

SEDIMENT ANALYSIS IN CHOCTAWHATCHEE BAY

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Abstract

A habitat quality survey was conducted in Choctawhatchee Bay at the request of the U.S. Fish and Wildlife Service. Hogtown Bayou in southern Choctawhatchee Bay is a documented frequent location and winter holding area for the Gulf sturgeon, *Acipenser oxyrinchus desotoi*, a federally listed endangered species. Sediment sampling was selected to characterize the chemical integrity of Choctawhatchee Bay. Sampling sites were chosen to represent the extent of the bay and to provide particular focus on certain areas. Focus areas were selected based on historical data from peer review literature and personal knowledge of local citizens.

Sediment samples were collected from 13 sites in Choctawhatchee Bay in a collaborative effort with the U.S. Fish and Wildlife Service and Choctawhatchee Basin Alliance staff. Analyses on sediment samples included metals, pesticides, organochlorines (OC), and polycyclic aromatic (PAH) and aliphatic hydrocarbons (AH). Sediment samples collected from Mullet Creek, Rocky, Tom's, and Hogtown bayous were also subjected to dioxin compound analysis. Overall, sediment contamination in Choctawhatchee Bay was low and found to be comparable to other bays in the Florida panhandle. However, sites in Mullet Creek (pesticides, OC, PAH, AH, metals), Tom's Bayou (OC, AH, metals), Garnier's Bayou (OC, PAH, AH, metals) and Cinco Bayou (OC, PAH) possessed high concentrations of sediment contaminants relative to other sites in Choctawhatchee Bay necessitating further investigation.

Introduction

Choctawhatchee Bay is located in the western Florida panhandle. The system was originally oligohaline with input primarily from Choctawhatchee River which terminates at the east end of the bay. The Choctawhatchee Bay and River watershed has a drainage area of 5,349 square miles in Florida and Alabama (NFWFMD, 1996). Historically, sea water input entered the bay via only periodic breakthroughs to the Gulf of Mexico. A permanent pass to the Gulf of Mexico was opened in 1929 at the west end of the bay (Livingston, 1987). Marine Gulf of Mexico waters flowed through the western pass and combined with the freshwaters from the Choctawhatchee River creating an estuary in transition.

Choctawhatchee Bay has an east to west longitudinal axis that stretches 27 miles long, but is only four miles wide. Average depth of the bay is 22 feet (U.S. Department of Commerce and NOAA, 1997). Choctawhatchee Bay has several small tributaries on the northern shore. Eglin Air Force Base occupies the majority of the immediate drainage basin on the northern shore. While the northern shore has experienced some development, the southern shore of Choctawhatchee Bay has been the site of an exponential increase in urbanized growth over the last few decades (NOAA, 1997).

Previous studies have identified high metal concentrations and low dissolved oxygen in Choctawhatchee Bay and adjoining bayous (Livingston, 1987). Some have speculated that the low dissolved oxygen concentrations result from the unique nature of Choctawhatchee Bay, particularly the dramatic convergence of fresh and marine waters (NOAA, 1997). Choctawhatchee Bay is stratified via a halocline separating freshwater at the surface from

marine waters at the bottom. The lack of mixing and gas exchange between the marine and freshwaters creates a large anoxic zone in the marine (bottom) bay layer is capable of supporting scant life (Livingston, 1987).

A literature review identified areas of concern in Choctawhatchee Bay and distinguished possible problem sources (Livingston, 1987; NOAA, 1997; NFWFMD, 1996). This review revealed that stormwater runoff and increased residential development were responsible for increased nutrient loading to the bay. It was further suggested that these nonpoint source inputs were exacerbating problems in the bayous where water quality was often lower (CBA, 1998). Other reports showed that Choctawhatchee Bay had higher mean organic nitrogen and organic carbon than the four other northwest Florida bays (Escambia, East, Panama City, and Pensacola bays) according to figures from the Environmental Protection Agency (EPA) and the U.S. Army Core of Engineers (Blaylock, 1983). Choctawhatchee Bay also had the third highest mean total phosphorus level (NOAA, 1997). Dr. Livingston, Director of the Center for Aquatic Research and Resource Management and Professor at Florida State University, cited anthropogenic effects and marinas for the cause of harmful stormwater runoff in his 1987 study of the Choctawhatchee Bay system (Livingston, 1997). In 1997 the National Oceanic and Atmospheric Administration (NOAA) performed a study on the bays in the Florida panhandle (NOAA, 1997). Minimal metal enrichment was found bay-wide, but elevated metal concentrations were recorded in Destin Harbor and near Boggy Point. NOAA also found elevated levels of organic contaminants at several locations including: Destin Harbor, Santa Rosa Sound and Boggy Point. Reported concentrations

were of the highest in the nation at the time (U.S. Department of Commerce and NOAA, 1997).

Habitat quality of aquatic systems has been evaluated via surveys of sediment contamination (O'Connor, 1991; US NOAA, 1991; Bolton *et al.* , 1985). The challenge lies in the interpretation of ecological risk posed by sediment contamination (Long *et al.*, 1995). For this reason, many have provided numeric criteria based on reported effects of exposure as a means to estimate relative risk to living organisms (Buchman, 1999; Long *et al.*, 1995; MacDonald, 1993; Persaud, 1992; Di Toro *et al.*, 1991; Long and Morgan, 1990; US EPA, 1989).

To assess the overall ecosystem health of Choctawhatchee Bay, a sediment survey was conducted. The results of this survey were compared to the findings of Long *et al.* (1995) to estimate risk to living resources. Long *et al.* (1995) developed Effects Range Low (ERL) and Effects Range Median (ERM) criteria for evaluating sediment contamination in marine and estuarine environments. Sediment contaminant concentrations exceeding the criterion ERL indicated that adverse negative effects on living resources might increase in incidence from rare to occasional. Sediment contaminant concentrations exceeding the ERM may indicate adverse effects will occur frequently.

METHODS

Sampling Design

The locations of the individual sampling stations were chosen based on historical data from literature review and personal communications with resident scientists. Stations were chosen based on anticipated sediment composition and reported contamination. Station locations were pre-selected, but were altered in cases where field collection of sediments was not feasible.

Sample Collection

Thirteen sediment samples were taken from Choctawhatchee Bay over a 2-day period in August 2002 (Figure 1, Table 1) according to the standard operating procedures (PCFO-EC SOP 004) for field collection of sediment samples (Appendix A). The vessel was navigated to the pre-determined stations; if the station was inaccessible or if the sediments at the location were comprised of only sand with no silt or clay components, an alternate location was chosen. In each case the original or the first alternate location was sufficient for sampling. Vessel navigation and positioning were aided by a Garmin Global Positioning System (GPS) 48 Personal Navigator unit and a supplemental navigation map.

Composite samples consisted of three 200 milliliter sub-samples. Samples were collected with a standard ponar 316 stainless steel grab and deposited in a stainless steel tray. The grab sampler and sampling utensils were acid washed with 10% dilute nitric acid, acetone, deionized water and ambient site water before and after each sample was collected. Three shallow grabs were most often sufficient for collecting samples. A stainless steel spoon was used to collect two scoops from the central portion of each grab. Sub-samples were combined in plastics bags, labeled, and placed on ice in a cooler.

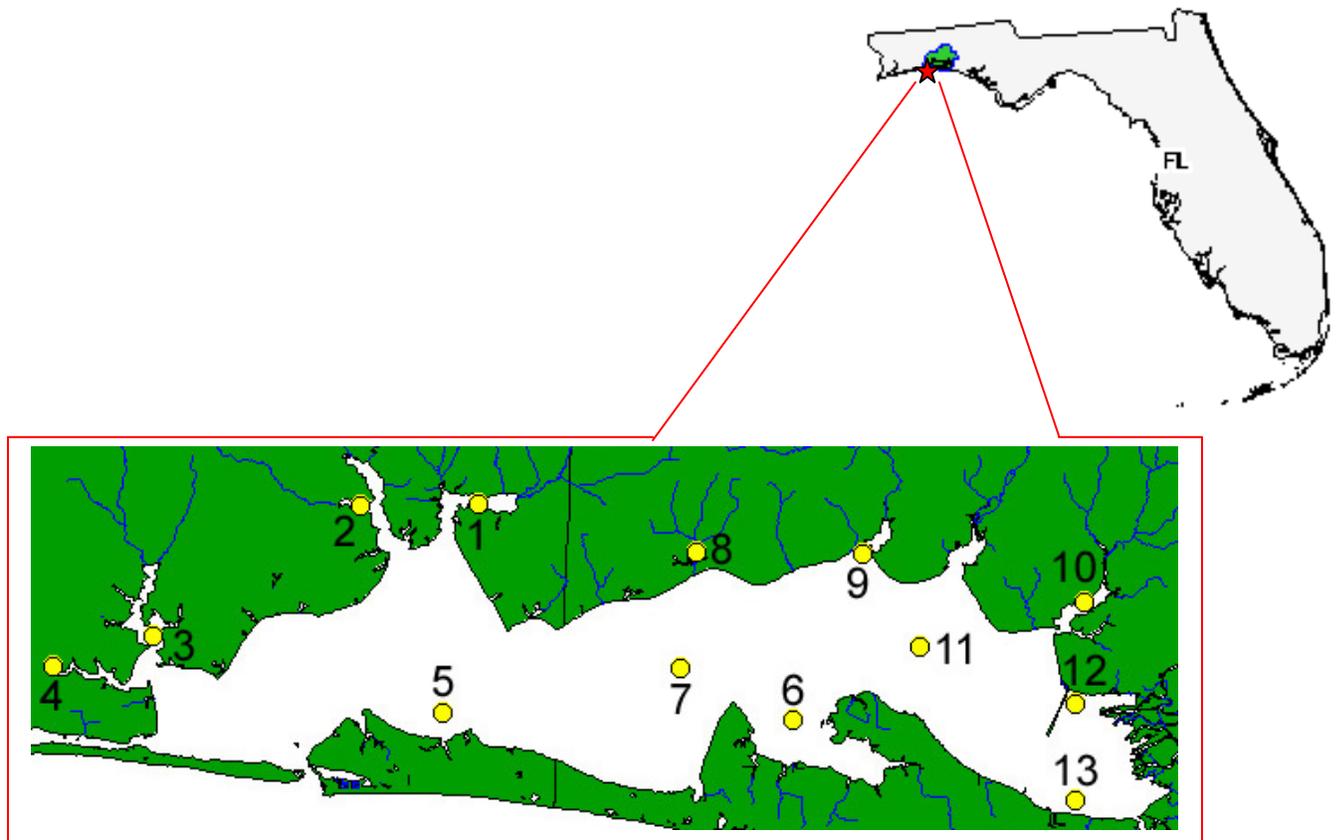


Figure 1 Choctawhatchee Bay sediment stations sampled in August 2002.

Table 1 Sample information for sediment samples taken by CBA and U.S. Fish and Wildlife Service in the Choctawhatchee Bay in August 2002, Station ID, Location, Latitude and Longitude (decimal degrees).

Station ID	Location	Latitude	Longitude
CBA 1	Rocky Bayou	30.50317	-86.43550
CBA 2	Tom's Bayou	30.50117	-86.49150
CBA 3	Garnier's Bayou	30.44617	-86.58917
CBA 4	Cinco Bayou	30.43233	-86.63667
CBA 5	Mid Bay off Piney Point	30.41667	-86.45000
CBA 6	Hogtown Bayou	30.41667	-86.28333
CBA 7	Mid Bay off Fourmile Point	30.43717	-86.33750
CBA 8	Mullet Creek	30.43233	-86.63667
CBA 9	Mouth of Basin Bayou	30.48550	-86.25167
CBA 10	La Grange Bayou	30.46717	-86.14567
CBA11	Mid Bay off Alligator Point	30.44750	-86.22367
CBA12	East end of Bay North shore	30.42550	-86.14917
CBA13	East end of Bay South shore	30.38533	-86.14900

Each sample was split into different containers relevant to their analytical needs with stainless steel tools that were washed with 10% nitric acid, acetone and deionized water between each sample. Each sample was separated into a clear jar with a Teflon lined lid and two new plastic bags. Samples 1, 2, 6 and 8 were also dolled into brown glass jars with Teflon lined lids to be sent for dioxin compound analysis.

All sediment samples were packed tightly into coolers with ice and bubble wrap. The coolers were shipped by overnight courier with chain of custody that indicated the condition of the samples and the time they were received at the laboratories.

Chemical Analysis

All 13 samples were analyzed for metals, organochlorines, pesticides, aliphatic and polycyclic aromatic hydrocarbons (Table 2) by the Geochemical and Environmental Research Group located on the Texas A&M University campus in College Station, Texas. Wellington Laboratories of Ontario, Canada analyzed selected samples for dioxin and furan compounds. Details of the analytical procedures performed at each lab are described in Appendix H.

Table 2 Chemical analytes measured in sediment samples taken in Choctawhatchee Bay in August 2002.

Metals	Polycyclic Aromatic Hydrocarbons	Aliphatic Hydrocarbons	Organochlorines and Pesticides
*Silver	*Naphthalene	n Dodecane	Hexachlorobenzene
Aluminum	*Fluorene	n Tridecane	a, b, g and d-BHC
*Arsenic	*Phenanthrene	n Tetradecane	Oxychlorane
Boron	*Anthracene	Cyclohexane	Heptchlor
Barium	*Fluoranthrene	Pentadecane	a, g-Chlordane
Beryllium	*Pyrene	n Hexadecane	t-Nonachlor
*Cadmium	*Benz(a)anthracene	n Heptadecane	Toxaphene
*Chromium	*Chrysene	Pristane	*Total PCBs
*Copper	Benzo(b)fluoranthrene	n Octadecane	*DDT analytes
Iron	Benzo(k)fluoranthrene	Phytane	Dieldrin
*Mercury	Benzo(e)pyrene	n Nonadecane	cis-Nonachlor
Manganese	*Benzo(a)pyrene	n Ecosane	Mirex
Molybdenum	Dibenzo(a,h)anthracene	Total AHs	Dicofol
*Nickel	Benzo(g,h,I)perylene		Dicamba
*Lead	*Total PAHs		Dichloprop
Selenium			Silvex
Strontium			2,4-D
Thallium			2,4,5-T
Vanadium			2,4-DB
*Zinc			Pentachlorophenol

*Sediment Quality Guidelines available from Long *et al.* 1995

Risk Analysis

The sediment quality guidelines used in this report to interpret much of the sediment data were founded on an effects-based system produced by Long *et al.* (1995). It should be noted that these are interpretive guidelines only. The guidelines are based on two concentration values for each analyte, the ERL and ERM, which delineates three relative safety ranges. The first range includes contaminant concentration values which fall below the ERL. Sediments in this range will cause minimal effects with direct contact and adverse biological effects would rarely be observed. The next range has a lower concentration limit at the ERL and an upper limit at the ERM. Sediment concentrations within this possible effects range would occasionally cause adverse effects in animals with direct contact to the sediments. The third range includes sediment concentration values that are equal to and above the ERM. Biological adverse effects would frequently occur to animals if they were to come in contact with sediments within this probable effects range (Long *et al.* 1995).

Sediment stations were evaluated and scored for relative risk from sediment contamination. This was done for those analytes for which sediment quality guidelines exist from Long et al (1995) including: polycyclic aromatic hydrocarbons (PAHs), organochlorines (OCs), and metals. The system consisted of assigning one point for each chemical concentration that exceeded the ERL value but fell below the ERM value (possible effects range), and two points for each concentration that was above the ERM value (probable effects range). The score for all analytes detected within a sample were then summed to provide a cumulative risk for each sample by chemical class and total analytes.

A similar procedure was followed for the analytes in the aliphatic hydrocarbon (AH) and phenoxy herbicide (PH) chemical classes. However, since sediment quality criteria were not available for these compounds, cumulative risk for each respective class was calculated relative to bay-wide mean concentrations. It was assumed that most elevated sediment contamination would be concentrated near the sources of contamination because the large bay would rapidly dilute most analytes. Using this assumption, it was further given that substantial variation from the mean concentration would indicate differences from background levels. Since the degree of variation about the mean would increase with the variability of the data, standard deviations of the mean were used to determine areas of relatively high concentrations of these contaminants. Sediment concentrations in excess of one deviation above the mean concentration of a given analyte among all 13 sites were given a score of 1. Concentrations greater than 2 standard deviations from the mean were given a score of 2. Scores for each site were summed for PH and AHs, but were not included in the multiple analyte cumulative total like the analytes with sediment quality criteria.

Dioxin toxicity equivalents (TEQs) were calculated for 17 dioxin and furan metabolic analytes found in four sediment samples collected in Choctawhatchee Bay. Assignment of risk levels were based on U.S. Environmental Protection Agency (US EPA) estimated risk to aquatic life associated with dioxin exposure (US EPA, 1993). Using these criteria, a relative risk level was established via Hemming *et al.* (2003) as follows: 0-10 ppt = no risk, 10.01-20 ppt = lowest possible risk level, 20.01-30 ppt = possible risk, 30.01-50 ppt = probable risk, and 50.01-80 = risk to some portion of resource populations if they directly come into contact with the sediments in the sampling areas.

Results

Data are provided in tables and spatially relevant figures. Figures are qualified by estimated sediment exposure risk. Exposure risks were estimated using the sediment quality guidelines of Long *et al.* (1995), deviations from bay-wide mean concentrations, and U.S. Environmental Protection Agency guidelines. Distribution of sediment composition profiles are provided in Table 3 and the composition distribution is shown in Figure 2. Analytes equal to or exceeding sediment quality guidelines (Long *et al.* 1995) are displayed: metals (Table 4), OCs (Table 5) and PAHs (Table 6). Relatively high concentrations for AHs (Table 7) and PHs (Table 8) are provided as well. Figures and estimated risk assessments are provided for three categories of analytes: PAHs (Figure 3), OCs (Figure 4) and metals (Figure 5). A cumulative risk level (Figure 6) was determined by adding scores from all analyte categories at each site. An estimated risk level and need for further evaluation are shown for PHs (Figure 8) and AHs (Figure 9). Results for the dioxin toxicity equivalents (TEQs) calculations are displayed in Table 9 and are spatially illustrated in Figure 7. Complete listings for the raw data collected are provided in the Appendices.

Table 3 Percent composition of sediment samples taken in Choctawhatchee Bay in August 2002, Gerg ID, Client ID, % Sand, % Silt and % Clay.

Gerg ID	Client ID	% Sand	% Silt	% Clay
C42411	CBA1	32.8	37.7	29.5
C42412	CBA2	46.0	39.7	14.3
C42413	CBA3	23.8	49.8	26.4
C42414	CBA4	97.3	2.2	0.5
C42415	CBA5	90.7	5.2	4.1
C42416	CBA6	95.6	1.8	2.6
C42417	CBA7	42.7	29.9	27.5
C42418	CBA8	76.6	23.4	0.0
C42419	CBA9	99.6	0.2	0.2
C42420	CBA10	27.1	38.4	34.5
C42421	CBA11	39.7	28.1	32.2
C42422	CBA12	73.4	16.8	9.8
C42423	CBA13	87.2	6.8	6.0

Table 4 Sediment samples taken in Choctawhatchee Bay in August 2002 with metal analytes equal to or exceeding sediment quality guidelines (Long *et al.* 1995): Site, Analyte, Sediment Concentration (ug/g, ppm, dry weight), Effects Range Low (ERL), Effects Range Median (ERM).

Site	Analyte	Sediment Concentration	ERL	ERM
CBA1	Arsenic	17.15	8.2	70
CBA2	Arsenic	11.59	8.2	70
"	Copper	183.83	34	270
"	Lead	57.25	46.7	218
"	Mercury	0.34	0.15	0.71
"	Silver	1.52	1	3.7
CBA3	Arsenic	21.75	8.2	70
"	Lead	58.14	46.7	218
"	Mercury	0.19	0.15	0.71
"	Nickel	22.37	20.9	51.6
CBA7	Arsenic	30.00	8.2	70
"	Nickel	27.96	20.9	51.6
CBA8	Mercury	0.18	0.15	0.71
CBA10	Arsenic	14.66	8.2	70
CBA11	Arsenic	28.82	8.2	70
"	Nickel	25.86	20.9	51.6

Table 5 Sediment samples taken in Choctawhatchee Bay in August 2002 with organochlorines and pesticide analytes equal to or exceeding sediment quality guidelines (Long *et al.* 1995): Site, Analyte, Sediment Concentration (ng/g, ppb, dry weight), Effects Range Low (ERL), Effects Range Median (ERM).

Site	Analyte	Sediment Concentration	ERL	ERM
CBA1	Total DDT	6.13	1.58	46.1
CBA2	Total DDT	43.20	1.58	46.1
"	Total PCBs	221.63	22.7	180
CBA3	Total DDT	25.25	1.58	46.1
"	Total PCBs	34.43	22.7	180
CBA4	Total PCBs	23.60	22.7	180
CBA7	Total DDT	2.69	1.58	46.1
CBA8	Total DDT	36.17	1.58	46.1
"	Total PCBs	103.75	22.7	180
CBA10	Total DDT	3.24	1.58	46.1
CBA11	Total DDT	2.77	1.58	46.1

Table 6 Sediment samples taken in Choctawhatchee Bay in August 2002 with polycyclic aromatic hydrocarbon analytes equal to or exceeding sediment quality guidelines (Long *et al.* 1995): Site, Analyte, Sediment Concentration (ng/g, ppb, dry weight), Effects Range Low (ERL), Effects Range Median (ERM).

Site	Analyte	Sediment Concentration	ERL	ERM
CBA2	Acenaphthylene	94.7	44	640
"	Anthracene	191.3	85.3	1100
"	Benzo(a)anthracene	345.2	261	1600
"	Benzo(a)pyrene	436.1	430	1600
"	Dibenzo(a,h)anthracene	66.4	63.4	260
"	Total PAHs	12935.3	4022	44792
CBA3	Acenaphthylene	56.3	44	640
"	Anthracene	115.4	85.3	1100
"	Total PAHs	8382.7	4022	44792
CBA4	Anthracene	103.8	85.3	1100
"	Benzo(a)anthracene	437.5	261	1600
"	Benzo(a)pyrene	599.6	430	1600
"	Chrysene	474.5	384	2800
"	Dibenzo(a,h)anthracene	86.7	63.4	260
"	Fluoranthene	1491.6	600	5100
"	Pyrene	1331.3	665	2600
"	Total PAHs	21618.0	4022	44792
CBA8	Total PAHs	719.6	4022	44792

Table 7 Sediment samples taken in Choctawhatchee Bay in August 2002 with relatively high concentrations of aliphatic hydrocarbon: Site, Analyte, Sediment Concentration (ug/g, ppb, dry weight), mean+1 standard deviation (SD), mean+2 standard deviations (SD).

Site	Analyte	Sediment Concentration	mean+1SD	mean+2SD
CBA1	n-C10	20	17	28
"	n-C11	82	64	104
"	n-C15	238	101	161
CBA2	n-C10	19	17	28
"	n-C12	7	3	6
"	n-C13	12	9	14
"	n-C14	16	11	16
"	n-C17	1382	1240	1927
"	Pristane	51	49	82
CBA3	n-C10	33	17	28
"	n-C11	130	64	104
"	n-C13	13	9	14
CBA8	n-C16	81	37	58
"	n-C17	2411	1240	1927
"	Pristane	116	49	82
"	n-C18	302	114	196
"	Phytane	218	83	142
"	n-C19	2700	979	1719
"	n-C20	666	250	432
"	n-C21	1921	783	1294
"	n-C22	1591	599	1028
"	n-C23	4165	1584	2704
"	n-C24	3060	1184	2004
"	n-C25	11334	4610	7698
"	n-C26	5174	1987	3371
"	n-C27	42436	15441	27055
"	n-C28	11021	4056	7058
"	n-C29	111996	40896	71498
"	n-C30	21874	7949	13938
"	n-C31	43749	16402	28232
"	n-C32	3197	1239	2094
"	n-C33	8504	3370	5630
"	n-C34	47711	17171	30299
"	Total Alkanes	324262	119800	207926
CBA10	n-C13	10	9	14
CBA11	n-C12	6	3	6
"	n-C14	12	11	16

Table 8 Sediment samples taken in Choctawhatchee Bay in August 2002 with relatively high concentrations of chlorophenoxy herbicides: Site, Analyte, Sediment Concentration (ug/g, ppb, dry weight), mean+1 standard deviation (SD), mean+2 standard deviations (SD).

Site	Analyte	Sediment		
		Concentration	mean+1SD	mean+2SD
CBA1	Dicamba	320	210	355
"	2,4-D	370	304	516
"	Dichlorprop	620	461	781
"	2,4-DB	260	211	339
CBA2	2,4,5-T	1322	567	971
CBA8	Total Phenoxy Herbicides	4551	1986	3300
"	Dicamba	451	210	355
"	2,4-D	714	304	516
"	Dichlorprop	1049	461	781
"	2,4-DB	445	211	339
"	2,4,5-T	744	567	971
"	Silvex	1147	440	751

Table 9 Dioxin total toxicity equivalents (TEQs) relative to 2,3,7,8-tetrachlorodibenzodioxin in sediment samples taken in Choctawhatchee Bay in August 2002: Site, TEQs (ppt).

Site	Total TEQs
CBA 1	11.3
CBA 2	25.1
CBA 6	0.787
CBA 8	8.11

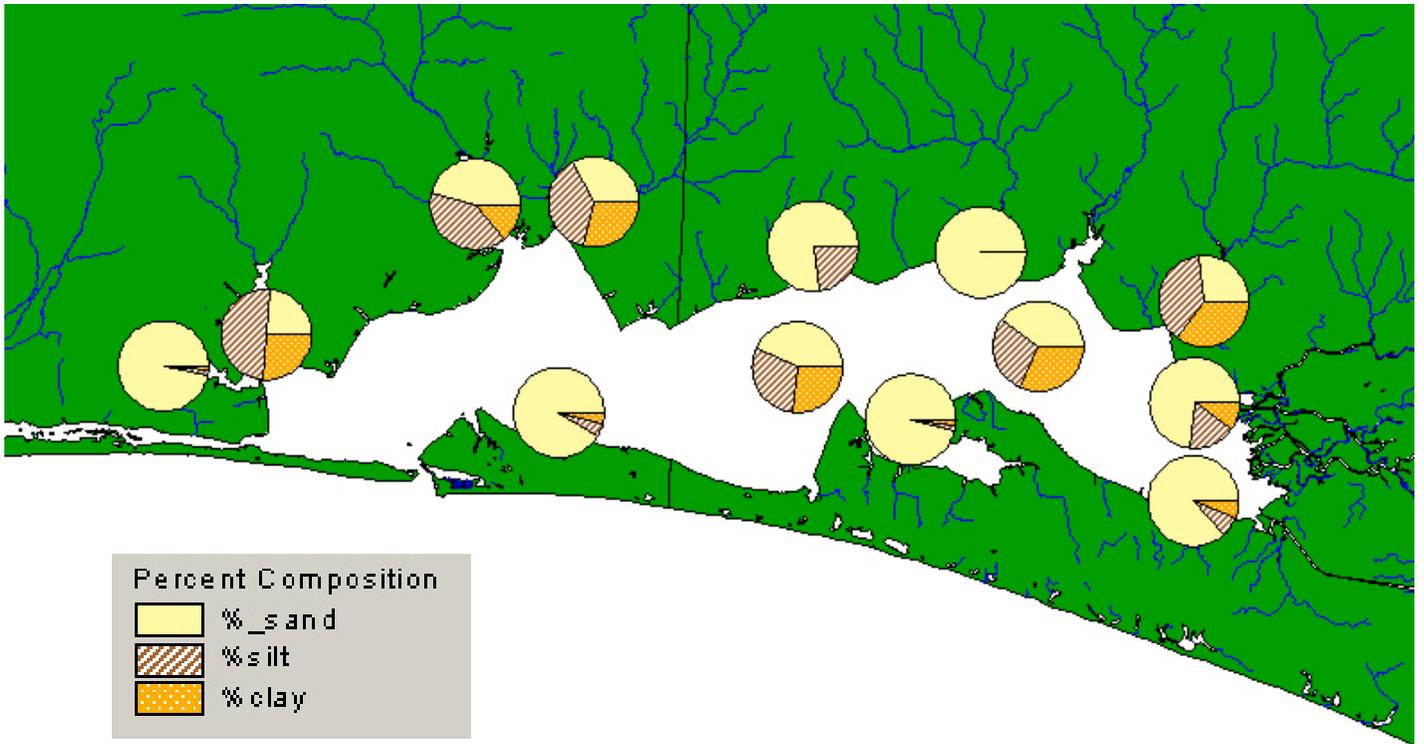


Figure 2 Sediment composition distribution for sediment samples taken in Choctawhatchee Bay, August 2002.

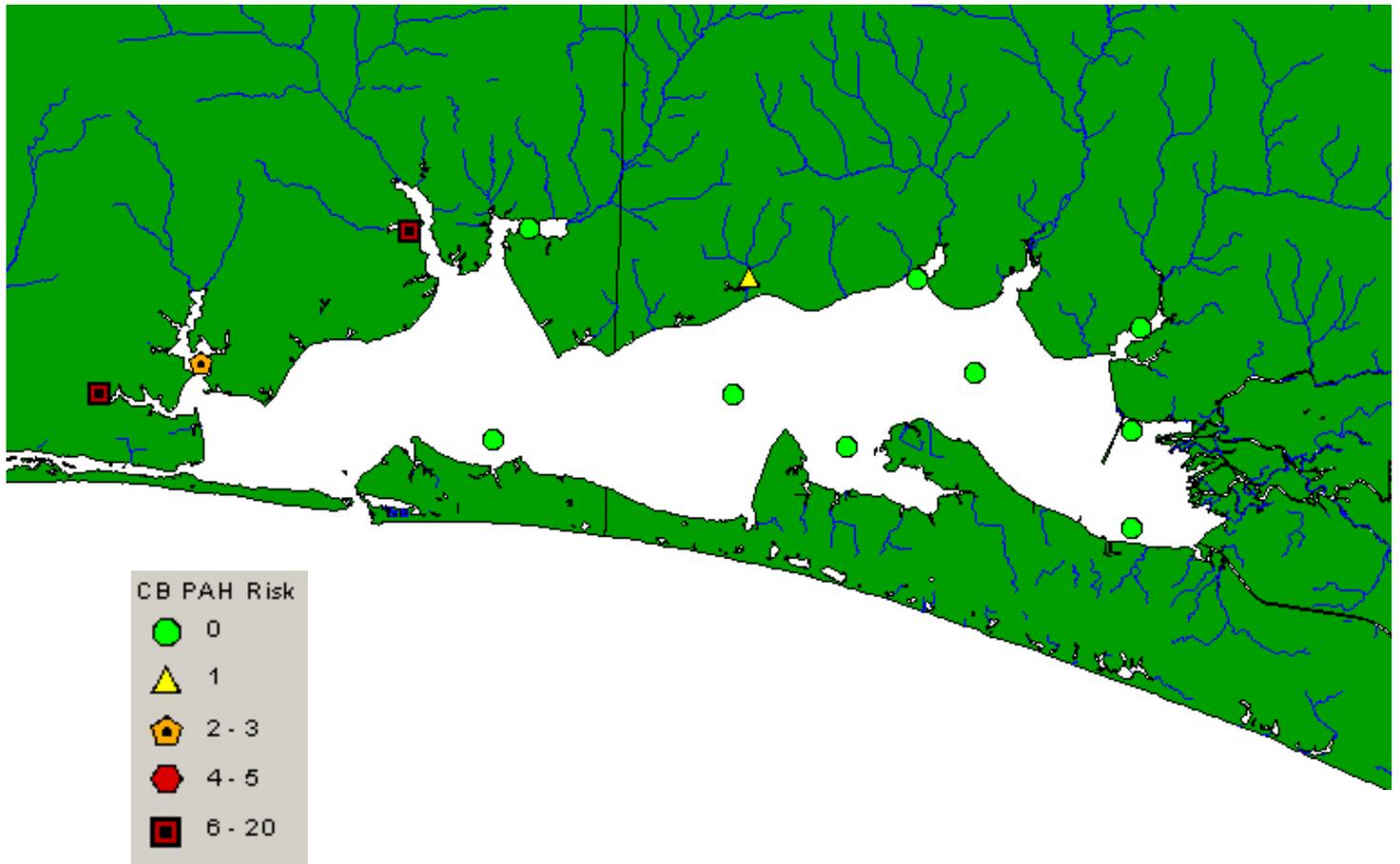


Figure 3 Estimated risk rank for polycyclic aromatic hydrocarbon (PAH) analytes in sediment samples taken from Choctawhatchee Bay, 2002, exceeding Long *et al.* (1995) sediment quality guidelines.

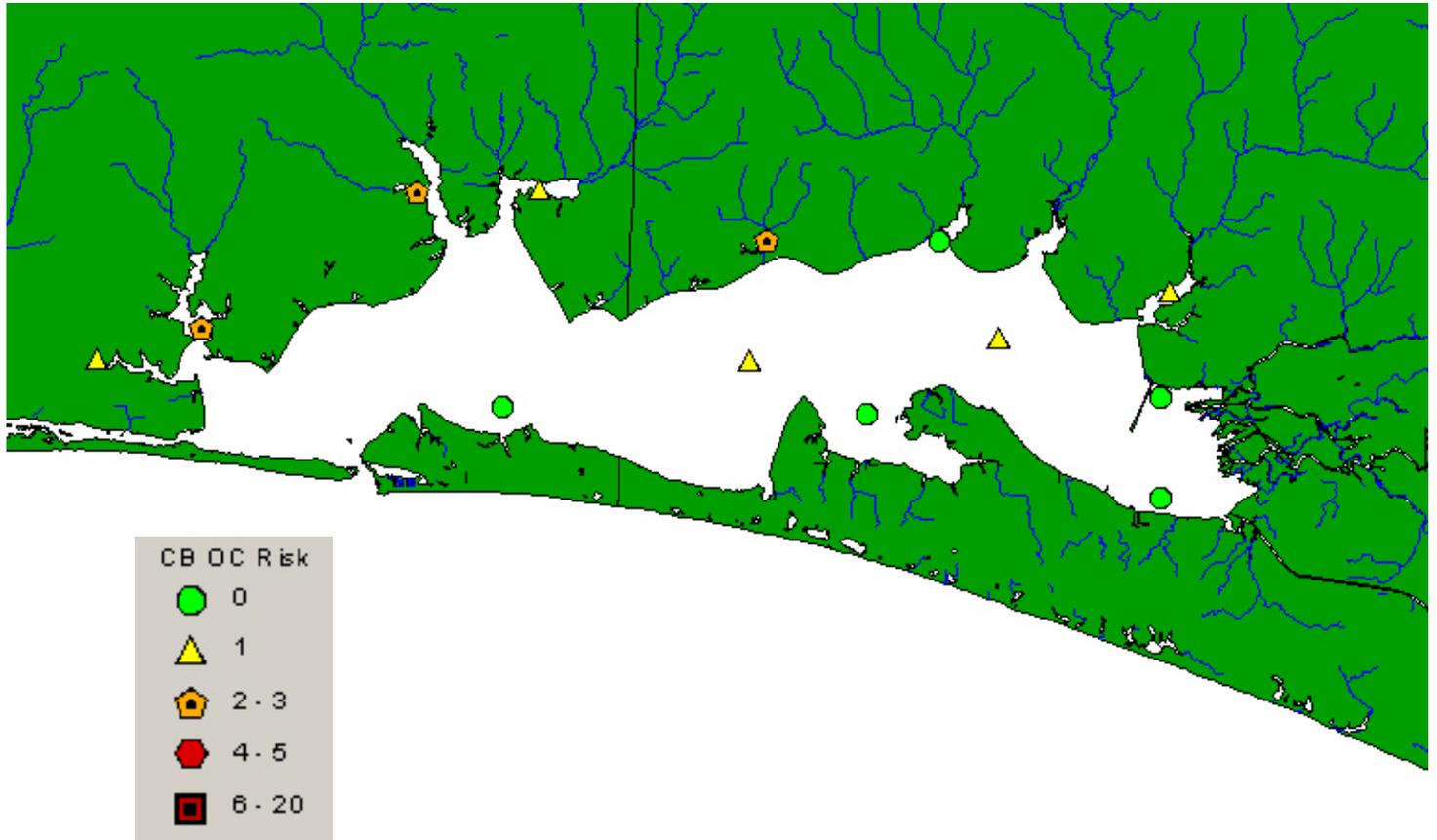


Figure 4 Estimated risk rank for organochlorine (OC) analytes in sediment samples taken from Choctawhatchee Bay, 2002, exceeding Long *et al.* (1995) sediment quality guidelines.

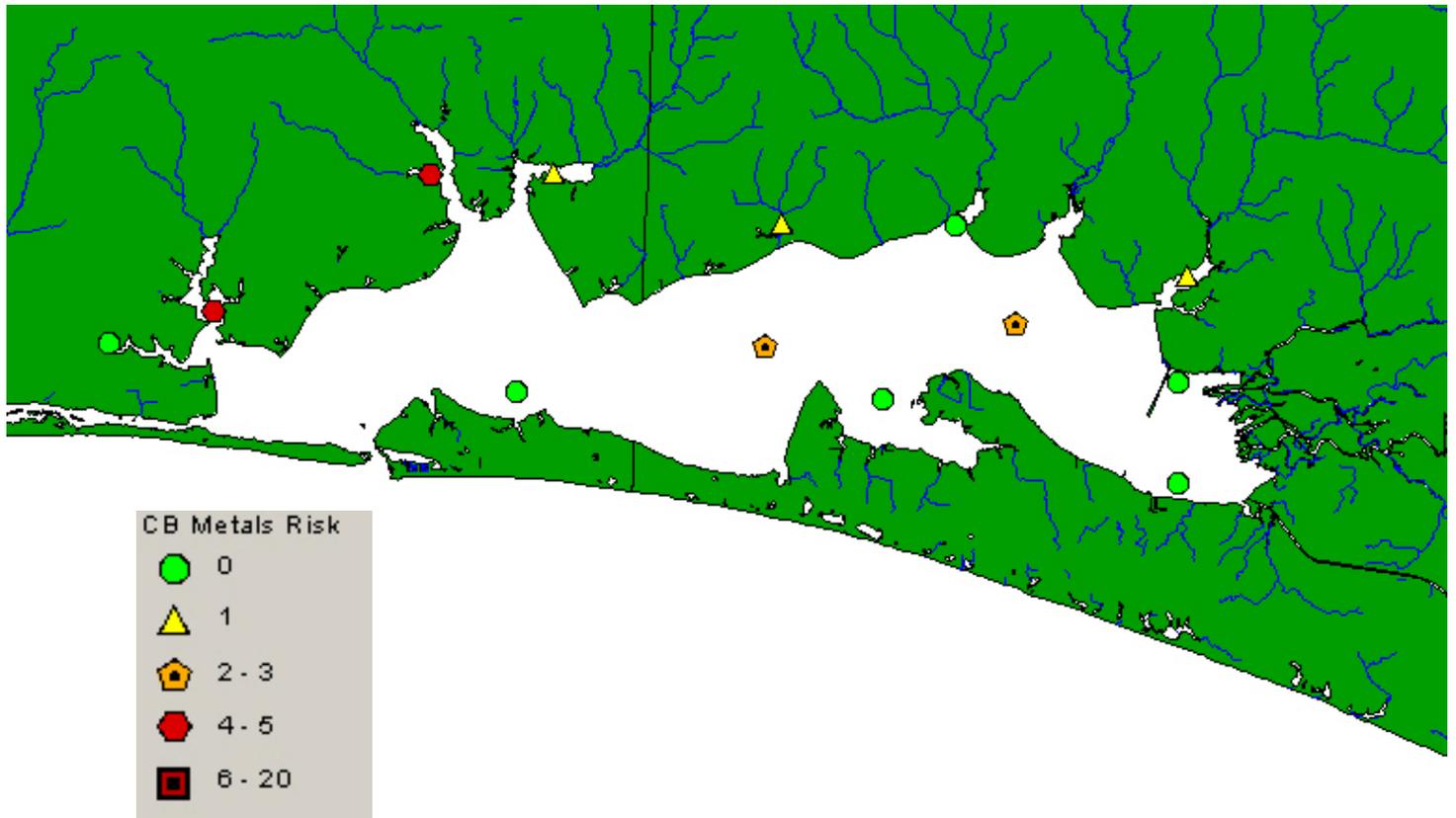


Figure 5 Estimated risk rank for metal analytes in sediment samples taken from Choctawhatchee Bay, 2002, exceeding Long *et al.* (1995) sediment quality guidelines.

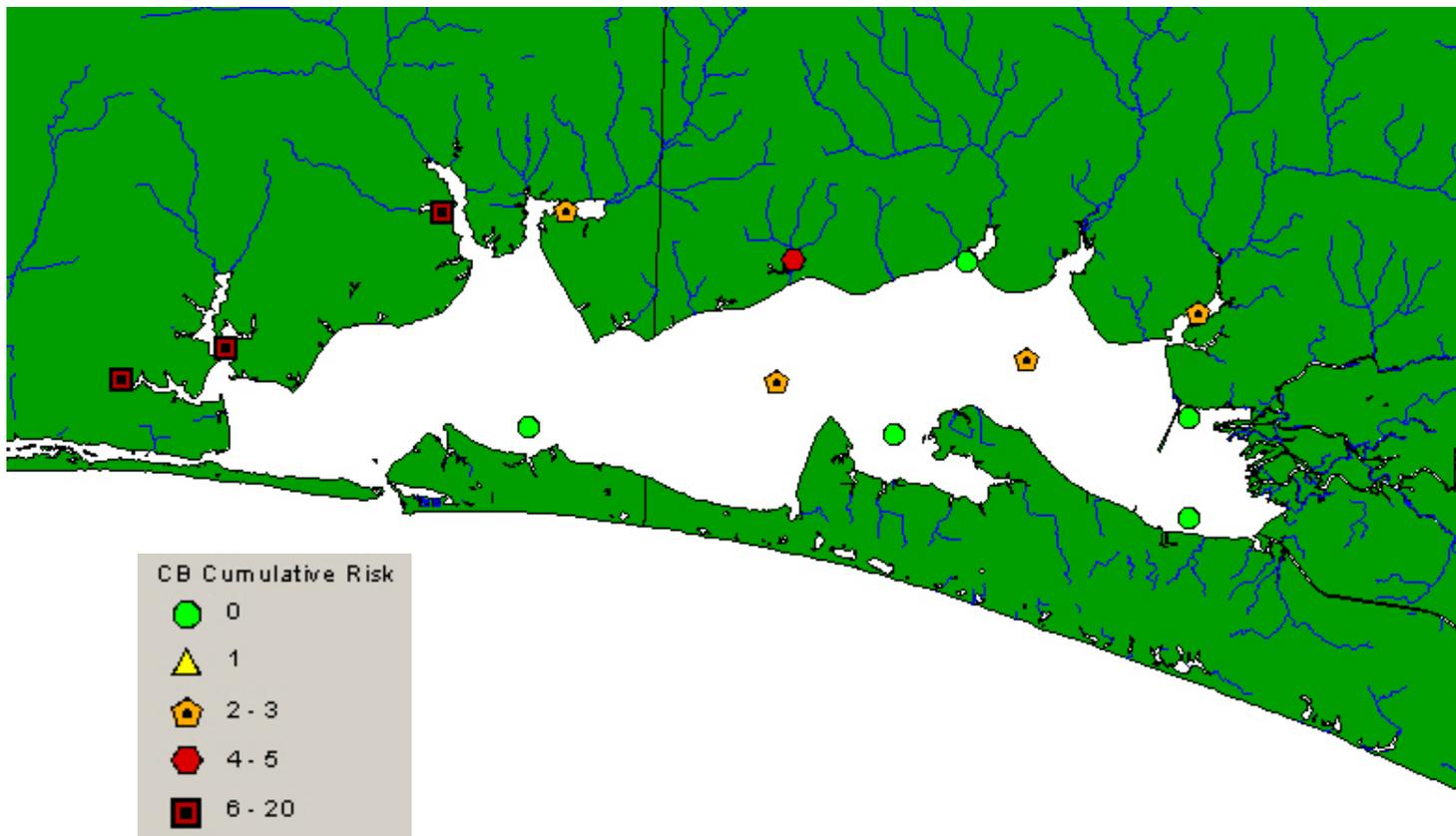


Figure 6 Estimated risk rank for cumulative analytes (PAH, OC and Metals) in sediment samples taken from Choctawhatchee Bay, 2002, exceeding Long *et al.* (1995) sediment quality guidelines.

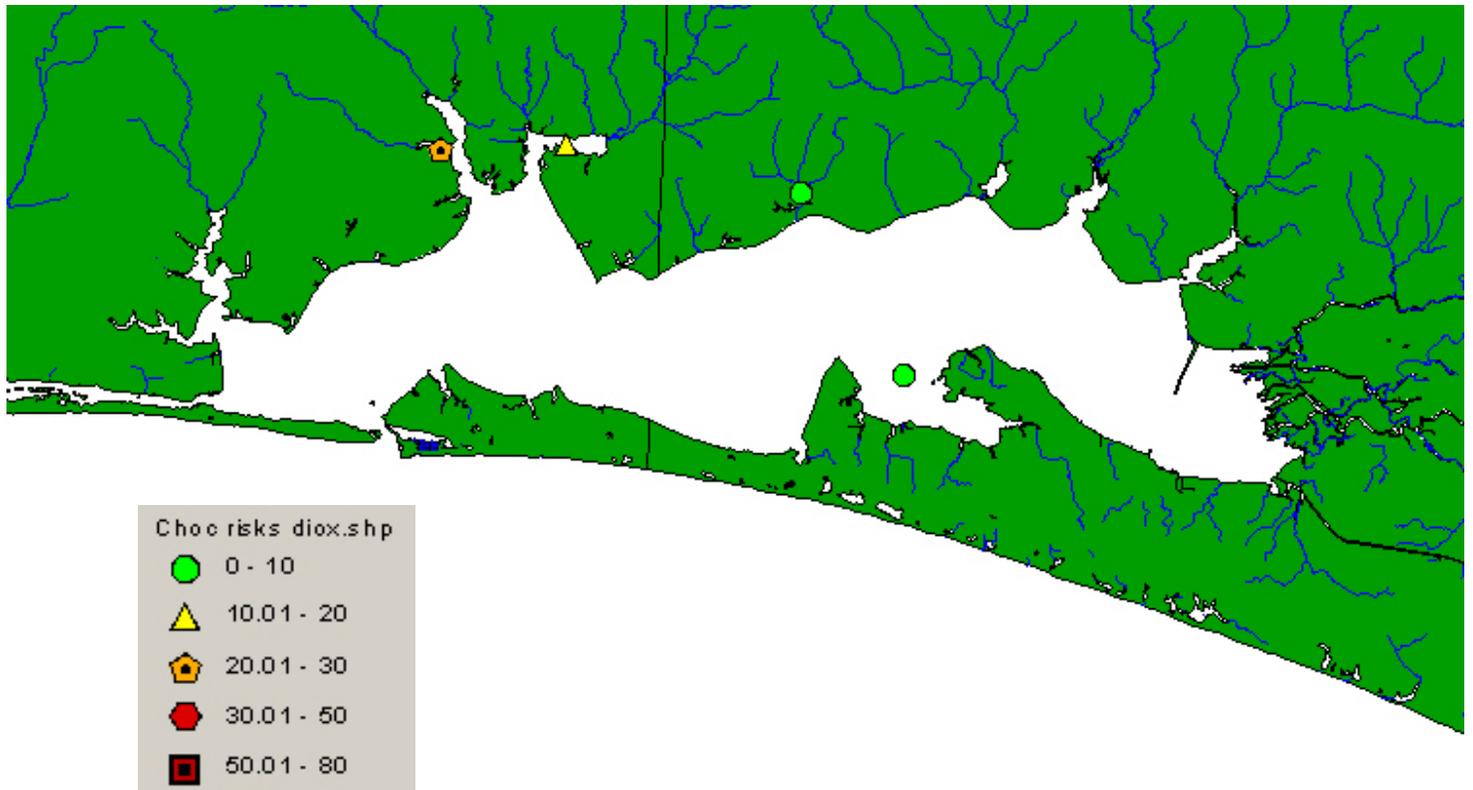


Figure 7 Dioxin toxicity equivalents (TEQs) calculated for dioxin and furan metabolic analytes found in sediment samples collected from four sites in Choctawhatchee Bay, 2002.

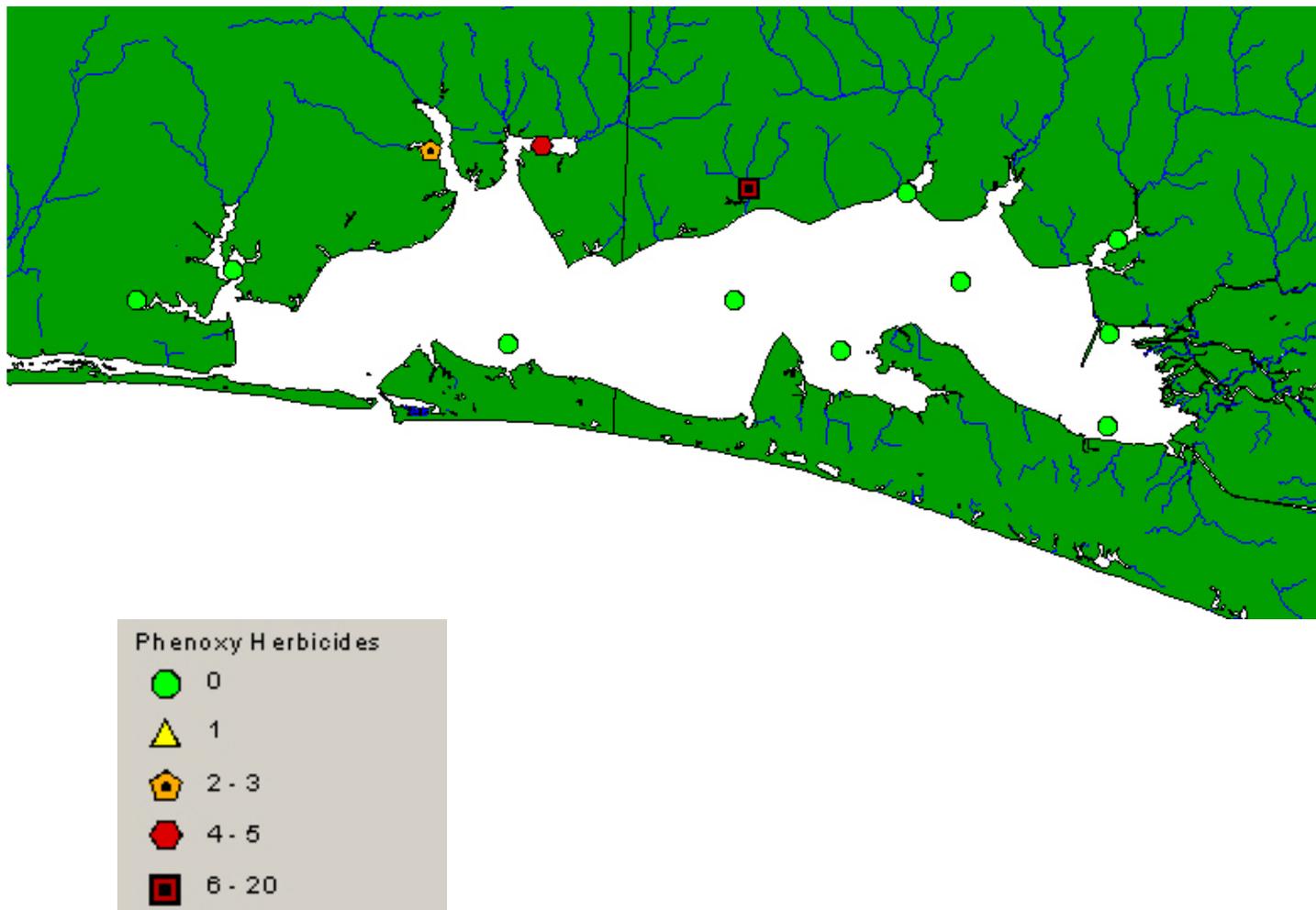


Figure 8 Estimated risk and need for further evaluation ranking scores for phenoxy herbicides in sediment samples collected in Choctawhatchee Bay, 2002.

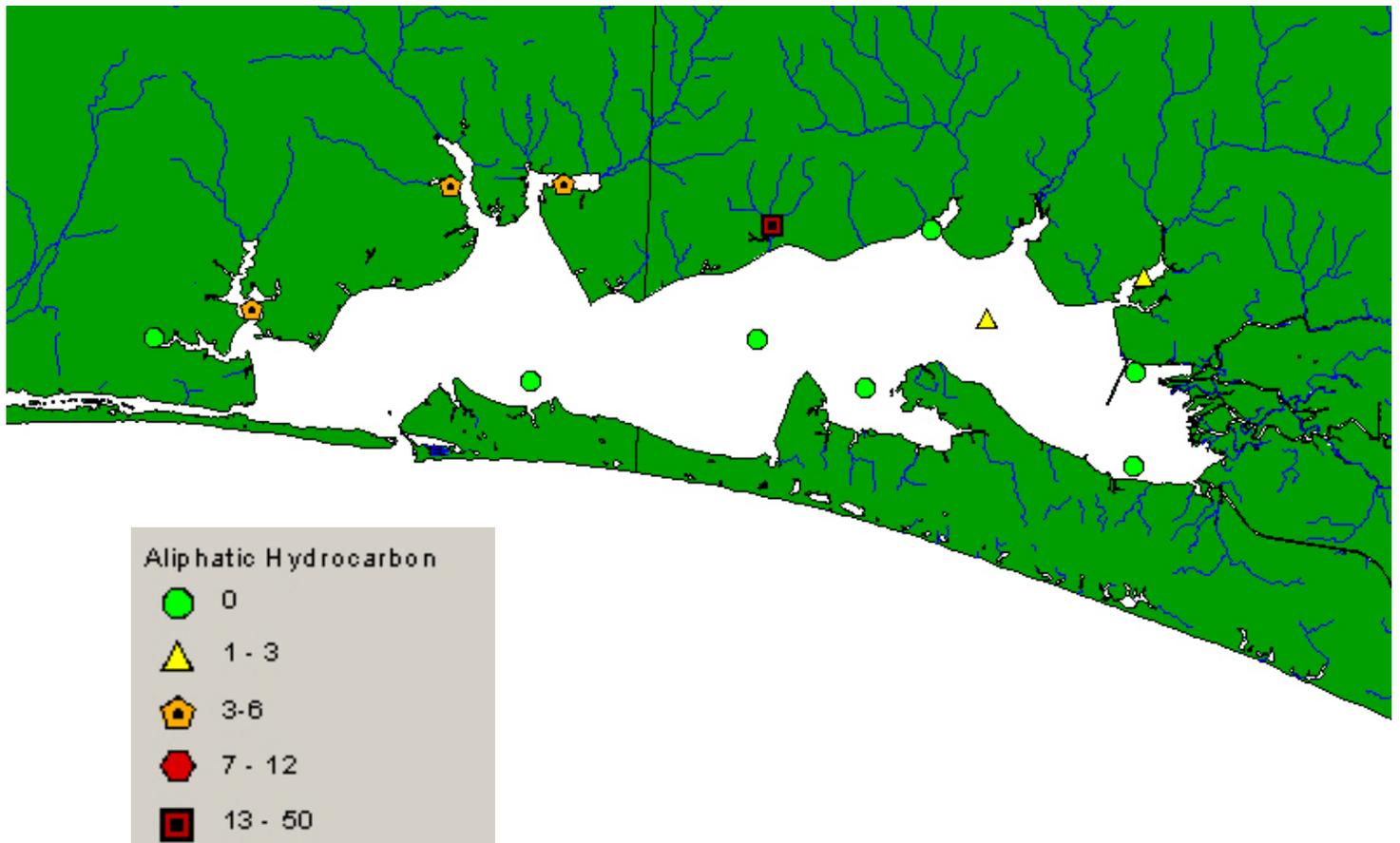


Figure 9 Estimated risk and need for further evaluation ranking scores for aliphatic hydrocarbons in sediment samples collected in Choctawhatchee Bay, 2002.

DISCUSSION

Habitat degradation in Choctawhatchee Bay has been reported (Blaylock, 1983; Livingston, 1997; NOAA, 1997). This study was designed to evaluate Choctawhatchee Bay to assess the current status of the bay, particularly in areas previously reported to be contaminated. Data was not dissimilar from earlier reports.

Sediment Composition

Sediment composition in Choctawhatchee Bay was comparable to other bay systems of the northeastern Gulf of Mexico (Brim *et al.*, 1998; Brim, 2000; Hemming *et al.* 2002). Sand fractions in Choctawhatchee Bay sediments ranged from a low 27.1% to a high of 99.6% with only 5 of the 13 samples containing less than 70% sand. The silt and clay fractions were correspondingly variable and reciprocal to the sand fractions. Silt ranged from 1.8% to as high 49.8% and clay range from 0.2 to 32.2%. Most samples collected from the deeper central portions of the bay were composed of silt, while sandy samples were collected from the shallow perimeter of Choctawhatchee Bay. Typical samples were a dark olivine color with an occasional sulfurous odor.

Metals

Arsenic, copper, lead, mercury, nickel, and silver were in excess of sediment quality guidelines at the Effects Range Low (ERL) level, but none exceeded the Effects Range Median (ERM) criteria (Long *et al.*, 1995). Sediment arsenic concentrations most frequently exceeded the sediment criterion with almost half the samples expected to increase the incidence of adverse negative effects on living resources from rare to occasional (ERL, Long

et al., 1995). Mercury and nickel concentrations exceeded their respective ERLs at 3 sites each. Lead surpassed its ERL at 2 sites and both copper and silver at 1 site each. The sediment sample from Tom's Bayou in the northwestern bay possessed all the above metals, except nickel, at concentrations exceeding ERL criteria. Concern prompted an environmental study by the Department of Environmental Protection in the late 90's after the Spence Boat Yard in Tom's Bayou burned to the ground in January of that year (Butts, 1997). Similarly, the adjacent Garnier's Bayou sediments contained all the listed metals, but silver and copper, above the ERL criteria. This localized metals contamination indicates a proximate source. Metal enrichment was found and sources were attributed to runoff from golf courses, marina activity, Chromated Copper Arsenate (CCA) treated dock pilings, antifouling paints, and general stormwater runoff from urban areas after rain event (Butts, 1997). A complete listing of the metal analytes are provided in Appendix G.

Polycyclic Aromatic Hydrocarbons (PAHs)

Like metals contamination, PAH concentrations exceeding ERL often occurred in Tom's Bayou and Garnier's Bayou, but even more frequently in Cinco Bayou, just east of Garnier's Bayou. No other bayou in the Choctawhatchee Bay system was shown to have sediment PAH contamination; however, Mullet Creek did exceed the ERL for total PAHs. The total PAHs criterion was exceeded in each of the three bayous listed above, as was the anthracene ERL criterion. Acenaphthylene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(a)pyrene, and dibenzo(a,h)anthracene were also found to exceed their respective ERLs in 1 to 2 bayous each. High concentrations were found in previous studies and reported sources included runoff, wastewater discharge, and illegal or accidental

dumping (CBA, 1998). As with metal contamination, sediments contaminated with PAHs at concentrations considered to pose ecological risk to fish and wildlife resources were most often found in the bayous of the northwestern bay. A complete listing of the PAH analytes are provided in Appendix F.

Organochlorines/Pesticides

Organochlorine (OC) contamination of sediments was only found to exceed sediment quality guidelines for the categories total polychlorinated biphenyls (PCBs) and total dichlorodiphenyltrichloroethane (DDT). Total DDT exceeded the ERL criterion at 7 sites, and was almost more than the ERM criterion in Tom's Bayou. Total PCB sediment concentrations exceeded the ERL in Garnier's Bayou, Cinco Bayou, and Mullet Creek, and were more than the ERM in Tom's Bayou indicating frequent adverse effects may have been expected from organochlorine compound exposure. The distribution of sediments contaminated with OC compounds was quite similar to the distribution of sediments contaminated with metals (described above). This type of contamination was also prevalent in the bayous of the northwestern bay area where metal and PAH contamination were predominant. Most of the areas with elevated organochlorine levels were drainage areas from historical spray fields used in the late 60's and early 70's (U.S. Department of Health and Human Services, 2003). A complete listing of the OC analytes are provided in Appendix E.

Dioxin

Dioxin contamination of sediments in Choctawhatchee Bay was not dissimilar from dioxin concentrations found in the sediments from bay systems across the Florida panhandle

(Hemming *et al.* 2003). The highest dioxin and furan concentrations measured in Choctawhatchee Bay were found in sediments taken from Tom's Bayou. As a result, the highest toxicity equivalency (TEQ) estimate was calculated for this bayou and it was more than twice the estimate for any of the other three samples taken. The Tom's Bayou sample could have imposed possible risk to some natural resource populations if in contact with these sediments; although, the other sites were likely to have posed only negligible risk (USEPA 1993, Hemming *et al.* 2003). However, risk may increase with changes in the distribution of these sediments via storm events or dredge and fill activities. Risk from exposure to dioxin compounds also dramatically increases in more sensitive life stages, different exposure routes (such as filtration feeding), and with concurrent exposure to other contaminants.

Dioxin found in Choctawhatchee Bay sediment may have originated from numerous historical spray fields and burial sites in the bay watershed (U.S. Department of Health and Human Services, 2003). However, natural burning occurrences and industrial processes also generate dioxin compounds (Harte *et al.*, 1991; Hoffman *et al.*, 2003; Schettler *et al.*, 1999; Im *et al.*, 2002). Resulting atmospheric concentrations (<6 pg/m³ range) in the United States are reportedly low (Smith *et al.*, 1989; Harless *et al.*, 1990; Maisel *et al.*, 1990; Hunt *et al.*, 1990a; CDEP, 1988; Harless *et al.*, 1991; Edgerton *et al.*, 1989; Eitzer *et al.*, 1989; Hunt *et al.*, 1990b), but can be traced to water body loading and sediment sequestering (Lodge and Cook, 1989, Hemming *et al.* 2003). Dioxin compounds are transferred from the sediment compartment to the food chain rather readily in aquatic systems. It is in the food chain that dioxins can be biologically magnified and cause adverse ecological effects (Hoffman *et al.*,

2003; Rhodes *et al.*, 1997; Woodford *et al.*, 1998; Landis and Yu, 1999; Marvin *et al.*, 2000; Kannan *et al.*, 2001; Im *et al.*, 2002). A complete listing of the dioxin analytes are provided in Appendix B.

Herbicides

Substantially more phenoxy herbicide residues were found in the sediment sample taken from Mullet Creek; however, noteworthy concentrations were also found in sediments from Tom's Bayou and Rocky Bayous. The phenoxy herbicides analyzed for in this survey included dicamba, 2,4-D, Dichloroprop, 2,4-DB, 2,4,5-T, and silvex. Dicamba is a synonym for the herbicide trichlopyr, commonly found as the active ingredient in landscaping "weed and feed" and brush control products (MeisterPro 2003). Phenoxy herbicides are systemic pesticides used for controlling woody plants and broadleaf weeds. They are used on lawns, golf courses, rights-of-way, non-irrigation ditch banks and agricultural fields (MeisterPro 2003). All three waterbodies with elevated concentrations of herbicides are lined with private homes, but Mullet Creek also has a drainage connection to a large private development on Lake Sharon.

Although no sediment quality guidelines were available for these chemicals, the literature does suggest that phenoxy herbicide exposure can cause adverse effects (Arias 1994, Arbuckle 1999, Duchnowicz 2002, Kleszczynska 2003). The effects of sediment-associated exposures are less clear (Romero 1998, Dorado and Almendros 2001). In any event, the elevated concentrations found only in certain bay segments indicated probable sub-watershed application of these herbicides and transport to the most proximate waterbody

(Felding *et al.* 1995, Hill *et al.* 2003). Appropriate pesticide management practices, such as adequate buffer zones and application timing and method alterations, could significantly reduce these inputs to the tributaries of Choctawhatchee Bay. A complete listing of the herbicide analytes are provided in Appendix D.

Aliphatic Hydrocarbons

Like phenoxy herbicides, the highest concentrations of aliphatic hydrocarbons (AHs) were found in sediments taken from Mullet Creek, Rocky Bayou, and Tom's Bayous. In addition to these sites, sediments from Garnier's Bayou also possessed noteworthy AH concentrations. While sediments from the above-mentioned bayous were contaminated with higher concentrations of 3 to 5 AH analytes, Mullet Creek sediments were heavily contaminated with over 20 AH analytes. Tom's and Rocky bayous are proximate to the Fort Walton Airport, but the land-use near Mullet Creek is mainly residential and owned by Eglin Air Force Base. Mullet Creek is one of the historical drainage sites from spray fields used in the late 60's and early 70's for testing of spray patterns and equipment. The test site above Mullet Creek was also a drum disposal site during the same time frame (U.S. Department of Health and Human Services, 2003). Mullet Creek is also in the vicinity of the Tri-Village Fire Department which might contribute to high levels of AH in the creek.

AHs are a large component of petroleum, such as fuels and oils, and are found associated with a variety of combustion engines from motor vehicles to aircraft. These products are found at various concentrations throughout the world as a result of the presence of petroleum (Hoffman et al 2003). Because of their wide use, occupational exposure

(Dudley *et al.* 2001, Spencer *et al.* 2002, Ritchie 2003) and environmental fate and transport (Suchanek *et al.* 2000, Lindstrom and Braddock 2002) have been examined. However, sediment quality guidelines are not yet available and risk assessments for this complex mix of analytes are not easily made despite their environmental toxicity and hazard to organisms (Hoffman *et al.* 2003). A complete listing of the AH analytes are provided in Appendix C.

CONCLUSIONS

The sediment quality of Choctawhatchee Bay was analogous to that reported for sediments of other Bay systems in the Florida panhandle (Brim *et al.*, 1998; Brim, 2000; Hemming *et al.*, 2003; Hemming et a. 2002). The occurrence of sediment contamination was largely site-specific with probable ties to proximate sub-watershed land-uses. More specific study of the distribution of contaminated sediments in these areas may reveal the historic and/or current sources of pollution. Further investigation into the extent of the contamination and the potential ecological risk posed is recommended for Mullet Creek, Rocky Bayou, Tom's Bayou, Garnier's Bayou, Cinco Bayou, and possibly La Grange Bayou.

The cumulative impact of the multiple analytes detected in some sediment samples has not been determined. However, the risk to the ecological systems in these bay areas is likely to far exceed the estimated risk of exposure to individual analytes as proposed by Long *et al.*, 1995. To further compound and intensify the point, heavy contamination of these same areas with contaminants not represented by the effects range categories (phenoxy herbicides and aliphatic hydrocarbons) existed.

RECOMMENDATIONS

The following recommendations are offered for consideration.

- 1) Conduct a more systematic sediment survey throughout the following water bodies to better assess the extent of contamination, level of contamination (increasing, decreasing, or stable) and possible migration of the contamination to surrounding areas: Mullet Creek, Rocky Bayou, Tom's Bayou, Garnier's Bayou, Cinco Bayou, and La Grange Bayou.
- 2) Conduct a land-use survey evaluating activities, historic and present, that may be related to site-specific contamination.
- 3) Monitor the biological tissues (especially reproductive tissues or eggs) of some resident piscivorous birds, in particular, the brown pelican and osprey for bioaccumulation of these contaminants to determine if remedial actions are needed.
- 4) Monitor the biological tissues (including unfertilized eggs) of coastal resident marine species, particularly spotted seatrout, flounder, redfish, and long-lived, deep-water clam species for bioaccumulation of these contaminants to determine if remedial actions are needed.

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APPENDICES

Appendix A
Standard operating procedures for field collection of sediment samples (PCFO-EC SOP 004).

STANDARD OPERATING PROCEDURES

SEDIMENT SAMPLING FOR CHEMICAL ANALYSES

To maintain and assure quality control, sediment samples collected for shipment to USFWS-approved analytical laboratories will be obtained and handled as follows:

COLLECTON OF SAMPLES FROM COASTAL WATERS OR LARGE RIVERS

1. Sampling Devices - The following devices are approved for obtaining sediment samples:

- A) Ponar grab, Standard. Manufactured from 316 stainless steel including jaws, side plates, underlip plate, screen. frame, screens and hinge pin. 583 micron mesh top screens; weight empty - 21 kg (45 lbs); sampling area 22.85 cm. x 22.85 cm (9" x 9").
- B) Ponar grab, Petite. Manufactured with 316 stainless steel including jaws, side plates, underlip plate, screen frame, screens and hinge pin. 583 micron mesh top screens; weight empty - 6.8 kg (15 lbs); sampling area 15.24 x 15.24 cm (6" x 6").

2. Sediment Sampling Boat-

- A) fiberglass boat with outboard motor equipped as follows:
 - 1) navigation and positioning capabilities including: a) loran navigation system, b) chart-printing depth recorder, c) compass, d) appropriate navigation charts.
 - 2) 12 volt electric winch; steel ginpole with heavy duty pulley; 100' of 1/2" braided nylon lift rope.

3. Other Equipment and Supplies -

- A) Stainless steel sample pan 28 x 48 x 10 cm.

- B) Pre-cleaned, chemical-free, glass 1.0 liter sample jars with screw-top lids having Teflon liners.
- C) Pre-cleaned, chemical-free stainless steel utensils.
- D) Clean insulated ice chests with ice.
- E) Permanent, glass-adhesive markers.
- F) Bound collection logbook or individual record sheets.
- G) Disposable laboratory gloves.
- H) Meters: dissolved oxygen, salinity, temperature, pH and others, as appropriate.

4. Operational Procedures -

- A) Prior to each *collection day* the ponar sampler will be scrubbed and washed with a detergent solution, rinsed thoroughly with tap water, and then rinsed with distilled water. After each collection *field* trip the ponar will be cleaned, as above, and stored properly.
- B) The daily collection plan shall provide, to the greatest extent possible, for sampling to begin at the least contaminated station, with work advancing toward the most contaminated station.
- C) Sediment samples obtained at *sampling stations* will be composite samples. Each composite will consist of five individual ponar sub-samples collected 3 meters apart along a straight-line transect, with the collection boat anchored. Move from one *sub-sample position* to the next by slipping the anchor line to provide approximately 3 meters of horizontal drift.
- D) Place each ponar sub-sample in the sample pan. Take approximately 150 grams - of sediment from the center of the sub-sample using appropriate utensils and place it in the collection jar designated for that station. After obtaining each sub-sample, rinse utensils, wash deck, sample pan, and the ponar sampler with seawater or river water.

Note: 150 grams *of* sub-sample collected from each *of* the 5 sub-sample positions (about 750 grams *of* sample total) should result in the sample jar being about 3/4 full. This leaves adequate space in the jar for any expansion of the sample during freezing.

- E) During collection of the third ponar sub-sample, record the *station location* by loran positions and by latitude and longitude. At this time, also record all other station information (such as depth, water temperature, etc).

- F) Place each sub-sample (total. n=5) in the appropriate pre-labeled, sample jar. Secure the lid and place sample on ice in a cooler.

- G) After work at each *sampling station* is complete, clean the ponar. Sample pan, wash deck and utensils thoroughly and rinse with seawater or river water.

- H) For field trips involving more than one day, samples will be frozen and stored in a portable *field freezer*.

- I) After each collection day double-wrap each full sample jar with clean, heavy-duty aluminum foil, place a second identification label over the foil and store in a freezer.

- J) Upon returning to the Panama City Field Office samples will be transferred to a *laboratory freezer* and held at -230 degrees centigrade (-10 Fahrenheit) until shipment for chemical analyses. Sediment samples for particle size analysis will be held at 40 degrees C.

Appendix B
Depth and bottom water temperature collected during sampling.

Station ID	Latitude	Longitude	Depth (m)	Temperature (C)
CBA1	30.50317	-86.43550	5.0	30.5
CBA2	30.50117	-86.49150	4.3	31.5
CBA3	30.44617	-86.58917	6.5	29.6
CBA4	30.43233	-86.63667	2.1	32.5
CBA5	30.41667	-86.45000	6.4	29.9
CBA6	30.41667	-86.28333	3.7	30.2
CBA7	30.43717	-86.33750	6.7	29.9
CBA8	30.43233	-86.63667	0.9	26.4
CBA9	30.48550	-86.25167	0.5	30.7
CBA10	30.46717	-86.14567	4.0	30.9
CBA11	30.44750	-86.22367	4.5	30.4
CBA12	30.42550	-86.14917	2.1	31.2
CBA13	30.38533	-86.14900	2.3	30.2

Appendix C
Dioxin data on samples from Rocky, Tom's and Hogtown Bayous, and Mullet Creek.

2002-457-CBA

Table A: Dioxins and Furans: Soil (ppt)

	Rocky Bayou CBA1 8/22/02 1003	# of pks	Tom's Bayou CBA2 8/22/02 1048	# of pks	Hogtown Bayou CBA6 8/21/02 1205	# of pks	Mullet Creek CBA8 8/21/02 0922	# of pks
<u>Furans:</u>								
2378-TCDF	0.4		2.9		NDR (0.3)		1.0	
Total TCDFs	6.8	6	27.3	8	ND (0.3)		15.1	5
12378-PeCDF	NDR (0.4)		1.5		ND (0.1)		ND (0.1)	
23478-PeCDF	0.4		4.2		ND (0.1)		0.6	
Total PeCDFs	2.3	2	124	8	ND (0.1)		15.2	8
123478-HxCDF	0.5		13.3		ND (0.1)		1.5	
123678-HxCDF	0.5		6.6		ND (0.1)		0.8	
234678-HxCDF	ND (0.1)		11.1		ND (0.1)		1.5	
123789-HxCDF	ND (0.1)		NDR (0.8)		ND (0.1)		NDR (0.5)	
Total HxCDFs	2.6	3	117	6	ND (0.1)		21.6	6
1234678-HpCDF	3.7		79.3		0.7		13.4	
1234789-HpCDF	NDR (0.3)		5.9		ND (0.2)		1.1	
Total HpCDFs	6.9	3	189	3	0.7	1	35.8	4
OCDF	4.6	1	124	1	1.9	1	23.5	1
<u>Dioxins:</u>								
2378-TCDD	0.3		0.7		ND (0.2)		5.0	
Total TCDDs	39.5	7	25.0	7	2.5	1	5.0	1
12378-PeCDD	1.1		2.7		ND (0.2)		NDR (0.9)	
Total PeCDDs	63.4	7	38.7	6	3.6	3	ND (0.9)	
123478-HxCDD	NDR (3.5)		6.8		NDR (0.5)		2.2	
123678-HxCDD	5.6		17.7		NDR (0.8)		4.0	
123789-HxCDD	18.9		24.2		NDR (2.0)		NDR (3.6)	
Total HxCDDs	527	5	488	7	36.1	3	42.5	6
1234678-HpCDD	253		543		25.0		71.5	
Total HpCDDs	1106	2	1644	2	93.5	2	174	2
OCDD	5081	1	6217	1	528	1	824	1
Toxic Equivalent (TEQ)	11.3 ppt		25.1 ppt		0.787 ppt		8.11 ppt	

2002-457-CBA

Table A (cont.)

	Rocky Bayou	Tom's Bayou	Hogtown Bayou	Mullet Creek
<u>% Recovery</u>	CBA1 8/22/02 1003	CBA2 8/22/02 1048	CBA6 8/21/02 1205	CBA8 8/21/02 0922
<u>of Surrogates:</u>				
13C-2378-TCDF	84	64	74	82
13C-2378-TCDD	82	65	74	83
13C-12378-PeCDF	82	63	79	84
13C-23478-PeCDF	83	63	76	81
13C-12378-PeCDD	95	66	89	91
13C-123478-HxCDF	86	71	79	94
13C-123678-HxCDF	90	72	85	91
13C-234678-HxCDF	88	68	78	93
13C-123789-HxCDF	84	66	81	88
13C-123478-HxCDD	89	74	80	85
13C-123678-HxCDD	95	76	91	102
13C-1234678-HpCDF	84	66	76	88
13C-1234789-HpCDF	81	61	78	83
13C-1234678-HpCDD	90	68	81	89
13C-OCDD	83	66	74	86

ND - none detected (detection limits in adjacent column)

NDR - none detected based on peak ratio

NDS - none detected based on peak shape

Appendix D
Aliphatic hydrocarbon data in sediment samples collected from the Choctawhatchee Bay,
2002.

Client Sample ID	CBA1	CBA2	CBA3	CBA4
GERG ID	C42411	C42412	C42413	C42414
Sample Type	SAMP	SAMP	SAMP	SAMP
SDG	C8695	C8695	C8695	C8695

Dry Weight	4.42	4.76	4.56	15.73
Wet Weight	20.28	20.13	20.22	20.23
Sample Size Units	Grams	Grams	Grams	Grams
Matrix	Sediment	Sediment	Sediment	Sediment
% solid	21.8	23.6	22.6	77.8
Reporting Units	ng/g	ng/g	ng/g	ng/g
Calculation Basis (dry/wet)	Dry	Dry	Dry	Dry

QC Batch ID	M3156	M3156	M3156	M3156
Method	GCFID	GCFID	GCFID	GCFID
Receive Date	08/27/02	08/27/02	08/27/02	08/27/02
Extraction Date	10/04/02	10/04/02	10/04/02	10/04/02
Analysis Date	10/20/02	10/20/02	10/20/02	10/20/02

Surrogate Compounds	%Recovery	%Recovery	%Recovery	%Recovery
D26-C12	82.0	68.0	78.0	89.0
D42-C20	90.0	92.0	82.0	106.0
D50-C24	89.0	98.0	86.0	106.0
D62-C30	87.0	75.0	70.0	92.0

Alkanes	Conc	DL	Conc	DL	Conc	DL	Conc	DL
n-C10	20.4	19.5	18.6	18.1	33.0	18.9	0.0	5.5 ND
n-C11	82.4	36.0	7.2	33.4 J	129.8	34.8	14.3	10.1
n-C12	0.0	62.8 ND	6.8	58.3 J	0.0	60.9 ND	0.0	17.6 ND
n-C13	0.0	18.1 ND	11.8	16.8 J	13.2	17.6 J	1.6	5.1 J
n-C14	10.4	23.9 J	16.2	22.2 J	9.1	23.2 J	2.6	6.7 J
n-C15	238.1	81.4	30.8	75.5 J	33.7	78.8 J	24.8	22.8
n-C16	0.0	117.8 ND	21.9	109.3 J	21.3	114.1 J	6.4	33.1 J
n-C17	286.7	85.0	1381.8	78.9	1037.0	82.3	245.0	23.9
Pristane	4.0	68.4 J	51.2	63.5 J	10.2	66.3 J	6.7	19.2 J
n-C18	12.1	116.1 J	30.7	107.8 J	14.6	112.4 J	3.6	32.6 J
Phytane	3.2	24.6 J	24.8	22.8	11.9	23.8 J	5.5	6.9 J
n-C19	43.3	74.4 J	106.1	69.1	49.5	72.1 J	41.1	20.9
n-C20	0.0	87.5 ND	105.4	81.3	24.1	84.8 J	0.0	24.6 ND
n-C21	159.1	87.3	270.7	81.0	383.2	84.5	12.0	24.5 J

n-C22	78.4	64.1	113.7	59.5	87.6	62.1	9.0	18.0 J
n-C23	243.1	50.5	287.6	46.8	201.8	48.9	42.4	14.2
n-C24	246.8	85.3	300.0	79.2	175.3	82.6	24.5	23.9
n-C25	697.3	32.1	2895.1	29.8	2280.8	31.1	45.8	9.0
n-C26	321.1	29.2	399.7	27.1	360.0	28.3	82.3	8.2
n-C27	1154.8	22.2	1131.4	20.7	657.4	21.5	130.3	6.2
n-C28	411.0	67.8	274.5	63.0	174.9	65.7	37.1	19.0
n-C29	3910.9	29.6	3204.6	27.5	1645.4	28.6	438.6	8.3
n-C30	664.1	88.2	394.4	81.9	479.2	85.4	76.2	24.8
n-C31	2449.5	34.4	2380.8	32.0	1277.6	33.4	281.0	9.7
n-C32	126.1	72.8	227.8	67.6	152.6	70.5	373.8	20.4
n-C33	740.3	16.4	941.1	15.3	606.1	15.9	217.8	4.6
n-C34	934.0	89.7	1525.0	83.3	355.2	86.9	230.2	25.2
Total Alkanes	12836.8		16159.6		10224.4		2352.2	
Reporting Units	ug/g		ug/g		ug/g		ug/g	
Total Resolved	44.01	17.1	51.83	15.8	34.35	16.5	10.70	4.8
Total TPH	101.60		385.52		278.30		120.34	
Total UCM	57.59		333.69		243.95		109.64	

ND	Not Detected
J	<MDL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3xMDL
D	Dilution

Client Sample ID	CBA5	CBA6	CBA7	CBA8
GERG ID	C42415	C42416	C42417	C42418
Sample Type	SAMP	SAMP	SAMP	SAMP
SDG	C8695	C8695	C8695	C8695

Dry Weight	12.80	14.26	5.60	1.65
Wet Weight	20.27	20.03	20.22	20.25
Sample Size Units	Grams	Grams	Grams	Grams
Matrix	Sediment	Sediment	Sediment	Sediment
% solid	63.2	71.2	27.7	8.1
Reporting Units	ng/g	ng/g	ng/g	ng/g
Calculation Basis (dry/wet)	Dry	Dry	Dry	Dry

QC Batch ID	M3156	M3156	M3156	M3156
Method	GCFID	GCFID	GCFID	GCFID
Receive Date	08/27/02	08/27/02	08/27/02	08/27/02
Extraction Date	10/04/02	10/04/02	10/04/02	10/04/02
Analysis Date	10/20/02	10/20/02	10/21/02	10/21/02

Surrogate Compounds	%Recovery	%Recovery	%Recovery	%Recovery	
D26-C12	70.0	73.0	74.0	57.0	
D42-C20	74.0	80.0	82.0	63.0	
D50-C24	75.0	78.0	83.0	73.0	
D62-C30	75.0	95.0	74.0	38.0	Q

Alkanes	Conc	DL	Conc	DL	Conc	DL	Conc	DL
n-C10	11.0	6.7	0.0	6.1 ND	0.0	15.4 ND	0.0	52.4 ND
n-C11	39.2	12.4	0.0	11.1 ND	0.0	28.4 ND	34.5	96.5 J
n-C12	0.0	21.7 ND	0.0	19.5 ND	0.0	49.6 ND	0.0	168.6 ND
n-C13	1.3	6.3 J	0.0	5.6 ND	0.0	14.3 ND	0.0	48.7 ND
n-C14	2.2	8.3 J	2.5	7.4 J	8.1	18.9 J	0.0	64.2 ND
n-C15	9.1	28.1 J	33.2	25.2	35.3	64.2 J	0.0	218.3 ND
n-C16	6.6	40.6 J	5.9	36.5 J	16.9	93.0 J	80.5	316.0 J
n-C17	164.7	29.3	87.7	26.3	461.3	67.1	2411.3	228.0
Pristane	3.5	23.6 J	1.7	21.2 J	11.2	54.0 J	115.7	183.6 J
n-C18	3.3	40.1 J	2.6	36.0 J	20.1	91.6 J	302.2	311.5 J
Phytane	2.1	8.5 J	2.5	7.6 J	8.5	19.4 J	218.2	66.0
n-C19	7.0	25.7 J	4.7	23.1 J	48.6	58.7 J	2700.2	199.6
n-C20	3.9	30.2 J	3.4	27.1 J	21.8	69.1 J	665.7	234.9
n-C21	56.4	30.1	32.4	27.0	324.5	68.9	1921.4	234.2

n-C22	14.5	22.1 J	9.7	19.9 J	68.4	50.6	1590.5	171.9
n-C23	23.4	17.4	14.5	15.6 J	194.8	39.8	4164.5	135.4
n-C24	16.1	29.4 J	12.2	26.4 J	176.6	67.3	3060.4	228.9
n-C25	33.0	11.1	20.7	10.0	394.1	25.4	11334.3	86.2
n-C26	51.6	10.1	25.9	9.1	409.0	23.1	5173.8	78.4
n-C27	87.2	7.7	55.0	6.9	782.3	17.6	42436.2	59.7
n-C28	29.1	23.4	17.0	21.0 J	327.4	53.5	11020.8	182.0
n-C29	205.2	10.2	119.3	9.2	2024.0	23.3	111996.5	79.4
n-C30	35.2	30.4	13.8	27.3 J	331.3	69.6	21874.3	236.7
n-C31	153.8	11.9	88.7	10.7	1511.0	27.2	43748.6	92.4
n-C32	21.3	25.1 J	9.1	22.6 J	162.8	57.5	3197.3	195.3
n-C33	2.0	5.7 J	57.7	5.1	643.5	13.0	8504.4	44.1
n-C34	35.8	30.9	20.7	27.8 J	355.7	70.8	47711.3	240.6
Total Alkanes	1018.0		640.7		8336.9		324262.4	
Reporting Units	ug/g		ug/g		ug/g		ug/g	
Total Resolved	4.70	5.9	3.30	5.3	24.70	13.5	1127.10	45.8
Total TPH	39.55		20.12		89.03		1774.12	
Total UCM	34.85		16.82		64.33		647.02	

ND	Not Detected
J	<MDL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3xMDL
D	Dilution

Client Sample ID	CBA9	CBA10	CBA11	CBA12
GERG ID	C42419	C42420	C42421	C42422
Sample Type	SAMP	SAMP	SAMP	SAMP
SDG	C8695	C8695	C8695	C8695

Dry Weight	14.70	5.83	4.88	10.88
Wet Weight	20.07	20.21	20.05	20.01
Sample Size Units	Grams	Grams	Grams	Grams
Matrix	Sediment	Sediment	Sediment	Sediment
% solid	73.3	28.8	24.3	54.4
Reporting Units	ng/g	ng/g	ng/g	ng/g
Calculation Basis (dry/wet)	Dry	Dry	Dry	Dry

QC Batch ID	M3156	M3156	M3156	M3156
Method	GCFID	GCFID	GCFID	GCFID
Receive Date	08/27/02	08/27/02	08/27/02	08/27/02
Extraction Date	10/04/02	10/04/02	10/04/02	10/04/02
Analysis Date	10/21/02	10/21/02	10/21/02	10/21/02

Surrogate Compounds	%Recovery	%Recovery	%Recovery	%Recovery
D26-C12	73.0	69.0	66.0	66.0
D42-C20	80.0	83.0	79.0	96.0
D50-C24	80.0	74.0	74.0	75.0
D62-C30	94.0	72.0	74.0	62.0

Alkanes	Conc	DL	Conc	DL	Conc	DL	Conc	DL
n-C10	0.0	5.9 ND	0.0	14.8 ND	0.0	17.7 ND	0.0	7.9 ND
n-C11	0.0	10.8 ND	0.0	27.3 ND	0.0	32.6 ND	1.6	14.6 J
n-C12	0.0	18.9 ND	0.0	47.6 ND	6.3	56.9 J	0.0	25.5 ND
n-C13	0.7	5.5 J	10.2	13.8 J	8.3	16.4 J	1.2	7.4 J
n-C14	2.8	7.2 J	8.8	18.1 J	12.4	21.7 J	2.2	9.7 J
n-C15	19.7	24.4 J	35.5	61.7 J	30.8	73.6 J	19.3	33.0 J
n-C16	5.5	35.4 J	0.0	89.2 ND	25.9	106.6 J	1.7	47.8 J
n-C17	23.5	25.5 J	581.2	64.4	272.0	76.9	58.4	34.5
Pristane	0.6	20.6 J	0.0	51.9 ND	3.8	61.9 J	0.9	27.8 J
n-C18	1.9	34.9 J	13.2	88.0 J	14.3	105.1 J	3.8	47.1 J
Phytane	2.3	7.4 J	21.2	18.6	10.7	22.3 J	5.3	10.0 J
n-C19	0.0	22.4 ND	44.1	56.4 J	37.3	67.3 J	12.6	30.2 J
n-C20	5.0	26.3 J	24.8	66.3 J	26.7	79.2 J	0.0	35.5 ND
n-C21	6.0	26.2 J	181.3	66.1	105.9	79.0	37.9	35.4

n-C22	3.6	19.3 J	101.3	48.6	99.4	58.0	25.5	26.0 J
n-C23	6.9	15.2 J	456.8	38.2	266.9	45.7	81.9	20.5
n-C24	13.6	25.6 J	401.7	64.6	206.6	77.2	69.6	34.6
n-C25	7.7	9.7 J	1155.8	24.3	684.0	29.1	157.1	13.0
n-C26	11.6	8.8	450.3	22.2	406.5	26.5	95.0	11.9
n-C27	19.4	6.7	1850.7	16.9	1003.8	20.1	291.2	9.0
n-C28	34.2	20.4	686.0	51.4	497.0	61.4	112.4	27.5
n-C29	66.1	8.9	5282.5	22.4	3108.6	26.8	1304.2	12.0
n-C30	25.6	26.5 J	783.7	66.8	557.3	79.8	160.3	35.8
n-C31	34.2	10.3	3868.4	26.1	2361.6	31.2	896.6	14.0
n-C32	1.4	21.9 J	353.7	55.2	282.4	65.9	50.7	29.5
n-C33	11.5	4.9	1237.5	12.5	1030.5	14.9	299.9	6.7
n-C34	0.0	26.9 ND	741.1	68.0	291.5	81.1	291.1	36.4
Total Alkanes	303.6		18289.8		11350.5		3980.2	
Reporting Units	ug/g		ug/g		ug/g		ug/g	
Total Resolved	2.51	5.1	57.03	12.9	31.96	15.4	12.51	6.9
Total TPH	13.58		160.80		102.66		33.30	
Total UCM	11.07		103.77		70.70		20.79	

ND	Not Detected
J	<MDL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3xMDL
D	Dilution

Client Sample ID	CBA13
GERG ID	C42423
Sample Type	SAMP
SDG	C8695

Dry Weight	14.12
Wet Weight	20.08
Sample Size Units	Grams
Matrix	Sediment
% solid	70.3
Reporting Units	ng/g
Calculation Basis (dry/wet)	Dry

QC Batch ID	M3156
Method	GCFID
Receive Date	08/27/02
Extraction Date	10/04/02
Analysis Date	10/21/02

Surrogate Compounds	%Recovery
D26-C12	72.0
D42-C20	84.0
D50-C24	77.0
D62-C30	78.0

Alkanes	Conc	DL
n-C10	1.2	6.1 J
n-C11	1.5	11.3 J
n-C12	0.0	19.7 ND
n-C13	2.6	5.7 J
n-C14	2.6	7.5 J
n-C15	20.7	25.5 J
n-C16	7.7	36.9 J
n-C17	179.3	26.6
Pristane	1.0	21.4 J
n-C18	5.5	36.3 J
Phytane	8.7	7.7
n-C19	7.5	23.3 J
n-C20	7.2	27.4 J
n-C21	40.7	27.3
n-C22	16.5	20.1 J
n-C23	46.8	15.8
n-C24	35.7	26.7
n-C25	92.2	10.1
n-C26	54.9	9.1
n-C27	157.6	7.0
n-C28	73.8	21.2
n-C29	512.3	9.3
n-C30	75.3	27.6
n-C31	388.6	10.8
n-C32	35.3	22.8
n-C33	150.8	5.1
n-C34	78.8	28.1
Total Alkanes	2004.4	

Reporting Units	ug/g
Total Resolved	6.59 5.3
Total TPH	21.49
Total UCM	14.90

ND	Not Detected
J	<MDL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3xMDL
D	Dilution

Appendix E
Chlorophenoxy herbicide data in sediment samples collected from the Choctawhatchee Bay,
2002.

Client Sample ID	CBA1	CBA2	CBA3	CBA4
GERG ID	C42411	C42412	C42413	C42414
Sample Type	SAMP	SAMP	SAMP	SAMP
SDG	C8695	C8695	C8695	C8695

Dry Weight	4.40	4.75	4.52	15.66
Wet Weight	20.21	20.10	20.06	20.14
Sample Size Units	Grams	Grams	Grams	Grams
Matrix	Sediment	Sediment	Sediment	Sediment
% solid	21.8	23.6	22.6	77.8
Reporting Units	ng/g	ng/g	ng/g	ng/g
Calculation Basis (dry/wet)	Dry	Dry	Dry	Dry

QC Batch ID	M3157	M3157	M3157	M3157
Method	GCMS	GCECD	GCECD	GCECD
Receive Date	8/27/2002	8/27/2002	8/27/2002	8/27/2002
Extraction Date	10/8/2002	10/8/2002	10/8/2002	10/8/2002
Analysis Date	11/1/2002	10/18/2002	10/19/2002	10/19/2002

Pehnoxy Herbicides	Conc	DL	Conc	DL	Conc	DL	Conc	DL
Dicamba	320	227	13	210 J	9	221 J	11	64
2,4-D	370	227	38	210	24	221	0	64 ND
Dichlorprop	620	227	36	210	13	221 J	6	64 J
2,4-DB	260	454	55	421	35	442 J	33	128
2,4,5-T	50	227	1322	210	0	221 ND	0	64 ND
Silvex	190	227	112	210	15	221 J	0	64 ND

ND	Not Detected
J	<MDL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3xMDL
d	Dilution
EC	Exceeds Calibration

Client Sample ID	CBA5	CBA6	CBA7	CBA8
GERG ID	C42415	C42416	C42417	C42418
Sample Type	SAMP	SAMP	SAMP	SAMP
SDG	C8695	C8695	C8695	C8695

Dry Weight	12.78	14.25	5.56	1.64
Wet Weight	20.23	20.02	20.07	20.16
Sample Size Units	Grams	Grams	Grams	Grams
Matrix	Sediment	Sediment	Sediment	Sediment
% solid	63.2	71.2	27.7	8.1
Reporting Units	ng/g	ng/g	ng/g	ng/g
Calculation Basis (dry/wet)	Dry	Dry	Dry	Dry

QC Batch ID	M3157	M3157	M3157	M3157
Method	GCECD	GCECD	GCECD	GCECD
Receive Date	8/27/2002	8/27/2002	8/27/2002	8/27/2002
Extraction Date	10/8/2002	10/8/2002	10/8/2002	10/8/2002
Analysis Date	10/19/2002	10/19/2002	10/19/2002	10/19/2002

Pehnoxy Herbicides	Conc	DL	Conc	DL	Conc	DL	Conc	DL
Dicamba	0	78 ND	0	70 ND	14	180 J	451	610
2,4-D	0	78 ND	0	70 ND	22	180	714	610
Dichlorprop	6	78 J	0	70 ND	29	180	1049	610
2,4-DB	11	157 J	9	140 J	56	360	445	1220
2,4,5-T	0	78 ND	0	70 ND	5	180 J	744	610
Silvex	7	78 J	0	70 ND	76	180	1147	610

ND	Not Detected
J	<MDL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3xMDL
d	Dilution
EC	Exceeds Calibration

Client Sample ID	CBA9	CBA10	CBA11
GERG ID	C42419	C42420	C42421
Sample Type	SAMP	SAMP	SAMP
SDG	C8695	C8695	C8695

Dry Weight	14.72	5.81	4.91
Wet Weight	20.09	20.13	20.17
Sample Size Units	Grams	Grams	Grams
Matrix	Sediment	Sediment	Sediment
% solid	73.3	28.8	24.3
Reporting Units	ng/g	ng/g	ng/g
Calculation Basis (dry/wet)	Dry	Dry	Dry

QC Batch ID	M3157	M3157	M3157
Method	GCECD	GCECD	GCECD
Receive Date	8/27/2002	8/27/2002	8/27/2002
Extraction Date	10/8/2002	10/8/2002	10/8/2002
Analysis Date	10/19/2002	10/19/2002	10/19/2002

Pehnoxy Herbicides	Conc	DL	Conc	DL	Conc	DL
Dicamba	9	68	9	172 J	0	204 ND
2,4-D	0	68 ND	21	172	8	204 J
Dichlorprop	0	68 ND	31	172	6	204 J
2,4-DB	21	136	95	344	0	407 ND
2,4,5-T	0	68 ND	0	172 ND	0	204 ND
Silvex	0	68 ND	79	172	20	204

ND	Not Detected
J	<MDL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3xMDL
d	Dilution
EC	Exceeds Calibration

Client Sample ID	CBA12	CBA13
GERG ID	C42422	C42423
Sample Type	SAMP	SAMP
SDG	C8695	C8695

Dry Weight	10.88	14.09
Wet Weight	20.01	20.05
Sample Size Units	Grams	Grams
Matrix	Sediment	Sediment
% solid	54.4	70.3
Reporting Units	ng/g	ng/g
Calculation Basis (dry/wet)	Dry	Dry

QC Batch ID	M3157	M3157
Method	GCECD	GCECD
Receive Date	8/27/2002	8/27/2002
Extraction Date	10/8/2002	10/8/2002
Analysis Date	10/19/2002	10/19/2002

Pehnoxy Herbicides	Conc	DL	Conc	DL
Dicamba	0	92 ND	0	71 ND
2,4-D	6	92 J	0	71 ND
Dichlorprop	12	92	10	71
2,4-DB	45	184	18	142
2,4,5-T	0	92 ND	0	71 ND
Silvex	27	92	13	71

ND	Not Detected
J	<MDL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3xMDL
d	Dilution
EC	Exceeds Calibration

Appendix F
Pesticide and PCB data in sediment samples collected from the Choctawhatchee Bay, 2002.

Client Sample ID	CBA1	CBA2	CBA3	CBA4
GERG ID	C42411	C42412	C42413	C42414
Sample Type	SAMP	SAMP	SAMP	SAMP
SDG	C8695	C8695	C8695	C8695

Dry Weight	4.42	4.76	4.56	15.73
Wet Weight	20.28	20.13	20.22	20.23
Sample Size Units	Grams	Grams	Grams	Grams
Matrix	Sediment	Sediment	Sediment	Sediment
% solid	21.8	23.6	22.6	77.8
Reporting Units	ng/g	ng/g	ng/g	ng/g
Calculation Basis (dry/wet)	Dry	Dry	Dry	Dry

QC Batch ID	M3156	M3156	M3156	M3156
Method	GCECD	GCECD	GCECD	GCECD
Receive Date	8/27/2002	8/27/2002	8/27/2002	8/27/2002
Extraction Date	10/4/2002	10/4/2002	10/4/2002	10/4/2002
Analysis Date	10/18/2002	10/18/2002	10/19/2002	10/19/2002

Surrogate Compounds	% Recov	% Recov	% Recov	% Recov
DBOFB	98.0	87.1	94.9	98.6
PCB103*	101.4	86.1	92.3	94.0
PCB198	93.9	78.8	83.1	89.2

Totals	Conc	Conc	Conc	Conc
Total PCBs	10.61	221.63	34.43	23.60
Total PCBs (SandT)	5.06	166.83	24.79	11.02

Pesticides	Conc	DL	Conc	DL	Conc	DL	Conc	DL
Chlorinated Benzenes								
Tetrachlorobenzene 1,2,4,5	1.96	0.4	2.16	0.4	2.77	0.4	0.64	0.1
Tetrachlorobenzene 1,2,3,4	0.05	0.6 J	0.04	0.6 J	0.02	0.6 J	0.01	0.2 J
Pentachlorobenzene	0.25	0.3 J	0.25	0.3 J	0.30	0.3 J	0.11	0.1
Hexachlorobenzene	0.00	0.2 ND	0.00	0.2 ND	0.00	0.2 ND	0.11	0.0
Hexachlorocyclohexanes								
Alpha HCH	0.04	0.2 J	0.39	0.1	0.29	0.2	0.02	0.0 J
Beta HCH	0.00	0.6 ND	0.00	0.6 ND	0.00	0.6 ND	0.00	0.2 ND
Gamma HCH	0.13	0.4 J	0.44	0.4	0.28	0.4 J	0.04	0.1 J
Delta HCH	0.00	0.2 ND	0.06	0.2 J	0.14	0.2 J	0.00	0.1 J

Chlordane-related Compounds

Heptachlor	0.00	0.5 ND	0.20	0.5 J	0.08	0.5 J	0.02	0.1 J
Heptachlor Epoxide	0.00	0.2 ND	0.26	0.2	0.03	0.2 J	0.04	0.0 J
Oxychlordane	0.00	0.2 ND	0.04	0.2 J	0.00	0.2 ND	0.08	0.0
Alpha Chlordane	0.07	0.4 J	1.22	0.3	0.79	0.3	0.46	0.1
Gamma Chlordane	0.05	0.1 J	1.33	0.1	0.54	0.1	0.77	0.0
Cis-Nonachlor	0.02	0.2 J	0.46	0.2	0.10	0.2 J	0.25	0.1
Trans-Nonachlor	0.00	0.3 ND	0.46	0.3	0.25	0.3 J	0.44	0.1

Other Cyclodiene Pesticides

Aldrin	0.00	0.2 ND	0.00	0.2 ND	0.00	0.2 ND	0.00	0.1 ND
Dieldrin	0.00	0.1 ND	0.35	0.1	0.03	0.1 J	0.01	0.0 J
Endrin	0.00	0.2 ND	0.20	0.2 J	0.48	0.2	0.08	0.1

Pesticides

Conc	DL	Conc	DL	Conc	DL	Conc	DL
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Other Chlorinated Pesticides

Pentachloroanisole	0.21	0.4 J	0.18	0.3 J	0.11	0.3 J	0.02	0.1 J
Chlorpyrifos	0.11	0.4 J	0.16	0.3 J	0.44	0.4	0.39	0.1
Mirex	0.00	0.3 ND	0.59	0.3	0.08	0.3 J	0.21	0.1
Endosulfan II	0.03	0.5 J	0.95	0.4	0.77	0.5	0.59	0.1

DDTs and Related Compounds

2,4' DDE	0.28	0.2	0.65	0.2	1.48	0.2	0.01	0.1 J
4,4' DDE	4.92	0.1	29.21	0.1	20.34	0.1	0.55	0.0
2,4' DDD	0.21	0.5 J	3.40	0.4	0.44	0.5 J	0.04	0.1 J
4,4' DDD	0.52	0.2	7.67	0.1	2.08	0.2	0.29	0.0
2,4' DDT	0.03	0.2 J	0.36	0.2	0.09	0.2 J	0.01	0.1 J
4,4' DDT	0.17	0.5 J	1.89	0.5	0.81	0.5	0.32	0.1

Individual PCBs

Conc	DL	Conc	DL	Conc	DL	Conc	DL	
PCB1*	1.26	1.3 J	1.22	1.2 J	0.92	1.3 J	0.68	0.4
PCB7/9*	0.00	1.3 ND	0.41	1.2 J	0.00	1.3 ND	0.00	0.4 ND
PCB8/5	0.40	0.6 J	2.69	0.5	0.84	0.5	0.12	0.2 J
PCB30*	0.00	1.3 ND	0.32	1.2 J	0.07	1.3 J	0.02	0.4 J
PCB18/17	0.18	0.3 J	1.91	0.3	0.40	0.3	0.09	0.1
PCB15*	0.10	1.3 J	2.50	1.2	0.44	1.3 J	0.09	0.4 J
PCB24/27*	0.00	1.3 ND	0.30	1.2 J	0.00	1.3 ND	0.00	0.4 J
PCB16/32*	1.12	1.3 J	2.04	1.2	1.07	1.3 J	0.32	0.4 J
PCB29	0.00	0.3 ND	0.05	0.3 J	0.00	0.3 ND	0.01	0.1 J
PCB26*	0.00	1.3 ND	1.52	1.2	0.00	1.3 ND	0.00	0.4 ND
PCB25*	0.00	1.3 ND	1.16	1.2 J	0.00	1.3 ND	0.25	0.4 J
PCB31*	0.75	1.3 J	0.27	1.2 J	0.07	1.3 J	0.05	0.4 J
PCB28	0.08	0.9 J	9.12	0.8	3.21	0.9	0.31	0.3
PCB33/20*	0.10	1.3 J	2.30	1.2	0.33	1.3 J	0.09	0.4 J
PCB53*	0.00	1.3 ND	0.90	1.2 J	0.10	1.3 J	0.00	0.4 ND
PCB22/51*	0.00	1.3 ND	0.66	1.2 J	0.01	1.3 J	0.01	0.4 J
PCB45*	0.00	1.3 ND	0.94	1.2 J	0.00	1.3 ND	0.00	0.4 ND
PCB46 *	0.13	1.3 J	0.72	1.2 J	0.32	1.3 J	0.00	0.4 ND
PCB39*	0.00	1.3 ND	0.00	1.2 ND	0.00	1.3 ND	0.00	0.4 ND

PCB69*	0.06	1.3 J	0.00	1.2 ND	0.00	1.3 ND	0.00	0.4 ND
PCB52	0.20	0.3 J	10.60	0.3	0.73	0.3	1.68	0.1
PCB49*	0.10	1.3 J	8.59	1.2	1.09	1.3 J	0.11	0.4 J
PCB47/75*	0.08	1.3 J	3.55	1.2	0.64	1.3 J	0.06	0.4 J
PCB48*	0.00	1.3 ND	1.79	1.2	0.00	1.3 ND	3.22	0.4
PCB44	0.13	0.5 J	6.94	0.4	0.26	0.4 J	0.10	0.1 J
PCB42/59/37*	0.00	1.3 ND	4.21	1.2	0.35	1.3 J	0.00	0.4 ND
PCB72*	0.00	1.3 ND	0.18	1.2 J	0.00	1.3 ND	0.02	0.4 J
PCB41/64*	27.21	1.3 I	9.36	1.2 I	15.86	1.3 I	8.99	0.4 I
PCB40*	0.01	1.3 J	1.68	1.2	0.27	1.3 J	0.14	0.4 J
PCB67*	0.00	1.3 ND	0.38	1.2 J	0.00	1.3 ND	0.00	0.4 ND
PCB63*	0.15	1.3 J	0.00	1.2 ND	0.29	1.3 J	0.00	0.4 ND
PCB74/61*	0.46	1.3 J	5.02	1.2	0.17	1.3 J	0.06	0.4 J
PCB70*	0.00	1.3 ND	7.98	1.2	0.17	1.3 J	0.09	0.4 J
PCB66	0.05	0.2 J	8.74	0.2	0.38	0.2	0.09	0.1
PCB95/80*	0.08	1.3 J	6.83	1.2	0.63	1.3 J	0.08	0.4 J
PCB55/91*	0.00	1.3 ND	3.69	1.2	0.67	1.3 J	0.30	0.4 J
PCB56/60*	0.18	1.3 J	6.77	1.2	0.25	1.3 J	0.25	0.4 J
PCB92*	0.00	1.3 ND	1.44	1.2	0.06	1.3 J	0.12	0.4 J
Individual PCBs	Conc	DL	Conc	DL	Conc	DL	Conc	DL
PCB84*	0.00	1.3 ND	3.15	1.2	0.00	1.3 ND	0.03	0.4 J
PCB101/90	0.18	1.4 J	8.86	1.3	1.44	1.4	0.11	0.4 J
PCB99*	0.18	1.3 J	6.14	1.2	1.15	1.3 J	0.08	0.4 J
PCB119*	0.00	1.3 ND	0.33	1.2 J	0.08	1.3 J	0.10	0.4 J
PCB83*	1.06	1.3 J	0.25	1.2 J	0.13	1.3 J	0.00	0.4 ND
PCB97*	0.00	1.3 ND	4.74	1.2	0.21	1.3 J	0.03	0.4 J
PCB81*	0.00	1.3 ND	0.76	1.2 J	0.80	1.3 J	0.72	0.4
PCB87/115	0.00	0.2 ND	2.75	0.2	0.12	0.2 J	0.04	0.1 J
PCB85*	0.03	1.3 J	0.60	1.2 J	0.03	1.3 J	0.01	0.4 J
PCB136*	0.08	1.3 J	1.18	1.2 J	0.31	1.3 J	0.32	0.4 J
PCB110/77	0.20	0.9 J	10.90	0.9	1.00	0.9	0.68	0.3
PCB82*	0.00	1.3 ND	1.64	1.2	0.16	1.3 J	0.01	0.4 J
PCB151*	0.00	1.3 ND	1.42	1.2	0.13	1.3 J	0.02	0.4 J
PCB135*	0.00	1.3 ND	0.92	1.2 J	0.14	1.3 J	0.01	0.4 J
PCB107*	0.00	1.3 ND	2.64	1.2	0.45	1.3 J	0.27	0.4 J
PCB149/123*	0.06	1.3 J	3.93	1.2	0.64	1.3 J	0.09	0.4 J
PCB118	0.02	1.2 J	7.52	1.1	0.55	1.2 J	0.16	0.3 J
PCB114*	0.00	1.3 ND	0.00	1.2 ND	0.00	1.3 ND	0.00	0.4 ND
PCB146*	0.00	1.3 ND	1.01	1.2 J	0.15	1.3 J	0.02	0.4 J
PCB153/132	0.26	4.5 J	7.00	4.1	1.48	4.3 J	0.25	1.3 J
PCB105	0.06	1.8 J	3.87	1.7	0.20	1.8 J	0.07	0.5 J
PCB141/179*	0.00	1.3 ND	1.24	1.2	0.34	1.3 J	0.23	0.4 J
PCB130*	0.00	1.3 ND	3.28	1.2	1.32	1.3	0.89	0.4
PCB176/137*	0.11	1.3 J	1.80	1.2	0.68	1.3 J	0.89	0.4
PCB138 /160	0.21	4.2 J	6.65	3.9	1.09	4.1 J	0.29	1.2 J
PCB158*	0.00	1.3 ND	0.79	1.2 J	0.20	1.3 J	0.03	0.4 J
PCB129*	0.00	1.3 ND	0.00	1.2 ND	0.00	1.3 ND	0.00	0.4 ND

PCB126*	0.38	1.3 J	0.00	1.2 ND	0.00	1.3 ND	0.00	0.4 ND
PCB178*	0.09	1.3 J	1.69	1.2	0.82	1.3 J	1.18	0.4
PCB166*	0.00	1.3 ND	0.23	1.2 J	0.02	1.3 J	0.04	0.4 J
PCB175*	0.11	1.3 J	0.36	1.2 J	0.27	1.3 J	0.43	0.4
PCB187	0.16	2.6 J	3.19	2.4	0.91	2.5 J	1.90	0.7
PCB183 *	0.00	1.3 ND	0.71	1.2 J	0.12	1.3 J	0.00	0.4 ND
PCB128	0.04	0.4 J	1.16	0.4	0.16	0.4 J	0.06	0.1 J
PCB167*	0.12	1.3 J	0.94	1.2 J	0.39	1.3 J	0.51	0.4
PCB185 *	0.16	1.3 J	1.04	1.2 J	0.50	1.3 J	0.92	0.4
PCB174*	0.00	1.3 ND	1.38	1.2	0.00	1.3 ND	0.00	0.4 ND
PCB177*	0.00	1.3 ND	0.00	1.2 ND	0.00	1.3 ND	0.00	0.4 ND
PCB171/202*	0.07	1.3 J	1.11	1.2 J	0.19	1.3 J	0.18	0.4 J
PCB156*	0.20	1.3 J	3.70	1.2	0.92	1.3 J	0.97	0.4
PCB201/157/173*	0.00	1.3 ND	0.54	1.2 J	0.00	1.3 ND	0.09	0.4 J
PCB172*	0.10	0.2 J	1.27	0.2	0.48	0.2	0.56	0.0
PCB197*	0.16	1.3 J	1.38	1.2	0.67	1.3 J	0.62	0.4
PCB180	0.12	5.1 J	3.51	4.8 J	0.51	5.0 J	0.14	1.4 J
PCB193*	0.05	1.3 J	0.18	1.2 J	0.07	1.3 J	0.03	0.4 J
PCB191*	0.00	1.3 ND	0.00	1.2 ND	0.00	1.3 ND	0.38	0.4
PCB200*	0.00	1.3 ND	0.12	1.2 J	0.00	1.3 ND	0.05	0.4 J
PCB169*	0.00	1.3 ND	0.00	1.2 ND	0.00	1.3 ND	0.00	0.4 ND
PCB170/190	1.30	2.8 I	11.93	2.6 I	9.95	2.7 I	20.10	0.8 I
PCB199*	0.12	1.3 J	2.00	1.2	0.51	1.3 J	0.21	0.4 J
PCB203/196*	0.13	1.3 J	1.57	1.2	0.26	1.3 J	0.27	0.4 J
Individual PCBs	Conc	DL	Conc	DL	Conc	DL	Conc	DL
PCB189*	0.00	1.3 ND	0.32	1.2 J	0.05	1.3 J	0.03	0.4 J
PCB195/208	0.11	0.4 J	0.67	0.4	0.00	0.4 ND	0.00	0.1 ND
PCB207*	0.00	1.3 ND	0.00	1.2 ND	0.00	1.3 ND	0.00	0.4 ND
PCB194*	0.08	1.3 J	2.77	1.2	0.80	1.3 J	1.19	0.4
PCB205 *	0.00	1.3 ND	0.00	1.2 ND	0.00	1.3 ND	0.00	0.4 ND
PCB206	0.14	0.2 J	0.56	0.2	0.07	0.2 J	0.02	0.1 J
PCB209	0.18	0.2 J	0.40	0.2	0.16	0.2 J	0.11	0.1

Totals by Chlorination Level

CL1	1.26		1.22		0.92		0.68
CL2	0.49		5.61		1.28		0.20
CL3	2.22		19.65		5.15		1.17
CL4	1.57		73.44		6.49		6.84
CL5	2.19		61.67		6.20		1.77
CL6	0.97		33.46		7.31		3.73
CL7	0.97		16.57		4.60		6.63
CL8	0.60		9.06		2.24		2.43
CL9	0.14		0.56		0.07		0.02
CL10	0.18		0.40		0.16		0.11
Total PCBs	10.61		221.63		34.43		23.60

Client Sample ID	CBA5	CBA6	CBA7	CBA8			
GERG ID	C42415	C42416	C42417	C42418			
Sample Type	SAMP	SAMP	SAMP	SAMP			
SDG	C8695	C8695	C8695	C8695			
Dry Weight	12.80	14.26	5.60	1.65			
Wet Weight	20.27	20.03	20.22	20.25			
Sample Size Units	Grams	Grams	Grams	Grams			
Matrix	Sediment	Sediment	Sediment	Sediment			
% solid	63.2	71.2	27.7	8.1			
Reporting Units	ng/g	ng/g	ng/g	ng/g			
Calculation Basis (dry/wet)	Dry	Dry	Dry	Dry			
QC Batch ID	M3156	M3156	M3156	M3156			
Method	GCECD	GCECD	GCECD	GCECD			
Receive Date	8/27/2002	8/27/2002	8/27/2002	8/27/2002			
Extraction Date	10/4/2002	10/4/2002	10/4/2002	10/4/2002			
Analysis Date	10/19/2002	10/19/2002	10/19/2002	10/19/2002			
Surrogate Compounds	% Recov	% Recov	% Recov	% Recov			
DBOFB	92.8	87.7	90.3	93.6			
PCB103*	96.3	94.9	91.6	104.0			
PCB198	87.3	90.0	87.2	89.8			
Totals	Conc	Conc	Conc	Conc			
Total PCBs	1.57	1.19	11.23	103.75			
Total PCBs (SandT)	1.35	0.67	5.57	34.78			
Pesticides	Conc	DL	Conc	DL	Conc	DL	Conc
Chlorinated Benzenes							
Tetrachlorobenzene 1,2,4,5	0.74	0.1	0.57	0.1	1.67	0.3	3.85
Tetrachlorobenzene 1,2,3,4	0.01	0.2 J	0.00	0.2 ND	0.02	0.5 J	0.11 J
Pentachlorobenzene	0.06	0.1 J	0.07	0.1 J	0.24	0.3 J	0.00 ND
Hexachlorobenzene	0.00	0.1 ND	0.00	0.1 ND	0.00	0.1 ND	0.00 ND
Hexachlorocyclohexanes							
Alpha HCH	0.01	0.1 J	0.02	0.0 J	0.04	0.1 J	0.62
Beta HCH	0.00	0.2 ND	0.00	0.2 ND	0.02	0.5 J	0.11 J
Gamma HCH	0.02	0.2 J	0.01	0.1 J	0.11	0.4 J	0.32 J
Delta HCH	0.00	0.1 J	0.00	0.1 J	0.01	0.2 J	0.12 J
Chlordane-related Compounds							

Heptachlor	0.00	0.2 J	0.02	0.2 J	0.00	0.4 ND	1.83	
Heptachlor Epoxide	0.00	0.1 ND	0.00	0.1 ND	0.00	0.1 ND	0.39	J
Oxychlorodane	0.00	0.1 ND	0.00	0.1 ND	0.00	0.1 ND	0.34	J
Alpha Chlordane	0.02	0.1 J	0.03	0.1 J	0.42	0.3	16.13	
Gamma Chlordane	0.02	0.0 J	0.01	0.0 J	0.03	0.1 J	12.81	
Cis-Nonachlor	0.01	0.1 J	0.01	0.1 J	0.03	0.2 J	6.87	
Trans-Nonachlor	0.01	0.1 J	0.00	0.1 ND	0.01	0.2 J	12.45	
Other Cyclodiene Pesticides								
Aldrin	0.00	0.1 ND	0.00	0.1 J	0.01	0.2 J	0.09	J
Dieldrin	0.00	0.0 ND	0.01	0.0 J	0.01	0.1 J	0.05	J
Endrin	0.07	0.1 J	0.06	0.1 J	0.15	0.2 J	0.75	
Pesticides	Conc	DL	Conc	DL	Conc	DL	Conc	
Other Chlorinated Pesticides								
Pentachloroanisole	0.02	0.1 J	0.01	0.1 J	0.07	0.3 J	2.34	
Chlorpyrifos	0.04	0.1 J	0.03	0.1 J	0.08	0.3 J	0.68	J
Mirex	0.00	0.1 ND	0.00	0.1 ND	0.00	0.2 ND	0.36	J
Endosulfan II	0.00	0.2 ND	0.00	0.1 J	0.00	0.4 ND	0.38	J
DDTs and Related Compounds								
2,4' DDE	0.07	0.1 J	0.00	0.1 J	0.11	0.2 J	0.37	J
4,4' DDE	0.16	0.0	0.07	0.0	1.50	0.1	17.97	
2,4' DDD	0.35	0.2	0.27	0.1	0.69	0.4	2.33	
4,4' DDD	0.05	0.1 J	0.01	0.0 J	0.14	0.1	12.24	
2,4' DDT	0.02	0.1 J	0.00	0.1 J	0.05	0.2 J	0.42	J
4,4' DDT	0.03	0.2 J	0.01	0.2 J	0.20	0.4 J	2.84	

Individual PCBs	Conc	DL	Conc	DL	Conc	DL	Conc	
PCB1*	0.00	0.5 ND	0.00	0.4 ND	0.39	1.1 J	4.12	
PCB7/9*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.00	ND
PCB8/5	0.06	0.2 J	0.03	0.2 J	0.38	0.4 J	2.53	
PCB30*	0.00	0.5 ND	0.00	0.4 J	0.02	1.1 J	0.17	J
PCB18/17	0.05	0.1 J	0.04	0.1 J	0.18	0.2 J	1.13	
PCB15*	0.04	0.5 J	0.06	0.4 J	0.19	1.1 J	0.42	J
PCB24/27*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.00	ND
PCB16/32*	0.18	0.5 J	0.10	0.4 J	0.97	1.1 J	11.14	
PCB29	0.00	0.1 ND	0.02	0.1 J	0.04	0.2 J	0.72	J
PCB26*	0.00	0.5 ND	0.01	0.4 J	0.00	1.1 ND	0.19	J
PCB25*	0.00	0.5 ND	0.02	0.4 J	0.03	1.1 J	2.71	J
PCB31*	0.02	0.5 J	0.14	0.4 J	2.31	1.1	10.69	
PCB28	0.13	0.3 J	0.02	0.3 J	0.18	0.7 J	1.45	J
PCB33/20*	0.01	0.5 J	0.01	0.4 J	0.08	1.1 J	0.00	ND
PCB53*	0.02	0.5 J	0.02	0.4 J	0.06	1.1 J	0.41	J
PCB22/51*	0.00	0.5 ND	0.02	0.4 J	0.03	1.1 J	0.14	J
PCB45*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.00	ND
PCB46 *	0.00	0.5 ND	0.01	0.4 J	0.13	1.1 J	0.27	J
PCB39*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.00	ND
PCB69*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.75	J

PCB52	0.09	0.1 J	0.00	0.1 J	0.11	0.3 J	0.54	J
PCB49*	0.07	0.5 J	0.02	0.4 J	0.14	1.1 J	0.98	J
PCB47/75*	0.11	0.5 J	0.02	0.4 J	0.08	1.1 J	0.12	J
PCB48*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.00	ND
PCB44	0.00	0.2 ND	0.01	0.1 J	0.03	0.4 J	0.88	J
PCB42/59/37*	0.00	0.5 ND	0.01	0.4 J	0.05	1.1 J	0.00	ND
PCB72*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	1.40	J
PCB41/64*	0.27	0.5 I	0.64	0.4 I	14.42	1.1 I	153.43	I
PCB40*	0.00	0.5 J	0.00	0.4 J	0.01	1.1 J	0.13	J
PCB67*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.49	J
PCB63*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	1.42	J
PCB74/61*	0.03	0.5 J	0.00	0.4 ND	0.00	1.1 ND	7.82	
PCB70*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.00	ND
PCB66	0.05	0.1 J	0.01	0.1 J	0.02	0.2 J	0.63	
PCB95/80*	0.03	0.5 J	0.01	0.4 J	0.16	1.1 J	0.17	J
PCB55/91*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	4.24	
PCB56/60*	0.00	0.5 ND	0.12	0.4 J	0.00	1.1 ND	0.57	J
PCB92*	0.00	0.5 ND	0.01	0.4 J	0.00	1.1 ND	6.60	
Individual PCBs	Conc	DL	Conc	DL	Conc	DL	Conc	
PCB84*	0.00	0.5 ND	0.01	0.4 J	0.00	1.1 ND	0.00	ND
PCB101/90	0.03	0.5 J	0.00	0.4 ND	0.05	1.1 J	0.93	J
PCB99*	0.06	0.5 J	0.04	0.4 J	0.15	1.1 J	1.77	J
PCB119*	0.00	0.5 ND	0.01	0.4 J	0.03	1.1 J	0.84	J
PCB83*	0.00	0.5 ND	0.02	0.4 J	0.53	1.1 J	0.90	J
PCB97*	0.00	0.5 ND	0.01	0.4 J	0.02	1.1 J	0.70	J
PCB81*	0.07	0.5 J	0.00	0.4 ND	0.21	1.1 J	0.74	J
PCB87/115	0.00	0.1 ND	0.01	0.1 J	0.01	0.2 J	0.16	J
PCB85*	0.00	0.5 J	0.00	0.4 J	0.01	1.1 J	0.10	J
PCB136*	0.00	0.5 J	0.01	0.4 J	0.04	1.1 J	0.27	J
PCB110/77	0.07	0.3 J	0.03	0.3 J	0.12	0.7 J	3.23	
PCB82*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.00	ND
PCB151*	0.00	0.5 ND	0.00	0.4 ND	0.10	1.1 J	0.00	ND
PCB135*	0.00	0.5 ND	0.00	0.4 ND	0.07	1.1 J	0.02	J
PCB107*	0.05	0.5 J	0.01	0.4 J	0.29	1.1 J	0.00	ND
PCB149/123*	0.02	0.5 J	0.01	0.4 J	0.23	1.1 J	0.44	J
PCB118	0.02	0.4 J	0.01	0.4 J	0.03	1.0 J	2.19	J
PCB114*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.00	ND
PCB146*	0.02	0.5 J	0.01	0.4 J	0.06	1.1 J	0.14	J
PCB153/132	0.09	1.5 J	0.06	1.4 J	0.63	3.5 J	1.52	J
PCB105	0.01	0.6 J	0.00	0.6 J	0.08	1.5 J	0.54	J
PCB141/179*	0.00	0.5 ND	0.00	0.4 ND	0.15	1.1 J	1.07	J
PCB130*	0.02	0.5 J	0.00	0.4 J	0.10	1.1 J	0.53	J
PCB176/137*	0.00	0.5 ND	0.00	0.4 ND	0.20	1.1 J	0.91	J
PCB138 /160	0.09	1.5 J	0.09	1.3 J	0.43	3.3 J	1.66	J
PCB158*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.00	ND
PCB129*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.00	ND
PCB126*	0.02	0.5 J	0.00	0.4 ND	0.00	1.1 ND	1.69	J

PCB178*	0.00	0.5 ND	0.00	0.4 ND	0.05	1.1 J	0.15	J
PCB166*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.00	ND
PCB175*	0.06	0.5 J	0.07	0.4 J	0.11	1.1 J	0.07	J
PCB187	0.02	0.9 J	0.00	0.8 ND	0.17	2.1 J	0.61	J
PCB183 *	0.00	0.5 ND	0.00	0.4 ND	0.13	1.1 J	0.00	ND
PCB128	0.00	0.1 ND	0.00	0.1 ND	0.04	0.3 J	0.52	J
PCB167*	0.00	0.5 ND	0.00	0.4 ND	0.03	1.1 J	0.49	J
PCB185 *	0.00	0.5 ND	0.00	0.4 ND	0.10	1.1 J	1.48	J
PCB174*	0.00	0.5 ND	0.00	0.4 ND	0.07	1.1 J	0.10	J
PCB177*	0.00	0.5 ND	0.00	0.4 ND	0.14	1.1 J	4.11	
PCB171/202*	0.00	0.5 ND	0.00	0.4 ND	0.04	1.1 J	0.96	J
PCB156*	0.00	0.5 ND	0.00	0.4 ND	0.37	1.1 J	0.67	J
PCB201/157/173*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	1.97	J
PCB172*	0.00	0.1 ND	0.00	0.1 ND	0.00	0.1 ND	0.59	
PCB197*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.94	J
PCB180	0.03	1.8 J	0.02	1.6 J	0.30	4.0 J	0.69	J
PCB193*	0.00	0.5 ND	0.01	0.4 J	0.03	1.1 J	1.51	J
PCB191*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.41	J
PCB200*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.00	ND
PCB169*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.00	ND
PCB170/190	0.32	1.0 I	0.04	0.9 J	0.68	2.2 I	6.92	I
PCB199*	0.00	0.5 ND	0.02	0.4 J	0.22	1.1 J	2.69	J
PCB203/196*	0.00	0.5 ND	0.00	0.4 ND	0.12	1.1 J	0.37	J
Individual PCBs	Conc	DL	Conc	DL	Conc	DL	Conc	
PCB189*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.00	ND
PCB195/208	0.00	0.1 ND	0.00	0.1 ND	0.09	0.3 J	0.44	J
PCB207*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.00	ND
PCB194*	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.49	J
PCB205 *	0.00	0.5 ND	0.00	0.4 ND	0.00	1.1 ND	0.21	J
PCB206	0.00	0.1 ND	0.00	0.1 ND	0.04	0.2 J	0.85	
PCB209	0.00	0.1 ND	0.00	0.1 ND	0.03	0.2 J	0.28	J

Totals by Chlorination Level

CL1	0.00		0.00		0.39		4.12	
CL2	0.10		0.09		0.57		2.95	
CL3	0.39		0.37		3.84		28.33	
CL4	0.43		0.22		0.85		21.38	
CL5	0.29		0.16		1.48		19.82	
CL6	0.23		0.18		2.27		7.33	
CL7	0.11		0.15		1.33		11.57	
CL8	0.00		0.02		0.44		7.11	
CL9	0.00		0.00		0.04		0.85	
CL10	0.00		0.00		0.03		0.28	
Total PCBs	1.57		1.19		11.23		103.75	

Client Sample ID	CBA9	CBA10	CBA11
GERG ID	C42419	C42420	C42421
Sample Type	SAMP	SAMP	SAMP
SDG	C8695	C8695	C8695

Dry Weight	14.70	5.83	4.88
Wet Weight	20.07	20.21	20.05
Sample Size Units	Grams	Grams	Grams
Matrix	Sediment	Sediment	Sediment
% solid	73.3	28.8	24.3
Reporting Units	ng/g	ng/g	ng/g
Calculation Basis (dry/wet)	Dry	Dry	Dry

QC Batch ID	M3156	M3156	M3156
Method	GCECD	GCECD	GCECD
Receive Date	8/27/2002	8/27/2002	8/27/2002
Extraction Date	10/4/2002	10/4/2002	10/4/2002
Analysis Date	10/19/2002	10/19/2002	10/19/2002

Surrogate Compounds	% Recov	% Recov	% Recov
DBOFB	79.5	88.3	96.1
PCB103*	87.0	91.2	100.7
PCB198	84.2	85.5	96.9

Totals	Conc	Conc	Conc
Total PCBs	0.92	15.48	12.89
Total PCBs (SandT)	0.83	8.80	8.70

Pesticides	Conc	DL	Conc	DL	Conc	DL
Chlorinated Benzenes						
Tetrachlorobenzene 1,2,4,5	0.58	0.1	1.42	0.3	1.70	0.4
Tetrachlorobenzene 1,2,3,4	0.00	0.2 ND	0.07	0.5 J	0.04	0.6 J
Pentachlorobenzene	0.05	0.1 J	0.21	0.2 J	0.15	0.3 J
Hexachlorobenzene	0.00	0.0 ND	0.00	0.1 ND	0.00	0.1 ND
Hexachlorocyclohexanes						
Alpha HCH	0.01	0.0 J	0.05	0.1 J	0.04	0.1 J
Beta HCH	0.00	0.2 ND	0.00	0.5 ND	0.00	0.6 ND
Gamma HCH	0.01	0.1 J	0.26	0.3 J	0.13	0.4 J
Delta HCH	0.00	0.1 ND	0.06	0.2 J	0.08	0.2 J
Chlordane-related Compounds						

Heptachlor	0.00	0.2 J	0.00	0.4 ND	0.00	0.5 ND
Heptachlor Epoxide	0.00	0.1 ND	0.00	0.1 ND	0.00	0.2 ND
Oxychlorane	0.00	0.0 ND	0.00	0.1 ND	0.00	0.1 ND
Alpha Chlordane	0.00	0.1 ND	0.03	0.3 J	0.06	0.3 J
Gamma Chlordane	0.01	0.0 J	0.03	0.1 J	0.02	0.1 J
Cis-Nonachlor	0.00	0.1 J	0.04	0.2 J	0.01	0.2 J
Trans-Nonachlor	0.00	0.1 ND	0.02	0.2 J	0.02	0.3 J
Other Cyclodiene Pesticides						
Aldrin	0.00	0.1 ND	0.00	0.2 ND	0.00	0.2 ND
Dieldrin	0.00	0.0 ND	0.00	0.1 ND	0.00	0.1 ND
Endrin	0.05	0.1 J	0.20	0.2	0.12	0.2 J
Pesticides	Conc	DL	Conc	DL	Conc	DL
Other Chlorinated Pesticides						
Pentachloroanisole	0.02	0.1 J	0.10	0.3 J	0.14	0.3 J
Chlorpyrifos	0.01	0.1 J	0.08	0.3 J	0.15	0.3 J
Mirex	0.00	0.1 ND	0.00	0.2 ND	0.00	0.3 ND
Endosulfan II	0.00	0.1 J	0.27	0.4 J	0.00	0.4 ND
DDTs and Related Compounds						
2,4' DDE	0.01	0.1 J	0.02	0.2 J	0.03	0.2 J
4,4' DDE	0.10	0.0	1.67	0.1	1.53	0.1
2,4' DDD	0.29	0.1	1.00	0.4	0.90	0.4
4,4' DDD	0.03	0.0 J	0.36	0.1	0.12	0.1 J
2,4' DDT	0.00	0.1 J	0.02	0.2 J	0.02	0.2 J
4,4' DDT	0.01	0.1 J	0.17	0.4 J	0.18	0.4 J

Individual PCBs	Conc	DL	Conc	DL	Conc	DL
PCB1*	0.00	0.4 ND	0.84	1.0 J	0.33	1.2 J
PCB7/9*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB8/5	0.04	0.2 J	0.59	0.4	0.88	0.5
PCB30*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB18/17	0.04	0.1 J	0.23	0.2	0.49	0.3
PCB15*	0.02	0.4 J	0.24	1.0 J	0.43	1.2 J
PCB24/27*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB16/32*	0.13	0.4 J	1.25	1.0	1.86	1.2
PCB29	0.00	0.1 ND	0.04	0.2 J	0.00	0.3 ND
PCB26*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB25*	0.01	0.4 J	0.00	1.0 ND	0.00	1.2 ND
PCB31*	0.05	0.4 J	3.56	1.0	1.71	1.2
PCB28	0.01	0.3 J	0.49	0.7 J	0.39	0.8 J
PCB33/20*	0.01	0.4 J	0.13	1.0 J	0.14	1.2 J
PCB53*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB22/51*	0.01	0.4 J	0.00	1.0 ND	0.06	1.2 J
PCB45*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB46 *	0.01	0.4 J	0.19	1.0 J	0.06	1.2 J
PCB39*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB69*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND

PCB52	0.02	0.1 J	0.24	0.2	0.32	0.3
PCB49*	0.02	0.4 J	0.32	1.0 J	0.17	1.2 J
PCB47/75*	0.02	0.4 J	0.00	1.0 ND	0.00	1.2 ND
PCB48*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB44	0.01	0.1 J	0.13	0.3 J	0.11	0.4 J
PCB42/59/37*	0.00	0.4 ND	0.09	1.0 J	0.13	1.2 J
PCB72*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB41/64*	0.10	0.4 I	7.42	1.0 I	12.60	1.2 I
PCB40*	0.00	0.4 J	0.07	1.0 J	0.08	1.2 J
PCB67*	0.00	0.4 ND	0.00	1.0 ND	0.04	1.2 J
PCB63*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB74/61*	0.00	0.4 ND	0.16	1.0 J	0.08	1.2 J
PCB70*	0.00	0.4 ND	0.05	1.0 J	0.00	1.2 ND
PCB66	0.02	0.1 J	0.07	0.2 J	0.13	0.2 J
PCB95/80*	0.02	0.4 J	0.17	1.0 J	0.09	1.2 J
PCB55/91*	0.00	0.4 ND	0.22	1.0 J	0.00	1.2 ND
PCB56/60*	0.00	0.4 ND	0.35	1.0 J	0.00	1.2 ND
PCB92*	0.00	0.4 ND	0.00	1.0 ND	0.05	1.2 J
Individual PCBs	Conc	DL	Conc	DL	Conc	DL
PCB84*	0.00	0.4 J	0.05	1.0 J	0.25	1.2 J
PCB101/90	0.00	0.4 ND	0.19	1.1 J	0.41	1.3 J
PCB99*	0.02	0.4 J	0.18	1.0 J	0.27	1.2 J
PCB119*	0.00	0.4 ND	0.02	1.0 J	0.03	1.2 J
PCB83*	0.01	0.4 J	0.41	1.0 J	0.88	1.2 J
PCB97*	0.00	0.4 ND	0.10	1.0 J	0.02	1.2 J
PCB81*	0.00	0.4 ND	0.00	1.0 ND	0.05	1.2 J
PCB87/115	0.00	0.1 ND	0.04	0.1 J	0.00	0.2 ND
PCB85*	0.00	0.4 J	0.01	1.0 J	0.00	1.2 J
PCB136*	0.01	0.4 J	0.02	1.0 J	0.03	1.2 J
PCB110/77	0.02	0.3 J	0.36	0.7 J	0.17	0.8 J
PCB82*	0.00	0.4 ND	0.02	1.0 J	0.01	1.2 J
PCB151*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB135*	0.02	0.4 J	0.06	1.0 J	0.03	1.2 J
PCB107*	0.00	0.4 ND	0.72	1.0 J	0.07	1.2 J
PCB149/123*	0.01	0.4 J	0.14	1.0 J	0.03	1.2 J
PCB118	0.03	0.4 J	0.16	0.9 J	0.03	1.1 J
PCB114*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB146*	0.00	0.4 ND	0.04	1.0 J	0.05	1.2 J
PCB153/132	0.07	1.3 J	0.20	3.4 J	0.22	4.0 J
PCB105	0.01	0.6 J	0.14	1.4 J	0.15	1.7 J
PCB141/179*	0.01	0.4 J	0.00	1.0 ND	0.00	1.2 ND
PCB130*	0.01	0.4 J	0.00	1.0 ND	0.00	1.2 ND
PCB176/137*	0.00	0.4 ND	0.19	1.0 J	0.31	1.2 J
PCB138 /160	0.05	1.3 J	0.33	3.2 J	0.26	3.8 J
PCB158*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB129*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB126*	0.00	0.4 ND	0.51	1.0 J	0.12	1.2 J

PCB178*	0.00	0.4 ND	0.08	1.0 J	0.05	1.2 J
PCB166*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB175*	0.07	0.4 J	0.05	1.0 J	0.14	1.2 J
PCB187	0.01	0.8 J	0.21	2.0 J	0.10	2.4 J
PCB183 *	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB128	0.00	0.1 ND	0.04	0.3 J	0.02	0.4 J
PCB167*	0.00	0.4 ND	0.11	1.0 J	0.08	1.2 J
PCB185 *	0.00	0.4 ND	0.05	1.0 J	0.06	1.2 J
PCB174*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB177*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB171/202*	0.00	0.4 ND	0.02	1.0 J	0.03	1.2 J
PCB156*	0.00	0.4 ND	0.15	1.0 J	0.19	1.2 J
PCB201/157/173*	0.00	0.4 ND	0.00	1.0 ND	0.04	1.2 J
PCB172*	0.00	0.0 ND	0.00	0.1 ND	0.00	0.1 ND
PCB197*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB180	0.02	1.5 J	0.08	3.9 J	0.12	4.6 J
PCB193*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB191*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB200*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB169*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB170/190	0.08	0.9 J	0.80	2.1 J	0.57	2.6 J
PCB199*	0.04	0.4 J	0.06	1.0 J	0.15	1.2 J
PCB203/196*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
Individual PCBs	Conc	DL	Conc	DL	Conc	DL
PCB189*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB195/208	0.00	0.1 ND	0.04	0.3 J	0.10	0.4 J
PCB207*	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB194*	0.00	0.4 ND	0.00	1.0 ND	0.24	1.2 J
PCB205 *	0.00	0.4 ND	0.00	1.0 ND	0.00	1.2 ND
PCB206	0.00	0.1 ND	0.00	0.2 ND	0.03	0.2 J
PCB209	0.00	0.1 ND	0.44	0.2	0.02	0.2 J

Totals by Chlorination Level

CL1	0.00	0.84	0.33
CL2	0.06	0.83	1.31
CL3	0.26	5.70	4.65
CL4	0.10	1.90	1.17
CL5	0.11	3.09	2.55
CL6	0.18	1.09	0.92
CL7	0.18	1.48	1.38
CL8	0.04	0.10	0.53
CL9	0.00	0.00	0.03
CL10	0.00	0.44	0.02
Total PCBs	0.92	15.48	12.89

Client Sample ID	CBA12	CBA13
GERG ID	C42422	C42423
Sample Type	SAMP	SAMP
SDG	C8695	C8695

Dry Weight	10.88	14.12
Wet Weight	20.01	20.08
Sample Size Units	Grams	Grams
Matrix	Sediment	Sediment
% solid	54.4	70.3
Reporting Units	ng/g	ng/g
Calculation Basis (dry/wet)	Dry	Dry

QC Batch ID	M3156	M3156
Method	GCECD	GCECD
Receive Date	8/27/2002	8/27/2002
Extraction Date	10/4/2002	10/4/2002
Analysis Date	10/19/2002	10/19/2002

Surrogate Compounds	% Recov	% Recov
DBOFB	88.7	98.1
PCB103*	89.4	99.2
PCB198	88.4	95.0

Totals	Conc	Conc
Total PCBs	8.43	3.43
Total PCBs (SandT)	6.19	2.41

Pesticides	Conc	DL	Conc	DL
Chlorinated Benzenes				
Tetrachlorobenzene 1,2,4,5	0.53	0.2	0.44	0.1
Tetrachlorobenzene 1,2,3,4	0.02	0.3 J	0.01	0.2 J
Pentachlorobenzene	0.10	0.1 J	0.03	0.1 J
Hexachlorobenzene	0.00	0.1 ND	0.00	0.1 ND
Hexachlorocyclohexanes				
Alpha HCH	0.01	0.1 J	0.01	0.0 J
Beta HCH	0.00	0.2 ND	0.00	0.2 ND
Gamma HCH	0.08	0.2 J	0.02	0.1 J
Delta HCH	0.03	0.1 J	0.00	0.1 ND
Chlordane-related Compounds				

Heptachlor	0.04	0.2 J	0.00	0.2 ND
Heptachlor Epoxide	0.00	0.1 ND	0.00	0.1 ND
Oxychlordan	0.00	0.1 ND	0.00	0.1 ND
Alpha Chlordane	0.05	0.1 J	0.02	0.1 J
Gamma Chlordane	0.04	0.0 J	0.01	0.0 J
Cis-Nonachlor	0.02	0.1 J	0.00	0.1 J
Trans-Nonachlor	0.01	0.1 J	0.01	0.1 J
Other Cyclodiene Pesticides				
Aldrin	0.03	0.1 J	0.00	0.1 ND
Dieldrin	0.00	0.0 ND	0.05	0.0
Endrin	0.07	0.1 J	0.06	0.1 J
Pesticides	Conc	DL	Conc	DL
Other Chlorinated Pesticides				
Pentachloroanisole	0.04	0.1 J	0.02	0.1 J
Chlorpyrifos	0.05	0.1 J	0.04	0.1 J
Mirex	0.00	0.1 ND	0.00	0.1 ND
Endosulfan II	0.04	0.2 J	0.00	0.1 ND
DDTs and Related Compounds				
2,4' DDE	0.07	0.1 J	0.14	0.1
4,4' DDE	0.40	0.0	0.20	0.0
2,4' DDD	0.14	0.2 J	0.14	0.1 J
4,4' DDD	0.00	0.1 J	0.03	0.1 J
2,4' DDT	0.01	0.1 J	0.05	0.1 J
4,4' DDT	0.24	0.2	0.09	0.2 J

Individual PCBs	Conc	DL	Conc	DL
PCB1*	0.00	0.5 ND	0.02	0.4 J
PCB7/9*	0.00	0.5 ND	0.00	0.4 ND
PCB8/5	0.30	0.2	0.16	0.2 J
PCB30*	0.00	0.5 ND	0.00	0.4 ND
PCB18/17	0.12	0.1	0.05	0.1 J
PCB15*	0.51	0.5 J	0.01	0.4 J
PCB24/27*	0.00	0.5 ND	0.00	0.4 ND
PCB16/32*	0.49	0.5 J	0.39	0.4 J
PCB29	0.00	0.1 ND	0.02	0.1 J
PCB26*	0.00	0.5 ND	0.00	0.4 ND
PCB25*	0.00	0.5 ND	0.00	0.4 ND
PCB31*	1.30	0.5	0.63	0.4
PCB28	0.21	0.4 J	0.15	0.3 J
PCB33/20*	0.03	0.5 J	0.02	0.4 J
PCB53*	0.00	0.5 ND	0.00	0.4 ND
PCB22/51*	0.19	0.5 J	0.00	0.4 ND
PCB45*	0.00	0.5 ND	0.02	0.4 J
PCB46 *	0.00	0.5 ND	0.00	0.4 ND
PCB39*	1.03	0.5	0.00	0.4 ND
PCB69*	0.00	0.5 ND	0.14	0.4 J

PCB52	0.04	0.1 J	0.02	0.1 J
PCB49*	0.03	0.5 J	0.06	0.4 J
PCB47/75*	0.01	0.5 J	0.00	0.4 ND
PCB48*	0.15	0.5 J	0.00	0.4 ND
PCB44	0.04	0.2 J	0.00	0.1 ND
PCB42/59/37*	0.00	0.5 ND	0.00	0.4 ND
PCB72*	0.00	0.5 ND	0.00	0.4 ND
PCB41/64*	0.12	0.5 J	0.04	0.4 J
PCB40*	75.66	0.5 I	0.09	0.4 J
PCB67*	0.08	0.5 J	0.01	0.4 J
PCB63*	0.00	0.5 ND	0.00	0.4 ND
PCB74/61*	0.02	0.5 J	0.00	0.4 ND
PCB70*	0.00	0.5 ND	0.00	0.4 ND
PCB66	0.01	0.1 J	0.03	0.1 J
PCB95/80*	0.02	0.5 J	0.02	0.4 J
PCB55/91*	0.00	0.5 ND	0.00	0.4 ND
PCB56/60*	0.00	0.5 ND	0.12	0.4 J
PCB92*	0.00	0.5 ND	0.03	0.4 J
Individual PCBs	Conc	DL	Conc	DL
PCB84*	0.00	0.5 J	0.00	0.4 ND
PCB101/90	0.05	0.6 J	0.03	0.5 J
PCB99*	0.07	0.5 J	0.03	0.4 J
PCB119*	0.01	0.5 J	0.01	0.4 J
PCB83*	0.33	0.5 J	0.11	0.4 J
PCB97*	0.00	0.5 ND	0.04	0.4 J
PCB81*	0.00	0.5 ND	0.00	0.4 ND
PCB87/115	0.01	0.1 J	0.00	0.1 ND
PCB85*	0.00	0.5 J	0.00	0.4 J
PCB136*	0.02	0.5 J	0.01	0.4 J
PCB110/77	0.05	0.4 J	0.03	0.3 J
PCB82*	0.01	0.5 J	0.02	0.4 J
PCB151*	0.00	0.5 ND	0.00	0.4 ND
PCB135*	0.00	0.5 ND	0.00	0.4 ND
PCB107*	0.02	0.5 J	0.06	0.4 J
PCB149/123*	0.03	0.5 J	0.01	0.4 J
PCB118	0.03	0.5 J	0.01	0.4 J
PCB114*	0.00	0.5 ND	0.00	0.4 ND
PCB146*	0.04	0.5 J	0.01	0.4 J
PCB153/132	0.05	1.8 J	0.04	1.4 J
PCB105	0.14	0.7 J	0.02	0.6 J
PCB141/179*	0.06	0.5 J	0.03	0.4 J
PCB130*	0.00	0.5 ND	0.06	0.4 J
PCB176/137*	0.07	0.5 J	0.00	0.4 ND
PCB138 /160	1.49	1.7 J	0.42	1.3 J
PCB158*	0.00	0.5 ND	0.00	0.4 ND
PCB129*	0.00	0.5 ND	0.00	0.4 ND
PCB126*	0.00	0.5 ND	0.00	0.4 ND

PCB178*	0.02	0.5 J	0.01	0.4 J
PCB166*	0.00	0.5 ND	0.00	0.4 ND
PCB175*	0.21	0.5 J	0.10	0.4 J
PCB187	0.14	1.1 J	0.05	0.8 J
PCB183 *	0.00	0.5 ND	0.00	0.4 ND
PCB128	0.00	0.2 J	0.00	0.1 J
PCB167*	0.04	0.5 J	0.01	0.4 J
PCB185 *	0.02	0.5 J	0.00	0.4 J
PCB174*	0.00	0.5 ND	0.00	0.4 ND
PCB177*	0.01	0.5 J	0.00	0.4 ND
PCB171/202*	0.08	0.5 J	0.03	0.4 J
PCB156*	0.05	0.5 J	0.01	0.4 J
PCB201/157/173*	0.00	0.5 ND	0.00	0.4 ND
PCB172*	0.00	0.1 ND	0.00	0.1 ND
PCB197*	0.00	0.5 ND	0.00	0.4 ND
PCB180	0.12	2.1 J	0.06	1.6 J
PCB193*	0.01	0.5 J	0.00	0.4 ND
PCB191*	0.10	0.5 J	0.00	0.4 ND
PCB200*	0.01	0.5 J	0.00	0.4 ND
PCB169*	0.00	0.5 ND	0.00	0.4 ND
PCB170/190	0.20	1.2 J	0.12	0.9 J
PCB199*	0.06	0.5 J	0.03	0.4 J
PCB203/196*	0.00	0.5 ND	0.00	0.4 ND
Individual PCBs	Conc	DL	Conc	DL
PCB189*	0.00	0.5 ND	0.00	0.4 ND
PCB195/208	0.06	0.2 J	0.03	0.1 J
PCB207*	0.04	0.5 J	0.00	0.4 ND
PCB194*	0.00	0.5 ND	0.00	0.4 ND
PCB205 *	0.02	0.5 J	0.00	0.4 ND
PCB206	0.00	0.1 ND	0.00	0.1 ND
PCB209	0.11	0.1	0.01	0.1 J

Totals by Chlorination Level

CL1	0.00	0.02
CL2	0.81	0.17
CL3	3.37	1.26
CL4	0.48	0.54
CL5	0.73	0.40
CL6	1.78	0.61
CL7	0.97	0.37
CL8	0.14	0.06
CL9	0.04	0.00
CL10	0.11	0.01
Total PCBs	8.43	3.43

ND	Not Detected
J	<MDL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3xMDL
d	Dilution
EC	Exceeds Calibration

Appendix G
Polycyclic Aromatic Hydrocarbon data in sediment samples collected from Choctawhatchee
Bay, 2002.

Client Sample ID	CBA1	CBA2	CBA3	CBA4
GERG ID	C42411	C42412	C42413	C42414
Sample Type	SAMP	SAMP	SAMP	SAMP
SDG	C8695	C8695	C8695	C8695

Dry Weight	4.42	4.76	4.56	15.73
Wet Weight	20.28	20.13	20.22	20.23
Sample Size Units	Grams	Grams	Grams	Grams
Matrix	Sediment	Sediment	Sediment	Sediment
% solid	21.8	23.6	22.6	77.8
Reporting Units	ng/g	ng/g	ng/g	ng/g
Calculation Basis (dry/wet)	Dry	Dry	Dry	Dry

QC Batch ID	M3156	M3156	M3156	M3156
Method	GCMS	GCMS	GCMS	GCMS
Receive Date	08/27/02	08/27/02	08/27/02	08/27/02
Extraction Date	10/04/02	10/04/02	10/04/02	10/04/02
Analysis Date	10/19/02	10/19/02	10/19/02	10/19/02

Surrogate Compounds	% Recov	% Recov	% Recov	% Recov
d8-Naphthalene	54.6	31.0	Q 54.0	54.1
d10-Acenaphthene	86.6	65.2	90.3	91.1
d10-Phenanthrene	80.1	97.8	76.5	77.0
d12-Chrysene	83.2	99.8	149.1	I 151.3
d12-Perylene	100.4	94.0	89.1	96.4

Total PAHs	Conc	Conc	Conc	Conc
Total PAHs with Perylene	866.1	5227.6	3373.5	8230.8
Total PAHs without Perylene	787.6	5095.2	3297.3	8144.1
Total NSandT PAHs	420.2	2612.5	1712.0	5243.0

PAH Compounds	Conc	DL	Conc	DL	Conc	DL	Conc	DL
Naphthalene	6.8	4.0	14.5	3.7	16.9	3.8	11.0	1.1
C1-Naphthalenes	4.0	3.2	9.8	3.0	7.5	3.1	6.6	0.9
C2-Naphthalenes	8.5	6.3	10.7	5.9	6.7	6.1	2.1	1.8
C3-Naphthalenes	3.4	5.0 J	13.5	4.6	2.9	4.8 J	1.5	1.4
C4-Naphthalenes	2.1	5.0 J	12.8	4.6	1.5	4.8 J	0.3	1.4 J
Biphenyl	3.2	3.2 J	3.1	3.0	4.0	3.1	1.8	0.9
Acenaphthylene	21.1	2.6	94.7	2.4	56.3	2.5	18.5	0.7

Acenaphthene	1.7	4.0 J	8.1	3.7	4.0	3.9	4.1	1.1
Fluorene	4.9	3.5	16.9	3.3	6.5	3.4	5.4	1.0
C1-Fluorenes	4.6	7.1 J	17.9	6.5	4.7	6.8 J	2.9	2.0
C2-Fluorenes	4.9	7.1 J	35.3	6.5	8.5	6.8	6.2	2.0
C3-Fluorenes	5.0	7.1 J	47.1	6.5	11.1	6.8	9.7	2.0
Phenanthrene	11.6	2.4	60.5	2.2	43.4	2.3	182.0	0.7
Anthracene	40.0	2.4	191.3	2.2	115.4	2.3	103.8	0.7
C1-Phenanthrenes/Anthracenes	9.6	4.0	76.9	3.7	30.6	3.9	100.2	1.1
C2-Phenanthrenes/Anthracenes	7.9	4.0	87.1	3.7	27.6	3.9	60.5	1.1
C3-Phenanthrenes/Anthracenes	5.0	4.0	56.9	3.7	23.0	3.9	42.8	1.1
C4-Phenanthrenes/Anthracenes	1.6	4.0 J	18.2	3.7	8.5	3.9	18.3	1.1
Dibenzothiophene	1.5	1.0	5.9	0.9	3.4	0.9	6.3	0.3
C1-Dibenzothiophenes	1.9	1.9 J	11.8	1.8	3.3	1.9	8.8	0.5
C2-Dibenzothiophenes	2.5	1.9	26.8	1.8	6.7	1.9	15.5	0.5
C3-Dibenzothiophenes	2.2	1.9	28.1	1.8	10.2	1.9	22.8	0.5
Fluoranthene	26.1	1.8	376.5	1.7	249.8	1.7	1491.6	0.5
Pyrene	28.2	1.7	361.6	1.6	253.1	1.6	1331.3	0.5
C1-Fluoranthenes/Pyrenes	29.3	3.5	262.8	3.2	148.0	3.4	438.7	1.0
Benzo(a)anthracene	40.7	2.5	345.2	2.4	200.1	2.5	437.5	0.7
Chrysene	26.4	2.4	289.1	2.2	193.7	2.3	474.5	0.7
C1-Chrysenes	32.3	4.8	231.9	4.5	111.0	4.7	167.0	1.4
C2-Chrysenes	16.3	4.8	124.8	4.5	49.1	4.7	82.9	1.4
C3-Chrysenes	5.8	4.8	21.0	4.5	9.2	4.7	15.4	1.4
C4-Chrysenes	21.9	4.8	18.4	4.5	10.2	4.7	14.0	1.4
Benzo(b)fluoranthene	96.1	1.6	713.9	1.5	546.5	1.5	950.3	0.4
Benzo(k)fluoranthene	30.3	1.7	183.6	1.6	124.6	1.7	201.7	0.5
Benzo(e)pyrene	47.2	1.6	279.4	1.5	193.8	1.6	390.1	0.5
Benzo(a)pyrene	77.3	1.7	436.1	1.6	285.2	1.7	599.6	0.5
Perylene	78.5	1.4	132.4	1.3	76.2	1.3	86.7	0.4
Indeno(1,2,3-c,d)pyrene	76.8	0.8	301.3	0.8	264.5	0.8	471.5	0.2
Dibenzo(a,h)anthracene	17.3	0.8	66.4	0.7	48.0	0.8	86.7	0.2
Benzo(g,h,i)perylene	61.5	1.1	235.4	1.0	207.9	1.0	360.5	0.3
2-Methylnaphthalene	2.6	1.7	6.6	1.5	5.3	1.6	5.0	0.5
1-Methylnaphthalene	1.4	1.6 J	3.3	1.4	2.2	1.5	1.6	0.4
2,6-Dimethylnaphthalene	4.4	3.2	6.3	2.9	8.2	3.1	1.6	0.9
1,6,7-Trimethylnaphthalene	0.9	2.5 J	6.4	2.3	1.2	2.4 J	0.5	0.7 J
1-Methylphenanthrene	1.8	2.0 J	15.3	1.9	6.1	1.9	28.9	0.6

ND	Not Detected
J	<MDL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3xMDL
D	Dilution

Client Sample ID	CBA5	CBA6	CBA7	CBA8
GERG ID	C42415	C42416	C42417	C42418
Sample Type	SAMP	SAMP	SAMP	SAMP
SDG	C8695	C8695	C8695	C8695

Dry Weight	12.80	14.26	5.60	1.65
Wet Weight	20.27	20.03	20.22	20.25
Sample Size Units	Grams	Grams	Grams	Grams
Matrix	Sediment	Sediment	Sediment	Sediment
% solid	63.2	71.2	27.7	8.1
Reporting Units	ng/g	ng/g	ng/g	ng/g
Calculation Basis (dry/wet)	Dry	Dry	Dry	Dry

QC Batch ID	M3156	M3156	M3156	M3156
Method	GCMS	GCMS	GCMS	GCMS
Receive Date	08/27/02	08/27/02	08/27/02	08/27/02
Extraction Date	10/04/02	10/04/02	10/04/02	10/04/02
Analysis Date	10/19/02	10/19/02	10/19/02	10/19/02

Surrogate Compounds	% Recov	% Recov	% Recov	% Recov	
d8-Naphthalene	66.7	72.0	60.8	32.2	Q
d10-Acenaphthene	90.8	87.1	85.5	115.7	
d10-Phenanthrene	88.1	81.8	91.0	85.4	
d12-Chrysene	103.6	92.7	97.5	93.2	
d12-Perylene	83.1	72.1	82.0	84.1	

Total PAHs	Conc	Conc	Conc	Conc
Total PAHs with Perylene	89.2	19.2	291.7	3065.6
Total PAHs without Perylene	84.6	17.4	249.9	2203.1
Total NSandT PAHs	42.1	9.9	165.2	1927.1

PAH Compounds	Conc	DL	Conc	DL	Conc	DL	Conc	DL
Naphthalene	0.8	1.4 J	0.3	1.2 J	7.1	3.1	28.3	10.6
C1-Naphthalenes	0.6	1.1 J	0.3	1.0 J	3.0	2.5	19.5	8.6
C2-Naphthalenes	0.5	2.2 J	0.3	2.0 J	2.5	5.0 J	84.8	17.0
C3-Naphthalenes	0.4	1.7 J	0.3	1.5 J	1.8	3.9 J	60.2	13.3
C4-Naphthalenes	0.3	1.7 J	0.2	1.5 J	1.1	3.9 J	10.4	13.3 J
Biphenyl	0.6	1.1 J	0.4	1.0 J	2.0	2.6 J	5.5	8.7 J
Acenaphthylene	0.7	0.9 J	0.3	0.8 J	3.8	2.1	26.8	7.0

Acenaphthene	0.1	1.4 J	0.0	1.2 J	0.8	3.2 J	9.2	10.8 J
Fluorene	0.4	1.2 J	0.2	1.1 J	2.2	2.8 J	12.5	9.5
C1-Fluorenes	0.4	2.4 J	0.4	2.2 J	2.5	5.6 J	12.5	18.9 J
C2-Fluorenes	1.0	2.4 J	0.7	2.2 J	3.7	5.6 J	15.3	18.9 J
C3-Fluorenes	0.7	2.4 J	0.1	2.2 J	2.2	5.6 J	3.5	18.9 J
Phenanthrene	1.5	0.8	0.6	0.7 J	8.3	1.9	43.5	6.4
Anthracene	1.2	0.8	0.4	0.7 J	7.4	1.9	78.8	6.4
C1-Phenanthrenes/Anthracenes	0.9	1.4 J	0.5	1.2 J	4.6	3.2	38.3	10.7
C2-Phenanthrenes/Anthracenes	0.9	1.4 J	0.4	1.2 J	4.8	3.2	24.1	10.7
C3-Phenanthrenes/Anthracenes	0.4	1.4 J	0.1	1.2 J	1.7	3.2 J	10.6	10.7 J
C4-Phenanthrenes/Anthracenes	0.5	1.4 J	0.0	1.2 J	1.0	3.2 J	15.2	10.7
Dibenzothiophene	0.2	0.3 J	0.1	0.3 J	1.2	0.8	8.0	2.6
C1-Dibenzothiophenes	0.2	0.7 J	0.1	0.6 J	1.3	1.5 J	4.1	5.2 J
C2-Dibenzothiophenes	0.4	0.7 J	0.2	0.6 J	1.9	1.5	7.4	5.2
C3-Dibenzothiophenes	0.4	0.7 J	0.1	0.6 J	1.9	1.5	5.2	5.2 J
Fluoranthene	5.9	0.6	1.1	0.6	18.7	1.4	146.7	4.8
Pyrene	5.3	0.6	1.0	0.5	18.6	1.3	105.5	4.5
C1-Fluoranthenes/Pyrenes	2.4	1.2	0.5	1.1 J	9.8	2.7	114.4	9.3
Benzo(a)anthracene	2.9	0.9	0.6	0.8 J	12.1	2.0	165.4	6.8
Chrysene	3.9	0.8	0.8	0.7	9.1	1.9	146.4	6.5
C1-Chrysenes	1.6	1.7 J	0.2	1.5 J	6.9	3.8	226.5	12.9
C2-Chrysenes	4.4	1.7	0.9	1.5 J	4.2	3.8	24.6	12.9
C3-Chrysenes	0.1	1.7 J	0.0	1.5 J	0.7	3.8 J	9.2	12.9 J
C4-Chrysenes	2.1	1.7	0.7	1.5 J	5.3	3.8	16.7	12.9
Benzo(b)fluoranthene	9.4	0.5	1.6	0.5	26.4	1.2	259.5	4.2
Benzo(k)fluoranthene	2.6	0.6	0.4	0.5 J	5.5	1.4	74.4	4.6
Benzo(e)pyrene	5.0	0.6	0.7	0.5	12.9	1.3	107.8	4.4
Benzo(a)pyrene	6.6	0.6	0.9	0.5	13.6	1.4	133.6	4.7
Perylene	4.7	0.5	1.8	0.4	41.7	1.1	862.5	3.7
Indeno(1,2,3-c,d)pyrene	9.5	0.3	1.1	0.3	18.8	0.7	110.8	2.2
Dibenzo(a,h)anthracene	1.7	0.3	0.2	0.2 J	2.9	0.6	26.4	2.1
Benzo(g,h,i)perylene	8.2	0.4	0.9	0.3	17.6	0.9	11.9	2.9
2-Methylnaphthalene	0.4	0.6 J	0.2	0.5 J	2.1	1.3	13.0	4.5
1-Methylnaphthalene	0.2	0.5 J	0.1	0.5 J	0.9	1.2 J	6.5	4.2
2,6-Dimethylnaphthalene	0.7	1.1 J	0.6	1.0 J	3.8	2.5	16.1	8.5
1,6,7-Trimethylnaphthalene	0.2	0.9 J	0.1	0.8 J	0.8	2.0 J	5.6	6.7 J
1-Methylphenanthrene	0.3	0.7 J	0.1	0.6 J	1.1	1.6 J	19.6	5.4

ND	Not Detected
J	<MDL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3xMDL
D	Dilution

QC Batch ID	M3156	M3156	M3156
Method	GCMS	GCMS	GCMS
Receive Date	08/27/02	08/27/02	08/27/02
Extraction Date	10/04/02	10/04/02	10/04/02
Analysis Date	10/19/02	10/19/02	10/19/02

Surrogate Compounds	% Recov	% Recov	% Recov
d8-Naphthalene	59.9	48.5	64.1
d10-Acenaphthene	76.6	86.4	92.1
d10-Phenanthrene	74.0	82.2	92.7
d12-Chrysene	81.5	108.4	102.5
d12-Perylene	67.3	79.9	86.6

Total PAHs	Conc	Conc	Conc
Total PAHs with Perylene	20.2	835.3	334.9
Total PAHs without Perylene	18.9	571.2	259.0
Total NSandT PAHs	11.4	489.0	193.9

PAH Compounds	Conc	DL	Conc	DL	Conc	DL
Naphthalene	0.3	1.2 J	12.6	3.0	7.8	3.6
C1-Naphthalenes	0.2	1.0 J	6.8	2.4	4.4	2.9
C2-Naphthalenes	0.2	1.9 J	7.2	4.8	3.9	5.7 J
C3-Naphthalenes	0.1	1.5 J	3.7	3.8 J	2.6	4.5 J
C4-Naphthalenes	0.1	1.5 J	2.0	3.8 J	1.1	4.5 J
Biphenyl	0.3	1.0 J	2.9	2.5	3.2	2.9
Acenaphthylene	0.3	0.8 J	5.9	2.0	3.8	2.4
Acenaphthene	0.0	1.2 J	1.5	3.0 J	1.1	3.6 J
Fluorene	0.1	1.1 J	3.8	2.7	3.1	3.2 J
C1-Fluorenes	0.2	2.1 J	5.6	5.3	3.8	6.4 J
C2-Fluorenes	0.5	2.1 J	13.0	5.3	5.9	6.4 J
C3-Fluorenes	0.1	2.1 J	15.2	5.3	3.0	6.4 J
Phenanthrene	0.4	0.7 J	9.1	1.8	10.8	2.2
Anthracene	0.4	0.7 J	14.1	1.8	7.9	2.1
C1-Phenanthrenes/Anthracenes	0.3	1.2 J	12.1	3.0	5.5	3.6
C2-Phenanthrenes/Anthracenes	0.5	1.2 J	18.2	3.0	5.4	3.6
C3-Phenanthrenes/Anthracenes	0.1	1.2 J	16.9	3.0	5.4	3.6
C4-Phenanthrenes/Anthracenes	0.1	1.2 J	7.5	3.0	1.9	3.6 J
Dibenzothiophene	0.1	0.3 J	1.7	0.7	1.4	0.9
C1-Dibenzothiophenes	0.1	0.6 J	4.3	1.5	1.4	1.7 J
C2-Dibenzothiophenes	0.1	0.6 J	9.3	1.5	2.2	1.7
C3-Dibenzothiophenes	0.0	0.6 J	17.3	1.5	2.2	1.7

Fluoranthene	1.8	0.5	25.9	1.4	13.5	1.6
Pyrene	1.5	0.5	43.3	1.3	14.1	1.5
C1-Fluoranthenes/Pyrenes	0.6	1.0 J	36.3	2.6	11.5	3.1
Benzo(a)anthracene	1.3	0.8	21.8	1.9	11.6	2.3
Chrysene	1.1	0.7	16.9	1.8	6.3	2.2
C1-Chrysenes	0.6	1.4 J	28.4	3.6	6.5	4.4
C2-Chrysenes	0.8	1.4 J	19.8	3.6	1.7	4.4 J
C3-Chrysenes	0.1	1.4 J	6.9	3.6	0.5	4.4 J
C4-Chrysenes	0.1	1.4 J	5.9	3.6	2.5	4.4 J
Benzo(b)fluoranthene	2.2	0.5	56.3	1.2	29.5	1.4
Benzo(k)fluoranthene	0.5	0.5 J	11.6	1.3	6.0	1.6
Benzo(e)pyrene	0.9	0.5	25.8	1.2	12.1	1.5
Benzo(a)pyrene	1.3	0.5	26.8	1.3	12.2	1.6
Perylene	1.3	0.4	264.1	1.1	76.0	1.3
Indeno(1,2,3-c,d)pyrene	1.0	0.2	25.9	0.6	21.2	0.7
Dibenzo(a,h)anthracene	0.2	0.2 J	5.3	0.6	2.7	0.7
Benzo(g,h,i)perylene	0.8	0.3	23.7	0.8	19.6	1.0
2-Methylnaphthalene	0.1	0.5 J	4.6	1.3	3.2	1.5
1-Methylnaphthalene	0.1	0.5 J	2.2	1.2	1.3	1.4 J
2,6-Dimethylnaphthalene	0.2	1.0 J	4.8	2.4	5.1	2.9
1,6,7-Trimethylnaphthalene	0.1	0.7 J	1.4	1.9 J	1.3	2.2 J
1-Methylphenanthrene	0.1	0.6 J	3.5	1.5	2.2	1.8

ND	Not Detected
J	<MDL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3xMDL
D	Dilution

Client Sample ID	CBA12	CBA13
GERG ID	C42422	C42423
Sample Type	SAMP	SAMP
SDG	C8695	C8695

Dry Weight	10.88	14.12
Wet Weight	20.01	20.08
Sample Size Units	Grams	Grams
Matrix	Sediment	Sediment
% solid	54.4	70.3
Reporting Units	ng/g	ng/g
Calculation Basis (dry/wet)	Dry	Dry

QC Batch ID	M3156	M3156
Method	GCMS	GCMS
Receive Date	08/27/02	08/27/02
Extraction Date	10/04/02	10/04/02
Analysis Date	10/19/02	10/19/02

Surrogate Compounds	% Recov	% Recov
d8-Naphthalene	62.5	64.3
d10-Acenaphthene	88.3	85.6
d10-Phenanthrene	85.5	86.1
d12-Chrysene	96.1	102.1
d12-Perylene	84.4	80.3

Total PAHs	Conc	Conc
Total PAHs with Perylene	138.2	62.3
Total PAHs without Perylene	100.5	50.6
Total NSandT PAHs	88.1	35.2

PAH Compounds	Conc	DL	Conc	DL
Naphthalene	3.6	1.6	1.1	1.2 J
C1-Naphthalenes	1.9	1.3	0.8	1.0 J
C2-Naphthalenes	1.8	2.6 J	0.7	2.0 J
C3-Naphthalenes	0.8	2.0 J	0.4	1.6 J
C4-Naphthalenes	0.3	2.0 J	0.2	1.6 J
Biphenyl	1.2	1.3 J	0.6	1.0 J
Acenaphthylene	1.6	1.1	1.1	0.8

Acenaphthene	0.4	1.6 J	0.3	1.3 J
Fluorene	1.2	1.4 J	0.5	1.1 J
C1-Fluorenes	1.1	2.9 J	0.7	2.2 J
C2-Fluorenes	2.0	2.9 J	1.4	2.2 J
C3-Fluorenes	1.2	2.9 J	0.7	2.2 J
Phenanthrene	3.3	1.0	1.2	0.7
Anthracene	3.5	1.0	2.3	0.7
C1-Phenanthrenes/Anthracenes	2.1	1.6	1.0	1.3 J
C2-Phenanthrenes/Anthracenes	1.9	1.6	1.2	1.3 J
C3-Phenanthrenes/Anthracenes	1.4	1.6 J	0.6	1.3 J
C4-Phenanthrenes/Anthracenes	0.6	1.6 J	0.3	1.3 J
Dibenzothiophene	0.4	0.4 J	0.2	0.3 J
C1-Dibenzothiophenes	0.5	0.8 J	0.3	0.6 J
C2-Dibenzothiophenes	0.6	0.8 J	0.3	0.6 J
C3-Dibenzothiophenes	0.4	0.8 J	0.3	0.6 J
Fluoranthene	6.7	0.7	2.9	0.6
Pyrene	8.7	0.7	3.0	0.5
C1-Fluoranthenes/Pyrenes	5.1	1.4	2.2	1.1
Benzo(a)anthracene	4.9	1.0	2.4	0.8
Chrysene	3.1	1.0	1.4	0.8
C1-Chrysenes	3.3	2.0	1.6	1.5
C2-Chrysenes	1.9	2.0 J	0.9	1.5 J
C3-Chrysenes	1.1	2.0 J	0.4	1.5 J
C4-Chrysenes	3.3	2.0	1.7	1.5
Benzo(b)fluoranthene	9.7	0.6	5.8	0.5
Benzo(k)fluoranthene	1.9	0.7	1.2	0.5
Benzo(e)pyrene	4.1	0.7	2.3	0.5
Benzo(a)pyrene	4.9	0.7	3.0	0.5
Perylene	37.7	0.6	11.7	0.4
Indeno(1,2,3-c,d)pyrene	4.7	0.3	2.8	0.3
Dibenzo(a,h)anthracene	1.0	0.3	0.6	0.2
Benzo(g,h,i)perylene	4.6	0.4	2.5	0.3
2-Methylnaphthalene	1.2	0.7	0.5	0.5
1-Methylnaphthalene	0.6	0.6	0.2	0.5 J
2,6-Dimethylnaphthalene	1.6	1.3	1.0	1.0
1,6,7-Trimethylnaphthalene	0.4	1.0 J	0.2	0.8 J
1-Methylphenanthrene	0.6	0.8 J	0.3	0.6 J

ND	Not Detected
J	<MDL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3xMDL
D	Dilution

Appendix H
Trace and Major Element data in sediment samples collected from the Choctawhatchee Bay,
2002.

Client Sample ID	CBA1			CBA2			CBA3		
GERG Sample ID	C42411			C42412			C42413		
Sample Type	SAMP			SAMP			SAMP		
GERG SDG	C8695			C8695			C8695		
Receipt Date	08/27/02			08/27/02			08/27/02		
Matrix	Sediment			Sediment			Sediment		
Acid Digest QC Batch	SD-230			SD-230			SD-230		
Acid Digestion Wt	1.02			1.08			1.01		
Acid Digestion Date	10/10/02			10/10/02			10/10/02		
Hg Digest QC Batch	Hg-1112			Hg-1112			Hg-1112		
Hg Digestion Wt	0.20			0.20			0.22		
Hg Digestion Date	10/21/2002			10/21/2002			10/21/2002		
Wt Units	Grams			Grams			Grams		
Unit Qual	Dry			Dry			Dry		
% Moisture	78.22			76.36			77.44		
% Solid	21.78			23.64			22.56		
Conc Units	ug/g	DL	QUAL	ug/g	DL	QUAL	ug/g	DL	QUAL

GFAA

Arsenic	17.15	0.49	D5	11.59	0.46	D5	21.75	0.49	D5
Cadmium	0.55	0.20		0.56	0.19		0.65	0.20	
Lead	19.15	0.98	D5	57.25	0.93	D10	58.14	0.99	D10
Selenium	1.34	0.98		0.96	0.93		1.14	0.99	D2
Silver	0.08	0.10	J	1.52	0.09	D1.5	0.21	0.10	
Thallium	0.19	0.98	J	0.25	0.93	J	0.27	0.99	J

ICP

Aluminum	29778	9.76	D15	20410	9.29	D8	32128	9.85	D15
Barium	22.56	0.98		25.60	0.93		23.18	0.99	
Beryllium	2.85	0.20		1.54	0.19		2.75	0.20	
Boron	51.31	2.93		34.68	2.79		54.41	2.96	
Chromium	60.34	0.98		43.75	0.93		60.45	0.99	
Copper	11.75	0.98		183.83	0.93		26.43	0.99	
Iron	36216	9.76	D15	20801	9.29	D8	35456	9.85	D15
Magnesium	10396	9.76	D4	5264	9.29	D2	13968	9.85	D15
Manganese	506	4.88		346	4.65		1093	4.93	
Molybdenum	2.74	1.95		2.53	1.86		2.91	1.97	
Nickel	18.97	1.95		12.89	1.86		22.37	1.97	
Strontium	70.66	1.95		43.42	1.86		78.03	1.97	
Vanadium	47.14	0.98		36.80	0.93		51.62	0.99	
Zinc	53.14	0.98		84.89	0.93		92.04	0.99	

CVAA

Mercury	0.15	0.20	J	0.34	0.20		0.19	0.18	
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ND	Not Detected
J	<DL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3*DL
Dx	Diluted x times
EL	Exceeds Linear Range

Client Sample ID	CBA4			CBA5			CBA6		
GERG Sample ID	C42414			C42415			C42416		
Sample Type	SAMP			SAMP			SAMP		
GERG SDG	C8695			C8695			C8695		
Receipt Date	08/27/02			08/27/02			08/27/02		
Matrix	Sediment			Sediment			Sediment		
Acid Digest QC Batch	SD-230			SD-230			SD-230		
Acid Digestion Wt	1.12			1.11			1.13		
Acid Digestion Date	10/10/02			10/10/02			10/10/02		
Hg Digest QC Batch	Hg-1112			Hg-1112			Hg-1112		
Hg Digestion Wt	0.30			0.23			0.28		
Hg Digestion Date	10/21/2002			10/21/2002			10/21/2002		
Wt Units	Grams			Grams			Grams		
Unit Qual	Dry			Dry			Dry		
% Moisture	22.22			36.84			28.83		
% Solid	77.78			63.16			71.17		
Conc Units	ug/g	DL	QUAL	ug/g	DL	QUAL	ug/g	DL	QUAL

GFAA

Arsenic	0.88	0.45		2.85	0.45	D2	1.87	0.44	D2
Cadmium	0.07	0.18	J	0.02	0.18	J	0.02	0.18	J
Lead	10.17	0.90	D5	3.85	0.90	D2	2.67	0.88	D2
Selenium	0.14	0.90	J	0.09	0.90	J	0.07	0.88	J
Silver	0.01	0.09	J	0.01	0.09	J	0.01	0.09	J
Thallium	0.01	0.90	J	0.08	0.90	J	0.05	0.88	J

ICP

Aluminum	876	8.96		4435	8.98	D2	2543	8.83	
Barium	1.60	0.90		3.97	0.90		2.85	0.88	
Beryllium	0.06	0.18	J	0.45	0.18		0.24	0.18	
Boron	5.14	2.69		10.53	2.70		7.40	2.65	
Chromium	2.79	0.90		8.87	0.90		5.96	0.88	
Copper	4.62	0.90		1.78	0.90		0.70	0.88	J
Iron	914	8.96		6078	8.98	D2	3878	8.83	
Magnesium	491	8.96		2065	8.98		944	8.83	
Manganese	3	4.48	J	135	4.49		74	4.42	
Molybdenum	0.00	1.79	ND	0.10	1.80	J	0.00	1.77	ND
Nickel	1.00	1.79	J	3.19	1.80		1.58	1.77	J
Strontium	4.29	1.79		24.39	1.80		23.92	1.77	
Vanadium	2.00	0.90		8.99	0.90		7.16	0.88	
Zinc	16.80	0.90		13.43	0.90		7.13	0.88	

CVAA

Mercury	0.03	0.13	J	0.04	0.18	J	0.03	0.14	J
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ND	Not Detected
J	<DL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3*DL
Dx	Diluted x times
EL	Exceeds Linear Range

Client Sample ID	CBA7			CBA8			CBA9		
GERG Sample ID	C42417			C42418			C42419		
Sample Type	SAMP			SAMP			SAMP		
GERG SDG	C8695			C8695			C8695		
Receipt Date	08/27/02			08/27/02			08/27/02		
Matrix	Sediment			Sediment			Sediment		
Acid Digest QC Batch	SD-230			SD-230			SD-230		
Acid Digestion Wt	1.08			0.52			1.13		
Acid Digestion Date	10/10/02			10/10/02			10/10/02		
Hg Digest QC Batch	Hg-1112			Hg-1112			Hg-1112		
Hg Digestion Wt	0.24			0.19			0.34		
Hg Digestion Date	10/21/2002			10/21/2002			10/21/2002		
Wt Units	Grams			Grams			Grams		
Unit Qual	Dry			Dry			Dry		
% Moisture	72.32			91.87			26.73		
% Solid	27.68			8.13			73.27		
Conc Units	ug/g	DL	QUAL	ug/g	DL	QUAL	ug/g	DL	QUAL
GFAA									
Arsenic	30.00	0.46	D5	4.56	0.96	D2	0.89	0.44	
Cadmium	0.14	0.19	J	0.53	0.38		0.03	0.18	J
Lead	27.86	0.93	D5	24.44	1.92	D5	2.11	0.88	J D5
Selenium	1.64	0.93		3.90	1.92		0.15	0.88	J
Silver	0.04	0.09	J	0.06	0.19	J	0.00	0.09	ND
Thallium	0.24	0.93	J	0.35	1.92	J	0.06	0.88	J
ICP									
Aluminum	47387	9.27	D25	6640	19.22		754	8.83	
Barium	33.56	0.93		24.25	1.92		3.77	0.88	
Beryllium	4.35	0.19		0.72	0.38		0.07	0.18	J
Boron	38.55	2.78		14.52	5.77		4.18	2.65	
Chromium	78.90	0.93		14.94	1.92		3.82	0.88	
Copper	12.18	0.93		6.31	1.92		0.15	0.88	J
Iron	60785	9.27	D25	1916	19.22		1050	8.83	
Magnesium	12508	9.27	D5	2229	19.22		393	8.83	
Manganese	829	4.64		12	9.61		12	4.41	
Molybdenum	0.00	1.85	ND	0.51	3.84	J	0.00	1.77	ND
Nickel	27.96	1.85		5.08	3.84		1.00	1.77	J
Strontium	66.44	1.85		42.56	3.84		13.01	1.77	
Vanadium	94.35	0.93		11.76	1.92		2.75	0.88	
Zinc	83.03	0.93		38.37	1.92		4.81	0.88	
CVAA									
Mercury	0.12	0.16	J	0.18	0.21	J	0.02	0.12	J

ND	Not Detected
J	<DL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3*DL
Dx	Diluted x times
EL	Exceeds Linear Range

Client Sample ID	CBA10			CBA11		
GERG Sample ID	C42420			C42421		
Sample Type	SAMP			SAMP		
GERG SDG	C8695			C8695		
Receipt Date	08/27/02			08/27/02		
Matrix	Sediment			Sediment		
Acid Digest QC Batch	SD-230			SD-230		
Acid Digestion Wt	1.06			1.04		
Acid Digestion Date	10/10/02			10/10/02		
Hg Digest QC Batch	Hg-1112			Hg-1112		
Hg Digestion Wt	0.22			0.24		
Hg Digestion Date	10/21/2002			10/21/2002		
Wt Units	Grams			Grams		
Unit Qual	Dry			Dry		
% Moisture	71.15			75.65		
% Solid	28.85			24.35		
Conc Units	ug/g	DL	QUAL	ug/g	DL	QUAL

GFAA

Arsenic	14.66	0.47	D5	28.82	0.48	D5
Cadmium	0.44	0.19		0.22	0.19	
Lead	17.26	0.95	D5	24.25	0.96	D5
Selenium	0.94	0.95	J	1.65	0.96	
Silver	0.03	0.09	J	0.03	0.10	J
Thallium	0.26	0.95	J	0.26	0.96	J

ICP

Aluminum	24431	9.45	D15	46321	9.64	D25
Barium	21.48	0.95		35.83	0.96	
Beryllium	2.74	0.19		4.40	0.19	
Boron	31.31	2.84		46.65	2.89	
Chromium	55.12	0.95		79.03	0.96	
Copper	8.72	0.95		9.30	0.96	
Iron	39847	9.45	D15	65864	9.64	D25
Magnesium	7567	9.45	D3	10786	9.64	D4
Manganese	220	4.73		528	4.82	
Molybdenum	0.25	1.89	J	0.35	1.93	J
Nickel	14.49	1.89		25.86	1.93	
Strontium	67.31	1.89		72.12	1.93	
Vanadium	42.57	0.95		103.43	0.96	
Zinc	60.60	0.95		74.85	0.96	

CVAA

Mercury	0.12	0.18	J	0.12	0.16	J
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ND	Not Detected
J	<DL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3*DL
Dx	Diluted x times
EL	Exceeds Linear Range

Client Sample ID	CBA12				CBA13			
GERG Sample ID	C42422				C42423			
Sample Type	SAMP				SAMP			
GERG SDG	C8695				C8695			
Receipt Date	08/27/02				08/27/02			
Matrix	Sediment				Sediment			
Acid Digest QC Batch	SD-230				SD-230			
Acid Digestion Wt	1.10				1.07			
Acid Digestion Date	10/10/02				10/10/02			
Hg Digest QC Batch	Hg-1112				Hg-1112			
Hg Digestion Wt	0.23				0.25			
Hg Digestion Date	10/21/2002				10/21/2002			
Wt Units	Grams				Grams			
Unit Qual	Dry				Dry			
% Moisture	44.92				36.27			
% Solid	55.08				63.73			
Conc Units	ug/g	DL	QUAL		ug/g	DL	QUAL	

GFAA

Arsenic	5.27	0.45	D2	4.70	0.47	D2
Cadmium	0.13	0.18	J	0.06	0.19	J
Lead	6.79	0.91	D5	4.76	0.93	D5
Selenium	0.29	0.91	J	0.20	0.93	J
Silver	0.01	0.09	J	0.01	0.09	J
Thallium	0.16	0.91	J	0.12	0.93	J

ICP

Aluminum	9105	9.08	D6	6014	9.33	D4
Barium	10.81	0.91		6.77	0.93	
Beryllium	1.09	0.18		0.71	0.19	
Boron	14.02	2.72		11.11	2.80	
Chromium	20.23	0.91		12.65	0.93	
Copper	2.30	0.91		1.33	0.93	
Iron	15525	9.08	D6	10667	9.33	D4
Magnesium	2264	9.08		1496	9.33	
Manganese	60	4.54		64	4.66	
Molybdenum	0.00	1.82	ND	0.00	1.87	ND
Nickel	6.36	1.82		4.31	1.87	
Strontium	18.32	1.82		11.27	1.87	
Vanadium	22.01	0.91		17.11	0.93	
Zinc	25.32	0.91		16.45	0.93	

CVAA

Mercury	0.05	0.17	J	0.04	0.16	J
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ND	Not Detected
J	<DL
NA	Not Applicable
Q	Results Outside QC
I	Interference
B	Blank Contamination >3*DL
Dx	Diluted x times
EL	Exceeds Linear Range

Appendix I
Lab analysis methods for Wellington and GERG labs.

The four samples chosen for Dioxin analysis were received intact in the lab and refrigerated at four degrees Celsius in the dark until they were processed. Wellington Laboratories used the US EPA 1613 revision B method for the HRGC/HRMS analysis for PCDD/PCDF analysis. The lab commented that the surrogate recoveries, the lab blank and all other QA/QC data associated with this analysis were acceptable according to the reference method. Dioxin and Furan data is provided for the soil samples in parts per trillion (ppt).

Thirteen (13) sediment samples were received in one sample delivery group under on August 27, 2002. Samples were logged in under custody and stored at -20 C. Samples were homogenized. Samples were analyzed for Aliphatic and Aromatic Hydrocarbons, Pesticides and Polychlorinated Biphenyls (PCBs), Trace metals, selected Chlorophenoxy Herbicides, Particle Size Distribution and Nutrients. The samples were extracted in QC batch M3156 on October 4, 2002 for analysis for hydrocarbons, pesticides and PCBs. The samples were also extracted on October 8, 2002 in QC Batch M3157 for the chlorophenoxy herbicides. Samples were digested for mercury analysis on October 21, 2002 in QC Batch Hg-1112 and digested for the other metals in QC Batch SD-230 on October 10, 2002. The data for these analyses are reported here.

Analysis Request

Standard Operating Procedures

The samples were analyzed for particle size distribution following the protocol contained in the following SOPs used at GERG: SOP-8908.

Sediment Grain Size Analyses – Gravel, Sand, Silt, Clay only. Rev 2 as of May 27, 1992.

The samples were analyzed for nutrients following the protocol contained in the following SOPs: EPA 353.3.

Nitrogen, Nitrate-Nitrite (Spectrophotometric, Cadmium Reduction) EPA 365.3

Phosphorous, All Forms (Colorimetric, Ascorbic Acid, Two Reagent)The samples were extracted and analyzed for hydrocarbons, pesticides and PCBs following the protocol contained in the following SOPs used at GERG: SOP-9805

Extracting Sediment Samples Using Accelerated Solvent Extractor for the Analyses of Organochlorine Pesticides, Polychlorinated Biphenyls, and Aromatic Hydrocarbons. Rev. 1 as of September 4, 1998. SOP-9733

Quantitative Determination of Polynuclear Aromatic Hydrocarbons by Gas Chromatography/Mass Spectrometry Using the Selected Ion Mode. Rev 3 as of October 16, 1998 SOP-9810

Quantitative Determination of Chlorinated Hydrocarbons by Gas Chromatography/Electron Capture Detection. Rev. 1 as of October 29, 1998. SOP-0008

Quantitative Determination of n-Alkanes, Pristane, Phytane, Total Resolved and Unresolved Complex Mixture, and Total Petroleum Hydrocarbons. Rev 1 as of April 20, 2000. The samples were extracted and analyzed for chlorophenoxy herbicides following the protocol contained in the following SOPs used at GERG: SOP-9805

Extracting Sediment Samples Using Accelerated Solvent Extractor for the Analyses of Organochlorine Pesticides, Polychlorinated Biphenyls, and Aromatic Hydrocarbons. Rev. 1 as of September 4, 1998. EPA 1658

The Determination of Phenoxy-Acid Herbicides in Municipal and Industrial Wastewater. August 1993. The samples were digested and analyzed for metals following the protocol contained in the following SOPs used at GERG: SOP-0203

Digestion of Sediment, Soil and Geological Samples Prior to Mercury Analysis Using the Cold Vapor Atomic Absorption Technique. Rev 1 as of May 21, 2002 SOP-0204

Digestion of Sediment or Soil for the Determination of Total Recoverable Trace Metals. Rev 1 as of May 21, 2002. SOP-9802

Standard Operating Procedure for Trace Metal Analysis Using Inductively Coupled Plasma (ICP) Emission Spectroscopy. Rev 1 as of June 3, 1998. SOP -0201

Determination of Trace metals by Graphite Furnace Atomic Absorption Spectrometry. Rev 1 as of February 6, 2002. SOP-0202

Determination of Mercury by Cold vapor Atomic Absorption Spectrometry. Rev 1 as of March 22, 2002.

SOP Modifications

None noted.

Quality Control

Laboratory Qualifiers

All of the analytical data have been qualified based on the most recent method detection limits determined. Concentrations that were less than the MDL, which are adjusted for sample size and dilution, are qualified “J”. Those analytes not detected are qualified “ND”. Concentrations that exceeded the calibration limits are qualified “EC”. The

concentrations that are determined by analyses of a diluted aliquot are qualified “D”. If the quantification of an analyte is interfered with by another analyte due to its high concentration the data will be left blank and qualified “I” to denote this interference. Analytes may be found above the three times the detection limits in the blank. These may cause possible contamination in samples that are less than ten times the observed level in the blank. These data are qualified “B” to denote this possible contamination.

Analytical Difficulties

Bulk Parameters

For the particle size determination, two duplicates were chosen. The relative percent differences (RPD) for the duplicate pairs were within the QC limits of +/- 25%. No action was required. During the nutrient analyses, one duplicate was performed for each analyte. The RPD were within the QC criteria of +/- 25%. A spiked blank was performed and the recovery of the spike was within the QC limits of 75 to 125%. A laboratory control sample was also analyzed. The recovery of this sample also was within the QC limits. No further action was required.

Aliphatic and Aromatic Hydrocarbon Analyses

There were two samples with low recovery of d8-naphthalene. This surrogate can be lost during concentration steps if there are low levels of hydrocarbons in the sample. In both of these the levels of the low molecular weight hydrocarbons are low. This should not affect the data since the samples are corrected for surrogate recovery. The other surrogates were well within the QC criteria. The recoveries were qualified “Q” to denote the variance. No further action was taken.

For two other samples d12-chrysene had high recoveries. The ion ratios for this compound did not match. The secondary ion was used to quantify the peaks that are based on deuterated chrysene. The recoveries are qualified “I” to denote the interference. No further action was taken.

No analytes were measured above the detection limits for the procedural blank (GERG ID Q20703). No action was required.

The recoveries for matrix spike/matrix spike duplicate of sample CBA1 (GER Ids Q20704 and Q20705) met the QC criteria of 40 to 120% for all but 2 analytes, n-C30 and n-C34. The peaks were checked for possible interference, but none was found. Several spiked analytes in the aromatic hydrocarbon (PAH) analysis were invalid due to the concentrations of these analytes in the original sample. These analytes are qualified “I” to denote the interference from the native concentrations in the sample. The overall QC objective was met with average recovery of 106.4 and 105.5% for the aliphatic analyses and 86.7 and 102.1 for the PAH analyses. The RPD of the duplicate spikes were 3.8 and 21.4. These meet the overall QC objectives. No further action was required.

The GERG STD Oil 2000 (REF Oil) is run on the instrument prior to each analytical batch. The sample is a solution of petroleum oil in methylene chloride with a concentration of about 800 mg/milliliter of solution. The analysis (GERG Ids W00943 for aliphatics and W42925 for PAHs) were compared to the running average for the laboratory for all single analyte peaks, which are primarily alkanes and non-alkylated PAH analytes. The control limits for the GERG STD Check samples (REF Oil) are +/- 35% of the laboratory average for each single component analyte. No control limits are applied to the alkylated PAH homologue clusters (multi-peak analytes) because the variation in the analytical results (and

associated uncertainty) increases with increased alkylation and increased number of homologues within the cluster. This effect can be seen in the data table that includes the laboratory average and one standard deviation for each analyte. All analytes were with the prescribed QC limits. No action was required.

Pesticide and PCB Analysis

Three analytes were measured above the detection limits, but less than three times the MDL, in the procedural blank (GERG ID Q20703). These peaks were qualified “<3xMDL” to denote this variance. No further action was required.

The recoveries for matrix spike/matrix spike duplicate of sample CBA1 (GER IDs Q20704 and Q20705) met the QC criteria of 40 to 120% for all analytes. The overall QC objective was met with average recovery of 84.5 and 95.9%. The RPD of the duplicate spikes was 12.7%. This met the overall QC objectives. No further action was required.

The PCB Mix (REF) is run on the instrument at the end of each analytical batch. The sample is a solution of known amounts of four aroclors in hexane. The analysis (GERG ID S16049) was compared to the running average for the laboratory. The control limits for the PCB Mix samples (REF) are +/- 35% of the laboratory average for each analyte. All analytes, except PCB 105 were with the prescribed QC limits. The peak was checked but no improvement was found. The data is qualified to denote this variance. No further action was taken.

Chlorophenoxy-Acid Herbicide Analysis

No analytes were measured above the detection limits in the procedural blank (GERG ID Q20703). No action was required.

A duplicate analysis was performed on sample CBA11 (GERG ID Q20704). No RPD was determined since all analytes are near or below detection limits. No action was required.

The recoveries for matrix spike of sample CBA11 (GERG ID Q20705) did not meet the QC criteria of 30 to 120% for all analytes. Two analytes had poor recovery. The spike level was too low. The samples should have been spiked at a level 10 times the detection limit. In this case the level was 2 times the detection limits. On review of the data, there is the possibility that these 2 analytes may not be recovered from this type of matrix well. GERG has seen this with other herbicides and estuarine sediments. The recoveries were qualified "Q" to denote the variance. No further action was taken.

Trace Metal Analysis

No analytes were measured above the detection limits in the procedural blank (GERG Ids I3945 and I3951). No action was required.

Recovery of all spiked analytes in spiked blanks (GERG Ids I3946 and I3952) met the QC criteria. No action was required.

A duplicate analysis was performed on sample CBA13 (GERG ID C42423D). The RPD were within the QC criteria of +/- 25% for all analytes except Thallium. Several analytes, including thallium were below the detection limits. No action was required.

The recoveries for matrix spike of sample CBA13 (GERG ID C42423S) did meet the QC criteria of 30 to 120% for all analytes. No further action was required.

The recovery of certified values for NRCC MESS-3 (GERG Ids I3947 and I3953) and NIST 1944 (GERG Ids I3948 and I3954) were within the normal +/-35% QC limits for most analytes. The certified values are based on a total digest and these samples were digested by a total recoverable method. The levels measured are consistent with our method and historical data for these SRMs. Since the overall QC objectives were achieved, no further action was taken.

No further variances or difficulties were observed.