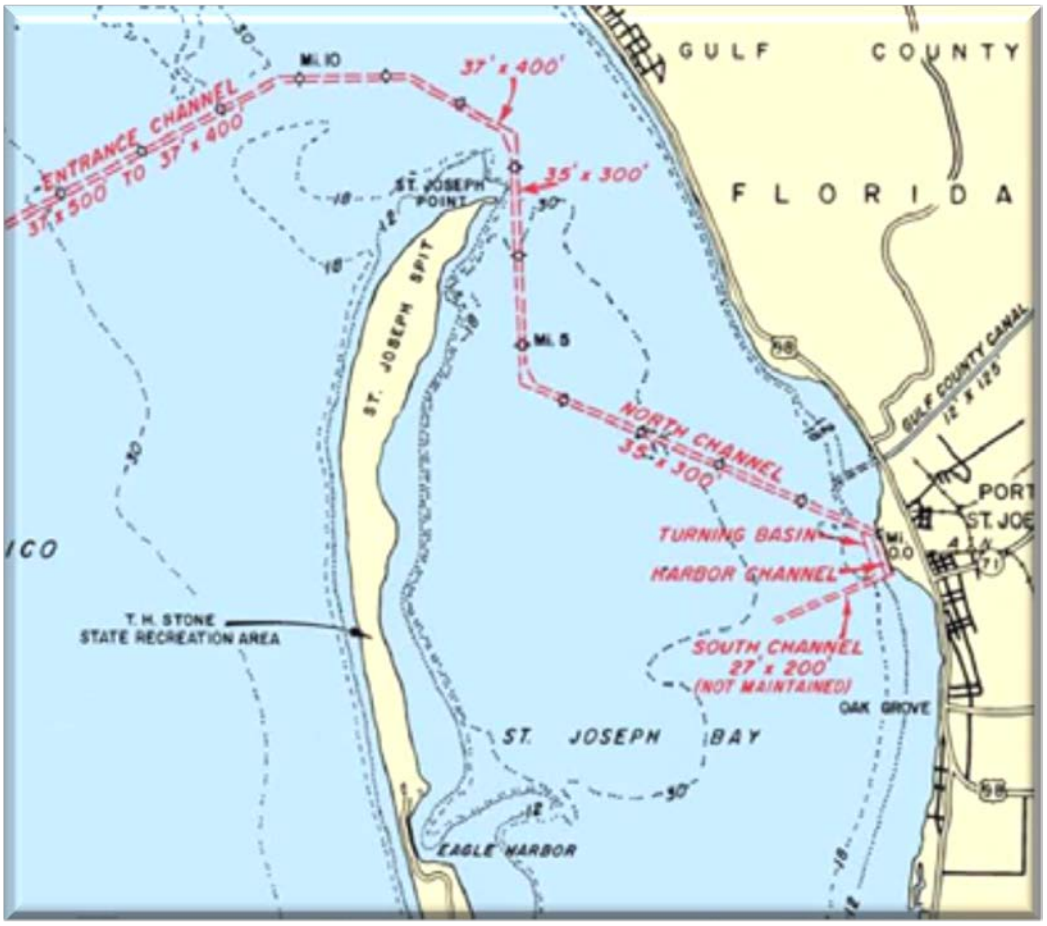
FINAL

North Channel and Turning Basin Environmental Testing Report for Maintenance Dredging of the Federal Channel and Turning Basin Port of Port St. Joe, Florida



February 2014

Prepared by:

7406 Fullerton, Suite 100
Jacksonville, FL 32256

List of Acronyms

ANZECC	Australian and New Zealand Environment and Conservation Council
CCME	Canadian Ministry for the Environment
DEC	Direct Exposure Criteria
DGPS	Differential Global Positioning System
EMPC	Estimated Maximum Possible Concentration
EPA	Environmental Protection Agency
ERL	Effects Range Low
ERM	Effects Range Median
FDEP	Florida Department of Environmental Protection
GEMS	Gulf of Mexico Ecological Management Site
H	High Plasticity
HDPE	High-density Polyethylene
Ind/Comm	Industrial/Commercial
LDPE	Ligh-density Polyethylene
LOEL	Lowest Observable Effect Level
MLW	Mean Low Water
MLLW	Mean Lower Low Water
MPH	Miles Per Hour
NOAA	National Oceanographic and Atmospheric Administration
O	Organic
OFW	Outstanding Florida Waterbody
PAH	Polycyclic Aromatic Hydrocarbon
PE	Project Engineer
RPD	Redox Potential Discontinuity
SQG	Sediment Quality Guidelines
SVOC	SemiVolatile Organic Compound
SWC	Surface Water Criteria
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System

Measurements

°C	Celsius
°F	Fahrenheit
Mg/kg	milligrams per kilogram or parts per million (ppm)
Ug/kg	micrograms per kilogram or parts per billion (ppb)
Pg/kg	picograms per kilogram or parts per trillion (ppt)
Mg/L	milligrams per liter
Ug/L	micrograms per liter
Pg/L	pictograms per liter

TABLE OF CONTENTS

List of Tables

List of Figures

1.0 INTRODUCTION

This report presents the results of an environmental sediment sampling and environmental testing program undertaken in the Port St. Joe Federal Shipping Channel's North Channel and Turning Basin (heretofore referred to as "harbor") on 22 and 23 November, 2013. The sediment sampling and environmental testing was done in accordance with a project-specific Sediment Sample Collection Plan (Cardno TEC 11/17/13) prepared in coordination with and with concurrence from project participants (Port of Port St. Joe Port Authority, Hatch Mott MacDonald, Cardno TEC, Southern Earth Sciences, Preble-Rish Engineering, TestAmerica Laboratories, US Army Corps of Engineers [USACE], and Florida Department of Environmental Protection [FDEP]). Sediment testing is in support of the Port St. Joe Port Authority's proposal for maintenance dredging of the Federal Channel.

This report provides sediment chemistry and elutriate testing results only from environmental sediment and site water samples collected from seven locations within the Turning Basin and North Channel. While the Sediment Sample Collection Plan (11/17/13) also offers guidance for the retrieval of additional geotechnical samples throughout the Federal Channel, this report focuses only on the environmental sampling methods and results in the interior harbor locations as identified in the Sediment Sample Collection Plan.

1.1 Location

The Port of Port St. Joe is located in the City of Port St. Joe in Gulf County, Florida (Figure 1-1). Port St. Joe is approximately 100 miles southwest of Tallahassee, 36 miles east of Panama City Harbor, and 140 miles east of Pensacola Harbor. The Port of Port of St. Joe is the only seaport located within a Florida Rural Area of Critical Economic Concern.

Partially isolated from the Gulf of Mexico, St. Joseph Bay extends from Cape San Blas in the south to the tip of the St. Joseph Peninsula in the north. St. Joseph Bay is bound on the eastern shoreline by the City of Port St. Joe and St. Joseph Bay State Buffer Preserve lands and on the west by the St. Joseph Peninsula and St. Joseph Peninsula State Park. The Bay is approximately 15 miles long north to south, with a maximum width of 6 miles, and opens north to the Gulf of Mexico.

Immediately west, south, and adjacent to the authorized Federal Channel is the St. Joseph's Bay Aquatic Preserve, which encompasses the entire St. Joseph's Peninsula from its northern tip to Cape San Blas in the south. The St. Joseph's Bay Aquatic Preserve is a 73,000 acre protected area, including 9,700 acres of seagrass bed, 760 acres of tidal marsh, and 53 acres of mudflat ecosystem. With exception of a buffer at the mouth of the Gulf County Canal, St. Joseph Bay is designated as a Class II Shellfish Harvesting Waterbody, Outstanding Florida Waterbody (OFW), and a Gulf of Mexico Ecological Management Site (GEMS).

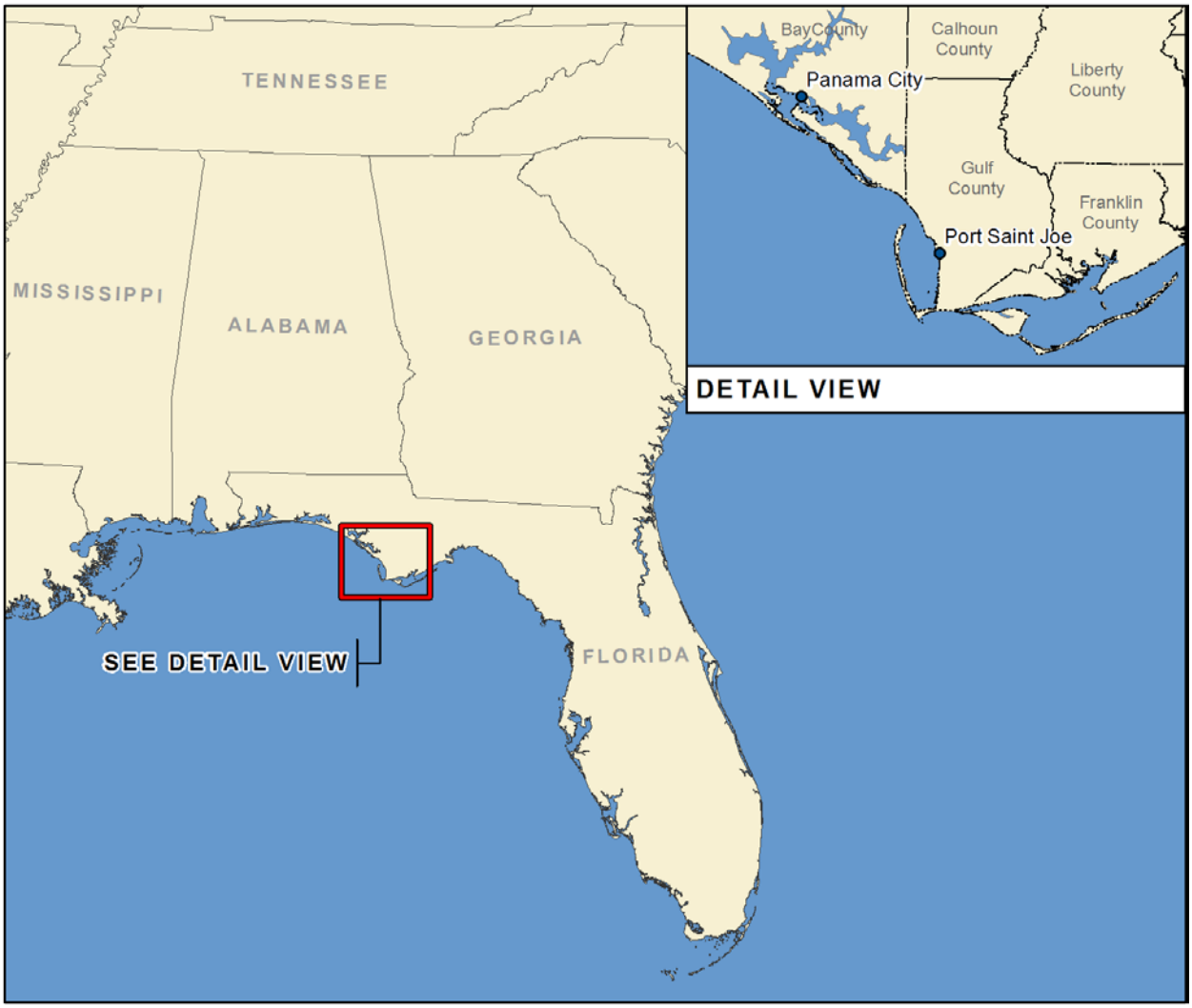


Figure 1-1: Port St. Joe Site Location

1.2 Dredging Project Background

The Port St. Joe Port Authority proposes to perform maintenance dredging activities that will re-establish the federal deep sea shipping channel and Turning Basin associated with the Port of Port St. Joe. Maintenance dredging the Port's Entrance Channel, North Channel, and Turning Basin is crucial to support current momentum to reanimate the Port and protect long-term Port sustainability. While the channel was originally dredged to its modern configuration in 1962, the USACE has not maintained the channel since 1986. The lack of consistent channel maintenance has resulted in shoaling and, in some areas, severely restricts the use of the channel by larger shipping vessels.

The Federal Channel has authorized depths of -37 feet Mean Low Water (MLW) for the Entrance Channel, -35 feet MLW for the North Channel, and -32 feet MLW for the Turning Basin. The lack of maintenance dredging has resulted in an average channel depth of 31.8 feet (with the deepest area [39 feet] in the Entrance Channel and the shallowest area [0-12 feet] at the tip of the St. Joseph Peninsula). The proposed maintenance dredging of the Channels and Turning Basin to authorized depths would

provide access to port infrastructure in accordance with the recently adopted Port Master Plan (2013) and would support recent Letters of Intent to export biofuel cargoes. Based upon the previous dredging history of the channel, continued maintenance of the channel is anticipated to be required every 8-10 years.

The total area to be dredged extends approximately 14 miles, beginning at the Port of Port St. Joe and heading north around St. Joseph Peninsula then turning west into the Gulf of Mexico. Dredging activities would begin in 2014 and would utilize a hydraulic cutterhead pipeline dredge system operating 24/7 until complete. Pending geotechnical and environmental testing results, and per State of Florida regulations for placement of dredge material (62B 41.005(15), F.A.C.), the dredged material may be beneficially reused for beach nourishment at previously authorized locations, as fill for Port upland development at one or more permitted upland locations within proximity to the Port, or for public reuse. Dredge sediments that are not beach quality material would be placed upon one or more upland sites to be permitted by the USACE and FDEP.

1.3 Purpose of the Sampling

Sampling locations in the North Channel and Turning Basin were selected using a targeted approach based on the review of previous sampling programs (USACE 2002) and recommendations from regulatory agencies (FDEP 2013).The samples were collected to characterize chemical constituents of concern to the FDEP in the sediment. Site water was also collected from the environmental sample locations to mix with sediment for undertaking standard and modified elutriates testing. This environmental chemical analysis will determine potential short-term water quality impacts during dredging and help predict potential effluent discharges from material stockpiled in the upland placement locations.

Adequate sample volumes were collected at each of the seven locations to perform bulk sediment chemistry for all seven samples, one standard elutriate test, and six modified elutriate tests. In accordance with the Sediment Sample Collection Plan, all samples were tested for the following constituents: metals (chromium, vanadium, thallium); semi-volatile organic compounds (SVOC) polycyclic aromatic hydrocarbons (PAHs); and dioxins/furans.

[Note: An additional 55 geotechnical borings were collected throughout the Federal Channel (December 2013) to characterize the physical parameters of the sediment to be dredged and to determine its suitability for beach nourishment applications. The results of these sampling activities will be presented in a separate report (Southern Earth Science, TBD).]

1.4 Division of Sediment Environmental Sampling Responsibility

Contracted by project lead Hatch Mott MacDonald, Cardno TEC prepared the Sediment Sample Collection Plan (11/17/13) and coordinated environmental sample project execution, including: overseeing sediment collection, processing samples in the field for shipping to and testing by the laboratory, and preparation of this report. Also contracted by Hatch Mott MacDonald, Southern Earth Science performed environmental sediment core sample collection and logging activities (as well as follow-on geotechnical studies). Subcontracted by Hatch Mott MacDonald, Preble-Rish Engineering provided field GPS, survey, and site location services. Subcontracted by Hatch Mott MacDonald,

TestAmerica Laboratory received and conducted the environmental chemical analyses of the sediment samples.

2.0 FIELD COLLECTION ACTIVITIES

Sediment sample collection activities were conducted on 22 and 23 November, 2013. Borings #58 through #66 were collected on the 22nd, duplicating #66 (labeled 66-D). Morning conditions on the 22nd were overcast with no winds and temperatures in the high 50s Fahrenheit (°F); afternoon conditions were overcast with no winds and temperatures reaching the upper 60s °F. Winds picked up to approximately 5-10 miles per hour (MPH) in the evening. Boring #44 was collected on the 23rd. Conditions were sunny with temperatures in the mid-70s °F and winds at approximately 5 MPH.

Brian Bloomfield of Southern Earth Sciences directed the sediment collection and served as the Project Engineer (PE) for the sediment sampling. Erika Fuery of Cardno TEC supervised sediment collection, led the processing of samples in the field, had chain-of-custody authority / was responsible for sample delivery to the TestAmerica laboratory courier, and served as the on-site health and safety officer. All field operations were coordinated with Tommy Pitts, Project Manager for Hatch Mott MacDonald.

2.1 Sample Collection Locations

As previously stated, sampling locations were selected using a targeted approach based on the review of previous sampling programs (USACE 2002) and recommendations from regulatory agencies (FDEP 2013). At the request of FDEP, samples were located within the channel in a zig-zag fashion to maximize channel coverage (Table 2-1, Figure 2-1).

Table 2-1: Environmental Sample Locations

Boring Number	Station Number (STA) (In 1,000 ft)	Northing (ft)	Easting (ft)	Elutriate Test Performed	Water Depth* (ft MLLW)	Core Sample Depth** (ft)
44	383	320052.5620	1688485.1320	Modified	34	3
58	483	310073.1470	1688493.1420	Modified	32.9	4
59	526	307463.9900	1691050.2620	Modified	34	3
61	606	304276.3260	1698379.5400	Modified	32	5
63	686	301065.4320	1705702.9230	Modified	27.5	10.5**
65	740	298365.2420	1710102.6110	Standard	27.5	7.5**
66	754	297145.1600	1710894.1900	Modified	29	7**
66-D	754	297145.1600	1710894.1900	Modified	29	7**

* Water depth is corrected for tide at time of sampling per NOAA predicted tide data
** Locations where core contained less than 100% return; i.e., sediment core depth was not fully recovered as recommended by Sediment Sample Collection Plan.

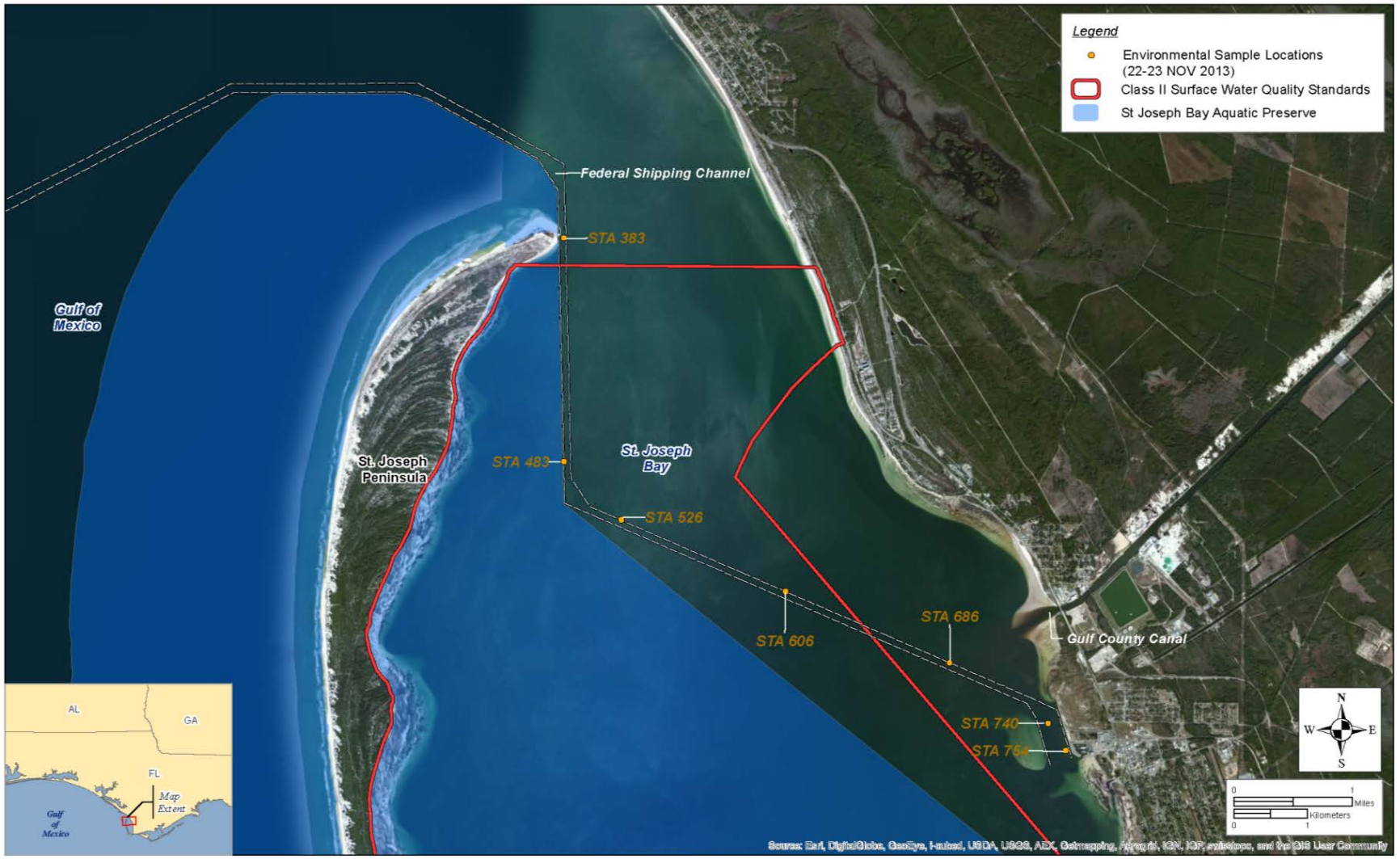


Figure 2-1: Environmental Sample Locations

2.2 Positioning

Borings were located by a Preble-Rish survey vessel equipped with a Differential Global Positioning System (DGPS) instrument utilizing federal broadcast correction signals resulting in typical accuracies of less than 1 meter. The sample collection vessel was anchored to accommodate retrieval of the sample at a locator buoy placed by the survey vessel team. Less than 25 feet was the acceptable drift from the buoy location. If refusal or sediment retention failure was encountered at the proposed boring location site, sample relocation remained within 25 feet of the planned position. All samples were taken within the boundaries of the federal channel.

Water depth was determined at each location. Depth was corrected for tide at the time of sampling using National Oceanographic and Atmospheric Administration (NOAA) predicted tide data to determine depth to sediment below MLLW and to calculate the depth of core penetration (Table 2-1).

2.3 Equipment Decontamination

All non-dedicated sampling equipment that came into contact with sediment was cleaned by washing with Alconox soap and water, followed by a distilled water rinse, and then allowed to air dry. Cross-contamination from sediment samples was avoided by collecting only sample material that was not in direct contact with sample collection equipment and by cleaning equipment between sampling stations. The sample collection apparatus was equipped with dedicated liners or scrubbed with a stiff brush and thoroughly rinsed with site water at the beginning of each day and between each sampling station.

2.4 Sediment Collection

The vessel was secured in place by an anchor located at the bow at each sampling location. The sediment samples were collected from a 30-foot pontoon vessel with a fixed boring platform by a three person crew, including two boring apparatus operators and the Southern Earth Sciences PE. All sediment samples were collected with a Specialty Devices, Inc., Vibecore unit equipped with a 4-inch outer diameter steel barrel. The Vibecore device was guided from an A-frame mounted to and through a hole in the boat platform. The barrel was driven into the sediment to the required core depth or refusal. Multiple deployments of the Vibecore at each location were necessary to collect the required volume of sediment for chemical testing.

Environmental sediment core samples were collected to the proposed dredge depths of -32 MLLW in the Turning basin and -35 feet MLLW for the North Channel, plus two additional feet in each area as a "safety factor" required by FDEP, or to the point of refusal (Table 2-1). While no overdredge will occur during actual channel dredging activities, the sediment sampling exceeded expected dredge depths to protect for potential field variability.

Once aboard the barge, a sediment Sample Log Form was completed by the PE for each core (Appendix A). Data on the log sample form included: water depth, project depth, sampling penetration depth, time and date of collection, NOAA tidal correction, estimated sample return, appearance (photos) of recovered cores, and description of each depth interval observed (consistency or density, color, texture, Unified Soil Classification System [USCS] classification, odor, moisture, presence of biota, presence of debris, presence of oily sheen, and presence/location/thickness of the redox potential discontinuity

(RPD) layer and any details pertaining to unusual events that might have occurred during the operation of the sampler). Weather and sea surface conditions and DGPS location coordinates were recorded in the PE's field log.

After Southern Earth Science finished the collection and logging activities, the Cardno TEC crew then boarded the pontoon vessel to process the sediment for environmental testing. The recovered sediment from each core was individually homogenized to a uniform consistency into one representative sample in a clean high-density polyethylene (HDPE) bucket, placed in laboratory-supplied glassware, and stored in iced coolers on the Preble-Rish survey vessel until shipment by courier to the laboratory at the end of each field day. After receipt by the lab, the collected sediment was maintained in refrigeration at 4 degrees Celsius (°C). All non-dedicated sample processing equipment was decontaminated between samples. Sample custody was maintained and documented throughout the process of collection, shipping, analysis, and, ultimately, the disposal of the sample.

2.5 Site Water Sample Collection

Site water was collected using a peristaltic pump at the same seven locations as the environmental sediment samples. Since the planned dredging is to occur using a hydraulic cutterhead dredge with sediment resuspension occurring predominantly near the sediment surface, the water sample was collected from near-bottom water (approximately 3 feet above the bottom). The water was collected and placed in laboratory supplied low-density polyethylene (LDPE) containers. Each container was stored in the dark in an iced cooler until receipt by the laboratory each evening, at which time the samples were stored in refrigeration until chemical analyses were performed. Sample custody was maintained and documented throughout the process of collection, shipping, analysis, and, ultimately, the disposal of the sample.

3.0 ANALYTICAL TESTS/METHODOLGY

TestAmerica laboratory in Tallahassee, Florida, received the seven sediment and water samples (plus one field duplicate) and subsequently sent them to their Pittsburgh, PA and Knoxville, TN laboratories to perform the required analyses. Analyses included bulk sediment chemistry for all seven samples, one standard elutriate test, and six modified elutriate tests. All samples were tested for the following constituents: metals (chromium, vanadium, thallium), SVOC/PAHs, and dioxins/furans. Table 3-1 describes the analytical program and required methodology for the recovered sediment samples.

Table 3-1: Environmental Sediment Tests and Methodology

Test Description	Method	Matrix
Chromium, Vanadium only	6010C (3050B)	Sediment
Thallium only	6020A (3050B)	Sediment
Chromium, Vanadium only	6010C (3005A)	Water
Thallium only	6020A (3005A)	Water
PAH by GC/MS LL	8270D LL (3541)	Sediment
PAH by GC/MS -LL	8270D LL (3520C)	Water
Dioxins/Furans 17 isomers	8290	Sediment & Water
Organic Carbon, Total (TOC)	Lloyd Kahn	Sediment
TOC - Duplicate	SM 5310C	Water
Organic Carbon, Dissolved (DOC)	SM 5310C (Filtration)	Water
Percent Moisture	2540G	Sediment
Water (Moisture) Content	D2216-90	Sediment
Grain Size % Passing Routine List	D422	Sediment
Grain Size Classification in %	D422	Sediment

4.0 RESULTS

4.1 Summary of Sediment Physical Characteristics

The USCS designation was assigned by the PE during the Southern Earth Science geotechnical analysis. The homogenized environmental samples were analyzed in the TestAmerica laboratories for percent grain size (Table 4-1). Six boring (#66 through #58) locations where the environmental samples were obtained are identified as organic (O) with high plasticity (H), meaning the soils in the harbor area are generally fine grain soils composed of black organic clay/organic silt (Southern Earth Science 2013). The sediment at Boring #44 (up near the tip of St. Joseph Peninsula) is predominantly fine sand, later classified as poorly graded (uniform particle size), silty sand with less than 12% fines (SP-SM) (Southern Earth Science 2014).

Table 4-1: Sediment Physical Characteristics

Boring Number	Grain Size (percent)						USCS Classification
	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	
44	0.1	0.1	10.0	84.2	2.0	3.6	SP-SM
58	0.0	7.2	4.2	28	46.2	14.4	OH
59	0.0	0.0	0.5	4.4	56.4	38.7	OH
61	0.0	0.0	2.9	6.7	55.4	35.0	OH
63	0.0	0.0	1.1	2.1	58.8	38.0	OH
65	0.0	0.0	0.6	4.7	52.0	42.7	OH
66	0.0	0.0	0.5	8.9	48.3	42.3	OH
66-D	0.0	0.0	0.6	7.8	48.2	43.4	OH

4.2 Sediment Chemistry

Bulk sediment chemistry results (Table 4-2); modified elutriate test results, total (Table 4-3); modified elutriate test results, dissolved (Table 4-4); and standard elutriate test results, dissolved (Table 4-5) are shown below. Tests for which no analyte was detectable within each sample are listed below each table.

For all tests, each of the seven samples is compared to both FDEP and NOAA standards, but results are generally shaded in accordance with FDEP regulatory requirements (Chapter 62-777, F.A.C. April 17, 2005; FDEP-62-777 Marine Surface Water Criteria 17 April 2005; and Chapter 62-302.530, F.A.C. August 1, 2013). Analytes that were detectable but did not exceed FDEP standards are colored green. No samples exceeded FDEP standards. Sample results are also compared to the NOAA Sediment Quality Guidelines (SQG) to understand the effects the sediments may currently be having in the harbor area (Buchman 2008). It should be noted that NOAA SQG are not promulgated as regulatory criteria or standards, nor are they intended to be used as cleanup or remediation targets; discharge attainment targets; as pass-fail criteria for dredged material disposal decisions; or any other regulatory purpose. Rather, they were intended as informal (non-regulatory) guidelines for use in interpreting chemical data from analyses of sediments and may be useful in performing environmental analysis of short-term effects of future dredging activities in the marine environment. Some of the NOAA SQG are taken from Canadian Environmental Quality Guidelines (CCME 2013), Australian and New Zealand Environment and Conservation Council (ANZECC) Water Quality Guidelines (New Zealand Ministry for the Environment 2000), or the Water Quality Guidelines for British Columbia (Nagpah, et. al 2006). One analyte slightly exceeded the NOAA standard and is noted in beige.

For bulk sediment chemistry, detected sediment concentrations are compared to FDEP direct exposure criteria (DEC) cleanup standards for soils in industrial/commercial (ind/comm) areas (Chapter 62-777, F.A.C. April 17, 2005) (Table 4-2). The FDEP Soil Cleanup standards are used because the dredged material not suitable for beach nourishment is intended to be placed in the upland environment. For the NOAA SQG, effects range low (ERL) represent concentrations below which effects were rarely observed, and effects range median (ERM) values represent concentrations above which effects frequently occur.

For the elutriate tests, detected concentrations were compared to FDEP Marine standards (FDEP-62-777 Marine Surface Water Criteria 17 April 2005) as well as standards for FDEP Surface Water Criteria (SWC) for Class 2 and Class 3 waterbodies (Chapter 62-302.530, F.A.C. August 1, 2013) (Tables 4-3, 4-4, 4-5). The Class 3 water quality standards would apply for those locations that are within an arc that surrounds the opening of the Gulf Coast Canal into St. Joseph's Bay (See Figure 2-1). This area is specifically excluded by Chapter 62-302 from designation as Class II waters. NOAA standards were compared for both acute and chronic exposure thresholds (Buchman 2008).

(This page intentionally left blank)

Table 4-2: Sediment Bulk Chemistry Results

Station Boring Number	STA-754D #66D		STA-754 #66		STA-740 #65		STA-686 #63		STA-606 #61		STA-526 #59		STA-483 #58		STA-383 #44		Standards		
																	NOAA SQG[1]		FDEP DEC[2]
Sample Result | Qualifier	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	ERL	ERM	Soil Ind/Comm Mg/kg
Metals (ug/kg)																			
Chromium	38	B	29	B	42	B	49	B	51	B	47	B	21	B	1.3	B	81 mg/kg (81,000 ug/kg)	370 mg/kg (370,000 ug/kg)	470 (470,000 ug/kg)
Vanadium	45		37		58		56		52		50		24		1.6	J	NE	NE	10,000 (10,000,000 ug/kg)
Thallium	0.34		0.28		0.40		0.39		0.29		0.27		0.17		0.014	J	NE	NE	150 (150,000 ug/kg)
PAHs (ug/kg)																			
Anthracene	8.8	J	6.4	J	ND		ND		2.5	J	ND		ND		ND		85.3 ug/kg	1,100 ug/kg	300,000 (300,000,000 ug/kg)
Benz(a)anthracene	28	J	22	J	21	J	15	J	ND		3.5	J	ND		ND		261 ug/kg	1,600 ug/kg	6.6 (6,600 ug/kg)
Benzo(b)fluoranthene	33	J	33	J	28	J	21	J	ND		ND		ND		ND		NE	NE	6.7 (6,700 ug/kg)
Benzo(k)fluoranthene	16	J	9.7	J	13	J	ND		ND		ND		ND		ND		NE	NE	66 (66,000 ug/kg)
Benzo(ghi)perylene	19	J	16	J	16	J	ND		ND		ND		ND		ND		NE	NE	52,000 (52,000,000 ug/kg)
Benzo(a)pyrene	23	J	22	J	20	J	ND		ND		ND		ND		ND		430 ug/kg	1,600 ug/kg	0.7 (700 ug/kg)
Chrysene	32	J	25	J	20	J	13	J	ND		3.3	J	ND		ND		384 ug/kg	2,800 ug/kg	640 (640,000 ug/kg)
Fluoranthene	50	J	34	J	28	J	21	J	7.6	J	5.2	J	1.9	J	ND		600 ug/kg	5,100 ug/kg	59,000 (59,000,000 ug/kg)
Indeno(1,2,3-cd)Pyrene	15	J	12	J	12	J	ND		ND		ND		ND		ND		NE	NE	6.6 (6,600 ug/kg)
Phenanthrene	18	J	13	J	12	J	11	J	5.7	J	4.0	J	ND		ND		240 ug/kg	1,500 ug/kg	36,000 (36,000,000 ug/kg)
Pyrene	42	J	33	J	31	J	22	J	7.7	J	5.8	J	2.2	J	ND		665 ug/kg	2,600 ug/kg	45,000 (45,000,000 ug/kg)
Naphthalene	11	J	7.9	J	10	J	9.9	J	4.5	J	3.6	J	ND		ND		160 ug/kg	2,100 ug/kg	300 (300,000 ug/kg)
Dissolved Organic Carbon (mg/kg)																			
DOC	56,000		44,000		60,000		56,000		39,000		40,000		17,000		2,200		NE	NE	NE
Dioxin/Furan (pg/kg)																			
2,3,7,8-TCDD	0.77	Q J	ND		ND		ND		ND		ND		ND		ND		0.0215 ug/kg (PEL) (21.5 pg/kg)		NE
1,2,3,7,8-PeCDD	2.2	Q J	2.3	Q J	2.1	Q J	2.7	Q J	2.4	J	2.3	J	0.66	Q J	ND		NE	NE	NE
1,2,3,4,7,8-HxCDD	3.4	J	3.2	Q J	3.7	J	4.0	J	4.0	J	3.6	Q J	1.5	J	ND		NE	NE	NE
1,2,3,6,7,8-HxCDD	8.7		8.1	J	7.8	J	8.4	J	6.6	J	8.3	J	2.6	J	ND		NE	NE	NE
1,2,3,7,8,9-HxCDD	14	C	15	C	16	C	17	C	13	C	17	C	6.3		0.39	Q J	NE	NE	NE
1,2,3,4,6,7,8-HpCDD	160	B	150	B	160	B	160	B	110	B	170	B	62	B	4.8	B J	NE	NE	NE
OCDD	1700	B	1600	B	1900	B	1600	B	890	B	1700	B	620	B	53	B	NE	NE	NE
2,3,7,8-TCDF	3.9	Q X	4.1	Q	2.5	X	1.9	Q J	1.0	J	0.89	Q J	0.30	Q J	ND		NE	NE	NE
1,2,3,7,8-PeCDF	0.66	Q J	0.72	Q J	ND		0.63	Q J	ND		ND		ND		ND		NE	NE	NE
2,3,4,7,8-PeCDF	1.1	J	1.5	J	0.89	J	0.79	Q J	ND		0.70	J	ND		ND		NE	NE	NE
1,2,3,4,7,8-HxCDF	1.1	J	0.95	Q J	1.5	J	1.1	J	0.83	J	0.53	Q J	0.25	Q J	ND		NE	NE	NE
1,2,3,6,7,8-HxCDF	1.9	J	1.7	J	1.8	J	1.5	J	0.82	J	0.65	Q J	ND		ND		NE	NE	NE
2,3,4,6,7,8-HxCDF	1.2	Q J	1.3	J	1.4	J	0.95	Q J	0.65	J	0.33	Q J	0.13	Q J	ND		NE	NE	NE
1,2,3,4,6,7,8-HpCDF	36		33		37		25		8.7	J	7.4	J	1.6	Q J	0.15	J	NE	NE	NE
1,2,3,4,7,8,9-HpCDF	0.95	Q J	ND		ND		ND		ND		ND		ND		ND		NE	NE	NE
OCDF	17	B	14	B J	10	B J	9.1	B J	2.8	B J	3.8	B J	1.2	B J	0.26	B J	NE	NE	NE
Dioxins, as total 2,3,7,8-TCDD equivalents	9.1142		8.4924		8.176		8.62241		6.36628		7.74238		2.46612		0.093826		NE	NE	0.00003 (30 pg/kg)

J Estimated result. Result is less than the reporting limit.
B Method blank contamination. The associated method blank contains the target analyte at a reportable level.
S Ion suppression.
Q Estimated maximum possible concentration (EMPC).
C Value for chemical class
Below threshold for FDEP standard
ND Not Detectable
NE Not Established
1 Buchman 2008
2 Chapter 62-777, F.A.C. April 17, 2005

Tests that concluded no analyte detectable within each sample include: Dibenz(a,h)anthracene; Fluorene; Acenaphthene; Acenaphthylene; and 1,2,3,7,8,9-HxCDF.

(This page intentionally left blank)

Table 4-3: Modified Elutriate Test Results, Total

Station Boring Number	STA-754D #66D		STA-745 #66		STA-686 #63		STA-606 #61		STA-526 #59		STA-483 #58		STA-383 #44		Standards			
															NOAA[1]		FDEP[3] Marine	FDEP Class II/III[4]
Sample Result | Qualifier	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	ACUTE ug/L	CHRONIC ug/L	SWC ug/L	SWC ug/L
Metals (ug/L)																		
Chromium	3.5	J	ND		ND		ND		ND		2.9	J	ND		NE	NE	50	50
Vanadium	84	J	82	J	67	J	83	J	37	J	31	J	ND		NE	50 (BC)	NE	NE
Thallium	ND		ND		ND		0.26	J	0.82	J	ND		ND		2,130*	17 (NZ)	NE	6.3
PAHs (ug/L)																		
Anthracene	0.036	J	ND		ND		0.031	J	0.025	J	0.034	J	0.020	J	300*C	NE	0.3	110
Fluorene	ND		ND		0.033	J	0.031	J	0.027	J	0.033	J	ND		300*C	NE	30	14
Phenanthrene	0.15	J	ND		0.10	J	0.13	J	0.13	J	0.14	J	0.10	J	7.7 P	4.6 P	NE	NE
Naphthalene	ND		0.046	J	0.089	J	0.047	J	0.070	J	0.082	J	ND		2,350*	1.4 (CA)	26	NE
Dissolved Organic Carbon (mg/L)																		
DOC	6.8		5.7		5.7		2.0		1.0		0.70	J	0.72	J	NE	NE	NE	NE
Dioxin/Furan (pg/L)																		
1,2,3,4,6,7,8-HpCDD	6.1	J	3.1	J	5.8	J	ND		2.6	Q J	ND		0.66	Q J	NE	NE	NE	NE
OCDD	130	B	69	B J	120	B	18	S B J	69	B J	21	S B J	24	B J	NE	NE	NE	NE
1,2,3,4,6,7,8-HpCDF	1.4	Q J	ND		ND		ND		ND		ND		ND		NE	NE	NE	NE
OCDF	ND		ND		ND		ND		ND		1.5	Q B J	ND		NE	NE	NE	NE

J Estimated result. Result is less than the reporting limit.
B Method blank contamination. The associated method blank contains the target analyte at a reportable level.
S Ion suppression.
Q Estimated maximum possible concentration (EMPC).
Below threshold for FDEP standard
Slightly exceeds NOAA standard
ND Not Detectable
NE Not Established
* Environmental Protection Agency (EPA) Lowest Observable Effect Level (LOEL)
BC British Columbia Water Quality Guidelines (either working or recommended) (Nagpah et al. 2006)
NZ ANZECC Water Quality Guidelines (New Zealand 2000)
CA Canadian Water Quality Guidelines (CCME 2013)

Tests that concluded no analyte detectable within each sample include: Benz(a)anthracene; Benzo(b)fluoranthene; Benzo(k)fluoranthene; Benzo(ghi)perylene; Benzo(a)pyrene; Chrysene; Dibenz(a,h)anthracene; Fluoranthene; Indeno(1,2,3-cd)Pyrene; Pyrene; Acenaphthene; Acenaphthylene; 2,3,7,8-TCDD; 1,2,3,7,8-PeCDD; 1,2,3,4,7,8-HxCDD; 1,2,3,6,7,8-HxCDD; 1,2,3,7,8,9-HxCDD; 2,3,7,8-TCDF; 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8-HxCDF; 2,3,4,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDF; and 1,2,3,4,7,8,9-HpCDF.

C Value for chemical class
P PROPOSED
1 Buchman 2008

3 FLDEP-62-777_Marine Surface Water Criteria-17 April 2005
4 Chapter 62-302.530, F.A.C. August 1, 2013

(This page intentionally left blank)

Table 4-4: Modified Elutriate Test Results, Dissolved

Station Boring Number	STA-754D #66D		STA-745 #66		STA-686 #63		STA-606 #61		STA-526 #59		STA-483 #58		STA-383 #44		Standards			
															NOAA[1]		FDEP[3] Marine	FDEP Class II/III[4]
Sample Result | Qualifier	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	ACUTE ug/L	CHRONIC ug/L	SWC ug/L	SWC ug/L
Metals (ug/L)																		
Chromium	ND		ND		5.4	J	ND		ND		ND		ND		NE	NE	50	50
Vanadium	26	J	52	J	32	J	63		22	J	30	J	ND		NE	50 (BC)	NE	NE
PAHs (ug/L)																		
Anthracene	ND		ND		ND		ND		ND		0.015	J	0.023	J	300*C	NE	0.3	110
Fluorene	ND		ND		ND		ND		ND		0.021	J	0.026	J	300*C	NE	30	14
Phenanthrene	ND		ND		ND		ND		ND		0.086	J	0.11	J	7.7 P	4.6 P	NE	NE
Naphthalene	ND		ND		ND		ND		ND		0.063	J	0.034	J	2,350*	1.4 (CA)	26	NE
Dissolved Organic Carbon (mg/L)																		
DOC	8.1		7.1		7.2		3.1		2.6		1.4		0.74	J	NE	NE	NE	NE
Dioxin/Furans (pg/L)																		
1,2,3,7,8,9-HxCDD	1.6	Q J	ND		ND		ND		ND		ND		ND		NE	NE	NE	NE
1,2,3,4,6,7,8-HpCDD	29	J	30	J	26	J	7.5	J	3.2	J	ND		ND		NE	NE	NE	NE
OCDD	460	B	470	S B	340	S B	100	S B J	58	B J	20	Q B J	25	B J	NE	NE	NE	NE
1,2,3,4,6,7,8-HpCDF	7.2	Q J	9.2	J	3.7	J	ND		ND		ND		ND		NE	NE	NE	NE
OCDF	3.9	Q B J	5.3	B J	2.9	B J	ND		ND		ND		ND		NE	NE	NE	NE

J Estimated result. Result is less than the reporting limit.
B Method blank contamination. The associated method blank contains the target analyte at a reportable level.
S Ion suppression.
Q Estimated maximum possible concentration (EMPC).
Below threshold for FDEP standard
Slightly exceeds NOAA standard
ND Not Detectable
NE Not Established
* Environmental Protection Agency (EPA) Lowest Observable Effect Level (LOEL)
BC British Columbia Water Quality Guidelines (either working or recommended) (Nagpah et al. 2006)
CA Canadian Water Quality Guidelines (CCME 2013)
P PROPOSED
C Value for chemical class

Tests that concluded no analyte detectable within each sample include: Thallium; Benz(a)anthracene; Benzo(b)fluoranthene; Benzo(k)fluoranthene; Benzo(ghi)perylene; Benzo(a)pyrene; Chrysene; Dibenz(a,h)anthracene; Fluoranthene; Indeno(1,2,3-cd)Pyrene; Pyrene; Acenaphthene; Acenaphthylene; 2,3,7,8-TCDD ; 1,2,3,7,8-PeCDD; 1,2,3,4,7,8-HxCDD; 1,2,3,6,7,8-HxCDD; 2,3,7,8-TCDF; 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF; 2,3,4,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDF; 1,2,3,4,7,8,9-HpCDF

1 Buchman 2008
3 FLDEP-62-777_Marine Surface Water Criteria-17 April 2005
4 Chapter 62-302.530, F.A.C. August 1, 2013

(This page intentionally left blank)

Table 4-5: Standard Elutriate Test Results, Dissolved

Station Boring Number	STA-740 #65		Standards			
			NOAA		FDEP Marine[3]	FEDEP Class II/III[4]
Sample Result | Qualifier	Result	Q	SWC ug/L	SWC ug/L	SWC ug/L	SWC ug/L
Metals (ug/kg)						
Vanadium	22	J	NE	50 (BC)	NE	NE
PAHs (ug/kg)						
Benz(a)anthracene	0.050	J	300*C	NE	NE	NE
Benzo(b)fluoranthene	0.077	J	300*C	NE	NE	NE
Benzo(k)fluoranthene	0.068	J	300*C	NE	NE	NE
Benzo(ghi)perylene	0.071	J	300*C	NE	NE	NE
Benzo(a)pyrene	0.029	J	300*C	NE	NE	NE
Chrysene	0.079	J	300*C	NE	NE	NE
Dibenz(a,h)anthracene	0.071	J	300*C	NE	NE	NE
Indeno(1,2,3-cd)Pyrene	0.064	J	300*C	NE	NE	NE
Dissolved Organic Carbon (mg/L)						
DOC	4.2		NE	NE	NE	NE
Dioxin/Furans (pg/L)						
1,2,3,4,6,7,8-HpCDD	18	J	NE	NE	NE	NE
OCDD	300	S B	NE	NE	NE	NE
1,2,3,4,6,7,8-HpCDF	4.1	J	NE	NE	NE	NE
OCDF	2.9	B J	NE	NE	NE	NE

J Estimated result. Result is less than the reporting limit.
B Method blank contamination. The associated method blank contains the target analyte at a reportable level.
S Ion suppression.
Q Estimated maximum possible concentration (EMPC).
Below threshold for FDEP standard
ND Not Detectable
NE Not Established
* Environmental Protection Agency (EPA) Lowest Observable Effect Level (LOEL)
BC British Columbia Water Quality Guidelines (either working or recommended) (Nagpah et al. 2006)
C Value for chemical class
1 Buchman 2008
3 FLDEP-62-777_Marine Surface Water Criteria-17 April 2005
4 Chapter 62-302.530, F.A.C. August 1, 2013
Tests that concluded no analyte detectable within each sample include: Chromium; Thallium; Anthracene; Fluoranthene; Fluorene; Phenanthrene; Pyrene; Acenaphthene; Acenaphthylene; Naphthalene; 2,3,7,8-TCDD; 1,2,3,7,8-PeCDD; 1,2,3,4,7,8-HxCDD; 1,2,3,6,7,8-HxCDD; 1,2,3,7,8,9-HxCDD; 2,3,7,8-TCDF; 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8-HxCDF; 2,3,4,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDF; 1,2,3,4,7,8,9-HpCDF

5.0 CONCLUSIONS

The chemistry results demonstrate that metals, dioxin/furans, and PAHs are present in the sediment of Port St. Joe harbor; however, all analytes were within applicable FDEP regulatory criteria for all samples. Per NOAA ERL standards, the sediment within Port St. Joe harbor in proximity to the outlet of the Gulf County Canal, Turning Basin, and Port St. Joe Marina is slightly contaminated with metals (vanadium), indicating that it has the potential to have environmental effects in the marine environment. However, the sediment is within the FDEP regulatory clean up criteria for industrial/commercial soils.

The dredging of these sediments and use for fill in industrial/commercial applications may improve the marine habitat quality as the slightly chemically enriched sediment is removed to the upland environment.

6.0 REFERENCES

Buchman, M. F. 2008. NOAA Screening Quick Reference Tables, NOAA OR&R Report 08-1, Seattle, WA Office of Response and Restoration Division, National Oceanic and Atmospheric Administration. Accessed on 06 Jan 2014 at: http://response.restoration.noaa.gov/environmental-restoration/environmental-assessment-tools/squirt-cards.html

Canadian Ministry for the Environment (CCME). 2013. Canadian Environmental Quality Guidelines. Accessed on 06 Jan 2014 at: http://ceqg-rcqe.ccme.ca/

Cardno TEC. 2013. Final Sediment Sample Collection Plan for Maintenance Dredging of the Federal Channel and Turning Basin, Port of Port St. Joe, Florida. 17 November.

Florida Department of Environmental Protection (FDEP). 2013. Memorandum for the Port of Port St. Joe: Sampling Guidance. September 05.

Nagpah, N. K., L.W Pommen, and L. G. Swain. 2006. A Compendium of Working Water Quality Guidelines for British Columbia. August. http://www.env.gov.bc.ca/wat/wq/

New Zealand Ministry for the Environment. 2000. Australian and New Zealand Environment and Conservation Council (ANZECC) Water Quality Guidelines. Accessed on 06 Jan 2014 at: http://www.mfe.govt.nz/publications/water/anzecc-water-quality-guide-02/anzecc-water-quality-guide-02-pdfs.htmlNOAA 2000.

Port St. Joe Port Authority. 2013. Port St. Joe Master Plan 2013, Port St. Joe, Florida. May.

Southern Earth Science. 2014 - *IN PROCESS*. Port St. Joe Federal Channel Geotechnical Sampling Report.

_____. 2013. Laboratory Summary. 11 December.

_____. 2014. Laboratory Summary. 05 January.

U.S. Army Corps of Engineers (USACE). 2002. Evaluation of Dredged Material from Port St. Joe Harbor, Gulf County, Florida. July.

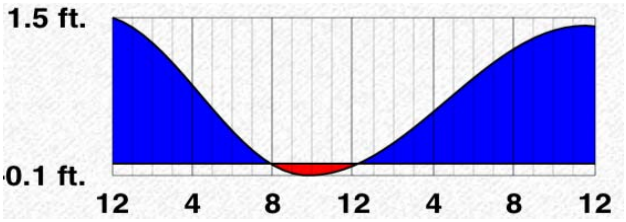
(This page intentionally left blank)

APPENDIX A
SEDIMENT LOGS

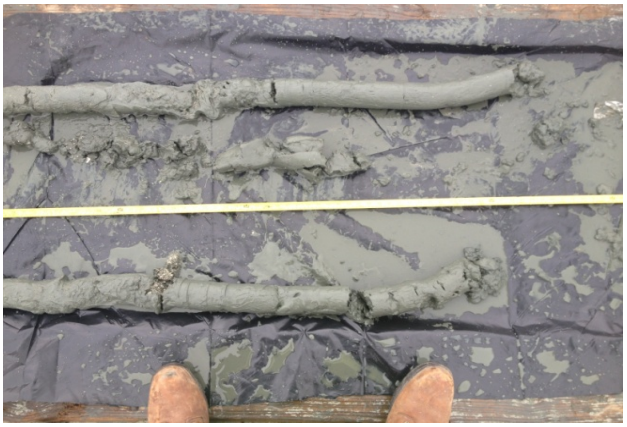
(This page intentionally left blank)

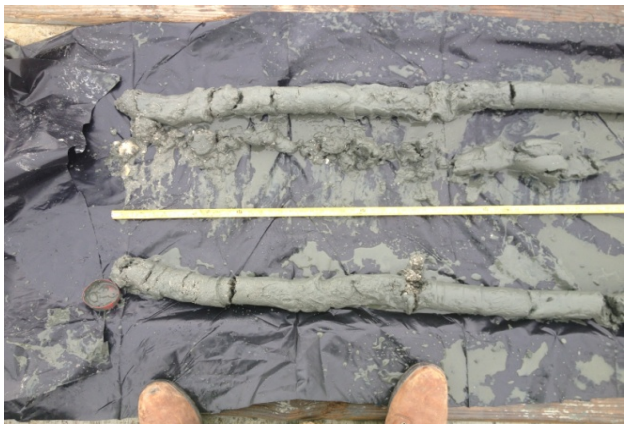
SUMMARY OF BORING B-58

Est. Water Depth: 33ft.
Project Depth: 35ft.
Depth of Sample: 4ft.
Date of Sampling: 11/22/13
Est. Time of Sampling: 10AM
Est. Tide: -0.1ft.
Est. % Return: 100



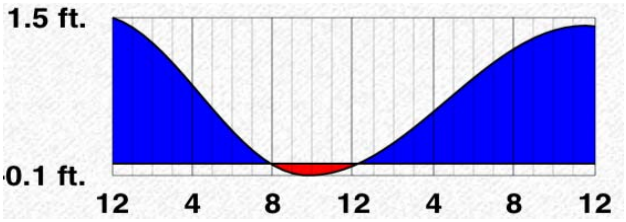
Sample Depth:	USCS:	Description:	SOIL COLOR:	SOIL COLOR AFTER WASHING OVER 200 SIEVE:
0-2.5ft.	OH	Organic CLAY with Shell	10YR 2/1 (Black)	---
2.5-6ft.	SC	Gray Clayey Fine SAND with Shell	10YR 4/1 (Dark Gray)	---





SUMMARY OF BORING B-59

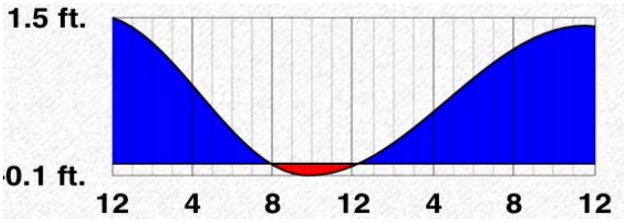
Est. Water Depth: 34ft.
Project Depth: 35ft.
Depth of Sample: 3ft.
Date of Sampling: 11/22/13
Est. Time of Sampling: 11:30AM
Est. Tide: +0ft.
Est. % Return: 100



Sample Depth:	USCS:	Description:	SOIL COLOR:	SOIL COLOR AFTER WASHING OVER 200 SIEVE:
0-3ft.	OH	Organic CLAY with Shell	10YR 2/1 (Black)	---

SUMMARY OF BORING B-61

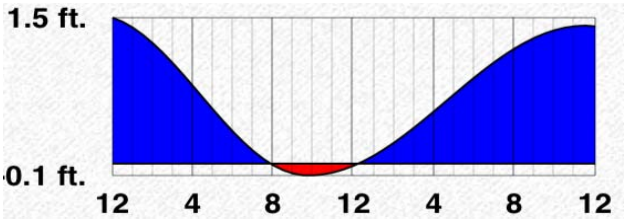
Est. Water Depth: 32ft.
Project Depth: 35ft.
Depth of Sample: 5ft.
Date of Sampling: 11/22/13
Est. Time of Sampling: 1PM
Est. Tide: +0ft.
Est. % Return: 100



Sample Depth:	USCS:	Description:	SOIL COLOR:	SOIL COLOR AFTER WASHING OVER 200 SIEVE:
0-6ft.	OH	Organic CLAY with Shell	7.5YR 2.5/1 (Black)	---

SUMMARY OF BORING B-63

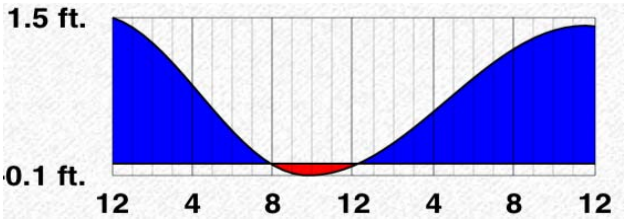
Est. Water Depth: 27ft.
Project Depth: 35ft.
Depth of Sample: 10.5ft.
Date of Sampling: 11/22/13
Est. Time of Sampling: 2PM
Est. Tide: +0.5ft.
Est. % Return: 76



Sample Depth:	USCS:	Description:	SOIL COLOR:	SOIL COLOR AFTER WASHING OVER 200 SIEVE:
0-1ft.	OH	Organic CLAY with Shell	10YR 2/1 (Black)	---
1-8ft.	OH	Organic CLAY with Shell	7.5YR 2.5/1 (Black)	---

SUMMARY OF BORING B-65

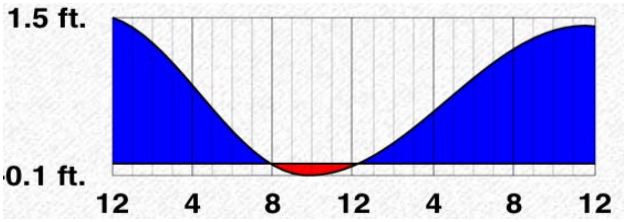
Est. Water Depth: 27ft.
Project Depth: 32ft.
Depth of Sample: 7.5ft.
Date of Sampling: 11/22/13
Est. Time of Sampling: 3PM
Est. Tide: +0.5ft.
Est. % Return: 53



Sample Depth:	USCS:	Description:	SOIL COLOR:	SOIL COLOR AFTER WASHING OVER 200 SIEVE:
0-4ft.	OH	Organic CLAY with Shell	10YR 2/1 (Black)	---

SUMMARY OF BORING B-66

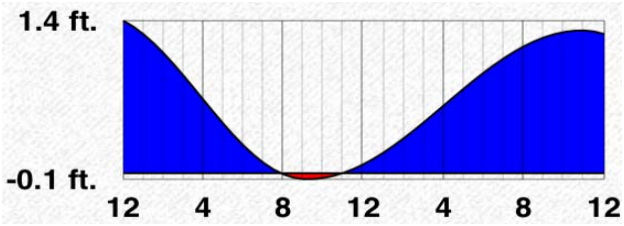
Est. Water Depth: 28ft.
Project Depth: 32ft.
Depth of Sample: 7ft.
Date of Sampling: 11/22/13
Est. Time of Sampling: 4:30PM
Est. Tide: +1ft.
Est. % Return: 93



Sample Depth:	USCS:	Description:	SOIL COLOR:	SOIL COLOR AFTER WASHING OVER 200 SIEVE:
0-6.5ft.	OH	Organic CLAY with Shell	10YR 2/1 (Black)	---

SUMMARY OF BORING B-44

Est. Water Depth: 34ft.
Project Depth: 35ft.
Depth of Sample: 3ft.
Date of Sampling: 11/23/13
Est. Time of Sampling: 10AM
Est. Tide: +0ft.
Est. % Return: 100



Sample Depth:	USCS:	Description:	SOIL COLOR:	SOIL COLOR AFTER WASHING OVER 200 SIEVE:
0-3ft.	SP-SM	Slightly Silty Fine SAND with Shell	10YR 5/3 (Brown)	---