

Inorganics

Sixteen storm water samples were collected from the WBA drainage ditches and analyzed for inorganics. Some inorganics had lower concentrations than during normal flow events, while others had higher concentrations. The maximum concentration of mercury detected in the storm event was 3.5 times higher than during normal flow conditions. **Table 21** includes a summary of detected inorganics in storm water, frequency of detection, range of concentrations, and the location of the maximum concentration.

Table 21: Bottomland Drainage Ditch Storm Water Data Summary - Inorganics

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Inorganics via method SW6010. Concentration units are in µg/L				
aluminum	69%	202	8,010	SW-16
barium	100%	29.3	111	SW-5
calcium	100%	17,300	101,000	SW-19
chromium	63%	8	13	SW-4
cobalt	6%	2.3	2.3	SW-5
copper	50%	7.6	13.5	SW-4
iron	100%	237	7,540	SW-16
lead	50%	4.7	9.2	SW-4
magnesium	100%	1,180	14,600	SW-19
manganese	100%	27.4	234	SW-4
nickel	63%	5	11	SW-4
potassium	100%	1,870	21,100	SW-5
sodium	100%	9,190	3,040,000	SW-5
vanadium	75%	11.1	24.3	SW-16
zinc	100%	6	218	SW-4
Mercury via method SW7470. Concentration units are in µg/L				
mercury	88%	0.43	81.8	SW-4

Pesticides

Eight storm water samples were collected from the WBA drainage ditches and analyzed for pesticides. Collectively, the samples contained three detected pesticides. The concentrations of the pesticides were slightly less than the concentrations of the same pesticides detected during non-storm events. **Table 22** summarizes detected pesticides in storm water, frequency of detection, range of concentrations, and the location of the maximum concentration.

Table 22: Bottomland Drainage Ditch Storm Water Data Summary - Pesticides

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Pesticides via method SW8081. Concentration units are in µg/L				
4,4'-DDD	13%	0.02	0.02	SW-5
4,4'-DDT	13%	0.03	0.03	SW-5
endrin aldehyde	25%	0.023	0.03	SW-5

PCBs

Eight storm water samples were collected from the WBA drainage ditches for Aroclor 1268 and PCB congeners. **Table 23** summarizes detected PCBs in storm water, frequency of detection, range of concentrations, and the location of the maximum concentration.

Table 23: Bottomland Drainage Ditch Storm Water Data Summary - PCBs

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Aroclors via method SW8082. Concentration units are in µg/L				
Aroclor 1268	88%	0.1	6.3	SW-4
PCB Congeners via method E1668. Concentration units are in ng/L				
PCB-105	100%	0.104	13.7	SW-14
PCB-106/118	100%	0.0545	33.6	SW-14
PCB-114	63%	0.109	0.876	SW-14
PCB-123	63%	0.0785	0.461	SW-4
PCB-126	63%	0.0889	0.352	SW-14
PCB-156	75%	0.0499	5.12	SW-14
PCB-157	63%	0.121	1.08	SW-14
PCB-167	63%	0.676	2.96	SW-14
PCB-169	63%	0.111	0.552	SW-4
PCB-189	88%	0.0721	5.12	SW-4
PCB-77	63%	0.26	1.26	SW-4
PCB-81	63%	0.0553	0.368	SW-14

Dioxins/Furans

Eight storm water samples were collected from the WBA drainage ditches and analyzed for dioxin/furan congeners and dioxin-like PCB congeners. A representative 2,3,7,8-TCDD toxicity equivalency quantity (TEQ) was calculated for each sample. Using the TEQ system, each of the dioxin/furan congeners and dioxin-like PCB congeners are assigned a Toxic Equivalency Factor (TEF) based on the congener's toxicity relative to 2,3,7,8-TCDD, with the toxicity of TCDD being equal to 1.0. The concentration of each dioxin/furan or dioxin-like PCB congener is multiplied by its respective TEF and the results are summed. The sum of the products of the concentrations multiplied by the appropriate TEF is known as the TEQ of the sample.

The results for 2,3,7,8-TCDD TEQs were similar to the concentrations detected in non-storm event surface water. **Table 24** summarizes detected dioxins/furans in storm water, frequency of detection, range of concentrations, and the location of the maximum concentration.

Table 24: Bottomland Drainage Ditch Storm Water Data Summary - Dioxins/Furans

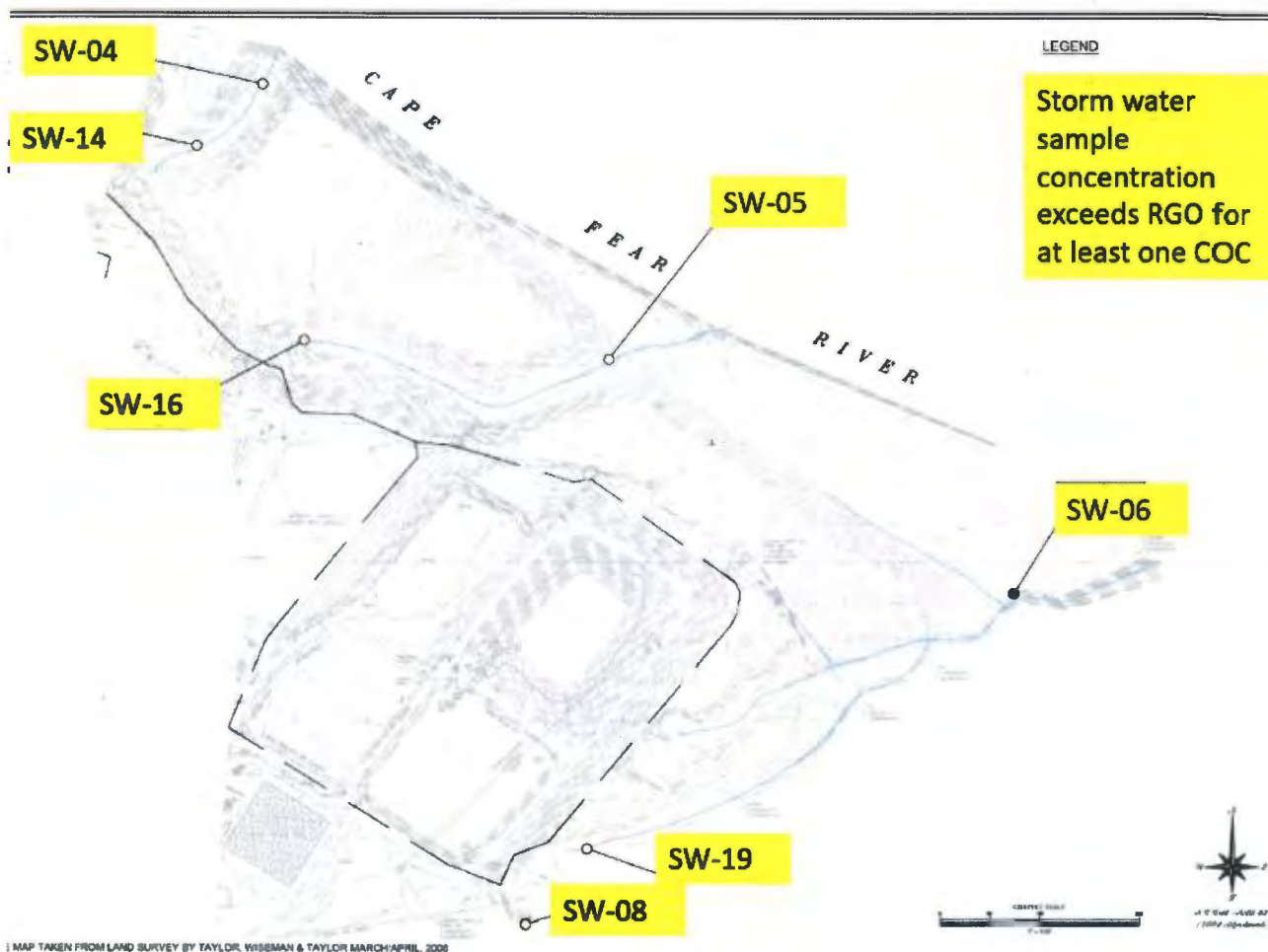
Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Dioxins/Furans via method E1613. Concentration units are in ng/L.				
1,2,3,4,6,7,8-HpCDD	75%	0.0148	0.611	SW-8
1,2,3,4,6,7,8-HpCDF	88%	0.0182	5.83	SW-4
1,2,3,4,7,8,9-HpCDF	63%	0.0299	0.253	SW-4
1,2,3,4,7,8-HxCDD	25%	0.0102	0.0159	SW-4
1,2,3,4,7,8-HxCDF	88%	0.00787	1.74	SW-4
1,2,3,6,7,8-HxCDD	25%	0.0145	0.0155	SW-8
1,2,3,6,7,8-HxCDF	63%	0.0289	0.37	SW-4
1,2,3,7,8,9-HxCDD	25%	0.0121	0.015	SW-8
1,2,3,7,8,9-HxCDF	75%	0.00256	0.0741	SW-4
1,2,3,7,8-PeCDF	75%	0.00516	0.268	SW-4
2,3,4,6,7,8-HxCDF	88%	0.00375	0.422	SW-4
2,3,4,7,8-PeCDF	75%	0.00569	0.247	SW-4
2,3,7,8-TCDF	63%	0.0177	0.149	SW-4
HpCDD	75%	0.0363	3.05	SW-8
HpCDF	88%	0.0354	8.27	SW-4
HxCDD	75%	0.00373	0.316	SW-8
HxCDF	100%	0.0119	5.5	SW-4
OCDD	100%	0.045	9.07	SW-8
OCDF	88%	0.0184	4.69	SW-4
PeCDD	38%	0.00625	0.0255	SW-4
PeCDF	88%	0.045	1.57	SW-4
TCDF	88%	0.0355	0.735	SW-4
Total 2,3,7,8-TCDD TEQ (dioxin/furan & PCB) - Bird	100%	0.0279	0.884	SW-4
Total 2,3,7,8-TCDD TEQ (dioxin/furan & PCB) - Fish	100%	0.0117	0.488	SW-4

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Total 2,3,7,8-TCDD TEQ (dioxin/furan & PCB) - Mammal	100%	0.0163	0.491	SW-4
Total 2,3,7,8-TCDD TEQ (dioxin/furan) - Bird	100%	0.0154	0.759	SW-4
Total 2,3,7,8-TCDD TEQ (dioxin/furan) - Fish	100%	0.0114	0.486	SW-4
Total 2,3,7,8-TCDD TEQ (dioxin/furan) - Mammal	100%	0.00975	0.44	SW-4
Total 2,3,7,8-TCDD TEQ (PCB) - Bird	100%	0.0000277	0.00239	SW-14
Total 2,3,7,8-TCDD TEQ (PCB) - Fish	100%	0.0122	0.131	SW-14
Total 2,3,7,8-TCDD TEQ (PCB) - Mammal	100%	0.00633	0.00505	SW-4

Summary

Figure 19 illustrates sampling locations that had concentrations of contaminants in storm water that exceeded PRGs.

Figure 19: Location of storm water samples that had a concentration that exceeds a surface water PRG for at least one COC



5.6.2.3 Cape Fear River and Livingston Creek

Surface water samples were collected from multiple locations in the Cape Fear River and Livingston Creek during 2002 through 2005. **Table 25** through **Table 29** include summary statistics for detected constituents in these off-site surface waters, frequency of detection, range of concentrations, and the location of the maximum concentration. **Figure 20** illustrates the sampling locations.

Table 25: Cape Fear River and Livingston Creek Surface Water Data Summary – Water Quality Parameters

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Water Quality Parameters				
Method E130.2. Concentration units are in µg/L				
Hardness, Total as CaCO ₃	100%	20,200	316,000	SW-19
Method E160.2. Concentration units are in µg/L				
Total Suspended Solids	100%	3,200	452,000	SW-8
Method SW9040B. No units.				
pH	100%	7	7.4	IP-SW

Table 26: Cape Fear River and Livingston Creek Surface Water Data Summary - VOCs and SVOCs

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
VOCs via method SW8260. Concentration units are in µg/L				
acetone	9%	2.5	2.5	WRIGHT-SW
methylene chloride	27%	10	10	LCP001, 5 & 6
toluene	9%	0.26	0.26	WRIGHT-SW
SVOCs via method SW8270. Concentration units are in µg/L				
bis(2-ethylhexyl)phthalate	36%	3.1	3.4	RIVER-UP-2

Table 27: Cape Fear River and Livingston Creek Surface Water Data Summary - Inorganics

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Inorganics via method SW6010. Concentration units are in µg/L				
aluminum	82%	123	1,320	RIVER-DN-1
antimony	45%	0.74	6.1	RIVER-REF
barium	100%	25.7	40	LCP007
calcium	100%	6,200	11,800	WRIGHT-SW
cobalt	9%	2	2	RIVER-REF
iron	100%	538	1,520	RIVER-DN-1
lead	45%	0.78	2	RIVER-REF
magnesium	100%	2,190	2,940	RIVER-REF
manganese	100%	21.7	110	LCP007
potassium	100%	2,450	4,500	LCP007
selenium	9%	3.7	3.7	RIVER-REF
sodium	100%	7,590	31,000	LCP007
strontium	100%	44	54	LCP007
thallium	55%	2.8	4.7	RIVER-DN-2
titanium	100%	6.9	11	LCP006 & LCP007
vanadium	64%	2.6	11	LCP007
zinc	100%	5.8	12	LCP007
Mercury via method E1631. Concentration units are in µg/L				
mercury	100%	0.0022	0.00634	SW-3

Table 28: Cape Fear River and Livingston Creek Surface Water Data Summary - Pesticides

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Pesticides via method SW8081. Concentration units are in µg/L				
4,4'-DDD	20%	0.00154	0.0362	IP-SW
4,4'-DDE	20%	0.00136	0.0228	IP-SW
4,4'-DDT	30%	0.000952	0.00388	RIVER-REF
acetone	9%	2.5	2.5	WRIGHT-SW
Aldrin	20%	0.00101	0.00237	IP-SW
alpha-chlordane	20%	0.00251	0.00282	WRIGHT-SW
dieldrin	40%	0.000366	0.00147	WRIGHT-SW
Endosulfan I	30%	0.000812	0.0043	IP-SW
Endosulfan II	20%	0.00113	0.00148	IP-SW
Endosulfan sulfate	30%	0.0019	0.00176	RIVER-UP-2
endrin	30%	0.000495	0.00843	IP-SW
gamma-chlordane	40%	0.000629	0.0112	RIVER-DN-1
heptachlor	20%	0.000754	0.0194	RIVER-REF

Table 29: Cape Fear River and Livingston Creek Surface Water Data Summary - Aroclors and Dioxins/Furans

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Aroclors via method SW8082. Concentration units are in µg/L				
Aroclor 1268	14%	0.0423	0.0423	RIVER-UP-1
Dioxins/Furans via method E1613. Concentration units are in pg/L.				
Total 2,3,7,8-TCDD TEQ (dioxin/furan & PCB) - Bird	100%	8.05	8.05	IP-SW
Total 2,3,7,8-TCDD TEQ (dioxin/furan & PCB) - Fish	100%	6.89	6.89	IP-SW
Total 2,3,7,8-TCDD TEQ (dioxin/furan & PCB) - Mammal	100%	6.27	6.27	IP-SW
Total 2,3,7,8-TCDD TEQ (dioxin/furan) - Bird	100%	7.66	7.66	IP-SW
Total 2,3,7,8-TCDD TEQ (dioxin/furan) - Fish	100%	6.87	6.87	IP-SW
Total 2,3,7,8-TCDD TEQ (dioxin/furan) - Mammal	100%	5.88	5.88	IP-SW
Total 2,3,7,8-TCDD TEQ (PCB) - Bird	100%	0.0196	0.0196	IP-SW
Total 2,3,7,8-TCDD TEQ (PCB) - Fish	100%	0.391	0.391	IP-SW
Total 2,3,7,8-TCDD TEQ (PCB) - Mammal	100%	0.391	0.391	IP-SW

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Mercury	<0.1
Arsenic	<0.05
Lead	<0.05
Cadmium	<0.001
Chromium	<0.001
Vanadium	<0.001
Barium	<0.001
Strontium	<0.001
Aluminum	<0.001
Iron	<0.001
Copper	<0.001
Zinc	<0.001
Manganese	<0.001
Selenium	<0.001
Fluoride	<0.001
Boron	<0.001
Silica	<0.001
Calcium	<0.001
Magnesium	<0.001
Sulfate	<0.001
Chloride	<0.001
Nitrate	<0.001
Ammonia	<0.001
Phosphate	<0.001
Hydroxide	<0.001
Sodium	<0.001
Potassium	<0.001
Lithium	<0.001
Silver	<0.001
Gold	<0.001
Platinum	<0.001
Palladium	<0.001
Cobalt	<0.001
Nickel	<0.001
Chromium	<0.001
Manganese	<0.001
Iron	<0.001
Copper	<0.001
Zinc	<0.001
Manganese	<0.001
Selenium	<0.001
Fluoride	<0.001
Boron	<0.001
Silica	<0.001
Calcium	<0.001
Magnesium	<0.001
Sulfate	<0.001
Chloride	<0.001
Nitrate	<0.001
Ammonia	<0.001
Phosphate	<0.001
Hydroxide	<0.001
Sodium	<0.001
Potassium	<0.001
Lithium	<0.001
Silver	<0.001
Gold	<0.001
Platinum	<0.001
Palladium	<0.001
Cobalt	<0.001
Nickel	<0.001
Chromium	<0.001
Manganese	<0.001
Iron	<0.001
Copper	<0.001
Zinc	<0.001
Manganese	<0.001
Selenium	<0.001
Fluoride	<0.001
Boron	<0.001
Silica	<0.001
Calcium	<0.001
Magnesium	<0.001
Sulfate	<0.001
Chloride	<0.001
Nitrate	<0.001
Ammonia	<0.001
Phosphate	<0.001
Hydroxide	<0.001
Sodium	<0.001
Potassium	<0.001
Lithium	<0.001
Silver	<0.001
Gold	<0.001
Platinum	<0.001
Palladium	<0.001
Cobalt	<0.001
Nickel	<0.001
Chromium	<0.001
Manganese	<0.001
Iron	<0.001
Copper	<0.001
Zinc	<0.001
Manganese	<0.001
Selenium	<0.001
Fluoride	<0.001
Boron	<0.001
Silica	<0.001
Calcium	<0.001
Magnesium	<0.001
Sulfate	<0.001
Chloride	<0.001
Nitrate	<0.001
Ammonia	<0.001
Phosphate	<0.001
Hydroxide	<0.001
Sodium	<0.001
Potassium	<0.001
Lithium	<0.001
Silver	<0.001
Gold	<0.001
Platinum	<0.001
Palladium	<0.001
Cobalt	<0.001
Nickel	<0.001
Chromium	<0.001
Manganese	<0.001
Iron	<0.001
Copper	<0.001
Zinc	<0.001
Manganese	<0.001
Selenium	<0.001
Fluoride	<0.001
Boron	<0.001
Silica	<0.001
Calcium	<0.001
Magnesium	<0.001
Sulfate	<0.001
Chloride	<0.001
Nitrate	<0.001
Ammonia	<0.001
Phosphate	<0.001
Hydroxide	<0.001
Sodium	<0.001
Potassium	<0.001
Lithium	<0.001
Silver	<0.001
Gold	<0.001
Platinum	<0.001
Palladium	<0.001
Cobalt	<0.001
Nickel	<0.001
Chromium	<0.001
Manganese	<0.001
Iron	<0.001
Copper	<0.001
Zinc	<0.001
Manganese	<0.001
Selenium	<0.001
Fluoride	<0.001
Boron	<0.001
Silica	<0.001
Calcium	<0.001
Magnesium	<0.001
Sulfate	<0.001
Chloride	<0.001
Nitrate	<0.001
Ammonia	<0.001
Phosphate	<0.001
Hydroxide	<0.001
Sodium	<0.001
Potassium	<0.001
Lithium	<0.001
Silver	<0.001
Gold	<0.001

During 2002 through 2009, 130 sediment samples were collected from multiple locations in the WBA drainage pathways, the storm sewers, the Cape Fear River and Livingston Creek. The following subsections discuss the data for each of the three areas.

The WBA drainage pathways are comprised of eastern, central and western channels. Sediment samples were collected and analyzed for VOCs, SVOCs, inorganics, pesticides, PCBs and dioxins/furans. Chemicals from each category were detected.

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Table 30: Wooded Bottomland Drainage Pathway Sediment Data Summary - Characterization

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Sediment Characterization				
Method E160.3				
Total Solids	100%	74.66%	78.79%	WSED-41
Method SM2540G				
Percent Solids	100%	73.90%	78.20%	WSED-41
Method E160.3M				
Percent Moisture	100%	14.50%	54.00%	WSED-20-D0.5-1
Method 9045				
pH	100%	6.8	9.1	WSED-17-D0.5-1
Method 9060. Concentration units are in mg/kg.				
Total Organic Carbon	89%	1,400	43,000	WSED-25-D0-0.5

VOCs

Fifty-four sediment samples were collected from the WBA drainage ditches and analyzed for VOCs. Collectively, the samples contained 12 detected VOCs. **Table 31** summarizes detected VOCs, frequency of detection, concentration ranges and location of the maximum concentration.

Table 31: Wooded Bottomland Drainage Pathway Sediment Data Summary - VOCs

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
VOCs via method SW8260. Concentration units are in µg/kg.				
1,3-Dichlorobenzene	9%	3.4	47	WSED-4-D1-2
1,4-Dichlorobenzene	7%	3.2	76	WSED-29-D0.5-1
2-butanone	13%	6.2	18	WSED-20-D0.5-1
acetone	17%	7.8	200	WSED-9-D0-0.5
bromomethane	2%	6.1	6.1	WSED-20-D0.5-1
carbon disulfide	6%	1.3	8.4	WSED-20-D0.5-1
chlorobenzene	7%	0.87	7.3	WSED-29-D0.5-1
chloroform	4%	2.1	4.6	WSED-1-D1-2
cis-1,2-dichloroethene	2%	2.3	2.3	WSED-7-D0.5-1
toluene	13%	0.89	2.7	WSED-20-D0.5-1
trichloroethene (TCE)	4%	0.88	1.6	WSED-7-D0.5-1
trichlorofluoromethane	21%	1.8	5.5	WSED-20-D0.5-1

SVOCs

Fifty-seven sediment samples were collected from the WBA drainage ditches and analyzed for SVOCs. Collectively, the samples contained 30 detected SVOCs. **Table 32** summarizes detected SVOCs, frequency of detection, concentration ranges and location of the maximum concentration.

Table 32: Wooded Bottomland Drainage Pathway Sediment Data Summary - SVOCs

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
SVOCs via method SW8270. Concentration units are in mg/kg.				
2-methylnaphthalene	2%	0.085	0.085	HC-16-SS
3,3'-dichlorobenzidine	4%	0.1	1.3	WSED-9-D0.5-1
3+4-methylphenol	5%	0.15	0.15	HC-16-SS
3-nitroaniline	2%	0.031	0.031	WSED-5-D1-2
4-methylphenol	3%	0.024	0.024	WSED-40-SED
acenaphthene	9%	0.0026	0.1	WSED-30-D0.5-1
acenaphthylene	2%	0.028	0.028	WSED-5-D0-0.5
anthracene	7%	0.036	0.76	WSED-5-D0-0.5
benzo(a)anthracene	33%	0.065	2.1	WSED-5-D0-0.5 & WSED-09-D0.5-1
benzo(a)pyrene	19%	0.0087	1.5	WSED-9-D0.5-1
benzo(b)fluoranthene	19%	0.022	1.7	WSED-5-D0-0.5 & WSED-09-D0.5-1
benzo(g,h,i)perylene	19%	0.0094	0.75	WSED-9-D0.5-1
benzo(k)fluoranthene	18%	0.042	1.3	WSED-9-D0.5-1
bis(2-ethylhexyl)phthalate	32%	0.056	0.63	WSED-9-D0.5-1
butyl benzyl phthalate	7%	0.045	0.36	WSED-24-D0.5-1
caprolactam	8%	0.02	0.02	WSED-40-SED
carbazole	4%	0.047	0.075	WSED-30-D0.5-1
chrysene	35%	0.013	2.7	WSED-5-D0-0.5
dibenzo(a,h)anthracene	7%	0.12	0.28	WSED-15-D0-0.5
dibenzofuran	4%	0.08	0.097	WSED-5-D0-0.5
diethyl phthalate	25%	0.032	0.3	WSED-9-D0.5-1
dimethyl phthalate	2%	0.096	0.096	WSED-10-D0-0.5
fluoranthene	37%	0.0083	6.7	WSED-5-D0-0.5
fluorene	7%	0.0043	0.24	WSED-5-D0-0.5
hexachlorobenzene	44%	0.027	1.3	WSED-9-D0.5-1
hexachloroethane	4%	0.036	0.18	WSED-2-D0-0.5
ideno(1,2,3-cd)pyrene	21%	0.0078	0.72	WSED-9-D0.5-1
naphthalene	4%	0.029	0.14	HC-16-SS
phenanthrene	30%	0.014	3.5	WSED-2-D0-0.5
pyrene	37%	0.005	6	WSED-5-D0-0.5

Inorganics

Fifty-seven sediment samples were collected from the WBA drainage ditches and analyzed for inorganics. Thirty more samples were collected and analyzed for only mercury. Collectively, the samples contained 25 detected inorganics and mercuric compounds. Many inorganics are naturally occurring. **Table 33** summarizes detected inorganics and mercuric compounds, frequency of detection, concentration ranges and location of the maximum concentration.

Table 33: Wooded Bottomland Drainage Pathway Sediment Data Summary - Inorganics

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Inorganics via method SW6010. Concentration units are in mg/kg.				
aluminum	95%	355	30,000	HC-16-SS
antimony	5%	0.3	0.47	WSED-4-D1-2
arsenic	64%	0.52	6.8	WSED-20-D0.5-1
barium	95%	1.4	76	HC-16-SS
beryllium	42%	0.069	0.93	WSED-20-D0.5-1
cadmium	49%	0.12	2	WSED-20-D0.5-1
calcium	95%	353	42,500	WSED-42
chromium	93%	1.2	55.4	WSED-20-D0.5-1
cobalt	74%	0.28	5.4	WSED-15-D0.5-1
copper	81%	0.26	13	HC-16-SS
iron	95%	403	32,100	WSED-20-D0.5-1
lead	93%	0.67	64.3	WSED-9-D0.5-1
magnesium	95%	48.8	3,070	WSED-20-D0.5-1
manganese	95%	4	208	WSED-30-D0-0.5
nickel	88%	0.56	23.9	WSED-10-D0-0.5
potassium	93%	58	2,890	WSED-20-D0.5-1
silver	2%	1.8	1.8	WSED-9-D0.5-1
sodium	82%	91.4	16,000	HC-16-SS
thallium	11%	0.35	0.8	WSED-4-D1-2
vanadium	95%	1.2	66	HC-16-SS
zinc	95%	3.1	262	WSED-9-D0.5-1
Mercury via method SW7471. Concentration units are in mg/kg.				
mercury	94%	0.038	126	WSED-16-D0.5-1
Mercury via method SW1630. Concentration units are in mg/kg.				
methylmercury	100%	0.00058	0.00164	WSED-40
Mercury via method SW1631. Concentration units are in mg/kg.				
mercury	100%	0.471	0.635	WSED-42
mercury fraction 1 bloom ES&T	100%	0.0095	0.015	WSED-41 & 42
mercury fraction 5 bloom ES&T	100%	0.0315	0.144	WSED-42

Pesticides

Fifty-seven sediment samples were collected from the WBA drainage ditches and analyzed for pesticides. Collectively, the samples contained 19 detected pesticides. **Table 34** summarizes detected pesticides, frequency of detection, concentration ranges and location of the maximum concentration.

Table 34: Wooded Bottomland Drainage Pathway Sediment Data Summary - Pesticides

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Pesticides via method SW8081. Concentration units are in mg/kg.				
4,4'-DDD	46%	0.00023	1.1	WSED-9-D0.5-1
4,4'-DDE	32%	0.00038	0.052	WSED-13-D0-0.5
4,4'-DDT	49%	0.0019	7.9	WSED-9-D0.5-1
aldrin	44%	0.000514	0.17	WSED-9-D0.5-1
alpha-BHC	20%	0.00034	0.064	WSED-41
alpha-chlorodane	4%	0.00153	0.00153	WSED-4-D0-0.5
beta-BHC	49%	0.011	0.88	WSED-9-D0.5-1
delta-BHC	26%	0.00023	0.14	WSED-9-D0.5-1
dieldrin	26%	0.00038	0.28	WSED-9-D0.5-1
endosulfan I	28%	0.00032	0.01	WSED-13-D0-0.5
endosulfan II	46%	0.00016	0.024	WSED-20-D0-0.5
endosulfan sulfate	28%	0.00033	0.042	WSED-13-D0-0.5
endrin	42%	0.00045	0.54	WSED-9-D0.5-1
endrin aldehyde	57%	0.0011	2.6	WSED-9-D0.5-1
gamma-BHC	35%	0.0009	0.19	WSED-9-D0.5-1
gamma-chlordane	11%	0.000944	0.00218	WSED-4-D0-0.5
heptachlor	12%	0.000677	0.012	WSED-10-D0-0.5
heptachlor epoxide	35%	0.00073	0.014	WSED-27-D0.5-1
methoxychlor	17%	0.00055	0.019	WSED-27-D0.5-1

PCBs

Seventy-seven sediment samples were collected from the WBA drainage ditches and analyzed for PCBs. Collectively, the samples contained four detected Aroclors and 13 PCB congeners. **Table 35** summarizes detected PCBs, frequency of detection, concentration ranges and location of the maximum concentration.

Table 35: Wooded Bottomland Drainage Pathway Sediment Data Summary - PCBs

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Aroclors via method SW8082. Concentration units are in mg/kg.				
Aroclor 1016	1%	1.9	1.9	WSED-13-D0-0.5
Aroclor 1248	3%	0.051	1.6	WSED-11-D0.5-1
Aroclor 1254	42%	0.0084	14	WSED-102705-001
Aroclor 1268	98%	0.042	1,500	WSED-9-D0.5-1
PCBs via method E1668. Concentration units are in ng/kg.				
PCB-105	8%	7.14	88,700	WSED-9-D0.5-1
PCB-106/118	100%	18.6	247,000	WSED-9-D0.5-1
PCB-114	67%	7.01	4,830	WSED-9-D0.5-1
PCB-118	90%	1.25	137	WSED-2-D1-2
PCB-123	67%	8.36	2,610	WSED-9-D0.5-1
PCB-126	67%	5.84	1,990	WSED-9-D0.5-1
PCB-156	83%	31.3	28,300	WSED-9-D0.5-1
PCB-157	83%	5.49	5,810	WSED-9-D0.5-1
PCB-167	83%	23.1	15,200	WSED-9-D0.5-1
PCB-169	75%	6.47	1,510	WSED-9-D0.5-1
PCB-189	83%	38.1	24,700	WSED-9-D0.5-1
PCB-77	83%	15.9	21,900	WSED-9-D0.5-1
PCB-81	67%	5.49	3,860	WSED-9-D0.5-1

Dioxins/Furans

Twenty-two sediment samples were collected from the WBA drainage ditches and analyzed for dioxins/furans.

Table 36 summarizes detected dioxins/furans, frequency of detection, concentration ranges and location of the maximum concentration.

Table 36: Wooded Bottomland Drainage Pathway Sediment Data Summary - Dioxins/Furans

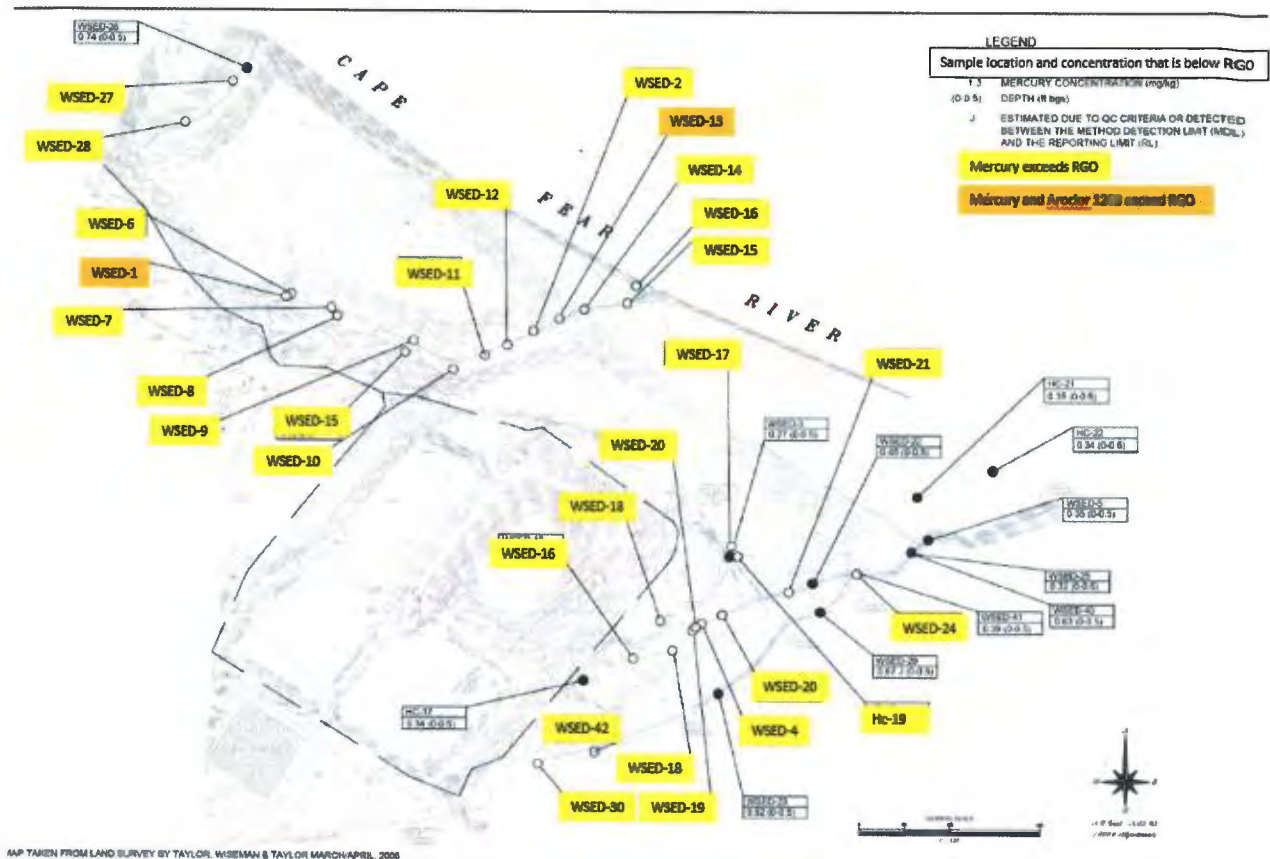
Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Dioxins/Furans via methods E1613 and SW8290. Concentration units are in ng/kg.				
1,2,3,4,6,7,8-HpCDD	100%	0.705	852	WSED-9D0.5-1
1,2,3,4,6,7,8-HpCDF	95%	1.41	34,300	WSED-2-D1-2
1,2,3,4,7,8,9-HpCDF	86%	0.736	1,720	WSED-9D0.5-1
1,2,3,4,7,8-HxCDD	59%	0.298	42	WSED-9D0.5-1
1,2,3,4,7,8-HxCDF	91%	0.552	9,950	WSED-9D0.5-1
1,2,3,6,7,8-HxCDD	68%	0.31	31.5	WSED-9D0.5-1
1,2,3,6,7,8-HxCDF	86%	0.737	2,170	WSED-9D0.5-1
1,2,3,7,8,9-HxCDD	68%	0.289	20.9	WSED-9D0.5-1
1,2,3,7,8,9-HxCDF	75%	2.29	360	WSED-9D0.5-1
1,2,3,7,8-PECDD	32%	0.243	11.1	WSED-9D0.5-1
1,2,3,7,8-PeCDF	86%	0.405	747	WSED-9D0.5-1
2,3,4,6,7,8-HxCDF	86%	0.815	3,140	WSED-9D0.5-1
2,3,4,7,8-PeCDF	86%	0.606	1,120	WSED-9D0.5-1
2,3,7,8-TCDD	32%	0.14	3.78	WSED-9D0.5-1
2,3,7,8-TCDF	86%	0.341	265	WSED-9D0.5-1
HpCDD	100%	1.87	2,460	WSED-9D0.5-1
HpCDF	100%	0.983	50,200	WSED-2-D1-2
HxCDD	100%	1.02	781	WSED-9D0.5-1
HxCDF	100%	0.906	37,000	WSED-9D0.5-1
OCDD	100%	37.7	10,500	WSED-26D0.5-1
OCDF	84%	1.4	34,500	WSED-9D0.5-1
PeCDD	27%	0.415	59.3	WSED-2-D1-2
PeCDF	91%	0.388	12,000	WSED-9D0.5-1
TCDD	68%	0.102	38.6	WSED-9D0.5-1
TCDF	91%	0.539	3,510	WSED-9D0.5-1
Total 2,3,7,8-TCDD TEQ (dioxin/furan & PCB) - Bird	100%	0.428	1,650	WSED-2-D1-2
Total 2,3,7,8-TCDD TEQ (dioxin/furan & PCB) - Fish	100%	0.384	1,480	WSED-2-D1-2
Total 2,3,7,8-TCDD TEQ (dioxin/furan & PCB) - Mammal	100%	0.38	1,450	WSED-2-D1-2
Total 2,3,7,8-TCDD TEQ (dioxin/furan) - Bird	100%	0.397	1,640	WSED-2-D1-2
Total 2,3,7,8-TCDD TEQ (dioxin/furan) - Fish	100%	0.382	1,480	WSED-2-D1-2
Total 2,3,7,8-TCDD TEQ (dioxin/furan) - Mammal	100%	0.349	1,430	WSED-2-D1-2
Total 2,3,7,8-TCDD TEQ (PCB) - bird	100%	0.00152	0.82	WSED-28-D0-0.5
Total 2,3,7,8-TCDD TEQ (PCB) - fish	100%	0.0303	56.5	WSED-27-D0.5-1
Total 2,3,7,8-TCDD TEQ (PCB) - Mammal	100%	0.0303	20.9	WSED-28-D0-0.5

Summary

Mercury and Aroclor 1268 are the contaminant that pose the greatest risks in the WBA sediments.⁵

Figure 21 illustrates the extent of mercury and Aroclor 1268 in W sediment. Mercury concentrations ranged from non-detect to 126 mg/kg. Aroclor 1268 concentrations in the wooded bottomland sediments ranged from non-detect to 1,500 mg/kg.

Figure 21: Wooded Bottomland Drainage Pathways Sediment Sample Locations



⁵ See Section 7.0 for risk assessment information.

5.6.3.2 Storm Water Sewer System Sediment

The storm water sewer system currently drains the UPA rainfall and storm water to the UNPA retention basins. Historically it may have collected spilled chemicals. The water flows through the sewer system and is treated prior to discharge to IP for further treatment. After treatment, it is discharged to the Cape Fear River. The sediment remaining in the sewer system was sampled during the EE/CA-RI.

VOCs

Twelve sediment samples were collected from the storm water sewer system and analyzed for VOCs. Collectively, the samples contained 10 detected VOCs. **Table 37** summarizes detected VOCs, frequency of detection, concentration ranges and location of the maximum concentration.

Table 37: Storm Sewer Sediment Data Summary - VOCs

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
VOCs via method SW8260. Concentration units are in µg/kg.				
1,2-dichloroethene (total)	25%	2.2	27	SED-9-D1-3
acetone	67%	12	200	SED-8-D0-1
carbon disulfide	75%	0.74	1.8	SED-1-1204
carbon tetrachloride	17%	2.9	3.3	SED-9-D1-3
chloroform	17%	0.99	3.5	SED-6-1204
methyl isobutyl ketone	58%	5.2	11	SED-8-D0-1
tetrachloroethene (PCE)	17%	7.6	150	SED-6-1204
trichloroethene (TCE)	25%	1.2	32	SED-9-D1-3
vinyl chloride	17%	1.8	4.5	SED-9-D1-3
xylene, total	8%	4.2	4.2	SED-6-1204

SVOCs

Twelve storm water sewer system sediment samples were collected and analyzed for SVOCs. Collectively, the samples contained 26 detected SVOCs. **Table 38** summarizes detected SVOCs, frequency of detection, concentration ranges and location of the maximum concentration.

Table 38: Storm Sewer Sediment Data Summary - SVOCs

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
SVOCs via method SW8270. Concentration units are in mg/kg.				
1,2,4-trichlorobenzene	8%	0.14	0.14	SED-6-1204
1,4-Dichlorobenzene	8%	0.069	0.069	SED-6-1204
3+4-methylphenol	8%	0.063	0.063	SED-1-1204
acenaphthene	25%	0.027	0.063	SED-6-1204
anthracene	33%	0.023	0.35	SED-1-1204
benzo(a)anthracene	58%	0.04	0.29	SED-1-1204
benzo(a)pyrene	42%	0.04	0.17	SED-1-1204
benzo(b)fluoranthene	42%	0.056	0.26	SED-1-1204
benzo(g,h,i)perylene	58%	0.025	0.094	SED-1-1204
benzo(k)fluoranthene	67%	0.035	0.22	SED-1-1204
bis(2-ethylhexyl)phthalate	58%	0.093	1.9	SED-1-1204
butyl benzyl phthalate	42%	0.021	0.11	SED-1-1204
carbazole	17%	0.046	0.1	SED-1-1204
chrysene	67%	0.036	0.41	SED-1-1204
dibenzo(a,h)anthracene	17%	0.022	0.031	SED-9-D0-1
dimethyl phthalate	33%	0.066	0.34	SED-6-1204
di-n-butyl phthalate	17%	0.14	0.74	SED-2-1204
di-n-octyl phthalate	8%	0.066	0.066	SED-1-1204
fluoranthene	67%	0.061	0.62	SED-1-1204
fluorene	25%	0.035	0.056	SED-1&6-1204
hexachlorobenzene	58%	0.027	1.1	SED-6-1204
hexachlorobutadiene	17%	0.053	0.37	SED-6-1204
hexachloroethane	17%	0.066	1.2	SED-6-1204
ideno(1,2,3-cd)pyrene	50%	0.026	0.097	SED-1-1204
phenanthrene	58%	0.044	0.39	SED-1&6-1204
pyrene	67%	0.058	0.59	SED-1-1204

Inorganics

Twelve storm water sewer system sediment samples were collected and analyzed for inorganics and mercury. Collectively, the samples contained 22 detected inorganics and mercuric compounds. Many inorganics are naturally occurring. **Table 39** summarizes detected inorganics and mercuric compounds, frequency of detection, concentration ranges and location of the maximum concentration.

Table 39: Storm Sewer Sediment Data Summary - Inorganics

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Inorganics via method SW6010. Concentration units are in mg/kg.				
aluminum	100%	1,850	7,630	SED-10-D3-4
antimony	42%	0.33	6.4	SED-2-1204
arsenic	92%	0.61	27.6	SED-2-1204
barium	100%	6.2	85.4	SED-1-1204
beryllium	100%	0.082	0.57	SED-7-D1-2
cadmium	42%	0.11	1.2	SED-1-1204
calcium	100%	1,230	53,100	SED-1-1204
chromium	100%	4.1	94.6	SED-2-1204
cobalt	100%	0.57	14.8	SED-2-1204
copper	100%	0.9	564	SED-2-1204
iron	100%	4,420	155,000	SED-2-1204
lead	100%	2.5	27.3	SED-2-1204
magnesium	100%	441	2,860	SED-7-D1-2
manganese	100%	18.7	597	SED-2-1204
nickel	100%	1.6	112	SED-2-1204
potassium	100%	100	2,410	SED-7-D1-2
silver	25%	0.45	5.4	SED-1-1204
sodium	83%	261	4,000	SED-6-1204
thallium	42%	0.34	0.56	SED-7-D0-1
vanadium	100%	4	42.2	SED-2-1204
zinc	100%	10	499	SED-2-1204
Mercury via method SW7471. Concentration units are in mg/kg.				
mercury	100%	1.4	570	SED-6-1204

Pesticides

Twelve storm water sewer system sediment samples were collected and analyzed for pesticides. Collectively, the samples contained 12 detected pesticides. **Table 40** summarizes detected pesticides, frequency of detection, concentration ranges and location of the maximum concentration.

Table 40: Storm Sewer Sediment Data Summary - Pesticides

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Pesticides via method SW8081. Concentration units are in mg/kg.				
4,4'-DDD	17%	0.000508	0.0315	SED-6-1204
4,4'-DDE	25%	0.000615	0.0195	SED-6-1204
4,4'-DDT	42%	0.0158	0.0787	SED-6-1204
aldrin	58%	0.000407	0.0551	SED-6-1204
alpha-chlorodane	50%	0.000487	0.0139	SED-9-D0-1
dieldrin	50%	0.00224	0.0198	SED-9-D1-3
endosulfan I	25%	0.000681	0.0156	SED-9-D1-3
endosulfan II	50%	0.00133	0.0199	SED-9-D1-3
endosulfan sulfate	8%	0.0379	0.0379	SED-6-1204
endrin	25%	0.00136	0.0323	SED-9-D1-3
gamma-chlordane	58%	0.000553	0.2	SED-6-1204
heptachlor	58%	0.00056	0.235	SED-1-1204

PCBs

Twelve storm water sewer system sediment samples were collected and analyzed for Aroclor 1268. **Table 41** summarizes detected PCBs, frequency of detection, concentration ranges and location of the maximum concentration.

Table 41: Storm Sewer Sediment Data Summary - Aroclor 1268

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Aroclor 1268 via method SW8082. Concentration units are in mg/kg.				
Aroclor 1268	100%	0.172	21.9	SED-2-1204

5.6.3.3 Off-site Sediment in the Cape Fear River and Livingston Creek

Twenty-one sediment samples were collected from the Cape Fear River and Livingston Creek. **Table 42** summarizes detected moisture content, pH and TOC, frequency of detection, concentration/percentage ranges and location of the maximum concentration/percentage.

Table 42: Cape Fear River and Livingston Creek Sediment Data Summary - Characterization

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Sediment Characterization				
Method E160.3M				
Percent Moisture	100%	30%	51.1%	IP-SED3
Method 9045				
pH	100%	6.7	6.7	IP-SED1&3
Method 9060. Concentration units are in mg/kg.				
Total Organic Carbon	100%	21	109	IP-SED3

VOCs

Twenty-one sediment samples were collected from the Cape Fear River and Livingston Creek and analyzed for VOCs. Collectively, the samples contained five detected VOCs. **Table 43** summarizes detected VOCs, frequency of detection, concentration ranges and location of the maximum concentration.

Table 43: Cape Fear River and Livingston Creek Sediment Data Summary - VOCs

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
VOCs via method SW8260. Concentration units are in µg/kg.				
acetone	71%	32	4,500	RIVER-REF-4-SED
carbon disulfide	86%	1.3	12	LCP005SD
methyl isobutyl ketone	29%	7.9	41	RIVER-REF-1-SED
styrene	76%	2.1	7.5	RIVER-UP-1-SED
o-xylene	100%	130	130	LCP007SD

SVOCs

Twenty-one sediment samples were collected from the Cape Fear River and Livingston Creek and were analyzed for SVOCs. Collectively, the samples contained 14 detected SVOCs. **Table 44** includes a summary of detected SVOCs, frequency of detection, concentration ranges and location of the maximum concentration.

Table 44: Cape Fear River and Livingston Creek Sediment Data Summary - SVOCs

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
SVOCs via method SW8270. Concentration units are in mg/kg.				
benzo(a)anthracene	24%	0.043	0.067	WRIGHT-SED3
benzo(a)pyrene	10%	0.036	0.078	WRIGHT-SED3
benzo(b)fluoranthene	10%	0.05	0.098	WRIGHT-SED3
benzo(g,h,i)perylene	14%	0.027	0.048	WRIGHT-SED3
benzo(k)fluoranthene	19%	0.042	0.094	WRIGHT-SED3
bis(2-ethylhexyl)phthalate	33%	0.05	0.36	RIVER-UP-1&2-SED
butyl benzyl phthalate	19%	0.042	0.17	WRIGHT-SED3
chrysene	57%	0.041	0.17	WRIGHT-SED3
dibenzo(a,h)anthracene	5%	0.04	0.04	WRIGHT-SED3
fluoranthene	67%	0.038	0.13	RIVER-UP-1-SED; RIVER-REF-1-SED
hexachlorobenzene	10%	0.12	0.37	SITE-2-SED
ideno(1,2,3-cd)pyrene	19%	0.024	0.063	RIVER-UP-1-SED
phenanthrene	14%	0.026	0.065	WRIGHT-SED3
pyrene	76%	0.041	0.13	RIVER-UP-1-SED

Inorganics

Twenty-one sediment samples were collected from the Cape Fear River and Livingston Creek and were analyzed for inorganics and mercury. Collectively, the samples contained 27 detected inorganics and mercuric compounds. Many inorganics are naturally occurring. **Table 45** summarizes detected inorganics and mercuric compounds, frequency of detection, concentration ranges and location of the maximum concentration.

Table 45: Cape Fear River and Livingston Creek Sediment Data Summary - Inorganics

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Inorganics via method SW6010. Concentration units are in mg/kg.				
aluminum	100%	2,920	26,800	RIVER-UP-1-SED
antimony	67%	0.36	4.2	WRIGHT-SED2
arsenic	100%	0.76	64.5	WRIGHT-SED3
barium	100%	16	399	WRIGHT-SED2
beryllium	100%	0.1	1.4	RIVER-UP-1-SED
cadmium	43%	0.14	7.2	WRIGHT-SED3
calcium	100%	676	41,000	LCP007SD
chromium	100%	6.5	34.1	RIVER-UP-1-SED
cobalt	100%	2.1	19.6	RIVER-UP-1-SED
copper	100%	3.4	456	
iron	100%	6,740	31,300	RIVER-UP-1-SED
lead	100%	4.3	272	WRIGHT-SED3
magnesium	100%	108	4,100	LCP007SD
manganese	100%	28.1	1,560	RIVER-UP-2-SED
molybdenum	25%	0.8	0.8	LCP007SD
nickel	100%	1.4	14.8	RIVER-UP-1-SED
potassium	100%	94.9	2,400	LCP007SD
selenium	24%	0.57	1.7	RIVER-REF-4-SED
silver	10%	0.059	0.065	WRIGHT-SED3
sodium	14%	170	1,100	LCP002SD
strontium	100%	8.8	140	LCP007SD
thallium	71%	0.47	1.9	RIVER-UP-2-SED
titanium	100%	40	49	LCP001SD
vanadium	100%	6	60.5	RIVER-UP-1-SED
yttrium	100%	6.1	11	LCP001SD
zinc	100%	20	637	WRIGHT-SED2
Mercury via method SW7471. Concentration units are in mg/kg.				
mercury	90%	0.024	1.3	LCP001SD

Pesticides

Twenty-one sediment samples were collected from the Cape Fear River and Livingston Creek and were analyzed for pesticides. Collectively, the samples contained 11 detected pesticides. **Table 46** summarizes detected pesticides, frequency of detection, concentration ranges and location of the maximum concentration.

Table 46: Cape Fear River and Livingston Creek Sediment Data Summary - Pesticides

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Pesticides via method SW8081. Concentration units are in mg/kg.				
4,4'-DDD	43%	0.00122	0.148	WRIGHT-SED3
4,4'-DDE	67%	0.00171	0.0425	WRIGHT-SED3
4,4'-DDT	62%	0.00126	0.0794	WRIGHT-SED2
aldrin	38%	0.000484	0.00786	WRIGHT-SED3
alpha-chlorodane	52%	0.000568	0.0147	WRIGHT-SED3
beta-BHC	25%	0.0027	0.0027	LCP002SD
dieldrin	29%	0.0018	0.0405	WRIGHT-SED3
endosulfan II	10%	0.000649	0.00105	WRIGHT-SED1
endrin	10%	0.0014	0.0073	LCP002SD
gamma-chlordane	38%	0.000855	0.0301	WRIGHT-SED3
heptachlor	10%	0.000918	0.00168	WRIGHT-SED3

PCBs

Seventeen sediment samples were collected from the Cape Fear River and Livingston Creek and were analyzed for Aroclor 1268. **Table 47** summarizes detected PCBs, frequency of detection, concentration ranges and location of the maximum concentration.

Table 47: Cape Fear River and Livingston Creek Sediment Data Summary – Aroclor 1268

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Aroclor 1268 via method SW8082. Concentration units are in mg/kg.				
Aroclor 1268	65%	0.0043	0.434	SITE-1-SED

Dioxins/Furans

Six sediment samples were collected from the Cape Fear River and Livingston Creek and were analyzed for dioxins/furans. Table 48 summarizes detected dioxins/furans, frequency of detection, concentration ranges and location of the maximum concentration.

Table 48: Cape Fear River and Livingston Creek Sediment Data Summary – Dioxins/Furans

Analyte	FOD%	Minimum Conc.	Maximum Conc.	Max location
Dioxins/Furans via methods E1613 and SW8290. Concentration units are in ng/kg.				
1,2,3,4,6,7,8-HpCDD	100%	0.84	179	IP-SED3
1,2,3,4,6,7,8-HpCDF	83%	0.38	170	LCP002SD
1,2,3,4,7,8,9-HpCDF	50%	0.405	5	LCP001SD
1,2,3,4,7,8-HxCDD	50%	0.565	1.38	IP-SED3
1,2,3,4,7,8-HxCDF	83%	0.38	31	LCP002SD
1,2,3,6,7,8-HxCDD	50%	1.6	4.26	IP-SED3
1,2,3,6,7,8-HxCDF	67%	0.28	5.4	LCP002SD
1,2,3,7,8,9-HxCDD	67%	2.02	6.8	LCP001SD
1,2,3,7,8-PECDD	33%	0.28	0.47	LCP005SD
1,2,3,7,8-PeCDF	20%	0.31	0.31	LCP007SD
2,3,4,6,7,8-HxCDF	67%	0.563	11	LCP002SD
2,3,4,7,8-PeCDF	50%	0.389	2.3	LCP001SD
2,3,7,8-TCDD	33%	0.171	0.255	IP-SED3
2,3,7,8-TCDF	50%	0.328	1.4	LCP001SD
HpCDD	100%	219	411	IP-SED3
HpCDF	100%	16.2	37	IP-SED3
HxCDD	100%	31	62.9	IP-SED3
HxCDF	100%	6.55	12.5	IP-SED3
OCDD	83%	2,700	7,600	LCP002SD
OCDF	83%	0.78	110	LCP002SD
PeCDD	100%	4.64	5.86	IP-SED3
PeCDF	100%	1.41	2.06	IP-SED3
TCDD	100%	5.78	8.27	IP-SED3
TCDF	100%	2.83	3.49	IP-SED3
Total 2,3,7,8-TCDD TEQ (dioxin/furan & PCB) - Bird	100%	2.23	4.74	IP-SED3
Total 2,3,7,8-TCDD TEQ (dioxin/furan & PCB) - Fish	100%	1.58	4.16	IP-SED3
Total 2,3,7,8-TCDD TEQ (dioxin/furan & PCB) - Mammal	100%	3.03	7.49	IP-SED3
Total 2,3,7,8-TCDD TEQ (dioxin/furan) - Bird	100%	2.18	4.67	IP-SED3
Total 2,3,7,8-TCDD TEQ (dioxin/furan) - Fish	100%	1.58	4.15	IP-SED3
Total 2,3,7,8-TCDD TEQ (dioxin/furan) - Mammal	100%	2.99	7.41	IP-SED3
Total 2,3,7,8-TCDD TEQ (PCB) - bird	100%	0.00241	0.00393	IP-SED3
Total 2,3,7,8-TCDD TEQ (PCB) - fish	100%	0.0482	0.0786	IP-SED3

Total 2,3,7,8-TCDD TEQ (PCB) - Mammal	100%	0.0482	0.0786	IP-SED3
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5.6.4 Wastewater Treatment Solids

During the removal action at IP in 2008-2009, sediments with concentrations of PCBs greater than 50 mg/kg were transported to the site for temporary storage in engineered stockpiles. Samples were collected of the WWTS at an interval of about one per 1,000 yd³. An off-site laboratory analyzed the samples for VOCs, SVOCs, metals, pesticides and dioxins. **Table 49** through **Table 53** summarize the analytical results of the 21 samples collected (which includes two duplicate samples). The maximum location indicates the sample ID that had the highest concentration of the analyte. Sample ID description: for example, ESP-7-071008 means that this was the seventh sample collected of WWTS entering the engineered stockpile, collected on July 10, 2008.

Notes for Tables in section 5.6.4:
21 samples were analyzed for each analyte. Only analytes detected in at least one sample are included in these tables. Complete analytical data reports are included in the IP Removal Action Report.
Sample ID: Example ESP-6-070808. The 6th sample collected from WWTS placed in the engineered stockpile (ESP); the sample was collected on July 8, 2008.
ESP = Engineered Stockpile
FOD = frequency of detection = number of samples with a detected concentration of the analyte divided by the total number of samples analyzed for the analyte.
mg/kg = milligrams per kilogram
ng/kg = nanograms per kilogram
TCDD = tetrachlorodibenzodioxin
TCDF = tetrachlorodibenzofuran
µg/kg = micrograms per kilogram

VOCs

Sixteen VOCs were detected in WWTS placed in the engineered stockpiles (ESP). **Table 49** summarizes VOC sample results, frequency of detection, concentration ranges and location of the maximum concentration.

Table 49: WWTS Data Summary – VOCs

Analyte	FOD%	minimum conc. (µg/kg)	maximum conc. (µg/kg)	Sample ID of highest concentration
1,1-dichloroethene	5%	37	37	ESP-7-071008
1,2,4-trichlorobenzene	57%	1	350	ESP-5-070108
1,3-dichlorobenzene	67%	1.5	480	ESP-8-071608
1,4-dichlorobenzene	62%	0.99	940	ESP-7-071008
2-butanone	19%	9.6	30	ESP-1-061408
acetone	52%	21	370	ESP-1-061408
benzene	10%	1.3	2.6	ESP-6-070808
carbon disulfide	33%	2.4	29	ESP-1-061408
chlorobenzene	43%	0.65	1,100	ESP-7-071008
chloroform	48%	1.1	1,000	ESP-7-071008
cis-1,2-dichloroethene	5%	83	83	ESP-5-070108
dichlorodifluoromethane	5%	3.2	3.2	ESP-10-073108
methyl acetate	19%	3,900	26,000	ESP-5-070108
tetrachloroethene	14%	2.1	130	ESP-5-070108
toluene	14%	1.6	180	ESP-8-071608
trichloroethene	24%	1.1	130	ESP-7-071008

SVOCs

Five VOCs were detected in WWTS placed in the ESPs. **Table 50** summarizes SVOC frequency of detection, concentration ranges and location of the maximum concentration.

Table 50: WWTS Data Summary - SVOCs

Analyte	FOD%	minimum conc. (µg/kg)	maximum conc. (µg/kg)	Sample ID of highest concentration
benzaldehyde	29%	28	98	ESP-16-092408
bis(2-ethylhexyl)phthalate	19%	120	240	ESP-18-100108
hexachlorobenzene	62%	83	18,000	ESP-17-092908
hexachloroethane	33%	130	960	ESP-6-070808
pyrene	5%	94	94	ESP-19-100208

Inorganics

Eight inorganics were detected in WWTS placed in the ESPs. **Table 51** summarizes inorganics detected, frequency of detection, concentration ranges and location of the maximum concentration.

Table 51: WWTS Data Summary - Inorganics

Analyte	FOD%	minimum conc. (mg/kg)	maximum conc. (mg/kg)	Sample ID of highest concentration
arsenic	95%	0.4	19.2	ESP-7-071008
barium	100%	10.3	146	ESP-18-100108-DUP
cadmium	57%	0.17	0.42	ESP-18-100108-DUP
chromium	100%	3.9	61	ESP-16-092408
lead	100%	3.3	56.7	ESP-6-070808
mercury	100%	0.56	185	ESP-6-070808
selenium	38%	0.87	2.2	ESP-18-100108
silver	67%	0.07	0.39	ESP-6-070808

Pesticides

Twenty pesticides were detected in WWTS placed in the ESPs. Table 52 summarizes pesticides detected, frequency of detection, concentration ranges and location of the maximum concentration.

Table 52: WWTS Data Summary – Pesticides

Analyte	FOD%	minimum conc. (µg/kg)	maximum conc. (µg/kg)	Sample ID of highest concentration
4,4'-DDD	38%	77	3,700	ESP-6-070808
4,4'-DDE	67%	0.88	330	ESP-7-071008
4,4'-DDT	100%	5.2	3,800	ESP-6-070808
aldrin	38%	1	120	ESP-7-071008
alpha-BHC	33%	0.38	43	ESP-6-070808
alpha-chlordane	33%	2.4	130	ESP-7-071008
beta-BHC	100%	1.7	1,900	ESP-6-070808
beta-chlordane	38%	6.3	250	ESP-7-071008
delta-BHC	33%	0.46	81	ESP-15-081908
dieldrin	76%	1.2	810	ESP-6-070808
endosulfan I	38%	0.32	64	ESP-15-081908
endosulfan II	38%	5.1	230	ESP-6-070808
endosulfan sulfate	14%	76	2,600	ESP-3-061908
endrin	67%	1.1	880	ESP-6-070808
endrin aldehyde	29%	91	19,000	ESP-5-070108
endrin ketone	19%	4	4,500	ESP-3-061908
gamma-BHC (lindane)	5%	63	63	ESP-15-081908
heptachlor	38%	1	740	ESP-15-081908
heptachlor epoxide	52%	4.3	260	ESP-7-071008
methoxychlor	10%	4	1,600	ESP-15-081908

Dioxins and Furans

Dioxins and furans were detected in all of the samples collected from WWTS placed in the ESPs. **Table 53** summarizes dioxin and furans detected, frequency of detection, concentration ranges and location of the maximum concentration.

Table 53: WWTS Data Summary – Dioxins and Furans

Analyte	FOD%	minimum conc. (ng/kg)	maximum conc. (ng/kg)	Sample ID of highest concentration
1,2,3,4,6,7,8-HpCDD	100%	13.3	1,070	ESP-7-071008
1,2,3,4,6,7,8-HpCDF	100%	31.5	56,700	ESP-6-070808
1,2,3,4,7,8,9-HpCDF	100%	2.58	2,420	ESP-6-070808
1,2,3,4,7,8-HxCDD	95%	0.522	24.2	ESP-6-070808
1,2,3,4,7,8-HxCDF	100%	9.84	15,500	ESP-7-071008
1,2,3,6,7,8-HxCDD	100%	0.885	41.3	ESP-7-071008
1,2,3,6,7,8-HxCDF	100%	2.29	2,950	ESP-6-070808
1,2,3,7,8,9-HxCDD	95%	0.558	17.7	ESP-7-071008
1,2,3,7,8,9-HxCDF	76%	0.813	102	ESP-7-071008
1,2,3,7,8-PeCDD	62%	0.439	3.16	ESP-7-071008
1,2,3,7,8-PeCDF	100%	2.66	3,210	ESP-7-071008
2,3,4,6,7,8-HxCDF	100%	3.62	3,350	ESP-6-070808
2,3,4,7,8-PeCDF	100%	1.89	1,580	ESP-6-070808
2,3,7,8-TCDD	100%	0.463	16.7	ESP-2-061708
2,3,7,8-TCDF	100%	18.7	1,670	ESP-7-071008
OCDD	100%	456	8,030	ESP-7-071008
OCDF	100%	53.3	55,400	ESP-6-070808
Total HpCDD	100%	34.8	2,240	ESP-7-071008
Total HpCDF	100%	69.6	67,500	ESP-6-070808
Total HxCDD	100%	6.29	8,635	ESP-18-100108
Total HxCDF	100%	39.3	43,400	ESP-6-070808
Total PeCDD	52%	0.857	33.9	ESP-6-070808
Total PeCDF	100%	31.3	24,900	ESP-18-100108
Total TCDD	95%	1.1	28.3	ESP-7-071008
Total TCDF	100%	68.1	7,690	ESP-7-071008
Toxic Equivalents	100%	17	3,900	ESP-6-070808