.					gamma-chlordane µg/kg dry wt.					Toxaphene µg/kg dry wt.				
Area	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site															
PDA 95 - Active	3	0.364	1.04	0.632	0.359	3	0.832	1.76	1.16	0.517	3	*23.4 U*	25,400	8,484	14,650
PDS Inactive	3	0.08 J	1.45	0.722	0.689	3	*0.0386 U*	1.45	0.850	0.729	3	*23.7 U*	19,300	12,108	10,528
Disposal Site Total	**6**	**0.08 J**	**1.45**	**0.677**	**0.494**	**6**	***0.0386 U***	**1.76**	**1.01**	**0.591**	**6**	***23.4 U***	**25,400**	**10,296**	**11,581**
Reference															
EREF	3	*0.0371 U*	*0.0438 U*	*0.04 U*	*N/A*	3	*0.0393 U*	*0.0464 U*	*0.0424 U*	*N/A*	3	*17.7 U*	*20.9 U*	*19.1 U*	*N/A*
SREF	3	*0.0367 U*	0.112 J	0.0771	0.0379	3	*0.0388 U*	*0.0467 U*	*0.0435 U*	*N/A*	3	*17.5 U*	*21 U*	*19.6 U*	*N/A*
Reference Total	**6**	***0.0367 U***	**0.112 J**	**0.0585**	**0.0315**	**6**	***0.0388 U***	***0.0467 U***	***0.0423 U***	***N/A***	**6**	***17.5 U***	***21 U***	***19.4 U***	***N/A***

U indicates not detected at or above Method Detection Limit

J indicates analyte detected below Reporting Limit but above Method Detection Limit.

[1] Total Chlordane is the sum of the individual isomers (i.e., alpha and gamma chlordane, heptachlor). Non-detected compounds were summed using ½ the MDL.

Table 3-11.

Metals Detected in PDS 2016 Sediments

	Arsenic mg/kg dry wt.					Cadmium mg/kg dry wt.					Chromium mg/kg dry wt.					Copper mg/kg dry wt.				
Area	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site																				
PDA 95 - Active	3	7.76	9.99	8.70	1.15	3	0.170	0.390	0.273	0.111	3	27.2	37.6	32.6	5.21	3	16.9	25.3	19.8	4.74
PDS Inactive	3	3.13	8.03	5.95	2.53	3	0.0400	0.290	0.147	0.129	3	10.7	28.4	21.8	9.67	3	5.86	18.1	13.8	6.87
Disposal Site Total	**6**	**3.13**	**9.99**	**7.33**	**2.32**	**6**	**0.0400**	**0.390**	**0.210**	**0.128**	**6**	**10.7**	**37.6**	**27.2**	**9.11**	**6**	**5.86**	**25.3**	**16.8**	**6.23**
Reference																				
EREF	3	2.88	3.81	3.30	0.472	3	0.0300	0.0700	0.0467	0.0208	3	13.4	17.8	15.2	2.32	3	3.38	5.58	4.25	1.17
SREF	3	3.44	4.25	3.93	0.433	3	0.0400	0.0600	0.0533	0.0115	3	16.3	19.00	17.4	1.40	3	4.40	7.37	6.10	1.53
Reference Total	**6**	**2.88**	**4.25**	**3.62**	**0.535**	**6**	**0.0300**	**0.0700**	**0.0500**	**0.0155**	**6**	**13.4**	**19.00**	**16.3**	**2.12**	**6**	**3.38**	**7.37**	**5.18**	**1.58**

	Lead mg/kg dry wt.					Mercury mg/kg dry wt.					Nickel mg/kg dry wt.					Zinc mg/kg dry wt.				
Area	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site																				
PDA 95 - Active	3	16.8	37.1	24.6	10.9	3	0.0540	0.230	0.121	0.0952	3	18.8	22.7	20.8	1.95	3	63.3	91.2	75.8	14.18
PDS Inactive	3	7.27	30.1	22.4	13.1	3	0.0280	0.190	0.0947	0.0847	3	6.54	20.0	14.0	6.86	3	21.1	74.6	54.8	29.4
Disposal Site Total	**6**	**7.27**	**37.1**	**23.5**	**10.8**	**6**	**0.0280**	**0.230**	**0.108**	**0.0819**	**6**	**6.54**	**22.7**	**17.4**	**5.82**	**6**	**21.1**	**91.2**	**65.3**	**23.6**
Reference																				
EREF	3	6.93	9.25	7.85	1.23	3	0.0150	0.0260	0.0193	0.00586	3	8.00	12.0	9.67	2.08	3	21.1	32.2	25.8	5.73
SREF	3	8.24	11.6	10.3	1.81	3	0.0250	0.0450	0.0377	0.0110	3	9.31	11.5	10.6	1.15	3	25.2	34.0	30.3	4.56
Reference Total	**6**	**6.93**	**11.6**	**9.08**	**1.93**	**6**	**0.0150**	**0.0450**	**0.0285**	**0.0128**	**6**	**8.00**	**12.0**	**10.1**	**1.59**	**6**	**21.1**	**34.0**	**28.1**	**5.24**

Table 3-12.

Lipids Data for PDS 2016 Tissue

			Lipids % Wet weight			
Area	**Matrix**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site						
PDA 95 - Active	Clam	0	N/A	N/A	N/A	N/A
PDA 95 - Active	Worm	1	2.07	2.07	2.07	N/A
Disposal Site Total		**1**	**2.07**	**2.07**	**2.07**	**N/A**
Reference						
EREF	Clam	1	1.09	1.09	1.09	N/A
SREF	Clam	1	0.850	0.850	0.850	N/A
Reference Total	**Clam**	**2**	**0.850**	**1.09**	**0.970**	**0.170**

Table 3-13.

Total PAH and Total PCB in PDS 2016 Tissue

		Total PAH µg/kg wet wt.						Total PCB (18 Congener) µg/kg wet wt.					
Area	**Matrix**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**Mean % Detected**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**Mean % Detected**
Disposal Site													
PDA 95 - Active	Clam	1	32.2	32.2	32.2	N/A	72	1	4.84	4.84	4.84	N/A	11
PDA 95 - Active	Worm	2	147	168	157	14.6	100	2	9.59	15.6	12.6	4.23	58
Disposal Site Total		**3**	**32.2**	**168**	**116**	**72.9**	**91**	**3**	**4.84**	**15.6**	**10.0**	**5.37**	**43**
Reference													
EREF	Clam	1	6.34	6.34	6.34	N/A	61	1	1.64	1.64	1.64	N/A	22
SREF	Clam	2	7.00	10.2	8.61	2.27	78	2	1.32	1.47	1.39	0.109	22
Reference Total	**Clam**	**3**	**6.34**	**10.2**	**7.85**	**2.07**	**72**	**3**	**1.32**	**1.64**	**1.48**	**0.164**	**22**

[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 3-14.

Pesticides in PDS 2016 Clams and Worms

		4,4'-DDD µg/kg wet weight					4,4'-DDE µg/kg wet weight					alpha-chlordane µg/kg wet weight				
Area	**Matrix**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site																
PDA 95 - Active	Clam	1	0.315	0.315	0.32	N/A	1	0.19 J	0.190	0.190	N/A	1	*0.154 U*	*0.154 U*	*0.154 U*	N/A
PDA 95 - Active	Worm	2	1.62	2.37	2.00	0.53	2	1.280	1.79	1.54	0.361	2	0.529	0.669	0.599	0.099
Disposal Site Total		**3**	**0.315**	**2.37**	**1.44**	**1.04**	**3**	**0.19 J**	**1.79**	**1.09**	**0.817**	**3**	***0.154 U***	**0.669**	**0.451**	**0.266**
Reference																
EREF	Clam	1	*0.0421 U*	*0.0421 U*	*0.0421 U*	N/A	1	0.0545 J	0.0545 J	0.0545 J	N/A	1	*0.0421 U*	*0.0421 U*	*0.0421 U*	N/A
SREF	Clam	2	*0.0421 U*	0.0703 J	0.0562	0.0199	2	0.0975 J	0.140	0.119	0.0301	2	*0.0421 U*	*0.0422 U*	*0.04215 U*	N/A
Reference Total	**Clam**	**3**	***0.0421 U***	**0.0703**	**0.0515**	**0.0163**	**3**	**0.0545 J**	**0.140**	**0.0973**	**0.0428**	**3**	***0.0421 U***	***0.0422 U***	***0.0421 U***	**N/A**

		Total chlordane[1] µg/kg wet weight					dieldrin µg/kg wet weight					Endosulfan II µg/kg wet weight				
Area	**Matrix**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site																
PDA 95 - Active	Clam	1	0.757	0.757	0.757	N/A	1	*0.132 U*	*0.132 U*	*0.132 U*	N/A	1	*0.242 U*	*0.242 U*	*0.242 U*	N/A
PDA 95 - Active	Worm	2	0.622	0.804	0.713	0.129	2	*0.0588 U*	*0.0856 U*	*0.0722 U*	N/A	2	0.143 J	*0.156 U*	0.150	0.0092
Disposal Site Total		**3**	**0.622**	**0.804**	**0.728**	**0.0945**	**3**	***0.0588 U***	***0.132 U***	***0.0921 U***	**N/A**	**3**	**0.143 J**	***0.242 U***	**0.180**	**0.0538**
Reference																
EREF	Clam	1	*U*	*U*	*U*	N/A	1	0.958	0.958	0.958	N/A	1	*0.0662 U*	*0.0662 U*	*0.0662 U*	N/A
SREF	Clam	3	*U*	*U*	*U*	N/A	2	0.906	0.996	0.951	0.0636	2	*0.0661 U*	*0.0662 U*	*0.0662 U*	N/A
Reference Total	**Clam**	**4**	***U***	***U***	***U***	**N/A**	**3**	**0.906**	**0.996**	**0.953**	**0.0452**	**3**	***0.0661 U***	***0.0662 U***	***0.0662 U***	**N/A**

Table 3-14. (continued)

Pesticides in PDS 2016 Clams and Worms

		Heptachlor µg/kg wet weight					methoxychlor µg/kg wet weight				
Area	**Matrix**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site											
PDA 95 - Active	Clam	1	0.548	0.548	0.548	N/A	1	*2.44 U*	*2.44 U*	*2.44 U*	N/A
PDA 95 - Active	Worm	2	*0.0684 U*	*0.0997 U*	*0.0841 U*	N/A	2	*1.58 U*	1.94	1.76	0.255
Disposal Site Total		**3**	***0.0684 U***	**0.548**	**0.239**	**0.268**	**3**	**1.58 U**	**2.44 U**	**1.99**	**0.432**
Reference											
EREF	Clam	1	*0.0421 U*	*0.0421 U*	*0.0421 U*	N/A	1	*0.668 U*	*0.668 U*	*0.668 U*	N/A
SREF	Clam	2	*0.0421 U*	*0.0422 U*	*0.0421 U*	N/A	2	*0.668 U*	*0.669 U*	*0.669 U*	N/A
Reference Total	**Clam**	**3**	***0.0421 U***	***0.0422 U***	***0.0421 U***	**N/A**	**3**	***0.668 U***	***0.669 U***	***0.668 U***	**N/A**

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 sulfate, endrin, gamma-chlordane, heptachlor epoxide, gamma HCH, and toxaphene.

U indicates not detected at or above Method Detection Limit.

J indicates analyte detected below Reporting Limit but above Method Detection Limit.

[1] Total Chlordane is the sum of the individual isomers (i.e., alpha and gamma chlordane, heptachlor). Non-detected compounds were summed using ½ the MDL.

Table 3-15.

Metals in PDS 2016 Clams and Worms

		Arsenic mg/kg wet wt.					Cadmium mg/kg wet wt.					Chromium mg/kg wet wt.					Copper mg/kg wet wt.				
Area	**Matrix**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site																					
PDA 95 - Active	Clam	1	3.59	3.59	3.59	N/A	1	1.04	1.04	1.04	N/A	1	0.140	0.140	0.140	N/A	1	1.38	1.38	1.38	N/A
PDA 95 - Active	Worm	2	5.30	6.17	5.74	0.62	2	0.110	0.140	0.125	0.0212	2	0.0420	0.0700	0.0560	0.0198	2	0.670	0.960	0.815	0.205
Disposal Site Total		**3**	**3.59**	**6.17**	**5.02**	**1.31**	**3**	**0.110**	**1.04**	**0.430**	**0.528**	**3**	**0.0420**	**0.140**	**0.0840**	**0.0505**	**3**	**0.670**	**1.38**	**1.00**	**0.357**
Reference																					
EREF	Clam	1	3.74	3.74	3.74	N/A	1	1.38	1.38	1.38	N/A	1	0.300	0.300	0.300	N/A	1	1.23	1.23	1.23	N/A
SREF	Clam	2	2.86	3.11	2.99	0.177	2	1.14	1.22	1.18	0.0566	2	0.0870	0.091	0.0890	0.00283	2	1.05	1.15	1.10	0.0707
Reference Total	**Clam**	**3**	**2.86**	**3.74**	**3.24**	**0.453**	**3**	**1.14**	**1.38**	**1.25**	**0.122**	**3**	**0.0870**	**0.300**	**0.159**	**0.122**	**3**	**1.05**	**1.23**	**1.14**	**0.0902**

		Lead mg/kg wet wt.					Mercury mg/kg wet wt.					Nickel mg/kg wet wt.					Zinc mg/kg wet wt.				
Area	**Matrix**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**	**n**	**MIN**	**MAX**	**Mean**	**StdDev**
Disposal Site																					
PDA 95 - Active	Clam	1	0.120	0.120	0.120	N/A	1	0.0450	0.0450	0.0450	N/A	1	0.380	0.380	0.380	N/A	1	7.64	7.64	7.64	N/A
PDA 95 - Active	Worm	2	0.160	0.220	0.190	0.0424	2	0.0050	0.0070	0.0060	0.0014	2	0.370	0.500	0.435	0.0919	2	19.60	25.5	22.6	4.17
Disposal Site Total		**3**	**0.120**	**0.220**	**0.167**	**0.0503**	**3**	**0.0050**	**0.0450**	**0.0190**	**0.0225**	**3**	**0.370**	**0.500**	**0.417**	**0.0723**	**3**	**7.64**	**25.5**	**17.6**	**9.10**
Reference																					
EREF	Clam	1	0.140	0.140	0.140	N/A	1	0.0400	0.0400	0.0400	N/A	1	0.740	0.740	0.740	N/A	1	7.17	7.17	7.17	N/A
SREF	Clam	2	0.0950	0.100	0.0975	0.00354	2	0.0310	0.0320	0.0315	0.000707	2	0.500	0.630	0.565	0.0919	2	6.72	7.22	6.97	0.354
Reference Total	**Clam**	**3**	**0.0950**	**0.140**	**0.112**	**0.0247**	**3**	**0.0310**	**0.0400**	**0.0343**	**0.00493**	**3**	**0.500**	**0.740**	**0.623**	**0.1201**	**3**	**6.72**	**7.22**	**7.04**	**0.275**

Table 3-16.

Benthic Community Abundance and Diversity Metrics for PDS 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
EREF	5	60	425	10625	3.0	0.7	*Yoldia limatula*	Annelida
PDS Inactive	16	53	401	10025	3.3	0.8	*Cirratulidae* (LPIL)	Mollusca
PDA 95	30	38	267	6675	2.9	0.8	*Galathowenia oculata*	Annelida
PDA 95	22	61	1010	25250	2.7	0.6	*Cirratulidae* (LPIL)	Annelida
SREF	7	58	665	16625	3.2	0.8	*Maldanidae* (LPIL)	Mollusca
SREF	10	58	535	13375	3.3	0.8	*Cirratulidae* (LPIL)	Mollusca
Mean across all samples		55	551	13763	3.1	0.8		

Table 3-17.

Benthic Community Biomass by Phylum for PDS 2016

		Biomass (g)					
Area	**Station**	**Annelida**	**Mollusca**	**Arthropoda**	**Echinodermata**	**Miscellaneous**	**Total**
EREF	5	0.7	0.7	0.2	0.3	0.2	2.1
PDS Inactive	16	0.2	0.3	0.2	0.0	0.2	0.9
PDA 95	30	0.4	0.3	0.0	0.0	0.0	0.7
PDA 95	22	1.0	0.0	0.0	0.0	0.1	1.2
SREF	7	0.6	0.9	0.0	0.0	0.0	1.5
SREF	10	0.6	0.7	0.0	0.0	0.3	1.6

Table 3-18.

Surface Marker Buoys Observed During the 2016 PDS Multibeam Survey

Buoy Description	**Date**	**Time**	**X**	**Y**	**Lat**	**Long**
Yellow Green	9/8/2016	11:44:54	911226.4	81002.36	43.56239	-70.0277
Yellow/Green & White/Green	9/8/2016	11:50:19	911260.9	81196.27	43.56413	-70.0273
Yellow Green	9/8/2016	11:54:25	911250.2	81171.26	43.56391	-70.0274
Fluorescent Yellow Orange Green	9/8/2016	12:03:15	911502.3	81201.46	43.56418	-70.0243
Orange Red	9/8/2016	12:04:29	911507.9	80900.93	43.56147	-70.0242
Orange Red	9/8/2016	12:04:55	911450.1	80803.31	43.56059	-70.0249
Orange Red	9/8/2016	12:07:58	911505.7	80883.61	43.56132	-70.0243
Fluorescent Yellow Orange Green	9/8/2016	12:09:12	911505.4	81179.34	43.56398	-70.0243
Yellow Green	9/8/2016	12:22:14	911538.5	80659.22	43.5593	-70.0239
Fluorescent Yellow Orange Green	9/8/2016	12:30:52	911605.7	81045.68	43.56277	-70.023
Yellow Green	9/8/2016	12:35:56	911732.6	81010.04	43.56245	-70.0214
Yellow Green	9/8/2016	12:46:04	911851.2	81129.3	43.56352	-70.02
Orange Red	9/8/2016	12:53:18	911465.2	80890.66	43.56138	-70.0248
White Green	9/8/2016	13:05:14	911249	81359.92	43.56561	-70.0274
Orange Red	9/8/2016	14:35:07	911338.6	80149.55	43.55471	-70.0263
Green White	9/8/2016	14:46:28	911243.5	80525.21	43.55809	-70.0275
Green White	9/8/2016	14:46:43	911240.8	80471.28	43.55761	-70.0275
Yellow Green	9/8/2016	14:54:24	911066.2	80547.61	43.5583	-70.0297
Yellow Green	9/8/2016	15:04:21	910918.1	80231.21	43.55545	-70.0315
Green White	9/8/2016	15:33:17	911250.3	80469.91	43.5576	-70.0274

Notes
1. Grid coordinates are NAD_1983_StatePlane_Maine_West_FIPS_1802_Meters
2. Geographic coordinates are NAD83 decimal degrees

4.0 DISCUSSION

4.1 Placement of Dredged Material and Stability of Deposits

In the early years of PDS operations, placement was managed by a taut-wire moored target “DG” buoy. Dredging contractors focused on getting close to the target buoy, but not so close as to risk entanglement with the mooring line. This practice resulted in a potentially greater spatial extent of material spread around the target location during a given season. Advancements in electronic positioning coupled with the Corps’ Dredging Quality Management System (DQM) for logging the track of each scow and its release point has allowed for implementation of an electronic target location for managing placement of the dredged material with potentially less spread of material. The advent of high-resolution MBES bathymetric surveys have provided characterizations of the seafloor that allow detailed mapping of bedrock outcrops (Figure 1-2). Previous surveys at PDS acknowledged the need to focus future placement within soft bottom trough areas between bedrock outcrops to best contain placed material (Sturdivant & Carey 2017).

Since the previous 2014 monitoring survey, approximately 120,800 m^3 of material has been placed at PDS. The majority of the dredged material placement events were centered on the PDA 95 Mound between bedrock outcrops (Figure 1-3). A small amount of material (700 m^3) was placed at the PDA A Mound (Figure 1-3). Acoustic results indicated dredged material placed at PDA 95 was constrained to a discrete mound, and the sediment texture and roughness of this location was harder and rougher than surrounding native sediments (Figure 3-2a, Figure 3-4a).

All stations surveyed with SPI at the PDA 95 disposal mound exhibited a thick layer of dredged material that had consistent evidence of biological reworking of sediment near the sediment–water interface (Figure 3-23A). Dredged material was also present at all stations surveyed at PDA A (Appendix E). At PDA A, dredged material was found to be intermixed with fine sand, with patches of dredged material visible (Figure 3-23C). The PDS Inactive disposal mound was found to have dredged material present at all stations, with a trace at Station 13 (Figure 3-22). Despite not receiving any dredged material placement since 1991, the dredged material at PDS Inactive closely resembled that of PDA 95, with a distinct dredged material layer that had been reworked in the upper centimeters of the sediment column (Figure 3-23B).

Existing bathymetry at PDS was evaluated in GIS, and the portions of the site between apparent ledge outcrops was delineated. Hypothetical extents of future disposals were estimated assuming a maximum slope between the deposited materials and the ambient seafloor of 3 degrees (rise/run of 1/19) to leave a variable buffer zone between the mound and the site boundary. The relationships between buffer zone width, remaining site area and hypothetical deposit thickness were modeled and suggested maximal capacity at a thickness of approximately 15 m. The thicker deposit offset the larger buffer zone required for the side slope to avoid impacting hard bottom areas. Areas delimiting the potential extent of future placements and volume capacities were calculated assuming uniform deposits of 5-m, 10-m and 15-m thickness (Figure 4-1).

Acoustic results and comparison to previous monitoring surveys indicate that the dredged material placed previously at the site was stable since the monitoring event in 2014 (Figure 3-7 in Sturdivant and Carey 2017). With active placement, material has accumulated at PDA (Figure 3-6). Sediment profile imagery revealed that the placed material was being slowly reworked into the sediment matrix by the benthic community (Figures 3-23 and 3-27). The water depth at PDS (37 to 71 m [121 to 230 ft]) and the presence of bedrock ridges provide a measure of protection from open ocean wave energy and subsurface currents, and thus act to enhance containment of the deposited dredged material.

4.2 Biological Recovery of the Benthic Community and Sediment Quality

The results of the 2016 SPI survey identified a benthic community at the PDA 95 and PDS Inactive disposal locations that was ecologically equivalent to the reference areas. Temporal aRPD comparison of the benthic communities at PDA 95 found equivalence between 2014 and 2016 despite recent disposal activity at the PDA 95 mound. These results suggest that the dredged material deposited at the site is being rapidly colonized and, as a result, does not differ from earlier observations and is similar to the ambient benthic community.

The PDA A disposal mound results showed a biological recovery that was not as mature as those observed at the other observed placement areas but was also marked by relatively coarse sediments and limited camera penetration, which inhibit the ability to detect deep burrowing fauna. As a result, the aRPD values could not be compared statistically, and successional stage was most likely underestimated. PDA A received a small amount of material since the last survey in 2014, but the last significant placement was completed in 2010. The presence of coarser sediments, shell fragments and thin layers of dredged material on bedrock limited interpretation of biological response at PDA A mound, but there was no evidence of direct impairment from the presence of dredged material (highly reduced sediments near the surface). The presence of coarse materials at the surface suggests exposure to higher current forcing from storms with some winnowing/armoring and the potential to 'reset' the successional stage.

Results of sediment and tissue chemistry also support lack of effect on the biological community at PDA 95 and PDA Inactive. While the sediment grain size within the disposal areas was two to three times finer than the sediment within the reference areas, the concentrations of most contaminants was similar to or only slightly higher than at the reference stations and generally lower than the ER-L benchmark. The exceptions were a number of the chlorinated pesticides, including total DDx (sum of DDT, DDE and DDD), dieldrin, total chlordane, and toxaphene, all of which were detected in sediment from at least one station from each of the disposal areas at concentrations greater than those found at the reference locations and at concentrations above the ER-L benchmark. Tissue concentrations, however, were generally found to be similar in organisms collected at the disposal and reference areas and in all cases orders of magnitude below any FDA action levels for edible fish tissue. The latter would indicate that while there are measurable concentrations of many contaminants in sediments at the disposal areas, they are not bioaccumulating at appreciable levels.

4.3 Management Considerations

The patterns of dredged material on the seafloor at PDS were detectable with elevation difference calculations between years of placement, through distinct signatures in the backscatter and side-scan sonar, through the presence of elevated percent fines in the sediment, and with the optical observations from SPI. There was no identification of dredged material at either of the reference locations, and the sediment characteristics and topography were similar to the disposal areas. On this basis, the reference areas remain valid for comparison with disposal site conditions.

Biological results from the PDA 95 mound, that has received dredged material in recent years, suggest that recovery is consistent with reference area conditions and can continue to receive dredged material placement. It is reasonable to expect that PDS could accommodate additional placement of substantial volumes of dredged material (6 to 12 million m^3) following the model of placement within the spaces between the exposed rock (Figure 4-1).

The results of sediment and tissue chemistry indicate that the levels of chlorinated pesticides in sediments should continue to be monitored periodically and compared to regional values and values measured in suitability testing of dredged material to inform management actions.

Lobster gear was observed at PDS both near the PDA 95 disposal location as well as at the SREF area. 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

The September 2016 survey at PDS was designed to assess changes at the site after placement of approximately 120,800 m^3 of dredged material since the previous survey conducted in 2014 as well as to provide additional site characterization data to aid in longer-term management of the site. The 2016 survey included collection of bathymetric data over a portion of the disposal site that received dredged material placed since 2014; collection of SPI and plan view imaging at three disposal target locations and two reference areas; and collection of benthic infauna, sediment, and tissue samples to further characterize the site and reference areas. All components of the survey were successfully performed and included the following results:

- Dredged material placed at PDA 95 was constrained to a discrete mound centered on the target placement location.
- Remaining site capacity was estimated to range between 6-12 million m^3 for placement depth ranging from 5-15 m thick respectively while constraining placement to the deeper portions of the site between rock outcrops.
- The benthic communities at the two disposal areas located within the deep trough (PDA 95 and PDS Inactive) were recovering consistent with the expected paradigm, with full recovery expected within one year of completion of dredged material placement. Mature benthic communities have developed at both disposal areas, including the most recently used location (PDA 95).
- The benthic community at PDA A, located on rocky outcrops had no evidence of direct impairment from dredged material placement, but due to limited camera penetration and the presence of coarse sediments, Stage 1 and Stage 2 taxa were identified at most stations.
- Chemical analyses of sediment and the tissue of benthic infauna (clams and worms) revealed concentrations that were generally low but that showed some variability between the reference and the disposal areas, attributed primarily to the difference in physical characteristics of the sediment (disposal site sediments had higher percentages of fine-grained material). Tissue concentrations were two orders of magnitude below FDA Action Levels. While these results are limited, they provide baseline measurements for reference to future studies.

Based on these results, the following are recommended:

R1: Continue placement of dredged material to deeper, soft bottom areas of the site to support containment of material with adequate buffer to minimize impacts to existing hard bottom areas.

R2: Continue periodic confirmatory monitoring following additional placement of significant quantities of dredged material.

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MONITORING SURVEY AT THE PORTLAND DISPOSAL SITE SEPTEMBER 2016

FIGURES

CONTRIBUTION #203

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LIST OF FIGURES

Page

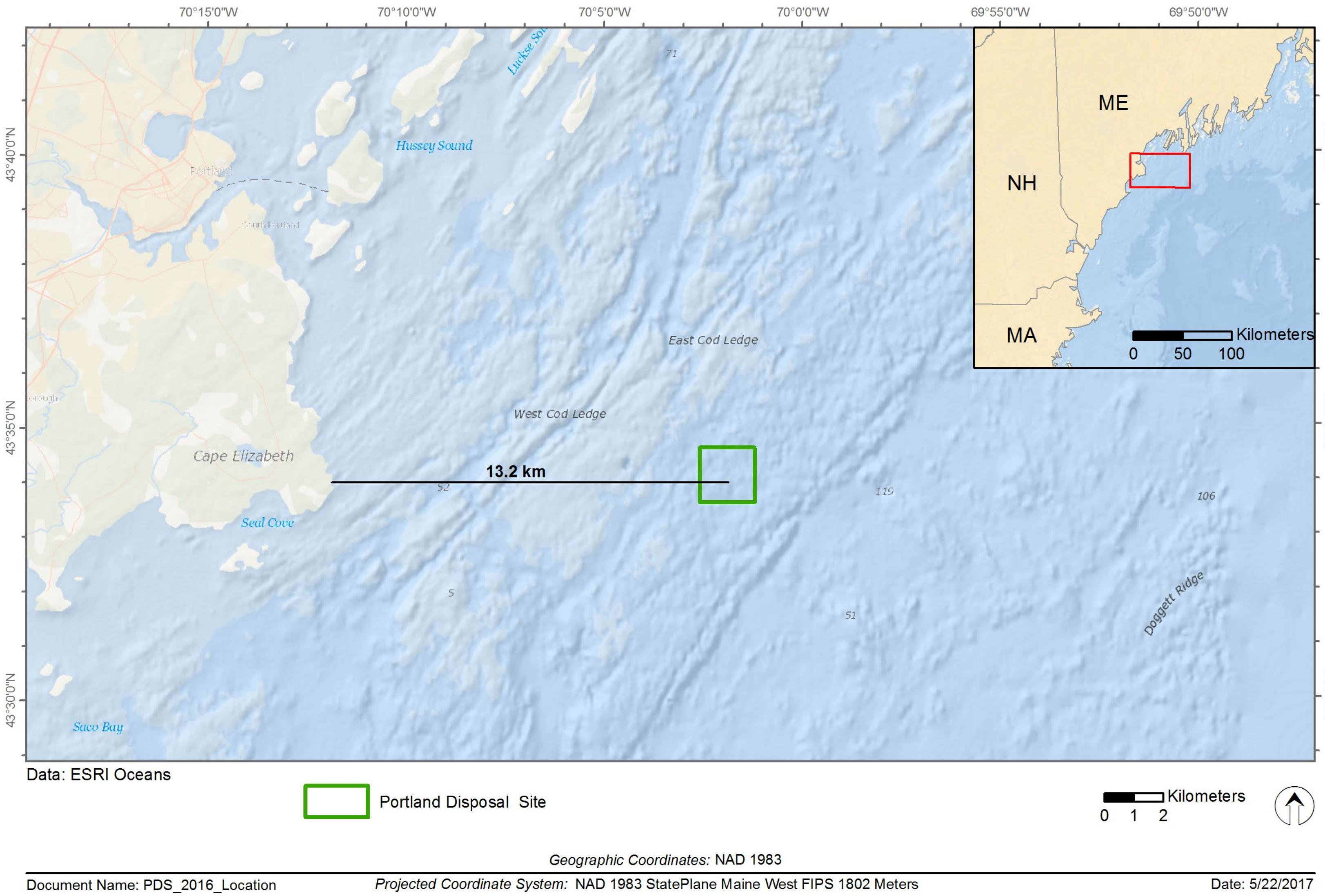


Figure 1-1. Location of the Portland Disposal Site (PDS)

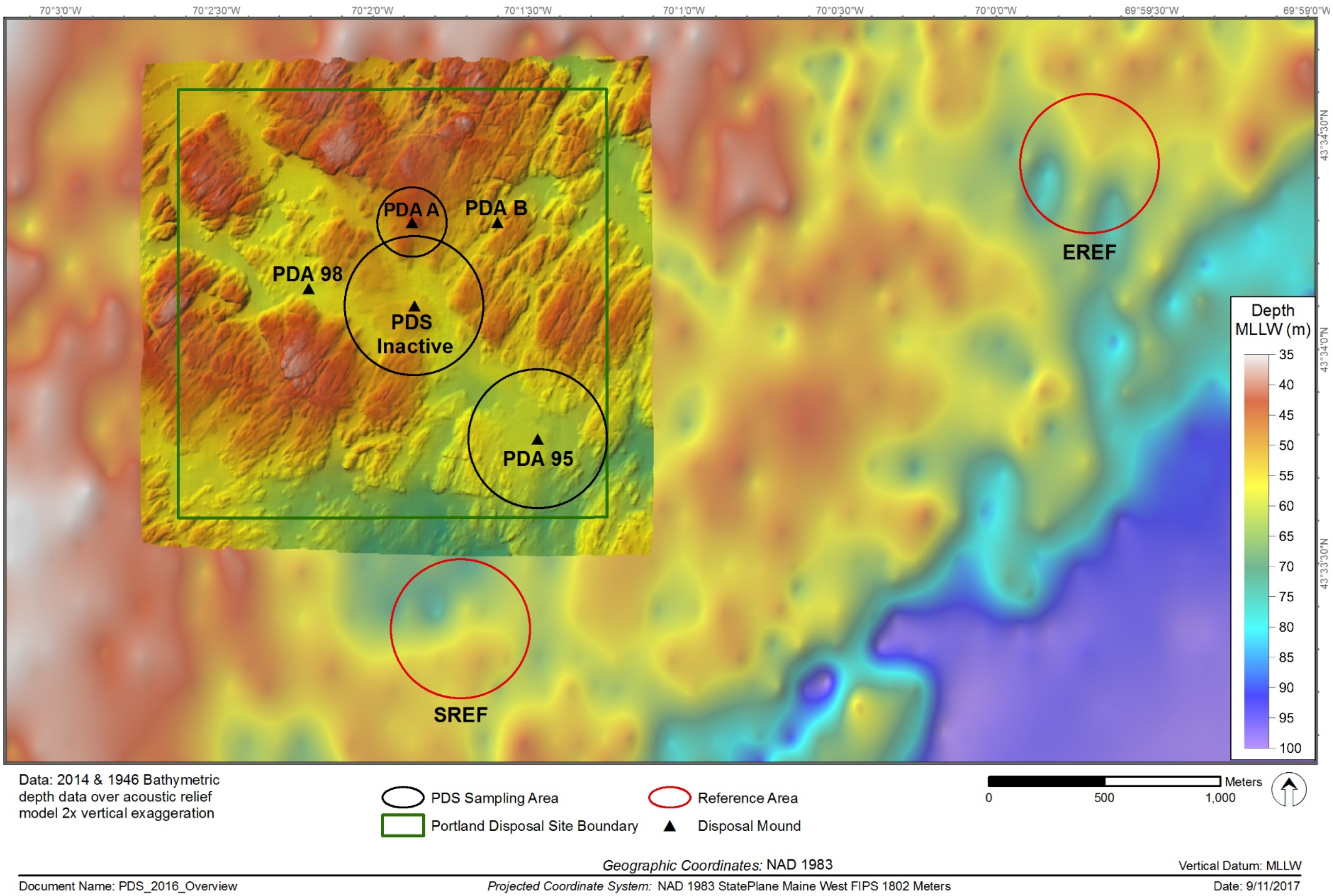


Figure 1-2. Overview of PDS on regional bathymetry with 2016 sampling areas indicated

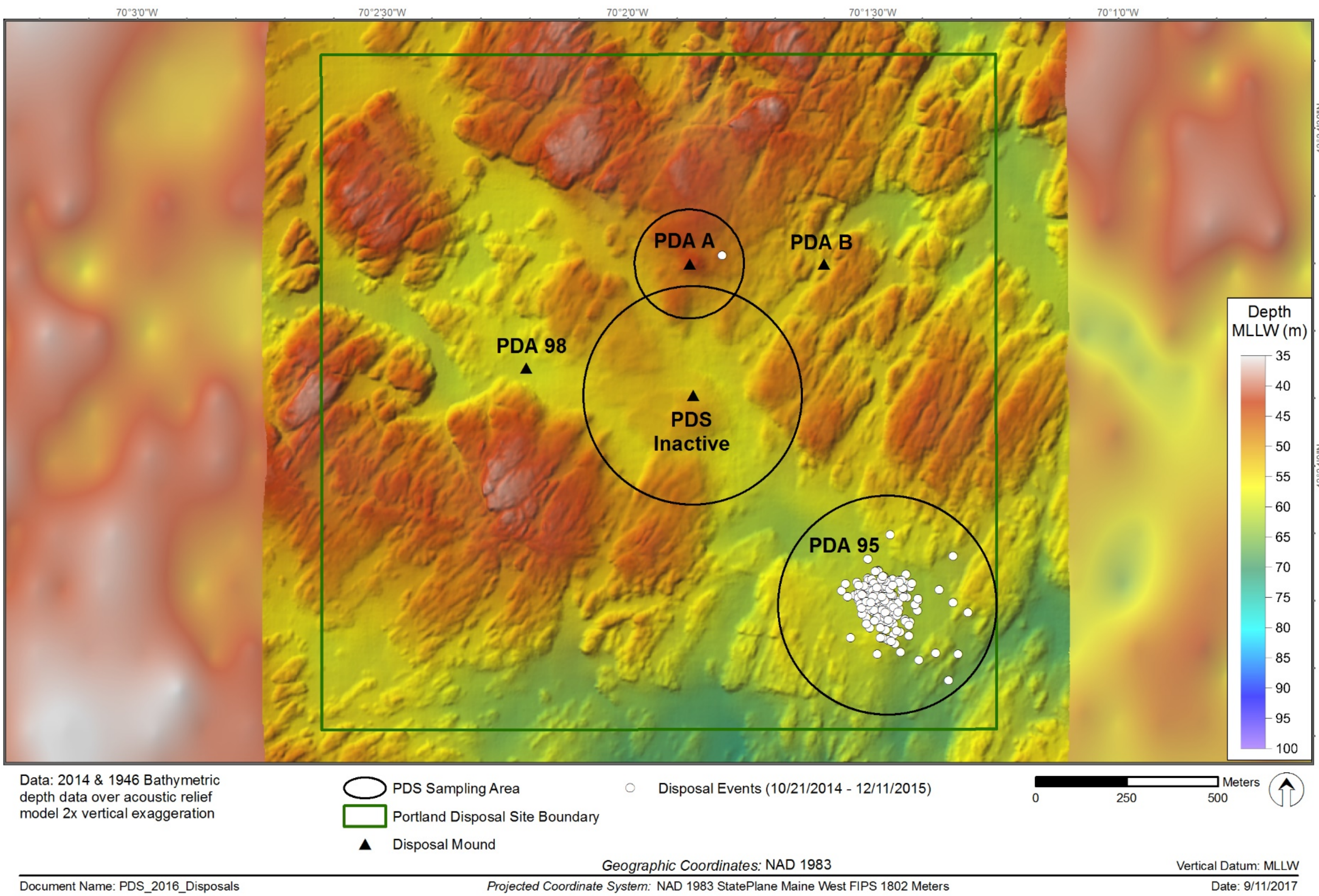


Figure 1-3. Location of reported disposal events at PDS from October 2014 through December 2015

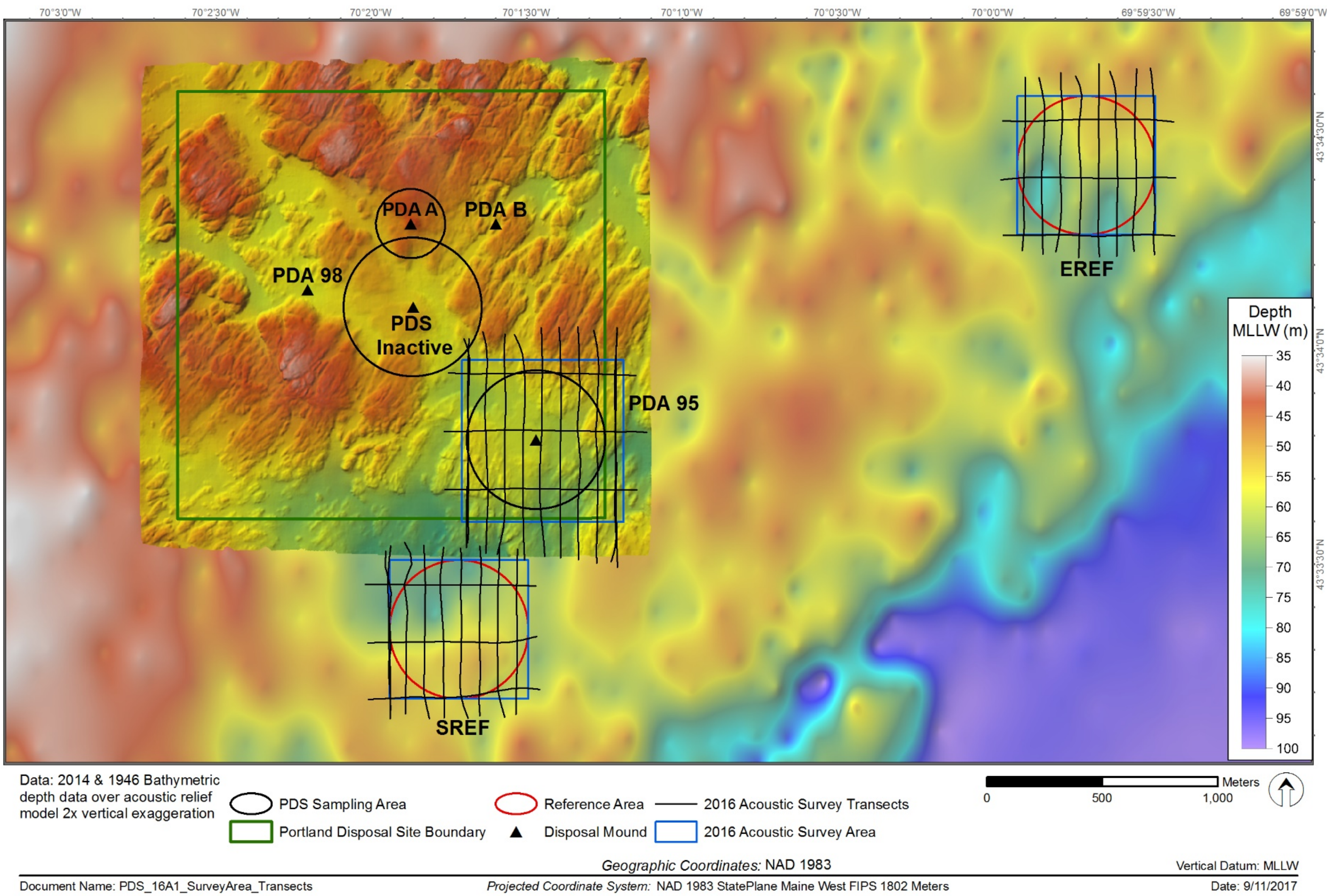


Figure 2-1. PDS 2016 acoustic survey area and tracklines

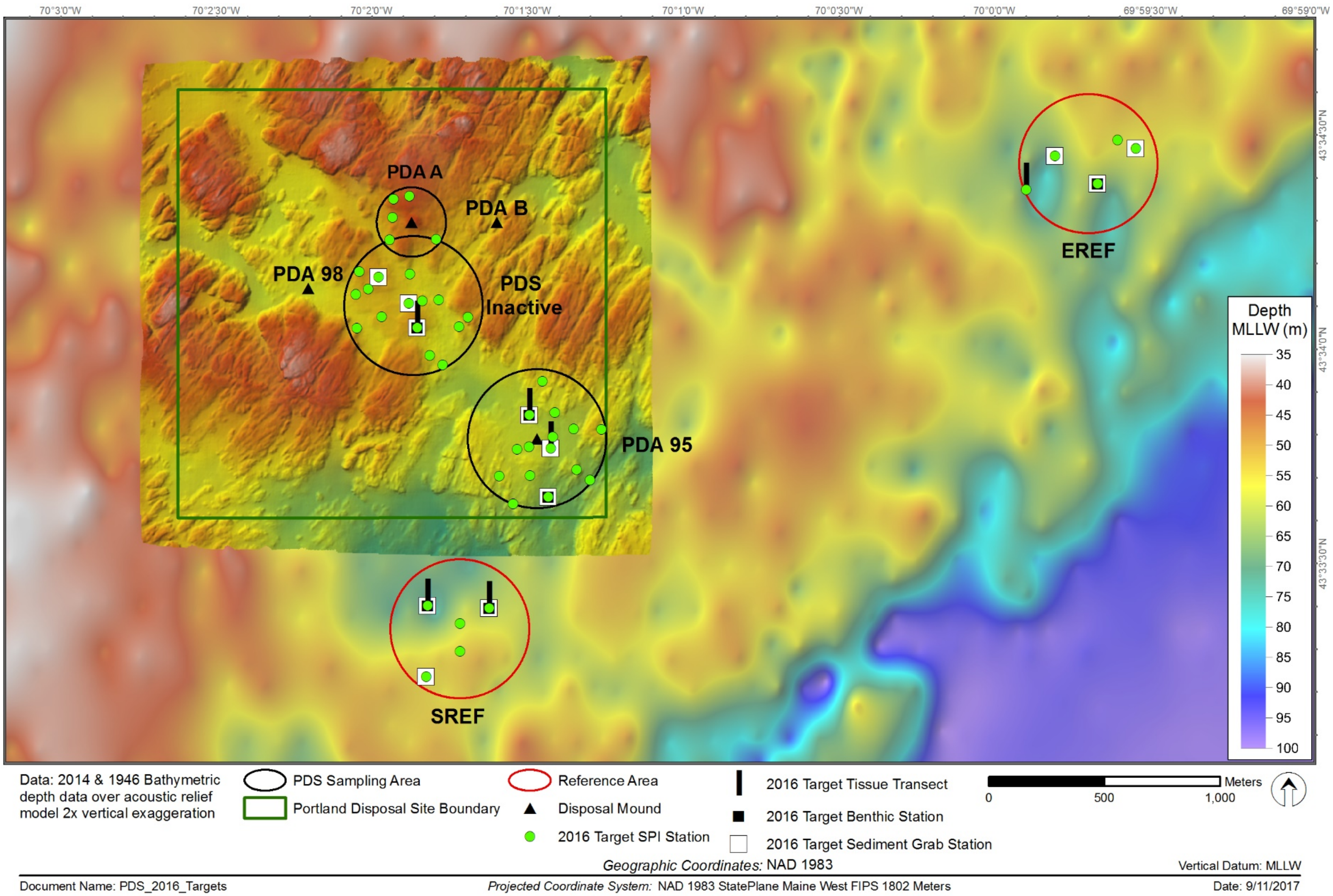


Figure 2-2. PDS 2016 target station locations for SPI, tissue, benthic, and sediment sampling

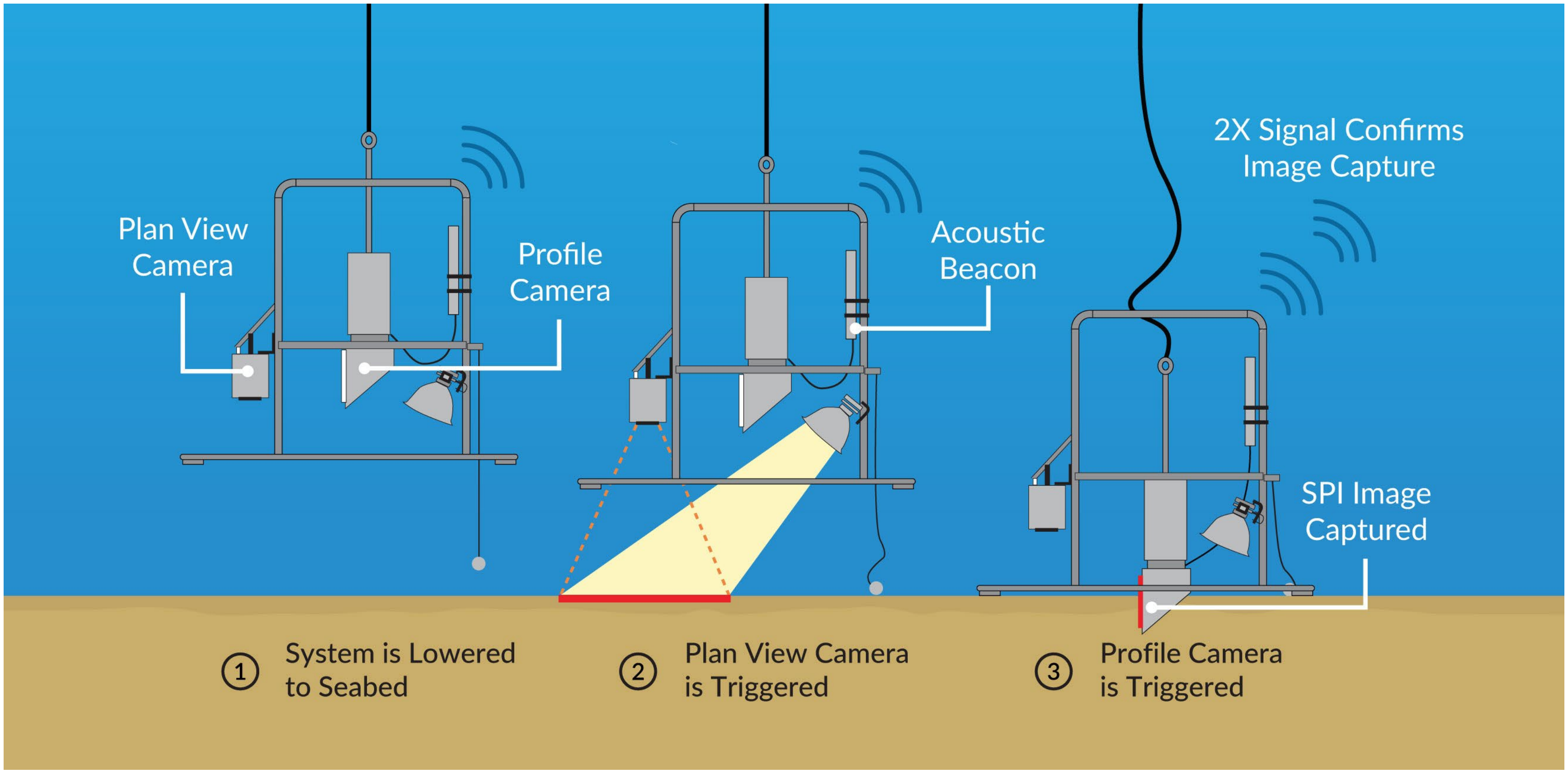


Figure 2-3. Operation of the sediment profile and plan view camera imaging system

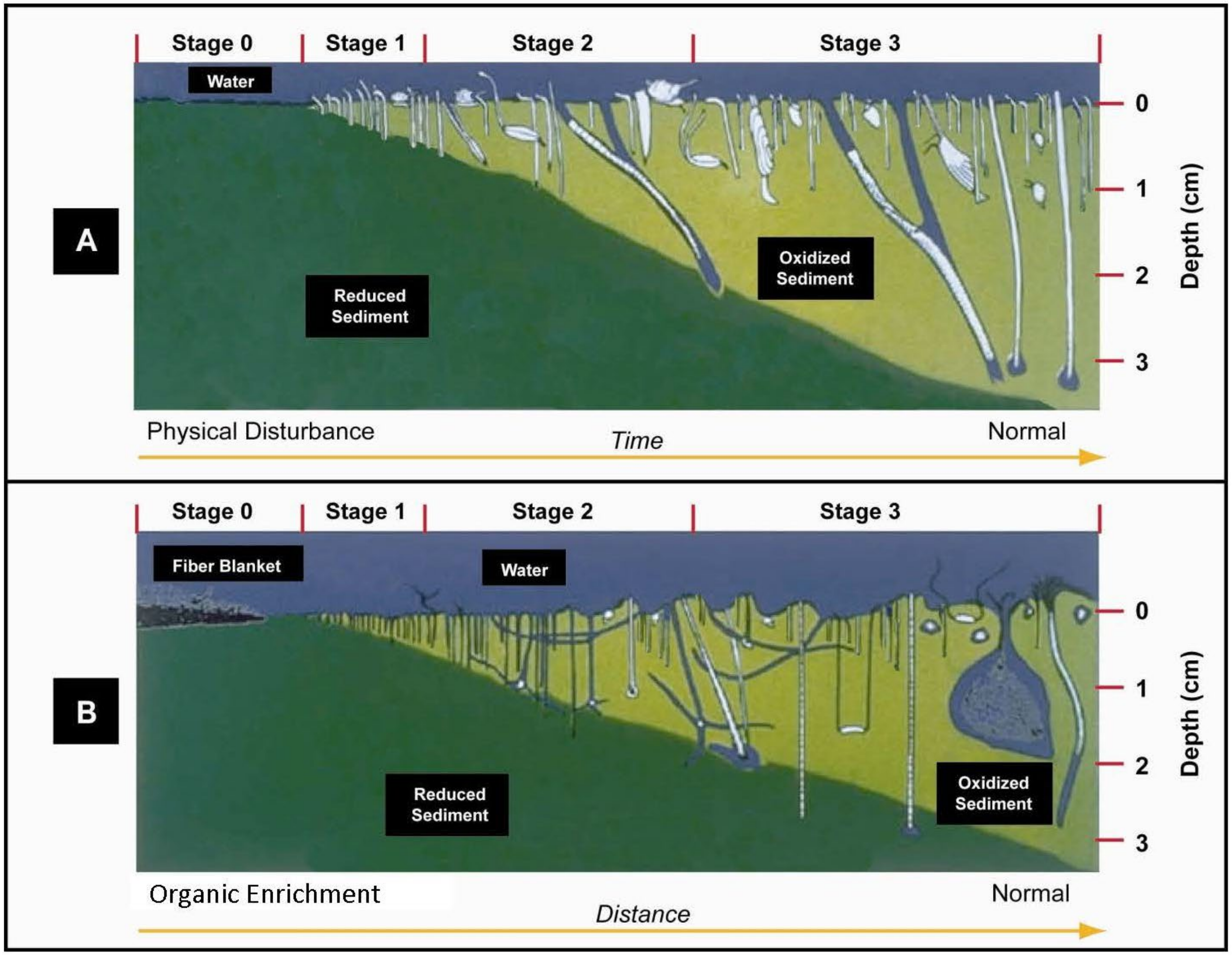


Figure 2-4. The stages of infaunal succession as a response of soft bottom benthic communities to (A) physical disturbance or (B) organic enrichment; from Rhoads and Germano (1982)

Figure 2-5. 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 plan view image may vary slightly between images and stations.

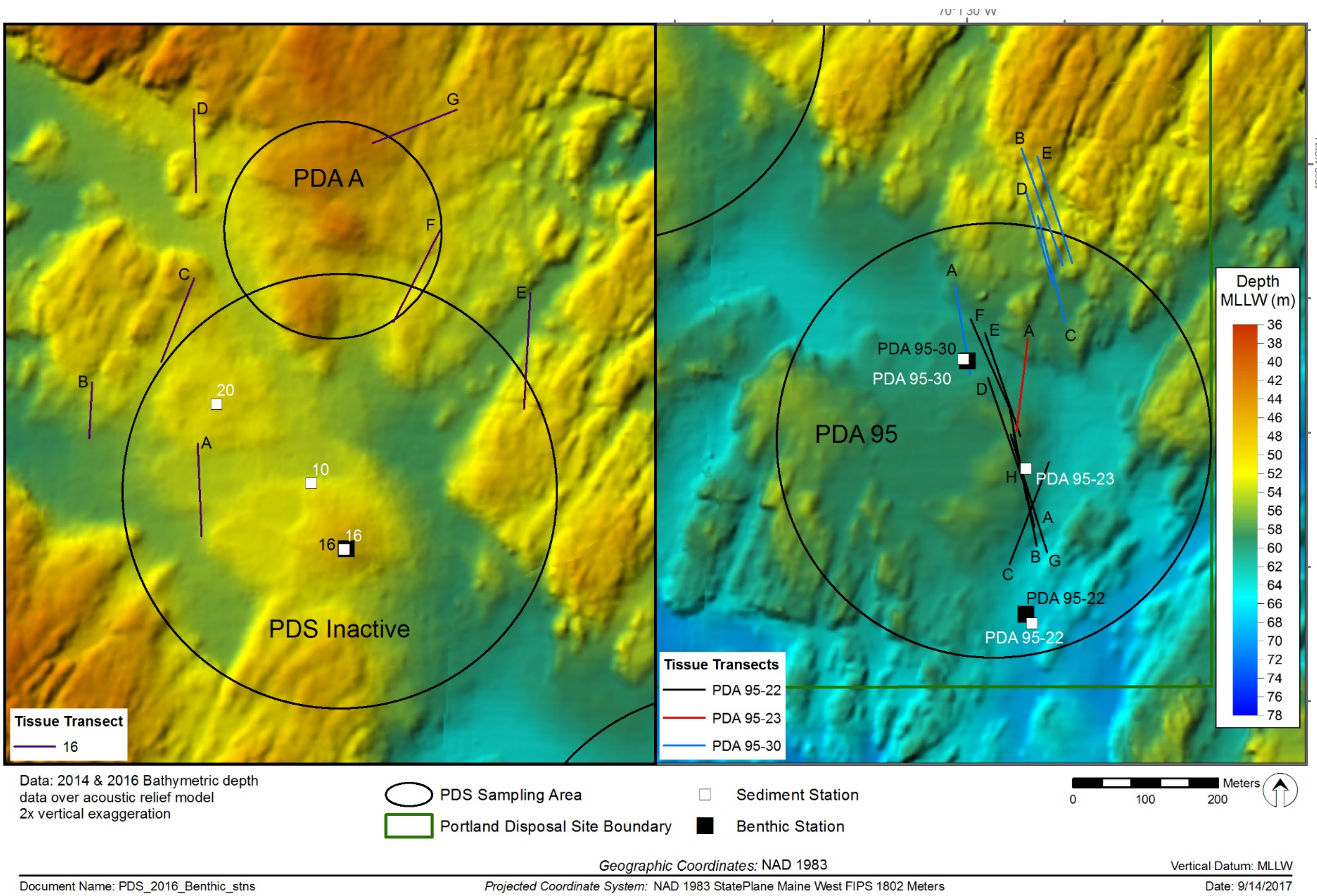


Figure 2-6. Surficial sediment grab and tissue trawl station locations at the PDS disposal areas

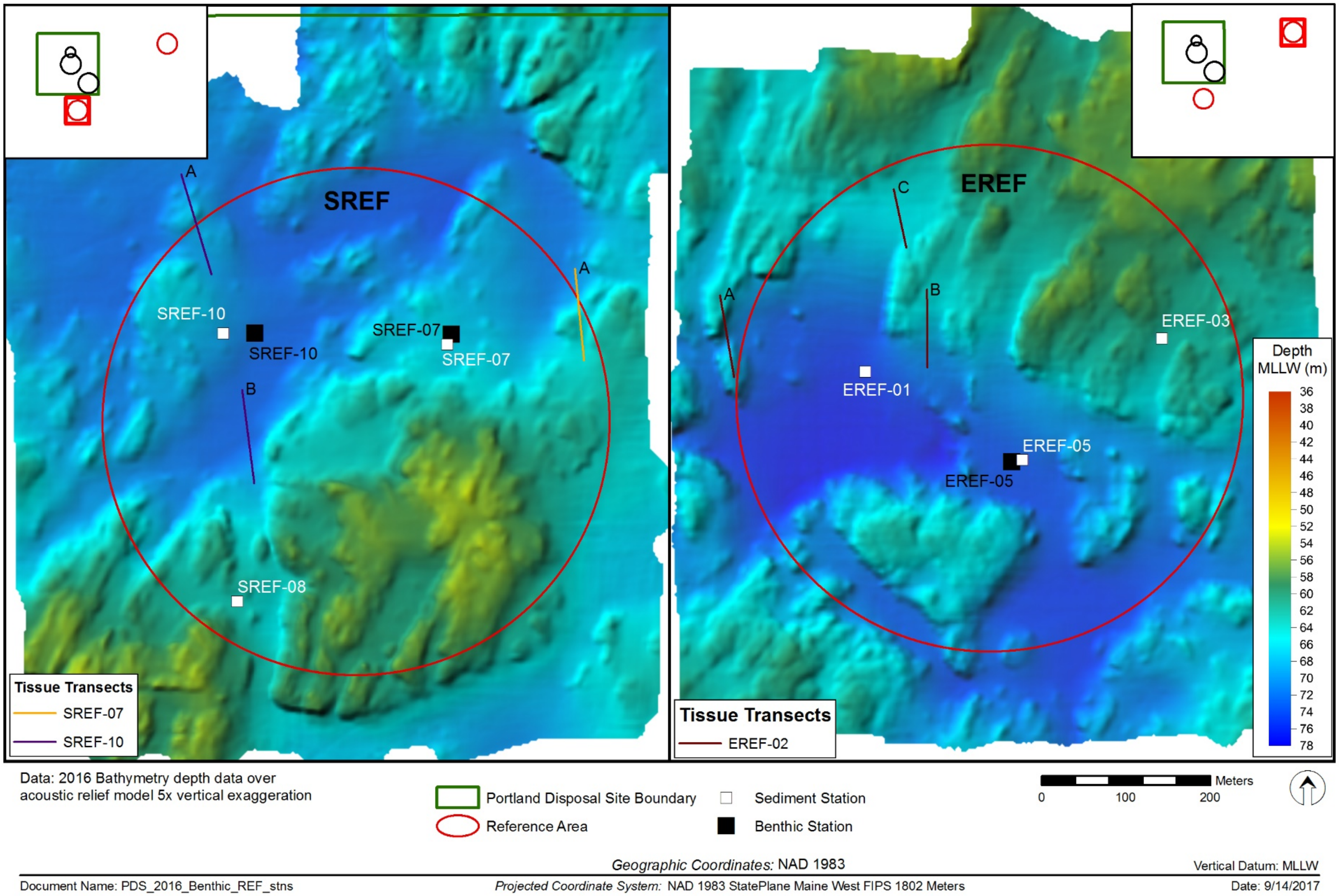


Figure 2-7. Surficial sediment grab and tissue trawl station locations at the PDS reference areas

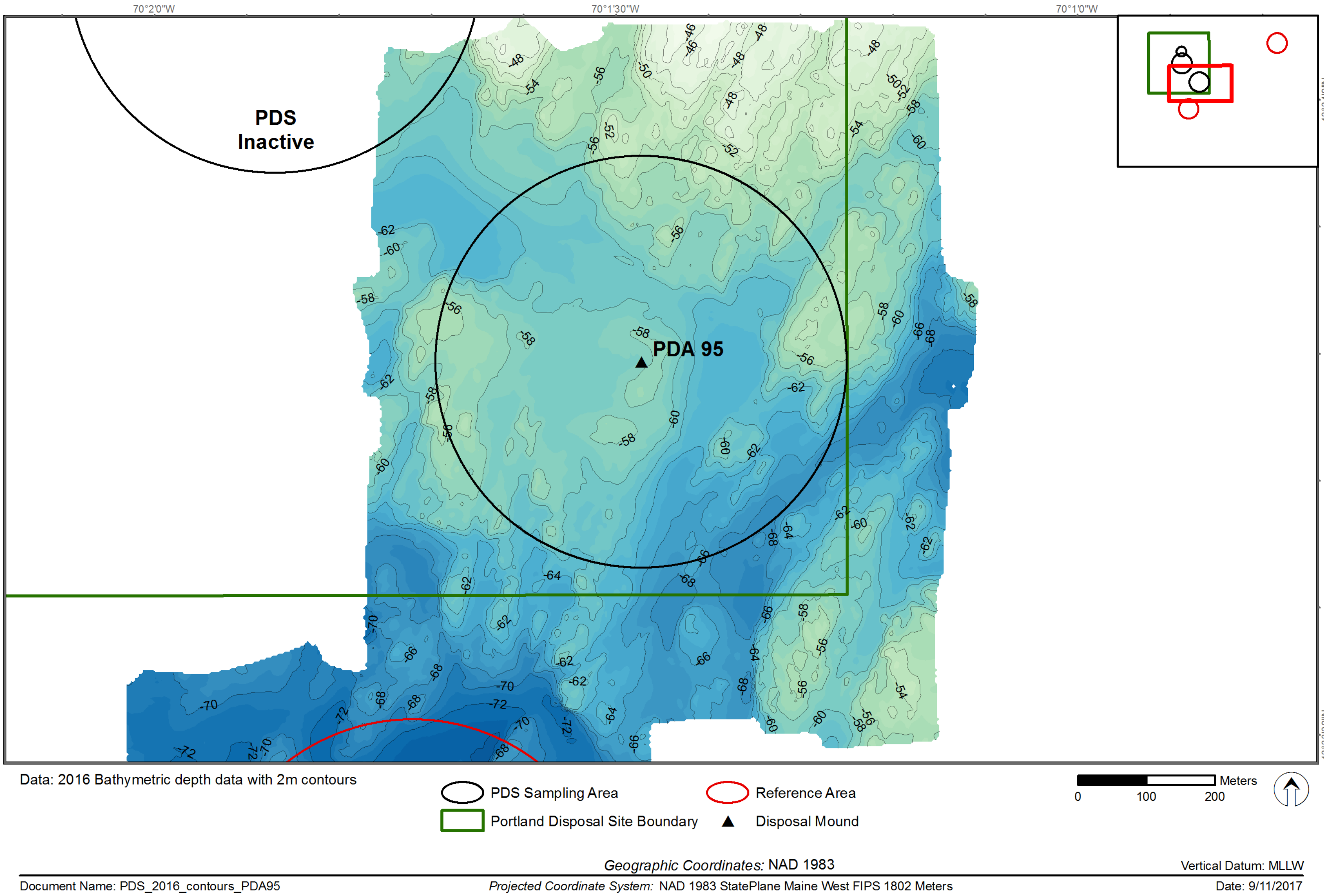


Figure 3-1a. Bathymetric contour map of PDS PDA 95 – September 2016

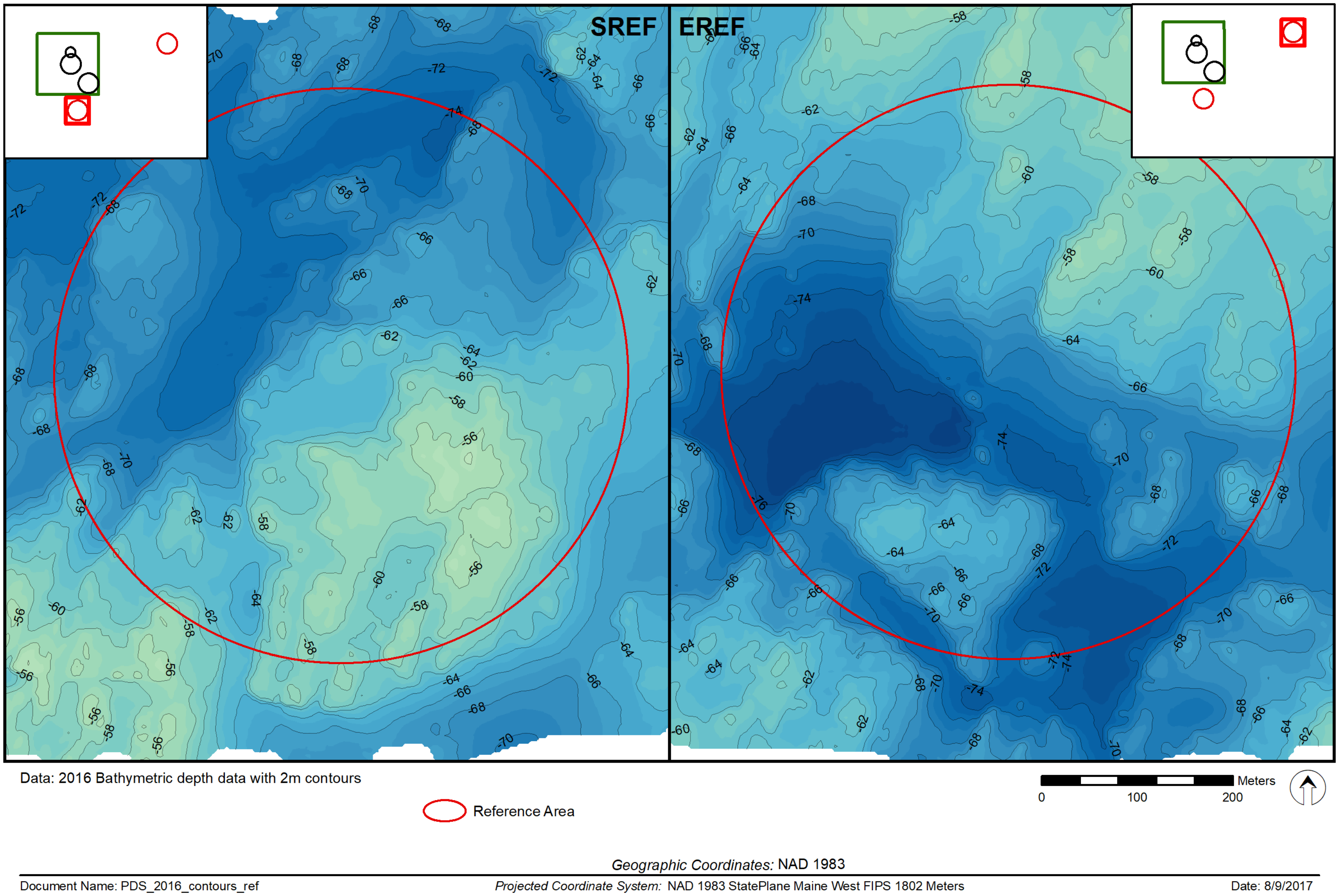


Figure 3-1b. Bathymetric contour map of PDS reference areas – September 2016

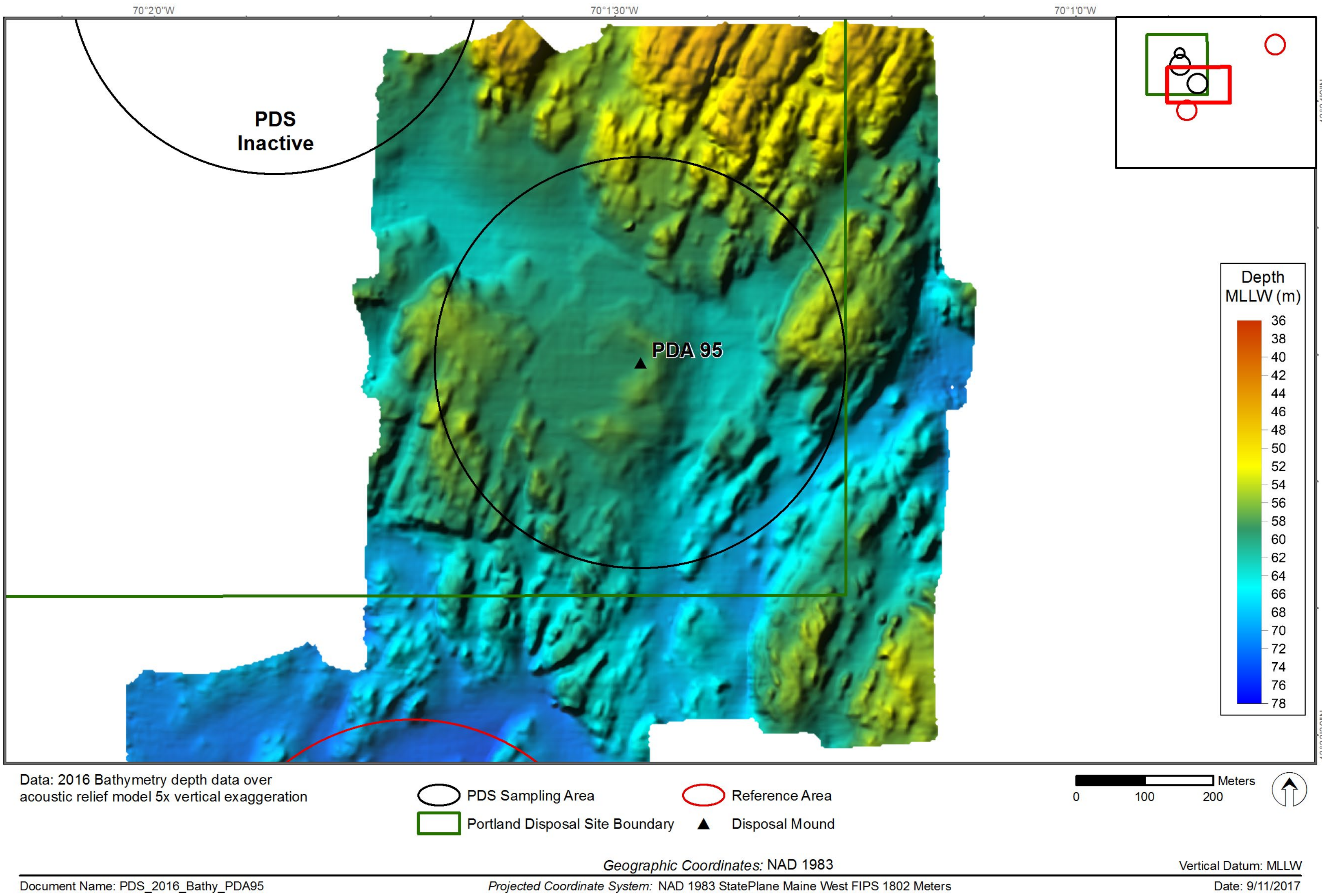


Figure 3-2a. Bathymetric depth data over acoustic relief model of PDS PDA 95 – September 2016

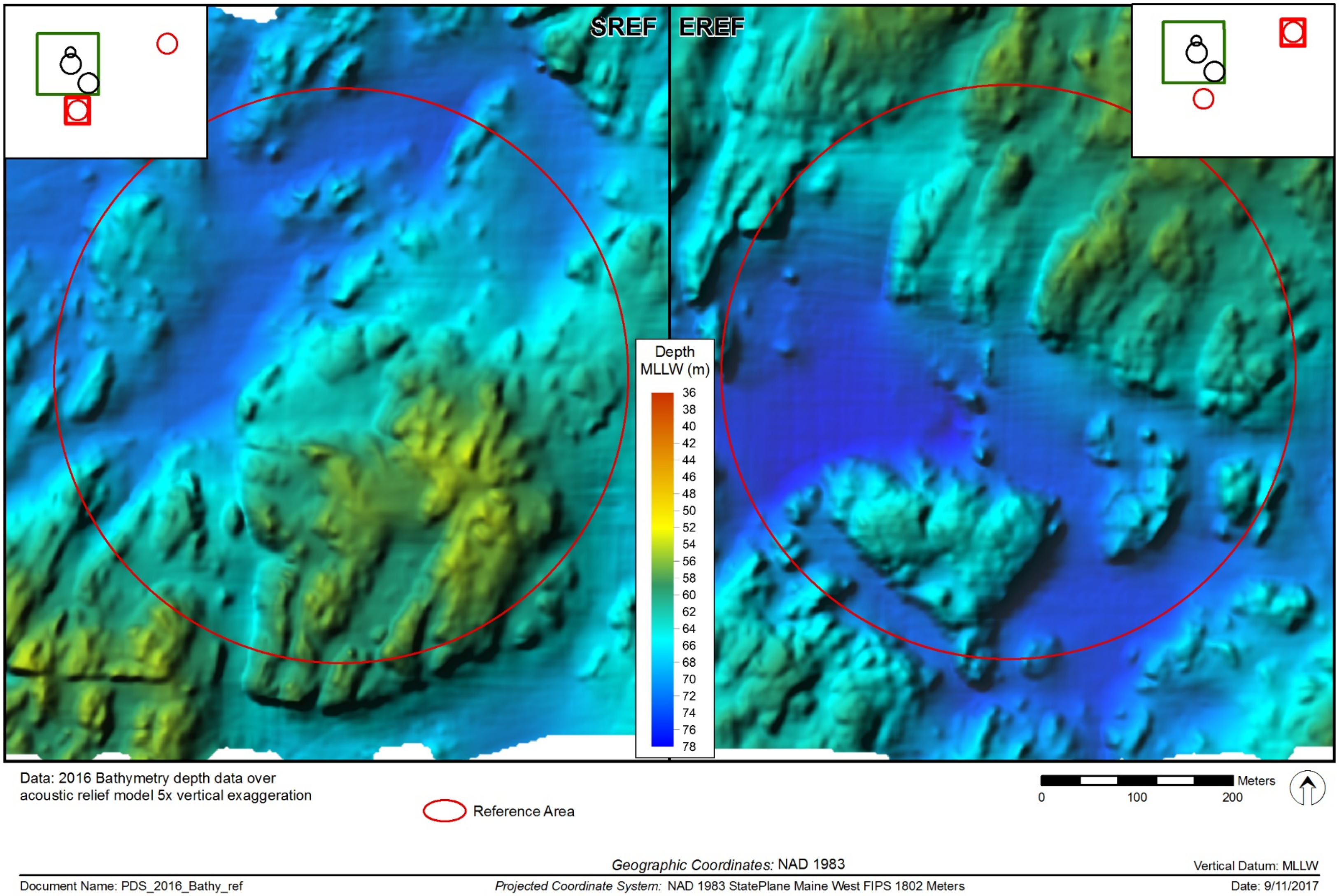


Figure 3-2b. Bathymetric depth data over acoustic relief model of PDS reference areas – September 2016

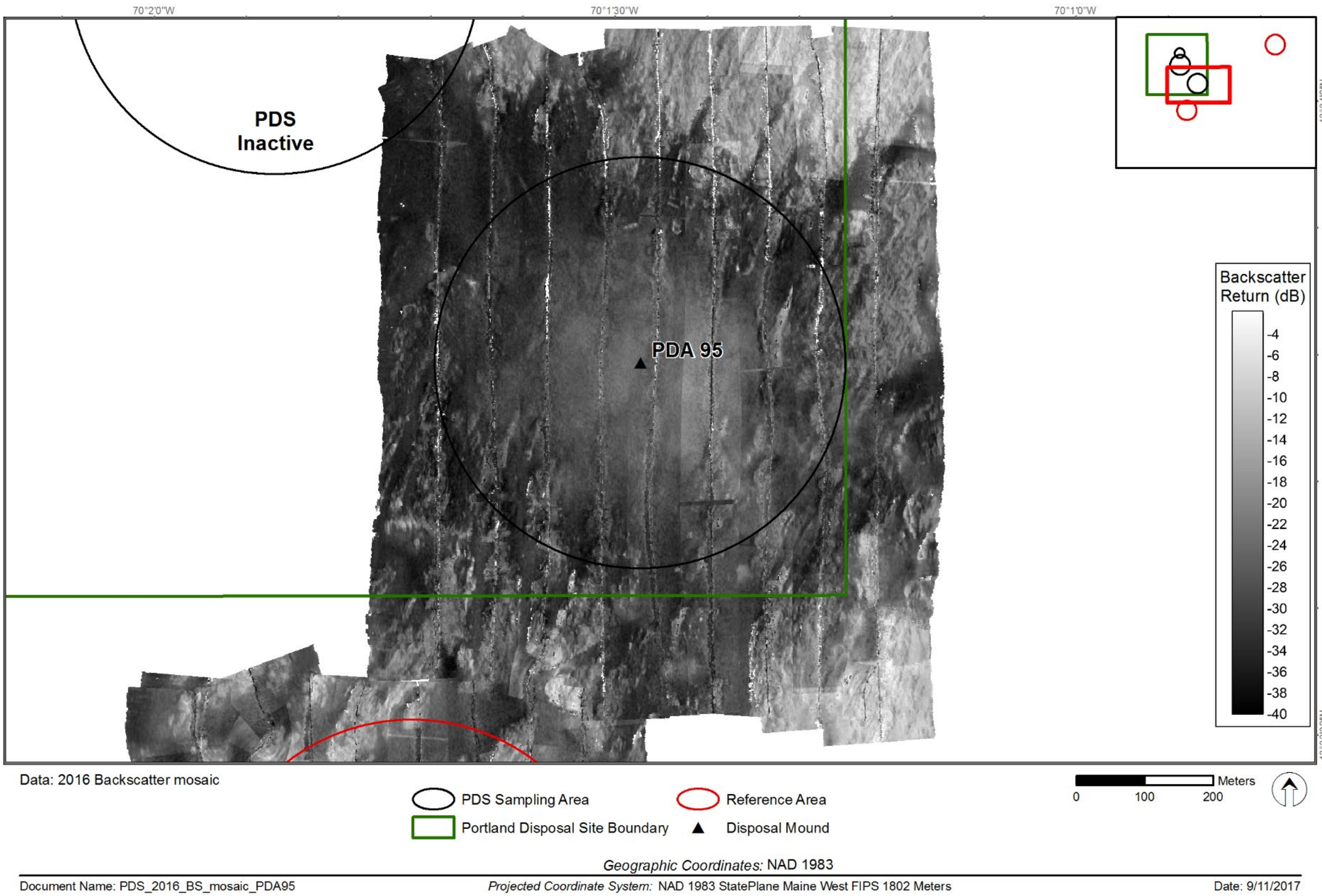


Figure 3-3a. Mosaic of unfiltered backscatter data of PDS PDA 95 – September 2016

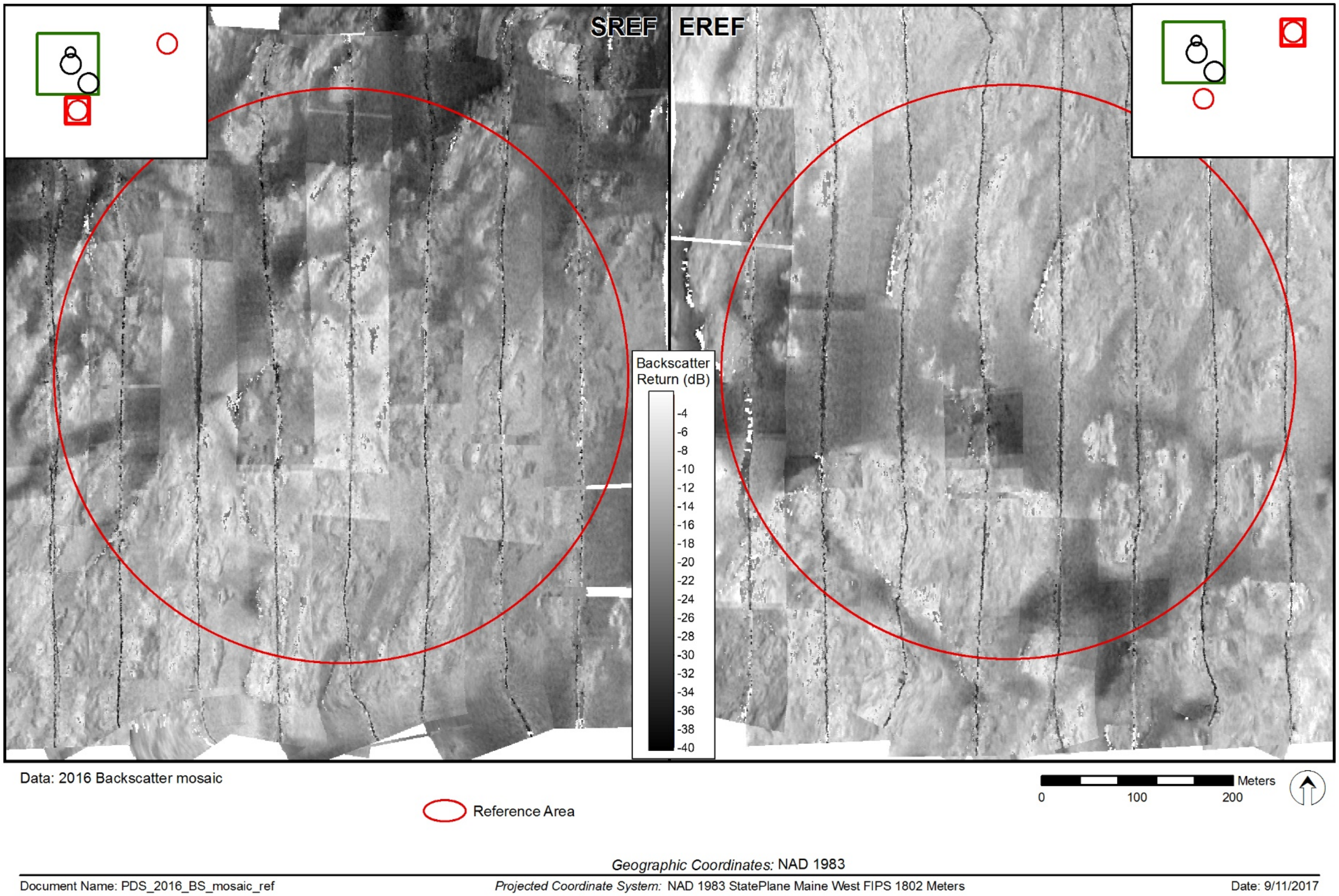


Figure 3-3b. Mosaic of unfiltered backscatter data of PDS reference areas – September 2016

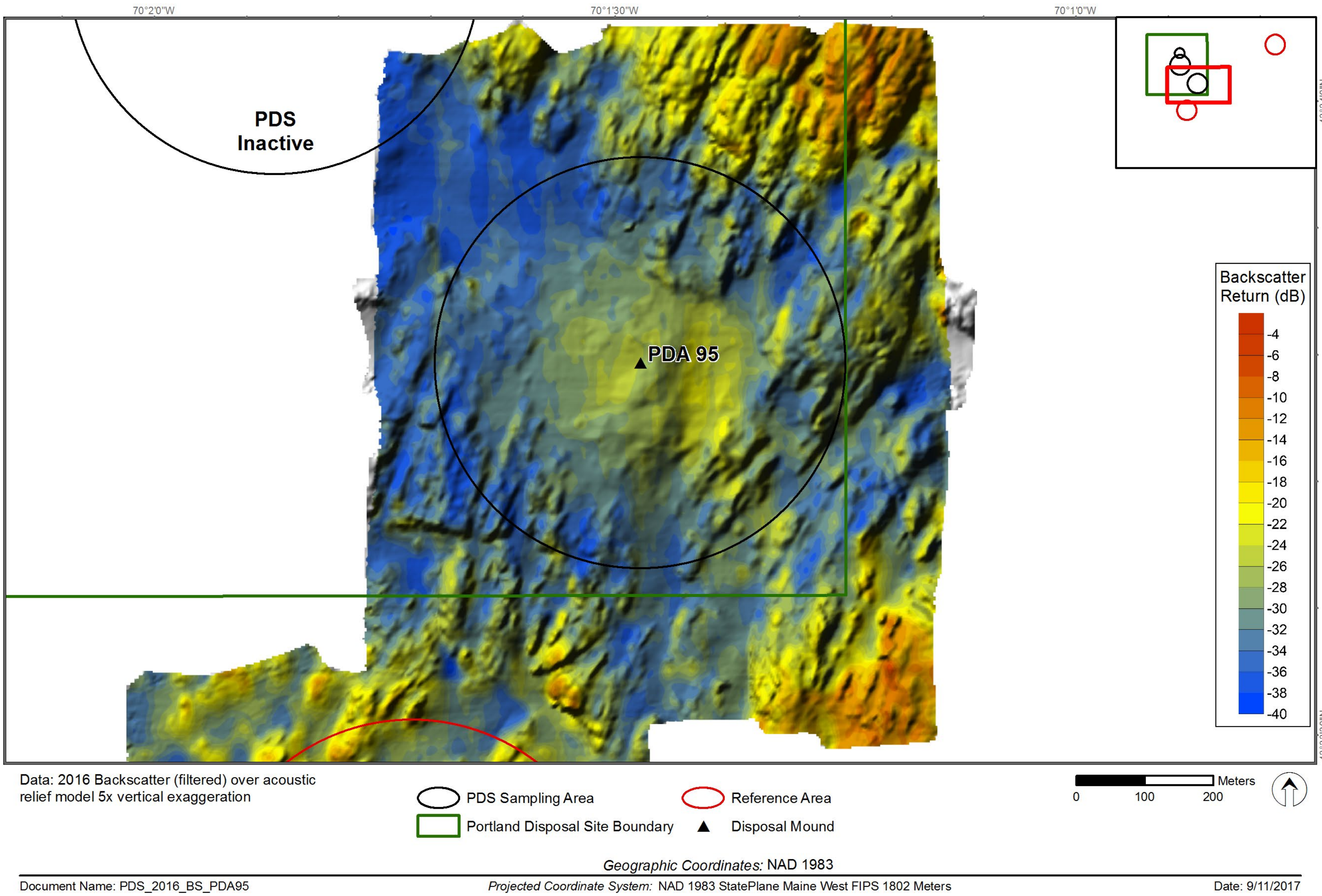


Figure 3-4a. Filtered backscatter over acoustic relief model of PDS PDA 95 – September 2016

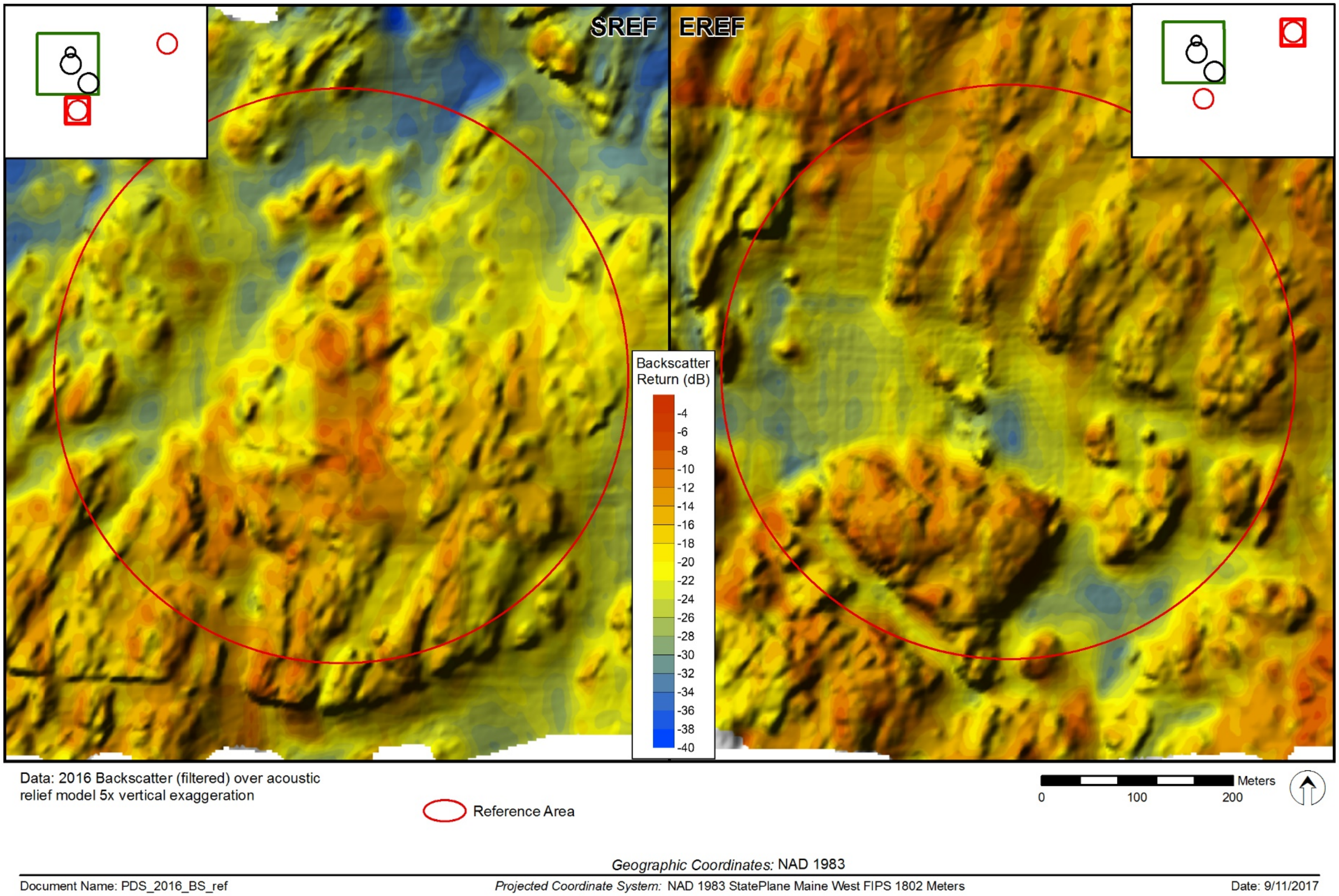


Figure 3-4b. Filtered backscatter over acoustic relief model of PDS reference areas – September 2016

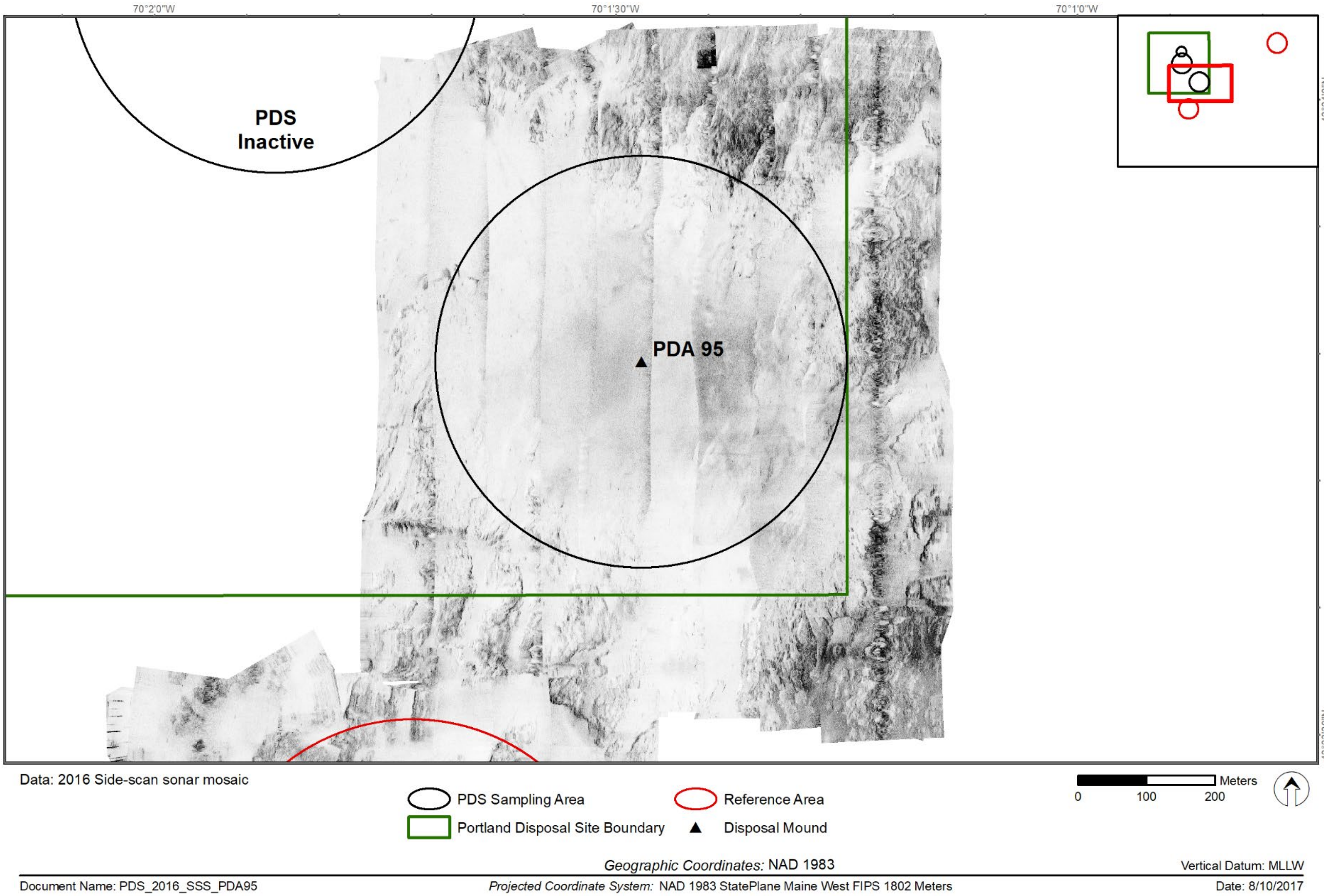


Figure 3-5a. Side-scan mosaic of PDS PDA 95 – September 2016

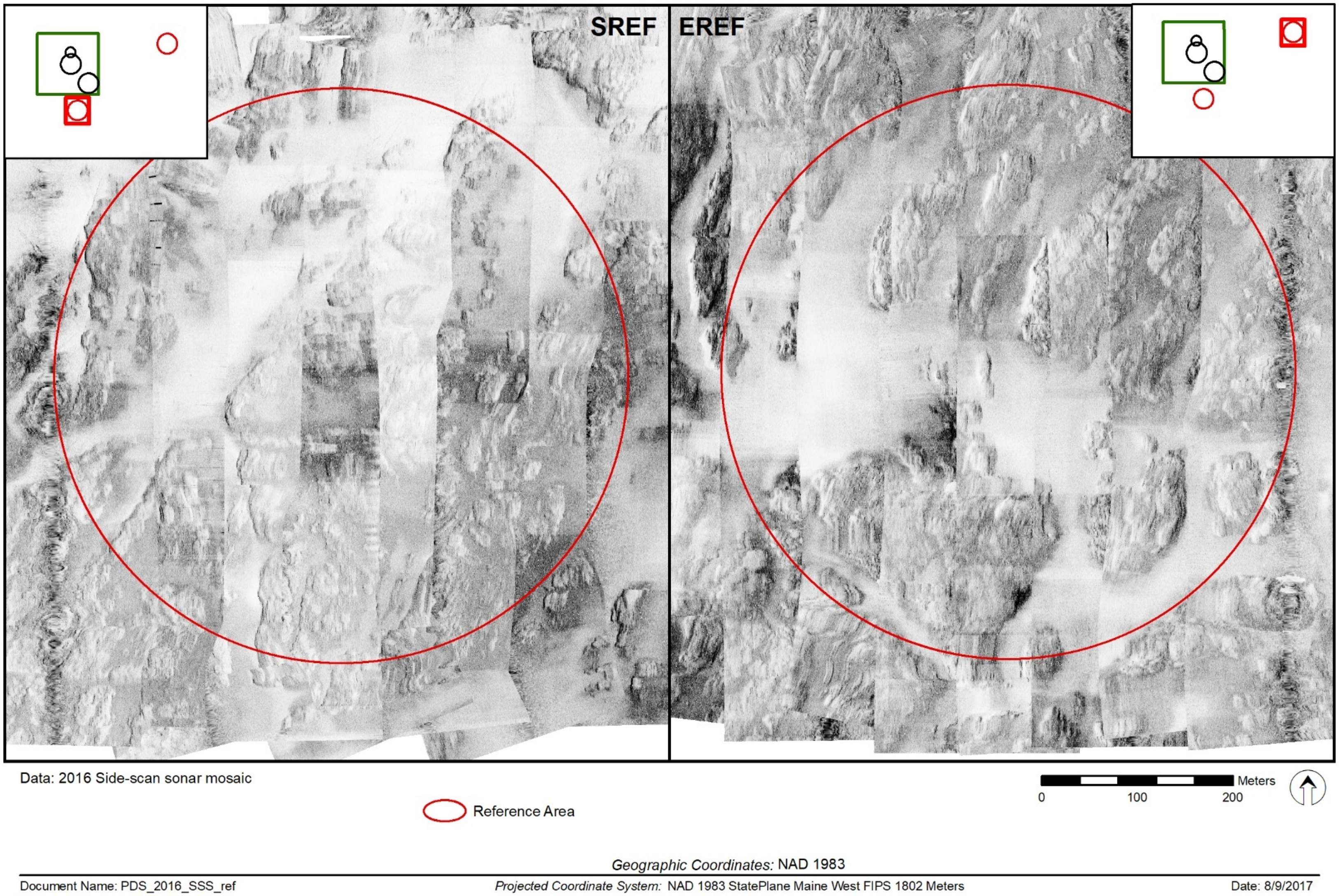


Figure 3-5b. Side-scan mosaic of PDS reference areas – September 2016

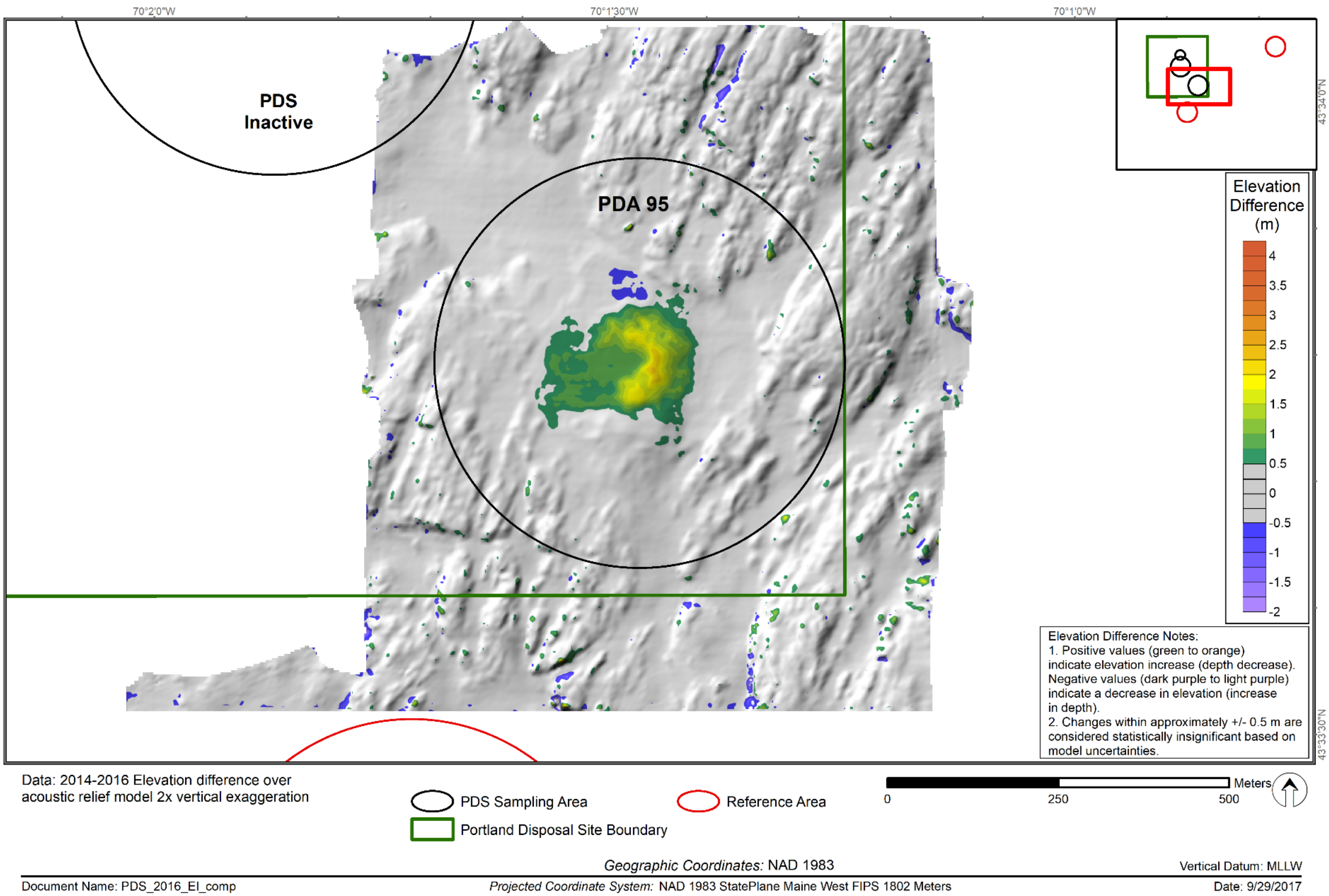


Figure 3-6. PDS disposal area elevation difference: 2016 vs. 2014

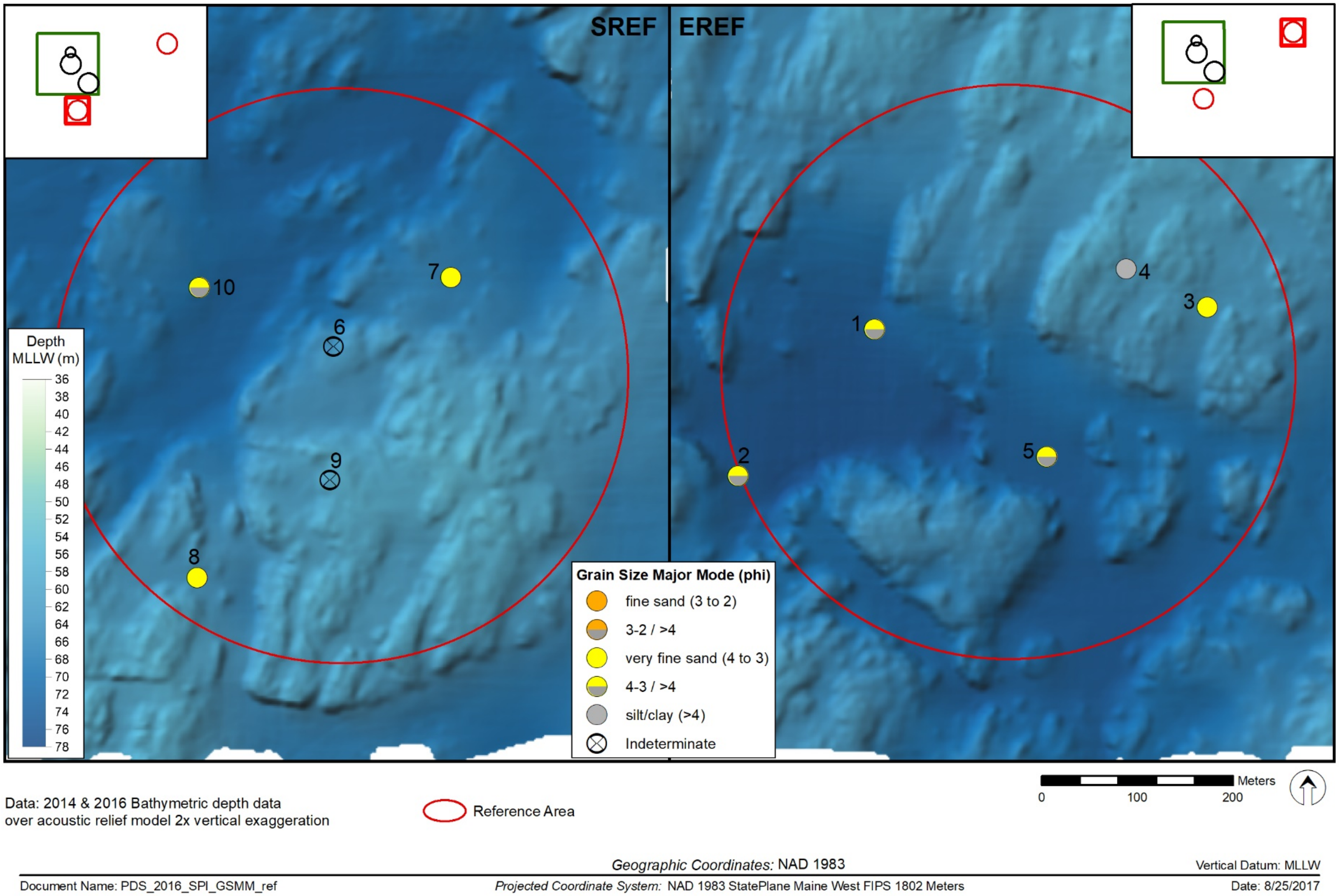
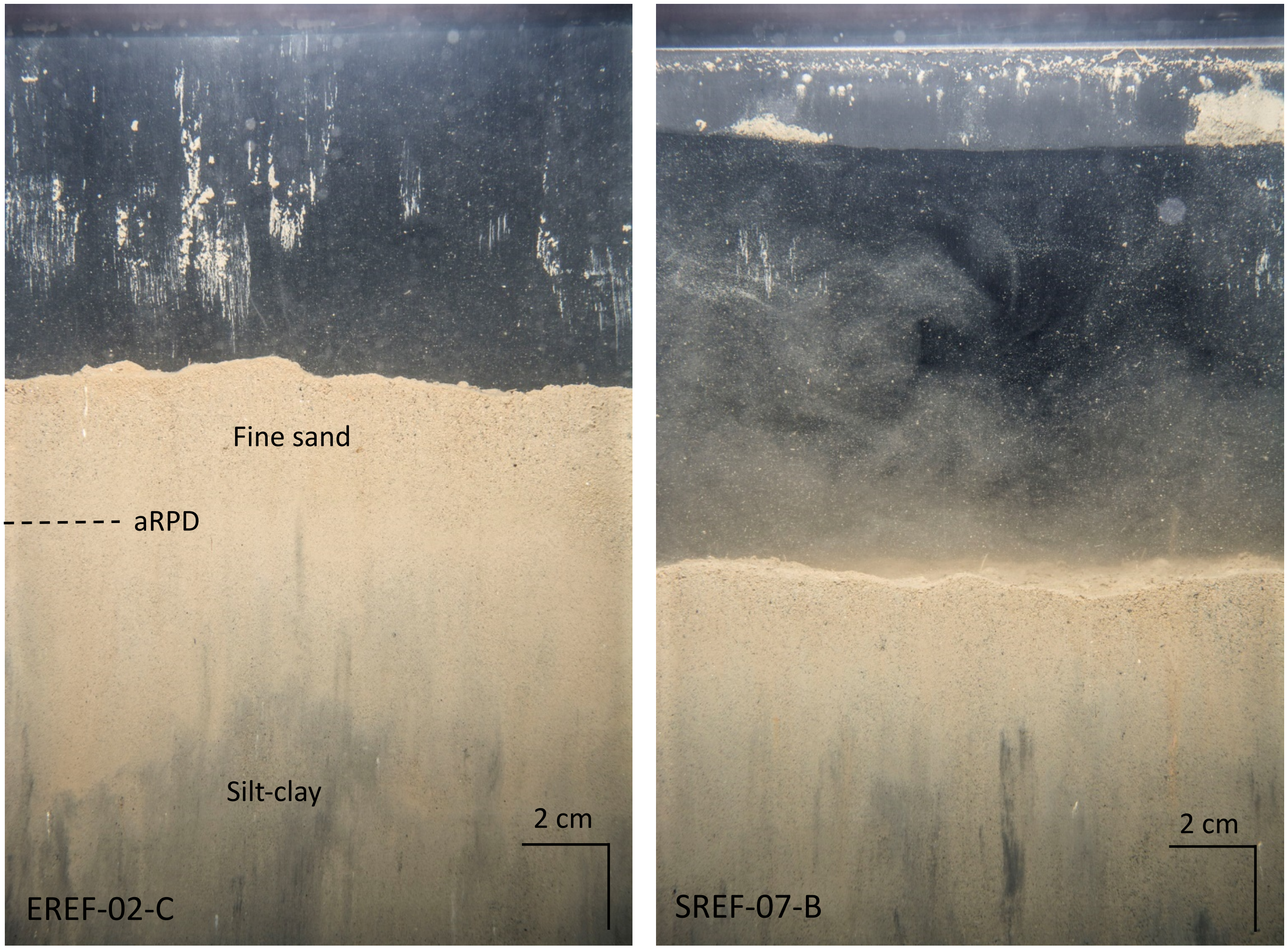


Figure 3-7. Sediment grain size major mode (phi units) at the PDS reference area stations



(A) **(B)**

Figure 3-8. Sediment profile images from reference areas; (A) Station EREF-02 with a well-developed aRPD in ambient fine sand over silt-clay; and (B) Station SREF-07 with small-scale boundary roughness caused by shallow burrowing

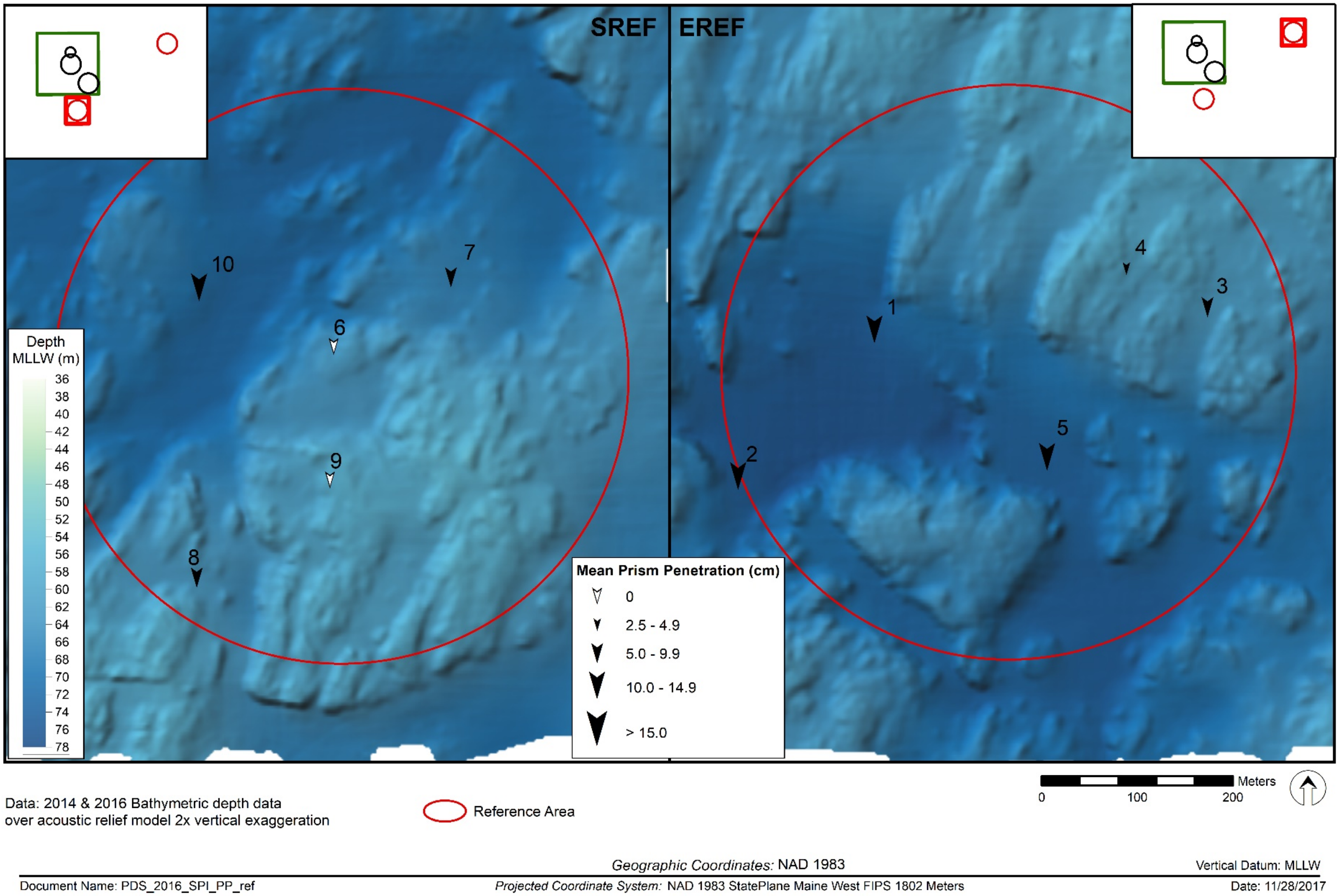


Figure 3-9. Mean station camera prism penetration depths (cm) at the PDS reference area stations

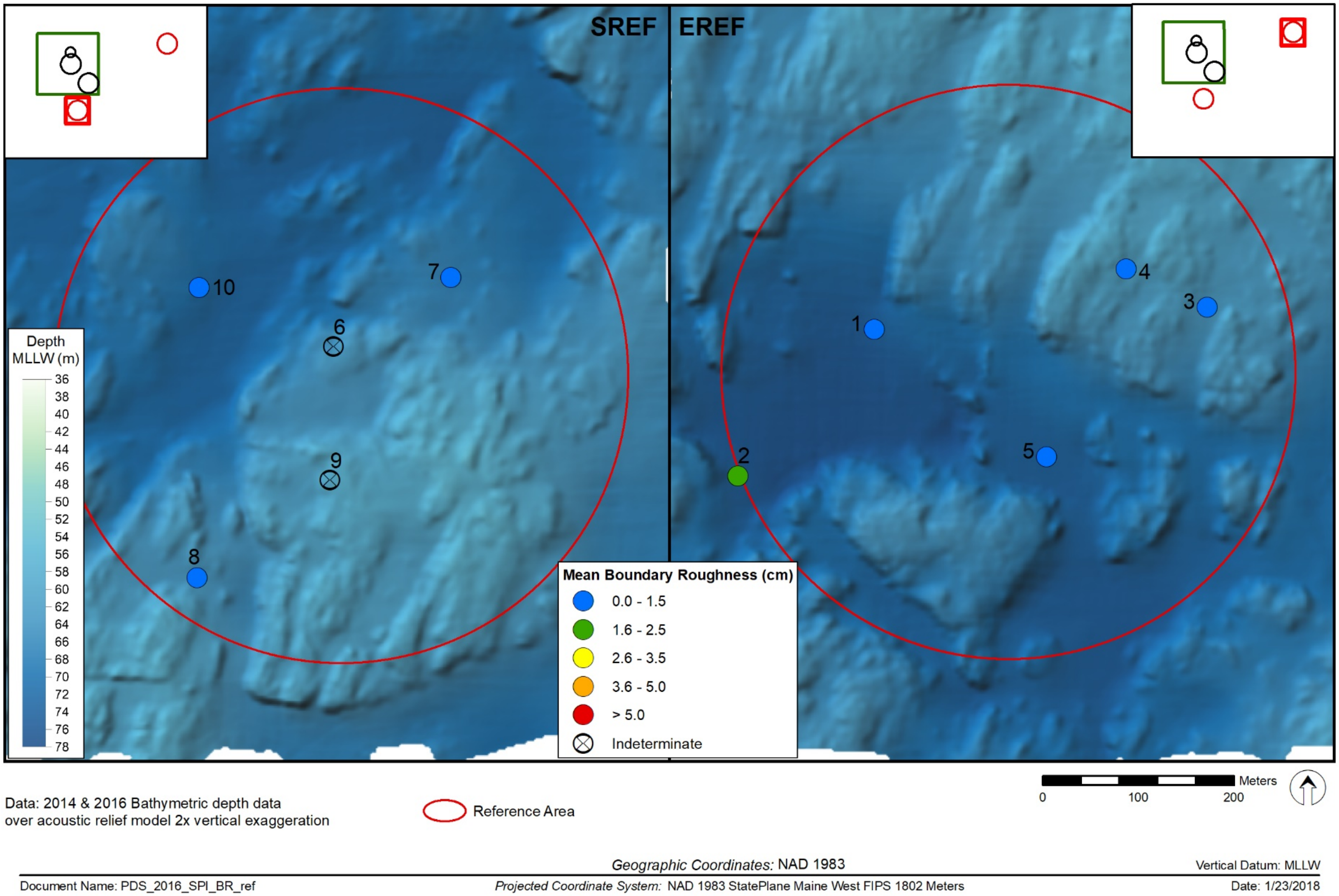
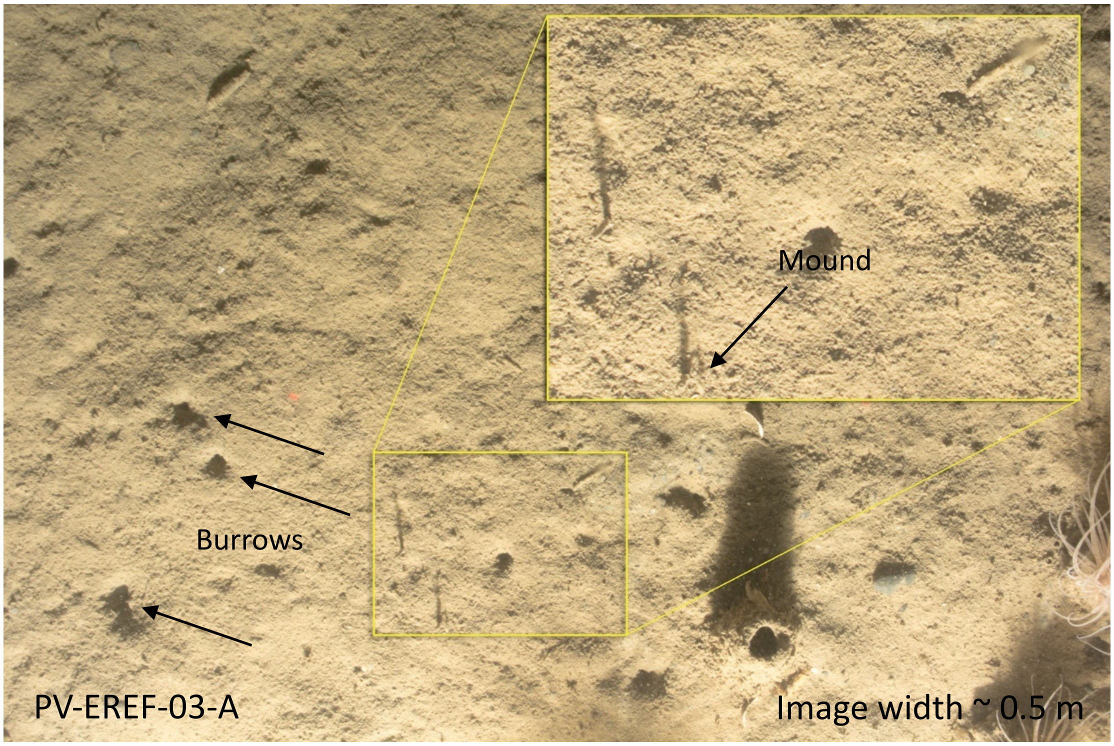
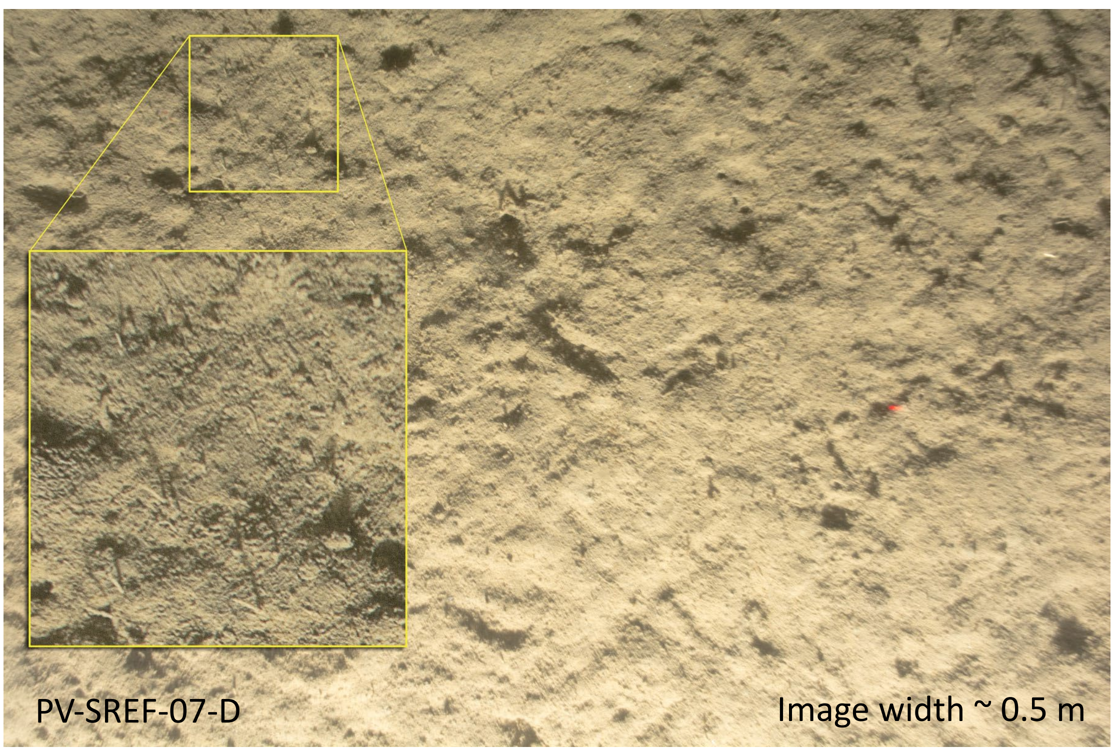


Figure 3-10. Mean station small-scale boundary roughness values (cm) at the PDS reference area stations



(A)



(B)

Figure 3-11. Plan view images from the reference areas at (A) Station EREF-03 depicting burrow openings and small tubes; and (B) Station SREF-07 depicting a cluster of small tubes

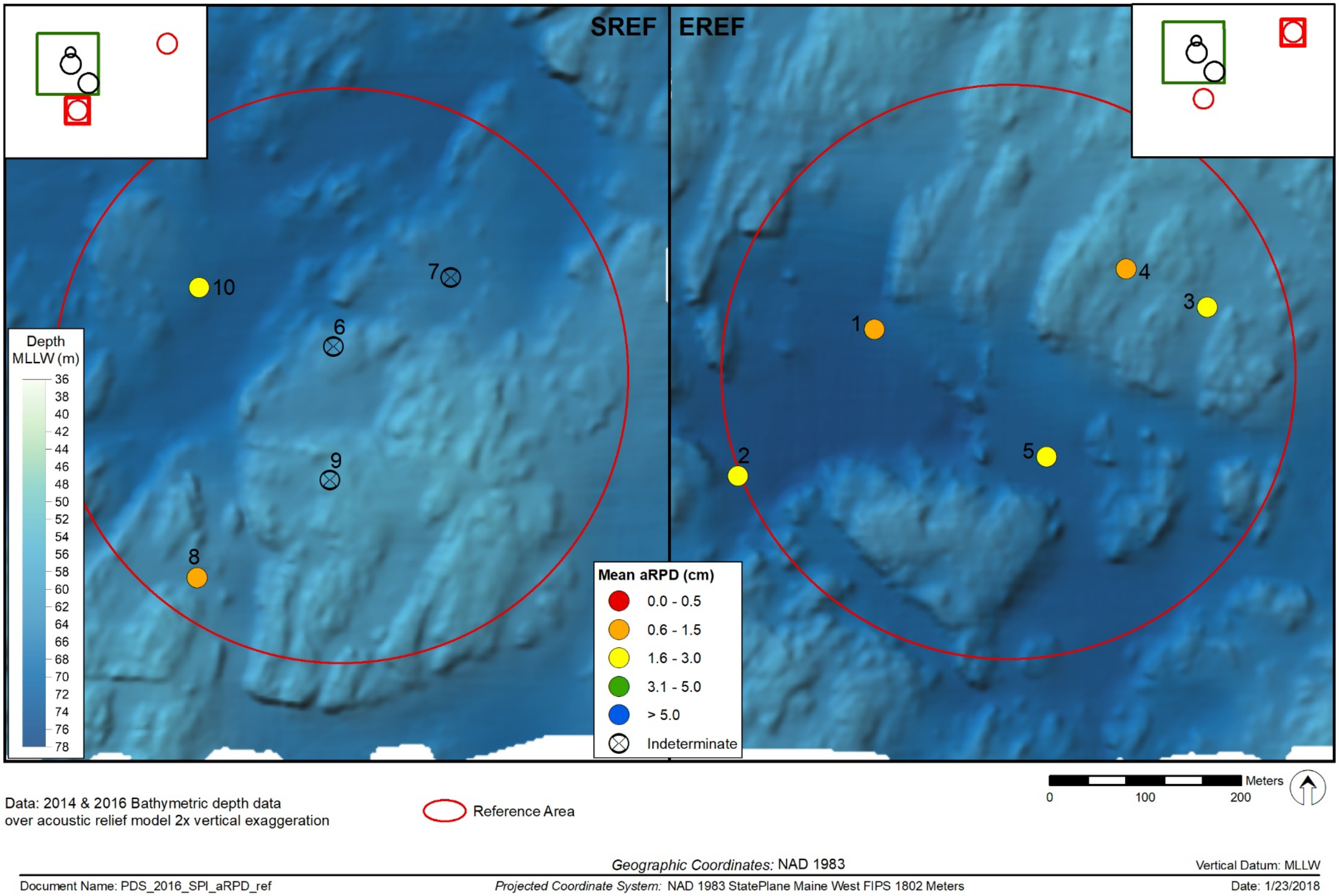


Figure 3-12. Mean station aRPD depth values (cm) at the PDS reference area stations

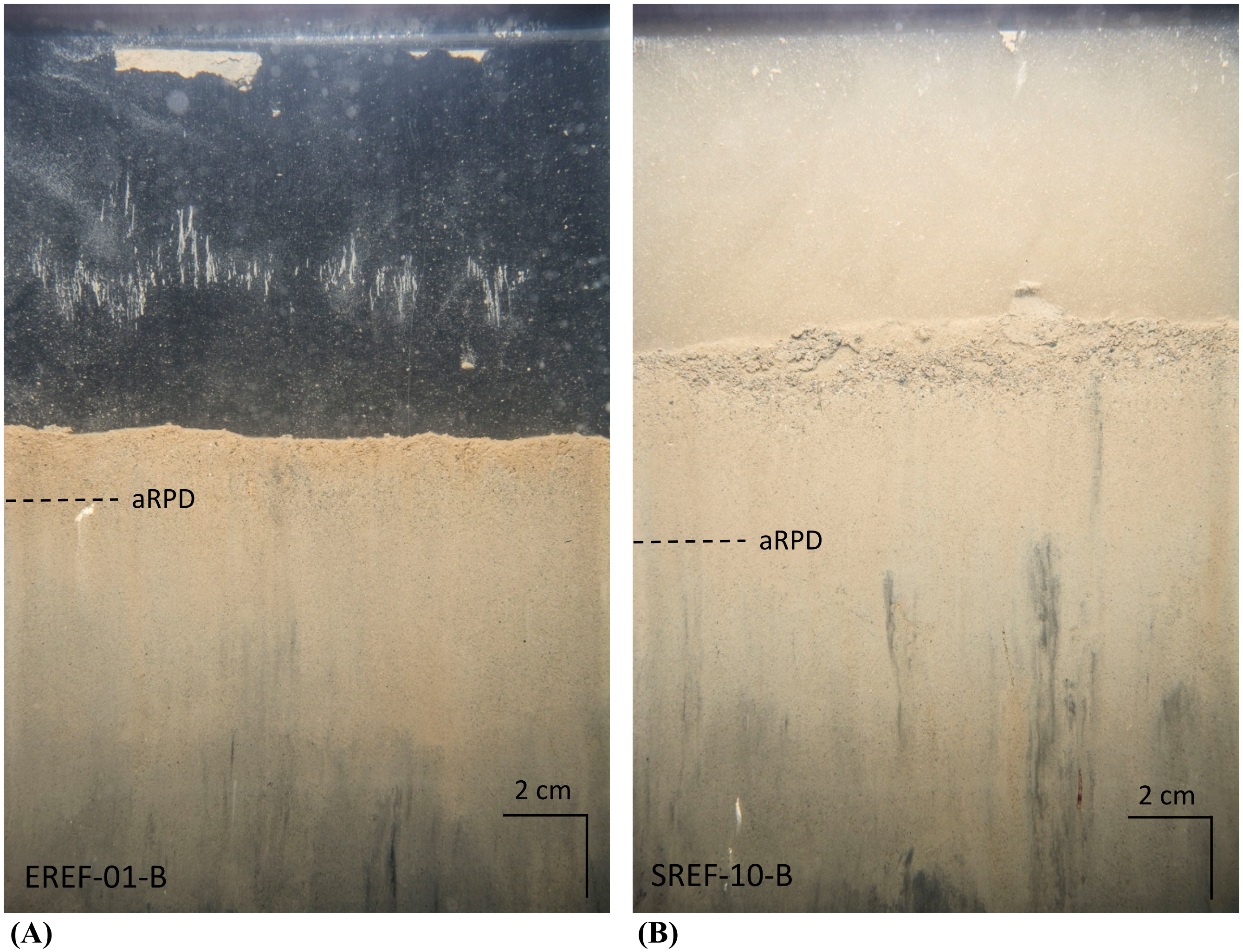


Figure 3-13. Sediment profile images from reference areas; (A) Station EREF-01 with a shallow aRPD; and (B) Station SREF-10 with a deep aRPD

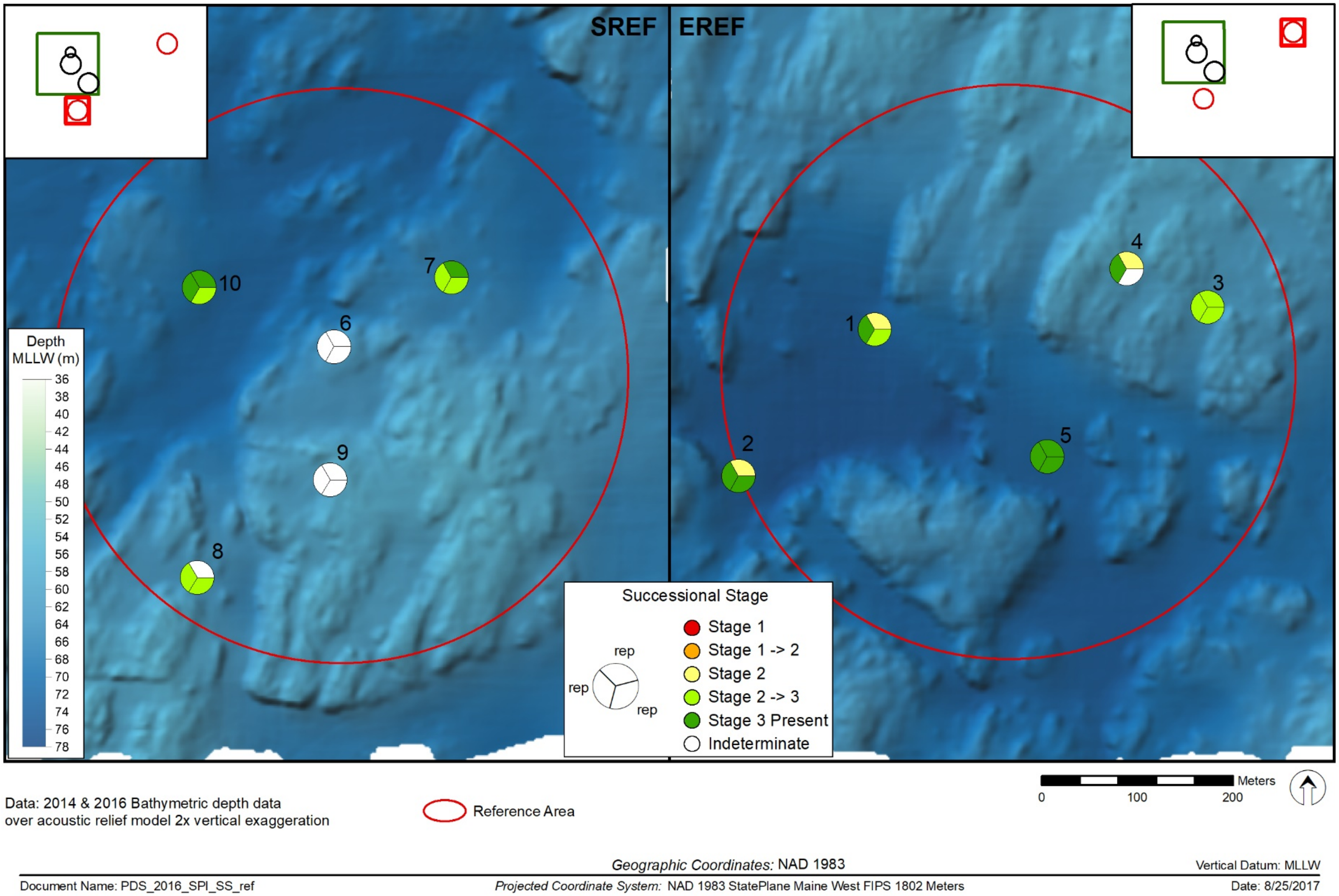


Figure 3-14. Infaunal successional stages found at the PDS reference area stations

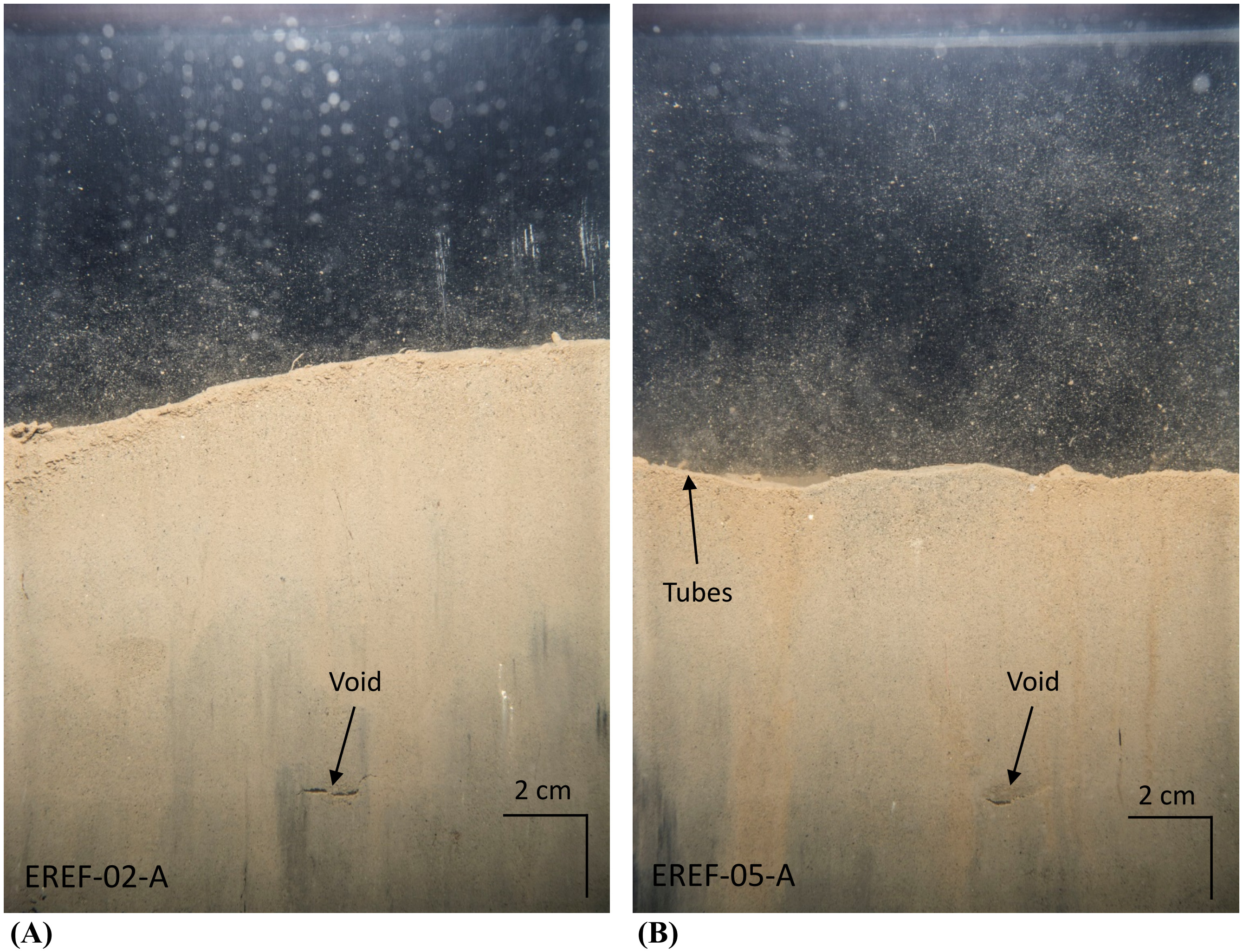


Figure 3-15. Sediment profile images from (A) Station EREF-02 indicating Stage 2 on 3 fauna with shallow burrows and deep feeding voids; and (B) Station EREF-05 indicating Stage 1 on 3 fauna represented by small tubes at the sediment–water interface and feeding void at depth

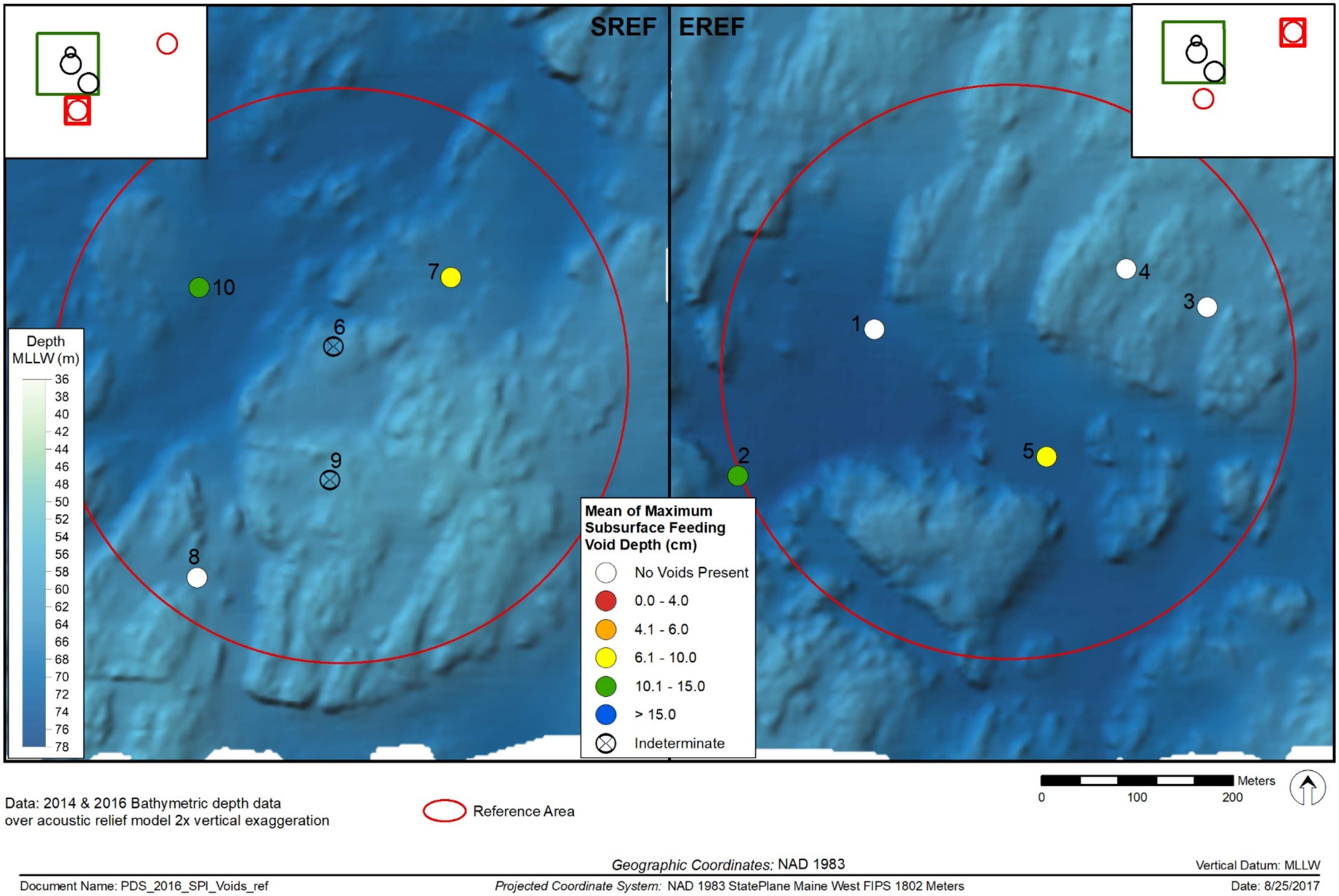


Figure 3-16. Mean depth (cm) of subsurface feeding voids at the PDS reference area stations

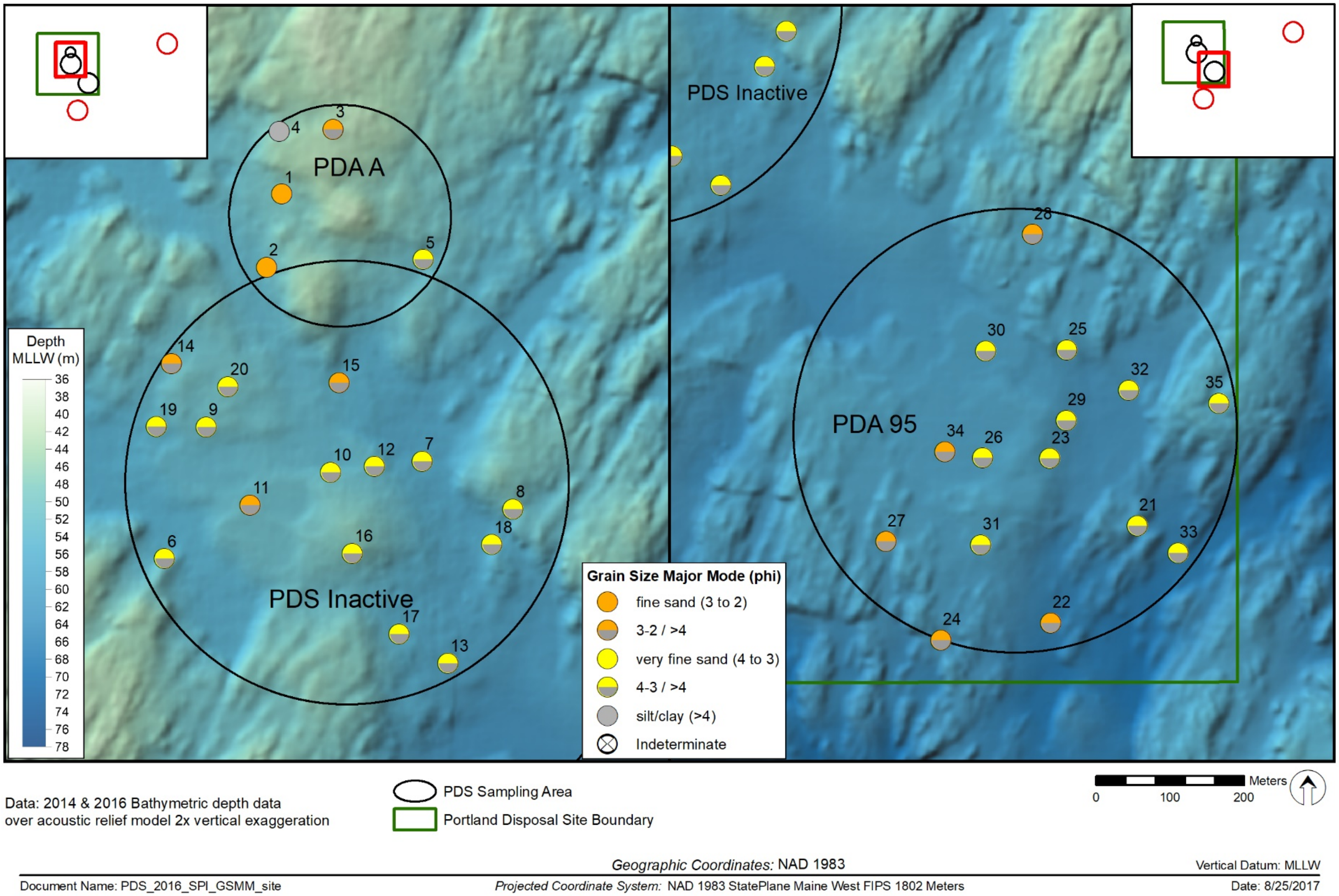
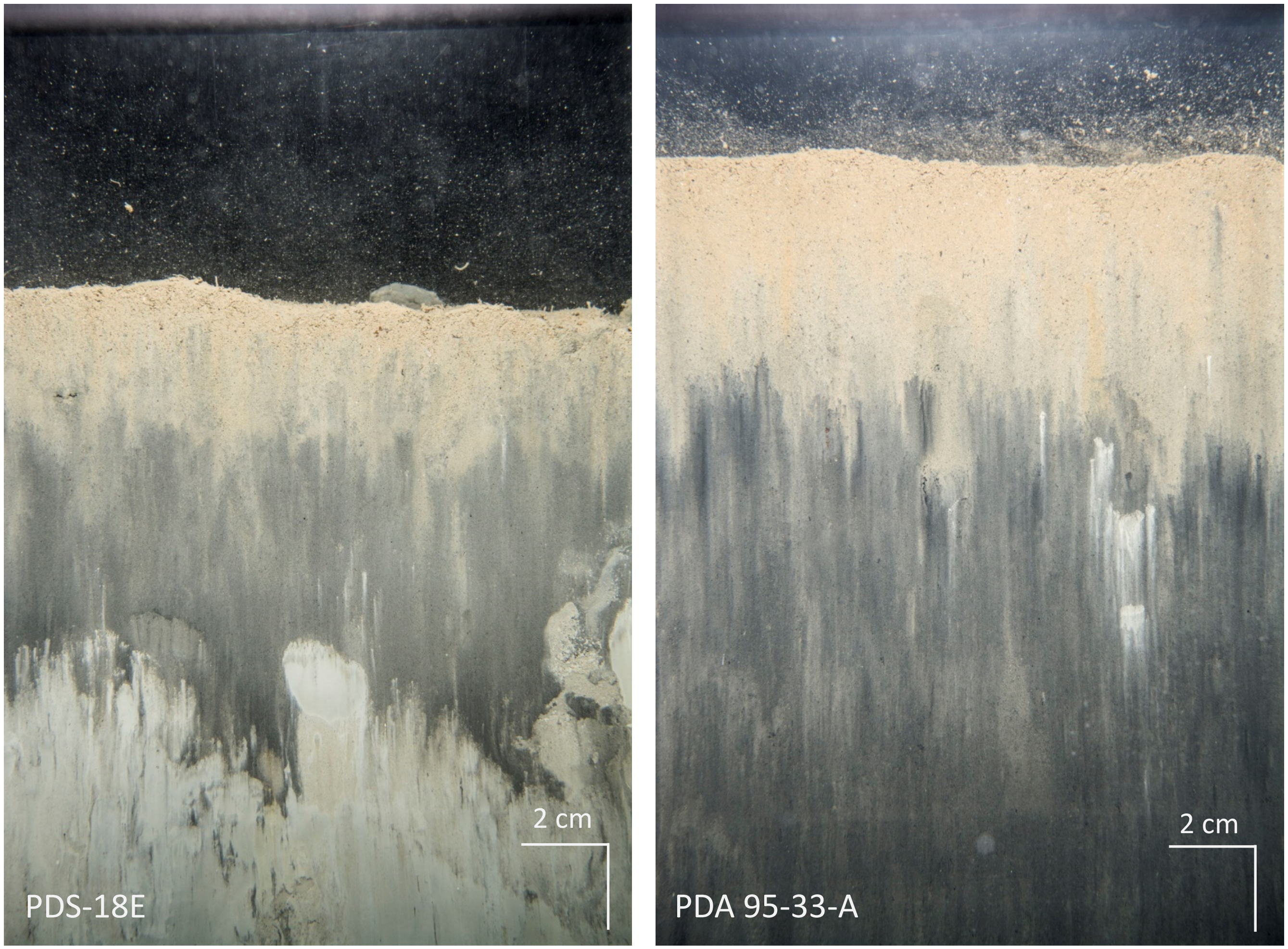


Figure 3-17. Sediment grain size major mode (phi units) at the PDS disposal area stations



(A) **(B)**

Figure 3-18. Sediment profile images depicting very fine sand layered over silt-clay from (A) Station PDS-18; and (B) Station PDA 95-33

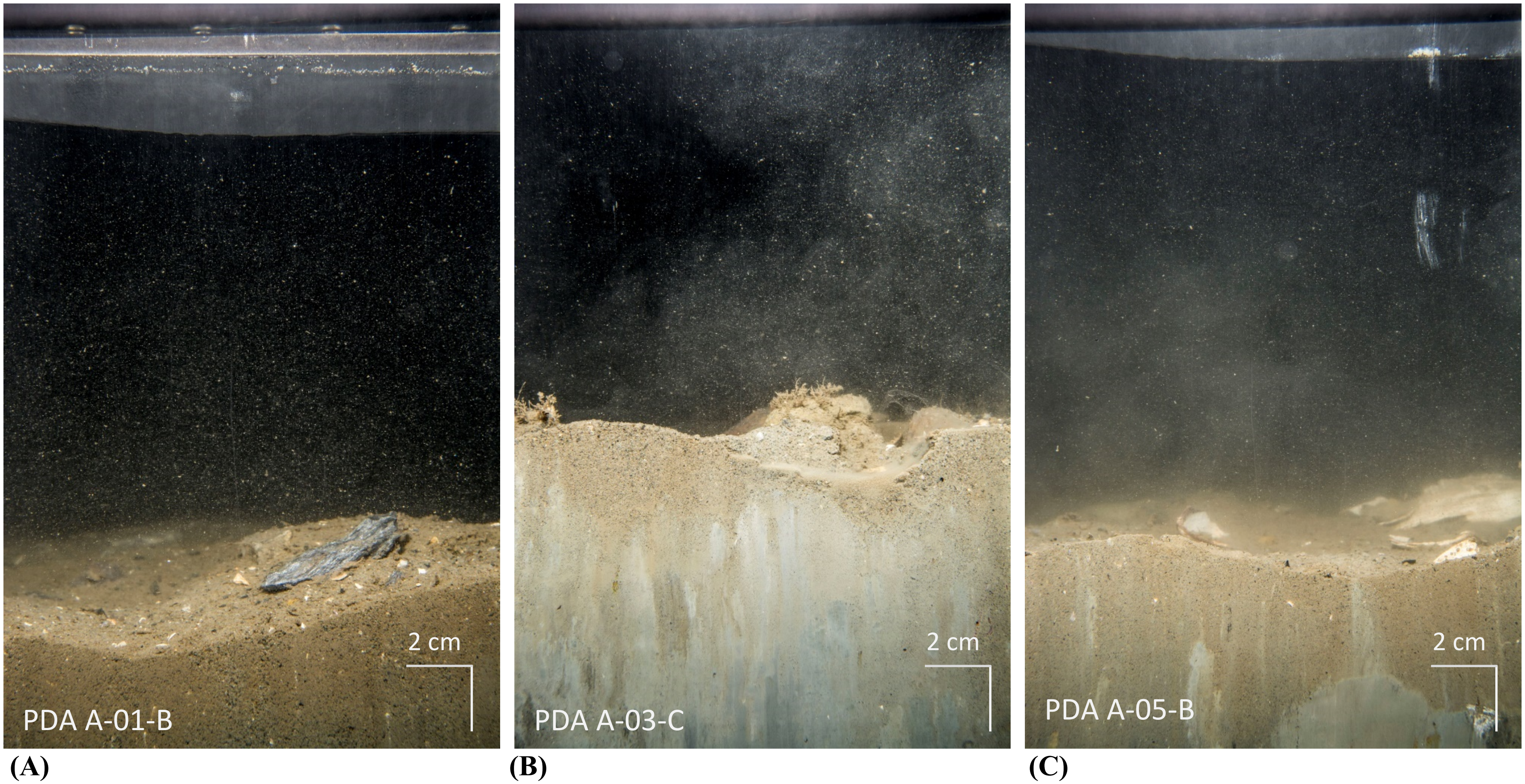


Figure 3-19. Sediment profile images from disposal area PDA A (A) Station PDA A-01 depicting fine sand; (B) Station PDA A-03 depicting fine sand over silt-clay; and (C) Station PDA A-05 depicting very fine sand over silt/clay

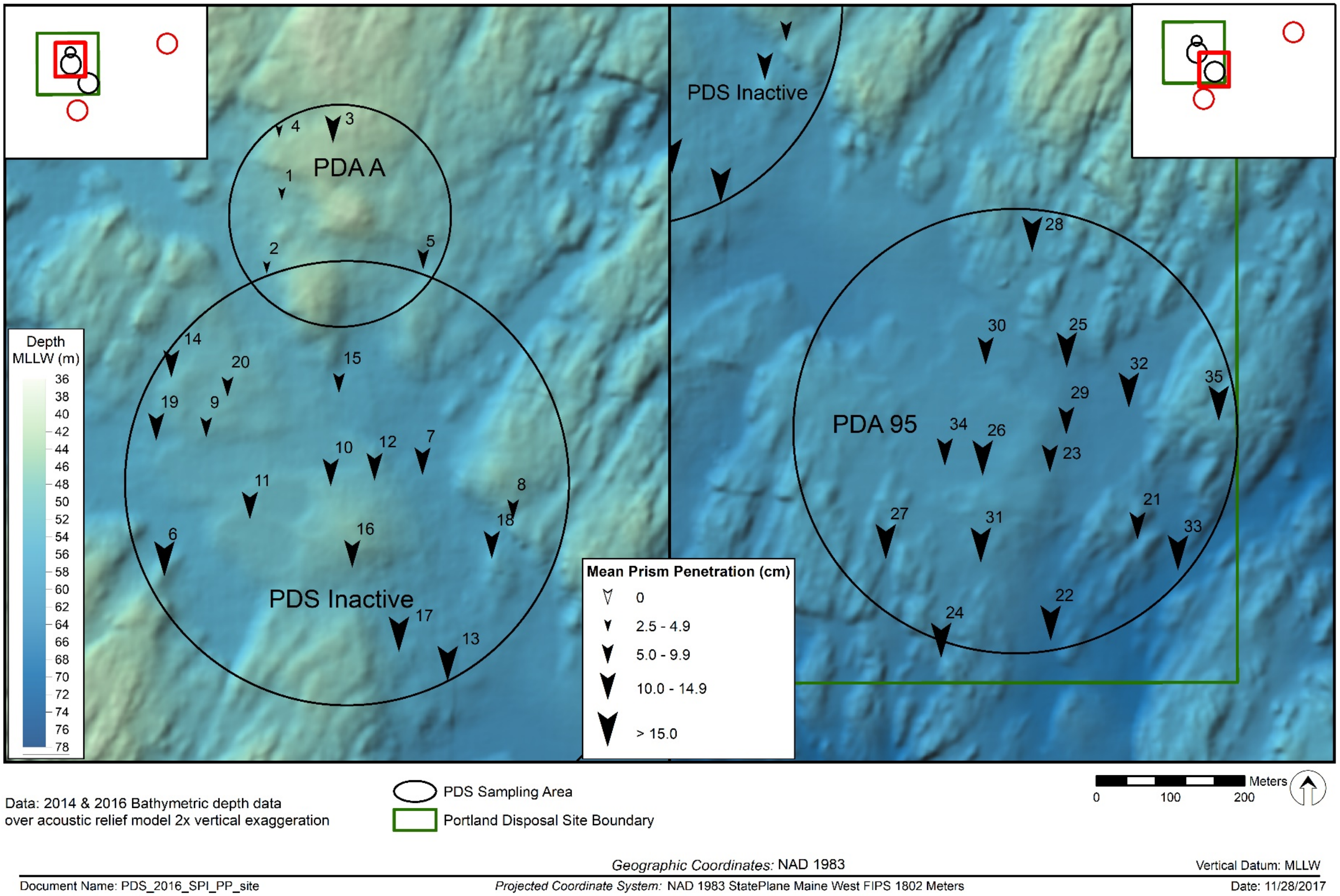
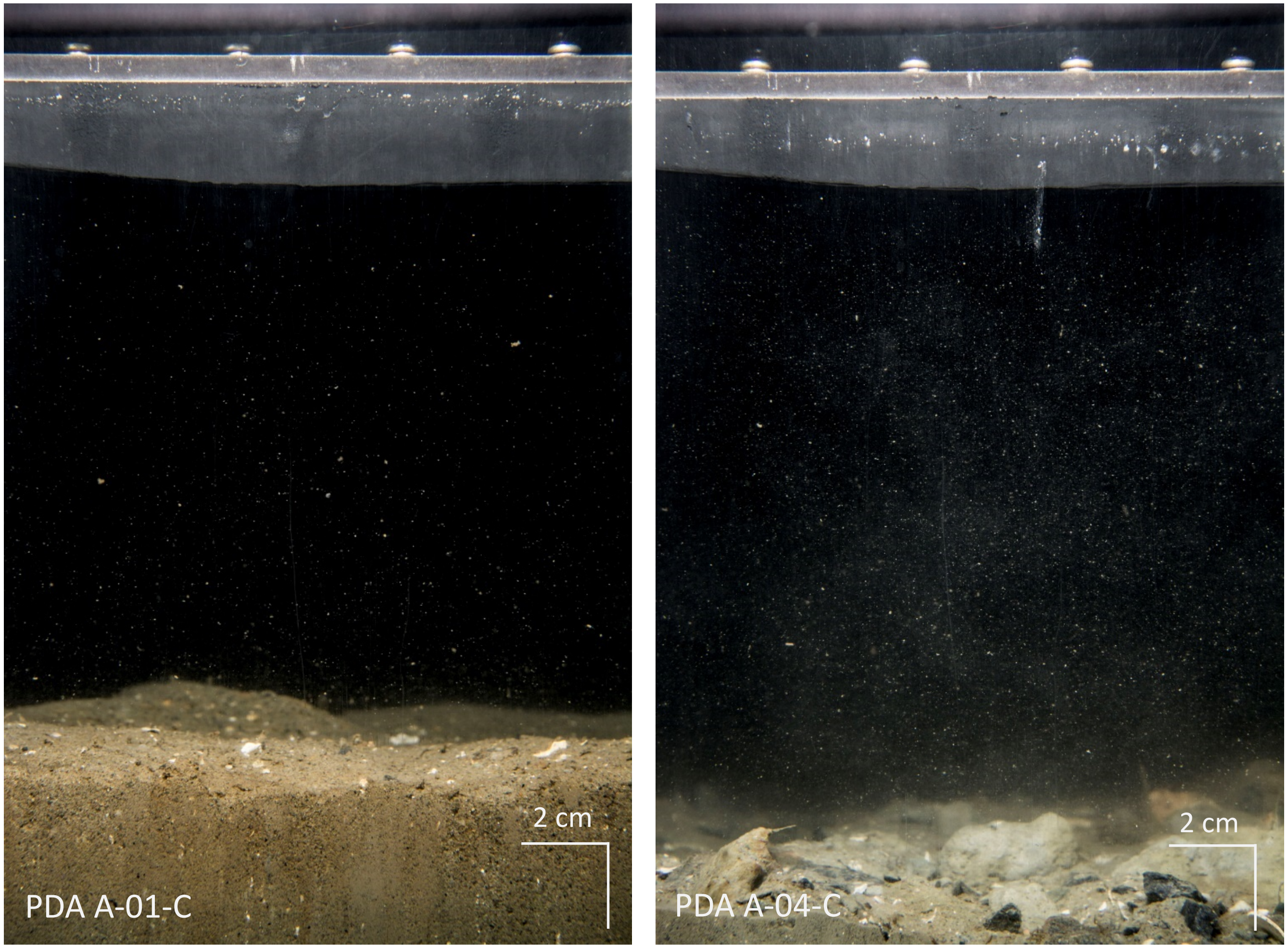


Figure 3-20. Mean station camera prism penetration depths (cm) at the PDS disposal area stations



(A) **(B)**

Figure 3-21. Sediment profile images from disposal areas; (A) Station PDA A-01 showing shallow prism penetration due to sediment consolidation; and (B) Station PDA A-04 showing shell fragments in the sediment

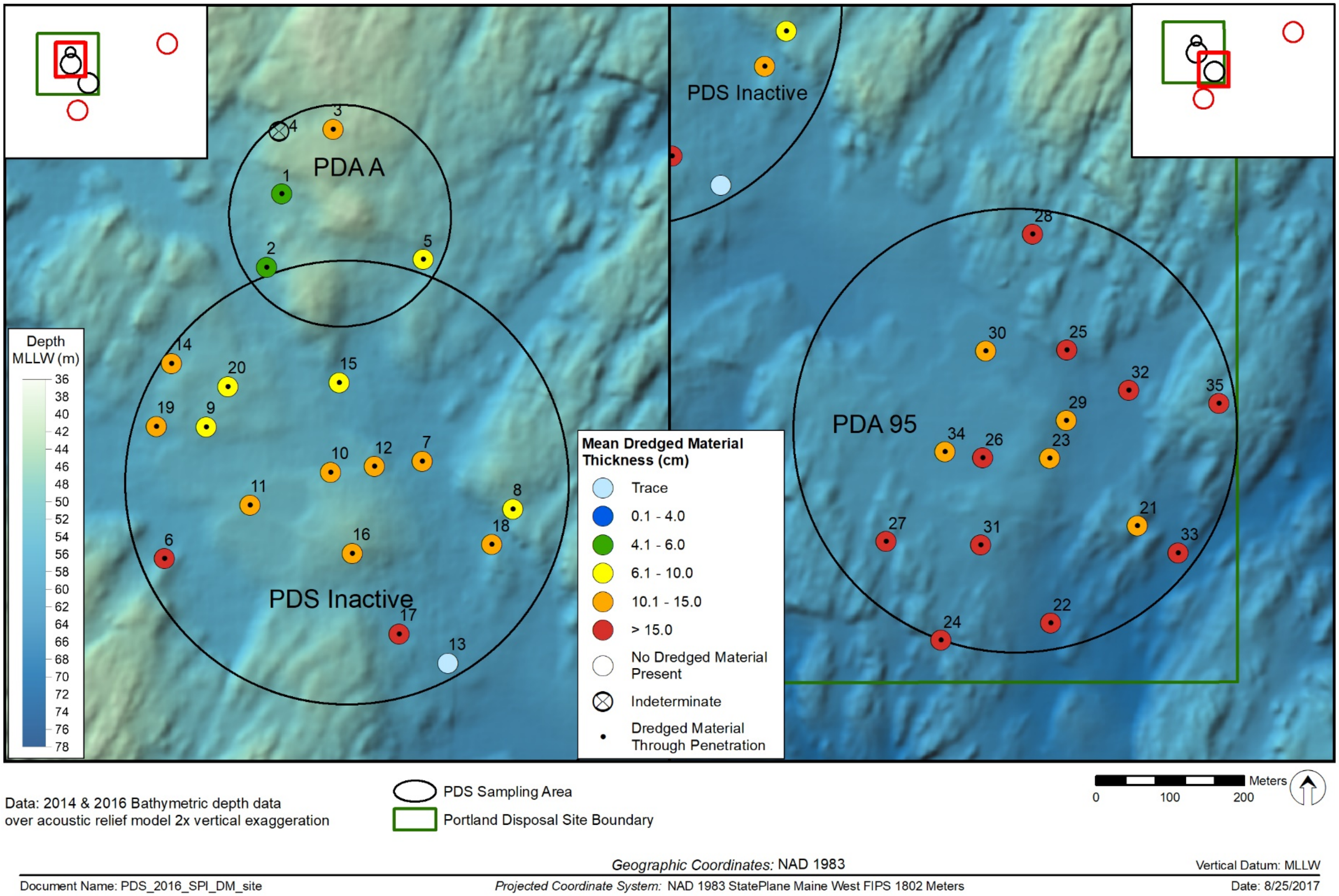
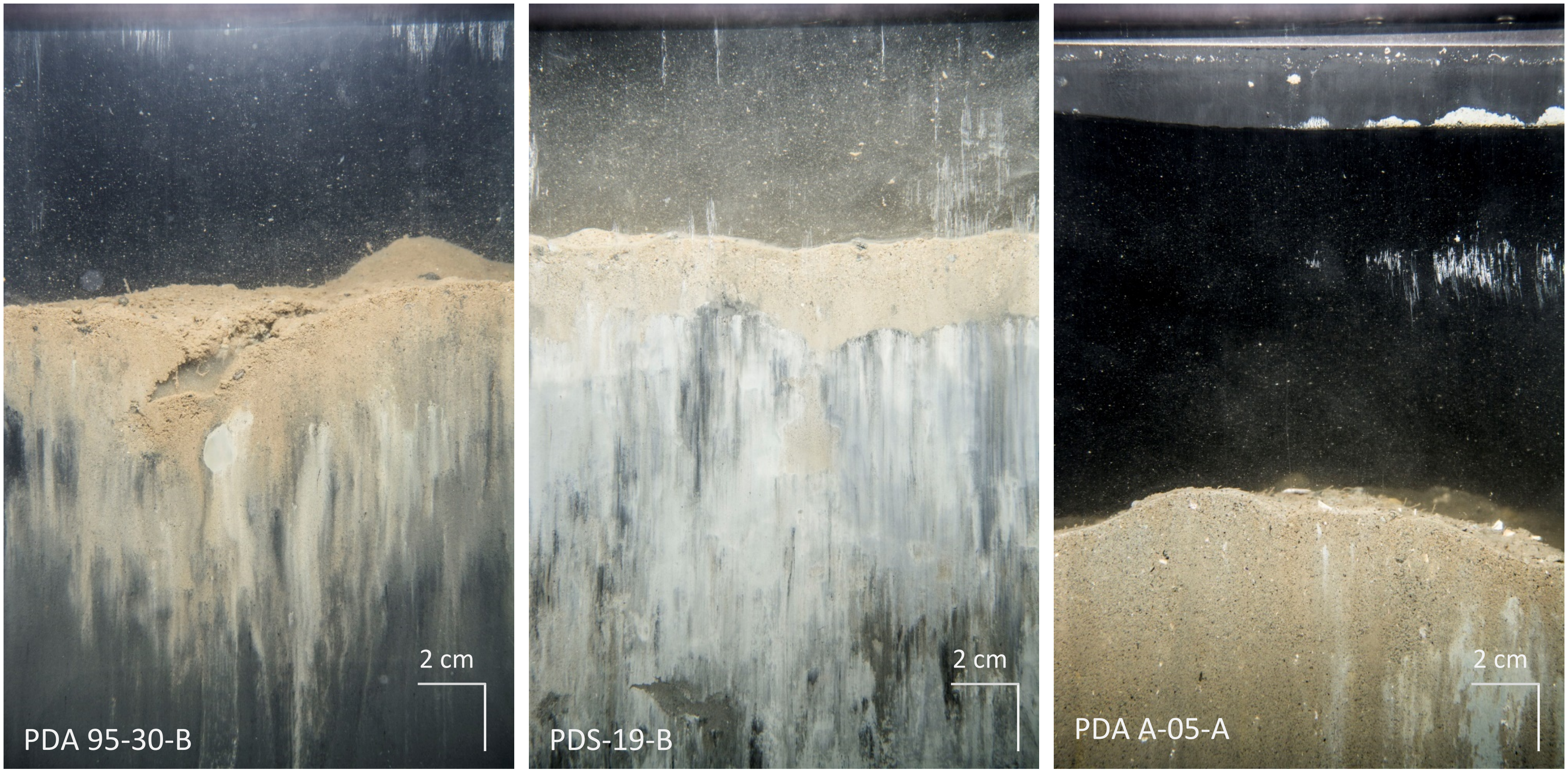


Figure 3-22. Mean dredged material thickness at the PDS disposal area stations



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

Figure 3-23. Sediment profile images from disposal areas; (A) Station PDA 95-30 with dredged material being biologically reworked to resemble ambient sediment near sediment–water interface; (B) Station PDS-19 with a thick layer of dredged material extending beyond camera prism penetration depth; and (C) Station PDA A-05 with patchy dredged material

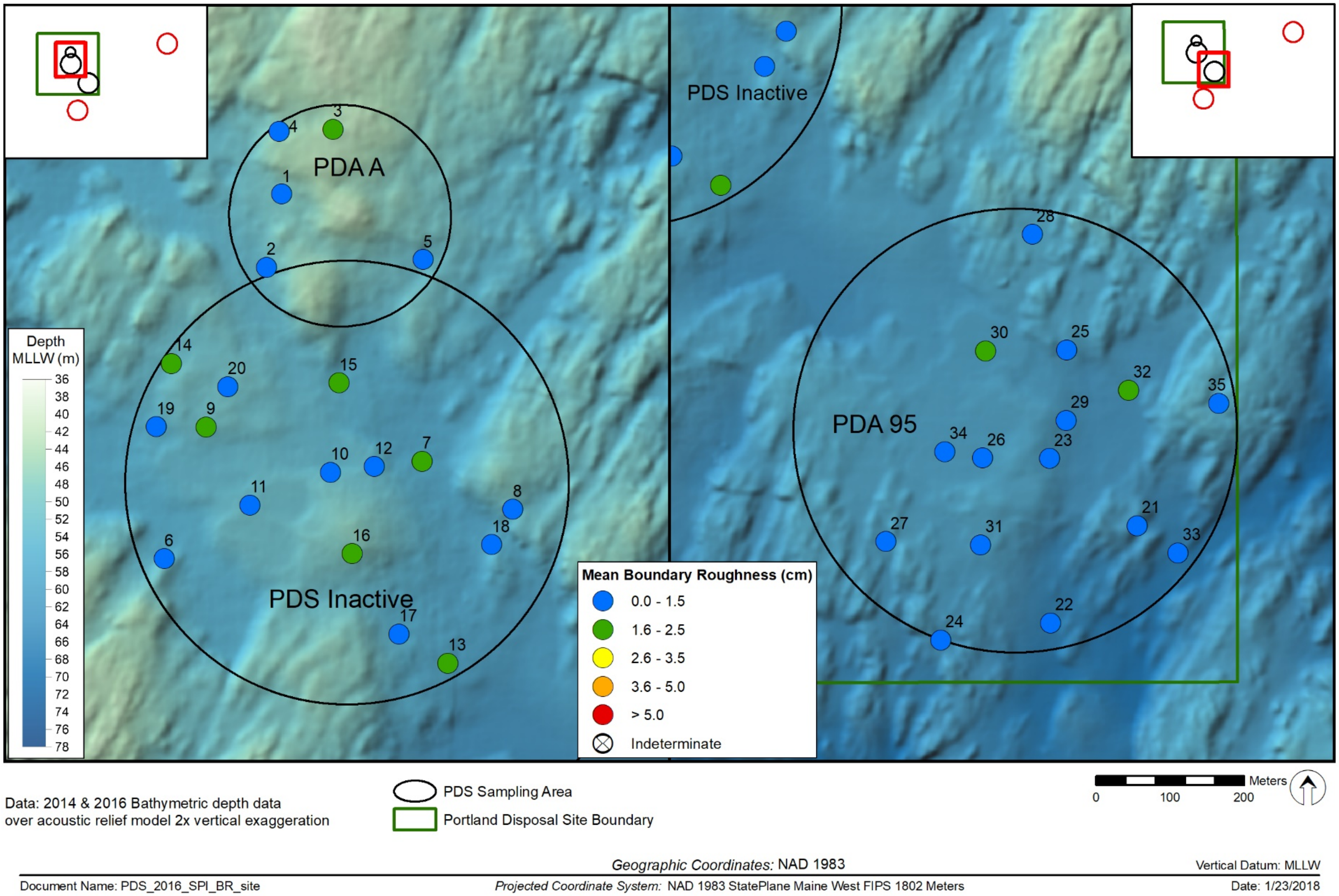
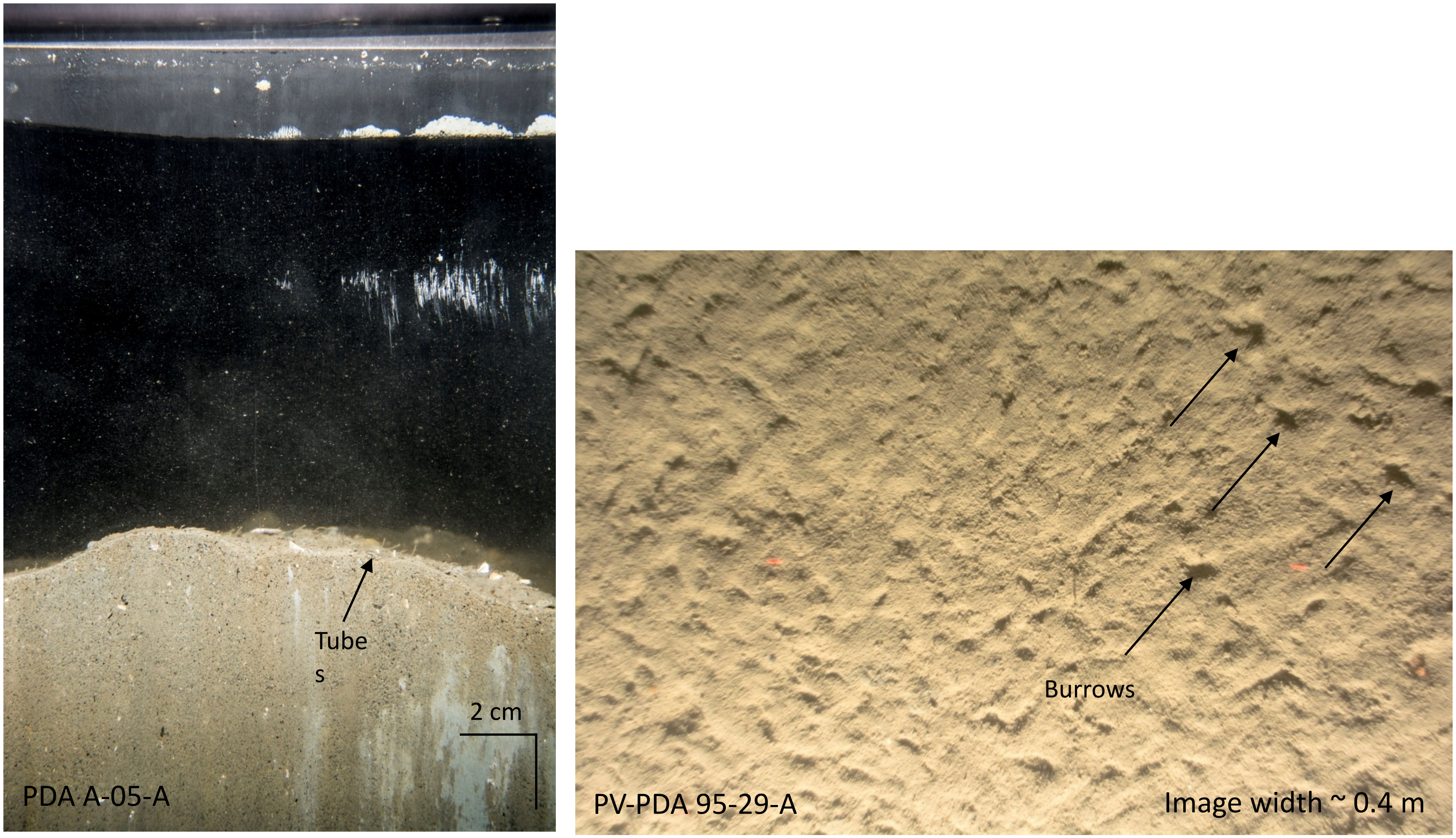


Figure 3-24. Mean station small-scale boundary roughness values (cm) at the PDS disposal area stations



(A) **(B)**

Figure 3-25. (A) Sediment profile image from Station PDA A-05 depicting Stage 1 tubes at the sediment–water interface; and (B) plan view image from Station PDA 95-29 depicting burrows

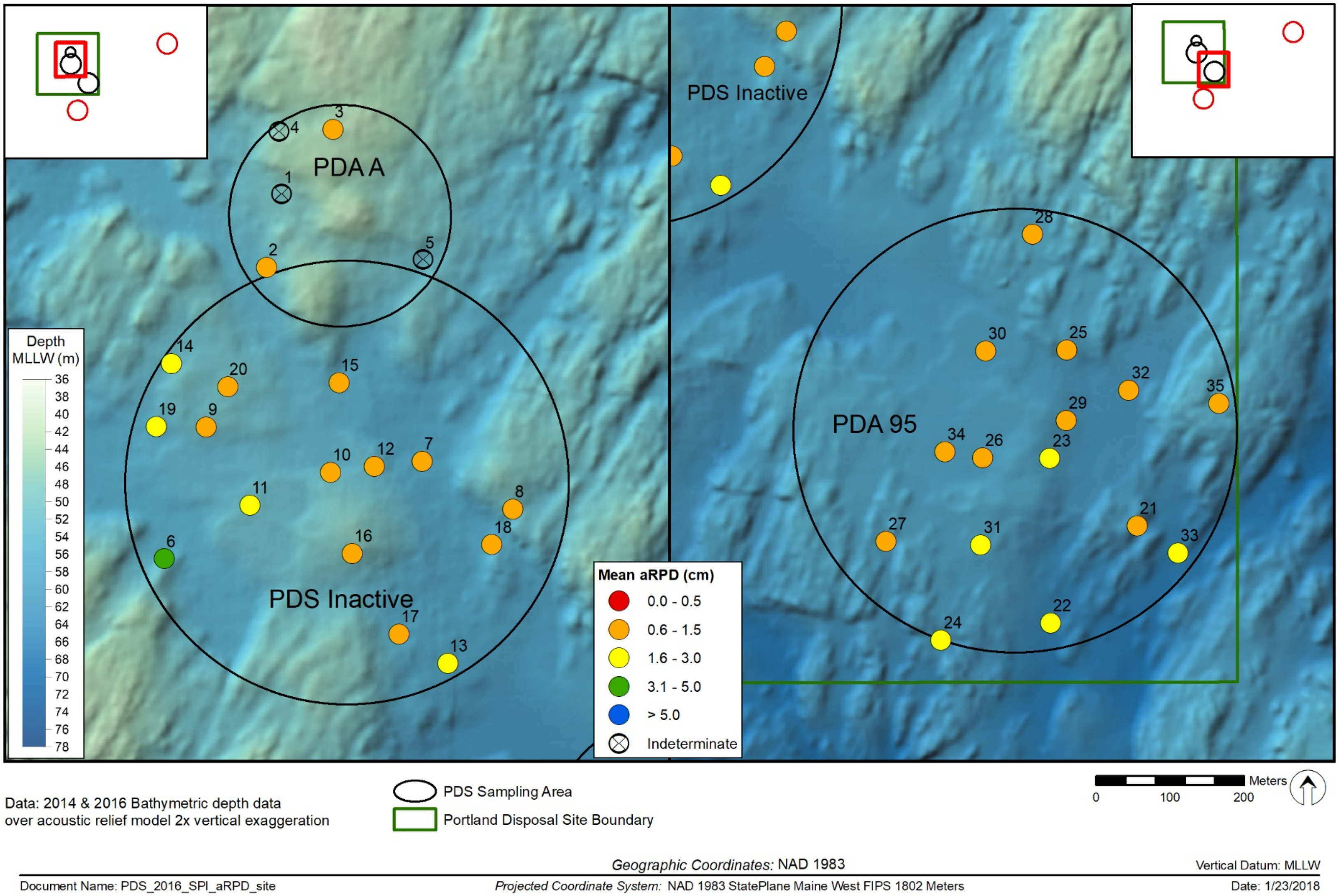


Figure 3-26. Mean station aRPD depth values (cm) at the PDS disposal area stations

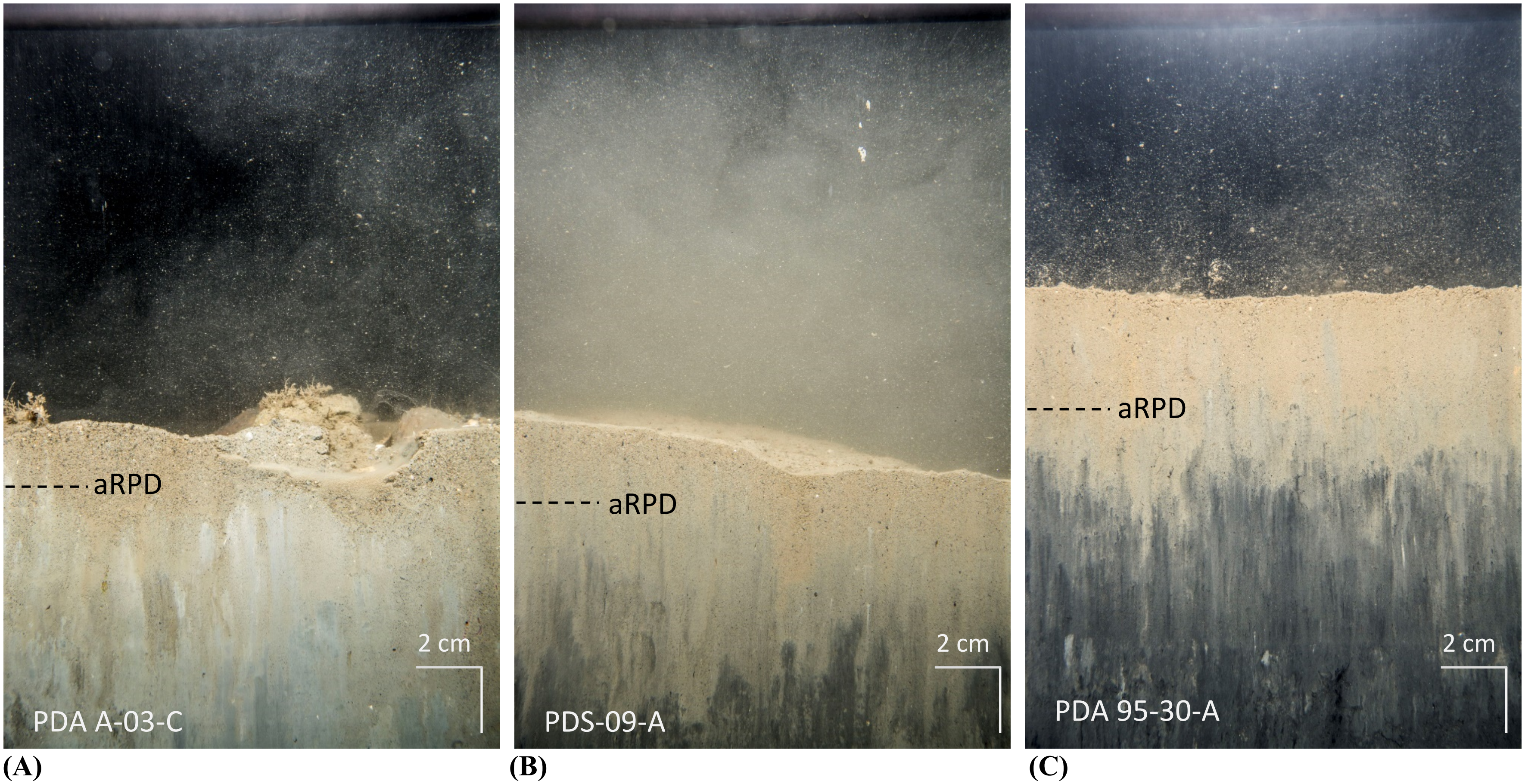


Figure 3-27. Sediment profile images depicting typical aRPD depth across disposal areas at (A) Station PDA A-03; (B) Station PDS-09; and (C) Station PDA 95-30

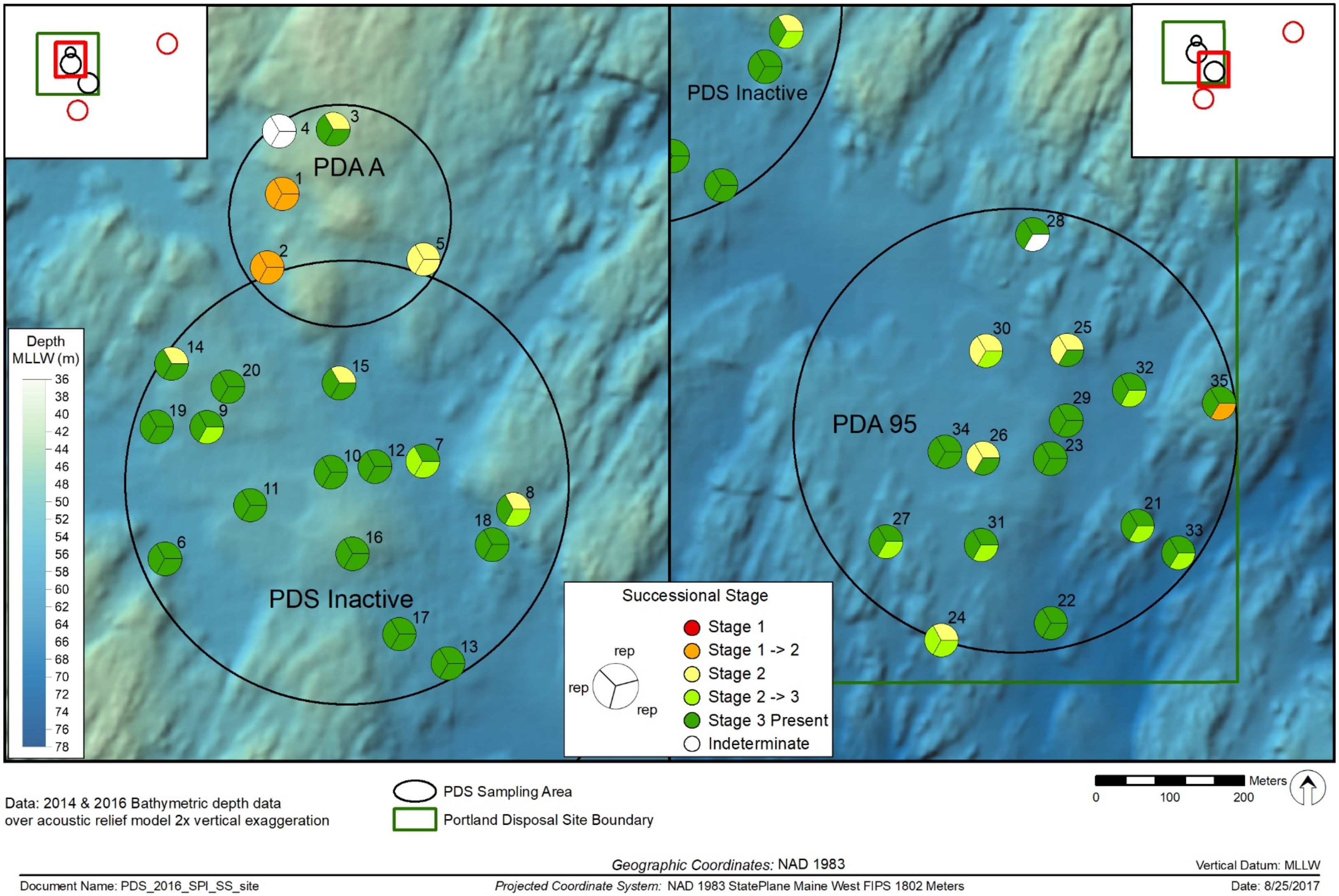
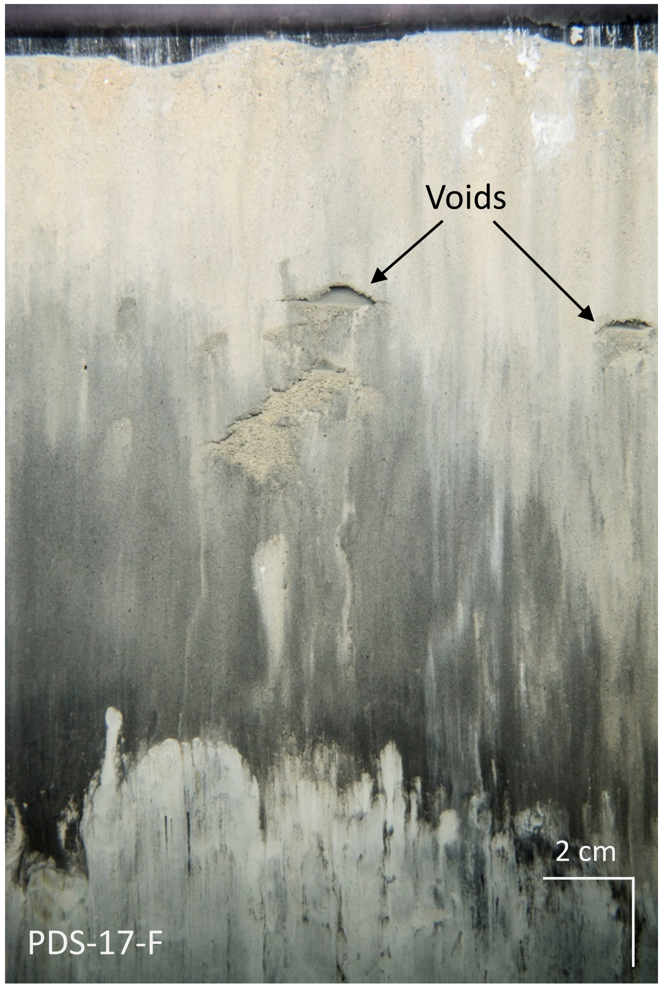


Figure 3-28. Infaunal successional stages found at the PDS disposal area stations



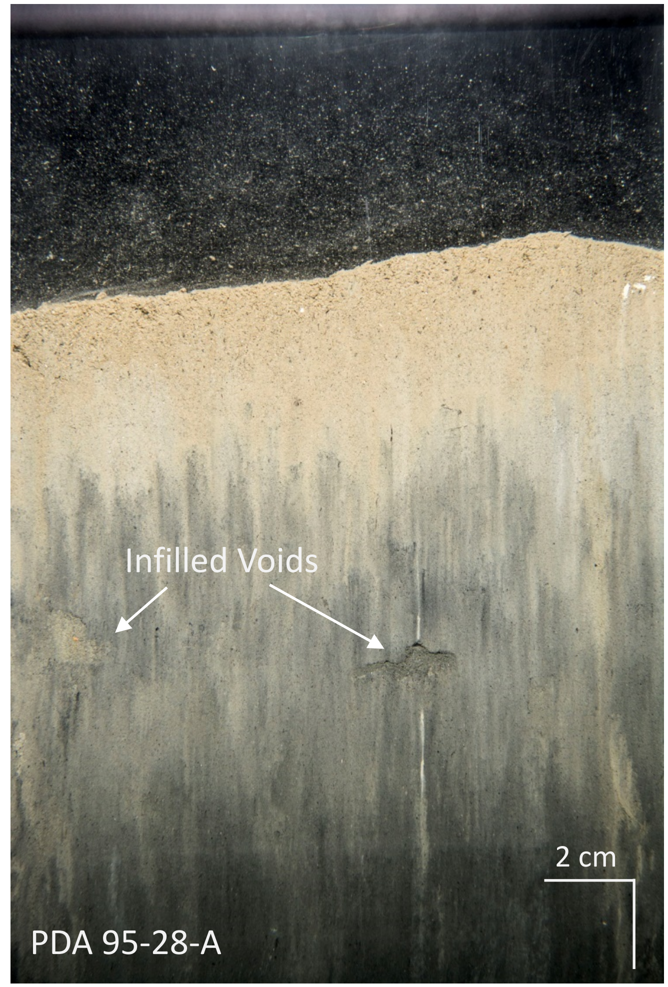
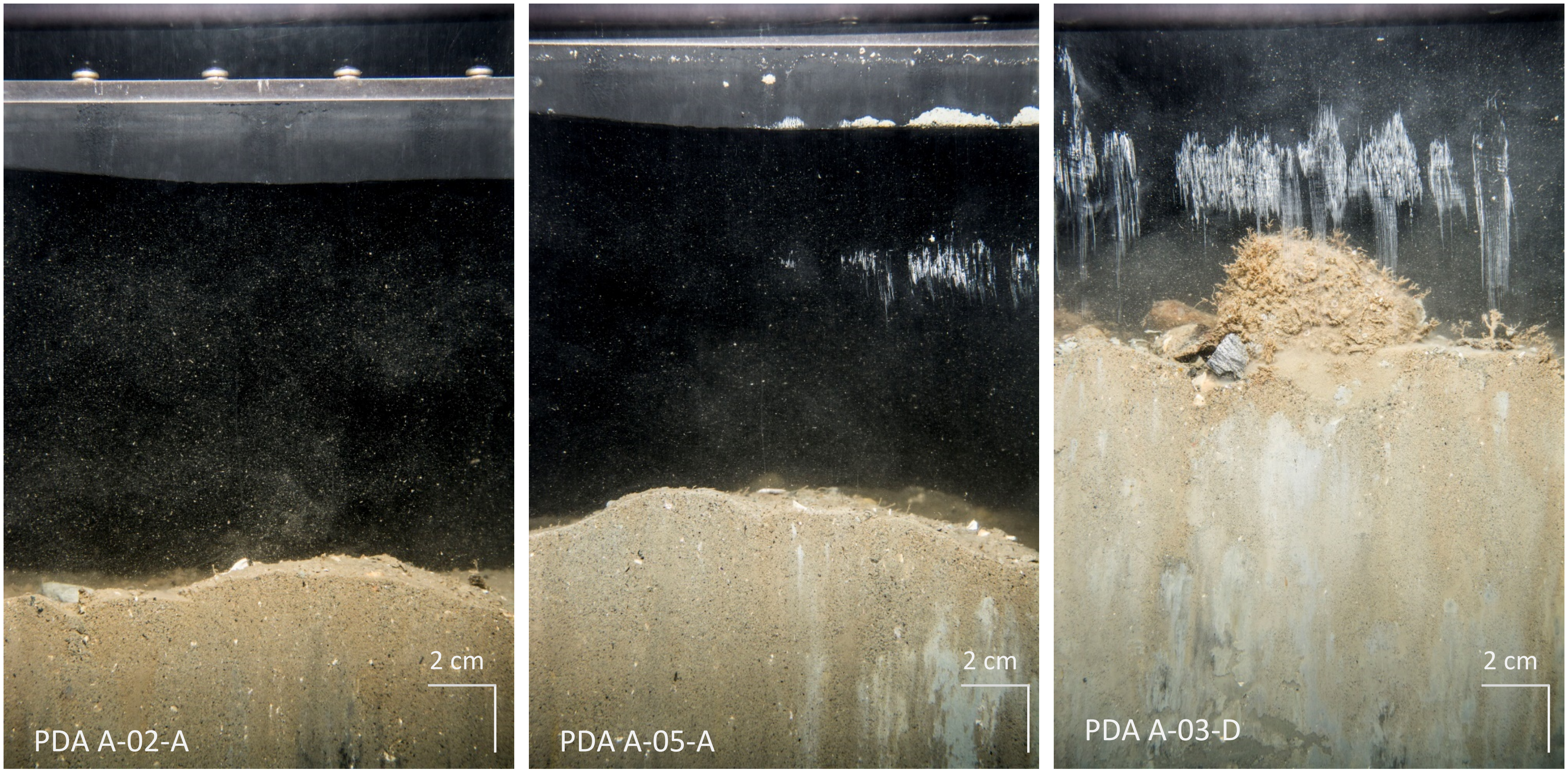


Figure 3-29. Sediment profile images showing evidence of Stage 3 fauna at (A) Station PDS-17 showing open feeding voids; and (B) Station PDA 95-28 showing infilled feeding voids



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

Figure 3-30. Sediment profile images showing successional stages at (A) Station PDA A-02 showing Stage 1 transitioning to Stage 2 and (B) Station PDA A-05 showing Stage 2 fauna; and (C) Station PDA A-03 showing evidence of Stage 3 fauna

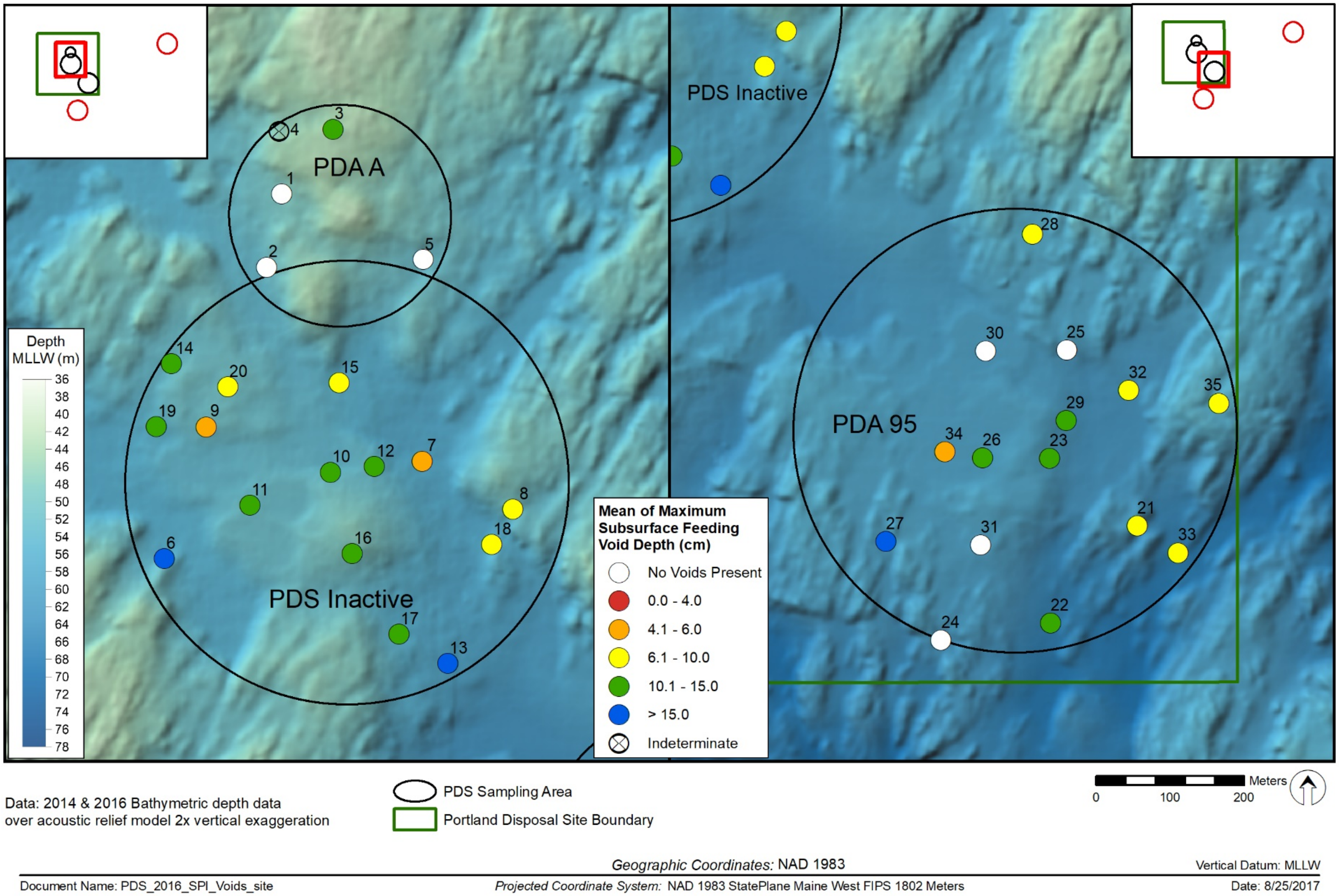


Figure 3-31. Mean depth of subsurface feeding voids at the PDS disposal area stations

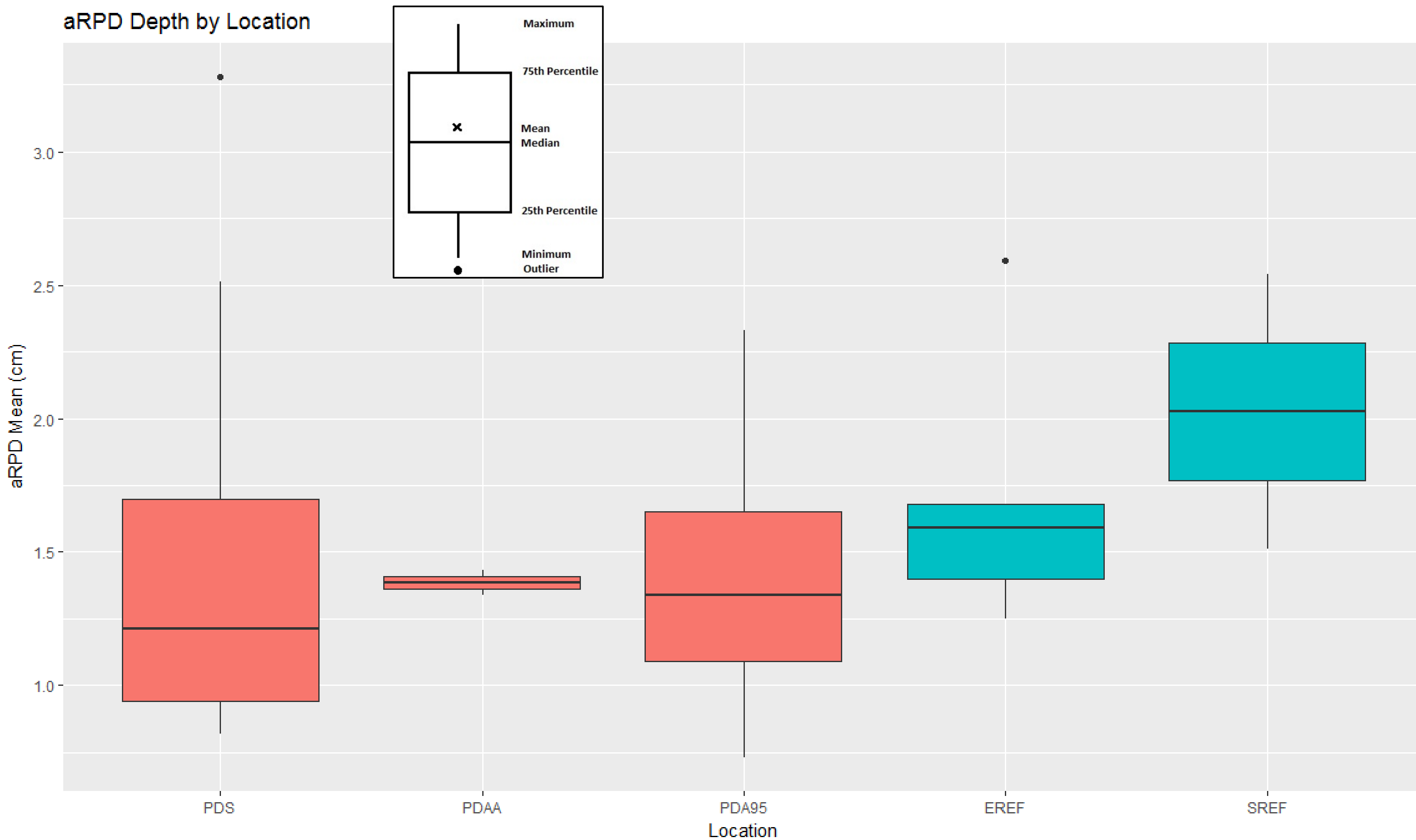


Figure 3-32. Boxplots showing the distribution of mean aRPD depths measured at the disposal site and reference area stations in the 2016 survey

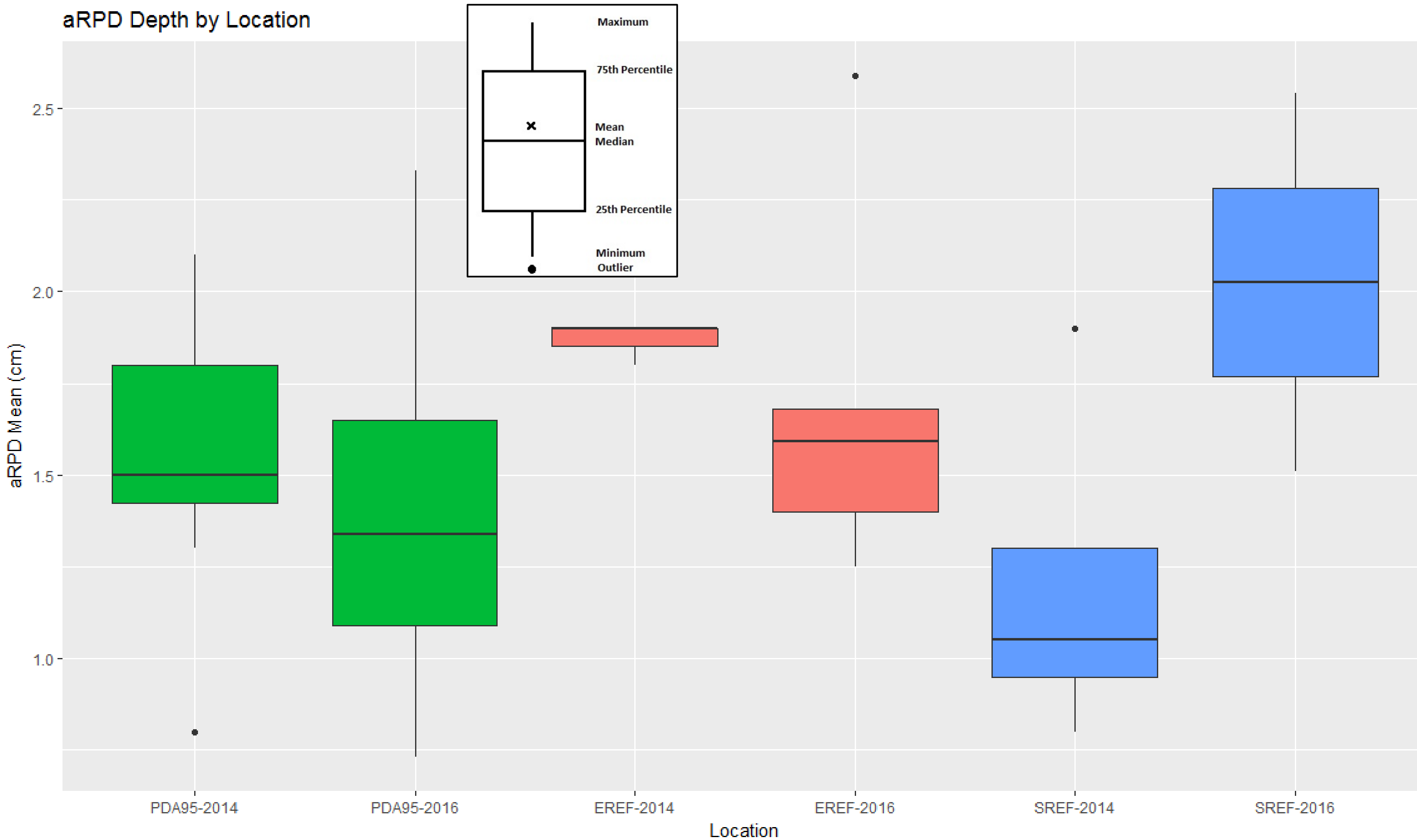


Figure 3-33. Boxplots showing the distribution of mean aRPD depths measured at the disposal area stations and reference area stations in the 2014 and 2016 surveys

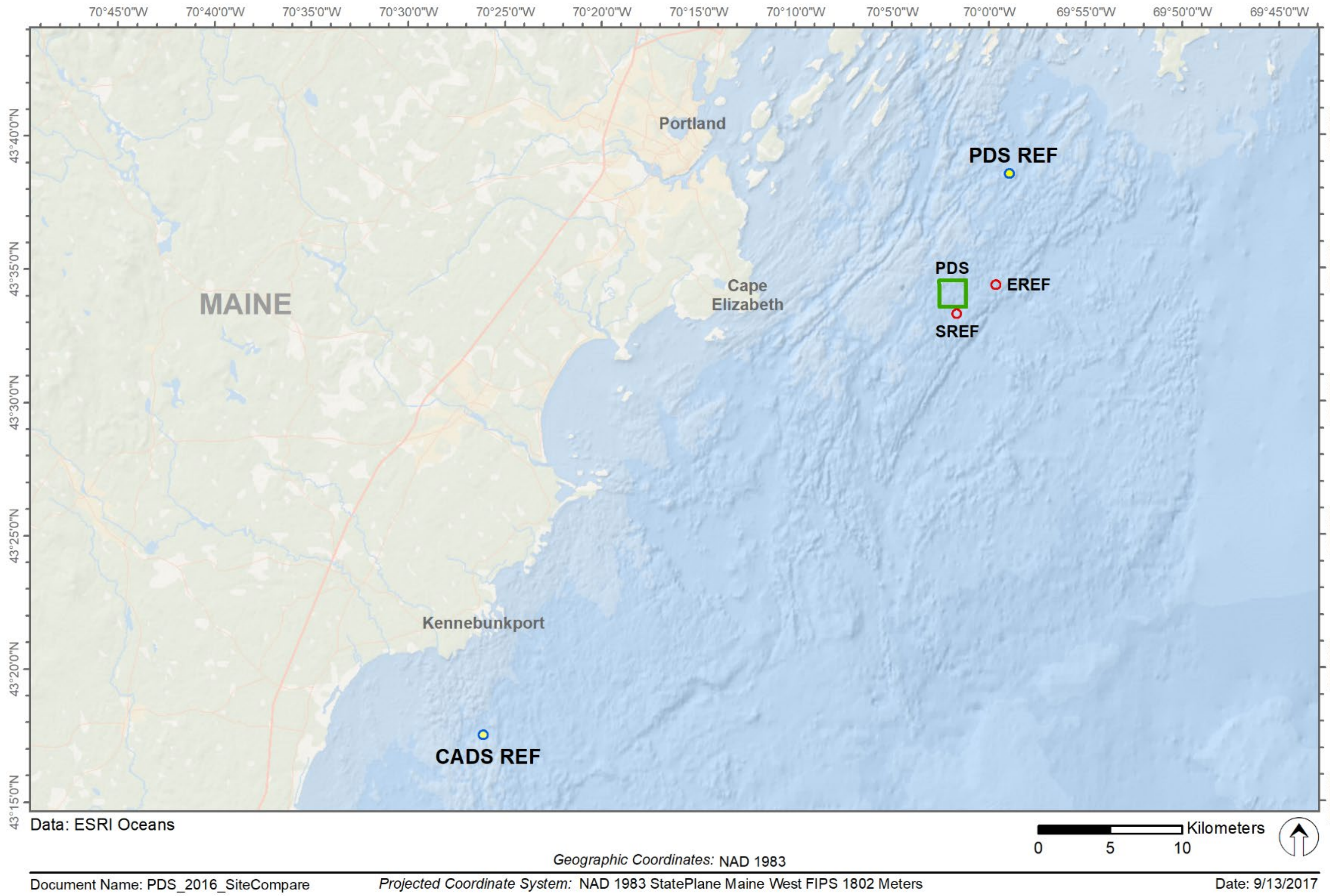


Figure 3-34. Map showing the location of reference areas CADS REF and PDS REF at which sediment was collected for laboratory bioaccumulation testing for Pepperell Cove (CADS REF) and York Harbor (PDS REF) sediments (USACE 2014, USACE 2015)

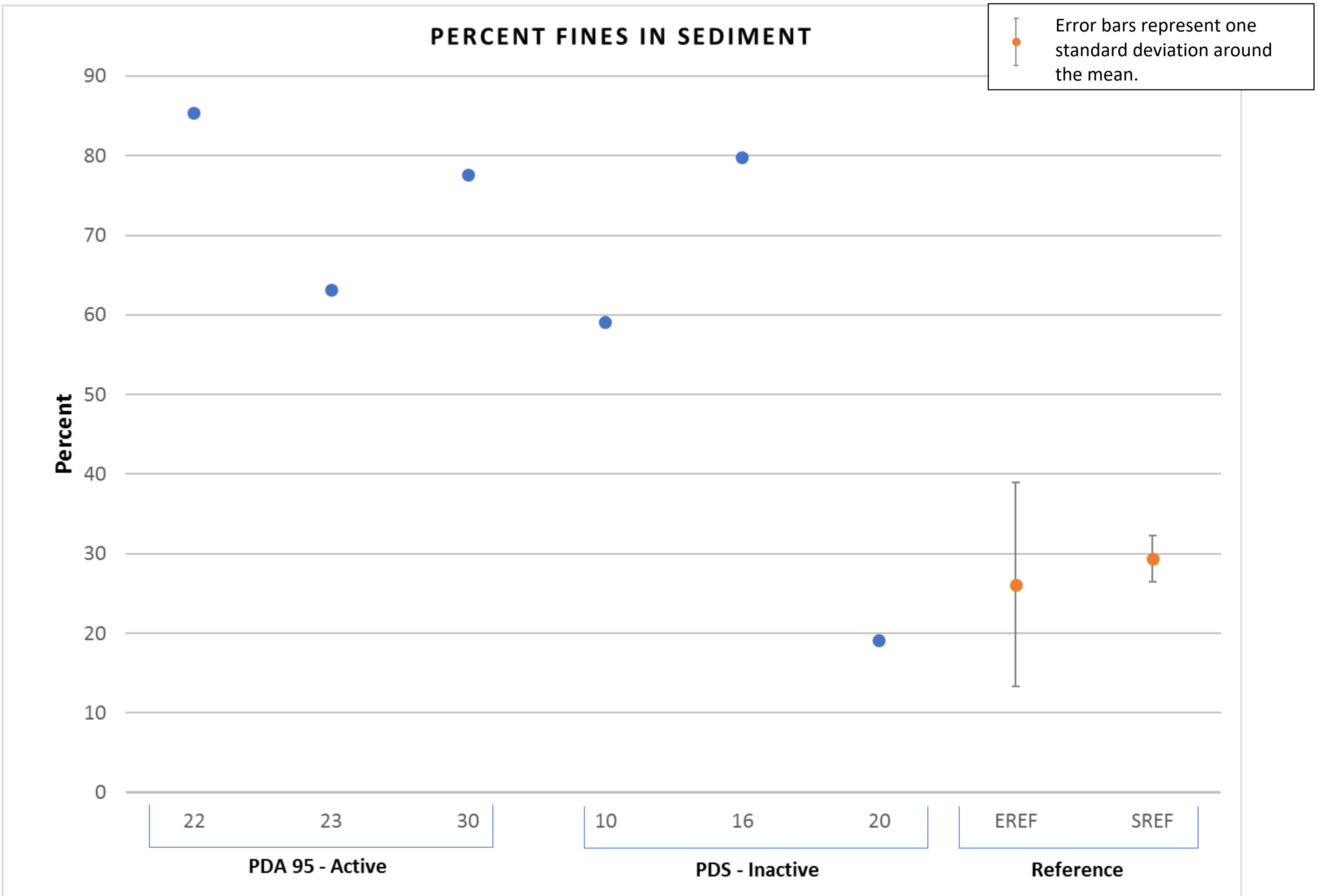


Figure 3-35. Percent fines in sediments from PDS 2016

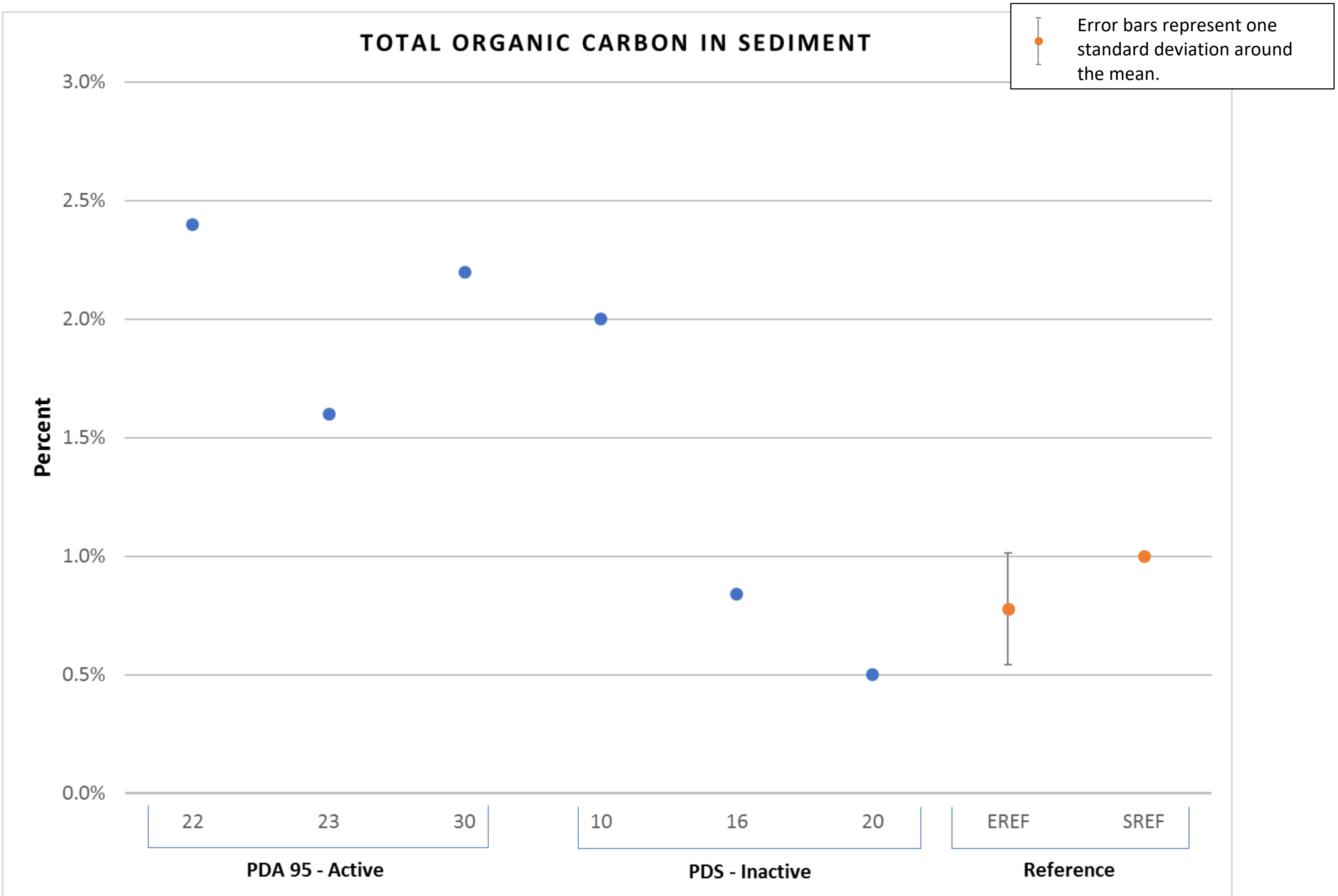


Figure 3-36. Percent total organic carbon in sediments from PDS 2016

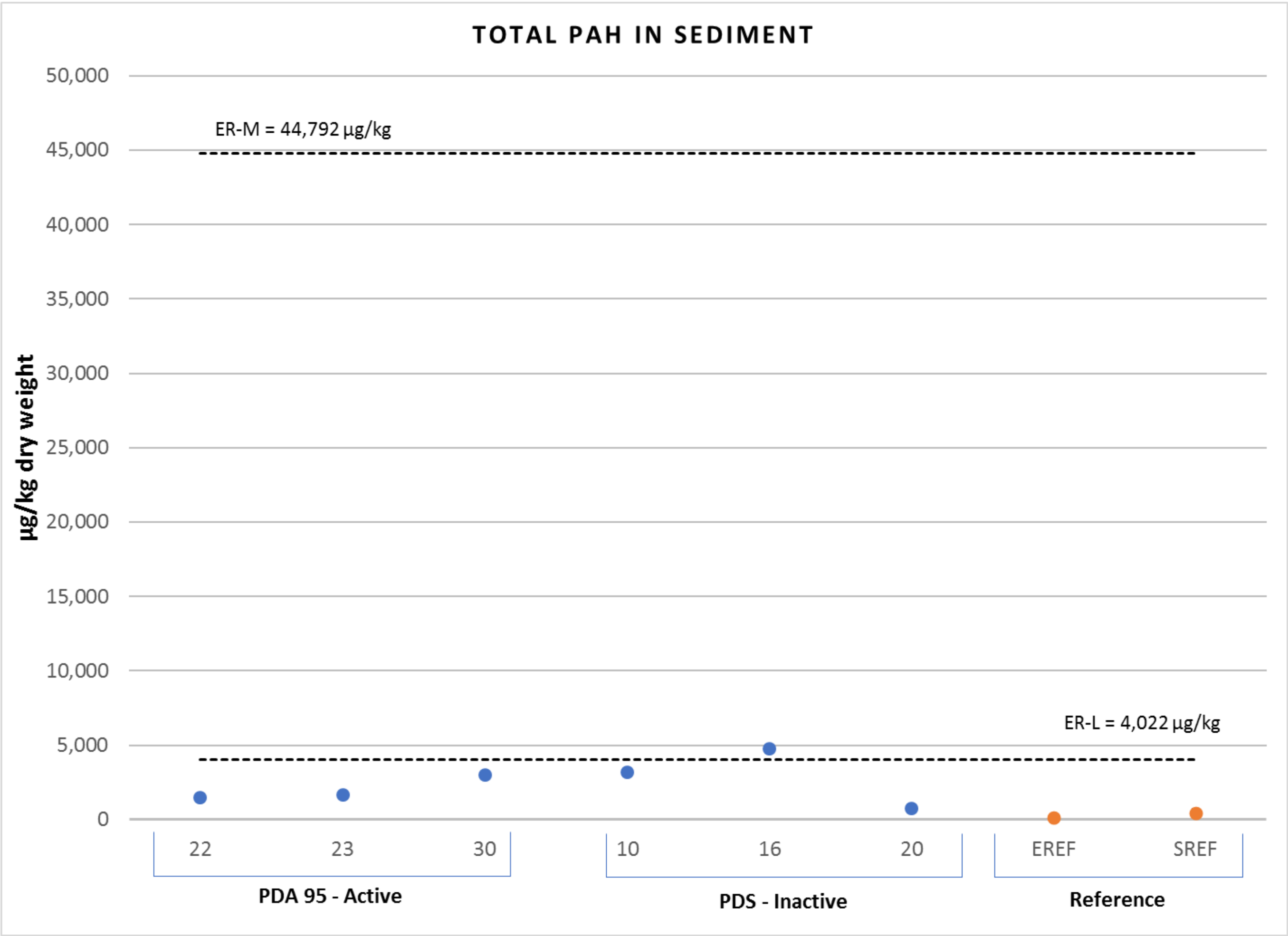


Figure 3-37. Total PAH (μ g/kg dry-wt.) in sediments from PDS 2016

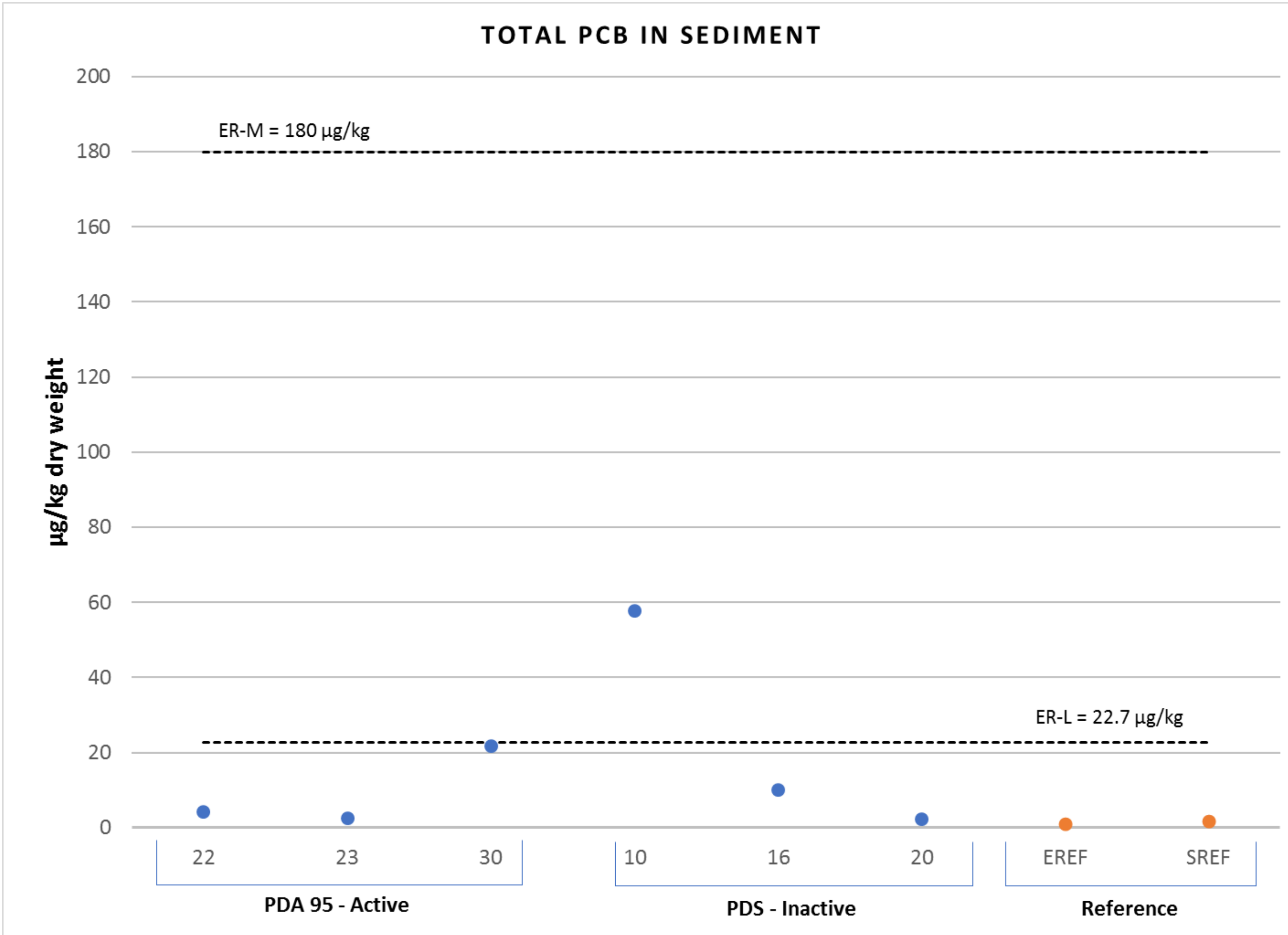


Figure 3-38. Total PCB (μ g/kg dry-wt.) in sediments from PDS 2016

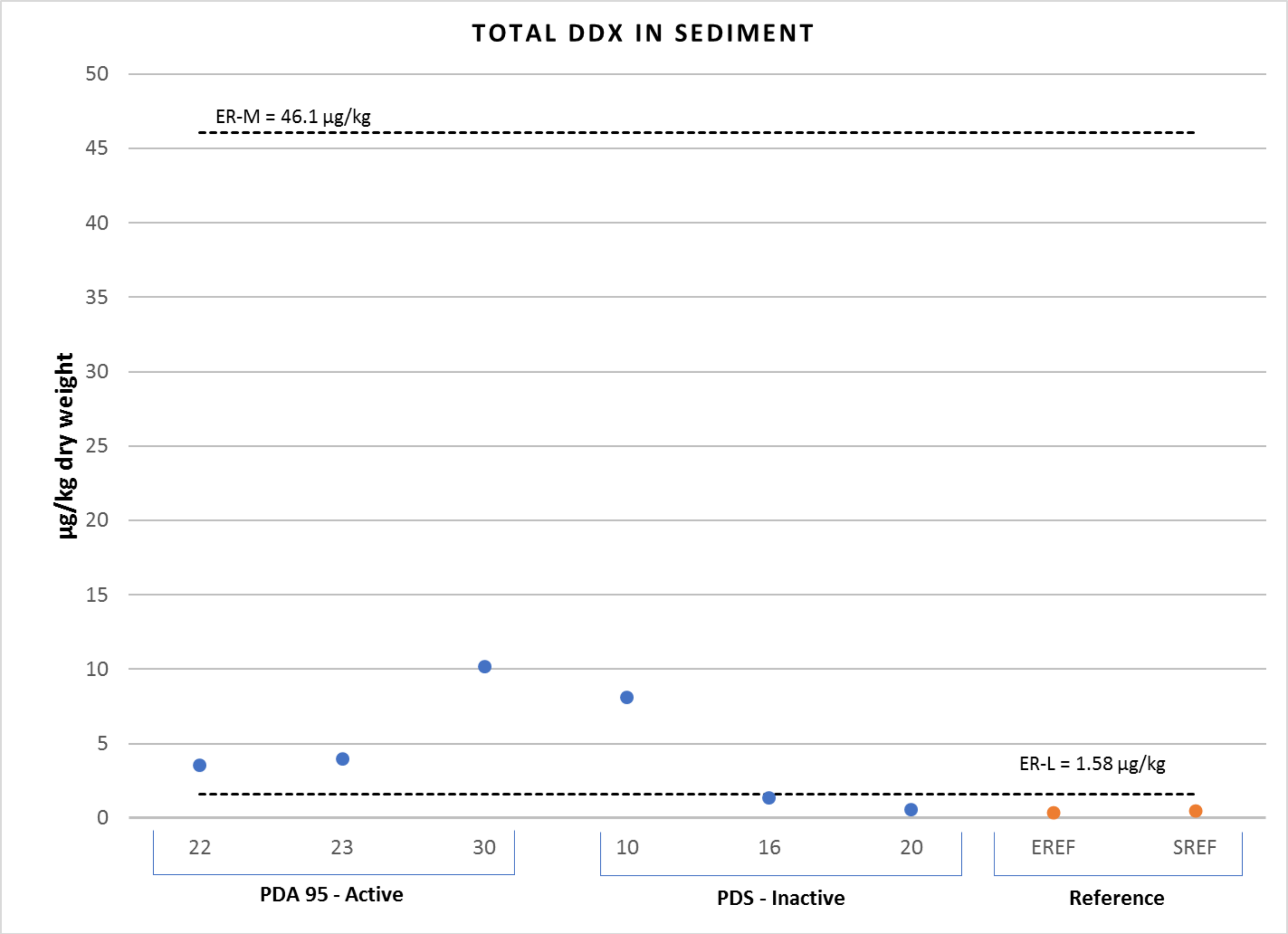


Figure 3-39a. Total DDX (μ g/kg dry-wt.) in sediments from PDS 2016

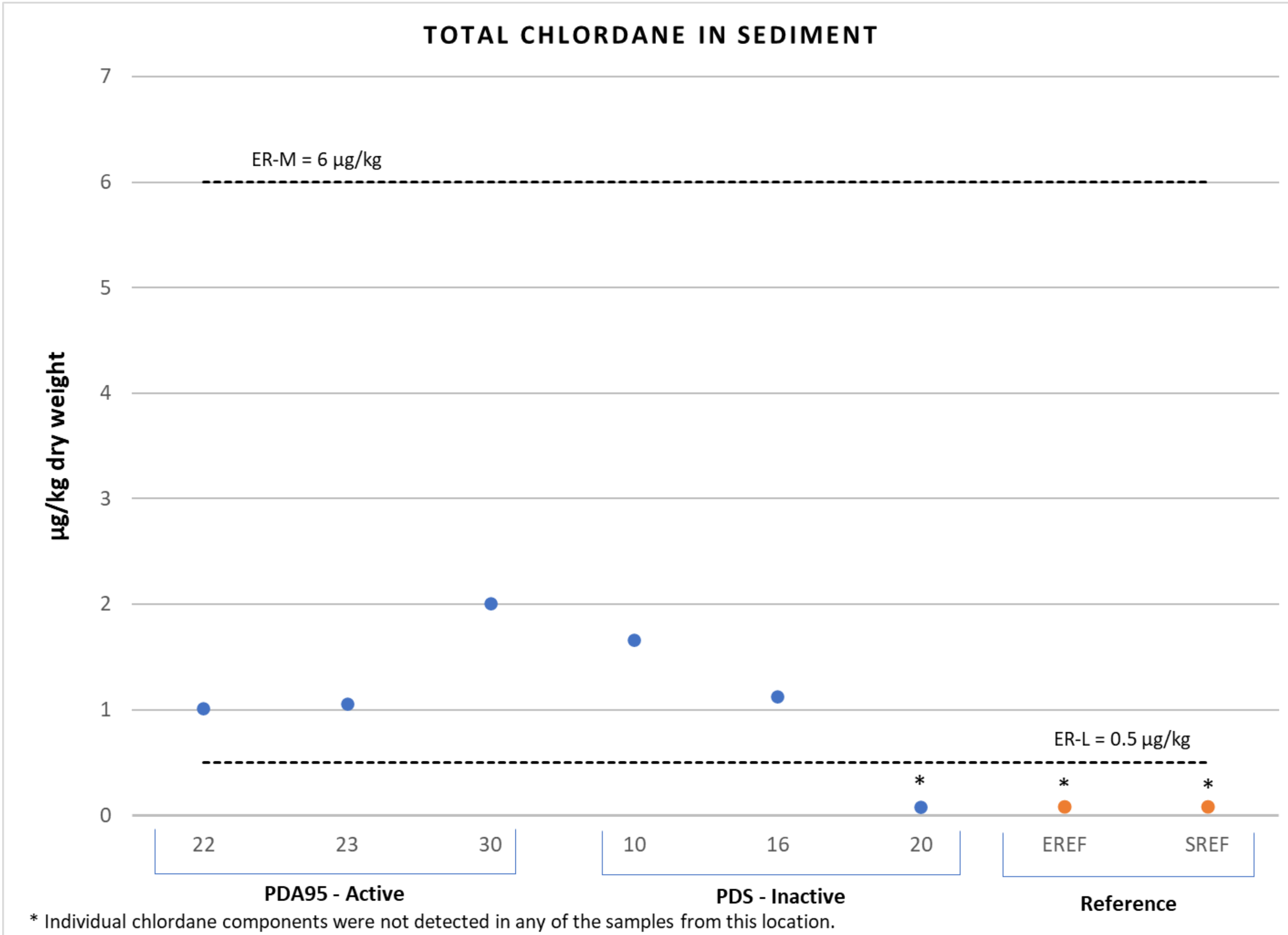


Figure 3-39b. Chlordane (μ g/kg dry-wt.) in sediments from PDS 2016

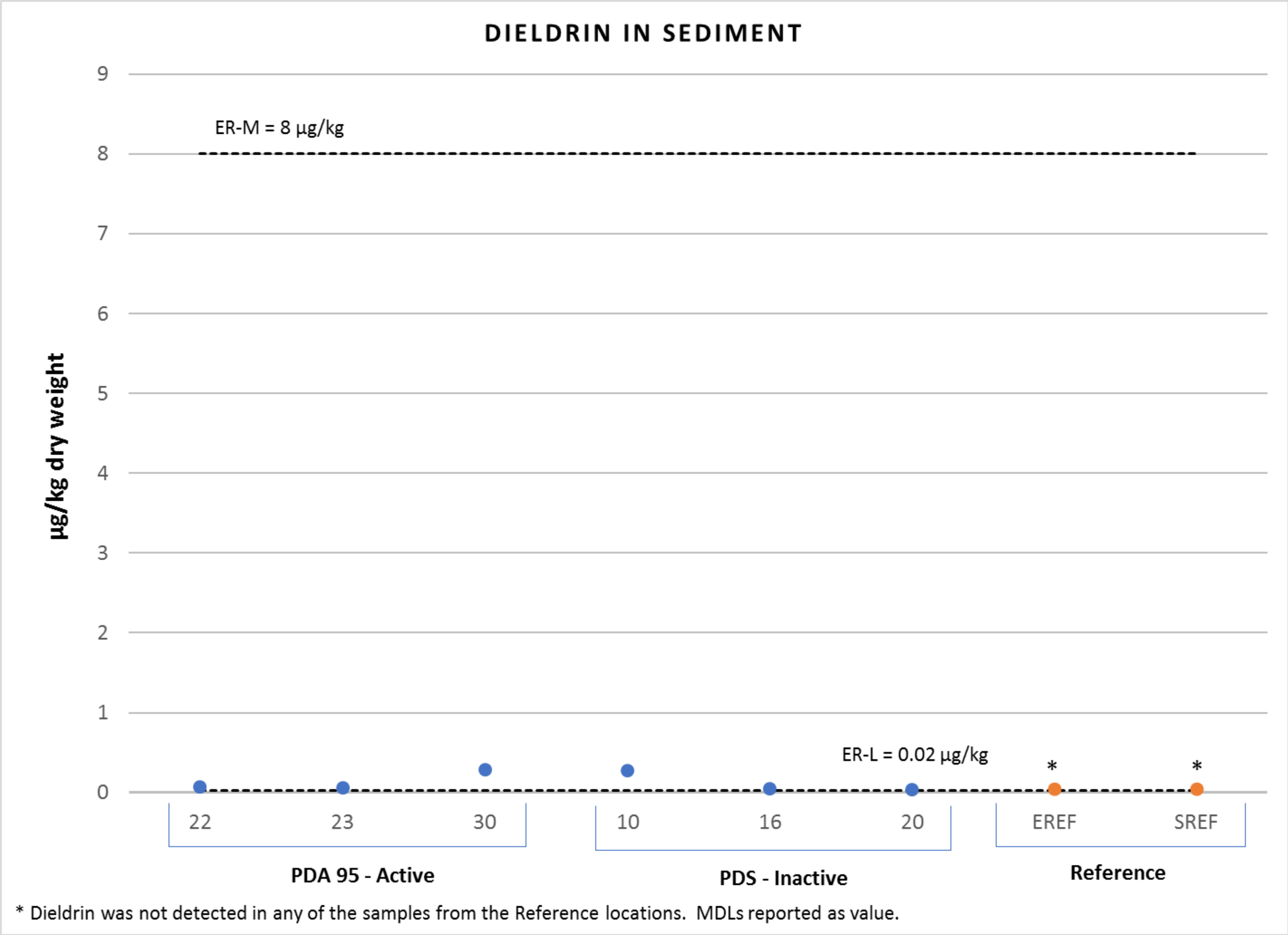


Figure 3-39c. Dieldrin (μ g/kg dry-wt.) in sediments from PDS 2016

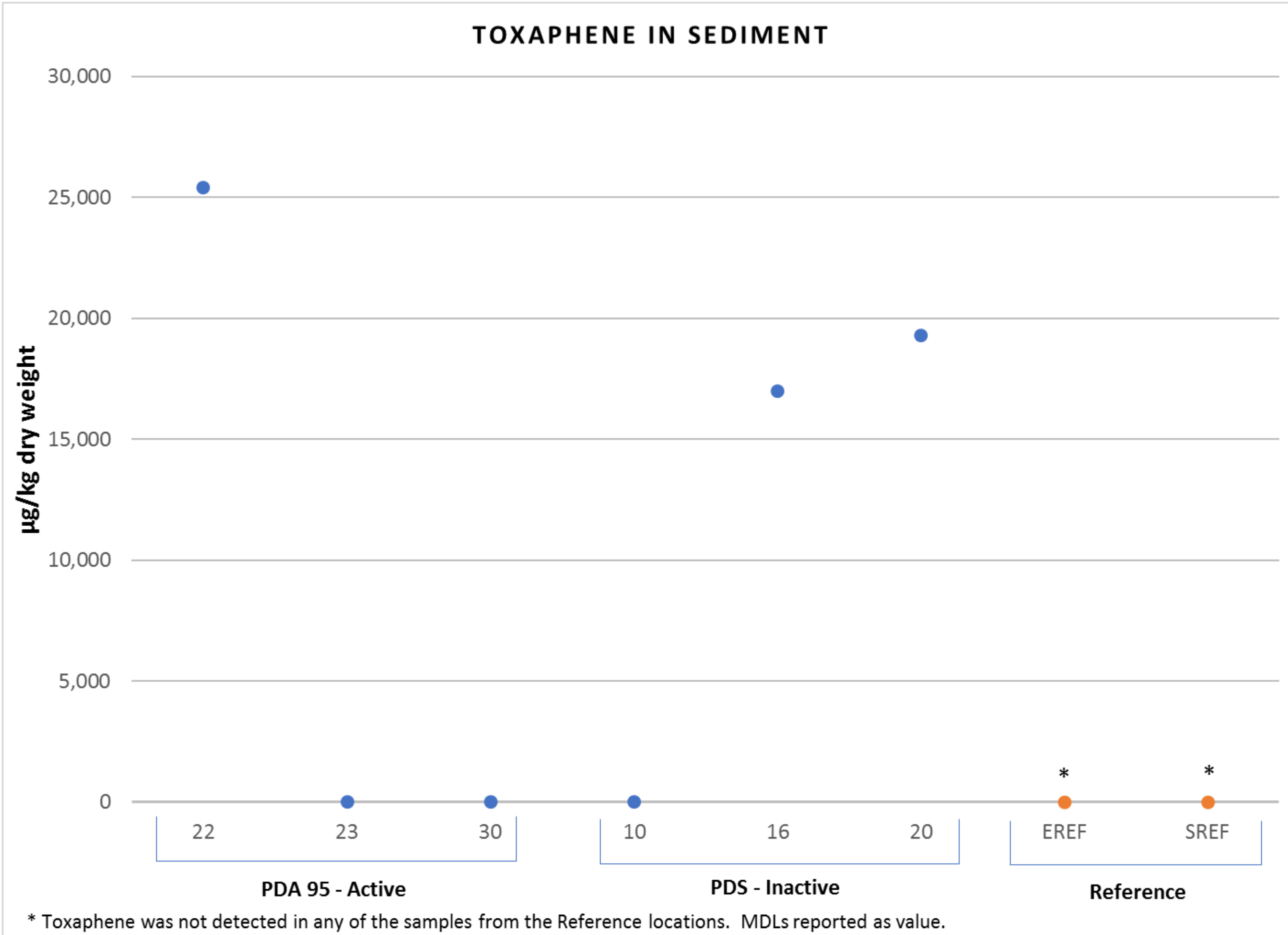


Figure 3-39d. Toxaphene (μ g/kg dry-wt.) in sediments from PDS 2016

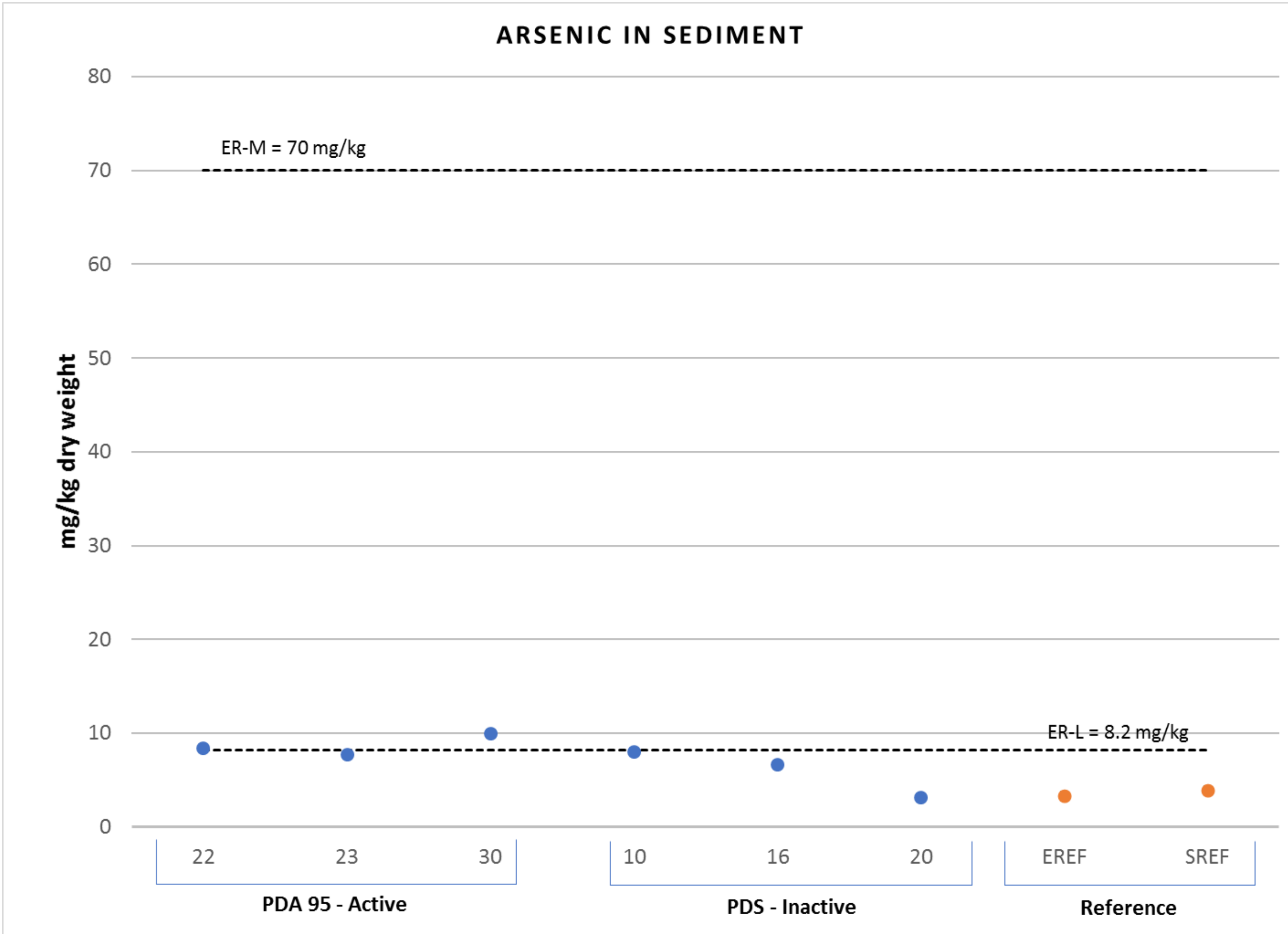


Figure 3-40a. Arsenic (mg/kg dry-wt.) in sediments from PDS 2016

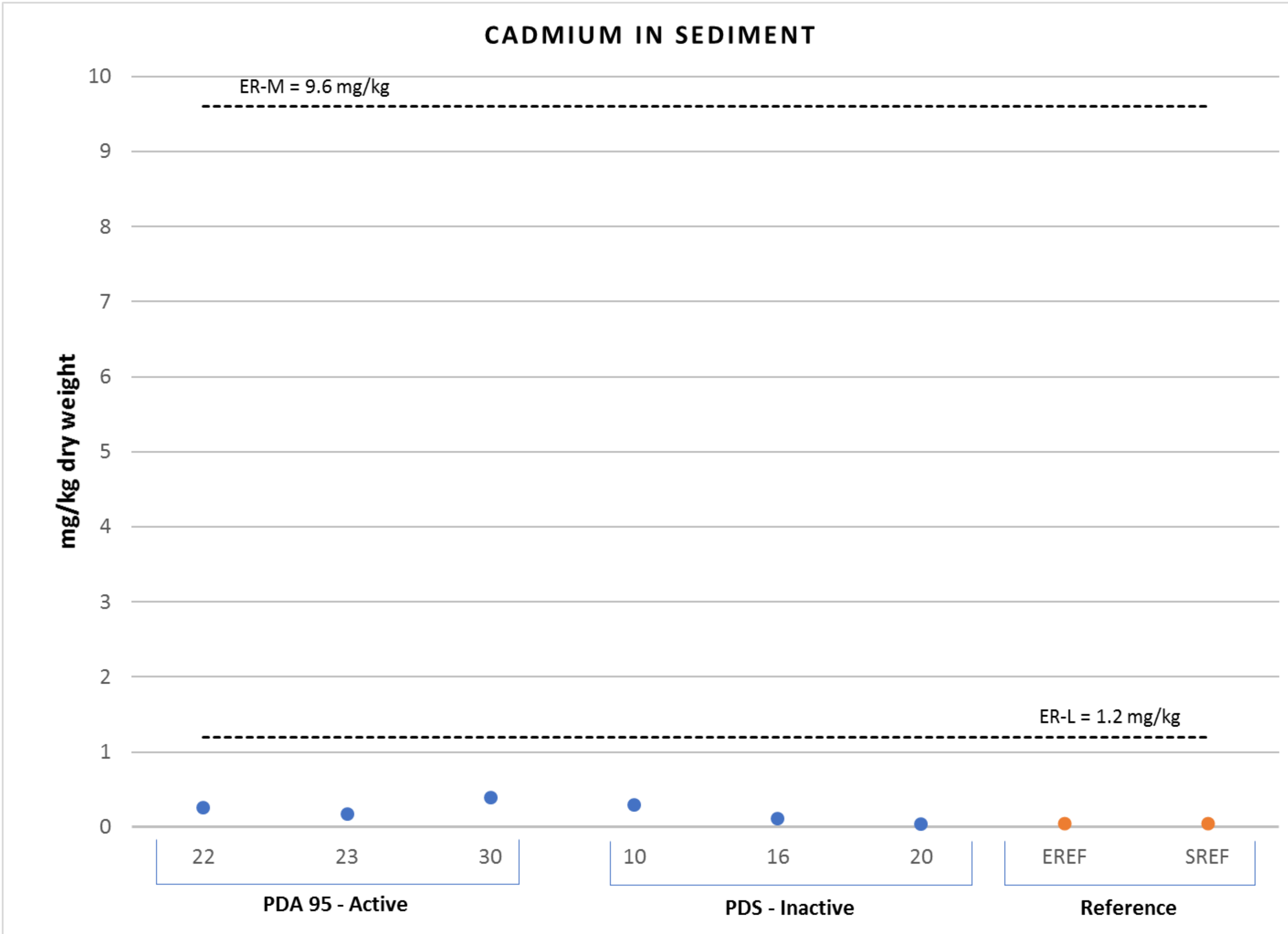


Figure 3-40b. Cadmium (mg/kg dry-wt.) in sediments from PDS 2016

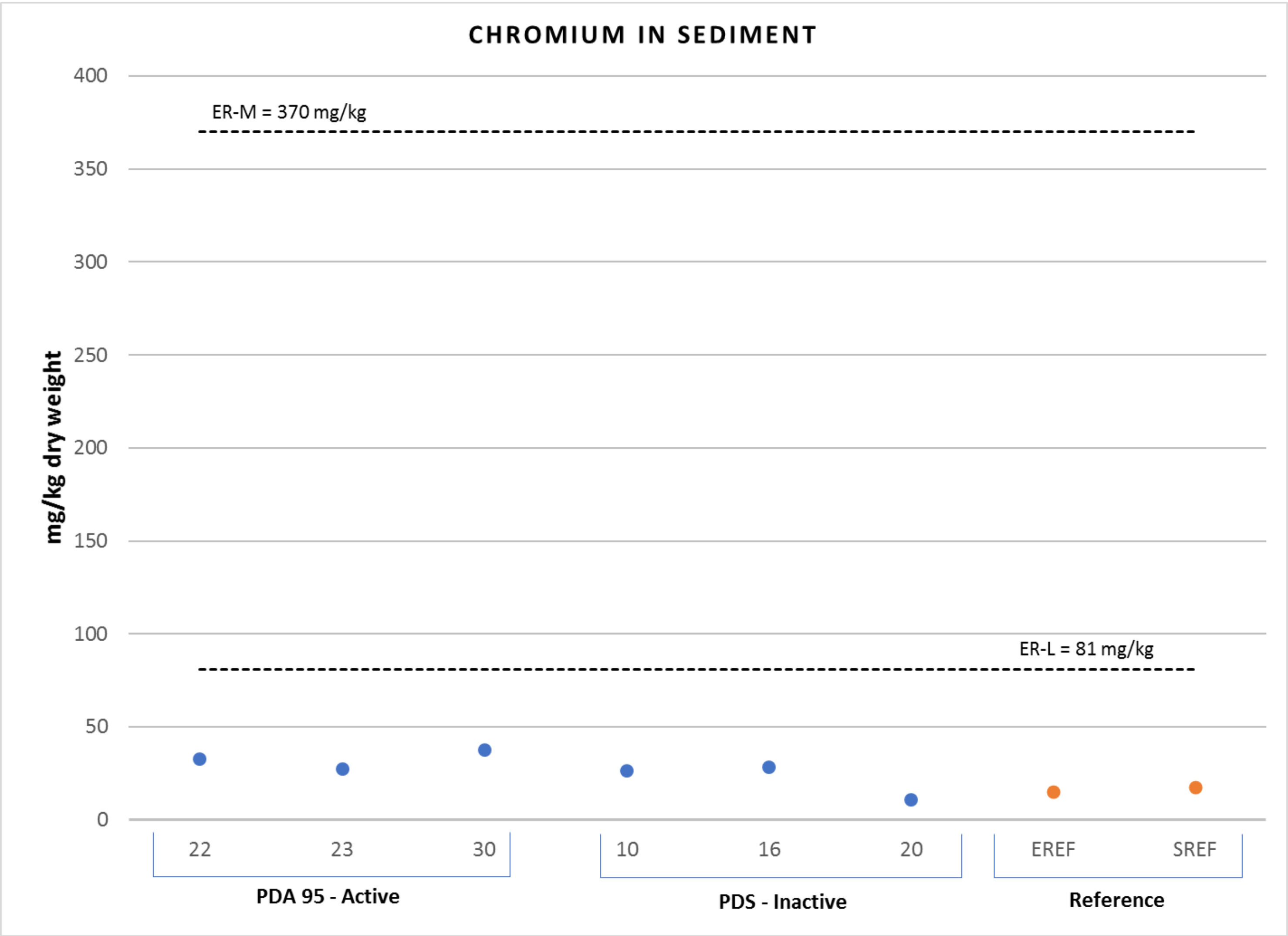


Figure 3-40c. Chromium (mg/kg dry-wt.) in sediments from PDS 2016

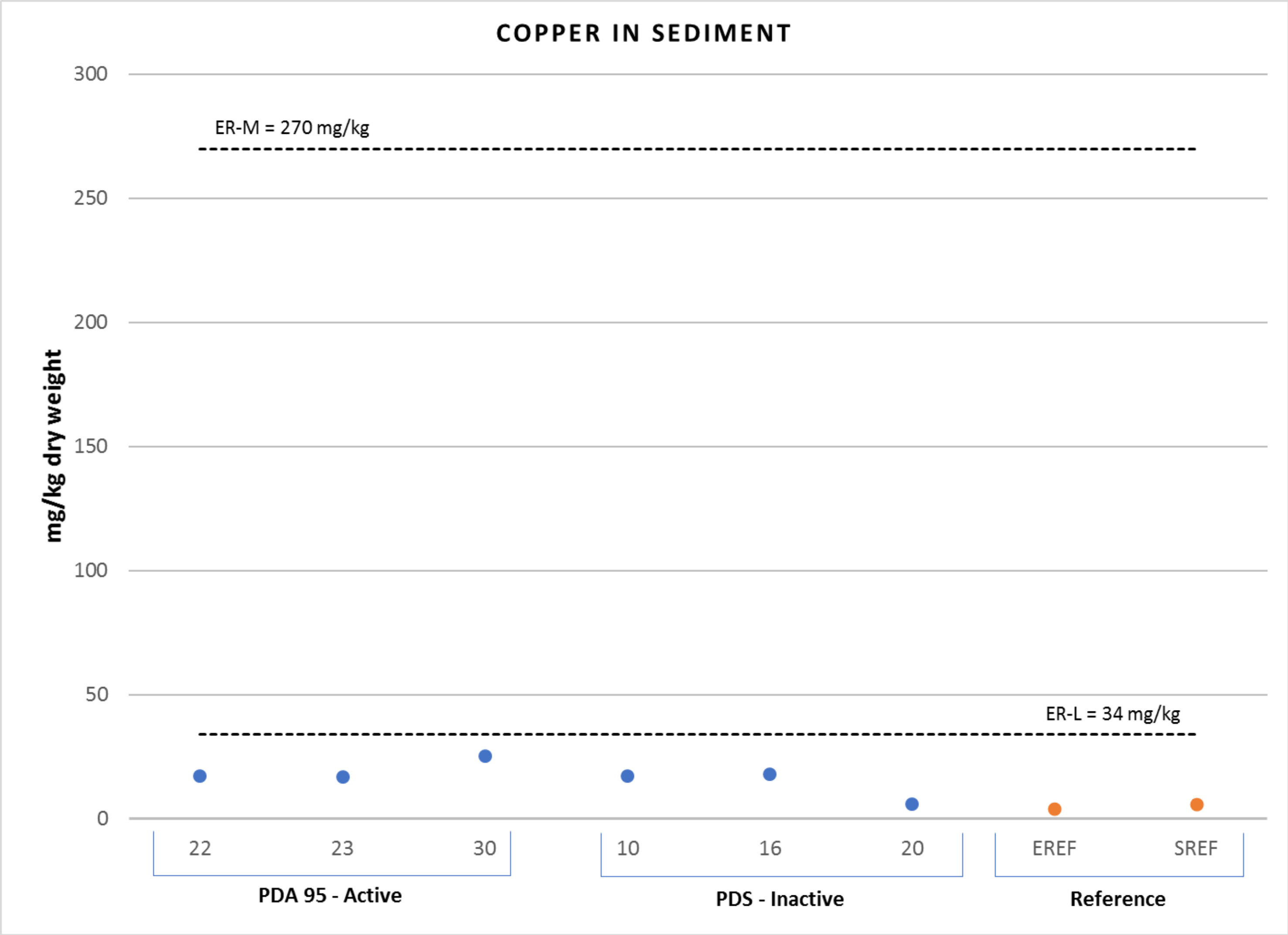


Figure 3-40d. Copper (mg/kg dry-wt.) in sediments from PDS 2016

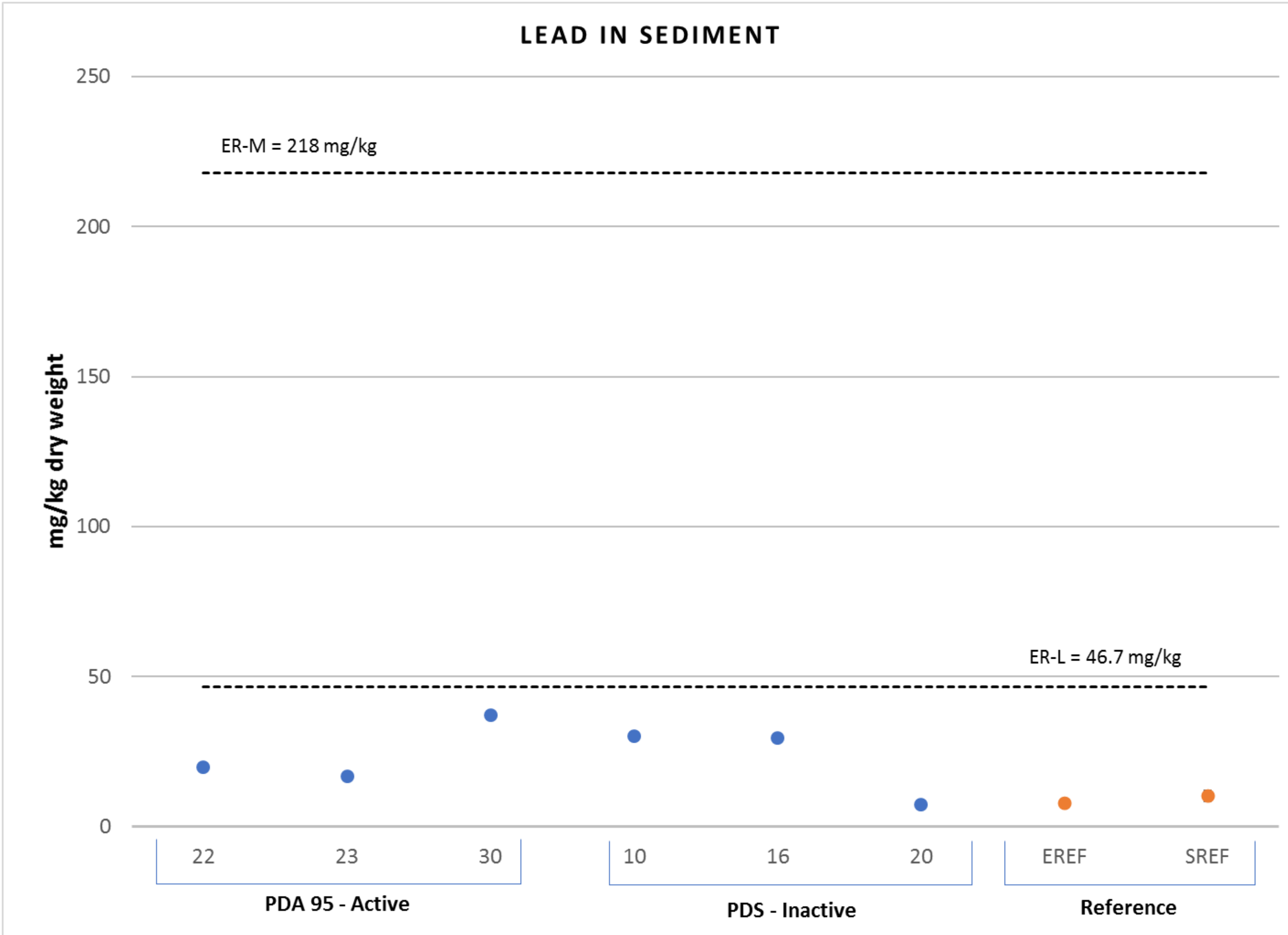


Figure 3-40e. Lead (mg/kg dry-wt.) in sediments from PDS 2016

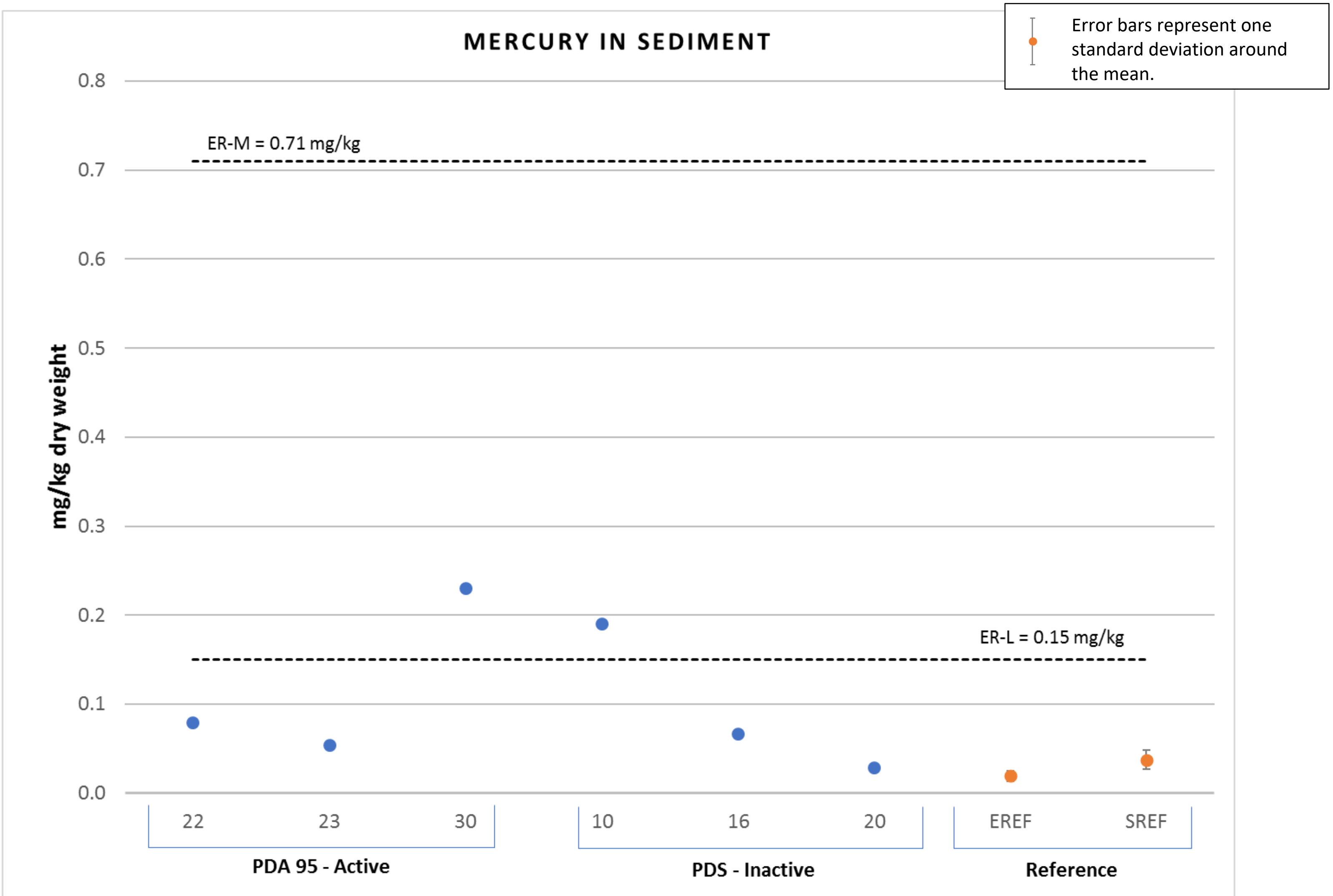


Figure 3-40f. Mercury (mg/kg dry-wt.) in sediments from PDS 2016

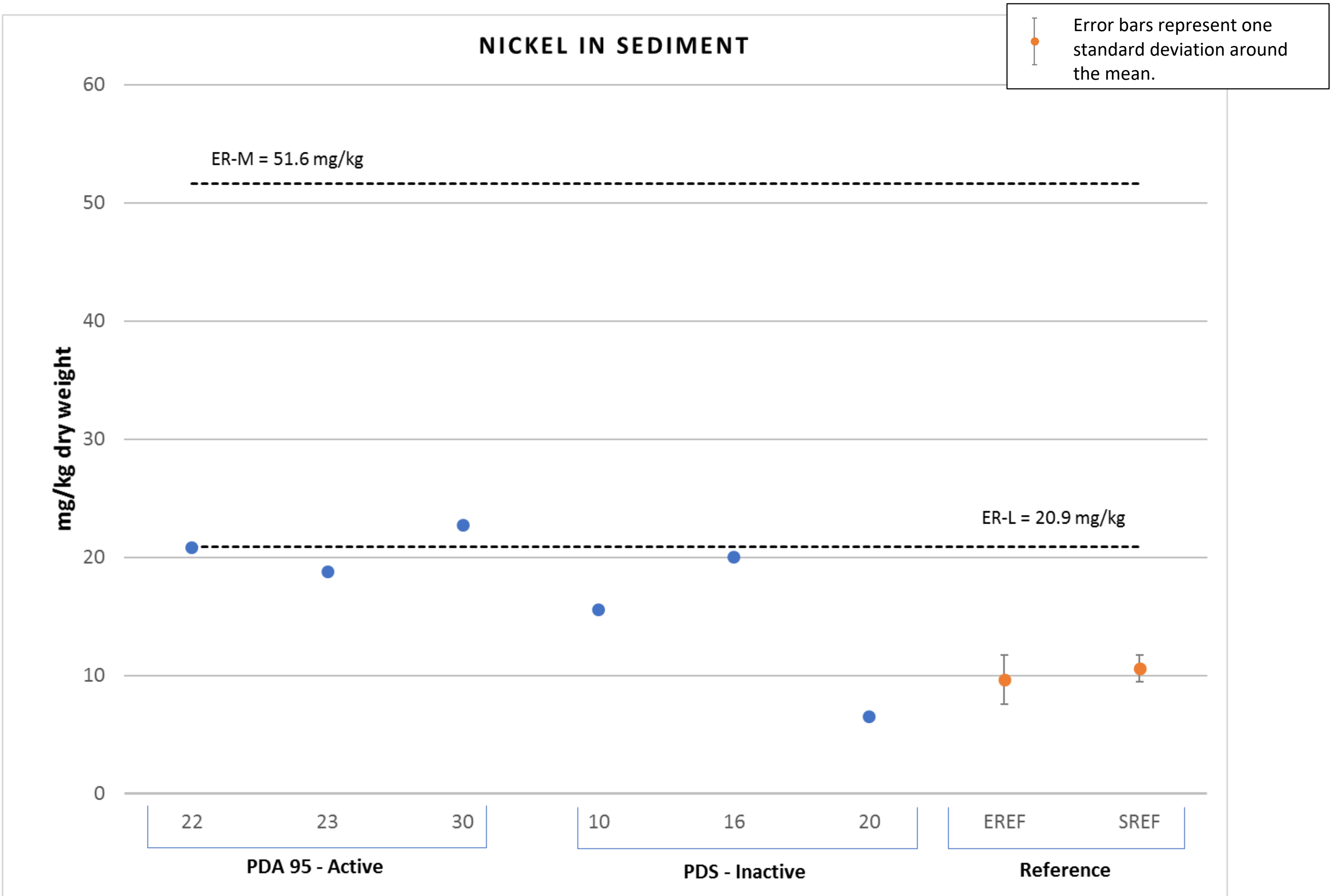


Figure 3-40g. Nickel (mg/kg dry-wt.) in sediments from PDS 2016

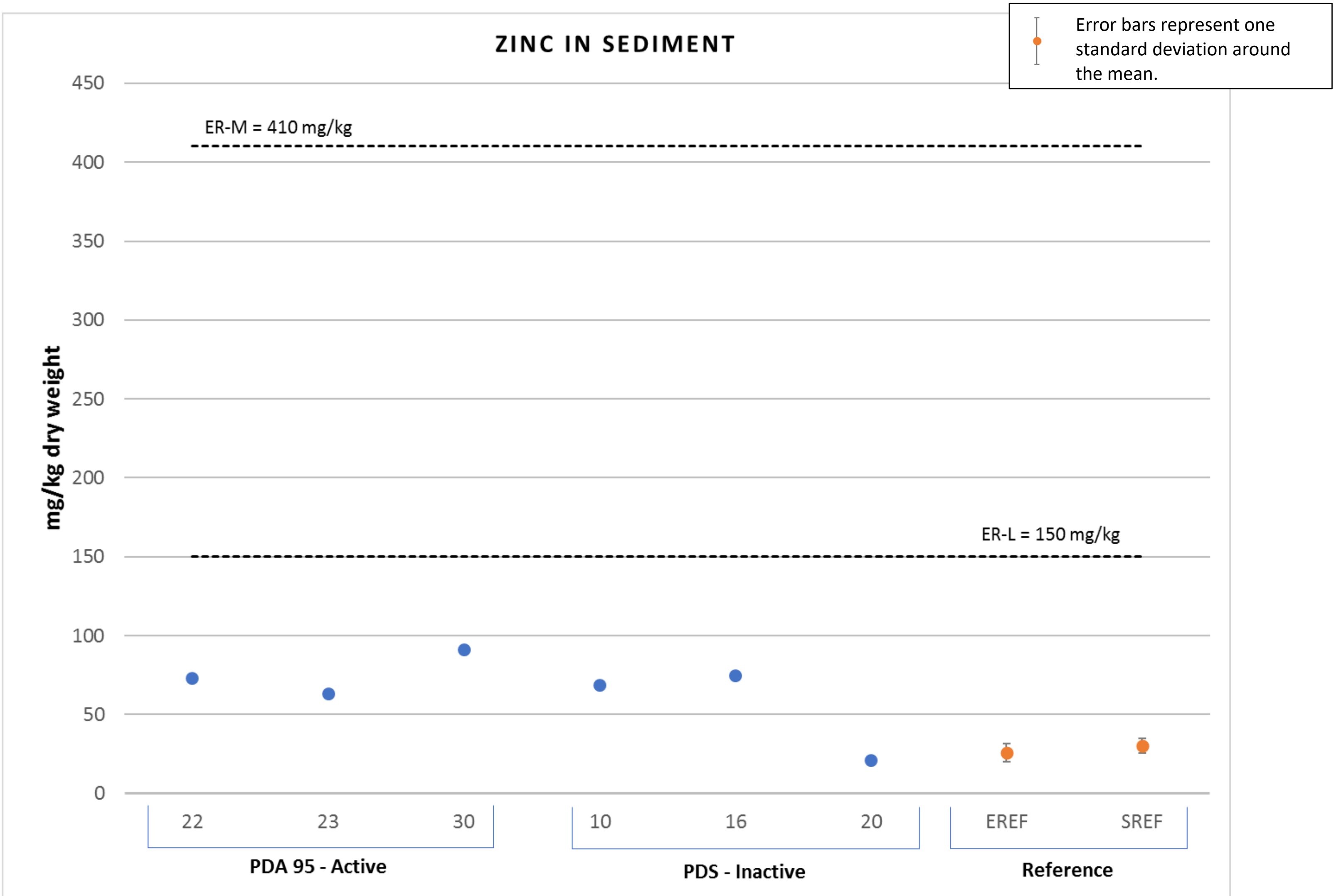


Figure 3-40h. Zinc (mg/kg dry-wt.) in sediments from PDS 2016

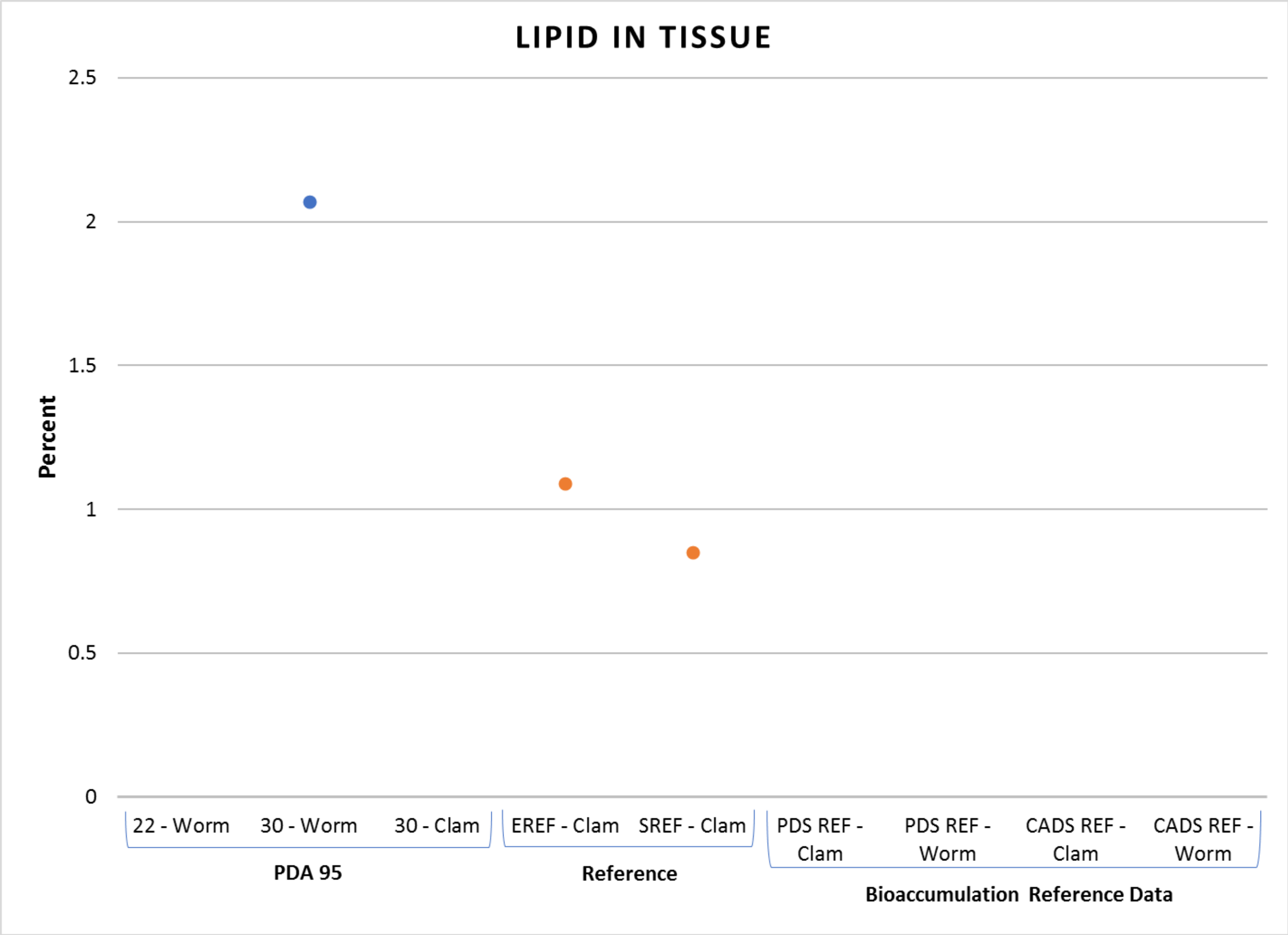


Figure 3-41. Percent lipids in tissue from PDS 2016

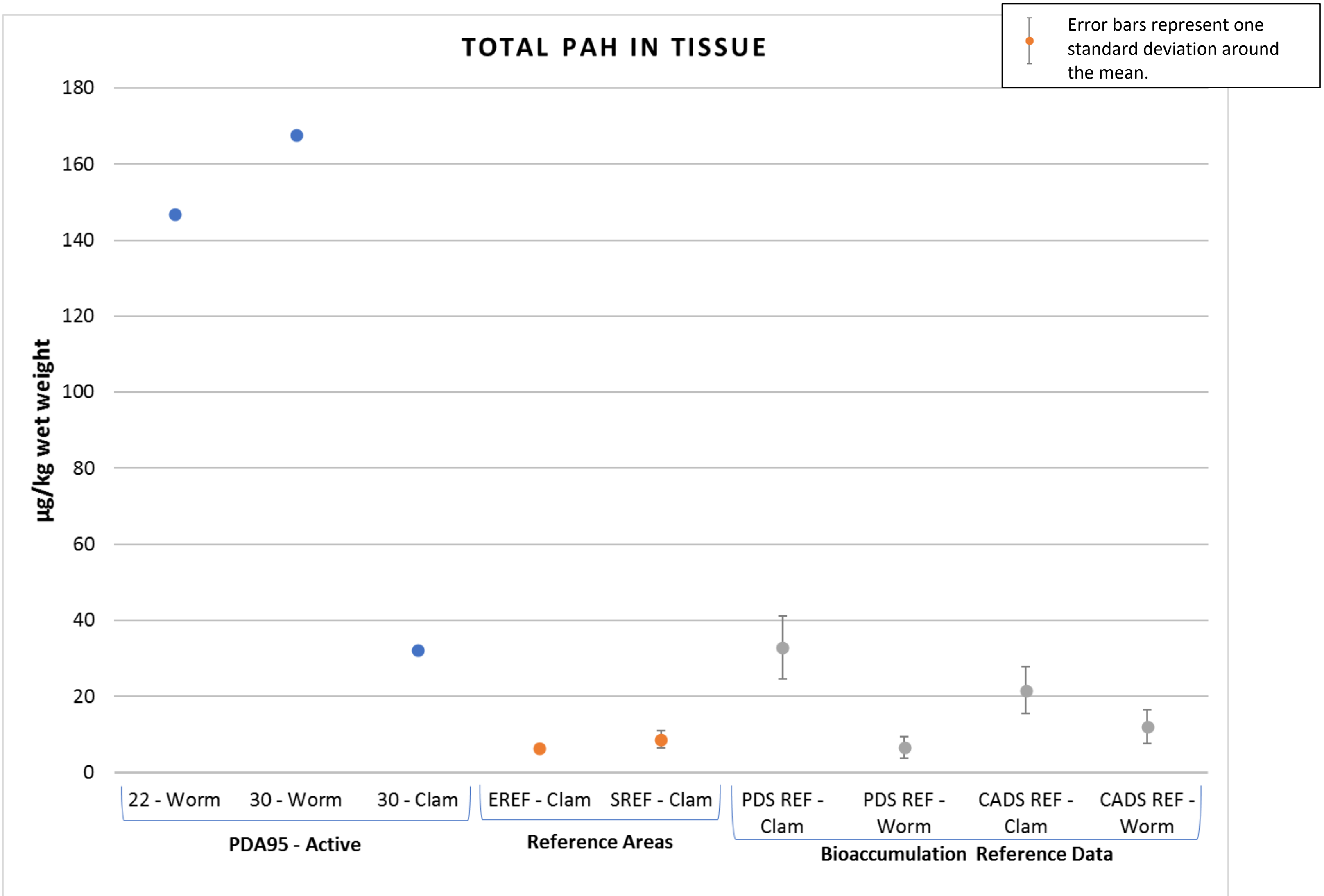


Figure 3-42. Total PAH (μ g/kg wet-wt.) in tissue from PDS 2016

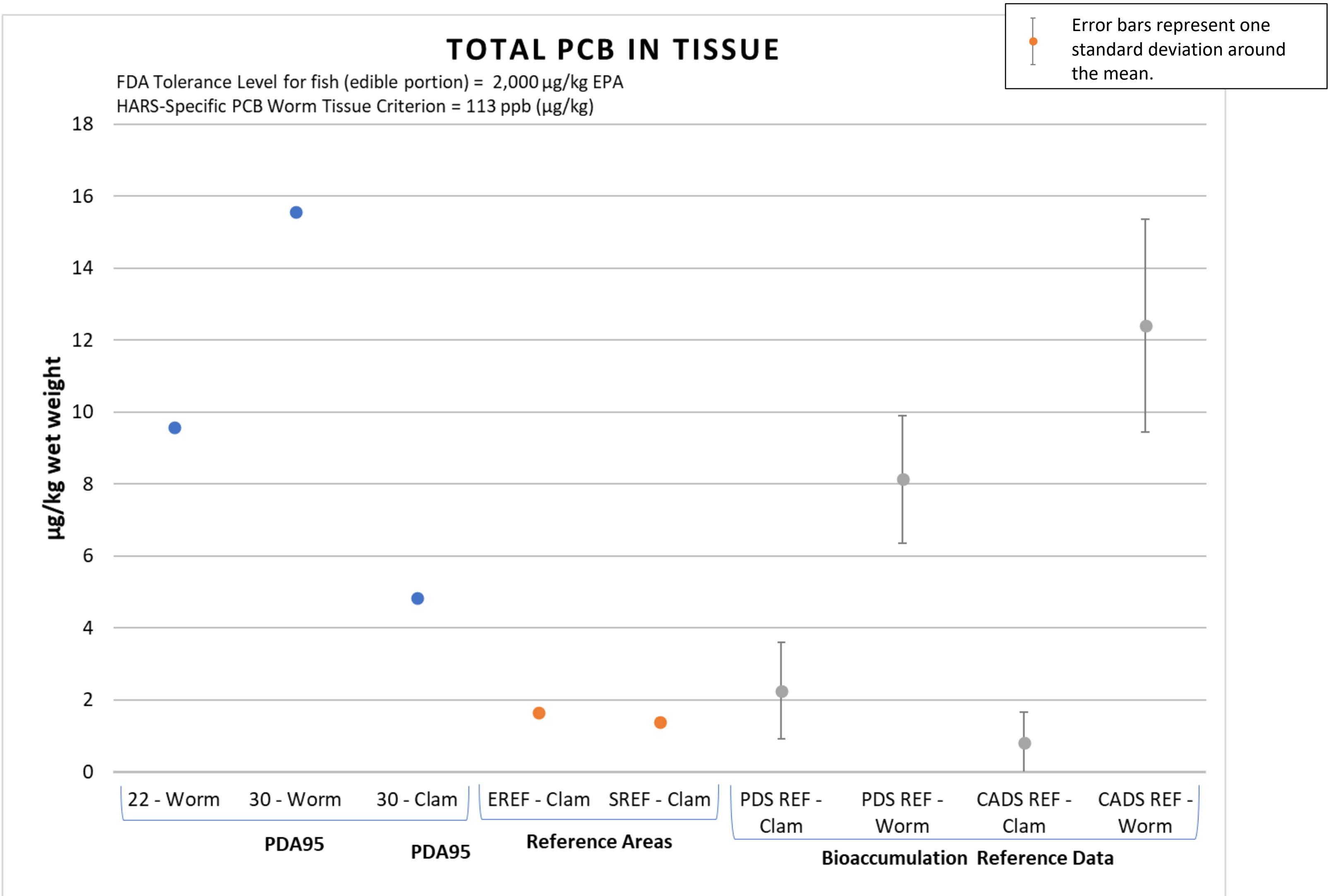


Figure 3-43. Total PCB (μ g/kg wet-wt.) in tissue from PDS 2016

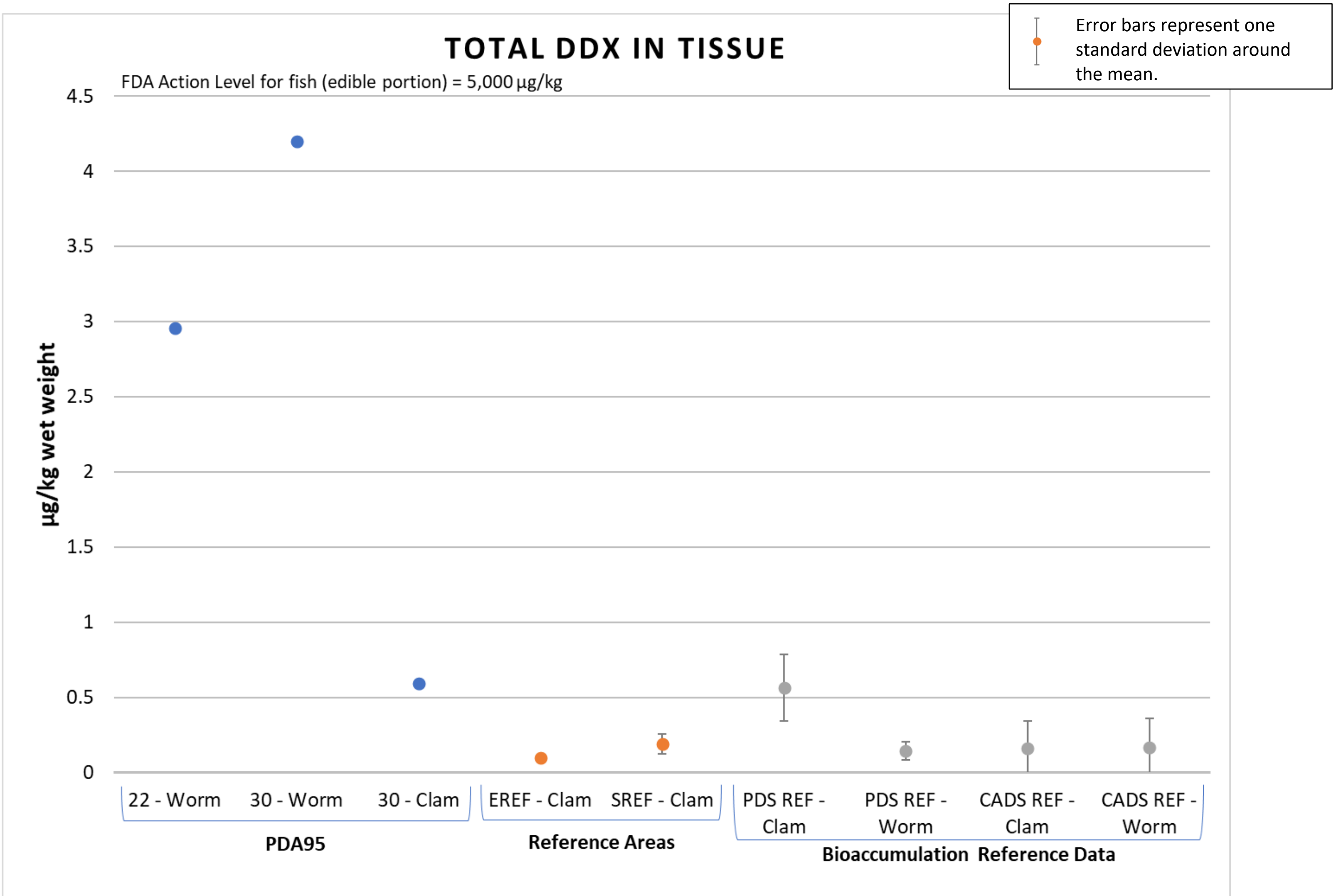


Figure 3-44a. Total DDX (μ g/kg wet-wt.) in tissue from PDS 2016

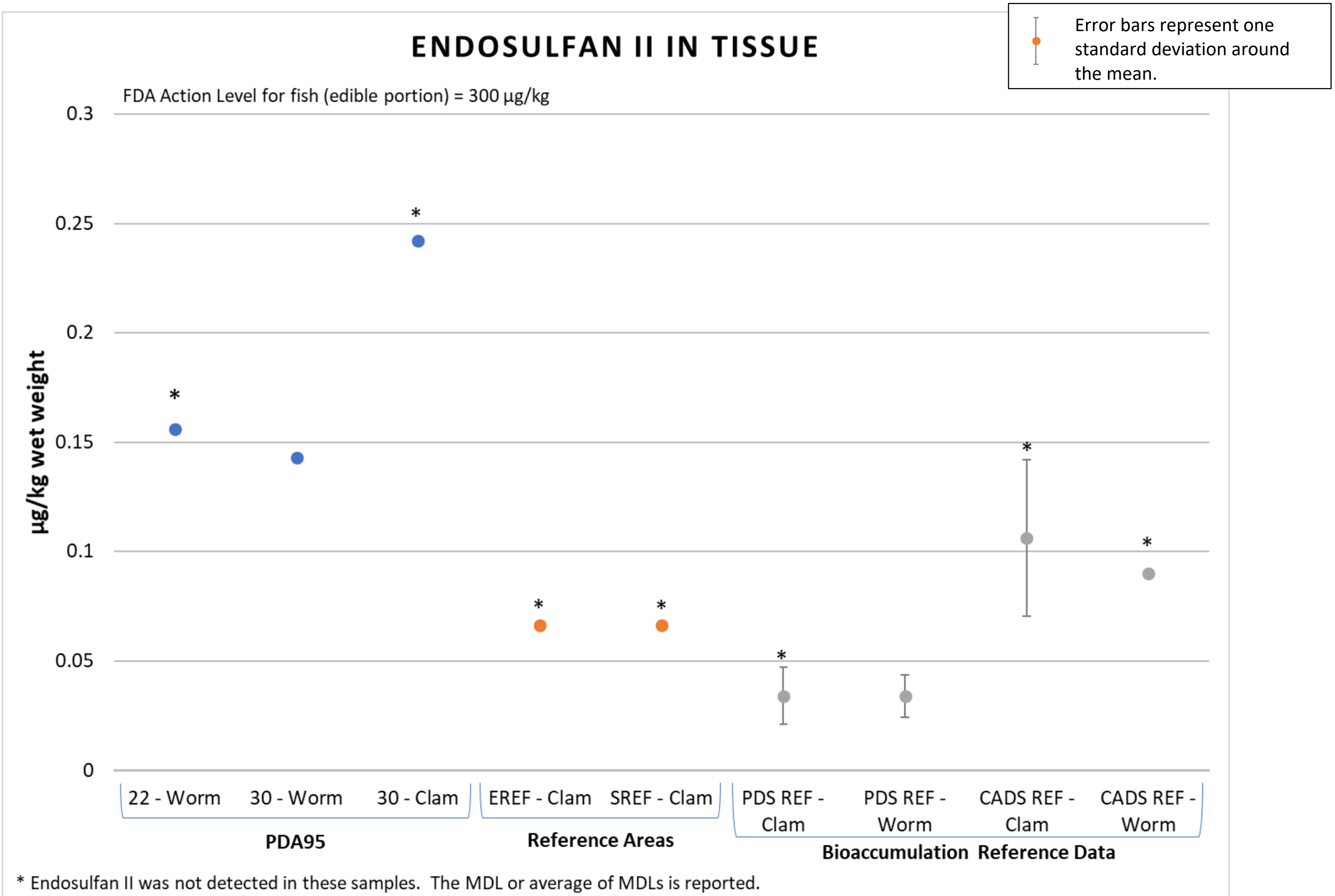


Figure 3-44b. Endosulfan (μ g/kg wet-wt.) in tissue from PDS 2016

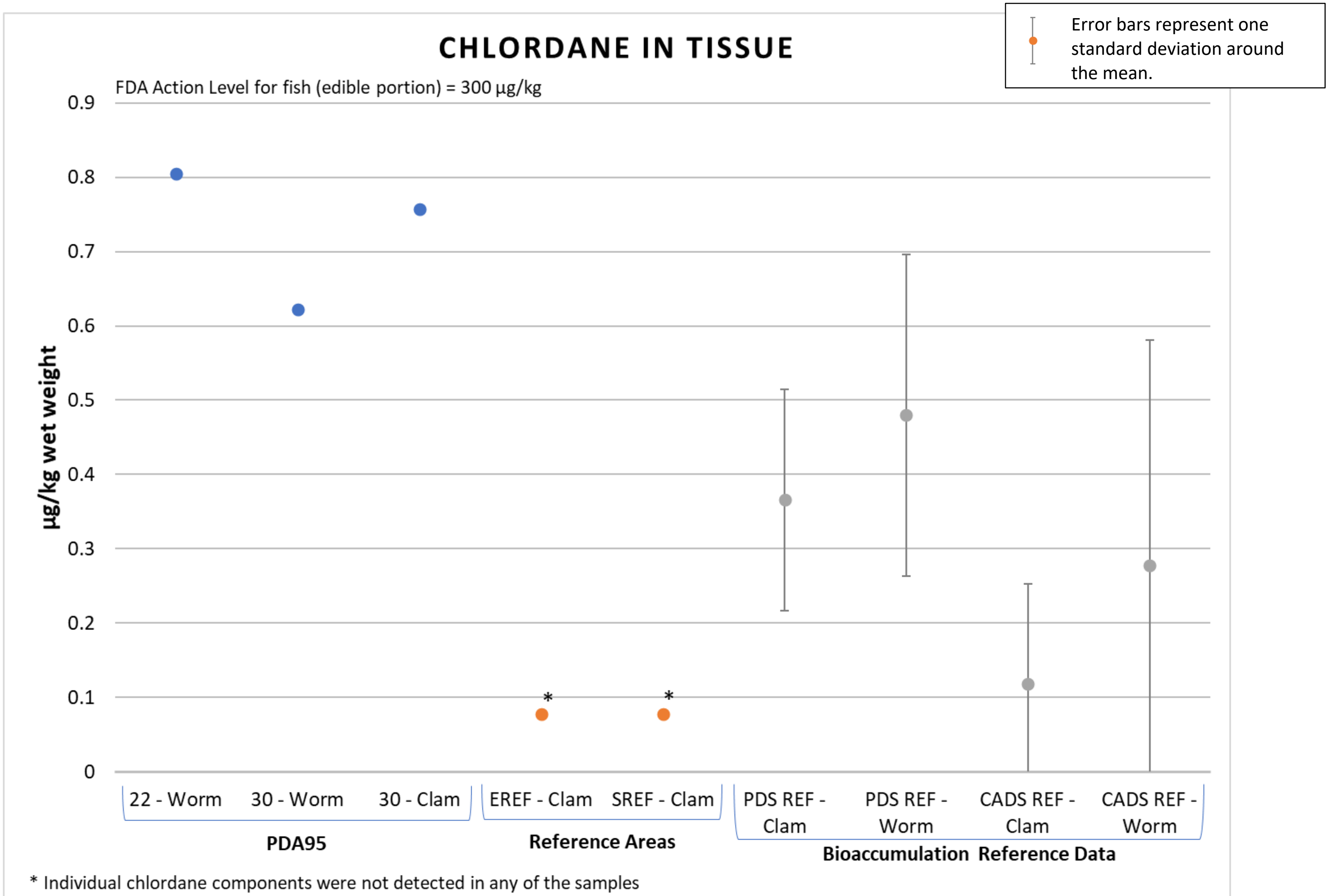


Figure 3-44c. Chlordane (μ g/kg wet-wt.) in tissue from PDS 2016

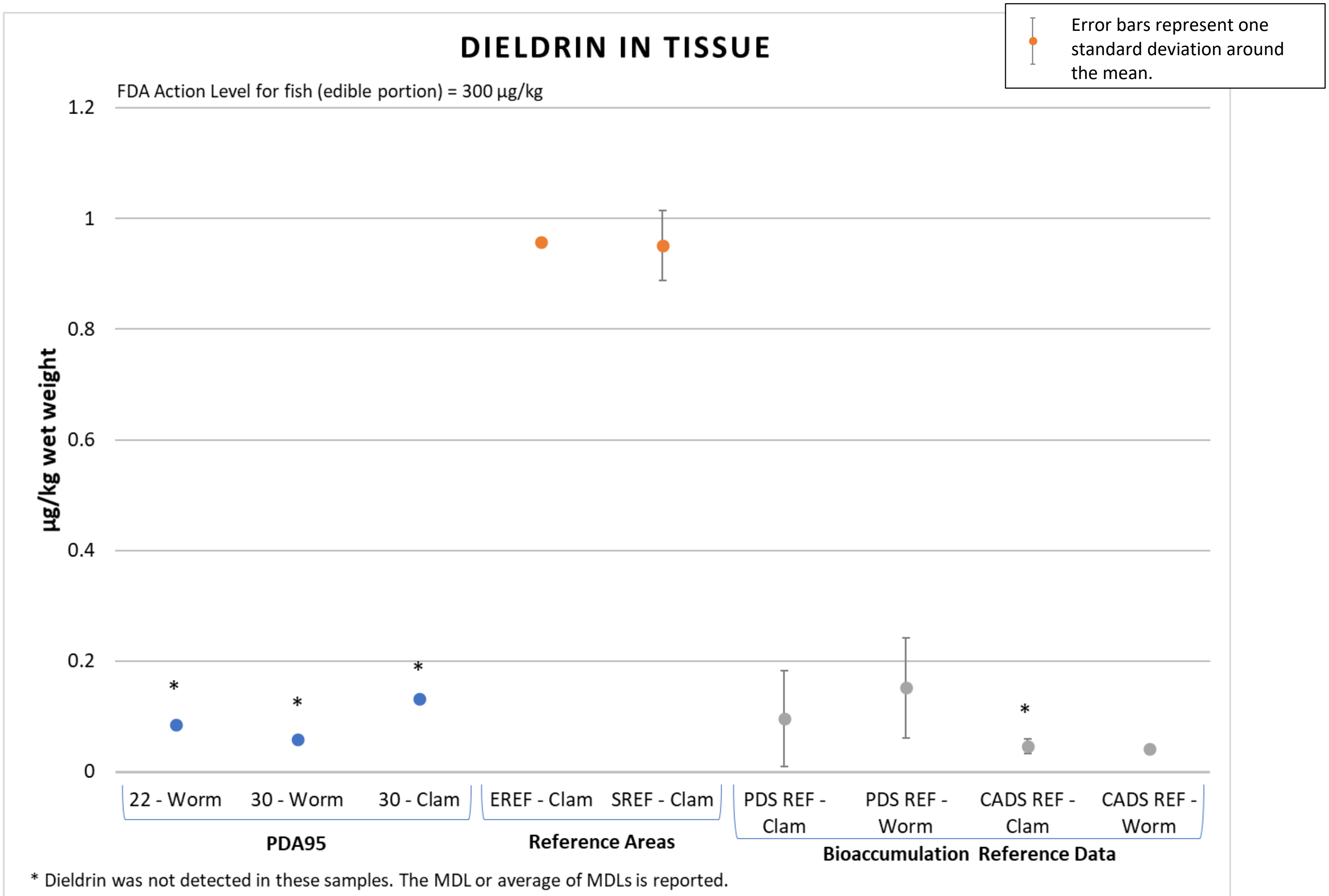


Figure 3-44d. Dieldrin (μ g/kg wet-wt.) in tissue from PDS 2016

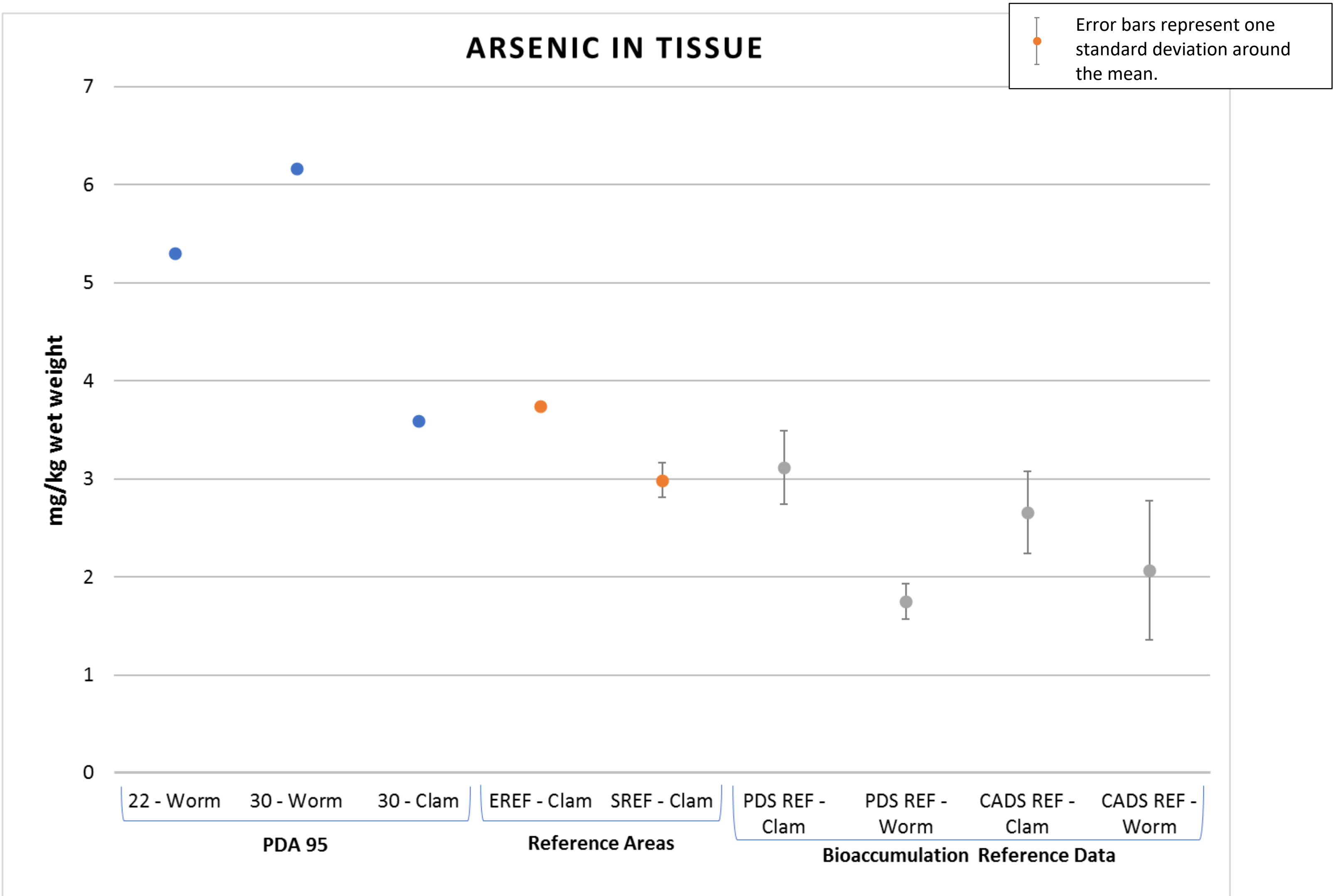


Figure 3-45a. Arsenic (mg/kg wet-wt.) in tissue from PDS 2016

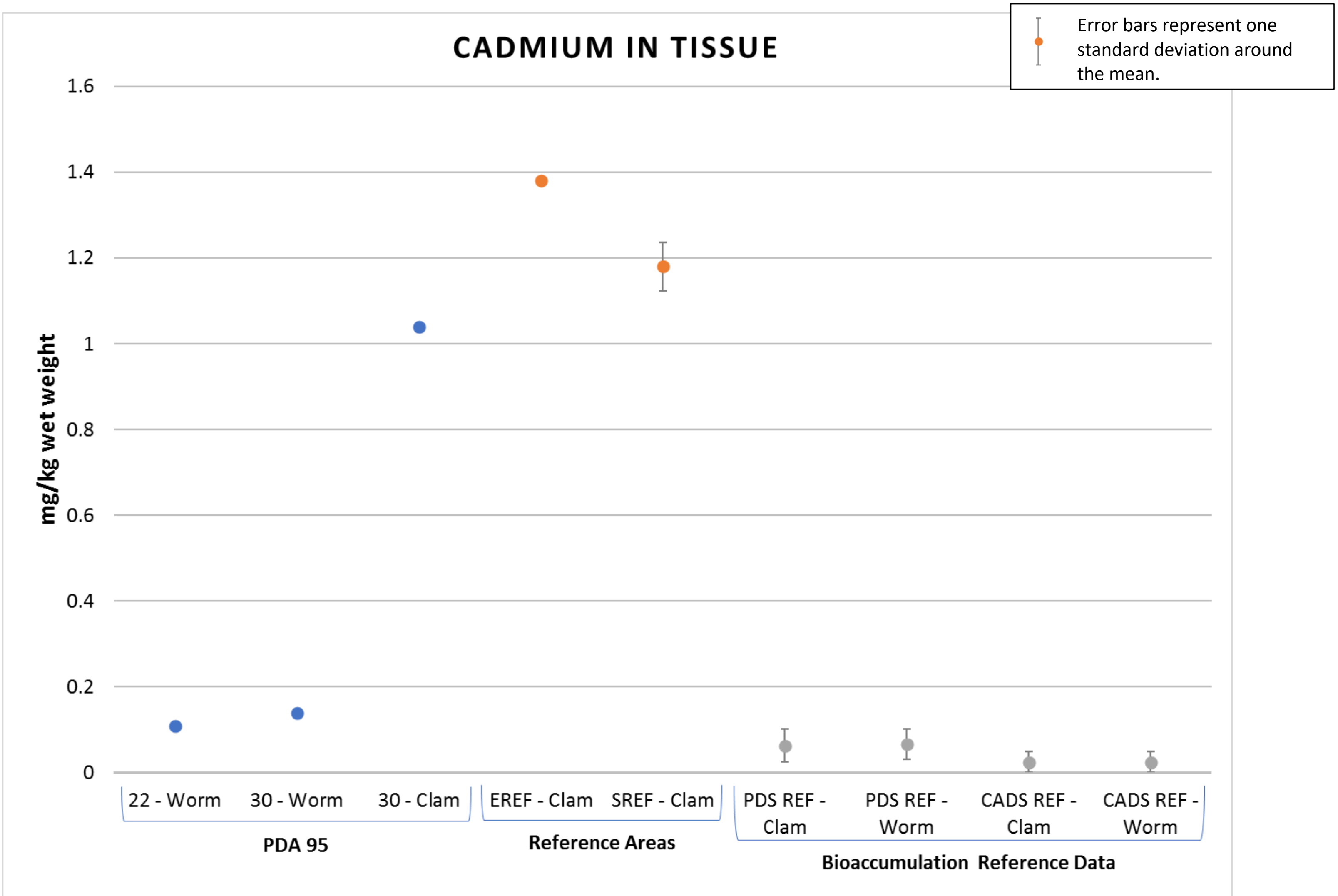


Figure 3-45b. Cadmium (mg/kg wet-wt.) in tissue from PDS 2016

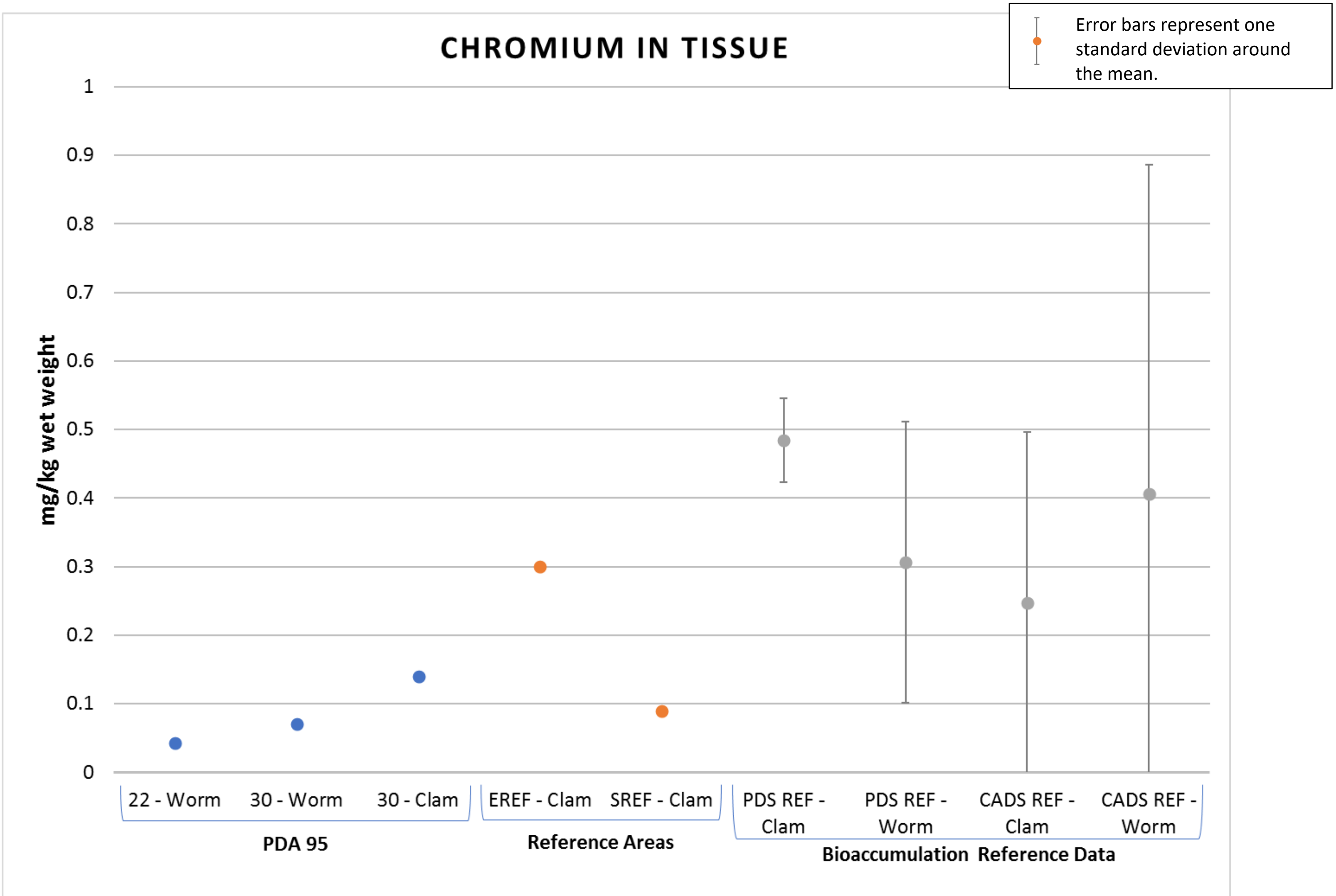


Figure 3-45c. Chromium (mg/kg wet-wt.) in tissue from PDS 2016

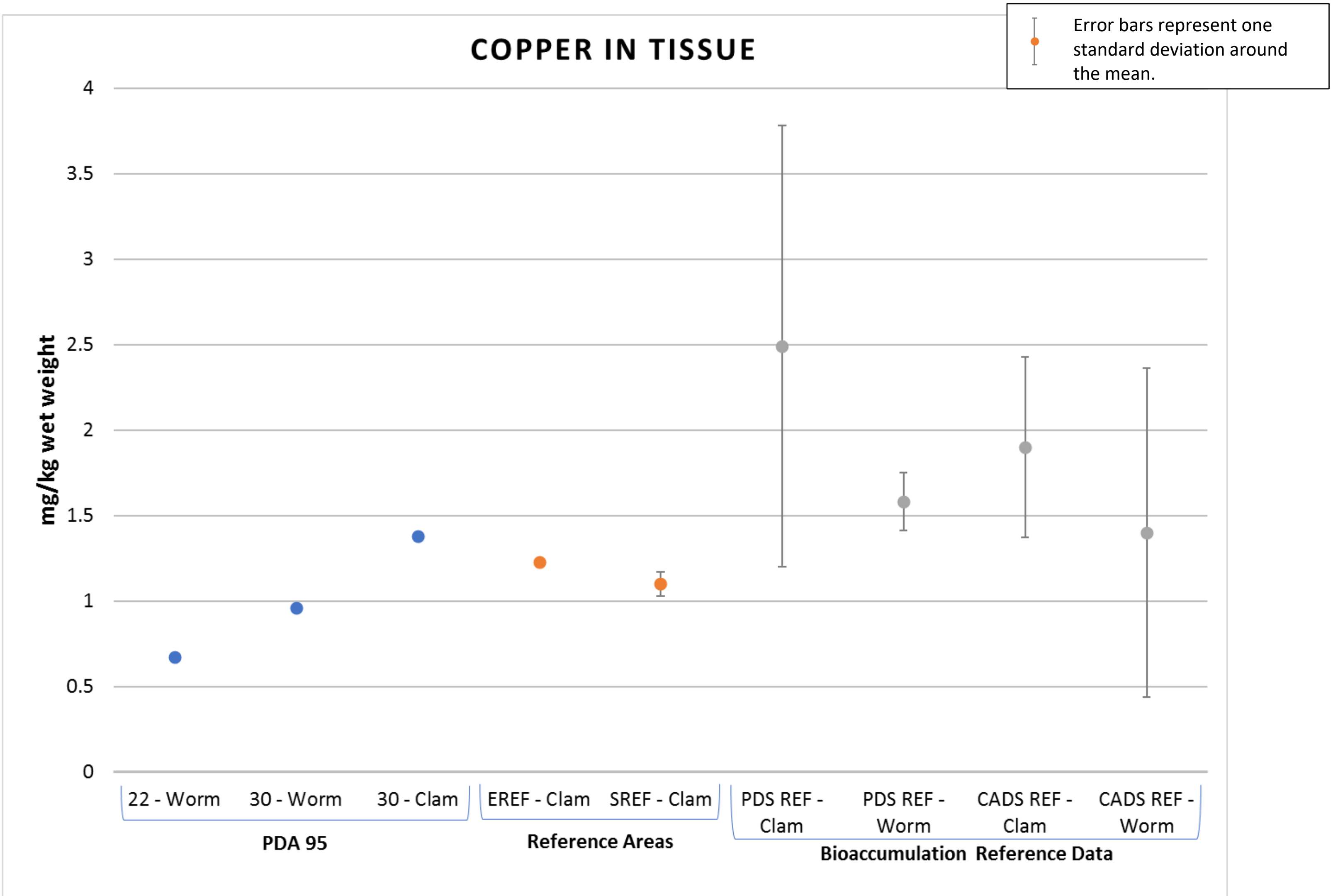


Figure 3-45d. Copper (mg/kg wet-wt.) in tissue from PDS 2016

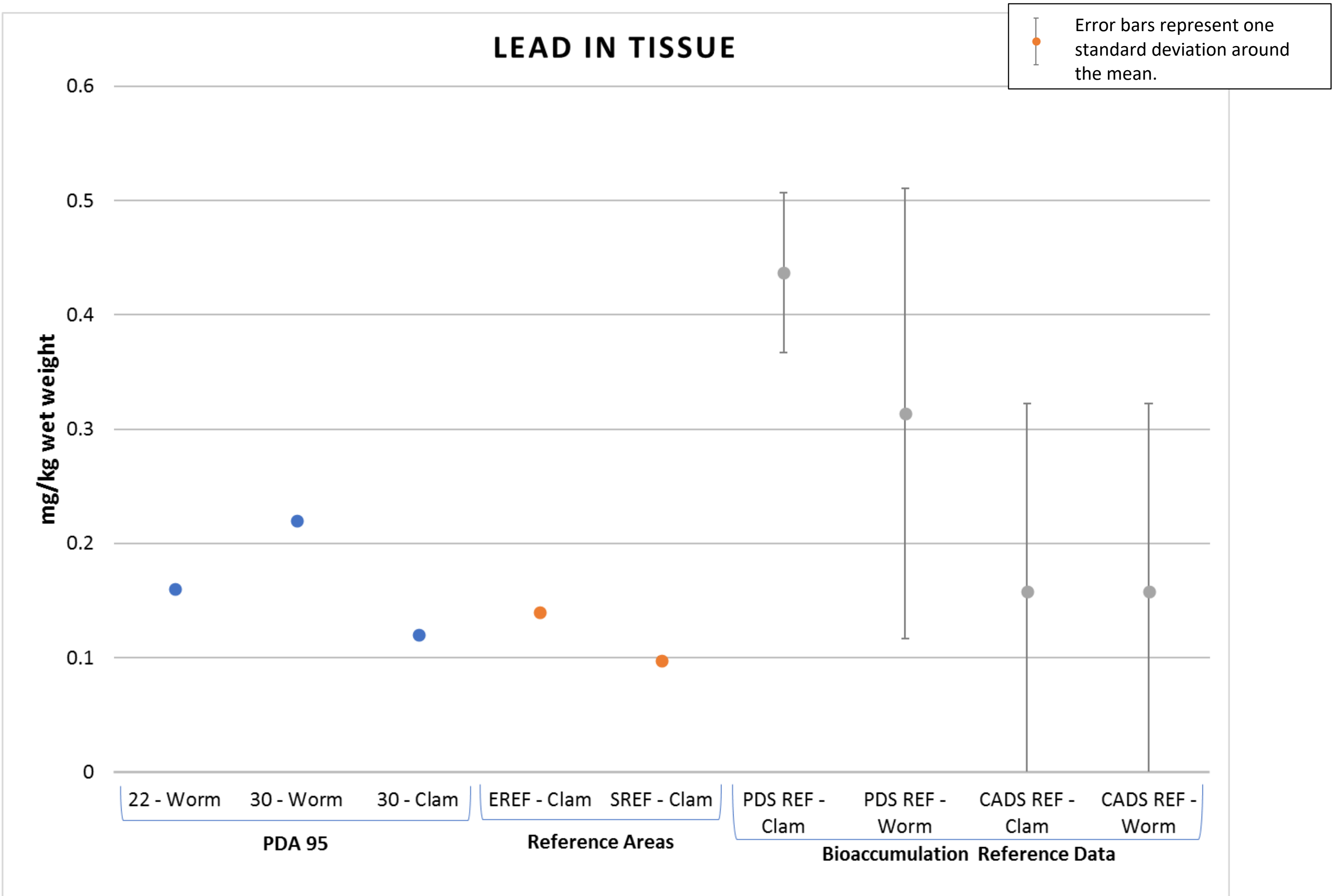


Figure 3-45e. Lead (mg/kg wet-wt.) in tissue from PDS 2016

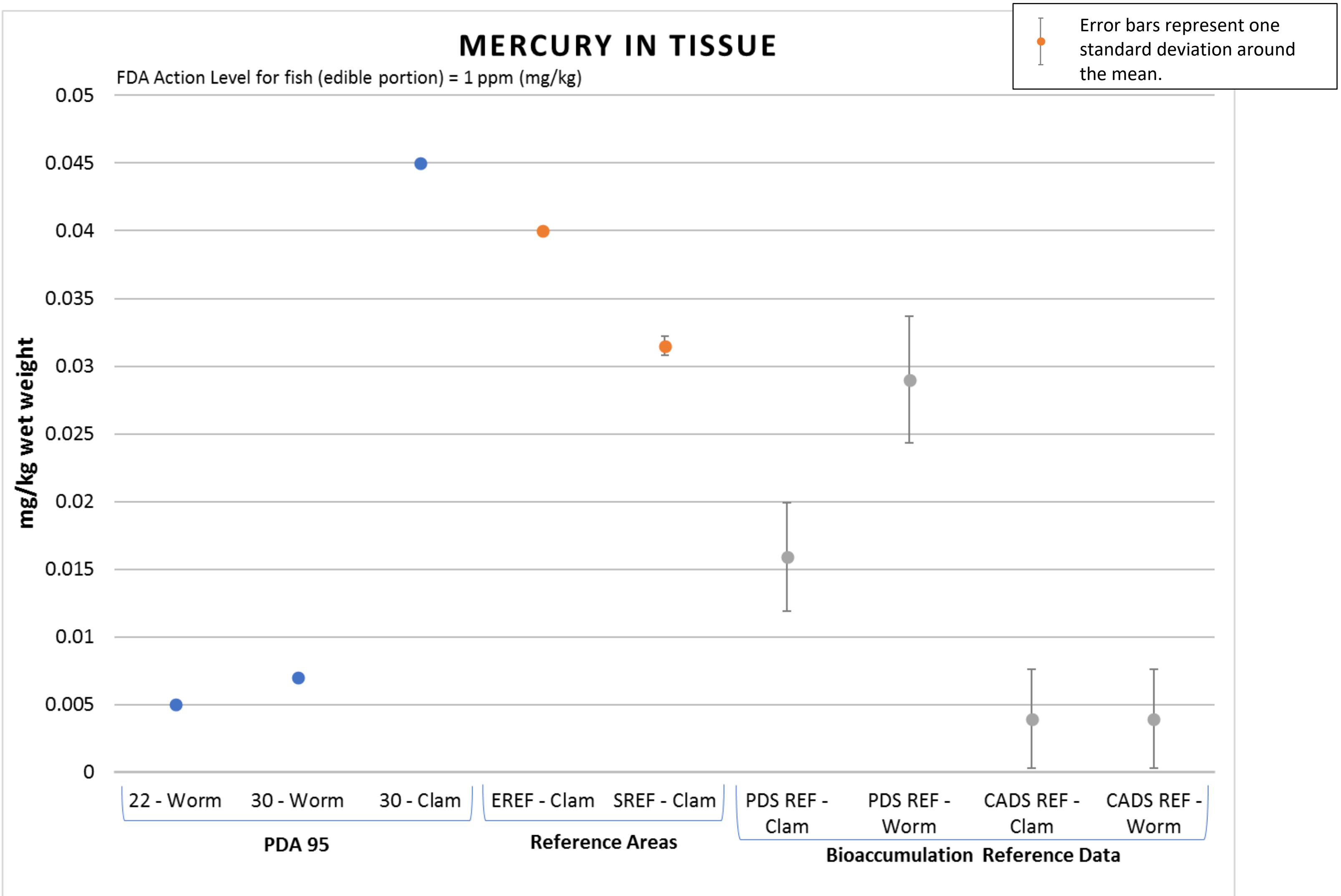


Figure 3-45f. Mercury (mg/kg wet-wt.) in tissue from PDS 2016

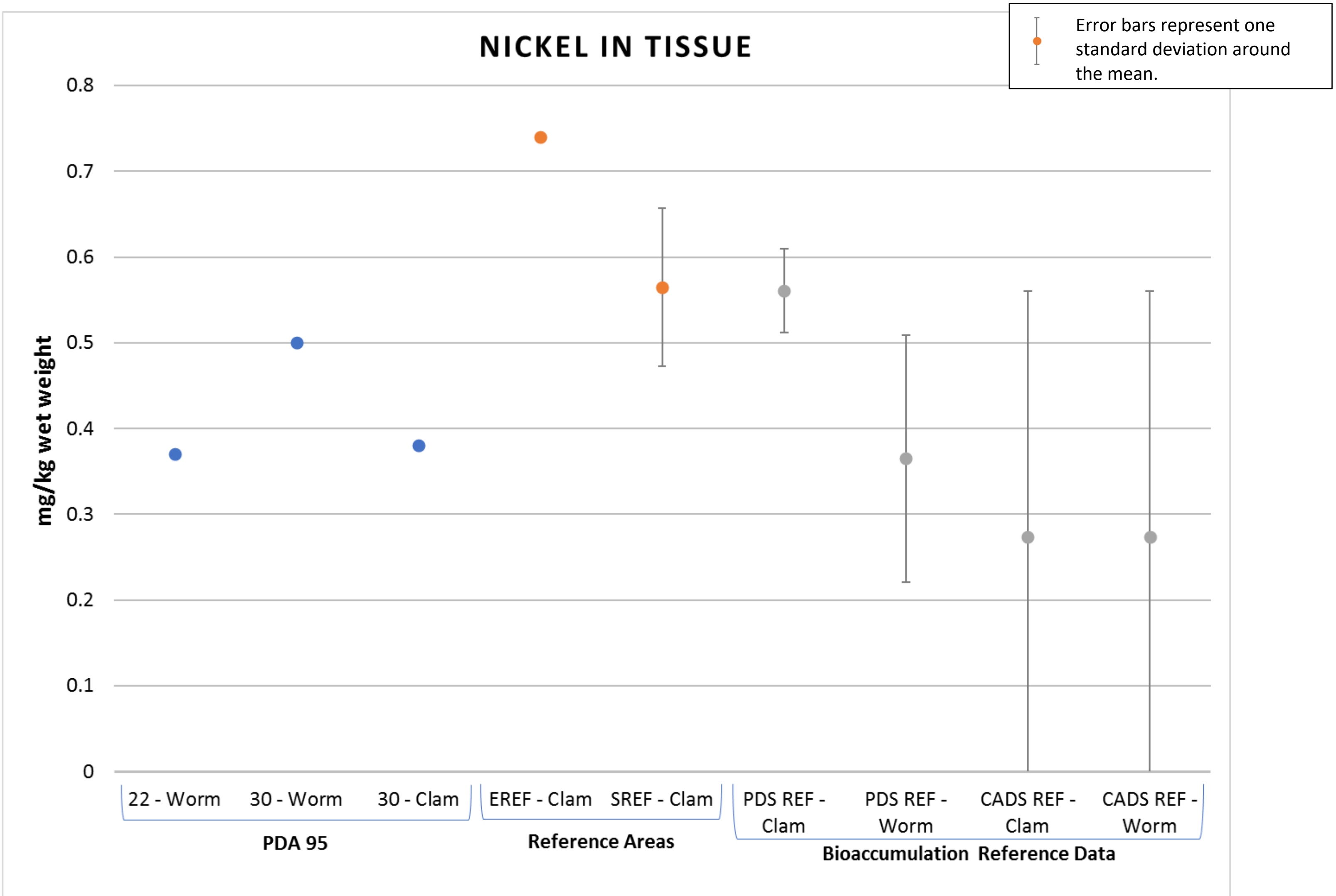


Figure 3-45g. Nickel (mg/kg wet-wt.) in tissue from PDS 2016

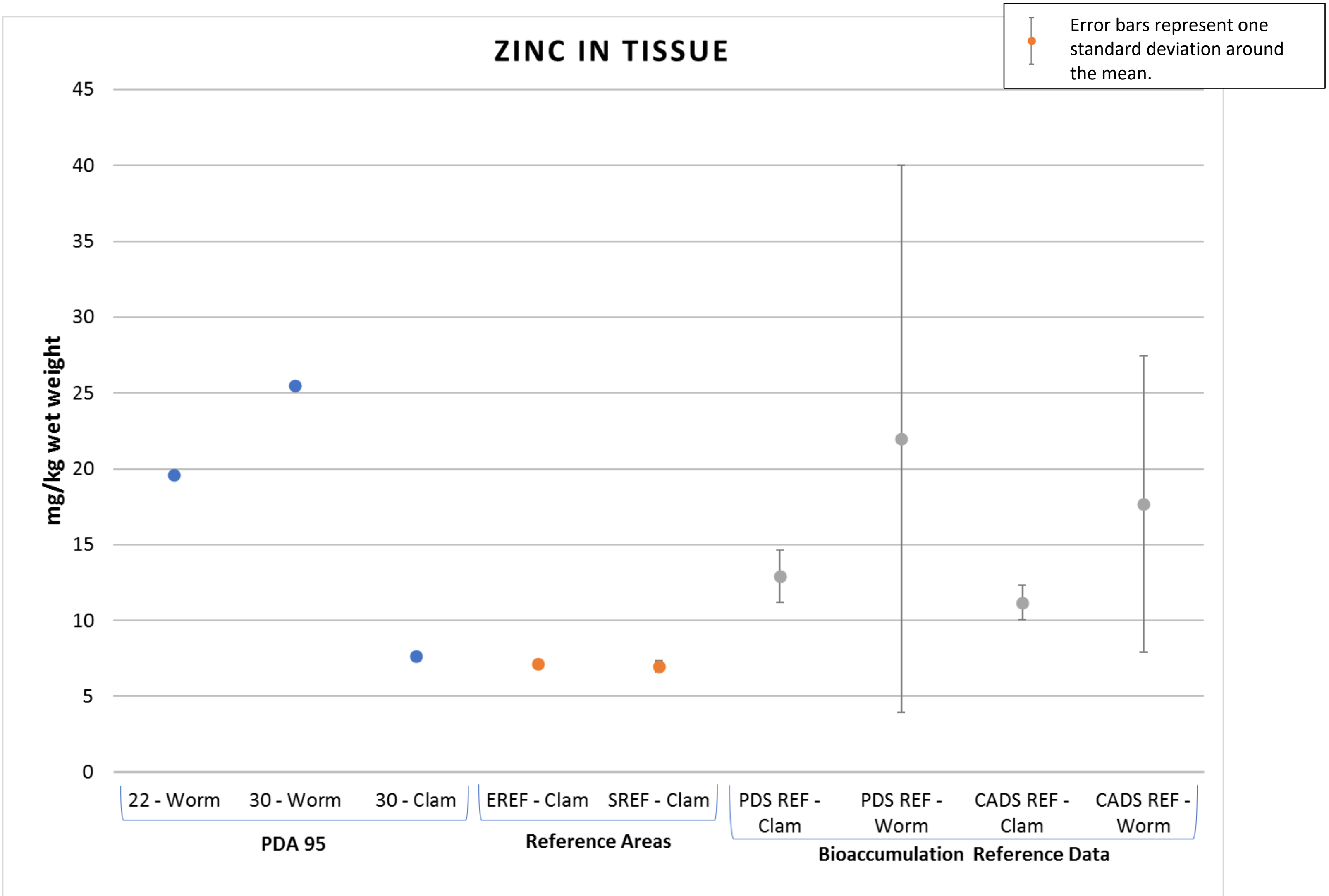


Figure 3-45h. Zinc (mg/kg wet-wt.) in tissue from PDS 2016

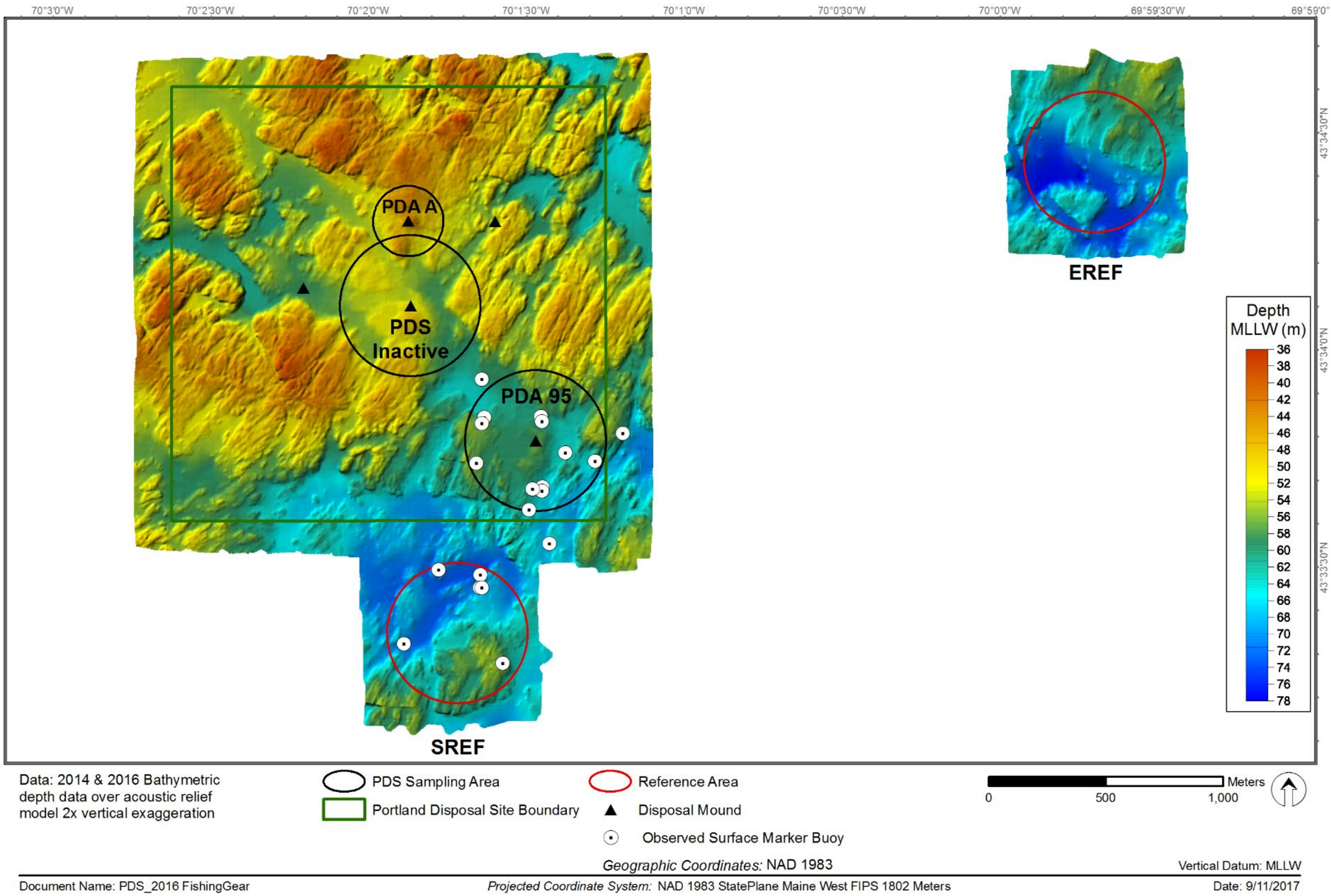
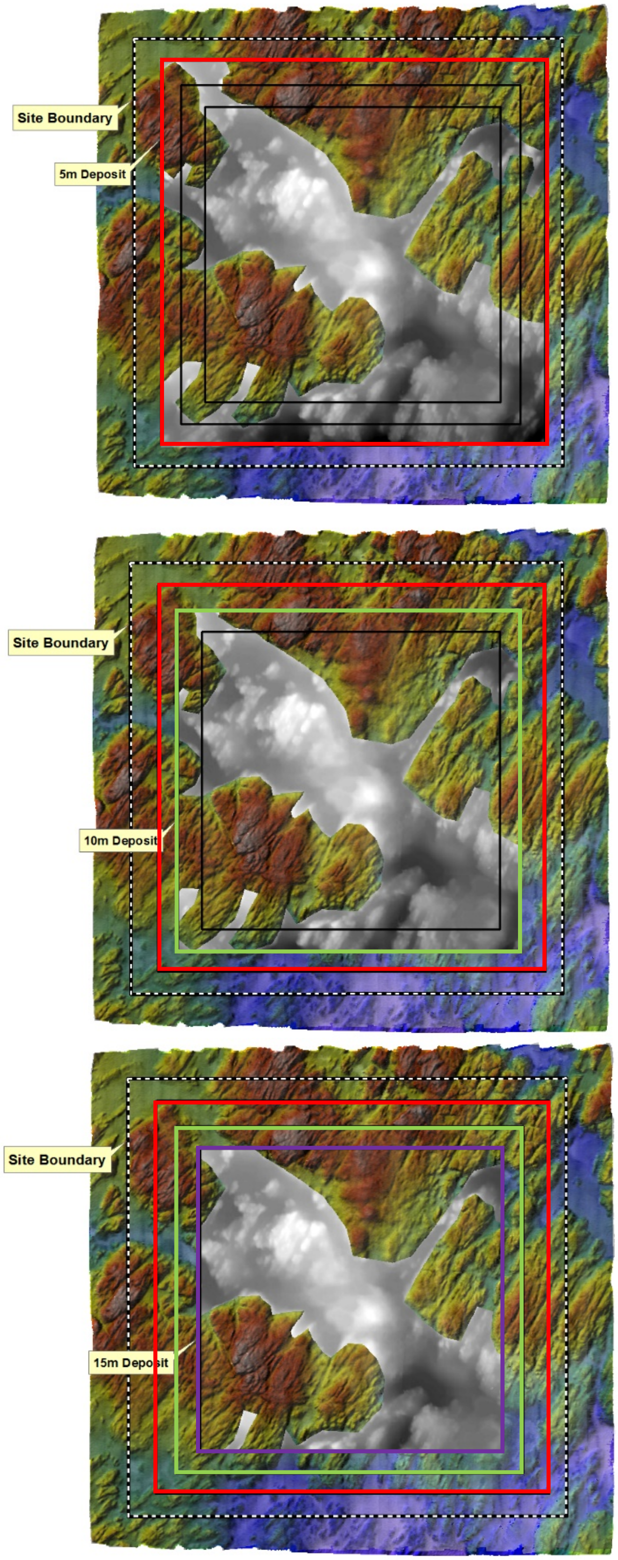


Figure 3-46. Surface marker buoy observations during the acoustic survey at PDS – September 2016



Capacity ~6 million m^3 with 5-m thick deposit

Capacity ~10 million m^3 with 10-m thick deposit

Capacity ~12 million m^3 with 15-m thick deposit

Hypothetical extents of future disposals were estimated assuming uniform deposits of 5-m, 10-m and 15-m thickness with a maximum slope between the deposited materials and the ambient seafloor of 3-degrees (rise/run of 1/19) to leave a variable buffer zone between the mound and the site boundary. The relationships between buffer zone width, remaining site area, and hypothetical deposit thickness were modeled and suggested maximal capacity at a thickness of approximately 15 m. The thicker deposit offset the larger buffer zone required for the side slope to avoid impacting hard bottom areas. Areas delimiting the potential extent of future placements between apparent ledge outcrops are shaded gray/white.

Figure 4-1. Capacity estimates at PDS

MONITORING SURVEY AT THE
PORTLAND DISPOSAL SITE
SEPTEMBER 2016

APPENDICES

CONTRIBUTION #203

July 2021

Contract No. W912WJ-12-D-0004

Submitted to:

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U.S. Army Corps of Engineers
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LIST OF APPENDICES

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

PDS DISPOSAL LOG DATA FROM OCT 2014 TO DEC 2015

Portland Disposal Site Disposal Logs Oct 2014 to December 2016

Placement site name	Placement location	Project name	Permit number	Target Site Code	Placement date/time	Placement latitude	Placement longitude	City/town	State	Load voume (cubic meters)	Load volume (cubic yards)	DQM trip number	Placement ID
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	10/21/2014 16:42	43.56288	-70.0244	Yarmouth	ME	940	1,230	3729682	56635
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	10/25/2014 15:20	43.56353	-70.02555	Yarmouth	ME	940	1,230	3729698	56636
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	10/26/2014 19:14	43.56312	-70.02465	Yarmouth	ME	940	1,230	3729727	56637
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	10/27/2014 17:59	43.5631	-70.02538	Yarmouth	ME	940	1,230	4642477	56677
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	10/27/2014 20:19	43.56292	-70.02465	Yarmouth	ME	940	1,230	3729728	56638
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	10/28/2014 21:15	43.5633	-70.02445	Yarmouth	ME	940	1,230	3729750	56639
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	10/29/2014 22:47	43.5629	-70.0245	Yarmouth	ME	940	1,230	3729751	56640
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	10/30/2014 23:05	43.56318	-70.0247	Yarmouth	ME	940	1,230	3729762	56641
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	10/31/2014 23:48	43.56315	-70.02417	Yarmouth	ME	940	1,230	3729782	56642
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/4/2014 3:34	43.56365	-70.02493	Yarmouth	ME	940	1,230	3730083	56643
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	11/5/2014 12:15	43.56335	-70.02422	Yarmouth	ME	581	760	1	56309
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/5/2014 18:02	43.56268	-70.02515	Yarmouth	ME	940	1,230	3730093	56644
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/6/2014 17:30	43.5634	-70.02487	Yarmouth	ME	940	1,230	3730105	56645
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/7/2014 19:46	43.56238	-70.02455	Yarmouth	ME	940	1,230	3730116	56646
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/8/2014 19:30	43.56375	-70.02438	Yarmouth	ME	940	1,230	3730117	56647
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/9/2014 21:00	43.56377	-70.02395	Yarmouth	ME	940	1,230	3730127	56648
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	11/10/2014 4:04	43.56337	-70.0244	Yarmouth	ME	581	760	2	56310
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	11/10/2014 16:51	43.56288	-70.02397	Yarmouth	ME	581	760	3	56311
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/10/2014 20:41	43.5635	-70.02448	Yarmouth	ME	940	1,230	3730137	56649
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	11/11/2014 16:57	43.56327	-70.02497	Yarmouth	ME	581	760	4	56312
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/11/2014 22:02	43.56388	-70.02438	Yarmouth	ME	940	1,230	3730147	56650
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	11/12/2014 17:45	43.56328	-70.02433	Yarmouth	ME	581	760	5	56313
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/12/2014 23:08	43.56368	-70.0238	Yarmouth	ME	940	1,230	3730157	56651
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	11/13/2014 17:07	43.56498	-70.02447	Yarmouth	ME	581	760	6	56314
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/13/2014 23:41	43.56357	-70.02548	Yarmouth	ME	940	1,230	3730168	56652
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/14/2014 23:55	43.5631	-70.02458	Yarmouth	ME	940	1,230	3730169	56653
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	11/15/2014 20:00	43.56313	-70.02495	Yarmouth	ME	581	760	7	56315
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/16/2014 0:34	43.56283	-70.02395	Yarmouth	ME	940	1,230	3730179	56654
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/17/2014 10:09	43.56347	-70.02402	Yarmouth	ME	940	1,230	3730189	56655
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/19/2014 18:01	43.56325	-70.02363	Yarmouth	ME	940	1,230	3730199	56656
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/20/2014 18:40	43.56273	-70.02383	Yarmouth	ME	940	1,230	3730209	56657
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	11/21/2014 14:27	43.5635	-70.02438	Yarmouth	ME	581	760	8	56316
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	11/22/2014 3:07	43.5631	-70.02355	Yarmouth	ME	581	760	9	56317
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/23/2014 19:44	43.5628	-70.02452	Yarmouth	ME	940	1,230	3730228	56658
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	11/24/2014 4:06	43.56358	-70.02467	Yarmouth	ME	581	760	10	56318
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/25/2014 22:38	43.56282	-70.0238	Yarmouth	ME	940	1,230	3719412	56613
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/26/2014 15:46	43.56258	-70.02413	Yarmouth	ME	940	1,230	3730237	56660
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	11/28/2014 18:53	43.56348	-70.02488	Yarmouth	ME	581	760	11	56319
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	11/29/2014 19:30	43.5635	-70.02478	Yarmouth	ME	581	760	12	56320
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/30/2014 0:57	43.563	-70.02422	Yarmouth	ME	940	1,230	3719425	56614
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/1/2014 17:46	43.5634	-70.02353	Yarmouth	ME	940	1,230	3730247	56661
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/2/2014 2:52	43.5625	-70.02435	Yarmouth	ME	940	1,230	3719426	56615
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	12/2/2014 9:29	43.5634	-70.02465	Yarmouth	ME	581	760	13	56321
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/4/2014 12:37	43.56407	-70.02497	Yarmouth	ME	940	1,230	3730256	56662
PDS	Outlier	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/4/2014 18:31	43.58265	-70.03685	Yarmouth	ME	940	1,230	3719437	56616
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	12/5/2014 0:48	43.5634	-70.02465	Yarmouth	ME	581	760	14	56322
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/5/2014 5:20	43.56325	-70.02445	Yarmouth	ME	940	1,230	3730265	56663
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	12/5/2014 13:45	43.56348	-70.02448	Yarmouth	ME	581	760	15	56323
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/5/2014 18:14	43.56278	-70.02475	Yarmouth	ME	940	1,230	3719448	56617
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/6/2014 7:07	43.56337	-70.02555	Yarmouth	ME	940	1,230	3730266	56664
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/6/2014 19:37	43.56277	-70.02435	Yarmouth	ME	940	1,230	3719459	56618
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/7/2014 19:15	43.56263	-70.02462	Yarmouth	ME	940	1,230	3730275	56665
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/8/2014 17:10	43.56317	-70.02517	Yarmouth	ME	940	1,230	3719480	56619
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	12/12/2014 17:22	43.56373	-70.025	Yarmouth	ME	581	760	16	56324
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/12/2014 23:08	43.5626	-70.02425	Yarmouth	ME	940	1,230	3730284	56667
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	12/13/2014 6:29	43.56338	-70.02497	Yarmouth	ME	581	760	17	56325
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/13/2014 14:14	43.5628	-70.02457	Yarmouth	ME	940	1,230	3719491	56620

Placement site name	Placement location	Project name	Permit number	Target Site Code	Placement date/time	Placement latitude	Placement longitude	City/town	State	Load voume (cubic meters)	Load volume (cubic yards)	DQM trip number	Placement ID
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	12/13/2014 19:27	43.56368	-70.0247	Yarmouth	ME	581	760	18	56326
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/13/2014 22:31	43.56335	-70.02502	Yarmouth	ME	940	1,230	3730294	56668
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	12/14/2014 7:25	43.56385	-70.0252	Yarmouth	ME	581	760	19	56327
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/14/2014 14:17	43.56327	-70.02523	Yarmouth	ME	940	1,230	3719502	56621
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	12/14/2014 20:20	43.56325	-70.0246	Yarmouth	ME	581	760	20	56328
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/14/2014 23:17	43.56303	-70.02467	Yarmouth	ME	940	1,230	3730303	56669
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	12/15/2014 7:42	43.56368	-70.02525	Yarmouth	ME	581	760	21	56329
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/15/2014 14:46	43.56308	-70.02505	Yarmouth	ME	940	1,230	3719503	56622
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/16/2014 0:27	43.56312	-70.02473	Yarmouth	ME	940	1,230	3730312	56670
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	12/16/2014 11:22	43.56388	-70.02508	Yarmouth	ME	581	760	22	56330
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/16/2014 12:30	43.5633	-70.0249	Yarmouth	ME	940	1,230	3719514	56623
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	12/16/2014 23:56	43.56338	-70.02485	Yarmouth	ME	581	760	23	56331
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	12/17/2014 10:46	43.56445	-70.02232	Yarmouth	ME	581	760	24	56332
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/17/2014 14:49	43.56328	-70.025	Yarmouth	ME	940	1,230	3719515	56624
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	12/18/2014 11:42	43.56358	-70.02502	Yarmouth	ME	581	760	25	56333
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/18/2014 18:20	43.56302	-70.02488	Yarmouth	ME	940	1,230	3719526	56625
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	12/18/2014 23:48	43.56325	-70.02485	Yarmouth	ME	581	760	26	56334
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/19/2014 3:04	43.56305	-70.02448	Yarmouth	ME	940	1,230	3719537	56626
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	12/20/2014 1:04	43.56243	-70.02582	Yarmouth	ME	581	760	27	56335
PDS	PDA 95	Yankee Marina	NAE-2004-2397	PDS 14/15/16	12/20/2014 13:57	43.56378	-70.02502	Yarmouth	ME	581	760	28	56336
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/20/2014 17:37	43.5631	-70.02523	Yarmouth	ME	940	1,230	3719538	56627
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	12/21/2014 7:13	43.56352	-70.02503	Yarmouth	ME	226	295	3655590	56292
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	12/21/2014 18:34	43.56368	-70.02483	Yarmouth	ME	226	295	3655643	56293
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/21/2014 19:42	43.56293	-70.0249	Yarmouth	ME	940	1,230	3719549	56628
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/22/2014 1:03	43.56317	-70.02502	Yarmouth	ME	940	1,230	3730329	56671
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	12/22/2014 7:04	43.56348	-70.02568	Yarmouth	ME	226	295	3655660	56115
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/22/2014 18:10	43.56327	-70.02497	Yarmouth	ME	940	1,230	3719550	56629
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	12/22/2014 19:13	43.5638	-70.0256	Yarmouth	ME	226	295	3655695	56116
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/22/2014 23:11	43.56312	-70.02503	Yarmouth	ME	940	1,230	3730339	56672
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	12/27/2014 11:22	43.56438	-70.02522	Yarmouth	ME	226	295	3655696	56117
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	12/27/2014 22:34	43.5641	-70.02487	Yarmouth	ME	226	295	3655708	56118
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	12/29/2014 14:48	43.56407	-70.02487	Yarmouth	ME	226	295	3655719	56119
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/29/2014 23:40	43.56348	-70.02493	Yarmouth	ME	940	1,230	3972395	56673
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	12/30/2014 1:16	43.5639	-70.02523	Yarmouth	ME	226	295	3655720	56120
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	12/30/2014 13:55	43.56345	-70.02513	Yarmouth	ME	226	295	3655746	56121
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/30/2014 15:34	43.56285	-70.025	Yarmouth	ME	940	1,230	3719561	56630
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	12/31/2014 0:51	43.5632	-70.02485	Yarmouth	ME	226	295	3655763	56122
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/31/2014 1:39	43.56358	-70.02407	Yarmouth	ME	940	1,230	3749901	56674
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	12/31/2014 15:37	43.56348	-70.02398	Yarmouth	ME	940	1,230	3719572	56631
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	12/31/2014 16:35	43.56385	-70.02447	Yarmouth	ME	226	295	3655764	56123
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	1/1/2015 2:19	43.56385	-70.0246	Yarmouth	ME	940	1,230	3749902	56675
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	1/1/2015 15:04	43.56393	-70.02467	Yarmouth	ME	226	295	3655773	56124
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	1/2/2015 20:44	43.56335	-70.02353	Yarmouth	ME	940	1,230	3719583	56632
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	1/3/2015 17:40	43.5635	-70.02498			226	295	3655782	56824
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	1/3/2015 18:36	43.56268	-70.0248	Yarmouth	ME	940	1,230	3719614	56678
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	1/6/2015 21:10	43.56377	-70.0247	Yarmouth	ME	940	1,230	3719645	56679
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	1/10/2015 15:54	43.56365	-70.02403	Yarmouth	ME	940	1,230	3719665	56680
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	1/17/2015 14:09	43.56355	-70.02522	South Portland	ME	641	839	3956430	56702
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	1/20/2015 19:37	43.5636	-70.02612	South Portland	ME	641	839	3956442	56703
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	1/22/2015 7:17	43.56188	-70.0235	South Portland	ME	641	839	3956448	56704
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	1/23/2015 5:05	43.56243	-70.02473	South Portland	ME	641	839	3956537	56705
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	1/30/2015 6:45	43.56345	-70.02592	South Portland	ME	641	839	3956543	56706
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	2/6/2015 15:09	43.56395	-70.0247	South Portland	ME	641	839	3956548	56707
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	2/14/2015 14:27	43.56228	-70.0243	South Portland	ME	641	839	3956553	56708
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	2/24/2015 13:53	43.56365	-70.02522	South Portland	ME	641	839	3956560	56709
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	2/25/2015 20:29	43.5636	-70.02518	South Portland	ME	641	839	3956564	56710
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	2/26/2015 22:11	43.56372	-70.02535	South Portland	ME	641	839	3956565	56711

Placement site name	Placement location	Project name	Permit number	Target Site Code	Placement date/time	Placement latitude	Placement longitude	City/town	State	Load voume (cubic meters)	Load volume (cubic yards)	DQM trip number	Placement ID
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	2/27/2015 21:49	43.56377	-70.02598	South Portland	ME	641	839	3956582	56712
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	2/28/2015 22:44	43.56342	-70.02512	South Portland	ME	641	839	3956586	56713
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	3/3/2015 11:08	43.56278	-70.02527	South Portland	ME	641	839	3956590	56714
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	3/4/2015 0:27	43.56385	-70.02417	South Portland	ME	641	839	3956603	56715
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	3/5/2015 22:15	43.56347	-70.02525	South Portland	ME	641	839	3956618	56716
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	3/7/2015 22:13	43.56345	-70.02532	South Portland	ME	641	839	3956619	56717
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	3/10/2015 13:28	43.56305	-70.02463	South Portland	ME	641	839	3956623	56718
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	3/11/2015 0:15	43.56377	-70.02373	South Portland	ME	641	839	3956630	56719
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	3/13/2015 11:18	43.56327	-70.02548	South Portland	ME	641	839	3956639	56720
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	3/13/2015 23:30	43.5635	-70.02463	South Portland	ME	641	839	3956644	56721
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	3/19/2015 17:21	43.56323	-70.02522	South Portland	ME	641	839	3956645	56722
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	3/21/2015 21:04	43.56243	-70.0248	South Portland	ME	641	839	3956666	56723
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	3/24/2015 0:03	43.56235	-70.02443	South Portland	ME	641	839	3956667	56724
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	3/24/2015 21:54	43.56337	-70.02497	South Portland	ME	641	839	3956672	56725
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	3/25/2015 21:52	43.56373	-70.02555	South Portland	ME	641	839	3956677	56726
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	3/25/2015 22:23	43.56318	-70.02435			226	295	3985826	56825
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	3/27/2015 15:38	43.56347	-70.0254	South Portland	ME	641	839	3956688	56727
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	3/28/2015 2:06	43.56388	-70.0247			226	295	3985827	56826
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	3/28/2015 15:27	43.56388	-70.02477			226	295	3985828	56827
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	3/31/2015 18:50	43.5633	-70.02418	South Portland	ME	641	839	3957765	56728
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	4/1/2015 5:32	43.56287	-70.02453			226	295	3985829	56828
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	4/1/2015 18:27	43.56307	-70.0242			226	295	3985830	56829
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	4/1/2015 21:07	43.56302	-70.02543	South Portland	ME	641	839	3959283	56729
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	4/2/2015 7:21	43.56335	-70.02465			226	295	3985831	56830
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	4/2/2015 18:41	43.56363	-70.02448	Yarmouth	ME	940	1,230	3985832	56831
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	4/3/2015	43.56317	-70.02545	South Portland	ME	635	830	3985466	56730
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	4/3/2015 21:08	43.56395	-70.02472			226	295	3985833	56832
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	4/4/2015 9:29	43.56367	-70.02492			226	295	3985834	56833
PDS	PDA 95	Royal River Boatyard - East	NAE-2002-1020	PDS 14/15/16	4/5/2015 22:11	43.56373	-70.02438			226	295	3985835	56834
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	4/6/2015 20:03	43.56342	-70.02555	South Portland	ME	641	839	3985478	56699
PDS	PDA 95	Global Petroleum	NAE-2006-02255	PDS 14/15/16	4/7/2015 20:01	43.56293	-70.02528	South Portland	ME	641	839	3985479	56700
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	4/13/2015 3:09	43.56345	-70.02465	Yarmouth	ME	726	949	4006895	56735
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	4/13/2015 16:07	43.56348	-70.02438	Yarmouth	ME	726	949	4006903	56736
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	4/15/2015 5:13	43.56248	-70.02383	Yarmouth	ME	726	949	4006904	56737
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	4/15/2015 18:08	43.5637	-70.0246	Yarmouth	ME	726	949	4006912	56738
PDS	PDA 95	Royal River Boat Yard	W912WJ-14-C-0022	PDS 14/15/16	11/2/2015 22:37	43.56138	-70.02248	Yarmouth	ME	940	1,230	4642478	56676
PDS	PDA 95	Lower Falls Landing Associates	NAE-2014-01473	PDS 14/15/16	11/3/2015 13:10	43.56345	-70.02505	Yarmouth	ME	237	310	4642892	57820
PDS	PDA 95	Lower Falls Landing Associates	NAE-2014-01473	PDS 14/15/16	11/4/2015 13:31	43.5633	-70.02513	Yarmouth	ME	237	310	4646965	57821
PDS	PDA 95	Lower Falls Landing Associates	NAE-2014-01473	PDS 14/15/16	11/6/2015 17:15	43.56345	-70.02475	Yarmouth	ME	237	310	4652722	57822
PDS	PDA 95	Lower Falls Landing Associates	NAE-2014-01473	PDS 14/15/16	11/8/2015 17:08	43.56208	-70.02412	Yarmouth	ME	237	310	4658931	57823
PDS	PDA 95	Lower Falls Landing Associates	NAE-2014-01473	PDS 14/15/16	11/9/2015 5:43	43.56203	-70.0249	Yarmouth	ME	237	310	4660723	57824
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	11/19/2015 13:02	43.56372	-70.02477	Yarmouth	ME	726	949	4806849	56731
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	11/21/2015 14:56	43.5636	-70.02505	Yarmouth	ME	726	949	4806850	56732
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	11/22/2015 1:39	43.564	-70.02392	Yarmouth	ME	726	949	4806851	56733
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	11/24/2015 16:39	43.56205	-70.02292	Yarmouth	ME	726	949	4806852	56734
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	11/25/2015 5:35	43.56362	-70.0228	Yarmouth	ME	726	949	4806853	56739
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	11/25/2015 17:00	43.56383	-70.02462	Yarmouth	ME	726	949	4806854	56740
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	11/29/2015 9:21	43.56343	-70.0239	Yarmouth	ME	726	949	4811444	56741
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	11/29/2015 21:06	43.56202	-70.02217	Yarmouth	ME	726	949	4811445	56742
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	11/30/2015 10:32	43.5633	-70.02233	Yarmouth	ME	726	949	4811446	56743
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	11/30/2015 22:53	43.56305	-70.02182	Yarmouth	ME	726	949	4812115	56744
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	12/1/2015 11:28	43.56385	-70.02408	Yarmouth	ME	726	949	4813432	56745
PDS	PDA A	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	12/1/2015 23:00	43.57188	-70.03015	Yarmouth	ME	726	950	4814857	56746
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	12/2/2015 12:49	43.5635	-70.02443	Yarmouth	ME	726	950	4816150	56747
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	12/3/2015 0:36	43.56365	-70.02405	Yarmouth	ME	726	950	4817347	56748
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	12/3/2015 13:31	43.5638	-70.02417	Yarmouth	ME	726	950	4818475	56749
PDS	Outlier	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	12/4/2015 14:41	43.55887	-70.01925	Yarmouth	ME	726	950	4820600	56750

Portland Disposal Site Disposal Logs Oct 2014 to December 2016

Placement site name	Placement location	Project name	Permit number	Target Site Code	Placement date/time	Placement latitude	Placement longitude	City/town	State	Load voume (cubic meters)	Load volume (cubic yards)	DQM trip number	Placement ID
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	12/7/2015 17:08	43.5635	-70.02543	Yarmouth	ME	726	950	4828547	56751
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	12/8/2015 18:13	43.56343	-70.02402	Yarmouth	ME	726	950	4833311	56752
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	12/9/2015 18:38	43.56332	-70.02527	Yarmouth	ME	726	950	4854898	56753
PDS	PDA 95	Yarmouth Boat Club Marina	NAE-2008-02244	PDS 14/15/16	12/11/2015 19:04	43.56298	-70.02423	Yarmouth	ME	726	950	4854909	56754

APPENDIX C

ACTUAL SPI/PV AND SEDIMENT GRAB REPLICATE LOCATIONS

PDS 2016 ACTUAL SPI/PV STATION IDS/COORDINATES							
Station ID	**Replicate**	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
PDAA-01	A	9/17/2016	12:40:03	910858.7	82063.57	43.5719470	-70.0322402
PDAA-01	B	9/17/2016	12:40:48	910840.6	82064.54	43.5719559	-70.0324636
PDAA-01	C	9/17/2016	12:41:49	910859.7	82071.15	43.5720152	-70.0322280
PDAA-01	D	9/17/2016	12:43:01	910868.6	82062.52	43.5719374	-70.0321173
PDAA-02	A	9/17/2016	12:33:23	910838.3	81964.25	43.5710533	-70.0324949
PDAA-02	B	9/17/2016	12:34:13	910841.4	81962.71	43.5710394	-70.0324568
PDAA-02	C	9/17/2016	12:34:53	910833	81964.92	43.5710594	-70.0325605
PDAA-02	D	9/17/2016	12:35:36	910840.2	81966.72	43.5710755	-70.0324705
PDAA-03	A	9/17/2016	12:55:42	910921.1	82148.58	43.5727112	-70.0314655
PDAA-03	B	9/17/2016	12:56:37	910927.7	82150.79	43.5727310	-70.0313841
PDAA-03	C	9/17/2016	12:57:26	910933.1	82151.94	43.5727413	-70.0313171
PDAA-03	D	9/17/2016	12:58:28	910928	82153.1	43.5727518	-70.0313807
PDAA-04	A	9/17/2016	12:46:51	910854.9	82148.05	43.5727074	-70.0322860
PDAA-04	B	9/17/2016	12:47:44	910852.5	82141.05	43.5726444	-70.0323157
PDAA-04	C	9/17/2016	12:48:32	910849.1	82144.66	43.5726770	-70.0323568
PDAA-04	D	9/17/2016	12:49:21	910849	82146.87	43.5726969	-70.0323586
PDAA-05	A	9/17/2016	13:05:40	911049.8	81975.11	43.5711479	-70.0298767
PDAA-05	B	9/17/2016	13:06:52	911043.5	81966.72	43.5710725	-70.0299541
PDAA-05	C	9/17/2016	13:07:34	911038.5	81962.31	43.5710329	-70.0300161
PDAA-05	D	9/17/2016	13:08:30	911028.8	81967.49	43.5710797	-70.0301367
PDS-06	A	9/17/2016	7:30:53	910708.3	81576.38	43.5675640	-70.0341115
PDS-06	B	9/17/2016	7:31:51	910707.7	81578.97	43.5675873	-70.0341184
PDS-06	C	9/17/2016	7:32:36	910710.6	81577.85	43.5675772	-70.0340830
PDS-06	D	9/17/2016	7:33:29	910717.8	81577.53	43.5675742	-70.0339939
PDS-06	E	9/17/2016	7:46:17	910700.2	81570.37	43.5675100	-70.0342123
PDS-06	F	9/17/2016	7:47:04	910700.6	81577.9	43.5675778	-70.0342065
PDS-06	G	9/17/2016	7:47:56	910688.1	81590.89	43.5676949	-70.0343613
PDS-06	H	9/17/2016	7:48:56	910694.9	81567.66	43.5674857	-70.0342780
PDS-07	A	9/17/2016	10:53:54	911048.6	81702.36	43.5686930	-70.0298964
PDS-07	B	9/17/2016	10:54:34	911053.9	81710.56	43.5687667	-70.0298309
PDS-07	C	9/17/2016	10:55:25	911047	81709.79	43.5687599	-70.0299157
PDS-07	D	9/17/2016	10:56:09	911041.2	81706.09	43.5687266	-70.0299887
PDS-08	A	9/17/2016	10:07:44	911171.2	81637.29	43.5681055	-70.0283802
PDS-08	B	9/17/2016	10:08:42	911188.7	81636.71	43.5681000	-70.0281638
PDS-08	C	9/17/2016	10:09:25	911186.4	81631.8	43.5680558	-70.0281928
PDS-08	D	9/17/2016	10:10:09	911179.3	81632.76	43.5680646	-70.0282796
PDS-09	A	9/17/2016	11:38:50	910756.6	81748.31	43.5691108	-70.0335102
PDS-09	B	9/17/2016	11:39:34	910757.8	81745.57	43.5690861	-70.0334950
PDS-09	C	9/17/2016	11:40:22	910761.4	81753.21	43.5691549	-70.0334512
PDS-09	D	9/17/2016	11:41:31	910757.4	81751.9	43.5691431	-70.0335000
PDS-10	A	9/17/2016	11:12:44	910924.6	81687.34	43.5685596	-70.0314316
PDS-10	B	9/17/2016	11:13:26	910921	81685.79	43.5685457	-70.0314765
PDS-10	C	9/17/2016	11:14:16	910925.1	81690.66	43.5685895	-70.0314260
PDS-10	D	9/17/2016	11:15:01	910925.7	81695.99	43.5686374	-70.0314184
PDS-11	A	9/17/2016	8:07:33	910815.5	81642.78	43.5681601	-70.0327827
PDS-11	B	9/17/2016	8:08:15	910812.3	81629.54	43.5680410	-70.0328226

PDS 2016 ACTUAL SPI/PV STATION IDS/COORDINATES							
Station ID	**Replicate**	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
PDS-11	C	9/17/2016	8:09:02	910807.5	81627.08	43.5680189	-70.0328828
PDS-11	D	9/17/2016	8:10:04	910808.2	81635.52	43.5680949	-70.0328744
PDS-12	A	9/17/2016	11:02:46	910983.9	81695.03	43.5686279	-70.0306971
PDS-12	B	9/17/2016	11:03:41	910980	81697.66	43.5686517	-70.0307464
PDS-12	C	9/17/2016	11:04:22	910973	81703.16	43.5687013	-70.0308320
PDS-12	D	9/17/2016	11:05:06	910979	81699.07	43.5686644	-70.0307580
PDS-13	A	9/17/2016	8:47:33	911074.4	81428.94	43.5662316	-70.0295832
PDS-13	B	9/17/2016	8:48:11	911079	81411.91	43.5660782	-70.0295259
PDS-13	C	9/17/2016	8:48:50	911069.8	81420.21	43.5661531	-70.0296397
PDS-13	D	9/17/2016	8:49:29	911068.6	81424.92	43.5661955	-70.0296545
PDS-13	E	9/17/2016	10:36:26	911083	81429.08	43.5662327	-70.0294763
PDS-13	F	9/17/2016	10:37:17	911081.4	81434.1	43.5662779	-70.0294960
PDS-13	G	9/17/2016	10:38:03	911075.8	81419.97	43.5661508	-70.0295657
PDS-13	H	9/17/2016	10:38:50	911069.4	81421.45	43.5661642	-70.0296450
PDS-14	A	9/17/2016	12:13:49	910709.3	81834.03	43.5698831	-70.0340946
PDS-14	B	9/17/2016	12:14:40	910713.9	81832.66	43.5698707	-70.0340369
PDS-14	C	9/17/2016	12:15:27	910722.1	81837.08	43.5699103	-70.0339354
PDS-14	D	9/17/2016	12:16:21	910720.2	81830.46	43.5698508	-70.0339587
PDS-15	A	9/17/2016	11:18:54	910935.8	81808.12	43.5696466	-70.0312905
PDS-15	B	9/17/2016	11:19:41	910926.5	81819.99	43.5697535	-70.0314059
PDS-15	C	9/17/2016	11:20:26	910922.9	81816.78	43.5697247	-70.0314502
PDS-15	D	9/17/2016	11:21:12	910932	81828.42	43.5698293	-70.0313370
PDS-16	A	9/17/2016	8:29:41	910953.9	81577.3	43.5675687	-70.0310719
PDS-16	B	9/17/2016	8:30:16	910955	81582.45	43.5676151	-70.0310580
PDS-16	C	9/17/2016	8:30:58	910950.5	81581.7	43.5676084	-70.0311139
PDS-16	D	9/17/2016	8:31:44	910953.3	81582.47	43.5676153	-70.0310791
PDS-17	A	9/17/2016	8:38:35	911014.8	81457.83	43.5664925	-70.0303200
PDS-17	B	9/17/2016	8:39:16	911019.5	81456.64	43.5664817	-70.0302619
PDS-17	C	9/17/2016	8:40:03	911016	81460.82	43.5665194	-70.0303051
PDS-17	D	9/17/2016	8:40:49	911015.4	81458.18	43.5664956	-70.0303123
PDS-17	E	9/17/2016	10:46:09	911017.1	81468.57	43.5665891	-70.0302909
PDS-17	F	9/17/2016	10:46:52	911013.4	81465.99	43.5665659	-70.0303375
PDS-17	G	9/17/2016	10:47:34	911013.7	81470.93	43.5666104	-70.0303337
PDS-17	H	9/17/2016	10:48:17	911017.3	81471.11	43.5666120	-70.0302889
PDS-18	A	9/17/2016	8:54:20	911139.3	81590.01	43.5676804	-70.0287765
PDS-18	B	9/17/2016	8:55:01	911136.5	81590.16	43.5676818	-70.0288111
PDS-18	C	9/17/2016	8:55:40	911143.4	81590.02	43.5676804	-70.0287254
PDS-18	D	9/17/2016	8:56:21	911144.1	81591.54	43.5676941	-70.0287161
PDS-18	E	9/17/2016	10:26:34	911142.5	81589.48	43.5676756	-70.0287368
PDS-18	F	9/17/2016	10:27:23	911154.6	81596.54	43.5677389	-70.0285870
PDS-18	G	9/17/2016	10:28:06	911152.5	81582.67	43.5676141	-70.0286133
PDS-18	H	9/17/2016	10:28:49	911144.3	81588.32	43.5676651	-70.0287144
PDS-19	A	9/17/2016	12:24:07	910688.9	81748.83	43.5691165	-70.0343480
PDS-19	B	9/17/2016	12:24:58	910681.5	81733.07	43.5689747	-70.0344405
PDS-19	C	9/17/2016	12:25:48	910701.1	81735.03	43.5689921	-70.0341970
PDS-19	D	9/17/2016	12:26:40	910708.6	81741.43	43.5690496	-70.0341045
PDS-20	A	9/17/2016	11:30:19	910785.3	81802.84	43.5696012	-70.0331535

PDS 2016 ACTUAL SPI/PV STATION IDS/COORDINATES							
Station ID	**Replicate**	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
PDS-20	B	9/17/2016	11:31:03	910788.2	81805.32	43.5696235	-70.0331181
PDS-20	C	9/17/2016	11:32:04	910798.8	81809.93	43.5696648	-70.0329866
PDS-20	D	9/17/2016	11:32:53	910784.4	81808.64	43.5696534	-70.0331647
PDA95-21	A	9/19/2016	15:16:42	911646	80969.09	43.5620838	-70.0225177
PDA95-21	B	9/19/2016	15:17:28	911648.1	80974.03	43.5621282	-70.0224910
PDA95-21	C	9/19/2016	15:18:23	911643.8	80977.14	43.5621563	-70.0225448
PDA95-21	D	9/19/2016	15:19:06	911639.9	80981.21	43.5621930	-70.0225927
PDA95-22	A	9/19/2016	14:27:24	911528.8	80837.7	43.5609030	-70.0239700
PDA95-22	B	9/19/2016	14:28:15	911528	80838.07	43.5609063	-70.0239799
PDA95-22	C	9/19/2016	14:29:18	911528.6	80840.76	43.5609306	-70.0239732
PDA95-22	D	9/19/2016	14:30:23	911529.4	80844.75	43.5609665	-70.0239627
PDA95-22	E	9/19/2016	14:31:18	911528.1	80847.55	43.5609917	-70.0239789
PDA95-23	A	9/19/2016	13:43:14	911527.6	81060.04	43.5629043	-70.0239810
PDA95-23	B	9/19/2016	13:44:16	911521.2	81053.72	43.5628475	-70.0240605
PDA95-23	C	9/19/2016	13:45:17	911523.6	81056.76	43.5628748	-70.0240309
PDA95-23	D	9/19/2016	13:47:00	911528.2	81056.58	43.5628731	-70.0239729
PDA95-24	A	9/19/2016	14:18:52	911380.7	80814.46	43.5606961	-70.0258040
PDA95-24	B	9/19/2016	14:19:51	911371.4	80813.31	43.5606859	-70.0259195
PDA95-24	C	9/19/2016	14:20:49	911362.8	80817.2	43.5607210	-70.0260255
PDA95-24	D	9/19/2016	14:21:43	911357	80821.28	43.5607578	-70.0260973
PDA95-25	A	9/19/2016	13:00:15	911550.6	81206.68	43.5642238	-70.0236923
PDA95-25	B	9/19/2016	13:00:57	911545.1	81203.4	43.5641944	-70.0237614
PDA95-25	C	9/19/2016	13:01:38	911539.1	81203.27	43.5641933	-70.0238349
PDA95-25	D	9/19/2016	13:02:15	911534	81203.71	43.5641973	-70.0238985
PDA95-26	A	9/19/2016	13:52:31	911437	81060.7	43.5629116	-70.0251023
PDA95-26	B	9/19/2016	13:53:21	911435.7	81064.36	43.5629446	-70.0251182
PDA95-26	C	9/19/2016	13:54:11	911432.7	81066.57	43.5629645	-70.0251553
PDA95-26	D	9/19/2016	13:55:05	911429.8	81066.49	43.5629638	-70.0251907
PDA95-27	A	9/19/2016	14:09:16	911306	80947.77	43.5618971	-70.0267264
PDA95-27	B	9/19/2016	14:10:08	911306.5	80952.15	43.5619366	-70.0267192
PDA95-27	C	9/19/2016	14:10:59	911309.3	80951.06	43.5619267	-70.0266847
PDA95-27	D	9/19/2016	14:11:51	911306.9	80952.39	43.5619387	-70.0267152
PDA95-28	A	9/17/2016	13:48:19	911503.9	81362.85	43.5656302	-70.0242673
PDA95-28	B	9/17/2016	13:49:10	911504.7	81354.83	43.5655580	-70.0242580
PDA95-28	C	9/17/2016	13:50:13	911499.7	81354.04	43.5655510	-70.0243204
PDA95-28	D	9/17/2016	13:50:56	911494.2	81359.62	43.5656013	-70.0243877
PDA95-29	A	9/19/2016	13:33:26	911549.6	81111.36	43.5633659	-70.0237069
PDA95-29	B	9/19/2016	13:34:26	911547.7	81111.94	43.5633711	-70.0237311
PDA95-29	C	9/19/2016	13:35:24	911546.9	81112.16	43.5633731	-70.0237413
PDA95-29	D	9/19/2016	13:36:20	911543.6	81112.45	43.5633758	-70.0237812
PDA95-30	A	9/19/2016	12:03:53	911440.9	81205.38	43.5642138	-70.0250510
PDA95-30	B	9/19/2016	12:04:45	911435	81202.44	43.5641874	-70.0251235
PDA95-30	C	9/19/2016	12:05:29	911434.2	81204.39	43.5642050	-70.0251336
PDA95-30	D	9/19/2016	12:06:15	911433.1	81208.77	43.5642444	-70.0251475
PDA95-31	A	9/19/2016	14:36:30	911434.3	80943.14	43.5618535	-70.0251375
PDA95-31	B	9/19/2016	14:37:23	911439.7	80939.39	43.5618197	-70.0250718
PDA95-31	C	9/19/2016	14:38:17	911442.4	80931.17	43.5617456	-70.0250383

PDS 2016 ACTUAL SPI/PV STATION IDS/COORDINATES							
Station ID	**Replicate**	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
PDA95-31	D	9/19/2016	14:39:20	911437	80933.89	43.5617702	-70.0251047
PDA95-32	A	9/19/2016	13:24:17	911634.4	81152.29	43.5637330	-70.0226567
PDA95-32	B	9/19/2016	13:25:09	911641.8	81154.08	43.5637489	-70.0225647
PDA95-32	C	9/19/2016	13:26:04	911640.1	81152.93	43.5637386	-70.0225858
PDA95-32	D	9/19/2016	13:27:02	911634.9	81152.63	43.5637360	-70.0226503
PDA95-33	A	9/19/2016	15:25:23	911700.9	80932.59	43.5617544	-70.0218380
PDA95-33	B	9/19/2016	15:26:13	911713.3	80934.78	43.5617739	-70.0216849
PDA95-33	C	9/19/2016	15:27:03	911720.6	80929.61	43.5617273	-70.0215942
PDA95-33	D	9/19/2016	15:27:57	911716.5	80930.07	43.5617315	-70.0216449
PDA95-34	A	9/19/2016	14:00:29	911385.7	81069.06	43.5629876	-70.0257374
PDA95-34	B	9/19/2016	14:01:31	911382.7	81072.19	43.5630159	-70.0257737
PDA95-34	C	9/19/2016	14:02:25	911395.7	81072.77	43.5630209	-70.0256130
PDA95-34	D	9/19/2016	14:03:45	911404.6	81061.16	43.5629163	-70.0255033
PDA95-35	A	9/19/2016	13:12:38	911746.9	81139.75	43.5636183	-70.0212640
PDA95-35	B	9/19/2016	13:15:52	911756.1	81134.61	43.5635719	-70.0211513
PDA95-35	C	9/19/2016	13:16:42	911754.3	81136.28	43.5635870	-70.0211733
PDA95-35	D	9/19/2016	13:17:33	911753.3	81138.01	43.5636026	-70.0211854
EREF-01	A	9/19/2016	17:21:34	913724.7	82331.13	43.5743080	-69.9967539
EREF-01	B	9/19/2016	17:22:16	913723.9	82325.89	43.5742608	-69.9967638
EREF-01	C	9/19/2016	17:23:00	913721.9	82328.69	43.5742861	-69.9967884
EREF-01	D	9/19/2016	17:23:40	913721.5	82330.49	43.5743023	-69.9967937
EREF-02	A	9/19/2016	16:57:08	913582.2	82177.93	43.5729317	-69.9985220
EREF-02	B	9/19/2016	16:58:05	913589.8	82174.8	43.5729034	-69.9984279
EREF-02	C	9/19/2016	16:59:04	913591.2	82171.44	43.5728731	-69.9984101
EREF-02	D	9/19/2016	17:00:00	913586.8	82180.38	43.5729536	-69.9984639
EREF-02	E	9/19/2016	17:11:25	913592	82170.23	43.5728622	-69.9983998
EREF-02	F	9/19/2016	17:11:49	913590.9	82171.91	43.5728773	-69.9984138
EREF-02	G	9/19/2016	17:12:10	913589.6	82173.67	43.5728932	-69.9984299
EREF-02	H	9/19/2016	17:12:36	913588.3	82176.71	43.5729206	-69.9984462
EREF-03	A	9/19/2016	17:40:22	914072.6	82354.28	43.5745099	-69.9924457
EREF-03	B	9/19/2016	17:41:13	914073	82358.15	43.5745447	-69.9924406
EREF-03	C	9/19/2016	17:42:02	914073.4	82362.87	43.5745872	-69.9924353
EREF-03	D	9/19/2016	17:42:50	914073.1	82367.18	43.5746260	-69.9924388
EREF-03	E	9/19/2016	18:21:39	914074.5	82370.89	43.5746594	-69.9924217
EREF-03	F	9/19/2016	18:22:42	914078.9	82357.31	43.5745370	-69.9923682
EREF-03	G	9/19/2016	18:23:29	914078.3	82356.96	43.5745339	-69.9923755
EREF-03	H	9/19/2016	18:24:22	914083.2	82361.8	43.5745774	-69.9923150
EREF-04	A	9/19/2016	17:47:54	913987.9	82394.43	43.5748729	-69.9934932
EREF-04	B	9/19/2016	17:48:42	913988.2	82397.73	43.5749026	-69.9934890
EREF-04	C	9/19/2016	17:49:25	913989.7	82401.68	43.5749381	-69.9934710
EREF-04	D	9/19/2016	17:50:13	913990.3	82406.3	43.5749797	-69.9934629
EREF-04	E	9/19/2016	18:13:22	914004.9	82398.99	43.5749136	-69.9932828
EREF-04	F	9/19/2016	18:14:05	913991.9	82397.44	43.5748999	-69.9934440
EREF-04	G	9/19/2016	18:15:16	913993.7	82404.23	43.5749610	-69.9934219
EREF-04	H	9/19/2016	18:16:11	913992.4	82403.45	43.5749540	-69.9934370
EREF-05	A	9/19/2016	17:30:49	913904.9	82198	43.5731064	-69.9945264
EREF-05	B	9/19/2016	17:31:32	913906.6	82204.22	43.5731623	-69.9945047

PDS 2016 ACTUAL SPI/PV STATION IDS/COORDINATES							
Station ID	**Replicate**	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
EREF-05	C	9/19/2016	17:32:15	913909.9	82208.75	43.5732030	-69.9944642
EREF-05	D	9/19/2016	17:33:00	913912.9	82213.52	43.5732459	-69.9944260
SREF-06	A	9/19/2016	15:49:53	911139.4	80306.8	43.5561304	-70.0288015
SREF-06	B	9/19/2016	15:50:48	911142.6	80307.57	43.5561372	-70.0287619
SREF-06	C	9/19/2016	15:51:40	911138.7	80308.87	43.5561490	-70.0288093
SREF-06	D	9/19/2016	15:52:29	911134	80310.16	43.5561607	-70.0288679
SREF-07	A	9/19/2016	15:38:50	911261.9	80378.98	43.5567782	-70.0272834
SREF-07	B	9/19/2016	15:39:58	911269.3	80384.06	43.5568238	-70.0271920
SREF-07	C	9/19/2016	15:41:03	911283.1	80370.98	43.5567059	-70.0270215
SREF-07	D	9/19/2016	15:42:39	911283.2	80372.08	43.5567158	-70.0270202
SREF-07	E	9/19/2016	15:43:30	911280.2	80375.15	43.5567434	-70.0270570
SREF-08	A	9/19/2016	16:17:47	910996.4	80065.66	43.5539620	-70.0305756
SREF-08	B	9/19/2016	16:18:33	910991.5	80065.66	43.5539621	-70.0306360
SREF-08	C	9/19/2016	16:19:28	910989	80067.56	43.5539792	-70.0306670
SREF-08	D	9/19/2016	16:20:18	910990	80070.35	43.5540043	-70.0306550
SREF-09	A	9/19/2016	16:01:55	911135.4	80167.68	43.5548782	-70.0288541
SREF-09	B	9/19/2016	16:09:51	911140.6	80174.97	43.5549437	-70.0287889
SREF-09	C	9/19/2016	16:11:06	911136.7	80172.38	43.5549205	-70.0288377
SREF-09	D	9/19/2016	16:11:55	911133	80170.8	43.5549063	-70.0288836
SREF-10	A	9/19/2016	16:27:21	910999.1	80374.3	43.5567400	-70.0305363
SREF-10	B	9/19/2016	16:28:12	910998.6	80368.56	43.5566883	-70.0305421
SREF-10	C	9/19/2016	16:29:04	910996.2	80366.84	43.5566729	-70.0305728
SREF-10	D	9/19/2016	16:29:50	910997.5	80368.44	43.5566873	-70.0305559

Notes

1. Grid coordinates are NAD_1983_StatePlane_Maine_West_FIPS_1802_Meters
2. Geographic coordinates are NAD83 decimal degrees

PDS 2016 ACTUAL GRAB STATION IDS/COORDINATES FOR SEDIMENT CHEMISTRY ANALYSIS						
Station ID	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
Sed-PDS-10a	9/20/2016	9:05:17	910907.42	81684.77	43.56853671	-70.03164452
Sed-PDS-16b	9/20/2016	9:22:55	910953.05	81593.49	43.56771444	-70.03108151
Sed-PDS-20a	9/20/2016	8:55:02	910776.51	81794.25	43.56952403	-70.03326286
Sed-PDA95-22	9/20/2016	10:06:25	911533.33	80845.22	43.56097062	-70.02391429
Sed-PDA95-23	9/20/2016	9:54:33	911525.69	81058.67	43.56289197	-70.02400432
Sed-PDA95-30	9/20/2016	9:36:07	911438.82	81209.78	43.56425343	-70.02507639
Sed-EREF-01	9/20/2016	12:27:05	913717.2	82318.28	43.57419247	-69.99684657
Sed-EREF-03	9/20/2016	11:45:22	914068.49	82357.28	43.57453696	-69.99249658
Sed-EREF-05	9/20/2016	12:11:33	913903.36	82213.65	43.57324726	-69.99454459
Sed-SREF-07a	9/20/2016	10:19:45	911255.38	80367.17	43.55667199	-70.02736449
Sed-SREF-08	9/20/2016	11:20:40	911007.22	80063.59	43.5539432	-70.03044198
Sed-SREF-10	9/20/2016	10:34:06	910990.13	80380.63	43.5567971	-70.03064707

Notes

1. Grid coordinates are NAD_1983_StatePlane_Maine_West_FIPS_1802_Meters
2. Geographic coordinates are NAD83 decimal degrees

PDS 2016 ACTUAL GRAB STATION IDS/COORDINATES FOR BENTHIC COMMUNITY STRUCTURE ANALYSIS (BCA)						
Station ID	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
BCA-PDS-16	9/20/2016	13:37:40	910955.7	81593.58	43.56772	-70.031
BCA-PDA95-22	9/20/2016	14:12:25	911525.4	80857.55	43.56108	-70.024
BCA-PDA95-30	9/20/2016	14:00:05	911444.4	81207.25	43.56423	-70.025
BCA_EREF-05	9/20/2016	13:15:34	913890.6	82211.16	43.57323	-69.9947
BCA-SREF-07	9/20/2016	14:28:35	911260.3	80379.31	43.55678	-70.0273
BCA-SREF-10	9/20/2016	14:41:53	911027.6	80380.65	43.5568	-70.0302

Notes

1. Grid coordinates are NAD_1983_StatePlane_Maine_West_FIPS_1802_Meters
2. Geographic coordinates are NAD83 decimal degrees

PDS 2016 ACTUAL TRAWL STATION IDS/COORDINATES FOR TISSUE CHEMISTRY ANALYSIS						
Station ID	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
Tis-PDS-16a-sol	9/21/2016	9:18:21	910755.81	81610.65	43.56787177	-70.03352275
Tis-PDS-16a-eol	9/21/2016	9:20:26	910750.04	81739.7	43.56903341	-70.03359162
Tis-PDS-16b-sol	9/21/2016	9:49:06	910600.61	81746.05	43.56909271	-70.03544129
Tis-PDS-16b-eol	9/21/2016	9:51:10	910604.45	81824.15	43.56979562	-70.03539222
Tis-PDS-16c-sol	9/21/2016	10:11:11	910699.95	81851.68	43.57004205	-70.03420947
Tis-PDS-16c-eol	9/21/2016	10:13:24	910745.67	81967.34	43.57108243	-70.0336412
Tis-PDS-16d-sol	9/21/2016	10:38:25	910748.03	82085.95	43.57214999	-70.03360964
Tis-PDS-16d-eol	9/21/2016	10:40:30	910744.54	82201.21	43.57318748	-70.03365056
Tis-PDS-16e-sol	9/21/2016	11:07:41	911200.95	81787.06	43.56945306	-70.02800883
Tis-PDS-16e-eol	9/21/2016	11:10:15	911209.65	81947.3	43.57089523	-70.02789782
Tis-PDS-16f-sol	9/21/2016	16:49:05	911020.27	81906.66	43.57053225	-70.03024305
Tis-PDS-16f-eol	9/21/2016	16:51:12	911085.12	82034.37	43.57168079	-70.02943764
Tis-PDS-16g-sol	9/21/2016	17:10:01	910992.21	82154.12	43.57276002	-70.0305854
Tis-PDS-16g-eol	9/21/2016	17:12:05	911108.39	82200.53	43.57317603	-70.02914617
Tis-PDA95-22a-sol	9/21/2016	11:48:03	911536.45	80977.63	43.56216238	-70.02387286
Tis-PDA95-22a-eol	9/21/2016	11:50:08	911507.73	81106.25	43.56332051	-70.02422561
Tis-PDA95-22b-sol	9/21/2016	12:15:37	911539.75	80952.31	43.56193442	-70.02383255
Tis-PDA95-22b-eol	9/21/2016	12:17:42	911507.76	81111.05	43.56336372	-70.02422514
Tis-PDA95-22c-sol	9/21/2016	12:43:10	911502.44	80926.81	43.56170548	-70.0242949
Tis-PDA95-22c-eol	9/21/2016	12:45:20	911556.89	81067.8	43.56297367	-70.02361794
Tis-PDA95-22d-sol	9/21/2016	13:23:03	911524.29	81031.59	43.56264825	-70.02402222
Tis-PDA95-22d-eol	9/21/2016	13:25:06	911472.02	81184.36	43.56402412	-70.02466598
Tis-PDA95-22e-sol	9/21/2016	13:41:55	911517.01	81102.82	43.5632895	-70.02411082
Tis-PDA95-22e-eol	9/21/2016	13:44:07	911468.41	81245.92	43.56457827	-70.02470936
Tis-PDA95-22f-sol	9/21/2016	14:00:06	911509.03	81126.41	43.56350195	-70.0242091
Tis-PDA95-22f-eol	9/21/2016	14:02:10	911448.75	81264.97	43.56475004	-70.02495231
Tis-PDA95-22g-sol	9/21/2016	14:20:49	911554.11	80942.96	43.56185004	-70.02365501
Tis-PDA95-22g-eol	9/21/2016	14:22:55	911503.51	81105.63	43.563315	-70.02427786
Tis-PDA95-22h-sol	9/21/2016	14:35:44	911526	81015.59	43.56250421	-70.0240014
Tis-PDA95-22h-eol	9/21/2016	14:37:52	911503.16	81138.22	43.56360834	-70.0242815
Tis-PDA95-23a-sol	9/20/2016	16:11:29	911511.69	81110.41	43.56335789	-70.02417651
Tis-PDA95-23a-eol	9/20/2016	16:13:36	911527.55	81238.81	43.56451336	-70.02397747

PDS 2016 ACTUAL TRAWL STATION IDS/COORDINATES FOR TISSUE CHEMISTRY ANALYSIS						
Station ID	**Date**	**Time**	**X**	**Y**	**Latitude**	**Longitude**
Tis-PDA95-30a-sol	9/21/2016	14:58:50	911575.51	81339.19	43.56541613	-70.02338168
Tis-PDA95-30a-eol	9/21/2016	15:00:53	911518.73	81500.44	43.56686839	-70.02408109
Tis-PDA95-30b-sol	9/21/2016	15:24:18	911579.28	81260.13	43.56470446	-70.0233367
Tis-PDA95-30b-eol	9/21/2016	15:26:28	911541.28	81407.72	43.56603349	-70.02380393
Tis-PDA95-30c-sol	9/21/2016	15:50:44	911561.78	81312.07	43.56517224	-70.02355221
Tis-PDA95-30c-eol	9/21/2016	15:52:51	911524.66	81441.43	43.56633716	-70.02400894
Tis-PDA95-30d-sol	9/21/2016	16:11:07	911588.57	81342.05	43.56544167	-70.02321996
Tis-PDA95-30d-eol	9/21/2016	16:13:09	911540.44	81489.86	43.56677283	-70.02381258
Tis-PDA95-30a-sol	9/20/2016	16:42:21	911447.43	81189.12	43.56406734	-70.02497025
Tis-PDA95-30a-eol	9/20/2016	16:44:26	911426.81	81312.82	43.56518106	-70.02522288
Tis-EREF-02a-sol	9/21/2016	8:04:05	913561.46	82311.71	43.57413618	-69.9987748
Tis-EREF-02a-eol	9/21/2016	8:06:12	913544.81	82408.04	43.57500354	-69.99897852
Tis-EREF-02b-sol	9/21/2016	8:23:11	913790.44	82323.05	43.57423405	-69.99593974
Tis-EREF-02b-eol	9/21/2016	8:26:15	913789.91	82415.14	43.57506295	-69.99594396
Tis-EREF-02c-sol	9/21/2016	8:49:10	913765.77	82464.92	43.57551146	-69.99624155
Tis-EREF-02c-eol	9/21/2016	8:51:16	913750.77	82533.69	43.57613072	-69.99642551
Tis-SREF-07a-sol	9/20/2016	15:49:22	911417.1	80347.99	43.5564969	-70.02536337
Tis-SREF-07a-eol	9/20/2016	15:51:28	911406.42	80456.52	43.55747393	-70.02549327
Tis-SREF-10a-sol	9/20/2016	15:06:45	910975.87	80450.17	43.55742323	-70.03082215
Tis-SREF-10a-eol	9/20/2016	15:08:51	910940.31	80568.47	43.55848855	-70.03125988
Tis-SREF-10b-sol	9/20/2016	15:26:07	911026.68	80202.84	43.55519629	-70.03019832
Tis-SREF-10b-eol	9/20/2016	15:28:14	911012.19	80313.45	43.55619209	-70.03037541

Notes

1. Grid coordinates are NAD_1983_StatePlane_Maine_West_FIPS_1802_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
PDS-06	A	9/17/2016	7:30:54	193	13	0	180	Frame count = 192, color card shot, focus good	
PDS-06	B	9/17/2016	7:31:46	194	13	0	180	SPI Camera s/n 2621653, lens s/n 341587: f9, 1/250 ISO 640	
PDS-06	C	9/17/2016	7:32:35	195	13	0	180	PV Camera: s/n 27069619, lens s/n 532303: f14 ISO 400, 1/30 shutter, 1'8" trigger	
PDS-06	D	9/17/2016	7:33:29	196	13	0	180		
PDS-06	E	9/17/2016	7:46:18	197	13	0	175		
PDS-06	F	9/17/2016	7:47:16	198	13	0	175		
PDS-06	G	9/17/2016	7:47:57	199	13	0	175		
PDS-06	H	9/17/2016	7:48:57	200	13	0	175		
PDS-11	A	9/17/2016	8:07:34	201	14	3	175		
PDS-11	B	9/17/2016	8:08:16	202	14	3	175		
PDS-11	C	9/17/2016	8:09:03	203	14	3	175		
PDS-11	D	9/17/2016	8:10:05	204	14	3	175	Lost top cotter pin on piston. Replaced and continued.	
PDS-16	A	9/17/2016	8:29:42	205	14	3	163		
PDS-16	B	9/17/2016	8:30:18	206	14	3	163		
PDS-16	C	9/17/2016	8:31:00	207	14	3	163		
PDS-16	D	9/17/2016	8:31:45	208	14	3	163		
PDS-17	A	9/17/2016	8:38:37	209	14	3	180		
PDS-17	B	9/17/2016	8:39:18	210	14	3	180		
PDS-17	C	9/17/2016	8:40:04	211	14	3	180		
PDS-17	D	9/17/2016	8:40:51	212	14	3	180		
PDS-13	A	9/17/2016	8:47:34	213	14	3	197		
PDS-13	B	9/17/2016	8:48:13	214	14	3	197		
PDS-13	C	9/17/2016	8:48:51	215	14	3	197		
PDS-13	D	9/17/2016	8:49:30	216	14	3	197		
PDS-18	A	9/17/2016	8:54:21	217	14	3	195		
PDS-18	B	9/17/2016	8:55:03	218	14	3	195		
PDS-18	C	9/17/2016	8:55:42	219	14	3	195		
PDS-18	D	9/17/2016	8:56:23	220	14	3	195	Download. Prism water has sediment intrusion. Replaced with clean water	
PDS-08	A	9/17/2016	10:07:46	222	13	1	180		
PDS-08	C	9/17/2016	10:08:27	223	13	1	180		
PDS-08	B	9/17/2016	10:08:43	224	13	1	180		
PDS-08	D	9/17/2016	10:10:10	225	13	1	180		
PDS-18	E	9/17/2016	10:26:37	226	13	1	198		
PDS-18	F	9/17/2016	10:27:25	227	13	1	198		
PDS-18	G	9/17/2016	10:28:09	228	13	1	198		
PDS-18	H	9/17/2016	10:28:50	229	13	1	198		
PDS-13	E	9/17/2016	10:36:28	230	13	1	200		
PDS-13	F	9/17/2016	10:37:19	231	13	1	200		
PDS-13	G	9/17/2016	10:38:05	232	13	1	200		
PDS-13	H	9/17/2016	10:38:50	233	13	1	200		
PDS-17	E	9/17/2016	10:46:11	234	13	1	190		
PDS-17	F	9/17/2016	10:46:54	235	13	1	190		
PDS-17	G	9/17/2016	10:47:35	236	13	1	190		
PDS-17	H	9/17/2016	10:48:19	237	13	1	190		
PDS-07	A	9/17/2016	10:53:54	238	13	1	198		
PDS-07	B	9/17/2016	10:54:36	239	13	1	198		
PDS-07	C	9/17/2016	10:55:25	240	13	1	198		
PDS-07	D	9/17/2016	10:56:10	241	13	1	198		
PDS-12	A	9/17/2016	11:02:48	242	13	1	182		
PDS-12	B	9/17/2016	11:03:42	243	13	1	182		
PDS-12	C	9/17/2016	11:04:24	244	13	1	182		
PDS-12	D	9/17/2016	11:05:18	245	13	1	182		
PDS-10	A	9/17/2016	11:12:44	246	13	1	186		
PDS-10	B	9/17/2016	11:13:28	247	13	1	186		
PDS-10	C	9/17/2016	11:14:17	248	13	1	186		
PDS-10	D	9/17/2016	11:15:01	249	13	1	186		
PDS-15	A	9/17/2016	11:18:56	250	13	1	190		
PDS-15	B	9/17/2016	11:19:42	251	13	1	190		
PDS-15	C	9/17/2016	11:20:27	252	13	1	190		
PDS-15	D	9/17/2016	11:21:13	253	13	1	190		
PDS-20	A	9/17/2016	11:30:21	254	13	1	180		
PDS-20	B	9/17/2016	11:30:58	255	13	1	180		
PDS-20	C	9/17/2016	11:32:07	256	13	1	180		
PDS-20	D	9/17/2016	11:32:56	257	13	1	180	No penetration, likely hard bottom	
PDS-09	A	9/17/2016	11:38:50	258	13	1	180		
PDS-09	B	9/17/2016	11:39:35	259	13	1	180		
PDS-09	C	9/17/2016	11:40:23	260	13	1	180		
PDS-09	D	9/17/2016	11:41:32	261	13	1	180	Download, frame count 262, stops shifted and weights added to 14 and 3	
PDS-14	A	9/17/2016	12:13:50	263	14	3	178		
PDS-14	B	9/17/2016	12:14:42	264	14	3	178		
PDS-14	C	9/17/2016	12:15:30	265	14	3	178		

StationID	Replicate	Date	Time	Frame	Stops_inches	Weights_per_side	Depth_ft	Comments	QC_Notes
PDS-14	D	9/17/2016	12:16:23	266	14	3	178		
PDS-19	A	9/17/2016	12:24:08	267	14	3	190		
PDS-19	B	9/17/2016	12:25:00	268	14	3	190		
PDS-19	C	9/17/2016	12:25:51	269	14	3	190		
PDS-19	D	9/17/2016	12:26:41	270	14	3	190		
PDAA-02	A	9/17/2016	12:33:14	271	14	3	175		
PDAA-02	B	9/17/2016	12:34:15	272	14	3	175		
PDAA-02	C	9/17/2016	12:34:55	273	14	3	175		
PDAA-02	D	9/17/2016	12:35:38	274	14	3	175		
PDAA-01	A	9/17/2016	12:40:05	275	14	3	170		
PDAA-01	B	9/17/2016	12:40:51	276	14	3	170		
PDAA-01	C	9/17/2016	12:41:52	277	14	3	170		
PDAA-01	D	9/17/2016	12:43:02	278	14	3	170		
PDAA-04	A	9/17/2016	12:46:52	279	14	3	155		
PDAA-04	B	9/17/2016	12:47:46	280	14	3	155		
PDAA-04	D	9/17/2016	12:48:24	281	14	3	155		
PDAA-04	C	9/17/2016	12:48:34	282	14	3	155		
PDAA-03	A	9/17/2016	12:55:44	283	14	3	150		
PDAA-03	B	9/17/2016	12:56:41	284	14	3	150		
PDAA-03	C	9/17/2016	12:57:27	285	14	3	150		
PDAA-03	D	9/17/2016	12:58:30	286	14	3	150		
PDAA-05	A	9/17/2016	13:05:42	287	14	3	178		
PDAA-05	B	9/17/2016	13:06:53	288	14	3	178		
PDAA-05	C	9/17/2016	13:07:37	289	14	3	178		
PDAA-05	D	9/17/2016	13:08:32	290	14	3	178	Download	
PDA95-28	A	9/17/2016	13:48:21	291	13	1	190		
PDA95-28	B	9/17/2016	13:49:12	292	13	1	190		
PDA95-28	C	9/17/2016	13:50:14	293	13	1	190		
PDA95-28	D	9/17/2016	13:50:58	294	13	1	190	End of day due to weather. Back at dock @ 14:50	
PDA95-30	A	9/19/2016	12:03:54	296	13	1	207		
PDA95-30	B	9/19/2016	12:04:45	297	13	1	207		
PDA95-30	C	9/19/2016	12:05:29	298	13	1	207		
PDA95-30	D	9/19/2016	12:06:15	299	13	1	207	Download, frame count 301, stops moved to 13.5 and 1, replaced PV D/L cable	
PDA95-25	A	9/19/2016	13:00:14	302	13.5	1	202		
PDA95-25	B	9/19/2016	13:00:59	303	13.5	1	202		
PDA95-25	C	9/19/2016	13:01:38	304	13.5	1	202		
PDA95-25	D	9/19/2016	13:02:15	305	13.5	1	202		
PDA95-35	A	9/19/2016	13:12:38	306	13.5	1	188		
PDA95-35	B	9/19/2016	13:15:54	307	13.5	1	188		
PDA95-35	C	9/19/2016	13:16:42	308	13.5	1	188		
PDA95-35	D	9/19/2016	13:17:33	309	13.5	1	188		
PDA95-32	A	9/19/2016	13:24:16	310	13.5	1	210		
PDA95-32	B	9/19/2016	13:25:09	311	13.5	1	210		
PDA95-32	C	9/19/2016	13:26:04	312	13.5	1	210		
PDA95-32	D	9/19/2016	13:27:33	313	13.5	1	210		EB20170228: Updated time from 13:17 to 13:27
PDA95-29	A	9/19/2016	13:33:27	314	13.5	1	217		JRJ20170419: Changed to Station 29, Field log says Station 25, SPILog says Station 29, NavLog says Station PDA95-29
PDA95-29	B	9/19/2016	13:34:26	315	13.5	1	217		JRJ20170419: Changed to Station 29, Field log says Station 25, SPILog says Station 29, NavLog says Station PDA95-29
PDA95-29	C	9/19/2016	13:35:23	316	13.5	1	217		JRJ20170419: Changed to Station 29, Field log says Station 25, SPILog says Station 29, NavLog says Station PDA95-29
PDA95-29	D	9/19/2016	13:36:20	317	13.5	1	217		JRJ20170419: Changed to Station 29, Field log says Station 25, SPILog says Station 29, NavLog says Station PDA95-29
PDA95-23	A	9/19/2016	13:43:13	318	13.5	1	210		
PDA95-23	B	9/19/2016	13:44:16	319	13.5	1	210		
PDA95-23	D	9/19/2016	13:46:53	320	13.5	1	210		
PDA95-23	C	9/19/2016	13:47:17	321	13.5	1	210		
PDA95-26	A	9/19/2016	13:52:29	322	13.5	1	205		
PDA95-26	B	9/19/2016	13:53:20	323	13.5	1	205		
PDA95-26	C	9/19/2016	13:54:11	324	13.5	1	205		
PDA95-26	D	9/19/2016	13:55:04	325	13.5	1	205		
PDA95-34	A	9/19/2016	14:00:29	326	13.5	1	200		
PDA95-34	B	9/19/2016	14:01:30	327	13.5	1	200		
PDA95-34	C	9/19/2016	14:02:27	328	13.5	1	200		
PDA95-34	D	9/19/2016	14:03:34	329	13.5	1	200		
PDA95-27	A	9/19/2016	14:09:18	330	13.5	1	200		
PDA95-27	B	9/19/2016	14:10:06	331	13.5	1	200		
PDA95-27	C	9/19/2016	14:10:48	332	13.5	1	200		
PDA95-27	D	9/19/2016	14:11:50	333	13.5	1	200		
PDA95-24	A	9/19/2016	14:18:52	334	13.5	1	208		
PDA95-24	B	9/19/2016	14:19:51	335	13.5	1	208		
PDA95-24	C	9/19/2016	14:20:50	336	13.5	1	208		

StationID	Replicate	Date	Time	Frame	Stops_inches	Weights_per_side	Depth_ft	Comments	QC_Notes
PDA95-24	D	9/19/2016	14:21:43	337	13.5	1	208		
PDA95-22	A	9/19/2016	14:27:24	338	13.5	1	225		
PDA95-22	B	9/19/2016	14:28:16	339	13.5	1	225		
PDA95-22	C	9/19/2016	14:29:18	340	13.5	1	225		
PDA95-22	D	9/19/2016	14:30:22	341	13.5	1	225		
PDA95-22	E	9/19/2016	14:31:15	342	13.5	1	225		
PDA95-31	A	9/19/2016	14:36:29	343	13.5	1	204		
PDA95-31	B	9/19/2016	14:37:22	344	13.5	1	204		
PDA95-31	C	9/19/2016	14:38:16	345	13.5	1	204		
PDA95-31	D	9/19/2016	14:39:20	346	13.5	1	204	On deck, Download	
PDA95-21	A	9/19/2016	15:16:41	347	13.5	1	206		
PDA95-21	B	9/19/2016	15:17:28	348	13.5	1	206		
PDA95-21	C	9/19/2016	15:18:14	349	13.5	1	206		
PDA95-21	D	9/19/2016	15:19:06	350	13.5	1	206		
PDA95-33	A	9/19/2016	15:25:22	351	13.5	1	227		
PDA95-33	B	9/19/2016	15:26:14	352	13.5	1	227		
PDA95-33	C	9/19/2016	15:27:05	353	13.5	1	227		
PDA95-33	D	9/19/2016	15:27:57	354	13.5	1	227	On deck, transit to SREF, frame count 355	
SREF-07	A	9/19/2016	15:38:50	356	13.5	1	226		
SREF-07	B	9/19/2016	15:39:59	357	13.5	1	226		
SREF-07	C	9/19/2016	15:41:00	358	13.5	1	226		
SREF-07	D	9/19/2016	15:42:38	359	13.5	1	226		
SREF-07	E	9/19/2016	15:43:29	360	13.5	1	226		
SREF-06	A	9/19/2016	15:49:54	361	13.5	1	210		
SREF-06	B	9/19/2016	15:50:48	362	13.5	1	210		
SREF-06	C	9/19/2016	15:51:38	363	13.5	1	210		
SREF-06	D	9/19/2016	15:52:29	364	13.5	1	210	On deck, weights added	
SREF-09	A	9/19/2016	16:01:53	365	13.5	3	191		
SREF-09	B	9/19/2016	16:09:52	366	13.5	3	191		
SREF-09	C	9/19/2016	16:11:06	367	13.5	3	191		
SREF-09	D	9/19/2016	16:11:54	368	13.5	3	191		
SREF-08	A	9/19/2016	16:17:46	369	13.5	3	210		
SREF-08	B	9/19/2016	16:18:34	370	13.5	3	210		
SREF-08	C	9/19/2016	16:19:27	371	13.5	3	210		
SREF-08	D	9/19/2016	16:20:18	372	13.5	3	210		
SREF-10	A	9/19/2016	16:27:20	373	13.5	3	238		
SREF-10	B	9/19/2016	16:28:12	374	13.5	3	238		
SREF-10	C	9/19/2016	16:29:05	375	13.5	3	238		
SREF-10	D	9/19/2016	16:29:50	376	13.5	3	238	On deck, download, frame count 377	
EREF-02	A	9/19/2016	16:57:08	378	13.5	3	252		
EREF-02	B	9/19/2016	16:58:05	379	13.5	3	252		
EREF-02	C	9/19/2016	16:59:05	380	13.5	3	252		
EREF-02	D	9/19/2016	16:59:59	381	13.5	3	252		
EREF-02	E	9/19/2016	17:11:27		13.5	3	252	PV Only	
EREF-02	F	9/19/2016	17:12:03		13.5	3	252	PV Only	
EREF-02	G	9/19/2016	17:12:11		13.5	3	252	PV Only	
EREF-02	H	9/19/2016	17:12:37		13.5	3	252	PV Only, On Deck, frame count 384	
EREF-01	A	9/19/2016	17:21:34	385	13.5	3	252		
EREF-01	B	9/19/2016	17:22:16	386	13.5	3	252		
EREF-01	C	9/19/2016	17:23:01	387	13.5	3	252		
EREF-01	D	9/19/2016	17:23:41	388	13.5	3	252		
EREF-05	A	9/19/2016	17:30:50	389	13.5	3	245		
EREF-05	B	9/19/2016	17:31:32	390	13.5	3	245		
EREF-05	C	9/19/2016	17:32:16	391	13.5	3	245		
EREF-05	D	9/19/2016	17:32:59	392	13.5	3	245		
EREF-03	A	9/19/2016	17:40:22	393	13.5	3	207		
EREF-03	B	9/19/2016	17:41:12	394	13.5	3	207		
EREF-03	C	9/19/2016	17:42:02	395	13.5	3	207		
EREF-03	D	9/19/2016	17:42:48	396	13.5	3	207		
EREF-04	A	9/19/2016	17:47:55	397	13.5	3	198		
EREF-04	B	9/19/2016	17:48:42	398	13.5	3	198		
EREF-04	C	9/19/2016	17:49:26	399	13.5	3	198		
EREF-04	D	9/19/2016	17:50:09	400	13.5	3	198	On deck, download, Frame count 401	
EREF-04	E	9/19/2016	18:13:22	402	14	5	195		
EREF-04	F	9/19/2016	18:14:06	403	14	5	195		
EREF-04	G	9/19/2016	18:15:12	404	14	5	195		
EREF-04	H	9/19/2016	18:16:11	405	14	5	195		
EREF-03	E	9/19/2016	18:21:36	406	14	5	200		
EREF-03	F	9/19/2016	18:22:41	407	14	5	200		
EREF-03	G	9/19/2016	18:23:24	408	14	5	200		
EREF-03	H	9/19/2016	18:24:18	409	14	5	200		

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)	Boundary Roughness (cm)	Boundary Roughness Type
Reference	EREF	EREF-01	A	9/19/2016	17:21:42	77	13.5	3	14.53	4-3/>4	>4	2	>4 to 2	11.21	10.76	11.60	0.84	Biological
Reference	EREF	EREF-01	B	9/19/2016	17:22:26	77	13.5	3	14.53	4-3/>4	>4	-1	>4 to -1	11.42	11.13	11.69	0.56	Biological
Reference	EREF	EREF-01	C	9/19/2016	17:23:10	77	13.5	3	14.53	4-3/>4	>4	1	>4 to 1	9.51	9.14	10.08	0.95	Biological
Reference	EREF	EREF-02	A	9/19/2016	16:57:17	77	13.5	3	14.53	4-3/>4	>4	1	>4 to 1	12.55	10.29	13.69	3.40	Biological
Reference	EREF	EREF-02	B	9/19/2016	16:58:09	77	13.5	3	14.53	4-3/>4	>4	2	>4 to 2	11.78	11.18	12.19	1.02	Biological
Reference	EREF	EREF-02	C	9/19/2016	16:59:15	77	13.5	3	14.53	4-3/>4	>4	0	>4 to 0	13.12	12.67	13.62	0.94	Biological
Reference	EREF	EREF-03	A	9/19/2016	17:40:31	63	13.5	3	14.53	4-3	>4	1	>4 to 1	6.33	6.02	6.74	0.72	Biological
Reference	EREF	EREF-03	B	9/19/2016	17:41:21	63	13.5	3	14.53	4-3/>4	>4	2	>4 to 2	7.47	6.93	8.06	1.12	Biological
Reference	EREF	EREF-03	C	9/19/2016	17:42:12	63	13.5	3	14.53	4-3	>4	0	>4 to 0	8.94	8.46	9.45	0.99	Biological
Reference	EREF	EREF-04	A	9/19/2016	17:48:03	60	13.5	3	14.53	IND	IND	IND	IND to IND	0.00	0.00	0.00	IND	Physical
Reference	EREF	EREF-04	B	9/19/2016	17:48:51	60	13.5	3	14.53	>4	>4	0	>4 to 0	5.42	4.65	6.10	1.45	Biological
Reference	EREF	EREF-04	C	9/19/2016	17:49:35	60	13.5	3	14.53	>4	>4	0	>4 to 0	5.13	4.60	6.04	1.44	Biological
Reference	EREF	EREF-05	A	9/19/2016	17:30:59	75	13.5	3	14.53	4-3/>4	>4	0	>4 to 0	10.47	10.12	10.84	0.73	Biological
Reference	EREF	EREF-05	B	9/19/2016	17:31:42	75	13.5	3	14.53	4-3/>4	>4	2	>4 to 2	10.64	10.23	11.09	0.86	Biological
Reference	EREF	EREF-05	C	9/19/2016	17:32:25	75	13.5	3	14.53	4-3/>4	>4	1	>4 to 1	10.87	10.43	11.35	0.92	Biological
Disposal	PDA95	PDA95-21	A	9/19/2016	15:16:51	63	13.5	1	14.53	4-3/>4	>4	0	>4 to 0	13.90	13.50	14.56	1.06	Biological
Disposal	PDA95	PDA95-21	B	9/19/2016	15:17:38	63	13.5	1	14.53	4-3/>4	>4	0	>4 to 0	12.76	12.37	13.30	0.93	Biological
Disposal	PDA95	PDA95-21	C	9/19/2016	15:18:25	63	13.5	1	14.53	>4	>4	-1	>4 to -1	14.38	13.79	14.88	1.09	Biological
Disposal	PDA95	PDA95-22	A	9/19/2016	14:27:36	69	13.5	1	14.53	4-3/>4	>4	0	>4 to 0	18.07	17.60	18.33	0.73	Biological
Disposal	PDA95	PDA95-22	B	9/19/2016	14:28:26	69	13.5	1	14.53	3-2/>4	>4	1	>4 to 1	17.55	17.22	18.53	1.31	Biological
Disposal	PDA95	PDA95-22	C	9/19/2016	14:29:29	69	13.5	1	14.53	3-2/>4	>4	1	>4 to 1	19.29	19.03	19.51	0.48	Biological
Disposal	PDA95	PDA95-23	A	9/19/2016	13:43:23	64	13.5	1	14.53	4-3/>4	>4	1	>4 to 1	12.60	11.92	13.34	1.42	Biological
Disposal	PDA95	PDA95-23	B	9/19/2016	13:44:27	64	13.5	1	14.53	4-3/>4	>4	1	>4 to 1	16.34	16.06	16.67	0.61	Biological
Disposal	PDA95	PDA95-23	C	9/19/2016	13:45:27	64	13.5	1	14.53	3-2/>4	>4	0	>4 to 0	13.84	13.46	14.24	0.78	Biological
Disposal	PDA95	PDA95-24	A	9/19/2016	14:19:02	63	13.5	1	14.53	4-3/>4	>4	2	>4 to 2	17.15	16.70	17.66	0.96	Biological
Disposal	PDA95	PDA95-24	B	9/19/2016	14:20:01	63	13.5	1	14.53	3-2/>4	>4	0	>4 to 0	20.08	19.49	20.52	1.02	Biological
Disposal	PDA95	PDA95-24	C	9/19/2016	14:21:00	63	13.5	1	14.53	3-2/>4	>4	1	>4 to 1	8.01	7.74	8.23	0.49	Biological
Disposal	PDA95	PDA95-25	A	9/19/2016	13:00:25	62	13.5	1	14.53	4-3/>4	>4	-1	>4 to -1	16.03	15.90	16.29	0.39	Biological
Disposal	PDA95	PDA95-25	B	9/19/2016	13:01:07	62	13.5	1	14.53	4-3/>4	>4	2	>4 to 2	16.78	16.38	17.27	0.89	Biological
Disposal	PDA95	PDA95-25	C	9/19/2016	13:01:48	62	13.5	1	14.53	4-3/>4	>4	1	>4 to 1	15.87	15.68	16.10	0.42	Biological
Disposal	PDA95	PDA95-26	A	9/19/2016	13:52:40	62	13.5	1	14.53	4-3/>4	>4	0	>4 to 0	14.47	14.27	14.62	0.35	Biological
Disposal	PDA95	PDA95-26	B	9/19/2016	13:53:31	62	13.5	1	14.53	4-3/>4	>4	0	>4 to 0	16.58	16.25	16.93	0.68	Biological

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)	Boundary Roughness (cm)	Boundary Roughness Type
Disposal	PDA95	PDA95-26	C	9/19/2016	13:54:22	62	13.5	1	14.53	4-3/>4	>4	0	>4 to 0	15.72	15.19	16.32	1.13	Biological
Disposal	PDA95	PDA95-27	A	9/19/2016	14:09:29	61	13.5	1	14.53	4-3/>4	>4	2	>4 to 2	15.08	13.91	15.76	1.85	Biological
Disposal	PDA95	PDA95-27	B	9/19/2016	14:10:17	61	13.5	1	14.53	3-2/>4	>4	1	>4 to 1	19.51	19.27	19.77	0.50	Biological
Disposal	PDA95	PDA95-27	C	9/19/2016	14:11:09	61	13.5	1	14.53	3-2/>4	>4	2	>4 to 2	17.32	17.15	17.51	0.36	Biological
Disposal	PDA95	PDA95-28	A	9/17/2016	13:48:32	58	13	1	14.53	3-2/>4	>4	-1	>4 to -1	15.86	14.88	16.72	1.83	Biological
Disposal	PDA95	PDA95-28	B	9/17/2016	13:49:23	58	13	1	14.53	3-2/>4	>4	0	>4 to 0	21.80	IND	IND	IND	IND
Disposal	PDA95	PDA95-28	C	9/17/2016	13:50:26	58	13	1	14.53	3-2/>4	>4	0	>4 to 0	20.48	20.08	20.83	0.75	Biological
Disposal	PDA95	PDA95-29	A	9/19/2016	13:33:37	66	13.5	1	14.53	4-3/>4	>4	0	>4 to 0	15.05	14.65	16.42	1.77	Biological
Disposal	PDA95	PDA95-29	B	9/19/2016	13:34:37	66	13.5	1	14.53	4-3/>4	>4	0	>4 to 0	14.23	13.88	14.78	0.90	Biological
Disposal	PDA95	PDA95-29	C	9/19/2016	13:35:34	66	13.5	1	14.53	4-3/>4	>4	0	>4 to 0	14.41	14.17	14.77	0.60	Biological
Disposal	PDA95	PDA95-30	A	9/19/2016	12:04:02	63	13	1	14.53	4-3/>4	>4	1	>4 to 1	13.33	13.13	13.59	0.47	Biological
Disposal	PDA95	PDA95-30	B	9/19/2016	12:04:54	63	13	1	14.53	4-3/>4	>4	2	>4 to 2	12.77	10.42	13.90	3.47	Biological
Disposal	PDA95	PDA95-30	C	9/19/2016	12:05:37	63	13	1	14.53	4-3/>4	>4	1	>4 to 1	14.76	14.20	15.16	0.96	Biological
Disposal	PDA95	PDA95-31	A	9/19/2016	14:36:40	62	13.5	1	14.53	4-3/>4	>4	1	>4 to 1	15.55	15.16	15.90	0.74	Biological
Disposal	PDA95	PDA95-31	B	9/19/2016	14:37:33	62	13.5	1	14.53	4-3/>4	>4	-1	>4 to -1	18.23	17.51	19.06	1.55	Biological
Disposal	PDA95	PDA95-31	C	9/19/2016	14:38:27	62	13.5	1	14.53	4-3/>4	>4	1	>4 to 1	17.25	16.80	18.27	1.47	Biological
Disposal	PDA95	PDA95-32	A	9/19/2016	13:24:27	64	13.5	1	14.53	4-3/>4	>4	1	>4 to 1	17.62	16.16	18.84	2.68	Physical
Disposal	PDA95	PDA95-32	B	9/19/2016	13:25:17	64	13.5	1	14.53	4-3/>4	>4	0	>4 to 0	14.78	13.78	16.02	2.25	Physical
Disposal	PDA95	PDA95-32	C	9/19/2016	13:26:15	64	13.5	1	14.53	4-3/>4	>4	2	>4 to 2	15.35	14.99	15.65	0.67	Biological
Disposal	PDA95	PDA95-33	A	9/19/2016	15:25:31	69	13.5	1	14.53	4-3/>4	>4	0	>4 to 0	18.17	18.01	18.42	0.41	Biological
Disposal	PDA95	PDA95-33	B	9/19/2016	15:26:29	69	13.5	1	14.53	4-3/>4	>4	2	>4 to 2	18.03	16.64	19.06	2.42	Biological
Disposal	PDA95	PDA95-33	C	9/19/2016	15:27:15	69	13.5	1	14.53	4-3/>4	>4	1	>4 to 1	20.01	19.38	20.78	1.40	Biological
Disposal	PDA95	PDA95-34	A	9/19/2016	14:00:39	61	13.5	1	14.53	3-2/>4	>4	1	>4 to 1	13.58	13.34	13.81	0.47	Biological
Disposal	PDA95	PDA95-34	B	9/19/2016	14:01:41	61	13.5	1	14.53	3-2/>4	>4	-2	>4 to -2	15.24	14.65	15.84	1.19	Biological
Disposal	PDA95	PDA95-34	C	9/19/2016	14:02:37	61	13.5	1	14.53	3-2/>4	>4	-1	>4 to -1	13.31	12.49	13.88	1.40	Biological
Disposal	PDA95	PDA95-35	B	9/19/2016	13:16:02	57	13.5	1	14.53	4-3/>4	>4	2	>4 to 2	15.57	15.01	16.02	1.00	Biological
Disposal	PDA95	PDA95-35	C	9/19/2016	13:16:54	57	13.5	1	14.53	4-3/>4	>4	2	>4 to 2	19.21	18.86	19.51	0.65	Biological
Disposal	PDA95	PDA95-35	D	9/19/2016	13:17:44	57	13.5	1	14.53	4-3/>4	>4	1	>4 to 1	16.09	15.36	16.98	1.61	Biological
Disposal	PDAA	PDAA-01	A	9/17/2016	12:40:14	52	14	3	14.53	3-2	>4	-4	>4 to -4	5.47	4.87	6.10	1.24	Physical
Disposal	PDAA	PDAA-01	B	9/17/2016	12:41:01	52	14	3	14.53	3-2	>4	-5	>4 to -5	3.58	2.61	4.91	2.30	Physical
Disposal	PDAA	PDAA-01	C	9/17/2016	12:42:01	52	14	3	14.53	3-2	>4	-2	>4 to -2	3.61	3.28	3.91	0.63	Physical

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)	Boundary Roughness (cm)	Boundary Roughness Type
Disposal	PDAA	PDAA-02	A	9/17/2016	12:33:25	53	14	3	14.53	3-2	>4	-4	>4 to -4	5.06	4.36	5.64	1.28	Physical
Disposal	PDAA	PDAA-02	B	9/17/2016	12:34:25	53	14	3	14.53	3-2	>4	-3	>4 to -3	4.09	3.67	4.43	0.75	Physical
Disposal	PDAA	PDAA-02	C	9/17/2016	12:35:05	53	14	3	14.53	3-2	>4	-2	>4 to -2	5.64	5.36	5.81	0.45	Biological
Disposal	PDAA	PDAA-03	B	9/17/2016	12:56:50	46	14	3	14.53	3-2	>4	-4	>4 to -4	9.99	9.42	10.39	0.97	Biological
Disposal	PDAA	PDAA-03	C	9/17/2016	12:57:36	46	14	3	14.53	3-2/>4	>4	-2	>4 to -2	8.81	7.72	9.57	1.85	Biological
Disposal	PDAA	PDAA-03	D	9/17/2016	12:58:40	46	14	3	14.53	4-3/>4	>4	-4	>4 to -4	11.37	10.26	12.15	1.90	Biological
Disposal	PDAA	PDAA-04	A	9/17/2016	12:47:02	47	14	3	14.53	>4	>4	-4	>4 to -4	0.10	0.00	0.33	0.33	Physical
Disposal	PDAA	PDAA-04	C	9/17/2016	12:48:44	47	14	3	14.53	>4	>4	-5	>4 to -5	0.25	0.00	0.83	0.83	Physical
Disposal	PDAA	PDAA-04	D	9/17/2016	12:49:33	47	14	3	14.53	3-2	>4	-4	>4 to -4	0.00	0.00	0.00	IND	Physical
Disposal	PDAA	PDAA-05	A	9/17/2016	13:05:51	54	14	3	14.53	3-2	>4	-1	>4 to -1	7.09	5.71	7.89	2.18	Physical
Disposal	PDAA	PDAA-05	B	9/17/2016	13:07:03	54	14	3	14.53	4-3/>4	>4	-2	>4 to -2	5.64	4.98	6.27	1.29	Biological
Disposal	PDAA	PDAA-05	C	9/17/2016	13:07:47	54	14	3	14.53	4-3/>4	>4	-3	>4 to -3	6.36	5.83	6.68	0.85	Physical
Disposal	PDS	PDS-06	E	9/17/2016	7:46:30	53	13	0	14.53	4-3/>4	>4	0	>4 to 0	16.67	16.13	17.37	1.23	Biological
Disposal	PDS	PDS-06	F	9/17/2016	7:47:17	53	13	0	14.53	4-3/>4	>4	0	>4 to 0	19.15	18.77	19.69	0.92	Biological
Disposal	PDS	PDS-06	G	9/17/2016	7:48:08	53	13	0	14.53	3-2/>4	>4	1	>4 to 1	19.67	19.32	19.97	0.65	Biological
Disposal	PDS	PDS-07	A	9/17/2016	10:54:06	60	13	1	14.53	4-3/>4	>4	-1	>4 to -1	14.44	13.87	14.75	0.89	Biological
Disposal	PDS	PDS-07	B	9/17/2016	10:54:47	60	13	1	14.53	4-3/>4	>4	0	>4 to 0	12.05	11.42	13.28	1.86	Biological
Disposal	PDS	PDS-07	C	9/17/2016	10:55:38	60	13	1	14.53	4-3/>4	>4	0	>4 to 0	13.50	12.59	14.62	2.03	Biological
Disposal	PDS	PDS-08	A	9/17/2016	10:07:57	55	13	1	14.53	3-2/>4	>4	1	>4 to 1	7.33	6.73	7.82	1.09	Biological
Disposal	PDS	PDS-08	B	9/17/2016	10:08:55	55	13	1	14.53	4-3/>4	>4	0	>4 to 0	10.84	10.20	11.56	1.35	Biological
Disposal	PDS	PDS-08	C	9/17/2016	10:09:39	55	13	1	14.53	4-3/>4	>4	0	>4 to 0	9.51	9.11	10.13	1.02	Physical
Disposal	PDS	PDS-09	A	9/17/2016	11:39:03	55	13	1	14.53	4-3/>4	>4	1	>4 to 1	8.66	7.91	9.75	1.84	Physical
Disposal	PDS	PDS-09	B	9/17/2016	11:39:48	55	13	1	14.53	3-2/>4	>4	1	>4 to 1	9.12	8.11	10.20	2.09	Physical
Disposal	PDS	PDS-09	C	9/17/2016	11:40:36	55	13	1	14.53	4-3/>4	>4	0	>4 to 0	11.71	11.12	12.41	1.29	Biological
Disposal	PDS	PDS-10	A	9/17/2016	11:12:56	57	13	1	14.53	4-3/>4	>4	1	>4 to 1	13.86	13.46	14.24	0.78	Biological
Disposal	PDS	PDS-10	B	9/17/2016	11:13:39	57	13	1	14.53	4-3/>4	>4	0	>4 to 0	12.65	12.01	13.07	1.06	Biological
Disposal	PDS	PDS-10	C	9/17/2016	11:14:29	57	13	1	14.53	4-3/>4	>4	2	>4 to 2	12.97	12.83	13.33	0.49	Biological
Disposal	PDS	PDS-11	A	9/17/2016	8:07:45	53	14	3	14.53	3-2/>4	>4	-1	>4 to -1	14.44	13.84	15.09	1.25	Physical
Disposal	PDS	PDS-11	B	9/17/2016	8:08:23	53	14	3	14.53	>4	>4	-1	>4 to -1	14.84	13.91	15.54	1.63	Biological
Disposal	PDS	PDS-11	C	9/17/2016	8:09:07	53	14	3	14.53	3-2/>4	>4	-1	>4 to -1	14.21	13.43	15.17	1.74	Biological
Disposal	PDS	PDS-12	A	9/17/2016	11:03:00	55	13	1	14.53	4-3/>4	>4	0	>4 to 0	14.46	13.68	15.33	1.66	Biological

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)	Boundary Roughness (cm)	Boundary Roughness Type
Disposal	PDS	PDS-12	B	9/17/2016	11:03:54	55	13	1	14.53	4-3/>4	>4	1	>4 to 1	13.46	12.69	14.11	1.42	Biological
Disposal	PDS	PDS-12	C	9/17/2016	11:04:36	55	13	1	14.53	4-3/>4	>4	1	>4 to 1	14.12	13.84	14.52	0.68	Biological
Disposal	PDS	PDS-13	E	9/17/2016	10:36:39	61	13	1	14.53	4-3/>4	>4	1	>4 to 1	19.30	18.27	19.80	1.53	Biological
Disposal	PDS	PDS-13	F	9/17/2016	10:37:31	61	13	1	14.53	4-3/>4	>4	2	>4 to 2	20.60	19.71	21.34	1.64	Biological
Disposal	PDS	PDS-13	G	9/17/2016	10:38:17	61	13	1	14.53	4-3/>4	>4	1	>4 to 1	21.80	IND	IND	IND	IND
Disposal	PDS	PDS-14	A	9/17/2016	12:14:01	54	14	3	14.53	3-2/>4	>4	1	>4 to 1	6.96	6.10	7.60	1.50	Biological
Disposal	PDS	PDS-14	B	9/17/2016	12:14:52	54	14	3	14.53	3-2	>4	1	>4 to 1	12.67	11.58	13.13	1.54	Biological
Disposal	PDS	PDS-14	C	9/17/2016	12:15:38	54	14	3	14.53	3-2/>4	>4	0	>4 to 0	18.54	17.75	20.15	2.40	Biological
Disposal	PDS	PDS-15	A	9/17/2016	11:19:08	58	13	1	14.53	3-2/>4	>4	-4	>4 to -4	11.50	10.73	11.99	1.26	Biological
Disposal	PDS	PDS-15	B	9/17/2016	11:19:55	58	13	1	14.53	3-2	>4	1	>4 to 1	6.56	6.07	7.00	0.93	Biological
Disposal	PDS	PDS-15	D	9/17/2016	11:21:27	58	13	1	14.53	3-2/>4	>4	-5	>4 to -5	4.92	3.58	6.21	2.64	Physical
Disposal	PDS	PDS-16	A	9/17/2016	8:29:53	50	14	3	14.53	4-3/>4	>4	0	>4 to 0	15.45	13.55	16.58	3.04	Physical
Disposal	PDS	PDS-16	B	9/17/2016	8:30:28	50	14	3	14.53	4-3/>4	>4	0	>4 to 0	12.52	12.19	13.30	1.10	Biological
Disposal	PDS	PDS-16	C	9/17/2016	8:31:10	50	14	3	14.53	4-3/>4	>4	-3	>4 to -3	14.41	12.56	15.12	2.56	Physical
Disposal	PDS	PDS-17	E	9/17/2016	10:46:23	58	13	1	14.53	4-3/>4	>4	2	>4 to 2	14.72	13.52	15.80	2.28	Biological
Disposal	PDS	PDS-17	F	9/17/2016	10:47:06	58	13	1	14.53	4-3/>4	>4	1	>4 to 1	20.85	20.41	21.32	0.92	Biological
Disposal	PDS	PDS-17	G	9/17/2016	10:47:48	58	13	1	14.53	4-3/>4	>4	0	>4 to 0	18.09	17.77	18.62	0.85	Biological
Disposal	PDS	PDS-18	E	9/17/2016	10:26:47	60	13	1	14.53	4-3/>4	>4	2	>4 to 2	14.91	14.29	15.42	1.13	Biological
Disposal	PDS	PDS-18	F	9/17/2016	10:27:37	60	13	1	14.53	4-3/>4	>4	1	>4 to 1	17.09	16.76	17.46	0.70	Biological
Disposal	PDS	PDS-18	G	9/17/2016	10:28:20	60	13	1	14.53	4-3/>4	>4	0	>4 to 0	10.24	9.93	10.48	0.55	Biological
Disposal	PDS	PDS-19	A	9/17/2016	12:24:18	58	14	3	14.53	4-3/>4	>4	2	>4 to 2	14.44	13.52	15.36	1.85	Biological
Disposal	PDS	PDS-19	B	9/17/2016	12:25:11	58	14	3	14.53	4-3/>4	>4	1	>4 to 1	14.97	14.78	15.26	0.48	Biological
Disposal	PDS	PDS-19	C	9/17/2016	12:26:01	58	14	3	14.53	4-3/>4	>4	-1	>4 to -1	14.24	13.68	14.87	1.19	Biological
Disposal	PDS	PDS-20	A	9/17/2016	11:30:33	55	13	1	14.53	4-3/>4	>4	1	>4 to 1	6.37	5.81	7.20	1.39	Biological
Disposal	PDS	PDS-20	B	9/17/2016	11:31:10	55	13	1	14.53	4-3/>4	>4	1	>4 to 1	10.98	10.67	11.41	0.74	Biological
Disposal	PDS	PDS-20	C	9/17/2016	11:32:18	55	13	1	14.53	4-3/>4	>4	0	>4 to 0	5.93	5.52	6.32	0.81	Biological
Reference	SREF	SREF-10	B	9/19/2016	16:28:22	73	13.5	3	14.53	4-3/>4	>4	1	>4 to 1	13.53	12.86	14.17	1.31	Biological
Reference	SREF	SREF-10	C	9/19/2016	16:29:14	73	13.5	3	14.53	4-3/>4	>4	-1	>4 to -1	9.58	8.98	10.07	1.09	Biological
Reference	SREF	SREF-06	A	9/19/2016	15:50:04	64	13.5	1	14.53	IND	IND	IND	IND to IND	0.00	0.00	0.00	IND	IND
Reference	SREF	SREF-06	B	9/19/2016	15:50:59	64	13.5	1	14.53	IND	IND	IND	IND to IND	0.00	0.00	0.00	IND	IND
Reference	SREF	SREF-06	C	9/19/2016	15:51:48	64	13.5	1	14.53	IND	IND	IND	IND to IND	0.00	0.00	0.00	IND	IND
Reference	SREF	SREF-07	A	9/19/2016	15:39:00	69	13.5	1	14.53	4-3	>4	2	>4 to 2	8.67	8.17	8.95	0.78	Biological
Reference	SREF	SREF-07	B	9/19/2016	15:40:04	69	13.5	1	14.53	4-3	>4	0	>4 to 0	8.48	8.01	8.87	0.86	Biological
Reference	SREF	SREF-07	C	9/19/2016	15:40:57	69	13.5	1	14.53	4-3/>4	>4	1	>4 to 1	8.56	8.21	8.83	0.62	Biological

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)	Boundary Roughness (cm)	Boundary Roughness Type
Reference	SREF	SREF-08	A	9/19/2016	16:17:55	64	13.5	3	14.53	IND	IND	IND	IND to IND	0.00	0.00	0.00	IND	IND
Reference	SREF	SREF-08	C	9/19/2016	16:19:38	64	13.5	3	14.53	4-3	>4	-1	>4 to -1	9.78	9.29	10.31	1.02	Biological
Reference	SREF	SREF-08	D	9/19/2016	16:20:28	64	13.5	3	14.53	4-3	>4	-2	>4 to -2	7.01	6.47	7.76	1.29	Biological
Reference	SREF	SREF-09	A	9/19/2016	16:02:03	58	13.5	3	14.53	IND	IND	IND	IND to IND	0.00	0.00	0.00	IND	IND
Reference	SREF	SREF-09	B	9/19/2016	16:10:01	58	13.5	3	14.53	IND	IND	IND	IND to IND	0.00	0.00	0.00	IND	IND
Reference	SREF	SREF-09	C	9/19/2016	16:11:15	58	13.5	3	14.53	IND	IND	IND	IND to IND	0.00	0.00	0.00	IND	IND
Reference	SREF	SREF-10	D	9/19/2016	16:30:00	73	13.5	3	14.53	4-3/>4	>4	1	>4 to 1	11.62	10.60	12.66	2.06	Biological

Area	Location	StationID	Replicate	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	EREF	EREF-01	A	1.66				No	0	No			
Reference	EREF	EREF-01	B	1.24				No	0	No			
Reference	EREF	EREF-01	C	1.31				No	0	No			
Reference	EREF	EREF-02	A	2.14				No	0	No			
Reference	EREF	EREF-02	B	2.22				No	0	No			
Reference	EREF	EREF-02	C	3.42				No	0	No			
Reference	EREF	EREF-03	A	1.35				No	0	No			
Reference	EREF	EREF-03	B	2.08				No	0	No			
Reference	EREF	EREF-03	C	1.61				No	0	No			
Reference	EREF	EREF-04	A	IND				No	0	No			
Reference	EREF	EREF-04	B	1.25				No	0	No			
Reference	EREF	EREF-04	C	1.25				No	0	No			
Reference	EREF	EREF-05	A	1.65				No	0	No			
Reference	EREF	EREF-05	B	1.68				No	0	No			
Reference	EREF	EREF-05	C	1.44				No	0	No			
Disposal	PDA95	PDA95-21	A	1.52				No	0	Yes		13.90	TRUE
Disposal	PDA95	PDA95-21	B	1.51				No	0	Yes		12.76	TRUE
Disposal	PDA95	PDA95-21	C	1.32				No	0	Yes		14.38	TRUE
Disposal	PDA95	PDA95-22	A	2.03				No	0	Yes		18.07	TRUE
Disposal	PDA95	PDA95-22	B	1.66		1	Red	No	0	Yes		17.55	TRUE
Disposal	PDA95	PDA95-22	C	3.30				No	0	Yes		19.29	TRUE
Disposal	PDA95	PDA95-23	A	2.75				No	0	Yes		12.60	TRUE
Disposal	PDA95	PDA95-23	B	0.99				No	0	Yes		16.34	TRUE
Disposal	PDA95	PDA95-23	C	1.42				No	0	Yes		13.84	TRUE
Disposal	PDA95	PDA95-24	A	2.22		2	Red	No	0	Yes		17.15	TRUE
Disposal	PDA95	PDA95-24	B	2.32				No	0	Yes		20.08	TRUE
Disposal	PDA95	PDA95-24	C	0.75				No	0	Yes		8.01	TRUE
Disposal	PDA95	PDA95-25	A	1.15				No	0	Yes		16.03	TRUE
Disposal	PDA95	PDA95-25	B	0.64				No	0	Yes		16.78	TRUE
Disposal	PDA95	PDA95-25	C	1.00				No	0	Yes		15.87	TRUE
Disposal	PDA95	PDA95-26	A	1.21				No	0	Yes		14.47	TRUE
Disposal	PDA95	PDA95-26	B	0.52		1	Red	No	0	Yes		16.58	TRUE

Area	Location	StationID	Replicate	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	PDA95	PDA95-26	C	0.83		1	Red	No	0	Yes		15.72	TRUE
Disposal	PDA95	PDA95-27	A	1.22				No	0	Yes		15.08	TRUE
Disposal	PDA95	PDA95-27	B	1.61				No	0	Yes		19.51	TRUE
Disposal	PDA95	PDA95-27	C	0.92				No	0	Yes		17.32	TRUE
Disposal	PDA95	PDA95-28	A	1.86				No	0	Yes		15.86	TRUE
Disposal	PDA95	PDA95-28	B	IND				No	0	Yes		21.80	TRUE
Disposal	PDA95	PDA95-28	C	0.81				No	0	Yes		20.48	TRUE
Disposal	PDA95	PDA95-29	A	1.31				No	0	Yes		15.05	TRUE
Disposal	PDA95	PDA95-29	B	0.45				No	0	Yes		14.23	TRUE
Disposal	PDA95	PDA95-29	C	0.44				No	0	Yes		14.41	TRUE
Disposal	PDA95	PDA95-30	A	1.35				No	0	Yes		13.33	TRUE
Disposal	PDA95	PDA95-30	B	0.85				No	0	Yes		12.77	TRUE
Disposal	PDA95	PDA95-30	C	1.64				No	0	Yes		14.76	TRUE
Disposal	PDA95	PDA95-31	A	1.97				No	0	Yes		15.55	TRUE
Disposal	PDA95	PDA95-31	B	1.32				No	0	Yes		18.23	TRUE
Disposal	PDA95	PDA95-31	C	1.47		1	Ox	No	0	Yes		17.25	TRUE
Disposal	PDA95	PDA95-32	A	1.32				No	0	Yes		17.62	TRUE
Disposal	PDA95	PDA95-32	B	1.32				No	0	Yes		14.78	TRUE
Disposal	PDA95	PDA95-32	C	IND		2	Red	No	0	Yes		15.35	TRUE
Disposal	PDA95	PDA95-33	A	1.80				No	0	Yes		18.17	TRUE
Disposal	PDA95	PDA95-33	B	1.31				No	0	Yes		18.03	TRUE
Disposal	PDA95	PDA95-33	C	2.05				No	0	Yes		20.01	TRUE
Disposal	PDA95	PDA95-34	A	1.08				No	0	Yes		13.58	TRUE
Disposal	PDA95	PDA95-34	B	0.49				No	0	Yes		15.24	TRUE
Disposal	PDA95	PDA95-34	C	IND				No	0	Yes		13.31	TRUE
Disposal	PDA95	PDA95-35	B	1.58				No	0	Yes		15.57	TRUE
Disposal	PDA95	PDA95-35	C	1.13				No	0	Yes		19.21	TRUE
Disposal	PDA95	PDA95-35	D	1.49				No	0	Yes		16.09	TRUE
Disposal	PDAA	PDAA-01	A	IND				No	0	Yes		5.47	TRUE
Disposal	PDAA	PDAA-01	B	IND				No	0	Yes		3.58	TRUE
Disposal	PDAA	PDAA-01	C	IND				No	0	Yes		3.61	TRUE

Area	Location	StationID	Replicate	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	PDAA	PDAA-02	A	1.43				No	0	Yes		5.06	TRUE
Disposal	PDAA	PDAA-02	B	IND				No	0	Yes		4.09	TRUE
Disposal	PDAA	PDAA-02	C	IND				No	0	Yes		5.64	TRUE
Disposal	PDAA	PDAA-03	B	IND				No	0	Yes		9.99	TRUE
Disposal	PDAA	PDAA-03	C	1.34				No	0	Yes		8.81	TRUE
Disposal	PDAA	PDAA-03	D	IND		1	Ox	No	0	Yes		11.37	TRUE
Disposal	PDAA	PDAA-04	A	IND	TRUE			No	0	IND		IND	
Disposal	PDAA	PDAA-04	C	IND	TRUE			No	0	IND		IND	
Disposal	PDAA	PDAA-04	D	IND	TRUE			No	0	IND		IND	
Disposal	PDAA	PDAA-05	A	IND				No	0	Yes		7.09	TRUE
Disposal	PDAA	PDAA-05	B	IND				No	0	Yes		5.64	TRUE
Disposal	PDAA	PDAA-05	C	IND				No	0	Yes		6.36	TRUE
Disposal	PDS	PDS-06	E	3.06				No	0	Yes		16.67	TRUE
Disposal	PDS	PDS-06	F	3.95				No	0	Yes		19.15	TRUE
Disposal	PDS	PDS-06	G	2.85				No	0	Yes		19.67	TRUE
Disposal	PDS	PDS-07	A	2.01				No	0	Yes		14.44	TRUE
Disposal	PDS	PDS-07	B	1.06				No	0	Yes		12.05	TRUE
Disposal	PDS	PDS-07	C	1.13				No	0	Yes		13.50	TRUE
Disposal	PDS	PDS-08	A	2.10				No	0	Yes		7.33	TRUE
Disposal	PDS	PDS-08	B	0.95				No	0	Yes		10.84	TRUE
Disposal	PDS	PDS-08	C	0.52				No	0	Yes		9.51	TRUE
Disposal	PDS	PDS-09	A	1.72				No	0	Yes		8.66	TRUE
Disposal	PDS	PDS-09	B	IND		1	Red	No	0	Yes		9.12	TRUE
Disposal	PDS	PDS-09	C	0.69				No	0	Yes		11.71	TRUE
Disposal	PDS	PDS-10	A	1.04				No	0	Yes		13.86	TRUE
Disposal	PDS	PDS-10	B	0.73				No	0	Yes		12.65	TRUE
Disposal	PDS	PDS-10	C	1.06				No	0	Yes		12.97	TRUE
Disposal	PDS	PDS-11	A	1.61				No	0	Yes		14.44	TRUE
Disposal	PDS	PDS-11	B	IND				No	0	Yes		14.84	TRUE
Disposal	PDS	PDS-11	C	IND				No	0	Yes		14.21	TRUE
Disposal	PDS	PDS-12	A	2.07				No	0	Yes		14.46	TRUE

Area	Location	StationID	Replicate	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	PDS	PDS-12	B	1.14		1	Red	No	0	Yes		13.46	TRUE
Disposal	PDS	PDS-12	C	1.22				No	0	Yes		14.12	TRUE
Disposal	PDS	PDS-13	E	3.13				No	0	Yes			
Disposal	PDS	PDS-13	F	1.88				No	0	Yes			
Disposal	PDS	PDS-13	G	IND				No	0	Yes			
Disposal	PDS	PDS-14	A	2.01				No	0	Yes		6.96	TRUE
Disposal	PDS	PDS-14	B	1.89				No	0	Yes		12.67	TRUE
Disposal	PDS	PDS-14	C	2.39				No	0	Yes		18.54	TRUE
Disposal	PDS	PDS-15	A	1.19				No	0	Yes		11.50	TRUE
Disposal	PDS	PDS-15	B	IND				No	0	Yes		6.56	TRUE
Disposal	PDS	PDS-15	D	1.05				No	0	Yes		4.92	TRUE
Disposal	PDS	PDS-16	A	1.28				No	0	Yes		15.45	TRUE
Disposal	PDS	PDS-16	B	0.36				No	0	Yes		12.52	TRUE
Disposal	PDS	PDS-16	C	IND		1	Red	No	0	Yes		14.41	TRUE
Disposal	PDS	PDS-17	E	1.08				No	0	Yes		14.72	TRUE
Disposal	PDS	PDS-17	F	IND				No	0	Yes		20.85	TRUE
Disposal	PDS	PDS-17	G	0.79		1	Red	No	0	Yes		18.09	TRUE
Disposal	PDS	PDS-18	E	0.74		1	Red	No	0	Yes		14.91	TRUE
Disposal	PDS	PDS-18	F	1.05				No	0	Yes		17.09	TRUE
Disposal	PDS	PDS-18	G	0.77				No	0	Yes		10.24	TRUE
Disposal	PDS	PDS-19	A	2.31				No	0	Yes		14.44	TRUE
Disposal	PDS	PDS-19	B	1.51				No	0	Yes		14.97	TRUE
Disposal	PDS	PDS-19	C	1.56		1	Red	No	0	Yes		14.24	TRUE
Disposal	PDS	PDS-20	A	1.31				No	0	Yes		6.37	TRUE
Disposal	PDS	PDS-20	B	0.63				No	0	Yes		10.98	TRUE
Disposal	PDS	PDS-20	C	0.67				No	0	Yes		5.93	TRUE
Reference	SREF	SREF-10	B	3.51				No	0	No			
Reference	SREF	SREF-10	C	2.32				No	0	No			
Reference	SREF	SREF-06	A	IND				No	0	No			
Reference	SREF	SREF-06	B	IND				No	0	No			
Reference	SREF	SREF-06	C	IND				No	0	No			
Reference	SREF	SREF-07	A	IND				No	0	No			
Reference	SREF	SREF-07	B	IND				No	0	No			
Reference	SREF	SREF-07	C	IND				No	0	No			

Area	Location	StationID	Replicate	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-08	A	IND				No	0	No			
Reference	SREF	SREF-08	C	IND				No	0	No			
Reference	SREF	SREF-08	D	1.51				No	0	No			
Reference	SREF	SREF-09	A	IND				No	0	No			
Reference	SREF	SREF-09	B	IND				No	0	No			
Reference	SREF	SREF-09	C	IND				No	0	No			
Reference	SREF	SREF-10	D	1.80				No	0	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)
Reference	EREF	EREF-01	A		No	High	No		0	
Reference	EREF	EREF-01	B		No	High	No		0	
Reference	EREF	EREF-01	C		No	High	No		0	
Reference	EREF	EREF-02	A		No	High	No		1	9.72
Reference	EREF	EREF-02	B		No	High	No		1	11.60
Reference	EREF	EREF-02	C		No	High	No		0	
Reference	EREF	EREF-03	A		No	High	No		0	
Reference	EREF	EREF-03	B		No	High	No		0	
Reference	EREF	EREF-03	C		No	High	No		0	
Reference	EREF	EREF-04	A		No	High	No		IND	IND
Reference	EREF	EREF-04	B		No	High	No		0	
Reference	EREF	EREF-04	C		No	High	No		0	
Reference	EREF	EREF-05	A		No	High	No		1	7.88
Reference	EREF	EREF-05	B		No	High	No		0	
Reference	EREF	EREF-05	C		No	High	No		0	
Disposal	PDA95	PDA95-21	A	Layer of milky white dredged material intermixed with dark sediment. Sandy sediment near SWI also contains dark, large grained sediments intermixed, suggesting image is all dredged material.	No	High	No		0	
Disposal	PDA95	PDA95-21	B	Layer of milky white dredged material intermixed with dark sediment. Sandy sediment near SWI also contains dark, large grained sediments intermixed, suggesting image is all dredged material.	No	High	No		2	8.11
Disposal	PDA95	PDA95-21	C	Clay/milky white intermix beneath coarser sediment combined with dark, large grained sediment.	No	High	No		1	9.72
Disposal	PDA95	PDA95-22	A	No distinct milky white dredged material present. Dark sediment with odd layering present throughout image suggests that entire image is dredged material being reworked.	No	High	No		1	8.72
Disposal	PDA95	PDA95-22	B	No distinct milky white dredged material present. Dark sediment with odd layering present throughout image suggests that entire image is dredged material being reworked.	No	High	No		1	16.41
Disposal	PDA95	PDA95-22	C	No distinct milky white dredged material present. Dark sediment with odd layering present throughout image suggests that entire image is dredged material being reworked.	No	High	No		1	16.63
Disposal	PDA95	PDA95-23	A	Milky white and rust colored dredged material throughout the image.	No	High	No		6	4.68
Disposal	PDA95	PDA95-23	B	Distinct layer of milky white dredged material at and near SWI with darker sediments below.	No	High	No		0	
Disposal	PDA95	PDA95-23	C	Distinct layer of milky white dredged material at and near SWI with darker sediments below.	No	High	No		2	5.81
Disposal	PDA95	PDA95-24	A	Sediment has layering similar to native but dark, coarse grained sediments throughout suggest sediment is dredged material being reworked.	No	High	No		0	
Disposal	PDA95	PDA95-24	B	Sediment has layering similar to native but dark, coarse grained sediments throughout suggest sediment is dredged material being reworked.	No	High	No		0	
Disposal	PDA95	PDA95-24	C	Sediment has layering similar to native but dark, coarse grained sediments throughout suggest sediment is dredged material being reworked.	No	High	No		0	
Disposal	PDA95	PDA95-25	A	Streaks of white dredged material throughout sediment. Dark, large grained sediment scattered throughout sediment column.	No	High	No		0	
Disposal	PDA95	PDA95-25	B	Unnatural layering of obvious dredged material.	No	High	No		0	
Disposal	PDA95	PDA95-25	C	Unnatural layering of obvious dredged material.	No	High	No		0	
Disposal	PDA95	PDA95-26	A	Large patches of milky white dredged material in sediment. Possible chunk of dredged material resting at SWI in background of image.	No	High	No		0	
Disposal	PDA95	PDA95-26	B	Large patches of milky white dredged material throughout sediment.	No	High	No		0	

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)
Disposal	PDA95	PDA95-26	C	Patches of milky white dredged material begin near SWI and continue to depth.	No	High	No		4	7.18
Disposal	PDA95	PDA95-27	A	Dredged material is not as obvious, but sediment does not appear to be similar grain size or layering as native.	No	High	No		0	
Disposal	PDA95	PDA95-27	B	Dredged material is not as obvious, but sediment does not appear to be similar grain size or layering as native.	No	High	No		1	19.00
Disposal	PDA95	PDA95-27	C	Dredged material is not as obvious, but sediment does not appear to be similar grain size or layering as native.	No	High	No		0	
Disposal	PDA95	PDA95-28	A	Dredged material is not as obvious, but sediment does not appear to be similar grain size or layering as native. Some dissolution of shell in upper sediment layer.	No	High	No		1	8.65
Disposal	PDA95	PDA95-28	B	Dredged material is not as obvious, but sediment does not appear to be similar grain size or layering as native.	No	High	No		2	IND
Disposal	PDA95	PDA95-28	C	Dredged material is not as obvious, but sediment does not appear to be similar grain size or layering as native.	No	High	No		0	
Disposal	PDA95	PDA95-29	A	Obvious dredged material layering beneath upper cm of sediment. Upper cm of sediment does not appear to be native but it is difficult to determine.	No	High	No		1	12.67
Disposal	PDA95	PDA95-29	B	Entire image is dredged material.	No	High	No		0	
Disposal	PDA95	PDA95-29	C	Entire image is dredged material.	No	High	No		0	
Disposal	PDA95	PDA95-30	A	Obvious dredged material layering beneath upper cm of sediment. Upper cm of sediment does not appear to be native but it is difficult to determine.	No	High	No		0	
Disposal	PDA95	PDA95-30	B	Dredged material containing some patches of milky white clay.	No	High	No		0	
Disposal	PDA95	PDA95-30	C	Obvious dredged material layering beneath upper cm of sediment. Upper cm of sediment does not appear to be native but it is difficult to determine.	No	High	No		0	
Disposal	PDA95	PDA95-31	A	Obvious dredged material layering beneath upper cm of sediment. Upper cm of sediment does not appear to be native but it is difficult to determine.	No	High	No		0	
Disposal	PDA95	PDA95-31	B	Dredged material being reworked.	No	High	No		0	
Disposal	PDA95	PDA95-31	C	Dredged material with reworking beginning at SWI and beginning to move deeper.	No	High	No		0	
Disposal	PDA95	PDA95-32	A	Entire image is dredged material.	No	High	No		3	8.12
Disposal	PDA95	PDA95-32	B	Obvious dredged material layering beneath upper cm of sediment. Upper cm of sediment does not appear to be native but it is difficult to determine.	No	High	No		0	
Disposal	PDA95	PDA95-32	C	Entire image is dredged material. Distinct layering of different dredged material types.	No	High	No		1	4.42
Disposal	PDA95	PDA95-33	A	Patch of milky white dredged material beneath aRPD. I believe the rest of sediment is also dredged material being reworked.	No	High	No		0	
Disposal	PDA95	PDA95-33	B	Sediment appears to be reworked dredged material.	No	High	No		1	3.82
Disposal	PDA95	PDA95-33	C	Sediment appears to be reworked dredged material.	No	High	No		2	4.44
Disposal	PDA95	PDA95-34	A	Coarse sediment resting on top of obvious dredged material suggests entire image is dredged material.	No	High	No		1	4.90
Disposal	PDA95	PDA95-34	B	Entire image is dredged material. Distinct layering of different dredged material types.	No	High	No		1	3.92
Disposal	PDA95	PDA95-34	C	Entire image is dredged material. Distinct layering of different dredged material types.	No	High	No		1	4.17
Disposal	PDA95	PDA95-35	B	Sediment is not obviously dredged material but presence of larger grained sediment throughout suggests that sediment is reworked dredged material.	No	High	No		2	7.72
Disposal	PDA95	PDA95-35	C	Sediment is not obviously dredged material but presence of larger grained sediment throughout suggests that sediment is reworked dredged material.	No	High	No		1	8.91
Disposal	PDA95	PDA95-35	D	Sediment is not obviously dredged material but presence of larger grained sediment throughout suggests that sediment is reworked dredged material.	No	High	No		0	
Disposal	PDAA	PDAA-01	A	Sediment does not match reference area sediment.	No	High	No		0	
Disposal	PDAA	PDAA-01	B	Sediment does not match reference area sediment.	No	High	No		0	
Disposal	PDAA	PDAA-01	C	Sediment does not match reference area sediment.	No	High	No		0	

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)
Disposal	PDAA	PDAA-02	A	Coarse sediment contains many dissolving shell fragments.	No	High	No		0	
Disposal	PDAA	PDAA-02	B	Coarse sediment contains many dissolving shell fragments.	No	High	No		0	
Disposal	PDAA	PDAA-02	C	Coarse sediment contains many dissolving shell fragments.	No	High	No		0	
Disposal	PDAA	PDAA-03	B	Coarse sediment with shell fragments throughout and some streaks of fine clay.	No	High	No		0	
Disposal	PDAA	PDAA-03	C	Milky white dredged material and fines throughout sediment.	No	High	No		0	
Disposal	PDAA	PDAA-03	D	Milky white dredged material and fines throughout sediment.	No	High	No		2	8.42
Disposal	PDAA	PDAA-04	A	Not sufficient penetration to determine dredged material. Many shell fragements resting on SWI suggest that material has been dumped here.	No	High	No		IND	IND
Disposal	PDAA	PDAA-04	C	Not sufficient penetration to determine dredged material. Many shell fragements resting on SWI suggest that material has been dumped here.	No	High	No		IND	IND
Disposal	PDAA	PDAA-04	D	Not sufficient penetration to determine dredged material. Many shell fragements resting on SWI suggest that material has been dumped here.	No	High	No		IND	IND
Disposal	PDAA	PDAA-05	A	Patches of milky white dredged material and fines throughout sediment.	No	High	No		0	
Disposal	PDAA	PDAA-05	B	Patches of milky white dredged material and fines throughout sediment.	No	High	No		0	
Disposal	PDAA	PDAA-05	C	Patches of milky white dredged material and fines throughout sediment.	No	High	No		0	
Disposal	PDS	PDS-06	E	Dredged material beneath coarse sediment that suggests all visible sediment is dredged material.	No	High	No		2	14.97
Disposal	PDS	PDS-06	F	Dredged material beneath coarse sediment that suggests all visible sediment is dredged material.	No	High	No		4	8.11
Disposal	PDS	PDS-06	G	Dredged material beneath coarse sediment that suggests all visible sediment is dredged material.	No	High	No		1	13.10
Disposal	PDS	PDS-07	A	Patches of milky white material beneath coarser sediment layer with dissolving shell.	No	High	No		1	3.98
Disposal	PDS	PDS-07	B	Presence of larger grained sediments throughout image suggest all sediment is dredged material being reworked.	No	High	No		0	
Disposal	PDS	PDS-07	C	Presence of larger grained sediments throughout image suggest all sediment is dredged material being reworked. Some milky white dredged material at depth.	No	High	No		0	
Disposal	PDS	PDS-08	A	Coarse grained sediment filled with organics over organically enriched sediment suggest entire image is dredged material.	No	High	No		0	
Disposal	PDS	PDS-08	B	Milky white dredged material and fines throughout sediment.	No	High	No		2	8.19
Disposal	PDS	PDS-08	C	Milky white dredged material and fines throughout sediment.	No	High	No		0	
Disposal	PDS	PDS-09	A	Organically enriched sediment at depth with some organics throughout sediment suggesting image is all dredged material.	No	High	No		0	
Disposal	PDS	PDS-09	B	Organically enriched sediment and patches of milky white dredged material.	No	High	No		2	4.51
Disposal	PDS	PDS-09	C	Milky white dredged material and fines throughout sediment.	No	High	No		2	4.68
Disposal	PDS	PDS-10	A	Scattered milky white dredged material beneath aRPD boundary. Very organically enriched sediment at depth.	No	High	No		3	12.98
Disposal	PDS	PDS-10	B	Trace milky white dredged material with organics throughout sediment.	No	High	No		0	
Disposal	PDS	PDS-10	C	Milky white dredged material throughout.	No	High	No		2	8.50
Disposal	PDS	PDS-11	A	Milky white dredged material throughout with coarser sediment resting on top.	No	High	No		1	9.43
Disposal	PDS	PDS-11	B	Organically enriched sediment and fines.	No	High	No		3	3.60
Disposal	PDS	PDS-11	C	Organically enriched sediment and fines.	No	High	No		3	5.80
Disposal	PDS	PDS-12	A	Fines and organically enriched sediment throughout.	No	High	No		1	9.35

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)
Disposal	PDS	PDS-12	B	Fines and organically enriched sediment throughout.	No	High	No		0	
Disposal	PDS	PDS-12	C	Fines and organically enriched sediment throughout. Some small patches of milky white material.	No	High	No		0	
Disposal	PDS	PDS-13	E	Trace dredged material.	No	High	No		3	2.03
Disposal	PDS	PDS-13	F	Trace dredged material.	No	High	No		7	5.03
Disposal	PDS	PDS-13	G	Trace dredged material.	No	High	No		1	IND
Disposal	PDS	PDS-14	A	Milky white dredged material and fines within sediment.	No	High	No		1	6.65
Disposal	PDS	PDS-14	B	Milky white dredged material and fines within sediment.	No	High	No		0	
Disposal	PDS	PDS-14	C	Milky white dredged material and fines within sediment.	No	High	No		3	5.55
Disposal	PDS	PDS-15	A	Fines and organically enriched sediment throughout.	No	High	No		3	10.97
Disposal	PDS	PDS-15	B	Fines and organically enriched sediment throughout.	No	High	No		0	
Disposal	PDS	PDS-15	D	Fines and organically enriched sediment throughout.	No	High	No		2	1.90
Disposal	PDS	PDS-16	A	Milky white dredged material and fines throughout sediment.	No	High	No		4	4.65
Disposal	PDS	PDS-16	B	Milky white dredged material and fines throughout sediment.	No	High	No		2	3.94
Disposal	PDS	PDS-16	C	Milky white dredged material and fines throughout sediment.	No	High	No		7	4.91
Disposal	PDS	PDS-17	E	Fine, organically enriched sediment with reworking.	No	High	No		6	6.76
Disposal	PDS	PDS-17	F	Milky white dredged material and fines throughout sediment.	No	High	No		3	5.19
Disposal	PDS	PDS-17	G	Milky white dredged material and fines throughout sediment.	No	High	No		2	13.94
Disposal	PDS	PDS-18	E	Milky white dredged material and fines throughout sediment.	No	High	No		2	2.40
Disposal	PDS	PDS-18	F	Milky white dredged material and fines throughout sediment.	No	High	No		1	2.23
Disposal	PDS	PDS-18	G	Milky white dredged material and fines throughout sediment.	No	High	No		1	5.73
Disposal	PDS	PDS-19	A	Milky white dredged material and fines throughout sediment.	No	High	No		2	8.13
Disposal	PDS	PDS-19	B	Milky white dredged material and fines throughout sediment.	No	High	No		0	
Disposal	PDS	PDS-19	C	Milky white dredged material and fines throughout sediment.	No	High	No		1	11.37
Disposal	PDS	PDS-20	A	Milky white dredged material and fines throughout sediment.	No	High	No		1	4.60
Disposal	PDS	PDS-20	B	Milky white dredged material and fines throughout sediment.	No	High	No		1	9.16
Disposal	PDS	PDS-20	C	Milky white dredged material and fines throughout sediment.	No	High	No		1	5.23
Reference	SREF	SREF-10	B		No	High	No		0	
Reference	SREF	SREF-10	C		No	High	No		1	9.68
Reference	SREF	SREF-06	A		No	High	No		IND	IND
Reference	SREF	SREF-06	B		No	High	No		IND	IND
Reference	SREF	SREF-06	C		No	High	No		IND	IND
Reference	SREF	SREF-07	A		No	High	No		0	
Reference	SREF	SREF-07	B		No	High	No		0	
Reference	SREF	SREF-07	C		No	High	No		1	6.64

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)
Reference	SREF	SREF-08	A		No	High	No		IND	IND
Reference	SREF	SREF-08	C		No	High	No		0	
Reference	SREF	SREF-08	D		No	High	No		0	
Reference	SREF	SREF-09	A		No	High	No		IND	IND
Reference	SREF	SREF-09	B		No	High	No		IND	IND
Reference	SREF	SREF-09	C		No	High	No		IND	IND
Reference	SREF	SREF-10	D		No	High	No		4	7.09

Area	Location	StationID	Replicate	Void Maximum Depth (cm)	Successional Stage	Comment
Reference	EREF	EREF-01	A		2 -> 3	Small worms and a medium sized tube at SWI. Infilled and open burrow beneath aRPD boundary but no visible stage 3 organisms or voids.
Reference	EREF	EREF-01	B		2	Small burrows visible in upper cms of sediment. A dissolving shell also in upper cms of sediment. No visible evidence of stage 3 organisms.
Reference	EREF	EREF-01	C		2 on 3	Small worms and tubes at SWI. Small burrows throughout sediment. Large burrow containing large worm visible just within image in bottom left corner.
Reference	EREF	EREF-02	A	10.28	2 on 3	Small worms and tubes at SWI. Open void beneath aRPD boundary.
Reference	EREF	EREF-02	B	11.88	2 on 3	Medium sized tube in background of SWI. Open burrow with associated void at depth.
Reference	EREF	EREF-02	C		2	Small worms visible at SWI. Worms visible in burrows in upper cms of sediment. No evidence of stage 3 organisms.
Reference	EREF	EREF-03	A		2 -> 3	Large anemones at SWI. Small worms also at SWI. No visible voids or worms in sediment.
Reference	EREF	EREF-03	B		2 -> 3	No visible worms or evidence of burrowing/feeding in sediment. PV images show large anemones, however.
Reference	EREF	EREF-03	C		2 -> 3	Small worms visible at SWI. No evidence of burrowing in sediment. However, PV images show large anemones at site.
Reference	EREF	EREF-04	A	IND	IND	No prism penetration. Possible cobble covered in hydroids visible in background of image.
Reference	EREF	EREF-04	B		2 on 3	Small tubes and worms at SWI. Pebbles and an anemone at SWI in background of image. Small burrows in sediment.
Reference	EREF	EREF-04	C		2	Small tubes at SWI. Small burrows in sediment. Small pebbles and an object in background at SWI.
Reference	EREF	EREF-05	A	8.14	1 on 3	Small worms at SWI. Open void and burrow with worm beneath aRPD boundary.
Reference	EREF	EREF-05	B		1 on 3	Small worms at SWI. Other images show evidence of stage 3 organisms in sediment.
Reference	EREF	EREF-05	C		1 on 3	Small worms at SWI. Other images show evidence of stage 3 organisms in sediment.
Disposal	PDA95	PDA95-21	A		2 -> 3	Many small worms at SWI. Evidence of bioturbation moving aRPD boundary deeper.
Disposal	PDA95	PDA95-21	B	9.23	2 on 3	Many small worms and tubes at SWI. Large, infilled burrow begins at SWI and moves to depth. Open voids at depth. Small sea star resting on SWI.
Disposal	PDA95	PDA95-21	C	9.96	2 on 3	Small worms and tubes at SWI. Infilled burrows and an infilled void beneath aRPD boundary.
Disposal	PDA95	PDA95-22	A	9.32	1 on 3	Partially collapsed void and visible worm in burrow beneath aRPD.
Disposal	PDA95	PDA95-22	B	17.11	2 on 3	Many worms at SWI. Reduced mudclast appears to have been deposited by faceplate. Open burrows and void at depth.
Disposal	PDA95	PDA95-22	C	17.02	1 on 3	Small worms at SWI. Open void and associated burrow at depth.
Disposal	PDA95	PDA95-23	A	11.54	1 on 3	A lot of bioturbation. Red clay intermixed with other sediments. Large, open burrows with many associated voids throughout sediment.
Disposal	PDA95	PDA95-23	B		1 on 3	A few small tubes at SWI. Shallow aRPD boundary with evidence of bioturbation moving boundary deeper. Patches of milky white dredged material near aRPD boundary.
Disposal	PDA95	PDA95-23	C	12.27	2 on 3	Large tubes in background of image at SWI. Layer of milky white dredged material begins at SWI and moves across image. Large, open burrow with associated voids beneath dredged material layer.
Disposal	PDA95	PDA95-24	A		2 -> 3	Mud clasts from camera resting on sediment. Small worms at SWI. Burrowing above aRPD boundary and evidence that bioturbation is moving the aRPD boundary deeper. No evidence of stage 3 organisms.
Disposal	PDA95	PDA95-24	B		2 -> 3	Bioturbation beginning at SWI, with an open burrow beginning at SWI and moving towards aRPD boundary. No evidence of stage 3 organisms.
Disposal	PDA95	PDA95-24	C		2	Small worms at SWI. Small, shallow burrows with no evidence of biotubation beneath aRPD boundary.
Disposal	PDA95	PDA95-25	A		2	Small worms at SWI. Small burrows appear to be moving aRPD boundary deeper. Streaks of milky white dredged material present beneath aRPD boundary.
Disposal	PDA95	PDA95-25	B		2	Small and medium-sized tubes at SWI. Small burrows in upper cms of sediment. aRPD boundary near SWI.
Disposal	PDA95	PDA95-25	C		1 on 3	Small tubes at SWI. Burrowing and infilled burrows beneath aRPD boundary.
Disposal	PDA95	PDA95-26	A		2	Tubes at SWI. Also, dredged material resting on top of SWI. Distinct milky white dredged material in patches throughout sediment.
Disposal	PDA95	PDA95-26	B		2	Shallow aRPD boundary with patches of milky white dredged material beneath. Open burrow with visible worm beneath aRPD boundary.

Area	Location	StationID	Replicate	Void Maximum Depth (cm)	Successional Stage	Comment
Disposal	PDA95	PDA95-26	C	14.14	1 on 3	Shallow aRPD boundary with patches of milky white dredged material beneath. Infilled burrows and voids beneath aRPD boundary continuing to depth.
Disposal	PDA95	PDA95-27	A		2 -> 3	Small worms at SWI. Burrows, some containing visible worms begin near SWI and continue just beyond aRPD boundary.
Disposal	PDA95	PDA95-27	B	19.16	2 on 3	Open burrows containing visible worms begin beneath aRPD boundary and move to depth. Open void at depth.
Disposal	PDA95	PDA95-27	C		1 on 3	Small worms at SWI. Many small burrows with visible worms just beneath aRPD boundary. Large, infilled burrow beneath aRPD boundary.
Disposal	PDA95	PDA95-28	A	9.52	1 on 3	Infilled void and burrow beneath aRPD boundary. Shell fragments dissolving in upper cm of sediment.
Disposal	PDA95	PDA95-28	B	IND	IND	Prism penetration greater than sediment. Large, open burrows and voids at depth.
Disposal	PDA95	PDA95-28	C		1 on 3	Small worms at SWI. Large, infilled burrow at depth with visible worm in burrow nearby.
Disposal	PDA95	PDA95-29	A	12.86	2 on 3	Tube at SWI. Infilled burrows and open void beneath aRPD boundary.
Disposal	PDA95	PDA95-29	B		1 on 3	Shallow aRPD boundary with infilled burrows at depth.
Disposal	PDA95	PDA95-29	C		1 on 3	Small tubes at SWI. Shallow aRPD boundary. Burrowing beneath aRPD boundary. Patches of milky white dredged material near aRPD boundary.
Disposal	PDA95	PDA95-30	A		2	Burrowing near aRPD boundary. Evidence of bioturbation moving boundary deeper.
Disposal	PDA95	PDA95-30	B		2 -> 3	Tubes visible at SWI. Mound of sediment in background of image at SWI. Large, open burrow at SWI moving toward aRPD boundary. Patches of milky white dredged material near aRPD boundary.
Disposal	PDA95	PDA95-30	C		2	Open burrows with visible worms at aRPD boundary. Layer of milky white dredged material in sediment.
Disposal	PDA95	PDA95-31	A		2 -> 3	Evidence of bioturbation moving aRPD boundary deeper. Open burrows with visible worms around aRPD boundary.
Disposal	PDA95	PDA95-31	B		2 on 3	Many small worms at SWI. Open burrows containing worms throughout sediment. Deep burrow with very large worm against faceplate at depth.
Disposal	PDA95	PDA95-31	C		1 on 3	Many small worms at SWI. Mud clast at SWI appears to have worms in it and has been oxidized. Burrows with visible worms throughout sediment. Large, infilled burrow beneath aRPD boundary.
Disposal	PDA95	PDA95-32	A	10.98	1 on 3	Shallow aRPD boundary. Open voids and burrows beneath aRPD boundary. Reddish sediment present near voids.
Disposal	PDA95	PDA95-32	B		2 -> 3	Small worms at SWI with small tubes in background of image. Bioturbation moving aRPD boundary deeper. Infilled burrows beneath aRPD boundary. Milky white dredged material near aRPD boundary.
Disposal	PDA95	PDA95-32	C	4.64	2 on 3	Many worms at SWI. Two reduced mud clasts at SWI. A thick layer of milky white dredged material near SWI obscures aRPD boundary. Open void in dredged material layer.
Disposal	PDA95	PDA95-33	A		2 -> 3	Bioturbation moving aRPD boundary deeper. Patch of milky white dredged material just beneath aRPD boundary.
Disposal	PDA95	PDA95-33	B	4.11	1 on 3	Many small worms at SWI. Open void jst beneath aRPD boundary.
Disposal	PDA95	PDA95-33	C	11.85	1 on 3	Small worms at SWI. Open and infilled voids beneath aRPD boundary. Open burrow with visible worm at depth.
Disposal	PDA95	PDA95-34	A	5.45	1 on 3	Small worms at SWI. Infilled void beneath aRPD boundary. Large patches of milky white dredged material beneath aRPD boundary.
Disposal	PDA95	PDA95-34	B	4.16	1 on 3	Shallow aRPd boundary with small tubes at SWI. Open void and visible worm in burrow beneath aRPD boundary.
Disposal	PDA95	PDA95-34	C	4.46	2 on 3	Many worms at SWI. Open void and burrow beneath aRPD boundary. aRPd is at SWI.
Disposal	PDA95	PDA95-35	B	8.55	1 on 3	Small worms at SWI. Open voids and burrows beneath aRPD boundary.
Disposal	PDA95	PDA95-35	C	9.38	1 on 3	Shallow aRPD boundary with open void beneath.
Disposal	PDA95	PDA95-35	D		1 -> 2	Shallow aRPD boundary with many small burrows above and at aRPD boundary.
Disposal	PDAA	PDAA-01	A		1 -> 2	Rocks at SWI. Coarse sediment makes aRPD boundary determination difficult. Small burrow with visible worm in upper cms of sediment.
Disposal	PDAA	PDAA-01	B		1 -> 2	Rocks and shell fragments at SWI. Coarse sediment makes aRPD boundary determination difficult.
Disposal	PDAA	PDAA-01	C		1 -> 2	Shell fragments at SWI and within sediment. Coarse sediment makes aRPD boundary determination difficult.

Area	Location	StationID	Replicate	Void Maximum Depth (cm)	Successional Stage	Comment
Disposal	PDAA	PDAA-02	A		1 -> 2	Small worms and a tube at SWI. Shell fragments at SWI and within sediment. Shallow aRPd boundary.
Disposal	PDAA	PDAA-02	B		1 -> 2	Shell fragments at SWI and within sediment. Coarse sediment makes aRPD boundary determination difficult.
Disposal	PDAA	PDAA-02	C		1 -> 2	A tube at SWI. Shell fragments at SWI and within sediment. Coarse sediment makes aRPD boundary determination difficult.
Disposal	PDAA	PDAA-03	B		2	Tubes at SWI and in background of image. Shell resting on sediment and throughout sediment. Coarse sediment makes aRPD determination difficult. A few small burrows in upper cms of sediment. Small bits of milky white dredged material in sediment.
Disposal	PDAA	PDAA-03	C		2 on 3	Many small tubes at SWI. Layer of milky white dredged material in sediment with many open burrows with large, visible worms beneath.
Disposal	PDAA	PDAA-03	D	10.05	2 on 3	Large mud clast containing worms, hydroids, and bivalves resting on SWI. Many hydroids and shells at SWI as well. Patch of milky white dredged material in sediment. Many shells and visible worms in sediment. Large, infilled voids and burrows at depth.
Disposal	PDAA	PDAA-04	A	0.00	IND	Large rocks at SWI. Prism penetration not enough to determine aRPD boundary or successional staging.
Disposal	PDAA	PDAA-04	C	0.00	IND	Large rocks at SWI. Prism penetration not enough to determine aRPD boundary or successional staging.
Disposal	PDAA	PDAA-04	D	IND	IND	Large rocks and fragments of shell at SWI. No prism penetration.
Disposal	PDAA	PDAA-05	A		2	Small worms and small tubes at SWI. Shell fragments at SWI. Coarse sediment makes aRPD boundary determination difficult. Milky white dredged material in patches in sediment.
Disposal	PDAA	PDAA-05	B		2	A few small tubes at SWI. Large fragments of shell and other debris at SWI. Coarse sediment makes aRPD determination difficult. Patches of milky white dredged material in sediment.
Disposal	PDAA	PDAA-05	C		2	Small tubes at SWI. Patches of milky white dredged material in sediment.
Disposal	PDS	PDS-06	E	15.74	2 on 3	Patches of milky white dredged material in sediment. Open voids at depth.
Disposal	PDS	PDS-06	F	17.81	2 on 3	Thick aRPD boundary with huge, open burrow descending out of image. Open voids throughout sediment below aRPD boundary.
Disposal	PDS	PDS-06	G	13.78	2 on 3	Open burrows with visible worms below aRPD boundary. Infilled burrows and a void at depth.
Disposal	PDS	PDS-07	A	4.93	2 on 3	Small worms and tubes at SWI. Infilled void at aRPD boundary Dissolving shells in upper cm of sediment. Two distinct patches of milky white dredged material below aRPD boundary.
Disposal	PDS	PDS-07	B		2 -> 3	Small worms and tubes at SWI. Open burrow with visible worm just beneath aRPD boundary. Milky white dredged material beneath aRPD boundary.
Disposal	PDS	PDS-07	C		2 -> 3	Small worms and tubes at SWI. Burrows above and at aRPD boundary pushing boundary deeper. Milky white dredged material beneath aRPD boundary.
Disposal	PDS	PDS-08	A		2 -> 3	Open burrows with visible worms near aRPD boundary.
Disposal	PDS	PDS-08	B	8.90	1 on 3	SWI appears to have been recently disturbed. A few infilled burrows and voids at depth. Milky white dredged material throughout sediment.
Disposal	PDS	PDS-08	C		2	Small worms and tubes at SWI. Small burrows visible in upper cms of sediment. Dredged material throughout visible sediment.
Disposal	PDS	PDS-09	A		2 -> 3	Small burrows with visible worms throughout sediment. Bioturbation appears to be pushing aRPD boundary deeper.
Disposal	PDS	PDS-09	B	6.13	2 on 3	Small worms and tubes at SWI with reduced mudclast that appears to have fallen from prism. aRPD boundary appears to be right at SWI. Two infilled voids in sediment. Dredged material throughout sediment.
Disposal	PDS	PDS-09	C	5.42	1 on 3	Shallow aRPD boundary with open voids beneath. Dredged material scattered throughout sediment.
Disposal	PDS	PDS-10	A	13.56	2 on 3	A few medium sized tubes at SWI. Open burrows and voids at depth. A few patches of milky white dredged material.
Disposal	PDS	PDS-10	B		1 on 3	Shallow aRPD boundary with evidence of bioturbation moving it deeper. Open burrows at depth. Trace milky white dredged material at depth.
Disposal	PDS	PDS-10	C	11.22	1 on 3	Open burrow and void beneath aRPD boundary. Also an infilled void beneath aRPD boundary. Trace milky white dredged material begins at SWI and continues to depth.
Disposal	PDS	PDS-11	A	9.88	1 on 3	Burrows in upper cms of sediment with open void at depth. Patches of milky white dredged material throughout sediment.
Disposal	PDS	PDS-11	B	10.80	2 on 3	Medium sized tubes at SWI. Open burrows, some containing visible worms throughout sediment. SWI is disturbed and makes aRPD boundary deterimation difficult.
Disposal	PDS	PDS-11	C	10.04	2 on 3	A few small tubes at SWI. Open voids and burrows at depth.
Disposal	PDS	PDS-12	A	10.12	2 on 3	Open burrows with visible worms beneath aRPD boundary. Infilled void beneath aRPD boundary. Very small spots of milky white dredged material at depth.

Area	Location	StationID	Replicate	Void Maximum Depth (cm)	Successional Stage	Comment
Disposal	PDS	PDS-12	B		1 on 3	Small worms at SWI. Some brown flora resting on sediment surface. Large, infilled burrow at depth. Small patches of while dredged material at depth.
Disposal	PDS	PDS-12	C		1 on 3	Small worms at SWI. Infilled burrow at depth. Small spots of milky white dredged material beneath aRPD boundary.
Disposal	PDS	PDS-13	E	11.58	1 on 3	Open void above aRPD boundary. Infilled voids beneath aRPD boundary. An open burrow with a visible worm just above aRPD boudnary. A small spot of milky white dredged material at depth.
Disposal	PDS	PDS-13	F	18.74	1 on 3	Penetration almost greater than prism height. Open voids begin just beneath aRPD boundary and continue to depth.
Disposal	PDS	PDS-13	G	IND	1 on 3	Penetration greater than prism height. An open void in sediment. Open burrow with large, visible worm present as well.
Disposal	PDS	PDS-14	A	6.88	1 on 3	An open void at depth. Patches of dredged material in sediment.
Disposal	PDS	PDS-14	B		2	A few tubes at SWI. No evidence of stage 3 organisms in image.
Disposal	PDS	PDS-14	C	17.28	2 on 3	A few small worms and tubes at SWI. Open and infilled voids begin just beneath aRPD boundary and move to depth.
Disposal	PDS	PDS-15	A	11.88	2 on 3	Shell fragment at SWI with small hydroid colonies forming. Small tubes and worms at SWI. Many open voids at depth. Dredged material throughout sediment below aRPD boundary.
Disposal	PDS	PDS-15	B		2	Coarse sediment makes aRPD determination difficult. Patches of white dredged material.
Disposal	PDS	PDS-15	D	4.75	1 on 3	Small worms at SWI. Some chunks of cobble visible in background of image. Open void above and below aRPD boundary. Trace dredged material at depth.
Disposal	PDS	PDS-16	A	14.03	1 on 3	SWI appears recently disturbed. Open and infilled burrows and voids begin beneath aRPD boundary and continue to depth. Milky white dredged material at depth.
Disposal	PDS	PDS-16	B	8.56	1 on 3	A small tube at SWI. Large, open burrow with associated voids begins beneath aRPD boundary and continues to depth. Patches of milky white dredged material throughout sediment.
Disposal	PDS	PDS-16	C	11.35	1 on 3	Large mud clast at SWI. Large, partially infilled burrow begins at SWI and continues to depth. Many open and infilled voids throughout sediment.
Disposal	PDS	PDS-17	E	11.67	1 on 3	Small tube visible at SWI. Large burrows with associated open and infilled voids begin at SWI and continue to depth.
Disposal	PDS	PDS-17	F	9.36	1 on 3	Open voids and infilled burrows present in sediment. Patches of milky white dredged material in upper cms of sediment and present as a layer at depth.
Disposal	PDS	PDS-17	G	17.68	1 on 3	Shallow aRPD boundary with open and infilled voids at depth. Layer of partially bioturbated dredged material at depth.
Disposal	PDS	PDS-18	E	13.76	1 on 3	Shallow aRPD boundary with small worms at SWI. Infilled burrows and voids at depth. A layer of partially bioturbated dredged material at depth.
Disposal	PDS	PDS-18	F	2.56	1 on 3	Open void just beneath aRPD boundary. Infilled burrows at depth in layer of bioturbated dredged material.
Disposal	PDS	PDS-18	G	5.92	1 on 3	Shallow aRPD boundary with small, open burrows and trace dredged material in sediment below.
Disposal	PDS	PDS-19	A	10.72	2 on 3	A few small tubes at SWI. Infilled burrows and voids beneath aRPD boundary. Trace milky white dredged material beneath aRPD boundary.
Disposal	PDS	PDS-19	B		1 on 3	Large, infilled burrows beneath aRPD boundary. Small burrows with visible worms also below aRPD boundary. Thick layer of milky white dredged material beneath aRPD boundary.
Disposal	PDS	PDS-19	C	11.72	1 on 3	Small worms at SWI. Large, open burrow with associated void at depth. Dredged material layer at depth.
Disposal	PDS	PDS-20	A	4.98	1 on 3	A small worm at SWI. Open burrow and void beneath aRPD boundary. Dredged material beneath aRPD boundary being reworked.
Disposal	PDS	PDS-20	B	10.35	1 on 3	Shallow aRPD boundary with infilled burrows at depth. Trace milky white dredged material throughout sediment.
Disposal	PDS	PDS-20	C	5.57	1 on 3	Reduced clay stuck to faceplate. Open void with visible worm at depth.
Reference	SREF	SREF-10	B		2 -> 3	Open burrows with visible worms in sediment moving towards depth.
Reference	SREF	SREF-10	C	9.88	2 on 3	Tubes at SWI. Open void and burrows at depth.
Reference	SREF	SREF-06	A	IND	IND	No prism penetration.
Reference	SREF	SREF-06	B	IND	IND	No prism penetration.
Reference	SREF	SREF-06	C	IND	IND	No prism penetration.
Reference	SREF	SREF-07	A		2 -> 3	Small worms and tubes at SWI. Coarse grain makes determining aRPD boundary difficult. Many open burrows containing visible worms at depth.
Reference	SREF	SREF-07	B		2 -> 3	Small worms at SWI. Open burrows containing visible worms moving towards depth.
Reference	SREF	SREF-07	C	7.82	2 on 3	Large, open void with visible worm at depth.

Area	Location	StationID	Replicate	Void Maximum Depth (cm)	Successional Stage	Comment
Reference	SREF	SREF-08	A	IND	IND	No prism penetration. Chunks of cobble visible in background of image.
Reference	SREF	SREF-08	C		2 -> 3	A few worms at SWI. Small burrows throughout sediment column.
Reference	SREF	SREF-08	D		2 -> 3	Worms, medium sized tubes, and a small sea start at SWI. Small burrows in sediment.
Reference	SREF	SREF-09	A	IND	IND	No prism penetratin. Large cobbles in background of image.
Reference	SREF	SREF-09	B	IND	IND	No prism penetration.
Reference	SREF	SREF-09	C	IND	IND	No prism penetratin. A hydroid visible in background of image.
Reference	SREF	SREF-10	D	12.08	2 on 3	Small worms at SWI. Visible worms in burrows in sediment and open voids begin beneath aRPD boundary and continue to depth.

Area	Location	StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View	Sediment Type	Surface Oxidation	Beggiatoa Present?	Beggiatoa Type/Extent
Reference	EREF	EREF-01	A	9/19/2016	17:21:25	41.10	27.40	0.11	sand/silt	Ox	No	
Reference	EREF	EREF-02	E	9/19/2016	17:11:18	44.07	29.38	0.13	sand/silt	Ox	No	
Reference	EREF	EREF-03	A	9/19/2016	17:40:12	50.52	33.68	0.17	sand/silt	Ox	No	
Reference	EREF	EREF-03	B	9/19/2016	17:41:03	52.28	34.85	0.18	sand/silt	Ox	No	
Reference	EREF	EREF-03	D	9/19/2016	17:41:54	47.79	31.86	0.15	sand/silt	Ox	No	
Reference	EREF	EREF-04	B	9/19/2016	17:48:34	52.28	34.85	0.18	gravel/sand	Ox	No	
Reference	EREF	EREF-04	C	9/19/2016	17:49:18	42.76	28.51	0.12	gravel/sand	Ox	No	
Reference	EREF	EREF-04	D	9/19/2016	17:49:59	IND	IND	IND	gravel/sand	Ox	No	
Reference	EREF	EREF-05	A	9/19/2016	17:30:41	41.98	27.99	0.12	sand/silt	Ox	No	
Reference	EREF	EREF-05	B	9/19/2016	17:31:25	IND	IND	IND	sand/silt	Ox	No	
Disposal	PDA95	PDA95-21	A	9/19/2016	15:16:33	46.59	31.06	0.14	sand/silt	Ox	No	
Disposal	PDA95	PDA95-21	B	9/19/2016	15:17:19	39.76	26.50	0.11	sand/silt	Ox	No	
Disposal	PDA95	PDA95-21	D	9/19/2016	15:18:58	46.99	31.33	0.15	sand/silt	Ox	No	
Disposal	PDA95	PDA95-22	A	9/19/2016	14:27:15	39.51	26.34	0.10	sand/silt	Ox	No	
Disposal	PDA95	PDA95-22	B	9/19/2016	14:28:07	34.18	22.79	0.08	sand/silt	Ox	No	
Disposal	PDA95	PDA95-23	A	9/19/2016	13:43:05	48.45	32.30	0.16	sand/silt	Ox	No	
Disposal	PDA95	PDA95-23	C	9/19/2016	13:45:08	42.16	28.11	0.12	gravel/sand	Ox	No	
Disposal	PDA95	PDA95-23	D	9/19/2016	13:46:43	IND	IND	IND	sand/silt	Ox	No	
Disposal	PDA95	PDA95-24	A	9/19/2016	14:18:42	30.47	20.31	0.06	sand/silt	Ox	No	
Disposal	PDA95	PDA95-24	B	9/19/2016	14:19:43	38.01	25.34	0.10	sand/silt	Ox	No	
Disposal	PDA95	PDA95-25	A	9/19/2016	13:00:07	43.05	28.70	0.12	sand/silt	Ox	No	
Disposal	PDA95	PDA95-25	B	9/19/2016	13:00:49	42.12	28.08	0.12	sand/silt	Ox	No	
Disposal	PDA95	PDA95-25	D	9/19/2016	13:02:06	45.72	30.48	0.14	gravel/sand	Ox	No	
Disposal	PDA95	PDA95-26	A	9/19/2016	13:52:21	47.56	31.71	0.15	sand/silt	Ox	No	
Disposal	PDA95	PDA95-26	C	9/19/2016	13:54:03	40.41	26.94	0.11	sand/silt	Ox	No	
Disposal	PDA95	PDA95-26	D	9/19/2016	13:54:56	44.02	29.35	0.13	sand/silt	Ox	No	
Disposal	PDA95	PDA95-27	A	9/19/2016	14:09:10	41.85	27.90	0.12	sand/silt	Ox	No	
Disposal	PDA95	PDA95-27	B	9/19/2016	14:09:58	40.92	27.28	0.11	sand/silt	Ox	No	
Disposal	PDA95	PDA95-27	C	9/19/2016	14:10:49	37.79	25.19	0.10	sand/silt	Ox	No	
Disposal	PDA95	PDA95-28	A	9/17/2016	13:48:12	51.72	34.48	0.18	sand/silt	Ox	No	
Disposal	PDA95	PDA95-28	B	9/17/2016	13:49:03	37.21	24.81	0.09	sand/silt	Ox	No	
Disposal	PDA95	PDA95-28	C	9/17/2016	13:50:08	30.14	20.09	0.06	sand/silt	Ox	No	
Disposal	PDA95	PDA95-29	A	9/19/2016	13:33:18	43.38	28.92	0.13	sand/silt	Ox	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
Disposal	PDA95	PDA95-29	D	9/19/2016	13:36:12	39.92	26.61	0.11	sand/silt	Ox	No	
Disposal	PDA95	PDA95-30	A	9/19/2016	12:03:44	47.79	31.86	0.15	sand/silt	Ox	No	
Disposal	PDA95	PDA95-30	B	9/19/2016	12:04:36	45.88	30.59	0.14	sand/silt	Ox	No	
Disposal	PDA95	PDA95-31	A	9/19/2016	14:36:21	44.98	29.99	0.13	sand/silt	>50% Ox	No	
Disposal	PDA95	PDA95-31	C	9/19/2016	14:38:09	48.69	32.46	0.16	sand/silt	Ox	No	
Disposal	PDA95	PDA95-32	A	9/19/2016	13:24:08	46.37	30.92	0.14	sand/silt	Ox	No	
Disposal	PDA95	PDA95-32	B	9/19/2016	13:24:58	42.16	28.11	0.12	sand/silt	Ox	No	
Disposal	PDA95	PDA95-32	D	9/19/2016	13:26:51	45.35	30.23	0.14	sand/silt	Ox	No	
Disposal	PDA95	PDA95-33	A	9/19/2016	15:25:12	42.25	28.17	0.12	sand/silt	Ox	No	
Disposal	PDA95	PDA95-33	B	9/19/2016	15:26:08	44.02	29.35	0.13	sand/silt	Ox	No	
Disposal	PDA95	PDA95-33	C	9/19/2016	15:26:56	42.30	28.20	0.12	sand/silt	Ox	No	
Disposal	PDA95	PDA95-34	A	9/19/2016	14:00:20	47.62	31.75	0.15	sand/silt	Ox	No	
Disposal	PDA95	PDA95-34	C	9/19/2016	14:02:18	38.73	25.82	0.10	gravel/sand	Ox	No	
Disposal	PDA95	PDA95-34	D	9/19/2016	14:03:25	42.30	28.20	0.12	sand/silt	Ox	No	
Disposal	PDA95	PDA95-35	A	9/19/2016	13:12:27	57.10	38.07	0.22	sand/silt	Ox	No	
Disposal	PDA95	PDA95-35	B	9/19/2016	13:15:40	49.74	33.16	0.16	sand/silt	Ox	No	
Disposal	PDA95	PDA95-35	C	9/19/2016	13:16:34	29.89	19.92	0.06	sand/silt	Ox	No	
Disposal	PDAA	PDAA-01	A	9/17/2016	12:39:57	33.39	22.26	0.07	gravel/sand	Ox	No	
Disposal	PDAA	PDAA-01	B	9/17/2016	12:40:44	39.04	26.03	0.10	gravel/sand	Ox	No	
Disposal	PDAA	PDAA-01	D	9/17/2016	12:42:33	48.99	32.66	0.16	gravel/sand	Ox	No	
Disposal	PDAA	PDAA-02	A	9/17/2016	12:33:07	43.00	28.67	0.12	gravel/sand	Ox	No	
Disposal	PDAA	PDAA-02	C	9/17/2016	12:34:48	33.71	22.47	0.08	gravel/sand	Ox	No	
Disposal	PDAA	PDAA-02	D	9/17/2016	12:35:31	39.96	26.64	0.11	sand/silt	Ox	No	
Disposal	PDAA	PDAA-03	A	9/17/2016	12:55:37	46.15	30.77	0.14	sand/silt	Ox	No	
Disposal	PDAA	PDAA-03	C	9/17/2016	12:57:20	36.04	24.03	0.09	gravel/sand	Ox	No	
Disposal	PDAA	PDAA-03	D	9/17/2016	12:58:21	41.53	27.69	0.12	cobble/gravel	Ox	No	
Disposal	PDAA	PDAA-04	A	9/17/2016	12:46:45	43.24	28.82	0.12	cobble/gravel	Ox	No	
Disposal	PDAA	PDAA-04	B	9/17/2016	12:47:36	43.00	28.67	0.12	gravel/sand	Ox	No	
Disposal	PDAA	PDAA-04	C	9/17/2016	12:48:26	IND	IND	IND	gravel/sand	Ox	No	
Disposal	PDAA	PDAA-05	A	9/17/2016	13:05:34	36.69	24.46	0.09	sand/silt	Ox	No	
Disposal	PDAA	PDAA-05	C	9/17/2016	13:07:28	44.42	29.61	0.13	sand/silt	Ox	No	
Disposal	PDAA	PDAA-05	D	9/17/2016	13:08:22	47.62	31.75	0.15	sand/silt	Ox	No	
Disposal	PDS	PDS-06	A	9/17/2016	7:30:48	32.80	21.87	0.07	sand/silt	Ox	No	
Disposal	PDS	PDS-06	B	9/17/2016	7:31:38	39.84	26.56	0.11	sand/silt	Ox	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
Disposal	PDS	PDS-06	C	9/17/2016	7:32:26	57.86	38.58	0.22	sand/silt	Ox	No	
Disposal	PDS	PDS-07	A	9/17/2016	10:53:45	30.21	20.14	0.06	sand/silt	Ox	No	
Disposal	PDS	PDS-07	C	9/17/2016	10:55:18	33.14	22.09	0.07	sand/silt	Ox	No	
Disposal	PDS	PDS-08	A	9/17/2016	10:07:39	32.50	21.67	0.07	sand/silt	Ox	No	
Disposal	PDS	PDS-08	B	9/17/2016	10:08:34	45.03	30.02	0.14	sand/silt	Ox	No	
Disposal	PDS	PDS-08	C	9/17/2016	10:09:21	36.48	24.32	0.09	sand/silt	Ox	No	
Disposal	PDS	PDS-09	A	9/17/2016	11:38:44	35.75	23.83	0.09	sand/silt	Ox	No	
Disposal	PDS	PDS-09	B	9/17/2016	11:39:29	35.94	23.96	0.09	sand/silt	Ox	No	
Disposal	PDS	PDS-09	C	9/17/2016	11:40:17	40.88	27.25	0.11	sand/silt	>50% Ox	No	
Disposal	PDS	PDS-10	A	9/17/2016	11:12:38	34.63	23.09	0.08	sand/silt	Ox	No	
Disposal	PDS	PDS-10	D	9/17/2016	11:14:55	38.09	25.39	0.10	sand/silt	Ox	No	
Disposal	PDS	PDS-11	A	9/17/2016	8:07:27	31.30	20.87	0.07	sand/silt	Ox	No	
Disposal	PDS	PDS-11	B	9/17/2016	8:08:08	32.91	21.94	0.07	sand/silt	Ox	No	
Disposal	PDS	PDS-11	D	9/17/2016	8:09:55	43.29	28.86	0.12	sand/silt	Ox	No	
Disposal	PDS	PDS-12	A	9/17/2016	11:02:41	37.50	25.00	0.09	sand/silt	Ox	No	
Disposal	PDS	PDS-12	B	9/17/2016	11:03:36	IND	IND	IND	sand/silt	Ox	No	
Disposal	PDS	PDS-12	C	9/17/2016	11:04:16	IND	IND	IND	sand/silt	Ox	No	
Disposal	PDS	PDS-13	A	9/17/2016	8:47:27	34.18	22.79	0.08	sand/silt	Ox	No	
Disposal	PDS	PDS-13	F	9/17/2016	10:37:13	29.89	19.92	0.06	sand/silt	Ox	No	
Disposal	PDS	PDS-13	G	9/17/2016	10:37:57	30.98	20.65	0.06	sand/silt	Ox	No	
Disposal	PDS	PDS-14	A	9/17/2016	12:13:43	37.28	24.86	0.09	sand/silt	Ox	No	
Disposal	PDS	PDS-14	B	9/17/2016	12:14:35	38.27	25.52	0.10	sand/silt	Ox	No	
Disposal	PDS	PDS-14	C	9/17/2016	12:15:22	48.93	32.62	0.16	sand/silt	Ox	No	
Disposal	PDS	PDS-15	A	9/17/2016	11:18:46	45.24	30.16	0.14	sand/silt	Ox	No	
Disposal	PDS	PDS-15	B	9/17/2016	11:19:36	42.72	28.48	0.12	sand/silt	Ox	No	
Disposal	PDS	PDS-15	D	9/17/2016	11:21:08	44.88	29.92	0.13	sand/silt	Ox	No	
Disposal	PDS	PDS-16	A	9/17/2016	8:29:36	40.46	26.97	0.11	sand/silt	Ox	No	
Disposal	PDS	PDS-16	B	9/17/2016	8:30:10	IND	IND	IND	sand/silt	Ox	No	
Disposal	PDS	PDS-16	C	9/17/2016	8:30:53	IND	IND	IND	gravel/sand	Ox	No	
Disposal	PDS	PDS-17	A	9/17/2016	8:38:30	31.84	21.22	0.07	sand/silt	Ox	No	
Disposal	PDS	PDS-17	B	9/17/2016	8:39:11	28.80	19.20	0.06	sand/silt	Ox	No	
Disposal	PDS	PDS-17	E	9/17/2016	10:46:03	33.53	22.36	0.07	sand/silt	Ox	No	
Disposal	PDS	PDS-18	A	9/17/2016	8:54:14	50.32	33.55	0.17	sand/silt	Ox	No	
Disposal	PDS	PDS-18	C	9/17/2016	8:55:35	52.77	35.18	0.19	sand/silt	Ox	No	
Disposal	PDS	PDS-18	D	9/17/2016	8:56:16	IND	IND	IND	sand/silt	Ox	No	
Disposal	PDS	PDS-19	A	9/17/2016	12:23:59	43.24	28.82	0.12	sand/silt	Ox	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
Disposal	PDS	PDS-19	B	9/17/2016	12:24:53	30.16	20.11	0.06	sand/silt	Ox	No	
Disposal	PDS	PDS-19	C	9/17/2016	12:25:43	IND	IND	IND	sand/silt	Ox	No	
Disposal	PDS	PDS-20	A	9/17/2016	11:30:12	38.65	25.77	0.10	sand/silt	Ox	No	
Disposal	PDS	PDS-20	B	9/17/2016	11:30:51	42.12	28.08	0.12	sand/silt	Ox	No	
Disposal	PDS	PDS-20	C	9/17/2016	11:31:59	33.77	22.51	0.08	sand/silt	Ox	No	
Reference	SREF	SREF-06	A	9/19/2016	15:49:45	40.50	27.00	0.11	sand/silt	Ox	No	
Reference	SREF	SREF-06	B	9/19/2016	15:50:40	37.64	25.10	0.09	sand/silt	Ox	No	
Reference	SREF	SREF-06	C	9/19/2016	15:51:30	59.63	39.76	0.24	sand/silt	Ox	No	
Reference	SREF	SREF-07	A	9/19/2016	15:38:42	44.12	29.41	0.13	sand/silt	Ox	No	
Reference	SREF	SREF-07	B	9/19/2016	15:39:46	38.16	25.44	0.10	sand/silt	Ox	No	
Reference	SREF	SREF-07	D	9/19/2016	15:42:30	45.88	30.59	0.14	sand/silt	Ox	No	
Reference	SREF	SREF-08	A	9/19/2016	16:17:38	44.67	29.78	0.13	cobble/gravel	Ox	No	
Reference	SREF	SREF-08	B	9/19/2016	16:18:26	38.42	25.62	0.10	sand/silt	Ox	No	
Reference	SREF	SREF-08	C	9/19/2016	16:19:20	49.74	33.16	0.16	sand/silt	Ox	No	
Reference	SREF	SREF-09	A	9/19/2016	16:01:46	50.45	33.64	0.17	cobble/gravel	Ox	No	
Reference	SREF	SREF-09	B	9/19/2016	16:09:44	55.32	36.88	0.20	sand/silt	Ox	No	
Reference	SREF	SREF-09	C	9/19/2016	16:10:58	IND	IND	IND	cobble/gravel	Ox	No	
Reference	SREF	SREF-10	B	9/19/2016	16:28:05	35.14	23.42	0.08	sand/silt	Ox	No	
Reference	SREF	SREF-10	C	9/19/2016	16:28:56	IND	IND	IND	sand/silt	Ox	No	

Area	Location	StationID	Replicate	Dredged Material Present?	Dredged Material Notes	Debris	Bedforms	Tubes	Burrows	Tracks
Reference	EREF	EREF-01	A					Sparse (<10%)	Abundant (25-75%)	Sparse (<10%)
Reference	EREF	EREF-02	E					Sparse (<10%)	Abundant (25-75%)	Present (10-25%)
Reference	EREF	EREF-03	A					Sparse (<10%)	Present (10-25%)	None
Reference	EREF	EREF-03	B					Sparse (<10%)	Sparse (<10%)	Sparse (<10%)
Reference	EREF	EREF-03	D					Sparse (<10%)	Sparse (<10%)	Sparse (<10%)
Reference	EREF	EREF-04	B			Cobble		Sparse (<10%)	Sparse (<10%)	None
Reference	EREF	EREF-04	C			Cobble		Sparse (<10%)	None	None
Reference	EREF	EREF-04	D			Cobble		Sparse (<10%)	None	None
Reference	EREF	EREF-05	A					Sparse (<10%)	Sparse (<10%)	None
Reference	EREF	EREF-05	B					IND	IND	IND
Disposal	PDA95	PDA95-21	A					Sparse (<10%)	Sparse (<10%)	Present (10-25%)
Disposal	PDA95	PDA95-21	B			Cobble		Sparse (<10%)	Abundant (25-75%)	Sparse (<10%)
Disposal	PDA95	PDA95-21	D					Sparse (<10%)	Present (10-25%)	Sparse (<10%)
Disposal	PDA95	PDA95-22	A					None	Sparse (<10%)	Sparse (<10%)
Disposal	PDA95	PDA95-22	B					None	Present (10-25%)	None
Disposal	PDA95	PDA95-23	A					Sparse (<10%)	Abundant (25-75%)	Present (10-25%)
Disposal	PDA95	PDA95-23	C	Yes			Rut	Sparse (<10%)	Sparse (<10%)	None
Disposal	PDA95	PDA95-23	D					Sparse (<10%)	Present (10-25%)	None
Disposal	PDA95	PDA95-24	A					None	Present (10-25%)	None
Disposal	PDA95	PDA95-24	B					Sparse (<10%)	Sparse (<10%)	None
Disposal	PDA95	PDA95-25	A					Sparse (<10%)	Present (10-25%)	Sparse (<10%)
Disposal	PDA95	PDA95-25	B					Sparse (<10%)	Sparse (<10%)	None
Disposal	PDA95	PDA95-25	D	Yes		Cobble	Mound	None	None	None
Disposal	PDA95	PDA95-26	A	Yes				Sparse (<10%)	Present (10-25%)	Sparse (<10%)
Disposal	PDA95	PDA95-26	C	Yes				None	Present (10-25%)	Sparse (<10%)
Disposal	PDA95	PDA95-26	D	Yes				None	Abundant (25-75%)	Present (10-25%)
Disposal	PDA95	PDA95-27	A					Sparse (<10%)	Present (10-25%)	None
Disposal	PDA95	PDA95-27	B	Yes				Sparse (<10%)	Sparse (<10%)	None
Disposal	PDA95	PDA95-27	C					Sparse (<10%)	Present (10-25%)	Sparse (<10%)
Disposal	PDA95	PDA95-28	A					None	Abundant (25-75%)	Sparse (<10%)
Disposal	PDA95	PDA95-28	B					IND	IND	IND
Disposal	PDA95	PDA95-28	C					Sparse (<10%)	Present (10-25%)	Sparse (<10%)
Disposal	PDA95	PDA95-29	A					Sparse (<10%)	Abundant (25-75%)	None

Area	Location	StationID	Replicate	Dredged Material Present?	Dredged Material Notes	Debris	Bedforms	Tubes	Burrows	Tracks
Disposal	PDA95	PDA95-29	D				Mound	Sparse (<10%)	Present (10-25%)	None
Disposal	PDA95	PDA95-30	A					Sparse (<10%)	Abundant (25-75%)	None
Disposal	PDA95	PDA95-30	B	Yes				Sparse (<10%)	Abundant (25-75%)	None
Disposal	PDA95	PDA95-31	A					Sparse (<10%)	Abundant (25-75%)	Sparse (<10%)
Disposal	PDA95	PDA95-31	C					Sparse (<10%)	Abundant (25-75%)	None
Disposal	PDA95	PDA95-32	A					Sparse (<10%)	Abundant (25-75%)	Present (10-25%)
Disposal	PDA95	PDA95-32	B			Wood		Sparse (<10%)	Present (10-25%)	None
Disposal	PDA95	PDA95-32	D					Sparse (<10%)	Sparse (<10%)	Sparse (<10%)
Disposal	PDA95	PDA95-33	A					Sparse (<10%)	Sparse (<10%)	None
Disposal	PDA95	PDA95-33	B					Sparse (<10%)	Sparse (<10%)	None
Disposal	PDA95	PDA95-33	C					Sparse (<10%)	Sparse (<10%)	None
Disposal	PDA95	PDA95-34	A			Cobble		Sparse (<10%)	Sparse (<10%)	None
Disposal	PDA95	PDA95-34	C			Cobble		Sparse (<10%)	None	None
Disposal	PDA95	PDA95-34	D					Sparse (<10%)	Present (10-25%)	None
Disposal	PDA95	PDA95-35	A					Sparse (<10%)	Abundant (25-75%)	None
Disposal	PDA95	PDA95-35	B					Sparse (<10%)	Abundant (25-75%)	None
Disposal	PDA95	PDA95-35	C					Sparse (<10%)	Present (10-25%)	None
Disposal	PDAA	PDAA-01	A			Shell, Cobble		Sparse (<10%)	Sparse (<10%)	Sparse (<10%)
Disposal	PDAA	PDAA-01	B			Shell, Cobble		Sparse (<10%)	Sparse (<10%)	Sparse (<10%)
Disposal	PDAA	PDAA-01	D			Shell, Cobble		Sparse (<10%)	Sparse (<10%)	None
Disposal	PDAA	PDAA-02	A			Shell		Sparse (<10%)	Sparse (<10%)	Present (10-25%)
Disposal	PDAA	PDAA-02	C			Shell		Sparse (<10%)	Sparse (<10%)	None
Disposal	PDAA	PDAA-02	D			Shell		Sparse (<10%)	Present (10-25%)	Sparse (<10%)
Disposal	PDAA	PDAA-03	A			Shell		None	None	Sparse (<10%)
Disposal	PDAA	PDAA-03	C			Shell, Cobble		Sparse (<10%)	None	Sparse (<10%)
Disposal	PDAA	PDAA-03	D			Shell, Cobble		Sparse (<10%)	Sparse (<10%)	Sparse (<10%)
Disposal	PDAA	PDAA-04	A			Shell, Cobble		Sparse (<10%)	None	None
Disposal	PDAA	PDAA-04	B			Shell		Sparse (<10%)	Sparse (<10%)	Sparse (<10%)
Disposal	PDAA	PDAA-04	C			Shell, Cobble		Sparse (<10%)	Sparse (<10%)	None
Disposal	PDAA	PDAA-05	A			Shell, Cobble		Sparse (<10%)	Sparse (<10%)	Sparse (<10%)
Disposal	PDAA	PDAA-05	C			Shell		Sparse (<10%)	Sparse (<10%)	Sparse (<10%)
Disposal	PDAA	PDAA-05	D			Shell		Sparse (<10%)	Present (10-25%)	Sparse (<10%)
Disposal	PDS	PDS-06	A			Shell		Sparse (<10%)	Present (10-25%)	None
Disposal	PDS	PDS-06	B					Present (10-25%)	Present (10-25%)	Sparse (<10%)

Area	Location	StationID	Replicate	Dredged Material Present?	Dredged Material Notes	Debris	Bedforms	Tubes	Burrows	Tracks
Disposal	PDS	PDS-06	C			Shell, Cobble		Present (10-25%)	Sparse (<10%)	None
Disposal	PDS	PDS-07	A					Sparse (<10%)	Present (10-25%)	Sparse (<10%)
Disposal	PDS	PDS-07	C					Sparse (<10%)	Present (10-25%)	Present (10-25%)
Disposal	PDS	PDS-08	A					Sparse (<10%)	Present (10-25%)	None
Disposal	PDS	PDS-08	B					Present (10-25%)	Abundant (25-75%)	Sparse (<10%)
Disposal	PDS	PDS-08	C					Sparse (<10%)	Abundant (25-75%)	Sparse (<10%)
Disposal	PDS	PDS-09	A					Sparse (<10%)	Sparse (<10%)	Sparse (<10%)
Disposal	PDS	PDS-09	B					Sparse (<10%)	Sparse (<10%)	None
Disposal	PDS	PDS-09	C			Cobble		Sparse (<10%)	Present (10-25%)	None
Disposal	PDS	PDS-10	A					Present (10-25%)	Sparse (<10%)	Present (10-25%)
Disposal	PDS	PDS-10	D					Present (10-25%)	Sparse (<10%)	None
Disposal	PDS	PDS-11	A					Present (10-25%)	Sparse (<10%)	None
Disposal	PDS	PDS-11	B					Sparse (<10%)	Sparse (<10%)	Abundant (25-75%)
Disposal	PDS	PDS-11	D			Shell		Sparse (<10%)	Present (10-25%)	None
Disposal	PDS	PDS-12	A					Sparse (<10%)	Present (10-25%)	None
Disposal	PDS	PDS-12	B					IND	IND	IND
Disposal	PDS	PDS-12	C			Shell		Sparse (<10%)	Sparse (<10%)	Sparse (<10%)
Disposal	PDS	PDS-13	A					Sparse (<10%)	Abundant (25-75%)	Sparse (<10%)
Disposal	PDS	PDS-13	F					Sparse (<10%)	Abundant (25-75%)	Sparse (<10%)
Disposal	PDS	PDS-13	G					Sparse (<10%)	Present (10-25%)	None
Disposal	PDS	PDS-14	A					Sparse (<10%)	Present (10-25%)	Sparse (<10%)
Disposal	PDS	PDS-14	B					Present (10-25%)	Present (10-25%)	Sparse (<10%)
Disposal	PDS	PDS-14	C			Shell		Present (10-25%)	Present (10-25%)	Sparse (<10%)
Disposal	PDS	PDS-15	A			Cobble		Sparse (<10%)	Present (10-25%)	Sparse (<10%)
Disposal	PDS	PDS-15	B			Cobble		Sparse (<10%)	Present (10-25%)	Present (10-25%)
Disposal	PDS	PDS-15	D			Cobble		Sparse (<10%)	Abundant (25-75%)	Sparse (<10%)
Disposal	PDS	PDS-16	A			Cobble		Sparse (<10%)	Present (10-25%)	Sparse (<10%)
Disposal	PDS	PDS-16	B					Sparse (<10%)	Abundant (25-75%)	None
Disposal	PDS	PDS-16	C			Shell, Cobble		Sparse (<10%)	None	None
Disposal	PDS	PDS-17	A					Sparse (<10%)	Sparse (<10%)	None
Disposal	PDS	PDS-17	B					Present (10-25%)	Present (10-25%)	None
Disposal	PDS	PDS-17	E					Sparse (<10%)	Present (10-25%)	Present (10-25%)
Disposal	PDS	PDS-18	A					Sparse (<10%)	Abundant (25-75%)	Present (10-25%)
Disposal	PDS	PDS-18	C			Cobble		Sparse (<10%)	Abundant (25-75%)	Present (10-25%)
Disposal	PDS	PDS-18	D			Cobble		Sparse (<10%)	Present (10-25%)	None
Disposal	PDS	PDS-19	A					Present (10-25%)	Present (10-25%)	Sparse (<10%)

Area	Location	StationID	Replicate	Dredged Material Present?	Dredged Material Notes	Debris	Bedforms	Tubes	Burrows	Tracks
Disposal	PDS	PDS-19	B					Sparse (<10%)	Present (10-25%)	Sparse (<10%)
Disposal	PDS	PDS-19	C					IND	IND	IND
Disposal	PDS	PDS-20	A	Yes				Sparse (<10%)	Present (10-25%)	Sparse (<10%)
Disposal	PDS	PDS-20	B					Present (10-25%)	Present (10-25%)	None
Disposal	PDS	PDS-20	C					Sparse (<10%)	Sparse (<10%)	Sparse (<10%)
Reference	SREF	SREF-06	A			Cobble		Abundant (25-75%)	Sparse (<10%)	None
Reference	SREF	SREF-06	B					Abundant (25-75%)	Sparse (<10%)	None
Reference	SREF	SREF-06	C			Cobble		Present (10-25%)	Sparse (<10%)	Sparse (<10%)
Reference	SREF	SREF-07	A					Present (10-25%)	Present (10-25%)	Sparse (<10%)
Reference	SREF	SREF-07	B					Present (10-25%)	Present (10-25%)	Sparse (<10%)
Reference	SREF	SREF-07	D					Present (10-25%)	Sparse (<10%)	None
Reference	SREF	SREF-08	A			Cobble		Sparse (<10%)	Sparse (<10%)	None
Reference	SREF	SREF-08	B					Present (10-25%)	Sparse (<10%)	Present (10-25%)
Reference	SREF	SREF-08	C					Present (10-25%)	Present (10-25%)	Sparse (<10%)
Reference	SREF	SREF-09	A			Shell, Cobble		Sparse (<10%)	None	None
Reference	SREF	SREF-09	B			Shell		Sparse (<10%)	Sparse (<10%)	Sparse (<10%)
Reference	SREF	SREF-09	C			Cobble		None	None	None
Reference	SREF	SREF-10	B					Sparse (<10%)	Present (10-25%)	Sparse (<10%)
Reference	SREF	SREF-10	C					Sparse (<10%)	Sparse (<10%)	None

Area	Location	StationID	Replicate	Epifauna	Flora	Number of Fish	Comments
Reference	EREF	EREF-01	A				Many medium sized burrows with small tracks and a few tubes scattered throughout.
Reference	EREF	EREF-02	E				Many medium sized burrows with small tracks and a few tubes scattered throughout.
Reference	EREF	EREF-03	A	anemones			Medium sized burrows present. A few small tubes. Large tubes created by visible anemones also in image.
Reference	EREF	EREF-03	B	anemones, shrimp			A few medium sized tubes. Large anemones in image. Large fecal pile beneath the largest anemone.
Reference	EREF	EREF-03	D				Medium sized burrows and tubes scattered about image.
Reference	EREF	EREF-04	B	anemone, shrimp, hydroids			An anemone and shrimp in image. Small cobble covered in hydroids in majority of image.
Reference	EREF	EREF-04	C	hydroids			Small pices of cobble with hydroids scattered across sediment surface.
Reference	EREF	EREF-04	D	hydroids			Most of image obscurred by sediment cloud. Visible sediment has scattered cobble covered in hydroids.
Reference	EREF	EREF-05	A				A few medium sized tubes and burrows.
Reference	EREF	EREF-05	B				Most of image obscurred by sediment cloud. Visible sediment is fine sand/silt.
Disposal	PDA95	PDA95-21	A	shrimps			Many tracks in image. A few tubes and burrows. Two shrimp visible.
Disposal	PDA95	PDA95-21	B				A large cobble just in frame in bottom of image. A few large tubes in image. Burrows of varying size throughout image.
Disposal	PDA95	PDA95-21	D				Medium sized tubes in image with burrows scattered throughout.
Disposal	PDA95	PDA95-22	A				Small burrows scattered about the image with a track or two visible.
Disposal	PDA95	PDA95-22	B	shrimp			Large and medium burrows present in image along with a shrimp.
Disposal	PDA95	PDA95-23	A				Small burrows throughout the image with a few tracks running through.
Disposal	PDA95	PDA95-23	C				Large rut running through image with reduced clasts and/or dredged material resting on sediment surface.
Disposal	PDA95	PDA95-23	D				Sediment cloud obscures half of image. Small burrows visible with a large tube also present.
Disposal	PDA95	PDA95-24	A				Coarse sediment surface with medium and large sized burrows.
Disposal	PDA95	PDA95-24	B				Coarse sediment surface with a few tubes and burrows.
Disposal	PDA95	PDA95-25	A				Burrows, some with tubes and a few small tracks.
Disposal	PDA95	PDA95-25	B	shrimp, orange sponges			Coarse sediment surface with a few tubes and burrows. Three small, orange sponges and a shrimp.
Disposal	PDA95	PDA95-25	D	shrimp			Large mound with small cobble and dredged material throughout image.
Disposal	PDA95	PDA95-26	A				Many small burrows and a large tube. Chunks of dredged material partially buried in sand.
Disposal	PDA95	PDA95-26	C	orange sponge			Many burrows and small tracks with chunks of dredged material partially buried. A small, orange sponge vsiible.
Disposal	PDA95	PDA95-26	D				Many burrows and tracks with a chunk of dredged material in upper right corner.
Disposal	PDA95	PDA95-27	A				Small burrows and a very large burrow with associated tube.
Disposal	PDA95	PDA95-27	B				Very large burrow. Small tubes scattered across sediment.
Disposal	PDA95	PDA95-27	C	shrimps			Many small burrows and tracks. At least three visible shrimp.
Disposal	PDA95	PDA95-28	A	shrimps			Many small burrows and a few tracks. At least two shrimp.
Disposal	PDA95	PDA95-28	B				Most of image obscured by sediment cloud.
Disposal	PDA95	PDA95-28	C				A couple small tubes between many burrows and a couple tracks.
Disposal	PDA95	PDA95-29	A	orange sponge			Many small burrows and an orange sponge.

Area	Location	StationID	Replicate	Epifauna	Flora	Number of Fish	Comments
Disposal	PDA95	PDA95-29	D	orange sponge			A large sediment mound surrounded by burrows, some with associated tubes. An orange sponge.
Disposal	PDA95	PDA95-30	A				A few large tubes amongst many small burrows.
Disposal	PDA95	PDA95-30	B	orange sponges			Many burrows with small chunks of dredged material and some sponges.
Disposal	PDA95	PDA95-31	A				Many small burrows and a huge burrow surrounde by reduced sediment.
Disposal	PDA95	PDA95-31	C	shrimp, orange sponges			Many small burrows, some with associated tubes scattered across sediment.
Disposal	PDA95	PDA95-32	A				Many small burrows, some with associated tubes scattered across sediment. A couple tracks run across entire image.
Disposal	PDA95	PDA95-32	B	shrimp, hydroids			Large piece of wood colonized by hydroids in image. Many medium sized burrows with a few associated tubes.
Disposal	PDA95	PDA95-32	D				A few tubes and burrows. Cloud of sediment obscures some of image.
Disposal	PDA95	PDA95-33	A				A few small burrows and one very large burrow in the center of image.
Disposal	PDA95	PDA95-33	B				A few very large burrows in image.
Disposal	PDA95	PDA95-33	C	shrimp			Coarse sediment surface with a few burrows.
Disposal	PDA95	PDA95-34	A				A few pieces of cobble scattered about sediment surface.
Disposal	PDA95	PDA95-34	C				Sediment surface covered in gravel and cobble.
Disposal	PDA95	PDA95-34	D				Coarse sediment surface with medium sized burrows scattered throughout.
Disposal	PDA95	PDA95-35	A				Sediment surface contains burrows throughout.
Disposal	PDA95	PDA95-35	B	shrimps			Sediment surface contains burrows throughout.
Disposal	PDA95	PDA95-35	C	shrimp			Coarse sediment surface contains scattered burrows.
Disposal	PDAA	PDAA-01	A	hydroids			Sediment surface covered in scattered shell, gravel, and cobble. Some hydroids attached to a larger cobble.
Disposal	PDAA	PDAA-01	B				Sediment surface covered in scattered shell, gravel, and cobble.
Disposal	PDAA	PDAA-01	D				Sediment surface covered in scattered shell, gravel, and cobble. A few large burrows with associated tubes.
Disposal	PDAA	PDAA-02	A				Sediment surface covered in scattered shell and gravel.
Disposal	PDAA	PDAA-02	C				Sediment surface covered in scattered shell and gravel.
Disposal	PDAA	PDAA-02	D				Sediment surface contains scattered shell. Many small burrows present.
Disposal	PDAA	PDAA-03	A				Scattered shell across sediment surface. A few tracks visible.
Disposal	PDAA	PDAA-03	C	hydroids			Sediment contains scattered shell and gravel, as well as a few larger cobbles. Large hydroid present in center of image.
Disposal	PDAA	PDAA-03	D	hydroids			Large cobble takes up most of image. Colonies of hydroids dense in image.
Disposal	PDAA	PDAA-04	A	hydroids			Large cobble takes up most of image. Colonies of hydroids dense in image.
Disposal	PDAA	PDAA-04	B				Scattered shell across sediment surface. A few tubes and burrows visible.
Disposal	PDAA	PDAA-04	C	hydroids			Cobble and shell in image. Some cobble has associated hydroid colonies.
Disposal	PDAA	PDAA-05	A				Shell fragments and a few chunks of cobble in image.
Disposal	PDAA	PDAA-05	C				Coarse sediment surface with scattered shell fragments throughout.
Disposal	PDAA	PDAA-05	D	shrimp			Large bivalve shell fragments in image. A shrimp is also present.
Disposal	PDS	PDS-06	A				Shell fragments and many small to medium burrows present.
Disposal	PDS	PDS-06	B	hydroids			Many small tubes and burrows. A couple large burrows. Some hydroid colones visible.

Area	Location	StationID	Replicate	Epifauna	Flora	Number of Fish	Comments
Disposal	PDS	PDS-06	C	hydroids			Many shell fragments and chunks of cobble with associated hydroids.
Disposal	PDS	PDS-07	A				Coarse sediment surface with many small burrows.
Disposal	PDS	PDS-07	C				Coarse sediment surface with many small burrows and tracks.
Disposal	PDS	PDS-08	A				Coarse sediment surface with many small burrows and a few larger burrows.
Disposal	PDS	PDS-08	B				Many small tubes and burrows. Some reduced chunks resting on sediment, possible dredged material or mud clasts.
Disposal	PDS	PDS-08	C				Many medium sized burrows with a few tracks and some material that could be dredged material or a mud clast.
Disposal	PDS	PDS-09	A				Some small tubes and burrows with a couple tracks moving through.
Disposal	PDS	PDS-09	B				Rough sediment surface with small tubes and burrows.
Disposal	PDS	PDS-09	C	hydroids			Large burrow with reduced sediment around it. A few chunks of cobble with associated hydroids.
Disposal	PDS	PDS-10	A				Track running through middle of image. Many tubes and a few large burrows.
Disposal	PDS	PDS-10	D	shrimp			Many small tubes and a few burrows.
Disposal	PDS	PDS-11	A	anemone			Rough sediment surface with an anemone just in image at bottom.
Disposal	PDS	PDS-11	B				Many tracks in image with a few small tubes.
Disposal	PDS	PDS-11	D	shrimp, gastropod			Large shell fragment with a very small gastropod and shrimp in image. Small burrows thorughout image.
Disposal	PDS	PDS-12	A	shrimp			Many burrows scattered across image.
Disposal	PDS	PDS-12	B				Unable to see much in image because of sediment cloud.
Disposal	PDS	PDS-12	C				Could not locate lasers. A few tubes, burrows, tracks, and shell fragments.
Disposal	PDS	PDS-13	A				All sizes of burrows throughout image.
Disposal	PDS	PDS-13	F	shrimp			Smaller burrows and tracks surrounding very large burrow in center of image.
Disposal	PDS	PDS-13	G				Coarse sediment surface with burrows scattered throughout.
Disposal	PDS	PDS-14	A				Many burrows with associated tubes scattered about.
Disposal	PDS	PDS-14	B				Many burrows with associated tubes scattered about.
Disposal	PDS	PDS-14	C	shrimp			Many burrows with associated tubes scattered about.
Disposal	PDS	PDS-15	A	hydroids, shrimp			Many burrows scattered in sediment between chunks of cobble with associated hydroid colonies.
Disposal	PDS	PDS-15	B	hydroids			A few chunks of cobble with many burrows and tracks throughout.
Disposal	PDS	PDS-15	D	hydroids			Cobble chunks scattered about image with many burrows throughout.
Disposal	PDS	PDS-16	A	anemone			A few chunks of cobble with burrows and associated tubes scattered across sediment.
Disposal	PDS	PDS-16	B	shrimp			Sediment contains many burrows of all sizes, some with associated tubes.
Disposal	PDS	PDS-16	C	hydroids			Most of image is hydroid covered cobble with some gravel and sand between.
Disposal	PDS	PDS-17	A				Coarse sediment surface containing scattered burrows, some with tubes.
Disposal	PDS	PDS-17	B				Many small burrows with associated tubes in coarse sediment surface.
Disposal	PDS	PDS-17	E				Burrows and tracks throughout image.
Disposal	PDS	PDS-18	A				Burrows and tracks throughout image.
Disposal	PDS	PDS-18	C	shrimp, gastropod			Burrows and tracks throughout image.
Disposal	PDS	PDS-18	D	hydroids			Huge piece of cobble with associated hydroids takes up majority of image.
Disposal	PDS	PDS-19	A				Burrows scattered throughout, many containing associated tubes.

Area	Location	StationID	Replicate	Epifauna	Flora	Number of Fish	Comments
Disposal	PDS	PDS-19	B				Many burrows, some with associated tubes in image.
Disposal	PDS	PDS-19	C				Sediment cloud obscures most of image.
Disposal	PDS	PDS-20	A				Many small burrows, some with associated tubes scattered across image. Patch of dredged material to left of image.
Disposal	PDS	PDS-20	B				Many small tubes and burrows throughout image.
Disposal	PDS	PDS-20	C				A few medium sized burrows and small tubes in image.
Reference	SREF	SREF-06	A	hydroids			Coarse sediment containing many small tubes covers slabs of cobble with associated hydroid colonies.
Reference	SREF	SREF-06	B	hydroids			Coarse sediment containing many small tubes covers slabs of cobble with associated hydroid colonies.
Reference	SREF	SREF-06	C	sea star, hydroids			Sediment has large ridge running through middle with many small tubes throughout. Sediment covers partially visible cobble slab with associated hydroids.
Reference	SREF	SREF-07	A				Many small burrows with many small tubes throughout image.
Reference	SREF	SREF-07	B	anemone			Many small burrows with many small tubes throughout image. Large anemone in center of image.
Reference	SREF	SREF-07	D				Many small tubes with scattered burrows throughout image.
Reference	SREF	SREF-08	A	anemone, shrimp, hydroids			Large cobbles cover majority of seafloor.
Reference	SREF	SREF-08	B				Many small tubes and tracks running throughout image.
Reference	SREF	SREF-08	C	anemone, shrimp			Many small tubes and burrows throughout image. Large anemone with shrimp hiding beneath in center of image.
Reference	SREF	SREF-09	A	hydroids, shrimps, attached epifauna			Large cobbles with hydroid colonies and many unknown, attached epifauna take up majority of image.
Reference	SREF	SREF-09	B				Coarse sediment surface with a few small tubes, burrows, and tracks.
Reference	SREF	SREF-09	C	hydroids, attached epifauna			Large, hydroid covered cobble take up entire image. Unknown attached epifauna present on cobble.
Reference	SREF	SREF-10	B				Sediment surface contains many burrows, some with associated tubes.
Reference	SREF	SREF-10	C				Sediment cloud covers some of image. Visible sediment contains a few tubes and burrows.

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 - Portland Disposal Site Sample Summary - SEDIMENT

STATION_ID	Field SAMPLE ID	MATRIX	LAB	LAB_SAMPLE_ID
QC_BLK	RAJ-901	BLK	Battelle	K2640-P
QC_BLK	RAJ-901	BLK	ESI	28209-011
QC_BLK	RAJ-901	BLK	ESI	28209-011D
QC_BLK	RAJ-901	BLK	ESI	28209-011S
QC_BLK	RAJ-901	BLK	ESI	28209-011SD
QC_BLK	RAJ-901	BLK	ESI	28209-012
QC_BLK	RAJ-901	BLK	ESI	28209-012D
QC_BLK	RAJ-901	BLK	ESI	28209-012S
QC_BLK	RAJ-901	BLK	ESI	28209-012SD
EREF-01	RAJ-012	SED	Battelle	K2642-P
EREF-01	RAJ-012	SED	ESI	28209-014
EREF-01	RAJ-012	SED	Katahdin	SJ7652-13
EREF-03	RAJ-010	SED	Battelle	K2639-P
EREF-03	RAJ-010	SED	ESI	28209-010
EREF-03	RAJ-010	SED	Katahdin	SJ7652-11
EREF-05	RAJ-011	SED	Battelle	K2641-P
EREF-05	RAJ-011	SED	ESI	28209-013
EREF-05	RAJ-011	SED	Katahdin	SJ7652-12
PDA95-22	RAJ-006	SED	Battelle	K2635-P
PDA95-22	RAJ-006	SED	ESI	28209-006
PDA95-22	RAJ-006	SED	Katahdin	SJ7652-7
PDA95-23	RAJ-005	SED	Battelle	K2634-P
PDA95-23	RAJ-005	SED	ESI	28209-005
PDA95-23	RAJ-005	SED	Katahdin	SJ7652-6
PDA95-30	RAJ-004	SED	Battelle	K2633MSD-P
PDA95-30	RAJ-004	SED	Battelle	K2633MS-P
PDA95-30	RAJ-004	SED	Battelle	K2633-P
PDA95-30	RAJ-004	SED	ESI	28209-004
PDA95-30	RAJ-004	SED	ESI	28209-004D
PDA95-30	RAJ-004	SED	ESI	28209-004S
PDA95-30	RAJ-004	SED	ESI	28209-004SD
PDA95-30	RAJ-004	SED	Katahdin	SJ7652-4
PDA95-30	RAJ-004	SED	Katahdin	SJ7652-5
PDS-10	RAJ-002	SED	Battelle	K2631-P
PDS-10	RAJ-002	SED	ESI	28209-002
PDS-10	RAJ-002	SED	Katahdin	SJ7652-2
PDS-16	RAJ-003	SED	Battelle	K2632-P
PDS-16	RAJ-003	SED	ESI	28209-003
PDS-16	RAJ-003	SED	Katahdin	SJ7652-3
PDS-20	RAJ-001	SED	Battelle	K2630-P
PDS-20	RAJ-001	SED	ESI	28209-001
PDS-20	RAJ-001	SED	Katahdin	SJ7652-1
SREF-07	RAJ-007	SED	Battelle	K2636-P
SREF-07	RAJ-007	SED	ESI	28209-007

DAMOS 2016 - Portland Disposal Site Sample Summary - SEDIMENT

STATION_ID	Field SAMPLE ID	MATRIX	LAB	LAB_SAMPLE_ID
SREF-07	RAJ-007	SED	Katahdin	SJ7652-8
SREF-08	RAJ-009	SED	Battelle	K2638-P
SREF-08	RAJ-009	SED	ESI	28209-009
SREF-08	RAJ-009	SED	Katahdin	SJ7652-10
SREF-10	RAJ-008	SED	Battelle	K2637DUP-P
SREF-10	RAJ-008	SED	Battelle	K2637-P
SREF-10	RAJ-008	SED	ESI	28209-008
SREF-10	RAJ-008	SED	Katahdin	SJ7652-9

			Study Id	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16
			Survey Id	PDS	PDS	PDS	PDS	PDS	PDS	PDS	PDS	PDS	PDS
			Station Id	EREF-01	EREF-01	EREF-01	EREF-01	EREF-01	EREF-01	EREF-01	EREF-01	EREF-03	EREF-03
			Sample Id	RAJ-012	RAJ-012	RAJ-012	RAJ-012	RAJ-012	RAJ-012	RAJ-012	RAJ-012	RAJ-010	RAJ-010
			Field Qc Code	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
			Lab Qc Code	SA	SA	DUP	DUP	TRIP	TRIP	QUAD	QUAD	SA	SA
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
GS	GRAVEL	Gravel (>2.00 mm)	PCT	0								16	
GS	SAND_CO	Course Sand (0.50-1.00 mm)	PCT	0								6.67	
GS	SAND_MED	Medium Sand (0.25-0.50 mm)	PCT	0.91								10.94	
GS	SAND_FI	Fine Sand (0.125-0.25 mm)	PCT	59.74								52.55	
GS	Total SAND	Sand (0.0625-2.00 mm)	PCT	60.65								70.16	
GS	SILT	Silt (0.0039-0.0625 mm)	PCT	30.28								7.28	
GS	CLAY	Clay (<0.00391 mm)	PCT	9.07								6.57	
MISC	TOC	Total Organic Carbon	UG/G	9400		9900		9500		9800		5100	
MISC	PCT_SOLIDS	Percent Solids (BDO)	PCT	63.73								75.24	
MISC	TOTAL_SOLIDS	Total Solids (ESI)	PCT	63.7								75.7	
MISC	TOTAL_SOLIDS	Total Solids (KASI)	PCT	63								74	
MET	7439-92-1	Lead	MG/KG_DRYWT	9.25								7.38	
MET	7439-97-6	Mercury	MG/KG_DRYWT	0.026								0.015	
MET	7440-02-0	Nickel	MG/KG_DRYWT	12								8	
MET	7440-38-2	Arsenic	MG/KG_DRYWT	3.81								3.2	
MET	7440-43-9	Cadmium	MG/KG_DRYWT	0.07								0.03	U
MET	7440-47-3	Chromium	MG/KG_DRYWT	17.8								13.4	
MET	7440-50-8	Copper	MG/KG_DRYWT	5.58								3.38	
MET	7440-66-6	Zinc	MG/KG_DRYWT	32.2								21.1	
CONG	31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	UG/KG_DRYWT	0.0801	U							0.0677	U
CONG	32598-10-0	2,3',4,4'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.0565	U							0.0478	U
CONG	32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	UG/KG_DRYWT	0.097	J							0.0795	J
CONG	34883-43-7	2,4'-Dichlorobiphenyl	UG/KG_DRYWT	0.067	U							0.0567	U
CONG	35065-27-1	2,2',4,4',5,5'-Hexachlorobiphenyl	UG/KG_DRYWT	0.17	U							0.144	U
CONG	35065-28-2	2,2',3,4,4',5'-Hexachlorobiphenyl	UG/KG_DRYWT	0.0591	U							0.05	U
CONG	35065-29-3	2,2',3,4,4',5,5'-Heptachlorobiphenyl	UG/KG_DRYWT	0.0565	U							0.0478	U
CONG	35065-30-6	2,2',3,3',4,4',5-Heptachlorobiphenyl	UG/KG_DRYWT	0.049	U							0.0415	U
CONG	35693-99-3	2,2',5,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.0644	U							0.0544	U
CONG	37680-65-2	2,2',5-Trichlorobiphenyl	UG/KG_DRYWT	0.049	U							0.0415	U
CONG	37680-73-2	2,2',4,5,5'-Pentachlorobiphenyl	UG/KG_DRYWT	0.049	U							0.0415	U
CONG	38380-02-8	2,2',3,4,5'-Pentachlorobiphenyl	UG/KG_DRYWT	0.0438	U							0.0371	U
CONG	38380-07-3	2,2',3,3',4,4'-Hexachlorobiphenyl	UG/KG_DRYWT	0.0438	U							0.0371	U
CONG	40186-72-9	2,2',3,3',4,4',5,5',6-Nonachlorobiphen	UG/KG_DRYWT	0.0438	U							0.0371	U
CONG	41464-39-5	2,2',3,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.0464	U							0.0393	U
CONG	41464-40-8	2,2',4,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.0464	U							0.0393	U
CONG	52663-68-0	2,2',3,4',5,5',6-Heptachlorobiphenyl	UG/KG_DRYWT	0.0464	U							0.0393	U
CONG	52663-69-1	2,2',3,4,4',5',6-Heptachlorobiphenyl	UG/KG_DRYWT	0.0387	U							0.0327	U
CONG	52663-78-2	2,2',3,3',4,4',5,6-Octachlorobiphenyl	UG/KG_DRYWT	0.0464	U							0.0393	U
CONG	7012-37-5	2,4,4'-Trichlorobiphenyl	UG/KG_DRYWT	0.0387	U							0.0327	U
CONG	74472-48-3	2,2',3,4,4',6,6'-Heptachlorobiphenyl	UG/KG_DRYWT	0.106	U							0.0894	U
CONG	C-2051-24-3	Decachlorobiphenyl - Congener	UG/KG_DRYWT	0.049	U							0.0415	U

			Study Id	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**
			Survey Id	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**
			Station Id	**EREF-01**	**EREF-01**	**EREF-01**	**EREF-01**	**EREF-01**	**EREF-01**	**EREF-01**	**EREF-01**	**EREF-03**	**EREF-03**
			Sample Id	**RAJ-012**	**RAJ-012**	**RAJ-012**	**RAJ-012**	**RAJ-012**	**RAJ-012**	**RAJ-012**	**RAJ-012**	**RAJ-010**	**RAJ-010**
			Field Qc Code	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**
			Lab Qc Code	**SA**	**SA**	**DUP**	**DUP**	**TRIP**	**TRIP**	**QUAD**	**QUAD**	**SA**	**SA**
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
	TOTAL_PCB_NST_CONGx2	**Total NS&T PCB *2 (ND as 1/2 MDL)**	UG/KG_DRYWT	1.2091								1.0182	
PEST	1024-57-3	heptachlor epoxide	UG/KG_DRYWT	0.0516	U							0.0436	U
PEST	1031-07-8	Endosulfan sulfate	UG/KG_DRYWT	0.0696	U							0.0589	U
PEST	309-00-2	aldrin	UG/KG_DRYWT	0.049	U							0.0415	U
PEST	319-84-6	alpha-BHC	UG/KG_DRYWT	0.0464	U							0.0393	U
PEST	319-85-7	beta-BHC	UG/KG_DRYWT	0.0696	U							0.0589	U
PEST	319-86-8	delta-BHC	UG/KG_DRYWT	0.0516	U							0.0436	U
PEST	33213-65-9	Endosulfan II	UG/KG_DRYWT	0.0438	U							0.0371	U
PEST	5103-71-9	alpha-chlordane	UG/KG_DRYWT	0.0516	U							0.0436	U
PEST	5103-74-2	gamma-chlordane	UG/KG_DRYWT	0.0464	U							0.0393	U
PEST	57-74-9	chlordane	UG/KG_DRYWT										
PEST	58-89-9	hexachlorocyclohexane, gamma	UG/KG_DRYWT	0.0748	U							0.0633	U
PEST	60-57-1	dieldrin	UG/KG_DRYWT	0.049	U							0.0415	U
PEST	72-20-8	endrin	UG/KG_DRYWT	0.0565	U							0.0478	U
PEST	72-43-5	methoxychlor	UG/KG_DRYWT	0.204	U							0.172	U
PEST	50-29-3	4,4'-DDT	UG/KG_DRYWT	0.355								0.288	
PEST	72-54-8	4,4'-DDD	UG/KG_DRYWT	0.0696	U							0.0589	U
PEST	72-55-9	4,4'-DDE	UG/KG_DRYWT	0.0644	U							0.0544	U
PEST	76-44-8	heptachlor	UG/KG_DRYWT	0.0853	U							0.0722	U
PEST	8001-35-2	Toxaphene	UG/KG_DRYWT	20.9	U							17.7	U
PEST	959-98-8	Endosulfan I	UG/KG_DRYWT	0.0544	U							0.046	U
SVOC	120-12-7	Anthracene	UG/KG_DRYWT	3.38								0.826	J
SVOC	129-00-0	Pyrene	UG/KG_DRYWT	25.8								10.4	
SVOC	191-24-2	Benzo(G,H,I)Perylene	UG/KG_DRYWT	11.8								5.67	
SVOC	193-39-5	Indeno(1,2,3-Cd)Pyrene	UG/KG_DRYWT	11.3								4.39	
SVOC	205-99-2	Benzo(B)Fluoranthene	UG/KG_DRYWT	12.6								6.13	
SVOC	206-44-0	Fluoranthene	UG/KG_DRYWT	27.4								11	
SVOC	207-08-9	Benzo(K)Fluoranthene	UG/KG_DRYWT	15.6								6.48	
SVOC	208-96-8	Acenaphthylene	UG/KG_DRYWT	1.84								0.93	
SVOC	218-01-9	Chrysene	UG/KG_DRYWT	15.6								6.7	
SVOC	50-32-8	Benzo(A)Pyrene	UG/KG_DRYWT	16								6.82	
SVOC	53-70-3	Dibenz(A,H)Anthracene	UG/KG_DRYWT	2.01								0.969	
SVOC	56-55-3	Benzo(A)Anthracene	UG/KG_DRYWT	12								4.89	
SVOC	83-32-9	Acenaphthene	UG/KG_DRYWT	0.74	J							0.249	J
SVOC	85-01-8	Phenanthrene	UG/KG_DRYWT	13.2								5.02	
SVOC	86-73-7	Fluorene	UG/KG_DRYWT	1.08								0.391	J
SVOC	90-12-0	1-Methylnaphthalene	UG/KG_DRYWT	0.857	J							0.43	J
SVOC	91-57-6	2-Methylnaphthalene	UG/KG_DRYWT	1.19								0.63	J
EPH	91-20-3	Naphthalene	UG/KG_DRYWT	1.76								0.947	
	TOTAL_PAH	**Total PAH (ND as 1/2 MDL)**	UG/KG_DRYWT	174.157								72.872	

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**	**DAMOS16**	**DAMOS16**	**DAMOS16**
			Survey Id	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**
			Station Id	**EREF-05**	**EREF-05**	**PDA95-22**	**PDA95-22**	**PDA95-23**	**PDA95-23**	**PDA95-30**	**PDA95-30**	**PDA95-30**	**PDA95-30**
			Sample Id	**RAJ-011**	**RAJ-011**	**RAJ-006**	**RAJ-006**	**RAJ-005**	**RAJ-005**	**RAJ-004**	**RAJ-004**	**RAJ-004**	**RAJ-004**
			Field Qc Code	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**
			Lab Qc Code	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**DUP**	**DUP**
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
GS	GRAVEL	Gravel (>2.00 mm)	PCT	1.16		0		2.06		0		0	
GS	SAND_CO	Course Sand (0.50-1.00 mm)	PCT	0.26		0		2.44		1.58		0.99	
GS	SAND_MED	Medium Sand (0.25-0.50 mm)	PCT	1.03		0.6		16.69		6.3		5.54	
GS	SAND_FI	Fine Sand (0.125-0.25 mm)	PCT	72.03		14.11		15.75		14.57		14.64	
GS	Total SAND	Sand (0.0625-2.00 mm)	PCT	73.59		14.71		34.88		22.45		21.17	
GS	SILT	Silt (0.0039-0.0625 mm)	PCT	16.99		75.85		56.27		66.37		69.16	
GS	CLAY	Clay (<0.00391 mm)	PCT	8.25		9.44		6.79		11.18		9.67	
MISC	TOC	Total Organic Carbon	UG/G	8900		24000		16000		22000		23000	
MISC	PCT_SOLIDS	Percent Solids (BDO)	PCT	71.48		48.2		56.94		49.25			
MISC	TOTAL_SOLIDS	Total Solids (ESI)	PCT	72.4		46.4		55.6		46.9			
MISC	TOTAL_SOLIDS	Total Solids (KASI)	PCT	70		46		57		51		47	
MET	7439-92-1	Lead	MG/KG_DRYWT	6.93		19.9		16.8		37.1		35.1	
MET	7439-97-6	Mercury	MG/KG_DRYWT	0.017		0.079		0.054		0.23		0.23	
MET	7440-02-0	Nickel	MG/KG_DRYWT	9		20.8		18.8		22.7		21.6	
MET	7440-38-2	Arsenic	MG/KG_DRYWT	2.88		8.36		7.76		9.99		9.48	
MET	7440-43-9	Cadmium	MG/KG_DRYWT	0.04		0.26		0.17		0.39		0.388	
MET	7440-47-3	Chromium	MG/KG_DRYWT	14.3		32.9		27.2		37.6		35.5	
MET	7440-50-8	Copper	MG/KG_DRYWT	3.8		17.3		16.9		25.3		23.8	
MET	7440-66-6	Zinc	MG/KG_DRYWT	24.2		72.8		63.3		91.2		87.1	
CONG	31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	UG/KG_DRYWT	0.0714	U	0.207	J	0.0893	U	1.2			
CONG	32598-10-0	2,3',4,4'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.0504	U	0.0797	J	0.071	J	0.455			
CONG	32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	UG/KG_DRYWT	0.0817	J	0.309	J	0.161	J	0.654			
CONG	34883-43-7	2,4'-Dichlorobiphenyl	UG/KG_DRYWT	0.0597	U	0.0885	U	0.0747	U	0.0866	U		
CONG	35065-27-1	2,2',4,4',5,5'-Hexachlorobiphenyl	UG/KG_DRYWT	0.152	U	0.225	U	0.19	U	1.59			
CONG	35065-28-2	2,2',3,4,4',5'-Hexachlorobiphenyl	UG/KG_DRYWT	0.0527	U	0.259	J	0.147	J	1.38			
CONG	35065-29-3	2,2',3,4,4',5,5'-Heptachlorobiphenyl	UG/KG_DRYWT	0.0504	U	0.236	J	0.175	J	0.655			
CONG	35065-30-6	2,2',3,3',4,4',5-Heptachlorobiphenyl	UG/KG_DRYWT	0.0437	U	0.0648	U	0.0547	U	0.358			
CONG	35693-99-3	2,2',5,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.0574	U	0.0851	U	0.0718	U	0.636			
CONG	37680-65-2	2,2',5-Trichlorobiphenyl	UG/KG_DRYWT	0.0437	U	0.0648	U	0.0547	U	0.0634	U		
CONG	37680-73-2	2,2',4,5,5'-Pentachlorobiphenyl	UG/KG_DRYWT	0.0437	U	0.173	J	0.145	J	1.42			
CONG	38380-02-8	2,2',3,4,5'-Pentachlorobiphenyl	UG/KG_DRYWT	0.0391	U	0.058	U	0.0489	U	0.357			
CONG	38380-07-3	2,2',3,3',4,4'-Hexachlorobiphenyl	UG/KG_DRYWT	0.0391	U	0.196	J	0.0489	U	0.26	J		
CONG	40186-72-9	2,2',3,3',4,4',5,5',6-Nonachlorobiphen	UG/KG_DRYWT	0.0391	U	0.058	U	0.0489	U	0.294	J		
CONG	41464-39-5	2,2',3,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.0414	U	0.0613	U	0.0518	U	0.236	J		
CONG	41464-40-8	2,2',4,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.0414	U	0.0613	U	0.0518	U	0.288	J		
CONG	52663-68-0	2,2',3,4',5,5',6-Heptachlorobiphenyl	UG/KG_DRYWT	0.0414	U	0.0613	U	0.0518	U	0.265	J		
CONG	52663-69-1	2,2',3,4,4',5',6-Heptachlorobiphenyl	UG/KG_DRYWT	0.0345	U	0.0511	U	0.0431	U	0.195	J		
CONG	52663-78-2	2,2',3,3',4,4',5,6-Octachlorobiphenyl	UG/KG_DRYWT	0.0414	U	0.0613	U	0.0518	U	0.184	J		
CONG	7012-37-5	2,4,4'-Trichlorobiphenyl	UG/KG_DRYWT	0.0345	U	0.0511	U	0.0431	U	0.125	J		
CONG	74472-48-3	2,2',3,4,4',6,6'-Heptachlorobiphenyl	UG/KG_DRYWT	0.0943	U	0.14	U	0.118	U	0.137	U		
CONG	C-2051-24-3	Decachlorobiphenyl - Congener	UG/KG_DRYWT	0.0437	U	0.174	J	0.15	J	1.1			

			Study Id	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16
			Survey Id	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**
			Station Id	**EREF-05**	**EREF-05**	**PDA95-22**	**PDA95-22**	**PDA95-23**	**PDA95-23**	**PDA95-30**	**PDA95-30**	**PDA95-30**	**PDA95-30**
			Sample Id	**RAJ-011**	**RAJ-011**	**RAJ-006**	**RAJ-006**	**RAJ-005**	**RAJ-005**	**RAJ-004**	**RAJ-004**	**RAJ-004**	**RAJ-004**
			Field Qc Code	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**
			Lab Qc Code	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**DUP**	**DUP**
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
	TOTAL_PCB_NST_CONGx2	**Total NS&T PCB *2 (ND as 1/2 MDL)**	UG/KG_DRYWT	1.0691		4.0886		2.5295		21.774			
PEST	1024-57-3	heptachlor epoxide	UG/KG_DRYWT	0.046	U	0.0682	U	0.0576	U	0.0667	U		
PEST	1031-07-8	Endosulfan sulfate	UG/KG_DRYWT	0.0621	U	0.092	U	0.0776	U	0.09	U		
PEST	309-00-2	aldrin	UG/KG_DRYWT	0.0437	U	0.0648	U	0.0547	U	0.0634	U		
PEST	319-84-6	alpha-BHC	UG/KG_DRYWT	0.0414	U	0.0613	U	0.0518	U	0.06	U		
PEST	319-85-7	beta-BHC	UG/KG_DRYWT	0.0621	U	0.092	U	0.0776	U	0.09	U		
PEST	319-86-8	delta-BHC	UG/KG_DRYWT	0.046	U	0.0682	U	0.0576	U	0.0667	U		
PEST	33213-65-9	Endosulfan II	UG/KG_DRYWT	0.0391	U	0.364		0.492		1.04			
PEST	5103-71-9	alpha-chlordane	UG/KG_DRYWT	0.046	U	0.123	J	0.103	J	0.188	J		
PEST	5103-74-2	gamma-chlordane	UG/KG_DRYWT	0.0414	U	0.832		0.9		1.76			
PEST	57-74-9	chlordane	UG/KG_DRYWT			4.89		5.13		9.97			
PEST	58-89-9	hexachlorocyclohexane, gamma	UG/KG_DRYWT	0.0667	U	0.0989	U	0.0835	U	0.0968	U		
PEST	60-57-1	dieldrin	UG/KG_DRYWT	0.0437	U	0.0648	U	0.0547	U	0.291	J		
PEST	72-20-8	endrin	UG/KG_DRYWT	0.0504	U	0.0747	U	0.063	U	0.0731	U		
PEST	72-43-5	methoxychlor	UG/KG_DRYWT	0.182	U	0.269	U	0.227	U	0.263	U		
PEST	50-29-3	4,4'-DDT	UG/KG_DRYWT	0.304		0.947		1.07		1.2			
PEST	72-54-8	4,4'-DDD	UG/KG_DRYWT	0.0621	U	1.69		1.63		6.68			
PEST	72-55-9	4,4'-DDE	UG/KG_DRYWT	0.0574	U	0.924		1.28		2.32			
PEST	76-44-8	heptachlor	UG/KG_DRYWT	0.0761	U	0.113	U	0.0952	U	0.11	U		
PEST	8001-35-2	Toxaphene	UG/KG_DRYWT	18.7	U	25400		23.4	U	27.1	U		
PEST	959-98-8	Endosulfan I	UG/KG_DRYWT	0.0485	U	0.0719	U	0.0607	U	0.0704	U		
SVOC	120-12-7	Anthracene	UG/KG_DRYWT	1.52		29.3		22.3		67.6			
SVOC	129-00-0	Pyrene	UG/KG_DRYWT	17.4		227		287		529			
SVOC	191-24-2	Benzo(G,H,I)Perylene	UG/KG_DRYWT	7.98		99.4		97.4		175			
SVOC	193-39-5	Indeno(1,2,3-Cd)Pyrene	UG/KG_DRYWT	6.25		92.5		101		170			
SVOC	205-99-2	Benzo(B)Fluoranthene	UG/KG_DRYWT	8.71		120		130		226			
SVOC	206-44-0	Fluoranthene	UG/KG_DRYWT	18.2		237		317		489			
SVOC	207-08-9	Benzo(K)Fluoranthene	UG/KG_DRYWT	9.66		121		135		231			
SVOC	208-96-8	Acenaphthylene	UG/KG_DRYWT	1.29		12.9		13.3		31			
SVOC	218-01-9	Chrysene	UG/KG_DRYWT	10.9		126		148		252			
SVOC	50-32-8	Benzo(A)Pyrene	UG/KG_DRYWT	11.4		125		129		238			
SVOC	53-70-3	Dibenz(A,H)Anthracene	UG/KG_DRYWT	1.38		21.6		22.2		37.6			
SVOC	56-55-3	Benzo(A)Anthracene	UG/KG_DRYWT	8.04		99.5		110		208			
SVOC	83-32-9	Acenaphthene	UG/KG_DRYWT	0.411	J	8.06		12.8		16.9			
SVOC	85-01-8	Phenanthrene	UG/KG_DRYWT	8.67		100		99.8		204			
SVOC	86-73-7	Fluorene	UG/KG_DRYWT	0.706	J	11.8		10.9		26.1			
SVOC	90-12-0	1-Methylnaphthalene	UG/KG_DRYWT	0.567	J	5.8		4.31		15			
SVOC	91-57-6	2-Methylnaphthalene	UG/KG_DRYWT	0.763	J	9.5		6.08		24.5			
EPH	91-20-3	Naphthalene	UG/KG_DRYWT	1.21		23.2		19		58.3			
	TOTAL_PAH	**Total PAH (ND as 1/2 MDL)**	UG/KG_DRYWT	115.057		1469.56		1665.09		2999			

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	DAMOS16	DAMOS16	DAMOS16
			Survey Id	PDS	PDS	PDS	PDS	PDS	PDS	PDS	PDS	PDS	PDS
			Station Id	PDS-10	PDS-10	PDS-16	PDS-16	PDS-20	PDS-20	PDS-20	PDS-20	PDS-20	PDS-20
			Sample Id	RAJ-002	RAJ-002	RAJ-003	RAJ-003	RAJ-001	RAJ-001	RAJ-001	RAJ-001	RAJ-001	RAJ-001
			Field Qc Code	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
			Lab Qc Code	SA	SA	SA	SA	SA	SA	DUP	DUP	TRIP	TRIP
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
GS	GRAVEL	Gravel (>2.00 mm)	PCT	2.27		0.13		0.39					
GS	SAND_CO	Course Sand (0.50-1.00 mm)	PCT	0.32		2.82		0.39					
GS	SAND_MED	Medium Sand (0.25-0.50 mm)	PCT	4.7		7.91		5.87					
GS	SAND_FI	Fine Sand (0.125-0.25 mm)	PCT	33.7		9.39		74.26					
GS	Total SAND	Sand (0.0625-2.00 mm)	PCT	38.72		20.12		80.52					
GS	SILT	Silt (0.0039-0.0625 mm)	PCT	48.64		49.57		13.73					
GS	CLAY	Clay (<0.00391 mm)	PCT	10.37		30.18		5.35					
MISC	TOC	Total Organic Carbon	UG/G	20000		8400		5000		4300		4800	
MISC	PCT_SOLIDS	Percent Solids (BDO)	PCT	56.24		66.48		76.58					
MISC	TOTAL_SOLIDS	Total Solids (ESI)	PCT	55.1		66.2		76.8					
MISC	TOTAL_SOLIDS	Total Solids (KASI)	PCT	55		68		74					
MET	7439-92-1	Lead	MG/KG_DRYWT	30.1		29.7		7.27					
MET	7439-97-6	Mercury	MG/KG_DRYWT	0.19		0.066		0.028					
MET	7440-02-0	Nickel	MG/KG_DRYWT	15.6		20		6.54					
MET	7440-38-2	Arsenic	MG/KG_DRYWT	8.03		6.69		3.13					
MET	7440-43-9	Cadmium	MG/KG_DRYWT	0.29		0.11		0.04					
MET	7440-47-3	Chromium	MG/KG_DRYWT	26.3		28.4		10.7					
MET	7440-50-8	Copper	MG/KG_DRYWT	17.4		18.1		5.86					
MET	7440-66-6	Zinc	MG/KG_DRYWT	68.8		74.6		21.1					
CONG	31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	UG/KG_DRYWT	1.31		0.19	J	0.16	J				
CONG	32598-10-0	2,3',4,4'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.592		0.176	J	0.047	U				
CONG	32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	UG/KG_DRYWT	0.682		0.197	J	0.149	J				
CONG	34883-43-7	2,4'-Dichlorobiphenyl	UG/KG_DRYWT	0.0758	U	0.0642	U	0.0557	U				
CONG	35065-27-1	2,2',4,4',5,5'-Hexachlorobiphenyl	UG/KG_DRYWT	5.08		0.163	U	0.141	U				
CONG	35065-28-2	2,2',3,4,4',5'-Hexachlorobiphenyl	UG/KG_DRYWT	4.3		0.228	J	0.177	J				
CONG	35065-29-3	2,2',3,4,4',5,5'-Heptachlorobiphenyl	UG/KG_DRYWT	5.32		0.0963	J	0.076	J				
CONG	35065-30-6	2,2',3,3',4,4',5-Heptachlorobiphenyl	UG/KG_DRYWT	2.56		0.047	U	0.0408	U				
CONG	35693-99-3	2,2',5,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.712		0.0617	U	0.0535	U				
CONG	37680-65-2	2,2',5-Trichlorobiphenyl	UG/KG_DRYWT	0.0555	U	0.047	U	0.0408	U				
CONG	37680-73-2	2,2',4,5,5'-Pentachlorobiphenyl	UG/KG_DRYWT	2.07		0.268		0.17	J				
CONG	38380-02-8	2,2',3,4,5'-Pentachlorobiphenyl	UG/KG_DRYWT	0.524		0.042	U	0.0365	U				
CONG	38380-07-3	2,2',3,3',4,4'-Hexachlorobiphenyl	UG/KG_DRYWT	0.613		0.042	U	0.0365	U				
CONG	40186-72-9	2,2',3,3',4,4',5,5',6-Nonachlorobiphen	UG/KG_DRYWT	0.473		0.924		0.0365	U				
CONG	41464-39-5	2,2',3,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.4		0.0445	U	0.0386	U				
CONG	41464-40-8	2,2',4,5'-Tetrachlorobiphenyl	UG/KG_DRYWT	0.275	J	0.0445	U	0.0386	U				
CONG	52663-68-0	2,2',3,4',5,5',6-Heptachlorobiphenyl	UG/KG_DRYWT	2.69		0.0445	U	0.0386	U				
CONG	52663-69-1	2,2',3,4,4',5',6-Heptachlorobiphenyl	UG/KG_DRYWT	1.64		0.0371	U	0.0322	U				
CONG	52663-78-2	2,2',3,3',4,4',5,6-Octachlorobiphenyl	UG/KG_DRYWT	0.838		0.35		0.0386	U				
CONG	7012-37-5	2,4,4'-Trichlorobiphenyl	UG/KG_DRYWT	0.13	J	0.0371	U	0.0322	U				
CONG	74472-48-3	2,2',3,4,4',6,6'-Heptachlorobiphenyl	UG/KG_DRYWT	0.12	U	0.101	U	0.0879	U				
CONG	C-2051-24-3	Decachlorobiphenyl - Congener	UG/KG_DRYWT	1.02		2.35		0.0722	J				

			Study Id	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16
			Survey Id	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**
			Station Id	**PDS-10**	**PDS-10**	**PDS-16**	**PDS-16**	**PDS-20**	**PDS-20**	**PDS-20**	**PDS-20**	**PDS-20**	**PDS-20**
			Sample Id	**RAJ-002**	**RAJ-002**	**RAJ-003**	**RAJ-003**	**RAJ-001**	**RAJ-001**	**RAJ-001**	**RAJ-001**	**RAJ-001**	**RAJ-001**
			Field Qc Code	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**
			Lab Qc Code	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**DUP**	**DUP**	**TRIP**	**TRIP**
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
	TOTAL_PCB_NST_CONGx2	**Total NS&T PCB *2 (ND as 1/2 MDL)**	UG/KG_DRYWT	57.7113		10.1096		2.2082					
PEST	1024-57-3	heptachlor epoxide	UG/KG_DRYWT	0.0584	U	0.0494	U	0.0429	U				
PEST	1031-07-8	Endosulfan sulfate	UG/KG_DRYWT	0.0787	U	0.0667	U	0.0579	U				
PEST	309-00-2	aldrin	UG/KG_DRYWT	0.0555	U	0.047	U	0.0408	U				
PEST	319-84-6	alpha-BHC	UG/KG_DRYWT	0.0525	U	0.0445	U	0.0386	U				
PEST	319-85-7	beta-BHC	UG/KG_DRYWT	0.0787	U	0.0667	U	0.0579	U				
PEST	319-86-8	delta-BHC	UG/KG_DRYWT	0.0584	U	0.0494	U	0.0429	U				
PEST	33213-65-9	Endosulfan II	UG/KG_DRYWT	1.45		0.637		0.08	J				
PEST	5103-71-9	alpha-chlordane	UG/KG_DRYWT	0.163	J	0.0494	U	0.0429	U				
PEST	5103-74-2	gamma-chlordane	UG/KG_DRYWT	1.45		1.06		0.0386	U				
PEST	57-74-9	chlordane	UG/KG_DRYWT	8.26		5.42							
PEST	58-89-9	hexachlorocyclohexane, gamma	UG/KG_DRYWT	0.0847	U	0.0717	U	0.0622	U				
PEST	60-57-1	dieldrin	UG/KG_DRYWT	0.27	J	0.047	U	0.0408	U				
PEST	72-20-8	endrin	UG/KG_DRYWT	0.0639	U	0.0542	U	0.047	U				
PEST	72-43-5	methoxychlor	UG/KG_DRYWT	0.23	U	0.195	U	0.169	U				
PEST	50-29-3	4,4'-DDT	UG/KG_DRYWT	1.19		0.101	U	0.314					
PEST	72-54-8	4,4'-DDD	UG/KG_DRYWT	5.73		0.847		0.171	J				
PEST	72-55-9	4,4'-DDE	UG/KG_DRYWT	1.18		0.475		0.0998	J				
PEST	76-44-8	heptachlor	UG/KG_DRYWT	0.0965	U	0.0818	U	0.0709	U				
PEST	8001-35-2	Toxaphene	UG/KG_DRYWT	23.7	U	17000		19300					
PEST	959-98-8	Endosulfan I	UG/KG_DRYWT	0.0616	U	0.0522	U	0.0453	U				
SVOC	120-12-7	Anthracene	UG/KG_DRYWT	85.7		119		21					
SVOC	129-00-0	Pyrene	UG/KG_DRYWT	548		897	D	121					
SVOC	191-24-2	Benzo(G,H,I)Perylene	UG/KG_DRYWT	182		241		39.1					
SVOC	193-39-5	Indeno(1,2,3-Cd)Pyrene	UG/KG_DRYWT	176		238		35.4					
SVOC	205-99-2	Benzo(B)Fluoranthene	UG/KG_DRYWT	226		283		52.4					
SVOC	206-44-0	Fluoranthene	UG/KG_DRYWT	482		866	D	123					
SVOC	207-08-9	Benzo(K)Fluoranthene	UG/KG_DRYWT	246		318		56.5					
SVOC	208-96-8	Acenaphthylene	UG/KG_DRYWT	35.6		36		6.68					
SVOC	218-01-9	Chrysene	UG/KG_DRYWT	267		354		67.1					
SVOC	50-32-8	Benzo(A)Pyrene	UG/KG_DRYWT	264		376		62.8					
SVOC	53-70-3	Dibenz(A,H)Anthracene	UG/KG_DRYWT	42.6		55		8.7					
SVOC	56-55-3	Benzo(A)Anthracene	UG/KG_DRYWT	230		356		64					
SVOC	83-32-9	Acenaphthene	UG/KG_DRYWT	16.7		37.9		4.57					
SVOC	85-01-8	Phenanthrene	UG/KG_DRYWT	245		428		61					
SVOC	86-73-7	Fluorene	UG/KG_DRYWT	26.5		54.6		5.57					
SVOC	90-12-0	1-Methylnaphthalene	UG/KG_DRYWT	13.3		18.7		2.74					
SVOC	91-57-6	2-Methylnaphthalene	UG/KG_DRYWT	21.7		21.4		3.72					
EPH	91-20-3	Naphthalene	UG/KG_DRYWT	42		63.7		8.48					
	TOTAL_PAH	**Total PAH (ND as 1/2 MDL)**	UG/KG_DRYWT	3150.1		4763.3		743.76					

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	DAMOS16
			Survey Id	PDS	PDS	PDS	PDS	PDS	PDS	PDS	PDS
			Station Id	PDS-20	PDS-20	SREF-07	SREF-07	SREF-08	SREF-08	SREF-10	SREF-10
			Sample Id	RAJ-001	RAJ-001	RAJ-007	RAJ-007	RAJ-009	RAJ-009	RAJ-008	RAJ-008
			Field Qc Code	SA	SA	SA	SA	SA	SA	SA	SA
			Lab Qc Code	QUAD	QUAD	SA	SA	SA	SA	SA	SA
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
GS	GRAVEL	Gravel (>2.00 mm)	PCT			0.27		4.93		7.07	
GS	SAND_CO	Course Sand (0.50-1.00 mm)	PCT			3.85		7.6		11.32	
GS	SAND_MED	Medium Sand (0.25-0.50 mm)	PCT			11.55		17.2		14.29	
GS	SAND_FI	Fine Sand (0.125-0.25 mm)	PCT			52.45		44.12		37.35	
GS	Total SAND	Sand (0.0625-2.00 mm)	PCT			67.85		68.92		62.96	
GS	SILT	Silt (0.0039-0.0625 mm)	PCT			21.69		18.1		20.31	
GS	CLAY	Clay (<0.00391 mm)	PCT			10.2		8.06		9.67	
MISC	TOC	Total Organic Carbon	UG/G	5800		10000		10000		10000	
MISC	PCT_SOLIDS	Percent Solids (BDO)	PCT			65.43		75.98		63.41	
MISC	TOTAL_SOLIDS	Total Solids (ESI)	PCT			64.3		73.9		66.4	
MISC	TOTAL_SOLIDS	Total Solids (KASI)	PCT			63		74		62	
MET	7439-92-1	Lead	MG/KG_DRYWT			11.6		8.24		11.1	
MET	7439-97-6	Mercury	MG/KG_DRYWT			0.043		0.025		0.045	
MET	7440-02-0	Nickel	MG/KG_DRYWT			11.5		9.31		11	
MET	7440-38-2	Arsenic	MG/KG_DRYWT			4.11		3.44		4.25	
MET	7440-43-9	Cadmium	MG/KG_DRYWT			0.06		0.04		0.06	
MET	7440-47-3	Chromium	MG/KG_DRYWT			19		16.3		17	
MET	7440-50-8	Copper	MG/KG_DRYWT			6.53		4.4		7.37	
MET	7440-66-6	Zinc	MG/KG_DRYWT			34		25.2		31.7	
CONG	31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	UG/KG_DRYWT			0.0778	U	0.067	U	0.15	J
CONG	32598-10-0	2,3',4,4'-Tetrachlorobiphenyl	UG/KG_DRYWT			0.0549	U	0.0473	U	0.0568	U
CONG	32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	UG/KG_DRYWT			0.158	J	0.0934	J	0.166	J
CONG	34883-43-7	2,4'-Dichlorobiphenyl	UG/KG_DRYWT			0.0651	U	0.056	U	0.0673	U
CONG	35065-27-1	2,2',4,4',5,5'-Hexachlorobiphenyl	UG/KG_DRYWT			0.165	U	0.142	U	0.171	U
CONG	35065-28-2	2,2',3,4,4',5'-Hexachlorobiphenyl	UG/KG_DRYWT			0.108	J	0.0494	U	0.146	J
CONG	35065-29-3	2,2',3,4,4',5,5'-Heptachlorobiphenyl	UG/KG_DRYWT			0.0675	J	0.0473	U	0.0842	J
CONG	35065-30-6	2,2',3,3',4,4',5-Heptachlorobiphenyl	UG/KG_DRYWT			0.0477	U	0.041	U	0.0493	U
CONG	35693-99-3	2,2',5,5'-Tetrachlorobiphenyl	UG/KG_DRYWT			0.0626	U	0.0538	U	0.0647	U
CONG	37680-65-2	2,2',5-Trichlorobiphenyl	UG/KG_DRYWT			0.0477	U	0.041	U	0.0493	U
CONG	37680-73-2	2,2',4,5,5'-Pentachlorobiphenyl	UG/KG_DRYWT			0.062	J	0.041	U	0.154	J
CONG	38380-02-8	2,2',3,4,5'-Pentachlorobiphenyl	UG/KG_DRYWT			0.0426	U	0.0367	U	0.0441	U
CONG	38380-07-3	2,2',3,3',4,4'-Hexachlorobiphenyl	UG/KG_DRYWT			0.0426	U	0.0367	U	0.0441	U
CONG	40186-72-9	2,2',3,3',4,4',5,5',6-Nonachlorobiphen	UG/KG_DRYWT			0.0426	U	0.0367	U	0.0441	U
CONG	41464-39-5	2,2',3,5'-Tetrachlorobiphenyl	UG/KG_DRYWT			0.0451	U	0.0388	U	0.0467	U
CONG	41464-40-8	2,2',4,5'-Tetrachlorobiphenyl	UG/KG_DRYWT			0.0451	U	0.0388	U	0.0467	U
CONG	52663-68-0	2,2',3,4',5,5',6-Heptachlorobiphenyl	UG/KG_DRYWT			0.0451	U	0.0388	U	0.0467	U
CONG	52663-69-1	2,2',3,4,4',5',6-Heptachlorobiphenyl	UG/KG_DRYWT			0.0376	U	0.0323	U	0.0389	U
CONG	52663-78-2	2,2',3,3',4,4',5,6-Octachlorobiphenyl	UG/KG_DRYWT			0.0451	U	0.0388	U	0.0467	U
CONG	7012-37-5	2,4,4'-Trichlorobiphenyl	UG/KG_DRYWT			0.0376	U	0.0323	U	0.0389	U
CONG	74472-48-3	2,2',3,4,4',6,6'-Heptachlorobiphenyl	UG/KG_DRYWT			0.103	U	0.0884	U	0.106	U
CONG	C-2051-24-3	Decachlorobiphenyl - Congener	UG/KG_DRYWT			0.0643	J	0.041	U	0.0741	J

			Study Id	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16
			Survey Id	PDS	PDS	PDS	PDS	PDS	PDS	PDS	PDS
			Station Id	PDS-20	PDS-20	SREF-07	SREF-07	SREF-08	SREF-08	SREF-10	SREF-10
			Sample Id	RAJ-001	RAJ-001	RAJ-007	RAJ-007	RAJ-009	RAJ-009	RAJ-008	RAJ-008
			Field Qc Code	SA	SA	SA	SA	SA	SA	SA	SA
			Lab Qc Code	QUAD	QUAD	SA	SA	SA	SA	SA	SA
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
	TOTAL_PCB_NST_CONGx2	**Total NS&T PCB *2 (ND as 1/2 MDL)**	UG/KG_DRYWT			1.6985		1.0357		2.2742	
PEST	1024-57-3	heptachlor epoxide	UG/KG_DRYWT			0.0502	U	0.0432	U	0.0519	U
PEST	1031-07-8	Endosulfan sulfate	UG/KG_DRYWT			0.0676	U	0.0582	U	0.07	U
PEST	309-00-2	aldrin	UG/KG_DRYWT			0.0477	U	0.041	U	0.0493	U
PEST	319-84-6	alpha-BHC	UG/KG_DRYWT			0.0451	U	0.0388	U	0.0467	U
PEST	319-85-7	beta-BHC	UG/KG_DRYWT			0.0676	U	0.0582	U	0.07	U
PEST	319-86-8	delta-BHC	UG/KG_DRYWT			0.0502	U	0.0432	U	0.0519	U
PEST	33213-65-9	Endosulfan II	UG/KG_DRYWT			0.0825	J	0.0367	U	0.112	J
PEST	5103-71-9	alpha-chlordane	UG/KG_DRYWT			0.0502	U	0.0432	U	0.0519	U
PEST	5103-74-2	gamma-chlordane	UG/KG_DRYWT			0.0451	U	0.0388	U	0.0467	U
PEST	57-74-9	chlordane	UG/KG_DRYWT								
PEST	58-89-9	hexachlorocyclohexane, gamma	UG/KG_DRYWT			0.0727	U	0.0626	U	0.0752	U
PEST	60-57-1	dieldrin	UG/KG_DRYWT			0.0477	U	0.041	U	0.0493	U
PEST	72-20-8	endrin	UG/KG_DRYWT			0.0549	U	0.0473	U	0.0568	U
PEST	72-43-5	methoxychlor	UG/KG_DRYWT			0.198	U	0.17	U	0.205	U
PEST	50-29-3	4,4'-DDT	UG/KG_DRYWT			0.4		0.307		0.412	
PEST	72-54-8	4,4'-DDD	UG/KG_DRYWT			0.0676	U	0.0582	U	0.07	U
PEST	72-55-9	4,4'-DDE	UG/KG_DRYWT			0.128	J	0.0817	J	0.126	J
PEST	76-44-8	heptachlor	UG/KG_DRYWT			0.0829	U	0.0713	U	0.0857	U
PEST	8001-35-2	Toxaphene	UG/KG_DRYWT			20.4	U	17.5	U	21	U
PEST	959-98-8	Endosulfan I	UG/KG_DRYWT			0.0529	U	0.0455	U	0.0547	U
SVOC	120-12-7	Anthracene	UG/KG_DRYWT			14.1		3.44		13.6	
SVOC	129-00-0	Pyrene	UG/KG_DRYWT			101		28.3		89.6	
SVOC	191-24-2	Benzo(G,H,I)Perylene	UG/KG_DRYWT			37.3		12.2		34	
SVOC	193-39-5	Indeno(1,2,3-Cd)Pyrene	UG/KG_DRYWT			38.5		11.2		33.3	
SVOC	205-99-2	Benzo(B)Fluoranthene	UG/KG_DRYWT			47.9		14.9		42.7	
SVOC	206-44-0	Fluoranthene	UG/KG_DRYWT			104		29.9		93.9	
SVOC	207-08-9	Benzo(K)Fluoranthene	UG/KG_DRYWT			50.2		15.4		47.7	
SVOC	208-96-8	Acenaphthylene	UG/KG_DRYWT			7.54		1.92		6.2	
SVOC	218-01-9	Chrysene	UG/KG_DRYWT			52.9		17.7		50.3	
SVOC	50-32-8	Benzo(A)Pyrene	UG/KG_DRYWT			53.2		17		50.4	
SVOC	53-70-3	Dibenz(A,H)Anthracene	UG/KG_DRYWT			5.55		2.37		6.73	
SVOC	56-55-3	Benzo(A)Anthracene	UG/KG_DRYWT			48.3		13		42.8	
SVOC	83-32-9	Acenaphthene	UG/KG_DRYWT			2.92		0.995		3.16	
SVOC	85-01-8	Phenanthrene	UG/KG_DRYWT			47.2		14.8		50.6	
SVOC	86-73-7	Fluorene	UG/KG_DRYWT			4.54		1.36		5.06	
SVOC	90-12-0	1-Methylnaphthalene	UG/KG_DRYWT			2.51		0.875		2.49	
SVOC	91-57-6	2-Methylnaphthalene	UG/KG_DRYWT			3.55		1.28		3.58	
EPH	91-20-3	Naphthalene	UG/KG_DRYWT			7.08		2.34		7.24	
	TOTAL_PAH	**Total PAH (ND as 1/2 MDL)**	UG/KG_DRYWT			628.29		188.98		583.36	

J value reported above MDL but below RL

U not detected above MDL; MDL value reported.

DAMOS 2016

Portland Disposal Site

Sediment PCB and Pesticides Results

Battelle Norwell

QA/QC Summary
Batch 16-0253

Project:	USACE/NAE – DAMOS Program
Parameters:	Pesticides and PCBs
Laboratory:	Battelle, Norwell, MA
Matrix:	Water
Data Set:	DP-16-0240
Analytical SOP:	5-128
Method Reference:	EPA 8081B/8082A modified

Sample Custody

Collection Date	Receipt Date	Temp (°C)
9/20/2016	9/22/2016	1.8

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.
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	Method ML0497H uses the quant sheets and RFs from ML0497C.

Holding Times	Extraction Date(s)	Analysis Date(s)
	9/23/2016	9/26/2016

QA/QC Summary
Batch 16-0253

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 GC/MS LCS solution. As such, several target analytes are not represented in the LCS on the data tables, and the LCS required a dilution. The GC/MS spike also includes several analytes which co-elute with analytes on the SOP 5-128 analyte list, 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 92%; therefore, the exceedance does not apply. PCB 195 concentration = 0.5 ng/µL. PCB 205 concentration = 0.51 ng/µL. 50 µL spike yields 50.5 ng total. 46.245/50.5*100 = 91.57%

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
The Business of Innovation

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

Client ID	RAJ-901	
Battelle ID	K2640-P	
Sample Type	SA	
Collection Date	09/20/16	
Extraction Date	09/23/16	
Analysis Date	09/26/16	
Analytical Instrument	ECD	
% Moisture	NA	
% Lipid	NA	
Matrix	WAT	
Sample Size	0.86	
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	0.058	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)	0.001	U
Cl9(206)	0.001	U
Cl10(209)	0.001	U

Surrogate Recoveries (%)

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

Client ID	RAJ-901
Battelle ID	K2640-P
Sample Type	SA
Collection Date	09/20/16
Extraction Date	09/23/16
Analysis Date	09/26/16
Analytical Instrument	ECD
% Moisture	NA
% Lipid	NA
Matrix	WAT
Sample Size	0.86
Size Unit-Basis	L_LIQUID
Units	UG/L_LIQUID
Cl3(34)	79
Cl6(152)	76

Battelle
The Business of Innovation

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

Client ID	Procedural Blank	
Battelle ID	CJ658PB-P	
Sample Type	PB	
Collection Date	09/23/16	
Extraction Date	09/23/16	
Analysis Date	09/26/16	
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	CJ658PB-P
Sample Type	PB
Collection Date	09/23/16
Extraction Date	09/23/16
Analysis Date	09/26/16
Analytical Instrument	ECD
% Moisture	NA
% Lipid	NA
Matrix	WATER
Sample Size	1.00
Size Unit-Basis	L_LIQUID
Units	UG/L_LIQUID
Cl3(34)	74
Cl6(152)	75

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
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

Cl3(34)
Cl6(152)

Battelle
The Business of Innovation

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

Client ID	Laboratory Control Sample				
Battelle ID	CJ659LCS-P				
Sample Type	LCS				
Collection Date	09/23/16				
Extraction Date	09/23/16				
Analysis Date	09/26/16				
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
4,4'-DDD	0.107	D	0.13	85	
4,4'-DDE	0.0794	D	0.13	64	
4,4'-DDT	0.0771	D	0.13	61	
aldrin	0.00053	U			
a-chlordane	0.076	D	0.13	60	
g-chlordane	0.0743	D	0.13	59	
a-BHC	0.00047	U			
b-BHC	0.00055	U			
d-BHC	0.00051	U			
Lindane	0.00067	U			
dieldrin	0.0857	D	0.13	68	
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	0.769				
Cl2(8)	0.0214		0.03	86	
Cl3(18)	0.0205		0.03	82	
Cl3(28)	0.0253		0.03	101	
Cl4(44)	0.0226		0.03	90	
Cl4(49)	0.0222		0.03	89	
Cl4(52)	0.0231		0.03	92	
Cl4(66)	0.0249		0.03	100	
Cl5(87)	0.0217		0.03	87	
Cl5(101)	0.0233		0.03	93	
Cl5(105)	0.0254		0.03	102	
Cl5(118)	0.0235		0.03	94	
Cl6(128)	0.0237		0.03	95	
Cl6(138)	0.0228		0.03	91	
Cl6(153)	0.0196		0.03	78	
Cl7(170)	0.0239		0.03	96	
Cl7(180)	0.022		0.03	88	
Cl7(183)	0.0238		0.03	95	
Cl7(184)	0.00058	U			
Cl7(187)	0.0225		0.03	90	
Cl8(195)	0.0462		0.03	185	N
Cl9(206)	0.0235		0.03	94	
Cl10(209)	0.023		0.03	92	

Surrogate Recoveries (%)

Battelle
The Business of Innovation

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

Client ID	Laboratory Control Sample	Target	% Recovery	Qualifier
Battelle ID	CJ659LCS-P			
Sample Type	LCS			
Collection Date	09/23/16			
Extraction Date	09/23/16			
Analysis Date	09/26/16			
Analytical Instrument	ECD			
% Moisture	NA			
% Lipid	NA			
Matrix	WATER			
Sample Size	1.00			
Size Unit-Basis	L_LIQUID			
Units	UG/L_LIQUID			
Cl3(34)	79			
Cl6(152)	79			

QA/QC Summary
Batch 16-0253

Project:	USACE/NAE – DAMOS Program
Parameters:	PAH
Laboratory:	Battelle, Norwell, MA
Matrix:	Water – Equipment Blank
Data Set:	DP-16-0239
Analytical SOP:	5-157
Method Reference:	EPA 8270D modified

Sample Custody

Collection Date	Receipt Date	Temp (°C)
9/20/2016	9/22/2016	1.8

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.
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	MG1137C uses the response factor (RF) from MG1137 and the quantitation reports from this are included for reference.

Holding Times	Extraction Date(s)	Analysis Date(s)
	9/23/2016	9/26/2016

QA/QC Summary
Batch 16-0253

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
The Business of Innovation

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

Client ID	RAJ-901	
Battelle ID	K2640-P	
Sample Type	SA	
Collection Date	09/20/16	
Extraction Date	09/23/16	
Analysis Date	09/26/16	
Analytical Instrument	MS	
% Moisture	NA	
% Lipid	NA	
Matrix	WAT	
Sample Size	0.86	
Size Unit-Basis	L_LIQUID	
Units	UG/L_LIQUID	
Naphthalene	0.010	
2-Methylnaphthalene	0.004	
1-Methylnaphthalene	0.004	U
Acenaphthylene	0.001	U
Acenaphthene	0.003	J
Fluorene	0.004	
Anthracene	0.001	U
Phenanthrene	0.006	
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	77
Acenaphthene-d10	85
Phenanthrene-d10	92
Benzo(a)pyrene-d12	84

Battelle
The Business of Innovation

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

Client ID	Procedural Blank	
Battelle ID	CJ658PB-P	
Sample Type	PB	
Collection Date	09/23/16	
Extraction Date	09/23/16	
Analysis Date	09/26/16	
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	80
Acenaphthene-d10	84
Phenanthrene-d10	86
Benzo(a)pyrene-d12	78

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

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
Benzo(g,h,i)perylene

Surrogate Recoveries (%)

Naphthalene-d8
Acenaphthene-d10
Phenanthrene-d10
Benzo(a)pyrene-d12

Battelle
The Business of Innovation

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

Client ID	Laboratory Control Sample			
Battelle ID	CJ659LCS-P			
Sample Type	LCS			
Collection Date	09/23/16			
Extraction Date	09/23/16			
Analysis Date	09/26/16			
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	0.202	0.25	81	
2-Methylnaphthalene	0.202	0.25	81	
1-Methylnaphthalene	0.205	0.25	82	
Acenaphthylene	0.199	0.25	79	
Acenaphthene	0.21	0.25	84	
Fluorene	0.209	0.25	83	
Anthracene	0.208	0.25	83	
Phenanthrene	0.227	0.25	91	
Fluoranthene	0.232	0.25	93	
Pyrene	0.231	0.25	92	
Benzo(a)anthracene	0.219	0.25	87	
Chrysene	0.219	0.25	87	
Benzo(b)fluoranthene	0.224	0.25	89	
Benzo(k)fluoranthene	0.229	0.25	91	
Benzo(a)pyrene	0.207	0.25	83	
Indeno(1,2,3-cd)pyrene	0.219	0.25	87	
Dibenz(a,h)anthracene	0.235	0.25	94	
Benzo(g,h,i)perylene	0.225	0.25	90	

Surrogate Recoveries (%)

Naphthalene-d8	80
Acenaphthene-d10	84
Phenanthrene-d10	88
Benzo(a)pyrene-d12	81

Battelle
The Business of Innovation

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

Client ID	RAJ-001	RAJ-002	RAJ-003	RAJ-004
Battelle ID	K2630-P	K2631-P	K2632-P	K2633-P
Sample Type	SA	SA	SA	SA
Collection Date	09/20/16	09/20/16	09/20/16	09/20/16
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	23.42	43.76	33.52	50.75
% Lipid	NA	NA	NA	NA
Matrix	SED	SED	SED	SED
Sample Size	22.98	16.89	19.94	14.78
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	0.171 J	5.730	0.847	6.680
4,4'-DDE	0.100 J	1.180	0.475	2.320
4,4'-DDT	0.314	1.190	0.101 U	1.200
aldrin	0.041 U	0.056 U	0.047 U	0.063 U
a-chlordane	0.043 U	0.163 J	0.049 U	0.188 J
g-chlordane	0.039 U	1.450	1.060	1.760
a-BHC	0.039 U	0.053 U	0.045 U	0.060 U
b-BHC	0.058 U	0.079 U	0.067 U	0.090 U
d-BHC	0.043 U	0.058 U	0.049 U	0.067 U
Lindane	0.062 U	0.085 U	0.072 U	0.097 U
dieldrin	0.041 U	0.270 J	0.047 U	0.291 J
endosulfan I	0.045 U	0.062 U	0.052 U	0.070 U
endosulfan II	0.080 J	1.450	0.637	1.040
endosulfan sulfate	0.058 U	0.079 U	0.067 U	0.090 U
endrin	0.047 U	0.064 U	0.054 U	0.073 U
heptachlor	0.071 U	0.097 U	0.082 U	0.110 U
heptachlor epoxide	0.043 U	0.058 U	0.049 U	0.067 U
methoxychlor	0.169 U	0.230 U	0.195 U	0.263 U
Toxaphene	19300.000	23.700 U	17000.000	27.100 U
Technical Chlordane		8.260	5.420	9.970
Cl2(8)	0.056 U	0.076 U	0.064 U	0.087 U
Cl3(18)	0.041 U	0.056 U	0.047 U	0.063 U
Cl3(28)	0.032 U	0.130 J	0.037 U	0.125 J
Cl4(44)	0.039 U	0.400	0.045 U	0.236 J
Cl4(49)	0.039 U	0.275 J	0.045 U	0.288 J
Cl4(52)	0.054 U	0.712	0.062 U	0.636
Cl4(66)	0.047 U	0.592	0.176 J	0.455
Cl5(87)	0.037 U	0.524	0.042 U	0.357
Cl5(101)	0.170 J	2.070	0.268	1.420
Cl5(105)	0.149 J	0.682	0.197 J	0.654
Cl5(118)	0.160 J	1.310	0.190 J	1.200
Cl6(128)	0.037 U	0.613	0.042 U	0.260 J
Cl6(138)	0.177 J	4.300	0.228 J	1.380
Cl6(153)	0.141 U	5.080	0.163 U	1.590
Cl7(170)	0.041 U	2.560	0.047 U	0.358
Cl7(180)	0.076 J	5.320	0.096 J	0.655
Cl7(183)	0.032 U	1.640	0.037 U	0.195 J
Cl7(184)	0.088 U	0.120 U	0.101 U	0.137 U
Cl7(187)	0.039 U	2.690	0.045 U	0.265 J
Cl8(195)	0.039 U	0.838	0.350	0.184 J
Cl9(206)	0.037 U	0.473	0.924	0.294 J
Cl10(209)	0.072 J	1.020	2.350	1.100

Surrogate Recoveries (%)

Cl3(34)	68	73	67	66
Cl6(152)	71	69	66	65

Battelle
The Business of Innovation

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

Client ID	RAJ-005	RAJ-006	RAJ-007	RAJ-008
Battelle ID	K2634-P	K2635-P	K2636-P	K2637-P
Sample Type	SA	SA	SA	SA
Collection Date	09/20/16	09/20/16	09/20/16	09/20/16
Extraction Date	09/26/16	09/26/16	09/26/16	09/26/16
Analysis Date	10/01/16	10/01/16	10/01/16	10/01/16
Analytical Instrument	ECD	ECD	ECD	ECD
% Moisture	43.06	51.8	34.57	36.59
% Lipid	NA	NA	NA	NA
Matrix	SED	SED	SED	SED
Sample Size	17.13	14.46	19.66	19.01
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	1.630	1.690	0.068 U	0.070 U
4,4'-DDE	1.280	0.924	0.128 J	0.126 J
4,4'-DDT	1.070	0.947	0.400	0.412
aldrin	0.055 U	0.065 U	0.048 U	0.049 U
a-chlordane	0.103 J	0.123 J	0.050 U	0.052 U
g-chlordane	0.900	0.832	0.045 U	0.047 U
a-BHC	0.052 U	0.061 U	0.045 U	0.047 U
b-BHC	0.078 U	0.092 U	0.068 U	0.070 U
d-BHC	0.058 U	0.068 U	0.050 U	0.052 U
Lindane	0.084 U	0.099 U	0.073 U	0.075 U
dieldrin	0.055 U	0.065 U	0.048 U	0.049 U
endosulfan I	0.061 U	0.072 U	0.053 U	0.055 U
endosulfan II	0.492	0.364	0.083 J	0.112 J
endosulfan sulfate	0.078 U	0.092 U	0.068 U	0.070 U
endrin	0.063 U	0.075 U	0.055 U	0.057 U
heptachlor	0.095 U	0.113 U	0.083 U	0.086 U
heptachlor epoxide	0.058 U	0.068 U	0.050 U	0.052 U
methoxychlor	0.227 U	0.269 U	0.198 U	0.205 U
Toxaphene	23.400 U	25400.000	20.400 U	21.000 U
Technical Chlordane	5.130	4.890		
Cl2(8)	0.075 U	0.089 U	0.065 U	0.067 U
Cl3(18)	0.055 U	0.065 U	0.048 U	0.049 U
Cl3(28)	0.043 U	0.051 U	0.038 U	0.039 U
Cl4(44)	0.052 U	0.061 U	0.045 U	0.047 U
Cl4(49)	0.052 U	0.061 U	0.045 U	0.047 U
Cl4(52)	0.072 U	0.085 U	0.063 U	0.065 U
Cl4(66)	0.071 J	0.080 J	0.055 U	0.057 U
Cl5(87)	0.049 U	0.058 U	0.043 U	0.044 U
Cl5(101)	0.145 J	0.173 J	0.062 J	0.154 J
Cl5(105)	0.161 J	0.309 J	0.158 J	0.166 J
Cl5(118)	0.089 U	0.207 J	0.078 U	0.150 J
Cl6(128)	0.049 U	0.196 J	0.043 U	0.044 U
Cl6(138)	0.147 J	0.259 J	0.108 J	0.146 J
Cl6(153)	0.190 U	0.225 U	0.165 U	0.171 U
Cl7(170)	0.055 U	0.065 U	0.048 U	0.049 U
Cl7(180)	0.175 J	0.236 J	0.068 J	0.084 J
Cl7(183)	0.043 U	0.051 U	0.038 U	0.039 U
Cl7(184)	0.118 U	0.140 U	0.103 U	0.106 U
Cl7(187)	0.052 U	0.061 U	0.045 U	0.047 U
Cl8(195)	0.052 U	0.061 U	0.045 U	0.047 U
Cl9(206)	0.049 U	0.058 U	0.043 U	0.044 U
Cl10(209)	0.150 J	0.174 J	0.064 J	0.074 J

Surrogate Recoveries (%)

Cl3(34)	61	67	67	70
Cl6(152)	61	66	67	67

Battelle
The Business of Innovation

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

Client ID	RAJ-009	RAJ-010	RAJ-011	RAJ-012
Battelle ID	K2638-P	K2639-P	K2641-P	K2642-P
Sample Type	SA	SA	SA	SA
Collection Date	09/20/16	09/20/16	09/20/16	09/20/16
Extraction Date	09/26/16	09/26/16	09/26/16	09/26/16
Analysis Date	10/01/16	10/01/16	10/01/16	10/01/16
Analytical Instrument	ECD	ECD	ECD	ECD
% Moisture	24.02	24.76	28.52	36.27
% Lipid	NA	NA	NA	NA
Matrix	SED	SED	SED	SED
Sample Size	22.85	22.59	21.43	19.11
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	0.058 U	0.059 U	0.062 U	0.070 U
4,4'-DDE	0.082 J	0.054 U	0.057 U	0.064 U
4,4'-DDT	0.307	0.288	0.304	0.355
aldrin	0.041 U	0.042 U	0.044 U	0.049 U
a-chlordane	0.043 U	0.044 U	0.046 U	0.052 U
g-chlordane	0.039 U	0.039 U	0.041 U	0.046 U
a-BHC	0.039 U	0.039 U	0.041 U	0.046 U
b-BHC	0.058 U	0.059 U	0.062 U	0.070 U
d-BHC	0.043 U	0.044 U	0.046 U	0.052 U
Lindane	0.063 U	0.063 U	0.067 U	0.075 U
dieldrin	0.041 U	0.042 U	0.044 U	0.049 U
endosulfan I	0.046 U	0.046 U	0.049 U	0.054 U
endosulfan II	0.037 U	0.037 U	0.039 U	0.044 U
endosulfan sulfate	0.058 U	0.059 U	0.062 U	0.070 U
endrin	0.047 U	0.048 U	0.050 U	0.057 U
heptachlor	0.071 U	0.072 U	0.076 U	0.085 U
heptachlor epoxide	0.043 U	0.044 U	0.046 U	0.052 U
methoxychlor	0.170 U	0.172 U	0.182 U	0.204 U
Toxaphene	17.500 U	17.700 U	18.700 U	20.900 U
Technical Chlordane				
Cl2(8)	0.056 U	0.057 U	0.060 U	0.067 U
Cl3(18)	0.041 U	0.042 U	0.044 U	0.049 U
Cl3(28)	0.032 U	0.033 U	0.035 U	0.039 U
Cl4(44)	0.039 U	0.039 U	0.041 U	0.046 U
Cl4(49)	0.039 U	0.039 U	0.041 U	0.046 U
Cl4(52)	0.054 U	0.054 U	0.057 U	0.064 U
Cl4(66)	0.047 U	0.048 U	0.050 U	0.057 U
Cl5(87)	0.037 U	0.037 U	0.039 U	0.044 U
Cl5(101)	0.041 U	0.042 U	0.044 U	0.049 U
Cl5(105)	0.093 J	0.080 J	0.082 J	0.097 J
Cl5(118)	0.067 U	0.068 U	0.071 U	0.080 U
Cl6(128)	0.037 U	0.037 U	0.039 U	0.044 U
Cl6(138)	0.049 U	0.050 U	0.053 U	0.059 U
Cl6(153)	0.142 U	0.144 U	0.152 U	0.170 U
Cl7(170)	0.041 U	0.042 U	0.044 U	0.049 U
Cl7(180)	0.047 U	0.048 U	0.050 U	0.057 U
Cl7(183)	0.032 U	0.033 U	0.035 U	0.039 U
Cl7(184)	0.088 U	0.089 U	0.094 U	0.106 U
Cl7(187)	0.039 U	0.039 U	0.041 U	0.046 U
Cl8(195)	0.039 U	0.039 U	0.041 U	0.046 U
Cl9(206)	0.037 U	0.037 U	0.039 U	0.044 U
Cl10(209)	0.041 U	0.042 U	0.044 U	0.049 U

Surrogate Recoveries (%)

Cl3(34)	69	73	73	68
Cl6(152)	67	71	72	68

Battelle
The Business of Innovation

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

Client ID	Procedural Blank
Battelle ID	CJ663PB-P
Sample Type	PB
Collection Date	09/26/16
Extraction Date	09/26/16
Analysis Date	09/30/16
Analytical Instrument	ECD
% Moisture	35.92
% Lipid	NA
Matrix	SEDIMENT
Sample Size	19.26
Size Unit-Basis	G_DRY
Units	UG/KG_DRY

4,4'-DDD	0.069 U
4,4'-DDE	0.0639 U
4,4'-DDT	0.105 U
aldrin	0.0486 U
a-chlordane	0.0512 U
g-chlordane	0.046 U
a-BHC	0.046 U
b-BHC	0.069 U
d-BHC	0.0512 U
Lindane	0.0742 U
dieldrin	0.0486 U
endosulfan I	0.054 U
endosulfan II	0.0435 U
endosulfan sulfate	0.069 U
endrin	0.0561 U
heptachlor	0.0846 U
heptachlor epoxide	0.0512 U
methoxychlor	0.202 U
Toxaphene	20.8 U
Technical Chlordane	
Cl2(8)	0.0665 U
Cl3(18)	0.0486 U
Cl3(28)	0.0384 U
Cl4(44)	0.046 U
Cl4(49)	0.046 U
Cl4(52)	0.0639 U
Cl4(66)	0.0561 U
Cl5(87)	0.0435 U
Cl5(101)	0.0486 U
Cl5(105)	0.046 U
Cl5(118)	0.0794 U
Cl6(128)	0.0435 U
Cl6(138)	0.0587 U
Cl6(153)	0.169 U
Cl7(170)	0.0486 U
Cl7(180)	0.0561 U
Cl7(183)	0.0384 U
Cl7(184)	0.105 U
Cl7(187)	0.046 U
Cl8(195)	0.046 U
Cl9(206)	0.0435 U
Cl10(209)	0.0486 U

Surrogate Recoveries (%)

Cl3(34)	75
Cl6(152)	76

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	CJ664LCS-P				
Sample Type	LCS				
Collection Date	09/26/16				
Extraction Date	09/26/16				
Analysis Date	09/30/16				
Analytical Instrument	ECD				
% Moisture	35.92				
% Lipid	NA				
Matrix	SEDIMENT				
Sample Size	19.25				
Size Unit-Basis	G_DRY				
Units	UG/KG_DRY		Target	% Recovery	Qualifier
4,4'-DDD	7.78		7.80	100	
4,4'-DDE	7.48		7.79	96	
4,4'-DDT	6.88		7.80	88	
aldrin	7.1		7.79	91	
a-chlordane	6.72		7.81	86	
g-chlordane	6.15		7.80	79	
a-BHC	7.15		7.80	92	
b-BHC	7.44		7.80	95	
d-BHC	7.68		7.80	98	
Lindane	7.32		7.79	94	
dieldrin	6.8		7.80	87	
endosulfan I	7.67		7.80	98	
endosulfan II	7.11		7.81	91	
endosulfan sulfate	6.83		7.80	88	
endrin	6.35		7.80	81	
heptachlor	7.54		7.80	97	
heptachlor epoxide	6.66		7.80	85	
methoxychlor	6.02		7.80	77	
Toxaphene	20.8	U			
Technical Chlordane	104				
Cl2(8)	6.26		7.81	80	
Cl3(18)	5.95		7.82	76	
Cl3(28)	6.91		7.82	88	
Cl4(44)	6.62		7.82	85	
Cl4(49)	6.41		7.79	82	
Cl4(52)	6.6		7.80	85	
Cl4(66)	7.09		7.81	91	
Cl5(87)	6.12		7.77	79	
Cl5(101)	6.75		7.81	86	
Cl5(105)	6.45		7.82	82	
Cl5(118)	6.78		7.82	87	
Cl6(128)	6.68		7.82	85	
Cl6(138)	6.72		7.82	86	
Cl6(153)	6.18		7.82	79	
Cl7(170)	6.96		7.82	89	
Cl7(180)	6.84		7.82	87	
Cl7(183)	6.7		7.78	86	
Cl7(184)	6.99		7.81	90	
Cl7(187)	6.68		7.82	85	
Cl8(195)	6.9		7.82	88	
Cl9(206)	6.91		7.81	88	
Cl10(209)	6.64		7.82	85	

Surrogate Recoveries (%)

Cl3(34)	80
Cl6(152)	76

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	CJ665SRM-P					
Sample Type	SRM					
Collection Date	09/26/16					
Extraction Date	09/26/16					
Analysis Date	09/30/16					
Analytical Instrument	ECD					
% Moisture	1.3					
% Lipid	NA					
Matrix	SEDIMENT					
Sample Size	1.02					
Size Unit-Basis	G_DRY	Certified		Passing	Actual	
Units	UG/KG_DRY	Value	+/-	%Difference	%Difference	Qualifier
4,4'-DDD	194					
4,4'-DDE	122					
4,4'-DDT	187					
aldrin	0.919 U					
a-chlordane	21.7	16.51	0.83	35.03	31.4	
g-chlordane	95.6					
a-BHC	0.87 U					
b-BHC	1.3 U					
d-BHC	0.967 U					
Lindane	1.4 U					
dieldrin	25.9					
endosulfan I	1.02 U					
endosulfan II	62.2					
endosulfan sulfate	1.3 U					
endrin	1.06 U					
heptachlor	1.6 U					
heptachlor epoxide	0.967 U					
methoxychlor	3.81 U					
Toxaphene	392 U					
Technical Chlordane	600					
Cl2(8)	22.5	22.3	2.30	40.31	0.9	
Cl3(18)	53.9	51	2.60	35.1	5.7	
Cl3(28)	91.4	80.8	2.70	33.34	13.1	
Cl4(44)	70.9	60.2	2.00	33.32	17.8	
Cl4(49)	58.4	53	1.70	33.21	10.2	
Cl4(52)	102	79.4	2.00	32.52	28.5	
Cl4(66)	59.5	71.9	4.30	35.98	17.2	
Cl5(87)	27.6	29.9	4.30	44.38	7.7	
Cl5(101)	92.9	73.4	2.50	33.41	26.6	
Cl5(105)	29.6	24.5	1.10	34.49	20.8	
Cl5(118)	59.9	58	4.30	37.41	3.3	
Cl6(128)	10.6	8.47	0.28	33.31	25.1	
Cl6(138)	68.5	62.1	3.00	34.83	10.3	
Cl6(153)	77.2	74	2.90	33.92	4.3	
Cl7(170)	19.9	22.6	1.40	36.19	11.9	
Cl7(180)	47.4	44.3	1.20	32.71	7	
Cl7(183)	11.4	12.19	0.57	34.68	6.5	
Cl7(184)	1.98 U					
Cl7(187)	21.9	25.1	1.00	33.98	12.7	
Cl8(195)	3.74 J	3.75	0.39	40.4	0.3	
Cl9(206)	9.08	9.21	0.51	35.54	1.4	
Cl10(209)	9.08	6.81	0.33	34.85	33.3	

Surrogate Recoveries (%)

Cl3(34)	75
Cl6(152)	73

Not Surrogate Corrected

Analyzed by Restucci Jr, Richard
8/28/2017

SRM: S16-0255ECD-Master_128B-Final.xlsx

Battelle
The Business of Innovation

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

Client ID	RAJ-004	RAJ-004				
Battelle ID	K2633-P	K2633MS-P				
Sample Type	SA	MS				
Collection Date	09/20/16	9/20/2016				
Extraction Date	09/26/16	9/26/2016				
Analysis Date	09/30/16	9/30/2016				
Analytical Instrument	ECD	ECD				
% Moisture	50.75	50.63				
% Lipid	NA	NA				
Matrix	SED	SED				
Sample Size	14.78	7.4				
Size Unit-Basis	G_DRY	G_DRY				
Units	UG/KG_DRY	UG/KG_DRY		Target	% Recovery	Qualifier
4,4'-DDD	6.68	30.500		20.29	117	
4,4'-DDE	2.32	21.100		20.28	93	
4,4'-DDT	1.2	18.800		20.28	87	
aldrin	0.0634 U	16.700		20.28	82	
a-chlordane	0.188 J	16.600		20.31	81	
g-chlordane	1.76	15.400		20.28	67	
a-BHC	0.06 U	17.700		20.29	87	
b-BHC	0.09 U	19.400		20.29	96	
d-BHC	0.0667 U	20.000		20.28	99	
Lindane	0.0968 U	19.200		20.28	95	
dieldrin	0.291 J	17.000		20.28	82	
endosulfan I	0.0704 U	19.600		20.29	97	
endosulfan II	1.04	18.600		20.33	86	
endosulfan sulfate	0.09 U	18.800		20.29	93	
endrin	0.0731 U	16.700		20.28	82	
heptachlor	0.11 U	20.700		20.28	102	
heptachlor epoxide	0.0667 U	14.800		20.29	73	
methoxychlor	0.263 U	15.100		20.28	74	
Toxaphene	27.1 U	54.000	U			
Technical Chlordane	9.97	270.000				
Cl2(8)	0.0866 U	15.700		20.31	77	
Cl3(18)	0.0634 U	14.400		20.35	71	
Cl3(28)	0.125 J	18.100		20.35	88	
Cl4(44)	0.236 J	16.900		20.35	82	
Cl4(49)	0.288 J	16.600		20.27	80	
Cl4(52)	0.636	17.200		20.29	82	
Cl4(66)	0.455	19.800		20.31	95	
Cl5(87)	0.357	15.700		20.21	76	
Cl5(101)	1.42	18.400		20.31	84	
Cl5(105)	0.654	18.100		20.33	86	
Cl5(118)	1.2	19.600		20.35	90	
Cl6(128)	0.26 J	16.400		20.35	79	
Cl6(138)	1.38	16.700		20.35	75	
Cl6(153)	1.59	15.300		20.35	67	
Cl7(170)	0.358	20.800		20.35	100	
Cl7(180)	0.655	16.700		20.35	79	
Cl7(183)	0.195 J	15.600		20.25	76	
Cl7(184)	0.137 U	17.600		20.31	87	
Cl7(187)	0.265 J	17.000		20.35	82	
Cl8(195)	0.184 J	16.300		20.35	79	
Cl9(206)	0.294 J	16.600		20.31	80	
Cl10(209)	1.1	21.700		20.35	101	

Surrogate Recoveries (%)

Cl3(34)	66	73
Cl6(152)	65	70

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

Client ID	RAJ-004						
Battelle ID	K2633MSD-P						
Sample Type	MSD						
Collection Date	9/20/2016						
Extraction Date	9/26/2016						
Analysis Date	9/30/2016						
Analytical Instrument	ECD						
% Moisture	49.64						
% Lipid	NA						
Matrix	SED						
Sample Size	7.55						
Size Unit-Basis	G_DRY						
Units	UG/KG_DRY		Target	% Recovery	Qualifier	RPD (%)	Qualifier
4,4'-DDD	26.200		19.88	98		17.7	
4,4'-DDE	19.700		19.87	87		6.7	
4,4'-DDT	19.200		19.87	91		4.5	
aldrin	15.500		19.87	78		5.0	
a-chlordane	15.500		19.91	77		5.1	
g-chlordane	14.400		19.88	64		4.6	
a-BHC	16.800		19.88	85		2.3	
b-BHC	18.200		19.88	92		4.3	
d-BHC	19.100		19.88	96		3.1	
Lindane	18.400		19.87	93		2.1	
dieldrin	15.900		19.88	79		3.7	
endosulfan I	16.600		19.89	83		15.6	
endosulfan II	17.900		19.92	85		1.2	
endosulfan sulfate	18.000		19.89	90		3.3	
endrin	15.800		19.88	79		3.7	
heptachlor	19.600		19.88	99		3.0	
heptachlor epoxide	14.400		19.89	72		1.4	
methoxychlor	15.000		19.88	75		1.3	
Toxaphene	53.000	U					
Technical Chlordane	253.000						
Cl2(8)	14.500		19.91	73		5.3	
Cl3(18)	13.000		19.95	65		8.8	
Cl3(28)	16.600		19.95	83		5.8	
Cl4(44)	15.000		19.95	74		10.3	
Cl4(49)	15.000		19.87	74		7.8	
Cl4(52)	15.300		19.89	74		10.3	
Cl4(66)	17.600		19.91	86		9.9	
Cl5(87)	14.400		19.81	71		6.8	
Cl5(101)	16.600		19.91	76		10.0	
Cl5(105)	17.200		19.93	83		3.6	
Cl5(118)	18.200		19.95	85		5.7	
Cl6(128)	15.800		19.95	78		1.3	
Cl6(138)	16.100		19.95	74		1.3	
Cl6(153)	14.800		19.95	66		1.5	
Cl7(170)	19.800		19.95	97		3.0	
Cl7(180)	15.600		19.95	75		5.2	
Cl7(183)	15.600		19.85	78		2.6	
Cl7(184)	16.800		19.91	84		3.5	
Cl7(187)	16.200		19.95	80		2.5	
Cl8(195)	15.700		19.95	78		1.3	
Cl9(206)	15.600		19.91	77		3.8	
Cl10(209)	20.400		19.95	97		4.0	

Surrogate Recoveries (%)

Cl3(34)	71
Cl6(152)	66

Battelle
The Business of Innovation

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

Client ID	RAJ-008	RAJ-008			
Battelle ID	K2637-P	K2637DUP-P			
Sample Type	SA	QADU			
Collection Date	09/20/16	9/20/2016			
Extraction Date	09/26/16	9/26/2016			
Analysis Date	10/01/16	10/1/2016			
Analytical Instrument	ECD	ECD			
% Moisture	36.59	36.77			
% Lipid	NA	NA			
Matrix	SED	SED			
Sample Size	19.01	18.96			
Size Unit-Basis	G_DRY	G_DRY			
Units	UG/KG_DRY	UG/KG_DRY		RPD	Qualifier
4,4'-DDD	0.07 U	0.070	U	NA	
4,4'-DDE	0.126 J	0.155	J	NA	
4,4'-DDT	0.412	0.410		0.5	
aldrin	0.0493 U	0.049	U	NA	
a-chlordane	0.0519 U	0.052	U	NA	
g-chlordane	0.0467 U	0.047	U	NA	
a-BHC	0.0467 U	0.047	U	NA	
b-BHC	0.07 U	0.070	U	NA	
d-BHC	0.0519 U	0.052	U	NA	
Lindane	0.0752 U	0.075	U	NA	
dieldrin	0.0493 U	0.049	U	NA	
endosulfan I	0.0547 U	0.055	U	NA	
endosulfan II	0.112 J	0.044	U	NA	
endosulfan sulfate	0.07 U	0.070	U	NA	
endrin	0.0568 U	0.057	U	NA	
heptachlor	0.0857 U	0.086	U	NA	
heptachlor epoxide	0.0519 U	0.052	U	NA	
methoxychlor	0.205 U	0.205	U	NA	
Toxaphene	21 U	21.100	U	NA	
Technical Chlordane				NA	
Cl2(8)	0.0673 U	0.068	U	NA	
Cl3(18)	0.0493 U	0.049	U	NA	
Cl3(28)	0.0389 U	0.039	U	NA	
Cl4(44)	0.0467 U	0.047	U	NA	
Cl4(49)	0.0467 U	0.047	U	NA	
Cl4(52)	0.0647 U	0.065	U	NA	
Cl4(66)	0.0568 U	0.057	U	NA	
Cl5(87)	0.0441 U	0.044	U	NA	
Cl5(101)	0.154 J	0.082	J	NA	
Cl5(105)	0.166 J	0.158	J	NA	
Cl5(118)	0.15 J	0.081	U	NA	
Cl6(128)	0.0441 U	0.044	U	NA	
Cl6(138)	0.146 J	0.143	J	NA	
Cl6(153)	0.171 U	0.171	U	NA	
Cl7(170)	0.0493 U	0.049	U	NA	
Cl7(180)	0.0842 J	0.074	J	NA	
Cl7(183)	0.0389 U	0.039	U	NA	
Cl7(184)	0.106 U	0.106	U	NA	
Cl7(187)	0.0467 U	0.047	U	NA	
Cl8(195)	0.0467 U	0.047	U	NA	
Cl9(206)	0.0441 U	0.044	U	NA	
Cl10(209)	0.0741 J	0.055	J	NA	

Surrogate Recoveries (%)

Cl3(34)	70	71
Cl6(152)	67	67

Not Surrogate Corrected

Analyzed by Restucci Jr, Richard
8/28/2017

DUP: S16-0255ECD-Master_128B-Final.xlsx

QA/QC Summary
Batch 16-0255

Project:	USACE/NAE – DAMOS Program (Portland Disposal Site)
Parameters:	PCB and Pesticides
Laboratory:	Battelle-Norwell, MA
Matrix:	Sediment
Data Set:	DP-16-0243
Analytical SOP:	5-128
Method Reference:	EPA 8081B/8082A modified

Sample Custody

Collection Date	Receipt Date	Temp (°C)
9/20/2016	9/22/2016	1.8

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

METHOD SUMMARIES

Sample Preparation	Approximately 30 g 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. Final extracts were fortified with internal standard (IS) compounds and submitted for PCB and pesticide analyses by GC/ECD.
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 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	Method ML0497H utilizes the quant sheets and RFs from method ML0497C. Method MM0487 is used to report PCBs 170 and 209 from the secondary column.

Holding Times	Extraction Date(s)	Analysis Date(s)
	9/26/2016	9/30/2016 – 10/1/2016; 10/8/2016

QA/QC Summary
Batch 16-0255

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 >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 16-0255

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 analyzed to ensure that initial calibration was still valid. Calibration verification was performed at the beginning and end of 10 injections or each 24 hour period (whichever is more frequent).
≤ 20% difference individual and ≤ 15% mean	One exceedance noted.
	d-BHC was high in one CCV. As d-BHC was not detected in any authentic samples, and the ICC/LCS/MS/MSD pass for this analyte, the samples were not re-run.

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

Client ID	RAJ-001	RAJ-002	RAJ-003	RAJ-004
Battelle ID	K2630-P	K2631-P	K2632-P	K2633-P
Sample Type	SA	SA	SA	SA
Collection Date	09/20/16	09/20/16	09/20/16	09/20/16
Extraction Date	09/26/16	09/26/16	09/26/16	09/26/16
Analysis Date	10/01/16	10/01/16	10/01/16	10/01/16
Analytical Instrument	MS	MS	MS	MS
% Moisture	23.42	43.76	33.52	50.75
% Lipid	NA	NA	NA	NA
Matrix	SED	SED	SED	SED
Sample Size	22.98	16.89	19.94	14.78
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	8.480	42.000	63.700	58.300
2-Methylnaphthalene	3.720	21.700	21.400	24.500
1-Methylnaphthalene	2.740	13.300	18.700	15.000
Acenaphthylene	6.680	35.600	36.000	31.000
Acenaphthene	4.570	16.700	37.900	16.900
Fluorene	5.570	26.500	54.600	26.100
Anthracene	21.000	85.700	119.000	67.600
Phenanthrene	61.000	245.000	428.000	204.000
Fluoranthene	123.000	482.000	866.000 D	489.000
Pyrene	121.000	548.000	897.000 D	529.000
Benzo(a)anthracene	64.000	230.000	356.000	208.000
Chrysene	67.100	267.000	354.000	252.000
Benzo(b)fluoranthene	52.400	226.000	283.000	226.000
Benzo(k)fluoranthene	56.500	246.000	318.000	231.000
Benzo(a)pyrene	62.800	264.000	376.000	238.000
Indeno(1,2,3-cd)pyrene	35.400	176.000	238.000	170.000
Dibenz(a,h)anthracene	8.700	42.600	55.000	37.600
Benzo(g,h,i)perylene	39.100	182.000	241.000	175.000

Surrogate Recoveries (%)

Naphthalene-d8	59	65	63	61
Acenaphthene-d10	67	72	69	67
Phenanthrene-d10	73	77	75	73
Benzo(a)pyrene-d12	71	77	75	72

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

Client ID	RAJ-005	RAJ-006	RAJ-007	RAJ-008
Battelle ID	K2634-P	K2635-P	K2636-P	K2637-P
Sample Type	SA	SA	SA	SA
Collection Date	09/20/16	09/20/16	09/20/16	09/20/16
Extraction Date	09/26/16	09/26/16	09/26/16	09/26/16
Analysis Date	10/01/16	10/01/16	10/01/16	10/01/16
Analytical Instrument	MS	MS	MS	MS
% Moisture	43.06	51.8	34.57	36.59
% Lipid	NA	NA	NA	NA
Matrix	SED	SED	SED	SED
Sample Size	17.13	14.46	19.66	19.01
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	19.000	23.200	7.080	7.240
2-Methylnaphthalene	6.080	9.500	3.550	3.580
1-Methylnaphthalene	4.310	5.800	2.510	2.490
Acenaphthylene	13.300	12.900	7.540	6.200
Acenaphthene	12.800	8.060	2.920	3.160
Fluorene	10.900	11.800	4.540	5.060
Anthracene	22.300	29.300	14.100	13.600
Phenanthrene	99.800	100.000	47.200	50.600
Fluoranthene	317.000	237.000	104.000	93.900
Pyrene	287.000	227.000	101.000	89.600
Benzo(a)anthracene	110.000	99.500	48.300	42.800
Chrysene	148.000	126.000	52.900	50.300
Benzo(b)fluoranthene	130.000	120.000	47.900	42.700
Benzo(k)fluoranthene	135.000	121.000	50.200	47.700
Benzo(a)pyrene	129.000	125.000	53.200	50.400
Indeno(1,2,3-cd)pyrene	101.000	92.500	38.500	33.300
Dibenz(a,h)anthracene	22.200	21.600	5.550	6.730
Benzo(g,h,i)perylene	97.400	99.400	37.300	34.000

Surrogate Recoveries (%)

Naphthalene-d8	56	58	59	61
Acenaphthene-d10	61	68	67	68
Phenanthrene-d10	66	72	72	73
Benzo(a)pyrene-d12	65	73	73	73

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

Client ID	RAJ-009	RAJ-010	RAJ-011	RAJ-012
Battelle ID	K2638-P	K2639-P	K2641-P	K2642-P
Sample Type	SA	SA	SA	SA
Collection Date	09/20/16	09/20/16	09/20/16	09/20/16
Extraction Date	09/26/16	09/26/16	09/26/16	09/26/16
Analysis Date	10/01/16	10/01/16	10/01/16	10/01/16
Analytical Instrument	MS	MS	MS	MS
% Moisture	24.02	24.76	28.52	36.27
% Lipid	NA	NA	NA	NA
Matrix	SED	SED	SED	SED
Sample Size	22.85	22.59	21.43	19.11
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	2.340	0.947	1.210	1.760
2-Methylnaphthalene	1.280	0.630 J	0.763 J	1.190
1-Methylnaphthalene	0.875	0.430 J	0.567 J	0.857 J
Acenaphthylene	1.920	0.930	1.290	1.840
Acenaphthene	0.995	0.249 J	0.411 J	0.740 J
Fluorene	1.360	0.391 J	0.706 J	1.080
Anthracene	3.440	0.826 J	1.520	3.380
Phenanthrene	14.800	5.020	8.670	13.200
Fluoranthene	29.900	11.000	18.200	27.400
Pyrene	28.300	10.400	17.400	25.800
Benzo(a)anthracene	13.000	4.890	8.040	12.000
Chrysene	17.700	6.700	10.900	15.600
Benzo(b)fluoranthene	14.900	6.130	8.710	12.600
Benzo(k)fluoranthene	15.400	6.480	9.660	15.600
Benzo(a)pyrene	17.000	6.820	11.400	16.000
Indeno(1,2,3-cd)pyrene	11.200	4.390	6.250	11.300
Dibenz(a,h)anthracene	2.370	0.969	1.380	2.010
Benzo(g,h,i)perylene	12.200	5.670	7.980	11.800

Surrogate Recoveries (%)

Naphthalene-d8	63	68	66	62
Acenaphthene-d10	70	74	72	68
Phenanthrene-d10	75	78	77	72
Benzo(a)pyrene-d12	73	74	73	67

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

Client ID	Procedural Blank	
Battelle ID	CJ663PB-P	
Sample Type	PB	
Collection Date	09/26/16	
Extraction Date	09/26/16	
Analysis Date	09/30/16	
Analytical Instrument	MS	
% Moisture	35.92	
% Lipid	NA	
Matrix	SEDIMENT	
Sample Size	19.26	
Size Unit-Basis	G_DRY	
Units	UG/KG_DRY	
Naphthalene	0.179	U
2-Methylnaphthalene	0.146	U
1-Methylnaphthalene	0.195	U
Acenaphthylene	0.322	U
Acenaphthene	0.154	U
Fluorene	0.174	U
Anthracene	0.225	U
Phenanthrene	0.228	U
Fluoranthene	0.363	U
Pyrene	0.509	U
Benzo(a)anthracene	0.312	U
Chrysene	0.54	U
Benzo(b)fluoranthene	0.402	U
Benzo(k)fluoranthene	0.545	U
Benzo(a)pyrene	0.853	U
Indeno(1,2,3-cd)pyrene	0.432	U
Dibenz(a,h)anthracene	0.404	U
Benzo(g,h,i)perylene	0.524	U

Surrogate Recoveries (%)

Naphthalene-d8	79
Acenaphthene-d10	82
Phenanthrene-d10	84
Benzo(a)pyrene-d12	69

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
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	
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	
Benzo(g,h,i)perylene	

Surrogate Recoveries (%)

Naphthalene-d8	
Acenaphthene-d10	
Phenanthrene-d10	
Benzo(a)pyrene-d12	

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	CJ664LCS-P			
Sample Type	LCS			
Collection Date	09/26/16			
Extraction Date	09/26/16			
Analysis Date	09/30/16			
Analytical Instrument	MS			
% Moisture	35.92			
% Lipid	NA			
Matrix	SEDIMENT			
Sample Size	19.25			
Size Unit-Basis	G_DRY			
Units	UG/KG_DRY	Target	% Recovery	Qualifier
Naphthalene	59.6	78.14	76	
2-Methylnaphthalene	59.6	78.14	76	
1-Methylnaphthalene	60.1	78.12	77	
Acenaphthylene	55	78.17	70	
Acenaphthene	58.6	78.13	75	
Fluorene	58.3	78.19	75	
Anthracene	56.5	78.12	72	
Phenanthrene	62.7	78.09	80	
Fluoranthene	60.6	78.17	78	
Pyrene	60.6	78.13	78	
Benzo(a)anthracene	56.5	78.16	72	
Chrysene	62	78.09	79	
Benzo(b)fluoranthene	54.7	78.23	70	
Benzo(k)fluoranthene	62.9	78.12	81	
Benzo(a)pyrene	51.8	78.04	66	
Indeno(1,2,3-cd)pyrene	45.2	78.13	58	
Dibenz(a,h)anthracene	53.5	78.07	69	
Benzo(g,h,i)perylene	57.2	78.18	73	

Surrogate Recoveries (%)

Naphthalene-d8	76
Acenaphthene-d10	79
Phenanthrene-d10	84
Benzo(a)pyrene-d12	72

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	CJ665SRM-P					
Sample Type	SRM					
Collection Date	09/26/16					
Extraction Date	09/26/16					
Analysis Date	10/01/16					
Analytical Instrument	MS					
% Moisture	1.3					
% Lipid	NA					
Matrix	SEDIMENT					
Sample Size	1.02					
Size Unit-Basis	G_DRY	Certified		Passing	Actual	
Units	UG/KG_DRY	Value	+/-	%Difference	%Difference	Qualifier
Naphthalene	942					
2-Methylnaphthalene	490					
1-Methylnaphthalene	354					
Acenaphthylene	526					
Acenaphthene	207					
Fluorene	212					
Anthracene	760					
Phenanthrene	4490	5270	219.76	34.17	14.8	
Fluoranthene	8180	8920	320.23	33.59	8.3	
Pyrene	8060	9700	420.01	34.33	16.9	
Benzo(a)anthracene	3440	4720	109.98	32.33	27.1	
Chrysene	4820	5900	369.99	36.27	18.3	
Benzo(b)fluoranthene	3520	3870	419.90	40.85	9	
Benzo(k)fluoranthene	3890	4390	640.06	44.58	11.4	
Benzo(a)pyrene	2950	4300	129.99	33.02	31.4	
Indeno(1,2,3-cd)pyrene	2710	2780	100.08	33.6	2.5	
Dibenz(a,h)anthracene	700	759	81.97	40.8	7.8	
Benzo(g,h,i)perylene	2840	2840	99.97	33.52	0	

Surrogate Recoveries (%)

Naphthalene-d8	69
Acenaphthene-d10	74
Phenanthrene-d10	82
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	RAJ-004	RAJ-004			
Battelle ID	K2633-P	K2633MS-P			
Sample Type	SA	MS			
Collection Date	09/20/16	9/20/2016			
Extraction Date	09/26/16	9/26/2016			
Analysis Date	10/01/16	10/1/2016			
Analytical Instrument	MS	MS			
% Moisture	50.75	50.63			
% Lipid	NA	NA			
Matrix	SED	SED			
Sample Size	14.78	7.4			
Size Unit-Basis	G_DRY	G_DRY			
Units	UG/KG_DRY	UG/KG_DRY	Target	% Recovery	Qualifier
Naphthalene	58.3	186.000	203.27	63	
2-Methylnaphthalene	24.5	162.000	203.27	68	
1-Methylnaphthalene	15	153.000	203.23	68	
Acenaphthylene	31	173.000	203.35	70	
Acenaphthene	16.9	157.000	203.25	69	
Fluorene	26.1	166.000	203.41	69	
Anthracene	67.6	219.000	203.21	75	
Phenanthrene	204	380.000	203.15	87	
Fluoranthene	489	683.000	203.35	95	
Pyrene	529	725.000	203.25	96	
Benzo(a)anthracene	208	395.000	203.31	92	
Chrysene	252	418.000	203.15	82	
Benzo(b)fluoranthene	226	420.000	203.51	95	
Benzo(k)fluoranthene	231	421.000	203.23	93	
Benzo(a)pyrene	238	430.000	203.01	95	
Indeno(1,2,3-cd)pyrene	170	348.000	203.25	88	
Dibenz(a,h)anthracene	37.6	202.000	203.09	81	
Benzo(g,h,i)perylene	175	365.000	203.37	93	

Surrogate Recoveries (%)

Naphthalene-d8	61	65
Acenaphthene-d10	67	70
Phenanthrene-d10	73	75
Benzo(a)pyrene-d12	72	76

Battelle
The Business of Innovation

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

Client ID	RAJ-004					
Battelle ID	K2633MSD-P					
Sample Type	MSD					
Collection Date	9/20/2016					
Extraction Date	9/26/2016					
Analysis Date	10/1/2016					
Analytical Instrument	MS					
% Moisture	49.64					
% Lipid	NA					
Matrix	SED					
Sample Size	7.55					
Size Unit-Basis	G_DRY					
Units	UG/KG_DRY	Target	% Recovery	Qualifier	RPD (%)	Qualifier
Naphthalene	193.000	199.23	68		7.6	
2-Methylnaphthalene	167.000	199.23	72		5.7	
1-Methylnaphthalene	159.000	199.19	72		5.7	
Acenaphthylene	213.000	199.31	91		26.1	
Acenaphthene	182.000	199.21	83		18.4	
Fluorene	182.000	199.37	78		12.2	
Anthracene	320.000	199.17	127	n	51.5	n
Phenanthrene	467.000	199.11	132	n	41.1	n
Fluoranthene	1050.000	199.31	281	n	98.9	n
Pyrene	1100.000	199.21	287	n	99.7	n
Benzo(a)anthracene	586.000	199.27	190	n	69.5	n
Chrysene	576.000	199.11	163	n	66.1	n
Benzo(b)fluoranthene	522.000	199.47	148	n	43.6	n
Benzo(k)fluoranthene	548.000	199.19	159	n	52.4	n
Benzo(a)pyrene	597.000	198.97	180	n	61.8	n
Indeno(1,2,3-cd)pyrene	437.000	199.21	134	n	41.4	n
Dibenz(a,h)anthracene	222.000	199.05	93		13.8	
Benzo(g,h,i)perylene	441.000	199.33	133	n	35.4	n

Surrogate Recoveries (%)

Naphthalene-d8	67
Acenaphthene-d10	74
Phenanthrene-d10	79
Benzo(a)pyrene-d12	79

Battelle
The Business of Innovation

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

Client ID	RAJ-008	RAJ-008		
Battelle ID	K2637-P	K2637DUP-P		
Sample Type	SA	QADU		
Collection Date	09/20/16	9/20/2016		
Extraction Date	09/26/16	9/26/2016		
Analysis Date	10/01/16	10/1/2016		
Analytical Instrument	MS	MS		
% Moisture	36.59	36.77		
% Lipid	NA	NA		
Matrix	SED	SED		
Sample Size	19.01	18.96		
Size Unit-Basis	G_DRY	G_DRY		
Units	UG/KG_DRY	UG/KG_DRY	RPD	Qualifier
Naphthalene	7.24	8.020	10.2	
2-Methylnaphthalene	3.58	4.030	11.8	
1-Methylnaphthalene	2.49	2.740	9.6	
Acenaphthylene	6.2	6.280	1.3	
Acenaphthene	3.16	4.050	24.7	
Fluorene	5.06	5.580	9.8	
Anthracene	13.6	14.600	7.1	
Phenanthrene	50.6	54.800	8.0	
Fluoranthene	93.9	103.000	9.2	
Pyrene	89.6	97.300	8.2	
Benzo(a)anthracene	42.8	46.400	8.1	
Chrysene	50.3	57.000	12.5	
Benzo(b)fluoranthene	42.7	47.300	10.2	
Benzo(k)fluoranthene	47.7	52.800	10.1	
Benzo(a)pyrene	50.4	56.700	11.8	
Indeno(1,2,3-cd)pyrene	33.3	38.700	15.0	
Dibenz(a,h)anthracene	6.73	7.760	14.2	
Benzo(g,h,i)perylene	34	37.800	10.6	

Surrogate Recoveries (%)

Naphthalene-d8	61	64
Acenaphthene-d10	68	70
Phenanthrene-d10	73	75
Benzo(a)pyrene-d12	73	73

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Sediment
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	
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	
Benzo(g,h,i)perylene	

Surrogate Recoveries (%)

Naphthalene-d8	
Acenaphthene-d10	
Phenanthrene-d10	
Benzo(a)pyrene-d12	

QA/QC Summary
Batch 16-0255

Project:	USACE/NAE – DAMOS Program (Portland Disposal Site)
Parameters:	PAH
Laboratory:	Battelle-Norwell, MA
Matrix:	Sediment
Data Set:	DP-16-0244
Analytical SOP:	5-157
Method Reference:	EPA 8270D modified

Sample Custody

Collection Date	Receipt Date	Temp (°C)
9/20/2016	9/22/2016	1.8

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 cleanup. 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 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	Method MG1137C uses the response factor (RF) from MG1137 and the quantitation reports from this are included for reference.

Holding Times	Extraction Date(s)	Analysis Date(s)
	9/26/2016	9/30/2016 – 10/1/2016; 10/7/2016

QA/QC Summary
Batch 16-0255

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 >5x MDL	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 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.

DAMOS 2016

Portland Disposal Site

Sediment Metals Results

Envirosystems Inc (ESI)

CHEMICAL ANALYSIS
OF A MARINE SEDIMENT:

Tier III Sediment Evaluation
DAMOS Portland 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 28209

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. Kenneth A. Simon ______________________ November 11, 2016

Kenneth A. Simon — Date

Technical Director

CHEMICAL ANALYSIS
OF A MARINE SEDIMENT:

DAMOS Portland 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

TABLE OF CONTENTS

Report No: 28209 SDG:
Project: USACE DAMOS Portland Disposal Site (RDS) Survey

Sample ID: RAJ-001
Matrix: Solid
Sampled: 09/20/16 0855

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28209-001	76.8	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28209-001	3.13	0.2	ug/g dry wt	10/12/16 0900	10/13/16 2106	JLH/SW846 3rd Ed. 6020
Cadmium, total	28209-001	0.04	0.02	ug/g dry wt	10/12/16 0900	10/13/16 2106	JLH/SW846 3rd Ed. 6020
Chromium, total	28209-001	10.7	0.2	ug/g dry wt	10/12/16 0900	10/13/16 2106	JLH/SW846 3rd Ed. 6020
Copper, total	28209-001	5.86	0.2	ug/g dry wt	10/12/16 0900	10/13/16 2106	JLH/SW846 3rd Ed. 6020
Lead, total	28209-001	7.27	0.2	ug/g dry wt	10/12/16 0900	10/13/16 2106	JLH/SW846 3rd Ed. 6020
Mercury, total	28209-001	0.028	0.01	ug/g dry wt	10/12/16 0900	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28209-001	6.54	0.4	ug/g dry wt	10/12/16 0900	10/13/16 2106	JLH/SW846 3rd Ed. 6020
Zinc, total	28209-001	21.1	0.8	ug/g dry wt	10/12/16 0900	10/13/16 2106	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28209 SDG:
Project: USACE DAMOS Portland Disposal Site (RDS) Survey

Sample ID: RAJ-002
Matrix: Solid
Sampled: 09/20/16 0905

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28209-002	55.1	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28209-002	8.03	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2111	JLH/SW846 3rd Ed. 6020
Cadmium, total	28209-002	0.29	0.03	ug/g dry wt	10/12/16 0900	10/13/16 2111	JLH/SW846 3rd Ed. 6020
Chromium, total	28209-002	26.3	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2111	JLH/SW846 3rd Ed. 6020
Copper, total	28209-002	17.4	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2111	JLH/SW846 3rd Ed. 6020
Lead, total	28209-002	30.1	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2111	JLH/SW846 3rd Ed. 6020
Mercury, total	28209-002	0.19	0.07	ug/g dry wt	10/12/16 0900	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28209-002	15.6	0.7	ug/g dry wt	10/12/16 0900	10/13/16 2111	JLH/SW846 3rd Ed. 6020
Zinc, total	28209-002	68.8	1	ug/g dry wt	10/12/16 0900	10/13/16 2111	JLH/SW846 3rd Ed. 6020

Notes:

Report No:	28209	SDG:	
Project:	USACE DAMOS Portland Disposal Site (RDS) Survey		
Sample ID:	RAJ-003		
Matrix:	Solid		
Sampled:	09/20/16 0922		

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28209-003	66.2	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28209-003	6.69	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2117	JLH/SW846 3rd Ed. 6020
Cadmium, total	28209-003	0.11	0.03	ug/g dry wt	10/12/16 0900	10/13/16 2117	JLH/SW846 3rd Ed. 6020
Chromium, total	28209-003	28.4	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2117	JLH/SW846 3rd Ed. 6020
Copper, total	28209-003	18.1	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2117	JLH/SW846 3rd Ed. 6020
Lead, total	28209-003	29.7	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2117	JLH/SW846 3rd Ed. 6020
Mercury, total	28209-003	0.066	0.03	ug/g dry wt	10/12/16 0900	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28209-003	20.0	0.6	ug/g dry wt	10/12/16 0900	10/13/16 2117	JLH/SW846 3rd Ed. 6020
Zinc, total	28209-003	74.6	1	ug/g dry wt	10/12/16 0900	10/13/16 2117	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28209 SDG:
Project: USACE DAMOS Portland Disposal Site (RDS) Survey

Sample ID: RAJ-004
Matrix: Solid
Sampled: 09/20/16 0936

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28209-004	46.9	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28209-004	9.99	0.5	ug/g dry wt	10/12/16 0900	10/13/16 2019	JLH/SW846 3rd Ed. 6020
Cadmium, total	28209-004	0.39	0.05	ug/g dry wt	10/12/16 0900	10/13/16 2019	JLH/SW846 3rd Ed. 6020
Chromium, total	28209-004	37.6	0.5	ug/g dry wt	10/12/16 0900	10/13/16 2019	JLH/SW846 3rd Ed. 6020
Copper, total	28209-004	25.3	0.5	ug/g dry wt	10/12/16 0900	10/13/16 2019	JLH/SW846 3rd Ed. 6020
Lead, total	28209-004	37.1	0.5	ug/g dry wt	10/12/16 0900	10/13/16 2019	JLH/SW846 3rd Ed. 6020
Mercury, total	28209-004	0.23	0.05	ug/g dry wt	10/12/16 0900	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28209-004	22.7	1	ug/g dry wt	10/12/16 0900	10/13/16 2019	JLH/SW846 3rd Ed. 6020
Zinc, total	28209-004	91.2	2	ug/g dry wt	10/12/16 0900	10/13/16 2019	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28209 SDG:
Project: USACE DAMOS Portland Disposal Site (RDS) Survey

Sample ID: RAJ-005
Matrix: Solid
Sampled: 09/22/16 0954

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28209-005	55.6	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28209-005	7.76	0.4	ug/g dry wt	10/12/16 0900	10/13/16 2123	JLH/SW846 3rd Ed. 6020
Cadmium, total	28209-005	0.17	0.04	ug/g dry wt	10/12/16 0900	10/13/16 2123	JLH/SW846 3rd Ed. 6020
Chromium, total	28209-005	27.2	0.4	ug/g dry wt	10/12/16 0900	10/13/16 2123	JLH/SW846 3rd Ed. 6020
Copper, total	28209-005	16.9	0.4	ug/g dry wt	10/12/16 0900	10/13/16 2123	JLH/SW846 3rd Ed. 6020
Lead, total	28209-005	16.8	0.4	ug/g dry wt	10/12/16 0900	10/13/16 2123	JLH/SW846 3rd Ed. 6020
Mercury, total	28209-005	0.054	0.02	ug/g dry wt	10/12/16 0900	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28209-005	18.8	0.8	ug/g dry wt	10/12/16 0900	10/13/16 2123	JLH/SW846 3rd Ed. 6020
Zinc, total	28209-005	63.3	2	ug/g dry wt	10/12/16 0900	10/13/16 2123	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28209 SDG:
Project: USACE DAMOS Portland Disposal Site (RDS) Survey

Sample ID: RAJ-006
Matrix: Solid
Sampled: 09/20/16 1006

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28209-006	46.4	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28209-006	8.36	0.5	ug/g dry wt	10/12/16 0900	10/13/16 2129	JLH/SW846 3rd Ed. 6020
Cadmium, total	28209-006	0.26	0.05	ug/g dry wt	10/12/16 0900	10/13/16 2129	JLH/SW846 3rd Ed. 6020
Chromium, total	28209-006	32.9	0.5	ug/g dry wt	10/12/16 0900	10/13/16 2129	JLH/SW846 3rd Ed. 6020
Copper, total	28209-006	17.3	0.5	ug/g dry wt	10/12/16 0900	10/13/16 2129	JLH/SW846 3rd Ed. 6020
Lead, total	28209-006	19.9	0.5	ug/g dry wt	10/12/16 0900	10/13/16 2129	JLH/SW846 3rd Ed. 6020
Mercury, total	28209-006	0.079	0.02	ug/g dry wt	10/12/16 0900	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28209-006	20.8	1	ug/g dry wt	10/12/16 0900	10/13/16 2129	JLH/SW846 3rd Ed. 6020
Zinc, total	28209-006	72.8	2	ug/g dry wt	10/12/16 0900	10/13/16 2129	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28209 SDG:
Project: USACE DAMOS Portland Disposal Site (RDS) Survey

Sample ID: RAJ-007
Matrix: Solid
Sampled: 09/20/16 1019

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28209-007	64.3	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28209-007	4.11	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2135	JLH/SW846 3rd Ed. 6020
Cadmium, total	28209-007	0.06	0.03	ug/g dry wt	10/12/16 0900	10/13/16 2135	JLH/SW846 3rd Ed. 6020
Chromium, total	28209-007	19.0	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2135	JLH/SW846 3rd Ed. 6020
Copper, total	28209-007	6.53	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2135	JLH/SW846 3rd Ed. 6020
Lead, total	28209-007	11.6	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2135	JLH/SW846 3rd Ed. 6020
Mercury, total	28209-007	0.043	0.01	ug/g dry wt	10/12/16 0900	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28209-007	11.5	0.5	ug/g dry wt	10/12/16 0900	10/13/16 2135	JLH/SW846 3rd Ed. 6020
Zinc, total	28209-007	34.0	1	ug/g dry wt	10/12/16 0900	10/13/16 2135	JLH/SW846 3rd Ed. 6020

Notes:

Report No:	28209	SDG:	
Project:	USACE DAMOS Portland Disposal Site (RDS) Survey		
Sample ID:	RAJ-008		
Matrix:	Solid		
Sampled:	09/20/16 1034		

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28209-008	66.4	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28209-008	4.25	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2152	JLH/SW846 3rd Ed. 6020
Cadmium, total	28209-008	0.06	0.03	ug/g dry wt	10/12/16 0900	10/13/16 2152	JLH/SW846 3rd Ed. 6020
Chromium, total	28209-008	17.0	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2152	JLH/SW846 3rd Ed. 6020
Copper, total	28209-008	7.37	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2152	JLH/SW846 3rd Ed. 6020
Lead, total	28209-008	11.1	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2152	JLH/SW846 3rd Ed. 6020
Mercury, total	28209-008	0.045	0.02	ug/g dry wt	10/12/16 0900	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28209-008	11.0	0.5	ug/g dry wt	10/12/16 0900	10/13/16 2152	JLH/SW846 3rd Ed. 6020
Zinc, total	28209-008	31.7	1	ug/g dry wt	10/12/16 0900	10/13/16 2152	JLH/SW846 3rd Ed. 6020

Notes:

Report No:	28209	SDG:	
Project:	USACE DAMOS Portland Disposal Site (RDS) Survey		

Sample ID:	RAJ-009
Matrix:	Solid
Sampled:	09/20/16 1120

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28209-009	73.9	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28209-009	3.44	0.2	ug/g dry wt	10/12/16 0900	10/13/16 2158	JLH/SW846 3rd Ed. 6020
Cadmium, total	28209-009	0.04	0.02	ug/g dry wt	10/12/16 0900	10/13/16 2158	JLH/SW846 3rd Ed. 6020
Chromium, total	28209-009	16.3	0.2	ug/g dry wt	10/12/16 0900	10/13/16 2158	JLH/SW846 3rd Ed. 6020
Copper, total	28209-009	4.40	0.2	ug/g dry wt	10/12/16 0900	10/13/16 2158	JLH/SW846 3rd Ed. 6020
Lead, total	28209-009	8.24	0.2	ug/g dry wt	10/12/16 0900	10/13/16 2158	JLH/SW846 3rd Ed. 6020
Mercury, total	28209-009	0.025	0.02	ug/g dry wt	10/12/16 0900	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28209-009	9.31	0.5	ug/g dry wt	10/12/16 0900	10/13/16 2158	JLH/SW846 3rd Ed. 6020
Zinc, total	28209-009	25.2	0.9	ug/g dry wt	10/12/16 0900	10/13/16 2158	JLH/SW846 3rd Ed. 6020

Notes:

Report No: 28209 SDG:
Project: USACE DAMOS Portland Disposal Site (RDS) Survey

Sample ID: RAJ-010
Matrix: Solid
Sampled: 09/20/16 1145

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28209-010	75.7	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28209-010	3.20	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2204	JLH/SW846 3rd Ed. 6020
Cadmium, total	28209-010	ND	0.03	ug/g dry wt	10/12/16 0900	10/13/16 2204	JLH/SW846 3rd Ed. 6020
Chromium, total	28209-010	13.4	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2204	JLH/SW846 3rd Ed. 6020
Copper, total	28209-010	3.38	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2204	JLH/SW846 3rd Ed. 6020
Lead, total	28209-010	7.38	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2204	JLH/SW846 3rd Ed. 6020
Mercury, total	28209-010	0.015	0.01	ug/g dry wt	10/12/16 0900	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28209-010	8.00	0.5	ug/g dry wt	10/12/16 0900	10/13/16 2204	JLH/SW846 3rd Ed. 6020
Zinc, total	28209-010	21.1	1	ug/g dry wt	10/12/16 0900	10/13/16 2204	JLH/SW846 3rd Ed. 6020

Notes:

ND = Not Detected

Report No: 28209 SDG:
Project: USACE DAMOS Portland Disposal Site (RDS) Survey

Sample ID: RAJ-901
Matrix: Water
Sampled: 09/20/16 1200

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Arsenic, total	28209-011	ND	0.001	mg/L	10/14/16 0800	10/14/16 1055	JLH/EPA 200.8
Cadmium, total	28209-011	ND	0.0001	mg/L	10/14/16 0800	10/14/16 1055	JLH/EPA 200.8
Chromium, total	28209-011	ND	0.001	mg/L	10/14/16 0800	10/14/16 1055	JLH/EPA 200.8
Copper, total	28209-011	ND	0.0005	mg/L	10/14/16 0800	10/14/16 1055	JLH/EPA 200.8
Lead, total	28209-011	ND	0.0002	mg/L	10/14/16 0800	10/14/16 1055	JLH/EPA 200.8
Mercury, total	28209-012	ND	0.01	ug/L	10/05/16 0900	10/05/16 1100	JLH/EPA 245.7
Nickel, total	28209-011	ND	0.001	mg/L	10/14/16 0800	10/14/16 1055	JLH/EPA 200.8
Zinc, total	28209-011	ND	0.002	mg/L	10/14/16 0800	10/14/16 1055	JLH/EPA 200.8

Notes:

ND = Not Detected

Report No:	28209	SDG:	
Project:	USACE DAMOS Portland Disposal Site (RDS) Survey		
Sample ID:	RAJ-011		
Matrix:	Solid		
Sampled:	09/20/16 1212		

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28209-013	72.4	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28209-013	2.88	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2210	JLH/SW846 3rd Ed. 6020
Cadmium, total	28209-013	0.04	0.03	ug/g dry wt	10/12/16 0900	10/13/16 2210	JLH/SW846 3rd Ed. 6020
Chromium, total	28209-013	14.3	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2210	JLH/SW846 3rd Ed. 6020
Copper, total	28209-013	3.80	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2210	JLH/SW846 3rd Ed. 6020
Lead, total	28209-013	6.93	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2210	JLH/SW846 3rd Ed. 6020
Mercury, total	28209-013	0.017	0.01	ug/g dry wt	10/12/16 0900	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28209-013	9.00	0.6	ug/g dry wt	10/12/16 0900	10/13/16 2210	JLH/SW846 3rd Ed. 6020
Zinc, total	28209-013	24.2	1	ug/g dry wt	10/12/16 0900	10/13/16 2210	JLH/SW846 3rd Ed. 6020

Notes:

Report No:	28209	SDG:	
Project:	USACE DAMOS Portland Disposal Site (RDS) Survey		
Sample ID:	RAJ-012		
Matrix:	Solid		
Sampled:	09/20/16 1227		

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Percent Solids	28209-014	63.7	0.1	%	10/11/16 1715	10/14/16 0930	AC /160.3 EPA 600/4/79/020
Arsenic, total	28209-014	3.81	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2215	JLH/SW846 3rd Ed. 6020
Cadmium, total	28209-014	0.07	0.03	ug/g dry wt	10/12/16 0900	10/13/16 2215	JLH/SW846 3rd Ed. 6020
Chromium, total	28209-014	17.8	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2215	JLH/SW846 3rd Ed. 6020
Copper, total	28209-014	5.58	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2215	JLH/SW846 3rd Ed. 6020
Lead, total	28209-014	9.25	0.3	ug/g dry wt	10/12/16 0900	10/13/16 2215	JLH/SW846 3rd Ed. 6020
Mercury, total	28209-014	0.026	0.01	ug/g dry wt	10/12/16 0900	10/18/16 1030	JLH/EPA 245.7
Nickel, total	28209-014	12.0	0.6	ug/g dry wt	10/12/16 0900	10/13/16 2215	JLH/SW846 3rd Ed. 6020
Zinc, total	28209-014	32.2	1	ug/g dry wt	10/12/16 0900	10/13/16 2215	JLH/SW846 3rd Ed. 6020

Notes:

Quality Control Summary

Parameter:	Arsenic, total
Project:	USACE DAMOS Portland Disposal Site (RDS) Survey
Matrix:	Solid
QC Batch No:	468S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28209-001	RAJ-001	28209-013	RAJ-011
28209-002	RAJ-002	28209-014	RAJ-012
28209-003	RAJ-003		
28209-004	RAJ-004		
28209-005	RAJ-005		
28209-006	RAJ-006		
28209-007	RAJ-007		
28209-008	RAJ-008		
28209-009	RAJ-009		
28209-010	RAJ-010		

	Control Limit +/-	Preparation Blank Result ug/g dry wt	Q		M
PB468S	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	25.0	25.0	100	25.1	25.0	100	Pass
SRM	70-130	16.2	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	
28209-004	20	9.48		9.99		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	
28209-004S	80-120	59.1	53.9	9.99		91		Pass
28209-004SD	80-120	61.5	53.9	9.99		96		Pass

Quality Control Summary

Parameter:	Cadmium, total
Project:	USACE DAMOS Portland Disposal Site (RDS) Survey
Matrix:	Solid
QC Batch No:	468S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28209-001	RAJ-001	28209-013	RAJ-011
28209-002	RAJ-002	28209-014	RAJ-012
28209-003	RAJ-003		
28209-004	RAJ-004		
28209-005	RAJ-005		
28209-006	RAJ-006		
28209-007	RAJ-007		
28209-008	RAJ-008		
28209-009	RAJ-009		
28209-010	RAJ-010		

	Control Limit +/-	Preparation Blank Result ug/g dry wt	Q		M
PB468S	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	12.4	12.5	99	12.6	12.5	101	Pass
SRM	70-130	8.49	8.80	96				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g dry wt	Q	Sample Result ug/g dry wt	Q	RPD	Q	
28209-004	20	0.388		0.391		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	
28209-004S	80-120	26.6	26.9	0.391		97		Pass
28209-004SD	80-120	27.3	26.9	0.391		100		Pass

Quality Control Summary

Parameter: Chromium, total
Project: USACE DAMOS Portland Disposal Site (RDS) Survey
Matrix: Solid
QC Batch No: 468S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28209-001	RAJ-001	28209-013	RAJ-011
28209-002	RAJ-002	28209-014	RAJ-012
28209-003	RAJ-003		
28209-004	RAJ-004		
28209-005	RAJ-005		
28209-006	RAJ-006		
28209-007	RAJ-007		
28209-008	RAJ-008		
28209-009	RAJ-009		
28209-010	RAJ-010		

	Control Limit +/-	Preparation Blank Result ug/g dry wt	Q		M
PB468S	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	20.0	20.0	100	19.9	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	
28209-004	20	35.5		37.6		6		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	
28209-004S	80-120	74.4	43.1	37.6		85		Pass
28209-004SD	80-120	76.2	43.1	37.6		90		Pass

Quality Control Summary

Parameter: Copper, total
Project: USACE DAMOS Portland Disposal Site (RDS) Survey
Matrix: Solid
QC Batch No: 468S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28209-001	RAJ-001	28209-013	RAJ-011
28209-002	RAJ-002	28209-014	RAJ-012
28209-003	RAJ-003		
28209-004	RAJ-004		
28209-005	RAJ-005		
28209-006	RAJ-006		
28209-007	RAJ-007		
28209-008	RAJ-008		
28209-009	RAJ-009		
28209-010	RAJ-010		

	Control Limit +/-	Preparation Blank Result ug/g dry wt	Q		M
PB468S	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	24.7	25.0	99	24.6	25.0	98	Pass
SRM	70-130	315	380	83				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g dry wt	Q	Sample Result ug/g dry wt	Q	RPD	Q	
28209-004	20	23.8		25.3		6		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	
28209-004S	80-120	71.1	53.9	25.3		85		Pass
28209-004SD	80-120	72.0	53.9	25.3		87		Pass

Quality Control Summary

Parameter: Lead, total
Project: USACE DAMOS Portland Disposal Site (RDS) Survey
Matrix: Solid
QC Batch No: 468S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28209-001	RAJ-001	28209-013	RAJ-011
28209-002	RAJ-002	28209-014	RAJ-012
28209-003	RAJ-003		
28209-004	RAJ-004		
28209-005	RAJ-005		
28209-006	RAJ-006		
28209-007	RAJ-007		
28209-008	RAJ-008		
28209-009	RAJ-009		
28209-010	RAJ-010		

	Control Limit +/-	Preparation Blank Result ug/g dry wt	Q		M
PB468S	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	24.8	25.0	99	Pass
SRM	70-130	297	330	90				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g dry wt	Q	Sample Result ug/g dry wt	Q	RPD	Q	
28209-004	20	35.1		37.1		6		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	
28209-004S	80-120	98.5	53.9	37.1		114		Pass
28209-004SD	80-120	92.9	53.9	37.1		104		Pass

Quality Control Summary

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

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28209-001	RAJ-001	28209-013	RAJ-011
28209-002	RAJ-002	28209-014	RAJ-012
28209-003	RAJ-003		
28209-004	RAJ-004		
28209-005	RAJ-005		
28209-006	RAJ-006		
28209-007	RAJ-007		
28209-008	RAJ-008		
28209-009	RAJ-009		
28209-010	RAJ-010		

	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	0.66	0.80	83	0.68	0.80	85	Pass
SRM	70-130	3.57	3.40	105				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g dry wt	Q	Sample Result ug/g dry wt	Q	RPD	Q	
28209-004	20	0.23		0.23		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	
28209-004S	75-125	1.70	1.72	0.23		85		Pass
28209-004SD	75-125	1.72	1.72	0.23		87		Pass

Quality Control Summary

Parameter:	Nickel, total
Project:	USACE DAMOS Portland Disposal Site (RDS) Survey
Matrix:	Solid
QC Batch No:	468S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28209-001	RAJ-001	28209-013	RAJ-011
28209-002	RAJ-002	28209-014	RAJ-012
28209-003	RAJ-003		
28209-004	RAJ-004		
28209-005	RAJ-005		
28209-006	RAJ-006		
28209-007	RAJ-007		
28209-008	RAJ-008		
28209-009	RAJ-009		
28209-010	RAJ-010		

	Control Limit +/-	Preparation Blank Result ug/g dry wt	Q		M
PB468S	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	50.5	50.0	101	50.4	50.0	101	Pass
SRM	70-130	60.1	76.1	79				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g dry wt	Q	Sample Result ug/g dry wt	Q	RPD	Q	
28209-004	20	21.6		22.7		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	
28209-004S	80-120	117	108	22.7		87		Pass
28209-004SD	80-120	117	108	22.7		87		Pass

Quality Control Summary

Parameter: Zinc, total
Project: USACE DAMOS Portland Disposal Site (RDS) Survey
Matrix: Solid
QC Batch No: 468S

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28209-001	RAJ-001	28209-013	RAJ-011
28209-002	RAJ-002	28209-014	RAJ-012
28209-003	RAJ-003		
28209-004	RAJ-004		
28209-005	RAJ-005		
28209-006	RAJ-006		
28209-007	RAJ-007		
28209-008	RAJ-008		
28209-009	RAJ-009		
28209-010	RAJ-010		

	Control Limit +/-	Preparation Blank Result ug/g dry wt	Q		M
PB468S	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	51.3	50.0	103	51.5	50.0	103	Pass
SRM	70-130	541	656	82				Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/g dry wt	Q	Sample Result ug/g dry wt	Q	RPD	Q	
28209-004	20	87.1		91.2		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	
28209-004S	80-120	186	108	91.2		88		Pass
28209-004SD	80-120	191	108	91.2		92		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 Portland Disposal Site (RDS) Survey
Matrix:	Water
QC Batch No:	498W

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28209-011	RAJ-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	
28209-011	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	
28209-011S	80-120	0.0509	0.050	0.001	U	102		Pass
28209-011SD	80-120	0.0511	0.050	0.001	U	102		Pass

Quality Control Summary

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

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28209-011	RAJ-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	
28209-011	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	
28209-011S	80-120	0.0248	0.0250	0.0001	U	99		Pass
28209-011SD	80-120	0.0251	0.0250	0.0001	U	100		Pass

Quality Control Summary

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

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28209-011	RAJ-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	
28209-011	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	
28209-011S	80-120	0.040	0.040	0.001	U	101		Pass
28209-011SD	80-120	0.040	0.040	0.001	U	101		Pass

Quality Control Summary

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

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28209-011	RAJ-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	
28209-011	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	
28209-011S	80-120	0.0502	0.050	0.0005	U	100		Pass
28209-011SD	80-120	0.0501	0.050	0.0005	U	100		Pass

Quality Control Summary

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

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28209-011	RAJ-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	
28209-011	20	0.0002	U	0.0002	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	
28209-011S	80-120	0.0497	0.050	0.0002	U	99		Pass
28209-011SD	80-120	0.0498	0.050	0.0002	U	100		Pass

Quality Control Summary

Parameter: Mercury, total
Project: USACE DAMOS Portland Disposal Site (RDS) Survey
Matrix: Water
QC Batch No: 176W

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28209-012	RAJ-901		

	Control Limit +/-	Preparation Blank Result ug/L	Q		M
PB176W	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	0.026	0.025	104	0.025	0.025	100	Pass

DUPLICATE ANALYSIS

ID	Control Limit %	Duplicate Result ug/L	Q	Sample Result ug/L	Q	RPD	Q	
28209-012	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	
28209-012S	80-120	0.025	0.025	0.01	U	100		Pass
28209-012SD	80-120	0.024	0.025	0.01	U	96		Pass

Quality Control Summary

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

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28209-011	RAJ-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	
28209-011	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	
28209-011S	80-120	0.100	0.100	0.001	U	100		Pass
28209-011SD	80-120	0.101	0.100	0.001	U	101		Pass

Quality Control Summary

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

Pertains to samples:

Lab ID	Sample ID	Lab ID	Sample ID
28209-011	RAJ-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	
28209-011	20	0.002	U	0.002	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	
28209-011S	80-120	0.103	0.100	0.002	U	103		Pass
28209-011SD	80-120	0.103	0.100	0.002	U	103		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 #: 28209 TASK:
CLIENT: battelle ELEMENT:
PROJECT: damos - portland disposal
DATE IN: 09/22/16 DATE DUE: 10/22/16
EDD Required Yes No QC Report Pages Required: Yes No

Analyst Data Review	Date	Initials	Comments
Chains of Custody Complete	09/22/16	EP	
Sample Receipt Complete	↓	↓	
Bench Sheets Complete (dates, times, initials, etc...)	10/24/16	JLH	
Analytical Components Complete			
QC Reports Generated			
EDD Generated	11/07/16		
Data Acceptability Review	↓	↓	

Technical Report Review	Date	Initials	Comments
Analytical Reports Generated	10/24/16	JLH	
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	11/10/16	EP	
Draft Report	10/26/16	EP	
QA Audit / Review Complete	10/28/16	EP	
Data Appendix Compiled	NA		
Tables Completed	10/28/16	EP	
Table Of Contents Complete / Accurate	10/28/16	EP	
Apply Footer To Data Appendix	11/11/16	EP	
Convert Text To PDF, Print			
Merge And Secure Document	↓	↓	
Review Final Report	11/11/16	JH	
Send / E-Mail Hard Copy To Client			
Send Invoice			
Report scanned to archive			

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Quality Assurance Statement

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

SDG Number: 28209

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 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 [illegible] 11/11/16

Signature of Reviewer/Date

11/11/16

Signature of Task Leader/Date

ESI

SAMPLE RECEIPT AND CONDITION DOCUMENTATION

STUDY NO:	28209		
SDG No:			
Project:	USACE DAMOS Portland Disposal Site (RDS) Survey		
Delivered via:	Client		
Date and Time Received:	09/22/16 0920	Date and TIme Logged into Lab:	09/22/16 1120
Received By:	EP	Logged into Lab by:	EP 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:	6	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
RAJ-001	28209-001	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAJ-002	28209-002	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAJ-003	28209-003	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAJ-004	28209-004	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAJ-005	28209-005	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAJ-006	28209-006	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAJ-007	28209-007	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAJ-008	28209-008	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAJ-009	28209-009	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAJ-010	28209-010	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAJ-901	28209-011	W	Total Metals As,Cd,Cr,Cu,Pb,Ni,Zn;	250mL P	HNO3	Yes
RAJ-901	28209-012	W	Total Metals Hg;	125mL G	HCl	Yes
RAJ-011	28209-013	S	Total Metals As,Cd,Cr,Cu,Hg,Pb,Ni,Zn;	1x16oz G	4C	Yes
RAJ-012	28209-014	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

28209

Project: USACE DAMOS
Portland 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

						Analyses (Record No. of containers / Preservative)						
Date	Time (Central Time)	Field ID	Lab ID(s)	Matrix	station	PCB Congeners, Pesticides, PAHs	4° C (ice)	Grain Size	TOC	4° C (ice)	Metals	4° C (ice)
9/20/2016	8:55	RAJ-001	28209-001	SED	PDS-20						1	X
9/20/2016	9:05	RAJ-002	-002	SED	PDS-10						1	X
9/20/2016	9:22	RAJ-003	-003	SED	PDS-16						1	X
9/20/2016	9:36	RAJ-004	-004	SED	PDA95-30						1	X
9/20/2016	9:54	RAJ-005	-005	SED	PDA95-23						1	X
9/20/2016	10:06	RAJ-006	-006	SED	PDA95-22						1	X
9/20/2016	10:19	RAJ-007	-007	SED	SREF-07						1	X
9/20/2016	10:34	RAJ-008	-008	SED	SREF-10						1	X
9/20/2016	11:20	RAJ-009	-009	SED	SREF-08						1	X
9/20/2016	11:45	RAJ-010	-010	SED	EREF-03						1	X
9/20/2016	12:00	RAJ-901	-011, -012 E10	WAT	EB1						2	X
9/20/2016	12:12	RAJ-011	-013	SED	EREF-05						1	X
9/20/2016	12:27	RAJ-012	-014	SED	EREF-01						1	X

Sufficient volume was provided for MS/MSD and Lab duplicate for samples RAJ-004
Note the water sample is preserved with Nitric for metals and HCL for Mercury.

E10 note – 28209-011 t.metals pres with HNO_3
28209-012 Hg pres with HCl
EP 09/22/16

Relinquished By (name/date/time): 9/22/16 0920

Page: 1 of 1

Received By(name/date/time): 09/22/16 0920

DAMOS 2016

Portland Disposal Site

Sediment Grain Size and TOC Results

Katahdin Analytical

BATTELLE
USACE NAE DAMOS
PORTLAND DISPOSAL SITE
SJ7652

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

TABLE OF CONTENTS

Total number of pages: 156

SAMPLE DATA PACKAGE

SDG NARRATIVE
KATAHDIN ANALYTICAL SERVICES
BATTELLE
USACE NAE DAMOS PORTLAND DISPOSAL SITE
SJ7652

Sample Receipt

The following samples were received on September 22, 2016 and were logged in under Katahdin Analytical Services work order number SJ7652 for a hardcopy due date of October 04, 2016.

KATAHDIN Sample No.	BATTELLE Sample Identification
SJ7652-1	RAJ-01
SJ7652-2	RAJ-02
SJ7652-3	RAJ-03
SJ7652-4	RAJ-04
SJ7652-5	RAJ-04 DUP
SJ7652-6	RAJ-05
SJ7652-7	RAJ-06
SJ7652-8	RAJ-07
SJ7652-9	RAJ-08
SJ7652-10	RAJ-09
SJ7652-11	RAJ-10
SJ7652-12	RAJ-11
SJ7652-13	RAJ-12

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 SJ7652 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 LOQ", where "LOQ" is the numerical value of the Limit of Quantitation.

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
10.05.16
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.

Katahdin Analytical Services, LLC. **Sample Receipt Condition Report**

Client: Battelle	KAS PM: JO	Sampled By: Client
Project:	KIMS Entry By: SO	Delivered By: Client
KAS Work Order#: SJ 7652	KIMS Review By: [illegible]	Received By: GN
SDG #:	Cooler: 1 of 1	Date/Time Rec.: 9-22-16/08:25

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): 4.2
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.

SJ7652

Battelle
The Business of Innovation

Chain of Custody

Project: USACE DAMOS
Portland 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)
9/20/2016	8:55	RAJ-001		SED	PDS-20			1	1	X		
9/20/2016	9:05	RAJ-002		SED	PDS-10			1	1	X		
9/20/2016	9:22	RAJ-003		SED	PDS-16			1	1	X		
9/20/2016	9:36	RAJ-004		SED	PDA95-30			2	2	X		
9/20/2016	9:54	RAJ-005		SED	PDA95-23			1	1	X		
9/20/2016	10:06	RAJ-006		SED	PDA95-22			1	1	X		
9/20/2016	10:19	RAJ-007		SED	SREF-07			1	1	X		
9/20/2016	10:34	RAJ-008		SED	SREF-10			1	1	X		
9/20/2016	11:20	RAJ-009		SED	SREF-08			1	1	X		
9/20/2016	11:45	RAJ-010		SED	EREF-03			1	1	X		
9/20/2016	12:12	RAJ-011		SED	EREF-05			1	1	X		
9/20/2016	12:27	RAJ-012		SED	EREF-01			1	1	X		

Sufficient volume was provided for Lab duplicate for samples RAJ-004

Relinquished By (name/date/time): 22-sep-16 8:25

Received By(name/date/time): 9-2316 / 08:25

0000006

Katahdin
ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Oct. 03, 2016
09:58 AM

Login Number: SJ7652

Quote/Incoming: BATT-DAMOS

Account: BATTEL001 NoWeb
Battelle

Project: BATT-DAMOS
USACE NAE 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	:	4.2
DELIVERY SERVICES	:	FedEx
EDD FORMAT	:	KAS127-XLS
LOGIN INITIALS	:	GN
PM	:	JO
PROJECT NAME	:	USACE NAE DAMOS Portland Disposal Site
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
SJ7652-1	RAJ-01	20-SEP-16 08:55	22-SEP-16			04-OCT-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	18-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	18-OCT-16	2oz Glass		
Solid	S	SW9060-TOC(2)	18-OCT-16	2oz Glass		
Solid	S	SW9060-TOC(3)	18-OCT-16	2oz Glass		
Solid	S	SW9060-TOC(4)	18-OCT-16	2oz Glass		
Solid	S	SW9060-TOC(AVG)	18-OCT-16	2oz Glass		
Solid	S	TS-ME	20-OCT-16			

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SJ7652-2	RAJ-02	20-SEP-16 09:05	22-SEP-16			04-OCT-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	18-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	18-OCT-16	2oz Glass		
Solid	S	TS-ME	20-OCT-16			

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SJ7652-3	RAJ-03	20-SEP-16 09:22	22-SEP-16			04-OCT-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	18-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	18-OCT-16	2oz Glass		
Solid	S	TS-ME	20-OCT-16			

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SJ7652-4	RAJ-04	20-SEP-16 09:36	22-SEP-16			04-OCT-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	18-OCT-16	8oz Glass		MS/MSD for TOC
Solid	S	SW9060-TOC(1)	18-OCT-16	2oz Glass		
Solid	S	TS-ME	20-OCT-16			

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SJ7652-5	RAJ-04 DUP	20-SEP-16 09:36	22-SEP-16			04-OCT-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	18-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	18-OCT-16	2oz Glass		
Solid	S	TS-ME	20-OCT-16			

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SJ7652-6	RAJ-05	20-SEP-16 09:54	22-SEP-16			04-OCT-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	18-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	18-OCT-16	2oz Glass		
Solid	S	TS-ME	20-OCT-16			

GN 10.03.16

Katahdin
ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Oct. 03, 2016

09:58 AM

Login Number: SJ7652

Quote/Incoming: BATT-DAMOS

Account: BATTEL001 NoWeb

Battelle

Project: BATT-DAMOS

USACE NAE DAMOS

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SJ7652-7	RAJ-06	20-SEP-16 10:06	22-SEP-16			04-OCT-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	18-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	18-OCT-16	2oz Glass		
Solid	S	TS-ME	20-OCT-16			

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SJ7652-8	RAJ-07	20-SEP-16 10:19	22-SEP-16			04-OCT-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	18-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	18-OCT-16	2oz Glass		
Solid	S	TS-ME	20-OCT-16			

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SJ7652-9	RAJ-08	20-SEP-16 10:34	22-SEP-16			04-OCT-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	18-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	18-OCT-16	2oz Glass		
Solid	S	TS-ME	20-OCT-16			

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SJ7652-10	RAJ-09	20-SEP-16 11:20	22-SEP-16			04-OCT-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	18-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	18-OCT-16	2oz Glass		
Solid	S	TS-ME	20-OCT-16			

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SJ7652-11	RAJ-10	20-SEP-16 11:45	22-SEP-16			04-OCT-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	18-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	18-OCT-16	2oz Glass		
Solid	S	TS-ME	20-OCT-16			

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SJ7652-12	RAJ-11	20-SEP-16 12:12	22-SEP-16			04-OCT-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	18-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	18-OCT-16	2oz Glass		
Solid	S	TS-ME	20-OCT-16			

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SJ7652-13	RAJ-12	20-SEP-16 12:27	22-SEP-16			04-OCT-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	GRAINSIZE-SIEVE+HYD	18-OCT-16	8oz Glass		
Solid	S	SW9060-TOC(1)	18-OCT-16	2oz Glass		
Solid	S	SW9060-TOC(2)	18-OCT-16	2oz Glass		
Solid	S	SW9060-TOC(3)	18-OCT-16	2oz Glass		
Solid	S	SW9060-TOC(4)	18-OCT-16	2oz Glass		
Solid	S	SW9060-TOC(AVG)	18-OCT-16	2oz Glass		
Solid	S	TS-ME	20-OCT-16			

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SJ7652-14	RAJ-04MS	20-SEP-16 09:36	22-SEP-16			04-OCT-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	SW9060-TOC(1)	18-OCT-16			**MS charge only. Not a sample.**

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SJ7652-15	RAJ-04MSD	20-SEP-16 09:36	22-SEP-16			04-OCT-16	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	SW9060-TOC(1)	18-OCT-16			**MSD charge only. Not a sample.**

OP 10.03.16

***Total Samples:* 15** ***Total Analyses:* 49**

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	RAJ-01
Lab Sample ID	SJ7652-1

Date Received	09/22/16
Start Date/Time	9/26/16:13:49
End Date/Time	9/29/16:13:54

Sample Weight	Sample (g)
Sample Weight (wet)	103.4
Sample Weight (oven dried)	76.62

Date/Time in oven	9/28/16:14:50
Date/Time out of oven	9/29/16:8:50

% Moisture	25.899

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0.6
Sample <=#10	76.02
%Passing #10	99.22

Hydrometer Data

Serial Number	379474
Cal Date:	9/27/16:10:33
Low Temp C	19.70
Low Temp Reading	1.0035
High Temp	23.40
High Temp Reading	1.0025
Hyd Cal Slope	-0.000270
Hyd Cal Intercept	0.008824
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	556.6	556.6	0	100	Gravel	
1/4"	6300	505.9	506.2	0.3	99.61	Gravel	
#4	4750	403.9	403.9	0	99.61	Gravel	
#10	2000	371.50	371.80	0.3	99.22	Sand	Coarse
#20	850	302.9	303.5	0.6	98.43	Sand	Medium
#40	425	273.9	277.8	3.9	93.34	Sand	Medium
#60	250	248	262.3	14.3	74.68	Sand	Fine
#80	180	328.1	345.6	17.5	51.84	Sand	Fine
#100	150	238.6	248.5	9.9	38.92	Sand	Fine
#200	75	227.8	243	15.2	19.08	Sand	Fine

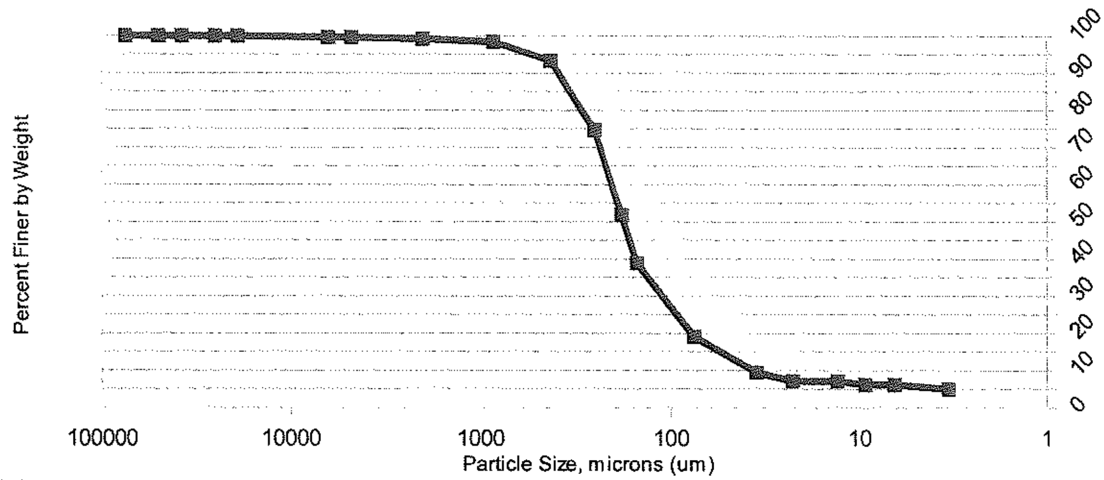
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0090	22	9.51	35.12	Silt
5	5	1.0075	22	7.18	22.60	Silt
15	15	1.0075	22	7.18	13.05	Silt
30	30	1.0070	21.5	6.19	9.28	Silt
60	61	1.0070	21.5	6.19	6.51	Silt
240	240	1.0065	20.5	5.00	3.36	Clay
1440	1440	1.0060	20	4.01	1.38	Clay

Gravel	0.39
Sand Coarse	0.39
Sand Medium	5.87
Sand Fine	74.26
Silt	13.73
Clay	5.35
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-01
Lab Sample ID	SJ7652-1



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	99.61
#4	4750	99.61
#10	2000	99.22
#20	850	98.43
#40	425	93.34
#60	250	74.68
#80	180	51.84
#100	150	38.92
#200	75	19.08
2	35.12	9.51
5	22.60	7.18
15	13.05	7.18
30	9.28	6.19
61	6.51	6.19
240	3.36	5.00
1440	1.38	4.01

Gravel	0.39
Sand Coarse	0.39
Sand Medium	5.87
Sand Fine	74.26
Silt	13.73
Clay	5.35

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-02
Lab Sample ID	SJ7652-2

Date Received	09/22/16
Start Date/Time	9/26/16:13:53
End Date/Time	9/29/16:14:07

Sample Weight	Sample (g)
Sample Weight (wet)	111.4
Sample Weight (oven dried)	61.72

Date/Time in oven	9/28/16:14:50
Date/Time out of oven	9/29/16:8:50

% Moisture	44.596

Hydrometer Data

Serial Number	379474
Cal Date:	9/27/16:10:33
Low Temp C	19.70
Low Temp Reading	1.0035
High Temp	23.40
High Temp Reading	1.0025
Hyd Cal Slope	-0.000270
Hyd Cal Intercept	0.008824
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	1.6
Sample <=#10	60.12
%Passing #10	97.41

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	556.6	556.6	0	100	Gravel	
1/4"	6300	505.9	507.3	1.4	97.73	Gravel	
#4	4750	403.9	403.9	0	97.73	Gravel	
#10	2000	371.50	371.70	0.2	97.41	Sand	Coarse
#20	850	302.9	303.8	0.9	95.95	Sand	Medium
#40	425	273.9	275.9	2	92.71	Sand	Medium
#60	250	248	251.6	3.6	86.88	Sand	Fine
#80	180	328.1	332.5	4.4	79.75	Sand	Fine
#100	150	238.5	241.7	3.2	74.56	Sand	Fine
#200	75	227.8	237.4	9.6	59.01	Sand	Fine

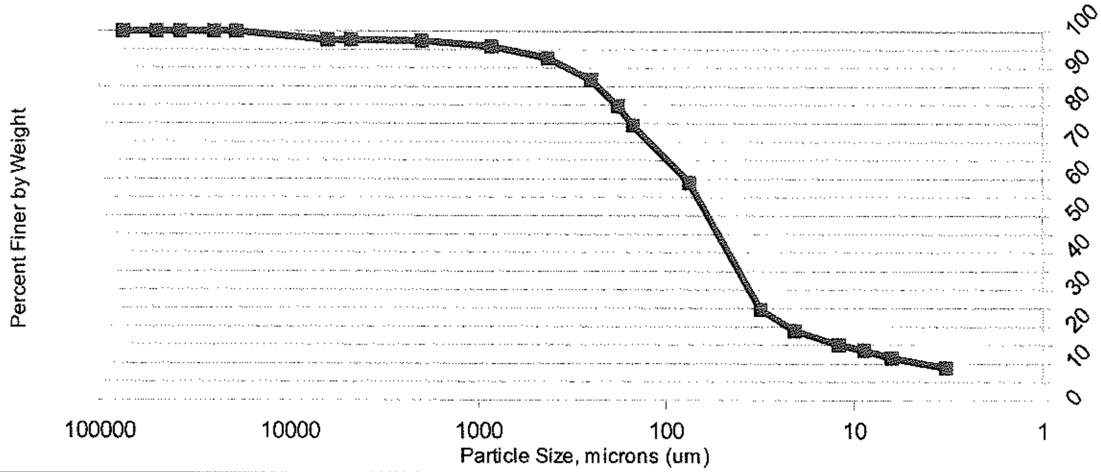
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0200	22	24.68	31.24	Silt
5	5	1.0160	22	18.92	20.72	Silt
15	16	1.0135	21.5	15.12	12.03	Silt
30	30	1.0125	21.5	13.68	8.85	Silt
60	60	1.0110	21.5	11.51	6.33	Silt
240	240	1.0095	20.5	8.96	3.26	Clay
1440	1440	1.0085	19.5	7.13	1.36	Clay

Gravel	2.27
Sand Coarse	0.32
Sand Medium	4.70
Sand Fine	33.70
Silt	48.64
Clay	10.37
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-02
Lab Sample ID	SJ7652-2



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	97.73
#4	4750	97.73
#10	2000	97.41
#20	850	95.95
#40	425	92.71
#60	250	86.88
#80	180	79.75
#100	150	74.56
#200	75	59.01
2	31.24	24.68
5	20.72	18.92
16	12.03	15.12
30	8.85	13.68
60	6.33	11.51
240	3.26	8.96
1440	1.36	7.13

Gravel	2.27
Sand Coarse	0.32
Sand Medium	4.70
Sand Fine	33.70
Silt	48.64
Clay	10.37

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-03
Lab Sample ID	SJ7652-3

Date Received	09/22/16
Start Date/Time	9/26/16:13:55
End Date/Time	9/29/16:14:24

Sample Weight	Sample (g)
Sample Weight (wet)	110.4
Sample Weight (oven dried)	74.59

Date/Time in oven	9/28/16:14:50
Date/Time out of oven	9/29/16:8:50

% Moisture	32.44

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	2.2
Sample <=#10	72.39
%Passing #10	97.06

Hydrometer Data

Serial Number	379474
Cal Date:	9/27/16:10:33
Low Temp C	19.70
Low Temp Reading	1.0035
High Temp	23.40
High Temp Reading	1.0025
Hyd Cal Slope	-0.000270
Hyd Cal Intercept	0.008824
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	99.87	Gravel	
#10	2000	371.50	373.60	2.1	97.05	Sand	Coarse
#20	850	302.9	305.6	2.7	93.43	Sand	Medium
#40	425	273.9	277.1	3.2	89.14	Sand	Medium
#60	250	248.1	249.9	1.8	86.73	Sand	Fine
#80	180	328.1	330.1	2	84.05	Sand	Fine
#100	150	238.5	239.6	1.1	82.57	Sand	Fine
#200	75	227.8	229.9	2.1	79.75	Sand	Fine

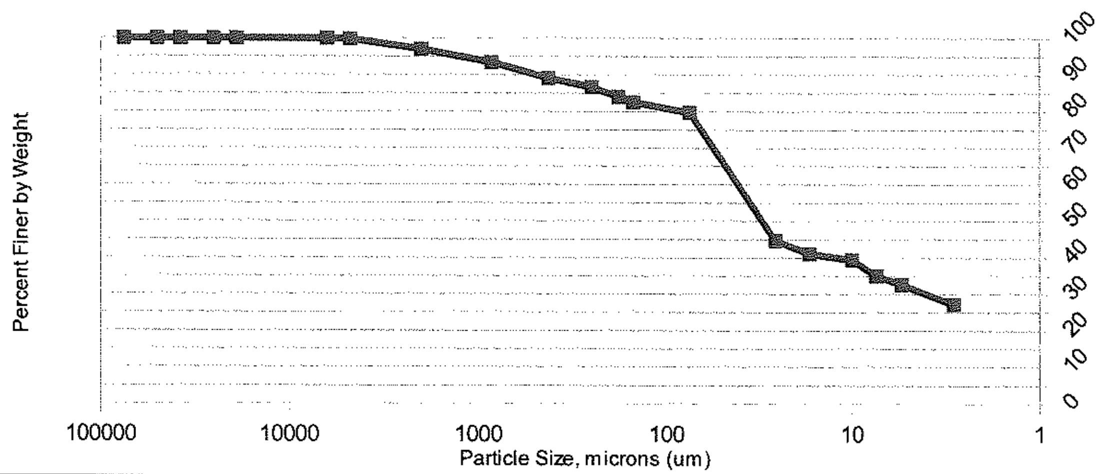
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0335	22.5	44.74	25.82	Silt
5	5	1.0310	22.5	41.11	16.86	Silt
15	15	1.0300	22	39.46	9.97	Silt
30	30	1.0270	22	35.09	7.38	Silt
60	60	1.0255	21.5	32.71	5.39	Silt
240	240	1.0220	20.5	27.23	2.84	Clay
1440	1440	1.0175	20	20.48	1.24	Clay

Gravel	0.13
Sand Coarse	2.82
Sand Medium	7.91
Sand Fine	9.39
Silt	49.57
Clay	30.18
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-03
Lab Sample ID	SJ7652-3



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	99.87
#10	2000	97.05
#20	850	93.43
#40	425	89.14
#60	250	86.73
#80	180	84.05
#100	150	82.57
#200	75	79.75
2	25.82	44.74
5	16.86	41.11
15	9.97	39.46
30	7.38	35.09
60	5.39	32.71
240	2.84	27.23
1440	1.24	20.48

Gravel	0.13
Sand Coarse	2.82
Sand Medium	7.91
Sand Fine	9.39
Silt	49.57
Clay	30.18

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-04
Lab Sample ID	SJ7652-4

Date Received	09/22/16
Start Date/Time	9/26/16:13:57
End Date/Time	9/29/16:14:30

Sample Weight	Sample (g)
Sample Weight (wet)	99.1
Sample Weight (oven dried)	50.78

Date/Time in oven	9/28/16:14:50
Date/Time out of oven	9/29/16:8:50

% Moisture	48.757

Hydrometer Data

Serial Number	379474
Cal Date:	9/27/16:10:33
Low Temp C	19.70
Low Temp Reading	1.0035
High Temp	23.40
High Temp Reading	1.0025
Hyd Cal Slope	-0.000270
Hyd Cal Intercept	0.008824
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0.8
Sample <=#10	49.98
%Passing #10	98.42

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	372.30	0.8	98.42	Sand	Coarse
#20	850	302.9	304.1	1.2	96.06	Sand	Medium
#40	425	273.8	275.8	2	92.12	Sand	Medium
#60	250	248	250	2	88.18	Sand	Fine
#80	180	328.1	329.6	1.5	85.23	Sand	Fine
#100	150	238.5	239.4	0.9	83.46	Sand	Fine
#200	75	227.8	230.8	3	77.55	Sand	Fine

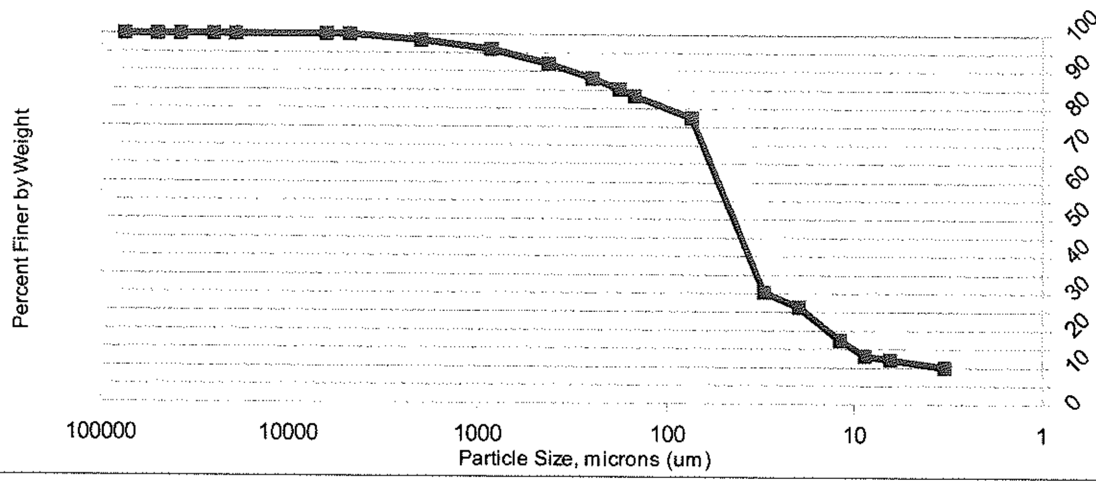
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0215	22.5	30.40	30.64	Silt
5	5	1.0190	22.5	26.35	19.91	Silt
15	16	1.0135	22.5	17.43	11.89	Silt
30	31	1.0110	22	13.16	8.76	Silt
60	60	1.0105	21.5	12.13	6.40	Silt
240	240	1.0095	20.5	10.07	3.26	Clay
1440	1440	1.0080	20	7.42	1.36	Clay

Gravel	0.00
Sand Coarse	1.58
Sand Medium	6.30
Sand Fine	14.57
Silt	66.37
Clay	11.18
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-04
Lab Sample ID	SJ7652-4



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	98.42
#20	850	96.06
#40	425	92.12
#60	250	88.18
#80	180	85.23
#100	150	83.46
#200	75	77.55
2	30.64	30.40
5	19.91	26.35
16	11.89	17.43
31	8.76	13.16
60	6.40	12.13
240	3.26	10.07
1440	1.36	7.42

Gravel	0.00
Sand Coarse	1.58
Sand Medium	6.30
Sand Fine	14.57
Silt	66.37
Clay	11.18

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-04DUP
Lab Sample ID	SJ7652-5

Date Received	09/22/16
Start Date/Time	9/26/16:13:59
End Date/Time	9/29/16:14:35

Sample Weight	Sample (g)
Sample Weight (wet)	106.8
Sample Weight (oven dried)	50.54

Date/Time in oven	9/28/16:14:50
Date/Time out of oven	9/29/16:8:50

% Moisture	52.68

Hydrometer Data

Serial Number	379474
Cal Date:	9/27/16:10:33
Low Temp C	19.70
Low Temp Reading	1.0035
High Temp	23.40
High Temp Reading	1.0025
Hyd Cal Slope	-0.000270
Hyd Cal Intercept	0.008824
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0.5
Sample <=#10	50.04
%Passing #10	99.02

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	372.00	0.5	99.01	Sand	Coarse
#20	850	302.9	303.8	0.9	97.23	Sand	Medium
#40	425	273.8	275.7	1.9	93.47	Sand	Medium
#60	250	248	249.9	1.9	89.71	Sand	Fine
#80	180	328.1	329.9	1.8	86.15	Sand	Fine
#100	150	238.5	239.5	1	84.17	Sand	Fine
#200	75	227.8	230.5	2.7	78.83	Sand	Fine

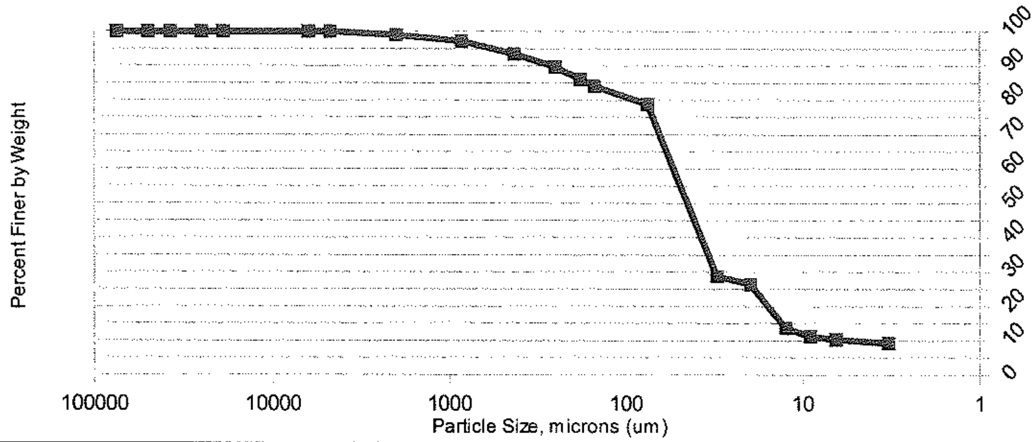
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0220	22	28.76	30.52	Silt
5	5	1.0205	22	26.50	19.76	Silt
15	15	1.0120	22	13.72	12.45	Silt
30	30	1.0105	21.5	11.26	9.06	Silt
60	60	1.0100	21	10.30	6.44	Silt
240	240	1.0095	20.5	9.35	3.26	Clay
1440	1440	1.0080	20	6.89	1.36	Clay

Gravel	0.00
Sand Coarse	0.99
Sand Medium	5.54
Sand Fine	14.64
Silt	69.16
Clay	9.67
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-04DUP
Lab Sample ID	SJ7652-5



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	99.01
#20	850	97.23
#40	425	93.47
#60	250	89.71
#80	180	86.15
#100	150	84.17
#200	75	78.83
2	30.52	28.76
5	19.76	26.50
15	12.45	13.72
30	9.06	11.26
60	6.44	10.30
240	3.26	9.35
1440	1.36	6.89

Gravel	0.00
Sand Coarse	0.99
Sand Medium	5.54
Sand Fine	14.64
Silt	69.16
Clay	9.67

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-05
Lab Sample ID	SJ7652-6

Date Received	09/22/16
Start Date/Time	9/26/16:14:01
End Date/Time	9/29/16:14:45

Sample Weight	Sample (g)
Sample Weight (wet)	92.7
Sample Weight (oven dried)	53.32

Date/Time in oven	9/28/16:14:50
Date/Time out of oven	9/29/16:8:50

% Moisture	42.481

Hydrometer Data

Serial Number	379474
Cal Date:	9/27/16:10:33
Low Temp C	19.70
Low Temp Reading	1.0035
High Temp	23.40
High Temp Reading	1.0025
Hyd Cal Slope	-0.000270
Hyd Cal Intercept	0.008824
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	2.4
Sample <=#10	50.92
%Passing #10	95.50

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	556.6	556.6	0	100	Gravel	
1/4"	6300	505.9	506.8	0.9	98.31	Gravel	
#4	4750	403.9	404.1	0.2	97.94	Gravel	
#10	2000	371.50	372.80	1.3	95.50	Sand	Coarse
#20	850	302.9	306.8	3.9	88.18	Sand	Medium
#40	425	273.8	278.8	5	78.81	Sand	Medium
#60	250	248	251.4	3.4	72.43	Sand	Fine
#80	180	328.1	329.8	1.7	69.24	Sand	Fine
#100	150	238.5	239.3	0.8	67.74	Sand	Fine
#200	75	227.8	230.3	2.5	63.05	Sand	Fine

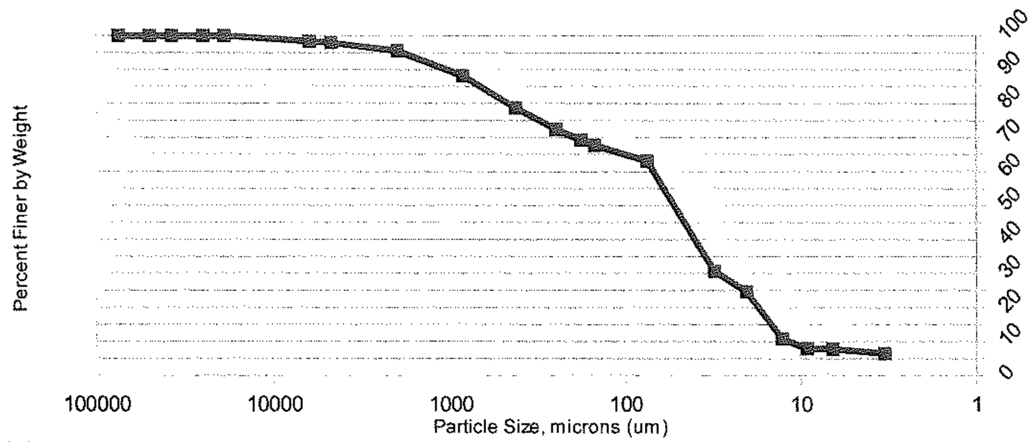
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0205	22.5	30.76	31.06	Silt
5	5	1.0170	22.5	24.70	20.35	Silt
15	15	1.0090	22.5	10.84	12.75	Silt
30	30	1.0075	22	8.01	9.23	Silt
60	60	1.0075	21.5	7.77	6.56	Silt
240	240	1.0070	20.5	6.44	3.32	Clay
1440	1440	1.0065	20	5.34	1.38	Clay

Gravel	2.06
Sand Coarse	2.44
Sand Medium	16.69
Sand Fine	15.75
Silt	56.27
Clay	6.79
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-05
Lab Sample ID	SJ7652-6



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	98.31
#4	4750	97.94
#10	2000	95.50
#20	850	88.18
#40	425	78.81
#60	250	72.43
#80	180	69.24
#100	150	67.74
#200	75	63.05
2	31.06	30.76
5	20.35	24.70
15	12.75	10.84
30	9.23	8.01
60	6.56	7.77
240	3.32	6.44
1440	1.38	5.34

Gravel	2.06
Sand Coarse	2.44
Sand Medium	16.69
Sand Fine	15.75
Silt	56.27
Clay	6.79

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-06
Lab Sample ID	SJ7652-7

Date Received	09/22/16
Start Date/Time	9/26/16:14:05
End Date/Time	9/29/16:14:55

Sample Weight	Sample (g)
Sample Weight (wet)	109
Sample Weight (oven dried)	50.32

Date/Time in oven	9/28/16:14:50
Date/Time out of oven	9/29/16:8:50

% Moisture	53.838

Hydrometer Data

Serial Number	379474
Cal Date:	9/27/16:10:33
Low Temp C	19.70
Low Temp Reading	1.0035
High Temp	23.40
High Temp Reading	1.0025
Hyd Cal Slope	-0.000270
Hyd Cal Intercept	0.008824
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	50.32
%Passing #10	100.01

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	302.9	302.9	0	100.00	Sand	Medium
#40	425	273.8	274.1	0.3	99.40	Sand	Medium
#60	250	248	248.6	0.6	98.21	Sand	Fine
#80	180	328.1	329.2	1.1	96.03	Sand	Fine
#100	150	238.5	239.4	0.9	94.24	Sand	Fine
#200	75	227.8	232.3	4.5	85.29	Sand	Fine

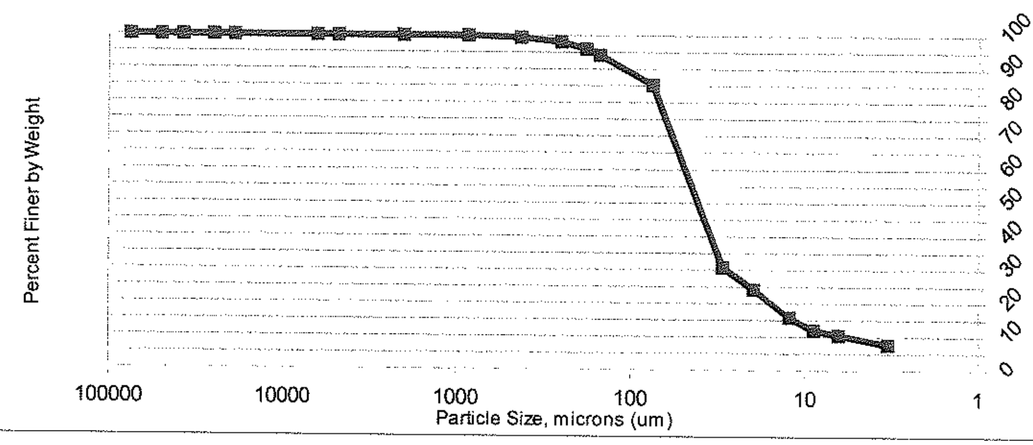
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0235	23	30.78	29.74	Silt
5	5	1.0190	23	24.15	19.80	Silt
15	15	1.0135	22.5	15.85	12.28	Silt
30	30	1.0110	22	11.97	8.90	Silt
60	60	1.0100	22	10.49	6.36	Silt
240	240	1.0085	20.5	7.69	3.30	Clay
1440	1440	1.0080	20	6.75	1.36	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.60
Sand Fine	14.11
Silt	75.85
Clay	9.44
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-06
Lab Sample ID	SJ7652-7



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	99.40
#60	250	98.21
#80	180	96.03
#100	150	94.24
#200	75	85.29
2	29.74	30.78
5	19.80	24.15
15	12.28	15.85
30	8.90	11.97
60	6.36	10.49
240	3.30	7.69
1440	1.36	6.75

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.60
Sand Fine	14.11
Silt	75.85
Clay	9.44

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-07
Lab Sample ID	SJ7652-8

Date Received	09/22/16
Start Date/Time	9/27/16:14:08
End Date/Time	9/30/16:15:21

Sample Weight	Sample (g)
Sample Weight (wet)	118.9
Sample Weight (oven dried)	75.31

Date/Time in oven	9/29/16:15:10
Date/Time out of oven	9/30/16:9:10

% Moisture	36.658

Hydrometer Data

Serial Number	379474
Cal Date:	9/28/16:10:33
Low Temp C	19.30
Low Temp Reading	1.0030
High Temp	23.10
High Temp Reading	1.0025
Hyd Cal Slope	-0.000132
Hyd Cal Intercept	0.005539
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	3.3
Sample <=#10	72.01
%Passing #10	95.61

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	404.1	0.2	99.73	Gravel	
#10	2000	371.50	374.40	2.9	95.88	Sand	Coarse
#20	850	302.9	306.5	3.6	91.10	Sand	Medium
#40	425	273.9	279	5.1	84.33	Sand	Medium
#60	250	248	257.2	9.2	72.12	Sand	Fine
#80	180	328.1	340	11.9	56.32	Sand	Fine
#100	150	238.6	246.2	7.6	46.22	Sand	Fine
#200	75	227.8	238.6	10.8	31.88	Sand	Fine

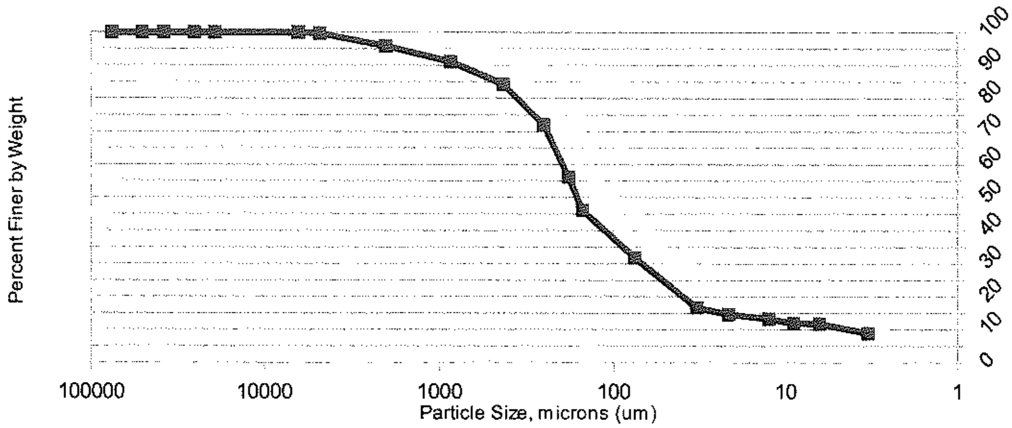
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0150	22.5	16.78	32.85	Silt
5	5	1.0135	22	14.66	21.40	Silt
15	15	1.0125	22	13.31	12.45	Silt
30	30	1.0115	22	11.96	8.90	Silt
60	61	1.0115	21.5	11.87	6.28	Silt
240	240	1.0095	20.5	8.99	3.26	Clay
1440	1440	1.0085	19.5	7.46	1.36	Clay

Gravel	0.27
Sand Coarse	3.85
Sand Medium	11.55
Sand Fine	52.45
Silt	21.69
Clay	10.20
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-07
Lab Sample ID	SJ7652-8



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	99.73
#10	2000	95.88
#20	850	91.10
#40	425	84.33
#60	250	72.12
#80	180	56.32
#100	150	46.22
#200	75	31.88
2	32.85	16.78
5	21.40	14.66
15	12.45	13.31
30	8.90	11.96
61	6.28	11.87
240	3.26	8.99
1440	1.36	7.46

Gravel	0.27
Sand Coarse	3.85
Sand Medium	11.55
Sand Fine	52.45
Silt	21.69
Clay	10.20

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-08
Lab Sample ID	SJ7652-9

Date Received	09/22/16
Start Date/Time	9/27/16:14:09
End Date/Time	9/30/16:15:28

Sample Weight	Sample (g)
Sample Weight (wet)	114.9
Sample Weight (oven dried)	70.69

Date/Time in oven	9/29/16:15:10
Date/Time out of oven	9/30/16:9:10

% Moisture	38.476

Hydrometer Data

Serial Number	379474
Cal Date:	9/28/16:10:33
Low Temp C	19.30
Low Temp Reading	1.0030
High Temp	23.10
High Temp Reading	1.0025
Hyd Cal Slope	-0.000132
Hyd Cal Intercept	0.005539
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	12.8
Sample <=#10	57.89
%Passing #10	81.89

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	556.6	556.6	0	100	Gravel	
1/4"	6300	505.9	508.9	3	95.76	Gravel	
#4	4750	403.9	405.9	2	92.93	Gravel	
#10	2000	371.50	379.50	8	81.61	Sand	Coarse
#20	850	302.9	307.3	4.4	75.39	Sand	Medium
#40	425	273.9	279.6	5.7	67.32	Sand	Medium
#60	250	248	254.1	6.1	58.69	Sand	Fine
#80	180	328.1	333.1	5	51.62	Sand	Fine
#100	150	238.6	242.1	3.5	46.67	Sand	Fine
#200	75	227.8	239.6	11.8	29.98	Sand	Fine

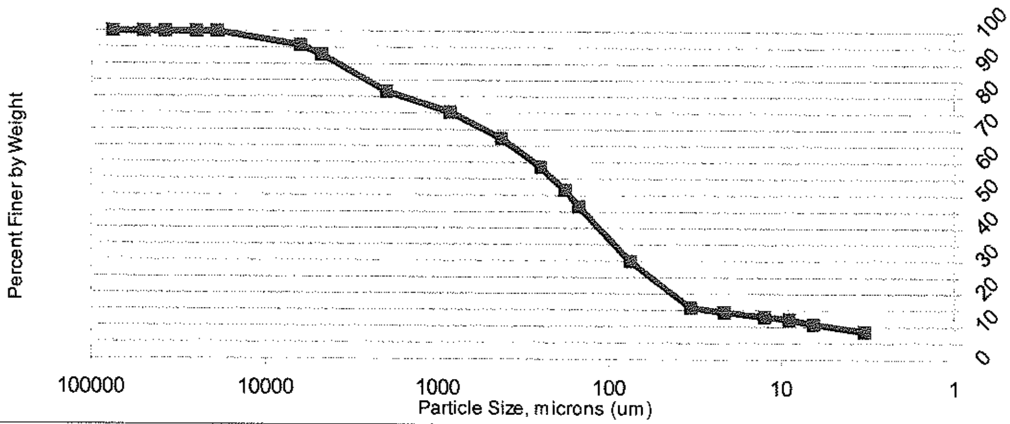
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0140	22	15.87	33.43	Silt
5	5	1.0130	22	14.47	21.40	Silt
15	15	1.0120	22	13.08	12.45	Silt
30	30	1.0115	21.5	12.29	8.96	Silt
60	60	1.0105	21	10.80	6.44	Silt
240	240	1.0090	20.5	8.61	3.26	Clay
1440	1440	1.0075	19.5	6.33	1.37	Clay

Gravel	7.07
Sand Coarse	11.32
Sand Medium	14.29
Sand Fine	37.35
Silt	20.31
Clay	9.67
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-08
Lab Sample ID	SJ7652-9



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	95.76
#4	4750	92.93
#10	2000	81.61
#20	850	75.39
#40	425	67.32
#60	250	58.69
#80	180	51.62
#100	150	46.67
#200	75	29.98
2	33.43	15.87
5	21.40	14.47
15	12.45	13.08
30	8.96	12.29
60	6.44	10.80
240	3.26	8.61
1440	1.37	6.33

Gravel	7.07
Sand Coarse	11.32
Sand Medium	14.29
Sand Fine	37.35
Silt	20.31
Clay	9.67

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-09
Lab Sample ID	SJ7652-10

Date Received	09/22/16
Start Date/Time	9/27/16:14:11
End Date/Time	9/30/16:15:35

Sample Weight	Sample (g)
Sample Weight (wet)	101.8
Sample Weight (oven dried)	75.02

Date/Time in oven	9/29/16:15:10
Date/Time out of oven	9/30/16:9:10

% Moisture	26.306

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	9.8
Sample <=#10	65.22
%Passing #10	86.94

Hydrometer Data

Serial Number	379474
Cal Date:	9/28/16:10:33
Low Temp C	19.30
Low Temp Reading	1.0030
High Temp	23.10
High Temp Reading	1.0025
Hyd Cal Slope	-0.000132
Hyd Cal Intercept	0.005539
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	556.6	556.6	0	100	Gravel	
1/4"	6300	505.9	508.4	2.5	96.67	Gravel	
#4	4750	403.9	405.1	1.2	95.07	Gravel	
#10	2000	371.50	377.20	5.7	87.47	Sand	Coarse
#20	850	302.9	309.1	6.2	79.21	Sand	Medium
#40	425	273.9	280.6	6.7	70.27	Sand	Medium
#60	250	248	257.8	9.8	57.21	Sand	Fine
#80	180	328.1	341.3	13.2	39.62	Sand	Fine
#100	150	238.6	243.7	5.1	32.82	Sand	Fine
#200	75	227.8	232.8	5	26.15	Sand	Fine

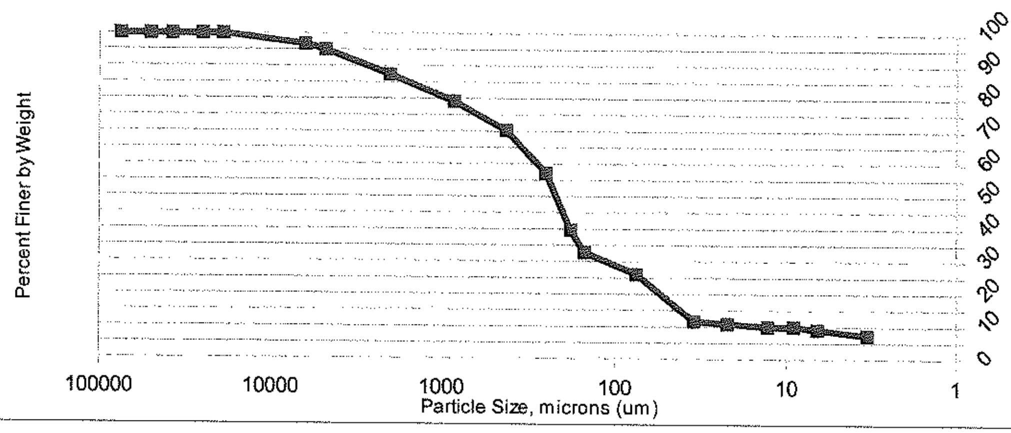
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0100	22.5	11.71	34.67	Silt
5	5	1.0095	22.5	10.92	22.08	Silt
15	15	1.0090	22	10.03	12.82	Silt
30	30	1.0090	22	10.03	9.07	Silt
60	60	1.0085	21.5	9.13	6.52	Silt
240	240	1.0075	20.5	7.35	3.32	Clay
1440	1440	1.0065	19.5	5.56	1.39	Clay

Gravel	4.93
Sand Coarse	7.60
Sand Medium	17.20
Sand Fine	44.12
Silt	18.10
Clay	8.06
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-09
Lab Sample ID	SJ7652-10



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	96.67
#4	4750	95.07
#10	2000	87.47
#20	850	79.21
#40	425	70.27
#60	250	57.21
#80	180	39.62
#100	150	32.82
#200	75	26.15
2	34.67	11.71
5	22.08	10.92
15	12.82	10.03
30	9.07	10.03
60	6.52	9.13
240	3.32	7.35
1440	1.39	5.56

Gravel	4.93
Sand Coarse	7.60
Sand Medium	17.20
Sand Fine	44.12
Silt	18.10
Clay	8.06

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-10
Lab Sample ID	SJ7652-11

Date Received	09/22/16
Start Date/Time	9/27/16:14:12
End Date/Time	9/30/16:15:48

Sample Weight	Sample (g)
Sample Weight (wet)	101.4
Sample Weight (oven dried)	74.98

Date/Time in oven	9/29/16:15:10
Date/Time out of oven	9/30/16:9:10

% Moisture	26.052

Hydrometer Data

Serial Number	379474
Cal Date:	9/28/16:10:33
Low Temp C	19.30
Low Temp Reading	1.0030
High Temp	23.10
High Temp Reading	1.0025
Hyd Cal Slope	-0.000132
Hyd Cal Intercept	0.005539
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	17
Sample <=#10	57.98
%Passing #10	77.32

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	556.6	556.6	0	100	Gravel	
1/4"	6300	505.9	517.2	11.3	84.93	Gravel	
#4	4750	403.9	404.6	0.7	84.00	Gravel	
#10	2000	371.50	376.50	5	77.33	Sand	Coarse
#20	850	302.9	306.7	3.8	72.26	Sand	Medium
#40	425	273.9	278.3	4.4	66.39	Sand	Medium
#60	250	248	258.2	10.2	52.79	Sand	Fine
#80	180	328.1	343.6	15.5	32.12	Sand	Fine
#100	150	238.6	245.7	7.1	22.65	Sand	Fine
#200	75	227.8	234.4	6.6	13.85	Sand	Fine

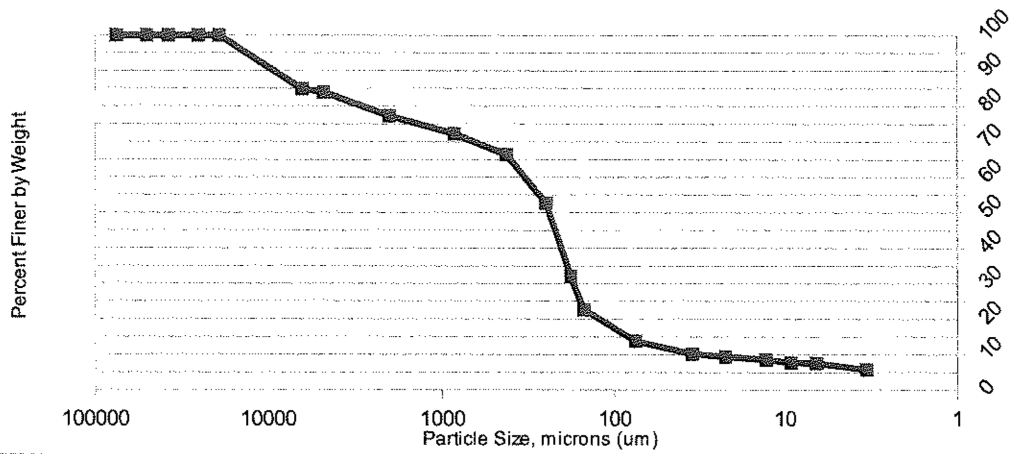
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0090	22.5	10.17	34.92	Silt
5	5	1.0085	22.5	9.38	22.32	Silt
15	15	1.0080	22.5	8.59	12.89	Silt
30	30	1.0075	22	7.69	9.23	Silt
60	60	1.0075	21.5	7.59	6.56	Silt
240	240	1.0065	20.5	5.79	3.36	Clay
1440	1440	1.0060	19.5	4.79	1.39	Clay

Gravel	16.00
Sand Coarse	6.67
Sand Medium	10.94
Sand Fine	52.55
Silt	7.28
Clay	6.57
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-10
Lab Sample ID	SJ7652-11



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	84.93
#4	4750	84.00
#10	2000	77.33
#20	850	72.26
#40	425	66.39
#60	250	52.79
#80	180	32.12
#100	150	22.65
#200	75	13.85
2	34.92	10.17
5	22.32	9.38
15	12.89	8.59
30	9.23	7.69
60	6.56	7.59
240	3.36	5.79
1440	1.39	4.79

Gravel	16.00
Sand Coarse	6.67
Sand Medium	10.94
Sand Fine	52.55
Silt	7.28
Clay	6.57

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-11
Lab Sample ID	SJ7652-12

Date Received	09/22/16
Start Date/Time	9/27/16:14:14
End Date/Time	9/30/16:15:55

Sample Weight	Sample (g)
Sample Weight (wet)	110.6
Sample Weight (oven dried)	77.31

Date/Time in oven	9/29/16:15:10
Date/Time out of oven	9/30/16:9:10

% Moisture	30.098

Hydrometer Data

Serial Number	379474
Cal Date:	9/28/16:10:33
Low Temp C	19.30
Low Temp Reading	1.0030
High Temp	23.10
High Temp Reading	1.0025
Hyd Cal Slope	-0.000132
Hyd Cal Intercept	0.005539
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	1.1
Sample <=#10	76.21
%Passing #10	98.58

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	556.6	556.6	0	100	Gravel	
1/4"	6300	505.9	506.4	0.5	99.35	Gravel	
#4	4750	403.9	404.3	0.4	98.84	Gravel	
#10	2000	371.50	371.70	0.2	98.58	Sand	Coarse
#20	850	302.9	303.2	0.3	98.19	Sand	Medium
#40	425	273.9	274.4	0.5	97.54	Sand	Medium
#60	250	248	250	2	94.96	Sand	Fine
#80	180	328.1	338.3	10.2	81.76	Sand	Fine
#100	150	238.6	251.4	12.8	65.21	Sand	Fine
#200	75	227.8	258.7	30.9	25.24	Sand	Fine

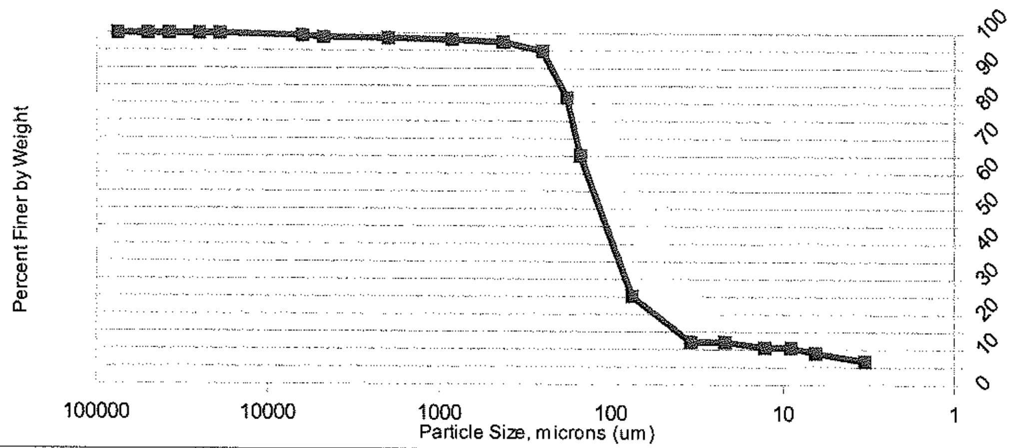
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0110	22.5	12.23	34.28	Silt
5	5	1.0110	22.5	12.23	21.68	Silt
15	15	1.0100	22	10.68	12.73	Silt
30	30	1.0100	22	10.68	9.00	Silt
60	60	1.0090	21.5	9.13	6.45	Silt
240	240	1.0075	20.5	6.76	3.32	Clay
1440	1440	1.0070	19.5	5.85	1.37	Clay

Gravel	1.16
Sand Coarse	0.26
Sand Medium	1.03
Sand Fine	72.30
Silt	16.99
Clay	8.25
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-11
Lab Sample ID	SJ7652-12



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	99.35
#4	4750	98.84
#10	2000	98.58
#20	850	98.19
#40	425	97.54
#60	250	94.96
#80	180	81.76
#100	150	65.21
#200	75	25.24
2	34.28	12.23
5	21.68	12.23
15	12.73	10.68
30	9.00	10.68
60	6.45	9.13
240	3.32	6.76
1440	1.37	5.85

Gravel	1.16
Sand Coarse	0.26
Sand Medium	1.03
Sand Fine	72.30
Silt	16.99
Clay	8.25

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-12
Lab Sample ID	SJ7652-13

Date Received	09/22/16
Start Date/Time	9/27/16:14:16
End Date/Time	9/30/16:16:02

Sample Weight	Sample (g)
Sample Weight (wet)	122.3
Sample Weight (oven dried)	77.17

Date/Time in oven	9/29/16:15:10
Date/Time out of oven	9/30/16:9:10

% Moisture	36.903

Hydrometer Data

Serial Number	379474
Cal Date:	9/28/16:10:33
Low Temp C	19.30
Low Temp Reading	1.0030
High Temp	23.10
High Temp Reading	1.0025
Hyd Cal Slope	-0.000132
Hyd Cal Intercept	0.005539
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	77.17
%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	302.9	303.2	0.3	99.61	Sand	Medium
#40	425	273.9	274.3	0.4	99.09	Sand	Medium
#60	250	248	248.9	0.9	97.93	Sand	Fine
#80	180	328.1	334	5.9	90.28	Sand	Fine
#100	150	238.6	248.3	9.7	77.71	Sand	Fine
#200	75	227.8	257.4	29.6	39.35	Sand	Fine

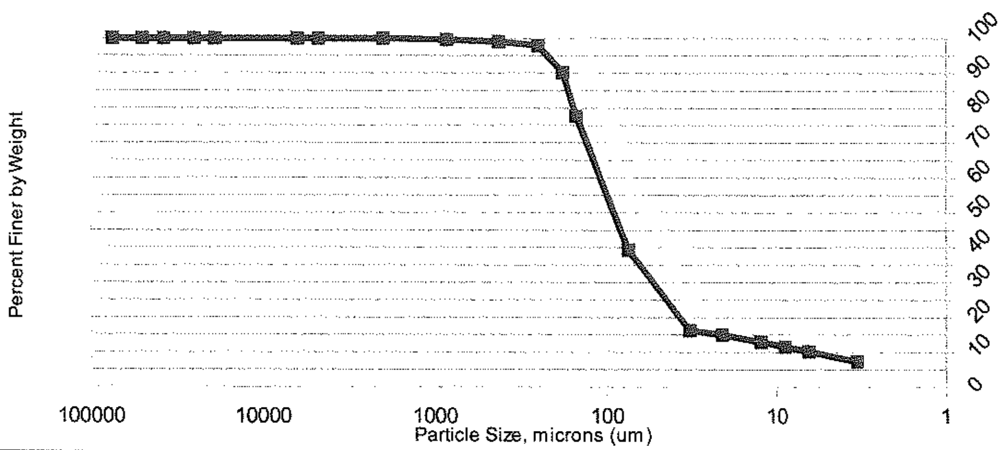
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0150	22.5	16.31	32.85	Silt
5	5	1.0140	22.5	15.00	21.03	Silt
15	15	1.0125	22.5	13.03	12.38	Silt
30	30	1.0115	22	11.63	8.90	Silt
60	60	1.0105	21.5	10.23	6.40	Silt
240	240	1.0085	20.5	7.43	3.30	Clay
1440	1440	1.0075	19.5	5.94	1.37	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.91
Sand Fine	59.74
Silt	30.28
Clay	9.07
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-12
Lab Sample ID	SJ7652-13



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	99.61
#40	425	99.09
#60	250	97.93
#80	180	90.28
#100	150	77.71
#200	75	39.35
2	32.85	16.31
5	21.03	15.00
15	12.38	13.03
30	8.90	11.63
60	6.40	10.23
240	3.30	7.43
1440	1.37	5.94

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.91
Sand Fine	59.74
Silt	30.28
Clay	9.07

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-1
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-01	SL	20-SEP-16 08:55:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	5000 ug/gdrywt	790	170	SW846 9060A Mod.	WG191840	27-SEP-16 13:24:19	N/A	N/A	ZF	
Toc In Soil(2)	4300 ug/gdrywt	660	140	SW846 9060A Mod.	WG191840	27-SEP-16 13:38:16	N/A	N/A	ZF	
Toc In Soil(3)	4800 ug/gdrywt	680	140	SW846 9060A Mod.	WG191840	27-SEP-16 13:53:38	N/A	N/A	ZF	
Toc In Soil(4)	5800 ug/gdrywt	650	140	SW846 9060A Mod.	WG191840	27-SEP-16 14:06:05	N/A	N/A	ZF	
Toc In Soil(Avg)	4600 ug/gdrywt	720	160	SW846 9060A Mod.	WG191840	27-SEP-16 17:40:00	N/A	N/A	ZF	
Total Solids	74. %	1		SM2540G	WG191232	26-SEP-16 11:16:20	SM2540G	23-SEP-16	AP	

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-2
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-02	SL	20-SEP-16 09:05:00	22-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	1300	280	SW846 9060A Mod.	WG191840	27-SEP-16 14:18:31	N/A	N/A	ZF	
Total Solids	55. %	1		SM2540G	WG191232	26-SEP-16 11:16:28	SM2540G	23-SEP-16	AP	

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-3
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-03	SL	20-SEP-16 09:22:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	8400 ug/gdrywt	820	170	SW846 9060A Mod.	WG191840	27-SEP-16 14:32:52	N/A	N/A	ZF	
Total Solids	68. %	1		SM2540G	WG191232	26-SEP-16 11:16:38	SM2540G	23-SEP-16	AP	

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-4
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-04	SL	20-SEP-16 09:36:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	22000 ug/gdrywt	1200	250	SW846 9060A Mod.	WG191840	27-SEP-16 14:51:50	N/A	N/A	ZF	
Total Solids	51. %	1		SM2540G	WG191232	26-SEP-16 11:16:49	SM2540G	23-SEP-16	AP	

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-5
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-04 DUP	SL	20-SEP-16 09:36:00	22-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	1300	270	SW846 9060A Mod.	WG191840	27-SEP-16 16:21:08	N/A	N/A	ZF	
Total Solids	47. %	1		SM2540G	WG191232	26-SEP-16 11:16:58	SM2540G	23-SEP-16	AP	

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-6
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-05	SL	20-SEP-16 09:54:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	16000 ug/gdrywt	880	190	SW846 9060A Mod.	WG191840	27-SEP-16 16:32:32	N/A	N/A	ZF	
Total Solids	57. %	1		SM2540G	WG191232	26-SEP-16 11:17:07	SM2540G	23-SEP-16	AP	

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Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-7
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-06	SL	20-SEP-16 10:06:00	22-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	1300	280	SW846 9060A Mod.	WG191840	27-SEP-16 17:07:49	N/A	N/A	ZF	
Total Solids	46. %	1		SM2540G	WG191232	26-SEP-16 11:17:18	SM2540G	23-SEP-16	AP	

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-8
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-07	SL	20-SEP-16 10:19:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	10000 ug/gdrywt	900	190	SW846 9060A Mod.	WG191840	27-SEP-16 17:18:41	N/A	N/A	ZF	
Total Solids	63. %	1		SM2540G	WG191232	26-SEP-16 11:17:28	SM2540G	23-SEP-16	AP	

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Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-9
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-08	SL	20-SEP-16 10:34:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	10000 ug/gdrywt	780	160	SW846 9060A Mod.	WG191850	28-SEP-16 12:16:13	N/A	N/A	ZF	
Total Solids	62. %	1		SM2540G	WG191232	26-SEP-16 11:17:36	SM2540G	23-SEP-16	AP	

Report of Analytical Results

Client:	Lisa Lefkovitz Battelle- Applied Coastal Engineering 141 Longwater Drive Norwell,MA 02061	**Lab Sample ID:**	SJ7652-10
		Report Date:	04-OCT-16
		Client PO:	US001-0000554493
		Project:	USACE NAE DAMOS Portland Disposal Sit
		SDG:	SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-09	SL	20-SEP-16 11:20:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	10000 ug/gdrywt	630	130	SW846 9060A Mod.	WG191850	28-SEP-16 12:34:33	N/A	N/A	ZF	
Total Solids	74. %	1		SM2540G	WG191232	26-SEP-16 11:17:44	SM2540G	23-SEP-16	AP	

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Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-11
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-10	SL	20-SEP-16 11:45:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	5100 ug/gdrywt	590	120	SW846 9060A Mod.	WG191850	28-SEP-16 12:47:50	N/A	N/A	ZF	
Total Solids	74. %	1		SM2540G	WG191232	26-SEP-16 11:17:58	SM2540G	23-SEP-16	AP	

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-12
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-11	SL	20-SEP-16 12:12:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	8900 ug/gdrywt	640	140	SW846 9060A Mod.	WG191850	28-SEP-16 13:02:13	N/A	N/A	ZF	
Total Solids	70. %	1		SM2540G	WG191232	26-SEP-16 11:18:06	SM2540G	23-SEP-16	AP	

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-13
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-12	SL	20-SEP-16 12:27:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	9400 ug/gdrywt	780	170	SW846 9060A Mod.	WG191850	28-SEP-16 13:12:31	N/A	N/A	ZF	
Toc In Soil(2)	9900 ug/gdrywt	800	170	SW846 9060A Mod.	WG191850	28-SEP-16 13:26:45	N/A	N/A	ZF	
Toc In Soil(3)	9500 ug/gdrywt	750	160	SW846 9060A Mod.	WG191850	28-SEP-16 13:36:33	N/A	N/A	ZF	
Toc In Soil(4)	9800 ug/gdrywt	800	170	SW846 9060A Mod.	WG191850	28-SEP-16 13:46:25	N/A	N/A	ZF	
Toc In Soil(Avg)	9600 ug/gdrywt	790	170	SW846 9060A Mod.	WG191850	28-SEP-16 16:50:00	N/A	N/A	ZF	
Total Solids	63. %	1		SM2540G	WG191232	26-SEP-16 11:18:15	SM2540G	23-SEP-16	AP	

GRAIN SIZE

Sample Data Section

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-01
Lab Sample ID	SJ7652-1

Date Received	09/22/16
Start Date/Time	9/26/16:13:49
End Date/Time	9/29/16:13:54

Sample Weight	Sample (g)
Sample Weight (wet)	103.4
Sample Weight (oven dried)	76.62

Date/Time in oven	9/28/16:14:50
Date/Time out of oven	9/29/16:8:50

% Moisture	25.899

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0.6
Sample <=#10	76.02
%Passing #10	99.22

Hydrometer Data

Serial Number	379474
Cal Date:	9/27/16:10:33
Low Temp C	19.70
Low Temp Reading	1.0035
High Temp	23.40
High Temp Reading	1.0025
Hyd Cal Slope	-0.000270
Hyd Cal Intercept	0.008824
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	556.6	556.6	0	100	Gravel	
1/4"	6300	505.9	506.2	0.3	99.61	Gravel	
#4	4750	403.9	403.9	0	99.61	Gravel	
#10	2000	371.50	371.80	0.3	99.22	Sand	Coarse
#20	850	302.9	303.5	0.6	98.43	Sand	Medium
#40	425	273.9	277.8	3.9	93.34	Sand	Medium
#60	250	248	262.3	14.3	74.68	Sand	Fine
#80	180	328.1	345.6	17.5	51.84	Sand	Fine
#100	150	238.6	248.5	9.9	38.92	Sand	Fine
#200	75	227.8	243	15.2	19.08	Sand	Fine

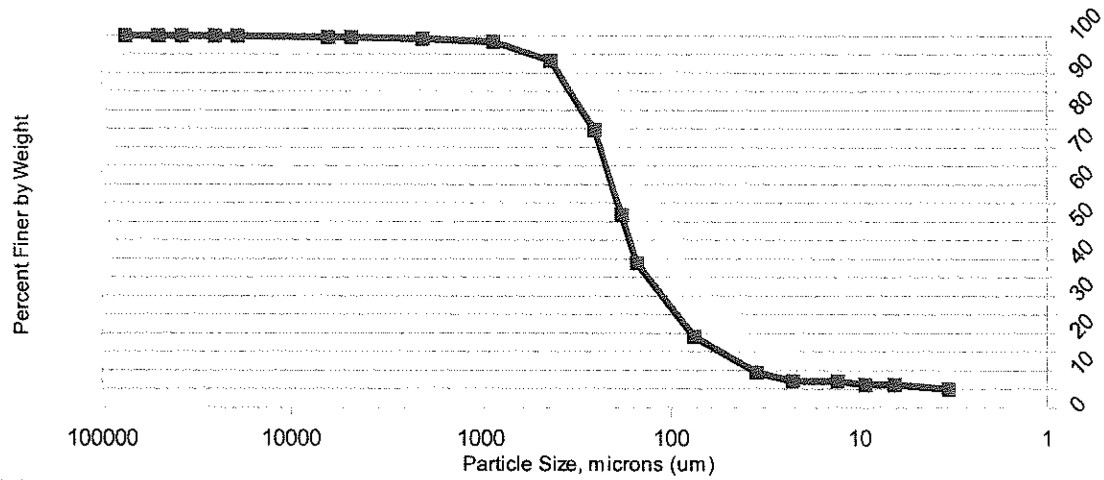
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0090	22	9.51	35.12	Silt
5	5	1.0075	22	7.18	22.60	Silt
15	15	1.0075	22	7.18	13.05	Silt
30	30	1.0070	21.5	6.19	9.28	Silt
60	61	1.0070	21.5	6.19	6.51	Silt
240	240	1.0065	20.5	5.00	3.36	Clay
1440	1440	1.0060	20	4.01	1.38	Clay

Gravel	0.39
Sand Coarse	0.39
Sand Medium	5.87
Sand Fine	74.26
Silt	13.73
Clay	5.35
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-01
Lab Sample ID	SJ7652-1



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	99.61
#4	4750	99.61
#10	2000	99.22
#20	850	98.43
#40	425	93.34
#60	250	74.68
#80	180	51.84
#100	150	38.92
#200	75	19.08
2	35.12	9.51
5	22.60	7.18
15	13.05	7.18
30	9.28	6.19
61	6.51	6.19
240	3.36	5.00
1440	1.38	4.01

Gravel	0.39
Sand Coarse	0.39
Sand Medium	5.87
Sand Fine	74.26
Silt	13.73
Clay	5.35

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-02
Lab Sample ID	SJ7652-2

Date Received	09/22/16
Start Date/Time	9/26/16:13:53
End Date/Time	9/29/16:14:07

Sample Weight	Sample (g)
Sample Weight (wet)	111.4
Sample Weight (oven dried)	61.72

Date/Time in oven	9/28/16:14:50
Date/Time out of oven	9/29/16:8:50

% Moisture	44.596

Hydrometer Data

Serial Number	379474
Cal Date:	9/27/16:10:33
Low Temp C	19.70
Low Temp Reading	1.0035
High Temp	23.40
High Temp Reading	1.0025
Hyd Cal Slope	-0.000270
Hyd Cal Intercept	0.008824
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	1.6
Sample <=#10	60.12
%Passing #10	97.41

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	556.6	556.6	0	100	Gravel	
1/4"	6300	505.9	507.3	1.4	97.73	Gravel	
#4	4750	403.9	403.9	0	97.73	Gravel	
#10	2000	371.50	371.70	0.2	97.41	Sand	Coarse
#20	850	302.9	303.8	0.9	95.95	Sand	Medium
#40	425	273.9	275.9	2	92.71	Sand	Medium
#60	250	248	251.6	3.6	86.88	Sand	Fine
#80	180	328.1	332.5	4.4	79.75	Sand	Fine
#100	150	238.5	241.7	3.2	74.56	Sand	Fine
#200	75	227.8	237.4	9.6	59.01	Sand	Fine

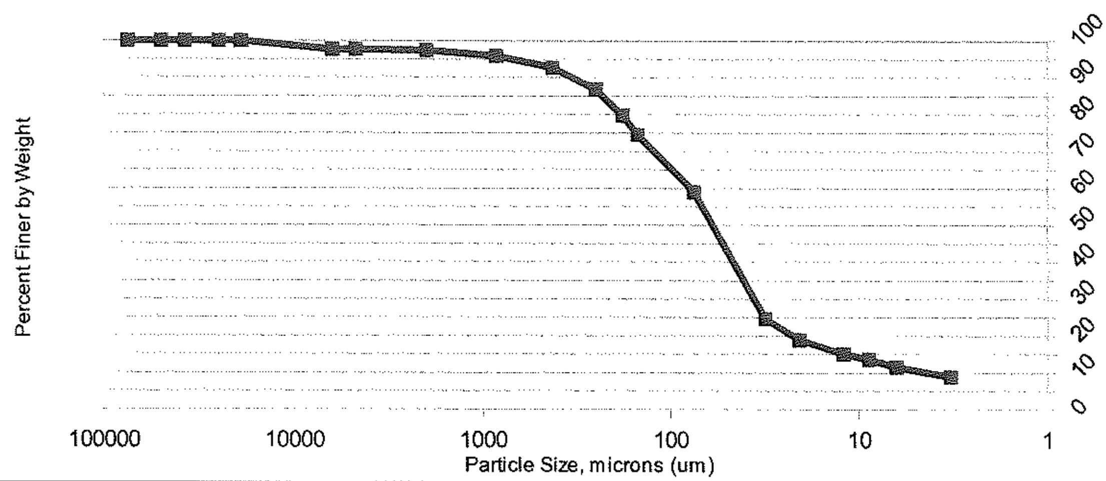
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0200	22	24.68	31.24	Silt
5	5	1.0160	22	18.92	20.72	Silt
15	16	1.0135	21.5	15.12	12.03	Silt
30	30	1.0125	21.5	13.68	8.85	Silt
60	60	1.0110	21.5	11.51	6.33	Silt
240	240	1.0095	20.5	8.96	3.26	Clay
1440	1440	1.0085	19.5	7.13	1.36	Clay

Gravel	2.27
Sand Coarse	0.32
Sand Medium	4.70
Sand Fine	33.70
Silt	48.64
Clay	10.37
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-02
Lab Sample ID	SJ7652-2



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	97.73
#4	4750	97.73
#10	2000	97.41
#20	850	95.95
#40	425	92.71
#60	250	86.88
#80	180	79.75
#100	150	74.56
#200	75	59.01
2	31.24	24.68
5	20.72	18.92
16	12.03	15.12
30	8.85	13.68
60	6.33	11.51
240	3.26	8.96
1440	1.36	7.13

Gravel	2.27
Sand Coarse	0.32
Sand Medium	4.70
Sand Fine	33.70
Silt	48.64
Clay	10.37

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-03
Lab Sample ID	SJ7652-3

Date Received	09/22/16
Start Date/Time	9/26/16:13:55
End Date/Time	9/29/16:14:24

Sample Weight	Sample (g)
Sample Weight (wet)	110.4
Sample Weight (oven dried)	74.59

Date/Time in oven	9/28/16:14:50
Date/Time out of oven	9/29/16:8:50

% Moisture	32.44

Hydrometer Data

Serial Number	379474
Cal Date:	9/27/16:10:33
Low Temp C	19.70
Low Temp Reading	1.0035
High Temp	23.40
High Temp Reading	1.0025
Hyd Cal Slope	-0.000270
Hyd Cal Intercept	0.008824
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	2.2
Sample <=#10	72.39
%Passing #10	97.06

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	99.87	Gravel	
#10	2000	371.50	373.60	2.1	97.05	Sand	Coarse
#20	850	302.9	305.6	2.7	93.43	Sand	Medium
#40	425	273.9	277.1	3.2	89.14	Sand	Medium
#60	250	248.1	249.9	1.8	86.73	Sand	Fine
#80	180	328.1	330.1	2	84.05	Sand	Fine
#100	150	238.5	239.6	1.1	82.57	Sand	Fine
#200	75	227.8	229.9	2.1	79.75	Sand	Fine

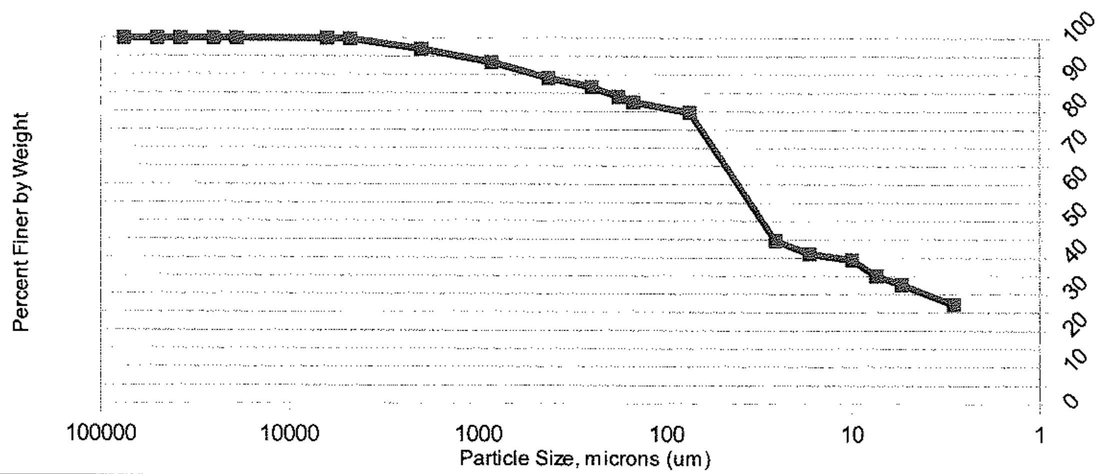
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0335	22.5	44.74	25.82	Silt
5	5	1.0310	22.5	41.11	16.86	Silt
15	15	1.0300	22	39.46	9.97	Silt
30	30	1.0270	22	35.09	7.38	Silt
60	60	1.0255	21.5	32.71	5.39	Silt
240	240	1.0220	20.5	27.23	2.84	Clay
1440	1440	1.0175	20	20.48	1.24	Clay

Gravel	0.13
Sand Coarse	2.82
Sand Medium	7.91
Sand Fine	9.39
Silt	49.57
Clay	30.18
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-03
Lab Sample ID	SJ7652-3



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	99.87
#10	2000	97.05
#20	850	93.43
#40	425	89.14
#60	250	86.73
#80	180	84.05
#100	150	82.57
#200	75	79.75
2	25.82	44.74
5	16.86	41.11
15	9.97	39.46
30	7.38	35.09
60	5.39	32.71
240	2.84	27.23
1440	1.24	20.48

Gravel	0.13
Sand Coarse	2.82
Sand Medium	7.91
Sand Fine	9.39
Silt	49.57
Clay	30.18

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-04
Lab Sample ID	SJ7652-4

Date Received	09/22/16
Start Date/Time	9/26/16:13:57
End Date/Time	9/29/16:14:30

Sample Weight	Sample (g)
Sample Weight (wet)	99.1
Sample Weight (oven dried)	50.78

Date/Time in oven	9/28/16:14:50
Date/Time out of oven	9/29/16:8:50

% Moisture	48.757

Hydrometer Data

Serial Number	379474
Cal Date:	9/27/16:10:33
Low Temp C	19.70
Low Temp Reading	1.0035
High Temp	23.40
High Temp Reading	1.0025
Hyd Cal Slope	-0.000270
Hyd Cal Intercept	0.008824
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0.8
Sample <=#10	49.98
%Passing #10	98.42

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	372.30	0.8	98.42	Sand	Coarse
#20	850	302.9	304.1	1.2	96.06	Sand	Medium
#40	425	273.8	275.8	2	92.12	Sand	Medium
#60	250	248	250	2	88.18	Sand	Fine
#80	180	328.1	329.6	1.5	85.23	Sand	Fine
#100	150	238.5	239.4	0.9	83.46	Sand	Fine
#200	75	227.8	230.8	3	77.55	Sand	Fine

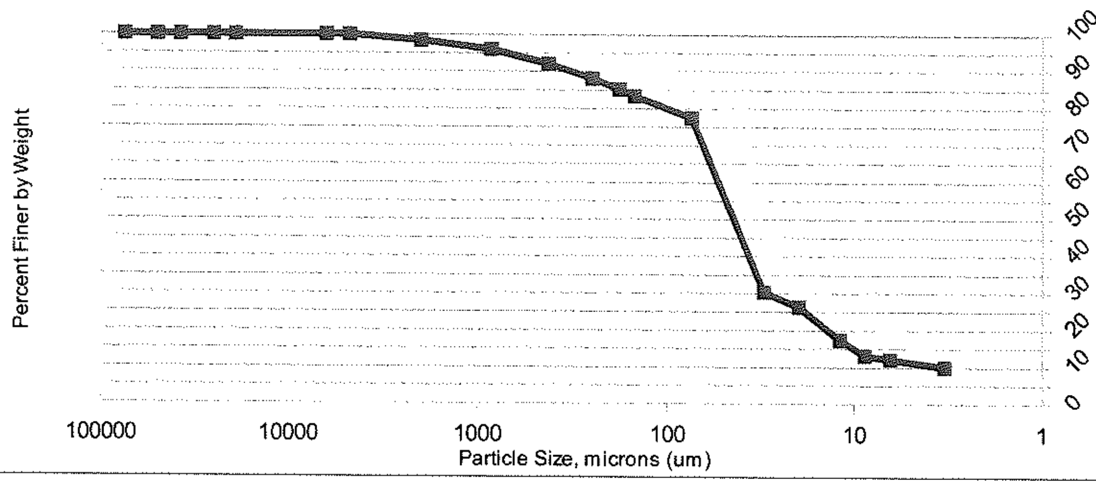
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0215	22.5	30.40	30.64	Silt
5	5	1.0190	22.5	26.35	19.91	Silt
15	16	1.0135	22.5	17.43	11.89	Silt
30	31	1.0110	22	13.16	8.76	Silt
60	60	1.0105	21.5	12.13	6.40	Silt
240	240	1.0095	20.5	10.07	3.26	Clay
1440	1440	1.0080	20	7.42	1.36	Clay

Gravel	0.00
Sand Coarse	1.58
Sand Medium	6.30
Sand Fine	14.57
Silt	66.37
Clay	11.18
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-04
Lab Sample ID	SJ7652-4



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	98.42
#20	850	96.06
#40	425	92.12
#60	250	88.18
#80	180	85.23
#100	150	83.46
#200	75	77.55
2	30.64	30.40
5	19.91	26.35
16	11.89	17.43
31	8.76	13.16
60	6.40	12.13
240	3.26	10.07
1440	1.36	7.42

Gravel	0.00
Sand Coarse	1.58
Sand Medium	6.30
Sand Fine	14.57
Silt	66.37
Clay	11.18

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-04DUP
Lab Sample ID	SJ7652-5

Date Received	09/22/16
Start Date/Time	9/26/16:13:59
End Date/Time	9/29/16:14:35

Sample Weight	Sample (g)
Sample Weight (wet)	106.8
Sample Weight (oven dried)	50.54

Date/Time in oven	9/28/16:14:50
Date/Time out of oven	9/29/16:8:50

% Moisture	52.68

Hydrometer Data

Serial Number	379474
Cal Date:	9/27/16:10:33
Low Temp C	19.70
Low Temp Reading	1.0035
High Temp	23.40
High Temp Reading	1.0025
Hyd Cal Slope	-0.000270
Hyd Cal Intercept	0.008824
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0.5
Sample <=#10	50.04
%Passing #10	99.02

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	372.00	0.5	99.01	Sand	Coarse
#20	850	302.9	303.8	0.9	97.23	Sand	Medium
#40	425	273.8	275.7	1.9	93.47	Sand	Medium
#60	250	248	249.9	1.9	89.71	Sand	Fine
#80	180	328.1	329.9	1.8	86.15	Sand	Fine
#100	150	238.5	239.5	1	84.17	Sand	Fine
#200	75	227.8	230.5	2.7	78.83	Sand	Fine

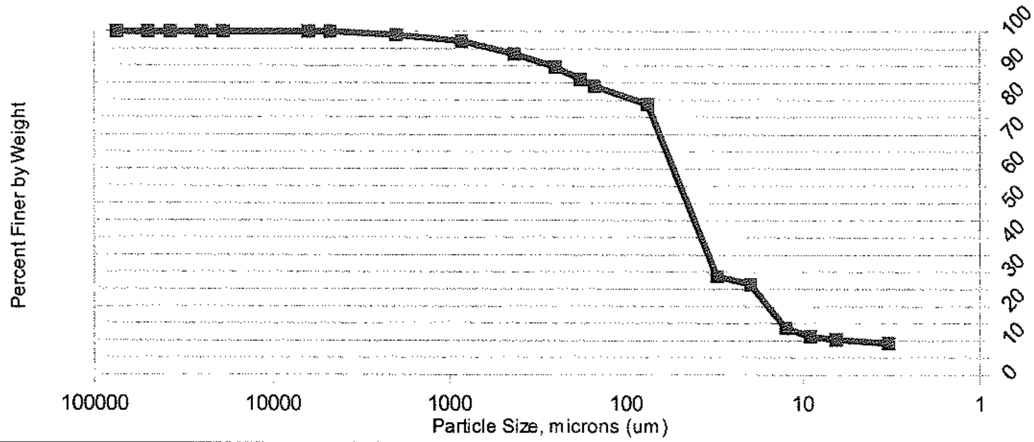
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0220	22	28.76	30.52	Silt
5	5	1.0205	22	26.50	19.76	Silt
15	15	1.0120	22	13.72	12.45	Silt
30	30	1.0105	21.5	11.26	9.06	Silt
60	60	1.0100	21	10.30	6.44	Silt
240	240	1.0095	20.5	9.35	3.26	Clay
1440	1440	1.0080	20	6.89	1.36	Clay

Gravel	0.00
Sand Coarse	0.99
Sand Medium	5.54
Sand Fine	14.64
Silt	69.16
Clay	9.67
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-04DUP
Lab Sample ID	SJ7652-5



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	99.01
#20	850	97.23
#40	425	93.47
#60	250	89.71
#80	180	86.15
#100	150	84.17
#200	75	78.83
2	30.52	28.76
5	19.76	26.50
15	12.45	13.72
30	9.06	11.26
60	6.44	10.30
240	3.26	9.35
1440	1.36	6.89

Gravel	0.00
Sand Coarse	0.99
Sand Medium	5.54
Sand Fine	14.64
Silt	69.16
Clay	9.67

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-05
Lab Sample ID	SJ7652-6

Date Received	09/22/16
Start Date/Time	9/26/16:14:01
End Date/Time	9/29/16:14:45

Sample Weight	Sample (g)
Sample Weight (wet)	92.7
Sample Weight (oven dried)	53.32

Date/Time in oven	9/28/16:14:50
Date/Time out of oven	9/29/16:8:50

% Moisture	42.481

Hydrometer Data

Serial Number	379474
Cal Date:	9/27/16:10:33
Low Temp C	19.70
Low Temp Reading	1.0035
High Temp	23.40
High Temp Reading	1.0025
Hyd Cal Slope	-0.000270
Hyd Cal Intercept	0.008824
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	2.4
Sample <=#10	50.92
%Passing #10	95.50

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	556.6	556.6	0	100	Gravel	
1/4"	6300	505.9	506.8	0.9	98.31	Gravel	
#4	4750	403.9	404.1	0.2	97.94	Gravel	
#10	2000	371.50	372.80	1.3	95.50	Sand	Coarse
#20	850	302.9	306.8	3.9	88.18	Sand	Medium
#40	425	273.8	278.8	5	78.81	Sand	Medium
#60	250	248	251.4	3.4	72.43	Sand	Fine
#80	180	328.1	329.8	1.7	69.24	Sand	Fine
#100	150	238.5	239.3	0.8	67.74	Sand	Fine
#200	75	227.8	230.3	2.5	63.05	Sand	Fine

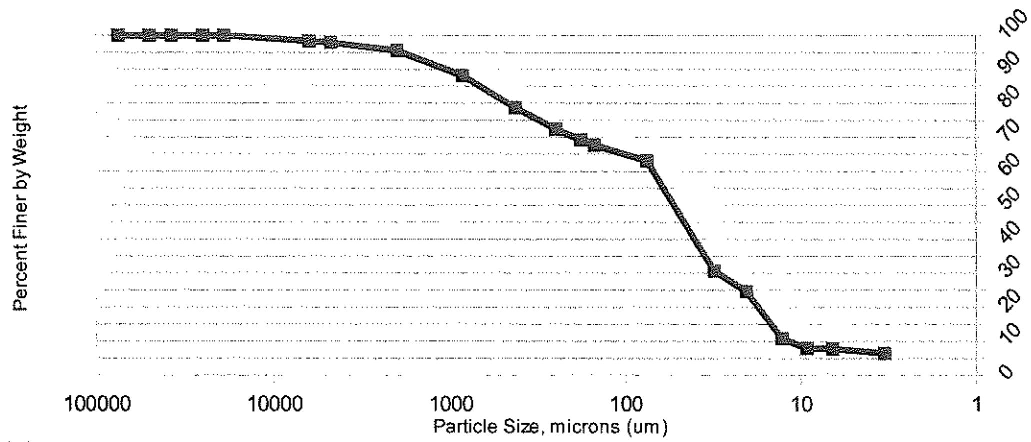
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0205	22.5	30.76	31.06	Silt
5	5	1.0170	22.5	24.70	20.35	Silt
15	15	1.0090	22.5	10.84	12.75	Silt
30	30	1.0075	22	8.01	9.23	Silt
60	60	1.0075	21.5	7.77	6.56	Silt
240	240	1.0070	20.5	6.44	3.32	Clay
1440	1440	1.0065	20	5.34	1.38	Clay

Gravel	2.06
Sand Coarse	2.44
Sand Medium	16.69
Sand Fine	15.75
Silt	56.27
Clay	6.79
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-05
Lab Sample ID	SJ7652-6



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	98.31
#4	4750	97.94
#10	2000	95.50
#20	850	88.18
#40	425	78.81
#60	250	72.43
#80	180	69.24
#100	150	67.74
#200	75	63.05
2	31.06	30.76
5	20.35	24.70
15	12.75	10.84
30	9.23	8.01
60	6.56	7.77
240	3.32	6.44
1440	1.38	5.34

Gravel	2.06
Sand Coarse	2.44
Sand Medium	16.69
Sand Fine	15.75
Silt	56.27
Clay	6.79

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-06
Lab Sample ID	SJ7652-7

Date Received	09/22/16
Start Date/Time	9/26/16:14:05
End Date/Time	9/29/16:14:55

Sample Weight	Sample (g)
Sample Weight (wet)	109
Sample Weight (oven dried)	50.32

Date/Time in oven	9/28/16:14:50
Date/Time out of oven	9/29/16:8:50

% Moisture	53.838

Hydrometer Data

Serial Number	379474
Cal Date:	9/27/16:10:33
Low Temp C	19.70
Low Temp Reading	1.0035
High Temp	23.40
High Temp Reading	1.0025
Hyd Cal Slope	-0.000270
Hyd Cal Intercept	0.008824
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	50.32
%Passing #10	100.01

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	302.9	302.9	0	100.00	Sand	Medium
#40	425	273.8	274.1	0.3	99.40	Sand	Medium
#60	250	248	248.6	0.6	98.21	Sand	Fine
#80	180	328.1	329.2	1.1	96.03	Sand	Fine
#100	150	238.5	239.4	0.9	94.24	Sand	Fine
#200	75	227.8	232.3	4.5	85.29	Sand	Fine

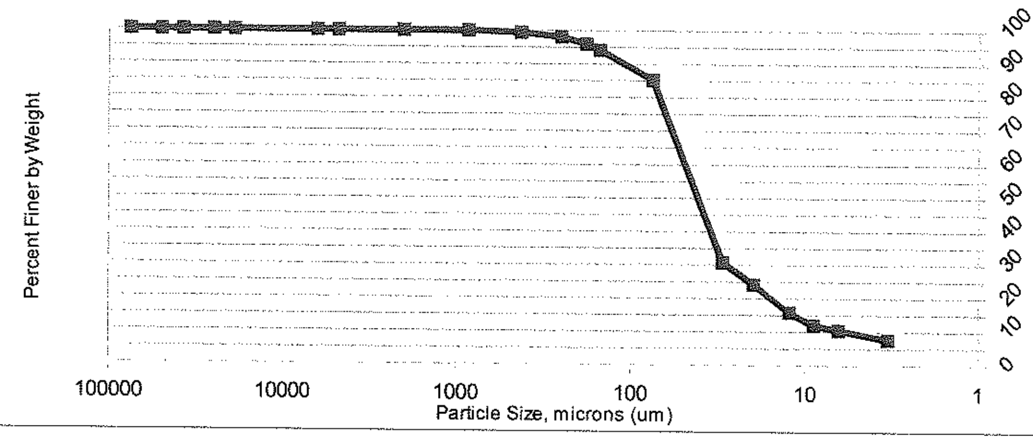
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0235	23	30.78	29.74	Silt
5	5	1.0190	23	24.15	19.80	Silt
15	15	1.0135	22.5	15.85	12.28	Silt
30	30	1.0110	22	11.97	8.90	Silt
60	60	1.0100	22	10.49	6.36	Silt
240	240	1.0085	20.5	7.69	3.30	Clay
1440	1440	1.0080	20	6.75	1.36	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.60
Sand Fine	14.11
Silt	75.85
Clay	9.44
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-06
Lab Sample ID	SJ7652-7



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	99.40
#60	250	98.21
#80	180	96.03
#100	150	94.24
#200	75	85.29
2	29.74	30.78
5	19.80	24.15
15	12.28	15.85
30	8.90	11.97
60	6.36	10.49
240	3.30	7.69
1440	1.36	6.75

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.60
Sand Fine	14.11
Silt	75.85
Clay	9.44

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-07
Lab Sample ID	SJ7652-8

Date Received	09/22/16
Start Date/Time	9/27/16:14:08
End Date/Time	9/30/16:15:21

Sample Weight	Sample (g)
Sample Weight (wet)	118.9
Sample Weight (oven dried)	75.31

Date/Time in oven	9/29/16:15:10
Date/Time out of oven	9/30/16:9:10

% Moisture	36.658

Hydrometer Data

Serial Number	379474
Cal Date:	9/28/16:10:33
Low Temp C	19.30
Low Temp Reading	1.0030
High Temp	23.10
High Temp Reading	1.0025
Hyd Cal Slope	-0.000132
Hyd Cal Intercept	0.005539
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	3.3
Sample <=#10	72.01
%Passing #10	95.61

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	404.1	0.2	99.73	Gravel	
#10	2000	371.50	374.40	2.9	95.88	Sand	Coarse
#20	850	302.9	306.5	3.6	91.10	Sand	Medium
#40	425	273.9	279	5.1	84.33	Sand	Medium
#60	250	248	257.2	9.2	72.12	Sand	Fine
#80	180	328.1	340	11.9	56.32	Sand	Fine
#100	150	238.6	246.2	7.6	46.22	Sand	Fine
#200	75	227.8	238.6	10.8	31.88	Sand	Fine

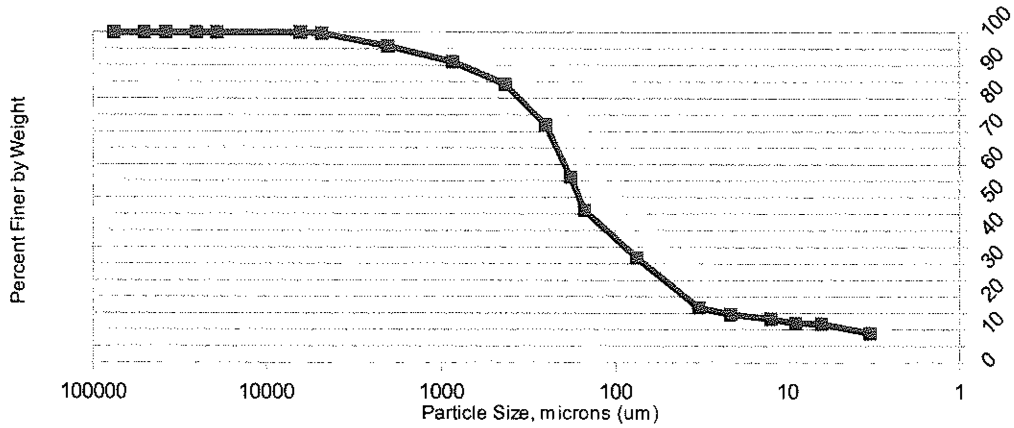
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0150	22.5	16.78	32.85	Silt
5	5	1.0135	22	14.66	21.40	Silt
15	15	1.0125	22	13.31	12.45	Silt
30	30	1.0115	22	11.96	8.90	Silt
60	61	1.0115	21.5	11.87	6.28	Silt
240	240	1.0095	20.5	8.99	3.26	Clay
1440	1440	1.0085	19.5	7.46	1.36	Clay

Gravel	0.27
Sand Coarse	3.85
Sand Medium	11.55
Sand Fine	52.45
Silt	21.69
Clay	10.20
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-07
Lab Sample ID	SJ7652-8



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	99.73
#10	2000	95.88
#20	850	91.10
#40	425	84.33
#60	250	72.12
#80	180	56.32
#100	150	46.22
#200	75	31.88
2	32.85	16.78
5	21.40	14.66
15	12.45	13.31
30	8.90	11.96
61	6.28	11.87
240	3.26	8.99
1440	1.36	7.46

Gravel	0.27
Sand Coarse	3.85
Sand Medium	11.55
Sand Fine	52.45
Silt	21.69
Clay	10.20

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-08
Lab Sample ID	SJ7652-9

Date Received	09/22/16
Start Date/Time	9/27/16:14:09
End Date/Time	9/30/16:15:28

Sample Weight	Sample (g)
Sample Weight (wet)	114.9
Sample Weight (oven dried)	70.69

Date/Time in oven	9/29/16:15:10
Date/Time out of oven	9/30/16:9:10

% Moisture	38.476

Hydrometer Data

Serial Number	379474
Cal Date:	9/28/16:10:33
Low Temp C	19.30
Low Temp Reading	1.0030
High Temp	23.10
High Temp Reading	1.0025
Hyd Cal Slope	-0.000132
Hyd Cal Intercept	0.005539
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	12.8
Sample <=#10	57.89
%Passing #10	81.89

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	556.6	556.6	0	100	Gravel	
1/4"	6300	505.9	508.9	3	95.76	Gravel	
#4	4750	403.9	405.9	2	92.93	Gravel	
#10	2000	371.50	379.50	8	81.61	Sand	Coarse
#20	850	302.9	307.3	4.4	75.39	Sand	Medium
#40	425	273.9	279.6	5.7	67.32	Sand	Medium
#60	250	248	254.1	6.1	58.69	Sand	Fine
#80	180	328.1	333.1	5	51.62	Sand	Fine
#100	150	238.6	242.1	3.5	46.67	Sand	Fine
#200	75	227.8	239.6	11.8	29.98	Sand	Fine

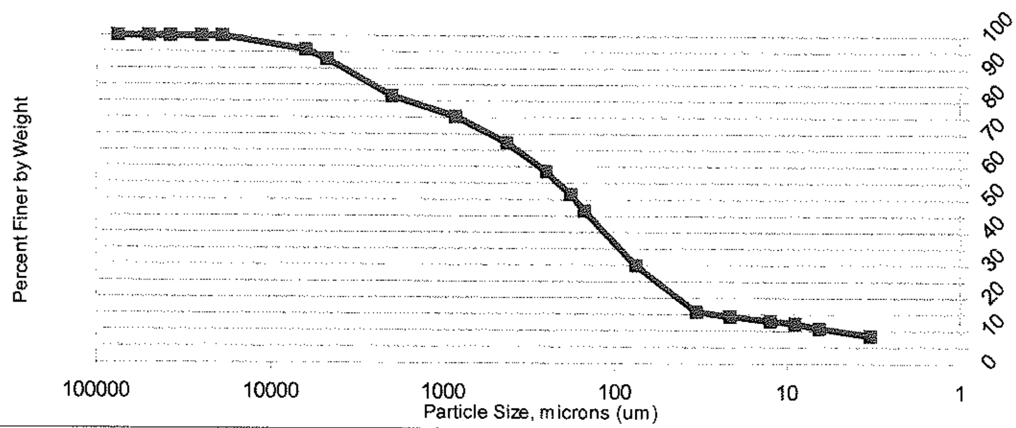
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0140	22	15.87	33.43	Silt
5	5	1.0130	22	14.47	21.40	Silt
15	15	1.0120	22	13.08	12.45	Silt
30	30	1.0115	21.5	12.29	8.96	Silt
60	60	1.0105	21	10.80	6.44	Silt
240	240	1.0090	20.5	8.61	3.26	Clay
1440	1440	1.0075	19.5	6.33	1.37	Clay

Gravel	7.07
Sand Coarse	11.32
Sand Medium	14.29
Sand Fine	37.35
Silt	20.31
Clay	9.67
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-08
Lab Sample ID	SJ7652-9



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	95.76
#4	4750	92.93
#10	2000	81.61
#20	850	75.39
#40	425	67.32
#60	250	58.69
#80	180	51.62
#100	150	46.67
#200	75	29.98
2	33.43	15.87
5	21.40	14.47
15	12.45	13.08
30	8.96	12.29
60	6.44	10.80
240	3.26	8.61
1440	1.37	6.33

Gravel	7.07
Sand Coarse	11.32
Sand Medium	14.29
Sand Fine	37.35
Silt	20.31
Clay	9.67

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-09
Lab Sample ID	SJ7652-10

Date Received	09/22/16
Start Date/Time	9/27/16:14:11
End Date/Time	9/30/16:15:35

Sample Weight	Sample (g)
Sample Weight (wet)	101.8
Sample Weight (oven dried)	75.02

Date/Time in oven	9/29/16:15:10
Date/Time out of oven	9/30/16:9:10

% Moisture	26.306

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	9.8
Sample <=#10	65.22
%Passing #10	86.94

Hydrometer Data

Serial Number	379474
Cal Date:	9/28/16:10:33
Low Temp C	19.30
Low Temp Reading	1.0030
High Temp	23.10
High Temp Reading	1.0025
Hyd Cal Slope	-0.000132
Hyd Cal Intercept	0.005539
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	556.6	556.6	0	100	Gravel	
1/4"	6300	505.9	508.4	2.5	96.67	Gravel	
#4	4750	403.9	405.1	1.2	95.07	Gravel	
#10	2000	371.50	377.20	5.7	87.47	Sand	Coarse
#20	850	302.9	309.1	6.2	79.21	Sand	Medium
#40	425	273.9	280.6	6.7	70.27	Sand	Medium
#60	250	248	257.8	9.8	57.21	Sand	Fine
#80	180	328.1	341.3	13.2	39.62	Sand	Fine
#100	150	238.6	243.7	5.1	32.82	Sand	Fine
#200	75	227.8	232.8	5	26.15	Sand	Fine

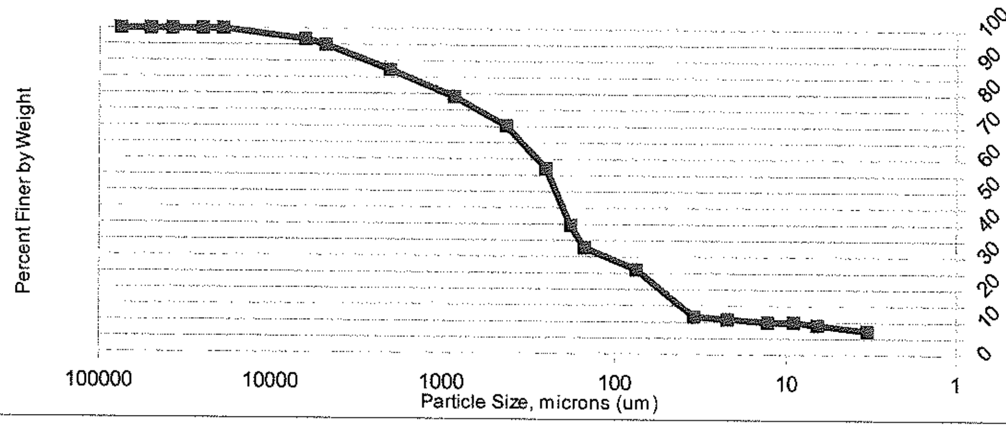
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0100	22.5	11.71	34.67	Silt
5	5	1.0095	22.5	10.92	22.08	Silt
15	15	1.0090	22	10.03	12.82	Silt
30	30	1.0090	22	10.03	9.07	Silt
60	60	1.0085	21.5	9.13	6.52	Silt
240	240	1.0075	20.5	7.35	3.32	Clay
1440	1440	1.0065	19.5	5.56	1.39	Clay

Gravel	4.93
Sand Coarse	7.60
Sand Medium	17.20
Sand Fine	44.12
Silt	18.10
Clay	8.06
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-09
Lab Sample ID	SJ7652-10



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	96.67
#4	4750	95.07
#10	2000	87.47
#20	850	79.21
#40	425	70.27
#60	250	57.21
#80	180	39.62
#100	150	32.82
#200	75	26.15
2	34.67	11.71
5	22.08	10.92
15	12.82	10.03
30	9.07	10.03
60	6.52	9.13
240	3.32	7.35
1440	1.39	5.56

Gravel	4.93
Sand Coarse	7.60
Sand Medium	17.20
Sand Fine	44.12
Silt	18.10
Clay	8.06

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-10
Lab Sample ID	SJ7652-11

Date Received	09/22/16
Start Date/Time	9/27/16:14:12
End Date/Time	9/30/16:15:48

Sample Weight	Sample (g)
Sample Weight (wet)	101.4
Sample Weight (oven dried)	74.98

Date/Time in oven	9/29/16:15:10
Date/Time out of oven	9/30/16:9:10

% Moisture	26.052

Hydrometer Data

Serial Number	379474
Cal Date:	9/28/16:10:33
Low Temp C	19.30
Low Temp Reading	1.0030
High Temp	23.10
High Temp Reading	1.0025
Hyd Cal Slope	-0.000132
Hyd Cal Intercept	0.005539
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	17
Sample <=#10	57.98
%Passing #10	77.32

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	556.6	556.6	0	100	Gravel	
1/4"	6300	505.9	517.2	11.3	84.93	Gravel	
#4	4750	403.9	404.6	0.7	84.00	Gravel	
#10	2000	371.50	376.50	5	77.33	Sand	Coarse
#20	850	302.9	306.7	3.8	72.26	Sand	Medium
#40	425	273.9	278.3	4.4	66.39	Sand	Medium
#60	250	248	258.2	10.2	52.79	Sand	Fine
#80	180	328.1	343.6	15.5	32.12	Sand	Fine
#100	150	238.6	245.7	7.1	22.65	Sand	Fine
#200	75	227.8	234.4	6.6	13.85	Sand	Fine

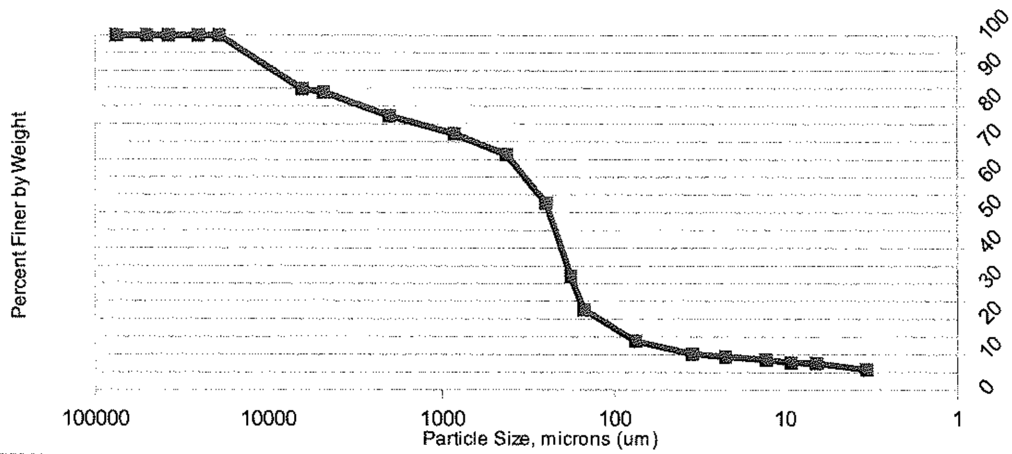
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0090	22.5	10.17	34.92	Silt
5	5	1.0085	22.5	9.38	22.32	Silt
15	15	1.0080	22.5	8.59	12.89	Silt
30	30	1.0075	22	7.69	9.23	Silt
60	60	1.0075	21.5	7.59	6.56	Silt
240	240	1.0065	20.5	5.79	3.36	Clay
1440	1440	1.0060	19.5	4.79	1.39	Clay

Gravel	16.00
Sand Coarse	6.67
Sand Medium	10.94
Sand Fine	52.55
Silt	7.28
Clay	6.57
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-10
Lab Sample ID	SJ7652-11



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	84.93
#4	4750	84.00
#10	2000	77.33
#20	850	72.26
#40	425	66.39
#60	250	52.79
#80	180	32.12
#100	150	22.65
#200	75	13.85
2	34.92	10.17
5	22.32	9.38
15	12.89	8.59
30	9.23	7.69
60	6.56	7.59
240	3.36	5.79
1440	1.39	4.79

Gravel	16.00
Sand Coarse	6.67
Sand Medium	10.94
Sand Fine	52.55
Silt	7.28
Clay	6.57

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-11
Lab Sample ID	SJ7652-12

Date Received	09/22/16
Start Date/Time	9/27/16:14:14
End Date/Time	9/30/16:15:55

Sample Weight	Sample (g)
Sample Weight (wet)	110.6
Sample Weight (oven dried)	77.31

Date/Time in oven	9/29/16:15:10
Date/Time out of oven	9/30/16:9:10

% Moisture	30.098

Hydrometer Data

Serial Number	379474
Cal Date:	9/28/16:10:33
Low Temp C	19.30
Low Temp Reading	1.0030
High Temp	23.10
High Temp Reading	1.0025
Hyd Cal Slope	-0.000132
Hyd Cal Intercept	0.005539
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	1.1
Sample <=#10	76.21
%Passing #10	98.58

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	556.6	556.6	0	100	Gravel	
1/4"	6300	505.9	506.4	0.5	99.35	Gravel	
#4	4750	403.9	404.3	0.4	98.84	Gravel	
#10	2000	371.50	371.70	0.2	98.58	Sand	Coarse
#20	850	302.9	303.2	0.3	98.19	Sand	Medium
#40	425	273.9	274.4	0.5	97.54	Sand	Medium
#60	250	248	250	2	94.96	Sand	Fine
#80	180	328.1	338.3	10.2	81.76	Sand	Fine
#100	150	238.6	251.4	12.8	65.21	Sand	Fine
#200	75	227.8	258.7	30.9	25.24	Sand	Fine

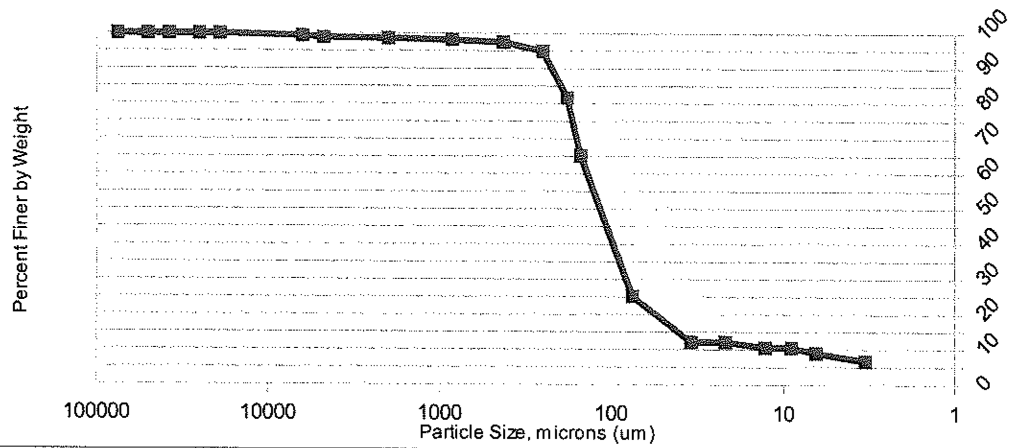
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0110	22.5	12.23	34.28	Silt
5	5	1.0110	22.5	12.23	21.68	Silt
15	15	1.0100	22	10.68	12.73	Silt
30	30	1.0100	22	10.68	9.00	Silt
60	60	1.0090	21.5	9.13	6.45	Silt
240	240	1.0075	20.5	6.76	3.32	Clay
1440	1440	1.0070	19.5	5.85	1.37	Clay

Gravel	1.16
Sand Coarse	0.26
Sand Medium	1.03
Sand Fine	72.30
Silt	16.99
Clay	8.25
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-11
Lab Sample ID	SJ7652-12



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	99.35
#4	4750	98.84
#10	2000	98.58
#20	850	98.19
#40	425	97.54
#60	250	94.96
#80	180	81.76
#100	150	65.21
#200	75	25.24
2	34.28	12.23
5	21.68	12.23
15	12.73	10.68
30	9.00	10.68
60	6.45	9.13
240	3.32	6.76
1440	1.37	5.85

Gravel	1.16
Sand Coarse	0.26
Sand Medium	1.03
Sand Fine	72.30
Silt	16.99
Clay	8.25

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-12
Lab Sample ID	SJ7652-13

Date Received	09/22/16
Start Date/Time	9/27/16:14:16
End Date/Time	9/30/16:16:02

Sample Weight	Sample (g)
Sample Weight (wet)	122.3
Sample Weight (oven dried)	77.17

Date/Time in oven	9/29/16:15:10
Date/Time out of oven	9/30/16:9:10

% Moisture	36.903

Hydrometer Data

Serial Number	379474
Cal Date:	9/28/16:10:33
Low Temp C	19.30
Low Temp Reading	1.0030
High Temp	23.10
High Temp Reading	1.0025
Hyd Cal Slope	-0.000132
Hyd Cal Intercept	0.005539
Soil Gravity	2.650000

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0
Sample <=#10	77.17
%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	302.9	303.2	0.3	99.61	Sand	Medium
#40	425	273.9	274.3	0.4	99.09	Sand	Medium
#60	250	248	248.9	0.9	97.93	Sand	Fine
#80	180	328.1	334	5.9	90.28	Sand	Fine
#100	150	238.6	248.3	9.7	77.71	Sand	Fine
#200	75	227.8	257.4	29.6	39.35	Sand	Fine

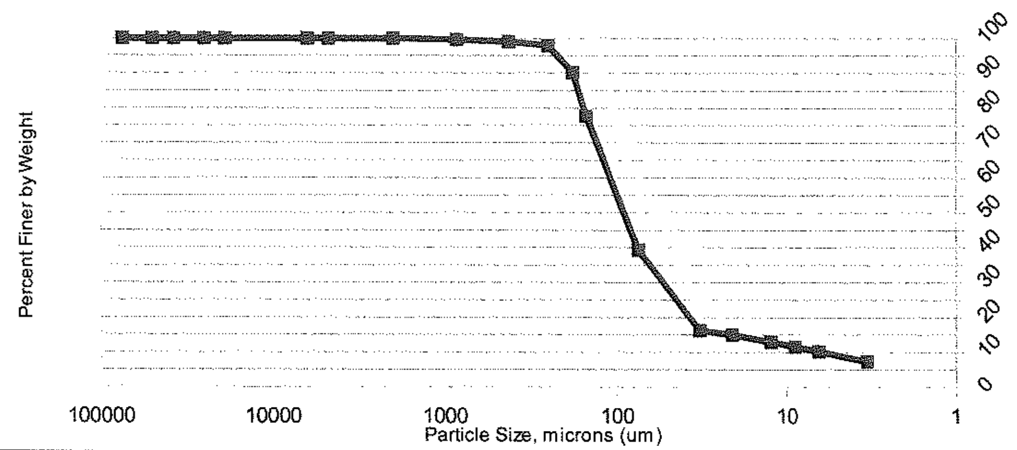
Silt/Clay Fraction (Hydrometer Test)

Time (min)	Actual Time	Spec. Gravity	Temp C	% Finer	Particle Size	Classification
2	2	1.0150	22.5	16.31	32.85	Silt
5	5	1.0140	22.5	15.00	21.03	Silt
15	15	1.0125	22.5	13.03	12.38	Silt
30	30	1.0115	22	11.63	8.90	Silt
60	60	1.0105	21.5	10.23	6.40	Silt
240	240	1.0085	20.5	7.43	3.30	Clay
1440	1440	1.0075	19.5	5.94	1.37	Clay

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.91
Sand Fine	59.74
Silt	30.28
Clay	9.07
Total =	100

Kathdin Analytical Services - Report of Analysis
Sediment Grain Size - ASTM D422

Client	BATTELLE
Client ID	RAJ-12
Lab Sample ID	SJ7652-13



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	99.61
#40	425	99.09
#60	250	97.93
#80	180	90.28
#100	150	77.71
#200	75	39.35
2	32.85	16.31
5	21.03	15.00
15	12.38	13.03
30	8.90	11.63
60	6.40	10.23
240	3.30	7.43
1440	1.37	5.94

Gravel	0.00
Sand Coarse	0.00
Sand Medium	0.91
Sand Fine	59.74
Silt	30.28
Clay	9.07

Raw Data Section

WG191577 Silt/Sand
R3866684

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-22-16
Client ID	RAJ-01	Start Date/Time	9-26-16: 13:49
Lab Sample ID	SJ7652-1B	End Date/Time	9-29-16: 13:54

Sample Weight	Sample (g)
Sample Weight (wet)	103.4
Sample Weight (oven dried)	76.62

Date/Time in oven	9-28-16: 14:50
Date/Time out of oven	9-29-16: 8:50

% Moisture	25.899

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0.6
Sample <=#10	76.02

Hydrometer Data	
Serial Number	379474
Cal Date:	9-~~26~~-16
Low Temp C	19.7
Low Temp Reading	1.0035
High Temp	23.4
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	556.6	556.6
1/4"	6300	505.9	506.2
#4	4750	~~403.8~~ 403.9	~~403.8~~ 403.9
#10	2000	371.5	371.8
#20	850	302.9	303.5
#40	425	273.9	277.8
#60	250	248.0	262.3
#80	180	328.1	345.6
#100	150	238.6	248.5
#200	75	227.8	243.0
Pan	Pan	298.8	299.5

10:32 Silt/Clay Fraction (Hydrometer Test)

Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	10:34	10:34 (2)	22.0	1.0090
5	10:37	10:37 (5)	~~22.2~~ 22.0	1.0075
15	10:47	10:47 (15)	21.8	1.0075
30	11:02	11:02 (30)	21.6	1.0070
60	11:32	11:33 (61)	~~21.6~~ 21.4	1.0070
240	~~14:32~~ ~~13:32~~ 14:32	14:32 (240)	20.3	1.0065
1440	10:32	10:32 (1440)	19.7	1.0060

5J-1-d

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-22-16
Client ID	RAJ-02	Start Date/Time	9-26-16: 13:53
Lab Sample ID	SJ7652-2 B	End Date/Time	9-29-16 : 14:07

Sample Weight	Sample (g)
Sample Weight (wet)	111.4
Sample Weight (oven dried)	61.72

Date/Time in oven	9-28-16 : 14:50
Date/Time out of oven	9-29-16 : 8:50

% Moisture	44.596

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	1.6
Sample <=#10	60.12

Hydrometer Data	
Serial Number	379474
Cal Date:	9-~~28~~-16
Low Temp C	19.7
Low Temp Reading	1.0035
High Temp	23.4
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	556.6	556.6
1/4"	6300	505.9	507.3
#4	4750	~~403.8~~ 403.9	403.9
#10	2000	371.5	371.7
#20	850	302.9	303.8
#40	425	273.9	275.9
#60	250	248.0	251.6
#80	180	328.1	332.5
#100	150	238.5	241.7
#200	75	227.8	237.4
Pan	Pan	298.8	300.1

10:~~33~~ 41

Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	~~10:35~~ 10:43	~~10:35~~ 10:43 (2)	22.1	1.0200
5	~~10:38~~ 10:46	10:46 (5)	22.1	1.0160
15	~~10:48~~ 10:56	10:57 (15)	21.6	1.0135
30	~~11:03~~ 11:11	11:11 (30)	21.6	1.0125
60	~~11:33~~ 11:41	11:41 (60)	21.4	1.0110
240	~~14:44~~ 14:41	14:41 (240)	20.3	1.0095
1440	10:41	10:41 (1440)	19.6	1.0085

Silt/sand

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9.22.16
Client ID	RAJ-03	Start Date/Time	9.26-16: 13:55
Lab Sample ID	SJ7652-3 B	End Date/Time	9.29-16: 14:24

Sample Weight	Sample (g)
Sample Weight (wet)	110.4
Sample Weight (oven dried)	74.59

Date/Time in oven	9.28.16
Date/Time out of oven	9.29.16

% Moisture	32.44

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	2.2
Sample <=#10	72.39

Hydrometer Data	
Serial Number	379474
Cal Date:	9.28.16
Low Temp C	19.67
Low Temp Reading	1.0035
High Temp	23.4
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	505.9	505.9
#4	4750	~~463.8~~ 403.9	404.0
#10	2000	371.5	373.6
#20	850	302.9	305.6
#40	425	273.9	277.1
#60	250	248.1	249.9
#80	180	328.1	330.1
#100	150	238.5	239.6
#200	75	227.8	229.9
Pan	Pan	298.8	298.9

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)	22.3	~~1.0305~~ 1.0335
5	10:56	10:56 (5)	22.3	1.0310
15	11:06	11:06 (15)	22.1	1.0300
30	11:21	11:21 (30)	21.8	1.0270
60	11:51	11:51 (60)	21.4	1.0255
240	14:51	14:51 (240)	20.4	1.0220
1440	10:51	10:51 (1440)	~~21.8~~ 19.8	1.0175

SJ7651

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9.22.16
Client ID	RAJ04	Start Date/Time	9.26.16: 13:57
Lab Sample ID	SJ7652-4 B	End Date/Time	9.29.16: 14:30

Sample Weight	Sample (g)	Date/Time in oven	9.28.16: 14:50
Sample Weight (wet)	99.1	Date/Time out of oven	9.29.16: 8:50
Sample Weight (oven dried)	50.78		

% Moisture	48.575

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	0.8
Sample <=#10	49.98

Hydrometer Data	
Serial Number	379474
Cal Date:	9-27-16
Low Temp C	19.7
Low Temp Reading	1.0035
High Temp	23.4
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	505.9	505.9
#4	4750	~~403.9~~ 403.9	403.9
#10	2000	371.5	372.3
#20	850	302.9	304.1
#40	425	273.8	275.8
#60	250	248.0	250.0
#80	180	328.1	329.6
#100	150	238.5	239.4
#200	75	227.8	230.8
Pan	Pan	298.8	299.8

11:03 Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	11:05	11:05 (2)	22.6	1.0215
5	11:08	11:08 (5)	22.3	1.0190
15	11:18	11:19 (16)	22.3	1.0135
30	11:33	11:34 (31)	21.9	1.0110
60	12:03	12:03 (60)	21.6	1.0105
240	~~11:03~~ 15:03	15:03 (240)	20.4	1.00985
1440	11:03	11:03 (1440)	~~22.9~~ 19.8	1.0080

SA1c1

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-22-16
Client ID	RMS-04 DUP	Start Date/Time	9-26-16: 13:59
Lab Sample ID	SJ7652-5 B	End Date/Time	9-29-16: 14:35

Sample Weight	Sample (g)	Date/Time in oven	9-28-16: 14:50
Sample Weight (wet)	106.8	Date/Time out of oven	9-29-16: 8:50
Sample Weight (oven dried)	50.54		
		Hydrometer Data	
% Moisture	52.68	Serial Number	379474
		Cal Date:	9-27-16
Sample Split (Oven Dried)	Sample (g)	Low Temp C	19.7
Sample >=#10	0.5	Low Temp Reading	1.0035
Sample <=#10	50.04	High Temp	23.4
		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	505.9	505.9
#4	4750	~~403.8~~ 403.9	403.9
#10	2000	371.5	372.0
#20	850	302.9	303.8
#40	425	273.8	275.7
#60	250	248.0	~~250~~ 249.9
#80	180	328.1	329.9
#100	150	238.5	~~239.5~~ 239.5
#200	75	227.8	230.5
Pan	Pan	298.8	298.9

11:13 Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	11:15	11:15 (2)	22.2	1.0220
5	11:18	11:18 (5)	22.2	1.0205
15	11:28	11:28 (15)	21.8	1.0120
30	11:43	11:43 (30)	21.6	1.0105
60	12:13	12:13 (60)	21.1	1.0100
240	~~14:13~~ 15:13	15:13 (240)	20.4	1.00985
1440	11:13	~~20~~ 11:13 (1440)	19.8	1.00850

silt/cl/sand

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-22-16
Client ID	RAS-05	Start Date/Time	9-26-16: 14:01
Lab Sample ID	SJ7652-6 B	End Date/Time	9-29-16: 14:45

Sample Weight	Sample (g)
Sample Weight (wet)	92.7
Sample Weight (oven dried)	53.32

% Moisture	42.581

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	2.4
Sample <=#10	50.92

Date/Time in oven	9.28.16: 14:50
Date/Time out of oven	9-29-16: 8:50

Hydrometer Data	
Serial Number	379474
Cal Date:	9.27.16
Low Temp C	19.7
Low Temp Reading	1.0035
High Temp	23.4
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	~~505.9~~ 556.6	556.6
1/4"	6300	505.9	506.8
#4	4750	~~403.8~~ 403.9	404.1
#10	2000	371.5	372.8
#20	850	302.9	306.8
#40	425	273.8	278.8
#60	250	248.0	251.4
#80	180	328.1	329.8
#100	150	238.5	239.3
#200	75	227.8	230.3
Pan	Pan	298.8	298.9

11:22 Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	11:24	11:24 (2)	22.6	1.0205
5	11:27	11:27 (5)	22.6	1.0170
15	11:37	11:37 (15)	22.4	1.0090
30	11:52	11:52 (30)	21.9	1.0075
60	12:22	12:22 (60)	21.5	1.0075
240	~~14:22~~ 15:22	15:22 (240)	20.4	1.0070
1440	11:22	11:22 (1440)	19.8	1.0065

5/4/01

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-22-16
Client ID	RAS-06	Start Date/Time	9-26-16: 14:05
Lab Sample ID	SJ7652-7 B	End Date/Time	9-29-16: 14:55

Sample Weight	Sample (g)	Date/Time in oven	9-28-16: 14:50
Sample Weight (wet)	109.0	Date/Time out of oven	9-29-16: 8:50
Sample Weight (oven dried)	50.32		
		Hydrometer Data	
% Moisture	53.838	Serial Number	379474
		Cal Date:	9-27-16
Sample Split (Oven Dried)	Sample (g)	Low Temp C	19.7
Sample >=#10	Ø	Low Temp Reading	1.0035
Sample <=#10	50.32	High Temp	23.4
		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	302.9	~~302.9~~ 302.9
#40	425	273.8	274.1
#60	250	248.0	248.6
#80	180	328.1	329.2
#100	150	238.5	239.4
#200	75	227.8	232.3
Pan	Pan	298.8	299.2

11:30

Silt/Clay Fraction (Hydrometer Test)

Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	11:32	11:32 (2)	~~22.8~~ 23.1	1.0235
5	11:35	11:35 (5)	23.1	1.0190
15	11:45	11:45 (15)	22.6	1.0135
30	12:00	12:00 (30)	22.1	1.0110
60	12:30	12:30 (60)	21.9	1.0100
240	~~14:30~~ 15:30	15:30 (240)	20.6	~~1.0080~~ 1.0085
1440	11:30	11:30 (1440)	19.9	1.0080

Silt/sand /cl

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-22-16
Client ID	RAJ-07	Start Date/Time	9-27-16: 14:08
Lab Sample ID	SJ7652-8 B	End Date/Time	9-30-16: 15:21

Sample Weight	Sample (g)
Sample Weight (wet)	~~119.2~~ 118.9
Sample Weight (oven dried)	75.31

% Moisture	36.658

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	3.3
Sample <=#10	72.01

Removed 0.3g organic material

Date/Time in oven	9-29-16: 15:10
Date/Time out of oven	9-30-16: 9:10

Hydrometer Data	
Serial Number	379474
Cal Date:	9-28-16
Low Temp C	19.3
Low Temp Reading	1.0030
High Temp	23.1
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	505.9	505.9
#4	4750	403.9	404.1
#10	2000	371.5	374.4
#20	850	302.9	306.5
#40	425	273.9	~~278~~ 279.0
#60	250	248.0	257.2
#80	180	328.1	340.0
#100	150	238.6	246.2
#200	75	227.8	238.6
Pan	Pan	298.8	299.0

10:40 Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	10:42	10:42 (2)	22.3	1.0150
5	10:45	10:45 (5)	22.2	1.0135
15	10:55	10:55 (15)	22.1	1.0125
30	11:10	11:10 (30)	21.8	1.0115
60	11:40	11:41 (60)	21.4	1.0115
240	14:40	14:40 (240)	20.4	1.0095
1440	10:40	10:40 (1440)	19.3	1.0085

silt/cl/sand

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-22-16
Client ID	BAJ-08	Start Date/Time	9-27-16: 14:09
Lab Sample ID	SJ7652-9	End Date/Time	9-30-16: 15:28

Sample Weight	Sample (g)
Sample Weight (wet)	~~121.2~~ 114.9
Sample Weight (oven dried)	70.69

Date/Time in oven	9-29-16: 15:10
Date/Time out of oven	9-30-16: 9:10

% Moisture	38.47%

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	12.8
Sample <=#10	57.89

Removed 6.3g organic material

Hydrometer Data	
Serial Number	379474
Cal Date:	9-28-16
Low Temp C	19.3
Low Temp Reading	1.0030
High Temp	23.1
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	556.6	556.6
1/4"	6300	505.9	508.9
#4	4750	403.9	405.9
#10	2000	371.5	379.5
#20	850	302.9	307.3
#40	425	273.9	279.6
#60	250	248.0	254.1
#80	180	328.1	333.1
#100	150	238.6	242.1
#200	75	227.8	239.6
Pan	Pan	298.8	299.2

10:56

Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	10:58	10:58 (2)	22.1	1.0140
5	11:01	11:01 (5)	21.9	1.0130
15	11:11	11:11 (15)	21.8	1.0120
30	11:26	11:26 (30)	21.6	1.0115
60	11:56	11:56 (60)	21.2	1.0105
240	14:56	1456 (240)	20.3	1.0090
1440	10:56	10:56 (1440)	19.3	1.0075

silt/sand/cl

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-22-16
Client ID	RAJ-09	Start Date/Time	9-27-16: 14:11
Lab Sample ID	SJ7652-10B	End Date/Time	9-30-16: 15:35

Sample Weight	Sample (g)
Sample Weight (wet)	101.8
Sample Weight (oven dried)	75.02

% Moisture	26.306

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	9.8
Sample <=#10	65.22

Date/Time in oven	9.~~28~~ 29.16 : 15:10
Date/Time out of oven	9.~~29~~ 30.16: 9:10

Hydrometer Data	
Serial Number	379474
Cal Date:	9.28.16
Low Temp C	19.3
Low Temp Reading	1.0030
High Temp	23.1
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	556.6	556.6
1/4"	6300	505.9	508.4
#4	4750	403.9	405.1
#10	2000	371.5	377.2
#20	850	302.9	309.1
#40	425	273.9	280.6
#60	250	248.0	257.8
#80	180	328.1	341.3
#100	150	238.6	243.7
#200	75	227.8	232.8
Pan	Pan	298.8	298.8

11:04 Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	11:06	11:06 (2)	22.3	1.0100
5	11:09	11:09 (5)	22.4	1.0095
15	11:19	11:19 (15)	22.2	1.0090
30	11:34	11:34 (30)	21.9	1.0090
60	12:04	12:04 (60)	21.5	1.0085
240	15:04	15:04 (240)	20.4	1.0075
1440	11:04	11:04 (1440)	19.2	1.0065

EX-028 – Revision 2 – 12/02/2015

silt/sand/cl

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9.22.16
Client ID	RAS-10	Start Date/Time	9.27-16: 14:12
Lab Sample ID	SJ7652-11 B	End Date/Time	9.30-16: 15:48

Sample Weight	Sample (g)
Sample Weight (wet)	~~101.7~~ 101.4
Sample Weight (oven dried)	~~75.21~~ 74.98

Date/Time in oven	9.29.16: 15:10
Date/Time out of oven	9.30.16: 9:10

% Moisture	26.052

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	17.0
Sample <=#10	~~58.21~~ 57.98

Removed 0.3 g organic material

Hydrometer Data	
Serial Number	379474
Cal Date:	9.20.16
Low Temp C	19.3
Low Temp Reading	1.0030
High Temp	23.1
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	556.6	556.6
1/4"	6300	505.9	517.2
#4	4750	403.9	404.6
#10	2000	371.5	376.5
#20	850	302.9	306.7
#40	425	273.9	278.3
#60	250	248.0	258.2
#80	180	328.1	343.6
#100	150	238.6	245.7
#200	75	227.8	234.4
Pan	Pan	298.8	298.8

11:15 Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	11:17	11:17 (2)	22.6	1.0090
5	11:20	11:20 (5)	22.6	1.0085
15	11:30	11:30 (15)	22.3	1.0080
30	11:45	11:45 (30)	21.9	1.0075
60	12:15	12:15 (60)	21.85	1.0075
240	15:15	15:15 (240)	20.4	1.0065
1440	11:15	11:15 (1440)	19.3	1.0060

Silt/sand/cl

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-22-16
Client ID	RAJ-11	Start Date/Time	9-27-16 : 14:14
Lab Sample ID	SJ7652-12 B	End Date/Time	9-30-16 : 15:55

Sample Weight	Sample (g)
Sample Weight (wet)	110.86
Sample Weight (oven dried)	77.31

% Moisture	30.098

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	1.1
Sample <=#10	76.21

Removed Oily organic material

Date/Time in oven	9.29.16 : 15:10
Date/Time out of oven	9.30.16 : 9:10

Hydrometer Data	
Serial Number	379474
Cal Date:	9.28.16
Low Temp C	19.3
Low Temp Reading	1.0030
High Temp	23.1
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	556.6	556.6
1/4"	6300	~~506.4~~ 505.9	506.4
#4	4750	403.9	404.3
#10	2000	371.5	371.7
#20	850	302.9	303.2
#40	425	273.9	274.4
#60	250	248.0	250.0
#80	180	328.1	338.3
#100	150	238.6	251.4
#200	75	227.8	258.7
Pan	Pan	298.8	299.5

11:27

Silt/Clay Fraction (Hydrometer Test)

Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	11:29	11:29 (2)	22.6	1.0110
5	11:32	11:32 (5)	22.4	1.0110
15	11:42	11:42 (15)	22.1	1.0100
30	11:57	11:57 (30)	21.9	1.0100
60	12:27	12:27 (60)	21.6	1.0090
240	15:27	15:27 (240)	20.4	1.0075
1440	11:27	11:27 (1440)	19.3	1.0070

Silt 1 sand (el

Katahdin Analytical Services, LLC.
Sediment Grain Size - Method ASTM D422

Client	Battelle	Date Received	9-22-16
Client ID	RAJ-12	Start Date/Time	9-27-16 5141:16
Lab Sample ID	SJ7652-13 B	End Date/Time	9.30-16: ~~16~~ 16:02

Sample Weight	Sample (g)
Sample Weight (wet)	122.43
Sample Weight (oven dried)	77.12

Date/Time in oven	9-29-16: 15:00
Date/Time out of oven	9-30-16: 8:00

% Moisture	36.903

Sample Split (Oven Dried)	Sample (g)
Sample >=#10	Ø
Sample <=#10	77.12

Removed 0.1g organic material

Hydrometer Data	
Serial Number	37447
Cal Date:	9-28-16
Low Temp C	19.3
Low Temp Reading	1.0030
High Temp	23.1
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	302.9	303.2
#40	425	273.9	274.3
#60	250	248.0	248.9
#80	180	~~27~~ 328.1	339.0
#100	150	238.6	248.3
#200	75	227.8	257.4
Pan	Pan	298.8	300.4

11:35 Silt/Clay Fraction (Hydrometer Test)				
Time (min)	Proposed Read Time	Actual Time (min)	Temp C	Spec. Gravity
2	11:37	11:37 (2)	22.6	1.0150
5	11:40	11:40 (5)	22.3	1.0140
15	11:50	11:50 (15)	22.3	1.0125
30	12:05	12:05 (30)	21.9	1.0115
60	12:35	12:35 (60)	21.6	~~1.0110~~ 1.0105
240	15:35	15:35 (240)	20.4	1.0085
1440	11:35	11:35 (1440)	19.3	1.0075

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	WG191840	SW846 9060A Mod.	27-SEP-16	N/A	U 300 ug/gdrywt	400 ug/gdrywt
MBLANK	WG191850	SW846 9060A Mod.	28-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	WG191232	SM2540	26-SEP-16	23-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
WG191840-2	LCS	WG191840	27-SEP-16	N/A	ug/gdrywt	400000.000	420000	105	80-120	
WG191850-2	LCS	WG191850	28-SEP-16	N/A	ug/gdrywt	400000.000	440000	110	80-120	

Total Solids

Lab Sample Id	Samp Type	QC Batch	Analysis Date	Prep Date	Units	Spike Amt.	Result	Recovery	Acceptance Range	RPD
WG191232-2	LCS	WG191232	26-SEP-16	23-SEP-16	%	90	90.	100	90-110	

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ANALYTICAL SERVICES

Cert No E87604

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
WG191232-3	SJ7652-4	WG191232	26-SEP-16	%	51.	48.	8	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
WG191850-3	MS	SJ7652-13	WG191850	28-SEP-16	ug/gdrywt	16905.19	9400	26000	99	75 - 125
WG191840-4	MSD	SJ7652-4	WG191840	27-SEP-16	ug/gdrywt	21552.56	22000	46000	107	75 - 125
WG191840-3	MS	SJ7652-4	WG191840	27-SEP-16	ug/gdrywt	20572.12	22000	43000	102	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: SJ7652-1
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-01	SL	20-SEP-16 08:55:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	5000 ug/gdrywt	790	170	SW846 9060A Mod.	WG191840	27-SEP-16 13:24:19	N/A	N/A	ZF	
Toc In Soil(2)	4300 ug/gdrywt	660	140	SW846 9060A Mod.	WG191840	27-SEP-16 13:38:16	N/A	N/A	ZF	
Toc In Soil(3)	4800 ug/gdrywt	680	140	SW846 9060A Mod.	WG191840	27-SEP-16 13:53:38	N/A	N/A	ZF	
Toc In Soil(4)	5800 ug/gdrywt	650	140	SW846 9060A Mod.	WG191840	27-SEP-16 14:06:05	N/A	N/A	ZF	
Toc In Soil(Avg)	4600 ug/gdrywt	720	160	SW846 9060A Mod.	WG191840	27-SEP-16 17:40:00	N/A	N/A	ZF	
Total Solids	74. %	1		SM2540G	WG191232	26-SEP-16 11:16:20	SM2540G	23-SEP-16	AP	

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-2
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-02	SL	20-SEP-16 09:05:00	22-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	1300	280	SW846 9060A Mod.	WG191840	27-SEP-16 14:18:31	N/A	N/A	ZF	
Total Solids	55. %	1		SM2540G	WG191232	26-SEP-16 11:16:28	SM2540G	23-SEP-16	AP	

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-3
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-03	SL	20-SEP-16 09:22:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	8400 ug/gdrywt	820	170	SW846 9060A Mod.	WG191840	27-SEP-16 14:32:52	N/A	N/A	ZF	
Total Solids	68. %	1		SM2540G	WG191232	26-SEP-16 11:16:38	SM2540G	23-SEP-16	AP	

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Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-4
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-04	SL	20-SEP-16 09:36:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	22000 ug/gdrywt	1200	250	SW846 9060A Mod.	WG191840	27-SEP-16 14:51:50	N/A	N/A	ZF	
Total Solids	51. %	1		SM2540G	WG191232	26-SEP-16 11:16:49	SM2540G	23-SEP-16	AP	

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ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-5
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-04 DUP	SL	20-SEP-16 09:36:00	22-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	1300	270	SW846 9060A Mod.	WG191840	27-SEP-16 16:21:08	N/A	N/A	ZF	
Total Solids	47. %	1		SM2540G	WG191232	26-SEP-16 11:16:58	SM2540G	23-SEP-16	AP	

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Report of Analytical Results

Client: Lisa Lefkovitz
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141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-6
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-05	SL	20-SEP-16 09:54:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	16000 ug/gdrywt	880	190	SW846 9060A Mod.	WG191840	27-SEP-16 16:32:32	N/A	N/A	ZF	
Total Solids	57. %	1		SM2540G	WG191232	26-SEP-16 11:17:07	SM2540G	23-SEP-16	AP	

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-7
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-06	SL	20-SEP-16 10:06:00	22-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	1300	280	SW846 9060A Mod.	WG191840	27-SEP-16 17:07:49	N/A	N/A	ZF	
Total Solids	46. %	1		SM2540G	WG191232	26-SEP-16 11:17:18	SM2540G	23-SEP-16	AP	

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-8
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-07	SL	20-SEP-16 10:19:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	10000 ug/gdrywt	900	190	SW846 9060A Mod.	WG191840	27-SEP-16 17:18:41	N/A	N/A	ZF	
Total Solids	63. %	1		SM2540G	WG191232	26-SEP-16 11:17:28	SM2540G	23-SEP-16	AP	

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ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-9
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-08	SL	20-SEP-16 10:34:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	10000 ug/gdrywt	780	160	SW846 9060A Mod.	WG191850	28-SEP-16 12:16:13	N/A	N/A	ZF	
Total Solids	62. %	1		SM2540G	WG191232	26-SEP-16 11:17:36	SM2540G	23-SEP-16	AP	

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-10
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-09	SL	20-SEP-16 11:20:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	10000 ug/gdrywt	630	130	SW846 9060A Mod.	WG191850	28-SEP-16 12:34:33	N/A	N/A	ZF	
Total Solids	74. %	1		SM2540G	WG191232	26-SEP-16 11:17:44	SM2540G	23-SEP-16	AP	

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-11
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-10	SL	20-SEP-16 11:45:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	5100 ug/gdrywt	590	120	SW846 9060A Mod.	WG191850	28-SEP-16 12:47:50	N/A	N/A	ZF	
Total Solids	74. %	1		SM2540G	WG191232	26-SEP-16 11:17:58	SM2540G	23-SEP-16	AP	

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Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-12
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-11	SL	20-SEP-16 12:12:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	8900 ug/gdrywt	640	140	SW846 9060A Mod.	WG191850	28-SEP-16 13:02:13	N/A	N/A	ZF	
Total Solids	70. %	1		SM2540G	WG191232	26-SEP-16 11:18:06	SM2540G	23-SEP-16	AP	

Report of Analytical Results

Client: Lisa Lefkovitz
Battelle- Applied Coastal Engineering
141 Longwater Drive
Norwell,MA 02061

Lab Sample ID: SJ7652-13
Report Date: 04-OCT-16
Client PO: US001-0000554493
Project: USACE NAE DAMOS Portland Disposal Sit
SDG: SJ7652

Sample Description	Matrix	Date Sampled	Date Received
RAJ-12	SL	20-SEP-16 12:27:00	22-SEP-16

Parameter	Result	Adj PQL	Adj MDL	Anal. Method	QC Batch	Analysis Date	Prep. Method	Prep. Date	Analyst	Footnotes
Toc In Soil(1)	9400 ug/gdrywt	780	170	SW846 9060A Mod.	WG191850	28-SEP-16 13:12:31	N/A	N/A	ZF	
Toc In Soil(2)	9900 ug/gdrywt	800	170	SW846 9060A Mod.	WG191850	28-SEP-16 13:26:45	N/A	N/A	ZF	
Toc In Soil(3)	9500 ug/gdrywt	750	160	SW846 9060A Mod.	WG191850	28-SEP-16 13:36:33	N/A	N/A	ZF	
Toc In Soil(4)	9800 ug/gdrywt	800	170	SW846 9060A Mod.	WG191850	28-SEP-16 13:46:25	N/A	N/A	ZF	
Toc In Soil(Avg)	9600 ug/gdrywt	790	170	SW846 9060A Mod.	WG191850	28-SEP-16 16:50:00	N/A	N/A	ZF	
Total Solids	63. %	1		SM2540G	WG191232	26-SEP-16 11:18:15	SM2540G	23-SEP-16	AP	

Raw Data Section

WET CHEMISTRY BATCH REPORT
Oct 03 2016, 09:21 am
Batch: WG191840

Parameter: Toc In Soil(1)   Prep Date: N/A

Date Analyzed: 27-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
SJ7652-1	SAMP	SW846 9060A	416.6mg		1	4963.30185	5000 ug/gdrywt	74.	400	170	790		
SJ7652-2	SAMP	SW846 9060A	270.1mg		1	19626.29136	20000 ug/gdrywt	55.	400	280	1300		
SJ7652-3	SAMP	SW846 9060A	358.5mg		1	8397.92802	8400 ug/gdrywt	68.	400	170	820		
SJ7652-4	SAMP	SW846 9060A	327.6mg		1	22467.13477	22000 ug/gdrywt	51.	400	250	1200		
SJ7652-5	SAMP	SW846 9060A	327.3mg		1	23470.03158	23000 ug/gdrywt	47.	400	270	1300		
SJ7652-6	SAMP	SW846 9060A	395.6mg		1	15593.25027	16000 ug/gdrywt	57.	400	190	880		
SJ7652-7	SAMP	SW846 9060A	326.2mg		1	24511.81509	24000 ug/gdrywt	46.	400	280	1300		
SJ7652-8	SAMP	SW846 9060A	350.4mg		1	10024.76373	10000 ug/gdrywt	63.	400	190	900		
WG191840-1	MBLANK	SW846 9060A	500mg		1	0	U300 ug/gdrywt	NA	400	85.	400		
WG191840-2	LCS	SW846 9060A	40mg		1	418775	420000 ug/gdrywt	NA	400	85.	400		105
WG191840-3	MS	SW846 9060A	378.1mg		1	43355.73937	43000 ug/gdrywt	NA	400	220	1000		102
WG191840-4	MSD	SW846 9060A	360.9mg		1	45632.152	46000 ug/gdrywt	NA	400	230	1100	5	107

Comments:

SJ7652-4	MS/MSD for TOC
WG191840-1	SJ7652-4
WG191840-2	SJ7652-4
WG191840-3	SJ7652-4
WG191840-4	SJ7652-4

Entered by: ZF   Date: 10-3-16   Accepted by: Ro   Date: 10/4/16

WET CHEMISTRY BATCH REPORT
Oct 03 2016, 09:21 am
Batch: WG191840

Parameter: Toc In Soil(2) | Prep Date: N/A

Date Analyzed: 27-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
SJ7652-1	SAMP	SW846 9060A	416.6mg		1	4312.45456	4300 ug/gdrywt	74.	400	140	660		

Comments:

SJ7652-4	MS/MSD for TOC
WG191840-1	SJ7652-4
WG191840-2	SJ7652-4
WG191840-3	SJ7652-4
WG191840-4	SJ7652-4

Entered by: ZF Date: 10-3-16 Accepted by: Ro Date: 10/4/16

WET CHEMISTRY BATCH REPORT
Oct 03 2016, 09:21 am
Batch: WG191840

Parameter: Toc In Soil(3)　　　Prep Date: N/A

Date Analyzed: 27-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
SJ7652-1	SAMP	SW846 9060A	416.6mg		1	4800.22283	4800 ug/gdrywt	74.	400	140	680		

Comments:

SJ7652-4	MS/MSD for TOC
WG191840-1	SJ7652-4
WG191840-2	SJ7652-4
WG191840-3	SJ7652-4
WG191840-4	SJ7652-4

Entered by: ZF　Date: 10-3-16　Accepted by: [illegible]　Date: 10/4/16

WET CHEMISTRY BATCH REPORT
Oct 03 2016, 09:21 am
Batch: WG191840

Parameter: Toc In Soil(4)

Date Analyzed: 27-SEP-16

Analyst Initials: ZF

Prep Date: N/A

Prep Method: N/A

Prep Chemist: N/A

Sample	Samp Type	Method	Initial Amt.	Final Amt.	Rpt. DF	Result	Rpt Result	TS(%)	PQL	MDL	Adj PQL	RPD	%Rec
SJ7652-1	SAMP	SW846 9060A	416.6mg		1	5821.09574	5800 ug/gdrywt	74.	400	140	650		

Comments:

SJ7652-4	MS/MSD for TOC
WG191840-1	SJ7652-4
WG191840-2	SJ7652-4
WG191840-3	SJ7652-4
WG191840-4	SJ7652-4

Entered by: ZF Date: 10.3.16 Accepted by: KO Date: 10/4/16

WET CHEMISTRY BATCH REPORT
Oct 03 2016, 09:21 am
Batch: WG191840

Parameter: Toc In Soil(Avg)

Date Analyzed: 27-SEP-16

Analyst Initials: ZF

Prep Date: N/A

Prep Method: N/A

Prep Chemist: N/A

Sample	Samp Type	Method	Initial Amt.	Final Amt.	Rpt. DF	Result	Rpt Result	TS(%)	PQL	MDL	Adj PQL	RPD	%Rec
SJ7652-1	SAMP	SW846 9060A	416.6mg		1	4637.8782	4600 ug/gdrywt	74.	400	160	720		

Comments:

SJ7652-4	MS/MSD for TOC
WG191840-1	SJ7652-4
WG191840-2	SJ7652-4
WG191840-3	SJ7652-4
WG191840-4	SJ7652-4

Entered by: ZF Date: 10-3-16 Accepted by: [illegible] Date: 10/4/16

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)
__X__ Total Organic Carbon (SW846 9060)
_____ Other (Specify):
_____ Total Organic Carbon (Lloyd Kahn)

Spiking Information		
LCS Spike Source ID / Compound:	W14538	TV: 16,000
CCV Spike Source ID / Compound:	W14524	TV: 16,000
MS Spike Source ID / Compound:	W14538	TV: 4,000

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	108.66 (109)
CCB	500	Wet Dry	
LCS	40	Wet Dry	105
LOD	500	Wet Dry	
LOQ	500	Wet Dry	
SJ7652-1	339.6	Wet Dry	
SJ7652-1	406.5	Wet Dry	
SJ7652-1	396.4	Wet Dry	
-1	416.6	Wet Dry	
-2	270.1	Wet Dry	
-3	358.5	Wet Dry	
-4	327.6	Wet Dry	
CCV	40	Wet Dry	108
CCB	500	Wet Dry	
SJ7652 -4MS	378.1	Wet Dry	
-4MSD	360.9	Wet Dry	
-5	327.3	Wet Dry	
-6	385.6	Wet Dry	
-7	326.2	Wet Dry	
-8	350.4	Wet Dry	
CCV	40	Wet Dry	106%
CCB	500	Wet Dry	

* "Wet" = field-moist sample (as received). "Dry" = oven-dried sample.

Analyst: SC / ZF	Analysis Date: 9.27.16
Reviewer: RO	Review Date: 10/4/16

	Sample Name	Dilution	Result	Comment	Date / Time
1	CCV	1.000	SSM-TC:17386 ug		9/27/2016 12:32:19 PM
2	CCB	1.000	SSM-TC:0.000 ug		9/27/2016 12:38:43 PM
3	LCS	1.000	SSM-TC:16751 ug		9/27/2016 12:52:02 PM
4	LOD	1.000	SSM-TC:201.5 ug		9/27/2016 1:01:08 PM
5	LOQ	1.000	SSM-TC:509.7 ug		9/27/2016 1:11:55 PM
6	SJ7652-1	1.000	SSM-TC:1249 ug		9/27/2016 1:24:19 PM
7	SJ7652-1	1.000	SSM-TC:1299 ug		9/27/2016 1:38:16 PM
8	SJ7652-1	1.000	SSM-TC:1410 ug		9/27/2016 1:53:38 PM
9	SJ7652-1	1.000	SSM-TC:1797 ug		9/27/2016 2:06:05 PM
10	SJ7652-2	1.000	SSM-TC:2937 ug		9/27/2016 2:18:31 PM
11	SJ7652-3	1.000	SSM-TC:2034 ug		9/27/2016 2:32:52 PM
12	SJ7652-4	1.000	SSM-TC:3785 ug		9/27/2016 2:51:50 PM
13	CCV	1.000	SSM-TC:17264 ug		9/27/2016 3:22:15 PM
14	CCB	1.000	SSM-TC:0.000 ug		9/27/2016 3:29:44 PM
15	SJ7652-4 MS	1.000	SSM-TC:8430 ug		9/27/2016 3:50:36 PM
16	SJ7652-4 MSD	1.000	SSM-TC:8469 ug		9/27/2016 4:07:08 PM
17	SJ7652-5	1.000	SSM-TC:3635 ug		9/27/2016 4:21:08 PM
18	SJ7652-6	1.000	SSM-TC:3542 ug		9/27/2016 4:32:32 PM
19	SJ7652-7	1.000	SSM-TC:3691 ug		9/27/2016 5:07:49 PM
20	SJ7652-8	1.000	SSM-TC:2225 ug		9/27/2016 5:18:41 PM
21	CCV	1.000	SSM-TC:16983 ug		9/27/2016 5:32:07 PM
22	CCB	1.000	SSM-TC:0.000 ug		9/27/2016 5:42:29 PM
23					
24					
25					
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	

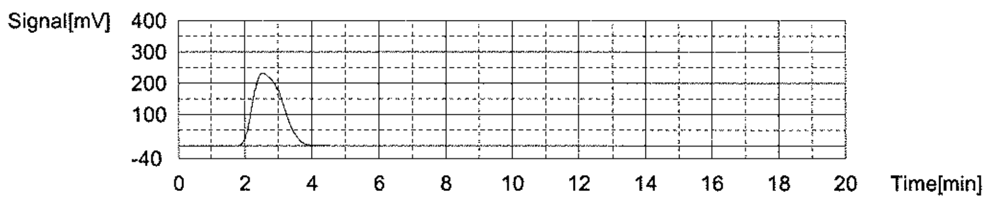
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:17386 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	1423	1423	17386ug	17386ug	40.00mg	40uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 12:32:19 PM

Mean Area	1423
Mean CNV	1423
Mean Conc.	17386ug



Sample

Sample Name:	CCB
Sample ID:	<Untitled>
Origin:	tc method SOILS.met
Chk. Result	

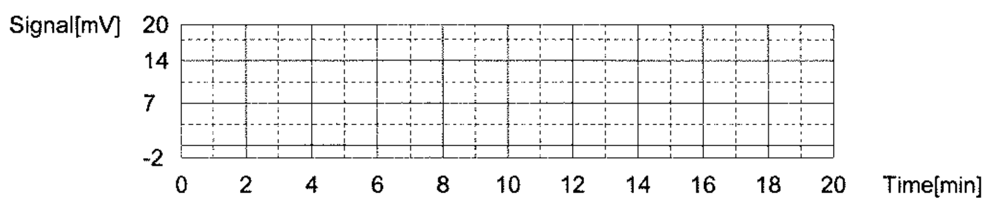
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:0.000 ug

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	9/27/2016 12:38:43 PM

Mean Area	0.000
Mean CNV	0.000
Mean Conc.	0.000ug



Sample

Sample Name: LCS
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

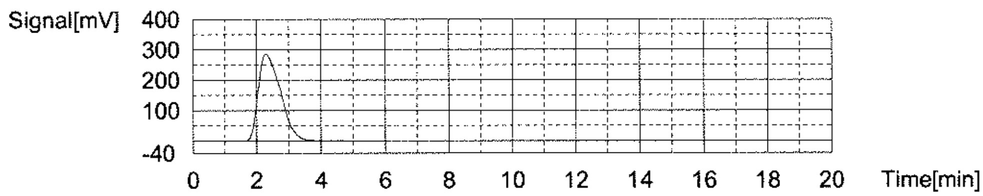
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:16751 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	1371	1371	16751ug	16751ug	40.00mg	40uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 12:52:02 PM

Mean Area 1371
Mean CNV 1371
Mean Conc. 16751ug



Sample

Sample Name: LOD
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

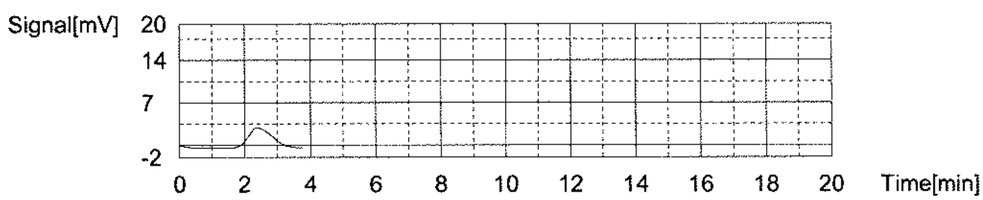
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:201.5 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	16.49	16.49	201.5ug	201.5ug	500.0mg	500uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 1:01:08 PM

Mean Area 16.49
Mean CNV 16.49
Mean Conc. 201.5ug



Sample

Sample Name: LOQ
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

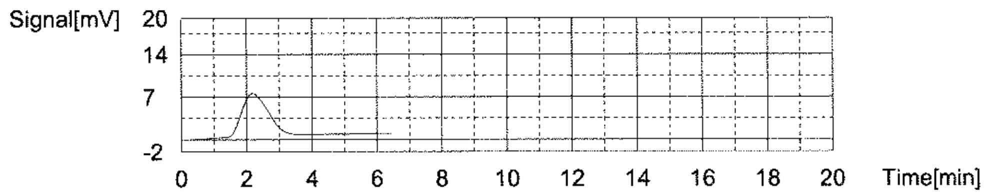
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:509.7 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	41.72	41.72	509.7ug	509.7ug	500.0mg	500uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 1:11:55 PM

Mean Area 41.72
Mean CNV 41.72
Mean Conc. 509.7ug



Sample

Sample Name: SJ7652-1
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

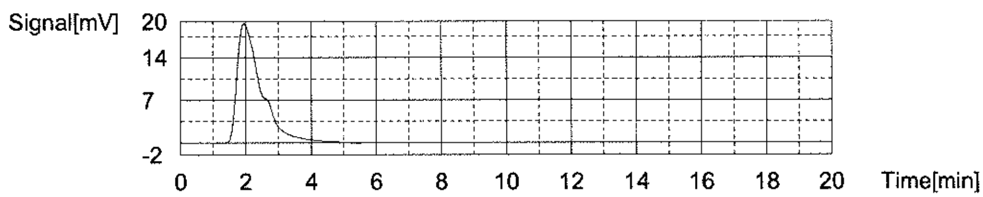
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:1249 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	102.2	102.2	1249ug	1249ug	339.6mg	339uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 1:24:19 PM

Mean Area 102.2
Mean CNV 102.2
Mean Conc. 1249ug



Sample

Sample Name: SJ7652-1
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

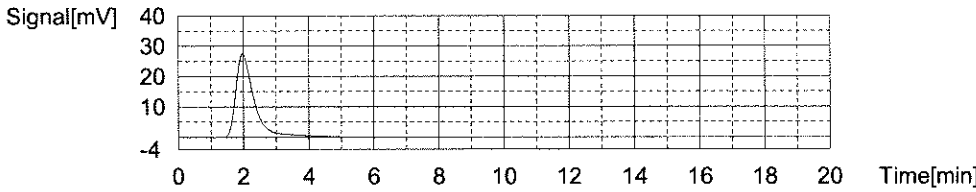
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:1299 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	106.3	106.3	1299ug	1299ug	406.5mg	406uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 1:38:16 PM

Mean Area 106.3
Mean CNV 106.3
Mean Conc. 1299ug



Sample

Sample Name: SJ7652-1
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

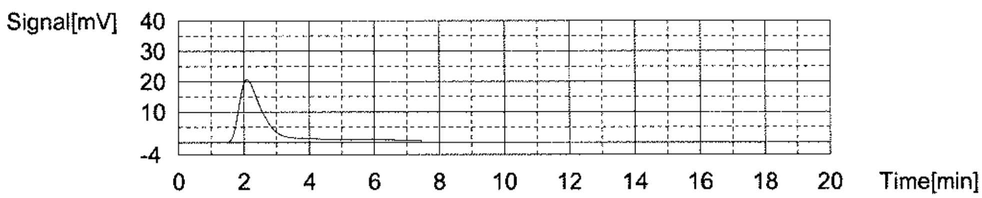
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:1410 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	115.4	115.4	1410ug	1410ug	396.4mg	396uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 1:53:38 PM

Mean Area 115.4
Mean CNV 115.4
Mean Conc. 1410ug



Sample

Sample Name: SJ7652-1
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

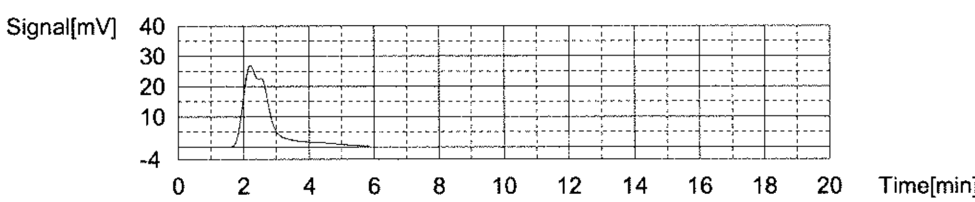
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:1797 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	147.1	147.1	1797ug	1797ug	416.6mg	416uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 2:06:05 PM

Mean Area 147.1
Mean CNV 147.1
Mean Conc. 1797ug



Sample

Sample Name: SJ7652-2
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

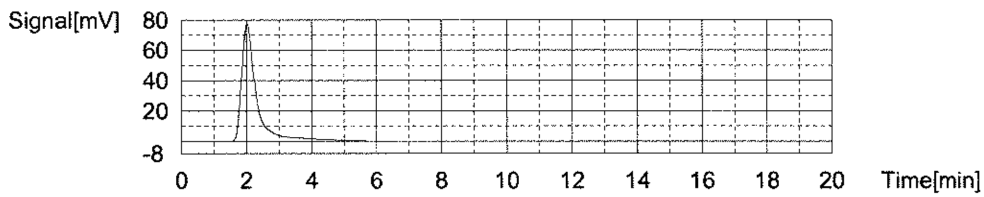
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2937 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	240.4	240.4	2937ug	2937ug	270.1mg	270uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 2:18:31 PM

Mean Area 240.4
Mean CNV 240.4
Mean Conc. 2937ug



Sample

Sample Name: SJ7652-3
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

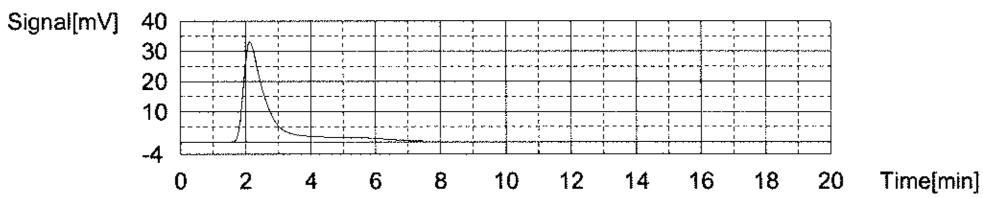
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2034 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	166.5	166.5	2034ug	2034ug	358.5mg	358uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 2:32:52 PM

Mean Area 166.5
Mean CNV 166.5
Mean Conc. 2034ug



Sample

Sample Name: SJ7652-4
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

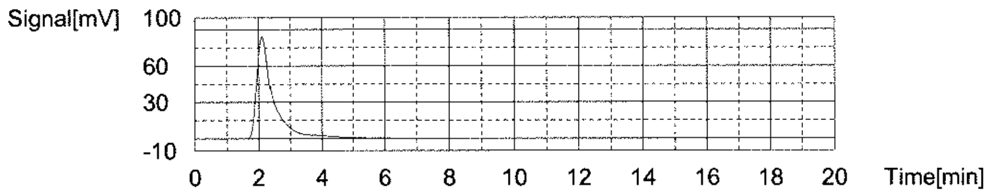
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:3785 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	309.8	309.8	3785ug	3785ug	327.6mg	327uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 2:51:50 PM

Mean Area 309.8
Mean CNV 309.8
Mean Conc. 3785ug



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

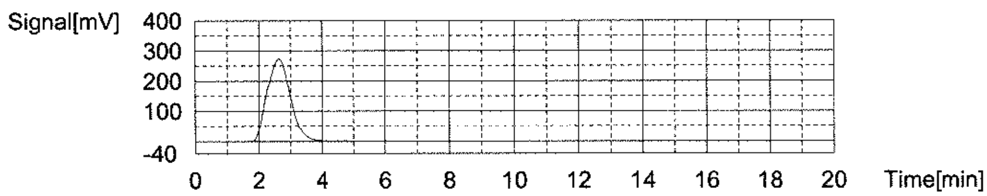
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:17264 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	1413	1413	17264ug	17264ug	40.00mg	40uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 3:22:15 PM

Mean Area 1413
Mean CNV 1413
Mean Conc. 17264ug



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

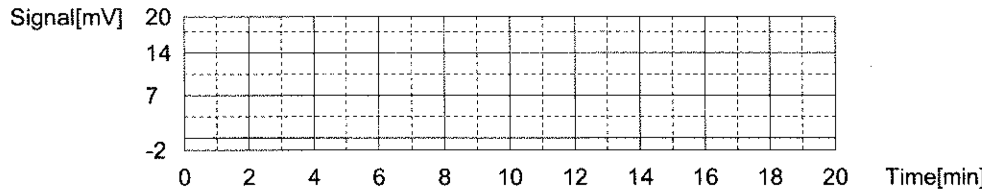
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:0.000 ug

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	9/27/2016 3:29:44 PM

Mean Area 0.000
Mean CNV 0.000
Mean Conc. 0.000ug



Sample

Sample Name: SJ7652-4 MS
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

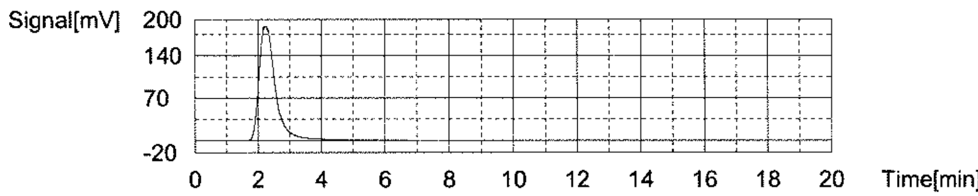
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:8430 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	690.0	690.0	8430ug	8430ug	378.1mg	378uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 3:50:36 PM

Mean Area 690.0
Mean CNV 690.0
Mean Conc. 8430ug



Sample

Sample Name: SJ7652-4 MSD
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

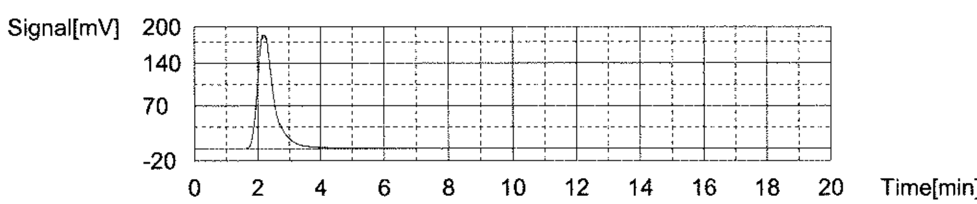
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:8469 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	693.2	693.2	8469ug	8469ug	360.9mg	360uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 4:07:08 PM

Mean Area 693.2
Mean CNV 693.2
Mean Conc. 8469ug



Sample

Sample Name: SJ7652-5
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

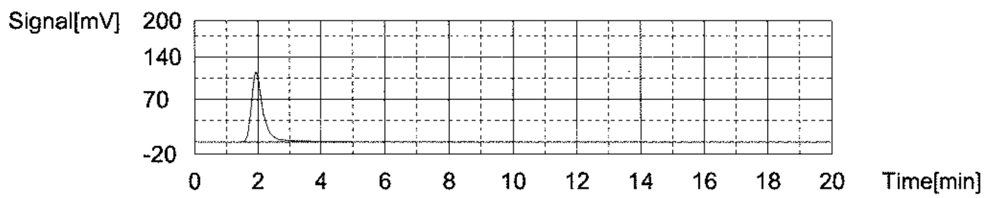
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:3635 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	297.5	297.5	3635ug	3635ug	327.3mg	327uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 4:21:08 PM

Mean Area 297.5
Mean CNV 297.5
Mean Conc. 3635ug



Sample

Sample Name: SJ7652-6
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

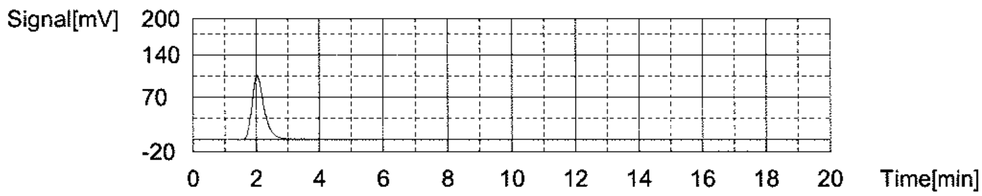
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:3542 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	289.9	289.9	3542ug	3542ug	395.6mg	395uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 4:32:32 PM

Mean Area 289.9
Mean CNV 289.9
Mean Conc. 3542ug



Sample

Sample Name: SJ7652-7
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

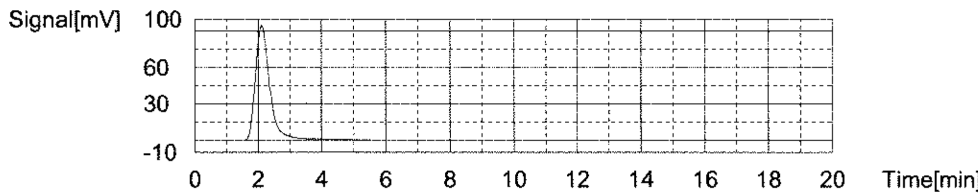
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:3691 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	302.1	302.1	3691ug	3691ug	326.2mg	326uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 5:07:49 PM

Mean Area 302.1
Mean CNV 302.1
Mean Conc. 3691ug



Sample

Sample Name: SJ7652-8
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

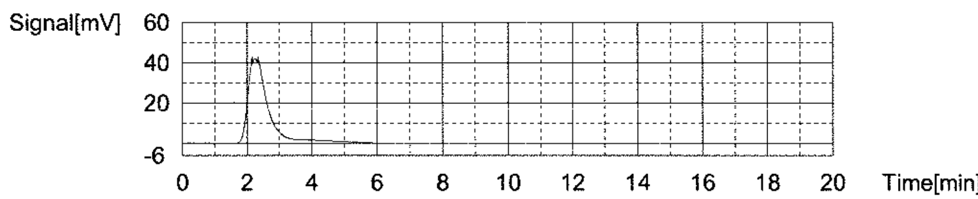
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2225 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	182.1	182.1	2225ug	2225ug	350.4mg	350uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 5:18:41 PM

Mean Area 182.1
Mean CNV 182.1
Mean Conc. 2225ug



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

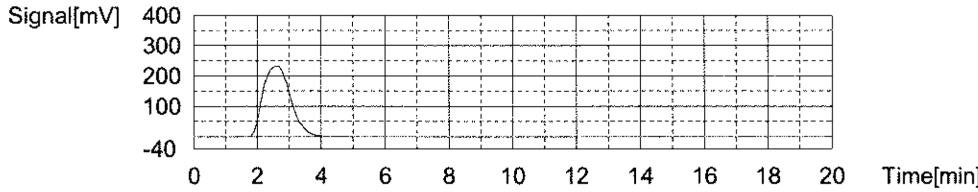
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:16983 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	1390	1390	16983ug	16983ug	40.00mg	40uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/27/2016 5:32:07 PM

Mean Area 1390
Mean CNV 1390
Mean Conc. 16983ug



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

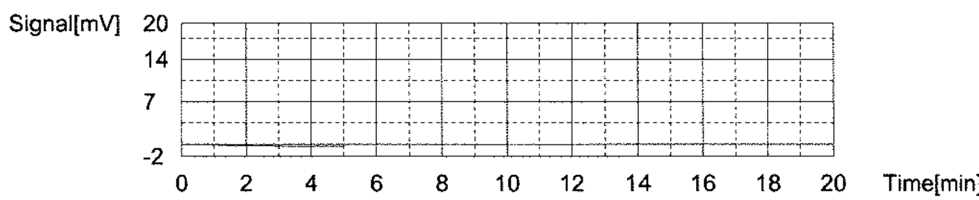
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:0.000 ug

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	9/27/2016 5:42:29 PM

Mean Area 0.000
Mean CNV 0.000
Mean Conc. 0.000ug



Instr.Information

System	SSM-5000A
Detector	Combustion
Catalyst	Regular Sensitivity
Cell Length	short

Cal. Curve

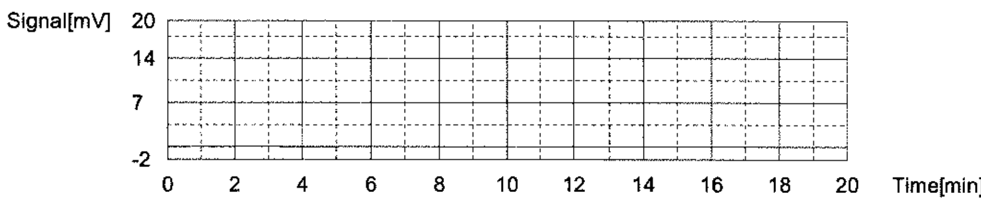
Sample Name:	Untitled
Sample ID:	Untitled
Cal. Curve:	toc sl cal 092316.2016_09_23_11_13_53.cal

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

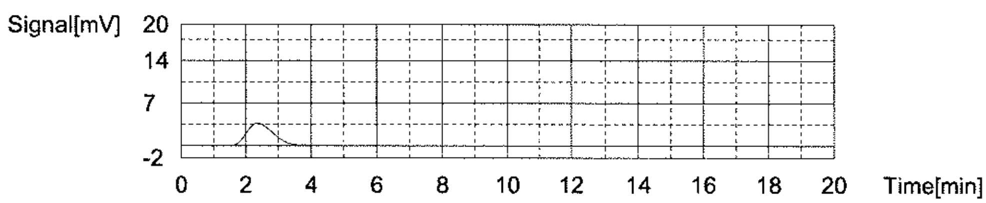
Mean Area 0.000
Mean CNV 0.000



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

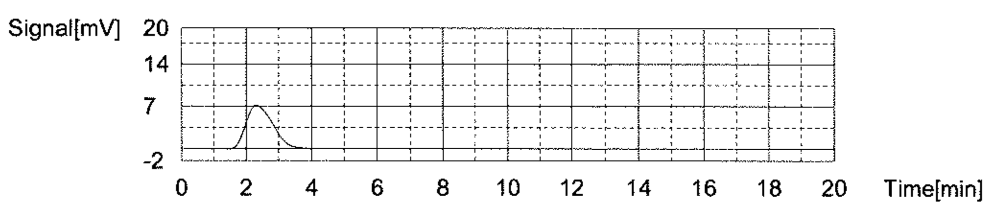
Mean Area 20.30
Mean CNV 20.30



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

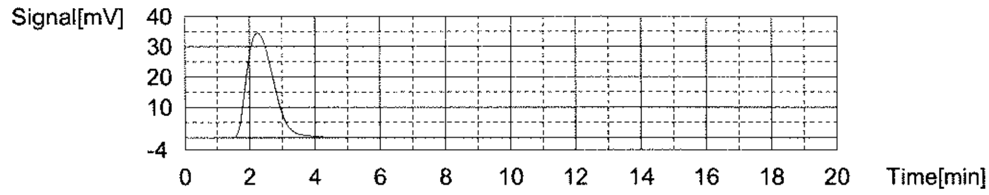
Mean Area 40.14
Mean CNV 40.14



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

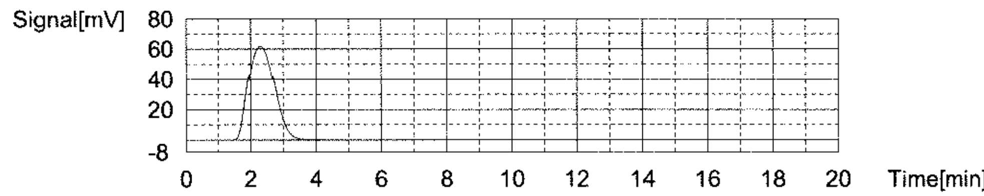
Mean Area 194.2
Mean CNV 194.2



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

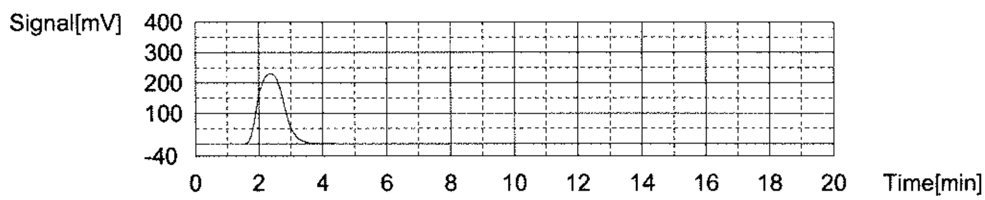
Mean Area 347.2
Mean CNV 347.2



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

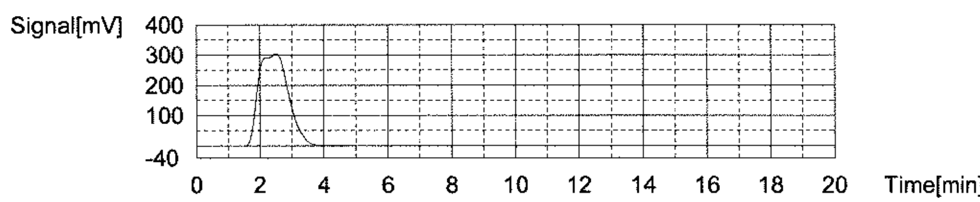
Mean Area 1283
Mean CNV 1283



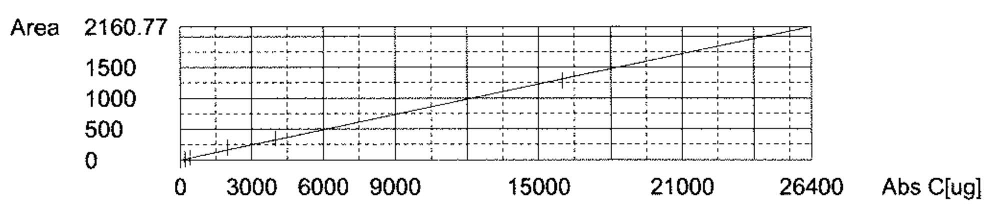
AbsC: 24000ug

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



WET CHEMISTRY BATCH REPORT
Oct 03 2016, 10:19 am
Batch: WG191850

Parameter: Toc In Soil(1)

Date Analyzed: 28-SEP-16

Analyst Initials: ZF

Prep Date: N/A

Prep Method: N/A

Prep Chemist: N/A

Sample	Samp Type	Method	Initial Amt.	Final Amt.	Rpt. DF	Result	Rpt Result	TS(%)	PQL	MDL	Adj PQL	RPD	%Rec
SJ7652-10	SAMP	SW846 9060A	432.5mg		1	10108.979	10000 ug/gdrywt	74.	400	130	630		
SJ7652-11	SAMP	SW846 9060A	458.3mg		1	5110.59656	5100 ug/gdrywt	74.	400	120	590		
SJ7652-12	SAMP	SW846 9060A	448.5mg		1	8905.60369	8900 ug/gdrywt	70.	400	140	640		
SJ7652-13	SAMP	SW846 9060A	396mg		1	9407.17239	9400 ug/gdrywt	63.	400	170	780		
SJ7652-9	SAMP	SW846 9060A	418.4mg		1	10399.49216	10000 ug/gdrywt	62.	400	160	780		
WG191850-1	MBLANK	SW846 9060A	500mg		1	0	U300 ug/gdrywt	NA	400	85.	400		
WG191850-2	LCS	SW846 9060A	40mg		1	439225	440000 ug/gdrywt	NA	400	85.	400		110
WG191850-3	MS	SW846 9060A	375mg		1	26224.17336	26000 ug/gdrywt	NA	400	180	840		99

Comments:

WG191850-1 SJ7652-13
WG191850-2 SJ7652-13
WG191850-3 SJ7652-13

Entered by: ZF Date: 10-3-16 Accepted by: AO Date: 10/4/16

WET CHEMISTRY BATCH REPORT
Oct 03 2016, 10:19 am
Batch: WG191850

Parameter: Toc In Soil(2) | Prep Date: N/A

Date Analyzed: 28-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
SJ7652-13	SAMP	SW846 9060A	396mg		1	9878.19055	9900 ug/gdrywt	63.	400	170	800		

Comments:

WG191850-1	SJ7652-13
WG191850-2	SJ7652-13
WG191850-3	SJ7652-13

Entered by: ZF Date: 10-3-16 Accepted by: [signature] Date: 10/4/16

WET CHEMISTRY BATCH REPORT
Oct 03 2016, 10:19 am
Batch: WG191850

Parameter: Toc In Soil(3)   Prep Date: N/A

Date Analyzed: 28-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
SJ7652-13	SAMP	SW846 9060A	396mg		1	9503.89058	9500 ug/gdrywt	63.	400	160	750		

Comments:

WG191850-1 SJ7652-13
WG191850-2 SJ7652-13
WG191850-3 SJ7652-13

Entered by: ZF   Date: 10-3-16   Accepted by: [signature]   Date: 10/4/16

WET CHEMISTRY BATCH REPORT
Oct 03 2016, 10:19 am
Batch: WG191850

Parameter: Toc In Soil(4)   Prep Date: N/A

Date Analyzed: 28-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
SJ7652-13	SAMP	SW846 9060A	396mg		1	9857.35767	9800 ug/gdrywt	63.	400	170	800		

Comments:

WG191850-1 SJ7652-13
WG191850-2 SJ7652-13
WG191850-3 SJ7652-13

Entered by: ZF   Date: 10-3-16   Accepted by: FO   Date: 10/4/16

WET CHEMISTRY BATCH REPORT
Oct 03 2016, 10:19 am
Batch: WG191850

Parameter: Toc In Soil(Avg)

Date Analyzed: 28-SEP-16

Analyst Initials: ZF

Prep Date: N/A

Prep Method: N/A

Prep Chemist: N/A

Sample	Samp Type	Method	Initial Amt.	Final Amt.	Rpt. DF	Result	Rpt Result	TS(%)	PQL	MDL	Adj PQL	RPD	%Rec
SJ7652-13	SAMP	SW846 9060A	396mg		1	9642.68147	9600 ug/gdrywt	63.	400	170	790		

Comments:

WG191850-1 SJ7652-13
WG191850-2 SJ7652-13
WG191850-3 SJ7652-13

Entered by: ZF Date: 10-3-16 Accepted by: LL Date: 10/4/16

WET CHEMISTRY BATCH REPORT
Oct 04 2016, 11:58 am
Batch: WG191852

Parameter: Carbon, Percent — Prep Date: N/A

Date Analyzed: 28-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
SJ7611-1	SAMP	SW846 9060A	91.6mg	0.10000g	1	18620	57. %	36.	.1	0.38	1.5		
WG191852-1	MBLANK	SW846 9060A	500mg	0.10000g	1	0	U0.10 %	NA	.1	0.025	0.10		
WG191852-2	LCS	SW846 9060A	40mg	0.10000g	1	17569	44. %	NA	.1	0.31	1.2		110

Comments:

WG191852-1 SJ7611-1
WG191852-2 SJ7611-1

Entered by: ZF Date: 10-04-16 Accepted by: [signature] Date: 10/4/16

WET CHEMISTRY BATCH REPORT
Oct 03 2016, 10:27 am
Batch: WG191853

Parameter: TOC In Soil

Prep Date: N/A

Date Analyzed: 28-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
SJ7611-1	SAMP	SW846 9060A	118.2mg	200.00ug	1	560793.11587	560000 ug/gdrywt	36.	400	1000	4700		
WG191853-1	MBLANK	SW846 9060A	500mg	200.00ug	1	0	U300 ug/gdrywt	NA	400	85.	400		
WG191853-2	LCS	SW846 9060A	40mg	200.00ug	1	439225	440000 ug/gdrywt	NA	400	85.	400		110

Comments:

WG191853-1 SJ7611-1
WG191853-2 SJ7611-1

Entered by: ZF Date: 10-3-16 Accepted by: RS Date: 10/4/16

TOC 1,2,3,4
WG191850
-R386625

% Carb.
WG191852
R386626

TOC
WG191853
R386627

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)
__X__ Total Organic Carbon (SW846 9060)
_____ Total Organic Carbon (Lloyd Kahn)
_____ Total Inorganic Carbon (SW846 9060M)
_____ Other (Specify):

Spiking Information		
LCS Spike Source ID / Compound:	W14538	TV: 16,000 mg
CCV Spike Source ID / Compound:	W14524	TV: 16,000 mg
MS Spike Source ID / Compound:	W14538	TV: 4,000 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)~~ ZF 9-28-16
CCV	40	Wet Dry	107%
CCB	500	Wet Dry	
LCS	40	Wet Dry	110%
SJ 7652-9	418.4	Wet Dry	
-10	432.5	Wet Dry	
-11	458.3	Wet Dry	
-12	448.5	Wet Dry	
-13	404.0	Wet Dry	
-13	393.4	Wet Dry	
-13	420.4	Wet Dry	
-13	396.0	Wet Dry	
-13 MS	375.0	Wet Dry	
CCV	40	Wet Dry	rerun baseline fluctuation
CCV	40	Wet Dry	108%
CCB	500	Wet Dry	
SJ 7611-1 (Acidified)	118.2	Wet Dry	
-1	139.5	Wet Dry	rerun too high over curve
-1	91.6	Wet Dry	
CCV	40	Wet Dry	102%
CCB	500	Wet Dry	
		Wet Dry	
ZF 9-28-16		Wet Dry	

* "Wet" = field-moist sample (as received). "Dry" = oven-dried sample.

Analyst: ZF	Analysis Date: 9-28-16
Reviewer: [illegible]	Review Date: 10/4/16

	Sample Name	Dilution	Result	Comment	Date / Time
1	CCV	1.000	SSM-TC:17117 ug		9/28/2016 11:41:00 AM
2	CCB	1.000	SSM-TC:0.000 ug		9/28/2016 11:48:58 AM
3	LCS	1.000	SSM-TC:17569 ug		9/28/2016 12:02:08 PM
4	SJ7652-9	1.000	SSM-TC:2677 ug		9/28/2016 12:16:13 PM
5	SJ7652-10	1.000	SSM-TC:3222 ug		9/28/2016 12:34:33 PM
6	SJ7652-11	1.000	SSM-TC:1732 ug		9/28/2016 12:47:50 PM
7	SJ7652-12	1.000	SSM-TC:2792 ug		9/28/2016 1:02:13 PM
8	SJ7652-13	1.000	SSM-TC:2398 ug		9/28/2016 1:12:31 PM
9	SJ7652-13	1.000	SSM-TC:2452 ug		9/28/2016 1:26:45 PM
10	SJ7652-13	1.000	SSM-TC:2521 ug		9/28/2016 1:36:33 PM
11	SJ7652-13	1.000	SSM-TC:2463 ug		9/28/2016 1:46:25 PM
12	SJ7652-13 MS	1.000	SSM-TC:6205 ug		9/28/2016 3:07:19 PM
13	CCV	1.000	SSM-TC:6.119 ug		9/28/2016 3:16:06 PM
14	CCV	1.000	SSM-TC:17288 ug		9/28/2016 3:44:11 PM
15	CCB	1.000	SSM-TC:0.000 ug		9/28/2016 3:51:28 PM
16	SJ7611-1	1.000	SSM-TC:23666 ug		9/28/2016 4:09:33 PM
17	SJ7611-1	1.000	SSM-TC:24900 ug		9/28/2016 4:22:08 PM
18	SJ7611-1	1.000	SSM-TC:18620 ug		9/28/2016 4:34:56 PM
19	CCV	1.000	SSM-TC:16372 ug		9/28/2016 4:45:04 PM
20	CCB	1.000	SSM-TC:0.000 ug		9/28/2016 4:51:34 PM
21					
22					
23					
24					
25					
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

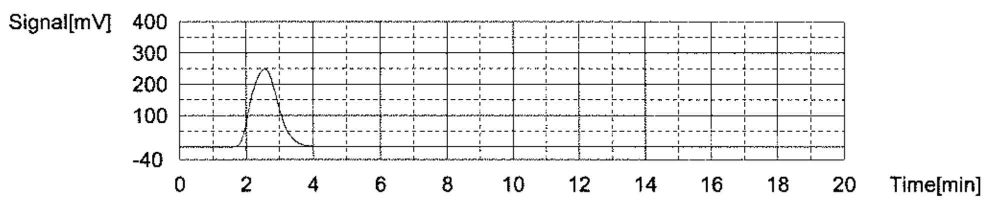
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:17117 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	1401	1401	17117ug	17117ug	40.00mg	40uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 11:41:00 AM

Mean Area 1401
Mean CNV 1401
Mean Conc. 17117ug



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

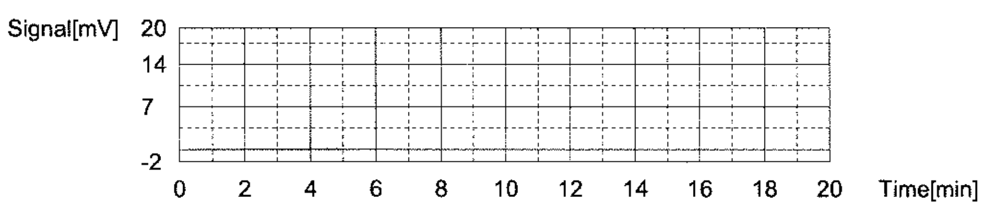
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:0.000 ug

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	9/28/2016 11:48:58 AM

Mean Area 0.000
Mean CNV 0.000
Mean Conc. 0.000ug



Sample

Sample Name: LCS
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

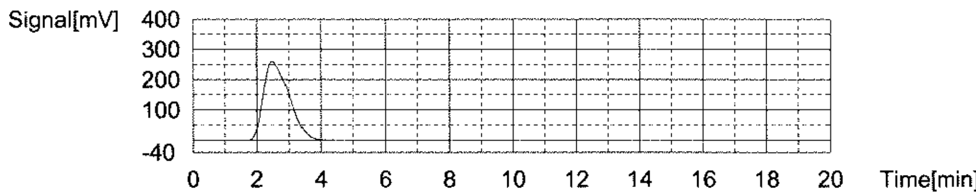
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:17569 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	1438	1438	17569ug	17569ug	40.00mg	40uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 12:02:08 PM

Mean Area 1438
Mean CNV 1438
Mean Conc. 17569ug



Sample

Sample Name: SJ7652-9
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

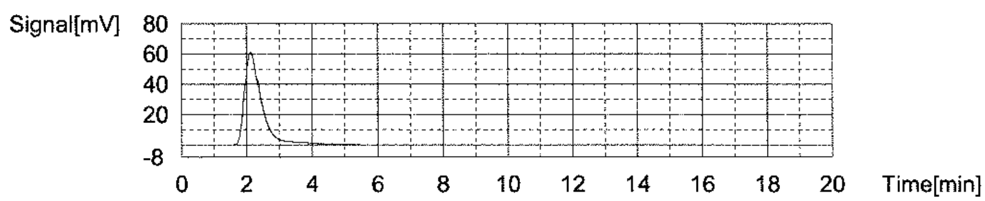
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2677 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	219.1	219.1	2677ug	2677ug	418.4mg	418uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 12:16:13 PM

Mean Area 219.1
Mean CNV 219.1
Mean Conc. 2677ug



Sample

Sample Name: SJ7652-10
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

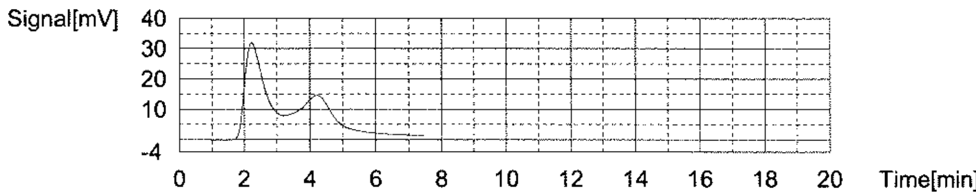
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:3222 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	263.7	263.7	3222ug	3222ug	432.5mg	432uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 12:34:33 PM

Mean Area 263.7
Mean CNV 263.7
Mean Conc. 3222ug



Sample

Sample Name: SJ7652-11
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

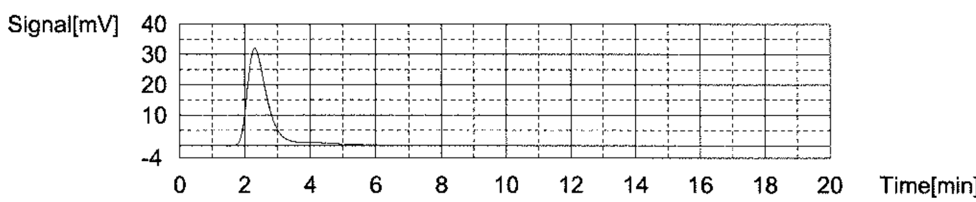
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:1732 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	141.8	141.8	1732ug	1732ug	458.3mg	458uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 12:47:50 PM

Mean Area 141.8
Mean CNV 141.8
Mean Conc. 1732ug



Sample

Sample Name: SJ7652-12
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

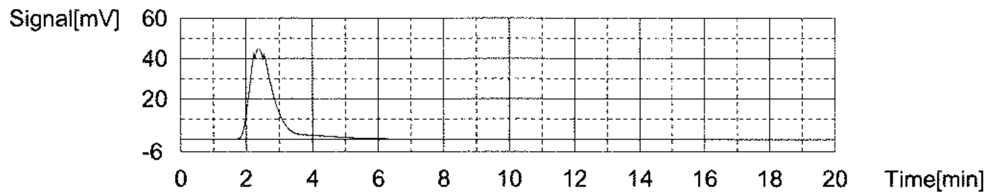
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2792 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	228.5	228.5	2792ug	2792ug	448.5mg	448uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 1:02:13 PM

Mean Area 228.5
Mean CNV 228.5
Mean Conc. 2792ug



Sample

Sample Name: SJ7652-13
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

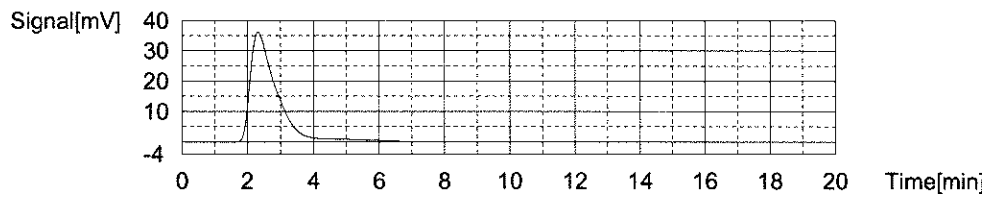
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2398 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	196.3	196.3	2398ug	2398ug	404.0mg	404uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 1:12:31 PM

Mean Area 196.3
Mean CNV 196.3
Mean Conc. 2398ug



Sample

Sample Name: SJ7652-13
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

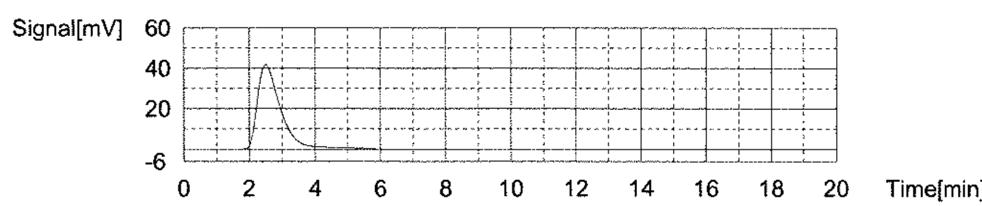
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2452 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	200.7	200.7	2452ug	2452ug	393.4mg	393uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 1:26:45 PM

Mean Area 200.7
Mean CNV 200.7
Mean Conc. 2452ug



Sample

Sample Name: SJ7652-13
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

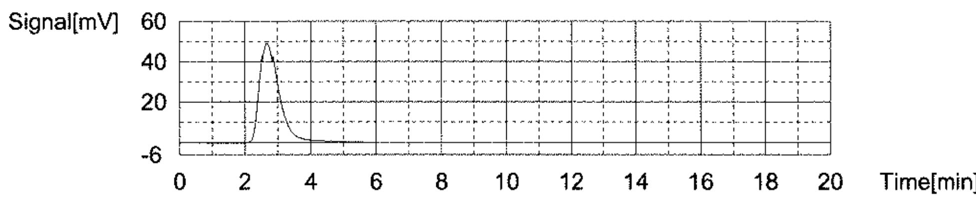
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2521 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	206.3	206.3	2521ug	2521ug	420.4mg	420uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 1:36:33 PM

Mean Area 206.3
Mean CNV 206.3
Mean Conc. 2521ug



Sample

Sample Name: SJ7652-13
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

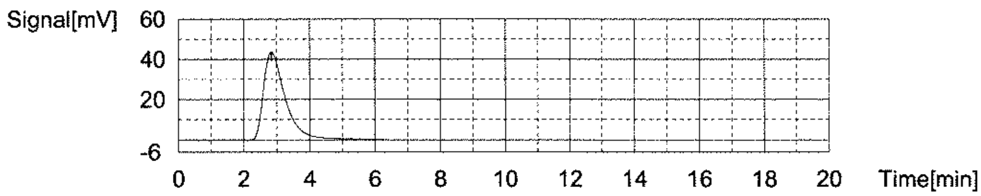
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:2463 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	201.6	201.6	2463ug	2463ug	396.0mg	396uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 1:46:25 PM

Mean Area 201.6
Mean CNV 201.6
Mean Conc. 2463ug



Sample

Sample Name: SJ7652-13 MS
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

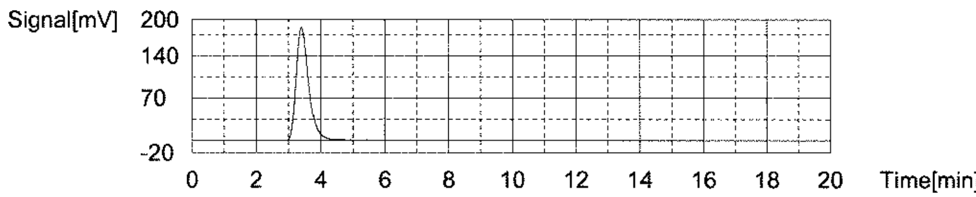
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:6205 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	507.9	507.9	6205ug	6205ug	375.0mg	375uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 3:07:19 PM

Mean Area 507.9
Mean CNV 507.9
Mean Conc. 6205ug



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

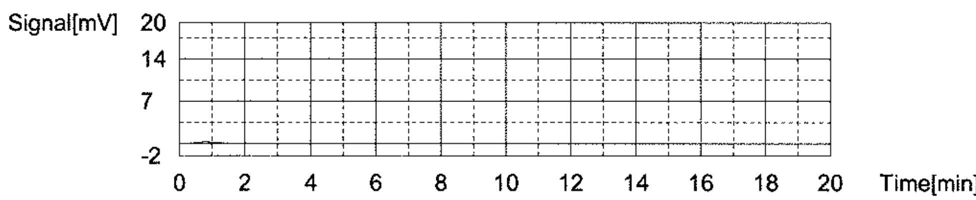
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:6.119 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	0.5008	0.5008	6.119ug	6.119ug	40.00mg	40uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 3:16:06 PM

Mean Area 0.5008
Mean CNV 0.5008
Mean Conc. 6.119ug



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

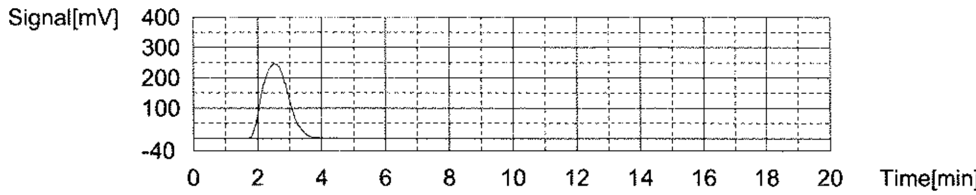
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:17288 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	1415	1415	17288ug	17288ug	40.00mg	40uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 3:44:11 PM

Mean Area 1415
Mean CNV 1415
Mean Conc. 17288ug



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

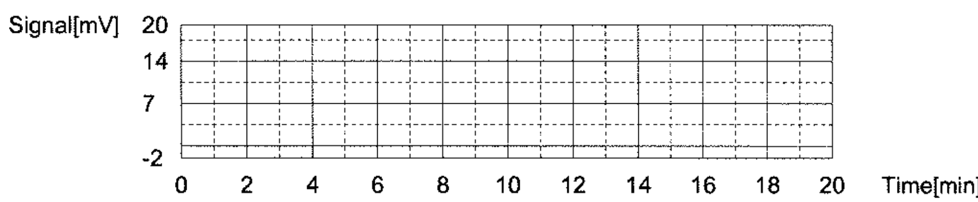
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:0.000 ug

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	9/28/2016 3:51:28 PM

Mean Area 0.000
Mean CNV 0.000
Mean Conc. 0.000ug



Sample

Sample Name: SJ7611-1
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

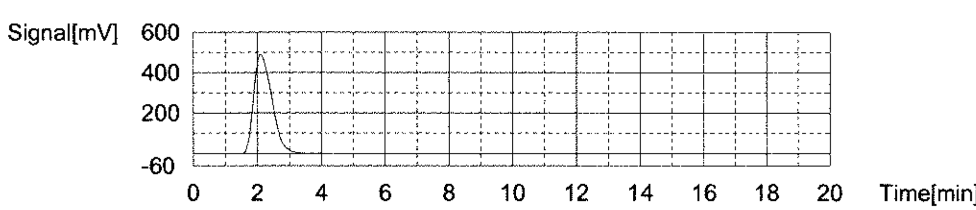
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:23666 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	1937	1937	23666ug	23666ug	118.2mg	118uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 4:09:33 PM

Mean Area 1937
Mean CNV 1937
Mean Conc. 23666ug



Sample

Sample Name: SJ7611-1
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

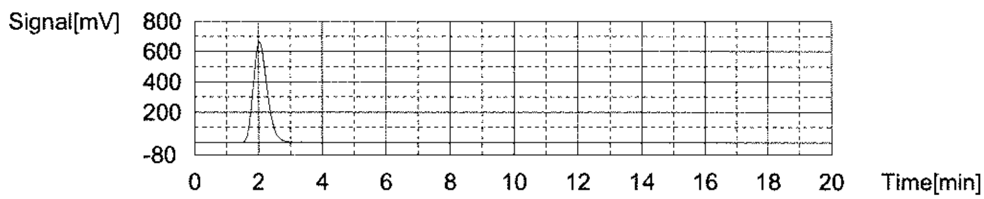
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:24900 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	2038	2038	24900ug	24900ug	139.5mg	139uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 4:22:08 PM

Mean Area 2038
Mean CNV 2038
Mean Conc. 24900ug



Sample

Sample Name: SJ7611-1
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

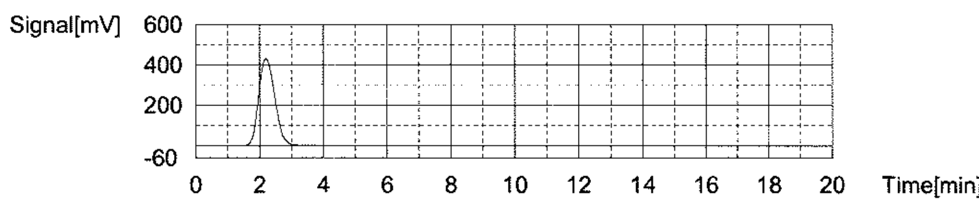
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:18620 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	1524	1524	18620ug	18620ug	91.60mg	91uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 4:34:56 PM

Mean Area 1524
Mean CNV 1524
Mean Conc. 18620ug



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

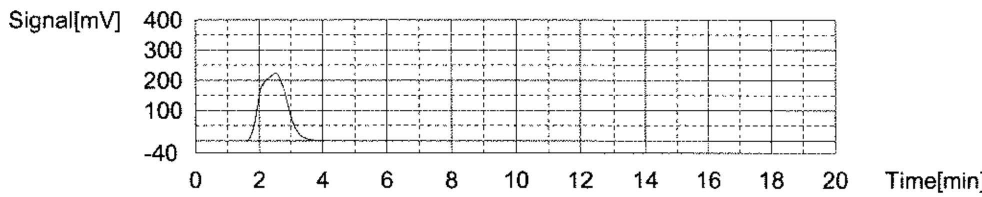
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:16372 ug

1. Det

Anal.: SSM-TC

No.	Area	CNV	Abs C	Conc.	Weight	Volume	Ex.	Cal. Curve	Date / Time
1	1340	1340	16372ug	16372ug	40.00mg	40uL		toc sl cal 092316.2016_09_23_11_13_53.cal	9/28/2016 4:45:04 PM

Mean Area 1340
Mean CNV 1340
Mean Conc. 16372ug



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: tc method SOILS.met
Chk. Result

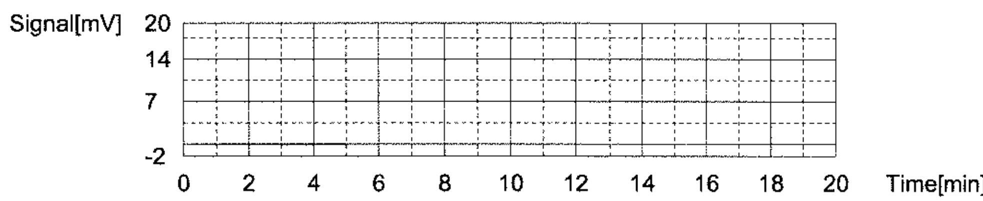
Type	Anal.	Dil.	Density	Result
Unknown	SSM-TC	1.000	1.000mg/uL	SSM-TC:0.000 ug

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	9/28/2016 4:51:34 PM

Mean Area 0.000
Mean CNV 0.000
Mean Conc. 0.000ug



Instr.Information

System	SSM-5000A
Detector	Combustion
Catalyst	Regular Sensitivity
Cell Length	short

Cal. Curve

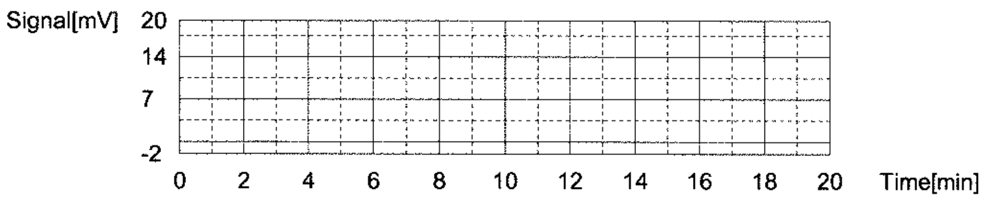
Sample Name:	Untitled
Sample ID:	Untitled
Cal. Curve:	toc sl cal 092316.2016_09_23_11_13_53.cal

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

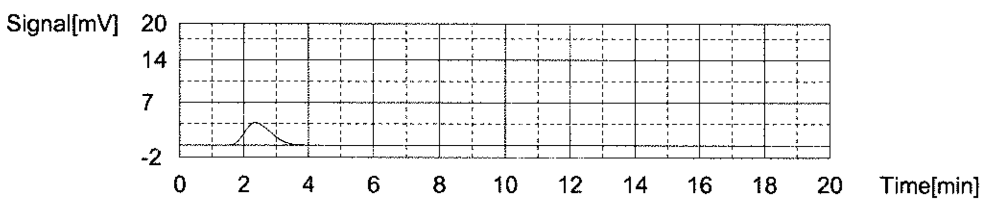
Mean Area 0.000
Mean CNV 0.000



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

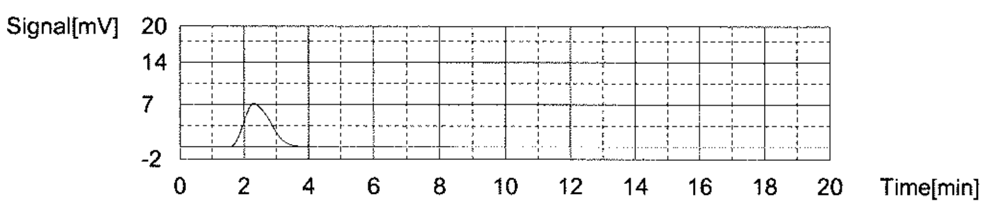
Mean Area 20.30
Mean CNV 20.30



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

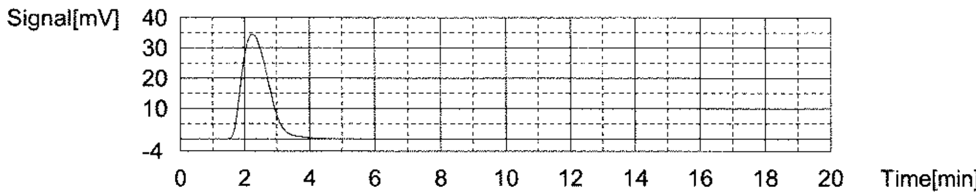
Mean Area 40.14
Mean CNV 40.14



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

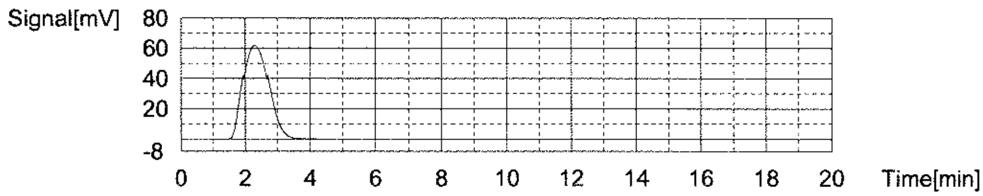
Mean Area 194.2
Mean CNV 194.2



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

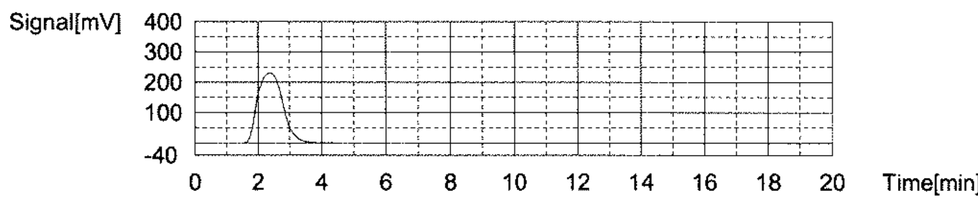
Mean Area 347.2
Mean CNV 347.2



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

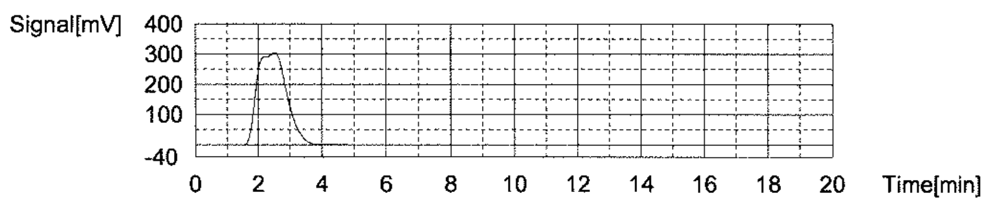
Mean Area 1283
Mean CNV 1283



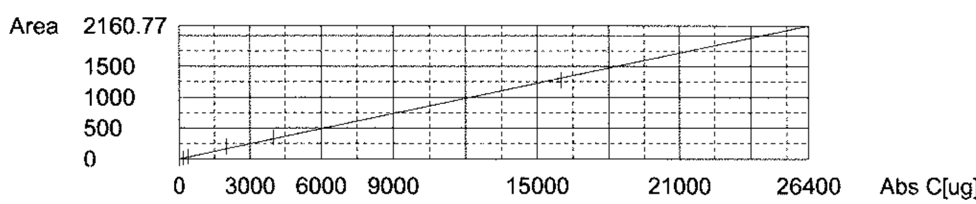
AbsC: 24000ug

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



TOTAL SOLIDS BATCH REPORT
Sep 26 2016, 11:21 am
Batch: WG191232

Sample	Matrix	Type	Prep Date	Tare	Initial	Final1	Final	by	Date	Raw TS	Rep TS	Recovery	RPD
SJ7527-4	SL	SAMP	23-SEP-16	1.29 g	5 g	5 g	5 g	AP	26-SEP-16	100.0000	100 %		
SJ7611-1	SL	SAMP	23-SEP-16	1.29 g	6.9808 g	3.3244 g	3.3218 g	AP	26-SEP-16	35.7030	36. %		
SJ7645-14	SL	SAMP	23-SEP-16	1.29 g	27.0801 g	17.9525 g	17.9551 g	AP	26-SEP-16	64.6180	65. %		
SJ7645-15	SL	SAMP	23-SEP-16	1.29 g	29.6727 g	19.4527 g	19.4548 g	AP	26-SEP-16	64.0000	64. %		
SJ7645-8	SL	SAMP	23-SEP-16	1.29 g	25.8767 g	10.4679 g	10.472 g	AP	26-SEP-16	37.3450	37. %		
SJ7645-9	SL	SAMP	23-SEP-16	1.29 g	27.4629 g	12.5555 g	12.5597 g	AP	26-SEP-16	43.0590	43. %		
SJ7652-1	SL	SAMP	23-SEP-16	1.29 g	37.6165 g	28.2039 g	28.2082 g	AP	26-SEP-16	74.1010	74. %		
SJ7652-10	SL	SAMP	23-SEP-16	1.29 g	36.0601 g	26.9093 g	26.9134 g	AP	26-SEP-16	73.6940	74. %		
SJ7652-11	SL	SAMP	23-SEP-16	1.29 g	33.7971 g	25.3254 g	25.3283 g	AP	26-SEP-16	73.9480	74. %		
SJ7652-12	SL	SAMP	23-SEP-16	1.29 g	35.9157 g	25.4905 g	25.4941 g	AP	26-SEP-16	69.9020	70. %		
SJ7652-13	SL	SAMP	23-SEP-16	1.29 g	30.2516 g	19.5576 g	19.564 g	AP	26-SEP-16	63.0970	63. %		
SJ7652-2	SL	SAMP	23-SEP-16	1.29 g	32.7009 g	18.6886 g	18.6929 g	AP	26-SEP-16	55.4040	55. %		
SJ7652-3	SL	SAMP	23-SEP-16	1.29 g	30.1353 g	20.7738 g	20.778 g	AP	26-SEP-16	67.5600	68. %		
SJ7652-4	SL	SAMP	23-SEP-16	1.29 g	31.856 g	17.0045 g	17.0087 g	AP	26-SEP-16	51.4250	51. %		
SJ7652-5	SL	SAMP	23-SEP-16	1.29 g	23.7778 g	11.9271 g	11.9312 g	AP	26-SEP-16	47.3200	47. %		
SJ7652-6	SL	SAMP	23-SEP-16	1.29 g	24.4837 g	14.6038 g	14.6075 g	AP	26-SEP-16	57.4190	57. %		
SJ7652-7	SL	SAMP	23-SEP-16	1.29 g	38.1958 g	18.3202 g	18.3264 g	AP	26-SEP-16	46.1620	46. %		
SJ7652-8	SL	SAMP	23-SEP-16	1.29 g	27.2385 g	17.7219 g	17.7262 g	AP	26-SEP-16	63.3420	63. %		
SJ7652-9	SL	SAMP	23-SEP-16	1.29 g	34.7135 g	21.8487 g	21.8535 g	AP	26-SEP-16	61.5240	62. %		
SJ7675-1	SL	SAMP	23-SEP-16	1.29 g	23.2615 g	22.0687 g	22.0687 g	AP	26-SEP-16	94.5710	94. %		
SJ7675-2	SL	SAMP	23-SEP-16	1.29 g	5 g	5 g	5 g	AP	26-SEP-16	100.0000	100 %		
WG191232-1	SL	MBLANK	23-SEP-16	1.29 g	5.837 g	5.8361 g	5.836 g	AP	26-SEP-16	99.9780	100 %		
WG191232-2	SL	LCS	23-SEP-16	1.29 g	6.3108 g	5.816 g	5.8157 g	AP	26-SEP-16	90.1390	90. %	100	
WG191232-3	SL	DUP	23-SEP-16	1.29 g	18.7673 g	9.6157 g	9.6202 g	AP	26-SEP-16	47.6630	48. %		8
WG191232-4	SL	DUP	23-SEP-16	1.29 g	28.4219 g	12.1433 g	12.1487 g	AP	26-SEP-16	40.0220	40. %		7
WG191232-5	SL	DUP	23-SEP-16	1.29 g	40.2533 g	25.2559 g	25.2584 g	AP	26-SEP-16	61.5150	62. %		5

Comments:

SJ7527-4	Dry Weight Basis
SJ7645-14	MS/MSD; Client Note:Sites 1&3 SED-18 is shared with Site 2
SJ7645-8	MS/MSD
SJ7652-4	MS/MSD for TOC
SJ7675-2	TB, no TS jar.
WG191232-1	SJ7652-4
WG191232-2	SJ7652-4
WG191232-3	SJ7652-4
WG191232-4	SJ7645-8
WG191232-5	SJ7645-14

Entered by: AP Date: 9/26/16 Accepted by: [signature] Date: 09/27/16

Katahdin ANALYTICAL SERVICES

Katahdin Analytical Services

Work Group Report (wk02)
23-SEP-16 02:45 PM

Work Group: WG191232 R385486
Department: 100 Wetlab Prep

Operator:

Created: 23-SEP-16
Due:

Tin	Sample	Account Name	Product	Matrix	Status	UA	Workdate	PR Location
100%	SJ7527-4	ReEnergy Stratton Energy L	TS-ME	Solid	WIP	U	01-OCT-16	
14	SJ7611-1	Northeast Laboratory Servic	TS-ME	Solid	WIP	U	03-OCT-16	100g Glass
15	SJ7645-8	AECOM Environment	TS-ME	Solid	WIP	U	10-OCT-16	
16	SJ7645-9	AECOM Environment	TS-ME	Solid	WIP	U	10-OCT-16	
17	SJ7645-14	AECOM Environment	TS-ME	Solid	WIP	U	10-OCT-16	
18	SJ7645-15	AECOM Environment	TS-ME	Solid	WIP	U	10-OCT-16	
19	SJ7652-1	Battelle	TS-ME	Solid	WIP	U	04-OCT-16	
20	SJ7652-2	Battelle	TS-ME	Solid	WIP	U	04-OCT-16	
21	SJ7652-3	Battelle	TS-ME	Solid	WIP	U	04-OCT-16	
22	SJ7652-4	Battelle	TS-ME	Solid	WIP	U	04-OCT-16	
23	SJ7652-5	Battelle	TS-ME	Solid	WIP	U	04-OCT-16	
24	SJ7652-6	Battelle	TS-ME	Solid	WIP	U	04-OCT-16	
25	SJ7652-7	Battelle	TS-ME	Solid	WIP	U	04-OCT-16	
26	SJ7652-8	Battelle	TS-ME	Solid	WIP	U	04-OCT-16	
27	SJ7652-9	Battelle	TS-ME	Solid	WIP	U	04-OCT-16	
28	SJ7652-10	Battelle	TS-ME	Solid	WIP	U	04-OCT-16	
29	SJ7652-11	Battelle	TS-ME	Solid	WIP	U	04-OCT-16	
30	SJ7652-12	Battelle	TS-ME	Solid	WIP	U	04-OCT-16	
31	SJ7652-13	Battelle	TS-ME	Solid	WIP	U	04-OCT-16	
32	SJ7675-1	Maine DEP	TS-ME	Solid	WIP	U	04-OCT-16	
TB	SJ7675-2	Maine DEP	TS-ME	Solid	WIP	U	04-OCT-16	
33	WG191232-1	MBLANK	TS-ME	Solid	WIP	U	23-SEP-16	
34	WG191232-2	LCS	TS-ME	Solid	WIP	U	23-SEP-16	
35	WG191232-3	DUP	TS-ME	Solid	WIP	U	23-SEP-16	
36	WG191232-4	DUP	TS-ME	Solid	WIP	U	23-SEP-16	
37	WG191232-5	DUP	TS-ME	Solid	WIP	U	23-SEP-16	

Comments:

SJ7527-4	Dry Weight Basis
SJ7645-14	MS/MSD; Client Note:Sites 1&3 SED-18 is shared with Site 2
SJ7645-8	MS/MSD
SJ7652-4	MS/MSD for TOC
SJ7675-2	TB, no TS jar.
WG191232-1	SJ7652-4
WG191232-2	SJ7652-4

Katahdin
ANALYTICAL SERVICES

Katahdin Analytical Services

Work Group Report (wk02)
23-SEP-16 02:45 PM

2 2

Work Group: WG191232
Department: 100 Wetlab Prep
Operator:
Created: 23-SEP-16
Due:

WG191232-3	SJ7652-4
WG191232-4	SJ7645-8
WG191232-5	SJ7645-14

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		In: ✓
DATE IN:	9/23/16	9/25/16	DATE OUT:	9/25/16		Out (TS): ✓
TIME IN:	1554	1630	TIME OUT:	1500		Balance ID:
TEMP IN:	105	104	TEMP OUT:	104		S/N 1124016031

APPENDIX H

TISSUE CHEMISTRY LAB RESULTS

DAMOS 2016 - Portland Disposal Site Sample Summary - TISSUE

STATION_ID	Field SAMPLE ID	MATRIX	TAXON NAME	LAB	LAB_SAMPLE_ID
EREF-02	RAJ-021	TS	Astarte	Battelle	K2645-BD
EREF-02	RAJ-021	TS	Astarte	Battelle	K2645DUP-BD
EREF-02	RAJ-021	TS	Astarte	Battelle	K2645-P
EREF-02	RAJ-021	TS	Astarte	ESI	28411-009
EREF-02	RAJ-021	TS	Astarte	ESI	28411-009D
EREF-02	RAJ-021	TS	Astarte	ESI	28411-009S
EREF-02	RAJ-021	TS	Astarte	ESI	28411-009SD
PDA95-22	RAJ-022	TS	Nephtys	Battelle	K2646-P
PDA95-22	RAJ-022	TS	Nephtys	ESI	28411-010
PDA95-30	RAJ-023	TS	Nephtys	Battelle	K2647-BD
PDA95-30	RAJ-023	TS	Nephtys	Battelle	K2647-P
PDA95-30	RAJ-023	TS	Nephtys	ESI	28411-011
PDA95-30	RAJ-024	TS	Astarte	Battelle	K2648-P
PDA95-30	RAJ-024	TS	Astarte	ESI	28411-012
SREF-07	RAJ-020	TS	Astarte	Battelle	K2644DUP-P
SREF-07	RAJ-020	TS	Astarte	Battelle	K2644-P
SREF-07	RAJ-020	TS	Astarte	ESI	28411-008
SREF-10	RAJ-019	TS	Astarte	Battelle	K2643-BD
SREF-10	RAJ-019	TS	Astarte	Battelle	K2643MSD-P
SREF-10	RAJ-019	TS	Astarte	Battelle	K2643MS-P
SREF-10	RAJ-019	TS	Astarte	Battelle	K2643-P
SREF-10	RAJ-019	TS	Astarte	ESI	28411-007

			Study Id	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16
			Survey Id	PDS	PDS	PDS	PDS	PDS	PDS	PDS	PDS
			Station Id	EREF-02	EREF-02	EREF-02	EREF-02	PDA95-22	PDA95-22	PDA95-30	PDA95-30
			Sample Id	RAJ-021	RAJ-021	RAJ-021	RAJ-021	RAJ-022	RAJ-022	RAJ-023	RAJ-023
			Field Qc Code	SA	SA	SA	SA	SA	SA	SA	SA
			Lab Qc Code	SA	SA	DUP	DUP	SA	SA	SA	SA
			Taxon Name	Astarte	Astarte	Astarte	Astarte	Nephtys	Nephtys	Nephtys	Nephtys
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
CONG	31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	UG/KG_WETWT	0.0542	U			0.387		0.586	
CONG	32598-10-0	2,3',4,4'-Tetrachlorobiphenyl	UG/KG_WETWT	0.0842	U			0.202		0.388	
CONG	32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	UG/KG_WETWT	0.0483	U			0.78		0.457	
CONG	34883-43-7	2,4'-Dichlorobiphenyl	UG/KG_WETWT	0.12	U			0.284	U	0.195	U
CONG	35065-27-1	2,2',4,4',5,5'-Hexachlorobiphenyl	UG/KG_WETWT	0.0662	U			0.903		1.57	
CONG	35065-28-2	2,2',3,4,4',5'-Hexachlorobiphenyl	UG/KG_WETWT	0.0542	U			0.626		1.12	
CONG	35065-29-3	2,2',3,4,4',5,5'-Heptachlorobiphenyl	UG/KG_WETWT	0.0483	U			0.324		0.522	
CONG	35065-30-6	2,2',3,3',4,4',5-Heptachlorobiphenyl	UG/KG_WETWT	0.0542	U			0.128	U	0.493	
CONG	35693-99-3	2,2',5,5'-Tetrachlorobiphenyl	UG/KG_WETWT	0.0902	U			0.213	U	0.147	U
CONG	37680-65-2	2,2',5-Trichlorobiphenyl	UG/KG_WETWT	0.0542	U			0.128	U	0.0881	U
CONG	37680-73-2	2,2',4,5,5'-Pentachlorobiphenyl	UG/KG_WETWT	0.0542	U			0.445		0.792	
CONG	38380-02-8	2,2',3,4,5'-Pentachlorobiphenyl	UG/KG_WETWT	0.0542	U			0.128	U	0.159	J
CONG	38380-07-3	2,2',3,3',4,4'-Hexachlorobiphenyl	UG/KG_WETWT	0.0602	U			0.142	U	0.153	J
CONG	40186-72-9	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	UG/KG_WETWT	0.0639	J			0.373		0.574	
CONG	41464-39-5	2,2',3,5'-Tetrachlorobiphenyl	UG/KG_WETWT	0.0483	U			0.114	U	0.0784	U
CONG	41464-40-8	2,2',4,5'-Tetrachlorobiphenyl	UG/KG_WETWT	0.0421	U			0.0997	U	0.0684	U
CONG	52663-68-0	2,2',3,4',5,5',6-Heptachlorobiphenyl	UG/KG_WETWT	0.164				0.0997	U	0.503	
CONG	52663-69-1	2,2',3,4,4',5',6-Heptachlorobiphenyl	UG/KG_WETWT	0.0421	U			0.0997	U	0.185	J
CONG	52663-78-2	2,2',3,3',4,4',5,6-Octachlorobiphenyl	UG/KG_WETWT	0.0654	J			0.0856	U	0.126	J
CONG	7012-37-5	2,4,4'-Trichlorobiphenyl	UG/KG_WETWT	0.0662	U			0.156	U	0.108	U
CONG	74472-48-3	2,2',3,4,4',6,6'-Heptachlorobiphenyl	UG/KG_WETWT	0.0964	U			0.228	U	0.157	U
CONG	C-2051-24-3	Decachlorobiphenyl - Congener	UG/KG_WETWT	0.0776	J			0.156	U	0.189	J
	TOTAL_PCB_NST_CONGx2	**Total NS&T PCB *2 (ND as 1/2 MDL)**	UG/KG_WETWT	1.6447				9.5863		15.5625	
CONGSURR	CS-37680-68-5	2,3',5'-Trichlorobiphenyl	PCT_REC	84				76		79	
CONGSURR	CS-68194-09-2	2,2',3,5,6,6'-Hexachlorobiphenyl	PCT_REC	81				75		80	
PEST	1024-57-3	heptachlor epoxide	UG/KG_WETWT	0.0662	U			0.156	U	0.108	U
PEST	1031-07-8	Endosulfan sulfate	UG/KG_WETWT	0.0483	U			0.114	U	0.0784	U
PEST	309-00-2	aldrin	UG/KG_WETWT	0.0542	U			0.128	U	0.0881	U
PEST	319-84-6	alpha-BHC	UG/KG_WETWT	0.0902	U			0.213	U	0.147	U
PEST	319-85-7	beta-BHC	UG/KG_WETWT	0.0483	U			0.114	U	0.0784	U
PEST	319-86-8	delta-BHC	UG/KG_WETWT	0.0421	U			0.0997	U	0.0684	U
PEST	33213-65-9	Endosulfan II	UG/KG_WETWT	0.0662	U			0.156	U	0.143	J
PEST	50-29-3	4,4'-DDT	UG/KG_WETWT	0.0483	U			0.114	U	0.0784	U
PEST	5103-71-9	alpha-chlordane	UG/KG_WETWT	0.0421	U			0.669		0.529	
PEST	5103-74-2	gamma-chlordane	UG/KG_WETWT	0.0723	U			0.171	U	0.118	U
PEST	57-74-9	chlordane	UG/KG_WETWT					3.42		2.71	
PEST	58-89-9	hexachlorocyclohexane, gamma	UG/KG_WETWT	0.0662	U			0.156	U	0.108	U
PEST	60-57-1	dieldrin	UG/KG_WETWT	0.958				0.0856	U	0.0588	U
PEST	72-20-8	endrin	UG/KG_WETWT	0.0483	U			0.114	U	0.0784	U
PEST	72-43-5	methoxychlor	UG/KG_WETWT	0.668	U			1.58	U	1.94	
PEST	72-54-8	4,4'-DDD	UG/KG_WETWT	0.0421	U			1.62		2.37	
PEST	72-55-9	4,4'-DDE	UG/KG_WETWT	0.0545	J			1.28		1.79	
PEST	76-44-8	heptachlor	UG/KG_WETWT	0.0421	U			0.0997	U	0.0684	U
PEST	8001-35-2	Toxaphene	UG/KG_WETWT	10.3	U			12.2	U	16.7	U
PEST	959-98-8	Endosulfan I	UG/KG_WETWT	0.0602	U			0.142	U	0.0978	U
SVOC	120-12-7	Anthracene	UG/KG_WETWT	0.117	U			1.76		1.56	

			Study Id	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**
			Survey Id	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**
			Station Id	**EREF-02**	**EREF-02**	**EREF-02**	**EREF-02**	**PDA95-22**	**PDA95-22**	**PDA95-30**	**PDA95-30**
			Sample Id	**RAJ-021**	**RAJ-021**	**RAJ-021**	**RAJ-021**	**RAJ-022**	**RAJ-022**	**RAJ-023**	**RAJ-023**
			Field Qc Code	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**
			Lab Qc Code	**SA**	**SA**	**DUP**	**DUP**	**SA**	**SA**	**SA**	**SA**
			Taxon Name	**Astarte**	**Astarte**	**Astarte**	**Astarte**	**Nephtys**	**Nephtys**	**Nephtys**	**Nephtys**
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
SVOC	129-00-0	Pyrene	UG/KG_WETWT	0.239	J			60.4		84.2	
SVOC	191-24-2	Benzo(G,H,I)Perylene	UG/KG_WETWT	0.476	J			4.6		6.01	
SVOC	193-39-5	Indeno(1,2,3-Cd)Pyrene	UG/KG_WETWT	0.27	J			1.31		1.49	
SVOC	205-99-2	Benzo(B)Fluoranthene	UG/KG_WETWT	0.458	J			4.58		4.42	
SVOC	206-44-0	Fluoranthene	UG/KG_WETWT	0.367	J			39		33.8	
SVOC	207-08-9	Benzo(K)Fluoranthene	UG/KG_WETWT	0.425	J			3.66		3.81	
SVOC	208-96-8	Acenaphthylene	UG/KG_WETWT	0.117	U			0.446	J	0.732	J
SVOC	218-01-9	Chrysene	UG/KG_WETWT	0.209	J			11.2		12.8	
SVOC	50-32-8	Benzo(A)Pyrene	UG/KG_WETWT	0.232	U			4.72		5.92	
SVOC	53-70-3	Dibenz(A,H)Anthracene	UG/KG_WETWT	0.0932	U			0.3	J	0.252	J
SVOC	56-55-3	Benzo(A)Anthracene	UG/KG_WETWT	0.142	U			3.6		3.16	
SVOC	83-32-9	Acenaphthene	UG/KG_WETWT	0.117	U			1.24		0.336	J
SVOC	85-01-8	Phenanthrene	UG/KG_WETWT	0.312	J			6.28		1.62	
SVOC	86-73-7	Fluorene	UG/KG_WETWT	0.105	U			0.858		0.451	J
SVOC	90-12-0	1-Methylnaphthalene	UG/KG_WETWT	0.383	J			0.529	J	1.32	
SVOC	91-57-6	2-Methylnaphthalene	UG/KG_WETWT	0.6				0.65		1.79	
EPH	91-20-3	Naphthalene	UG/KG_WETWT	2.14				1.78		3.89	
	TOTAL_PAH	**Total PAH (ND as 1/2 MDL)**	UG/KG_WETWT	6.3406				146.913		167.561	
SVOCSURR	SV-1146-65-2	Naphthalene-d8	PCT_REC	77				71		78	
SVOCSURR	SV-15067-26-2	Acenaphthene-d10	PCT_REC	79				77		81	
SVOCSURR	SV-1517-22-2	Phenanthrene-d10	PCT_REC	81				82		85	
SVOCSURR	SV-63466-71-7	Benzo(A)pyrene-d12	PCT_REC	75				83		86	
MET	7439-92-1	Lead	MG/KG_WETWT	0.14		0.12		0.16		0.22	
MET	7439-97-6	Mercury	MG/KG_WETWT	0.04		0.038		0.005		0.007	
MET	7440-02-0	Nickel	MG/KG_WETWT	0.74		0.79		0.37		0.5	
MET	7440-38-2	Arsenic	MG/KG_WETWT	3.74		3.49		5.3		6.17	
MET	7440-43-9	Cadmium	MG/KG_WETWT	1.38		1.42		0.11		0.14	
MET	7440-47-3	Chromium	MG/KG_WETWT	0.3		0.4		0.042		0.07	
MET	7440-50-8	Copper	MG/KG_WETWT	1.23		1.25		0.67		0.96	
MET	7440-66-6	Zinc	MG/KG_WETWT	7.17		7.23		19.6		25.5	
MET	NBH008	Percent Moisture - Metals	PCT_MST	89.2				85.6		82.8	
MISC	LIPIDS	Percent Lipids (B&D)	PCT_WETWT	1.09		0.98				2.07	
MISC	PCT_SOLIDS	Percent Solids	PCT	12.45				15.63		17.41	

J value reported above MDL but below RL
U not detected above MDL; MDL value reported.

Class	Param Code	Param Name	Unit	Result	Lab Qual	Result	Lab Qual	Result	Lab Qual	Result	Lab Qual
			Study Id	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16	DAMOS16
			Survey Id	PDS	PDS	PDS	PDS	PDS	PDS	PDS	PDS
			Station Id	PDA95-30	PDA95-30	SREF-07	SREF-07	SREF-07	SREF-07	SREF-10	SREF-10
			Sample Id	RAJ-024	RAJ-024	RAJ-020	RAJ-020	RAJ-020	RAJ-020	RAJ-019	RAJ-019
			Field Qc Code	SA	SA	SA	SA	SA	SA	SA	SA
			Lab Qc Code	SA	SA	SA	SA	DUP	DUP	SA	SA
			Taxon Name	Astarte	Astarte	Astarte	Astarte	Astarte	Astarte	Astarte	Astarte
CONG	31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	UG/KG_WETWT	0.298		0.0671	J	0.0541	U	0.0542	U
CONG	32598-10-0	2,3',4,4'-Tetrachlorobiphenyl	UG/KG_WETWT	0.308	U	0.0843	U	0.0841	U	0.0842	U
CONG	32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	UG/KG_WETWT	0.176	U	0.0662	J	0.0482	U	0.0482	U
CONG	34883-43-7	2,4'-Dichlorobiphenyl	UG/KG_WETWT	0.439	U	0.12	U	0.12	U	0.12	U
CONG	35065-27-1	2,2',4,4',5,5'-Hexachlorobiphenyl	UG/KG_WETWT	0.242	U	0.0662	U	0.066	U	0.0661	U
CONG	35065-28-2	2,2',3,4,4',5'-Hexachlorobiphenyl	UG/KG_WETWT	0.198	U	0.0543	U	0.0541	U	0.0669	J
CONG	35065-29-3	2,2',3,4,4',5,5'-Heptachlorobiphenyl	UG/KG_WETWT	0.176	U	0.0483	U	0.0482	U	0.0516	J
CONG	35065-30-6	2,2',3,3',4,4',5-Heptachlorobiphenyl	UG/KG_WETWT	0.198	U	0.0543	U	0.0541	U	0.0542	U
CONG	35693-99-3	2,2',5,5'-Tetrachlorobiphenyl	UG/KG_WETWT	0.329	U	0.0903	U	0.09	U	0.0901	U
CONG	37680-65-2	2,2',5-Trichlorobiphenyl	UG/KG_WETWT	0.198	U	0.0543	U	0.0541	U	0.0542	U
CONG	37680-73-2	2,2',4,5,5'-Pentachlorobiphenyl	UG/KG_WETWT	0.198	U	0.0543	U	0.0541	U	0.0542	U
CONG	38380-02-8	2,2',3,4,5'-Pentachlorobiphenyl	UG/KG_WETWT	0.198	U	0.0543	U	0.0541	U	0.0542	U
CONG	38380-07-3	2,2',3,3',4,4'-Hexachlorobiphenyl	UG/KG_WETWT	0.22	U	0.0603	U	0.0601	U	0.0601	U
CONG	40186-72-9	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	UG/KG_WETWT	0.132	U	0.0362	U	0.0361	U	0.0664	J
CONG	41464-39-5	2,2',3,5'-Tetrachlorobiphenyl	UG/KG_WETWT	0.33		0.0483	U	0.0482	U	0.0482	U
CONG	41464-40-8	2,2',4,5'-Tetrachlorobiphenyl	UG/KG_WETWT	0.154	U	0.0422	U	0.042	U	0.0421	U
CONG	52663-68-0	2,2',3,4',5,5',6-Heptachlorobiphenyl	UG/KG_WETWT	0.154	U	0.0422	U	0.042	U	0.0421	U
CONG	52663-69-1	2,2',3,4,4',5',6-Heptachlorobiphenyl	UG/KG_WETWT	0.154	U	0.0422	U	0.042	U	0.0421	U
CONG	52663-78-2	2,2',3,3',4,4',5,6-Octachlorobiphenyl	UG/KG_WETWT	0.132	U	0.0525	J	0.0607	J	0.0581	J
CONG	7012-37-5	2,4,4'-Trichlorobiphenyl	UG/KG_WETWT	0.242	U	0.0662	U	0.066	U	0.0661	U
CONG	74472-48-3	2,2',3,4,4',6,6'-Heptachlorobiphenyl	UG/KG_WETWT	0.352	U	0.0965	U	0.0962	U	0.0963	U
CONG	C-2051-24-3	Decachlorobiphenyl - Congener	UG/KG_WETWT	0.242	U	0.0662	U	0.066	U	0.0716	J
	TOTAL_PCB_NST_CONGx2	**Total NS&T PCB *2 (ND as 1/2 MDL)**	UG/KG_WETWT	4.84		1.3173		1.1668		1.4711	
CONGSURR	CS-37680-68-5	2,3',5'-Trichlorobiphenyl	PCT_REC	79		81		75		88	
CONGSURR	CS-68194-09-2	2,2',3,5,6,6'-Hexachlorobiphenyl	PCT_REC	79		82		82		89	
PEST	1024-57-3	heptachlor epoxide	UG/KG_WETWT	0.242	U	0.0662	U	0.066	U	0.0661	U
PEST	1031-07-8	Endosulfan sulfate	UG/KG_WETWT	0.176	U	0.0483	U	0.0482	U	0.0482	U
PEST	309-00-2	aldrin	UG/KG_WETWT	0.198	U	0.0543	U	0.0541	U	0.0542	U
PEST	319-84-6	alpha-BHC	UG/KG_WETWT	0.329	U	0.0903	U	0.09	U	0.0901	U
PEST	319-85-7	beta-BHC	UG/KG_WETWT	0.176	U	0.0483	U	0.0482	U	0.0482	U
PEST	319-86-8	delta-BHC	UG/KG_WETWT	0.154	U	0.0422	U	0.042	U	0.0421	U
PEST	33213-65-9	Endosulfan II	UG/KG_WETWT	0.242	U	0.0662	U	0.066	U	0.0661	U
PEST	50-29-3	4,4'-DDT	UG/KG_WETWT	0.176	U	0.0483	U	0.0482	U	0.0482	U
PEST	5103-71-9	alpha-chlordane	UG/KG_WETWT	0.154	U	0.0422	U	0.042	U	0.0421	U
PEST	5103-74-2	gamma-chlordane	UG/KG_WETWT	0.264	U	0.0724	U	0.0722	U	0.0722	U
PEST	57-74-9	chlordane	UG/KG_WETWT	2.8							
PEST	58-89-9	hexachlorocyclohexane, gamma	UG/KG_WETWT	0.242	U	0.0662	U	0.066	U	0.0661	U
PEST	60-57-1	dieldrin	UG/KG_WETWT	0.132	U	0.996		1.04		0.906	
PEST	72-20-8	endrin	UG/KG_WETWT	0.176	U	0.0483	U	0.0482	U	0.0482	U
PEST	72-43-5	methoxychlor	UG/KG_WETWT	2.44	U	0.669	U	0.667	U	0.668	U
PEST	72-54-8	4,4'-DDD	UG/KG_WETWT	0.315		0.0703	J	0.0857	J	0.0421	U
PEST	72-55-9	4,4'-DDE	UG/KG_WETWT	0.19	J	0.14		0.16		0.0975	J
PEST	76-44-8	heptachlor	UG/KG_WETWT	0.548		0.0422	U	0.042	U	0.0421	U
PEST	8001-35-2	Toxaphene	UG/KG_WETWT	18.9	U	10.3	U	10.2	U	10.3	U
PEST	959-98-8	Endosulfan I	UG/KG_WETWT	0.22	U	0.0603	U	0.0601	U	0.0601	U
SVOC	120-12-7	Anthracene	UG/KG_WETWT	0.428	U	0.509	J	0.455	J	0.275	J

			Study Id	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**	**DAMOS16**
			Survey Id	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**	**PDS**
			Station Id	**PDA95-30**	**PDA95-30**	**SREF-07**	**SREF-07**	**SREF-07**	**SREF-07**	**SREF-10**	**SREF-10**
			Sample Id	**RAJ-024**	**RAJ-024**	**RAJ-020**	**RAJ-020**	**RAJ-020**	**RAJ-020**	**RAJ-019**	**RAJ-019**
			Field Qc Code	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**	**SA**
			Lab Qc Code	**SA**	**SA**	**SA**	**SA**	**DUP**	**DUP**	**SA**	**SA**
			Taxon Name	**Astarte**	**Astarte**	**Astarte**	**Astarte**	**Astarte**	**Astarte**	**Astarte**	**Astarte**
Class	**Param Code**	**Param Name**	**Unit**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**	**Result**	**Lab Qual**
SVOC	129-00-0	Pyrene	UG/KG_WETWT	9.66		1.33		1.3		0.57	
SVOC	191-24-2	Benzo(G,H,I)Perylene	UG/KG_WETWT	1.66		0.669		0.689		0.603	
SVOC	193-39-5	Indeno(1,2,3-Cd)Pyrene	UG/KG_WETWT	0.952		0.41	J	0.42	J	0.348	J
SVOC	205-99-2	Benzo(B)Fluoranthene	UG/KG_WETWT	2.98		1.09		1.02		0.804	
SVOC	206-44-0	Fluoranthene	UG/KG_WETWT	3.36		0.538		0.513		0.447	J
SVOC	207-08-9	Benzo(K)Fluoranthene	UG/KG_WETWT	2.47		0.945	J	0.965	J	0.733	J
SVOC	208-96-8	Acenaphthylene	UG/KG_WETWT	0.428	U	0.117	U	0.117	U	0.117	U
SVOC	218-01-9	Chrysene	UG/KG_WETWT	1.66		0.367	J	0.407	J	0.299	J
SVOC	50-32-8	Benzo(A)Pyrene	UG/KG_WETWT	1.88		0.478	J	0.46	J	0.333	J
SVOC	53-70-3	Dibenz(A,H)Anthracene	UG/KG_WETWT	0.34	U	0.0932	U	0.093	U	0.0931	U
SVOC	56-55-3	Benzo(A)Anthracene	UG/KG_WETWT	1.19		0.17	J	0.176	J	0.142	U
SVOC	83-32-9	Acenaphthene	UG/KG_WETWT	0.428	U	0.132	J	0.138	J	0.117	U
SVOC	85-01-8	Phenanthrene	UG/KG_WETWT	0.641	J	0.273	J	0.307	J	0.267	J
SVOC	86-73-7	Fluorene	UG/KG_WETWT	0.384	U	0.105	U	0.105	U	0.105	U
SVOC	90-12-0	1-Methylnaphthalene	UG/KG_WETWT	0.717	J	0.385	J	0.392	J	0.155	J
SVOC	91-57-6	2-Methylnaphthalene	UG/KG_WETWT	0.988		0.586		0.576		0.24	J
EPH	91-20-3	Naphthalene	UG/KG_WETWT	3.08		2.17		2.2		1.64	
	TOTAL_PAH	**Total PAH (ND as 1/2 MDL)**	UG/KG_WETWT	32.242		10.2096		10.1755		7.00105	
SVOCSURR	SV-1146-65-2	Naphthalene-d8	PCT_REC	85		74		72		79	
SVOCSURR	SV-15067-26-2	Acenaphthene-d10	PCT_REC	90		78		75		81	
SVOCSURR	SV-1517-22-2	Phenanthrene-d10	PCT_REC	93		81		78		84	
SVOCSURR	SV-63466-71-7	Benzo(A)pyrene-d12	PCT_REC	86		64		66		69	
MET	7439-92-1	Lead	MG/KG_WETWT	0.12		0.1				0.095	
MET	7439-97-6	Mercury	MG/KG_WETWT	0.045		0.032				0.031	
MET	7440-02-0	Nickel	MG/KG_WETWT	0.38		0.5				0.63	
MET	7440-38-2	Arsenic	MG/KG_WETWT	3.59		3.11				2.86	
MET	7440-43-9	Cadmium	MG/KG_WETWT	1.04		1.14				1.22	
MET	7440-47-3	Chromium	MG/KG_WETWT	0.14		0.087				0.091	
MET	7440-50-8	Copper	MG/KG_WETWT	1.38		1.05				1.15	
MET	7440-66-6	Zinc	MG/KG_WETWT	7.64		6.72				7.22	
MET	NBH008	Percent Moisture - Metals	PCT_MST	87.8		89.3				89	
MISC	LIPIDS	Percent Lipids (B&D)	PCT_WETWT							0.85	
MISC	PCT_SOLIDS	Percent Solids	PCT	13.4		11.47		11.56		13.06	

J value reported above MDL but below RL
U not detected above MDL; MDL value reported.

DAMOS 2016

Portland Disposal Site

Tissue Lipid, PCB and Pesticides 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 9/20-21/2016	9/16/2016 9/22/2016	1.9 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.

QA/QC Summary
Batch 16-0287

	• 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.

QA/QC Summary
Batch 16-0287

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.

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

Client ID	RAJ-019	RAJ-020	RAJ-021	RAJ-022
Battelle ID	K2643-P	K2644-P	K2645-P	K2646-P
Sample Type	SA	SA	SA	SA
Collection Date	09/20/16	09/20/16	09/21/16	09/21/16
Extraction Date	10/21/16	10/21/16	10/21/16	10/21/16
Analysis Date	11/12/16	11/12/16	11/12/16	11/12/16
Analytical Instrument	ECD	ECD	ECD	ECD
% Moisture	86.94	88.53	87.55	84.37
% Lipid	0.54	0.52	0.61	1.13
Matrix	CLAM TISS	CLAM TISS	CLAM TISS	WORM TISS
Sample Size	19.99	19.95	19.97	8.44
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	0.042 U	0.070 J	0.042 U	1.620
4,4'-DDE	0.098 J	0.140	0.055 J	1.280
4,4'-DDT	0.048 U	0.048 U	0.048 U	0.114 U
aldrin	0.054 U	0.054 U	0.054 U	0.128 U
a-chlordane	0.042 U	0.042 U	0.042 U	0.669
g-chlordane	0.072 U	0.072 U	0.072 U	0.171 U
a-BHC	0.090 U	0.090 U	0.090 U	0.213 U
b-BHC	0.048 U	0.048 U	0.048 U	0.114 U
d-BHC	0.042 U	0.042 U	0.042 U	0.100 U
Lindane	0.066 U	0.066 U	0.066 U	0.156 U
dieldrin	0.906	0.996	0.958	0.086 U
endosulfan I	0.060 U	0.060 U	0.060 U	0.142 U
endosulfan II	0.066 U	0.066 U	0.066 U	0.156 U
endosulfan sulfate	0.048 U	0.048 U	0.048 U	0.114 U
endrin	0.048 U	0.048 U	0.048 U	0.114 U
heptachlor	0.042 U	0.042 U	0.042 U	0.100 U
heptachlor epoxide	0.066 U	0.066 U	0.066 U	0.156 U
methoxychlor	0.668 U	0.669 U	0.668 U	1.580 U
Toxaphene	10.300 U	10.300 U	10.300 U	12.200 U
Technical Chlordane				3.420
Cl2(8)	0.120 U	0.120 U	0.120 U	0.284 U
Cl3(18)	0.054 U	0.054 U	0.054 U	0.128 U
Cl3(28)	0.066 U	0.066 U	0.066 U	0.156 U
Cl4(44)	0.048 U	0.048 U	0.048 U	0.114 U
Cl4(49)	0.042 U	0.042 U	0.042 U	0.100 U
Cl4(52)	0.090 U	0.090 U	0.090 U	0.213 U
Cl4(66)	0.084 U	0.084 U	0.084 U	0.202
Cl5(87)	0.054 U	0.054 U	0.054 U	0.128 U
Cl5(101)	0.054 U	0.054 U	0.054 U	0.445
Cl5(105)	0.048 U	0.066 J	0.048 U	0.780
Cl5(118)	0.054 U	0.067 J	0.054 U	0.387
Cl6(128)	0.060 U	0.060 U	0.060 U	0.142 U
Cl6(138)	0.067 J	0.054 U	0.054 U	0.626
Cl6(153)	0.066 U	0.066 U	0.066 U	0.903
Cl7(170)	0.054 U	0.054 U	0.054 U	0.128 U
Cl7(180)	0.052 J	0.048 U	0.048 U	0.324
Cl7(183)	0.042 U	0.042 U	0.042 U	0.100 U
Cl7(184)	0.096 U	0.097 U	0.096 U	0.228 U
Cl7(187)	0.042 U	0.042 U	0.164	0.100 U
Cl8(195)	0.058 J	0.053 J	0.065 J	0.086 U
Cl9(206)	0.066 J	0.036 U	0.064 J	0.373
Cl10(209)	0.072 J	0.066 U	0.078 J	0.156 U

Surrogate Recoveries (%)

Cl3(34)	88	81	84	76
Cl6(152)	89	82	81	75

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

Client ID	RAJ-023	RAJ-024
Battelle ID	K2647-P	K2648-P
Sample Type	SA	SA
Collection Date	09/21/16	09/21/16
Extraction Date	10/21/16	10/21/16
Analysis Date	11/12/16	11/12/16
Analytical Instrument	ECD	ECD
% Moisture	82.59	86.6
% Lipid	1.93	1.03
Matrix	WORM TISS	CLAM TISS
Sample Size	12.29	5.47
Size Unit-Basis	G_WET	G_WET
Units	UG/KG_WET	UG/KG_WET
4,4'-DDD	2.370	0.315
4,4'-DDE	1.790	0.190 J
4,4'-DDT	0.078 U	0.176 U
aldrin	0.088 U	0.198 U
a-chlordane	0.529	0.154 U
g-chlordane	0.118 U	0.264 U
a-BHC	0.147 U	0.329 U
b-BHC	0.078 U	0.176 U
d-BHC	0.068 U	0.154 U
Lindane	0.108 U	0.242 U
dieldrin	0.059 U	0.132 U
endosulfan I	0.098 U	0.220 U
endosulfan II	0.143 J	0.242 U
endosulfan sulfate	0.078 U	0.176 U
endrin	0.078 U	0.176 U
heptachlor	0.068 U	0.548
heptachlor epoxide	0.108 U	0.242 U
methoxychlor	1.940	2.440 U
Toxaphene	16.700 U	18.900 U
Technical Chlordane	2.710	2.800
Cl2(8)	0.195 U	0.439 U
Cl3(18)	0.088 U	0.198 U
Cl3(28)	0.108 U	0.242 U
Cl4(44)	0.078 U	0.330
Cl4(49)	0.068 U	0.154 U
Cl4(52)	0.147 U	0.329 U
Cl4(66)	0.388	0.308 U
Cl5(87)	0.159 J	0.198 U
Cl5(101)	0.792	0.198 U
Cl5(105)	0.457	0.176 U
Cl5(118)	0.586	0.298
Cl6(128)	0.153 J	0.220 U
Cl6(138)	1.120	0.198 U
Cl6(153)	1.570	0.242 U
Cl7(170)	0.493	0.198 U
Cl7(180)	0.522	0.176 U
Cl7(183)	0.185 J	0.154 U
Cl7(184)	0.157 U	0.352 U
Cl7(187)	0.503	0.154 U
Cl8(195)	0.126 J	0.132 U
Cl9(206)	0.574	0.132 U
Cl10(209)	0.189 J	0.242 U

Surrogate Recoveries (%)

Cl3(34)	79	79
Cl6(152)	80	79

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Project Client: USACE - North Atlantic Division
Project Name: DAMOS Tissues
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 (%)

Cl3(34)
Cl6(152)

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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 (%)

Battelle
The Business of Innovation

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
Cl3(34)	85
Cl6(152)	85

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS Tissues
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
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS Tissues
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
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 (%)

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
Cl3(34)	80			
Cl6(152)	79			

Battelle
The Business of Innovation

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

Client ID	161005-01: SRM 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 (%)

Battelle
The Business of Innovation

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

Client ID	161005-01: SRM 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
Cl3(34)	87					
Cl6(152)	80					

Battelle
The Business of Innovation

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 (%)

Not Surrogate Corrected

Analyzed by Restucci Jr, Richard
8/28/2017

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Battelle
The Business of Innovation

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
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 (%)

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
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 (%)

Battelle
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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
Cl3(34)	81	75		
Cl6(152)	82	82		

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Project Client: USACE - North Atlantic Division
Project Name: DAMOS Tissues
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 Tissues
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)	

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.

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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Disposal Area Monitoring Study Program
Project Number: 100087718

Client ID	RAJ-019	RAJ-020	RAJ-021	RAJ-022
Battelle ID	K2643-P	K2644-P	K2645-P	K2646-P
Sample Type	SA	SA	SA	SA
Collection Date	09/20/16	09/20/16	09/21/16	09/21/16
Extraction Date	10/21/16	10/21/16	10/21/16	10/21/16
Analysis Date	10/26/16	10/27/16	10/27/16	10/27/16
Analytical Instrument	MS	MS	MS	MS
% Moisture	86.94	88.53	87.55	84.37
% Lipid	0.54	0.52	0.61	1.13
Matrix	CLAM TISS	CLAM TISS	CLAM TISS	WORM TISS
Sample Size	19.99	19.95	19.97	8.44
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	1.640	2.170	2.140	1.780
2-Methylnaphthalene	0.240 J	0.586	0.600	0.650
1-Methylnaphthalene	0.155 J	0.385 J	0.383 J	0.529 J
Acenaphthylene	0.117 U	0.117 U	0.117 U	0.446 J
Acenaphthene	0.117 U	0.132 J	0.117 U	1.240
Fluorene	0.105 U	0.105 U	0.105 U	0.858
Anthracene	0.275 J	0.509 J	0.117 U	1.760
Phenanthrene	0.267 J	0.273 J	0.312 J	6.280
Fluoranthene	0.447 J	0.538	0.367 J	39.000
Pyrene	0.570	1.330	0.239 J	60.400
Benzo(a)anthracene	0.142 U	0.170 J	0.142 U	3.600
Chrysene	0.299 J	0.367 J	0.209 J	11.200
Benzo(b)fluoranthene	0.804	1.090	0.458 J	4.580
Benzo(k)fluoranthene	0.733 J	0.945 J	0.425 J	3.660
Benzo(a)pyrene	0.333 J	0.478 J	0.232 U	4.720
Indeno(1,2,3-cd)pyrene	0.348 J	0.410 J	0.270 J	1.310
Dibenz(a,h)anthracene	0.093 U	0.093 U	0.093 U	0.300 J
Benzo(g,h,i)perylene	0.603	0.669	0.476 J	4.600

Surrogate Recoveries (%)

Naphthalene-d8	79	74	77	71
Acenaphthene-d10	81	78	79	77
Phenanthrene-d10	84	81	81	82
Benzo(a)pyrene-d12	69	64	75	83

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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Disposal Area Monitoring Study Program
Project Number: 100087718

Client ID	RAJ-023	RAJ-024
Battelle ID	K2647-P	K2648-P
Sample Type	SA	SA
Collection Date	09/21/16	09/21/16
Extraction Date	10/21/16	10/21/16
Analysis Date	10/27/16	10/27/16
Analytical Instrument	MS	MS
% Moisture	82.59	86.6
% Lipid	1.93	1.03
Matrix	WORM TISS	CLAM TISS
Sample Size	12.29	5.47
Size Unit-Basis	G_WET	G_WET
Units	UG/KG_WET	UG/KG_WET
Naphthalene	3.890	3.080
2-Methylnaphthalene	1.790	0.988
1-Methylnaphthalene	1.320	0.717 J
Acenaphthylene	0.732 J	0.428 U
Acenaphthene	0.336 J	0.428 U
Fluorene	0.451 J	0.384 U
Anthracene	1.560	0.428 U
Phenanthrene	1.620	0.641 J
Fluoranthene	33.800	3.360
Pyrene	84.200	9.660
Benzo(a)anthracene	3.160	1.190
Chrysene	12.800	1.660
Benzo(b)fluoranthene	4.420	2.980
Benzo(k)fluoranthene	3.810	2.470
Benzo(a)pyrene	5.920	1.880
Indeno(1,2,3-cd)pyrene	1.490	0.952
Dibenz(a,h)anthracene	0.252 J	0.340 U
Benzo(g,h,i)perylene	6.010	1.660

Surrogate Recoveries (%)

Naphthalene-d8	78	85
Acenaphthene-d10	81	90
Phenanthrene-d10	85	93
Benzo(a)pyrene-d12	86	86

Battelle
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Disposal Area Monitoring Study Program
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	
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	
Benzo(g,h,i)perylene	

Surrogate Recoveries (%)

Naphthalene-d8	
Acenaphthene-d10	
Phenanthrene-d10	
Benzo(a)pyrene-d12	

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

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Disposal Area Monitoring Study Program
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

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
Benzo(g,h,i)perylene

Surrogate Recoveries (%)

Naphthalene-d8
Acenaphthene-d10
Phenanthrene-d10
Benzo(a)pyrene-d12

Battelle
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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
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Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Disposal Area Monitoring Study Program
Project Number: 100087718

Client ID	161005-01: SRM 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

Not Surrogate Corrected

Analyzed by Griffith, Lauren
8/28/2017

MS: T16-0287MS-Master_157-Final.xlsx

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

Battelle
The Business of Innovation

Project Client: USACE - North Atlantic Division
Project Name: DAMOS - Disposal Area Monitoring Study Program
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
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
Benzo(g,h,i)perylene

Surrogate Recoveries (%)

Naphthalene-d8
Acenaphthene-d10
Phenanthrene-d10
Benzo(a)pyrene-d12

DAMOS 2016

Portland 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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EnviroSystems, Inc. Sample Delivery Group Reference 28411

TABLE OF CONTENTS

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 Date
Technical Director

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...)	12/15/16	JLH	
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

Proj. No: 100087718

Proj. Name: DAMOS - Disposal Area Monitoring Study Program

SAMPLERS: Singature

A N A L Y S I S   R E Q U E S T E D →
" N U M B E R   O F   C O N T A I N E R S "

	DATE/TIME	BATTELLE ID	CLIENT ID	MATRIX											Total No of Containers
001	Sep 14 2016 12:45P	K2622	RAH-001	WORM TISS											1
002	Sep 14 2016 1:56P	K2623	RAH-002	WORM TISS											1
003	Sep 14 2016 3:57P	K2624	RAH-003	WORM TISS											1
004	Sep 15 2016 2:38P	K2625	RAH-006	WORM TISS											1
005	Sep 15 2016 3:48P	K2626	RAH-005	WORM TISS											1
006	Sep 15 2016 4:30P	K2627	RAH-004	WORM TISS											1
007	Sep 20 2016 3:06P	K2643	RAJ-019	CLAM TISS											1
008	Sep 20 2016 3:49P	K2644	RAJ-020	CLAM TISS											1
009	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

DATE/TIME	BATTELLE ID	CLIENT ID	MATRIX	ANALYSIS REQUESTED → "NUMBER OF CONTAINERS"										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:

Printed on 10/26/2016

ESI

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:

EnviroSystems, Inc. One Lafayette Road P.O. Box 778 Hampton, NH 03842-0778 (603) 926-3345 fax (603) 926-3521 www.envirosystems.com

APPENDIX I

BENTHIC COMMUNITY ANALYSIS RESULTS

BATTELLE - USACE - DAMOS RAW DATA NOVEMBER 2016						
Station Name	Phylum	Class	Order	Family	ID	Number
RAJ-013/EREF-05	Nemertea	Anopla	Heteronemertea	Lineidae	Micrura (LPIL)	3
RAJ-013/EREF-05	Nemertea	Anopla	Heteronemertea	Lineidae	Lineidae (LPIL)	1
RAJ-013/EREF-05	Nemertea				Nemertea (LPIL)	1
RAJ-013/EREF-05	Arthropoda	Malacostraca	Amphipoda	Lysianassidae	Lysianassidae (LPIL)	1
RAJ-013/EREF-05	Arthropoda	Malacostraca	Amphipoda	Ampeliscidae	Ampeliscidae (LPIL)	1
RAJ-013/EREF-05	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Harpinia propinqua	4
RAJ-013/EREF-05	Arthropoda	Malacostraca	Cumacea	Diastylidae	Diastylis sculpta	1
RAJ-013/EREF-05	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	Amphiuridae (LPIL)	10
RAJ-013/EREF-05	Arthropoda	Malacostraca	Amphipoda	Stenothoidae	Metopella angusta	1
RAJ-013/EREF-05	Mollusca	Gastropoda	Neotaenioglossa	Rissoidae	Onoba pelagica	65
RAJ-013/EREF-05	Mollusca	Bivalvia	Veneroida	Astartidae	Astarte undata	58
RAJ-013/EREF-05	Mollusca	Bivalvia	Nuculoida	Yoldiidae	Yoldia limatula	66
RAJ-013/EREF-05	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula proxima	17
RAJ-013/EREF-05	Mollusca	Bivalvia	Nuculida	Nuculidae	Ennucula tenuis	24
RAJ-013/EREF-05	Mollusca	Bivalvia	Nuculida	Nuculidae	Ennucula aegeensis	9
RAJ-013/EREF-05	Mollusca	Bivalvia	Myoida	Corbulidae	Corbula contracta	1
RAJ-013/EREF-05	Mollusca	Bivalvia	Pholadomyoida	Periplomatidae	Periploma papyratium	10
RAJ-013/EREF-05	Mollusca	Bivalvia	Veneroida	Thyasiridae	Thyasira flexuosa	2
RAJ-013/EREF-05	Mollusca	Bivalvia			Bivalvia (LPIL)	1
RAJ-013/EREF-05	Mollusca	Gastropoda			Gastropoda (LPIL)	1
RAJ-013/EREF-05	Mollusca	Bivalvia	Nuculanida	Nuculanidae	Nuculana pernula	1
RAJ-013/EREF-05	Mollusca	Bivalvia	Mytiloida	Mytilidae	Crenella decussata	3
RAJ-013/EREF-05	Mollusca	Scaphopoda	Dentaliida	Dentaliidae	Dentaliidae (LPIL)	1
RAJ-013/EREF-05	Mollusca	Bivalvia	Cardiida	Cardiidae	Parvicardium pinnulatum	3
RAJ-013/EREF-05	Mollusca	Bivalvia	Veneroida	Carditidae	Cyclocardia borealis	6
RAJ-013/EREF-05	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtyidae (LPIL)	1
RAJ-013/EREF-05	Annelida	Polychaeta	Terebellida	Ampharetidae	Anobothrus gracilis	4
RAJ-013/EREF-05	Annelida	Polychaeta	Scolecida	Paraonidae	Aricidea quadrilobata	1
RAJ-013/EREF-05	Annelida	Polychaeta	Opheliida	Scalibregmatidae	Scalibregma inflatum	2
RAJ-013/EREF-05	Annelida	Polychaeta	Terebellida	Trichobranchidae	Terebellides stroemi	5
RAJ-013/EREF-05	Annelida	Polychaeta	Spionida	Spionidae	Prionospio (LPIL)	23
RAJ-013/EREF-05	Annelida	Polychaeta	Terebellida	Cirratulidae	Chaetozone setosa	2
RAJ-013/EREF-05	Annelida	Polychaeta	Orbiniida	Orginiidae	Scoloplos armiger	1
RAJ-013/EREF-05	Annelida	Polychaeta	Oweniida	Oweniidae	Galathowenia oculata	2
RAJ-013/EREF-05	Annelida	Polychaeta	Terebellida	Cirratulidae	Cirratulidae (LPIL)	33
RAJ-013/EREF-05	Annelida	Polychaeta	Scolecida	Maldanidae	Maldanidae (LPIL)	12
RAJ-013/EREF-05	Annelida	Polychaeta	Terebellida	Terebellidae	Polycirrus eximius	1
RAJ-013/EREF-05	Annelida	Polychaeta	Cossurida	Cossuridae	Cossura soyeri	4
RAJ-013/EREF-05	Annelida	Polychaeta	Eunicida	Lumbrineridae	Ninoe nigripes	2
RAJ-013/EREF-05	Annelida	Polychaeta	Scolecida	Paraonidae	Aricidea (LPIL)	5
RAJ-013/EREF-05	Annelida	Polychaeta	Spionida	Spionidae	Prionospio steenstrupi	2
RAJ-013/EREF-05	Annelida	Polychaeta	Phyllodocida	Syllidae	Exogone rolani	1
RAJ-013/EREF-05	Annelida	Oligochaeta	Tubificida	Naididae	Naididae (LPIL)	6
RAJ-013/EREF-05	Annelida	Polychaeta	Phyllodocida	Pholoidae	Pholoe minuta	3
RAJ-013/EREF-05	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus (LPIL)	1

Station Name	Phylum	Class	Order	Family	ID	Number
RAJ-013/EREF-05	Annelida	Polychaeta	Orbiniida	Orbiniidae	Orbiniidae (LPIL)	1
RAJ-013/EREF-05	Annelida	Polychaeta	Orbiniida	Orbiniidae	Leitoscoloplos (LPIL)	1
RAJ-013/EREF-05	Annelida	Polychaeta	Spionida	Spionidae	Spiophanes missionensis	7
RAJ-013/EREF-05	Annelida	Polychaeta	Eunicida	Lumbrineridae	Lumbrineridae (LPIL)	2
RAJ-013/EREF-05	Annelida	Polychaeta	Sabellida	Sabellidae	Euchone incolor	1
RAJ-013/EREF-05	Annelida	Polychaeta	Spionida	Spionidae	Spiophanes bombyx	1
RAJ-013/EREF-05	Annelida	Polychaeta	Oweniida	Oweniidae	Owenia fusiformis	2
RAJ-013/EREF-05	Annelida	Polychaeta	Scolecida	Paraonidae	Paraonidae (LPIL)	1
RAJ-013/EREF-05	Annelida	Polychaeta	Terebellida	Cirratulidae	Tharyx acutus	1
RAJ-013/EREF-05	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Phyllodocidae (LPIL)	1
RAJ-013/EREF-05	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtys incisa	1
RAJ-013/EREF-05	Annelida	Polychaeta	Phyllodocida	Goniadidae	Goniada (LPIL)	1
RAJ-013/EREF-05	Annelida	Polychaeta	Phyllodocida	Syllidae	Exogone verugera	1
RAJ-013/EREF-05	Annelida	Polychaeta	Phyllodocida	Polynoidae	Polynoidae (LPIL)	1
RAJ-013/EREF-05	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	Pherusa affinis	1
RAJ-014/PDS-16	Mollusca	Aplacophora			Aplacophora (LPIL)	3
RAJ-014/PDS-16	Nemertea	Anopla	Heteronemertea	Lineidae	Lineidae (LPIL)	2
RAJ-014/PDS-16	Nemertea				Nemertea (LPIL)	1
RAJ-014/PDS-16	Sipuncula				Sipuncula (LPIL)	1
RAJ-014/PDS-16	Arthropoda	Malacostraca	Amphipoda	Stenothoidae	Metopella angusta	5
RAJ-014/PDS-16	Arthropoda	Malacostraca	Amphipoda	Lysianassidae	Lysianassidae (LPIL)	1
RAJ-014/PDS-16	Arthropoda	Malacostraca	Cumacea	Nannastacidae	Campylaspis sp. AA	11
RAJ-014/PDS-16	Arthropoda	Malacostraca	Cumacea	Diastylidae	Diastylis (LPIL)	1
RAJ-014/PDS-16	Mollusca	Bivalvia	Mytiloida	Mytilidae	Crenella decussata	4
RAJ-014/PDS-16	Mollusca	Bivalvia	Veneroida	Astartidae	Astarte undata	1
RAJ-014/PDS-16	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula proxima	10
RAJ-014/PDS-16	Mollusca	Bivalvia	Nuculida	Nuculidae	Ennucula tenuis	11
RAJ-014/PDS-16	Mollusca	Bivalvia	Nuculida	Nuculidae	Ennucula aegeensis	1
RAJ-014/PDS-16	Mollusca	Bivalvia	Nuculoida	Yoldiidae	Yoldia limatula	7
RAJ-014/PDS-16	Mollusca	Bivalvia	Myoida	Corbulidae	Corbula contracta	9
RAJ-014/PDS-16	Mollusca	Scaphopoda	Dentaliida	Dentaliidae	Dentaliidae (LPIL)	2
RAJ-014/PDS-16	Mollusca	Gastropoda	Neotaenioglossa	Rissoidae	Onoba pelagica	35
RAJ-014/PDS-16	Mollusca	Bivalvia	Pholadomyoida	Periplomatidae	Periploma papyratium	3
RAJ-014/PDS-16	Mollusca	Bivalvia	Veneroida	Thyasiridae	Thyasira flexuosa	1
RAJ-014/PDS-16	Mollusca	Bivalvia	Pectinida	Dimyidae	Dimyidae (LPIL)	1
RAJ-014/PDS-16	Mollusca	Bivalvia	Veneroida	Semelidae	Semelidae (LPIL)	6
RAJ-014/PDS-16	Annelida	Polychaeta	Terebellida	Cirratulidae	Tharyx acutus	11
RAJ-014/PDS-16	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus (LPIL)	6
RAJ-014/PDS-16	Annelida	Polychaeta	Terebellida	Cirratulidae	Cirratulidae (LPIL)	70
RAJ-014/PDS-16	Annelida	Polychaeta	Orbiniida	Orbiniidae	Leitoscoloplos (LPIL)	3
RAJ-014/PDS-16	Annelida	Polychaeta	Spionida	Spionidae	Spiophanes missionensis	6
RAJ-014/PDS-16	Annelida	Polychaeta	Oweniida	Oweniidae	Owenia fusiformis	3
RAJ-014/PDS-16	Annelida	Polychaeta	Terebellida	Cirratulidae	Aphelochaeta marioni	4
RAJ-014/PDS-16	Annelida	Polychaeta	Sabellida	Sabellidae	Euchone incolor	40
RAJ-014/PDS-16	Annelida	Polychaeta	Scolecida	Paraonidae	Aricidea (LPIL)	25
RAJ-014/PDS-16	Annelida	Polychaeta	Eunicida	Lumbrineridae	Ninoe nigripes	8

Station Name	Phylum	Class	Order	Family	ID	Number
RAJ-014/PDS-16	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtyidae (LPIL)	9
RAJ-014/PDS-16	Annelida	Polychaeta	Scolecida	Paraonidae	Levinsenia gracilis	17
RAJ-014/PDS-16	Annelida	Oligochaeta	Tubificida	Naididae	Naididae (LPIL)	8
RAJ-014/PDS-16	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Eteone longa	3
RAJ-014/PDS-16	Annelida	Polychaeta	Spionida	Spionidae	Prionospio steenstrupi	2
RAJ-014/PDS-16	Annelida	Polychaeta	Scolecida	Maldanidae	Maldanidae (LPIL)	6
RAJ-014/PDS-16	Annelida	Polychaeta	Spionida	Spionidae	Prionospio (LPIL)	15
RAJ-014/PDS-16	Annelida	Polychaeta	Spionida	Trochochaetidae	Trochochaeta multisetosa	1
RAJ-014/PDS-16	Annelida	Polychaeta	Oweniida	Oweniidae	Galathowenia oculata	2
RAJ-014/PDS-16	Annelida	Polychaeta	Cossurida	Cossuridae	Cossura soyeri	8
RAJ-014/PDS-16	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtys incisa	6
RAJ-014/PDS-16	Annelida	Polychaeta	Scolecida	Paraonidae	Aricidea quadrilobata	9
RAJ-014/PDS-16	Annelida	Polychaeta	Opheliida	Scalibregmatidae	Scalibregma inflatum	1
RAJ-014/PDS-16	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	Pherusa affinis	4
RAJ-014/PDS-16	Annelida	Polychaeta	Canalipalpata	Sternaspidae	Sternaspis scutata	1
RAJ-014/PDS-16	Annelida	Polychaeta	Phyllodocida	Sphaerodoridae	Sphaerodoridium minutum	5
RAJ-014/PDS-16	Annelida	Polychaeta	Eunicida	Lumbrineridae	Lumbrineridae (LPIL)	2
RAJ-014/PDS-16	Annelida	Polychaeta	Spionida	Apistobranchidae	Apistobranchus tullbergi	2
RAJ-014/PDS-16	Phoronida			Phoronidae	Phoronis (LPIL)	2
RAJ-014/PDS-16	Annelida	Polychaeta	Phyllodocida	Goniadidae	Goniada (LPIL)	2
RAJ-014/PDS-16	Annelida	Polychaeta	Terebellida	Terebellidae	Polycirrus eximius	3
RAJ-014/PDS-16	Annelida	Polychaeta	Spionida	Spionidae	Spionidae (LPIL)	1
RAJ-015/PDA95-30	Nemertea	Anopla	Heteronemertea	Lineidae	Lineidae (LPIL)	2
RAJ-015/PDA95-30	Nemertea	Anopla	Heteronemertea	Lineidae	Micrura (LPIL)	1
RAJ-015/PDA95-30	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	Amphiuridae (LPIL)	2
RAJ-015/PDA95-30	Arthropoda	Malacostraca	Cumacea	Diastylidae	Leptostylis longimana	1
RAJ-015/PDA95-30	Arthropoda	Malacostraca	Cumacea	Diastylidae	Diastylis cornuifer	1
RAJ-015/PDA95-30	Arthropoda	Malacostraca	Amphipoda	Pleustidae	Pleustidae (LPIL)	1
RAJ-015/PDA95-30	Mollusca	Scaphopoda	Dentaliida	Dentaliidae	Dentaliidae (LPIL)	2
RAJ-015/PDA95-30	Mollusca	Bivalvia	Myoida	Corbulidae	Corbula contracta	34
RAJ-015/PDA95-30	Mollusca	Bivalvia	Nuculoida	Yoldiidae	Yoldia limatula	4
RAJ-015/PDA95-30	Mollusca	Bivalvia	Venerida	Veneridae	Pitar morrhuanus	7
RAJ-015/PDA95-30	Mollusca	Bivalvia	Cardiida	Cardiidae	Parvicardium pinnulatum	3
RAJ-015/PDA95-30	Annelida	Polychaeta	Oweniida	Oweniidae	Galathowenia oculata	40
RAJ-015/PDA95-30	Annelida	Polychaeta	Spionida	Spionidae	Spio setosa	1
RAJ-015/PDA95-30	Annelida	Polychaeta	Spionida	Spionidae	Prionospio (LPIL)	34
RAJ-015/PDA95-30	Annelida	Polychaeta	Sabellida	Sabellidae	Euchone incolor	28
RAJ-015/PDA95-30	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtys incisa	11
RAJ-015/PDA95-30	Annelida	Polychaeta	Terebellida	Ampharetidae	Anobothrus gracilis	1
RAJ-015/PDA95-30	Annelida	Polychaeta	Scolecida	Paraonidae	Aricidea (LPIL)	3
RAJ-015/PDA95-30	Annelida	Polychaeta	Terebellida	Cirratulidae	Cirratulidae (LPIL)	21
RAJ-015/PDA95-30	Annelida	Polychaeta	Terebellida	Cirratulidae	Tharyx acutus	4
RAJ-015/PDA95-30	Annelida	Polychaeta	Orbiniida	Orbiniidae	Leitoscoloplos foliosus	1
RAJ-015/PDA95-30	Annelida	Polychaeta	Eunicida	Lumbrineridae	Ninoe nigripes	3
RAJ-015/PDA95-30	Annelida	Polychaeta	Phyllodocida	Pholoidae	Pholoe minuta	13
RAJ-015/PDA95-30	Annelida	Polychaeta	Phyllodocida	Goniadidae	Goniada (LPIL)	1

Station Name	Phylum	Class	Order	Family	ID	Number
RAJ-015/PDA95-30	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus (LPIL)	18
RAJ-015/PDA95-30	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Paranaitis speciosa	1
RAJ-015/PDA95-30	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtyidae (LPIL)	5
RAJ-015/PDA95-30	Annelida	Polychaeta	Terebellida	Terebellidae	Polycirrus eximius	2
RAJ-015/PDA95-30	Annelida	Polychaeta	Scolecida	Paraonidae	Aricidea catherinae	3
RAJ-015/PDA95-30	Annelida	Polychaeta	Terebellida	Cirratulidae	Chaetozone setosa	1
RAJ-015/PDA95-30	Annelida	Polychaeta	Spionida	Spionidae	Prionospio steenstrupi	4
RAJ-015/PDA95-30	Annelida	Polychaeta	Terebellida	Trichobranchidae	Terebellides stroemi	3
RAJ-015/PDA95-30	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Eteone longa	3
RAJ-015/PDA95-30	Annelida	Polychaeta	Eunicida	Dorvilleidae	Dorvilleidae (LPIL)	3
RAJ-015/PDA95-30	Annelida	Polychaeta	Orbiniida	Orbiniidae	Leitoscoloplos (LPIL)	2
RAJ-015/PDA95-30	Annelida	Polychaeta	Scolecida	Maldanidae	Maldanidae (LPIL)	1
RAJ-015/PDA95-30	Annelida	Oligochaeta	Tubificida	Naididae	Naididae (LPIL)	1
RAJ-015/PDA95-30	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Phyllodoce arenae	1
RAJ-016/PDA95-22	Nemertea	Anopla	Heteronemertea	Lineidae	Lineidae (LPIL)	8
RAJ-016/PDA95-22	Nemertea	Anopla	Heteronemertea	Lineidae	Micrura (LPIL)	5
RAJ-016/PDA95-22	Nemertea				Nemertea (LPIL)	21
RAJ-016/PDA95-22	Hemichordata				Hemichordata (LPIL)	1
RAJ-016/PDA95-22	Arthropoda	Malacostraca	Cumacea	Nannastacidae	Campylaspis sp. AA	3
RAJ-016/PDA95-22	Arthropoda	Malacostraca	Amphipoda	Stenothoidae	Metopella angusta	1
RAJ-016/PDA95-22	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Harpinia propinqua	1
RAJ-016/PDA95-22	Mollusca	Aplacophora			Aplacophora (LPIL)	1
RAJ-016/PDA95-22	Mollusca	Scaphopoda	Dentaliida	Dentaliidae	Dentaliidae (LPIL)	3
RAJ-016/PDA95-22	Mollusca	Gastropoda			Gastropoda (LPIL)	1
RAJ-016/PDA95-22	Mollusca	Gastropoda	Neotaenioglossa	Rissoidae	Onoba pelagica	7
RAJ-016/PDA95-22	Mollusca	Bivalvia	Pholadomyoida	Periplomatidae	Periploma papyratium	4
RAJ-016/PDA95-22	Mollusca	Bivalvia	Myoida	Corbulidae	Corbula contracta	11
RAJ-016/PDA95-22	Mollusca	Bivalvia	Veneroida	Astartidae	Astarte undata	1
RAJ-016/PDA95-22	Mollusca	Bivalvia	Venerida	Veneridae	Pitar morrhuanus	1
RAJ-016/PDA95-22	Mollusca	Bivalvia	Mytiloida	Mytilidae	Crenella decussata	1
RAJ-016/PDA95-22	Mollusca	Bivalvia	Nuculoida	Yoldiidae	Yoldia limatula	4
RAJ-016/PDA95-22	Mollusca	Bivalvia	Cardiida	Cardiidae	Parvicardium pinnulatum	2
RAJ-016/PDA95-22	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula proxima	3
RAJ-016/PDA95-22	Mollusca	Bivalvia	Nuculida	Nuculidae	Ennucula tenuis	4
RAJ-016/PDA95-22	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Eteone longa	10
RAJ-016/PDA95-22	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtys incisa	3
RAJ-016/PDA95-22	Annelida	Polychaeta	Eunicida	Dorvilleidae	Dorvilleidae (LPIL)	1
RAJ-016/PDA95-22	Annelida	Polychaeta	Scolecida	Paraonidae	Aricidea quadrilobata	189
RAJ-016/PDA95-22	Annelida	Polychaeta	Spionida	Spionidae	Prionospio steenstrupi	58
RAJ-016/PDA95-22	Annelida	Polychaeta	Terebellida	Cirratulidae	Tharyx acutus	53
RAJ-016/PDA95-22	Annelida	Polychaeta	Cossurida	Cossuridae	Cossura soyeri	58
RAJ-016/PDA95-22	Annelida	Polychaeta	Terebellida	Cirratulidae	Cirratulidae (LPIL)	310
RAJ-016/PDA95-22	Annelida	Polychaeta	Canalipalpata	Sternaspidae	Sternaspis scutata	6
RAJ-016/PDA95-22	Annelida	Polychaeta	Terebellida	Ampharetidae	Anobothrus gracilis	2
RAJ-016/PDA95-22	Annelida	Polychaeta	Oweniida	Oweniidae	Galathowenia oculata	20
RAJ-016/PDA95-22	Annelida	Polychaeta	Terebellida	Cirratulidae	Chaetozone setosa	28

Station Name	Phylum	Class	Order	Family	ID	Number
RAJ-016/PDA95-22	Annelida	Polychaeta	Scolecida	Maldanidae	Maldanidae (LPIL)	2
RAJ-016/PDA95-22	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus (LPIL)	32
RAJ-016/PDA95-22	Annelida	Polychaeta	Scolecida	Paraonidae	Levinsenia gracilis	10
RAJ-016/PDA95-22	Annelida	Polychaeta	Sabellida	Sabellidae	Euchone incolor	41
RAJ-016/PDA95-22	Annelida	Polychaeta	Oweniida	Oweniidae	Owenia fusiformis	8
RAJ-016/PDA95-22	Annelida	Polychaeta	Scolecida	Paraonidae	Aricidea catherinae	28
RAJ-016/PDA95-22	Annelida	Polychaeta	Phyllodocida	Syllidae	Streptosyllis arenae	1
RAJ-016/PDA95-22	Annelida	Polychaeta	Phyllodocida	Pholoidae	Pholoe minuta	4
RAJ-016/PDA95-22	Annelida	Polychaeta	Spionida	Spionidae	Spio setosa	4
RAJ-016/PDA95-22	Annelida	Polychaeta	Orbiniida	Orbiniidae	Leitoscoloplos foliosus	14
RAJ-016/PDA95-22	Annelida	Polychaeta	Scolecida	Paraonidae	Aricidea (LPIL)	4
RAJ-016/PDA95-22	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	Pherusa affinis	6
RAJ-016/PDA95-22	Annelida	Polychaeta	Eunicida	Lumbrineridae	Ninoe nigripes	1
RAJ-016/PDA95-22	Annelida	Polychaeta	Opheliida	Scalibregmatidae	Scalibregma inflatum	3
RAJ-016/PDA95-22	Annelida	Polychaeta	Phyllodocida	Goniadidae	Goniada (LPIL)	1
RAJ-016/PDA95-22	Annelida	Polychaeta	Phyllodocida	Polynoidae	Polynoidae (LPIL)	2
RAJ-016/PDA95-22	Annelida	Polychaeta	Phyllodocida	Sphaerodoridae	Sphaerodoridium minutum	2
RAJ-016/PDA95-22	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtyidae (LPIL)	5
RAJ-016/PDA95-22	Annelida	Polychaeta	Terebellida	Ampharetidae	Melinna maculata	1
RAJ-016/PDA95-22	Annelida	Polychaeta	Phyllodocida	Nereididae	Ceratocephale oculata	1
RAJ-016/PDA95-22	Annelida	Polychaeta	Spionida	Apistobranchidae	Apistobranchus tullbergi	5
RAJ-016/PDA95-22	Annelida	Oligochaeta	Tubificida	Naididae	Naididae (LPIL)	2
RAJ-016/PDA95-22	Annelida	Polychaeta	Terebellida	Ampharetidae	Ampharetidae (LPIL)	1
RAJ-016/PDA95-22	Annelida	Polychaeta	Scolecida	Capitellidae	Capitella capitata	1
RAJ-016/PDA95-22	Annelida	Polychaeta	Phyllodocida	Polynoidae	Harmothoe imbricata	1
RAJ-016/PDA95-22	Annelida	Polychaeta	Orbiniida	Orbiniidae	Leitoscoloplos (LPIL)	4
RAJ-016/PDA95-22	Annelida	Polychaeta	Terebellida	Cirratulidae	Aphelochaeta marioni	3
RAJ-016/PDA95-22	Annelida	Polychaeta	Spionida	Spionidae	Spiophanes missionensis	1
RAJ-016/PDA95-22	Annelida	Polychaeta	Terebellida	Ampharetidae	Ampharete acutifrons	1
RAJ-017/SREF-07	Nemertea	Anopla	Heteronemertea	Lineidae	Lineidae (LPIL)	1
RAJ-017/SREF-07	Nemertea				Nemertea (LPIL)	3
RAJ-017/SREF-07	Arthropoda	Malacostraca	Amphipoda	Stenothoidae	Metopella angusta	2
RAJ-017/SREF-07	Arthropoda	Malacostraca	Cumacea	Diastylidae	Leptostylis longimana	1
RAJ-017/SREF-07	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Harpinia propinqua	3
RAJ-017/SREF-07	Arthropoda	Malacostraca	Amphipoda	Pleustidae	Pleustidae (LPIL)	1
RAJ-017/SREF-07	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	Amphiuridae (LPIL)	5
RAJ-017/SREF-07	Mollusca	Aplacophora			Aplacophora (LPIL)	1
RAJ-017/SREF-07	Mollusca	Bivalvia	Nuculida	Nuculidae	Ennucula aegeensis	11
RAJ-017/SREF-07	Mollusca	Bivalvia	Nuculida	Nuculidae	Ennucula tenuis	18
RAJ-017/SREF-07	Mollusca	Bivalvia	Nuculanida	Nuculanidae	Nuculana pernula	4
RAJ-017/SREF-07	Mollusca	Bivalvia	Veneroida	Carditidae	Cyclocardia borealis	6
RAJ-017/SREF-07	Mollusca	Bivalvia	Pholadomyoida	Periplomatidae	Periploma papyratium	12
RAJ-017/SREF-07	Mollusca	Bivalvia	Veneroida	Thyasiridae	Thyasira flexuosa	17
RAJ-017/SREF-07	Mollusca	Gastropoda			Gastropoda (LPIL)	1
RAJ-017/SREF-07	Mollusca	Bivalvia	Myoida	Corbulidae	Corbula contracta	4
RAJ-017/SREF-07	Mollusca	Scaphopoda	Dentaliida	Dentaliidae	Dentaliidae (LPIL)	3

Station Name	Phylum	Class	Order	Family	ID	Number
RAJ-017/SREF-07	Mollusca	Bivalvia	Nuculoida	Yoldiidae	Yoldia limatula	32
RAJ-017/SREF-07	Mollusca	Bivalvia	Mytiloida	Mytilidae	Crenella decussata	35
RAJ-017/SREF-07	Mollusca	Bivalvia	Veneroida	Astartidae	Astarte undata	28
RAJ-017/SREF-07	Mollusca	Gastropoda	Neotaenioglossa	Rissoidae	Onoba pelagica	39
RAJ-017/SREF-07	Mollusca	Bivalvia	Cardiida	Cardiidae	Parvicardium pinnulatum	1
RAJ-017/SREF-07	Annelida	Polychaeta	Canalipalpata	Sternaspidae	Sternaspis scutata	7
RAJ-017/SREF-07	Annelida	Polychaeta	Scolecida	Maldanidae	Maldanidae (LPIL)	115
RAJ-017/SREF-07	Annelida	Polychaeta	Terebellida	Cirratulidae	Cirratulidae (LPIL)	80
RAJ-017/SREF-07	Annelida	Polychaeta	Terebellida	Trichobranchidae	Trichobranchus glacialis	2
RAJ-017/SREF-07	Annelida	Polychaeta	Eunicida	Lumbrineridae	Ninoe nigripes	12
RAJ-017/SREF-07	Annelida	Polychaeta	Terebellida	Cirratulidae	Monticellina dorsobranchialis	3
RAJ-017/SREF-07	Annelida	Polychaeta	Sabellida	Sabellidae	Euchone incolor	29
RAJ-017/SREF-07	Annelida	Polychaeta	Scolecida	Paraonidae	Levinsenia gracilis	14
RAJ-017/SREF-07	Annelida	Polychaeta	Scolecida	Paraonidae	Aricidea quadrilobata	43
RAJ-017/SREF-07	Annelida	Polychaeta	Terebellida	Cirratulidae	Tharyx acutus	14
RAJ-017/SREF-07	Annelida	Polychaeta	Phyllodocida	Nereididae	Ceratocephale oculata	1
RAJ-017/SREF-07	Annelida	Oligochaeta	Tubificida	Naididae	Naididae (LPIL)	17
RAJ-017/SREF-07	Annelida	Polychaeta	Phyllodocida	Goniadidae	Goniada (LPIL)	4
RAJ-017/SREF-07	Annelida	Polychaeta	Spionida	Spionidae	Prionospio steenstrupi	23
RAJ-017/SREF-07	Annelida	Polychaeta	Spionida	Spionidae	Prionospio (LPIL)	2
RAJ-017/SREF-07	Annelida	Polychaeta	Phyllodocida	Syllidae	Streptosyllis pettiboneae	1
RAJ-017/SREF-07	Annelida	Polychaeta	Cossurida	Cossuridae	Cossura soyeri	9
RAJ-017/SREF-07	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	Brada villosa	1
RAJ-017/SREF-07	Annelida	Polychaeta	Terebellida	Trichobranchidae	Terebellides stroemi	5
RAJ-017/SREF-07	Annelida	Polychaeta	Opheliida	Scalibregmatidae	Scalibregma inflatum	3
RAJ-017/SREF-07	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtys incisa	2
RAJ-017/SREF-07	Annelida	Polychaeta	Phyllodocida	Pholoidae	Pholoe minuta	3
RAJ-017/SREF-07	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtyidae (LPIL)	6
RAJ-017/SREF-07	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus (LPIL)	4
RAJ-017/SREF-07	Annelida	Polychaeta	Terebellida	Cirratulidae	Monticellina baptisteae	8
RAJ-017/SREF-07	Annelida	Polychaeta	Scolecida	Paraonidae	Aricidea (LPIL)	2
RAJ-017/SREF-07	Annelida	Polychaeta	Terebellida	Cirratulidae	Chaetozone setosa	7
RAJ-017/SREF-07	Annelida	Polychaeta	Terebellida	Terebellidae	Terebellidae (LPIL)	1
RAJ-017/SREF-07	Annelida	Polychaeta	Spionida	Spionidae	Spiophanes missionensis	5
RAJ-017/SREF-07	Annelida	Polychaeta	Eunicida	Lumbrineridae	Lumbrineridae (LPIL)	3
RAJ-017/SREF-07	Annelida	Polychaeta	Oweniida	Oweniidae	Galathowenia oculata	3
RAJ-017/SREF-07	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Eteone longa	3
RAJ-017/SREF-07	Annelida	Polychaeta	Sabellida	Sabellidae	Sabellidae (LPIL)	2
RAJ-017/SREF-07	Annelida	Polychaeta	Terebellida	Ampharetidae	Ampharetidae (LPIL)	1
RAJ-017/SREF-07	Annelida	Polychaeta	Terebellida	Terebellidae	Polycirrus eximius	1
RAJ-017/SREF-07	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	Pherusa affinis	1
RAJ-018/SREF-10	Nemertea	Anopla	Heteronemertea	Lineidae	Lineidae (LPIL)	4
RAJ-018/SREF-10	Nemertea	Anopla	Heteronemertea	Lineidae	Micrura (LPIL)	2
RAJ-018/SREF-10	Nemertea				Nemertea (LPIL)	8
RAJ-018/SREF-10	Sipuncula				Sipuncula (LPIL)	7
RAJ-018/SREF-10	Nemertea	Enopla	Monostilifera	Tetrastemmatidae	Tetrastemma (LPIL)	17

Station Name	Phylum	Class	Order	Family	ID	Number
RAJ-018/SREF-10	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Harpinia propinqua	4
RAJ-018/SREF-10	Arthropoda	Malacostraca	Cumacea	Nannastacidae	Campylaspis sp. AA	1
RAJ-018/SREF-10	Arthropoda	Malacostraca	Cumacea	Leuconidae	Eudorella pusilla	1
RAJ-018/SREF-10	Arthropoda	Malacostraca	Amphipoda	Pleustidae	Stenopleustes inermis	1
RAJ-018/SREF-10	Arthropoda	Malacostraca	Amphipoda	Lysianassidae	Lysianassidae (LPIL)	1
RAJ-018/SREF-10	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus pinguis	1
RAJ-018/SREF-10	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	Amphiuridae (LPIL)	3
RAJ-018/SREF-10	Mollusca	Aplacophora			Aplacophora (LPIL)	5
RAJ-018/SREF-10	Mollusca	Scaphopoda	Dentaliida	Dentaliidae	Dentaliidae (LPIL)	1
RAJ-018/SREF-10	Mollusca	Gastropoda	Neotaenioglossa	Rissoidae	Onoba pelagica	22
RAJ-018/SREF-10	Mollusca	Bivalvia	Veneroida	Astartidae	Astarte undata	46
RAJ-018/SREF-10	Mollusca	Bivalvia	Myoida	Corbulidae	Corbula contracta	1
RAJ-018/SREF-10	Mollusca	Bivalvia	Mytiloida	Mytilidae	Crenella decussata	8
RAJ-018/SREF-10	Mollusca	Bivalvia	Veneroida	Carditidae	Cyclocardia borealis	4
RAJ-018/SREF-10	Mollusca	Bivalvia	Nuculanida	Nuculanidae	Nuculana pernula	1
RAJ-018/SREF-10	Mollusca	Bivalvia	Pholadomyoida	Periplomatidae	Periploma papyratium	17
RAJ-018/SREF-10	Mollusca	Bivalvia	Nuculoida	Yoldiidae	Yoldia (LPIL)	3
RAJ-018/SREF-10	Mollusca	Bivalvia	Nuculoida	Yoldiidae	Yoldia limatula	21
RAJ-018/SREF-10	Mollusca	Bivalvia	Veneroida	Thyasiridae	Thyasira flexuosa	20
RAJ-018/SREF-10	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula proxima	38
RAJ-018/SREF-10	Mollusca	Bivalvia	Nuculida	Nuculidae	Ennucula tenuis	40
RAJ-018/SREF-10	Mollusca	Bivalvia	Nuculida	Nuculidae	Ennucula aegeensis	8
RAJ-018/SREF-10	Mollusca	Gastropoda	Cephalaspidea	Scaphandridae	Acteocina (LPIL)	5
RAJ-018/SREF-10	Mollusca	Gastropoda	Cephalaspidea	Haminoeidae	Haminoea solitaria	1
RAJ-018/SREF-10	Mollusca	Gastropoda	Pyramidelloida	Pyramidellidae	Pyramidellidae (LPIL)	1
RAJ-018/SREF-10	Annelida	Polychaeta	Terebellida	Cirratulidae	Cirratulidae (LPIL)	98
RAJ-018/SREF-10	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtyidae (LPIL)	3
RAJ-018/SREF-10	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Nephtys incisa	8
RAJ-018/SREF-10	Annelida	Polychaeta	Terebellida	Ampharetidae	Ampharetidae (LPIL)	2
RAJ-018/SREF-10	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	Pherusa (LPIL)	2
RAJ-018/SREF-10	Annelida	Polychaeta	Scolecida	Paraonidae	Levinsenia gracilis	6
RAJ-018/SREF-10	Annelida	Polychaeta	Terebellida	Trichobranchidae	Trichobranchus glacialis	2
RAJ-018/SREF-10	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus (LPIL)	8
RAJ-018/SREF-10	Annelida	Polychaeta	Scolecida	Maldanidae	Maldanidae (LPIL)	23
RAJ-018/SREF-10	Annelida	Polychaeta	Terebellida	Cirratulidae	Tharyx acutus	16
RAJ-018/SREF-10	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	Flabelligeridae (LPIL)	1
RAJ-018/SREF-10	Annelida	Polychaeta	Spionida	Spionidae	Prionospio steenstrupi	8
RAJ-018/SREF-10	Annelida	Polychaeta	Canalipalpata	Sternaspidae	Sternaspis scutata	13
RAJ-018/SREF-10	Annelida	Polychaeta	Terebellida	Cirratulidae	Chaetozone setosa	2
RAJ-018/SREF-10	Annelida	Polychaeta	Oweniida	Oweniidae	Galathowenia oculata	2
RAJ-018/SREF-10	Annelida	Polychaeta	Spionida	Spionidae	Spio setosa	2
RAJ-018/SREF-10	Annelida	Polychaeta	Eunicida	Lumbrineridae	Ninoe nigripes	6
RAJ-018/SREF-10	Annelida	Polychaeta	Scolecida	Paraonidae	Aricidea quadrilobata	19
RAJ-018/SREF-10	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	Pherusa affinis	1
RAJ-018/SREF-10	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	Brada villosa	2
RAJ-018/SREF-10	Annelida	Oligochaeta	Tubificida	Naididae	Naididae (LPIL)	3

Station Name	Phylum	Class	Order	Family	ID	Number
RAJ-018/SREF-10	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Eteone longa	2
RAJ-018/SREF-10	Annelida	Polychaeta	Terebellida	Trichobranchidae	Terebellides stroemi	2
RAJ-018/SREF-10	Annelida	Polychaeta	Spionida	Spionidae	Spiophanes missionensis	1
RAJ-018/SREF-10	Annelida	Polychaeta	Phyllodocida	Pholoidae	Pholoe minuta	6
RAJ-018/SREF-10	Annelida	Polychaeta	Opheliida	Scalibregmatidae	Scalibregma inflatum	2
RAJ-018/SREF-10	Annelida	Polychaeta	Phyllodocida	Polynoidae	Harmothoe imbricata	2
RAJ-018/SREF-10	Annelida	Polychaeta	Terebellida	Terebellidae	Polycirrus eximius	1