WATER QUALITY IMPROVEMENT TECHNOLOGY

EVALUATION REPORT FOR

CANAL #278 EDEN PINES

BIG PINE KEY, MONROE COUNTY, FLORIDA



PREPARED FOR:

MONROE COUNTY

PREPARED BY:

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1.0 EXECUTIVE SUMMARY

The Water Quality Protection Program (WQPP) Action Plan of the Florida Keys National Marine Sanctuary identified impaired water quality in residential canals as a priority for corrective action. Monroe County initiated the Canal Restoration Demonstration Program (Demo Program) to evaluate the effectiveness and feasibility of implementing restoration technologies that were evaluated for Phase II of the Canal Management Master Plan (CMMP). Canal 278 in Eden Pines was selected to evaluate the effectiveness of water recirculation using an electrically powered pumping system to improve water quality. Due to homeowners concerns with operation and maintenance cost of the pumping system and site access issues, the project was placed on hold so that other technologies could be evaluated.

Site characterization efforts were completed to determine the water quality impairments of the canal, and to support the evaluation of technologies for water quality improvement. Site characterization consisted of collecting sediment cores, completing a tidal study, and collecting dissolved oxygen measurements. The sediment cores indicate that degraded organic material is present to the north and west of the Watson Blvd Bridge in a layer approximately 0.3 feet, and that the sediment to north and east of the Watson Blvd Bridge exhibits little organic material and is primarily granular. The tidal study indicates that a dampening of the tide is not occurring significantly in the canal system. The dissolved oxygen measurements indicate that the upper portion of the water column to the north and west of the Watson Blvd Bridge is likely below the state standards, and that the dissolved oxygen concentration in the lower portion of the water column is below the state standards throughout the canal system.

The evaluation ranked the feasible technologies by effectiveness, ease to implement, ease of permitting, property owner disruption, time, and cost. The evaluation considered the following technologies:

1) Injection wells
2) Pump-in recirculation system
3) Culvert installed via directional drilling and/or trenching
4) Bio-augmented aeration
5) Organic sediment removal

The evaluation determined that the most efficient technology to improve water quality in the canal system is injection wells. In summary the injection wells will function like a flushing culvert, and will allow the incoming tide to flush the stagnant portions of the canal. However, an injection well will require less construction effort than a flushing culvert, given the canal configuration. It is estimated that a single injection well that is constructed of a 24" diameter casing to 60 feet below land surface with an open hole interval from 60 feet to 120 feet below land surface can flush approximately 1,600 gallons per minute (gpm) at high tide using only gravity. It is estimated that a single gravity injection well will cost approximately $45,000 for installation, and will require minimal maintenance. Given the high infiltration rate that can be achieved by a single injection well, Amec Foster Wheeler proposes that injection wells be installed in a sequential fashion so that injection rates and functionality can be evaluated prior to full scale implementation. Full scale implementation of the injection wells is likely to consist of six injection wells installed at each canal finger north of Violet Drive.

2.0 INTRODUCTION

2.1 BACKGROUND

The Water Quality Protection Program (WQPP) Action Plan of the Florida Keys National Marine Sanctuary (FKNMS) identified impaired water quality in residential canals as a priority for corrective action. An inventory and ranking of the residential canals in Monroe County has been incorporated into a Demo Program to initiate water quality improvements in the residential canals and to evaluate the effectiveness and ease of implementation of the technologies selected for water quality improvement. The Demo Program included seven canals, with each canal selected to demonstrate a different technology or combination of technologies. The technologies included the following:

1) Air Curtain
2) Organic Removal
3) Culvert Installation
4) Pumping
5) Backfilling

The Canal #278 Eden Pines located in Big Pine Key, Florida was selected as one of seven original canals for the Monroe County Demo Program. The canal was selected for the implementation of a circulation pump to improve dissolved oxygen within the canal system. A conceptual design plan was prepared and homeowner interest letters were sent to the property owners adjacent to the canal system. After the residents reviewed the project, they had concerns with operation and maintenance cost and site access issues, and the project was placed on hold so that other technologies could be evaluated.

2.2 SCOPE OF WORK

The County requested Amec Foster Wheeler to evaluate various water quality improvement technologies to identify the best available technology to improve water quality in the canal system. The evaluated technologies were ranked based on implementation cost, operation and maintenance cost, effectiveness, ease of permitting, and ease of implementation.

2.3 OBJECTIVES

This report presents the evaluation of various water quality improvement technologies for Canal 278 Eden Pines. In order to determine cost and effectiveness of the evaluated technologies, the following information was collected:

1) Sediment Physical and Chemical Characteristics
2) Site Constraints
3) Tidal Conditions
4) Dissolved Oxygen Concentrations

The site characterization data is the basis for the ranking criteria matrix for the following technologies:

1) Injection wells
2) Pump-in recirculation system
3) Culvert installed via directional drilling and/or trenching
4) Bio-augmented aeration
5) Organic sediment removal

3.0 SEDIMENT CHARACTERIZATION

3.1 SAMPLE LOCATIONS

Thirty-four (34) sediment samples were collected to characterize the sediment composition in the canal system. From the thirty-four (34) sediment samples, one (1) representative sediment sample was submitted for physical characterization and six (6) representative sediment samples were submitted for chemical characterization to identify the effect of sediment quality on water quality in the canal system and to assist in estimating the cost for removal and disposal of the material from the canal. The samples were taken throughout the canal to document the muck sediment thickness, **Figure 1**.

Figure 1 - Sediment Core Locations

3.2 SAMPLING METHODOLOGY

The sediment cores were collected in clear plastic core-tube liner inserted inside the sampler to allow retrieval of the sediment for chemical and physical analysis. Upon withdrawal from the water surface, the top and bottom of the liner were capped and labeled. New liners were

used at each sample location. Once on shore, the cores to be submitted for chemical analysis were extracted using a clean stainless steel spoon and transferred to a clean stainless steel bowl for homogenizing (compositing). The general texture, color, odor, and composition were observed and recorded by depth as measured from the top of the core on a soil boring log. **Appendix A** provides a description of the observed sediment type along with photos of the sediment cores.

Homogenized sediment from the stainless steel bowl was placed in laboratory supplied sample containers. The sample containers were labeled and preserved with wet ice. The sample containers were delivered to a TestAmerica Laboratory under proper chain-of-custody for transportation to the Tampa laboratory.

3.3 LABORATORY TEST METHODS

3.3.1 Physical Test Methods

The physical tests performed at TestAmerica Laboratory in Tampa, Florida included the following methods:

1) Grain size analysis was determined using ASTM D422, Standard Test Method for Particle-Size Analysis of Soils, and D1140, Standard Test Methods for Amount of Material in Soils Finer Than the No. 200 (75-um) Sieve.
2) Total organic content was determined by ASTM D2974, Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.

3.3.2 Chemical Test Methods

The chemical tests performed at TestAmerica Laboratory in Tampa, Florida included the following methods:

- Organochlorine Pesticides and PCBs by 8081/8082
- Chlorinated Herbicides by 8151
- 8 RCRA Metals by 6010/7471
- Copper by 6010
- Polynuclear Aromatic Hydrocarbons (PAHs) by 8270 low level
- Total Recoverable Petroleum Hydrocarbons (TRPH) by FL-PRO
- TCLP metals

3.4 GENERAL DESCRIPTION OF SEDIMENT

The sediment cores were an average of 0.3 feet thick. The sediment was composed of organic material along the bottom of the canal, with the largest accumulation of organic material in the dead ends of the finger canals to the north and west of the Watson Blvd Bridge. Because such a small amount of decayed material is present, removal of the sediment would likely be an inefficient method for water quality restoration. Also, some of the sediment cores collected to the north and west of the Watson Blvd Bridge exhibited humic matter (non-degraded organic material); indicating that the flotsam that enters the canal system primarily accrues in the canal fingers between Iris and Violet Drives, **Figure 2.**

Figure 2- Primary Seaweed Accumulation Area

The sediment cores collected to the north and east of the Watson Blvd Bridge contained little organic material and were primarily granular. An accrual of degraded organic material was observed south of the Watson Blvd Bridge. **Figure 1** show the locations where the sediment samples were collected, and **Appendix A** provides a description of the observed sediment type along with photos of the sediment cores.

3.5 PHYSICAL CHARACTERIZATION

Laboratory tests were completed on the one (1) composite sediment sample collected from the canal to determine the physical characteristics of the sediment. The complete laboratory reports are included in **Appendix B**. The physical laboratory test data are summarized in **Table 1**. The physical characteristics of the composite sediment sample demonstrates a fines content (passing the #200 sieve) that is greater than 70 percent, indicating that dewatering of the sediment during dredging would be difficult; similar to other dredging projects completed in Big Pine Key during the Demo Program. The fines content in addition to the limited thickness and distribution of organic sediment indicates that removal of the organic sediment would be an inefficient means of water quality restoration.

Table 1 - Physical Characteristics Results

Organic Content (%)	% Finer #200 Mesh Sieve	Sieve No.	Sieve Size (mm)	Cumulative Weight (grams) on Sieve
CS#1				
4.9	70.1	3/8 in.	9.5	0.0
		#10	2.0	9.1
		#40	0.42	13.6
		#60	0.25	17.3
		#80	0.18	21.1
		#100	0.15	24.6
		#200	0.075	39.3

3.6 CHEMICAL CHARACTERIZATION

Laboratory tests were also completed on the six (6) composite sediment samples collected from the canal to determine the chemical characteristics of the sediment and potential disposal options if sediment removal were to be completed. The reported sample concentrations are compared to the DEP 62-777 Table 2 Soil Cleanup Target Levels (SCTLs) as well as the DEP Sediment Quality Assessment Guidelines (SQAGs) for both Toxic Effect Level (TEL) and Probable Effect Level (PEL). The complete laboratory reports are included in **Appendix B**. The chemical laboratory test data are summarized in **Table 2** in **Appendix B.**

All concentrations of the targeted constituents were below the applicable FDEP Soil Cleanup Target Levels (SCTL), with the exception of Arsenic. Arsenic was observed at an average concentration of 3.0 mg/Kg for the six (6) composite samples, which exceeds the SCTL for direct exposure for both residential scenarios. The presence of Arsenic, which is commonly observed in canal sediment across the County, may be naturally occurring or may be associated with anthropogenic effects such as herbicide application.

3.7 DISPOSAL OPTIONS

The DEP SCTLs are the regulatory guidelines to be utilized for determining disposal options. The sediment from the canal cannot be considered clean fill material. Therefore, the sediment would need to be transported under a manifest document to an approved Class I Landfill for disposal.

Beneficial reuse of the material is only possible if it is first mixed with clean soil to achieve an arsenic concentration below 2.1 mg/Kg, or if it were to be reused at a facility that has a land use restriction recorded by property deed that prevents residential use of the property.

4.0 SITE CONDITIONS

4.1 ENGINEERING SURVEY

Amec Foster Wheeler performed a field survey on June 22, 2016 on Canal 278 to identify overhead electric lines and existing structures that could affect the implementation of the restoration technologies, see **Figure 3.** There are underground utilities such as water and sewer lines that will need to be evaluated during implementation to minimize impacts. Depending on the location of the utilities, the project may need to be revised to avoid impact.

Figure 3 – Engineering Survey Map

4.2 TIDAL SURVEY

To determine the influence of the tide throughout the canal system, Amec Foster Wheeler completed a 7 hour tidal study on July 27, 2016, **Figure 4**.

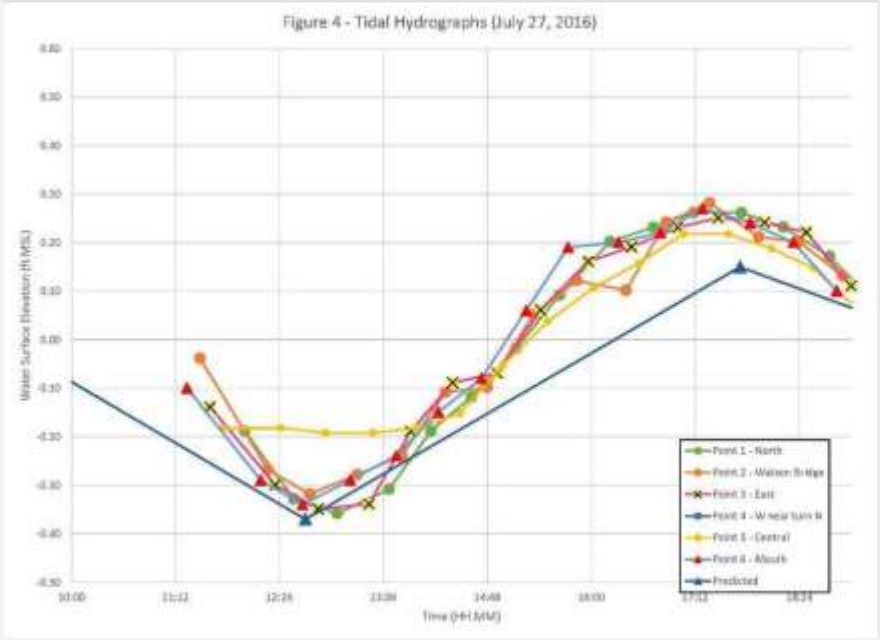
Figure 4– Tidal Survey Map

The tidal data was normalized so that each measurement location had the same mean water surface level, see **Table 3.** The data showed an average of 0.58 feet of tidal fluctuation (from low to high tide) throughout the canal system, indicating that the energy of the tide is not reduced as it moves through the main segment towards the back of the canal system. However, tidal observation point number 5 located in the back of the finger canal between Violet Dr and Cedar Dr did indicate a reduction in the tidal range of approximately 30 percent. Overall, the results indicate that tidal flushing within the canal system is impacted within the finger canals north of the Watson Boulevard Bridge due to the elongated distance from the mouth. Tidal hydrographs for the July 27, 2016 tidal study are provided in **Figure 5**.

Table 3 – Tidal Survey Results

Tidal Study Point 1		Tidal Study Point 2		Tidal Study Point 3		Tidal Study Point 4		Tidal Study Point 5		Tidal Study Point 6	
Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading
12:00	-0.19	11:29	-0.04	11:36	-0.14	11:51	-0.17	11:45	-0.18	11:20	-0.10
12:34	-0.33	12:16	-0.27	12:21	-0.30	12:28	-0.34	12:25	-0.18	12:11	-0.29
13:04	-0.36	12:45	-0.32	12:51	-0.35	12:59	-0.36	12:56	-0.19	12:40	-0.34
13:40	-0.31	13:18	-0.28	13:26	-0.34	13:32	-0.30	13:29	-0.19	13:13	-0.29
14:09	-0.19	13:49	-0.24	13:55	-0.19	14:04	-0.20	14:00	-0.18	13:45	-0.24
14:37	-0.12	14:19	-0.11	14:24	-0.09	14:32	-0.12	14:29	-0.15	14:14	-0.15
15:08	-0.02	14:48	-0.10	14:55	-0.07	15:03	-0.04	14:59	-0.05	14:44	-0.08
15:38	0.09	15:20	0.05	15:25	0.06	15:33	0.06	15:30	0.04	15:15	0.06
16:13	0.20	15:50	0.12	15:58	0.16	16:08	0.16	16:02	0.11	15:44	0.19
16:43	0.23	16:24	0.10	16:28	0.19	16:38	0.22	16:33	0.16	16:19	0.20
17:11	0.26	16:52	0.24	17:00	0.23	17:07	0.26	17:04	0.22	16:48	0.22
17:44	0.26	17:22	0.28	17:28	0.25	17:39	0.27	17:35	0.22	17:17	0.27
18:13	0.23	17:56	0.21	18:00	0.24	18:08	0.24	18:05	0.19	17:50	0.24
18:45	0.17	18:24	0.20	18:29	0.22	18:38	0.17	18:34	0.15	18:20	0.20
19:25	0.05	18:54	0.13	19:00	0.11	19:10	0.09	19:06	0.06	18:50	0.10

Figure 5 – Tidal Hydrographs (July 27, 2016)



4.3 DISSOLVED OXYGEN SURVEY

To further characterize the water quality in the canal system, Amec Foster Wheeler gathered dissolved oxygen readings at seven (7) locations on September 7, 2016 as shown on **Figure 6**. **Table 4** shows that the dissolved oxygen levels decreased towards the back of the canal system. The surficial portion of the water column to the north and west and north of the Watson Bridge Blvd exhibited dissolved oxygen readings below the 42 percent saturation standard pursuant to FDEP 62-302.530 for Class III – Marine Waters. The dissolved oxygen readings documented that the oxygen levels at 6 feet below the water surface were below the state water quality standard throughout the canal system. Please note that based on the average temperature, a dissolved oxygen saturation of 42 percent corresponds to approximately 3.2 mg/L. The lowest concentration of dissolved oxygen, near 0 mg/L was observed in the lower portion of the water column in the finger canals located to the north of Violet Dr. Overall the results indicate that the impaired dissolved oxygen levels are directly correlated to the lack of tidal flushing northwest of the Watson Boulevard Bridge as indicated in Section 4.2. However, the dissolved oxygen readings in the northeast section of the canal

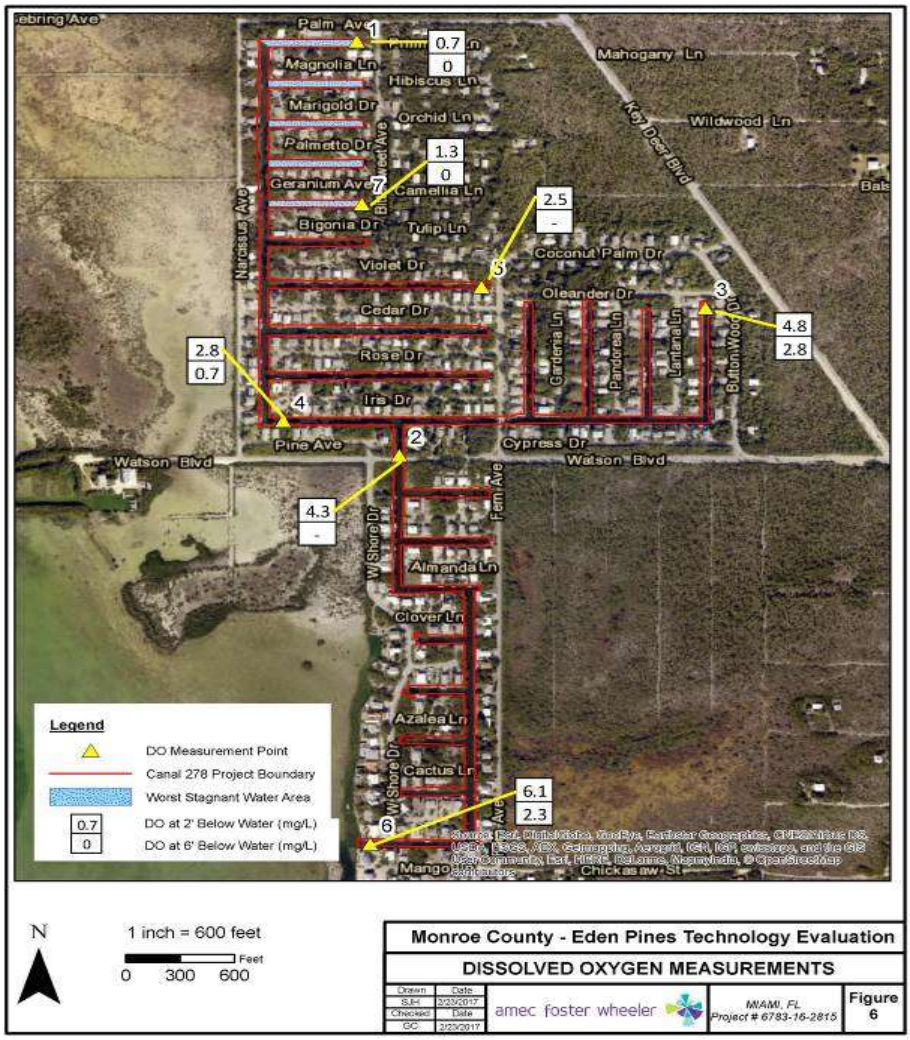
as characterized by point 3 are higher than at the Watson Blvd Bridge. Therefore, it is apparent that the seepage of groundwater from the adjacent freshwater lens increases the dissolved oxygen in this portion of the canal, as further discussed in Section 4.4. The dissolved oxygen readings are presented in **Figure 6**.

Table 4 – Dissolved Oxygen Results

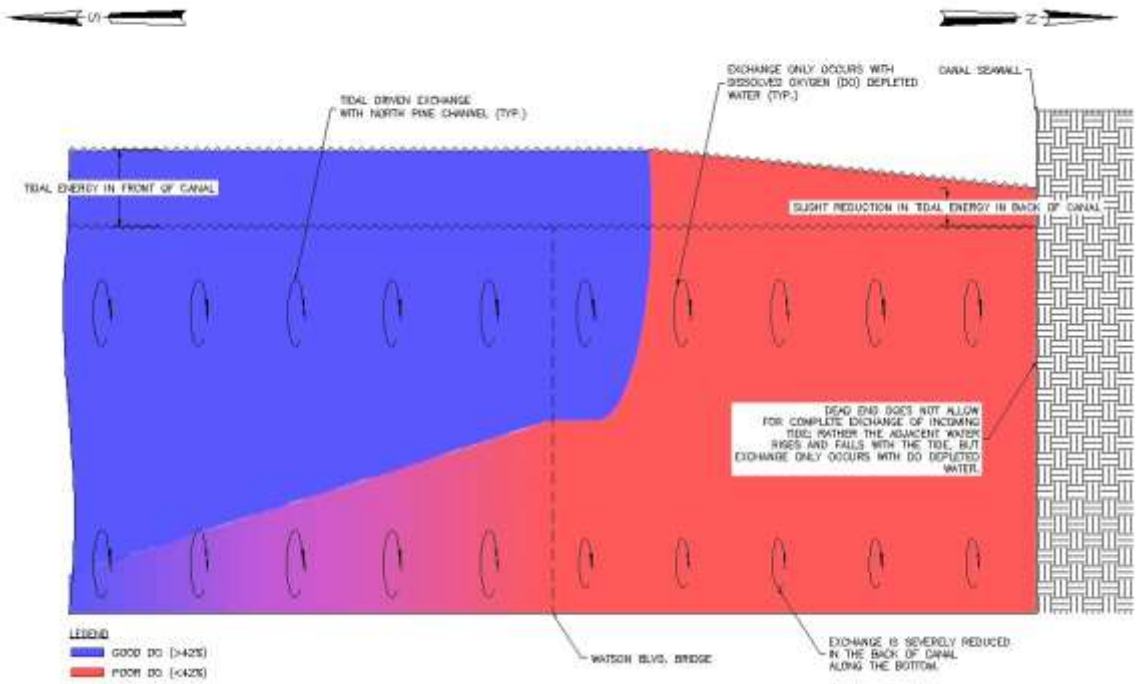
Tidal Study Point	Location	DO Reading (mg/L) at 2 feet Below Water Level	DO Reading (mg/L) at 6 feet Below Water Level
1	Palm Ave & Bittersweet	0.7	0
2	Watson Blvd Bridge	4.3	--
3	Oleander & Buttonwood	4.8	2.8
4	Pine Ave & Narcissus	2.8	0.7
5	Violet Dr & Fern Ave	2.5	--
6	Canal Mouth	6.1	2.3
7	Boat Ramp	1.3	0

-- = Not able to obtain sample due to equipment constraints and access

Figure 6 – Dissolved Oxygen Measurements



Schematic of current flow patterns and dissolved oxygen conditions



4.4 SUMMARY OF FIELD OBSERVATIONS

The sediment characterization, tidal study, and dissolved oxygen readings indicate that the most stagnant portion of the canal is located north and west of the Watson Blvd Bridge in the finger canals located north of Violet Dr. It is apparent that three primary factors are contributing to the more severe degradation of the water quality to the north of Violet Dr rather than to the east of Fern Avenue:

- The sediment core data indicates that floating debris that enters the canal typically migrates to the finger canals between Iris Dr and Violet Dr.
- The section of the canal north of the Watson Blvd Bridge all drains under the Watson Blvd Bridge, and the section west of Fern Avenue is approximately twice as large as the section east of Fern Avenue, with respective areas of 10.3 acres and 4.4 acres. Therefore, it is reasonable to assume that the flow under the Watson Blvd Bridge is equally comprised of water from the eastern and western sections, and as a result the travel time is more than two times longer in the western section than the eastern section.

- The reviewed literature that characterizes the hydrogeology of the Florida Keys indicates that there is a freshwater lens in the subsurface that is adjacent to the northeastern extent of the canal system near Buttonwood Dr and Oleander Dr. It is likely, especially considering field observations, that freshwater from the adjacent freshwater aquifer is discharging into the eastern section of the canal. When this occurs, it is likely that limestone is being dissolved, and that the dissolved limestone is reducing the nutrient concentration in the surface water; since limestone has been demonstrated to absorb phosphorous. Water quality monitoring data (**Table 5**) demonstrates that the total phosphorous concentration in the eastern portion of the canal is approximately 0.018 mg/L, and approximately 0.023 mg/L in western portion of the canal. Nutrient concentrations have been demonstrated to significantly affect the dissolved oxygen consumption rate of sediment by a factor of approximately 10.

Table 5 – Summary of Nutrient Concentrations

Survey No.	Date	Location	Interval	Bottle ID	Total Nitrogen (mg/L)	Total Phosphorous (mg/L)
FKC01	5/7/2014	South Extent of Pandorea Ln	Surface	278A-S	0.251	0.020
			Bottom	278A-B	0.246	0.018
		North Extent of Narcissus Ave	Surface	278B-S	0.290	0.024
			Bottom	278B-B	0.262	0.026
FKC02	10/15/2014	South Extent of Pandorea Ln	Surface	278A-S	0.387	0.017
			Bottom	278A-B	0.343	0.017
		North Extent of Narcissus Ave	Surface	278B S	0.402	0.021
			Bottom	278B-B	0.356	0.021
FKC04	6/24/2015	South Extent of Pandorea Ln	Surface	278A-S	0.2299	0.0174
			Bottom	278A-B	0.2353	0.0175
		North Extent of Narcissus Ave	Surface	278B-S	0.2583	0.0257
			Bottom	278B-B	0.3306	0.0237
Average		South Extent of Pandorea Ln			0.282	0.018
		North Extent of Narcissus Ave			0.317	0.023

Source: Florida International University: Southeast Environmental Research Center, Water Quality Monitoring Network.

5.0 EVALUATION OF TECHNOLOGIES

The Canal 278 Eden Pines is a complex canal system with 21 dead end finger canals that are connected to the North Pine Channel by one mouth that is located approximately 1.3 miles from the back of the canal system. The complexity and extent of the canal system is a major consideration for the evaluation of each technology. A combination of the site characterization data discussed in previous sections and the complexity of the canal system was used to evaluate the feasible available technologies to improve water quality in the canal system. The evaluated technologies are a combination of technologies identified in Phase II of the Canal Management Master Plan (CMMP), which are weed barriers, organic removal, culverts, pumping, and backfilling, along with applicable technologies evaluated for Task 3 of EPA Grant X7-00D40915-0, which are seagrass planting, macro-algae farming, oyster aquaculture, floating mangrove islands and bioremediation.

The site characterization data is the basis for the ranking criteria matrix for the following technologies:

1) Injection wells
2) Pump-in recirculation system (original technology selection)
3) Culvert installed via directional drilling and/or trenching
4) Bio-augmented aeration
5) Organic sediment removal

5.1 RANKING METHODOLOGY

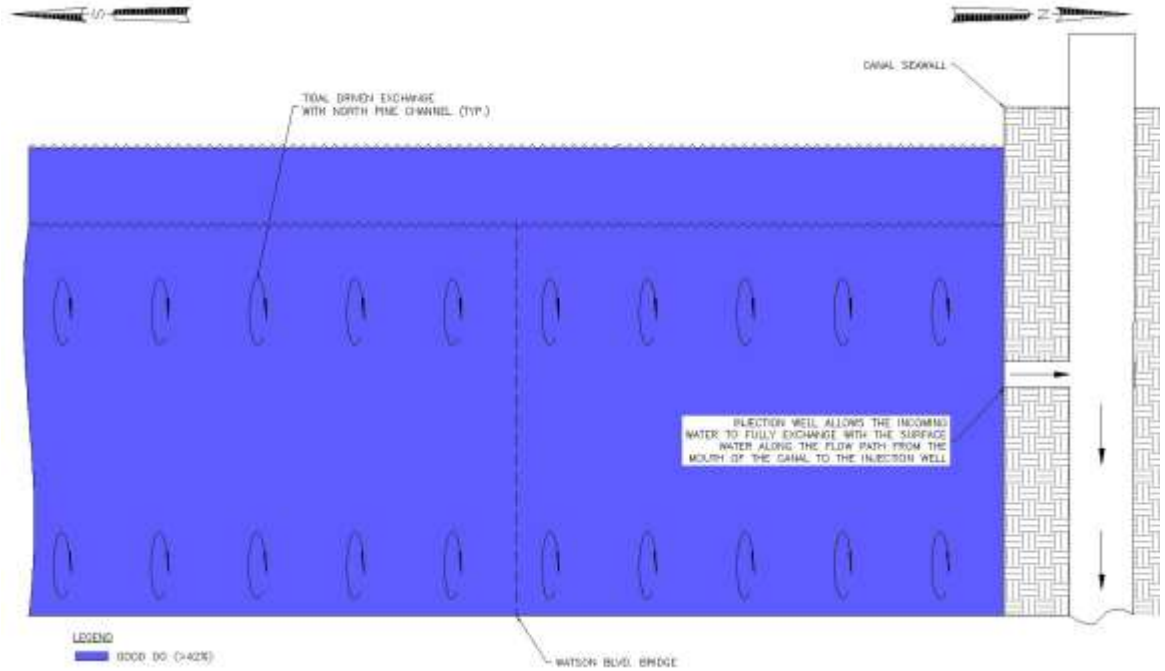
Each of the technologies were evaluated for effectiveness, ease to implement, ease of permitting, property owner disruption, time to achieve canal restoration, and cost for implementation, operation, and maintenance; including electric power consumption for two years. The purpose of the evaluation criteria is to rank technologies by potential for success in improving the water quality associated with Canal 278 Eden Pines in addition to implementation cost. All criteria were scored from 0 to 5.

Table 6 – Technology Ranking Matrix

Technology	Effectiveness (0-5)	Ease to Implement (0-5)	Permitting (0-5)	Homeowner Disruption (0 to 5)	Time (0-5)	Cost (0 to 5)	Total	Rank
Injection Wells	4	4	3	4	3	5	23	1
Pump-in Recirculation System	3	1	2	4	3	5	18	2
Culvert	1	3	5	3	3	2	17	3
Bio-augmented Aeration	2	2	4	2	2	4	14	4
Organic Muck Removal	2	1	3	1	1	0	7	5

5.1.1 Injection Wells

Schematic of proposed flow patterns and dissolved oxygen conditions with injection well



Hydro-geologic characterization of the Florida Keys indicates that the limestone formation present at 100 feet below land surface is highly transmissive, and can infiltrate water at a rapid rate. Given the published values for conductivity, it is estimated that a 24-inch diameter injection well with an open hole interval from 60 feet to 120 feet below land surface can infiltrate approximately 1,600 gpm using gravity, with a potentiometric head of 0.6 feet assumed to be present at the injection well during high tide given the tidal datums for Big Pine Key. Given the infiltration capacity of an injection well, it is proposed to first install a single pilot well to confirm infiltration rates, collect groundwater mounding observations, and collect water quality improvement observations. Based on the findings of the pilot well, the full scale design can be implemented, with the preliminary full scale design comprised of six gravity injection wells located in the back of the finger canals north of Violet Dr.

Minimal infrastructure will be needed for the injections wells. Each injection well system will have a fish impingement device which is 15 feet high of 2-inch mechanically slotted well screen with protective screen that ties into the well through an inlet. It is proposed that the injection well be equipped with a check valve such as a Waterflex WF-3 or equivalent to prevent extraction from the well during low tide.

Figure 7 – Conceptual Layout of an Injection Well System

The following rankings were developed for injection wells:

Effectiveness (**4**) – It is expected that the system will provide adequate mixing to the stagnant areas of the canal, and the number of injection wells can be increased to achieve water quality targets.

Ease to Implement (**4**) – The staging area for the injection well equipment will be located within the Monroe County Right of Way. Requires canal property access to run the piping to the wells.

Permitting (**3**) – Shallow injection wells have been permitted in the Keys for treated stormwater and sewer effluent. The nutrient content of the surface water in the canal is lower than the Best Achievable Technology (BAT) for wastewater treatment. Therefore, quality of the water infiltrating into the well should not be of concern. The well will be classified as a Class V Well according to FDEP 62-528 and will require a groundwater model and monitoring wells to demonstrate compliance.

Homeowner Disruption (**4**) – Little to no disruption to the homeowners is expected, and the system will not generate long term noise.

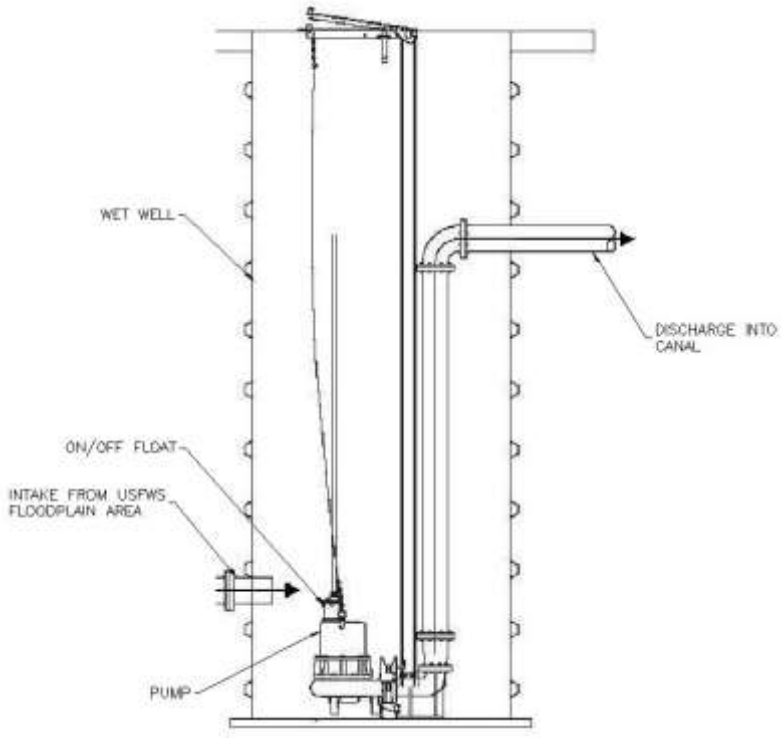
Time (**3**) – It is expected that improvements to water quality will be observed within 90 days of startup.

Cost (**5**) – A modeling cost of $10,000 to support permitting is expected, along with an additional $10,000 to monitor the effectiveness of the pilot injection well. Estimated installation cost of $270,000 to construct six injection wells. No electrical cost assuming that an injection pump is not required; Annual maintenance cost of $1,800 for a cleanout. Therefore, the two year contract for design, construction and maintenance is approximately $292,000.

Total: 23

5.1.2 Pump-in recirculation system technology

Schematic of proposed pump-in recirculation system



Pumping was the original selected demonstration technology for Canal 278 in Eden Pines. The conceptual pumping system included a wet well connected to a series of pipe segments to transmit water into the end of the finger canals to promote flushing based on the EPA recommended water turnover rate of 4 days. The conceptual design included a scour prevention diffuser at the end of the transmission lines, and a venturi system to treat that low dissolved oxygen water that was expected to exit the canal upon startup of the pump-in system.

One primary concern for the conceptual pump-in design was determination of the appropriate size of the circulation pump. Initial estimates selected a two 6-hp pumps to promote circulation, with later iterations selecting a 30-hp pump with Variable Frequency Drive (VFD) to control pump speed. It was proposed that water quality modeling could be utilized to ensure proper pump size selection. However, the effort to complete water quality modeling would provide a significant up front cost due to the complex nature of modeling water quality in tidally influenced surface water bodies.

Another difficulty encountered during the implementation of a pump-in system for the canal was placement of the intake structure. Given the configuration of the canal, the most feasible location was near the bridge to United States Fish & Wildlife Service (USFWS) property located at the western extent of Watson Blvd. However, the USFWS didn't want surface water extracted from this location. Also, the area surrounding the likely intake structure location was shallow, and could result in a high rate of sedimentation.

Figure 8 – Conceptual Layout of a Pump-In Recirculation System

The rankings below were developed for pumping.

Effectiveness (**3**) – It is expected that the system will provide the EPA recommended water body turnover rate of 4 days.

Ease to Implement (**1**) – Requires approval from USFWS for the intake system and canal property access to run the piping, which is not anticipated to occur.

Permitting (**2**) – Not previously permitted in the Keys, would require water quality and quantity model showing no effects to surrounding OFW.

Homeowner Disruption (**4**) – Minimal closure of canal for a portion of the project with moderate noise long term.

Time (**3**) – It is expected that improvements to water quality will be observed within 90 days of startup.

Cost (**5**) – A modeling cost of $20,000 to support permitting is expected, along with an installation cost of $250,000 for two 6-hp pumps. Long term electrical and operation and maintenance costs will be approximately $17,000 per year. Therefore, the two year contract for construction and operation in conjunction with the added permitting effort is approximately $304,000.

Total: 18

5.1.3 Culverts

Culverts have been a proven technology used in the Demo Program and throughout the Keys to promote flushing in the dead end segments of canals. The culverts are traditionally submerged to prevent the migration of weed wrack. The culvert for Canal 278 Eden Pines would be installed via trenching under W. Shore Drive and consist of a 60-inch reinforced concrete culvert with manatee grates on each end. Ideally, the culvert would be placed in the northwest section of the canal where the greatest degree of stagnation and depleted dissolved oxygen is observed. However, due to the distance from the northwest section of the canal to the shoreline, a culvert in this location would exceed 2,000 feet in length; which would result in an excessive cost of construction.

Figure 9 – Conceptual Layout of a Flushing Culvert

The following rankings were developed for culverts:

Effectiveness (**1**) – The proposed culvert location is expected to increase mixing of the incoming tide further into the canal system, but it is not expected to promote sufficient mixing in the upper extents of the canal system to achieve the dissolved oxygen water quality target. Based on the reduction in dissolved oxygen observed northwest of the Watson Blvd Bridge, it is anticipated that the proposed culvert would only provide adequate flushing as far northwest as Cedar Drive. A culvert location that could increase mixing in the upper extents of the canal system is not available given the configuration of the canal.

Ease to Implement (**3**) – The staging area, which is available upon homeowner approval, for the culvert installation will require a twenty foot wide temporary easement and substantial site disturbance is required for installation.

Permitting (**5**) – Culverts have been permitted in the Keys for past canal restoration projects and require a minimal amount of in-water work disturbances.

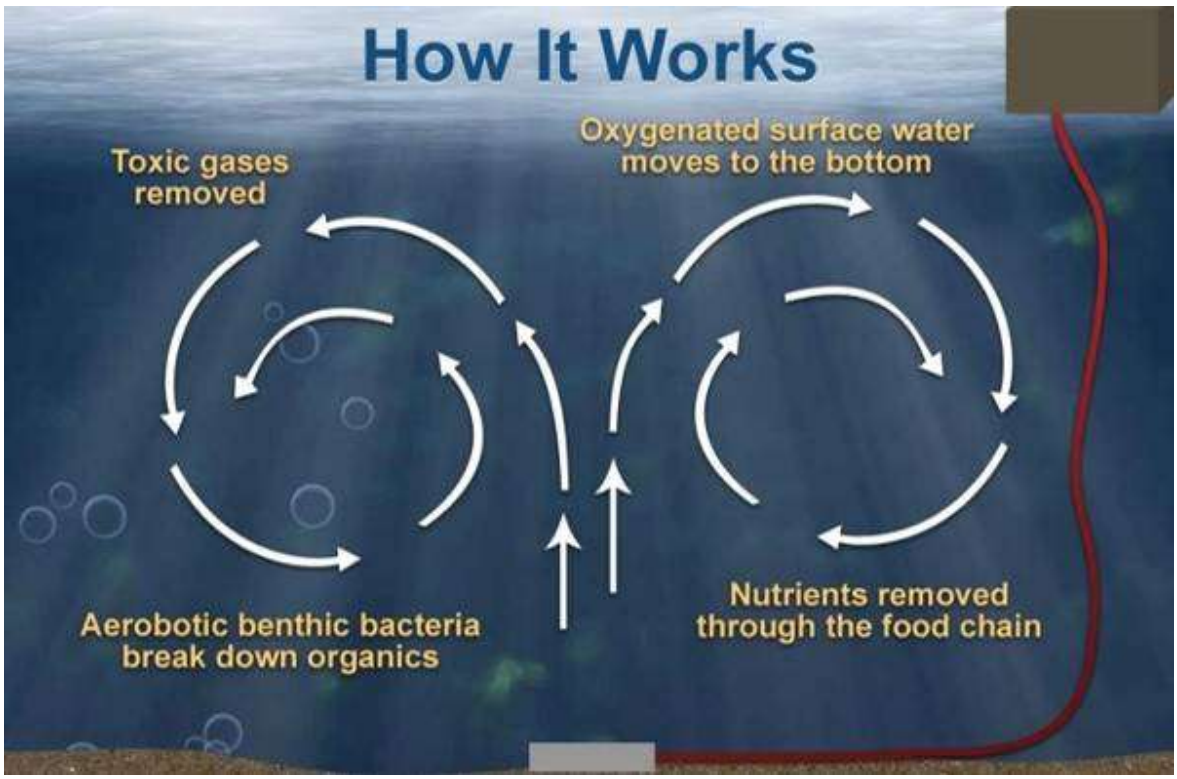
Homeowner Disruption (**3**) – The staging area footprint will require a cooperative homeowner to allow their property to be disturbed for the duration of the project. Maintenance of traffic measures will need to be in place which will create temporary modified traffic patterns through the neighborhood. The equipment will also cause a moderate noise impact near the project area.

Time (**3**) – It is expected that improvements to water quality will be observed within 90 days of startup.

Cost (**2**) – Installation cost of $630,000. No electrical costs. Annual maintenance cost of $1,800 for a cleanout. Therefore, the two year contract for construction and maintenance is approximately $633,600.

Total: 17

5.1.4 Bio-Augmented Aeriation



Bio-augmented aeration was chosen as one of the preferred technologies identified in a prior report about alternative technologies as part of EPA Grant X7-00D40915-0, and consists of small solar powered aeration system coupled with biological enhancements such as macro-algae. Bio-augmented aeration is completed in a modular approach, with a typical spacing of approximately 100 feet between aeration systems. Given the extent of the target area, it is estimated that approximately 54 aeration units would be required, based on the expected radius of influence of approximately 150 feet per aeration unit.

Figure 10 – Conceptual Layout of a Bio-augmented Aeration System

The following rankings were developed for bio-augmented aeration:

Effectiveness (**2**) – Provides targeted improvement in dissolved oxygen, but the radius of influence of the aeration systems is limited.

Ease to Implement (**2**) – Assembly and installation of the aeration systems can be completed quickly. However, a significant effort is associated with obtaining homeowner approval for the installations.

Permitting (**2**) – Permitting should not be more extensive than for a standard aeration system, although it is unknown of the permitting requirements for the addition of bio bugs.

Homeowner Disruption (**2**) – Some homeowners may consider the aeration units and solar panels to be a nuisance.

Time (**2**) – It is expected that improvements to water quality could take up 6 months to be observed.

Cost (**4**) – Construction cost of $378,000 for the bio-augmented aeration system. No long term electrical cost. Operation and maintenance costs will be approximately $18,180 per year. Therefore, the two year contract for construction and operation is approximately $414,400.

Total: 14

5.1.5 Organic Removal

Organic removal is a proven technology that is included as one of the Demo Program. Based on past project experience it has shown positive results in the improvement of water quality with canals that have a good tidal flushing. That being said, the technology is expensive and requires a large vacant footprint to dewater and dispose of the dredged material. Additionally, given the lack of flushing in the canal, it is not expected that dredging the organic sediment would fully restore the water quality. The sediment data gathered for Canal #278 Eden Pines showed an average thickness of 0.3 feet north and west of Watson Blvd; resulting in an estimated dredge volume of 5,000 CY. The organic muck would be removed via hydraulic vacuum dredge and dewatered using either a mechanical or passive system. The chemical results indicated the material needs to be transported under manifest to an approved landfill for disposal. Due to lack of flushing within the canal system, this technology would need to be combined with another to achieve full restoration.

Figure 11 – Conceptual Layout for Organic Sediment Removal

The following rankings were developed for organic removal:

Effectiveness (**1**) – Remove greater than 95% of the organic material, although it would not improve the flushing impairment within the canal, and would need to be supported with another technology. In addition to a technology to promote flushing, an air curtain will need to be installed at the mouth of the canal following removal to prevent future loading.

Ease to Implement (**1**) – Requires a half acre staging area and specialized dredging and dewatering equipment.

Permitting (**3**) – Previously permitted, but requires toxicology and residual polymer testing during operation.

Homeowner Disruption (**1**) – Closed canal for the duration of the project. The equipment will also cause a moderate noise impact near the project area.

Time (**1**) – It is expected that improvements to water quality could take up 9 months to be observed.

Cost (**0**) – Completion cost of $762,000 includes air curtain installation, but not any additional measures to improve flushing. Long term electrical and operation and maintenance costs for the air curtain will be approximately $20,840 per year. Therefore, the two year contract for construction and operation is approximately $803,700.

Total: 7

6.0 SELECTED CONCEPTUAL DESIGN

Based on the results of the evaluation, an injection well system was selected as the top ranked technology for the Canal 278 Eden Pines.

Upon approval from the County, Amec Foster Wheeler will provide a scope of work and cost associated with implementation of the injection well system which will entail the following:

1. Pilot Test Plan and Permit Application
2. Installation and Monitoring of the Pilot Test Well
3. Modeling and Permitting
4. Bid Support
5. Construction Support Services and Engineering During Construction

Table 7– Injection Well System Conceptual Cost Estimate

Item #	UoM	Approx Qty	Item	Unit Price In Figures	Total Amount
1	EA	6.0	24-inch Diameter Well with Open Hole Interval of 60 feet to 120 feet	$ 35,000.00	$210,000.00
2	EA	6.0	Check Valve	$ 5,500.00	$33,000.00
3	EA	6.0	Intake manifold and connection piping installation	$ 2,500.00	$15,000.00
4	EA	6.0	Headwall Restoration	$ 1,500.00	$9,000.00
5	LF	120.0	Water Quality Control System primary and secondary curtain system	$ 10.50	$1,260.00
				Subtotal	$268,260.00
				10% contingency	$ 26,826.00
				Subcontractor subtotal:	**$295,086.00**
			Pilot Well Monitoring		$ 10,000.00
			Groundwater Modeling		$ 10,000.00
			Construction Administration		$ 29,508.60
			Construction Oversight (60 field days)		$ 52,200.00
			Total	**TOTAL**	**$376,794.60**

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APPENDIX A

SEDIMENT CORE DESCRIPTIONS & PHOTOS

Sample ID	Depth to Top of Sediment (ft)	Depth to Refusal (ft)	Core Length (ft)	Core Length (in)	Description
#1	5.9	7.5	1.6	19	(0-4") Dark brown, highly organic marl (4-15") Brown, moderately organic marl (15-19") Gray, slightly organic marl with rock fragments
#2	7.7	8.8	1.2	14	(0-1") Moderately degraded organic material (1-7") Gray, moderately organic marl (7-14") Light tan sandy marl with rock fragments
#3	5.8	6.3	0.4	5	(0-5") Light tan marly sand
#4	6.3	7.3	1.1	13	(0-2") Light brown, moderately organic marl with shell fragments (2-5") Gray, slightly organic marl (5-13") Light gray sandy marl
#5	7.7	8.2	0.5	6	(0-6") Light tan sandy marl
#6	5.8	6.8	1.0	12	(0-1") Slightly degraded organic material (1-12") Tan sandy marl with pockets of organic material
#7	6.8	7.3	0.5	6	(0-1") Tan marl (1-6") Light tan marl
#8	7.3	7.9	0.7	8	(0-1") Tan marl (1-8") Light tan marl
#9	7.5	8.3	0.8	10	(0-10") Light tan marl
#10	6.5	7.3	0.8	9	(0-5") Brown, moderately organic marl intermixed with slightly degraded organic material (5-9") Gray marl with rock fragments
#11	6.3	7.4	1.2	14	(0-7") Dark brown, moderately degraded organic material (7-14") Tan marl with rock fragments
#12	6.9	7.8	0.8	10	(0-10") Tan marl
#13	7.0	7.3	0.3	3	(0-3") Gray, moderately organic marl
#14	7.3	8.0	0.7	8	(0-8") Green/Brown, moderately organic marl with rock fragments
#15	6.7	7.2	0.5	6	(0-4") Tan marl with thin layer of degraded organic material on top (4-6") Light tan sand
#16	6.8	7.5	0.7	8	(0-4") Brown marl with pockets of slightly degraded organic material (4-8") Tan sandy marl with shell fragments
#17	7.8	8.4	0.6	7	(0-7") Tan sandy marl with thin layer of degraded organic material on top
#18	7.4	8.2	0.8	9	(0-4") Brown, moderately organic marl (4-9") Gray marl

Sample ID	Depth to Top of Sediment (ft)	Depth to Refusal (ft)	Core Length (ft)	Core Length (in)	Description
#19	6.5	7.1	0.6	7	(0-2") Light brown, moderately organic marl (2-7") Tan marl with rock fragment
#20	5.9	8.4	1.5	18	(0-8") Black, highly organic marl (8-18") Gray marl with rock fragments
#21	6.8	7.9	0.9	11	(0-2") Light brown, moderately organic marl (2-11") Light gray sandy marl
#22	7.4	8.1	0.7	8	(0-6") Gray, slightly organic marl (6-8") Gray marly sandy
#23	6.0	6.6	0.8	9	(0-6") Gray, slightly organic marl (6-9") Gray sandy marl with rock fragments
#24	7.5	8.6	1.1	13	(0-13") Light tan marl
#25	7.7	8.9	1.3	15	(0-1") Dark brown, moderately degraded organic material (1-15") Light tan marl
#26	8.2	9.4	1.3	15	(0-1") Brown, moderately organic marl (1-15") Light tan marl
#27	8.3	9.7	1.3	16	(0-1") Brown, moderately organic marl (1-16") Light tan marl
#28	11.6	12.3	0.8	9	(0-9") Tan marl
#29	9.9	9.9	0.8	10	(0-2") Dark brown, highly organic marl (2-10") Light tan marl with rock fragments
#30	9.7	10.8	1.1	13	(0-2") Light brown, moderately organic marl (2-13") Light tan marl
#31	9.1	10.6	1.5	18	(0-2") Brown, moderately organic marl (2-18") Light tan marl
#32	7.3	8.0	0.7	8	(0-1") Brown, moderately organic marl (1-8") Light tan marl
#33	5.7	6.5	0.8	9	(0-1") Brown, moderately organic marl (1-9") Light tan marl
#34	5.7	6.8	1.2	14	(0-9") Brown, moderately organic marl (9-14") Tan marl

Soil Sample #2 - Collected in Northwest Section of Canal Near Palm Avenue

Soil Sample #11 - Collected Northwest of the Watson Blvd Bridge near Pine Ave & Narcissus Ave

Soil Sample #30– Collected Northeast of the Watson Blvd Bridge near the South End of Pandorea Lane

Soil Sample #33– Collected South of the Watson Blvd Bridge near the West End of Aster Lane

APPENDIX B

SEDIMENT LABORATORY RESULTS

Table 2
Chemical Analytical Results

Parameter	Reporting Units	SQAGs for FL Coastal Waters TEL	SQAGs for FL Coastal Waters PEL	62-777 Table2 Soil Commercial Industrial Direct	62-777 Table 2 Soil Leach Base GW Criteria	62-777 Table2 Soil Residential	Laboratory Results CS#1	CS#2	CS#3	CS#4	CS#5	CS#6
GC/MS SEMI VOA BY 8270C LL												
1-Methylnaphthalene	mg/Kg	-	-	1800	3.1	200	0.012 U	0.014 U	0.016 U	0.0046 J	0.014 U	0.015 U
2-Methylnaphthalene	mg/Kg	0.0201	0.201	2100	8.5	210	0.012 U	0.0061 J	0.0057 J	0.007 J	0.014 U	0.015 U
Acenaphthene	mg/Kg	0.00671	0.0889	20000	2.1	2400	0.012 U	0.014 U	0.016 U	0.016 U	0.014 U	0.015 U
Acenaphthylene	mg/Kg	0.00587	0.128	20000	27	1800	0.012 U	0.014 U	0.016 U	0.016 U	0.014 U	0.015 U
Anthracene	mg/Kg	0.0469	0.245	300000	2500	21000	0.012 U	0.014 U	0.016 U	0.016 U	0.014 U	0.015 U
Benzo[a]anthracene	mg/Kg	0.0748	0.693	#	0.8	#	0.012 U	0.014 U	0.016 U	0.016 U	0.014 U	0.015 U
Benzo[a]pyrene	mg/Kg	0.0888	0.763	0.7	8	0.1	0.012 U	0.014 U	0.016 U	0.016 U	0.014 U	0.015 U
Benzo[b]fluoranthene	mg/Kg	-	-	#	2.4	#	0.012 U	0.014 U	0.016 U	0.016 U	0.014 U	0.015 U
Benzo[g,h,i]perylene	mg/Kg	-	-	52000	32000	2500	0.012 U	0.014 U	0.016 U	0.016 U	0.014 U	0.0044 J
Benzo[k]fluoranthene	mg/Kg	-	-	#	24	#	0.012 U	0.014 U	0.016 U	0.016 U	0.014 U	0.015 U
Chrysene	mg/Kg	0.108	0.846	#	77	#	0.012 U	0.014 U	0.016 U	0.016 U	0.014 U	0.015 U
Dibenz(a,h)anthracene	mg/Kg	0.00622	0.135	#	0.7	#	0.012 U	0.014 U	0.016 U	0.016 U	0.014 U	0.015 U
Fluoranthene	mg/Kg	0.113	1.494	59000	1200	3200	0.0039 J	0.014 U	0.0029 J	0.016 U	0.003 J	0.0032 U
Fluorene	mg/Kg	0.0212	0.144	33000	160	2600	0.012 U	0.014 U	0.016 U	0.016 U	0.014 U	0.015 U
Indeno[1,2,3-cd]pyrene	mg/Kg	-	-	#	6.6	#	0.012 U	0.014 U	0.016 U	0.016 U	0.014 U	0.0054 J
Naphthalene	mg/Kg	0.0346	0.391	300	1.2	55	0.012 U	0.014 U	0.0025 J	0.016 U	0.014 U	0.015 U
Phenanthrene	mg/Kg	0.0867	0.544	36000	250	2200	0.003 J	0.014 U	0.016 U	0.016 U	0.014 U	0.015 U
Pyrene	mg/Kg	0.153	1.398	45000	880	2400	0.0021 J	0.0024 J	0.016 U	0.016 U	0.014 U	0.015 U
8081B - Organochlorine Pesticides												
4,4'-DDD	mg/Kg	0.00122	0.00781	22	5.8	4.2	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
4,4'-DDE	mg/Kg	0.00207	0.374	15	18	2.9	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
4,4'-DDT	mg/Kg	0.00119	0.00477	15	11	2.9	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
Aldrin	mg/Kg	ID	ID	0.3	0.2	0.06	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
alpha-BHC	mg/Kg	-	-	0.6	0.0003	0.1	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
beta-BHC	mg/Kg	-	-	2.4	0.001	0.5	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
Chlordane (technical)	mg/Kg	0.00226	0.00479	-	9.6	2.8	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
delta-BHC	mg/Kg	-	-	490	0.2	24	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
Dieldrin	mg/Kg	0.000715	0.0043	0.3	0.002	0.06	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
Endosulfan I	mg/Kg	ID	ID	-	-	-	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
Endosulfan II	mg/Kg	ID	ID	-	-	-	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
Endosulfan sulfate	mg/Kg	-	-	-	-	-	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
Endrin	mg/Kg	ID	ID	510	1	25	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
Endrin aldehyde	mg/Kg	-	-	-	-	-	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
Endrin ketone	mg/Kg	-	-	-	-	-	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
gamma-BHC (Lindane)	mg/Kg	0.00032	0.00099	2.5	0.009	0.7	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0052	0.0038 U F2
Heptachlor	mg/Kg	ID	ID	1	23	0.2	0.0032 U	0.0015 J	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
Heptachlor epoxide	mg/Kg	ID	ID	0.5	0.6	0.1	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
Methoxychlor	mg/Kg	-	-	8800	160	420	0.0032 U	0.0036 U	0.0042 U	0.0042 U	0.0036 U	0.0038 U F2
Toxaphene	mg/Kg	ID	ID	4.5	31	0.9	0.19 U	0.21 U	0.25 U	0.24 U	0.21 U	0.22 U
GC SEMI VOA BY 8082												
PCB-1016	mg/Kg	****	****	-	-	-	0.032 U	0.036 U	0.042 U	0.042 U	0.036 U	0.038 U
PCB-1221	mg/Kg	****	****	-	-	-	0.032 U	0.036 U	0.042 U	0.042 U	0.036 U	0.038 U
PCB-1232	mg/Kg	****	****	-	-	-	0.032 U	0.036 U	0.042 U	0.042 U	0.036 U	0.038 U
PCB-1242	mg/Kg	****	****	-	-	-	0.032 U	0.036 U	0.042 U	0.042 U	0.036 U	0.038 U
PCB-1248	mg/Kg	****	****	-	-	-	0.032 U	0.036 U	0.042 U	0.042 U	0.036 U	0.038 U
PCB-1254	mg/Kg	****	****	-	-	-	0.032 U	0.036 U	0.042 U	0.042 U	0.036 U	0.038 U
PCB-1260	mg/Kg	****	****	-	-	-	0.032 U	0.036 U	0.042 U	0.042 U	0.036 U	0.038 U
GC SEMI VOA BY 8151A												
2,4,5-T	mg/Kg	-	-	9500	0.4	690	0.077 U	0.085 U	0.1 U	0.1 U	0.087 U	0.089 U
2,4-D	mg/Kg	-	-	13000	0.7	770	0.39 U	0.43 U	0.5 U	0.5 U	0.43 U	0.45 U
2,4-DB	mg/Kg	-	-	-	-	-	0.029 U	0.032 U	0.037 U	0.038 U	0.032 U	0.033 U
Dalapon	mg/Kg	-	-	-	-	-	0.039 U F1	0.043 U	0.05 U	0.05 U F1	0.043 U	0.045 U
Dicamba	mg/Kg	-	-	40000	2.6	2300	0.12 U	0.13 U	0.15 U	0.15 U	0.13 U	0.13 U
Dichlorprop	mg/Kg	-	-	5800	0.3	370	0.25 U	0.28 U	0.32 U	0.33 U	0.28 U	0.29 U
Dinoseb	mg/Kg	-	-	840	0.03	65	0.39 U	0.43 U	0.5 U	0.5 U	0.43 U	0.45 U
MCPA	mg/Kg	-	-	500	0.02	35	96 U	110 U	120 U	130 U	110 U	110 U
MCPP	mg/Kg	-	-	800	0.03	64	96 U F1	110 U	120 U	130 U	110 U	110 U
GC SEMI VOA BY FL-PRO												
Total Petroleum Hydrocarbons (C8-C40)	mg/Kg	-	-	2700	340	460	76	52	67	77	84	57
METALS BY 6010C												
Arsenic	mg/Kg	7.24	41.6	12	***	2.1	2.4	3.3	3.8	3.3	2.5	2.9
Barium	mg/Kg	-	-	130000	1600	120	9.9	11	11	11	11	11
Cadmium	mg/Kg	0.676	4.21	1700	7.5	82	0.89 U	1.1 U	0.42 J	1.2 U	1.1 U	1.1 U
Chromium	mg/Kg	52.3	160	470	38	210	11	13	14	15	13	13
Copper	mg/Kg	18.7	108	89000	***	150	18	20	37	33	21	21
Lead	mg/Kg	30.2	112	1400	***	400	3.3	3.1	5.4	4.8	3.6	3.7
Selenium	mg/Kg	-	-	11000	5.2	440	1.2 J	0.9 J	3 J	1.8 J	1.3 J	1.6 J
Silver	mg/Kg	0.733	1.77	8200	17	410	0.89 U	1.1 U	1.2 U	1.2 U	1.1 U	1.1 U
METALS BY 7471A												
Mercury	mg/Kg	0.13	0.696	17	2.1	3	0.02 J	0.021 J	0.027 J	0.026 J	0.017 J	0.026 J
GENERAL CHEMISTRY BY MOISTURE												
Percent Moisture	%	-	-	-	-	-	48.6	53.5	59.9	60	54	55.8

Notes:
Residential Direct Exposure SCTL exceedance
TEL - Toxic Effect Concentration
PEL - Probable effect level
SQAGs - Numerical Sediment Quality Assessment Guidelines
Bold indicates TEL exceedance
Bold with PEL Exc label = PEL exceedance
mg/Kg - milligrams per kilogram
J- Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U - Indicates that the compound was analyzed for but not detected.
F1 - MS and/or MSD Recovery is outside acceptance limits
F2 - MS/MSD RPD exceeds control limits
* Contaminant is not a health concern for this exposure scenario.
** Direct exposure based on acute toxicity considerations
*** Leachability values may be derived using the SPLP Test to calculate site-specific SCTLs or may be determined using TCLP in the event oily wastes are present
# = Site concentrations for carcinogenic polycyclic aromatic hydrocarbons must be converted to Benzo(a)pyrene equivalents before comparison with the appropriate direct exposure SCTL for Benzo(a)pyrene using the approach described in the February 2005 'Final Technical Report: Development of Cleanup Target Levels (CTLs) for Chapter 62-777, F.A.C.'
ID - insufficient data to derive sediment quality assessment guidelines
**** - Total PCB TEC = 0.0216 mg/kg and PEC = 0.189 mg/kg
- not listed in the SQAG guidelines or SCTL tables
NR - not required

Client Sample ID: Composite Sample (CS #1)

Lab Sample ID: 660-74597-1

Date Collected: 06/22/16 13:30
Matrix: Solid
Date Received: 06/23/16 09:25
Percent Solids: 51.4

Method: 8270C LL - Semivolatile Organic Compounds by GCMS - Low Levels

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	0.012	U	0.012	0.0019	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
2-Methylnaphthalene	0.012	U	0.012	0.0019	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
Acenaphthene	0.012	U	0.012	0.0019	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
Acenaphthylene	0.012	U	0.012	0.0019	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
Anthracene	0.012	U	0.012	0.0019	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
Benzo[a]anthracene	0.012	U	0.012	0.0019	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
Benzo[a]pyrene	0.012	U	0.012	0.0019	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
Benzo[b]fluoranthene	0.012	U	0.012	0.0019	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
Benzo[g,h,i]perylene	0.012	U	0.012	0.0038	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
Benzo[k]fluoranthene	0.012	U	0.012	0.0019	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
Chrysene	0.012	U	0.012	0.0019	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
Dibenz(a,h)anthracene	0.012	U	0.012	0.0038	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
Fluoranthene	**0.0039**	**J**	0.012	0.0019	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
Fluorene	0.012	U	0.012	0.0019	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
Indeno[1,2,3-cd]pyrene	0.012	U	0.012	0.0038	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
Naphthalene	0.012	U	0.012	0.0019	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
Phenanthrene	**0.0030**	**J**	0.012	0.0019	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1
Pyrene	**0.0021**	**J**	0.012	0.0019	mg/Kg	☼	06/25/16 09:51	06/28/16 03:06	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*71*		*27 - 127*	*06/25/16 09:51*	*06/28/16 03:06*	*1*
Nitrobenzene-d5	*73*		*15 - 136*	*06/25/16 09:51*	*06/28/16 03:06*	*1*
Terphenyl-d14	*60*		*24 - 146*	*06/25/16 09:51*	*06/28/16 03:06*	*1*

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	3.2	U	3.2	1.2	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
alpha-BHC	3.2	U	3.2	0.46	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
beta-BHC	3.2	U	3.2	0.95	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
delta-BHC	3.2	U	3.2	0.61	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
gamma-BHC (Lindane)	3.2	U	3.2	0.42	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
alpha-Chlordane	3.2	U	3.2	0.53	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
gamma-Chlordane	3.2	U	3.2	0.51	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
4,4'-DDD	3.2	U	3.2	0.36	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
4,4'-DDE	3.2	U	3.2	0.51	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
4,4'-DDT	3.2	U	3.2	1.5	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
Dieldrin	3.2	U	3.2	0.68	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
Endosulfan I	3.2	U	3.2	0.40	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
Endosulfan II	3.2	U	3.2	0.44	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
Endosulfan sulfate	3.2	U	3.2	0.40	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
Endrin	3.2	U	3.2	0.36	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
Endrin aldehyde	3.2	U	3.2	0.55	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
Endrin ketone	3.2	U	3.2	0.66	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
Heptachlor	3.2	U	3.2	0.46	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
Heptachlor epoxide	3.2	U	3.2	0.85	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
Methoxychlor	3.2	U	3.2	0.63	ug/Kg	☼	06/25/16 10:38	06/29/16 17:49	1
Toxaphene	190	U	190	55	ug/Kg	☼	06/25/16 10:38	06/28/16 05:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*37*		*26 - 129*	*06/25/16 10:38*	*06/29/16 17:49*	*1*

Client Sample ID: Composite Sample (CS #1)
Date Collected: 06/22/16 13:30
Date Received: 06/23/16 09:25

Lab Sample ID: 660-74597-1
Matrix: Solid
Percent Solids: 51.4

Method: 8081B - Organochlorine Pesticides (GC) (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Tetrachloro-m-xylene	*28*	*X*	*31 - 122*	*06/25/16 10:38*	*06/29/16 17:49*	*1*

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	32	U	32	4.6	ug/Kg	☼	06/25/16 10:38	06/28/16 05:09	1
PCB-1221	32	U	32	15	ug/Kg	☼	06/25/16 10:38	06/28/16 05:09	1
PCB-1232	32	U	32	21	ug/Kg	☼	06/25/16 10:38	06/28/16 05:09	1
PCB-1242	32	U	32	16	ug/Kg	☼	06/25/16 10:38	06/28/16 05:09	1
PCB-1248	32	U	32	6.3	ug/Kg	☼	06/25/16 10:38	06/28/16 05:09	1
PCB-1254	32	U	32	4.0	ug/Kg	☼	06/25/16 10:38	06/28/16 05:09	1
PCB-1260	32	U	32	2.3	ug/Kg	☼	06/25/16 10:38	06/28/16 05:09	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCB Decachlorobiphenyl	*38*		*26 - 129*	*06/25/16 10:38*	*06/28/16 05:09*	*1*
Tetrachloro-m-xylene	*31*		*31 - 122*	*06/25/16 10:38*	*06/28/16 05:09*	*1*

Method: 8151A - Herbicides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.39	U	0.39	0.021	mg/Kg	☼	06/27/16 07:42	06/29/16 18:38	1
2,4-DB	0.029	U	0.029	0.014	mg/Kg	☼	06/27/16 07:42	06/29/16 18:38	1
2,4,5-T	0.077	U	0.077	0.0066	mg/Kg	☼	06/27/16 07:42	06/29/16 18:38	1
Silvex (2,4,5-TP)	0.077	U	0.077	0.033	mg/Kg	☼	06/27/16 07:42	06/29/16 18:38	1
Dalapon	0.039	F1 U	0.039	0.019	mg/Kg	☼	06/27/16 07:42	07/05/16 18:02	1
Dicamba	0.12	U	0.12	0.0052	mg/Kg	☼	06/27/16 07:42	06/29/16 18:38	1
Dichlorprop	0.25	U	0.25	0.0064	mg/Kg	☼	06/27/16 07:42	06/29/16 18:38	1
Dinoseb	0.39	U	0.39	0.033	mg/Kg	☼	06/27/16 07:42	06/29/16 18:38	1
MCPA	96	U	96	1.7	mg/Kg	☼	06/27/16 07:42	06/29/16 18:38	1
MCPP	96	F1 U	96	0.77	mg/Kg	☼	06/27/16 07:42	06/29/16 18:38	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2,4-Dichlorophenylacetic acid	*55*		*10 - 150*	*06/27/16 07:42*	*06/29/16 18:38*	*1*

Method: FL-PRO - Florida - Petroleum Range Organics (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C8-C40	**76**		20	3.3	mg/Kg	☼	06/27/16 09:21	06/28/16 17:10	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
n-C39	*101*		*60 - 118*	*06/27/16 09:21*	*06/28/16 17:10*	*1*
o-Terphenyl	*74*		*62 - 109*	*06/27/16 09:21*	*06/28/16 17:10*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**2.4**		1.8	0.71	mg/Kg	☼	06/26/16 12:31	06/27/16 16:48	1
Barium	**9.9**		1.8	0.36	mg/Kg	☼	06/26/16 12:31	06/27/16 16:48	1
Cadmium	0.89	U	0.89	0.18	mg/Kg	☼	06/26/16 12:31	06/27/16 16:48	1
Chromium	**11**		1.8	0.36	mg/Kg	☼	06/26/16 12:31	06/27/16 16:48	1
Copper	**18**		3.6	0.36	mg/Kg	☼	06/26/16 12:31	06/27/16 16:48	1
Lead	**3.3**		1.8	0.36	mg/Kg	☼	06/26/16 12:31	06/27/16 16:48	1
Selenium	**1.2**	**J**	3.6	0.71	mg/Kg	☼	06/26/16 12:31	06/27/16 16:48	1
Silver	0.89	U	0.89	0.36	mg/Kg	☼	06/26/16 12:31	06/27/16 16:48	1

Client Sample ID: Composite Sample (CS #1)

Lab Sample ID: 660-74597-1
Date Collected: 06/22/16 13:30
Matrix: Solid
Date Received: 06/23/16 09:25
Percent Solids: 51.4

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.025	U	0.025	0.010	mg/L		06/26/16 09:58	06/27/16 20:03	1
Arsenic	0.050	U	0.050	0.020	mg/L		06/26/16 09:58	06/27/16 20:03	1
Barium	**0.096**	**J**	5.0	0.050	mg/L		06/26/16 09:58	06/27/16 20:03	1
Cadmium	0.025	U	0.025	0.0050	mg/L		06/26/16 09:58	06/27/16 20:03	1
Chromium	0.050	U	0.050	0.010	mg/L		06/26/16 09:58	06/27/16 20:03	1
Lead	**0.016**	**J**	0.050	0.010	mg/L		06/26/16 09:58	06/27/16 20:03	1
Selenium	0.10	U	0.10	0.020	mg/L		06/26/16 09:58	06/27/16 20:03	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	1.6	U	1.6	0.56	ug/L		06/26/16 11:15	06/27/16 14:06	1

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.020**	**J**	0.024	0.015	mg/Kg	☼	06/24/16 14:06	06/27/16 11:43	1

Method: D1140 - Amount of Material Finer than 75 um

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Finer than #200 Sieve	**70.1**				Percent			06/25/16 12:50	1
Moisture Content	**122.5**				%			06/25/16 12:50	1

Method: D2974 - Moisture, Ash and Organic Matter

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Matter	**4.9**				%			06/25/16 12:46	1
Moisture Content	**122.5**				%			06/25/16 12:46	1
Ash Content	**95.1**				%			06/25/16 12:46	1
Fractional Organic Carbon	**2.9**				%			06/25/16 12:46	1

Method: D422 - Grain Size

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Gravel	**4.0**				%			06/25/16 13:42	1
Sieve Size 3 inch - Percent Finer	**100.0**				% Passing			06/25/16 13:42	1
Sand	**26.4**				%			06/25/16 13:42	1
Sieve Size 2 inch - Percent Finer	**100.0**				% Passing			06/25/16 13:42	1
Coarse Sand	**3.0**				%			06/25/16 13:42	1
Sieve Size 1.5 inch - Percent Finer	**100.0**				% Passing			06/25/16 13:42	1
Medium Sand	**3.5**				%			06/25/16 13:42	1
Sieve Size 1 inch - Percent Finer	**100.0**				% Passing			06/25/16 13:42	1
Fine Sand	**19.9**				%			06/25/16 13:42	1
Sieve Size 0.75 inch - Percent Finer	**100.0**				% Passing			06/25/16 13:42	1
Sieve Size 0.375 inch - Percent Finer	**100.0**				% Passing			06/25/16 13:42	1
Silt	**46.4**				%			06/25/16 13:42	1
Clay	**23.2**				%			06/25/16 13:42	1
Sieve Size #4 - Percent Finer	**96.0**				% Passing			06/25/16 13:42	1
Sieve Size #10 - Percent Finer	**93.0**				% Passing			06/25/16 13:42	1
Sieve Size #20 - Percent Finer	**91.3**				% Passing			06/25/16 13:42	1
Sieve Size #40 - Percent Finer	**89.5**				% Passing			06/25/16 13:42	1
Sieve Size #60 - Percent Finer	**86.6**				% Passing			06/25/16 13:42	1
Sieve Size #80 - Percent Finer	**83.7**				% Passing			06/25/16 13:42	1

Client: AMEC Foster Wheeler E & I, Inc
Project/Site: Canal 278 Eden Pines

TestAmerica Job ID: 660-74597-1

Client Sample ID: Composite Sample (CS #1)
Date Collected: 06/22/16 13:30
Date Received: 06/23/16 09:25

Lab Sample ID: 660-74597-1
Matrix: Solid
Percent Solids: 51.4

Method: D422 - Grain Size (Continued)

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Sieve Size #100 - Percent Finer	81.0				% Passing			06/25/16 13:42	1
Sieve Size #200 - Percent Finer	69.6				% Passing			06/25/16 13:42	1
Hydrometer Reading 1 - Percent Finer	38.4				% Passing			06/25/16 13:42	1
Hydrometer Reading 2 - Percent Finer	35.6				% Passing			06/25/16 13:42	1
Hydrometer Reading 3 - Percent Finer	30.1				% Passing			06/25/16 13:42	1
Hydrometer Reading 4 - Percent Finer	24.5				% Passing			06/25/16 13:42	1
Hydrometer Reading 5 - Percent Finer	23.2				% Passing			06/25/16 13:42	1
Hydrometer Reading 6 - Percent Finer	16.2				% Passing			06/25/16 13:42	1
Hydrometer Reading 7 - Percent Finer	13.5				% Passing			06/25/16 13:42	1

Client Sample ID: Composite Sample (CS #2)

Lab Sample ID: 660-74597-2

Date Collected: 06/22/16 13:35
Matrix: Solid
Date Received: 06/23/16 09:25
Percent Solids: 46.5

Method: 8270C LL - Semivolatile Organic Compounds by GCMS - Low Levels

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
2-Methylnaphthalene	**0.0061**	**J**	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
Acenaphthene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
Acenaphthylene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
Anthracene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
Benzo[a]anthracene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
Benzo[a]pyrene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
Benzo[b]fluoranthene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
Benzo[g,h,i]perylene	0.014	U	0.014	0.0043	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
Benzo[k]fluoranthene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
Chrysene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
Dibenz(a,h)anthracene	0.014	U	0.014	0.0043	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
Fluoranthene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
Fluorene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
Indeno[1,2,3-cd]pyrene	0.014	U	0.014	0.0043	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
Naphthalene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
Phenanthrene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1
Pyrene	**0.0024**	**J**	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 03:32	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*70*		*27 - 127*	*06/25/16 09:51*	*06/28/16 03:32*	*1*
Nitrobenzene-d5	*80*		*15 - 136*	*06/25/16 09:51*	*06/28/16 03:32*	*1*
Terphenyl-d14	*73*		*24 - 146*	*06/25/16 09:51*	*06/28/16 03:32*	*1*

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	3.6	U	3.6	1.3	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
alpha-BHC	3.6	U	3.6	0.51	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
beta-BHC	3.6	U	3.6	1.1	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
delta-BHC	3.6	U	3.6	0.68	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
gamma-BHC (Lindane)	3.6	U	3.6	0.46	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
alpha-Chlordane	3.6	U	3.6	0.59	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
gamma-Chlordane	3.6	U	3.6	0.57	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
4,4'-DDD	3.6	U	3.6	0.40	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
4,4'-DDE	3.6	U	3.6	0.57	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
4,4'-DDT	3.6	U	3.6	1.6	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
Dieldrin	3.6	U	3.6	0.76	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
Endosulfan I	3.6	U	3.6	0.44	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
Endosulfan II	3.6	U	3.6	0.49	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
Endosulfan sulfate	3.6	U	3.6	0.44	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
Endrin	3.6	U	3.6	0.40	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
Endrin aldehyde	3.6	U	3.6	0.61	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
Endrin ketone	3.6	U	3.6	0.74	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
Heptachlor	**1.5**	**J**	3.6	0.51	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
Heptachlor epoxide	3.6	U	3.6	0.95	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
Methoxychlor	3.6	U	3.6	0.70	ug/Kg	☼	06/25/16 10:38	06/29/16 17:24	1
Toxaphene	210	U	210	61	ug/Kg	☼	06/25/16 10:38	06/28/16 04:44	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*41*		*26 - 129*	*06/25/16 10:38*	*06/29/16 17:24*	*1*

Client Sample ID: Composite Sample (CS #2)

Lab Sample ID: 660-74597-2
Date Collected: 06/22/16 13:35
Matrix: Solid
Date Received: 06/23/16 09:25
Percent Solids: 46.5

Method: 8081B - Organochlorine Pesticides (GC) (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Tetrachloro-m-xylene	*28*	*X*	*31 - 122*	*06/25/16 10:38*	*06/29/16 17:24*	*1*

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	36	U	36	5.1	ug/Kg	☼	06/25/16 10:38	06/28/16 04:44	1
PCB-1221	36	U	36	17	ug/Kg	☼	06/25/16 10:38	06/28/16 04:44	1
PCB-1232	36	U	36	23	ug/Kg	☼	06/25/16 10:38	06/28/16 04:44	1
PCB-1242	36	U	36	17	ug/Kg	☼	06/25/16 10:38	06/28/16 04:44	1
PCB-1248	36	U	36	7.0	ug/Kg	☼	06/25/16 10:38	06/28/16 04:44	1
PCB-1254	36	U	36	4.4	ug/Kg	☼	06/25/16 10:38	06/28/16 04:44	1
PCB-1260	36	U	36	2.5	ug/Kg	☼	06/25/16 10:38	06/28/16 04:44	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCB Decachlorobiphenyl	*42*		*26 - 129*	*06/25/16 10:38*	*06/28/16 04:44*	*1*
Tetrachloro-m-xylene	*34*		*31 - 122*	*06/25/16 10:38*	*06/28/16 04:44*	*1*

Method: 8151A - Herbicides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.43	U	0.43	0.023	mg/Kg	☼	06/27/16 07:42	06/29/16 19:07	1
2,4-DB	0.032	U	0.032	0.015	mg/Kg	☼	06/27/16 07:42	06/29/16 19:07	1
2,4,5-T	0.085	U	0.085	0.0072	mg/Kg	☼	06/27/16 07:42	06/29/16 19:07	1
Silvex (2,4,5-TP)	0.085	U	0.085	0.036	mg/Kg	☼	06/27/16 07:42	06/29/16 19:07	1
Dalapon	0.043	U	0.043	0.021	mg/Kg	☼	06/27/16 07:42	07/05/16 18:30	1
Dicamba	0.13	U	0.13	0.0057	mg/Kg	☼	06/27/16 07:42	06/29/16 19:07	1
Dichlorprop	0.28	U	0.28	0.0070	mg/Kg	☼	06/27/16 07:42	06/29/16 19:07	1
Dinoseb	0.43	U	0.43	0.036	mg/Kg	☼	06/27/16 07:42	06/29/16 19:07	1
MCPA	110	U	110	1.9	mg/Kg	☼	06/27/16 07:42	06/29/16 19:07	1
MCPP	110	U	110	0.85	mg/Kg	☼	06/27/16 07:42	06/29/16 19:07	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2,4-Dichlorophenylacetic acid	*60*		*10 - 150*	*06/27/16 07:42*	*06/29/16 19:07*	*1*

Method: FL-PRO - Florida - Petroleum Range Organics (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C8-C40	**52**		21	3.6	mg/Kg	☼	06/27/16 09:21	06/28/16 17:21	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
n-C39	*78*		*60 - 118*	*06/27/16 09:21*	*06/28/16 17:21*	*1*
o-Terphenyl	*59*	*X*	*62 - 109*	*06/27/16 09:21*	*06/28/16 17:21*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**3.3**		2.1	0.85	mg/Kg	☼	06/26/16 12:31	06/27/16 17:02	1
Barium	**11**		2.1	0.43	mg/Kg	☼	06/26/16 12:31	06/27/16 17:02	1
Cadmium	1.1	U	1.1	0.21	mg/Kg	☼	06/26/16 12:31	06/27/16 17:02	1
Chromium	**13**		2.1	0.43	mg/Kg	☼	06/26/16 12:31	06/27/16 17:02	1
Copper	**20**		4.3	0.43	mg/Kg	☼	06/26/16 12:31	06/27/16 17:02	1
Lead	**3.1**		2.1	0.43	mg/Kg	☼	06/26/16 12:31	06/27/16 17:02	1
Selenium	**0.90**	**J**	4.3	0.85	mg/Kg	☼	06/26/16 12:31	06/27/16 17:02	1
Silver	1.1	U	1.1	0.43	mg/Kg	☼	06/26/16 12:31	06/27/16 17:02	1

Client: AMEC Foster Wheeler E & I, Inc
Project/Site: Canal 278 Eden Pines

TestAmerica Job ID: 660-74597-1

Client Sample ID: Composite Sample (CS #2)
Date Collected: 06/22/16 13:35
Date Received: 06/23/16 09:25

Lab Sample ID: 660-74597-2
Matrix: Solid
Percent Solids: 46.5

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.025	U	0.025	0.010	mg/L		06/26/16 09:58	06/27/16 20:19	1
Arsenic	0.050	U	0.050	0.020	mg/L		06/26/16 09:58	06/27/16 20:19	1
Barium	**0.11**	**J**	5.0	0.050	mg/L		06/26/16 09:58	06/27/16 20:19	1
Cadmium	0.025	U	0.025	0.0050	mg/L		06/26/16 09:58	06/27/16 20:19	1
Chromium	0.050	U	0.050	0.010	mg/L		06/26/16 09:58	06/27/16 20:19	1
Lead	**0.025**	**J**	0.050	0.010	mg/L		06/26/16 09:58	06/27/16 20:19	1
Selenium	0.10	U	0.10	0.020	mg/L		06/26/16 09:58	06/27/16 20:19	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	1.6	U	1.6	0.56	ug/L		06/26/16 11:15	06/27/16 14:16	1

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.021**	**J**	0.028	0.017	mg/Kg	☼	06/24/16 14:06	06/27/16 11:45	1

Client Sample ID: Composite Sample (CS #3)

Lab Sample ID: 660-74597-3
Date Collected: 06/22/16 13:40
Matrix: Solid
Date Received: 06/23/16 09:25
Percent Solids: 40.1

Method: 8270C LL - Semivolatile Organic Compounds by GCMS - Low Levels

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
2-Methylnaphthalene	**0.0057**	**J**	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
Acenaphthene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
Acenaphthylene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
Anthracene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
Benzo[a]anthracene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
Benzo[a]pyrene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
Benzo[b]fluoranthene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
Benzo[g,h,i]perylene	0.016	U	0.016	0.0049	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
Benzo[k]fluoranthene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
Chrysene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
Dibenz(a,h)anthracene	0.016	U	0.016	0.0049	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
Fluoranthene	**0.0029**	**J**	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
Fluorene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
Indeno[1,2,3-cd]pyrene	0.016	U	0.016	0.0049	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
Naphthalene	**0.0025**	**J**	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
Phenanthrene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1
Pyrene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 03:57	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*65*		*27 - 127*	*06/25/16 09:51*	*06/28/16 03:57*	*1*
Nitrobenzene-d5	*69*		*15 - 136*	*06/25/16 09:51*	*06/28/16 03:57*	*1*
Terphenyl-d14	*67*		*24 - 146*	*06/25/16 09:51*	*06/28/16 03:57*	*1*

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	4.2	U	4.2	1.5	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
alpha-BHC	4.2	U	4.2	0.59	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
beta-BHC	4.2	U	4.2	1.2	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
delta-BHC	4.2	U	4.2	0.79	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
gamma-BHC (Lindane)	4.2	U	4.2	0.54	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
alpha-Chlordane	4.2	U	4.2	0.69	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
gamma-Chlordane	4.2	U	4.2	0.67	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
4,4'-DDD	4.2	U	4.2	0.47	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
4,4'-DDE	4.2	U	4.2	0.67	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
4,4'-DDT	4.2	U	4.2	1.9	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
Dieldrin	4.2	U	4.2	0.89	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
Endosulfan I	4.2	U	4.2	0.52	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
Endosulfan II	4.2	U	4.2	0.57	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
Endosulfan sulfate	4.2	U	4.2	0.52	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
Endrin	4.2	U	4.2	0.47	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
Endrin aldehyde	4.2	U	4.2	0.72	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
Endrin ketone	4.2	U	4.2	0.86	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
Heptachlor	4.2	U	4.2	0.59	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
Heptachlor epoxide	4.2	U	4.2	1.1	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
Methoxychlor	4.2	U	4.2	0.82	ug/Kg	☼	06/25/16 10:38	06/29/16 16:58	1
Toxaphene	250	U	250	72	ug/Kg	☼	06/25/16 10:38	06/28/16 04:19	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*42*		*26 - 129*	*06/25/16 10:38*	*06/29/16 16:58*	*1*

Client Sample ID: Composite Sample (CS #3)

Date Collected: 06/22/16 13:40
Date Received: 06/23/16 09:25

Lab Sample ID: 660-74597-3
Matrix: Solid
Percent Solids: 40.1

Method: 8081B - Organochlorine Pesticides (GC) (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Tetrachloro-m-xylene	*32*		*31 - 122*	*06/25/16 10:38*	*06/29/16 16:58*	*1*

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	42	U	42	5.9	ug/Kg	☼	06/25/16 10:38	06/28/16 04:19	1
PCB-1221	42	U	42	20	ug/Kg	☼	06/25/16 10:38	06/28/16 04:19	1
PCB-1232	42	U	42	27	ug/Kg	☼	06/25/16 10:38	06/28/16 04:19	1
PCB-1242	42	U	42	20	ug/Kg	☼	06/25/16 10:38	06/28/16 04:19	1
PCB-1248	42	U	42	8.2	ug/Kg	☼	06/25/16 10:38	06/28/16 04:19	1
PCB-1254	42	U	42	5.2	ug/Kg	☼	06/25/16 10:38	06/28/16 04:19	1
PCB-1260	42	U	42	3.0	ug/Kg	☼	06/25/16 10:38	06/28/16 04:19	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCB Decachlorobiphenyl	*44*		*26 - 129*	*06/25/16 10:38*	*06/28/16 04:19*	*1*
Tetrachloro-m-xylene	*40*		*31 - 122*	*06/25/16 10:38*	*06/28/16 04:19*	*1*

Method: 8151A - Herbicides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.50	U	0.50	0.027	mg/Kg	☼	06/27/16 07:42	06/29/16 19:35	1
2,4-DB	0.037	U	0.037	0.017	mg/Kg	☼	06/27/16 07:42	06/29/16 19:35	1
2,4,5-T	0.10	U	0.10	0.0085	mg/Kg	☼	06/27/16 07:42	06/29/16 19:35	1
Silvex (2,4,5-TP)	0.10	U	0.10	0.042	mg/Kg	☼	06/27/16 07:42	06/29/16 19:35	1
Dalapon	0.050	U	0.050	0.025	mg/Kg	☼	06/27/16 07:42	07/05/16 18:58	1
Dicamba	0.15	U	0.15	0.0067	mg/Kg	☼	06/27/16 07:42	06/29/16 19:35	1
Dichlorprop	0.32	U	0.32	0.0082	mg/Kg	☼	06/27/16 07:42	06/29/16 19:35	1
Dinoseb	0.50	U	0.50	0.042	mg/Kg	☼	06/27/16 07:42	06/29/16 19:35	1
MCPA	120	U	120	2.2	mg/Kg	☼	06/27/16 07:42	06/29/16 19:35	1
MCPP	120	U	120	1.0	mg/Kg	☼	06/27/16 07:42	06/29/16 19:35	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2,4-Dichlorophenylacetic acid	*72*		*10 - 150*	*06/27/16 07:42*	*06/29/16 19:35*	*1*

Method: FL-PRO - Florida - Petroleum Range Organics (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C8-C40	**67**		25	4.3	mg/Kg	☼	06/27/16 09:21	06/28/16 17:32	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
n-C39	*54*	*X*	*60 - 118*	*06/27/16 09:21*	*06/28/16 17:32*	*1*
o-Terphenyl	*49*	*X*	*62 - 109*	*06/27/16 09:21*	*06/28/16 17:32*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**3.8**		2.4	0.97	mg/Kg	☼	06/26/16 12:31	06/27/16 17:05	1
Barium	**11**		2.4	0.48	mg/Kg	☼	06/26/16 12:31	06/27/16 17:05	1
Cadmium	**0.42**	**J**	1.2	0.24	mg/Kg	☼	06/26/16 12:31	06/27/16 17:05	1
Chromium	**14**		2.4	0.48	mg/Kg	☼	06/26/16 12:31	06/27/16 17:05	1
Copper	**37**		4.8	0.48	mg/Kg	☼	06/26/16 12:31	06/27/16 17:05	1
Lead	**5.4**		2.4	0.48	mg/Kg	☼	06/26/16 12:31	06/27/16 17:05	1
Selenium	**3.0**	**J**	4.8	0.97	mg/Kg	☼	06/26/16 12:31	06/27/16 17:05	1
Silver	1.2	U	1.2	0.48	mg/Kg	☼	06/26/16 12:31	06/27/16 17:05	1

Client Sample ID: Composite Sample (CS #3)

Lab Sample ID: 660-74597-3
Date Collected: 06/22/16 13:40
Matrix: Solid
Date Received: 06/23/16 09:25
Percent Solids: 40.1

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.025	U	0.025	0.010	mg/L		06/26/16 09:58	06/27/16 20:23	1
Arsenic	0.050	U	0.050	0.020	mg/L		06/26/16 09:58	06/27/16 20:23	1
Barium	**0.12**	**J**	5.0	0.050	mg/L		06/26/16 09:58	06/27/16 20:23	1
Cadmium	0.025	U	0.025	0.0050	mg/L		06/26/16 09:58	06/27/16 20:23	1
Chromium	**0.011**	**J**	0.050	0.010	mg/L		06/26/16 09:58	06/27/16 20:23	1
Lead	**0.023**	**J**	0.050	0.010	mg/L		06/26/16 09:58	06/27/16 20:23	1
Selenium	0.10	U	0.10	0.020	mg/L		06/26/16 09:58	06/27/16 20:23	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	1.6	U	1.6	0.56	ug/L		06/26/16 11:15	06/27/16 14:17	1

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.027**	**J**	0.032	0.019	mg/Kg	☼	06/24/16 14:06	06/27/16 11:46	1

Client Sample ID: Composite Sample (CS #4)

Lab Sample ID: 660-74597-4

Date Collected: 06/22/16 13:45
Matrix: Solid
Date Received: 06/23/16 09:25
Percent Solids: 40.0

Method: 8270C LL - Semivolatile Organic Compounds by GCMS - Low Levels

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	**0.0046**	**J**	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
2-Methylnaphthalene	**0.0070**	**J**	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
Acenaphthene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
Acenaphthylene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
Anthracene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
Benzo[a]anthracene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
Benzo[a]pyrene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
Benzo[b]fluoranthene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
Benzo[g,h,i]perylene	0.016	U	0.016	0.0049	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
Benzo[k]fluoranthene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
Chrysene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
Dibenz(a,h)anthracene	0.016	U	0.016	0.0049	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
Fluoranthene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
Fluorene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
Indeno[1,2,3-cd]pyrene	0.016	U	0.016	0.0049	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
Naphthalene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
Phenanthrene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1
Pyrene	0.016	U	0.016	0.0025	mg/Kg	☼	06/25/16 09:51	06/28/16 04:23	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*72*		*27 - 127*	*06/25/16 09:51*	*06/28/16 04:23*	*1*
Nitrobenzene-d5	*74*		*15 - 136*	*06/25/16 09:51*	*06/28/16 04:23*	*1*
Terphenyl-d14	*76*		*24 - 146*	*06/25/16 09:51*	*06/28/16 04:23*	*1*

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	4.2	U	4.2	1.5	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
alpha-BHC	4.2	U	4.2	0.59	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
beta-BHC	**8.5**		4.2	1.2	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
delta-BHC	4.2	U	4.2	0.78	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
gamma-BHC (Lindane)	4.2	U	4.2	0.54	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
alpha-Chlordane	4.2	U	4.2	0.69	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
gamma-Chlordane	4.2	U	4.2	0.66	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
4,4'-DDD	4.2	U	4.2	0.46	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
4,4'-DDE	4.2	U	4.2	0.66	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
4,4'-DDT	4.2	U	4.2	1.9	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
Dieldrin	4.2	U	4.2	0.88	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
Endosulfan I	4.2	U	4.2	0.51	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
Endosulfan II	4.2	U	4.2	0.56	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
Endosulfan sulfate	4.2	U	4.2	0.51	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
Endrin	4.2	U	4.2	0.46	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
Endrin aldehyde	4.2	U	4.2	0.71	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
Endrin ketone	4.2	U	4.2	0.86	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
Heptachlor	4.2	U	4.2	0.59	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
Heptachlor epoxide	4.2	U	4.2	1.1	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
Methoxychlor	4.2	U	4.2	0.81	ug/Kg	☼	06/25/16 10:38	06/29/16 16:33	1
Toxaphene	240	U	240	71	ug/Kg	☼	06/25/16 10:38	06/28/16 03:53	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*34*		*26 - 129*	*06/25/16 10:38*	*06/29/16 16:33*	*1*

Client Sample ID: Composite Sample (CS #4)
Date Collected: 06/22/16 13:45
Date Received: 06/23/16 09:25

Lab Sample ID: 660-74597-4
Matrix: Solid
Percent Solids: 40.0

Method: 8081B - Organochlorine Pesticides (GC) (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Tetrachloro-m-xylene	*30*	*X*	*31 - 122*	*06/25/16 10:38*	*06/29/16 16:33*	*1*

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	42	U	42	5.9	ug/Kg	☼	06/25/16 10:38	06/28/16 03:53	1
PCB-1221	42	U	42	20	ug/Kg	☼	06/25/16 10:38	06/28/16 03:53	1
PCB-1232	42	U	42	27	ug/Kg	☼	06/25/16 10:38	06/28/16 03:53	1
PCB-1242	42	U	42	20	ug/Kg	☼	06/25/16 10:38	06/28/16 03:53	1
PCB-1248	42	U	42	8.1	ug/Kg	☼	06/25/16 10:38	06/28/16 03:53	1
PCB-1254	42	U	42	5.1	ug/Kg	☼	06/25/16 10:38	06/28/16 03:53	1
PCB-1260	42	U	42	2.9	ug/Kg	☼	06/25/16 10:38	06/28/16 03:53	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCB Decachlorobiphenyl	*36*		*26 - 129*	*06/25/16 10:38*	*06/28/16 03:53*	*1*
Tetrachloro-m-xylene	*32*		*31 - 122*	*06/25/16 10:38*	*06/28/16 03:53*	*1*

Method: 8151A - Herbicides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.50	U	0.50	0.028	mg/Kg	☼	07/01/16 14:17	07/05/16 23:13	1
2,4-DB	0.038	U	0.038	0.018	mg/Kg	☼	07/01/16 14:17	07/05/16 23:13	1
2,4,5-T	0.10	U	0.10	0.0086	mg/Kg	☼	07/01/16 14:17	07/05/16 23:13	1
Silvex (2,4,5-TP)	0.10	U	0.10	0.043	mg/Kg	☼	07/01/16 14:17	07/05/16 23:13	1
Dalapon	0.050	F1 U	0.050	0.025	mg/Kg	☼	07/01/16 14:17	07/05/16 23:13	1
Dicamba	0.15	U	0.15	0.0068	mg/Kg	☼	07/01/16 14:17	07/05/16 23:13	1
Dichlorprop	0.33	U	0.33	0.0083	mg/Kg	☼	07/01/16 14:17	07/05/16 23:13	1
Dinoseb	0.50	U	0.50	0.043	mg/Kg	☼	07/01/16 14:17	07/05/16 23:13	1
MCPA	130	U	130	2.2	mg/Kg	☼	07/01/16 14:17	07/05/16 23:13	1
MCPP	130	U	130	1.0	mg/Kg	☼	07/01/16 14:17	07/05/16 23:13	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2,4-Dichlorophenylacetic acid	*20*		*10 - 150*	*07/01/16 14:17*	*07/05/16 23:13*	*1*

Method: FL-PRO - Florida - Petroleum Range Organics (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C8-C40	**77**		25	4.3	mg/Kg	☼	06/27/16 09:21	06/28/16 17:43	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
n-C39	*70*		*60 - 118*	*06/27/16 09:21*	*06/28/16 17:43*	*1*
o-Terphenyl	*70*		*62 - 109*	*06/27/16 09:21*	*06/28/16 17:43*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**3.3**		2.4	0.95	mg/Kg	☼	06/26/16 12:31	06/27/16 17:09	1
Barium	**11**		2.4	0.48	mg/Kg	☼	06/26/16 12:31	06/27/16 17:09	1
Cadmium	1.2	U	1.2	0.24	mg/Kg	☼	06/26/16 12:31	06/27/16 17:09	1
Chromium	**15**		2.4	0.48	mg/Kg	☼	06/26/16 12:31	06/27/16 17:09	1
Copper	**33**		4.8	0.48	mg/Kg	☼	06/26/16 12:31	06/27/16 17:09	1
Lead	**4.8**		2.4	0.48	mg/Kg	☼	06/26/16 12:31	06/27/16 17:09	1
Selenium	**1.8**	**J**	4.8	0.95	mg/Kg	☼	06/26/16 12:31	06/27/16 17:09	1
Silver	1.2	U	1.2	0.48	mg/Kg	☼	06/26/16 12:31	06/27/16 17:09	1

Client Sample ID: Composite Sample (CS #4)

Lab Sample ID: 660-74597-4
Date Collected: 06/22/16 13:45
Matrix: Solid
Date Received: 06/23/16 09:25
Percent Solids: 40.0

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.025	U	0.025	0.010	mg/L		06/26/16 09:58	06/27/16 20:26	1
Arsenic	0.050	U	0.050	0.020	mg/L		06/26/16 09:58	06/27/16 20:26	1
Barium	**0.14**	**J**	5.0	0.050	mg/L		06/26/16 09:58	06/27/16 20:26	1
Cadmium	0.025	U	0.025	0.0050	mg/L		06/26/16 09:58	06/27/16 20:26	1
Chromium	**0.016**	**J**	0.050	0.010	mg/L		06/26/16 09:58	06/27/16 20:26	1
Lead	**0.018**	**J**	0.050	0.010	mg/L		06/26/16 09:58	06/27/16 20:26	1
Selenium	0.10	U	0.10	0.020	mg/L		06/26/16 09:58	06/27/16 20:26	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	1.6	U	1.6	0.56	ug/L		06/26/16 11:15	06/27/16 14:18	1

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.026**	**J**	0.033	0.020	mg/Kg	☼	06/24/16 14:06	06/27/16 11:55	1

Client Sample ID: Composite Sample (CS #5)

Lab Sample ID: 660-74597-5
Date Collected: 06/22/16 13:50
Matrix: Solid
Date Received: 06/23/16 09:25
Percent Solids: 46.0

Method: 8270C LL - Semivolatile Organic Compounds by GCMS - Low Levels

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
2-Methylnaphthalene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
Acenaphthene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
Acenaphthylene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
Anthracene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
Benzo[a]anthracene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
Benzo[a]pyrene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
Benzo[b]fluoranthene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
Benzo[g,h,i]perylene	0.014	U	0.014	0.0043	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
Benzo[k]fluoranthene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
Chrysene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
Dibenz(a,h)anthracene	0.014	U	0.014	0.0043	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
Fluoranthene	**0.0030**	**J**	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
Fluorene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
Indeno[1,2,3-cd]pyrene	0.014	U	0.014	0.0043	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
Naphthalene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
Phenanthrene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1
Pyrene	0.014	U	0.014	0.0021	mg/Kg	☼	06/25/16 09:51	06/28/16 04:49	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*77*		*27 - 127*	*06/25/16 09:51*	*06/28/16 04:49*	*1*
Nitrobenzene-d5	*85*		*15 - 136*	*06/25/16 09:51*	*06/28/16 04:49*	*1*
Terphenyl-d14	*81*		*24 - 146*	*06/25/16 09:51*	*06/28/16 04:49*	*1*

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	3.6	U	3.6	1.3	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
alpha-BHC	3.6	U	3.6	0.51	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
beta-BHC	3.6	U	3.6	1.1	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
delta-BHC	3.6	U	3.6	0.69	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
gamma-BHC (Lindane)	**5.2**		3.6	0.47	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
alpha-Chlordane	3.6	U	3.6	0.60	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
gamma-Chlordane	3.6	U	3.6	0.58	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
4,4'-DDD	3.6	U	3.6	0.41	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
4,4'-DDE	3.6	U	3.6	0.58	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
4,4'-DDT	3.6	U	3.6	1.6	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
Dieldrin	3.6	U	3.6	0.77	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
Endosulfan I	3.6	U	3.6	0.45	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
Endosulfan II	3.6	U	3.6	0.49	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
Endosulfan sulfate	3.6	U	3.6	0.45	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
Endrin	3.6	U	3.6	0.41	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
Endrin aldehyde	3.6	U	3.6	0.62	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
Endrin ketone	3.6	U	3.6	0.75	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
Heptachlor	3.6	U	3.6	0.51	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
Heptachlor epoxide	3.6	U	3.6	0.96	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
Methoxychlor	3.6	U	3.6	0.71	ug/Kg	☼	06/25/16 10:38	06/29/16 16:08	1
Toxaphene	210	U	210	62	ug/Kg	☼	06/25/16 10:38	06/28/16 03:28	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*43*		*26 - 129*	*06/25/16 10:38*	*06/29/16 16:08*	*1*

Client Sample ID: Composite Sample (CS #5)

Date Collected: 06/22/16 13:50
Date Received: 06/23/16 09:25

Lab Sample ID: 660-74597-5
Matrix: Solid
Percent Solids: 46.0

Method: 8081B - Organochlorine Pesticides (GC) (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Tetrachloro-m-xylene	*45*		*31 - 122*	*06/25/16 10:38*	*06/29/16 16:08*	*1*

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	36	U	36	5.1	ug/Kg	☼	06/25/16 10:38	06/28/16 03:28	1
PCB-1221	36	U	36	17	ug/Kg	☼	06/25/16 10:38	06/28/16 03:28	1
PCB-1232	36	U	36	24	ug/Kg	☼	06/25/16 10:38	06/28/16 03:28	1
PCB-1242	36	U	36	18	ug/Kg	☼	06/25/16 10:38	06/28/16 03:28	1
PCB-1248	36	U	36	7.1	ug/Kg	☼	06/25/16 10:38	06/28/16 03:28	1
PCB-1254	36	U	36	4.5	ug/Kg	☼	06/25/16 10:38	06/28/16 03:28	1
PCB-1260	36	U	36	2.6	ug/Kg	☼	06/25/16 10:38	06/28/16 03:28	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCB Decachlorobiphenyl	*48*		*26 - 129*	*06/25/16 10:38*	*06/28/16 03:28*	*1*
Tetrachloro-m-xylene	*41*		*31 - 122*	*06/25/16 10:38*	*06/28/16 03:28*	*1*

Method: 8151A - Herbicides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.43	U	0.43	0.024	mg/Kg	☼	06/27/16 07:42	06/29/16 20:32	1
2,4-DB	0.032	U	0.032	0.015	mg/Kg	☼	06/27/16 07:42	06/29/16 20:32	1
2,4,5-T	0.087	U	0.087	0.0074	mg/Kg	☼	06/27/16 07:42	06/29/16 20:32	1
Silvex (2,4,5-TP)	0.087	U	0.087	0.037	mg/Kg	☼	06/27/16 07:42	06/29/16 20:32	1
Dalapon	0.043	U	0.043	0.022	mg/Kg	☼	06/27/16 07:42	07/05/16 19:55	1
Dicamba	0.13	U	0.13	0.0058	mg/Kg	☼	06/27/16 07:42	06/29/16 20:32	1
Dichlorprop	0.28	U	0.28	0.0071	mg/Kg	☼	06/27/16 07:42	06/29/16 20:32	1
Dinoseb	0.43	U	0.43	0.037	mg/Kg	☼	06/27/16 07:42	06/29/16 20:32	1
MCPA	110	U	110	1.9	mg/Kg	☼	06/27/16 07:42	06/29/16 20:32	1
MCPP	110	U	110	0.87	mg/Kg	☼	06/27/16 07:42	06/29/16 20:32	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2,4-Dichlorophenylacetic acid	*51*		*10 - 150*	*06/27/16 07:42*	*06/29/16 20:32*	*1*

Method: FL-PRO - Florida - Petroleum Range Organics (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C8-C40	**84**		22	3.7	mg/Kg	☼	06/27/16 09:21	06/28/16 17:53	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
n-C39	*78*		*60 - 118*	*06/27/16 09:21*	*06/28/16 17:53*	*1*
o-Terphenyl	*75*		*62 - 109*	*06/27/16 09:21*	*06/28/16 17:53*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**2.5**		2.1	0.85	mg/Kg	☼	06/26/16 12:31	06/27/16 17:12	1
Barium	**11**		2.1	0.43	mg/Kg	☼	06/26/16 12:31	06/27/16 17:12	1
Cadmium	1.1	U	1.1	0.21	mg/Kg	☼	06/26/16 12:31	06/27/16 17:12	1
Chromium	**13**		2.1	0.43	mg/Kg	☼	06/26/16 12:31	06/27/16 17:12	1
Copper	**21**		4.3	0.43	mg/Kg	☼	06/26/16 12:31	06/27/16 17:12	1
Lead	**3.6**		2.1	0.43	mg/Kg	☼	06/26/16 12:31	06/27/16 17:12	1
Selenium	**1.3**	**J**	4.3	0.85	mg/Kg	☼	06/26/16 12:31	06/27/16 17:12	1
Silver	1.1	U	1.1	0.43	mg/Kg	☼	06/26/16 12:31	06/27/16 17:12	1

Client: AMEC Foster Wheeler E & I, Inc
Project/Site: Canal 278 Eden Pines

TestAmerica Job ID: 660-74597-1

Client Sample ID: Composite Sample (CS #5)
Date Collected: 06/22/16 13:50
Date Received: 06/23/16 09:25

Lab Sample ID: 660-74597-5
Matrix: Solid
Percent Solids: 46.0

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.025	U	0.025	0.010	mg/L		06/26/16 09:58	06/27/16 20:39	1
Arsenic	0.050	U	0.050	0.020	mg/L		06/26/16 09:58	06/27/16 20:39	1
Barium	**0.13**	**J**	5.0	0.050	mg/L		06/26/16 09:58	06/27/16 20:39	1
Cadmium	0.025	U	0.025	0.0050	mg/L		06/26/16 09:58	06/27/16 20:39	1
Chromium	**0.014**	**J**	0.050	0.010	mg/L		06/26/16 09:58	06/27/16 20:39	1
Lead	**0.025**	**J**	0.050	0.010	mg/L		06/26/16 09:58	06/27/16 20:39	1
Selenium	0.10	U	0.10	0.020	mg/L		06/26/16 09:58	06/27/16 20:39	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	1.6	U	1.6	0.56	ug/L		06/26/16 11:15	06/27/16 14:19	1

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.017**	**J**	0.028	0.017	mg/Kg	☼	06/24/16 14:06	06/27/16 11:57	1

Client Sample ID: Composite Sample (CS #6)

Lab Sample ID: 660-74597-6
Date Collected: 06/22/16 13:55
Matrix: Solid
Date Received: 06/23/16 09:25
Percent Solids: 44.2

Method: 8270C LL - Semivolatile Organic Compounds by GCMS - Low Levels

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	0.015	U	0.015	0.0022	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
2-Methylnaphthalene	0.015	U	0.015	0.0022	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
Acenaphthene	0.015	U	0.015	0.0022	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
Acenaphthylene	0.015	U	0.015	0.0022	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
Anthracene	0.015	U	0.015	0.0022	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
Benzo[a]anthracene	0.015	U	0.015	0.0022	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
Benzo[a]pyrene	0.015	U	0.015	0.0022	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
Benzo[b]fluoranthene	0.015	U	0.015	0.0022	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
Benzo[g,h,i]perylene	**0.0044**	**J**	0.015	0.0044	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
Benzo[k]fluoranthene	0.015	U	0.015	0.0022	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
Chrysene	0.015	U	0.015	0.0022	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
Dibenz(a,h)anthracene	0.015	U	0.015	0.0044	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
Fluoranthene	**0.0032**	**J**	0.015	0.0022	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
Fluorene	0.015	U	0.015	0.0022	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
Indeno[1,2,3-cd]pyrene	**0.0054**	**J**	0.015	0.0044	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
Naphthalene	0.015	U	0.015	0.0022	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
Phenanthrene	0.015	U	0.015	0.0022	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1
Pyrene	0.015	U	0.015	0.0022	mg/Kg	☼	06/25/16 09:51	06/28/16 02:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*65*		*27 - 127*	*06/25/16 09:51*	*06/28/16 02:41*	*1*
Nitrobenzene-d5	*74*		*15 - 136*	*06/25/16 09:51*	*06/28/16 02:41*	*1*
Terphenyl-d14	*68*		*24 - 146*	*06/25/16 09:51*	*06/28/16 02:41*	*1*

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aldrin	3.8	F2 U	3.8	1.4	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
alpha-BHC	3.8	F2 U	3.8	0.53	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
beta-BHC	3.8	F2 U	3.8	1.1	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
delta-BHC	3.8	F2 U	3.8	0.71	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
gamma-BHC (Lindane)	3.8	F2 U	3.8	0.49	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
alpha-Chlordane	3.8	F2 U	3.8	0.62	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
gamma-Chlordane	3.8	F2 U	3.8	0.60	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
4,4'-DDD	3.8	F2 U	3.8	0.42	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
4,4'-DDE	3.8	F2 U	3.8	0.60	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
4,4'-DDT	3.8	F2 U	3.8	1.7	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
Dieldrin	3.8	F2 U	3.8	0.80	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
Endosulfan I	3.8	F2 U	3.8	0.47	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
Endosulfan II	3.8	F2 U	3.8	0.51	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
Endosulfan sulfate	3.8	F2 U	3.8	0.47	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
Endrin	3.8	F2 U	3.8	0.42	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
Endrin aldehyde	3.8	F2 U	3.8	0.64	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
Endrin ketone	3.8	F2 U	3.8	0.78	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
Heptachlor	3.8	F2 U	3.8	0.53	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
Heptachlor epoxide	3.8	F2 U	3.8	1.0	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
Methoxychlor	3.8	F2 U	3.8	0.73	ug/Kg	☼	06/25/16 10:38	06/29/16 15:24	1
Toxaphene	220	U	220	64	ug/Kg	☼	06/25/16 10:38	06/28/16 03:03	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*36*		*26 - 129*	*06/25/16 10:38*	*06/29/16 15:24*	*1*

Client Sample ID: Composite Sample (CS #6)

Date Collected: 06/22/16 13:55
Date Received: 06/23/16 09:25

Lab Sample ID: 660-74597-6
Matrix: Solid
Percent Solids: 44.2

Method: 8081B - Organochlorine Pesticides (GC) (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Tetrachloro-m-xylene	*32*		*31 - 122*	*06/25/16 10:38*	*06/29/16 15:24*	*1*

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	38	F1 U	38	5.3	ug/Kg	☼	06/25/16 10:38	06/28/16 03:03	1
PCB-1221	38	U	38	18	ug/Kg	☼	06/25/16 10:38	06/28/16 03:03	1
PCB-1232	38	U	38	24	ug/Kg	☼	06/25/16 10:38	06/28/16 03:03	1
PCB-1242	38	U	38	18	ug/Kg	☼	06/25/16 10:38	06/28/16 03:03	1
PCB-1248	38	U	38	7.3	ug/Kg	☼	06/25/16 10:38	06/28/16 03:03	1
PCB-1254	38	U	38	4.7	ug/Kg	☼	06/25/16 10:38	06/28/16 03:03	1
PCB-1260	38	F1 U	38	2.7	ug/Kg	☼	06/25/16 10:38	06/28/16 03:03	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCB Decachlorobiphenyl	*39*		*26 - 129*	*06/25/16 10:38*	*06/28/16 03:03*	*1*
Tetrachloro-m-xylene	*42*		*31 - 122*	*06/25/16 10:38*	*06/28/16 03:03*	*1*

Method: 8151A - Herbicides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.45	U	0.45	0.025	mg/Kg	☼	06/27/16 07:42	06/29/16 21:00	1
2,4-DB	0.033	U	0.033	0.016	mg/Kg	☼	06/27/16 07:42	06/29/16 21:00	1
2,4,5-T	0.089	U	0.089	0.0076	mg/Kg	☼	06/27/16 07:42	06/29/16 21:00	1
Silvex (2,4,5-TP)	0.089	U	0.089	0.038	mg/Kg	☼	06/27/16 07:42	06/29/16 21:00	1
Dalapon	0.045	U	0.045	0.022	mg/Kg	☼	06/27/16 07:42	07/05/16 20:23	1
Dicamba	0.13	U	0.13	0.0060	mg/Kg	☼	06/27/16 07:42	06/29/16 21:00	1
Dichlorprop	0.29	U	0.29	0.0074	mg/Kg	☼	06/27/16 07:42	06/29/16 21:00	1
Dinoseb	0.45	U	0.45	0.038	mg/Kg	☼	06/27/16 07:42	06/29/16 21:00	1
MCPA	110	U	110	1.9	mg/Kg	☼	06/27/16 07:42	06/29/16 21:00	1
MCPP	110	U	110	0.89	mg/Kg	☼	06/27/16 07:42	06/29/16 21:00	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2,4-Dichlorophenylacetic acid	*51*		*10 - 150*	*06/27/16 07:42*	*06/29/16 21:00*	*1*

Method: FL-PRO - Florida - Petroleum Range Organics (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C8-C40	**57**		23	3.9	mg/Kg	☼	06/27/16 09:21	06/28/16 18:04	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
n-C39	*85*		*60 - 118*	*06/27/16 09:21*	*06/28/16 18:04*	*1*
o-Terphenyl	*73*		*62 - 109*	*06/27/16 09:21*	*06/28/16 18:04*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**2.9**		2.2	0.88	mg/Kg	☼	06/26/16 12:31	06/27/16 17:16	1
Barium	**11**		2.2	0.44	mg/Kg	☼	06/26/16 12:31	06/27/16 17:16	1
Cadmium	1.1	U	1.1	0.22	mg/Kg	☼	06/26/16 12:31	06/27/16 17:16	1
Chromium	**13**		2.2	0.44	mg/Kg	☼	06/26/16 12:31	06/27/16 17:16	1
Copper	**21**		4.4	0.44	mg/Kg	☼	06/26/16 12:31	06/27/16 17:16	1
Lead	**3.7**		2.2	0.44	mg/Kg	☼	06/26/16 12:31	06/27/16 17:16	1
Selenium	**1.6**	**J**	4.4	0.88	mg/Kg	☼	06/26/16 12:31	06/27/16 17:16	1
Silver	1.1	U	1.1	0.44	mg/Kg	☼	06/26/16 12:31	06/27/16 17:16	1

Client: AMEC Foster Wheeler E & I, Inc
Project/Site: Canal 278 Eden Pines

TestAmerica Job ID: 660-74597-1

Client Sample ID: Composite Sample (CS #6)
Date Collected: 06/22/16 13:55
Date Received: 06/23/16 09:25

Lab Sample ID: 660-74597-6
Matrix: Solid
Percent Solids: 44.2

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.025	U	0.025	0.010	mg/L		06/26/16 09:58	06/27/16 20:43	1
Arsenic	0.050	U	0.050	0.020	mg/L		06/26/16 09:58	06/27/16 20:43	1
Barium	**0.087**	**J**	5.0	0.050	mg/L		06/26/16 09:58	06/27/16 20:43	1
Cadmium	0.025	U	0.025	0.0050	mg/L		06/26/16 09:58	06/27/16 20:43	1
Chromium	0.050	U	0.050	0.010	mg/L		06/26/16 09:58	06/27/16 20:43	1
Lead	**0.014**	**J**	0.050	0.010	mg/L		06/26/16 09:58	06/27/16 20:43	1
Selenium	0.10	U	0.10	0.020	mg/L		06/26/16 09:58	06/27/16 20:43	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	1.6	U	1.6	0.56	ug/L		06/26/16 11:15	06/27/16 14:20	1

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.026**	**J**	0.030	0.018	mg/Kg	☼	06/24/16 14:06	06/27/16 11:58	1