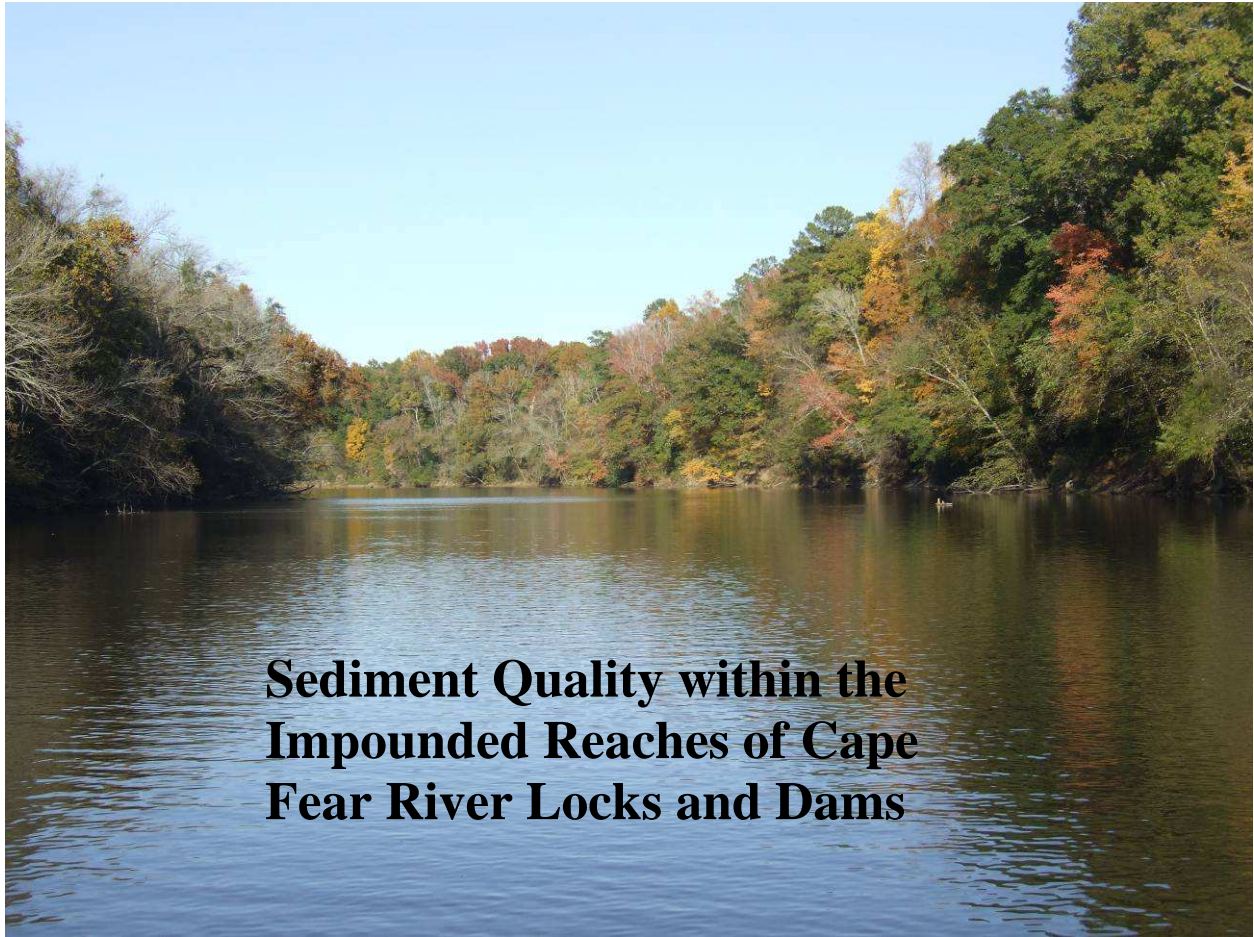


U.S. Fish and Wildlife Service  
U.S. Geological Survey



**Sediment Quality within the  
Impounded Reaches of Cape  
Fear River Locks and Dams**

August 2007



U.S. Fish and Wildlife Service  
Ecological Services  
Raleigh, North Carolina



U.S. Geological Survey  
Columbia Environmental Research Center  
Columbia, Missouri

## **Preface**

The U.S. Fish and Wildlife Service assisted the U.S. Army Corps of Engineers (Wilmington District) in an assessment of the chemical contaminants in, and toxicity of, sediments at Cape Fear River locks and dams. The work was coordinated by Tom Augspurger (Ecologist / Environmental Contaminant Specialist) and Sara Ward (Ecologist / Environmental Contaminant Specialist) in the U.S. Fish and Wildlife Service's Raleigh Field Office and was funded through a transfer agreement between the U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers. Toxicity tests were performed by the U.S. Geological Survey's Columbia Environmental Research Center (CERC) under the direction of Chris Ingersoll through an intra-agency agreement with the U.S. Fish and Wildlife Service. Other CERC scientists primarily responsible for the toxicity testing component of the project were Nile Kemble and James Kunz. Analytical chemistry was performed by Environmental Conservation Laboratories, Inc. and Severn Trent Laboratories, Inc.

The report follows a May 2007 draft which was distributed for peer review and comment. Peer reviews were requested from scientists with the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, and the North Carolina Division of Water Quality. This final report addresses comments received on the draft.

Additional questions, comments, and suggestions related to this draft are encouraged. Inquires can be directed to the U.S. Fish and Wildlife Service at the following address:

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# Sediment Quality within the Impounded Reaches of Cape Fear River Locks and Dams

## Executive Summary

This report documents an evaluation of chemical contaminants in, and toxicity of, sediments collected from impoundments created by locks and dams on the Cape Fear River in Bladen and Cumberland Counties, North Carolina. Twelve whole-sediment samples from within the impounded reaches of the three locks and dams were collected in November 2006. All samples were analyzed for elemental contaminants and polycyclic aromatic hydrocarbons (PAHs), and a subset of nine of the samples were used in toxicity tests. Whole sediments had no significant effect on survival or growth in 28-d toxicity tests with *Hyallela azteca* (freshwater amphipod) or in 10-d tests with *Chironomus dilutus* (freshwater midge). In 2-d sediment elutriate (water-extractable fraction) tests with *Ceriodaphnia dubia* (freshwater cladoceran), statistically-significant reductions in survival occurred in four of the nine exposures. Pairwise correlation analyses indicated several whole-sediment and elutriate water chemistry variables were significantly and negatively correlated with *C. dubia* survival. Of the correlated variables, elutriate manganese had among the strongest correlation ( $r^2 = 0.79$ ,  $p = 0.0006$ ) and the most plausible biological association with reduced *C. dubia* survival because some elutriate manganese concentrations exceeded published lethal concentrations for *C. dubia* in water exposures. All elemental contaminants for which published freshwater whole-sediment *threshold effects concentrations* (TECs, concentrations of contaminants in whole sediment below which adverse effects to sensitive aquatic organisms are not expected to occur) are available were less than their corresponding TECs and are therefore considered toxicologically insignificant. Sediment PAHs with published freshwater whole-sediment TECs were in excess of TECs at two of the 12 sampling stations (river mile 112.9 near Fayetteville and river mile 88.5 about 0.2 miles upstream of Tar Heel Landing Road). Five individual PAHs exceeded TECs at these locations, but no samples exceeded the *probable effects concentrations* (PECs, concentrations of contaminants in whole sediment above which adverse effects to sediment-dwelling organisms may be expected). Based on review of existing data (Tier 1) and results of sediment chemistry and toxicity tests (Tier 2 and 3), contamination in surface sediments behind Cape Fear River locks and dams is unlikely to be a concern in-place. Mobilization of sediments may be a short-term water column concern based on the elutriate toxicity test results. While sediment re-suspension and contaminant release in the elutriate tests may be near a worst case simulation of actual conditions following sediment disturbing activities, additional synthesis is needed to characterize the nature and magnitude of this issue. In particular, data regarding the modeled or measured sediment re-suspension caused by specific sediment disturbing activities (e.g., dredging, dam alterations, etc.) will help put the elutriate test results in context for normal sediment management practices. Sediment disturbing activities proposed for the Cape Fear River would benefit from development of a sediment management plan to address these issues.

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# **Sediment Quality within the Impounded Reaches of Cape Fear River Locks and Dams**

## **Introduction**

This report documents an evaluation of chemical contaminants in, and toxicity of, sediments collected from impoundments created by locks and dams on the Cape Fear River in Bladen and Cumberland Counties, North Carolina. Lock and Dam #1 is located about 39 miles (63 km) upstream of Wilmington, Lock and Dam #2 is located at river mile 71 near Elizabethtown, and Lock and Dam #3 (the William O. Huske Lock and Dam) is located at river mile 95 just downstream of the Cumberland County / Bladen County border. The locks and dams were built between 1915 (Lock and Dam #1) and 1935 (Lock and Dam #3). The U.S. Army Corps of Engineers (Corps) owns and operates the three locks and dams, and these structures are no longer used for commercial navigation which was their original purpose. The Corps is interested in "decommissioning" the dams and is currently studying their options as part of a General Reevaluation Report (GRR) for the Wilmington Harbor Deepening Project. The U.S. Fish and Wildlife Service (Service) is assisting the Corps and others interested in the Cape Fear River's natural resources by providing data to support the GRR.

Between May and August 2006, the Service conducted a review of existing information on pollutant sources within a one-mile boundary of the impounded reach of each of the three locks and dams. The work, which entailed database searches, file reviews, interviews, synthesis of environmental monitoring data, and a field reconnaissance, was similar to an environmental audit. In August 2006, the Service provided the Corps with a report, *Tier 1 Preliminary Evaluation of Pollutant Sources to the Impounded Reaches of Cape Fear River Locks and Dams 1, 2, and 3*, which concluded there were no known significant sediment pollutant problems in the assessment area. However, existing data were limited, and there were indications of pollutant sources of concern in the upper portion of the assessment area including controlled or uncontrolled releases from facilities such as Borden Chemical, Monsanto, and EI DuPont Nemours. The 2006 report narrowed the scope of potential contaminant concerns to a targeted list of chemicals and several sites along the about 75 miles of impounded river reach. The Corps concluded that chemical analyses and toxicity testing of sediment samples from depositional areas would be a prudent next step. The Service coordinated an effort to assess area sediments; while low contaminant burdens were expected, the objectives of the effort were to:

- 1) generate current data on the chemical and physical quality of the sediments behind the locks and dams for comparison to sediment toxicological screening values; and,
- 2) assess the toxicity of whole sediments and sediment elutriates prepared from these whole-sediment samples to sensitive aquatic organisms.

The following summary presents the sediment sampling and testing methods, results, and an interpretation of the findings.

## Methods

### *Sample sites*

Factors considered in determining the number and location of samples included the location of identified potential sources of concern and areas of sediment accumulation. Physical factors considered included the area and depth of potentially affected sediments behind the dams, distribution of sediments, and the length and breadth of the impounded reaches. By comparing the results of surveys of the river performed in 1903 and contemporary (2005 and 2006) hydrographic surveys, the Corps mapped changes in elevation of the river bottom within about 1,500-feet upstream of each lock and dam. At Lock and Dam #1, there is only an average of about two feet of sediment accumulation with a maximum of about eight feet of accumulation in a small area near at the base of the dam (and opposite the lock). Similar efforts at Lock and Dam #2 indicated even less accumulation with the greatest depths again near the dam and opposite the lock while there was little overall accumulation at Lock and Dam #3. These depositional areas were among the targeted sites for sample collection.

During reconnaissance of the river, Service staff examined the nature of sediments at inside channel bends of the river. These are typically more quiescent areas where fine-grained sediments (which have the greatest potential to accumulate contaminants) would settle. We found silty, highly organic samples indicative of depositional environments within 20-feet of the bank at river bends, such as Kellys Cove (about 5 miles upstream of Lock and Dam #1). These depositional areas were also targeted sites for sample collection. Sediments farther from the bank were typically coarse sand which is characteristic of the straighter portions of the river channel as well; this sandy material has little potential for contaminant accumulation and sediments from these areas were not retained for analyses. Twelve samples were collected by Service Ecologists / Environmental Contaminants Specialists between November 1 and 3, 2006. Table 1 lists the collection locations, collection date, time, and specific coordinates. Figures 1 through 9 depict the collection locations.

### *Sediment sample collection and storage*

Samples were collected, transported, stored, and shipped for analyses under chain of custody. Because the Corps determined minimal depth of sediment accumulation, surface sediment grab sampling was conducted for this characterization. A stainless-steel petit Ponar dredge was used to collect the top 5 to 10 cm of sediment; multiple grabs were collected and composited to form one sample at each site. The composite of the grab samples was homogenized by stirring with a stainless-steel spoon in a stainless-steel bucket. Debris (e.g., sticks, leaves, rocks bigger than about 0.5 cm<sup>3</sup>) were physically removed during homogenization. Collection equipment was thoroughly cleaned (ambient water rinse, detergent and water scrub, distilled / demineralized water rinse, 10% nitric acid rinse, another distilled / demineralized water rinse, acetone rinse, and a final rinse with distilled / demineralized water) before sampling at each site.

Aliquants of the homogenate were split in into chemically cleaned glass jars (provided by the analytical laboratory) with Teflon®-lined lids for chemical analyses with about 4 L of the same sediment homogenate from each site placed in a high-density polyethylene jar (EP Scientific



Table 1. Cape Fear River sediment sampling location data and the date and time of collection.

Sample ID	River Mile	Description and GPS Coordinates
CF 1	76.1	About 1.2 miles upstream of Elizabethtown Dock and upstream of most local sources, about 15 to 20 feet from west bank (11-01-06; 10:15 am) N 34.65373° W 78.64207°
CF 2	72.8	About 0.3 miles downstream of Hwy 701 bridge at Elizabethtown and about 15 to 20 feet from north bank (11-01-06; 11:25 am) N 34.62982° W 78.59916°
CF 3	71.8	About 0.3 miles upstream of Lock and Dam #2 and about 15 feet from south bank (11-01-06; 11:54 am) N 34.62848° W 78.58287°
CF 4	93.4	Back eddy behind rock downstream of DuPont, along south side of channel and about 0.1 mile downstream of gaging station (11-01-06; 3:47 pm) N 34.81243° W 78.81832°
CF 5	88.5	About 0.2 miles upstream of Tar Heel Landing Road crossing, downstream of Smithfield Foods and about 15 feet from northwest shore (11-01-06; 4:39 pm) N 34.74638° W 78.78783°
CF 6	44.7	About 1.0 mile downstream of confluence with Carvers Creek upstream of Locks Point, about 15 to 20 feet from west bank (11-02-06; 11:09 am) N 34.44568° W 78.34975°
CF 7	46.3	About 1.5 miles downstream of Elwell's Ferry at inside bend of Kellys Cove, about 15 to 20 feet from west bank (11-02-06; 11:48 am) N 34.46391° W 78.35083°
CF 8	39.0	About 0.25 miles upstream of Lock and Dam #1 at depositional area along southwest bank noted on Corps bathymetry map (11-02-06; 2:00 pm) N 34.40745° W 78.29622°
CF 9	105.9	About 0.2 miles downstream of unnamed tributary adjacent to Monsanto and Rohm and Haas (11-03-06; 9:47 am) N 34.97574° W 78.77853°
CF 10	108.4	About 0.3 miles downstream of confluence with Rock Fish Creek, downstream of Rock Fish Creek Wastewater Treatment Plant, along north side of channel (11-03-06; 10:24 am) N 34.96910° W 78.81459°
CF 11	112.9	About 2.5 miles upstream of I-95 crossing, downstream of Borden Chemical, and about 15 to 20 feet from east bank (11-03-06; 1:50 pm) N 35.01809° W 78.85653°
CF 12	95.2	About 0.2 miles upstream of Lock and Dam #3 and about 10 to 15 feet from west bank (11-03-06; 2:47 pm) N 34.83860° W 78.82367°

Figure 1. Vicinity map for Cape Fear River lock and dam sediment sampling sites. Green boxes delineate areas enlarged on subsequent maps.

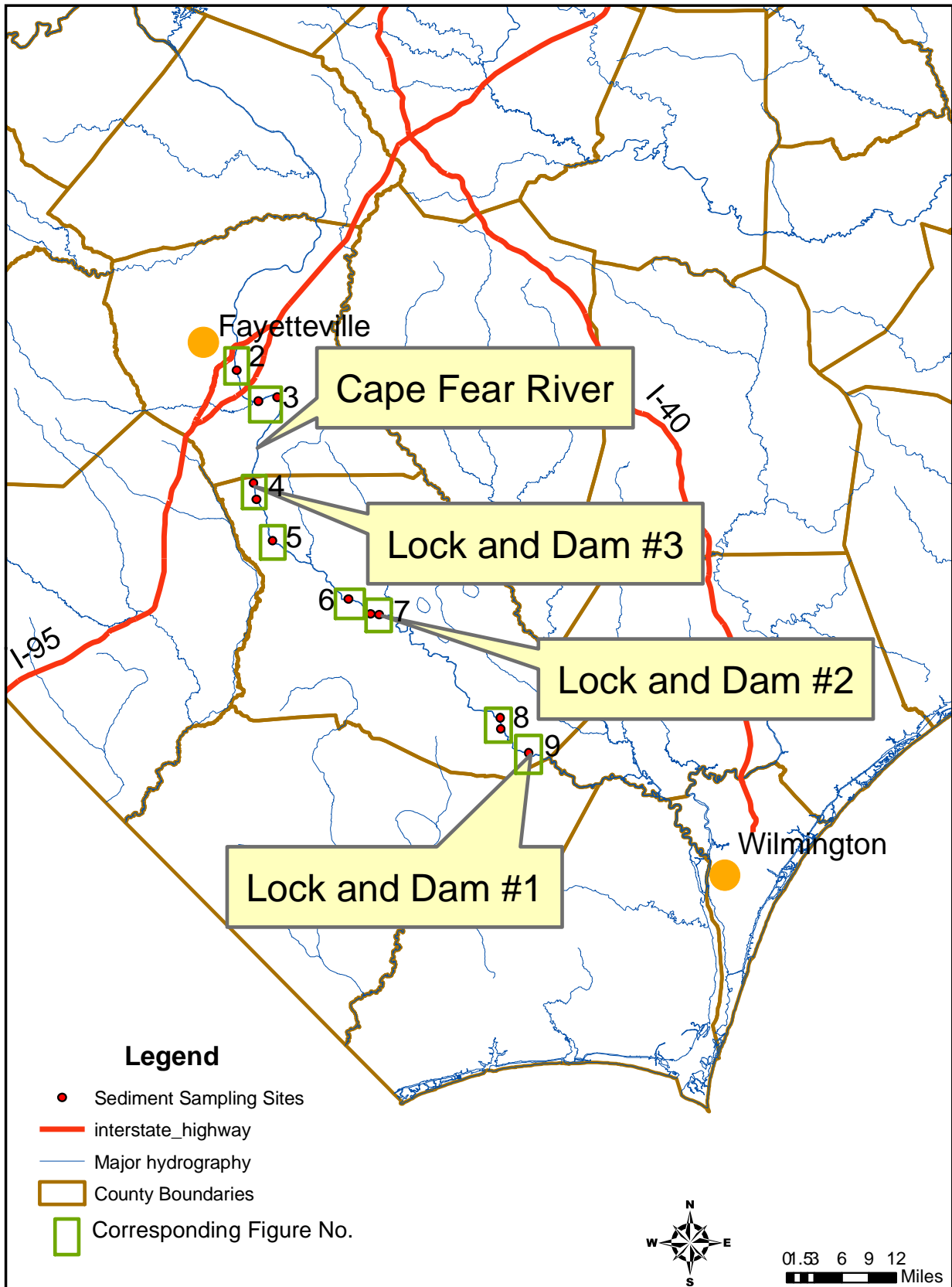
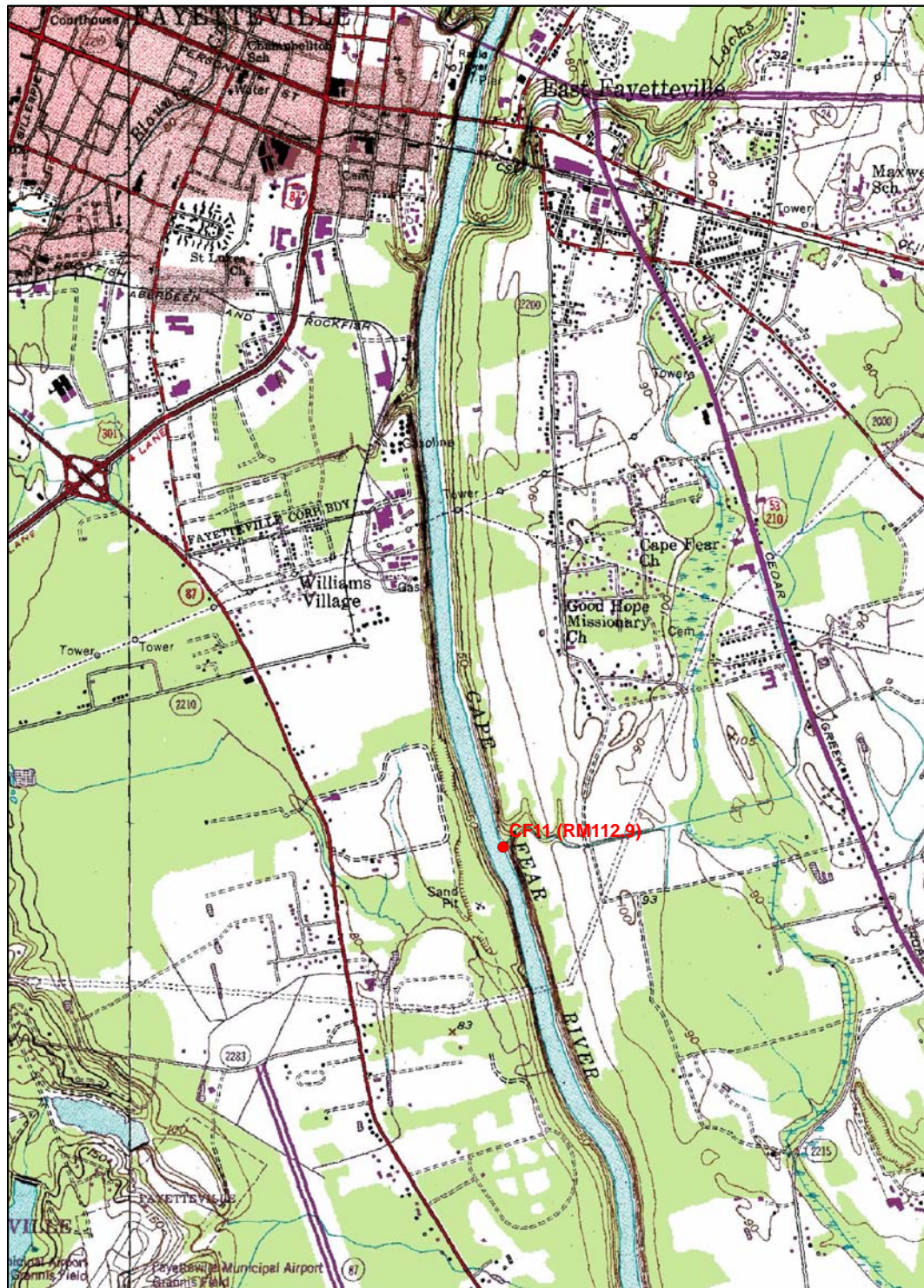


Figure 2. Cape Fear River sediment sampling site downstream of Fayetteville (furthest upstream sample in this assessment).



0 0.5 1 1.5 2 Kilometers

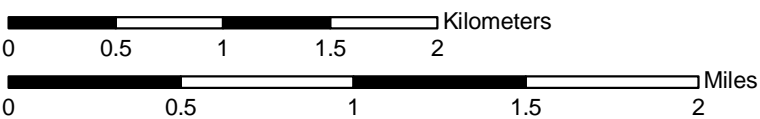
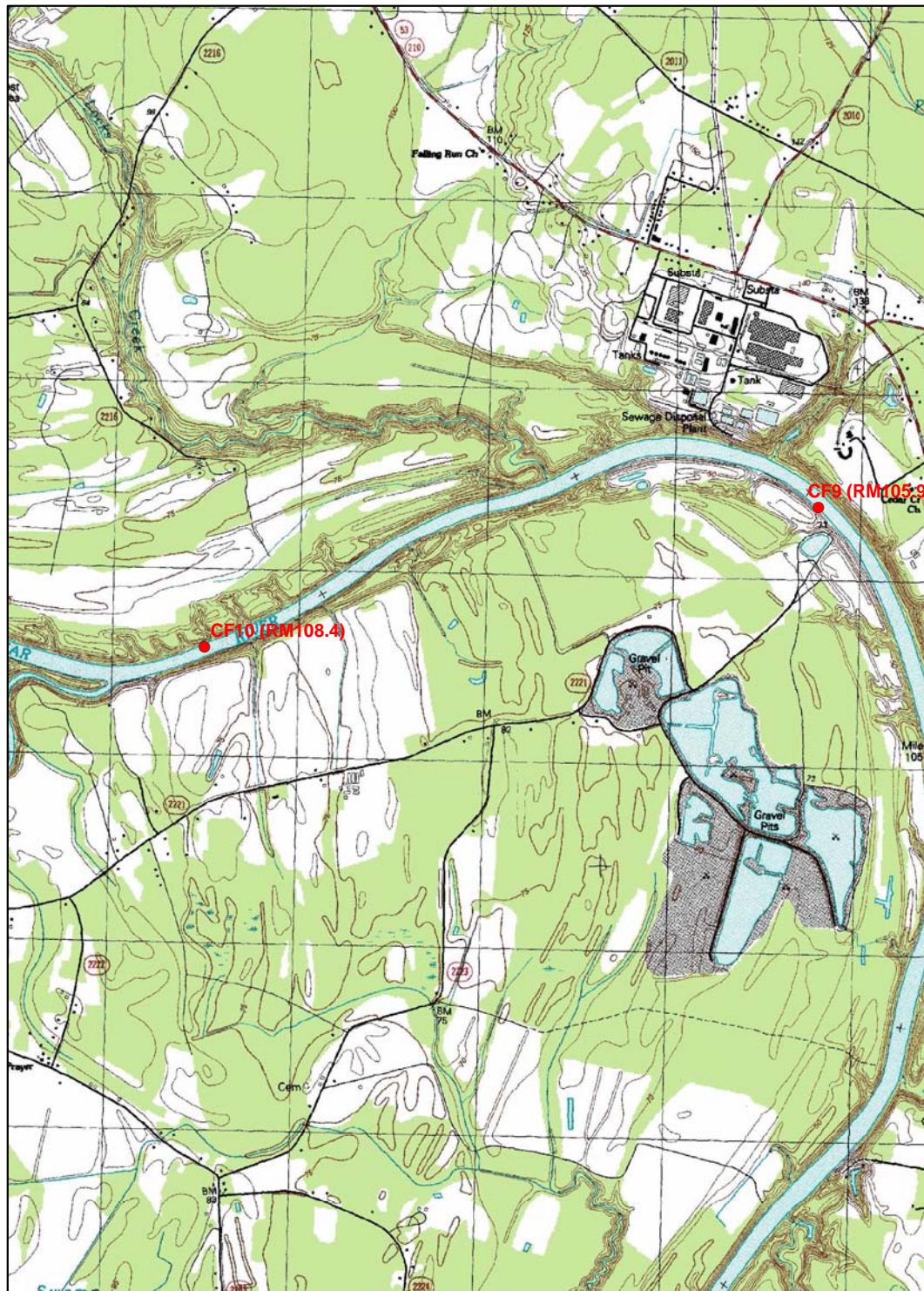
0 0.5 1 1.5 2 Miles



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Figure 3. Cape Fear River sediment sampling sites between confluence with Rock Fish Creek and Lock and Dam #3.

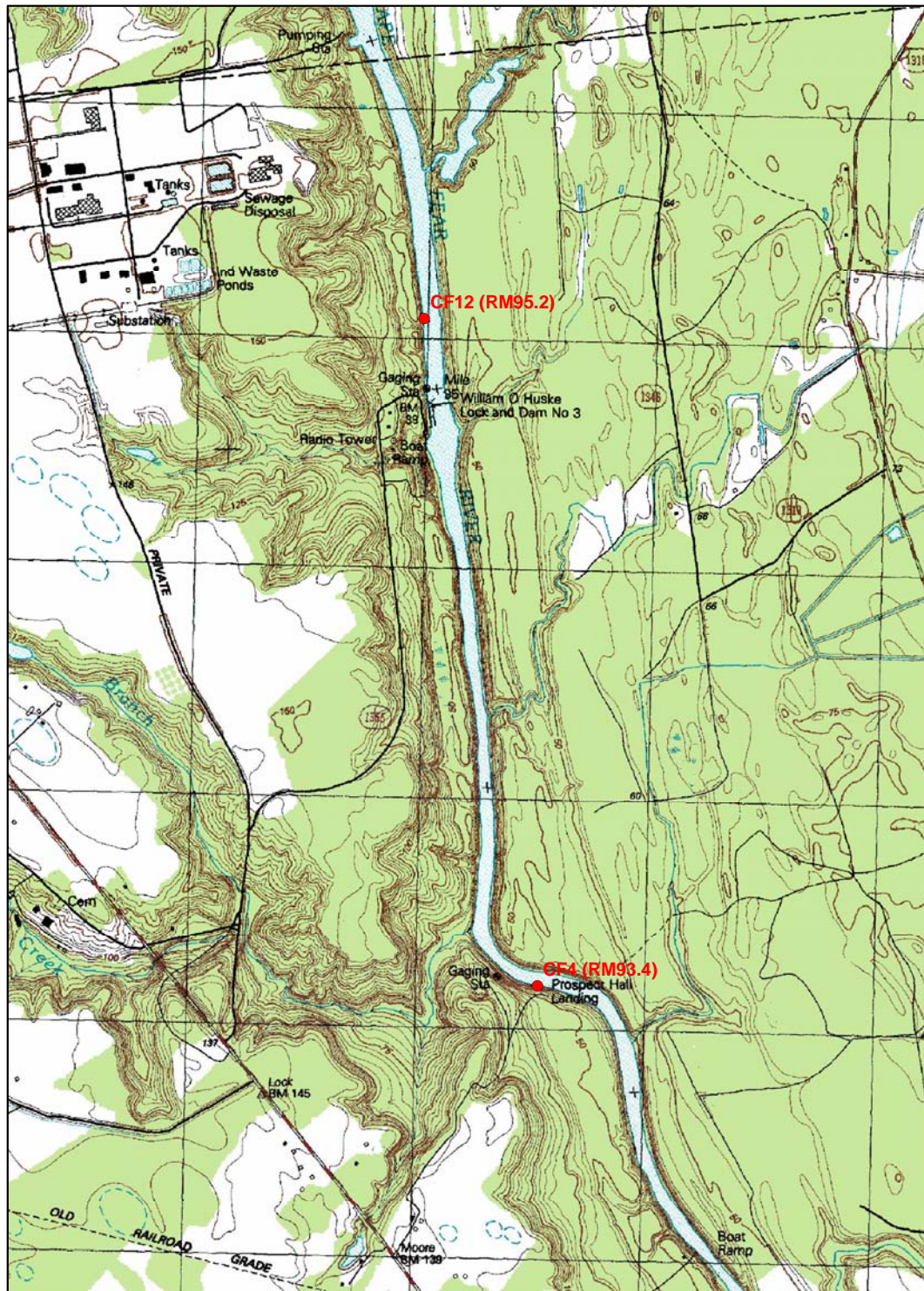


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Figure 4. Cape Fear River sediment sampling sites upstream and downstream of Lock and Dam #3.



0 0.5 1 1.5 2 Kilometers

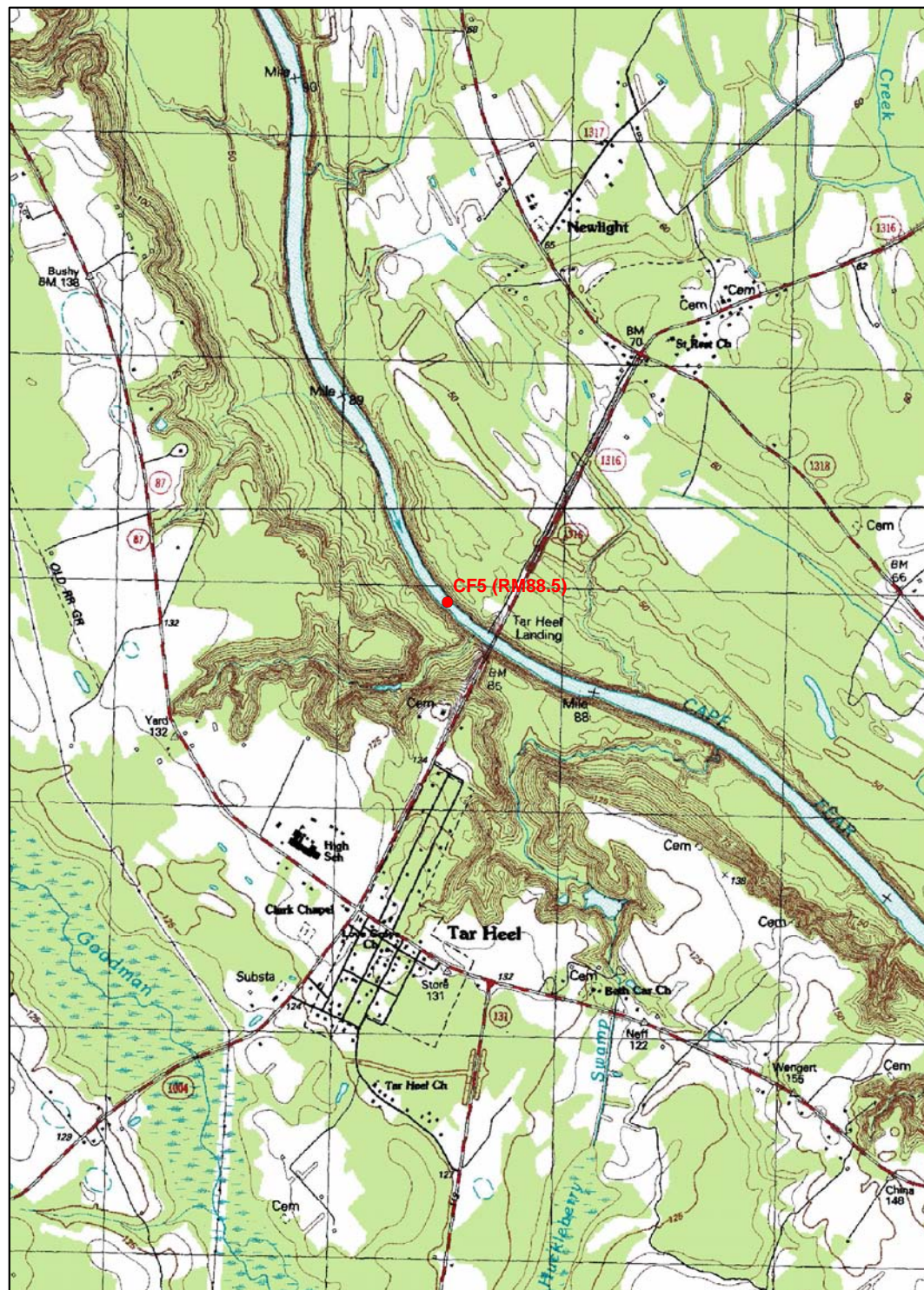
0 0.5 1 1.5 2 Miles



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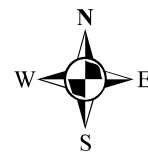


Figure 5. Cape Fear River sediment sampling site at Tar Heel Landing.



0 0.5 1 1.5 2 Kilometers

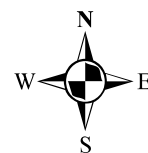
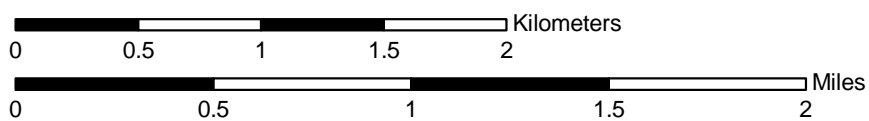
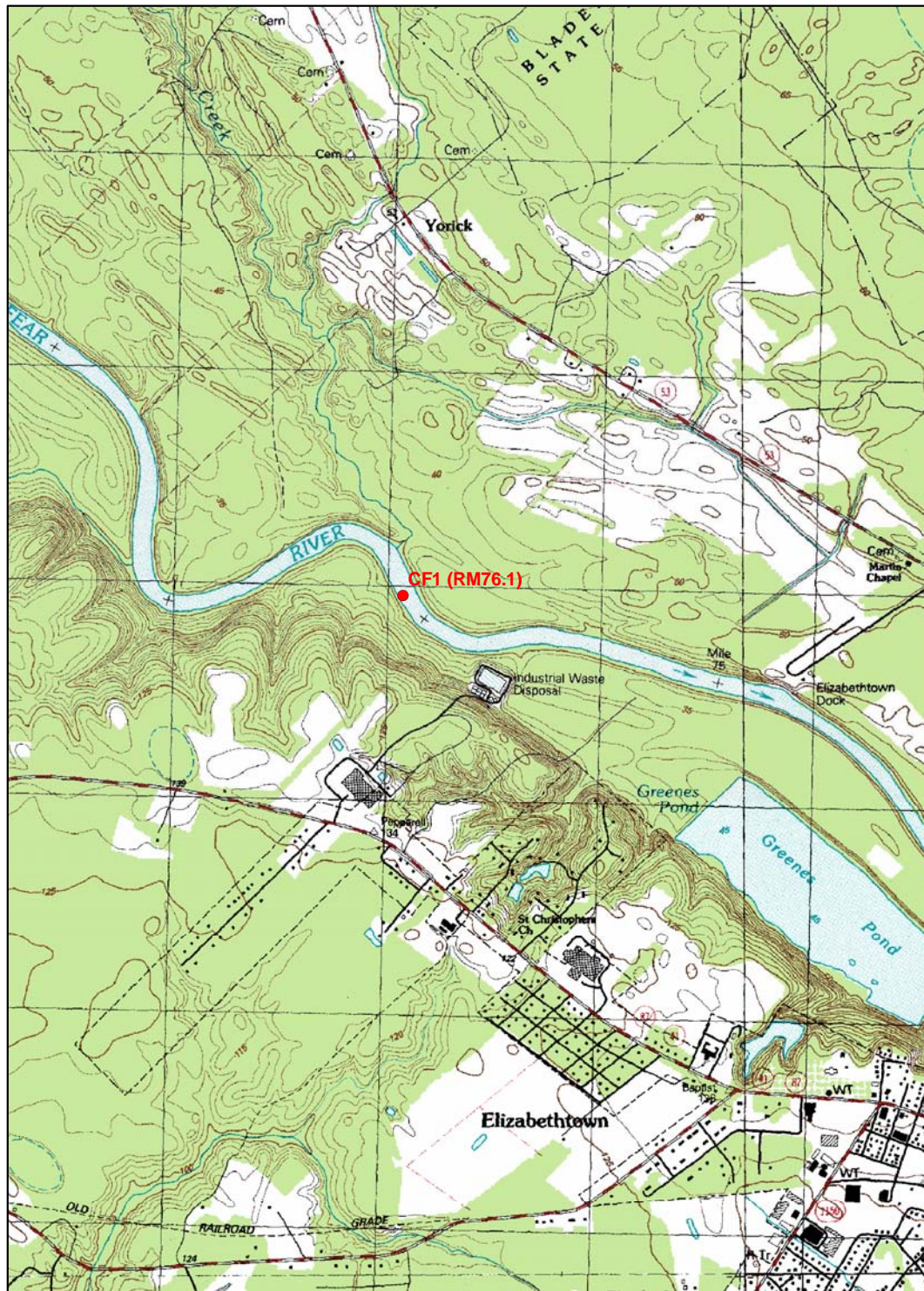
0 0.5 1 1.5 2 Miles



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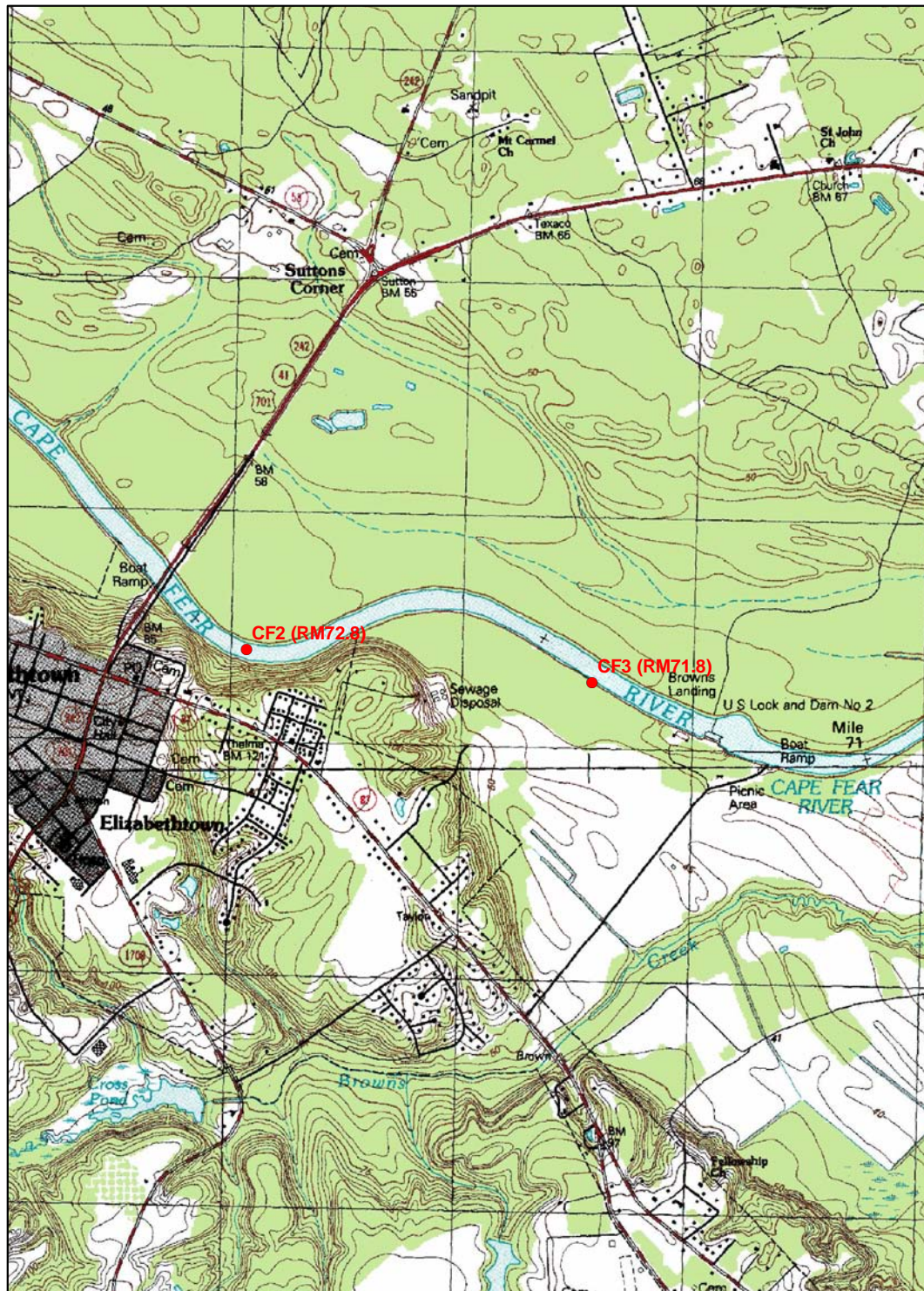
Figure 6. Cape Fear River sediment sampling site upstream of Elizabethtown.



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Figure 7. Cape Fear River sediment sampling sites downstream of Elizabethtown and upstream of Lock and Dam #2.



0 0.5 1 1.5 2 Kilometers

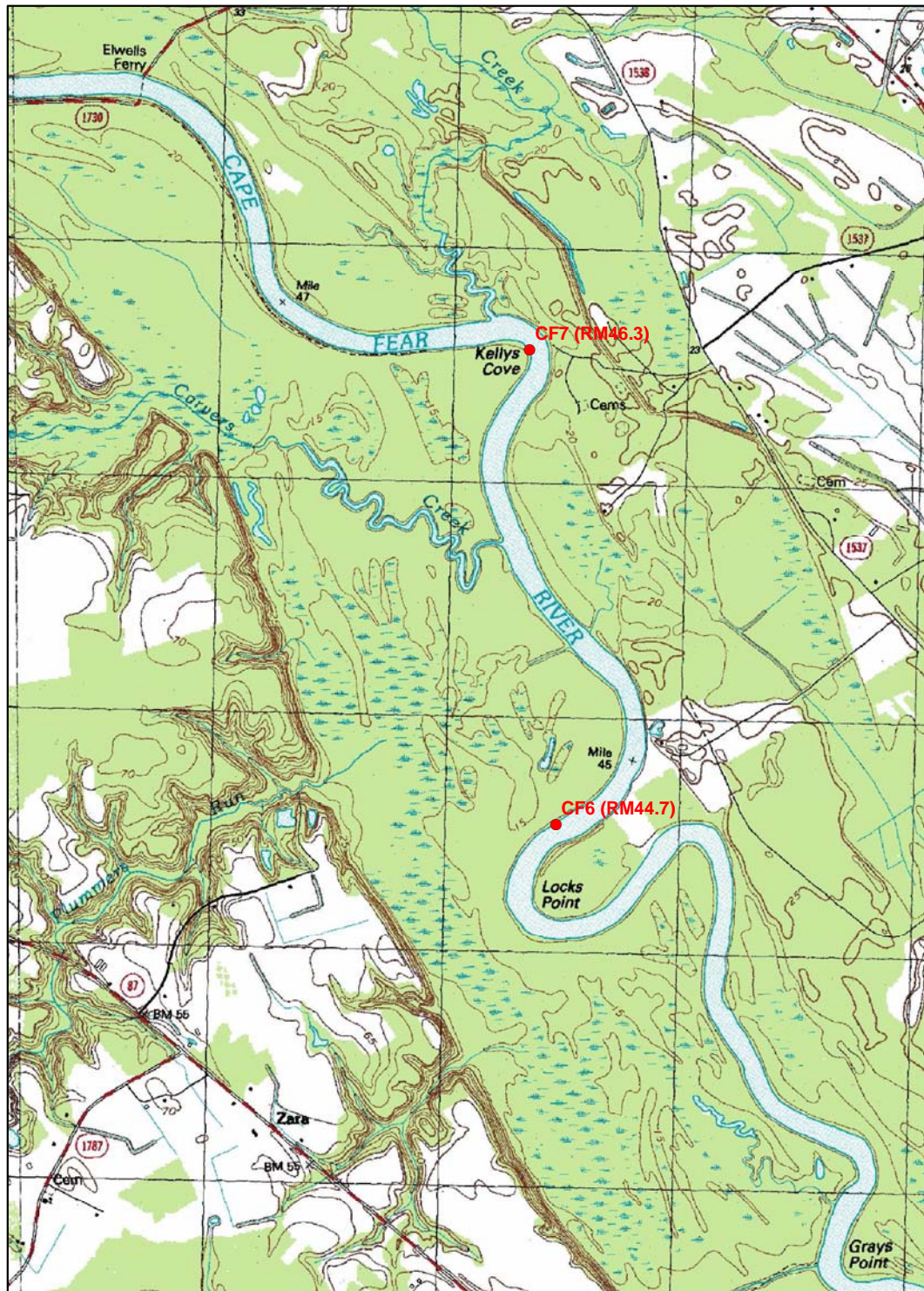
0 0.5 1 1.5 2 Miles W



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Figure 8. Cape Fear River sediment sampling sites upstream of Lock and Dam #1, near Elwells Ferry



0 0.5 1 1.5 2 Kilometers

0 0.5 1 1.5 2 Miles W E

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Figure 9. Cape Fear River sediment sampling sites upstream of Lock and Dam #1, near Riegelwood.



0 0.5 1 1.5 2 Kilometers

0 0.5 1 1.5 2 Miles



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Products, Miami, OK) for toxicity testing. Samples were stored in a cooler on ice (about 4°C) in the field. Upon reaching the Service lab in Raleigh each evening, samples were stored refrigerated (about 4°C). The analytical chemistry fractions were held at this temperature for seven days when a refrigerator thermostat failed causing samples to be frozen (at least -10°C) overnight. The samples were subsequently transferred to another refrigerator. The temperature change would not affect analyses of elemental contaminants because their concentrations cannot be altered by freezing. Chemists we conferred with advised that significant degradation of the polycyclic aromatic hydrocarbons (PAHs) was also unlikely, so the analytical chemistry fractions were retained for analyses. The sample fractions for toxicity testing had been shipped prior to the temperature change.

### *Sediment toxicity tests*

Nine samples were sent to the U.S. Geological Survey Columbia Environmental Research Center (CERC), Columbia, MO by overnight delivery on November 7, 2006. Toxicity tests included 28-d whole-sediment exposures of *Hyallolella azteca* (freshwater amphipod) evaluating effects on growth and survival, 10-d whole-sediment exposures of *Chironomus dilutus* (freshwater midge) evaluating effects on growth and survival (USEPA 2000a, ASTM 2007), and 2-d sediment elutriate (water-extractable fraction of the sediment) exposures of *Ceriodaphnia dubia* (freshwater cladoceran) evaluating effects on survival (USEPA 1993a). This battery of toxicity tests was selected to help evaluate the toxicity of sediments, both in-place and upon re-suspension. Toxicity tests were performed on nine of the twelve samples based on prioritizing areas of interest from the results of the Tier 1 assessment (USFWS 2006).

Test organism culture - Amphipods were mass cultured at 23°C with a luminance of about 800 lux using 80-L glass aquaria containing 50 L of well water (hardness 283 mg/L as CaCO<sub>3</sub>, alkalinity 255 mg/L as CaCO<sub>3</sub>, pH 7.8; Ingersoll et al. 2002). Amphipods used to start the tests were obtained by collecting amphipods that passed through a #35 U.S. Standard size (500-µm opening) and were collected on a #40 (425-µm opening) sieve placed under water. Amphipods were held in 3 L of water with gentle aeration and with a small amount of Tetramin<sup>®</sup> and a maple leaf for 24 hours before the start of the test. Use of this sieving method resulted in mean amphipod lengths at the start of the exposure of 1.78 mm (0.09 standard error of the mean (SE)).

Midge were mass cultured under static conditions in 5.7-L polyethylene cylindrical chambers containing about 3 L of water and 25 ml of silica sand as a substrate at a temperature of 25°C and a light intensity of about 800 lux. Second instar midge (10-d old) to start the tests were obtained by isolating <24 h old midge larvae ten days before starting the toxicity test.

Cladocerans were cultured under static conditions in 30-ml disposable clear plastic cups each containing 15 ml of well water and one adult at a temperature of 25°C and a light intensity of about 200 lux (USEPA 1993a). Cladocerans in each cup were fed 0.1 ml/d Yeast-Cerophyll-trout chow (YCT; 1.7 to 1.9 g/L) and 0.1 ml/d unicellular green algae ( $3 \times 10^7$  cells of *Selenastrum capricornutum*). Neonates (<24 hours) to start the tests were obtained from adults that produce eight or more young in their third brood or subsequent broods.

Whole-sediment toxicity tests - Whole-sediment toxicity tests with *H. azteca* were conducted for 28 d and with *C. dilutus* were conducted for 10 d in accordance with methods described in ASTM (2007) and USEPA (2000a) starting within 3 weeks of sediment collection. Endpoints measured in the amphipod exposures included survival and length on Day 28. Endpoints measured in the midge exposures included survival and growth (ash-free dry weight) on Day 10. Test sediments were homogenized in a stainless-steel bowl using a plastic spoon and added to exposure beakers 1 d before test organisms were added (Day -1). Sub-samples of sediment were then collected for physical characterizations and for isolating pore water. Amphipods and midge were exposed to 100 ml of sediment with 175 ml of overlying water in 300-ml beakers with four replicates/treatment. The photoperiod was 16 h light: 8 h dark at a light intensity of about 200 lux at the surface of the exposure beakers and the temperature was 23°C. Each beaker received 2-volume additions/d of overlying water starting on Day -1 (Ingersoll et al. 2002). Overlying water was prepared by diluting well water with deionized water to a hardness of 100 mg/L as CaCO<sub>3</sub>, alkalinity of 85 mg/L as CaCO<sub>3</sub>, and pH about 7.8. The water delivery system cycled every 4 h with each cycle delivering 125 ml of water to each beaker. Tests were started on Day 0 by placing 10 amphipods or 10 midge into each beaker using an eyedropper. Amphipods in each beaker were fed 1.0 ml of YCT (1.7 to 1.9 g/L) in a water suspension daily (USEPA 2000a, ASTM 2007). Midge in each beaker were fed 1.5 ml of Zeigler prime tropical flake fish food (red) (Zeigler Bros, Inc., Gardens, PA) (6.0 mg of dry solids) in a water suspension daily (USEPA 2000a, ASTM 2007). Beakers were observed daily for the presence of animals, signs of animal activity (i.e., burrowing), and to monitor test conditions (mainly water clarity).

Midge were isolated from each beaker on Day 10 of the exposure and amphipods were isolated from each beaker on Day 28 of the exposure by pouring off most of the overlying water, gently swirling the remaining overlying water and upper layer of sediment, and washing the sediment through a No. 50 (300- $\mu$ m opening) U.S. Standard stainless-steel sieve. The materials that were retained on the sieve were washed into a glass pan and the surviving midge and amphipods were removed. This process was repeated with the remainder of the sediment in a beaker if all 10 of the amphipods or midge were not recovered from the upper layer of the sediment. Amphipods from each sediment were counted and preserved in 8% sugar formalin for subsequent length measurements (Ingersoll et al. 2002). Length of amphipods was measured along the dorsal surface from the base of the first antenna to the tip of the third uropod along the curve of the dorsal surface. Amphipod length measurements were made using an EPIX imaging system (PIXCI® SV4 imaging board and XCAP software; EPIX Inc., Buffalo Grove, IL) connected to a computer and a microscope (Ingersoll et al. 2002). Midge from each sediment were counted and dried at 100°C in a drying oven for subsequent ash-free dry weight measurements (ASTM 2007). Ash-free dry weight was obtained by recording the weights after drying, transferring to an ashing oven and ashing at 500°C. Ash-free dry weights were determined by subtracting the ashed weight from the dry weight.

About 50 ml of pore water was isolated from sediment samples by centrifugation at 5200 rpm (7000 x G) for 15 min at 4°C (Kemble et al. 1994). Immediately after pore water was isolated, dissolved oxygen, pH, alkalinity, temperature, conductivity, total ammonia, and hardness were measured using methods outlined in Kemble et al. (1994). Mean characteristics of pore-water quality (ranges in parentheses) were: pH 6.95 (4.5 to 7.4), alkalinity 491 (248 to 824 mg/L as CaCO<sub>3</sub>), hardness 298 (144 to 498 mg/L as CaCO<sub>3</sub>), dissolved oxygen 1.8 (1.0 to 5.7 mg/L),

conductivity 1016 (524 to 1597  $\mu\text{mho/cm}$ ), total ammonia 13.5 (2.1 to 33.7 mg N/L), and unionized ammonia 0.057 (0.001 to 0.078 mg N/L; Table 5).

In the amphipod test, conductivity, pH, alkalinity, hardness, dissolved oxygen, and total ammonia were measured in overlying test water on Day 0 (the day amphipods were added to the exposure beakers) and Day 28 of the exposure. Conductivity and dissolved oxygen, in overlying water were also measured weekly. Temperature in the water baths containing the exposure beakers was recorded daily. Overlying water pH, alkalinity, total hardness, conductivity and total ammonia measurements were similar among all treatments. Mean characteristics of overlying water quality (ranges in parentheses) are as follows: pH 8.0 (7.9 to 8.0), alkalinity 88 (81 to 94 mg/L as  $\text{CaCO}_3$ ), hardness 93 (90 to 96 mg/L as  $\text{CaCO}_3$ ), dissolved oxygen 7.1 (6.7 to 7.5 mg/L), conductivity 257 (252 to 263  $\mu\text{mho/cm}$ ), total ammonia 0.39 (0.19 to 0.70 mg N/L), and unionized ammonia 0.010 (0.004 to 0.010 mg N/L; Table 7). Dissolved oxygen in overlying water was at or above the acceptable level of 2.5 mg/L in all treatments throughout the study (USEPA 2000a, ASTM 2007).

In the midge test, conductivity, pH, alkalinity, hardness, dissolved oxygen, and total ammonia were measured in overlying test water on Day 0 (the day midge were added to the exposure beakers) and Day 10 of the exposure. Conductivity and dissolved oxygen in overlying water were also measured weekly. Temperature in the water baths holding the exposure beakers was monitored daily. Overlying water pH, alkalinity, total hardness, conductivity and total ammonia measurements were similar among all treatments. Mean characteristics of overlying water quality (ranges in parentheses) are as follows: pH 8.0 (7.6 to 8.1), alkalinity 87 (83 to 96 mg/L as  $\text{CaCO}_3$ ), hardness 92 (85 to 100 mg/L as  $\text{CaCO}_3$ ), dissolved oxygen 7.4 (7.1 to 7.6 mg/L), conductivity 255 (249 to 263  $\mu\text{mho/cm}$ ), total ammonia 0.38 (0.20 to 0.64 mg N/L), and unionized ammonia 0.010 (0.011 to 0.017 mg N/L; Table 8). Dissolved oxygen in overlying water was above acceptable levels of 2.5 mg/L in all treatments throughout the study (USEPA 2000a, ASTM 2007).

Elutriate toxicity tests - Toxicity tests with *C. dubia* were conducted for 2 d in accordance with methods outlined in USEPA (1993a) starting within 5 weeks of sediment collection. Elutriate samples were prepared by mixing one part sediment with four parts water (prepared by diluting well water, the characteristics of which are described at page 13 above under Test organism culture, with deionized water to a hardness of 100 mg/L as  $\text{CaCO}_3$ , alkalinity of 85 mg/L as  $\text{CaCO}_3$ , and pH about 7.8). Elutriate samples were prepared following procedures outlined in USEPA (1993a). About 50 ml of sediment was placed into two 250-ml high-density polypropylene centrifuge tubes and topped off with 200 ml of water. The tubes were sealed and tumbled on a rolling mill for 30 min. The tubes were then be centrifuged for 15 min at 5200 rpm (7000 x G). The water was then decanted through a US Standard #50 stainless steel sieve (300- $\mu\text{m}$  opening) into a 500-ml beaker. A sub-sample of the elutriate samples was collected for water quality characterization, with the remaining sample used in toxicity tests.

The cladoceran test was started on Day 0 with <24-h old *C. dubia*. A total of 10 cladocerans were exposed to each elutriate sample and were exposed individually in 30-ml disposable clear plastic cups containing 15 ml of 100% elutriate test solution. Trays holding the plastic cups were covered with plastic sheets to prevent evaporation. Cladocerans were maintained in a water bath

at 25±1° C on a 16 h light: 8 h darkness photoperiod at a light intensity of about 200 lux. Cladocerans were not fed during the exposures. On Day 2, survival of the cladocerans was determined by pouring all the test water into a petri dish and using a light table to facilitate counting the neonates. Four of the elutriate samples that were found to be toxic to *C. dubia* (CF1, CF6, CF10, and CF11) were re-tested in a dilution series prepared 21 d after the start of the initial toxicity tests with 100% elutriate sample. The four samples were prepared by the same procedures outlined above and a 50 % dilution series (elutriate sample was prepared with the 100 mg/L hardness water, testing 100, 50, 25, 12.5, 6.25% elutriate) and a dilution water control.

Conductivity, pH, alkalinity, hardness, dissolved oxygen, and total ammonia were measured in elutriate test water on Day 0 (the day cladocerans were added to the exposure beakers). Temperature in the water baths containing the exposure beakers was recorded daily. Elutriate water pH, alkalinity, total hardness, conductivity and total ammonia measurements were similar among all treatments. Mean characteristics of elutriate water quality (ranges in parentheses) are as follows: pH 7.4 (6.2 to 7.8), alkalinity 100 (32 to 150 mg/L as CaCO<sub>3</sub>), hardness 100 (64 to 154 mg/L as CaCO<sub>3</sub>), dissolved oxygen 5 (4 to 7 mg/L), conductivity 359 (259 to 491 µmho/cm), total ammonia 3.63 (0.8 to 6.7 mg N/L), and unionized ammonia 0.049 (0.001 to 0.088 mg N/L). Dissolved oxygen in overlying water was above 2.5 mg/L in all treatments throughout the study.

#### *Sediment chemical and physical analyses*

Elemental contaminants and PAHs were targeted for analyses in all samples; in addition to being detected in the assessment area above threshold effect levels by others (USFWS 2006), these classes of compounds include many common pollutants. Additionally, these compounds have consensus-based freshwater effects sediment quality guidelines (MacDonald et al. 2000, USEPA 2000b) with which to evaluate the results.

Sediment samples were delivered to Environmental Conservation Laboratories, Inc. (ENCO) in Cary, NC on November 9, 2006. ENCO has the North Carolina Laboratory Certification for the requested analyses. Sediment samples were analyzed for Al, As, Ba, Cd, Cr, Cu, Fe, Pb, Mn, Ni, Se, Ag, and Zn by USEPA method 6010B (inductively coupled plasma-atomic emission spectrometry, or ICP-AES). Analyses of mercury in sediment samples were by USEPA method 7471A (cold-vapor atomic absorption spectrophotometry). ENCO analyzed sediments for PAHs, including 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorine, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene, by USEPA method 8270C (gas chromatography / mass spectrometry, or GC/MS).

Pore-water and elutriate samples prepared by CERC (described above) were also analyzed for elemental contaminants by ENCO. Elements in the analyses included Al, As, Cd, Cr, Cu, Fe, Pb, Mn, Ni, Se and Zn by USEPA method 200.8 (Trace Elements by ICP/Mass Spectrometry). This method was also used to measure Mg and Ca which provided the measures of hardness for these samples (by the calculation method in Standard Methods SM 2340B).



Physical characterization of whole sediments included percentage water, particle size and total organic carbon (TOC). Particle size analysis was conducted at CERC by sieve series following methods described in Foth et al. (1982), Gee and Bauder (1986), and Kemble et al. (1994). The TOC analyses were by the Walkley Black method (Schumacher 2002) and were conducted by Severn Trent Laboratories of Tampa, FL (under subcontract to ENCO).

All analyses were accompanied by batch-specific quality control / quality assurance samples (blanks, spikes, and duplicates). Review of quality assurance data (provided in their entirety in the appendices) indicate acceptable precision and accuracy for all analyses.

Threshold effects concentrations (TECs) and probable effects concentrations (PECs) were used to assess the significance of the sediment chemistry results. The TECs are concentrations of contaminants in whole sediment below which adverse effects to sensitive aquatic organisms are not expected to occur, and the PECs are effect-based sediment quality guidelines established as concentrations of contaminants in whole sediment above which adverse effects are expected to frequently occur in field-collected sediments (MacDonald et al. 2000). Mean quotients based on PECs were calculated to provide an overall measure of chemical contamination and to support an evaluation of the combined effects of multiple contaminants in sediments (MacDonald et al. 2000; USEPA 2000b). A PEC quotient (PEC-Q) was calculated for each chemical in each sediment sample by dividing the dry-weight concentration of a chemical by the PEC for that chemical. To equally weight the contribution of metals and PAHs in the evaluation of sediment chemistry and toxicity (assuming these diverse groups of chemicals exert some form of collective toxic action), an average PEC-Q for metals was calculated based on concentrations of each metal. A mean overall quotient was then calculated for each sample by summing the average quotient for metals and the quotient for total PAHs, and dividing this sum by two ( $n = 2$  quotients/sample). Use of this approach for calculating the quotients was selected to avoid over-weighting the influence of an individual chemical (e.g., a single metal) on the combined mean quotient (USEPA 2000b).

Relationships between toxicity and concentrations of PAHs in sediment samples were calculated using equilibrium partitioning sediment guideline toxic units (ESGTU; USEPA 2003). The ESGTUs are a way of summarizing many PAHs compounds into one representative number. An ESGTU is basically the organic carbon normalized concentration of a chemical divided by a toxicity threshold (this is a toxic unit for the specific chemical). Then the ESGTU for specific chemicals are summed for each sample yielding  $\Sigma$ ESGTUs.

### *Statistical analyses*

Statistical analyses for the amphipod exposures were conducted using one-way analysis of variance (ANOVA) at  $p = 0.05$  for all endpoints except length which was analyzed using a one-way nested ANOVA at  $p = 0.05$  (amphipods nested within a beaker; Snedecor and Cochran 1982). Before statistical analyses were performed, all data were tested for normality. Variance among treatment means for both endpoints was heterogeneous, therefore, a rank analysis of variance was performed and mean differences were determined using a t-test on ranked means (at  $p = 0.05$ ). A sample was designated as toxic when mean survival or growth was significantly reduced relative to the control sediment. Statistical analyses on toxicity tests were performed

with Statistical Analysis System programs (SAS 2001). Pairwise correlations among the *C. dubia* survival results and all sediment and elutriate chemical analyses were calculated with JMP 5.1.2 software (SAS Institute, Inc., Cary, NC).

Contaminant concentrations were analyzed for goodness of fit to a normal distribution by the Shapiro-Wilk test (JMP 5.1.2, SAS Institute, Inc.). All elemental contaminants concentrations were normally-distributed. Most of the sediment PAH concentrations were not normally-distributed and these were log-transformed prior to additional analyses. No statistical analyses were conducted for compounds detected in less than 40% of the samples, these included (in sediment samples) silver, 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, dibenzo(a,h)anthracene, fluorene and naphthalene. For analytes present in at least 40% of samples at concentrations greater than detection limits, a value of the detection limit was substituted for non-detects in statistical comparisons. For analytes reported as estimated values (near the detection limits), the estimated concentration was used.

## Results and Discussion

### *Toxicity tests*

Control survival of *H. azteca* was 98% and met the test acceptability requirement of 80% survival recommended in USEPA (2000a) and ASTM (2007). Control survival of *C. dilutus* was 65% and did not meet the test acceptability requirement of 70% survival recommended in USEPA (2000a) and ASTM (2007). USEPA (2000a) and ASTM (2007) state that a study in which organisms in the negative control do not meet performance criteria must be considered questionable because it suggests that adverse factors affected the response of test organisms. Some studies have reported cases where performance in the negative control is poor, but performance criteria are met in reference sediment included in the study design. In these cases, it might be reasonable to infer that other samples that show good performance are probably not toxic; however, any samples showing poor performance should not be judged to have shown toxicity, since it is unknown whether the adverse factors that caused poor control performance might have also caused poor performance in the test treatments (USEPA 2000a, ASTM 2007). In the current study, survival of midge in all of the test sediments was above 75% and was frequently above 90% suggesting that the test sediments were not toxic to midge. No reason for the poor performance of midge in the control sediment could be identified other than the control sample had been held in the laboratory for over three years for use in routine testing.

Whole sediments had no significant effect on survival or growth in 28-d toxicity tests with *H. azteca* or in 10-d tests with *C. dilutus* (Table 2). Results indicate the contaminants associated with the whole-sediment samples were not chronically toxic to amphipods or midge.

In 2-d sediment elutriate (water-extractable fraction) tests with *C. dubia*, statistically-significant reductions in survival occurred in four (CF 11, 10, 1 and 6) of the nine exposures (Table 2). Sample site CF 11 is downstream of Borden Chemical and the 25 million gallon per day [MGD] discharge of Fayetteville-Cross Creek wastewater treatment plant. Site CF 10 is downstream of the Fayetteville-Rockfish Creek wastewater treatment plant discharge. However, site CF 1 (upstream of Elizabethtown) and CF 6 (near Locks Point) have no known nearby pollutant



Table 2. Response of *Hyalella azteca* in 28-d whole-sediment exposures, *Chironomus dilutus* in 10-d whole-sediment exposures, and *Ceriodaphnia dubia* in 2-d elutriate exposures prepared from sediment samples collected from the Cape Fear River and to a control sediment (WB). Means (standard error of the means in parentheses) with an asterisk (CF 11, 10, 1 and 6) within a column are significantly different than the control ( $p < 0.05$ ).

River Mile	Sample ID	Amphipod Survival (%)	Amphipod Growth (mm)	Midge Survival (%)	Midge Growth (mg)	Cladoceran Survival (%)
112.9	CF 11	98 (2.50)	4.25 (0.09)	93 (4.79)	0.99 (0.02)	20 *
108.4	CF 10	100 (0.00)	4.37 (0.07)	75 (12.9)	0.74 (0.08)	0 *
105.9	CF 9	93 (4.15)	4.04 (0.06)	85 (6.45)	1.03 (0.04)	70
93.4	CF 4	90 (5.77)	4.12 (0.09)	88 (6.29)	1.08 (0.13)	80
88.5	CF 5	98 (2.50)	4.10 (0.05)	88 (2.50)	1.03 (0.05)	80
76.1	CF 1	98 (2.50)	4.34 (0.05)	98 (2.50)	0.86 (0.04)	0 *
71.8	CF 3	100 (0.00)	4.03 (0.07)	95 (2.89)	0.93 (0.06)	80
44.7	CF 6	98 (2.89)	3.96 (0.08)	93 (4.79)	0.93 (0.05)	40 *
39.0	CF 8	95 (2.89)	4.32 (0.08)	95 (2.89)	1.04 (0.05)	80
	WB	98 (2.50)	4.32 (0.06)	65 (8.66)	0.51 (0.06)	80

sources. As discussed later in this report, elutriate sample toxicity appears to be related to sediment manganese concentrations rather than any particular point source. Tables 3 through 8 summarize the chemistry of elutriates and overlying water in the whole-sediment toxicity tests.

#### *Whole-sediment analytical chemistry*

The reports from ENCO and Severn Trent are reprinted in Appendix A and summarized here. Total organic carbon in the samples averaged 3.1% and the average percent fines (sum of silt and clay fraction) was 55% indicating depositional areas were located for the assessment (Table 9).

There are no North Carolina or federal sediment quality criteria, but Tables 10 and 11 compare the elemental contaminants and PAHs in whole sediment to the TECs and PECs of McDonald et al. (2000). Florida and Wisconsin recommend TECs and PECs for use as guidance in their programs, including evaluation of dredged material and risk assessment of contaminated sites (MacDonald et al. 2003). While no regulatory implications are inferred in our use of the TECs and PECs, sediment quality guidelines like these have been found to offer good utility in site assessment by various government and non-government organizations (Wenning et al. 2005).

Table 3. Water quality characteristics in 2-d elutriate exposures with *Ceriodaphnia dubia* prepared from Cape Fear River sediment samples and a control sediment (WB).

River Mile	Sample ID	Dissolved Oxygen (mg/L)		Conductivity (umho @25°C)	pH	Total Ammonia (mg/L)	Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Sulfide (mg/L)	Dissolved Organic Carbon (mg/L)
		Lab	CERC	CERC	CERC	CERC	ENCO	CERC	MERC	CERC
112.9	CF 11		4	478	7.8	6.7	154	150	0.013	2.77
108.4	CF 10		5	491	7.8	3.6	149	130	0.021	4.51
105.9	CF 9		5	299	7.7	2.0	85.8	92	0.0195	2.93
93.4	CF 4		6	302	7.7	2.7	63.8	84	0.049	3.15
88.5	CF 5		5	262	7.6	2.8	83.8	93	0.019	2.75
76.1	CF 1		5	404	7.0	6.4	135	120	0.016	7.25
71.8	CF 3		6	297	7.1	3.5	81.7	88	0.0175	4.25
44.7	CF 6		5	411	7.6	6.2	101	120	0.0165	4.71
39.0	CF 8		5	259	7.7	1.6	70.6	86	0.045	4.45
	WB		7	387	6.2	0.8	78.0	32	0.035	4.85

Table 4. Elemental contaminant concentrations ( $\mu\text{g/L}$ ) of 2-d elutriate exposures with *Ceriodaphnia dubia* prepared from Cape Fear River sediment samples and a control sediment (WB).

River Mile	Sample ID	Al	As	Cd	Cr	Cu	Fe	Pb	Mn	Ni	Se	Zn
112.9	CF 11	6680 B	6.07	0.26 J	27.9	15.4	32200	113	15700	19.5	0.74 J	79.9
108.4	CF 10	2680 B	7.42	0.12 U	6.85	9.32	26800	366	18600	10.8	0.95 J	63.8
105.9	CF 9	9590 B	4.89	0.33 J	19.7	16.9	24400	59.3	7710	13.2	0.51 J	133
93.4	CF 4	7900 B	3.91	0.27 J	18.0	15.4	21400	47.7	5700	10.8	0.49 J	79.2
88.5	CF 5	12000 B	5.17	0.46 J	23.1	18.0	29700	62.2	6780	12.9	0.42 J	110
76.1	CF 1	5380 B	5.01	0.24 J	24.1	11.7	24400	44.8	11500	11.4	1.10	77.0
71.8	CF 3	12300 B	4.86	0.41 J	23.2	18.8	27300	110	6900	13.6	0.73 J	108
44.7	CF 6	3970 B	6.46	0.13 J	9.51	9.01	25100	49.4	9250	8.20	0.78 J	76.1
39.0	CF 8	15600 B	5.44	0.39 J	30.3	24.2	33200	231	5010	19.8	0.52 J	140
	WB	513 B	1.27	0.12 U	5.92	9.96	17100	31.2	2690	7.84	0.32 U	20.2

B = aluminum was detected in the blank at 47.7  $\mu\text{g/L}$ . Because sample results were typically two orders of magnitude higher than this concentration, the presence of aluminum in the blank should not affect interpretation of results

J = less than reporting limit (estimated value)

U = not detected

Table 5. Water quality characteristics of pore water isolated from Cape Fear River whole-sediment samples and a control sediment (WB). NA = not analyzed

River Mile	Sample ID	Dissolved Oxygen (mg/L)		Conductivity (umho@25°C)	pH	Total Ammonia (mg/L)	Alkalinity (mg/L as CaCO <sub>3</sub> )	Hardness (mg/L as CaCO <sub>3</sub> )
		Lab	CERC	CERC	CERC	CERC	CERC	ENCO
112.9	CF 11		1.1	1471	7.2	21.4	760	498
108.4	CF 10		1.0	1597	7.3	11.5	824	507
105.9	CF 9		1.4	824	7.4	10.2	380	246
93.4	CF 4		1.3	894	7.1	10.9	268	144
88.5	CF 5		1.2	750	7.2	7.2	340	231
76.1	CF 1		2.7	1243	7.2	33.7	582	377
71.8	CF 3		1.3	840	7.1	13.4	400	218
44.7	CF 6		1.0	1235	7.3	21.5	616	382
39.0	CF 8		1.3	524	7.2	3.6	248	161
	WB		5.7	779	4.5	2.1	NA	220

Table 6. Elemental contaminant concentrations ( $\mu\text{g/L}$ ) of pore water isolated from Cape Fear River whole-sediment samples and a control sediment (WB).

River Mile	Sample ID	Al	As	Cd	Cr	Cu	Fe	Pb	Mn	Ni	Se	Zn
112.9	CF 11	0.6 U	14.5	0.30 J	1.40	14.8	102000	13.7	48800	5.77	2.01	76.4
108.4	CF 10	823 B	22.5	0.34 J	0.74 J	19.8	102000	19.7	64600	9.06	2.95	52.6
105.9	CF 9	2060 B	11.6	0.28 J	5.75	18.5	61900	19.3	23400	6.21	1.46	68.8
93.4	CF 4	7090 B	7.67	0.83 J	16.6	48.5	69000	54.2	19200	7.98	1.51	122
88.5	CF 5	3130 B	10.8	0.42 J	8.50	22.3	68000	23.2	20600	6.77	1.26	103
76.1	CF 1	1380 B	14.7	0.37 J	2.22	19.5	96100	19.6	43300	6.22	2.17	59.5
71.8	CF 3	4540 B	10.7	0.66 J	11.6	36.5	81500	36.2	24900	8.17	1.83	121
44.7	CF 6	1650 B	18.6	0.34 J	2.37	18.7	111000	18.2	37200	6.99	2.41	67.0
39.0	CF 8	8680 B	9.62	0.63 J	22.7	32.7	52900	32.6	10300	9.01	1.37	127
	WB	0.6 U	2.56	0.39 J	2.14	34.6	67900	6.49	9830	17.5	0.78 J	80.4

B = aluminum was detected in the blank at 47.7  $\mu\text{g/L}$ . Because sample results were typically two orders of magnitude higher than this concentration, the presence of aluminum in the blank should not affect interpretation of results

J = less than reporting limit (estimated value)

U = not detected

Table 7. Mean water quality characteristics of overlying water in whole-sediment toxicity tests with *Hyalella azteca* and Cape Fear River sediments and a control sediment (WB). NA = not applicable.

River Mile	Sample ID	Dissolved oxygen (mg/L)	Conductivity ( $\mu\text{mho}@25^\circ\text{C}$ )	Hardness (mg/L as $\text{CaCO}_3$ )	Alkalinity (mg/L as $\text{CaCO}_3$ )	pH	Total ammonia (mg/L)
112.9	CF 11	7.1	261	96	91	8.0	0.22
108.4	CF 10	6.7	263	94	94	8.0	0.70
105.9	CF 9	7.4	255	92	86	8.0	0.24
93.4	CF 4	7.1	254	92	87	8.0	0.34
88.5	CF 5	7.2	253	93	87	8.0	0.38
76.1	CF 1	7.0	259	95	90	7.9	0.66
71.8	CF 3	7.2	254	90	88	8.0	0.50
44.7	CF 6	7.0	257	92	90	8.0	0.39
39.0	CF 8	7.2	254	95	86	7.9	0.23
	WB	7.5	252	90	81	7.9	0.19

Table 8. Mean water quality characteristics of overlying water in whole-sediment toxicity tests with *Chironomus dilutus* and Cape Fear River sediments and a control sediment (WB).

River Mile	Sample ID	Dissolved oxygen (mg/L)	Conductivity ( $\mu\text{mho}@25^\circ\text{C}$ )	Hardness (mg/L as $\text{CaCO}_3$ )	Alkalinity (mg/L as $\text{CaCO}_3$ )	pH	Total ammonia (mg/L)
112.9	CF 11	7.3	263	85	83	8.0	0.20
108.4	CF 10	7.5	260	95	96	8.0	0.64
105.9	CF 9	7.6	252	90	86	8.1	0.27
93.4	CF 4	7.5	250	92	85	8.0	0.29
88.5	CF 5	7.6	250	92	86	7.9	0.40
76.1	CF 1	7.5	255	100	89	7.9	0.55
71.8	CF 3	7.5	252	88	86	8.0	0.55
44.7	CF 6	7.1	258	93	88	8.0	0.43
39.0	CF 8	7.1	249	96	83	7.9	0.25
	WB	7.3	263	85	83	8.0	0.20

Table 9. Total organic carbon, grain size and moisture measured in whole-sediment samples collected from the Cape Fear River.

River Mile	Sample ID	Total Organic Carbon (%)	Sand (%)	Clay (%)	Silt (%)	Moisture (%)
		STL <sup>1</sup>	CERC <sup>2</sup>	CERC	CERC	ENCO <sup>3</sup>
112.9	CF 11	4.5	48	19	33	48.4
108.4	CF 10	4.3	32	25	44	59.6
105.9	CF 9	2.7	62	18	19	46.3
95.2	CF 12	4.1	78	18	5	51.9
93.4	CF 4	2.0	37	20	44	45.4
88.5	CF 5	1.9	53	27	21	40.3
76.1	CF 1	2.9	31	24	44	53.3
72.8	CF 2	2.9	45	22	33	59.4
71.8	CF 3	3.5	36	24	40	49.7
46.3	CF 7	3.7	41	24	35	65.0
44.7	CF 6	2.6	28	30	41	59.4
39.0	CF 8	2.2	46	20	35	55.0

<sup>1</sup>STL = Severn Trent Laboratories, Inc., Tampa, FL

<sup>2</sup>CERC = USGS Columbia Environmental Research Center, Columbia, MO

<sup>3</sup>ENCO = Environmental Conservation Laboratories, Inc., Cary, NC and Jacksonville, FL



Table 10. Elemental contaminants in whole-sediment samples collected from the Cape Fear River. All data are mg/kg dry weight (parts per million). For each element, results are compared to threshold-effects concentration (TEC) guidelines of MacDonald et al. (2000) -- values below which adverse effects to sensitive aquatic organisms are not expected to occur, and probable effects concentrations (PECs) -- values above which adverse effects to sediment dwelling organisms may be expected. No samples exceeded TECs. Silver was below detection in all samples.

River Mile	Sample ID	Al	As	Ba	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Ni	Se	Zn
112.9	CF 11	6750	3.0	95.7	0.22	15.6	15.1	14800 D	17.8	930	0.051	5.6	1.8	76.1
108.4	CF 10	10500	4.3	139	0.28	22.4	21.5	20600 D	22.9	1610	0.101	8.2	2.5	101
105.9	CF 9	4940	1.8	64.8	0.15	11.9	9.81	10300	13.6	506	0.057	3.8 J	1.3	57.5
95.2	CF 12	8310	2.9	108	0.30	19.0	17.7	16800 D	19.4	693	0.073	6.4	2.1	96.6
93.4	CF 4	9790 D	3.6	97.5	0.15	18.7	15.9	20100 D	16.1	777	0.064	6.2	2.5	70.7
88.5	CF 5	5600	2.3	74.4	0.22	13.3	11.7	12400 D	13.7	544	0.040	4.4	1.8	62.9
76.1	CF 1	9470	3.6	116	0.22	19.6	17.3	19600 D	18.7	1040	0.087	7.1	2.7	93.8
72.8	CF 2	10100	3.5	125	0.25	20.2	17.4	19800 D	19.0	1050	0.097	7.7	2.5	101
71.8	CF 3	9320	3.2	113	0.24	18.8	18.0	18700 D	17.4	815	0.097	6.8	2.4	93.2
46.3	CF 7	13000	4.3	148	0.22	24.1	19.2	24400 D	21.9	1260	0.084	9.1	3.0	105
44.7	CF 6	13500 D	4.3	148	0.27	24.2	19.8	24700 D	21.8	1160	0.092	9.0	3.1	109
39.0	CF 8	8730	2.7	100	0.24	16.7	13.6	16600 D	15.2	595	0.072	6.4	1.9	78.7
TEC			9.79		0.99	43.4	31.6		35.8		0.18	22.7		121
PEC			33		4.98	111	149		128		1.06	48.6		459

D = data reported from a dilution

J = less than reporting limit (estimated value)

Table 11. Polycyclic aromatic hydrocarbons measured in whole-sediment samples collected from the Cape Fear River. All data are  $\mu\text{g}/\text{kg}$  dry weight (parts per billion). For each compound, results are compared to threshold-effects concentration (TEC) guidelines of MacDonald et al. (2000) -- values below which adverse effects to sensitive aquatic organisms are not expected to occur, and probable effects concentrations (PECs) -- values above which adverse effects to sediment dwelling organisms may be expected. Only CF 5 and CF 11 exceeded TECs (exceedences designated with and asterisk), and no samples exceeded PECs. 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, fluorene and naphthalene were detected in one or no samples. J = less than reporting limit (estimated value), U = not detected.

River Mile	Sample ID	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene
112.9	CF 11	194*	232*	316	200	110	226*	168*	355	232	136	336*
108.4	CF 10	57.8J	57.8J	90.8	124	17.1U	66.0J	27.7U	140	165	74.3J	107
105.9	CF 9	55.8J	55.8J	86.8	99.2	37.2J	55.8J	20.8U	99.2	136	12.8U	80.6
95.2	CF 12	55.4J	55.4J	90.0	111	14.3U	62.3J	23.3U	118	152	41.6J	90.0
93.4	CF 4	42.7J	42.7J	67.2	91.6	30.5J	54.9J	20.5U	79.4	128	30.5J	67.2
88.5	CF 5	89.3	100	162	123	55.8	134	134*	346	156	78.1	262*
76.1	CF 1	14.8U	14.8U	11.4U	21.8U	14.8U	15.6U	24.0U	42.8J	24.8U	14.8U	35.7J
72.8	CF 2	65.7J	49.3J	73.9J	123	41.0J	49.3J	27.6U	73.9J	164	17.0U	65.7J
71.8	CF 3	46.4J	39.8J	59.6J	99.4	13.7U	39.8J	22.3U	66.3	133	13.7U	59.6J
46.3	CF 7	19.7U	19.7U	15.2U	29.2U	19.7U	20.9U	32.0U	47.7J	33.2U	19.7U	25.5U
44.7	CF 6	17.0U	17.0U	13.1U	25.1U	17.0U	18.0U	27.6U	21.9U	28.6U	17.0U	21.9U
39.0	CF 8	15.3U	15.3U	11.8U	22.7U	15.3U	16.2U	24.9U	19.8U	25.8U	15.3U	19.8U
	TEC	108	150				166	33	423		204	195
	PEC	1050	1450				1290		2230		1170	1520

No samples exceeded the TECs (concentrations below which adverse effects to sensitive aquatic organisms are not expected to occur) for elemental contaminants; these are therefore considered toxicologically insignificant. Sediment PAHs with freshwater sediment TECs were in excess of TECs at two of the 12 sampling stations: CF 11 (river mile 112.9 near Fayetteville) and CF 5 (river mile 88.5 about 0.2 miles upstream of Tar Heel Landing Road). Five individual PAHs exceeded TECs at these locations, but no samples exceeded the PECs. MacDonald et al. (2000) and USEPA (2000b) concluded that infrequent exceedences of TECs is not associated with sediment toxicity; however, exceedences of PECs (by frequency or by magnitude) is frequently associated with sediment toxicity. Probable effect concentration quotients (PEC-Qs) and PAH equilibrium partitioning sediment guideline toxic units ( $\Sigma$ ESGTUs) for sediment samples from the Cape Fear River were all much less than 1 (unitless) indicating no anticipated toxicity from these constituents (Table 12). Collectively, the whole-sediment chemistry results indicate minimal contamination which is consistent with the lack of toxicity in the whole-sediment samples in the amphipod and midge tests (Table 2).

Table 12. Probable effect concentration quotients (PEC-Qs) and polycyclic aromatic hydrocarbon equilibrium partitioning sediment guideline toxic units ( $\Sigma$ ESBTUs) for whole-sediment samples collected from the Cape Fear River. Values are unitless with levels of concern typically not indicated until exceeding 1 on these scales.

River Mile	Sample ID	Mean PEC-Q	Mean Metal PEC-Q	Total PAH PEC-Q	$\Sigma$ ESGTU for PAHs
112.9	CF 11	0.089	0.105	0.072	0.160
108.4	CF 10	0.084	0.147	0.020	0.066
105.9	CF 9	0.045	0.074	0.014	0.078
95.2	CF 12	0.069	0.120	0.017	0.058
93.4	CF 4	0.063	0.111	0.013	0.095
88.5	CF 5	0.067	0.085	0.049	0.252
76.1	CF 1	0.065	0.123	0.007	0.043
72.8	CF 2	0.069	0.127	0.010	0.072
71.8	CF 3	0.064	0.119	0.010	0.048
46.3	CF 7	0.077	0.146	0.007	0.038
44.7	CF 6	0.077	0.148	0.006	0.043
39.0	CF 8	0.054	0.104	0.005	0.046

Although the elutriates and pore-water samples are not surface waters, we compared elemental contaminant concentrations in these media to State water quality standards and action levels (Table 13). This is not a regulatory application of the standards; it is rather a comparison of test results to the standards as toxicological benchmarks, or estimates of safe water column concentrations. Copper, lead, and zinc exceed State standards, an indication that aggressive re-suspension of sediments like those tested could temporarily impair surface water quality.

Table 13. Elutriate and pore water exceedences of North Carolina water quality standards or action levels for elemental contaminants (NCDENR 2004). Analytical data for elutriates and pore water are in Tables 4 and 6.

Contaminant	Standard or Action Level	Elutriate samples in excess of threshold (%)	Pore water in excess of threshold (%)
Arsenic	50 µg/L	0 (max = 7.42 µg/L)	0 (max = 22.5 µg/L)
Cadmium	2 µg/L	0 (max = 0.46 µg/L)	0 (max = 0.83 µg/L)
Chromium	50 µg/L	0 (max = 30.3 µg/L)	0 (max = 22.7 µg/L)
Copper	7 µg/L	100 (max = 24.2 µg/L)	100 (max = 48.5 µg/L)
Lead	25 µg/L	100 (max = 366 µg/L)	33 (max = 54.2 µg/L)
Nickel	88 µg/L	0 (max = 19.8 µg/L)	0 (max = 9.06 µg/L)
Selenium	5 µg/L	0 (max = 1.10 µg/L)	0 (max = 2.95µg/L)
Zinc	50 µg/L	100 (max = 140 µg/L)	100 (max = 127µg/L)

In 2-d sediment elutriate tests with *C. dubia*, statistically-significant reductions in survival occurred in four of the nine exposures. Pairwise correlation analyses indicated several sediment and elutriate water chemistry variables were significantly and negatively correlated with *C. dubia* survival in the elutriates (Table 14). Of the correlated variables, hardness, alkalinity, and conductivity are unlikely to impair cladocerans at the concentrations we encountered based on their tolerance of much higher salt concentrations (Mount et al. 1997). The correlations with selenium and arsenic also lack strong toxicological support because effects concentrations for these parameters were generally above concentrations found in the elutriates (USEPA 1996, 2004). Elutriate manganese had among the strongest correlation ( $r^2 = 0.79$ ,  $p = 0.0006$ ) (Figure 10) and the most plausible biological association with reduced *C. dubia* survival.

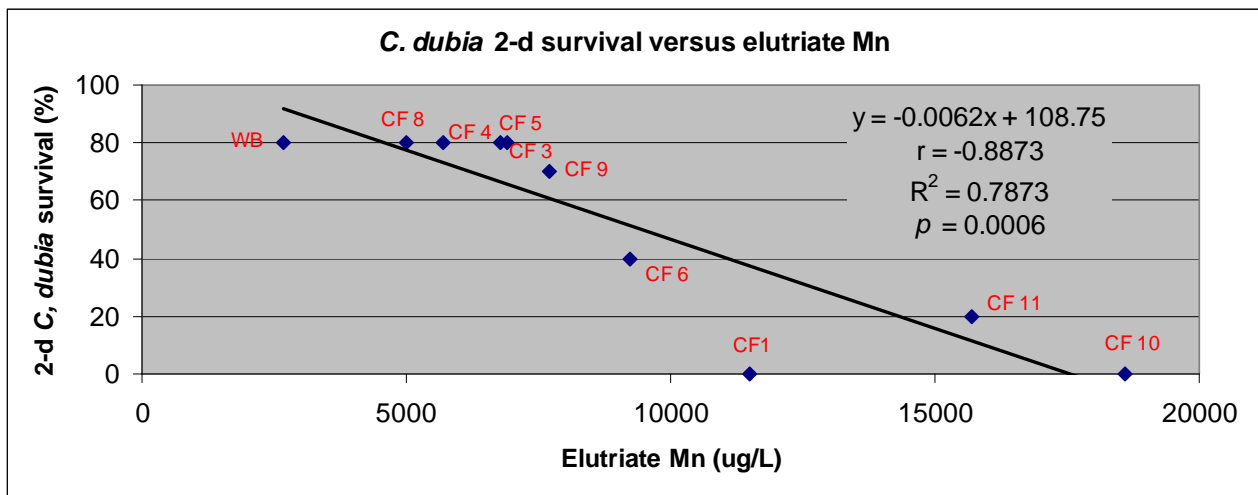


Figure 10. Relationship between elutriate manganese concentrations and *Ceriodaphnia dubia* survival in 2-d elutriate exposures prepared from sediment samples collected from Cape Fear River locks and dams (and to a control sediment, WB).

Table 14. Pearson's correlations for 2-d *C. dubia* survival in sediment elutriates versus whole-sediment and elutriate physical and chemical constituents (presented in Tables 3, 4, 9-11). All significant correlations are presented; only select variables that were not significant are included.

Variable	Correlation to <i>C. dubia</i> survival				Threshold	Samples in excess of threshold (%)
	n	R	r <sup>2</sup>	p		
Elutriate Hardness	10	-0.9411	0.8857	<0.0001		
Elutriate Conductivity	10	-0.8452	0.7144	0.0021		
Elutriate Mn	10	-0.8873	0.7873	0.0006	7.2 mg/L <sup>1</sup>	56
Elutriate Se	10	-0.8785	0.7718	0.0008	220 µg/L <sup>2</sup>	0
Elutriate As	10	-0.5880	0.3457	0.0738	760 µg/L <sup>3</sup>	0
Elutriate DO	10	0.5491	0.3015	0.1002		
Elutriate pH	10	-0.1855	0.0344	0.6079		
Elutriate Ammonia	10	-0.7444	0.5541	0.0135	26 mg-N/L <sup>4</sup>	0
Elutriate Alkalinity	10	-0.7739	0.5989	0.0086		
Elutriate Sulfide	10	0.5431	0.2950	0.1047		
Elutriate DOC	10	-0.4689	0.2199	0.1717		
Sediment TOC	9	-0.6633	0.4400	0.0515		
Sediment Mn	9	-0.8044	0.6471	0.0089		
Sediment Pb	9	-0.7415	0.5498	0.0222		

<sup>1</sup> Lasier et al. (2000) report a *C. dubia* LC50 (median lethal concentration) of 14.5 mg/L for manganese at hardness of 93 mg/L as CaCO<sub>3</sub>. This value was multiplied by 0.5 to approximate a lethal effects threshold for the Cape Fear River sediment elutriates (which ranged in hardness from 70.6 to 154 mg/L as CaCO<sub>3</sub>). Evaluation of acute toxicity data over a large number of tests and species has generally shown that multiplying an LC50 or EC50 by 0.5 provides an estimate of a concentration near or below the lethality threshold. The technical rationale is found in the *Federal Register* notice soliciting comment on USEPA's methodology for deriving water quality criteria (43 FR 21506, May 18, 1978) (Stephan et al. 1985).

<sup>2</sup> USEPA (2004) report a *C. dubia* LC50 of 842 µg/L for selenate and 440 µg/L for selenite. The lower of these values was multiplied by 0.5 to approximate a lethal effects threshold for the Cape Fear River sediment elutriates.

<sup>3</sup> USEPA (1996) report a *C. reticulata* LC50 of 1,511 µg/L for arsenic. This was multiplied by 0.5 to approximate a lethal effects threshold for the Cape Fear River sediment elutriates.

<sup>4</sup> USEPA (1999) report a *C. acanthina* LC50 of 25.78 mg total ammonia nitrogen /L at pH=8. This was multiplied by 0.5 to approximate a lethal effects threshold of 12.9 mg-N/L at pH=8. This was adjusted for the average pH (7.6) of our *C. dubia* elutriate tests with USEPA's (1999) equation 11 resulting in a threshold of 26 mg-N/L for the Cape Fear River sediment elutriates.

Stubblefield and Hockett (2000) report a geometric mean LC50 (median lethal concentration) from eight manganese toxicity tests with *C. dubia* of 15.4 mg/L (data normalized to a hardness of 50 mg/L as CaCO<sub>3</sub>). Similarly, Lasier et al. (2000) report a *C. dubia* LC50 of 14.5 mg/L for manganese at a hardness of 93 mg/L as CaCO<sub>3</sub>. The Cape Fear River sediment elutriates ranged in hardness from 70.6 to 154 mg/L as CaCO<sub>3</sub>. To approximate a threshold at which lethal effects may begin, we multiplied the LC50 reported by Lasier et al. (2000) by 0.5. This yields an estimated lethal effects threshold of 7.2 mg/L for manganese. Evaluation of acute toxicity data over a large number of tests and species has generally shown that dividing an LC50 or EC50 by 2 (i.e., multiplying by 0.5) provides an estimate of a concentration near or below the lethality threshold. The technical rationale for dividing by 2 is found in the *Federal Register* notice soliciting comment on USEPA's methodology for deriving water quality criteria (43 FR 21506, May 18, 1978) (Stephan et al. 1985). Because the estimate was derived for a large battery of species and chemicals, it may not be accurate for particular individual species and chemical combinations, but it is useful for risk screening purposes.

Elutriate manganese concentrations from samples sites CF 1 (11.5 mg/L), CF 6 (9.25 mg/L), CF 9 (7.71 mg/L), CF 10 (18.6 mg/L) and CF 11 (15.7 mg/L) exceeded the 7.2 mg/L estimated lethal effects threshold concentration for *C. dubia* and manganese (Table 4). The four samples with significant *C. dubia* toxicity were CF 1, CF 6, CF 10 and CF 11 (Table 2). Manganese is a naturally occurring and very common element in soils and surface waters; among the heavy metals, only iron is more abundant in the earth's crust (ATSDR 2000). Impoundments have the potential to increase metal concentrations due to soil disturbance and increased surface area exposed to water. Elevated manganese was the number one problem associated with water quality downstream of Tennessee dams in a recent evaluation (Arnwine et al 2006). Anthropogenic enrichment of manganese can occur through burning fossil fuels, steel production, battery manufacturing, animal feed supplements, fertilizers, wastewater treatments plants (using potassium permanganate), manganese-based fungicides, and antiknock fuel additives (ATSDR 2000). This project did not include any manganese source assessments for the Cape Fear River system.

Ammonia is often implicated in sediment toxicity evaluations. While ammonia is a natural constituent of freshwater sediments, excess ammonia from pollution can lead to toxic concentrations, and ammonia can also contribute to the toxicity of other sediment contaminants. Ammonia concentrations at the start of our elutriate test were significantly and inversely correlated with *C. dubia* survival in the elutriate test (Table 14). Unlike manganese, however, the elutriate ammonia concentrations did not exceed those expected to be toxic to *C. dubia*. USEPA (1999) report a *C. acanthina* LC50 of 25.78 mg total ammonia nitrogen /L at pH=8. Multiplying that LC50 by 0.5 yields an approximate lethal effects threshold of 12.9 mg-N/L at pH=8. Because ammonia toxicity decreases as pH decreases, we adjusted this lethal effects threshold for the average pH (7.6) of our *C. dubia* elutriate tests using USEPA's (1999) equation 11. This yields an estimated total ammonia toxicity threshold of 26 mg-N/L for the Cape Fear River sediment elutriates. The measured elutriate ammonia concentrations (Table 3) were 4- to 14-times less than this estimated ammonia effects threshold.

If it becomes important to more definitively assess the cause of toxicity in the sediment elutriate samples, there are well established toxicity identification evaluation (TIE) approaches that can be

applied (USEPA 1993 b, c, Besser et al. 1998, Boucher and Watzin 1999). Non-toxic elutriate samples could be spiked with increasing concentrations of manganese or ammonia to determine toxic concentrations of these constituents to *C. dubia* in a manner inclusive of site-specific elutriate chemistry. Procedures to reduce concentrations of elutriate components (e.g. sequester metals like manganese) also exist to investigate how their presence or absence explains toxicity.

Elutriate tests aid in the evaluation of the effects of suspended sediments (e.g., dredged material evaluations) within the water column. Mobilization of sediments we tested may be a short-term water column concern based on the elutriate toxicity test results. While sediment re-suspension and contaminant release in the elutriate tests may be near a worst case simulation of actual conditions following sediment disturbing activities, additional synthesis is needed to characterize the nature and magnitude of this issue. In particular, data on the modeled or measured sediment re-suspension caused by specific sediment disturbing activities will help put the elutriate test results in context for normal sediment management practices. The joint U.S. EPA and U.S. Army Corps of Engineers Inland Testing Manual (USEPA/USACE 1998) contains sediment fate models which may be helpful for this purpose. Other issues to be further evaluated regarding the significance of the elutriate test results include more background on manganese concentrations and sources in the Cape Fear River and the relative sensitivity of *C. dubia* to other freshwater organisms, particularly those resident to the Cape Fear River.

In summary, 12 sediment samples from within the impounded reaches of three locks and dams on the Cape Fear River were collected in November 2006. Elemental contaminant and PAH concentrations in whole sediments were below those of toxicological significance. Whole-sediment toxicity tests with midges and amphipods showed no adverse effects of the sediments on test organism survival or growth. In 2-d sediment elutriate tests with *Ceriodaphnia dubia*, statistically-significant reductions in survival occurred in samples from four sites. Manganese had among the strongest correlation and the most plausible biological association with reduced *C. dubia* survival; elutriate manganese concentrations exceeded published lethal concentrations for *C. dubia* in all four of the toxic samples. Elutriates and pore water samples are not surface waters, but copper, lead, and zinc in these sediment fractions or preparations frequently exceed State water quality standards, an indication that aggressive re-suspension of sediments like those tested could temporarily impair surface water quality. Based on review of existing data (Tier 1) and results of sediment chemistry and toxicity tests (Tier 2 and 3), contamination in surface sediments behind Cape Fear River locks and dams is unlikely to be a concern in-place. Mobilization of sediments may be a short-term water column concern based on the elutriate toxicity test results. While sediment re-suspension and contaminant release in the elutriate tests may be near a worst case simulation of actual conditions following sediment disturbing activities, additional synthesis is needed to characterize the nature and magnitude of this issue. In particular, data regarding the modeled or measured sediment re-suspension caused by specific sediment disturbing activities (e.g., dredging, dam alterations, etc.) will help put the elutriate test results in context for normal sediment management practices. Sediment disturbing activities proposed for the Cape Fear River would benefit from development of a sediment management plan to address these issues. The work presented here addresses the toxicological properties of the sediments evaluated; it does not address sediments other than surface deposits. This report does not inventory the accumulated sediments or address the potential physical impacts of sediment mobilization; these issues could also be addressed in a sediment management plan.

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Appendix. Analytical Chemistry Reports and Chain of Custody Forms

**Environmental Conservation Laboratories, Inc.**

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Jacksonville FL, 32216-6069

Phone: 904.296.3007 FAX: 904.296.6210



www.encolabs.com

Thursday, December 7, 2006

US Fish and Wildlife (US014)

Attn: Tom Augspurgen

PO Box 33726

Raleigh, NC 27636-3726

**RE: Project Number: [none], Project Name/Desc: Cape Fear Sediments  
ENCO Workorder: B609856**

Dear Tom Augspurgen,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Friday, November 10, 2006.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

This data has been produced in accordance with NELAC standards (June, 2003). This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

A handwritten signature in black ink that reads "Christina M. Tompkins". The signature is written in a cursive, flowing style.

Chris Tompkins

Project Manager

Enclosure(s)



[www.encolabs.com](http://www.encolabs.com)

## CASE NARRATIVE

Date: November 20, 2006  
Client: US Fish and Wildlife  
Project: Cape Fear Sediments  
Lab ID: B609856

### Overview

All samples submitted were analyzed by Environmental Conservation Laboratories, Inc. in accordance with the methods referenced in the laboratory report. Any particular difficulties encountered during sample handling by Environmental Conservation Laboratories, Inc. will be discussed in the QC Remarks section below.

### Quality Control Remarks

Total Organic Carbon analysis was sent to an outside laboratory and reported under a separate header.

### Other Comments

The analytical data presented in this report are consistent with the methods as referenced in the analytical report. Any exceptions or deviations are noted in the QC remarks section of this narrative.

Released By:  
Environmental Conservation Laboratories, Inc.



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**SAMPLE SUMMARY/LABORATORY CHRONICLE**

**Client ID:** CF-1

**Lab ID:** B609856-01

**Sampled:** 11/01/06 10:15

**Received:** 11/10/06 00:00

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<b>Parameter</b>	<b>Hold Date/Time(s)</b>	<b>Prep Date/Time(s)</b>	<b>Analysis Date/Time(s)</b>
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:02
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:04
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:04
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:05
EPA 6010B	04/30/07	11/14/06 07:13	11/28/2006 22:26
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:04
EPA 7471A	11/29/06	11/14/06 15:11	11/17/2006 08:33
EPA 8270C	11/15/06 12/24/06	11/14/06 10:38	11/16/2006 19:09

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**Client ID:** CF-2

**Lab ID:** B609856-02

**Sampled:** 11/01/06 11:25

**Received:** 11/10/06 00:00

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<b>Parameter</b>	<b>Hold Date/Time(s)</b>	<b>Prep Date/Time(s)</b>	<b>Analysis Date/Time(s)</b>
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:09
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:11
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:11
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:11
EPA 6010B	04/30/07	11/14/06 07:13	11/28/2006 22:33
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:11
EPA 7471A	11/29/06	11/14/06 15:11	11/17/2006 08:36
EPA 8270C	11/15/06 12/24/06	11/14/06 10:38	11/16/2006 19:27

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**Client ID:** CF-3

**Lab ID:** B609856-03

**Sampled:** 11/01/06 11:54

**Received:** 11/10/06 00:00

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<b>Parameter</b>	<b>Hold Date/Time(s)</b>	<b>Prep Date/Time(s)</b>	<b>Analysis Date/Time(s)</b>
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:16
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:17
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:18
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:18
EPA 6010B	04/30/07	11/14/06 07:13	11/28/2006 22:39
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:18
EPA 7471A	11/29/06	11/14/06 15:11	11/17/2006 08:40
EPA 8270C	11/15/06 12/24/06	11/14/06 10:38	11/16/2006 19:44

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**Client ID:** CF-4

**Lab ID:** B609856-04

**Sampled:** 11/01/06 15:47

**Received:** 11/10/06 00:00

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<b>Parameter</b>	<b>Hold Date/Time(s)</b>	<b>Prep Date/Time(s)</b>	<b>Analysis Date/Time(s)</b>
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:24
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:24
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:24
EPA 6010B	04/30/07	11/14/06 07:13	11/16/2006 11:18
EPA 6010B	04/30/07	11/14/06 07:13	11/28/2006 22:44
EPA 6010B	04/30/07	11/14/06 07:13	11/28/2006 22:46
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:24
EPA 7471A	11/29/06	11/14/06 15:11	11/17/2006 08:43
EPA 8270C	11/15/06 12/24/06	11/14/06 10:38	11/16/2006 20:02

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**Client ID:** CF-5

**Lab ID:** B609856-05

**Sampled:** 11/01/06 16:39

**Received:** 11/10/06 00:00

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:29
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:31
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:31
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:31
EPA 6010B	04/30/07	11/14/06 07:13	11/28/2006 23:14
EPA 6010B	04/30/07	11/14/06 07:13	11/15/2006 13:31
EPA 7471A	11/29/06	11/14/06 15:11	11/17/2006 08:46
EPA 8270C	11/15/06 12/24/06	11/14/06 10:38	11/16/2006 20:52

**Client ID:** CF-6

**Lab ID:** B609856-06

**Sampled:** 11/02/06 11:09

**Received:** 11/10/06 00:00

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 6010B	05/01/07	11/14/06 07:13	11/15/2006 13:38
EPA 6010B	05/01/07	11/14/06 07:13	11/15/2006 13:38
EPA 6010B	05/01/07	11/14/06 07:13	11/15/2006 13:38
EPA 6010B	05/01/07	11/14/06 07:13	11/28/2006 23:19
EPA 6010B	05/01/07	11/14/06 07:13	11/28/2006 23:21
EPA 6010B	05/01/07	11/14/06 07:13	11/15/2006 13:38
EPA 7471A	11/30/06	11/15/06 13:32	11/17/2006 08:50
EPA 8270C	11/16/06 12/24/06	11/14/06 10:38	11/16/2006 21:09

**Client ID:** CF-7

**Lab ID:** B609856-07

**Sampled:** 11/02/06 11:48

**Received:** 11/10/06 00:00

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 6010B	05/01/07	11/14/06 07:13	11/15/2006 13:42
EPA 6010B	05/01/07	11/14/06 07:13	11/15/2006 13:44
EPA 6010B	05/01/07	11/14/06 07:13	11/15/2006 13:44
EPA 6010B	05/01/07	11/14/06 07:13	11/15/2006 13:44
EPA 6010B	05/01/07	11/14/06 07:13	11/28/2006 23:27
EPA 6010B	05/01/07	11/14/06 07:13	11/15/2006 13:44
EPA 7471A	11/30/06	11/14/06 15:11	11/17/2006 08:53
EPA 8270C	11/16/06 12/24/06	11/14/06 10:38	11/16/2006 21:27





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**Client ID:** CF-8

**Lab ID:** B609856-08

**Sampled:** 11/02/06 14:00

**Received:** 11/10/06 00:00

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 6010B	05/01/07	11/14/06 07:13	11/15/2006 13:49
EPA 6010B	05/01/07	11/14/06 07:13	11/15/2006 13:50
EPA 6010B	05/01/07	11/14/06 07:13	11/15/2006 13:51
EPA 6010B	05/01/07	11/14/06 07:13	11/15/2006 13:51
EPA 6010B	05/01/07	11/14/06 07:13	11/28/2006 23:34
EPA 6010B	05/01/07	11/14/06 07:13	11/15/2006 13:51
EPA 7471A	11/30/06	11/14/06 15:11	11/17/2006 09:07
EPA 8270C	11/16/06 12/24/06	11/14/06 10:38	11/16/2006 21:44

**Client ID:** CF-9

**Lab ID:** B609856-09

**Sampled:** 11/03/06 09:47

**Received:** 11/10/06 00:00

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:16
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:18
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:18
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:18
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:18
EPA 7471A	12/01/06	11/14/06 15:11	11/17/2006 09:10
EPA 8270C	11/17/06 12/24/06	11/14/06 10:38	11/16/2006 22:02

**Client ID:** CF-10

**Lab ID:** B609856-10

**Sampled:** 11/03/06 10:24

**Received:** 11/10/06 00:00

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:23
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:25
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:25
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:25
EPA 6010B	05/02/07	11/14/06 07:13	12/5/2006 11:01
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:25
EPA 7471A	12/01/06	11/14/06 15:11	11/17/2006 09:13
EPA 8270C	11/17/06 12/24/06	11/14/06 10:38	11/16/2006 22:20



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**Client ID:** CF-11

**Lab ID:** B609856-11

**Sampled:** 11/03/06 13:50

**Received:** 11/10/06 00:00

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<b>Parameter</b>	<b>Hold Date/Time(s)</b>	<b>Prep Date/Time(s)</b>	<b>Analysis Date/Time(s)</b>
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:30
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:32
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:32
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:32
EPA 6010B	05/02/07	11/14/06 07:13	12/5/2006 11:07
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:32
EPA 7471A	12/01/06	11/14/06 15:11	11/17/2006 09:17
EPA 8270C	11/17/06 12/24/06	11/14/06 10:38	11/16/2006 22:37

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**Client ID:** CF-12

**Lab ID:** B609856-12

**Sampled:** 11/03/06 14:47

**Received:** 11/10/06 00:00

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<b>Parameter</b>	<b>Hold Date/Time(s)</b>	<b>Prep Date/Time(s)</b>	<b>Analysis Date/Time(s)</b>
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:37
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:38
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:38
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:39
EPA 6010B	05/02/07	11/14/06 07:13	12/5/2006 11:14
EPA 6010B	05/02/07	11/14/06 07:13	11/15/2006 14:38
EPA 7471A	12/01/06	11/14/06 15:11	11/17/2006 09:20
EPA 8270C	11/17/06 12/24/06	11/14/06 10:38	11/16/2006 22:55

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**SAMPLE DETECTION SUMMARY**

**Client ID: CF-1**

**Lab ID: B609856-01**

Analyte	Results/Qual	MRL	Units	Method
2-Methylnaphthalene	0.0571 J	0.0707	mg/kg dry	EPA 8270C
Aluminum	9470	21	mg/kg dry	EPA 6010B
Arsenic	3.6	1.1	mg/kg dry	EPA 6010B
Barium	116	1.1	mg/kg dry	EPA 6010B
Cadmium	0.22	0.11	mg/kg dry	EPA 6010B
Chromium	19.6	1.1	mg/kg dry	EPA 6010B
Copper	17.3	1.07	mg/kg dry	EPA 6010B
Fluoranthene	0.0428 J	0.0707	mg/kg dry	EPA 8270C
Iron	19600 D	27	mg/kg dry	EPA 6010B
Lead	18.7	1.1	mg/kg dry	EPA 6010B
Manganese	1040	1.07	mg/kg dry	EPA 6010B
Mercury	0.087	0.021	mg/kg dry	EPA 7471A
Naphthalene	0.0428 J	0.0707	mg/kg dry	EPA 8270C
Nickel	7.1	5.4	mg/kg dry	EPA 6010B
Pyrene	0.0357 J	0.0707	mg/kg dry	EPA 8270C
Selenium	2.7	1.1	mg/kg dry	EPA 6010B
Zinc	93.8	2.1	mg/kg dry	EPA 6010B

**Client ID: CF-2**

**Lab ID: B609856-02**

Analyte	Results/Qual	MRL	Units	Method
Aluminum	10100	25	mg/kg dry	EPA 6010B
Arsenic	3.5	1.2	mg/kg dry	EPA 6010B
Barium	125	1.2	mg/kg dry	EPA 6010B
Benzo(a)anthracene	0.0657 J	0.0813	mg/kg dry	EPA 8270C
Benzo(a)pyrene	0.0493 J	0.0813	mg/kg dry	EPA 8270C
Benzo(b)fluoranthene	0.0739 J	0.0813	mg/kg dry	EPA 8270C
Benzo(g,h,i)perylene	0.123	0.0813	mg/kg dry	EPA 8270C
Benzo(k)fluoranthene	0.0410 J	0.0813	mg/kg dry	EPA 8270C
Cadmium	0.25	0.12	mg/kg dry	EPA 6010B
Chromium	20.2	1.2	mg/kg dry	EPA 6010B
Chrysene	0.0493 J	0.0813	mg/kg dry	EPA 8270C
Copper	17.4	1.23	mg/kg dry	EPA 6010B
Fluoranthene	0.0739 J	0.0813	mg/kg dry	EPA 8270C
Indeno(1,2,3-cd)pyrene	0.164	0.0813	mg/kg dry	EPA 8270C
Iron	19800 D	31	mg/kg dry	EPA 6010B
Lead	19.0	1.2	mg/kg dry	EPA 6010B
Manganese	1050	1.23	mg/kg dry	EPA 6010B
Mercury	0.097	0.020	mg/kg dry	EPA 7471A
Nickel	7.7	6.2	mg/kg dry	EPA 6010B
Pyrene	0.0657 J	0.0813	mg/kg dry	EPA 8270C
Selenium	2.5	1.2	mg/kg dry	EPA 6010B
Zinc	101	2.5	mg/kg dry	EPA 6010B



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Client ID: CF-3

Lab ID: B609856-03

Analyte	Results/Qual	MRL	Units	Method
Aluminum	9320	20	mg/kg dry	EPA 6010B
Arsenic	3.2	1.0	mg/kg dry	EPA 6010B
Barium	113	1.0	mg/kg dry	EPA 6010B
Benzo(a)anthracene	0.0464 J	0.0656	mg/kg dry	EPA 8270C
Benzo(a)pyrene	0.0398 J	0.0656	mg/kg dry	EPA 8270C
Benzo(b)fluoranthene	0.0596 J	0.0656	mg/kg dry	EPA 8270C
Benzo(g,h,i)perylene	0.0994	0.0656	mg/kg dry	EPA 8270C
Cadmium	0.24	0.10	mg/kg dry	EPA 6010B
Chromium	18.8	1.0	mg/kg dry	EPA 6010B
Chrysene	0.0398 J	0.0656	mg/kg dry	EPA 8270C
Copper	18.0	0.99	mg/kg dry	EPA 6010B
Fluoranthene	0.0663	0.0656	mg/kg dry	EPA 8270C
Indeno(1,2,3-cd)pyrene	0.133	0.0656	mg/kg dry	EPA 8270C
Iron	18700 D	25	mg/kg dry	EPA 6010B
Lead	17.4	1.0	mg/kg dry	EPA 6010B
Manganese	815	0.99	mg/kg dry	EPA 6010B
Mercury	0.097	0.022	mg/kg dry	EPA 7471A
Nickel	6.8	5.0	mg/kg dry	EPA 6010B
Pyrene	0.0596 J	0.0656	mg/kg dry	EPA 8270C
Selenium	2.4	1.0	mg/kg dry	EPA 6010B
Zinc	93.2	2.0	mg/kg dry	EPA 6010B

Client ID: CF-4

Lab ID: B609856-04

Analyte	Results/Qual	MRL	Units	Method
Aluminum	9790 D	92	mg/kg dry	EPA 6010B
Arsenic	3.6	0.9	mg/kg dry	EPA 6010B
Barium	97.5	0.9	mg/kg dry	EPA 6010B
Benzo(a)anthracene	0.0427 J	0.0604	mg/kg dry	EPA 8270C
Benzo(a)pyrene	0.0427 J	0.0604	mg/kg dry	EPA 8270C
Benzo(b)fluoranthene	0.0672	0.0604	mg/kg dry	EPA 8270C
Benzo(g,h,i)perylene	0.0916	0.0604	mg/kg dry	EPA 8270C
Benzo(k)fluoranthene	0.0305 J	0.0604	mg/kg dry	EPA 8270C
Cadmium	0.15	0.09	mg/kg dry	EPA 6010B
Chromium	18.7	0.9	mg/kg dry	EPA 6010B
Chrysene	0.0549 J	0.0604	mg/kg dry	EPA 8270C
Copper	15.9	0.92	mg/kg dry	EPA 6010B
Fluoranthene	0.0794	0.0604	mg/kg dry	EPA 8270C
Indeno(1,2,3-cd)pyrene	0.128	0.0604	mg/kg dry	EPA 8270C
Iron	20100 D	23	mg/kg dry	EPA 6010B
Lead	16.1	0.9	mg/kg dry	EPA 6010B
Manganese	777	0.92	mg/kg dry	EPA 6010B
Mercury	0.064	0.017	mg/kg dry	EPA 7471A
Nickel	6.2	4.6	mg/kg dry	EPA 6010B
Phenanthrene	0.0305 J	0.0604	mg/kg dry	EPA 8270C



Pyrene	0.0672	0.0604	mg/kg dry	EPA 8270C
Selenium	2.5	0.9	mg/kg dry	EPA 6010B
Zinc	70.7	1.8	mg/kg dry	EPA 6010B

Client ID: CF-5

Lab ID: B609856-05

Analyte	Results/Qual	MRL	Units	Method
Aluminum	5600	17	mg/kg dry	EPA 6010B
Arsenic	2.3	0.8	mg/kg dry	EPA 6010B
Barium	74.4	0.8	mg/kg dry	EPA 6010B
Benzo(a)anthracene	0.0893	0.0553	mg/kg dry	EPA 8270C
Benzo(a)pyrene	0.100	0.0553	mg/kg dry	EPA 8270C
Benzo(b)fluoranthene	0.162	0.0553	mg/kg dry	EPA 8270C
Benzo(g,h,i)perylene	0.123	0.0553	mg/kg dry	EPA 8270C
Benzo(k)fluoranthene	0.0558	0.0553	mg/kg dry	EPA 8270C
Cadmium	0.22	0.08	mg/kg dry	EPA 6010B
Chromium	13.3	0.8	mg/kg dry	EPA 6010B
Chrysene	0.134	0.0553	mg/kg dry	EPA 8270C
Copper	11.7	0.84	mg/kg dry	EPA 6010B
Dibenzo(a,h)anthracene	0.134	0.0553	mg/kg dry	EPA 8270C
Fluoranthene	0.346	0.0553	mg/kg dry	EPA 8270C
Indeno(1,2,3-cd)pyrene	0.156	0.0553	mg/kg dry	EPA 8270C
Iron	12400 D	21	mg/kg dry	EPA 6010B
Lead	13.7	0.8	mg/kg dry	EPA 6010B
Manganese	544	0.84	mg/kg dry	EPA 6010B
Mercury	0.040	0.017	mg/kg dry	EPA 7471A
Nickel	4.4	4.2	mg/kg dry	EPA 6010B
Phenanthrene	0.0781	0.0553	mg/kg dry	EPA 8270C
Pyrene	0.262	0.0553	mg/kg dry	EPA 8270C
Selenium	1.8	0.8	mg/kg dry	EPA 6010B
Zinc	62.9	1.7	mg/kg dry	EPA 6010B

Client ID: CF-6

Lab ID: B609856-06

Analyte	Results/Qual	MRL	Units	Method
Aluminum	13500 D	123	mg/kg dry	EPA 6010B
Arsenic	4.3	1.2	mg/kg dry	EPA 6010B
Barium	148	1.2	mg/kg dry	EPA 6010B
Cadmium	0.27	0.12	mg/kg dry	EPA 6010B
Chromium	24.2	1.2	mg/kg dry	EPA 6010B
Copper	19.8	1.23	mg/kg dry	EPA 6010B
Iron	24700 D	31	mg/kg dry	EPA 6010B
Lead	21.8	1.2	mg/kg dry	EPA 6010B
Manganese	1160	1.23	mg/kg dry	EPA 6010B
Mercury	0.092	0.025	mg/kg dry	EPA 7471A
Nickel	9.0	6.2	mg/kg dry	EPA 6010B
Selenium	3.1	1.2	mg/kg dry	EPA 6010B
Zinc	109	2.5	mg/kg dry	EPA 6010B



Client ID: CF-7

Lab ID: B609856-07

Analyte	Results/Qual	MRL	Units	Method
Aluminum	13000	29	mg/kg dry	EPA 6010B
Arsenic	4.3	1.4	mg/kg dry	EPA 6010B
Barium	148	1.4	mg/kg dry	EPA 6010B
Cadmium	0.22	0.14	mg/kg dry	EPA 6010B
Chromium	24.1	1.4	mg/kg dry	EPA 6010B
Copper	19.2	1.43	mg/kg dry	EPA 6010B
Fluoranthene	0.0477 J	0.0944	mg/kg dry	EPA 8270C
Iron	24400 D	36	mg/kg dry	EPA 6010B
Lead	21.9	1.4	mg/kg dry	EPA 6010B
Manganese	1260	1.43	mg/kg dry	EPA 6010B
Mercury	0.084	0.020	mg/kg dry	EPA 7471A
Nickel	9.1	7.1	mg/kg dry	EPA 6010B
Selenium	3.0	1.4	mg/kg dry	EPA 6010B
Zinc	105	2.9	mg/kg dry	EPA 6010B

Client ID: CF-8

Lab ID: B609856-08

Analyte	Results/Qual	MRL	Units	Method
Aluminum	8730	22	mg/kg dry	EPA 6010B
Arsenic	2.7	1.1	mg/kg dry	EPA 6010B
Barium	100	1.1	mg/kg dry	EPA 6010B
Cadmium	0.24	0.11	mg/kg dry	EPA 6010B
Chromium	16.7	1.1	mg/kg dry	EPA 6010B
Copper	13.6	1.11	mg/kg dry	EPA 6010B
Iron	16600 D	28	mg/kg dry	EPA 6010B
Lead	15.2	1.1	mg/kg dry	EPA 6010B
Manganese	595	1.11	mg/kg dry	EPA 6010B
Mercury	0.072	0.018	mg/kg dry	EPA 7471A
Nickel	6.4	5.6	mg/kg dry	EPA 6010B
Selenium	1.9	1.1	mg/kg dry	EPA 6010B
Zinc	78.7	2.2	mg/kg dry	EPA 6010B

Client ID: CF-9

Lab ID: B609856-09

Analyte	Results/Qual	MRL	Units	Method
Aluminum	4940	19	mg/kg dry	EPA 6010B
Arsenic	1.8	0.9	mg/kg dry	EPA 6010B
Barium	64.8	0.9	mg/kg dry	EPA 6010B
Benzo(a)anthracene	0.0558 J	0.0614	mg/kg dry	EPA 8270C
Benzo(a)pyrene	0.0558 J	0.0614	mg/kg dry	EPA 8270C
Benzo(b)fluoranthene	0.0868	0.0614	mg/kg dry	EPA 8270C
Benzo(g,h,i)perylene	0.0992	0.0614	mg/kg dry	EPA 8270C
Benzo(k)fluoranthene	0.0372 J	0.0614	mg/kg dry	EPA 8270C
Cadmium	0.15	0.09	mg/kg dry	EPA 6010B
Chromium	11.9	0.9	mg/kg dry	EPA 6010B
Chrysene	0.0558 J	0.0614	mg/kg dry	EPA 8270C
Copper	9.81	0.93	mg/kg dry	EPA 6010B

Fluoranthene	0.0992	0.0614	mg/kg dry	EPA 8270C
Indeno(1,2,3-cd)pyrene	0.136	0.0614	mg/kg dry	EPA 8270C
Iron	10300	5	mg/kg dry	EPA 6010B
Lead	13.6	0.9	mg/kg dry	EPA 6010B
Manganese	506	0.93	mg/kg dry	EPA 6010B
Mercury	0.057	0.016	mg/kg dry	EPA 7471A
Nickel	3.8 J	4.7	mg/kg dry	EPA 6010B
Pyrene	0.0806	0.0614	mg/kg dry	EPA 8270C
Selenium	1.3	0.9	mg/kg dry	EPA 6010B
Zinc	57.5	1.9	mg/kg dry	EPA 6010B

**Client ID: CF-10**

**Lab ID: B609856-10**

Analyte	Results/Qual	MRL	Units	Method
Aluminum	10500	25	mg/kg dry	EPA 6010B
Arsenic	4.3	1.2	mg/kg dry	EPA 6010B
Barium	139	1.2	mg/kg dry	EPA 6010B
Benzo(a)anthracene	0.0578 J	0.0817	mg/kg dry	EPA 8270C
Benzo(a)pyrene	0.0578 J	0.0817	mg/kg dry	EPA 8270C
Benzo(b)fluoranthene	0.0908	0.0817	mg/kg dry	EPA 8270C
Benzo(g,h,i)perylene	0.124	0.0817	mg/kg dry	EPA 8270C
Cadmium	0.28	0.12	mg/kg dry	EPA 6010B
Chromium	22.4	1.2	mg/kg dry	EPA 6010B
Chrysene	0.0660 J	0.0817	mg/kg dry	EPA 8270C
Copper	21.5	1.24	mg/kg dry	EPA 6010B
Fluoranthene	0.140	0.0817	mg/kg dry	EPA 8270C
Indeno(1,2,3-cd)pyrene	0.165	0.0817	mg/kg dry	EPA 8270C
Iron	20600 D	12	mg/kg dry	EPA 6010B
Lead	22.9	1.2	mg/kg dry	EPA 6010B
Manganese	1610	1.24	mg/kg dry	EPA 6010B
Mercury	0.101	0.023	mg/kg dry	EPA 7471A
Nickel	8.2	6.2	mg/kg dry	EPA 6010B
Phenanthrene	0.0743 J	0.0817	mg/kg dry	EPA 8270C
Pyrene	0.107	0.0817	mg/kg dry	EPA 8270C
Selenium	2.5	1.2	mg/kg dry	EPA 6010B
Zinc	101	2.5	mg/kg dry	EPA 6010B

**Client ID: CF-11**

**Lab ID: B609856-11**

Analyte	Results/Qual	MRL	Units	Method
Acenaphthylene	0.0452 J	0.0639	mg/kg dry	EPA 8270C
Aluminum	6750	19	mg/kg dry	EPA 6010B
Arsenic	3.0	1.0	mg/kg dry	EPA 6010B
Barium	95.7	1.0	mg/kg dry	EPA 6010B
Benzo(a)anthracene	0.194	0.0639	mg/kg dry	EPA 8270C
Benzo(a)pyrene	0.232	0.0639	mg/kg dry	EPA 8270C
Benzo(b)fluoranthene	0.316	0.0639	mg/kg dry	EPA 8270C
Benzo(g,h,i)perylene	0.200	0.0639	mg/kg dry	EPA 8270C
Benzo(k)fluoranthene	0.110	0.0639	mg/kg dry	EPA 8270C



Cadmium	0.22	0.10	mg/kg dry	EPA 6010B
Chromium	15.6	1.0	mg/kg dry	EPA 6010B
Chrysene	0.226	0.0639	mg/kg dry	EPA 8270C
Copper	15.1	0.97	mg/kg dry	EPA 6010B
Dibenzo(a,h)anthracene	0.168	0.0639	mg/kg dry	EPA 8270C
Fluoranthene	0.355	0.0639	mg/kg dry	EPA 8270C
Indeno(1,2,3-cd)pyrene	0.232	0.0639	mg/kg dry	EPA 8270C
Iron	14800 D	10	mg/kg dry	EPA 6010B
Lead	17.8	1.0	mg/kg dry	EPA 6010B
Manganese	930	0.97	mg/kg dry	EPA 6010B
Mercury	0.051	0.018	mg/kg dry	EPA 7471A
Nickel	5.6	4.8	mg/kg dry	EPA 6010B
Phenanthrene	0.136	0.0639	mg/kg dry	EPA 8270C
Pyrene	0.336	0.0639	mg/kg dry	EPA 8270C
Selenium	1.8	1.0	mg/kg dry	EPA 6010B
Zinc	76.1	1.9	mg/kg dry	EPA 6010B

Client ID: CF-12

Lab ID: B609856-12

Analyte	Results/Qual	MRL	Units	Method
Aluminum	8310	21	mg/kg dry	EPA 6010B
Arsenic	2.9	1.0	mg/kg dry	EPA 6010B
Barium	108	1.0	mg/kg dry	EPA 6010B
Benzo(a)anthracene	0.0554 J	0.0686	mg/kg dry	EPA 8270C
Benzo(a)pyrene	0.0554 J	0.0686	mg/kg dry	EPA 8270C
Benzo(b)fluoranthene	0.0900	0.0686	mg/kg dry	EPA 8270C
Benzo(g,h,i)perylene	0.111	0.0686	mg/kg dry	EPA 8270C
Cadmium	0.30	0.10	mg/kg dry	EPA 6010B
Chromium	19.0	1.0	mg/kg dry	EPA 6010B
Chrysene	0.0623 J	0.0686	mg/kg dry	EPA 8270C
Copper	17.7	1.04	mg/kg dry	EPA 6010B
Fluoranthene	0.118	0.0686	mg/kg dry	EPA 8270C
Indeno(1,2,3-cd)pyrene	0.152	0.0686	mg/kg dry	EPA 8270C
Iron	16800 D	10	mg/kg dry	EPA 6010B
Lead	19.4	1.0	mg/kg dry	EPA 6010B
Manganese	693	1.04	mg/kg dry	EPA 6010B
Mercury	0.073	0.018	mg/kg dry	EPA 7471A
Nickel	6.4	5.2	mg/kg dry	EPA 6010B
Phenanthrene	0.0416 J	0.0686	mg/kg dry	EPA 8270C
Pyrene	0.0900	0.0686	mg/kg dry	EPA 8270C
Selenium	2.1	1.0	mg/kg dry	EPA 6010B
Zinc	96.6	2.1	mg/kg dry	EPA 6010B





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**ANALYTICAL REPORT**

Sample ID: CF-1  
 Lab #: B609856-01  
 Prep. Method: EPA 3545\_MS  
 Analyzed: 11/16/06 By: jj  
 Anal. Method: EPA 8270C  
 Anal. Batch:  
 QC Batch: 6K14012

Project: Cape Fear Sediments  
 Work Order #: B609856  
 Matrix: Soil  
 Unit: mg/kg dry  
 Dilution Factor: 1  
 Percent Solids: 46.69

**Semivolatile Organic Compounds by GCMS SIM**

Parameter	CAS Number	Analytical Results	MDL	MRL	Units
1-Methylnaphthalene	90-12-0	0.0227 U	0.0227	0.0707	mg/kg dry
<b>2-Methylnaphthalene</b>	91-57-6	<b>0.0571 J</b>	0.0212	0.0707	mg/kg dry
Acenaphthene	83-32-9	0.0156 U	0.0156	0.0707	mg/kg dry
Acenaphthylene	208-96-8	0.0227 U	0.0227	0.0707	mg/kg dry
Anthracene	120-12-7	0.0148 U	0.0148	0.0707	mg/kg dry
Benzo(a)anthracene	56-55-3	0.0148 U	0.0148	0.0707	mg/kg dry
Benzo(a)pyrene	50-32-8	0.0148 U	0.0148	0.0707	mg/kg dry
Benzo(b)fluoranthene	205-99-2	0.0114 U	0.0114	0.0707	mg/kg dry
Benzo(g,h,i)perylene	191-24-2	0.0218 U	0.0218	0.0707	mg/kg dry
Benzo(k)fluoranthene	207-08-9	0.0148 U	0.0148	0.0707	mg/kg dry
Chrysene	218-01-9	0.0156 U	0.0156	0.0707	mg/kg dry
Dibenzo(a,h)anthracene	53-70-3	0.0240 U	0.0240	0.0707	mg/kg dry
<b>Fluoranthene</b>	206-44-0	<b>0.0428 J</b>	0.0191	0.0707	mg/kg dry
Fluorene	86-73-7	0.0135 U	0.0135	0.0707	mg/kg dry
Indeno(1,2,3-cd)pyrene	193-39-5	0.0248 U	0.0248	0.0707	mg/kg dry
<b>Naphthalene</b>	91-20-3	<b>0.0428 J</b>	0.0261	0.0707	mg/kg dry
Phenanthrene	85-01-8	0.0148 U	0.0148	0.0707	mg/kg dry
<b>Pyrene</b>	129-00-0	<b>0.0357 J</b>	0.0191	0.0707	mg/kg dry
<b>Surrogate Recovery</b>		<b>Result</b>	<b>Spike Level</b>	<b>% Recovery</b>	<b>% Recovery Limits</b>
p-Terphenyl	92-94-4	3.54	3.57	99 %	34-180



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### ANALYTICAL REPORT

Sample ID: CF-1  
Lab #: B609856-01

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 46.69

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	9470	5	21	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Arsenic	7440-38-2	3.6	0.4	1.1	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Barium	7440-39-3	116	0.1	1.1	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Cadmium	7440-43-9	0.22	0.05	0.11	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Chromium	7440-47-3	19.6	0.3	1.1	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Copper	7440-50-8	17.3	0.30	1.07	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Iron	7439-89-6	19600 D	19	27	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Lead	7439-92-1	18.7	0.2	1.1	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Manganese	7439-96-5	1040	0.15	1.07	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Nickel	7440-02-0	7.1	0.2	5.4	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Selenium	7782-49-2	2.7	0.3	1.1	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Silver	7440-22-4	0.21 U	0.21	1.07	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Zinc	7440-66-6	93.8	0.3	2.1	mg/kg dry	EPA 6010B	EPA 3050B	6K14001



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### ANALYTICAL REPORT

Sample ID: CF-1  
Lab #: B609856-01

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 47.53

#### Metals by EPA 6000/7000 Series Methods

<u>Parameter</u>	<u>CAS Number</u>	<u>Analytical Results</u>	<u>MDL</u>	<u>MRL</u>	<u>Units</u>	<u>Analysis Method</u>	<u>Prep Method</u>	<u>Analytical Batch</u>
Mercury	7439-97-6	0.087	0.0007	0.021	mg/kg dry	EPA 7471A	EPA 7471A	6K14013

**ANALYTICAL REPORT**

Sample ID: CF-2  
 Lab #: B609856-02  
 Prep. Method: EPA 3545\_MS  
 Analyzed: 11/16/06 By: jj  
 Anal. Method: EPA 8270C  
 Anal. Batch:  
 QC Batch: 6K14012

Project: Cape Fear Sediments  
 Work Order #: B609856  
 Matrix: Soil  
 Unit: mg/kg dry  
 Dilution Factor: 1  
 Percent Solids: 40.60

**Semivolatile Organic Compounds by GCMS SIM**

Parameter	CAS Number	Analytical Results	MDL	MRL	Units
1-Methylnaphthalene	90-12-0	0.0261 U	0.0261	0.0813	mg/kg dry
2-Methylnaphthalene	91-57-6	0.0244 U	0.0244	0.0813	mg/kg dry
Acenaphthene	83-32-9	0.0179 U	0.0179	0.0813	mg/kg dry
Acenaphthylene	208-96-8	0.0261 U	0.0261	0.0813	mg/kg dry
Anthracene	120-12-7	0.0170 U	0.0170	0.0813	mg/kg dry
<b>Benzo(a)anthracene</b>	56-55-3	<b>0.0657 J</b>	0.0170	0.0813	mg/kg dry
<b>Benzo(a)pyrene</b>	50-32-8	<b>0.0493 J</b>	0.0170	0.0813	mg/kg dry
<b>Benzo(b)fluoranthene</b>	205-99-2	<b>0.0739 J</b>	0.0131	0.0813	mg/kg dry
<b>Benzo(g,h,i)perylene</b>	191-24-2	<b>0.123</b>	0.0251	0.0813	mg/kg dry
<b>Benzo(k)fluoranthene</b>	207-08-9	<b>0.0410 J</b>	0.0170	0.0813	mg/kg dry
<b>Chrysene</b>	218-01-9	<b>0.0493 J</b>	0.0180	0.0813	mg/kg dry
Dibenzo(a,h)anthracene	53-70-3	0.0276 U	0.0276	0.0813	mg/kg dry
<b>Fluoranthene</b>	206-44-0	<b>0.0739 J</b>	0.0219	0.0813	mg/kg dry
Fluorene	86-73-7	0.0155 U	0.0155	0.0813	mg/kg dry
<b>Indeno(1,2,3-cd)pyrene</b>	193-39-5	<b>0.164</b>	0.0286	0.0813	mg/kg dry
Naphthalene	91-20-3	0.0300 U	0.0300	0.0813	mg/kg dry
Phenanthrene	85-01-8	0.0170 U	0.0170	0.0813	mg/kg dry
<b>Pyrene</b>	129-00-0	<b>0.0657 J</b>	0.0219	0.0813	mg/kg dry
<b>Surrogate Recovery</b>		<b>Result</b>	<b>Spike Level</b>	<b>% Recovery</b>	<b>% Recovery Limits</b>
p-Terphenyl	92-94-4	5.93	4.10	144 %	34-180



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### ANALYTICAL REPORT

Sample ID: CF-2  
Lab #: B609856-02

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 40.60

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	10100	6	25	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Arsenic	7440-38-2	3.5	0.5	1.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Barium	7440-39-3	125	0.1	1.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Cadmium	7440-43-9	0.25	0.06	0.12	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Chromium	7440-47-3	20.2	0.4	1.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Copper	7440-50-8	17.4	0.34	1.23	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Iron	7439-89-6	19800 D	22	31	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Lead	7439-92-1	19.0	0.2	1.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Manganese	7439-96-5	1050	0.17	1.23	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Nickel	7440-02-0	7.7	0.2	6.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Selenium	7782-49-2	2.5	0.3	1.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Silver	7440-22-4	0.25 U	0.25	1.23	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Zinc	7440-66-6	101	0.3	2.5	mg/kg dry	EPA 6010B	EPA 3050B	6K14001



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### ANALYTICAL REPORT

Sample ID: CF-2  
Lab #: B609856-02

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 50.76

#### Metals by EPA 6000/7000 Series Methods

<u>Parameter</u>	<u>CAS Number</u>	<u>Analytical Results</u>	<u>MDL</u>	<u>MRL</u>	<u>Units</u>	<u>Analysis Method</u>	<u>Prep Method</u>	<u>Analytical Batch</u>
Mercury	7439-97-6	0.097	0.0006	0.020	mg/kg dry	EPA 7471A	EPA 7471A	6K14013

**ANALYTICAL REPORT**

Sample ID: CF-3  
 Lab #: B609856-03  
 Prep. Method: EPA 3545\_MS  
 Analyzed: 11/16/06 By: jj  
 Anal. Method: EPA 8270C  
 Anal. Batch:  
 QC Batch: 6K14012

Project: Cape Fear Sediments  
 Work Order #: B609856  
 Matrix: Soil  
 Unit: mg/kg dry  
 Dilution Factor: 1  
 Percent Solids: 50.30

**Semivolatile Organic Compounds by GCMS SIM**

Parameter	CAS Number	Analytical Results	MDL	MRL	Units
1-Methylnaphthalene	90-12-0	0.0211 U	0.0211	0.0656	mg/kg dry
2-Methylnaphthalene	91-57-6	0.0197 U	0.0197	0.0656	mg/kg dry
Acenaphthene	83-32-9	0.0144 U	0.0144	0.0656	mg/kg dry
Acenaphthylene	208-96-8	0.0211 U	0.0211	0.0656	mg/kg dry
Anthracene	120-12-7	0.0137 U	0.0137	0.0656	mg/kg dry
<b>Benzo(a)anthracene</b>	56-55-3	<b>0.0464 J</b>	0.0137	0.0656	mg/kg dry
<b>Benzo(a)pyrene</b>	50-32-8	<b>0.0398 J</b>	0.0137	0.0656	mg/kg dry
<b>Benzo(b)fluoranthene</b>	205-99-2	<b>0.0596 J</b>	0.0106	0.0656	mg/kg dry
<b>Benzo(g,h,i)perylene</b>	191-24-2	<b>0.0994</b>	0.0203	0.0656	mg/kg dry
Benzo(k)fluoranthene	207-08-9	0.0137 U	0.0137	0.0656	mg/kg dry
<b>Chrysene</b>	218-01-9	<b>0.0398 J</b>	0.0145	0.0656	mg/kg dry
Dibenzo(a,h)anthracene	53-70-3	0.0223 U	0.0223	0.0656	mg/kg dry
<b>Fluoranthene</b>	206-44-0	<b>0.0663</b>	0.0177	0.0656	mg/kg dry
Fluorene	86-73-7	0.0125 U	0.0125	0.0656	mg/kg dry
<b>Indeno(1,2,3-cd)pyrene</b>	193-39-5	<b>0.133</b>	0.0231	0.0656	mg/kg dry
Naphthalene	91-20-3	0.0243 U	0.0243	0.0656	mg/kg dry
Phenanthrene	85-01-8	0.0137 U	0.0137	0.0656	mg/kg dry
<b>Pyrene</b>	129-00-0	<b>0.0596 J</b>	0.0177	0.0656	mg/kg dry
<b>Surrogate Recovery</b>		<b>Result</b>	<b>Spike Level</b>	<b>% Recovery</b>	<b>% Recovery Limits</b>
p-Terphenyl	92-94-4	4.62	3.31	139 %	34-180



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### ANALYTICAL REPORT

Sample ID: CF-3  
Lab #: B609856-03

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 50.30

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	9320	5	20	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Arsenic	7440-38-2	3.2	0.4	1.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Barium	7440-39-3	113	0.1	1.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Cadmium	7440-43-9	0.24	0.05	0.10	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Chromium	7440-47-3	18.8	0.3	1.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Copper	7440-50-8	18.0	0.28	0.99	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Iron	7439-89-6	18700 D	18	25	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Lead	7439-92-1	17.4	0.2	1.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Manganese	7439-96-5	815	0.14	0.99	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Nickel	7440-02-0	6.8	0.2	5.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Selenium	7782-49-2	2.4	0.2	1.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Silver	7440-22-4	0.20 U	0.20	0.99	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Zinc	7440-66-6	93.2	0.3	2.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001





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### ANALYTICAL REPORT

Sample ID: CF-3  
Lab #: B609856-03

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 45.81

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Mercury	7439-97-6	0.097	0.0007	0.022	mg/kg dry	EPA 7471A	EPA 7471A	6K14013

**ANALYTICAL REPORT**

Sample ID: CF-4  
 Lab #: B609856-04  
 Prep. Method: EPA 3545\_MS  
 Analyzed: 11/16/06 By: jj  
 Anal. Method: EPA 8270C  
 Anal. Batch:  
 QC Batch: 6K14012

Project: Cape Fear Sediments  
 Work Order #: B609856  
 Matrix: Soil  
 Unit: mg/kg dry  
 Dilution Factor: 1  
 Percent Solids: 54.60

**Semivolatile Organic Compounds by GCMS SIM**

Parameter	CAS Number	Analytical Results	MDL	MRL	Units
1-Methylnaphthalene	90-12-0	0.0194 U	0.0194	0.0604	mg/kg dry
2-Methylnaphthalene	91-57-6	0.0181 U	0.0181	0.0604	mg/kg dry
Acenaphthene	83-32-9	0.0133 U	0.0133	0.0604	mg/kg dry
Acenaphthylene	208-96-8	0.0194 U	0.0194	0.0604	mg/kg dry
Anthracene	120-12-7	0.0126 U	0.0126	0.0604	mg/kg dry
<b>Benzo(a)anthracene</b>	56-55-3	<b>0.0427 J</b>	0.0126	0.0604	mg/kg dry
<b>Benzo(a)pyrene</b>	50-32-8	<b>0.0427 J</b>	0.0126	0.0604	mg/kg dry
<b>Benzo(b)fluoranthene</b>	205-99-2	<b>0.0672</b>	0.00976	0.0604	mg/kg dry
<b>Benzo(g,h,i)perylene</b>	191-24-2	<b>0.0916</b>	0.0187	0.0604	mg/kg dry
<b>Benzo(k)fluoranthene</b>	207-08-9	<b>0.0305 J</b>	0.0126	0.0604	mg/kg dry
<b>Chrysene</b>	218-01-9	<b>0.0549 J</b>	0.0134	0.0604	mg/kg dry
Dibenzo(a,h)anthracene	53-70-3	0.0205 U	0.0205	0.0604	mg/kg dry
<b>Fluoranthene</b>	206-44-0	<b>0.0794</b>	0.0163	0.0604	mg/kg dry
Fluorene	86-73-7	0.0115 U	0.0115	0.0604	mg/kg dry
<b>Indeno(1,2,3-cd)pyrene</b>	193-39-5	<b>0.128</b>	0.0212	0.0604	mg/kg dry
Naphthalene	91-20-3	0.0223 U	0.0223	0.0604	mg/kg dry
<b>Phenanthrene</b>	85-01-8	<b>0.0305 J</b>	0.0126	0.0604	mg/kg dry
<b>Pyrene</b>	129-00-0	<b>0.0672</b>	0.0163	0.0604	mg/kg dry
<b>Surrogate Recovery</b>		<b>Result</b>	<b>Spike Level</b>	<b>% Recovery</b>	<b>% Recovery Limits</b>
p-Terphenyl	92-94-4	4.45	3.05	146 %	34-180



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### ANALYTICAL REPORT

Sample ID: CF-4  
Lab #: B609856-04

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 54.60

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	9790 D	23	92	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Arsenic	7440-38-2	3.6	0.4	0.9	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Barium	7440-39-3	97.5	0.1	0.9	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Cadmium	7440-43-9	0.15	0.05	0.09	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Chromium	7440-47-3	18.7	0.3	0.9	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Copper	7440-50-8	15.9	0.26	0.92	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Iron	7439-89-6	20100 D	16	23	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Lead	7439-92-1	16.1	0.2	0.9	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Manganese	7439-96-5	777	0.13	0.92	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Nickel	7440-02-0	6.2	0.2	4.6	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Selenium	7782-49-2	2.5	0.2	0.9	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Silver	7440-22-4	0.37 U, D	0.37	1.83	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Zinc	7440-66-6	70.7	0.2	1.8	mg/kg dry	EPA 6010B	EPA 3050B	6K14001



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### ANALYTICAL REPORT

Sample ID: CF-4  
Lab #: B609856-04

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 59.72

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Mercury	7439-97-6	0.064	0.0005	0.017	mg/kg dry	EPA 7471A	EPA 7471A	6K14013

**ANALYTICAL REPORT**

Sample ID: CF-5  
 Lab #: B609856-05  
 Prep. Method: EPA 3545\_MS  
 Analyzed: 11/16/06 By: jj  
 Anal. Method: EPA 8270C  
 Anal. Batch:  
 QC Batch: 6K14012

Project: Cape Fear Sediments  
 Work Order #: B609856  
 Matrix: Soil  
 Unit: mg/kg dry  
 Dilution Factor: 1  
 Percent Solids: 59.71

**Semivolatile Organic Compounds by GCMS SIM**

Parameter	CAS Number	Analytical Results	MDL	MRL	Units
1-Methylnaphthalene	90-12-0	0.0178 U	0.0178	0.0553	mg/kg dry
2-Methylnaphthalene	91-57-6	0.0166 U	0.0166	0.0553	mg/kg dry
Acenaphthene	83-32-9	0.0122 U	0.0122	0.0553	mg/kg dry
Acenaphthylene	208-96-8	0.0178 U	0.0178	0.0553	mg/kg dry
Anthracene	120-12-7	0.0116 U	0.0116	0.0553	mg/kg dry
<b>Benzo(a)anthracene</b>	56-55-3	<b>0.0893</b>	0.0116	0.0553	mg/kg dry
<b>Benzo(a)pyrene</b>	50-32-8	<b>0.100</b>	0.0116	0.0553	mg/kg dry
<b>Benzo(b)fluoranthene</b>	205-99-2	<b>0.162</b>	0.00892	0.0553	mg/kg dry
<b>Benzo(g,h,i)perylene</b>	191-24-2	<b>0.123</b>	0.0171	0.0553	mg/kg dry
<b>Benzo(k)fluoranthene</b>	207-08-9	<b>0.0558</b>	0.0116	0.0553	mg/kg dry
<b>Chrysene</b>	218-01-9	<b>0.134</b>	0.0122	0.0553	mg/kg dry
<b>Dibenzo(a,h)anthracene</b>	53-70-3	<b>0.134</b>	0.0188	0.0553	mg/kg dry
<b>Fluoranthene</b>	206-44-0	<b>0.346</b>	0.0149	0.0553	mg/kg dry
Fluorene	86-73-7	0.0106 U	0.0106	0.0553	mg/kg dry
<b>Indeno(1,2,3-cd)pyrene</b>	193-39-5	<b>0.156</b>	0.0194	0.0553	mg/kg dry
Naphthalene	91-20-3	0.0204 U	0.0204	0.0553	mg/kg dry
<b>Phenanthrene</b>	85-01-8	<b>0.0781</b>	0.0116	0.0553	mg/kg dry
<b>Pyrene</b>	129-00-0	<b>0.262</b>	0.0149	0.0553	mg/kg dry
<b>Surrogate Recovery</b>		<b>Result</b>	<b>Spike Level</b>	<b>% Recovery</b>	<b>% Recovery Limits</b>
p-Terphenyl	92-94-4	3.84	2.79	138 %	34-180





### ANALYTICAL REPORT

Sample ID: CF-5  
Lab #: B609856-05

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 59.71

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	5600	4	17	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Arsenic	7440-38-2	2.3	0.3	0.8	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Barium	7440-39-3	74.4	0.09	0.8	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Cadmium	7440-43-9	0.22	0.04	0.08	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Chromium	7440-47-3	13.3	0.3	0.8	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Copper	7440-50-8	11.7	0.23	0.84	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Iron	7439-89-6	12400 D	15	21	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Lead	7439-92-1	13.7	0.2	0.8	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Manganese	7439-96-5	544	0.12	0.84	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Nickel	7440-02-0	4.4	0.2	4.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Selenium	7782-49-2	1.8	0.2	0.8	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Silver	7440-22-4	0.17 U	0.17	0.84	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Zinc	7440-66-6	62.9	0.2	1.7	mg/kg dry	EPA 6010B	EPA 3050B	6K14001



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### ANALYTICAL REPORT

Sample ID: CF-5  
Lab #: B609856-05

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 59.01

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Mercury	7439-97-6	0.040	0.0005	0.017	mg/kg dry	EPA 7471A	EPA 7471A	6K14013



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### ANALYTICAL REPORT

Sample ID: CF-6  
Lab #: B609856-06  
Prep. Method: EPA 3545\_MS  
Analyzed: 11/16/06 By: jj  
Anal. Method: EPA 8270C  
Anal. Batch:  
QC Batch: 6K14012

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Unit: mg/kg dry  
Dilution Factor: 1  
Percent Solids: 40.63

#### Semivolatile Organic Compounds by GCMS SIM

<u>Parameter</u>	<u>CAS Number</u>	<u>Analytical Results</u>	<u>MDL</u>	<u>MRL</u>	<u>Units</u>
1-Methylnaphthalene	90-12-0	0.0261 U	0.0261	0.0812	mg/kg dry
2-Methylnaphthalene	91-57-6	0.0244 U	0.0244	0.0812	mg/kg dry
Acenaphthene	83-32-9	0.0179 U	0.0179	0.0812	mg/kg dry
Acenaphthylene	208-96-8	0.0261 U	0.0261	0.0812	mg/kg dry
Anthracene	120-12-7	0.0170 U	0.0170	0.0812	mg/kg dry
Benzo(a)anthracene	56-55-3	0.0170 U	0.0170	0.0812	mg/kg dry
Benzo(a)pyrene	50-32-8	0.0170 U	0.0170	0.0812	mg/kg dry
Benzo(b)fluoranthene	205-99-2	0.0131 U	0.0131	0.0812	mg/kg dry
Benzo(g,h,i)perylene	191-24-2	0.0251 U	0.0251	0.0812	mg/kg dry
Benzo(k)fluoranthene	207-08-9	0.0170 U	0.0170	0.0812	mg/kg dry
Chrysene	218-01-9	0.0180 U	0.0180	0.0812	mg/kg dry
Dibenzo(a,h)anthracene	53-70-3	0.0276 U	0.0276	0.0812	mg/kg dry
Fluoranthene	206-44-0	0.0219 U	0.0219	0.0812	mg/kg dry
Fluorene	86-73-7	0.0155 U	0.0155	0.0812	mg/kg dry
Indeno(1,2,3-cd)pyrene	193-39-5	0.0286 U	0.0286	0.0812	mg/kg dry
Naphthalene	91-20-3	0.0300 U	0.0300	0.0812	mg/kg dry
Phenanthrene	85-01-8	0.0170 U	0.0170	0.0812	mg/kg dry
Pyrene	129-00-0	0.0219 U	0.0219	0.0812	mg/kg dry

<u>Surrogate Recovery</u>		<u>Result</u>	<u>Spike Level</u>	<u>% Recovery</u>	<u>% Recovery Limits</u>
p-Terphenyl	92-94-4	5.42	4.10	132 %	34-180



### ANALYTICAL REPORT

Sample ID: CF-6  
Lab #: B609856-06

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 40.63

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	13500 D	31	123	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Arsenic	7440-38-2	4.3	0.5	1.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Barium	7440-39-3	148	0.1	1.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Cadmium	7440-43-9	0.27	0.06	0.12	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Chromium	7440-47-3	24.2	0.4	1.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Copper	7440-50-8	19.8	0.34	1.23	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Iron	7439-89-6	24700 D	22	31	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Lead	7439-92-1	21.8	0.2	1.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Manganese	7439-96-5	1160	0.17	1.23	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Nickel	7440-02-0	9.0	0.2	6.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Selenium	7782-49-2	3.1	0.3	1.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Silver	7440-22-4	0.25 U	0.25	1.23	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Zinc	7440-66-6	109	0.3	2.5	mg/kg dry	EPA 6010B	EPA 3050B	6K14001



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### ANALYTICAL REPORT

Sample ID: CF-6  
Lab #: B609856-06

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 39.78

#### Metals by EPA 6000/7000 Series Methods

<u>Parameter</u>	<u>CAS Number</u>	<u>Analytical Results</u>	<u>MDL</u>	<u>MRL</u>	<u>Units</u>	<u>Analysis Method</u>	<u>Prep Method</u>	<u>Analytical Batch</u>
Mercury	7439-97-6	0.092	0.0008	0.025	mg/kg dry	EPA 7471A	EPA 7471A	6K14013

**ANALYTICAL REPORT**

Sample ID: CF-7  
 Lab #: B609856-07  
 Prep. Method: EPA 3545\_MS  
 Analyzed: 11/16/06 By: jj  
 Anal. Method: EPA 8270C  
 Anal. Batch:  
 QC Batch: 6K14012

Project: Cape Fear Sediments  
 Work Order #: B609856  
 Matrix: Soil  
 Unit: mg/kg dry  
 Dilution Factor: 1  
 Percent Solids: 34.97

**Semivolatile Organic Compounds by GCMS SIM**

Parameter	CAS Number	Analytical Results	MDL	MRL	Units
1-Methylnaphthalene	90-12-0	0.0303 U	0.0303	0.0944	mg/kg dry
2-Methylnaphthalene	91-57-6	0.0283 U	0.0283	0.0944	mg/kg dry
Acenaphthene	83-32-9	0.0208 U	0.0208	0.0944	mg/kg dry
Acenaphthylene	208-96-8	0.0303 U	0.0303	0.0944	mg/kg dry
Anthracene	120-12-7	0.0197 U	0.0197	0.0944	mg/kg dry
Benzo(a)anthracene	56-55-3	0.0197 U	0.0197	0.0944	mg/kg dry
Benzo(a)pyrene	50-32-8	0.0197 U	0.0197	0.0944	mg/kg dry
Benzo(b)fluoranthene	205-99-2	0.0152 U	0.0152	0.0944	mg/kg dry
Benzo(g,h,i)perylene	191-24-2	0.0292 U	0.0292	0.0944	mg/kg dry
Benzo(k)fluoranthene	207-08-9	0.0197 U	0.0197	0.0944	mg/kg dry
Chrysene	218-01-9	0.0209 U	0.0209	0.0944	mg/kg dry
Dibenzo(a,h)anthracene	53-70-3	0.0320 U	0.0320	0.0944	mg/kg dry
<b>Fluoranthene</b>	206-44-0	<b>0.0477 J</b>	0.0255	0.0944	mg/kg dry
Fluorene	86-73-7	0.0180 U	0.0180	0.0944	mg/kg dry
Indeno(1,2,3-cd)pyrene	193-39-5	0.0332 U	0.0332	0.0944	mg/kg dry
Naphthalene	91-20-3	0.0349 U	0.0349	0.0944	mg/kg dry
Phenanthrene	85-01-8	0.0197 U	0.0197	0.0944	mg/kg dry
Pyrene	129-00-0	0.0255 U	0.0255	0.0944	mg/kg dry

Surrogate Recovery		Result	Spike Level	% Recovery	% Recovery Limits
p-Terphenyl	92-94-4	5.10	4.77	107 %	34-180



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### ANALYTICAL REPORT

Sample ID: CF-7  
Lab #: B609856-07

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 34.97

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	13000	7	29	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Arsenic	7440-38-2	4.3	0.6	1.4	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Barium	7440-39-3	148	0.2	1.4	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Cadmium	7440-43-9	0.22	0.07	0.14	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Chromium	7440-47-3	24.1	0.5	1.4	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Copper	7440-50-8	19.2	0.40	1.43	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Iron	7439-89-6	24400 D	26	36	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Lead	7439-92-1	21.9	0.3	1.4	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Manganese	7439-96-5	1260	0.20	1.43	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Nickel	7440-02-0	9.1	0.3	7.1	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Selenium	7782-49-2	3.0	0.3	1.4	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Silver	7440-22-4	0.29 U	0.29	1.43	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Zinc	7440-66-6	105	0.4	2.9	mg/kg dry	EPA 6010B	EPA 3050B	6K14001





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### ANALYTICAL REPORT

Sample ID: CF-7  
Lab #: B609856-07

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 49.60

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Mercury	7439-97-6	0.084	0.0006	0.020	mg/kg dry	EPA 7471A	EPA 7471A	6K14013

**ANALYTICAL REPORT**

Sample ID: CF-8  
Lab #: B609856-08  
Prep. Method: EPA 3545\_MS  
Analyzed: 11/16/06 By: jj  
Anal. Method: EPA 8270C  
Anal. Batch:  
QC Batch: 6K14012

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Unit: mg/kg dry  
Dilution Factor: 1  
Percent Solids: 44.98

**Semivolatile Organic Compounds by GCMS SIM**

<b>Parameter</b>	<b>CAS Number</b>	<b>Analytical Results</b>	<b>MDL</b>	<b>MRL</b>	<b>Units</b>
1-Methylnaphthalene	90-12-0	0.0236 U	0.0236	0.0734	mg/kg dry
2-Methylnaphthalene	91-57-6	0.0220 U	0.0220	0.0734	mg/kg dry
Acenaphthene	83-32-9	0.0161 U	0.0161	0.0734	mg/kg dry
Acenaphthylene	208-96-8	0.0236 U	0.0236	0.0734	mg/kg dry
Anthracene	120-12-7	0.0153 U	0.0153	0.0734	mg/kg dry
Benzo(a)anthracene	56-55-3	0.0153 U	0.0153	0.0734	mg/kg dry
Benzo(a)pyrene	50-32-8	0.0153 U	0.0153	0.0734	mg/kg dry
Benzo(b)fluoranthene	205-99-2	0.0118 U	0.0118	0.0734	mg/kg dry
Benzo(g,h,i)perylene	191-24-2	0.0227 U	0.0227	0.0734	mg/kg dry
Benzo(k)fluoranthene	207-08-9	0.0153 U	0.0153	0.0734	mg/kg dry
Chrysene	218-01-9	0.0162 U	0.0162	0.0734	mg/kg dry
Dibenzo(a,h)anthracene	53-70-3	0.0249 U	0.0249	0.0734	mg/kg dry
Fluoranthene	206-44-0	0.0198 U	0.0198	0.0734	mg/kg dry
Fluorene	86-73-7	0.0140 U	0.0140	0.0734	mg/kg dry
Indeno(1,2,3-cd)pyrene	193-39-5	0.0258 U	0.0258	0.0734	mg/kg dry
Naphthalene	91-20-3	0.0271 U	0.0271	0.0734	mg/kg dry
Phenanthrene	85-01-8	0.0153 U	0.0153	0.0734	mg/kg dry
Pyrene	129-00-0	0.0198 U	0.0198	0.0734	mg/kg dry
<b>Surrogate Recovery</b>		<b>Result</b>	<b>Spike Level</b>	<b>% Recovery</b>	<b>% Recovery Limits</b>
p-Terphenyl	92-94-4	4.79	3.71	129 %	34-180



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### ANALYTICAL REPORT

Sample ID: CF-8  
Lab #: B609856-08

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 44.98

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	8730	6	22	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Arsenic	7440-38-2	2.7	0.4	1.1	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Barium	7440-39-3	100	0.1	1.1	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Cadmium	7440-43-9	0.24	0.06	0.11	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Chromium	7440-47-3	16.7	0.4	1.1	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Copper	7440-50-8	13.6	0.31	1.11	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Iron	7439-89-6	16600 D	20	28	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Lead	7439-92-1	15.2	0.2	1.1	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Manganese	7439-96-5	595	0.16	1.11	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Nickel	7440-02-0	6.4	0.2	5.6	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Selenium	7782-49-2	1.9	0.3	1.1	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Silver	7440-22-4	0.22 U	0.22	1.11	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Zinc	7440-66-6	78.7	0.3	2.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001



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### ANALYTICAL REPORT

Sample ID: CF-8  
Lab #: B609856-08

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 55.96

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Mercury	7439-97-6	0.072	0.0006	0.018	mg/kg dry	EPA 7471A	EPA 7471A	6K14013

**ANALYTICAL REPORT**

Sample ID: CF-9  
 Lab #: B609856-09  
 Prep. Method: EPA 3545\_MS  
 Analyzed: 11/16/06 By: jj  
 Anal. Method: EPA 8270C  
 Anal. Batch:  
 QC Batch: 6K14012

Project: Cape Fear Sediments  
 Work Order #: B609856  
 Matrix: Soil  
 Unit: mg/kg dry  
 Dilution Factor: 1  
 Percent Solids: 53.74

**Semivolatile Organic Compounds by GCMS SIM**

Parameter	CAS Number	Analytical Results	MDL	MRL	Units
1-Methylnaphthalene	90-12-0	0.0197 U	0.0197	0.0614	mg/kg dry
2-Methylnaphthalene	91-57-6	0.0184 U	0.0184	0.0614	mg/kg dry
Acenaphthene	83-32-9	0.0135 U	0.0135	0.0614	mg/kg dry
Acenaphthylene	208-96-8	0.0197 U	0.0197	0.0614	mg/kg dry
Anthracene	120-12-7	0.0128 U	0.0128	0.0614	mg/kg dry
<b>Benzo(a)anthracene</b>	56-55-3	<b>0.0558 J</b>	0.0128	0.0614	mg/kg dry
<b>Benzo(a)pyrene</b>	50-32-8	<b>0.0558 J</b>	0.0128	0.0614	mg/kg dry
<b>Benzo(b)fluoranthene</b>	205-99-2	<b>0.0868</b>	0.00991	0.0614	mg/kg dry
<b>Benzo(g,h,i)perylene</b>	191-24-2	<b>0.0992</b>	0.0190	0.0614	mg/kg dry
<b>Benzo(k)fluoranthene</b>	207-08-9	<b>0.0372 J</b>	0.0128	0.0614	mg/kg dry
<b>Chrysene</b>	218-01-9	<b>0.0558 J</b>	0.0136	0.0614	mg/kg dry
Dibenzo(a,h)anthracene	53-70-3	0.0208 U	0.0208	0.0614	mg/kg dry
<b>Fluoranthene</b>	206-44-0	<b>0.0992</b>	0.0166	0.0614	mg/kg dry
Fluorene	86-73-7	0.0117 U	0.0117	0.0614	mg/kg dry
<b>Indeno(1,2,3-cd)pyrene</b>	193-39-5	<b>0.136</b>	0.0216	0.0614	mg/kg dry
Naphthalene	91-20-3	0.0227 U	0.0227	0.0614	mg/kg dry
Phenanthrene	85-01-8	0.0128 U	0.0128	0.0614	mg/kg dry
<b>Pyrene</b>	129-00-0	<b>0.0806</b>	0.0166	0.0614	mg/kg dry
<b>Surrogate Recovery</b>		<b>Result</b>	<b>Spike Level</b>	<b>% Recovery</b>	<b>% Recovery Limits</b>
p-Terphenyl	92-94-4	4.45	3.10	143 %	34-180



**ANALYTICAL REPORT**

Sample ID: CF-9  
Lab #: B609856-09

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 53.74

**Metals by EPA 6000/7000 Series Methods**

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	4940	5	19	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Arsenic	7440-38-2	1.8	0.4	0.9	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Barium	7440-39-3	64.8	0.1	0.9	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Cadmium	7440-43-9	0.15	0.05	0.09	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Chromium	7440-47-3	11.9	0.3	0.9	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Copper	7440-50-8	9.81	0.26	0.93	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Iron	7439-89-6	10300	3	5	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Lead	7439-92-1	13.6	0.2	0.9	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Manganese	7439-96-5	506	0.13	0.93	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Nickel	7440-02-0	3.8 J	0.2	4.7	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Selenium	7782-49-2	1.3	0.2	0.9	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Silver	7440-22-4	0.19 U	0.19	0.93	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Zinc	7440-66-6	57.5	0.2	1.9	mg/kg dry	EPA 6010B	EPA 3050B	6K14001



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### ANALYTICAL REPORT

Sample ID: CF-9  
Lab #: B609856-09

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 61.68

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Mercury	7439-97-6	0.057	0.0005	0.016	mg/kg dry	EPA 7471A	EPA 7471A	6K14013





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**ANALYTICAL REPORT**

Sample ID: CF-10  
 Lab #: B609856-10  
 Prep. Method: EPA 3545\_MS  
 Analyzed: 11/16/06 By: jj  
 Anal. Method: EPA 8270C  
 Anal. Batch:  
 QC Batch: 6K14012

Project: Cape Fear Sediments  
 Work Order #: B609856  
 Matrix: Soil  
 Unit: mg/kg dry  
 Dilution Factor: 1  
 Percent Solids: 40.40

**Semivolatile Organic Compounds by GCMS SIM**

Parameter	CAS Number	Analytical Results	MDL	MRL	Units
1-Methylnaphthalene	90-12-0	0.0262 U	0.0262	0.0817	mg/kg dry
2-Methylnaphthalene	91-57-6	0.0245 U	0.0245	0.0817	mg/kg dry
Acenaphthene	83-32-9	0.0180 U	0.0180	0.0817	mg/kg dry
Acenaphthylene	208-96-8	0.0262 U	0.0262	0.0817	mg/kg dry
Anthracene	120-12-7	0.0171 U	0.0171	0.0817	mg/kg dry
<b>Benzo(a)anthracene</b>	56-55-3	<b>0.0578 J</b>	0.0171	0.0817	mg/kg dry
<b>Benzo(a)pyrene</b>	50-32-8	<b>0.0578 J</b>	0.0171	0.0817	mg/kg dry
<b>Benzo(b)fluoranthene</b>	205-99-2	<b>0.0908</b>	0.0132	0.0817	mg/kg dry
<b>Benzo(g,h,i)perylene</b>	191-24-2	<b>0.124</b>	0.0252	0.0817	mg/kg dry
Benzo(k)fluoranthene	207-08-9	0.0171 U	0.0171	0.0817	mg/kg dry
<b>Chrysene</b>	218-01-9	<b>0.0660 J</b>	0.0181	0.0817	mg/kg dry
Dibenzo(a,h)anthracene	53-70-3	0.0277 U	0.0277	0.0817	mg/kg dry
<b>Fluoranthene</b>	206-44-0	<b>0.140</b>	0.0220	0.0817	mg/kg dry
Fluorene	86-73-7	0.0156 U	0.0156	0.0817	mg/kg dry
<b>Indeno(1,2,3-cd)pyrene</b>	193-39-5	<b>0.165</b>	0.0287	0.0817	mg/kg dry
Naphthalene	91-20-3	0.0302 U	0.0302	0.0817	mg/kg dry
<b>Phenanthrene</b>	85-01-8	<b>0.0743 J</b>	0.0171	0.0817	mg/kg dry
<b>Pyrene</b>	129-00-0	<b>0.107</b>	0.0220	0.0817	mg/kg dry
<b>Surrogate Recovery</b>		<b>Result</b>	<b>Spike Level</b>	<b>% Recovery</b>	<b>% Recovery Limits</b>
p-Terphenyl	92-94-4	4.93	4.13	119 %	34-180



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### ANALYTICAL REPORT

Sample ID: CF-10  
Lab #: B609856-10

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 40.40

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	10500	6	25	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Arsenic	7440-38-2	4.3	0.5	1.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Barium	7440-39-3	139	0.1	1.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Cadmium	7440-43-9	0.28	0.06	0.12	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Chromium	7440-47-3	22.4	0.4	1.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Copper	7440-50-8	21.5	0.35	1.24	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Iron	7439-89-6	20600 D	9	12	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Lead	7439-92-1	22.9	0.2	1.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Manganese	7439-96-5	1610	0.17	1.24	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Nickel	7440-02-0	8.2	0.2	6.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Selenium	7782-49-2	2.5	0.3	1.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Silver	7440-22-4	0.25 U	0.25	1.24	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Zinc	7440-66-6	101	0.3	2.5	mg/kg dry	EPA 6010B	EPA 3050B	6K14001



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### ANALYTICAL REPORT

Sample ID: CF-10  
Lab #: B609856-10

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 42.86

#### Metals by EPA 6000/7000 Series Methods

<u>Parameter</u>	<u>CAS Number</u>	<u>Analytical Results</u>	<u>MDL</u>	<u>MRL</u>	<u>Units</u>	<u>Analysis Method</u>	<u>Prep Method</u>	<u>Analytical Batch</u>
Mercury	7439-97-6	0.101	0.0007	0.023	mg/kg dry	EPA 7471A	EPA 7471A	6K14013

**ANALYTICAL REPORT**

Sample ID: CF-11  
 Lab #: B609856-11  
 Prep. Method: EPA 3545\_MS  
 Analyzed: 11/16/06 By: jj  
 Anal. Method: EPA 8270C  
 Anal. Batch:  
 QC Batch: 6K14012

Project: Cape Fear Sediments  
 Work Order #: B609856  
 Matrix: Soil  
 Unit: mg/kg dry  
 Dilution Factor: 1  
 Percent Solids: 51.65

**Semivolatile Organic Compounds by GCMS SIM**

Parameter	CAS Number	Analytical Results	MDL	MRL	Units
1-Methylnaphthalene	90-12-0	0.0205 U	0.0205	0.0639	mg/kg dry
2-Methylnaphthalene	91-57-6	0.0192 U	0.0192	0.0639	mg/kg dry
Acenaphthene	83-32-9	0.0141 U	0.0141	0.0639	mg/kg dry
<b>Acenaphthylene</b>	208-96-8	<b>0.0452 J</b>	0.0205	0.0639	mg/kg dry
Anthracene	120-12-7	0.0134 U	0.0134	0.0639	mg/kg dry
<b>Benzo(a)anthracene</b>	56-55-3	<b>0.194</b>	0.0134	0.0639	mg/kg dry
<b>Benzo(a)pyrene</b>	50-32-8	<b>0.232</b>	0.0134	0.0639	mg/kg dry
<b>Benzo(b)fluoranthene</b>	205-99-2	<b>0.316</b>	0.0103	0.0639	mg/kg dry
<b>Benzo(g,h,i)perylene</b>	191-24-2	<b>0.200</b>	0.0197	0.0639	mg/kg dry
<b>Benzo(k)fluoranthene</b>	207-08-9	<b>0.110</b>	0.0134	0.0639	mg/kg dry
<b>Chrysene</b>	218-01-9	<b>0.226</b>	0.0141	0.0639	mg/kg dry
<b>Dibenzo(a,h)anthracene</b>	53-70-3	<b>0.168</b>	0.0217	0.0639	mg/kg dry
<b>Fluoranthene</b>	206-44-0	<b>0.355</b>	0.0172	0.0639	mg/kg dry
Fluorene	86-73-7	0.0122 U	0.0122	0.0639	mg/kg dry
<b>Indeno(1,2,3-cd)pyrene</b>	193-39-5	<b>0.232</b>	0.0225	0.0639	mg/kg dry
Naphthalene	91-20-3	0.0236 U	0.0236	0.0639	mg/kg dry
<b>Phenanthrene</b>	85-01-8	<b>0.136</b>	0.0134	0.0639	mg/kg dry
<b>Pyrene</b>	129-00-0	<b>0.336</b>	0.0172	0.0639	mg/kg dry
<b>Surrogate Recovery</b>		<b>Result</b>	<b>Spike Level</b>	<b>% Recovery</b>	<b>% Recovery Limits</b>
p-Terphenyl	92-94-4	4.41	3.23	137 %	34-180



**ANALYTICAL REPORT**

Sample ID: CF-11  
Lab #: B609856-11

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 51.65

**Metals by EPA 6000/7000 Series Methods**

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	6750	5	19	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Arsenic	7440-38-2	3.0	0.4	1.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Barium	7440-39-3	95.7	0.1	1.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Cadmium	7440-43-9	0.22	0.05	0.10	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Chromium	7440-47-3	15.6	0.3	1.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Copper	7440-50-8	15.1	0.27	0.97	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Iron	7439-89-6	14800 D	7	10	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Lead	7439-92-1	17.8	0.2	1.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Manganese	7439-96-5	930	0.14	0.97	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Nickel	7440-02-0	5.6	0.2	4.8	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Selenium	7782-49-2	1.8	0.2	1.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Silver	7440-22-4	0.19 U	0.19	0.97	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Zinc	7440-66-6	76.1	0.3	1.9	mg/kg dry	EPA 6010B	EPA 3050B	6K14001



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### ANALYTICAL REPORT

Sample ID: CF-11  
Lab #: B609856-11

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 56.45

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Mercury	7439-97-6	0.051	0.0005	0.018	mg/kg dry	EPA 7471A	EPA 7471A	6K14013

**ANALYTICAL REPORT**

Sample ID: CF-12  
 Lab #: B609856-12  
 Prep. Method: EPA 3545\_MS  
 Analyzed: 11/16/06 By: jj  
 Anal. Method: EPA 8270C  
 Anal. Batch:  
 QC Batch: 6K14012

Project: Cape Fear Sediments  
 Work Order #: B609856  
 Matrix: Soil  
 Unit: mg/kg dry  
 Dilution Factor: 1  
 Percent Solids: 48.13

**Semivolatile Organic Compounds by GCMS SIM**

Parameter	CAS Number	Analytical Results	MDL	MRL	Units
1-Methylnaphthalene	90-12-0	0.0220 U	0.0220	0.0686	mg/kg dry
2-Methylnaphthalene	91-57-6	0.0206 U	0.0206	0.0686	mg/kg dry
Acenaphthene	83-32-9	0.0151 U	0.0151	0.0686	mg/kg dry
Acenaphthylene	208-96-8	0.0220 U	0.0220	0.0686	mg/kg dry
Anthracene	120-12-7	0.0143 U	0.0143	0.0686	mg/kg dry
<b>Benzo(a)anthracene</b>	56-55-3	<b>0.0554 J</b>	0.0143	0.0686	mg/kg dry
<b>Benzo(a)pyrene</b>	50-32-8	<b>0.0554 J</b>	0.0143	0.0686	mg/kg dry
<b>Benzo(b)fluoranthene</b>	205-99-2	<b>0.0900</b>	0.0111	0.0686	mg/kg dry
<b>Benzo(g,h,i)perylene</b>	191-24-2	<b>0.111</b>	0.0212	0.0686	mg/kg dry
Benzo(k)fluoranthene	207-08-9	0.0143 U	0.0143	0.0686	mg/kg dry
<b>Chrysene</b>	218-01-9	<b>0.0623 J</b>	0.0152	0.0686	mg/kg dry
Dibenzo(a,h)anthracene	53-70-3	0.0233 U	0.0233	0.0686	mg/kg dry
<b>Fluoranthene</b>	206-44-0	<b>0.118</b>	0.0185	0.0686	mg/kg dry
Fluorene	86-73-7	0.0131 U	0.0131	0.0686	mg/kg dry
<b>Indeno(1,2,3-cd)pyrene</b>	193-39-5	<b>0.152</b>	0.0241	0.0686	mg/kg dry
Naphthalene	91-20-3	0.0253 U	0.0253	0.0686	mg/kg dry
<b>Phenanthrene</b>	85-01-8	<b>0.0416 J</b>	0.0143	0.0686	mg/kg dry
<b>Pyrene</b>	129-00-0	<b>0.0900</b>	0.0185	0.0686	mg/kg dry
<b>Surrogate Recovery</b>		<b>Result</b>	<b>Spike Level</b>	<b>% Recovery</b>	<b>% Recovery Limits</b>
p-Terphenyl	92-94-4	4.20	3.46	121 %	34-180





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### ANALYTICAL REPORT

Sample ID: CF-12  
Lab #: B609856-12

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 48.13

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	8310	5	21	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Arsenic	7440-38-2	2.9	0.4	1.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Barium	7440-39-3	108	0.1	1.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Cadmium	7440-43-9	0.30	0.05	0.10	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Chromium	7440-47-3	19.0	0.3	1.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Copper	7440-50-8	17.7	0.29	1.04	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Iron	7439-89-6	16800 D	7	10	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Lead	7439-92-1	19.4	0.2	1.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Manganese	7439-96-5	693	0.15	1.04	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Nickel	7440-02-0	6.4	0.2	5.2	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Selenium	7782-49-2	2.1	0.2	1.0	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Silver	7440-22-4	0.21 U	0.21	1.04	mg/kg dry	EPA 6010B	EPA 3050B	6K14001
Zinc	7440-66-6	96.6	0.3	2.1	mg/kg dry	EPA 6010B	EPA 3050B	6K14001



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### ANALYTICAL REPORT

Sample ID: CF-12  
Lab #: B609856-12

Project: Cape Fear Sediments  
Work Order #: B609856  
Matrix: Soil  
Percent Solids: 54.68

#### Metals by EPA 6000/7000 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Mercury	7439-97-6	0.073	0.0006	0.018	mg/kg dry	EPA 7471A	EPA 7471A	6K14013

**QUALITY CONTROL**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Sample Notes
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**Semivolatile Organic Compounds by GCMS SIM - Quality Control**

Batch 6K14012 - EPA 3545\_MS

**Blank (6K14012-BLK1)**

Prepared: 11/14/2006 10:38 Analyzed: 11/16/2006 11:29

Benzo(a)anthracene	0.00690 U	0.0330	mg/kg wet							
Benzo(b)fluoranthene	0.00533 U	0.0330	mg/kg wet							
Benzo(k)fluoranthene	0.00690 U	0.0330	mg/kg wet							
Benzo(g,h,i)perylene	0.0102 U	0.0330	mg/kg wet							
Benzo(a)pyrene	0.00690 U	0.0330	mg/kg wet							
Dibenzo(a,h)anthracene	0.0112 U	0.0330	mg/kg wet							
Indeno(1,2,3-cd)pyrene	0.0116 U	0.0330	mg/kg wet							
Naphthalene	0.0122 U	0.0330	mg/kg wet							
2-Methylnaphthalene	0.00990 U	0.0330	mg/kg wet							
1-Methylnaphthalene	0.0106 U	0.0330	mg/kg wet							
Acenaphthylene	0.0106 U	0.0330	mg/kg wet							
Acenaphthene	0.00726 U	0.0330	mg/kg wet							
Fluorene	0.00630 U	0.0330	mg/kg wet							
Phenanthrene	0.00690 U	0.0330	mg/kg wet							
Anthracene	0.00690 U	0.0330	mg/kg wet							
Fluoranthene	0.00890 U	0.0330	mg/kg wet							
Pyrene	0.00890 U	0.0330	mg/kg wet							
Chrysene	0.00730 U	0.0330	mg/kg wet							

Surrogate: p-Terphenyl	3.14		mg/kg wet	3.33		94	34-180			
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**LCS (6K14012-BS1)**

Prepared: 11/14/2006 10:38 Analyzed: 11/16/2006 11:46

Benzo(g,h,i)perylene	0.877	0.0330	mg/kg wet	1.33		66	10-168			
Benzo(a)pyrene	0.980	0.0330	mg/kg wet	1.33		74	41-125			
Naphthalene	0.937	0.0330	mg/kg wet	1.33		70	40.4-121			
Acenaphthene	0.963	0.0330	mg/kg wet	1.33		72	41-123			

Surrogate: p-Terphenyl	2.72		mg/kg wet	3.33		82	34-180			
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**Matrix Spike (6K14012-MS1)**

Source: B609856-01

Prepared: 11/14/2006 10:38 Analyzed: 11/16/2006 18:17

Benzo(g,h,i)perylene	1.14	0.0707	mg/kg dry	1.43	0.0218 U	80	10-168			
Benzo(a)pyrene	1.24	0.0707	mg/kg dry	1.43	0.0148 U	87	43-136			
Naphthalene	1.54	0.0707	mg/kg dry	1.43	0.0428	105	48-112			
Acenaphthene	1.39	0.0707	mg/kg dry	1.43	0.0156 U	97	48-119			

Surrogate: p-Terphenyl	3.72		mg/kg dry	3.57		104	34-180			
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**Matrix Spike Dup (6K14012-MSD1)**

Source: B609856-01

Prepared: 11/14/2006 10:38 Analyzed: 11/16/2006 18:34

Benzo(g,h,i)perylene	0.857	0.0707	mg/kg dry	1.43	0.0218 U	60	10-168	29	48	
Benzo(a)pyrene	0.935	0.0707	mg/kg dry	1.43	0.0148 U	66	43-136	28	34	
Naphthalene	1.34	0.0707	mg/kg dry	1.43	0.0428	91	48-112	14	22	
Acenaphthene	1.14	0.0707	mg/kg dry	1.43	0.0156 U	80	48-119	20	31	

Surrogate: p-Terphenyl	3.01		mg/kg dry	3.57		84	34-180			
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**Metals by EPA 6000/7000 Series Methods - Quality Control**

Batch 6K14001 - EPA 3050B

**Blank (6K14001-BLK1)**

Prepared: 11/14/2006 07:13 Analyzed: 11/15/2006 11:18

Aluminum	2 U	10	mg/kg wet							
Arsenic	0.2 U	0.5	mg/kg wet							

**QUALITY CONTROL**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Sample Notes
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**Metals by EPA 6000/7000 Series Methods - Quality Control**

Batch 6K14001 - EPA 3050B

**Blank (6K14001-BLK1) Continued**

Prepared: 11/14/2006 07:13 Analyzed: 11/15/2006 11:20

Barium	0.06 U	0.5	mg/kg wet							
Cadmium	0.02 U	0.05	mg/kg wet							
Chromium	0.2 U	0.5	mg/kg wet							
Copper	0.14 U	0.50	mg/kg wet							
Iron	2 U	2	mg/kg wet							
Lead	0.1 U	0.5	mg/kg wet							
Manganese	0.07 U	0.50	mg/kg wet							
Nickel	0.1 U	2.5	mg/kg wet							
Selenium	0.1 U	0.5	mg/kg wet							
Silver	0.10 U	0.50	mg/kg wet							
Zinc	0.1 U	1.0	mg/kg wet							

**LCS (6K14001-BS1)**

Prepared: 11/14/2006 07:13 Analyzed: 11/15/2006 11:25

Aluminum	489	10	mg/kg wet	500		98	78-115			
Arsenic	50.8	0.5	mg/kg wet	50.0		102	84-113			
Barium	50.5	0.5	mg/kg wet	50.0		101	87-110			
Cadmium	24.9	0.05	mg/kg wet	25.0		100	85-110			
Chromium	50.9	0.5	mg/kg wet	50.0		102	86-111			
Copper	25.6	0.50	mg/kg wet	25.0		102	86-115			
Iron	499	2	mg/kg wet	500		100	81-109			
Lead	51.4	0.5	mg/kg wet	50.0		103	84-112			
Manganese	25.0	0.50	mg/kg wet	25.0		100	85-111			
Nickel	51.6	2.5	mg/kg wet	50.0		103	86-111			
Selenium	50.0	0.5	mg/kg wet	50.0		100	85-109			
Silver	5.09	0.50	mg/kg wet	5.00		102	86-109			
Zinc	51.6	1.0	mg/kg wet	50.0		103	84-121			

**Matrix Spike (6K14001-MS1)**

Source: B609764-AR

Prepared: 11/14/2006 07:13 Analyzed: 11/15/2006 11:32

Aluminum	1960	10	mg/kg dry	507	1110	166	35-172			
Arsenic	46.8	0.5	mg/kg dry	50.7	0.476	91	63-122			
Barium	54.2	0.5	mg/kg dry	50.7	7.95	91	34-147			
Cadmium	22.2	0.05	mg/kg dry	25.3	0.100	87	64-119			
Chromium	49.0	0.5	mg/kg dry	50.7	2.42	92	44-144			
Copper	29.4	0.51	mg/kg dry	25.3	5.52	94	32-163			
Iron	1480	3	mg/kg dry	507	1000	93	48-139			
Lead	71.5	0.5	mg/kg dry	50.7	25.7	90	41-144			
Manganese	50.5	0.51	mg/kg dry	25.3	31.5	75	30-164			
Nickel	47.5	2.5	mg/kg dry	50.7	1.07	92	60-123			
Selenium	46.1	0.5	mg/kg dry	50.7	0.170	91	64-117			
Silver	4.73	0.51	mg/kg dry	5.07	0.10 U	93	69-118			
Zinc	68.5	1.0	mg/kg dry	50.7	22.1	92	39-143			

**Matrix Spike Dup (6K14001-MSD1)**

Source: B609764-AR

Prepared: 11/14/2006 07:13 Analyzed: 11/15/2006 11:37

Aluminum	2000 QM-05	10	mg/kg dry	507	1110	174	35-172	2	32	QM-05
Arsenic	49.7	0.5	mg/kg dry	50.7	0.476	97	63-122	6	16	
Barium	60.9	0.5	mg/kg dry	50.7	7.95	104	34-147	12	22	
Cadmium	23.6	0.05	mg/kg dry	25.3	0.100	93	64-119	6	17	

**QUALITY CONTROL**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Sample Notes
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**Metals by EPA 6000/7000 Series Methods - Quality Control***Batch 6K14001 - EPA 3050B***Matrix Spike Dup (6K14001-MSD1) Continued** Source: **B609764-AR** Prepared: 11/14/2006 07:13 Analyzed: 11/15/2006 11:40

Chromium	52.0	0.5	mg/kg dry	50.7	2.42	98	44-144	6	21	
Copper	32.9	0.51	mg/kg dry	25.3	5.52	108	32-163	11	24	
Iron	1540	3	mg/kg dry	507	1000	105	48-139	4	38	
Lead	72.2	0.5	mg/kg dry	50.7	25.7	92	41-144	0.9	32	
Manganese	51.5	0.51	mg/kg dry	25.3	31.5	79	30-164	2	21	
Nickel	50.5	2.5	mg/kg dry	50.7	1.07	98	60-123	6	23	
Selenium	48.8	0.5	mg/kg dry	50.7	0.170	96	64-117	6	18	
Silver	4.96	0.51	mg/kg dry	5.07	0.10 U	98	69-118	5	10	
Zinc	74.0	1.0	mg/kg dry	50.7	22.1	103	39-143	8	31	

**QUALITY CONTROL**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Sample Notes
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**Metals by EPA 6000/7000 Series Methods - Quality Control***Batch 6K14013 - EPA 7471A***Blank (6K14013-BLK1)** Prepared: 11/14/2006 15:11 Analyzed: 11/17/2006 07:41

Mercury	0.0003 U	0.010	mg/kg wet							
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**Blank (6K14013-BLK2)** Prepared: 11/15/2006 13:32 Analyzed: 11/17/2006 07:44

Mercury	0.0003 U	0.010	mg/kg wet							
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**LCS (6K14013-BS1)** Prepared: 11/14/2006 15:11 Analyzed: 11/17/2006 07:47

Mercury	0.261	0.010	mg/kg wet	0.250		105	90-112			
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**LCS (6K14013-BS2)** Prepared: 11/15/2006 13:32 Analyzed: 11/17/2006 07:50

Mercury	0.255	0.010	mg/kg wet	0.250		102	90-112			
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**Matrix Spike (6K14013-MS1)** Source: **A605654-05** Prepared: 11/14/2006 15:11 Analyzed: 11/17/2006 07:56

Mercury	0.284	0.011	mg/kg dry	0.266	0.0003 U	107	69-121			
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**Matrix Spike Dup (6K14013-MSD1)** Source: **A605654-05** Prepared: 11/14/2006 15:11 Analyzed: 11/17/2006 08:00

Mercury	0.276	0.011	mg/kg dry	0.266	0.0003 U	104	69-121	3	18	
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**NOTES AND DEFINITIONS**

- D Data reported from a dilution
- J Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag).
- QM-05 The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
- U Analyte included in the analysis, but not detected

**LABORATORY CERTIFICATION SUMMARY**

<b>Analysis</b>	<b>Matrix</b>	<b>Cert ID</b>	<b>Cert Number</b>
8270C PAH SIM	Soil	NC	442
Aluminum Total EPA 6010B	Soil	NC	442
Arsenic Total EPA 6010B	Soil	NC	442
Barium Total EPA 6010B	Soil	NC	442
Cadmium Total EPA 6010B	Soil	NC	442
Chromium Total EPA 6010B	Soil	NC	442
Copper Total EPA 6010B	Soil	NC	442
Iron Total EPA 6010B	Soil	NC	442
Lead Total EPA 6010B	Soil	NC	442
Manganese Total EPA 6010B	Soil	NC	442
Nickel Total EPA 6010B	Soil	NC	442
Selenium Total EPA 6010B	Soil	NC	442
Silver Total EPA 6010B	Soil	NC	442
Zinc Total EPA 6010B	Soil	NC	442
Mercury Total EPA 7471A	Soil	NC	424



**ENVIRONMENTAL CONSERVATION LABORATORIES**

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ENCO CompQAP No.: 9600398G10

**CHAIN OF CUSTODY RECORD**

PROJECT REFERENCE		PROJECT NO.	PO NUMBER	REQUIRED ANALYSIS		PAGE	OF
Cape Fear Sediments							
PROJECT LOC. (SHA#)	SAMPLING NAME	PHONE	FAX			<input type="checkbox"/> STANDARD REPORT DELIVERY <input type="checkbox"/> EXPEDITED REPORT DELIVERY (charge)	
NC	Tom Avaspurg	919/856-4520	919/856-4556			Date Due: _____	
CLIENT NAME		CLIENT PROJECT MANAGER		MATRIX TYPE		REMARKS	
US Fish and Wildlife Service		Tom Avaspurg		SURFACE WATER GROUND WATER WASTEWATER DRINKING WATER SOIL/SOLID WASTE NONAQUEOUS LIQUID AIR SLUDGE OTHER		PRESERVATIVE NUMBER OF CONTAINERS SUBMITTED	
CLIENT ADDRESS (CITY, STATE, ZIP)		551-F Pylon Drive, Raleigh, NC 27606		METH/ORG/CLAS PARTS-SIM			
STATION	DATE	TIME	GRAB	CONP	SAMPLE IDENTIFICATION		
1 CF-1	11-01-06	1015	✓		CF-1	✓	
2 CF-2	11-01-06	1125	✓		CF-2	✓	
3 CF-3	11-01-06	1159	✓		CF-3	✓	
4 CF-4	11-01-06	1517	✓		CF-4	✓	
5 CF-5	11-01-06	1639	✓		CF-5	✓	
6 CF-6	11-02-06	1109	✓		CF-6	✓	
7 CF-7	11-02-06	1148	✓		CF-7	✓	
8 CF-8	11-02-06	1400	✓		CF-8	✓	
9 CF-9	11-03-06	0947	✓		CF-9	✓	
10 CF-10	11-03-06	1024	✓		CF-10	✓	
11 CF-11	11-03-06	1350	✓		CF-11	✓	
12 CF-12	11-03-06	1447	✓		CF-12	✓	
13							
14							
SAMPLE KIT PREPARED BY: DJACKSONVILLE		DATE	TIME	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
				Anna C. Ward	11/14/06	10:30A	Tom Avaspurg
RELINQUISHED BY (SIGNATURE)		DATE	TIME	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
					11/14/06		
RECEIVED BY (SIGNATURE)		DATE	TIME	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
RECEIVED FOR LABORATORY BY (SIGNATURE)		DATE	TIME	CUSTODY INTACT	ENCO LOG NO.	REMARKS	
Tom Avaspurg		11/14/06		YES	B058556	- 1.0A	



**Environmental Conservation Laboratories, Inc.**

102-A Woodwinds Industrial Court

Cary NC, 27511

Phone: 919.467.3090 FAX: 919.467.3515



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Tuesday, January 30, 2007

US Fish and Wildlife (US014)

Attn: Tom Augspurger

PO Box 33726

Raleigh, NC 27636-3726

**RE: Project Number: [none], Project Name/Desc: Cape Fear River Project  
ENCO Workorder: C700518**

Dear Tom Augspurger,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Friday, January 12, 2007.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

This data has been produced in accordance with NELAC standards (June, 2003). This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Two handwritten signatures in black ink. The first signature is 'BG' and the second is 'CS'.

Bob George For Chuck Smith  
Project Manager

Enclosure(s)



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## CASE NARRATIVE

Date: January 26, 2007

Client: US Fish and Wildlife

Project #: Cape Fear River Project

Lab ID: C700518

### Overview

All samples submitted were analyzed by Environmental Conservation Laboratories, Inc. in accordance with the methods referenced in the laboratory report. Any particular difficulties encountered during sample handling by Environmental Conservation Laboratories, Inc. will be discussed in the QC Remarks section below.

### Quality Control Samples

A Blank Spike and Blank Spike Duplicate (LCS/LCSD) were run due to insufficient sample to prepare a matrix spike and matrix spike duplicate (MS/MSD).

### Other Comments

The hardness was run using EPA Method 200.8 rather than 200.7 due to insufficient sample.

The analytical data presented in this report are consistent with the methods as referenced in the analytical report. Any exceptions or deviations are noted in the QC remarks section of this narrative. Should there be any questions regarding this package, please feel free to contact the undersigned for additional information.

Released By:

Environmental Conservation Laboratories, Inc.

Robert George  
Laboratory Manager



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**SAMPLE SUMMARY/LABORATORY CHRONICLE**

**Client ID:** CF1E

**Lab ID:** C700518-01

**Sampled:** 11/17/06 00:00

**Received:** 01/12/07 12:51

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<b>Parameter</b>	<b>Hold Date/Time(s)</b>	<b>Prep Date/Time(s)</b>	<b>Analysis Date/Time(s)</b>
EPA 200.8	05/16/07	01/18/07 11:30	1/19/2007 15:14
SM 2340B	05/16/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** CF3E

**Lab ID:** C700518-02

**Sampled:** 11/17/06 00:00

**Received:** 01/12/07 12:51

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<b>Parameter</b>	<b>Hold Date/Time(s)</b>	<b>Prep Date/Time(s)</b>	<b>Analysis Date/Time(s)</b>
EPA 200.8	05/16/07	01/18/07 11:30	1/19/2007 15:36
SM 2340B	05/16/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** CF4E

**Lab ID:** C700518-03

**Sampled:** 11/17/06 00:00

**Received:** 01/12/07 12:51

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<b>Parameter</b>	<b>Hold Date/Time(s)</b>	<b>Prep Date/Time(s)</b>	<b>Analysis Date/Time(s)</b>
EPA 200.8	05/16/07	01/18/07 11:30	1/19/2007 15:39
SM 2340B	05/16/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** CF5E

**Lab ID:** C700518-04

**Sampled:** 11/17/06 00:00

**Received:** 01/12/07 12:51

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<b>Parameter</b>	<b>Hold Date/Time(s)</b>	<b>Prep Date/Time(s)</b>	<b>Analysis Date/Time(s)</b>
EPA 200.8	05/16/07	01/18/07 11:30	1/19/2007 15:42
SM 2340B	05/16/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** CF6E

**Lab ID:** C700518-05

**Sampled:** 11/17/06 00:00

**Received:** 01/12/07 12:51

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<b>Parameter</b>	<b>Hold Date/Time(s)</b>	<b>Prep Date/Time(s)</b>	<b>Analysis Date/Time(s)</b>
EPA 200.8	05/16/07	01/18/07 11:30	1/19/2007 15:45
SM 2340B	05/16/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** CF8E

**Lab ID:** C700518-06

**Sampled:** 11/17/06 00:00

**Received:** 01/12/07 12:51

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Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 200.8	05/16/07	01/18/07 11:30	1/19/2007 15:48
SM 2340B	05/16/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** CF9E

**Lab ID:** C700518-07

**Sampled:** 11/17/06 00:00

**Received:** 01/12/07 12:51

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Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 200.8	05/16/07	01/18/07 11:30	1/19/2007 15:51
SM 2340B	05/16/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** CF10E

**Lab ID:** C700518-08

**Sampled:** 11/17/06 00:00

**Received:** 01/12/07 12:51

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Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 200.8	05/16/07	01/18/07 11:30	1/19/2007 15:54
SM 2340B	05/16/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** CF11E

**Lab ID:** C700518-09

**Sampled:** 11/17/06 00:00

**Received:** 01/12/07 12:51

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Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 200.8	05/16/07	01/18/07 11:30	1/19/2007 15:57
SM 2340B	05/16/07	01/25/07 11:24	1/25/2007 13:19

---

**Client ID:** WBE

**Lab ID:** C700518-10

**Sampled:** 11/17/06 00:00

**Received:** 01/12/07 12:51

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Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 200.8	05/16/07	01/18/07 11:30	1/19/2007 16:00
SM 2340B	05/16/07	01/25/07 11:24	1/25/2007 13:19

---



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**Client ID:** CF1

**Lab ID:** C700518-11

**Sampled:** 11/21/06 00:00

**Received:** 01/12/07 12:51

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Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 200.8	05/20/07	01/18/07 11:30	1/19/2007 16:04
SM 2340B	05/20/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** CF3

**Lab ID:** C700518-12

**Sampled:** 11/21/06 00:00

**Received:** 01/12/07 12:51

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Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 200.8	05/20/07	01/18/07 11:30	1/19/2007 16:44
SM 2340B	05/20/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** CF4

**Lab ID:** C700518-13

**Sampled:** 11/21/06 00:00

**Received:** 01/12/07 12:51

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Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 200.8	05/20/07	01/18/07 11:30	1/19/2007 16:47
SM 2340B	05/20/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** CF5

**Lab ID:** C700518-14

**Sampled:** 11/21/06 00:00

**Received:** 01/12/07 12:51

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Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 200.8	05/20/07	01/18/07 11:30	1/19/2007 16:50
SM 2340B	05/20/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** CF6

**Lab ID:** C700518-15

**Sampled:** 11/21/06 00:00

**Received:** 01/12/07 12:51

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Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 200.8	05/20/07	01/18/07 11:30	1/19/2007 16:53
SM 2340B	05/20/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** CF8

**Lab ID:** C700518-16

**Sampled:** 11/21/06 00:00

**Received:** 01/12/07 12:51

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Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 200.8	05/20/07	01/18/07 11:30	1/19/2007 16:56
SM 2340B	05/20/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** CF9

**Lab ID:** C700518-17

**Sampled:** 11/21/06 00:00

**Received:** 01/12/07 12:51

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Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 200.8	05/20/07	01/18/07 11:30	1/19/2007 16:59
SM 2340B	05/20/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** CF10

**Lab ID:** C700518-18

**Sampled:** 11/21/06 00:00

**Received:** 01/12/07 12:51

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Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 200.8	05/20/07	01/18/07 11:30	1/19/2007 17:02
SM 2340B	05/20/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** CF11

**Lab ID:** C700518-19

**Sampled:** 11/21/06 00:00

**Received:** 01/12/07 12:51

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Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 200.8	05/20/07	01/18/07 11:30	1/19/2007 18:26
SM 2340B	05/20/07	01/25/07 11:24	1/25/2007 13:19

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**Client ID:** WB

**Lab ID:** C700518-20

**Sampled:** 11/21/06 00:00

**Received:** 01/12/07 12:51

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Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 200.8	05/20/07	01/18/07 11:30	1/19/2007 18:29
SM 2340B	05/20/07	01/25/07 11:24	1/25/2007 13:19

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**SAMPLE DETECTION SUMMARY**

**Client ID:** CF1E

**Lab ID:** C700518-01

Analyte	Results/Qual	MRL	Units	Method
Aluminum	5380 B	5.0	ug/L	EPA 200.8
Arsenic	5.01	1.00	ug/L	EPA 200.8
Cadmium	0.24 J	1.00	ug/L	EPA 200.8
Chromium	24.1	1.00	ug/L	EPA 200.8
Copper	11.7	1.00	ug/L	EPA 200.8
Hardness	135	0.67	mg/L	SM 2340B
Iron	24400	50	ug/L	EPA 200.8
Lead	44.8	1.00	ug/L	EPA 200.8
Manganese	11500	1.00	ug/L	EPA 200.8
Nickel	11.4	1.00	ug/L	EPA 200.8
Selenium	1.10	1.00	ug/L	EPA 200.8
Zinc	77.0	5.00	ug/L	EPA 200.8

**Client ID:** CF3E

**Lab ID:** C700518-02

Analyte	Results/Qual	MRL	Units	Method
Aluminum	12300 B	5.0	ug/L	EPA 200.8
Arsenic	4.86	1.00	ug/L	EPA 200.8
Cadmium	0.41 J	1.00	ug/L	EPA 200.8
Chromium	23.2	1.00	ug/L	EPA 200.8
Copper	18.8	1.00	ug/L	EPA 200.8
Hardness	81.7	0.67	mg/L	SM 2340B
Iron	27300	50	ug/L	EPA 200.8
Lead	110	1.00	ug/L	EPA 200.8
Manganese	6900	1.00	ug/L	EPA 200.8
Nickel	13.6	1.00	ug/L	EPA 200.8
Selenium	0.73 J	1.00	ug/L	EPA 200.8
Zinc	108	5.00	ug/L	EPA 200.8

**Client ID:** CF4E

**Lab ID:** C700518-03

Analyte	Results/Qual	MRL	Units	Method
Aluminum	7900 B	5.0	ug/L	EPA 200.8
Arsenic	3.91	1.00	ug/L	EPA 200.8
Cadmium	0.27 J	1.00	ug/L	EPA 200.8
Chromium	18.0	1.00	ug/L	EPA 200.8
Copper	15.4	1.00	ug/L	EPA 200.8
Hardness	63.8	0.67	mg/L	SM 2340B
Iron	21400	50	ug/L	EPA 200.8
Lead	47.7	1.00	ug/L	EPA 200.8
Manganese	5700	1.00	ug/L	EPA 200.8
Nickel	10.8	1.00	ug/L	EPA 200.8
Selenium	0.49 J	1.00	ug/L	EPA 200.8
Zinc	79.2	5.00	ug/L	EPA 200.8



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Client ID: CF5E

Lab ID: C700518-04

Analyte	Results/Qual	MRL	Units	Method
Aluminum	12000 B	5.0	ug/L	EPA 200.8
Arsenic	5.17	1.00	ug/L	EPA 200.8
Cadmium	0.46 J	1.00	ug/L	EPA 200.8
Chromium	23.1	1.00	ug/L	EPA 200.8
Copper	18.0	1.00	ug/L	EPA 200.8
Hardness	83.8	0.67	mg/L	SM 2340B
Iron	29700	50	ug/L	EPA 200.8
Lead	62.2	1.00	ug/L	EPA 200.8
Manganese	6780	1.00	ug/L	EPA 200.8
Nickel	12.9	1.00	ug/L	EPA 200.8
Selenium	0.42 J	1.00	ug/L	EPA 200.8
Zinc	110	5.00	ug/L	EPA 200.8

Client ID: CF6E

Lab ID: C700518-05

Analyte	Results/Qual	MRL	Units	Method
Aluminum	3970 B	5.0	ug/L	EPA 200.8
Arsenic	6.46	1.00	ug/L	EPA 200.8
Cadmium	0.13 J	1.00	ug/L	EPA 200.8
Chromium	9.51	1.00	ug/L	EPA 200.8
Copper	9.01	1.00	ug/L	EPA 200.8
Hardness	101	0.67	mg/L	SM 2340B
Iron	25100	50	ug/L	EPA 200.8
Lead	49.4	1.00	ug/L	EPA 200.8
Manganese	9250	1.00	ug/L	EPA 200.8
Nickel	8.20	1.00	ug/L	EPA 200.8
Selenium	0.78 J	1.00	ug/L	EPA 200.8
Zinc	76.1	5.00	ug/L	EPA 200.8

Client ID: CF8E

Lab ID: C700518-06

Analyte	Results/Qual	MRL	Units	Method
Aluminum	15600 B	5.0	ug/L	EPA 200.8
Arsenic	5.44	1.00	ug/L	EPA 200.8
Cadmium	0.39 J	1.00	ug/L	EPA 200.8
Chromium	30.3	1.00	ug/L	EPA 200.8
Copper	24.2	1.00	ug/L	EPA 200.8
Hardness	70.6	0.67	mg/L	SM 2340B
Iron	33200	50	ug/L	EPA 200.8
Lead	231	1.00	ug/L	EPA 200.8
Manganese	5010	1.00	ug/L	EPA 200.8
Nickel	19.8	1.00	ug/L	EPA 200.8
Selenium	0.52 J	1.00	ug/L	EPA 200.8
Zinc	140	5.00	ug/L	EPA 200.8

Client ID: CF9E

Lab ID: C700518-07

Analyte	Results/Qual	MRL	Units	Method
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Aluminum	9590 B	5.0	ug/L	EPA 200.8
Arsenic	4.89	1.00	ug/L	EPA 200.8
Cadmium	0.33 J	1.00	ug/L	EPA 200.8
Chromium	19.7	1.00	ug/L	EPA 200.8
Copper	16.9	1.00	ug/L	EPA 200.8
Hardness	85.8	0.67	mg/L	SM 2340B
Iron	24400	50	ug/L	EPA 200.8
Lead	59.3	1.00	ug/L	EPA 200.8
Manganese	7710	1.00	ug/L	EPA 200.8
Nickel	13.2	1.00	ug/L	EPA 200.8
Selenium	0.51 J	1.00	ug/L	EPA 200.8
Zinc	133	5.00	ug/L	EPA 200.8

Client ID: CF10E

Lab ID: C700518-08

Analyte	Results/Qual	MRL	Units	Method
Aluminum	2680 B	5.0	ug/L	EPA 200.8
Arsenic	7.42	1.00	ug/L	EPA 200.8
Chromium	6.85	1.00	ug/L	EPA 200.8
Copper	9.32	1.00	ug/L	EPA 200.8
Hardness	149	0.67	mg/L	SM 2340B
Iron	26800	50	ug/L	EPA 200.8
Lead	366	1.00	ug/L	EPA 200.8
Manganese	18600	1.00	ug/L	EPA 200.8
Nickel	10.8	1.00	ug/L	EPA 200.8
Selenium	0.95 J	1.00	ug/L	EPA 200.8
Zinc	63.8	5.00	ug/L	EPA 200.8

Client ID: CF11E

Lab ID: C700518-09

Analyte	Results/Qual	MRL	Units	Method
Aluminum	6680 B	5.0	ug/L	EPA 200.8
Arsenic	6.07	1.00	ug/L	EPA 200.8
Cadmium	0.26 J	1.00	ug/L	EPA 200.8
Chromium	27.9	1.00	ug/L	EPA 200.8
Copper	15.4	1.00	ug/L	EPA 200.8
Hardness	154	0.67	mg/L	SM 2340B
Iron	32200	50	ug/L	EPA 200.8
Lead	113	1.00	ug/L	EPA 200.8
Manganese	15700	1.00	ug/L	EPA 200.8
Nickel	19.5	1.00	ug/L	EPA 200.8
Selenium	0.74 J	1.00	ug/L	EPA 200.8
Zinc	79.9	5.00	ug/L	EPA 200.8

Client ID: WBE

Lab ID: C700518-10

Analyte	Results/Qual	MRL	Units	Method
Aluminum	513 B	5.0	ug/L	EPA 200.8
Arsenic	1.27	1.00	ug/L	EPA 200.8
Chromium	5.92	1.00	ug/L	EPA 200.8
Copper	9.96	1.00	ug/L	EPA 200.8



Hardness	78.0	0.67	mg/L	SM 2340B
Iron	17100	50	ug/L	EPA 200.8
Lead	31.2	1.00	ug/L	EPA 200.8
Manganese	2690	1.00	ug/L	EPA 200.8
Nickel	7.84	1.00	ug/L	EPA 200.8
Zinc	20.2	5.00	ug/L	EPA 200.8

Client ID: CF1

Lab ID: C700518-11

Analyte	Results/Qual	MRL	Units	Method
Aluminum	1380 B	5.0	ug/L	EPA 200.8
Arsenic	14.7	1.00	ug/L	EPA 200.8
Cadmium	0.37 J	1.00	ug/L	EPA 200.8
Chromium	2.22	1.00	ug/L	EPA 200.8
Copper	19.5	1.00	ug/L	EPA 200.8
Hardness	377	0.67	mg/L	SM 2340B
Iron	96100	50	ug/L	EPA 200.8
Lead	19.6	1.00	ug/L	EPA 200.8
Manganese	43300	1.00	ug/L	EPA 200.8
Nickel	6.22	1.00	ug/L	EPA 200.8
Selenium	2.17	1.00	ug/L	EPA 200.8
Zinc	59.5	5.00	ug/L	EPA 200.8

Client ID: CF3

Lab ID: C700518-12

Analyte	Results/Qual	MRL	Units	Method
Aluminum	4540 B	5.0	ug/L	EPA 200.8
Arsenic	10.7	1.00	ug/L	EPA 200.8
Cadmium	0.66 J	1.00	ug/L	EPA 200.8
Chromium	11.6	1.00	ug/L	EPA 200.8
Copper	36.5	1.00	ug/L	EPA 200.8
Hardness	218	0.67	mg/L	SM 2340B
Iron	81500	50	ug/L	EPA 200.8
Lead	36.2	1.00	ug/L	EPA 200.8
Manganese	24900	1.00	ug/L	EPA 200.8
Nickel	8.17	1.00	ug/L	EPA 200.8
Selenium	1.83	1.00	ug/L	EPA 200.8
Zinc	121	5.00	ug/L	EPA 200.8

Client ID: CF4

Lab ID: C700518-13

Analyte	Results/Qual	MRL	Units	Method
Aluminum	7090 B	5.0	ug/L	EPA 200.8
Arsenic	7.67	1.00	ug/L	EPA 200.8
Cadmium	0.83 J	1.00	ug/L	EPA 200.8
Chromium	16.6	1.00	ug/L	EPA 200.8
Copper	48.5	1.00	ug/L	EPA 200.8
Hardness	144	0.67	mg/L	SM 2340B
Iron	69000	50	ug/L	EPA 200.8
Lead	54.2	1.00	ug/L	EPA 200.8
Manganese	19200	1.00	ug/L	EPA 200.8



Nickel	7.98	1.00	ug/L	EPA 200.8
Selenium	1.51	1.00	ug/L	EPA 200.8
Zinc	122	5.00	ug/L	EPA 200.8

Client ID: CF5

Lab ID: C700518-14

Analyte	Results/Qual	MRL	Units	Method
Aluminum	3130 B	5.0	ug/L	EPA 200.8
Arsenic	10.8	1.00	ug/L	EPA 200.8
Cadmium	0.42 J	1.00	ug/L	EPA 200.8
Chromium	8.50	1.00	ug/L	EPA 200.8
Copper	22.3	1.00	ug/L	EPA 200.8
Hardness	231	0.67	mg/L	SM 2340B
Iron	68000	50	ug/L	EPA 200.8
Lead	23.2	1.00	ug/L	EPA 200.8
Manganese	20600	1.00	ug/L	EPA 200.8
Nickel	6.77	1.00	ug/L	EPA 200.8
Selenium	1.26	1.00	ug/L	EPA 200.8
Zinc	103	5.00	ug/L	EPA 200.8

Client ID: CF6

Lab ID: C700518-15

Analyte	Results/Qual	MRL	Units	Method
Aluminum	1650 B	5.0	ug/L	EPA 200.8
Arsenic	18.6	1.00	ug/L	EPA 200.8
Cadmium	0.34 J	1.00	ug/L	EPA 200.8
Chromium	2.37	1.00	ug/L	EPA 200.8
Copper	18.7	1.00	ug/L	EPA 200.8
Hardness	382	0.67	mg/L	SM 2340B
Iron	111000	50	ug/L	EPA 200.8
Lead	18.2	1.00	ug/L	EPA 200.8
Manganese	37200	1.00	ug/L	EPA 200.8
Nickel	6.99	1.00	ug/L	EPA 200.8
Selenium	2.41	1.00	ug/L	EPA 200.8
Zinc	67.0	5.00	ug/L	EPA 200.8

Client ID: CF8

Lab ID: C700518-16

Analyte	Results/Qual	MRL	Units	Method
Aluminum	8680 B	5.0	ug/L	EPA 200.8
Arsenic	9.62	1.00	ug/L	EPA 200.8
Cadmium	0.63 J	1.00	ug/L	EPA 200.8
Chromium	22.7	1.00	ug/L	EPA 200.8
Copper	32.7	1.00	ug/L	EPA 200.8
Hardness	161	0.67	mg/L	SM 2340B
Iron	52900	50	ug/L	EPA 200.8
Lead	32.6	1.00	ug/L	EPA 200.8
Manganese	10300	1.00	ug/L	EPA 200.8
Nickel	9.01	1.00	ug/L	EPA 200.8
Selenium	1.37	1.00	ug/L	EPA 200.8
Zinc	127	5.00	ug/L	EPA 200.8



Client ID: CF9

Lab ID: C700518-17

Analyte	Results/Qual	MRL	Units	Method
Aluminum	2060 B	5.0	ug/L	EPA 200.8
Arsenic	11.6	1.00	ug/L	EPA 200.8
Cadmium	0.28 J	1.00	ug/L	EPA 200.8
Chromium	5.75	1.00	ug/L	EPA 200.8
Copper	18.5	1.00	ug/L	EPA 200.8
Hardness	246	0.67	mg/L	SM 2340B
Iron	61900	50	ug/L	EPA 200.8
Lead	19.3	1.00	ug/L	EPA 200.8
Manganese	23400	1.00	ug/L	EPA 200.8
Nickel	6.21	1.00	ug/L	EPA 200.8
Selenium	1.46	1.00	ug/L	EPA 200.8
Zinc	68.8	5.00	ug/L	EPA 200.8

Client ID: CF10

Lab ID: C700518-18

Analyte	Results/Qual	MRL	Units	Method
Aluminum	823 B	5.0	ug/L	EPA 200.8
Arsenic	22.5	1.00	ug/L	EPA 200.8
Cadmium	0.34 J	1.00	ug/L	EPA 200.8
Chromium	0.74 J	1.00	ug/L	EPA 200.8
Copper	19.8	1.00	ug/L	EPA 200.8
Hardness	507	0.67	mg/L	SM 2340B
Iron	102000	50	ug/L	EPA 200.8
Lead	19.7	1.00	ug/L	EPA 200.8
Manganese	64600	1.00	ug/L	EPA 200.8
Nickel	9.06	1.00	ug/L	EPA 200.8
Selenium	2.95	1.00	ug/L	EPA 200.8
Zinc	52.6	5.00	ug/L	EPA 200.8

Client ID: CF11

Lab ID: C700518-19

Analyte	Results/Qual	MRL	Units	Method
Arsenic	14.5	1.00	ug/L	EPA 200.8
Cadmium	0.30 J	1.00	ug/L	EPA 200.8
Chromium	1.40	1.00	ug/L	EPA 200.8
Copper	14.8	1.00	ug/L	EPA 200.8
Hardness	498	0.67	mg/L	SM 2340B
Iron	102000	50	ug/L	EPA 200.8
Lead	13.7	1.00	ug/L	EPA 200.8
Manganese	48800	1.00	ug/L	EPA 200.8
Nickel	5.77	1.00	ug/L	EPA 200.8
Selenium	2.01	1.00	ug/L	EPA 200.8
Zinc	76.4	5.00	ug/L	EPA 200.8

Client ID: WB

Lab ID: C700518-20

Analyte	Results/Qual	MRL	Units	Method
Arsenic	2.56	1.00	ug/L	EPA 200.8



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Cadmium	0.39 J	1.00	ug/L	EPA 200.8
Chromium	2.14	1.00	ug/L	EPA 200.8
Copper	34.6	1.00	ug/L	EPA 200.8
Hardness	220	0.67	mg/L	SM 2340B
Iron	67900	50	ug/L	EPA 200.8
Lead	6.49	1.00	ug/L	EPA 200.8
Manganese	9830	1.00	ug/L	EPA 200.8
Nickel	17.5	1.00	ug/L	EPA 200.8
Selenium	0.78 J	1.00	ug/L	EPA 200.8
Zinc	80.4	5.00	ug/L	EPA 200.8



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### ANALYTICAL REPORT

Sample ID: CF1E  
Lab #: C700518-01

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	5380 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	5.01	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.24 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	24.1	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	11.7	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	24400	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	44.8	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	11500	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	11.4	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	1.10	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	77.0	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012



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### ANALYTICAL REPORT

Sample ID: CF1E  
Lab #: C700518-01

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Hardness	NA	135	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF3E  
Lab #: C700518-02

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	12300 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	4.86	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.41 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	23.2	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	18.8	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	27300	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	110	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	6900	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	13.6	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	0.73 J	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	108	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012





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### ANALYTICAL REPORT

Sample ID: CF3E  
Lab #: C700518-02

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Hardness	NA	81.7	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF4E  
Lab #: C700518-03

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	7900 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	3.91	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.27 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	18.0	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	15.4	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	21400	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	47.7	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	5700	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	10.8	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	0.49 J	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	79.2	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012



**ANALYTICAL REPORT**

Sample ID: CF4E  
Lab #: C700518-03

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

**Classical Chemistry Parameters**

<b>Parameter</b>	<b>CAS Number</b>	<b>Analytical Results</b>	<b>MDL</b>	<b>MRL</b>	<b>Units</b>	<b>Analysis Method</b>	<b>Prep Method</b>	<b>Analytical Batch</b>
<b>Hardness</b>	NA	<b>63.8</b>	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF5E  
Lab #: C700518-04

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	12000 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	5.17	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.46 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	23.1	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	18.0	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	29700	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	62.2	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	6780	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	12.9	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	0.42 J	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	110	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012



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### ANALYTICAL REPORT

Sample ID: CF5E  
Lab #: C700518-04

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

<b>Parameter</b>	<b>CAS Number</b>	<b>Analytical Results</b>	<b>MDL</b>	<b>MRL</b>	<b>Units</b>	<b>Analysis Method</b>	<b>Prep Method</b>	<b>Analytical Batch</b>
<b>Hardness</b>	NA	<b>83.8</b>	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF6E  
Lab #: C700518-05

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	3970 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	6.46	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.13 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	9.51	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	9.01	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	25100	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	49.4	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	9250	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	8.20	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	0.78 J	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	76.1	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012



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### ANALYTICAL REPORT

Sample ID: CF6E  
Lab #: C700518-05

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

<b>Parameter</b>	<b>CAS Number</b>	<b>Analytical Results</b>	<b>MDL</b>	<b>MRL</b>	<b>Units</b>	<b>Analysis Method</b>	<b>Prep Method</b>	<b>Analytical Batch</b>
<b>Hardness</b>	NA	<b>101</b>	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF8E  
Lab #: C700518-06

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	15600 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	5.44	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.39 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	30.3	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	24.2	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	33200	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	231	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	5010	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	19.8	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	0.52 J	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	140	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012





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### ANALYTICAL REPORT

Sample ID: CF8E  
Lab #: C700518-06

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

<b>Parameter</b>	<b>CAS Number</b>	<b>Analytical Results</b>	<b>MDL</b>	<b>MRL</b>	<b>Units</b>	<b>Analysis Method</b>	<b>Prep Method</b>	<b>Analytical Batch</b>
<b>Hardness</b>	NA	<b>70.6</b>	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF9E  
Lab #: C700518-07

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	9590 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	4.89	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.33 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	19.7	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	16.9	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	24400	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	59.3	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	7710	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	13.2	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	0.51 J	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	133	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012



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### ANALYTICAL REPORT

Sample ID: CF9E  
Lab #: C700518-07

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

<b>Parameter</b>	<b>CAS Number</b>	<b>Analytical Results</b>	<b>MDL</b>	<b>MRL</b>	<b>Units</b>	<b>Analysis Method</b>	<b>Prep Method</b>	<b>Analytical Batch</b>
<b>Hardness</b>	NA	<b>85.8</b>	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF10E  
Lab #: C700518-08

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	2680 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	7.42	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.12 U	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	6.85	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	9.32	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	26800	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	366	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	18600	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	10.8	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	0.95 J	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	63.8	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012



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### ANALYTICAL REPORT

Sample ID: CF10E  
Lab #: C700518-08

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Hardness	NA	149	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF11E  
Lab #: C700518-09

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	6680 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	6.07	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.26 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	27.9	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	15.4	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	32200	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	113	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	15700	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	19.5	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	0.74 J	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	79.9	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012



**ANALYTICAL REPORT**

Sample ID: CF11E  
Lab #: C700518-09

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

**Classical Chemistry Parameters**

<b>Parameter</b>	<b>CAS Number</b>	<b>Analytical Results</b>	<b>MDL</b>	<b>MRL</b>	<b>Units</b>	<b>Analysis Method</b>	<b>Prep Method</b>	<b>Analytical Batch</b>
<b>Hardness</b>	NA	<b>154</b>	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: WBE  
Lab #: C700518-10

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	513 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	1.27	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.12 U	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	5.92	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	9.96	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	17100	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	31.2	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	2690	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	7.84	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	0.32 U	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	20.2	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012





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### ANALYTICAL REPORT

Sample ID: WBE  
Lab #: C700518-10

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

<b>Parameter</b>	<b>CAS Number</b>	<b>Analytical Results</b>	<b>MDL</b>	<b>MRL</b>	<b>Units</b>	<b>Analysis Method</b>	<b>Prep Method</b>	<b>Analytical Batch</b>
<b>Hardness</b>	NA	<b>78.0</b>	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF1  
Lab #: C700518-11

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	1380 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	14.7	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.37 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	2.22	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	19.5	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	96100	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	19.6	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	43300	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	6.22	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	2.17	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	59.5	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012



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### ANALYTICAL REPORT

Sample ID: CF1  
Lab #: C700518-11

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Hardness	NA	377	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF3  
Lab #: C700518-12

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	4540 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	10.7	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.66 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	11.6	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	36.5	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	81500	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	36.2	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	24900	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	8.17	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	1.83	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	121	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012



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### ANALYTICAL REPORT

Sample ID: CF3  
Lab #: C700518-12

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

<b>Parameter</b>	<b>CAS Number</b>	<b>Analytical Results</b>	<b>MDL</b>	<b>MRL</b>	<b>Units</b>	<b>Analysis Method</b>	<b>Prep Method</b>	<b>Analytical Batch</b>
<b>Hardness</b>	NA	<b>218</b>	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF4  
Lab #: C700518-13

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	7090 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	7.67	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.83 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	16.6	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	48.5	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	69000	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	54.2	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	19200	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	7.98	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	1.51	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	122	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012



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### ANALYTICAL REPORT

Sample ID: CF4  
Lab #: C700518-13

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

<b>Parameter</b>	<b>CAS Number</b>	<b>Analytical Results</b>	<b>MDL</b>	<b>MRL</b>	<b>Units</b>	<b>Analysis Method</b>	<b>Prep Method</b>	<b>Analytical Batch</b>
<b>Hardness</b>	NA	<b>144</b>	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF5  
Lab #: C700518-14

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	3130 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	10.8	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.42 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	8.50	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	22.3	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	68000	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	23.2	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	20600	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	6.77	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	1.26	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	103	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012





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### ANALYTICAL REPORT

Sample ID: CF5  
Lab #: C700518-14

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Hardness	NA	231	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF6  
Lab #: C700518-15

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	1650 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	18.6	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.34 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	2.37	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	18.7	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	111000	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	18.2	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	37200	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	6.99	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	2.41	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	67.0	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012



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### ANALYTICAL REPORT

Sample ID: CF6  
Lab #: C700518-15

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

<b>Parameter</b>	<b>CAS Number</b>	<b>Analytical Results</b>	<b>MDL</b>	<b>MRL</b>	<b>Units</b>	<b>Analysis Method</b>	<b>Prep Method</b>	<b>Analytical Batch</b>
<b>Hardness</b>	NA	<b>382</b>	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF8  
Lab #: C700518-16

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	8680 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	9.62	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.63 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	22.7	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	32.7	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	52900	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	32.6	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	10300	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	9.01	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	1.37	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	127	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012



**ANALYTICAL REPORT**

Sample ID: CF8  
Lab #: C700518-16

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

**Classical Chemistry Parameters**

<b>Parameter</b>	<b>CAS Number</b>	<b>Analytical Results</b>	<b>MDL</b>	<b>MRL</b>	<b>Units</b>	<b>Analysis Method</b>	<b>Prep Method</b>	<b>Analytical Batch</b>
<b>Hardness</b>	NA	<b>161</b>	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF9  
Lab #: C700518-17

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	2060 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	11.6	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.28 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	5.75	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	18.5	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	61900	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	19.3	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	23400	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	6.21	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	1.46	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	68.8	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012



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### ANALYTICAL REPORT

Sample ID: CF9  
Lab #: C700518-17

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Hardness	NA	246	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF10  
Lab #: C700518-18

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	823 B	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	22.5	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.34 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	0.74 J	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	19.8	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	102000	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	19.7	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	64600	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	9.06	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	2.95	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	52.6	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012





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### ANALYTICAL REPORT

Sample ID: CF10  
Lab #: C700518-18

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

<b>Parameter</b>	<b>CAS Number</b>	<b>Analytical Results</b>	<b>MDL</b>	<b>MRL</b>	<b>Units</b>	<b>Analysis Method</b>	<b>Prep Method</b>	<b>Analytical Batch</b>
<b>Hardness</b>	NA	<b>507</b>	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: CF11  
Lab #: C700518-19

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	0.6 U	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
Arsenic	7440-38-2	14.5	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Cadmium	7440-43-9	0.30 J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Chromium	7440-47-3	1.40	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Copper	7440-50-8	14.8	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Iron	7439-89-6	102000	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
Lead	7439-92-1	13.7	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Manganese	7439-96-5	48800	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Nickel	7440-02-0	5.77	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Selenium	7782-49-2	2.01	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
Zinc	7440-66-6	76.4	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012



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### ANALYTICAL REPORT

Sample ID: CF11  
Lab #: C700518-19

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

<b>Parameter</b>	<b>CAS Number</b>	<b>Analytical Results</b>	<b>MDL</b>	<b>MRL</b>	<b>Units</b>	<b>Analysis Method</b>	<b>Prep Method</b>	<b>Analytical Batch</b>
<b>Hardness</b>	NA	<b>498</b>	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013



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### ANALYTICAL REPORT

Sample ID: WB  
Lab #: C700518-20

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Metals by EPA 200 Series Methods

Parameter	CAS Number	Analytical Results	MDL	MRL	Units	Analysis Method	Prep Method	Analytical Batch
Aluminum	7429-90-5	0.6 U	0.6	5.0	ug/L	EPA 200.8	EPA 200.8	7A18012
<b>Arsenic</b>	7440-38-2	<b>2.56</b>	0.18	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
<b>Cadmium</b>	7440-43-9	<b>0.39</b> J	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
<b>Chromium</b>	7440-47-3	<b>2.14</b>	0.33	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
<b>Copper</b>	7440-50-8	<b>34.6</b>	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
<b>Iron</b>	7439-89-6	<b>67900</b>	10	50	ug/L	EPA 200.8	EPA 200.8	7A18012
<b>Lead</b>	7439-92-1	<b>6.49</b>	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
<b>Manganese</b>	7439-96-5	<b>9830</b>	0.11	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
<b>Nickel</b>	7440-02-0	<b>17.5</b>	0.12	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
<b>Selenium</b>	7782-49-2	<b>0.78</b> J	0.32	1.00	ug/L	EPA 200.8	EPA 200.8	7A18012
<b>Zinc</b>	7440-66-6	<b>80.4</b>	0.45	5.00	ug/L	EPA 200.8	EPA 200.8	7A18012



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### ANALYTICAL REPORT

Sample ID: WB  
Lab #: C700518-20

Project: Cape Fear River Project  
Work Order #: C700518  
Matrix: Water

#### Classical Chemistry Parameters

<b>Parameter</b>	<b>CAS Number</b>	<b>Analytical Results</b>	<b>MDL</b>	<b>MRL</b>	<b>Units</b>	<b>Analysis Method</b>	<b>Prep Method</b>	<b>Analytical Batch</b>
<b>Hardness</b>	NA	<b>220</b>	0.10	0.67	mg/L	SM 2340B	EPA 200.7	7A18013

**QUALITY CONTROL**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Sample Notes
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**Metals by EPA 200 Series Methods - Quality Control***Batch 7A18012 - EPA 200.8***Blank (7A18012-BLK1)**

Prepared: 01/18/2007 11:30 Analyzed: 01/19/2007 15:04

Aluminum	47.7	5.0	ug/L							
Selenium	0.32 U	1.00	ug/L							
Arsenic	0.18 U	1.00	ug/L							
Cadmium	0.12 U	1.00	ug/L							
Chromium	0.637 J	1.00	ug/L							
Copper	0.12 U	1.00	ug/L							
Iron	10 U	50	ug/L							
Lead	0.11 U	1.00	ug/L							
Manganese	0.955 J	1.00	ug/L							
Nickel	0.142 J	1.00	ug/L							
Zinc	3.68 J	5.00	ug/L							

**LCS (7A18012-BS1)**

Prepared: 01/18/2007 11:30 Analyzed: 01/19/2007 15:08

Aluminum	111 B	5.0	ug/L	50.0		222	85-115			B
Selenium	53.9	1.00	ug/L	50.0		108	85-115			
Arsenic	52.9	1.00	ug/L	50.0		106	85-115			
Cadmium	54.7	1.00	ug/L	50.0		109	85-115			
Chromium	55.7	1.00	ug/L	50.0		111	85-115			
Copper	53.7	1.00	ug/L	50.0		107	85-115			
Iron	48.1 J	50	ug/L	50.0		96	85-115			
Lead	55.0	1.00	ug/L	50.0		110	85-115			
Manganese	57.2	1.00	ug/L	50.0		114	85-115			
Nickel	54.5	1.00	ug/L	50.0		109	85-115			
Zinc	61.1	5.00	ug/L	50.0		122	85-115			

**LCS Dup (7A18012-BSD1)**

Prepared: 01/18/2007 11:30 Analyzed: 01/19/2007 15:11

Aluminum	128 B	5.0	ug/L	50.0		255	85-115	14	200	B
Selenium	52.0	1.00	ug/L	50.0		104	85-115	4	200	
Arsenic	50.1	1.00	ug/L	50.0		100	85-115	5	200	
Cadmium	51.4	1.00	ug/L	50.0		103	85-115	6	200	
Chromium	52.6	1.00	ug/L	50.0		105	85-115	6	200	
Copper	50.8	1.00	ug/L	50.0		102	85-115	5	200	
Iron	42.6 J	50	ug/L	50.0		85	85-115	12	200	
Lead	52.6	1.00	ug/L	50.0		105	85-115	4	200	
Manganese	53.5	1.00	ug/L	50.0		107	85-115	7	200	
Nickel	50.6	1.00	ug/L	50.0		101	85-115	7	200	
Zinc	65.0	5.00	ug/L	50.0		130	85-115	6	200	

*Batch 7A18013 - EPA 200.7***Blank (7A18013-BLK1)**

Prepared: 01/29/2007 09:03 Analyzed: 01/24/2007 16:53

Calcium	97.0	50	ug/L							
Magnesium	5.6 U	50.0	ug/L							

**LCS (7A18013-BS1)**

Prepared: 01/29/2007 09:03 Analyzed: 01/24/2007 16:56

Calcium	2740 B	50	ug/L				85-115			B
Magnesium	2590	50.0	ug/L				85-115			

**LCS Dup (7A18013-BSD1)**

Prepared: 01/29/2007 09:03 Analyzed: 01/24/2007 16:58

Calcium	2610 B	50	ug/L	2500		104	85-115	5	200	B
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**QUALITY CONTROL**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Sample Notes
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**Metals by EPA 200 Series Methods - Quality Control**

*Batch 7A18013 - EPA 200.7*

**LCS Dup (7A18013-BSD1) Continued**

Prepared: 01/29/2007 09:03 Analyzed: 01/24/2007 16:58

Magnesium	2540	50.0	ug/L	2500		102	85-115	2	200	
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**Classical Chemistry Parameters - Quality Control**

*Batch 7A18013 - EPA 200.7*

**Blank (7A18013-BLK1)**

Prepared: 01/29/2007 09:03 Analyzed: 01/24/2007 16:53

Hardness	0.10 U	0.67	mg/L							
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**NOTES AND DEFINITIONS**

- B Analyte is found in the associated blank as well as in the sample (CLP B-flag).
- J Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag).
- U Analyte included in the analysis, but not detected

**LABORATORY CERTIFICATION SUMMARY**

<b>Analysis</b>	<b>Matrix</b>	<b>Cert ID</b>	<b>Cert Number</b>
Aluminum Total EPA 200.8	Water	NC	591
Arsenic Total EPA 200.8	Water	NC	591
Cadmium Total EPA 200.8	Water	NC	591
Chromium Total EPA 200.8	Water	NC	591
Copper Total EPA 200.8	Water	NC	591
Hardness Total EPA 200.7	Water	NC	591
Iron Total EPA 200.8	Water	NC	591
Lead Total EPA 200.8	Water	NC	591
Manganese Total EPA 200.8	Water	NC	591
Nickel Total EPA 200.8	Water	NC	591
Selenium Total EPA 200.8	Water	NC	591
Zinc Total EPA 200.8	Water	NC	591



## ANALYTICAL REPORT

Job Number: 660-12391-1

Job Description: B609856

For:  
Environmental Conservation Laboratories  
4810 Executive Park Court, Suite 211  
Jacksonville, FL 32216-6069

Attention: Ms. Chris Tompkins



---

Tina Fritz  
Project Manager II  
tfritz@stl-inc.com  
12/01/2006

Project Manager: Nancy Robertson

Methods: FDEP, DOH Certification #: E84282 These test results meet all the requirements of NELAC unless specified in the case narrative. All questions regarding this test report should be directed to the STL Project Manager who signed this test report. The estimated uncertainty associated with these reported results is available upon request.

**Severn Trent Laboratories, Inc.**

STL Tampa 6712 Benjamin Road Suite 100, Tampa, FL 33634  
Tel (813) 885-7427 Fax (813) 885-7049 www.stl-inc.com

### EXECUTIVE SUMMARY - Detections

Client: Environmental Conservation Laboratories

Job Number: 660-12391-1

Lab Sample ID Analyte	Client Sample ID	Result / Qualifier	Reporting Limit	Units	Method
660-12391-1 Total Organic Carbon	CF-1	29000	1000	mg/Kg	WALKLEY BLACK
660-12391-2 Total Organic Carbon	CF-2	29000	1000	mg/Kg	WALKLEY BLACK
660-12391-3 Total Organic Carbon	CF-3	35000	1100	mg/Kg	WALKLEY BLACK
660-12391-4 Total Organic Carbon	CF-4	20000	880	mg/Kg	WALKLEY BLACK
660-12391-5 Total Organic Carbon	CF-5	19000	820	mg/Kg	WALKLEY BLACK
660-12391-6 Total Organic Carbon	CF-6	26000	1200	mg/Kg	WALKLEY BLACK
660-12391-7 Total Organic Carbon	CF-7	37000	1100	mg/Kg	WALKLEY BLACK
660-12391-8 Total Organic Carbon	CF-8	22000	920	mg/Kg	WALKLEY BLACK
660-12391-9 Total Organic Carbon	CF-9	27000	900	mg/Kg	WALKLEY BLACK
660-12391-10 Total Organic Carbon	CF-10	43000	1200	mg/Kg	WALKLEY BLACK
660-12391-11 Total Organic Carbon	CF-11	45000	1000	mg/Kg	WALKLEY BLACK

STL Tampa

### EXECUTIVE SUMMARY - Detections

Client: Environmental Conservation Laboratories

Job Number: 660-12391-1

Lab Sample ID Analyte	Client Sample ID	Result / Qualifier	Reporting Limit	Units	Method
660-12391-12 Total Organic Carbon	CF-12	41000	1100	mg/Kg	WALKLEY BLACK

## METHOD SUMMARY

Client: Environmental Conservation Laboratories

Job Number: 660-12391-1

Description	Lab Location	Method	Preparation Method
<b>Matrix: Solid</b>			
Percent Moisture	STL TAM	EPA	PercentMoisture
Total Organic Carbon (Walkley Black)	STL TAM	MSA	WALKLEY BLACK

**LAB REFERENCES:**

STL TAM = STL Tampa

**METHOD REFERENCES:**

EPA - US Environmental Protection Agency

MSA - "Methods Of Soil Analysis, Chemical And Microbiological Properties", Part 2, 2nd Ed., 1982 And Subsequent Revisions.

**METHOD / ANALYST SUMMARY**

Client: Environmental Conservation Laboratories

Job Number: 660-12391-1

<b>Method</b>	<b>Analyst</b>	<b>Analyst ID</b>
MSA WALKLEY BLACK	Steward, Tiffany	TS

## SAMPLE SUMMARY

Client: Environmental Conservation Laboratories

Job Number: 660-12391-1

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
660-12391-1	CF-1	Solid	11/01/2006 1015	11/14/2006 0915
660-12391-2	CF-2	Solid	11/01/2006 1125	11/14/2006 0915
660-12391-3	CF-3	Solid	11/01/2006 1154	11/14/2006 0915
660-12391-4	CF-4	Solid	11/01/2006 1547	11/14/2006 0915
660-12391-5	CF-5	Solid	11/01/2006 1639	11/14/2006 0915
660-12391-6	CF-6	Solid	11/02/2006 1109	11/14/2006 0915
660-12391-7	CF-7	Solid	11/02/2006 1148	11/14/2006 0915
660-12391-8	CF-8	Solid	11/02/2006 1400	11/14/2006 0915
660-12391-9	CF-9	Solid	11/03/2006 0947	11/14/2006 0915
660-12391-10	CF-10	Solid	11/03/2006 1024	11/14/2006 0915
660-12391-11	CF-11	Solid	11/03/2006 1350	11/14/2006 0915
660-12391-12	CF-12	Solid	11/03/2006 1447	11/14/2006 0915

**Analytical Data**

Client: Environmental Conservation Laboratories

Job Number: 660-12391-1

**General Chemistry**

**Client Sample ID: CF-1**

Lab Sample ID: 660-12391-1  
Client Matrix: Solid

% Moisture: 50.6

Date Sampled: 11/01/2006 1015  
Date Received: 11/14/2006 0915

Analyte	Result	Qual	Units	PQL	PQL	Dil	Method
Total Organic Carbon	29000		mg/Kg	1000	1000	1.0	WALKLEY BLAC
	Anly Batch: 660-35558	Date Analyzed	11/30/2006	1000			DryWt Corrected: Y

**Client Sample ID: CF-2**

Lab Sample ID: 660-12391-2  
Client Matrix: Solid

% Moisture: 51.5

Date Sampled: 11/01/2006 1125  
Date Received: 11/14/2006 0915

Analyte	Result	Qual	Units	PQL	PQL	Dil	Method
Total Organic Carbon	29000		mg/Kg	1000	1000	1.0	WALKLEY BLAC
	Anly Batch: 660-35558	Date Analyzed	11/30/2006	1000			DryWt Corrected: Y

**Client Sample ID: CF-3**

Lab Sample ID: 660-12391-3  
Client Matrix: Solid

% Moisture: 53.4

Date Sampled: 11/01/2006 1154  
Date Received: 11/14/2006 0915

Analyte	Result	Qual	Units	PQL	PQL	Dil	Method
Total Organic Carbon	35000		mg/Kg	1100	1100	1.0	WALKLEY BLAC
	Anly Batch: 660-35558	Date Analyzed	11/30/2006	1000			DryWt Corrected: Y

**Client Sample ID: CF-4**

Lab Sample ID: 660-12391-4  
Client Matrix: Solid

% Moisture: 42.9

Date Sampled: 11/01/2006 1547  
Date Received: 11/14/2006 0915

Analyte	Result	Qual	Units	PQL	PQL	Dil	Method
Total Organic Carbon	20000		mg/Kg	880	880	1.0	WALKLEY BLAC
	Anly Batch: 660-35558	Date Analyzed	11/30/2006	1000			DryWt Corrected: Y

**Analytical Data**

Client: Environmental Conservation Laboratories

Job Number: 660-12391-1

**General Chemistry**

**Client Sample ID: CF-5**

Lab Sample ID: 660-12391-5

Client Matrix: Solid

% Moisture: 38.8

Date Sampled: 11/01/2006 1639

Date Received: 11/14/2006 0915

Analyte	Result	Qual	Units	PQL	PQL	Dil	Method
Total Organic Carbon	19000		mg/Kg	820	820	1.0	WALKLEY BLAC
	Anly Batch: 660-35558	Date Analyzed	11/30/2006	1000			DryWt Corrected: Y

**Client Sample ID: CF-6**

Lab Sample ID: 660-12391-6

Client Matrix: Solid

% Moisture: 59.0

Date Sampled: 11/02/2006 1109

Date Received: 11/14/2006 0915

Analyte	Result	Qual	Units	PQL	PQL	Dil	Method
Total Organic Carbon	26000		mg/Kg	1200	1200	1.0	WALKLEY BLAC
	Anly Batch: 660-35558	Date Analyzed	11/30/2006	1000			DryWt Corrected: Y

**Client Sample ID: CF-7**

Lab Sample ID: 660-12391-7

Client Matrix: Solid

% Moisture: 54.1

Date Sampled: 11/02/2006 1148

Date Received: 11/14/2006 0915

Analyte	Result	Qual	Units	PQL	PQL	Dil	Method
Total Organic Carbon	37000		mg/Kg	1100	1100	1.0	WALKLEY BLAC
	Anly Batch: 660-35558	Date Analyzed	11/30/2006	1000			DryWt Corrected: Y

**Client Sample ID: CF-8**

Lab Sample ID: 660-12391-8

Client Matrix: Solid

% Moisture: 45.8

Date Sampled: 11/02/2006 1400

Date Received: 11/14/2006 0915

Analyte	Result	Qual	Units	PQL	PQL	Dil	Method
Total Organic Carbon	22000		mg/Kg	920	920	1.0	WALKLEY BLAC
	Anly Batch: 660-35558	Date Analyzed	11/30/2006	1000			DryWt Corrected: Y



**Analytical Data**

Client: Environmental Conservation Laboratories

Job Number: 660-12391-1

**General Chemistry**

**Client Sample ID: CF-9**

Lab Sample ID: 660-12391-9

Client Matrix: Solid

% Moisture: 44.5

Date Sampled: 11/03/2006 0947

Date Received: 11/14/2006 0915

Analyte	Result	Qual	Units	PQL	PQL	Dil	Method
Total Organic Carbon	27000		mg/Kg	900	900	1.0	WALKLEY BLAC
	Anly Batch: 660-35558	Date Analyzed	11/30/2006	1000			DryWt Corrected: Y

**Client Sample ID: CF-10**

Lab Sample ID: 660-12391-10

Client Matrix: Solid

% Moisture: 57.6

Date Sampled: 11/03/2006 1024

Date Received: 11/14/2006 0915

Analyte	Result	Qual	Units	PQL	PQL	Dil	Method
Total Organic Carbon	43000		mg/Kg	1200	1200	1.0	WALKLEY BLAC
	Anly Batch: 660-35558	Date Analyzed	11/30/2006	1000			DryWt Corrected: Y

**Client Sample ID: CF-11**

Lab Sample ID: 660-12391-11

Client Matrix: Solid

% Moisture: 50.8

Date Sampled: 11/03/2006 1350

Date Received: 11/14/2006 0915

Analyte	Result	Qual	Units	PQL	PQL	Dil	Method
Total Organic Carbon	45000		mg/Kg	1000	1000	1.0	WALKLEY BLAC
	Anly Batch: 660-35558	Date Analyzed	11/30/2006	1000			DryWt Corrected: Y

**Client Sample ID: CF-12**

Lab Sample ID: 660-12391-12

Client Matrix: Solid

% Moisture: 53.7

Date Sampled: 11/03/2006 1447

Date Received: 11/14/2006 0915

Analyte	Result	Qual	Units	PQL	PQL	Dil	Method
Total Organic Carbon	41000		mg/Kg	1100	1100	1.0	WALKLEY BLAC
	Anly Batch: 660-35558	Date Analyzed	11/30/2006	1000			DryWt Corrected: Y

### DATA REPORTING QUALIFIERS

Client: Environmental Conservation Laboratories

Job Number: 660-12391-1

Lab Section	Qualifier	Description
General Chemistry	U	Indicates that the compound was analyzed for but not detected.

### Quality Control Results

Client: Environmental Conservation Laboratories

Job Number: 660-12391-1

**Method Blank - Batch: 660-35558**

Lab Sample ID: MB 660-35558/1  
 Client Matrix: Solid  
 Dilution: 1.0  
 Date Analyzed: 11/30/2006 1000  
 Date Prepared: N/A

Analysis Batch: 660-35558  
 Prep Batch: N/A  
 Units: mg/Kg

**Method: WALKLEY BLACK**  
**Preparation: N/A**

Instrument ID: No Equipment Assigned  
 Lab File ID: N/A  
 Initial Weight/Volume:  
 Final Weight/Volume:

Analyte	Result	Qual	PQL	PQL
Total Organic Carbon	500	U	500	500

**Lab Control Spike/  
 Lab Control Spike Duplicate Recovery Report - Batch: 660-35558**

LCS Lab Sample ID: LCS 660-35558/2  
 Client Matrix: Solid  
 Dilution: 1.0  
 Date Analyzed: 11/30/2006 1000  
 Date Prepared: N/A

Analysis Batch: 660-35558  
 Prep Batch: N/A  
 Units: mg/Kg

**Method: WALKLEY BLACK**  
**Preparation: N/A**

Instrument ID: No Equipment Assigned  
 Lab File ID: N/A  
 Initial Weight/Volume:  
 Final Weight/Volume:

LCSD Lab Sample ID: LCSD 660-35558/3  
 Client Matrix: Solid  
 Dilution: 1.0  
 Date Analyzed: 11/30/2006 1000  
 Date Prepared: N/A

Analysis Batch: 660-35558  
 Prep Batch: N/A  
 Units: mg/Kg

Instrument ID: No Equipment Assigned  
 Lab File ID: N/A  
 Initial Weight/Volume:  
 Final Weight/Volume:

Analyte	% Rec.		Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
	LCS	LCSD					
Total Organic Carbon	107	107	60 - 140	0	40		

Calculations are performed before rounding to avoid round-off errors in calculated results.

SENDING LABORATORY:

ENCO Jacksonville  
4810 Executive Park Court, Suite 211  
Jacksonville, FL 32216-6069  
Phone: 904.296.3007  
Fax: 904.296.6210  
Project Manager: Chris Tompkins

RECEIVING LABORATORY:

MISC FARM LAB  
*STL TAMPA*  
Phone: 999  
Fax: 990  
Project State of Origin: \_\_\_\_\_ *NC*

Analysis	Due	Expires	Laboratory ID	Comments
CF-1 Soil TOC Walkley Black <i>Containers Supplied: 4ozjar (C)</i>	<i>[Redacted]</i>	01-Nov-06 10:15	<i>[Redacted]</i>	Get % data from Jax
CF-2 Soil TOC Walkley Black <i>Containers Supplied: 4ozjar (C)</i>	<i>[Redacted]</i>	01-Nov-06 11:25	<i>[Redacted]</i>	Get % data from Jax
CF-3 Soil TOC Walkley Black <i>Containers Supplied: 4ozjar (C)</i>	<i>[Redacted]</i>	01-Nov-06 11:54	<i>[Redacted]</i>	Get % data from Jax
CF-4 Soil TOC Walkley Black <i>Containers Supplied: 4ozjar (C)</i>	<i>[Redacted]</i>	01-Nov-06 15:47	<i>[Redacted]</i>	Get % data from Jax
CF-5 Soil TOC Walkley Black <i>Containers Supplied: 4ozjar (C)</i>	<i>[Redacted]</i>	01-Nov-06 16:39	<i>[Redacted]</i>	Get % data from Jax
CF-6 Soil TOC Walkley Black <i>Containers Supplied: 4ozjar (C)</i>	<i>[Redacted]</i>	02-Nov-06 11:09	<i>[Redacted]</i>	Get % data from Jax

Released By: *Hauptman* Date: *11/13/06* Received By: *Daly* Date: *11/14/06* *0915*

Released By: \_\_\_\_\_ Date: \_\_\_\_\_ Received By: \_\_\_\_\_ Date: \_\_\_\_\_



STL

SUBCONTRACT ORDER

ENCO Jacksonville

B609856

Analysis	Due	Expires	Laboratory ID	Comments
CF-7	Soil	02-Nov-06 11:48		Get % data from Jax
TOC Walkley Black		02-Dec-06 11:48		
<i>Containers Supplied:</i> 4ozjar (C)				
CF-8	Soil	02-Nov-06 14:00		Get % data from Jax
TOC Walkley Black		02-Dec-06 14:00		
<i>Containers Supplied:</i> 4ozjar (C)				
CF-9	Soil	03-Nov-06 09:47		Get % data from Jax
TOC Walkley Black		03-Dec-06 09:47		
<i>Containers Supplied:</i> 4ozjar (C)				
CF-10	Soil	03-Nov-06 10:24		Get % data from Jax
TOC Walkley Black		03-Dec-06 10:24		
<i>Containers Supplied:</i> 4ozjar (C)				
CF-11	Soil	03-Nov-06 13:50		Get % data from Jax
TOC Walkley Black		03-Dec-06 13:50		
<i>Containers Supplied:</i> 4ozjar (C)				
CF-12	Soil	03-Nov-06 14:47		Get % data from Jax
TOC Walkley Black		03-Dec-06 14:47		
<i>Containers Supplied:</i> 4ozjar (C)				

Standard TAT

Released By: Hampton Date: 11/13/06 Received By: [Signature] Date: 11/14/06 0915

Released By: \_\_\_\_\_ Date: \_\_\_\_\_ Received By: \_\_\_\_\_ Date: \_\_\_\_\_

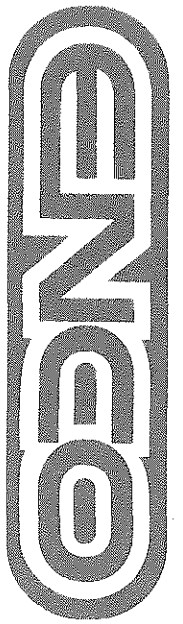
## LOGIN SAMPLE RECEIPT CHECK LIST

Client: Environmental Conservation Laboratories

Job Number: 660-12391-1

Login Number: 12391

Question	T/F/NA	Comment
Radioactivity either was not measured or, if measured, is at or below background	NA	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	NA	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	



**ENVIRONMENTAL CONSERVATION LABORATORIES**

QSARF # \_\_\_\_\_

4810 Executive Park Court, Suite 211  
 Jacksonville, Florida 32216-6069  
 Ph. (904) 296-3007 • Fax (904) 296-6210

10207 General Drive  
 Orlando, Florida 32824-8529  
 Ph. (407) 826-5314 • Fax (407) 850-6945

10115 Passport Way  
 Cary, North Carolina 27513  
 Ph. (919) 677-1669 • Fax (919) 677-9846

ENCO CompQAP No.: 960038G/0

**CHAIN OF CUSTODY RECORD**

PROJECT REFERENCE		PROJECT NO.		P.O. NUMBER		MATRIX TYPE		REQUIRED ANALYSIS		PAGE 1 OF 1						
Cape Fear Sediments		PROJECT LOC. NC		SAMPLER(S) NAME Tom Aungspurger		PHONE 919/856-4520		STANDARD REPORT DELIVERY <input type="checkbox"/>		EXPEDITED REPORT DELIVERY (surcharge) <input type="checkbox"/>						
US Fish and Wildlife Service		CLIENT NAME Tom Aungspurger		CLIENT PROJECT MANAGER		FAX 919/856-4556		DATE Due: _____								
551-F Pylon Drive, Raleigh, NC 27606		CLIENT ADDRESS (CITY, STATE, ZIP)														
STATION	DATE	TIME	GRAB	COMP	SAMPLE IDENTIFICATION	SURFACE WATER	GROUND WATER	WASTEWATER	DRINKING WATER	SOIL/SOLID/SEDIMENT	NONAQUEOUS LIQUID (oil, solvent, etc.)	AIR	SLUDGE	OTHER	NUMBER OF CONTAINERS SUBMITTED	REMARKS
1	CF-1	11-01-06	1015	✓	CF-1	✓									✓	Metals/Trace
2	CF-2	11-01-06	1125	✓	CF-2	✓									✓	PATHS-SIM
3	CF-3	11-01-06	1154	✓	CF-3	✓									✓	Total Org. Carbon
4	CF-4	11-01-06	1547	✓	CF-4	✓									✓	
5	CF-5	11-01-06	1639	✓	CF-5	✓									✓	
6	CF-6	11-02-06	1109	✓	CF-6	✓									✓	
7	CF-7	11-02-06	1148	✓	CF-7	✓									✓	
8	CF-8	11-02-06	1400	✓	CF-8	✓									✓	
9	CF-9	11-03-06	0947	✓	CF-9	✓									✓	
10	CF-10	11-03-06	1024	✓	CF-10	✓									✓	
11	CF-11	11-03-06	1350	✓	CF-11	✓									✓	
12	CF-12	11-03-06	1447	✓	CF-12	✓									✓	
13																
14																
SAMPLE KIT PREPARED BY: DIACKSONVILLE DORLANDO		DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)
RECEIVED BY: (SIGNATURE)		DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)
RECEIVED FOR LABORATORY BY: (SIGNATURE)		DATE	TIME	CUSTODY INTACT	YES	NO	ENCO LOG NO.	REMARKS								
RECEIVED BY: (SIGNATURE)		DATE	TIME	YES	NO	REMARKS										



U.S. Department of the Interior  
 U.S. GEOLOGICAL SURVEY  
 Columbia Environmental Research Center  
 4200 New Haven Road  
 Columbia, Missouri 65201

**Chain-of-Custody Record**

**Attachment 1**

Study No.	Study Name: Preliminary Evaluation of Sediments (Tier 2) for Cape Fear River Locks & Dams (1, 2 & 3)	Control No.
Samplers: (Signatures) Tom Augspurger, Sara Ward, Dale Suiter		page 1 of 1

Sample Identification	Date	Time	Type *	Remarks and Observations
CF-1	11/1/06	10:15	S	~3mi upstr. of Elizabethtown Ramp
CF-3	11/1/06	11:54	S	~1/4 mi upstr. L&D2
CF-4	11/1/06	15:47	S	below Dupont outfall & L&D3
CF-5	11/1/06	16:39	S	~200m upstr. of Tar Heel Landing Rd bridge
CF-6	11/2/06	11:09	S	near Locks Point
CF-8	11/2/06	14:00	S	Above L&D7
CF-9	11/3/06	09:47	S	dwstr. of Monsanto outfall @ RM 106
CF-10	11/3/06	10:24	S	dwstr. of Rockfish Creek WWTP
CF-11	11/3/06	13:50	S	dwstr. of Borden Chem. & Fayetteville sources

Relinquished by: (Signature) Sara E. Ward	Date/Time 9AM 11/7/06	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	

\* W=water, S=sediment, P=plant, F=fish, B=benthos, O=other, define in remarks



United States Department of the Interior

11

U.S. GEOLOGICAL SURVEY  
Columbia Environmental Research Center  
4200 New Haven Road  
Columbia, Missouri 65201  
**SAMPLE BATCH HISTORY INFORMATION  
FOR SAMPLES RECEIVED AT CERC**

PROJECT LEADER, STUDY DIRECTOR,  
OR BIOMONITORING SPECIALIST: Tom Augspurger (FWS)

FY: 07 PROJECT OR STUDY #: \_\_\_\_\_ WU#: \_\_\_\_\_

DATE: 11/7/06 OTHER INFORMATION: \_\_\_\_\_

BRIEF DESCRIPTION OF BATCH: 9 Sediment Composite Samples for Preliminary Evaluation of Sediments (Tier 2) for Cape Fear River Locks & Dams (1, 2 & 3) Project → for bioassays

TOTAL NUMBER OF SAMPLES IN BATCH: 9

TYPE(S) OF SAMPLES IN BATCH: Sediment - Composite samples

COLLECTED BY: T. Augspurger, S. Ward, & D. Suiter

DATE(S) COLLECTED: 11/1/06, 11/2/06 & 11/3/06

COLLECTION SOP'S : \_\_\_\_\_

GENERAL GEOGRAPHICAL AREA(S) OF COLLECTION: Cape Fear River in Bladen & Cumberland Counties, NC.

HOW ARE SAMPLES PACKAGED? on blue ice, in coolers. Samples contained in certified chemically-clean 4 liter Wide Mouth HDPE bottles

WHO PACKAGED SAMPLES? S. Ward

METHOD(S) OF PRESERVATION: no preservation - stored chilled @ 4°C since collection

NUMBER OF COOLERS, BOXES, ETC. COMPRISING BATCH: 2

WERE SAMPLES STORED BEFORE TRANSMISSION? yes

IF SO, STORAGE TIME, METHOD, AND LOCATION: storage in field on ice (<10hrs total) then stored in refrigerator @ 4°C until shipped.

## SAMPLE BATCH HISTORY INFORMATION (continued)

TRANSMISSION DATE: 11/7/06TRANSMITTED FROM: Raleigh ES Field Office (FWS)TRANSMITTED TO: USGS CERC

MODE OF TRANSMISSION (HOW ARE YOU SENDING THE SAMPLES?):

via Fed Ex overnight delivery (tracking nos: 8576 7860 7348)  
8576 7860 7337)ANALYSES REQUESTED: potwater extraction (see below) &Sediment bioassays (per IAA)DESCRIBE ANY DOCUMENTS ACCOMPANYING THE SAMPLES: USGS chain  
of custody and sample batch history formsADDITIONAL COMMENTS: ① request that CERC extract potwater  
and return to Raleigh ES for analysis (per prior dialog)② NCDWQ ambient data from stations bracketing sediment  
collection sites indicates that <sup>mean</sup> total water hardness  
ranges between 26.7 and 31.2 mg/L.

## SIGNATURE OF INDIVIDUAL ULTIMATELY RESPONSIBLE FOR THE SAMPLES:

NAME: Sara E. WardADDRESS: 551F - Pylon Drive (shipping)PO Box 33726 (mailing)Raleigh, NC 27606 (shipping or 27636 mailing)PHONE: (919) 856 - 4520 x.30FAX: (919) 856 - 4556



U.S. Department of the Interior  
 U.S. GEOLOGICAL SURVEY  
 Columbia Environmental Research Center  
 4200 New Haven Road  
 Columbia, Missouri 65201

**Chain-of-Custody Record**

**Attachment 1**

Study No.	Study Name <i>Preliminary Evaluation of Sediments (Tier 2) for Cape Fear R. Locks &amp; Dams (1, 2, &amp; 3)</i>	Control No.
Samplers: (Signatures) <i>Tom Augspurger, Sara Ward, Dale Switzer</i>		page ___ of ___

Sample Identification	Date	Time	Type *	Remarks and Observations
<i>CF-2</i>	<i>11/1/06</i>	<i>1125</i>	<i>S</i>	<i>~ 1/3 mi dwstr. of Hwy 701 Bridge</i>
<i>CF-7</i>	<i>11/2/06</i>	<i>1148</i>	<i>S</i>	<i>@ Kellys Cove (above L&amp;D1)</i>
<i>CF-12</i>	<i>11/3/06</i>	<i>1447</i>	<i>S</i>	<i>just upstrm. of L&amp;D3</i>

Relinquished by: (Signature) <i>Sara E. Ward</i>	Date/Time <i>11/20/06 11AM</i>	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	

\* W=water, S=sediment, P=plant, F=fish, B=benthos, O=other, define in remarks



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United States Department of the Interior

U.S. GEOLOGICAL SURVEY  
Columbia Environmental Research Center  
4200 New Haven Road  
Columbia, Missouri 65201  
SAMPLE BATCH HISTORY INFORMATION  
FOR SAMPLES RECEIVED AT CERC

PROJECT LEADER, STUDY DIRECTOR,  
OR BIOMONITORING SPECIALIST: Tom Augspurger

FY: 07 PROJECT OR STUDY #: \_\_\_\_\_ WU#: \_\_\_\_\_

DATE: \_\_\_\_\_ OTHER INFORMATION: \_\_\_\_\_

BRIEF DESCRIPTION OF BATCH: 3 sediment composite samples for Prelim. Evaluation of Sediments (Tier 2) for Cape Fear R Locks & Dams (1, 2, & 3) Project -> for grain size analysis

TOTAL NUMBER OF SAMPLES IN BATCH: 3

TYPE(S) OF SAMPLES IN BATCH: sediment - composite samples

COLLECTED BY: T. Augspurger, S. Ward, D. Snitzer

DATE(S) COLLECTED: 11/1-3/06

COLLECTION SOP'S : \_\_\_\_\_

GENERAL GEOGRAPHICAL AREA(S) OF COLLECTION: Cape Fear River (Bladen & Cumberland Cos.)

HOW ARE SAMPLES PACKAGED? on blue ice in cooler. Samples contained in chemically clean 1 chem jars

WHO PACKAGED SAMPLES? S. Ward

METHOD(S) OF PRESERVATION: no preservation - kept chilled since collection

NUMBER OF COOLERS, BOXES, ETC. COMPRISING BATCH: 1

WERE SAMPLES STORED BEFORE TRANSMISSION? yes

IF SO, STORAGE TIME, METHOD, AND LOCATION: Stored on ice in field (<10 hrs. total) \* stored @ 4°C\* until shipped

\* briefly frozen due to thermostat malfunction

SAMPLE BATCH HISTORY INFORMATION (continued)

TRANSMISSION DATE: 11 / 20 / 06

TRANSMITTED FROM: Raleigh ES Field Office (FWS)

TRANSMITTED TO: USGS (CERC)

MODE OF TRANSMISSION (HOW ARE YOU SENDING THE SAMPLES?):

Fed Ex overnight delivery (tr. # 8576 7860 7370)

ANALYSES REQUESTED: grain size analysis

DESCRIBE ANY DOCUMENTS ACCOMPANYING THE SAMPLES: USGS COC

E batch history forms

ADDITIONAL COMMENTS:

SIGNATURE OF INDIVIDUAL ULTIMATELY RESPONSIBLE FOR THE SAMPLES:

NAME: Sara E Ward

ADDRESS: 551-F Pylon Dr. (shipping)

PO Box 33726 (mailing)

Raleigh, NC 27606 (ship or 27636 mailing)

PHONE: ( 919 ) 856 - 4520 x 30

FAX: ( 919 ) 856 - 4556



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**Chain-of-Custody Record**

**Attachment 1**

Study No. 07-20-03	Study Name: Sediment Quality at Cape Fear River Locks and Dam	Control No.
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Samplers: (Signatures) <div style="text-align: center; font-family: cursive; font-size: 1.2em; margin-top: 10px;">James King</div>	page ___ of ___
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Sample Identification	Date	Time	Type *	Remarks and Observations
CF 1	11-21-06		W	Total Metals Pore Water ✓
CF 3	11-21-06		W	Total Metals Pore Water ✓
CF 4	11-21-06		W	Total Metals Pore Water ✓
CF 5	11-21-06		W	Total Metals Pore Water ✓
CF 6	11-21-06		W	Total Metals Pore Water ✓
CF 8	11-21-06		W	Total Metals Pore Water ✓
CF 9	11-21-06		W	Total Metals Pore Water ✓
CF 10	11-21-06		W	Total Metals Pore Water ✓
CF 11	11-21-06		W	Total Metals Pore Water ✓
WB	11-21-06		W	Total Metals Pore Water ✓

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by:(Signature)	Date/Time	Remarks	

\* W=water, S=sediment, P=plant, F=fish, B=benthos, O=other, define in remarks



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**Chain-of-Custody Record**

**Attachment 1**

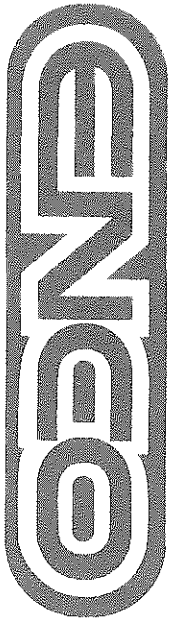
Study No. 07-20-03	Study Name: Sediment Quality at Cape Fear River Locks and Dam	Control No.
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Samplers: (Signatures) <div style="text-align: center; font-family: cursive; font-size: 1.2em; margin-top: 10px;">James King</div>	page ___ of ___
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Sample Identification	Date	Time	Type *	Remarks and Observations
CF 1	11-17-06		W	Total Metals Elutriate ✓
CF 3	11-17-06		W	Total Metals Elutriate ✓
CF 4	11-17-06		W	Total Metals Elutriate ✓
CF 5	11-17-06		W	Total Metals Elutriate ✓
CF 6	11-17-06		W	Total Metals Elutriate ✓
CF 8	11-17-06		W	Total Metals Elutriate ✓
CF 9	11-17-06		W	Total Metals Elutriate ✓
CF 10	11-17-06		W	Total Metals Elutriate ✓
CF 11	11-17-06		W	Total Metals Elutriate ✓
WB	11-17-06		W	Total Metals Elutriate ✓

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by:(Signature)	Date/Time	Remarks	

\* W=water, S=sediment, P=plant, F=fish, B=benthos, O=other, define in remarks



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 Ph. (407) 826-5314 • Fax (407) 850-6945

1015 Passport Way  
 Cary, North Carolina 27513  
 Ph. (919) 677-1669 • Fax (919) 677-9846

**ENVIRONMENTAL CONSERVATION LABORATORIES**

QSARF # \_\_\_\_\_

**CHAIN OF CUSTODY RECORD**

PROJECT REFERENCE: *Capri Palm River Project* PROJECT NO. \_\_\_\_\_ PO. NUMBER \_\_\_\_\_

PROJECT LOG (State): *NC* SAMPLE(S) NAME: *Tom Augspurger* PHONE: *919-856-7520*

CLIENT NAME: *US Fish and Wildlife Service* CLIENT PROJECT MANAGER: *Tom Augspurger* FAX: *919-856-4956*

CLIENT ADDRESS (CITY, STATE, ZIP): *551-F Pylon Drive, Raleigh, NC 27606*

MATRIX TYPE: \_\_\_\_\_ REQUIRED ANALYSIS: \_\_\_\_\_

STATION	DATE	TIME	GRAB	COMP	SAMPLE IDENTIFICATION	SURFACE WATER	GROUND WATER	WASTEWATER	DRINKING WATER	SOIL/SOLID/SEDIMENT	NONAQUEOUS LIQUID (per 81 Vent, et. 1)	AIR	SLUDGE	OTHER	PREPARED	NUMBER OF CONTAINERS SUBMITTED	REMARKS
1	CF1E	11-17-06	✓		CF1E											1	See checked list, all samples reserved
2	CF3E	11-17-06	✓		CF3E											1	See checked list, all samples reserved
3	CF4E	11-17-06	✓		CF4E											1	See checked list, all samples reserved
4	CF5E	11-17-06	✓		CF5E											1	See checked list, all samples reserved
5	CF6E	11-17-06	✓		CF6E											1	See checked list, all samples reserved
6	CF8E	11-17-06	✓		CF8E											1	See checked list, all samples reserved
7	CF9E	11-17-06	✓		CF9E											1	See checked list, all samples reserved
8	CF10E	11-17-06	✓		CF10E											1	See checked list, all samples reserved
9	CF11E	11-17-06	✓		CF11E											1	See checked list, all samples reserved
10	WBE	11-17-06	✓		WBE											1	See checked list, all samples reserved
11	CF1	11-21-06	✓		CF1											1	See checked list, all samples reserved
12	CF3	11-21-06	✓		CF3											1	See checked list, all samples reserved
13	CF4	11-21-06	✓		CF4											1	See checked list, all samples reserved
14	CF5	11-21-06	✓		CF5											1	See checked list, all samples reserved

SAMPLE KIT PREPARED BY: *DORLANDO* DATE: \_\_\_\_\_ TIME: \_\_\_\_\_

RECEIVED BY (SIGNATURE): *Janet E. Bland* DATE: *11/21/11:24* TIME: \_\_\_\_\_

RECEIVED FOR LABORATORY BY (SIGNATURE): \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_

REMARKS: *Received on ice*

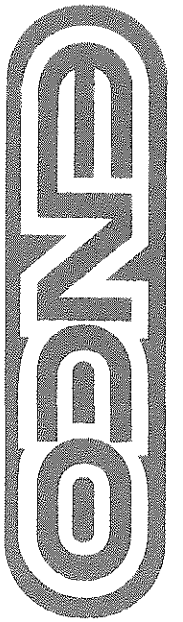
EXPEDITED REPORT DELIVERY (surcharge)

STANDARD REPORT DELIVERY

DATE Due: \_\_\_\_\_

PAGE *1* OF *2*





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ENCO CompQAP No.: 960038G/0

**CHAIN OF CUSTODY RECORD**

PROJECT REFERENCE <i>Cape Fear River Project</i>		PROJECT NO.		P.O. NUMBER		MATRIX TYPE		REQUIRED ANALYSIS		PAGE 2 OF 2	
PROJECT LOG (State) <i>NC</i>	SAMPLER(S) NAME <i>Tom Huggsburger</i>	PHONE <i>919-856-4520</i>	FAX <i>919-856-4556</i>	CLIENT NAME <i>US Fish and Wildlife Service</i>	CLIENT PROJECT MANAGER <i>Tom Huggsburger #21</i>	SURFACE WATER		METALS (see attached list)		STANDARD REPORT DELIVERY <input type="checkbox"/>	
CLIENT ADDRESS (CITY, STATE, ZIP) <i>651-F Pylon Drive, Raleigh, NC 27606</i>						GROUND WATER		Hardness (see form)		EXPEDITED REPORT DELIVERY (surcharge) <input type="checkbox"/>	
DATE		TIME		GRAB		COMB		SAMPLE IDENTIFICATION		REMARKS	
1	CF6	11-21-06						CF6	✓		All samples proceeding w/ HNO3; 1 sample bottle available for each sample
2	CF8	11-21-06						CF8	✓		
3	CF9	11-21-06						CF9	✓		
4	CF10	11-21-06						CF10	✓		
5	CF11	11-21-06						CF11	✓		
6	WB	11-21-06						WB	✓		
7											
8											
9											
10											
11											
12											
13											
14											
SAMPLE KIT PREPARED BY <i>DORLANDO</i>		DATE		TIME		RELINQUISHED BY (SIGNATURE)		DATE		TIME	
RELINQUISHED BY (SIGNATURE) <i>Shane E. Dorland</i>		DATE <i>11/20/07 11:12A</i>		TIME		RECEIVED BY (SIGNATURE)		DATE <i>11/21/07 11:12</i>		TIME	
RECEIVED FOR LABORATORY BY (SIGNATURE)		DATE		TIME		CUSTODY INTACT <input type="checkbox"/> YES <input type="checkbox"/> NO		ENCO LOG NO.		REMARKS <i>Received on 11/21</i>	
<input type="checkbox"/> Jacksonville		<input type="checkbox"/> Orlando									