Prepared for:

LCP SITE STEERING COMMITTEE

DATA REPORT

RESULTS OF THE JULY 2011 SAMPLING IN THE FORMER BRUNSWICK-ALTAMAHA CANAL, SOUTH OF THE LCP CHEMICALS SITE BRUNSWICK GEORGIA

Prepared by:

EPS
900 Ashwood Parkway, Suite 350
Atlanta, Georgia 30338
Tel: 404-315-9113

October 11, 2011

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900 Ashwood Parkway, Suite 350
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Kirk Kessler

Kirk Kessler, Principal

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1 INTRODUCTION

1.1 Overview

This data report presents the results of sediment and fish tissue samples collected from the former Brunswick-Altamaha Canal, in a segment of the canal south of the LCP Chemicals Site in Brunswick, Georgia in July 2010. This sampling event was conducted pursuant to a request from the United States Environmental Protection Agency's ("EPA") in a letter to Honeywell dated November 17, 2010. The letter cited recommendations made by the Agency for Toxic Substances and Disease Registry ("ATSDR") regarding the need for additional characterization of sediment and fish tissue in a the segment of the former Brunswick-Altamaha Canal located to the south of the LCP Site to "determine if mercury and PCBs have migrated to and contaminated portions of the canal" (ATSDR 2010).

Representatives of Honeywell, EPA, and the Georgia Environmental Protection Division ("EPD") met on December 10, 2010 to discuss the general scope of work for the Altamaha Canal characterization. Subsequently, Honeywell submitted a draft Work Plan for this characterization on December 30, 2010 and received comments on the Work Plan from the agencies in a letter dated March 9, 2011. A revised Work Plan was submitted to EPA on March 31, 2011 (EPS 2011a).

In summary, and as set forth in more detail below, the results of the canal characterization reveal relatively low concentrations of constituents generally associated with the LCP site, in the sediment and fish tissue. Although sediment samples collected from the two-to-three northernmost locations in the canal (nearest the LCP Site) did contain the highest concentrations of mercury and Aroclor 1268. The average concentrations of these constituents within the canal were lower than the exposure point concentrations estimated for the marsh trespasser in Human Health Baseline Risk Assessment ("HHBRA") for the LCP Marsh. The HHBRA concluded that potential health risks for trespassers were within acceptable limits established by the EPA (EPS 2011b). The concentrations of site-related constituents in finfish and shellfish tissues were also substantially lower than the exposure point concentrations estimated in the same species for seafood consumers in the HHBRA for the LCP Marsh (EPS 2011b). The detected concentrations are also in line with recent historical observations from the area of the Turtle River that hydraulically communicates with the Altamaha canal via Academy Creek. Thus, the finfish and shellfish results are not unexpected in the context of the conditions in the broader Turtle River estuary and do not represent any special or unique concerns.

1.2 Background

The Brunswick-Altamaha Canal was constructed in the mid-1800s to serve as a transportation corridor between harbors at Brunswick, Georgia and the Altamaha River approximately 12 miles to the north. A segment of the canal once traversed the shoreline area along the west edge of the LCP Site uplands. However, the earliest available aerial photograph of the LCP Site taken in 1941 shows that the canal had been filled at that time across the LCP property. This is important because it pre-dates the first use of PCBs and the construction of the chlor-alkali plant (1956) at the Site. There is no surface expression of the canal on the LCP property today, nor is there direct surface water communication between the LCP marsh and the canal.

South of the LCP Site, the canal feature is preserved to a variable extent along the rest of its length to the southern terminus, where it flows through a culvert under T-Street near the City of Brunswick Publically-Owned Treatment Works (POTW) into Academy Creek, which connects with the Turtle River approximately one mile south of the Brunswick Cellulose Plant. Along this southern segment, the canal width varies from about 30 to 80 feet wide, with about 8 to 10 feet of vertical relief. The canal is tidally influenced along its entire length. The tide enters and exits through the culvert beneath T Street. A combination of dense vegetation along the eastern border of the canal and thick a thick layer of loose mud along the shorelines at low tide, serve to substantially limit foot traffic along this portion of the canal.

Several point-source and non-point-source discharges are evident along the canal from the adjoining properties of Brunswick Cellulose, Seldon Park, Greenwood Cemetery, Palmetto Cemetery, and the City of Brunswick POTW (see Figure 1 of the Canal Work Plan). A report entitled *Brunswick-Altamaha Canal Study,* prepared by the Brunswick-Glynn County Joint Planning Commission (1981), describes this portion of the canal as being littered by "bricks, bottles, and general domentic [sic] refuse." This condition persists today. During the sampling event, EPS personnel observed a significant amount of discarded solid waste (e.g., tires, appliances, drums, general litter, etc.) in numerous locations along this stretch of the canal (Photos 1 and 2). All of these sources potentially affect the condition of the canal sediments as well as finfish and shellfish that may inhabit or frequent the canal.

Photo 1

Photo 2

2 JULY 2011 FIELDWORK

2.1 Overview

Sediment and fish sampling in the Altamaha Canal was conducted by EPS personnel between July 11 and July 14, 2011. One or more representatives of the EPA and EPD were present to observe the sampling.

2.2 Sediment Sampling

Surficial sediment samples (upper 6 inches) were obtained twenty locations[1] within the canal segment between the West 9th Street (northern limit) and T Street (southern limit) at the City of Brunswick POTW. The sampling locations are shown on Figure 1. As specified in the Work Plan, geographic coordinates of each sample were determined prior to going into the field, using the Geographic Information System (GIS) project setup to generate a systematic grid across each 300-ft segment of the canal and using a random number selector to establish each grab sampling location.

In the field, the pre-determined sample locations were identified using Trimble portable Global Positioning System ("GPS") unit. Labeled stakes were driven into the sediment at each sampling location. Sediment samples were collected using a standard stainless steel hand auger assembly. Samples extracted by the auger were placed into a pre-cleaned stainless steel bowl, vegetative debris was removed, and the sample was thoroughly homogenized prior to placing aliquots into the appropriate, labeled sample jars. Labeled ample jars were stored in the dark at 4°C prior to and during shipment to the analytical laboratory under chain-of-custody protocol. These procedures are consistent with the EPA Region 4 Field Branches Quality System and Technical Procedures (EPA 2011a).

2.3 Fish Tissue Sampling

2.3.1 Fish Collection

The goal of this sampling event was to collect three replicate samples from each finfish and shellfish species. The fish collection was "opportunistic" and took place over three and a half days attempting to capture as many of target species specified in the Work Plan during that

[1] The Canal Work Plan stated that 18 sediment samples would be collected from the canal. However, a bifurcation in the canal near its southern terminus was observed and two additional samples were collected to characterize both channels.

period. A collection permit was acquired by EPS from the Georgia Department of Natural Resources (GDNR), Coastal Resources Division to allow capture and testing of fishes from the Altamaha Canal. Fish and shellfish were collected from areas near the southern terminus of the canal via deployment of gill nets, cast nets, and crab traps. As described in the Work Plan, the procedures for the fish and shellfish collection were consistent with the Sampling and Quality Assurance Plan (SQAP, Geosyntec 2002), prepared for the 2002 "seafood survey," and approved by the GDNR.

Gill nets were deployed from a small boat at slack high tide (after the majority of fish would have moved into the canal from the estuary) in an area immediately south of the culvert at T Street. The nets were spread across the full width of the canal to catch fish as they left during ebb tide (Photo 3). The nets were retrieved during low tide. Cast netting was conducted in an area to the north of T Street. Cast nets of two different mesh sizes were used to obtain striped mullet and white shrimp.

Photo 3

Multiple crab traps were deployed in the canal in areas immediately north and immediately south of T Street. The locations of the finfish and shellfish sampling are shown in Figure 2.

Through the combination of these collection methods, the following types and numbers of finfish and shellfish were collected:

- one spotted seatrout (*Cynoscion nebulosus*)
  - gill net

- one red drum (Sciaenops ocellatus)
  - gill net
- seven striped mullet (*Mugil cephalus*)
  - six with cast net, one with gill net
- fifteen blue crab (Callinectes *sapidus*)
  - twelve with traps, three with gill net
- approximately 108 white shrimp (*Penaeus spp.*)
  - cast net

All specimens were placed into coolers containing ice immediately after collection and transported in that condition to the LCP Site for processing.

2.3.2 On-Site Fish Processing Procedures

All fish were individually measured to the nearest 5 mm (fork length for striped mullet) on a fish measuring board and weighted to the nearest gram (Photo 4). Blue crabs were similarly measured (carapace width; point-to-point) and weighed. Samples of white shrimp (each consisting of 36 individuals) were weight. Table 1 provides details of the finfish and shellfish collected.

Photo 4

The finfishes were scaled and a dual sided fillet (including the belly flap portions) was taken from each fish. The fillet was placed in a Ziploc® bag, which was labeled with the Julian date, the abbreviated fish species, and the individual replicate number (e.g., for the first stripped mullet: 11193–SM–R1). The Ziploc® bags and associated fish fillets were stored in an on-site freezer under chain-of-custody seal until time to ship samples to the analytical laboratories. At the time of shipping, a bag containing fillets from an individual fish was placed into a larger, properly labeled Ziploc® bag, together with other bags of fish fillets constituting the complete composite sample, and placed into a cooler containing dry ice for shipping.

A similar process was used for blue crabs and white shrimp, except that for these species, several (crabs) to many (shrimp) individuals were grouped together in large Ziploc® bags. For shrimp, the heads were removed with a knife prior to grouping the individuals into three composite samples.

Protocols were followed during the on-site processing of all fishes to avoid cross-contamination of individual fish samples. For example, the board on which each finfish was scaled and filleted was covered with a sheet of aluminum that was replaced before processing of the next fish. Stainless-steel scaling and filleting knives used to process each finfish were decontaminated (with successive rinses of Alconox™, de-ionized water, and isopropanol) prior to their use with another fish. Finally, new nitrile gloves were used for the processing of each fish.

2.4 Sample Shipping

All coolers contained a chain-of-custody record, and were secured by custody seals prior to shipping. All sediment, finfish, and shellfish samples were shipped overnight via Federal Express. A cooler containing sediment samples for analysis of dioxins/furans was sent to the Test America laboratory in Sacramento, California. Coolers containing samples for all other analyses were sent to the Columbia Analytical Services (CAS) laboratory in Kelso, Washington. Shipping receipts with tracking numbers were obtained for each shipment.

2.5 Laboratory Processing / Analysis

2.5.1 Sediment

Sediment samples sent to the CAS laboratory in Kelso, Washington, were analyzed for total metals (including mercury), Aroclors (including Aroclor 1268), polycyclic aromatic hydrocarbons (PAHs), and moisture content. The inset table below contains information on the specific methods used in these analyses.

Sediment samples sent to the Test America laboratory in Sacramento, California, were analyzed for dioxins/furans by EPA Method EPA SW846 Method 8290. The laboratory analytical report includes results for the seven dioxin and ten furan congeners for which toxic equivalency factors ("TEFs") has been developed. TEFs are used to estimate the relative toxicity of different dioxin/furan congeners present in environmental samples, and are used to convert congener-specific data into equivalent concentrations of the congener 2,3,7,8-tetrachlordibenzo-p-dioxin ("TCDD").

Matrix	Method #	Parameter / Method Name
Sediment	160.3M	% moisture
	1631E	Trace mercury by CVAFS
	6010C/6020A	Trace metals by ICP/AES (6010) or ICP/MS (6020)
	8082A	Aroclors by GC
	8270D	SVOCs by GC/MS
	8290	PCDDs/PCDFs by HRGC/HRMS

2.5.2 Fish Tissue

The fish tissue samples sent to the CAS laboratory in Kelso, Washington, were were analyzed for total metals (including mercury), Aroclors (including Aroclor 1268), PAHs, moisture content, and lipid content. The inset table below contains information on the specific methods used in these analyses.

The laboratory prepared composite samples of fishes for chemical analyses prior to performing the actual analyses. This preparation was conducted according to detailed procedures outlined in the SQAP (Geosyntec 2002). For finfishes, these procedures consisted of ensuring that the weights of the ground fillets from all the individual fish in a composite sample were equal. For the composite samples of white shrimp (heads removed), laboratory preparation included removal of the exoskeleton, followed by homogenization of the edible tissue obtained from the shrimp in each composite. For the composite samples of blue crab, laboratory preparation included removal of the exoskeleton, removal of the claw and back meat, and homogenization of the edible tissue obtained from the crabs in each composite.

Matrix	Method #	Parameter / Method Name
Finfish and Shellfish Tissue	160.3M	% moisture
	D2216	% lipid
	1631E	Trace mercury by CVAFS
	6010C/6020A	Trace metals by ICP/AES (6010) or ICP/MS (6020)
	8082A	Aroclors by GC
	8270D	SVOCs by GC/MS

3 DATA QUALITY EVALUATION

Electronic Data Deliverables (EDDs) were obtained from both laboratories for inclusion in the "Master" project database. Before the data were uploaded to the database, a series of data quality checks were performed as described in the Work Plan (EPS 2011a). Briefly, the "raw" electronic data from each of the laboratory EDDs were imported into a "Build" database, assigned separate batch number, and subjected to a series of Quality Assurance/Quality Control (QA/QC) queries, which included

- Raw data were checked for duplicate records and if duplicate records existed, they were assigned a "Dup Code" based on the specific type of duplicate record;
- Analyte names were checked for spelling to ensure proper encoding;
- Units and laboratory analytical methods were checked to ensure proper encoding;
- Missing values were checked in order to prevent errors of omission;
- Sample ID and Sample Date pairs were checked against chain of custody forms and field log books to ensure proper encoding; and

All raw records were checked against the Master database's "Data" table to prevent duplicate entries.

These QA/QC queries did not identify any data quality issues with the EDDs provided by either Columbia Analytical Services or Test America. Accordingly, all of the data were added to the Master database and all temporary tables were deleted.

4 RESULTS

4.1 Overview

Analytical results from the 2011 Altamaha Canal sampling event were compared with conservative risk based screening levels developed by the EPA to evaluate the potential health risks associated with long-term, intensive exposure to chemicals in the environment (EPA 2011a,b).

4.2 Sediment

Tables 2 and 3 provide the analytical results of the sediment samples collected from the Altamaha Canal. Table 2 compares the concentrations of inorganic constituents, PCBs, and PAHs with EPA's Regional Screening Levels (RSLs) for residential soils (EPA 2011b). Most of the exposure assumptions used to derive these values are not applicable to any sediment, much less sediment in areas with low potential for repeated human contact. However, they are used here to provide a conservative preliminary evaluation of the concentrations of these constituents in the Altamaha Canal sediments.

Only three constituents were detected in one or more canal sediment samples at concentrations that exceeded the RSLs for residential soil. These were arsenic (20 of 20 samples), Aroclor 1262 (1 sample), Aroclor 1268 (1 sample), benzo(a)pyrene (16 of 20 samples), and dibenz(a,h)anthracene (1 sample).

Arsenic, benzo(a)pyrene, and dibenz(a,h)anthracene are commonly identified in this type of conservative risk-based screening. Arsenic is a metal that occurs naturally in the environment and background levels across Georgia are frequently around 10 mg/kg. Benzo(a)pyrene and dibenz(a,h)anthracene are formed as by products of combustion, and as a result, are ubiquitous in the environment. The concentrations of all three of these constituents in the canal samples are consistent with ambient background conditions and show no apparent spatial relationship within the canal.

Aroclor 1268 and Aroclor 1262 were the only PCBs detected in the canal sediment samples. Aroclor 1268 was detected in all of the canal sediment samples; however the only exceedence of the conservative residential soil RSL for Aroclor 1254[2] was in the sample from the northernmost sampling location (AL-A1-41). Across the length of the canal, the average concentration of Aroclor 1268 is well below the exposure point concentration estimated for the marsh trespasser in Human Health Baseline Risk Assessment ("HHBRA") for the LCP Marsh. That report

[2] Aroclor 1268 and Aroclor 1262 do not have RSL values developed by the EPA. The RSL value for Aroclor 1254 was used as a conservative surrogate for data screening purposes.

concluded that the potential risks to a marsh trespasser were within the acceptable limits established by the EPA. Although Aroclor 1262 is not a constituent of concern at the LCP Site, it was detected in samples from the two northernmost canal sampling locations (AL-A1-41 and AL-B1-89).

Mercury was detected below the conservative residential RSL values in all of the canal sediment samples.

Table 3 presents the results of the dioxin/furan analyses in four of the sediment samples[3] collected from the Altamaha Canal. The dioxin/furan data were converted to TCDD Equivalents ("TEQ") using the current World Health Organization ("WHO") TEFs (Van den Berg et al. 2006). The TEQ result from each sample was compared with the EPA's draft recommended interim preliminary remediation goal ("PRG") for TCDD TEQ of 72 nanograms per kilogram (ng/kg) for residential soil. The highest TEQ result was slightly above the 72 ng/kg draft PRG at a concentration of 130 ng/kg, while all other results were below this criterion. As noted previously, the use of a residential soil screening level for sediments is highly conservative.

4.3 Finfish and Shellfish Tissue

Tables 4 and 5 provide the analytical results of the finfish and shellfish samples, respectively, collected from the Altamaha Canal and compared these values with the RSLs for fish consumption (EPA 2011c). As with the soil RSLs, the RSLs for fish consumption are based on long-term, high-consumption rate exposure to chemicals in seafood and thus provide a highly conservative evaluation of potential health risk. As shown in these tables, arsenic and Aroclor 1268 were the only constituents that exceeded the fish RSLs.

For arsenic, although concentrations detected in every sample exceed the EPA RSLs, these concentrations do not represent an exposure concern. Finfishes and shellfishes are known to accumulate arsenic in their tissues where it is sequestered in organic complexes (e.g., arsenobetaine and arsenocholine, also known colloquially as "fish arsenic"). These organic forms of arsenic have been studied extensively and have been found to be essentially nontoxic (ATSDR 2000).

For Aroclor 1268, concentrations in all samples exceed the conservative fish RSL value. However, the significance of these results should be interpreted carefully. The concentrations of Aroclor 1268 in all samples collected from the Altamaha Canal are below (typically by more than an order of magnitude) the exposure point concentrations estimated for the same species in for seafood consumers in the HHBRA for the LCP Marsh (EPS 2011b).

Each year the GDNR publishes fish consumption guidelines (FCGs) for all of these species in four areas of the Turtle River estuary (DNR 2010). The current guidelines have been in place

[3] Work Plan called for the analysis of dioxins/furans in 20% of the sediment samples collected from the canal.

since the 2004 publication and are based on data from a seafood survey conducted in 2002. Using those survey data, the GDNR maintains the following FCGs for the Lower Turtle River[4]:

Species	2002 Concentration Range (µg/kg-ww)		FCG Recommendation	Basis
	Aroclor 1268	Total Mercury		
Red Drum	<100 - 456	0.31 - 240	1 meal/week	PCBs
Stripped Mullet	<100 - 504	12 - 22	1 meal/month	PCBs
Spotted Seatrout	<100 - 816	207 - 288	1 meal/week	PCBs, Mercury
Blue Crab	<100 (all ND)	137 - 494	1 meal/week	Mercury
White Shrimp	<100 (all ND)	24 - 66	No Restrictions	No Restrictions

ND = non-detect

As shown in the table above, the concentrations of Aroclor 1268 detected in finfish and shellfish collected from the Altamaha Canal are in the range of Aroclor 1268 concentrations in the same species of fish and shellfish collected from the zones that comprise the Lower Turtle River area during the 2002 survey. This is the same area of the Turtle River that communicates hydraulically with the Altamaha Canal via Academy Creek. Thus, the finfish and shellfish results from the canal sampling event are not unexpected in the context of the conditions in the broader Turtle River estuary and do not represent any special or unique concerns.

[4] Lower Turtle River defined by GDNR (2011) as Zone E (Turtle River from Channel Marker 9 to U.S. Hwy. 17), Zone F (South Brunswick River from its mouth to Hillary Creek and Fancy Bluff Creek), and Zone G (Brunswick River from U.S. Hwy 17 to Channel Marker 22 (Parsons Creek)).

5 CONCLUSIONS

As described in Section 1.2, observations of the section of the Altamaha Canal located south of the LCP Site show that it has limited appeal as a recreational resource. Access to the canal via foot is restricted along most of its length due to dense vegetation on near the banks and soft mud at low tide. The culvert under T Street at the canal's southern terminus prevents boat access via Academy Creek. In addition, the canal is littered with residential-type solid waste.

The results of the 2011 sampling event demonstrate that there is very little evidence direct migration of chemicals of concern (primarily mercury and Aroclor 1268) from the LCP Site to the Altamaha Canal.

Although the concentrations of Aroclor 1268 in tissues of finfish and shellfish collected from the Altamaha Canal exceeded conservative risk-based screening levels, the detected concentrations are in line with recent historical observations from the area of the Turtle River that hydraulically communicates with the canal via Academy Creek. Thus, the finfish and shellfish results are not unexpected in the context of the conditions in the broader Turtle River estuary and do not represent any special or unique concerns.

Based on the results of this sampling event, it is concluded that no further investigation of the Altamaha Canal south of the LCP Site.

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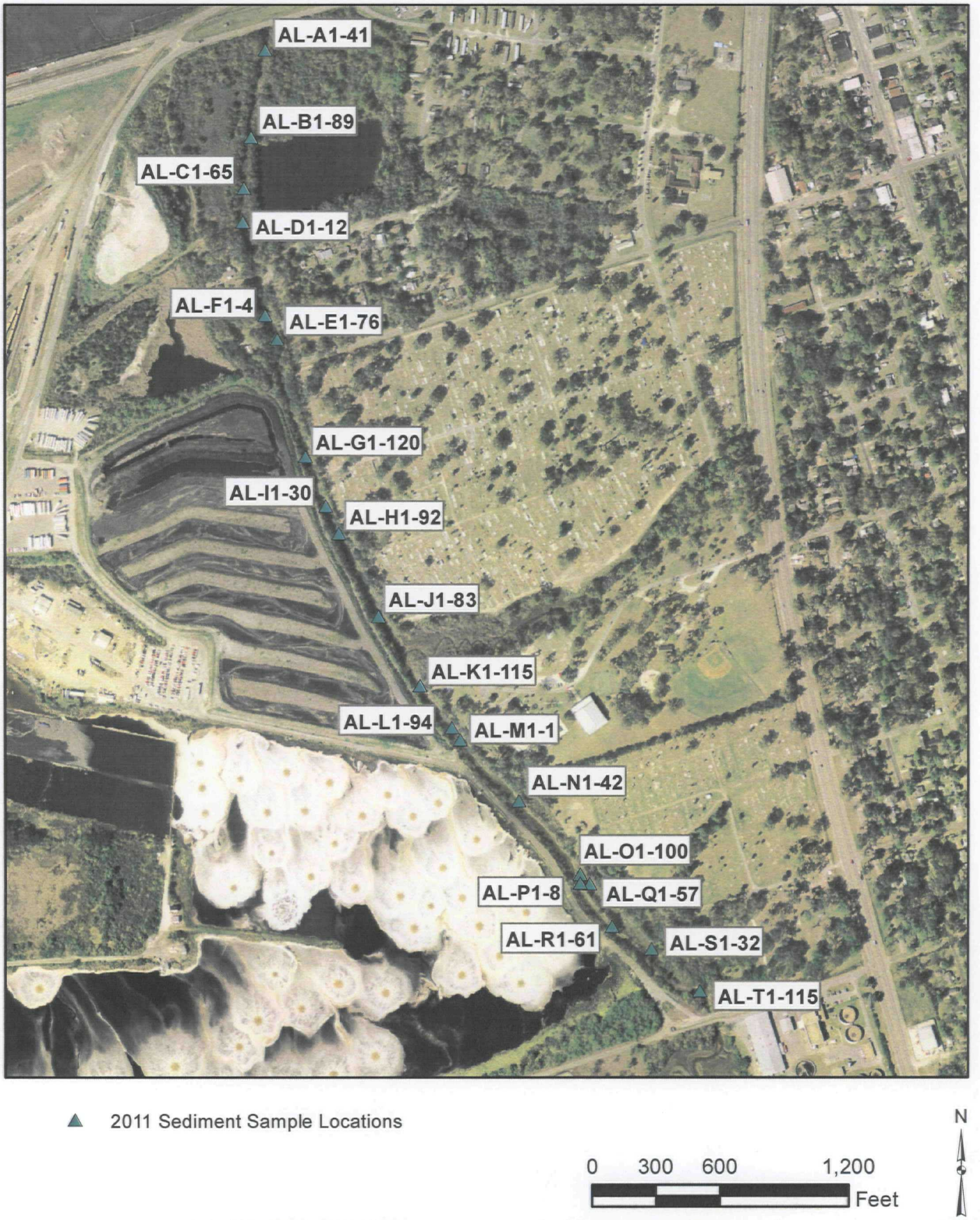
Figures

2011 Sediment Sampling Locations In Southern Segment of Brunswick-Altamaha Canal



Environmental Planning Specialists, Inc.

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Figure No.1

2011 Finfish and Shellfish Sampling Locations in the Southern Segment of Brunswick-Altamaha Canal

Environmental Planning Specialists, Inc.
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Figure No.2

Tables

Table 1
Details of Finfish and Shellfish Samples
Altamaha Canal South of LCP Chemicals Site

Lab Sample ID	Sample ID	Species	Total Length (mm)	Total Weight (g)	Date Caught	Comment
11195-AL-BC-R1	11195-BC-10	Blue Crab	97	80.3	7/14/2011	
11195-AL-BC-R1	11195-BC-14	Blue Crab	105	91.5	7/14/2011	
11195-AL-BC-R1	11195-BC-7	Blue Crab	100	80.9	7/14/2011	
11195-AL-BC-R1	11193-BC-2	Blue Crab	110	73.3	7/12/2011	
11195-AL-BC-R2	11193-BC-1	Blue Crab	120	130.3	7/12/2011	
11195-AL-BC-R2	11194-BC-5	Blue Crab	120	125.4	7/13/2011	
11195-AL-BC-R2	11195-BC-11	Blue Crab	115	118.2	7/14/2011	
11195-AL-BC-R2	11195-BC-12	Blue Crab	115	89.7	7/14/2011	
11195-AL-BC-R2	11195-BC-13	Blue Crab	115	112.1	7/14/2011	
11195-AL-BC-R2	11195-BC-15	Blue Crab	114	94.4	7/14/2011	
11195-AL-BC-R3	11195-BC-9	Blue Crab	124	118.4	7/14/2011	missing claw
11195-AL-BC-R3	11193-BC-3	Blue Crab	125	128.2	7/12/2011	
11195-AL-BC-R3	11194-BC-4	Blue Crab	130	150.5	7/13/2011	
11195-AL-BC-R3	11194-BC-6	Blue Crab	135	140.8	7/13/2011	
11195-AL-BC-R3	11195-BC-8	Blue Crab	150	75.6	7/14/2011	
11194-AL-SM-R1	11193-SM-4	Striped Mullet	330	359.1	7/12/2011	
11194-AL-SM-R1	11194-SM-7	Striped Mullet	340	396.7	7/13/2011	
11193-AL-SM-R2	11193-SM-1	Striped Mullet	360	399	7/12/2011	
11193-AL-SM-R2	11193-SM-3	Striped Mullet	362	508.8	7/12/2011	
11193-AL-SM-R2	11193-SM-5	Striped Mullet	371	540.6	7/12/2011	
11193-AL-SM-R3	11193-SM-2	Striped Mullet	412	563	7/12/2011	
11193-AL-SM-R3	11193-SM-6	Striped Mullet	400	563	7/12/2011	
11194-AL-PS-R1	11194-AL-PS-R1	White Shrimp		58.7	7/13/2011	36 shrimp de-headed
11194-AL-PS-R2	11194-AL-PS-R2	White Shrimp		59.7	7/13/2011	36 shrimp de-headed
11194-AL-PS-R3	11194-AL-PS-R3	White Shrimp		61.6	7/13/2011	36 shrimp de-headed
11193-AL-RD-R1	11193-RD-1	Red Drum	265	306.7	7/12/2011	
11194-AL-SS-R1	11194-SS-1	Spotted Seatrout	200	209.4	7/13/2011	missing part of tail

Table 2
Results of 2011 Sediment Sampling - Inorganics, PCBs, PAHs
Altamaha Canal South of LCP Chemicals Site

Parameters	RSLs Residential Soil [1]	Sample order represents their orientation from north to south along the lenghth of the canal																			
		AL-A1-41		AL-B1-89		AL-C1-65		AL-D1-12		AL-E1-76		AL-F1-4		AL-G1-120		AL-H1-92		AL-I1-30		AL-J1-83	
		Result	DetLim	Result	DetLim	Result	DetLim	Result	DetLim	Result	DetLim	Result	DetLim	Result	DetLim	Result	DetLim	Result	DetLim	Result	DetLim
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Inorganics																					
Aluminum	77000	9070	14.8	9340	10.7	5250	7.0	2110	5.8	6730	7.0	3860	5.9	5620	6.0	16000	7.9	5360	6.1	19200	5.8
Antimony	31	0.23 N	0.049	0.19 N	0.036	0.21 N	0.023	0.05 J,N	0.019	0.35 N	0.023	0.07 N	0.02	0.00 U,N	0.02	0.08 N	0.026	0.02 J,N	0.02	0.09 N	0.019
Arsenic	0.4	4.3	0.16	3.4	0.11	3.4	0.07	0.7	0.06	3.5	0.07	2.7	0.06	1.9	0.06	5.0	0.08	1.5	0.06	8.6	0.06
Barium	15000	19.6	0.70	14.7	0.50	8.8	0.30	4.2	0.30	13.6	0.40	10.2	0.30	8.6	0.30	21.3	0.40	9.8	0.30	25.2	0.30
Beryllium	160	0.42	0.008	0.36	0.005	0.22	0.003	0.08	0.003	0.40	0.004	0.24	0.003	0.25	0.003	0.83	0.004	0.23	0.003	1.00	0.003
Cadmium	70	0.40	0.008	0.32	0.005	0.19	0.003	0.05	0.003	0.97	0.004	0.14	0.003	0.06	0.003	0.32	0.004	0.08	0.003	0.19	0.003
Calcium	NV	10600	4.9	8570	3.6	4120	2.3	1310	2	3560	2.3	1410	2	5990	2.0	3540	2.6	2180	2.0	4030	2.0
Chromium [2]	120000	40.4	0.08	42.6	0.05	19.3	0.04	5.7	0.03	37.6	0.04	14.6	0.03	11.0	0.03	34.7	0.04	9.5	0.03	36.5	0.03
Cobalt	23	1.5	0.008	1.7	0.005	1.5	0.003	0.4	0.003	2.1	0.004	1.4	0.003	1.1	0.003	3.2	0.004	0.8	0.003	3.4	0.003
Copper	3100	32.2	0.13	21.2	0.09	11.8	0.06	4.0	0.05	34.5	0.06	8.6	0.05	6.2	0.05	19.9	0.07	5.4	0.05	17.2	0.05
Iron	55000	7940	0.70	10800	0.50	5720	0.30	2100	0.30	7410	0.40	5570	0.30	5790	0.30	18700	0.40	4600	0.30	24900	0.30
Lead	400	45.2	0.024	33.1	0.016	14.8	0.01	10.6	0.009	33.7	0.011	12.2	0.009	12.5	0.009	34.2	0.012	10.7	0.009	36.2	0.009
Magnesium	NV	8650	0.1	10200	0.07	5350	0.05	1090	0.04	3280	0.05	2110	0.04	2060	0.04	6170	0.05	1930	0.04	6830	0.04
Manganese	1800	44.8	0.1	98.6	0.07	52.3	0.05	12.8	0.04	26.3	0.05	33.4	0.04	40.3	0.04	134.0	0.05	40.4	0.04	142.0	0.04
Mercury	23	4.90	0.0074	4.96	0.0045	1.75	0.0034	0.09	0.0014	0.89	0.0034	0.30	0.0023	0.11	0.0015	0.58	0.0035	0.11	0.0016	0.38	0.003
Nickel	1500	10.7	0.08	9.5	0.05	5.9	0.04	1.7	0.03	13.2	0.04	4.0	0.03	3.1	0.03	8.4	0.04	2.4	0.03	8.5	0.03
Potassium	NV	1930	12	2580	8.9	1480	5.8	382	4.9	950	5.8	838	5.0	892	5.0	2590	6.6	783	5.1	3410	4.9
Selenium	390	1.3 J	0.5	1.2 J	0.4	0.80 J	0.2	0 U	0.2	1.40	0.2	0.40 J	0.2	0 U	0.2	1.0 J	0.3	0.20 J	0.2	0.9 J	0.2
Silver	390	0.26	0.007	0.34	0.005	0.18	0.003	0.04	0.003	0.52	0.003	0.23	0.003	0.09	0.003	0.72	0.004	0.17	0.003	0.38	0.003
Sodium	NV	32400	9.9	38300	7.1	21600	4.6	3910	3.9	8860	4.7	6840	4.0	5530	4.0	15500	5.3	5540	4.1	18200	3.9
Thallium	0.8	0.09	0.005	0.09	0.004	0.07	0.002	0.02	0.002	0.53	0.002	0.07	0.002	0.05	0.002	0.17	0.003	0.04	0.002	0.16	0.002
Vanadium	390	79.0	0.05	61.7	0.04	42.9	0.02	6.2	0.02	175.0	0.02	19.6	0.02	9.9	0.02	31.0	0.03	8.8	0.02	43.5	0.02
Zinc	23000	105	0.70	120	0.50	78	0.30	18	0.30	57	0.40	39	0.30	29	0.30	124	0.40	37	0.30	89	0.30
PCBs																					
Aroclor-1016	3.9	0 Ui	0.11	0 Ui	0.021	0 U	0.0037	0 U	0.0021	0 Ui	0.26	0 Ui	0.014	0 Ui	0.0054	0 Ui	0.023	0 Ui	0.015	0 Ui	0.012
Aroclor-1221	0.1	0 Ui	0.45	0 Ui	0.061	0 U	0.0037	0 U	0.0021	0 Ui	0.43	0 Ui	0.034	0 Ui	0.042	0 Ui	0.06	0 Ui	0.022	0 Ui	0.036
Aroclor-1232	0.1	0 Ui	0.19	0 Ui	0.023	0 U	0.0037	0 U	0.0021	0 Ui	0.37	0 Ui	0.025	0 Ui	0.0094	0 Ui	0.044	0 Ui	0.022	0 Ui	0.025
Aroclor-1242	0.2	0 Ui	0.054	0 Ui	0.027	0 U	0.0037	0 U	0.0021	0 Ui	0.12	0 Ui	0.0063	0 Ui	0.005	0 Ui	0.018	0 Ui	0.0085	0 Ui	0.012
Aroclor-1248	0.2	0 Ui	0.092	0 Ui	0.015	0 U	0.0037	0 U	0.0021	0 Ui	0.18	0 Ui	0.007	0 Ui	0.0071	0 Ui	0.022	0 Ui	0.0059	0 Ui	0.0074
Aroclor-1254	0.2	0 Ui	0.062	0 Ui	0.016	0 U	0.0037	0 U	0.0021	0 Ui	0.1	0 Ui	0.011	0 Ui	0.0042	0 Ui	0.024	0 Ui	0.0082	0 Ui	0.0091
Aroclor-1260	0.2	0 Ui	0.14	0 Ui	0.021	0 U	0.0037	0.02	0.0021	0 Ui	0.048	0 Ui	0.011	0 Ui	0.0074	0 Ui	0.02	0 Ui	0.0092	0 Ui	0.012
Aroclor-1262 [3]	0.2	1.2	0.0083	0.1 P	0.0037	0 U	0.0037	0 U	0.0021	0 Ui	0.22	0 Ui	0.055	0 Ui	0.02	0 Ui	0.085	0 Ui	0.024	0 Ui	0.041
Aroclor-1268 [3]	0.2	1.1	0.0083	0.1 P	0.0037	0.04	0.0037	0.02	0.0021	0.18	0.0037	0.05	0.0024	0.03	0.0021	0.11	0.0043	0.03	0.0021	0.04	0.0032
PAHs																					
2-Methylnaphthalene	310	0.01 J	0.0018	0.004 J	0.0012	0.001 J	0.00079	0.001 J	0.00046	0.021	0.0008	0.002 J	0.00051	0.001 J	0.00046	0.005 J	0.00093	0.002 J	0.00046	0.002 J	0.00069
Acenaphthene	3400	0.18	0.003	0.01 J	0.002	0.01 J	0.0014	0.001 J	0.00076	0.008 J	0.0014	0.003 J	0.00084	0.001 J	0.00076	0.005 J	0.0016	0.002 J	0.00076	0.002 J	0.0012
Acenaphthylene [3]	1700	0.01 J	0.0023	0 J	0.0016	0.003 J	0.0011	0.002 J	0.00059	0.012	0.0011	0.003 J	0.00065	0.003 J	0.00059	0.011	0.0012	0.004 J	0.00059	0.007 J	0.00088
Anthracene	17000	0.01 J	0.0023	0.02	0.0016	0.01 J	0.001	0.002 J	0.00058	0.022	0.0011	0.007	0.00064	0.003 J	0.00058	0.023	0.0012	0.005	0.00058	0.008	0.00087
Benzo(a)anthracene	0.2	0.04	0.0028	0.03	0.0019	0.02	0.0013	0.01	0.00072	0.05	0.0013	0.02	0.00079	0.01	0.00072	0.08	0.0015	0.03	0.00072	0.04	0.0011
Benzo(a)pyrene	0.02	0.10 X	0.003	0.05	0.002	0.04	0.0014	0.01	0.00076	0.05	0.0014	0.03	0.00084	0.02	0.00076	0.10	0.0016	0.04	0.00076	0.06	0.0012
Benzo(b)fluoranthene	0.2	0.11	0.0036	0.09	0.0024	0.06	0.0016	0.03	0.00092	0.08	0.0016	0.05	0.0011	0.04	0.00092	0.20	0.0019	0.08	0.00092	0.11	0.0014
Benzo(g,h,i)perylene [3]	1700	0.05	0.0034	0.04	0.0023	0.02	0.0015	0.01	0.00085	0.03	0.0015	0.02	0.00093	0.02	0.00085	0.08	0.0018	0.03	0.00085	0.06	0.0013
Benzo(k)fluoranthene	1.5	0.03	0.0034	0.03	0.0023	0.02	0.0015	0.01	0.00087	0.02	0.0016	0.02	0.00096	0.01	0.00087	0.06	0.0018	0.03	0.00087	0.04	0.0013
Chrysene	15	0.04	0.0032	0.03	0.0021	0.02	0.0014	0.01	0.0008	0.02	0.0014	0.02	0.00088	0.01	0.0008	0.06	0.0017	0.03	0.0008	0.04	0.0012
Dibenzo(a,h)anthracene	0.02	0.01 J	0.0032	0.01 J	0.0021	0.005 J	0.0014	0.003 J	0.0008	0.008 J	0.0014	0.005 J	0.00088	0.004 J	0.0008	0.018	0.0017	0.007	0.0008	0.014	0.0012
Dibenzofuran	1200	0.01 J	0.0025	0.004 J	0.0017	0.003 J	0.0011	0.001 J	0.00063	0.016	0.0011	0.003 J	0.00069	0.001 J	0.00063	0.005 J	0.0013	0.001 J	0.00063	0.002 J	0.00094
Fluoranthene	2300	0.12	0.0039	0.08	0.0026	0.05	0.0017	0.02	0.00098	0.17	0.0018	0.05	0.0011	0.02	0.00098	0.17	0.002	0.06	0.00098	0.07	0.0015
Fluorene	2300	0.02 J	0.0024	0.01 J	0.0016	0.005 J	0.0011	0.001 J	0.00061	0.018	0.0011	0.005 J	0.00067	0.001 J	0.00061	0.007 J	0.0013	0.002 J	0.00061	0.002 J	0.00091
Indeno(1,2,3-cd)pyrene	0.2	0.04	0.0034	0.04	0.0023	0.02	0.0015	0.01	0.00087	0.03	0.0016	0.02	0.00096	0.02	0.00087	0.09	0.0018	0.03	0.00087	0.06	0.0013
Naphthalene	3.6	0.01 J	0.0024	0.01 J	0.0016	0.00 J	0.0011	0.002 J	0.0006	0.024	0.0011	0.007	0.00066	0.002 J	0.0006	0.012	0.0013	0.002 J	0.0006	0.004 J	0.00089
Phenanthrene [3]	1700	0.03	0.0055	0.02	0.0037	0.01 J	0.0024	0.01	0.0014	0.06	0.0025	0.01	0.0016	0.01 J	0.0014	0.04	0.0029	0.01	0.0014	0.02	0.0021
Pyrene	1700	0.09	0.003	0.07	0.002	0.05	0.0014	0.02	0.00076	0.16	0.0014	0.05	0.00084	0.02	0.00076	0.18	0.0016	0.07	0.00076	0.07	0.0012

Table 2
Results of 2011 Sediment Sampling - Inorganics, PCBs, PAHs
Altamaha Canal South of LCP Chemicals Site

Parameters	Sample order represents their orientation from north to south along the lenghth of the canal																			
	AL-K1-115		AL-L1-94		AL-M1-1		AL-N1-42		AL-O1-100		AL-P1-8		AL-Q1-57		AL-R1-61		AL-S1-32		AL-T1-115	
	Result mg/kg	DetLim mg/kg	Result mg/kg	DetLim mg/kg	Result mg/kg	DetLim mg/kg	Result mg/kg	DetLim mg/kg	Result mg/kg	DetLim mg/kg	Result mg/kg	DetLim mg/kg	Result mg/kg	DetLim mg/kg	Result mg/kg	DetLim mg/kg	Result mg/kg	DetLim mg/kg	Result mg/kg	DetLim mg/kg
Inorganics																				
Aluminum	3130	6.1	9930	6.1	11000	6.0	8690	5.9	9740	6.0	20700	6.1	1690	5.7	1840	5.8	3710	6.1	2880	5.8
Antimony	0.03 J,N	0.02	0.03 J,N	0.02	0.05 J,N	0.02	0.06 N	0.02	0.07 N	0.02	0.08 N	0.02	0.02 J,N	0.019	0.13 N	0.019	0.00 U,N	0.02	0.00 U,N	0.019
Arsenic	1.3	0.06	2.8	0.06	4.2	0.06	4.2	0.06	4.2	0.06	6.0	0.06	0.7	0.06	1.2	0.06	1.7	0.06	0.6	0.06
Barium	5.4	0.30	12.3	0.30	16.0	0.30	18.7	0.30	17.4	0.30	29.9	0.30	5.6	0.30	9.9	0.30	5.9	0.30	4.9	0.30
Beryllium	0.17	0.003	0.46	0.003	0.61	0.003	0.47	0.003	0.53	0.003	1.21	0.003	0.09	0.003	0.10	0.003	0.23	0.003	0.12	0.003
Cadmium	0.09	0.003	0.10	0.003	0.22	0.003	0.21	0.003	0.27	0.003	0.14	0.003	0.06	0.003	0.09	0.003	0.05	0.003	0.04	0.003
Calcium	1170	2.0	1890	2.0	3060	2.0	6760	2.0	3700	2.0	3260	2.1	790	1.9	2570	1.9	914	2.0	1220	1.9
Chromium [(2)]	8.1	0.03	31.3	0.03	24.7	0.03	29.4	0.03	29.5	0.03	56.9	0.03	4.4	0.03	5.2	0.03	9.8	0.03	5.4	0.03
Cobalt	0.7	0.003	1.8	0.003	2.3	0.003	2.3	0.003	2.4	0.003	3.0	0.003	0.4	0.003	0.5	0.003	0.9	0.003	0.4	0.003
Copper	5.4	0.05	10.1	0.05	14.5	0.05	14.7	0.05	17.2	0.05	26.9	0.05	4.2	0.05	10.1	0.05	5.3	0.05	3.3	0.05
Iron	3900	0.30	10300	0.30	14800	0.30	15100	0.30	14300	0.30	17500	0.30	1810	0.30	5330	0.30	4040	0.30	2500	0.30
Lead	10.7	0.008	23.4	0.009	26.6	0.009	27.2	0.009	37.5	0.009	52.3	0.009	13.6	0.009	25.6	0.009	11.5	0.009	5.8	0.009
Magnesium	1570	0.04	3370	0.04	4960	0.04	3920	0.04	5120	0.04	6880	0.04	911	0.04	1080	0.04	1660	0.04	617	0.04
Manganese	30.6	0.04	66.6	0.04	139.0	0.04	108.0	0.04	154.0	0.04	83.1	0.04	13.4	0.04	24.7	0.04	39.7	0.04	17.2	0.04
Mercury	0.09	0.0015	0.19	0.00175	0.26	0.0025	0.28	0.0021	0.47	0.003	0.47	0.0024	0.05	0.0014	0.04	0.0014	0.10	0.0014	0.05	0.0012
Nickel	2.0	0.03	4.2	0.03	5.8	0.03	6.2	0.03	6.4	0.03	8.6	0.03	1.1	0.03	2.1	0.03	2.2	0.03	1.3	0.03
Potassium	650	5.1	1770	5.1	2140	5.0	1350	4.9	2130	5.0	3840	5.1	384	4.7	429	4.9	790	5.1	274	4.8
Selenium	0 U	0.2	0.40 J	0.2	0.7 J	0.2	1 J	0.2	1 J	0.2	1 J	0.2	0 U	0.2	0 U	0.2	0 J	0.2	0 U	0.2
Silver	0.15	0.003	0.44	0.003	0.43	0.003	0.39	0.003	0.60	0.003	0.51	0.003	0.09	0.003	0.13	0.003	0.09	0.003	0.07	0.003
Sodium	5890	4.1	8230	4.0	14500	4.0	12300	3.9	17300	4.0	17400	4.1	4190	3.8	4430	3.9	6510	4.0	842	3.9
Thallium	0.04	0.002	0.08	0.002	0.11	0.002	0.09	0.002	0.12	0.002	0.14	0.002	0.02	0.002	0.02	0.002	0.04	0.002	0.02	0.002
Vanadium	7.5	0.02	20.3	0.02	20.5	0.02	22.7	0.02	25.9	0.02	49.5	0.02	3.9	0.02	5.5	0.02	8.7	0.02	4.6	0.02
Zinc	31	0.30	49	0.30	76	0.30	101	0.30	90	0.30	106	0.30	23	0.30	103	0.30	20	0.30	33	0.30
PCBs																				
Aroclor-1016	0 U	0.0021	0 U	0.0021	0 U	0.0027	0 Ui	0.069	0 Ui	0.027	0 Ui	0.023	0 Ui	0.008	0 Ui	0.014	0 U	0.0021	0 U	0.0021
Aroclor-1221	0 U	0.0021	0 U	0.0021	0 U	0.0027	0 Ui	0.11	0 Ui	0.16	0 Ui	0.048	0 Ui	0.011	0 Ui	0.025	0 U	0.0021	0 U	0.0021
Aroclor-1232	0 U	0.0021	0 U	0.0021	0 U	0.0027	0 Ui	0.081	0 Ui	0.048	0 Ui	0.082	0 Ui	0.012	0 Ui	0.016	0 U	0.0021	0 U	0.0021
Aroclor-1242	0 U	0.0021	0 U	0.0021	0 U	0.0027	0 Ui	0.047	0 Ui	0.018	0 Ui	0.049	0 Ui	0.0061	0 Ui	0.021	0 U	0.0021	0 U	0.0021
Aroclor-1248	0 U	0.0021	0 U	0.0021	0 U	0.0027	0 Ui	0.026	0 Ui	0.027	0 Ui	0.026	0 Ui	0.0065	0 Ui	0.02	0 U	0.0021	0 U	0.0021
Aroclor-1254	0	0.0021	0 U	0.0021	0 U	0.0027	0 Ui	0.026	0 Ui	0.028	0 Ui	0.027	0 Ui	0.0075	0 Ui	0.031	0 U	0.0021	0 U	0.0021
Aroclor-1260	0 U	0.0021	0 U	0.0021	0 Ui	0.011	0 Ui	0.024	0 Ui	0.019	0 Ui	0.026	0 Ui	0.0055	0 Ui	0.012	0 U	0.0021	0.02 P	0.0021
Aroclor-1262 [(3)]	0 U	0.0021	0 U	0.0021	0 U	0.0027	0 Ui	0.045	0 Ui	0.063	0 Ui	0.054	0 Ui	0.015	0 Ui	0.017	0 U	0.0021	0 U	0.0021
Aroclor-1268 [(3)]	0.05	0.0021	0.05	0.0021	0.04	0.0027	0.04	0.0024	0.07	0.0031	0.05	0.0027	0.01	0.0021	0.02	0.0021	0.03	0.0021	0.04	0.0021
PAHs																				
2-Methylnaphthalene	0.001 J	0.00046	0.002 J	0.00046	0.002 J	0.00058	0.003 J	0.00052	0.004 J	0.00067	0.003 J	0.00059	0.002 J	0.00046	0.002 J	0.00046	0.001 J	0.00046	0.002 J	0.00046
Acenaphthene	0.001 J	0.00076	0.001 J	0.00076	0.002 J	0.00096	0.003 J	0.00086	0.005 J	0.0012	0.002 J	0.00097	0.001 J	0.00076	0.001 J	0.00076	0.000 U	0.00076	0.001 J	0.00076
Acenaphthylene [(3)]	0.004 J	0.00059	0.003 J	0.00059	0.005 J	0.00074	0.006 J	0.00067	0.008	0.00086	0.009	0.00075	0.002 J	0.00059	0.004 J	0.00059	0.001 J	0.00059	0.002 J	0.00059
Anthracene	0.006	0.00058	0.004 J	0.00058	0.010	0.00073	0.008	0.00065	0.013	0.00085	0.006	0.00074	0.005	0.00058	0.006	0.00058	0.003 J	0.00058	0.005 J	0.00058
Benzo(a)anthracene	0.05	0.00072	0.02	0.00072	0.04	0.00091	0.05	0.00081	0.11	0.0011	0.05	0.00092	0.04	0.00072	0.04	0.00072	0.02	0.00072	0.02	0.00072
Benzo(a)pyrene	0.05	0.00076	0.03	0.00076	0.06	0.00096	0.07	0.00086	0.15	0.0012	0.07	0.00097	0.05	0.00076	0.05	0.00076	0.02	0.00076	0.02	0.00076
Benzo(b)fluoranthene	0.11	0.00092	0.07	0.00092	0.11	0.0012	0.11	0.0011	0.27	0.0014	0.14	0.0012	0.09	0.00092	0.09	0.00092	0.04	0.00092	0.04	0.00092
Benzo(g,h,i)perylene [(3)]	0.03	0.00085	0.03	0.00085	0.05	0.0011	0.06	0.00096	0.13	0.0013	0.07	0.0011	0.05	0.00085	0.06	0.00085	0.02	0.00085	0.02	0.00085
Benzo(k)fluoranthene	0.04	0.00087	0.02	0.00087	0.03	0.0011	0.04	0.00098	0.09	0.0013	0.04	0.0012	0.03	0.00087	0.03	0.00087	0.01	0.00087	0.01	0.00087
Chrysene	0.04	0.0008	0.02	0.0008	0.05	0.0011	0.04	0.0009	0.11	0.0012	0.05	0.0011	0.05	0.0008	0.04	0.0008	0.03	0.0008	0.02	0.0008
Dibenzo(a,h)anthracene	0.008	0.0008	0.006	0.0008	0.010	0.0011	0.012	0.0009	0.027	0.0012	0.015	0.0011	0.009	0.0008	0.011	0.0008	0.003 J	0.0008	0.004 J	0.0008
Dibenzofuran	0.001 J	0.00063	0.001 J	0.00063	0.002 J	0.00079	0.002 J	0.00071	0.003 J	0.00092	0.002 J	0.0008	0.001 J	0.00063	0.002 J	0.00063	0.001 J	0.00063	0.002 J	0.00063
Fluoranthene	0.06	0.00098	0.05	0.00098	0.09	0.0013	0.11	0.0011	0.24	0.0015	0.11	0.0013	0.09	0.00098	0.08	0.00098	0.03	0.00098	0.04	0.00098
Fluorene	0.002 J	0.00061	0.002 J	0.00061	0.003 J	0.00077	0.003 J	0.00069	0.004 J	0.00089	0.003 J	0.00078	0.002 J	0.00061	0.002 J	0.00061	0.001 J	0.00061	0.002 J	0.00061
Indeno(1,2,3-cd)pyrene	0.04	0.00087	0.03	0.00087	0.05	0.0011	0.07	0.00098	0.14	0.0013	0.08	0.0012	0.05	0.00087	0.06	0.00087	0.02	0.00087	0.02	0.00087
Naphthalene	0.003 J	0.0006	0.002 J	0.0006	0.003 J	0.00076	0.003 J	0.00068	0.005 J	0.00088	0.003 J	0.00077	0.002 J	0.0006	0.002 J	0.0006	0.001 J	0.0006	0.002 J	0.0006
Phenanthrene [(3)]	0.01	0.0014	0.01	0.0014	0.02	0.0018	0.03	0.0016	0.04	0.0021	0.02	0.0018	0.02	0.0014	0.02	0.0014	0.01	0.0014	0.01	0.0014
Pyrene	0.09	0.00076	0.05	0.00076	0.09	0.00096	0.10	0.00086	0.25	0.0012	0.10	0.00097	0.08	0.00076	0.08	0.00076	0.03	0.00076	0.03	0.00076

Notes:

Shaded cells indicate analytical results exceeding the Residential RSL value.

(1) The EPA's Regional Screening Levels for residential soil (June 2010) are shown. Most of the exposure assumptions used to derive these values are not applicable to sediment. However, the are used here to provide a conservative preliminar evaluation of the concentrations of these constituents in the Altahama Canal sediments

(2) The RSL for trivalent chromium was used for screening purposes because the trivalent fom predominates under the reducing (anoxic) conditions in sediment

(3) The RSL for Aroclor 1254 was used as a surrogate for Aroclor 1262 and Aroclor 1268. The RSL for pyrene was used as a surrogate for acenapthylene, benzo(g,h,i)perylene, and phenanthrene

U = the analyte was analyzes for, but was not detected ("Non-detect") at or above the MRL/MDI

J = The result is an estimated value

i = The MRL/MDL or LOQ/LOD is elevated due to matrix interferance

N = The Matrix Spike sample recovery is not within control limits

X = May contain a slight high bias, chromatogram indicated the presence of non-target background components

P = The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical result

Table 3
Results of 2011 Sediment Sampling - Dioxins/Furans
Altamaha Canal South of LCP Chemicals Site

Parameters	2005 WHO TEFs	AL-D1-12		AL-J1-83		AL-M1-1		AL-S1-32	
		Result ng/kg	DetLim ng/kg	Result ng/kg	DetLim ng/kg	Result ng/kg	DetLim ng/kg	Result ng/kg	DetLim ng/kg
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1	36.0	0.099	72.0	0.3	37.0	0.26	11.0	0.11
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	1	0.67 J Q	0.31	2.5 J Q	1.2	2.4 J Q	1.0	1.0 J Q	0.42
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1	0.72 J Q	0.13	3.8 J Q	1.5	4.5 J Q	2.0	1.7 J Q	0.48
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1	1.6 J	0.11	7.5 J	1.3	8.0 J	1.7	2.9 J	0.42
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1	1.6 J	0.11	7.0 J	1.3	9.8 J	1.7	3.4 J	0.41
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	0.01	34.0 B	0.58	160 B	1.5	170.0 B	4.5	76.0 B	0.97
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	0.003	350 B	0.56	1700 B	2.8	1700 B	2.4	810 B	1.20
hepta-CDD (total)		130	0.58	560	1.5	620	4.5	260	0.97
hexa-CDD (total)		37.0	0.11	350.0	1.3	280.0	1.8	99.0	0.44
penta-CDD (total)		8.0	0.31	61.0	1.2	46.0	1.0	17.0	0.42
tetra-CDD (total)		41.0	0.10	110	0.26	62.0	0.26	19.0	0.11
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.1	230 CON	0.20	440 CON	0.48	210 CON	0.43	53 CON	0.20
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.03	3.3 J	0.13	5.9 J	0.21	5.2 J	0.20	1.5 J	0.11
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.3	1.7 J Q	0.11	4.2 J Q	0.19	4.3 J Q	0.18	1.6 J Q	0.10
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.1	0.7 J	0.088	2.1 J	0.21	3.4 J	0.21	1.5 J	0.090
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	0.1	1.9 J	0.090	4.8 J	0.22	5.7 J	0.21	2.7 J	0.092
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.1	0.72 J	0.083	2.0 J	0.20	2.9 J	0.20	1.1 J	0.085
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.1	0 U	0.10	0.3 U	0.24	0.0 U	0.24	0.0 U	0.10
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	0.1	5.8 J	0.24	21.0 J	1.3	26.0 J	1.3	12.0 J	0.58
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	0.1	0.4 J	0.28	0.0 J	1.5	0.0 J	1.6	1.4 J	0.67
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	0.0003	11.0 J B	0.19	38.0 J B	0.6	41.0 J B	0.47	23.0 J B	0.22
tetra-CDF (total)		470	0.23	950	0.52	480	0.41	120	0.12
penta-CDF (total)		20.0	0.12	43.0	0.20	56.0	0.19	17.0	0.10
hexa-CDF (total)		15.0	0.090	50.0	0.22	67.0	0.21	25.0	0.092
hepta-CDF (total)		14.0	0.26	57.0	1.4	26.0	1.40	35.0	0.62
Total TCDD TEQ		**62**		**130**		**68**		**20**	

Notes:

Shaded cells denote an analytical result exceeding the EPA's draft recommended interim residential soil preliminary remediation goal (PRG) for TCDD TEQ of 72 ng/kg (ppt).

B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.

CON = Confirmation analysis

J = Estimated result

Q = Estimated maximum possible concentration (EMPC)

Table 4
Results of 2011 Finfish Sampling
Altamaha Canal South of LCP Site

		Red Drum		Striped Mullet						Spotted Seatrout	
		11193-AL-RD-R1 7/12/2011		11193-AL-SM-R2 7/12/2011		11193-AL-SM-R3 7/12/2011		11194-AL-SM-R1 7/13/2011		11194-AL-SS-R1 7/13/2011	
	Fish RSLs ug/kg	Result ug/kg-ww	DL ug/kg-ww	Result ug/kg-ww	DL ug/kg-ww	Result ug/kg-ww	DL ug/kg-ww	Result ug/kg-ww	DL ug/kg-ww	Result ug/kg-ww	DL ug/kg-ww
Inorganics											
Aluminum	1400000	390	40	3740	50	1590	50	1430	50	15500	50
Antimony	540	11.8	0.4	6.3 J	0.5	11.9 J	0.5	3.5 J	0.5	4.9 J	0.5
Arsenic [(1)]	2.1	926	4.0	538	5.0	328	5.0	533	5.0	143	5.0
Barium	270000	126 *	0.9	272 *	1.3	166 *	1.3	487 *	1.3	127 *	1.1
Beryllium	2700	0 U	0.6	0 U	0.8	0 U	0.8	0 U	0.8	0 U	0.7
Cadmium	1400	0.50 J	0.4	0 U	0.5	0 U	0.5	0 U	0.5	0 U	0.5
Calcium	NV	1500000	600	371000 *	800	332000 *	800	1730000	800	1080000	700
Chromium	2000000	40.0 J	20	40.0 J	20	30.0 J	20	30.0 J	20	80.0	20
Cobalt	410	2.00 J	1.0	5.00	1.0	5.00 J	1.0	4.00 J	1.0	5.00	1.0
Copper	54000	208 N*	4.0	225 N*	5.0	219 N*	5.0	230 N*	5.0	180 N*	5.0
Iron	950000	2600	70	10400 N*	100	10300 N*	100	9770	100	12000	90
Lead	NV	3.10 J	0.1	17.40	0.1	19.30	0.1	20.9	0.1	33.6	0.1
Magnesium	NV	251000	70	235000	100	237000	100	273000	100	408000	90
Manganese	190000	569 *	4.0	260 *	5.0	169 *	5.0	699 *	5.0	521 *	5.0
Mercury	140	88.3	0.1	12.3	0.2	14.9	0.2	12.8	0.2	117	0.3
Nickel	27000	26.0 J	4.0	20.0 J	5.0	24.0 J	5.0	19.0 J	5.0	32.0 J	5.0
Potassium	NV	2840000	1100	3160000	1500	3320000	1500	3250000	1600	3810000	1400
Selenium	6800	186 *	9.0	128 *	13.0	166 *	13.0	162 *	13.0	264 *	11.0
Silver	6800	0 U	1.0	0 U	2.0	0 U	2.0	0 U	2.0	0 U	1.0
Sodium	NV	573000	700	400000	1000	332000	1000	435000	1000	1280000	900
Thallium	14	0 U	0.20	0 J	0.20	1 J	0.20	0 J	0.20	0 U	0.20
Vanadium	6800	0 U	10	0 U	20	0 U	20	50 J	20	60.00	20
Zinc	410000	5860	10	12600	20	10500	20	16900	20	7760	10
PCBs											
Aroclor-1016	45	0 U	2.8	0 Ui	38	0 Ui	35	0 Ui	24	0 U	2.8
Aroclor-1221	1.6	0 U	2.8	0 Ui	21	0 Ui	39	0 Ui	20	0 U	2.8
Aroclor-1232	1.6	0 U	2.8	0 Ui	23	0 Ui	20	0 Ui	11	0 U	2.8
Aroclor-1242	1.6	0 U	2.8	0 Ui	37	0 Ui	32	0 Ui	28	0 U	2.8
Aroclor-1248	1.6	0 U	2.8	0 Ui	58	0 Ui	56	0 Ui	44	0 U	2.8
Aroclor-1254	1.6	0 U	2.8	0 Ui	71	0 Ui	80	0 Ui	48	0 U	2.8
Aroclor-1260	1.6	0 U	2.8	0 Ui	200	0 Ui	190	0 Ui	130	0 U	2.8
Aroclor-1262	1.6	0 U	2.8	0 Ui	390	0 Ui	350	0 Ui	270	0 U	2.8
Aroclor-1268	1.6	21.0	2.8	290	2.8	260	2.8	200	2.8	81.0	2.8

Table 4
Results of 2011 Finfish Sampling
Altamaha Canal South of LCP Site

	Fish RSLs ug/kg	Red Drum 11193-AL-RD-R1 7/12/2011 Result ug/kg-ww	DL ug/kg-ww	Striped Mullet 11193-AL-SM-R2 7/12/2011 Result ug/kg-ww	DL ug/kg-ww	Striped Mullet 11193-AL-SM-R3 7/12/2011 Result ug/kg-ww	DL ug/kg-ww	Striped Mullet 11194-AL-SM-R1 7/13/2011 Result ug/kg-ww	DL ug/kg-ww	Spotted Seatrout 11194-AL-SS-R1 7/13/2011 Result ug/kg-ww	DL ug/kg-ww
PAHs											
2-Methylnaphthalene	5400	0.47 J	0.12	1.10	0.12	3.20 JD	1.20	1.50	0.12	0.44 J	0.12
Acenaphthene	41000	0.29 J	0.05	5.70	0.05	6.30 D	0.47	4.70 JD	0.47	0.24 J	0.05
Acenaphthylene	41000	0 U	0.05	1	0.05	2 JD	0.46	1 JD	0.46	0.05 J	0.05
Anthracene	410000	0.10 J	0.04	2.90	0.04	4.00 JD	0.38	2.70 JD	0.38	0.14 J	0.04
Benzo(a)anthracene	4.3	0 U	0.04	3 JD	0.38	2 JD	0.38	2 JD	0.38	0 U	0.04
Benzo(a)pyrene	0.43	0 U	0.07	0 U	0.07	2 JD	0.73	0 U	0.73	0 U	0.07
Benzo(b)fluoranthene	4.3	0 Ui	0.13	2	0.07	2 JD	0.66	0 U	0.66	0 Ui	0.26
Benzo(g,h,i)perylene	41000	0 U	0.09	0 U	0.09	3 JD	0.95	0 U	0.95	0 U	0.09
Benzo(k)fluoranthene	43	0 U	0.06	0 U	0.06	2 JD	0.57	0 U	0.57	0 U	0.06
Chrysene	430	0 U	0.05	3 JD	0.55	3 JD	0.55	4 JD	0.55	0.00 U	0.05
Dibenzo(a,h)anthracene	0.43	0 U	0.09	0 U	0.09	2 JD	0.86	0 U	0.86	0.00 U	0.09
Dibenzofuran	1400	0.29 J	0.05	2.00	0.05	3.80 JD	0.45	2.90 JD	0.45	0.31 J	0.05
Fluoranthene	54000	0.18 J	0.05	1.70	0.05	4.90 JD	0.49	4.20 JD	0.49	0.27 J	0.05
Fluorene	54000	0.40 J	0.05	3.90	0.05	5.40 D	0.52	4.00 JD	0.52	0.43 J	0.05
Indeno(1,2,3-cd)pyrene	4.3	0 U	0.10	0 U	0.10	2 JD	0.96	0 U	0.96	0 U	0.10
Naphthalene	27000	0.62 J	0.15	1.70	0.15	2.60 JD	1.50	3.60	0.15	0.56 J	0.15
Phenanthrene	41000	0.38 J	0.07	4.00	0.07	6.20 D	0.66	4.40 JD	0.66	0.43 J	0.07
Pyrene	41000	0.09 J	0.05	2.70 JD	0.50	5.90 D	0.50	4.40 JD	0.50	0.12 J	0.05
Other											
Percent Lipid		0.30	0.02	4.70	0.02	4.30	0.02	3.80	0.02	0.45	0.02
Percent Moisture		81.2		74.3		74.5		73.9		77.1	

Notes:

Shated cells indicate analytical results exceeding the fish RSL value.

(1) The RSL for arsenic is specific to the inorganic form. Arsenic in fish is predominately in orgainc forms that are essentially non-toxic for human consumption (ATSDR 2000).

U the analyte was analyzes for, but was not detected ("Non-detect") at or above the MRL/MDL

J The result is an estimated value

i The MRL/MDL or LOQ/LOD is elevated due to matrix interferance

N The Matrix Spike sample recovery is not within control limits

D The reported result is from a dilution

Table 5
Results of 2011 Shellfish Sampling
Altamaha Canal South of LCP Site

		Blue Crab						Penaeid Shrimp					
	Fish	11195-AL-BC-R1 7/14/2011		11195-AL-BC-R2 7/14/2011		11195-AL-BC-R3 7/14/2011		11194-AL-PS-R1 7/13/2011		11194-AL-PS-R2 7/13/2011		11194-AL-PS-R3 7/13/2011	
	RSLs ug/kg	Result ug/kg-ww	Det Lim ug/kg-ww	Result ug/kg-ww	Det Lim ug/kg-ww	Result ug/kg-ww	Det Lim ug/kg-ww	Result ug/kg-ww	Det Lim ug/kg-ww	Result ug/kg-ww	Det Lim ug/kg-ww	Result ug/kg-ww	Det Lim ug/kg-ww
Inorganics													
Aluminum	1400000	4130	40	5030	40	5700	40	22200	40	22500	40	27900	50
Antimony	540	6.7 J	0.4	13.5	0.4	14.9	0.4	17.5	0.4	8.0 J	0.4	7.9 J	0.4
Arsenic [1]	2.1	1340	4.0	2160	4.0	2170	4.0	908	4.0	912	4.0	929	4.0
Barium	270000	494 *	0.9	286 *	1.0	301 *	0.9	1990 *	1.1	1780 *	1.1	1550 *	1.1
Beryllium	2700	0.70 J	0.6	0 U	0.6	0.70 J	0.5	1.2 J	0.6	1.0 J	0.6	1.4 J	0.7
Cadmium	1400	13.5	0.4	18.8	0.4	14.90	0.4	1.2 J	0.4	4.7	0.4	1.1 J	0.4
Calcium	NV	3660000 *	600	2360000 *	600	2370000 *	500	4910000 *	600	4330000 *	700	4750000 *	700
Chromium	2000000	70.0	20	30.0 J	20	40.0	20	80.0	20	80.0	20	120	20
Cobalt	410	11.0	1.0	13.0	1.0	13.0	1.0	13.0	1.0	12.0	1.0	13.0	1.0
Copper	54000	16000 N*	4.0	15100 N*	4.0	12900 N*	4.0	9380 N*	4.0	12200 N*	4.0	10700 N*	4.0
Iron	950000	5780 N*	70	7200 N*	80	6800 N*	70	44500 N*	90	49100 N*	90	37000 N*	90
Lead	NV	180	0.1	48.1	0.1	21.9	0.1	411	0.1	334	0.1	155	0.1
Magnesium	NV	641000	70	572000	80	537000	70	572000	90	568000	90	623000	90
Manganese	190000	2790 *	4.0	2100 *	4.0	2650 *	4.0	1760 *	4.0	1860 *	4.0	2010 *	4.0
Mercury	140	67.2	0.1	69.2	0.1	107.0	0.1	18.7	0.1	22.3	0.1	21.2	0.1
Nickel	27000	53	4.0	31 J	4.0	33 J	4.0	142	4.0	58	4.0	78	4.0
Potassium	NV	2510000	1100	2830000	1200	2410000	1100	2980000	1300	2990000	1300	3260000	1300
Selenium	6800	257 *	9.0	205 *	10.0	228 *	18.0	213 *	11.0	194 *	11.0	260 *	11.0
Silver	6800	257.0	1.0	203.0	1.0	181.0	1.0	10.0	1.0	12.0	1.0	14.0	1.0
Sodium	NV	5070000	700	4440000	800	4280000	700	1480000	900	1400000	900	1580000	900
Thallium	14	0.00 U	0.20	0.00 U	0.20	0.40 J	0.20	2.80 J	0.20	0.40 J	0.20	0.60 J	0.20
Vanadium	6800	40.0 J	10	30.0 J	10	40.0	10	40.0	20	40.0 J	20	70.0	20
Zinc	410000	33800	10	43000	10	43200	10	11800	10	13300	10	12600	10
PCBs													
Aroclor-1016	45	0 U	2.8	0 U	2.8	0 U	2.8	0 U	5.6	0 U	5.6	0 U	5.6
Aroclor-1221	1.6	0 U	2.8	0 U	2.8	0 U	2.8	0 U	5.6	0 U	5.6	0 U	5.6
Aroclor-1232	1.6	0 U	2.8	0 U	2.8	0 U	2.8	0 U	5.6	0 U	5.6	0 U	5.6
Aroclor-1242	1.6	0 U	2.8	0 U	2.8	0 U	2.8	0 U	5.6	0 U	5.6	0 U	5.6
Aroclor-1248	1.6	0 U	2.8	0 U	2.8	0 U	2.8	0 U	5.6	0 U	5.6	0 U	5.6
Aroclor-1254	1.6	0 U	2.8	0 U	2.8	0 U	2.8	0 U	5.6	0 U	5.6	0 U	5.6
Aroclor-1260	1.6	0 U	2.8	0 U	2.8	0 U	2.8	0 U	5.6	0 U	5.6	0 U	5.6
Aroclor-1262	1.6	0 U	2.8	0 U	2.8	0 U	2.8	0 U	5.6	0 U	5.6	0 U	5.6
Aroclor-1268	1.6	14.0	2.8	21.0	2.8	9.4 J	2.8	14.0 J	5.6	16.0 J	5.6	16.0 J	5.6

Table 5
Results of 2011 Shellfish Sampling
Altamaha Canal South of LCP Site

		Blue Crab						Penaeid Shrimp					
		11195-AL-BC-R1 7/14/2011		11195-AL-BC-R2 7/14/2011		11195-AL-BC-R3 7/14/2011		11194-AL-PS-R1 7/13/2011		11194-AL-PS-R2 7/13/2011		11194-AL-PS-R3 7/13/2011	
	Fish RSLs ug/kg	Result ug/kg-ww	Det Lim ug/kg-ww	Result ug/kg-ww	Det Lim ug/kg-ww	Result ug/kg-ww	Det Lim ug/kg-ww	Result ug/kg-ww	Det Lim ug/kg-ww	Result ug/kg-ww	Det Lim ug/kg-ww	Result ug/kg-ww	Det Lim ug/kg-ww
PAHs													
2-Methylnaphthalene	5400	0.15 J	0.12	0.17 J	0.12	0.13 J	0.12	0.59 J	0.12	0.79 J	0.12	0.61 J	0.12
Acenaphthene	41000	0.59	0.05	1.10	0.05	0.77	0.05	0.42 J	0.05	0.52	0.05	0.42 J	0.05
Acenaphthylene	41000	0 U	0.05	0.06 J	0.05	0.06 J	0.05	0.09 J	0.05	0.12 J	0.05	0.09 J	0.05
Anthracene	410000	0.06 J	0.04	0.16 J	0.04	0.09 J	0.04	0.20 J	0.04	0.29 J	0.04	0.20 J	0.04
Benzo(a)anthracene	4.3	0 U	0.04	0.18 J	0.04	0.10 J	0.04	0.15 J	0.04	0.21 J	0.04	0.14 J	0.04
Benzo(a)pyrene	0.43	0 U	0.07	0.08 J	0.07	0 U	0.07	0.13 J	0.07	0.21 J	0.07	0.00 U	0.07
Benzo(b)fluoranthene	4.3	0.31 J	0.07	0.23 J	0.07	0.12 J	0.07	0.28 J	0.07	0.45 J	0.07	0.27 J	0.07
Benzo(g,h,i)perylene	41000	0 U	0.09	0 U	0.09	0 U	0.09	0.22 J	0.09	0.28 J	0.09	0.10 J	0.09
Benzo(k)fluoranthene	43	0 U	0.06	0 U	0.06	0 U	0.06	0.09 J	0.06	0.11 J	0.06	0 U	0.06
Chrysene	430	0 Ui	0.21	0.24 J	0.05	0.23 J	0.05	0.13 J	0.05	0.18 J	0.05	0.08 J	0.05
Dibenzo(a,h)anthracene	0.43	0 U	0.09	0 U	0.09	0 U	0.09	0.13 J	0.09	0.10 J	0.09	0.00 U	0.09
Dibenzofuran	1400	0.10 J	0.05	0.19 J	0.05	0.15 J	0.05	0.61	0.05	0.58	0.05	0.58	0.05
Fluoranthene	54000	0.41 J	0.05	0.80	0.05	0.49 J	0.05	0.49 J	0.05	0.75	0.05	0.50 J	0.05
Fluorene	54000	0.26 J	0.05	0.42 J	0.05	0.27 J	0.05	0.95	0.05	1.10	0.05	0.91	0.05
Indeno(1,2,3-cd)pyrene	4.3	0 U	0.10	0 U	0.10	0 U	0.10	0.16 J	0.10	0.21 J	0.10	0.00 U	0.10
Naphthalene	27000	0.29 J	0.15	0.35 J	0.15	0.27 J	0.15	0.52 J	0.15	0.70 J	0.15	0.54 J	0.15
Phenanthrene	41000	0.31 J	0.07	0.57	0.07	0.37 J	0.07	1.50	0.07	1.70	0.07	1.40	0.07
Pyrene	41000	0.38 J	0.05	0.76	0.05	0.53	0.05	0.49 J	0.05	0.73	0.05	0.48 J	0.05
Other													
Percent Lipid		0.75	0.02	0.57	0.02	0.15	0.02	0.30	0.05	0.40	0.05	0.35	0.05
Percent Moisture		81.4		79.5		81.6		78.4		78.2		77.5	

Notes:

Shaded cells indicate analytical results exceeding the fish RSL value.

(1) The RSL for arsenic is specific to the inorganic form. Arsenic in fish is predominately in orgainc forms that are essentially non-toxic for human consumption (ATSDR 2000).

U = the analyte was analyzes for, but was not detected ("Non-detect") at or above the MRL/MDL

J = The result is an estimated value

i = The MRL/MDL or LOQ/LOD is elevated due to matrix interferance

N = The Matrix Spike sample recovery is not within control limits