

Sediment Quality in Springstead and Hogtown Creeks Near the Cabot - Koppers Superfund Site

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Sediment Quality in Springstead and Hogtown Creeks Near the Cabot - Koppers Superfund Site

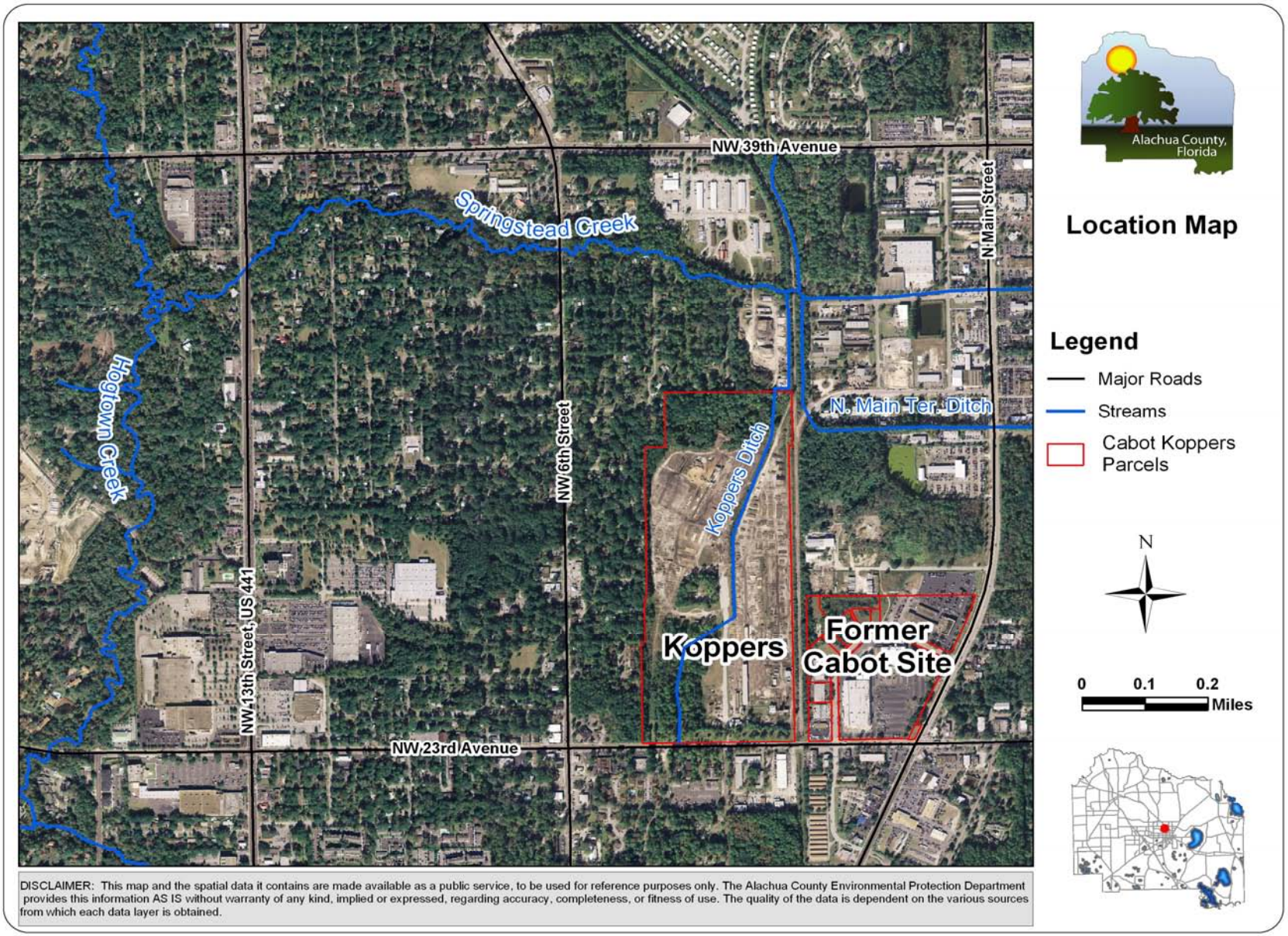
1.0 Objective

The objective of this study was to determine the extent of contamination in surface and subsurface sediments in Springstead and Hogtown Creeks and selected ditched tributaries in the vicinity and downstream of the Cabot-Koppers Superfund site in Gainesville, Florida. The objective was accomplished by performance of a streambed reconnaissance survey to identify areas of contamination and by collection and analysis of sediment samples. The study focused primarily on sampling areas with evidence of contamination in the sediments. Concentrations of contaminants detected were compared to State of Florida soil contamination clean-up criteria and sediment quality guidelines as a preliminary screen for areas of potential environmental concern. This study was also intended to provide a more complete assessment of the extent of contamination to supplement the limited sediment testing performed by the Alachua County Environmental Protection Department (ACEPD) in Springstead Creek during 1994, 1995, 1996 and 2006. Semi-volatile organic compounds (SVOCs) including polynuclear aromatic hydrocarbons (PAHs), pentachlorophenol (PCP), dioxins and furans, and volatile organic compounds (VOCs), metals (copper (Cu), chromium (Cr), arsenic (As), aluminum (Al), iron (Fe)), and total organic carbon (TOC) were determined in the sediments. To provide a more complete characterization of the contamination in the sediments and possibly provide further information about the source of the contaminants, screening of samples for "tentatively identified compounds" (TICs) in the SVOC analysis by gas chromatography/mass spectrometry (GC/MS) was also included in the testing to be performed.

2.0 Background

The Cabot-Koppers Superfund Site in Gainesville, Florida is located in the Springstead Creek watershed. **Figure 1** shows the location of the Cabot Koppers Superfund site and its physical relationship to Springstead and Hogtown Creeks and the N. Main Terrace ditched tributary. The Cabot-Koppers Superfund site covers approximately 170 acres bridging the former Cabot Carbon property and the current Koppers property. Cabot Carbon formerly operated on the eastern portion of the site making naval stores and charcoal from pine trees. Wastewater containing pine tar waste from lagoons on the former Cabot site was released to Springstead Creek via drainage ditch tributaries north of the Cabot site when the property was cleared for development in the late 1960s. Tarry wastes from these discharges were documented to have migrated downstream into Hogtown Creek. (USEPA, ROD 1990). Koppers currently operates a chromated copper arsenate (CCA) wood-treating operation on the western portion of the site. Historically, the Koppers facility preserved wood utility poles and timber by using three different chemicals: creosote, pentachlorophenol (PCP) and CCA. Currently the plant uses only CCA in their wood treating operations. Under current operations, Koppers stores CCA and creosote treated wood poles on-site. Stormwater runoff from the Koppers wood treating operations combined with runoff from NW 23rd Ave located south of the Koppers plant discharges to and may have impacted Springstead Creek sediments via the on-site drainage ditch that crosses the Koppers property from south to north.

Figure 1. Springstead and Hogtown Creek Sediment Sampling Near Cabot-Koppers Superfund Site – General Location

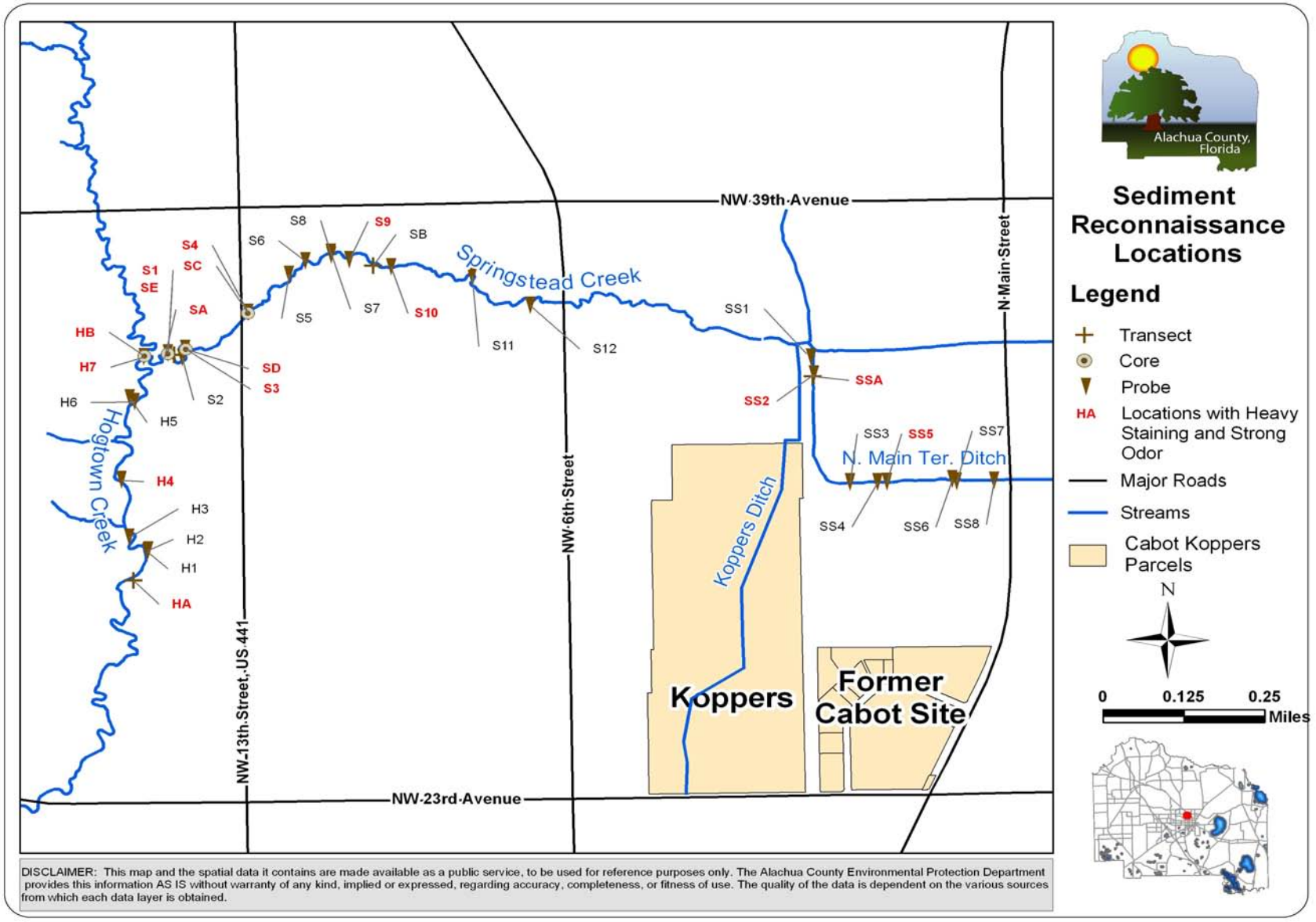


In 1994, 1995 and 1996 sediment samples were collected from Springstead Creek and analyzed for metals, VOCs and SVOCs (ACEPD, 2007). The results showed the presence of site-related constituents in the top few inches of sediments of Springstead Creek. A 1995 report prepared by the Florida Department of Health and Rehabilitative Services (FDHRS) under Cooperative Agreement with the Agency for Toxic Substances and Disease Registry states that arsenic, chromium, phenol and benzene levels in the sediments were not high enough to cause a human health risk from incidental ingestion (FDHRS, 1995 pp. 5, 6). Evaluation of the health risk of the Springstead Creek sediments for other chemical constituents that may be related to discharges from the Cabot-Koppers Superfund site such as polynuclear aromatic hydrocarbons (PAHs) and dioxins and furans was not conducted due to lack of data. In 2006, ACEPD conducted limited sampling and chemical testing of near surface (0 to 5cm depth) sediments and water quality in Springstead Creek and ditched tributaries that drain the Cabot-Koppers Superfund site (ACEPD 2006). Low levels of several contaminants including PAHs and arsenic were detected in sediment samples taken from the outfall point of the ditch that drains the Koppers site to the north. In order to better characterize the extent and depth of the contamination, sampling and testing of sediments was desired at more locations in Springstead Creek, in its tributary the N. Main Terrace ditch, in locations downstream of the former Cabot Carbon and current Koppers site, and in Hogtown Creek near its confluence with Springstead Creek. A more thorough assessment of the location and extent of remaining contamination was also desired to help address continuing public concern about the occasional appearance of tarry contamination in the creek system. In 2008, ACEPD received grant funding from the US Environmental Protection Agency, Region 4 to conduct the study described in this report.

3.0 In-stream Contamination Reconnaissance Survey

During the week of December 8 – 11, 2008, ACEPD conducted a visual and olfactory reconnaissance survey of Springstead Creek, a portion of Hogtown Creek downstream of its confluence with Springstead Creek and the N. Main Terrace ditch, a tributary of Springstead Creek that drains the Cabot-Koppers site (Study Area). **Figure 2** shows the Study Area surveyed. Because heavy rains associated with hurricanes which affected the Gainesville area in 2004 caused significant shifting of stream sediments, ACEPD was expecting that tarry contamination previously observed and sampled by ACEPD in 1994, 1995 and 1996 would be buried deeper in the sediments. ACEPD staff conducted the reconnaissance by walking the creeks and ditch noting any areas of observable "tar-like" materials or heavy soil staining. A soil probe was used to evaluate the deeper sediments at all sand bars and depositional areas within the stream and ditch to look for and document areas of buried contamination. At three locations, transects traversing the cross sectional area of the streambed were conducted to evaluate the distribution of the contaminated sediments. These transects were conducted in areas where sediment deposition had occurred and visual and olfactory evidence of contamination was observed. The streambed transects included shallow borings or cores conducted to a depth of approximately two feet below the surface of the streambed, unless the naturally occurring Hawthorn Group formations were encountered at a shallower depth. Borings (cores) were conducted at approximately three-foot intervals across the streambed to define sediment composition and profile. Each of the cores was described detailing the observable features including the following: sediment type, stratification, observable staining, color, odor and texture. Transect coordinates and any observed in-stream sediment contamination were documented as part of the survey. The locations of all probe, core and transect sites where evidence of contamination was observed are shown in **Figure 2**.

Figure 2. Springstead and Hogtown Creek Reconnaissance Survey Area and Probe, Core and Transect Locations



After surveying the sediment depositional areas within the Study Area, several locations were identified as having very strong indicators of contamination such as heavy staining on the probes and strong odors. Sites with heavy staining and strong odor are highlighted in red on **Figure 2**. Four of these areas were further evaluated by taking a core where the contaminants were found. This allowed the depth of contaminants to be determined which aided in the later selection of sampling sites.

3.1 In-stream Survey Results and Observations

Table 1 provides a summary of field observations from each of the probe, core and transect locations. **Appendix A** contains photographs and graphical representations of the observed contamination at several of the core locations. Key observations from the creek survey include the following:

- At the time of the creek survey, excessively stained soil or tarry contamination was not visually observed on the surface of the creek and ditch sediments in any section of the Study Area.

- Heavy to light contamination with an odorous, tarry material was visually observed on sample probes and in sediment cores at depths ranging from 8" to 24" below the top of the stream or ditch sediments at thirty-five locations in the Study Area. Buried deposits of tarry contamination were principally found in sand bars of accumulated sediment located near the stream banks and sometimes in mid-channel.

- The number of creek and ditch locations showing evidence of buried contamination was much greater than originally expected based on earlier preliminary surveys by ACEPD. These earlier limited surveys had identified visually contaminated sediments only near the confluence of Springstead and Hogtown Creeks and no attempts were made at that time to evaluate the buried deposits.

- The heaviest observed buried contamination based on the extent of staining and odors from the sampling probes and cores was located at the following points: HA, H4 and H7 in Hogtown Creek downstream of the Springstead Creek confluence; S1,SA and S3 in Springstead Creek near where it joins Hogtown Creek; SC just upstream of the 13th Street overpass culvert; S9 and S10 on Springstead Creek midway between NW 6th Street and NW 13th Street; and at SS2 and SS5 in the N. Main Terrace Ditch north of the former Cabot site.

- No tarry contamination was observed in the sediments in Springstead Creek from N. Main Street past the confluence with the N. Main Terrace ditch and the Koppers plant outfall and ending at point S12 located just downsteam of NW 6th Street. This stretch of Springstead Creek is heavily eroded and does not show large accumulation of sediment above the Hawthorn Group formations.

Table 1. Springstead and Hogtown Creek In-Stream Sediment Survey Observations				
Site ID	**Date**	**Stream ID**	**Method**	**Observations***
HA	12/8/08	Hogtown	Transect	All four cores had layers of organics and leaf packs from approximately 12 to 30 inches , all had an dark oil type stain and sheen with a strong odor
H1	12/8/08	Hogtown	Probe	Slight staining and odor found in the sand bars on the left and right banks
H2	12/8/08	Hogtown	Probe	Slight staining and odor found in the sand bar on the right bank
H3	12/8/08	Hogtown	Probe	Very slight odor found in the sand bar on the left bank
H4	12/8/08	Hogtown	Probe	Heavy staining and strong odor found in the sand bar on the left bank
H5	12/8/08	Hogtown	Probe	Black and brown sandy clay deposits had a slight odor on the left bank
H6	12/8/08	Hogtown	Probe	Slight staining and odor from the sand bar on the left bank
H7	12/8/08	Hogtown	Probe	Heavy staining and a strong odor were found in a sand bar on the right bank
HB	12/11/08	Hogtown	Core	A dark grey medium grain sand with black streaks and organics which had a strong odor and a sheen from 15 to 24 inches
S1	12/8/08	Springstead	Probe	Heavy staining and a strong odor were found in a sand bar on the right bank
SE	12/11/08	Springstead	Core	Complex soil profile, 5 to 7 inches dark black sand and fine organics with a slight odor, from 20 to 21 inches black sand, some organics had a strong odor and a slight sheen
SA	12/8/08	Springstead	Transect	A sand bar in the middle of the creek was the only core that had heavy staining and a strong odor in the depth interval of 8 to 14 inches
S2	12/8/08	Springstead	Probe	Slight staining and odor found in the sand bar on the right bank
S3	12/8/08	Springstead	Probe	Heavy staining and strong odor found in a sand bar in the center of the channel
SD	12/11/08	Springstead	Core	From 18 to 24 inches the medium grain grey sand had a strong odor and produced a sheen
S4	12/9/08	Springstead	Probe	Heavy staining and a strong odor were found in a sand bar on the left bank
SC	12/11/08	Springstead	Core	From 13 to 15 inches the dark brown and black sand had a strong odor and an oily sheen
S5	12/9/08	Springstead	Probe	Slight to moderate staining and odor from the sand bar on the left bank
S6	12/9/08	Springstead	Probe	Moderate staining and odor from the sand bar on the left bank
S7	12/9/08	Springstead	Probe	Slight staining and odor from the sand bar on the left bank
S8	12/9/08	Springstead	Probe	Slight staining and odor from the sand bar on the left bank
S9	12/9/08	Springstead	Probe	Heavy staining and a strong odor were found in a sand bar on the left bank
SB	12/9/08	Springstead	Transect	Found slight staining and odor on soil probe but found no staining or odors in the 5 cores collected along the transect
S10	12/9/08	Springstead	Probe	Heavy staining and a strong odor were found in a sand bar on the right bank
S11	12/9/08	Springstead	Probe	Slight staining and odor from the sand bar on the left bank
S12	12/9/08	Springstead	Probe	Slight staining and odor from the sand bar on the right bank
SS1	12/10/08	N. Main Tr. Dtch	Probe	Slight staining and odor from the sand bar in the center of the channel
SS2	12/10/08	N. Main Tr. Dtch	Probe	Heavy staining and strong odor found in a sand bar in the center of the channel
SS A	12/10/08	N. Main Tr. Dtch	Transect	Only 1 of 5 cores had an odor and produced a sheen, Clayey sand layer from 6 to 8 inches had a strong odor; dark brown sand layer from 18 to 24 inches had a slight sheen and odor
SS3	12/10/08	N. Main Tr. Dtch	Probe	Slight odor from the sand bar on the left bank
SS4	12/10/08	N. Main Tr. Dtch	Probe	Slight odor from the sand bar on the right bank
SS5	12/10/08	N. Main Tr. Dtch	Probe	Heavy staining and a strong odor were found in a sand bar on the right bank
SS6	12/10/08	N. Main Tr. Dtch	Probe	Slight staining and odor from the sand bar in the center of the channel
SS7	12/10/08	N. Main Tr. Dtch	Probe	Slight staining and odor from the sand bar in the center of the channel
SS8	12/10/08	N. Main Tr. Dtch	Probe	Slight staining and odor from the sand bar in the center of the channel

*Left and right bank were determined facing downstream direction.

4.0 Sediment Sampling

Sampling locations were selected after completion and evaluation of the in-stream reconnaissance results. **Figure 3** shows the location of the sampling points selected. Thirteen total sampling locations were selected. A representative from AMEC Earth and Environmental, Inc. (AMEC), a consulting firm working for Beazer East, Inc., the responsible party for the contamination at the Koppers portion of the Cabot-Koppers Superfund site, accompanied ACEPD staff during the sediment sampling and stream reconnaissance phases of the project. Split samples from selected sampling locations were taken by the AMEC representative.

The general sampling plan called for sampling from two discrete zones at each sampling location: 1) a shallow depth sample from 0 to 6 inches below the sediment surface, and 2) a deeper sample from 6 to 24 inches below the sediment surface. The rationale for selection of sampling locations included the following:

1) Sediments from the most visually contaminated areas of Springstead and Hogtown Creeks and the N. Main Terrace Ditch (H4, HB, SD, SC, S9, S10, SS5);
2) Sediments from areas that would provide more complete characterization of the study area (HA, SS2);
3) One sediment sample from a downstream location near the outfall of the Koppers ditch (SG);
4) One sediment sample representing a less diluted, more concentrated sample of the tarry buried contamination (SA); and
5) One sediment sample each from Springstead and Hogtown Creeks that represented an upstream location with no known history of contamination from Cabot or Koppers discharges (SF and HC).

In the original plans for this study, a sediment sample was to be taken at the outfall of the Koppers drainage ditch where it discharges into Springstead Creek. Recent emergency repair work by the City of Gainesville on the stormwater culvert resulted in sediments at the outfall being disturbed and a rocky bank stabilization being placed over the sediment and stream banks at the outfall. This situation prevented ACEPD from sampling sediment directly at the outfall and therefore a further downstream sample point SG was selected to assess the impact of Koppers discharges if any on Springstead Creek sediments.

Sediment samples were analyzed for the following chemical classes: VOCs , SVOCs (including PAHs) , PCP, dioxins and furans, metals (Cu, Cr, As, Al, Fe) and TOC. Additionally, the SVOC fraction of selected samples was analyzed for TICs to aid in further sample characterization and possible contaminant source identification. Testing for Fe and Al was added to the analytical scope based on the recommendation of the Florida Department of Environmental Protection (FDEP) to provide a means to compare elevated Cr, As and Cu concentrations to FDEP models for evaluating metal enrichment in sediments. SVOCs, metals and TOC were analyzed in every sample collected from each sampling location. Testing for VOCs and PCP was limited to select locations due to the lower probability of finding impacts from these compounds. Testing for dioxins and furans was only performed at selected locations due to analytical cost considerations. **Table 2** lists the sampling stations and the chemical parameters tested at each location. Samples taken from the shallow (approx. 0 to 6 inch) depth at each location were labeled with (S) suffix after the site ID and samples from the deeper (approx. 6 to 24 inch) depth were labeled with (D) suffix after the site ID.

Figure 3. Sediment Sampling Locations

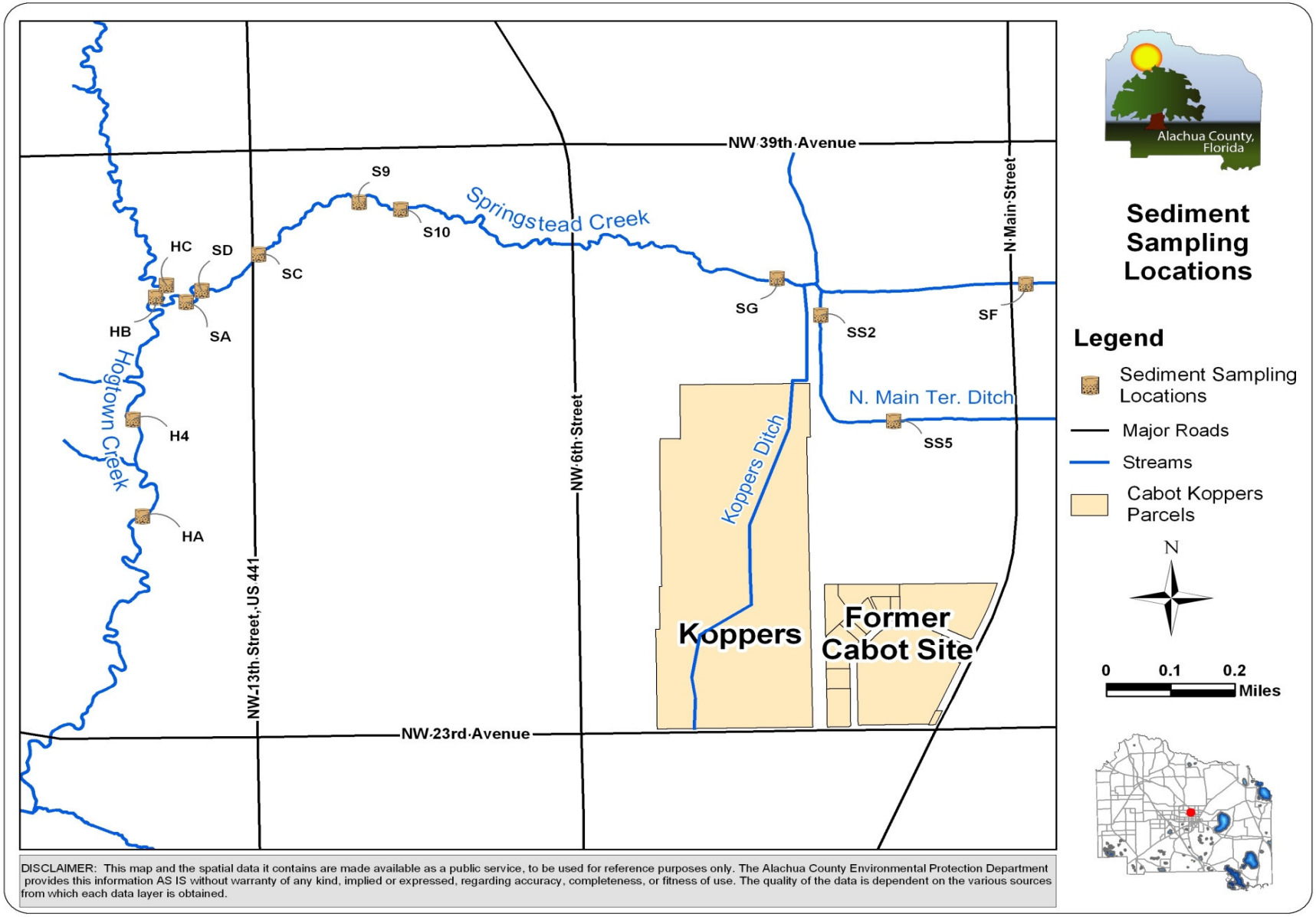


Table 2. Location and Number of Samples and Chemical Parameters Tested

				Number of Samples						
Sample Location Description	**Site ID****	**Latitude #**	**Longitude #**	**SVOCs**	**TICs**	**PCP**	**Dioxins/ Furans**	**VOCs**	**As, Cu, Cr, Fe, Al**	**TOC**
Upstream Springstead - East of N. Main St.	SF	-82.31903	29.68488	2	2	2	2	2	2	2
Middle of N. Main Ter. Ditch	SS5	-82.32253	29.68154	2	2	0	0	0	2	2
North End of N. Main Ter. Ditch	SS2	-82.32435	29.68420	2	0	2	2	0	2	2
Springstead- Downstream of Koppers Drainage Ditch Outfall	SG	-82.32546	29.68512	2	2	2	2	2	2	2
Springstead -Downstream of NW 6th St.	S10	-82.33516	29.68700	2	0	2	2	0	2	2
Springstead -Downstream of NW 6th St.	S9	-82.33623	29.68720	2	0	0	0	0	2	2
Springstead -Upstream of NW 13th St.	SC	-82.33886	29.68594	2	2	0	0	0	2	2
Springstead -Downstream of NW 13th St.	SD	-82.34035	29.68508	2	2	2	2	2	2	2
Springstead -Downstream of 13th Street *	SA	-82.34076	29.68480	1	1	1	1	1	1	1
Upstream Hogtown North of Confluence with Springstead	HC	-82.34126	29.68522	2	2	2	2	2	2	2
Hogtown - Near Springstead Confluence	HB	-82.34154	29.68493	2	0	0	0	0	2	2
Hogtown - Downstream of Confluence with Springstead	H4	-82.34220	29.68191	2	2	2	2	2	2	2
Hogtown -Downstream of Confluence with Springstead	HA	-82.34201	29.67951	2	0	0	0	0	2	2
Field equipment blanks/trip blanks				1	1	1	1	2	1	0
Total Lab Samples/Tests				26	16	16	16	13	26	25

* Sample at this location will be of the zone of greatest contamination or the tarry material.

** Samples from the shallow ~ 0 to 6 inch depth are labeled with (S) suffix after the site ID . Samples from the deeper (~ 6 to 24 inch) depth are labeled with (D) suffix after the site ID.

\# WGS 1984

All sediment sample collection procedures followed the current FDEP Standard Operating Procedures for Laboratory Operations and Sample Collection, Quality Assurance/Quality Control (QA/QC) and chain of custody protocols. Specific sediment sample collection procedures set forth in DEP-SOP-001/01 FS 4000 were followed for sediment sample collection (FDEP, 2004). Additionally sediment sampling followed procedures outlined in EPA Region 4 Science and Ecosystem Support Division (SESD) Operating Procedure SESPROC-200-R1 for Sediment Sampling (EPA, 2007). All sediment sampling equipment was decontaminated between samples following procedures set forth in DEP-SOP-001/01 FC 1000 (FDEP, 2004). Samples were placed on wet ice immediately after collection for shipment to the laboratory. Laboratory analyses for all parameters except dioxins and furans were performed by TestAmerica, Tallahassee, FL laboratory, a NELAC (Florida) certified laboratory. Dioxin and furans analysis by EPA Method 1613B was performed by the TestAmerica West Sacramento, CA

laboratory also a NELAC (California) and (Florida) certified laboratory. Chemical analysis test methods are listed in **Table 3**.

Table 3. Sediment and Water Quality Test Methods

Description of Analytes for Solid Matrix	Method	Prep Method
Volatile Organic Compounds by GC/MS	SW846 8260B	
Closed System Purge & Trap/Field Preservation		SW846 5035
Semivolatile Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	SW846 8270C	
Ultrasonic Extraction (sediments)		SW846 3550B
Pentachlorophenol (Herbicides method)	SW846 8151A	SW846 8151A
Total Dioxins (TCDD Toxic Equivalents (WHO 2005)	EPA Method 1613B	
Ultrasonic Extraction (sediments)		SW846 3550B
Copper, Chromium, Arsenic, Iron and Aluminum by Inductively Coupled Plasma	SW846 6010B	
Acid Digestion of Sediments, Sludges, and Soils		SW846 3050B
Total Organic Content	Walkley Black	

Shallow depth sediment samples were collected using a three-foot length of two-inch diameter Schedule 40 stainless steel pipe which had been pre-cleaned in the lab and wrapped in aluminum foil for transport to the field. Multiple cores from the 0 to 6 inch (0-15 cm) depth interval within a one-foot radius of the sample point were necessary in order to get enough sample to fill the multiple sampling containers for all the analytical tests scheduled for each sampling point. All cores were placed in a stainless steel bowl. When testing for VOCs was required at a sampling location, one of the shallow cores was selected for sampling VOCs. Immediately after extrusion of the selected core, a Terra Core sampler was used to collect sediment from the layer of the core that appeared to have the most contamination. After collection of the VOC samples, the remaining shallow sediment cores were homogenized using a pre-cleaned stainless steel spoon and soil was then transferred into the remaining sampling containers. All samples were then placed in a cooler with ice.

For collection of the deep depth samples the same type of coring device that was used for the shallow samples was driven to a depth of approximately 24 inches unless refusal was encountered at a shallower depth. A well plug was used to cap the top of the pipe providing a vacuum to retain the core during extraction. As the core was extracted a pre-cleaned sheet of polytetrafluoroethylene (PTFE) was used to catch the core. The core was then transferred into another pre-cleaned stainless steel bowl discarding the top 6 inches of the sample. Immediately the VOCs sample was collected using a Terra Core sampling device prior to any mixing of the sample. Additional sediment cores were collected within a one-foot radius if soil volume was not sufficient to fill scheduled sample containers. Subsequently, the sediment cores were mixed to homogenize the sediments and the sample fractions were collected.

Some variability in the exact depth of sampling and the sampling interval was experienced during sampling at some of the sampling locations. At certain locations, the native Hawthorn Group material was encountered at a depth shallower than 24 inches and the sampling core could not be driven deeper into the clay encountered in the Hawthorn Group. At these locations, the deeper sample represented sediment from a shallower depth. At other locations there was a compaction of sediments observed upon driving of the core sampler causing a less than 24 inch depth interval to be collected. At other locations, the wetness of the sample core caused sediment from the bottom few inches or

sometimes the entire core to be lost and therefore new cores needed to be taken from within a one-foot radius of the original core. These sampling variations were documented for each sampling point and are summarized in **Table 4**.

Table 4. Sediment Sampling Observations

Station ID	Sample Date	Depth Interval	Number of Cores	Sample Information
HAS	1/28/09	0-6"	3	No odor
HAD	1/28/09	6-24"	2	Bottom 4 inches had dark staining and a strong odor; split sample taken by AMEC.
H4S	1/28/09	0-6"	5	Slight odor and staining on core tube and sampling equipment
H4D	1/28/09	6-approx 24"	2	Compaction of sediments while driving the coring tube to a depth of 24 inches; after discarding top 6 inches of the core it was difficult to estimate exact depth interval, the sediments had dark staining and a strong odor, heavy staining left on sampling equipment
HBS	1/30/09	0-6"	2	No odor
HBD	1/30/09	6-24"	2	Bottom 4 inches had dark staining and a strong odor; split sample taken by AMEC.
HCS	1/26/09	0-6"	5	Lost a couple of inches out of two cores prior to compositing
HCD	1/26/09	6-14"	3	Compaction of sediments while driving the coring tube
SA	2/3/09	10-18"	4	About 4 inches of each core that appeared to be the most contaminated was sampled
SDS	1/30/09	0-6"	5	No odor
SDD	1/30/09	6-24"	3	All cores had dark staining and a strong odor in the bottom 12 inches; only the bottom 12 inches could be extruded from last core; split sample taken by AMEC.
SCS	1/27/09	0-6"	3	No odor
SCD	1/27/09	6-24" and 6-30"	2	The second and third attempts at extraction a core from 24 inches all of the material was lost so the fourth core was driven to 30 inches there was a sheen and odor on both cores; split sample taken by AMEC.
S9S	2/3/09	0-6"	3	Very slight odor
S9D	2/3/09	6-24"	2	Heavy staining and odor left on coring device
S10S	2/3/09	0-6"	3	No odor
S10D	2/3/09	6-16"	3	Wood debris encountered at 16 inches; bottom 6 inches had staining and a moderate odor
SGS	1/27/09	0-6"	4	No odor
SGD	1/27/09	6-22"	3	Lost all of the second core during extraction
SS2S	1/28/09	0-6"	5	Had a slight odor
SS2D	1/28/09	6-24"	2	Bottom 4 inches had dark staining and a strong odor; split sample taken by AMEC.
SS5S	1/27/09	0-6"	3	No odor; split sample taken by AMEC
SS5D	1/27/09	6-28"	2	Both cores had staining and a strong odor. Heavy staining left on sampling equipments. Split sample taken by AMEC.
SFS	1/26/09	0-6"	2	No odor
SFD	1/26/09	6-17"	3	Encountered native Hawthorn clay at 12 and 17 inches deep

5.0 Sediment Analysis Results and Discussion

Chemical analysis results for the sediment samples collected from the thirteen sampling locations in this study and comparison of these results to sample results from un-impacted or upstream locations and regulatory criteria and guidelines are summarized in **Tables 5, 6, 7 and 8** attached at the end of this report. **Table 5** presents a summary of all the laboratory analytical data and shows a comparison to upstream sample concentrations. Shallow and deep depth upstream samples SFS and SFD from Springstead Creek are compared to the corresponding shallow (S) and deep (D) samples for other Springstead Creek and N. Main Terrace ditch locations (SS5, SS2, SG, S10, S9, SC, SD and SA) and, similarly, shallow and deep upstream samples HCS and HCD from Hogtown Creek are compared to corresponding shallow and deep zone samples from other Hogtown Creek locations (HB, H4 and HA). The unique sample SA of a less diluted tarry zone of contaminated soil was compared to the deep zone upstream sample SFD for evaluation purposes.

Since this study was designed as a screening level assessment, only two sample locations for each of the shallow and deep sampling horizons were selected to represent upstream conditions from areas not believed to be impacted by past or current discharges from the Cabot-Koppers site. The small number of upstream sample data points limited the ability to determine the statistical significance of differences between upstream sample concentrations and potentially impacted area sample concentrations and make definitive conclusions about these differences. The limited number of upstream samples is not sufficient to be representative of actual background concentrations on Springstead and Hogtown creeks because of the natural variability of the contaminant concentrations. Additional samples would have been required to get a more representative estimate of background conditions. However, these upstream data points were useful in a screening sense to identify areas of potential significant differences. In the evaluation of data for screening purposes, only large differences of an order of magnitude or greater were highlighted as potentially indicating a significant difference from upstream levels. Sediment sample concentrations that exceeded the corresponding upstream shallow or deep sediment concentration by 10 times or more and 100 times or more are highlighted in **Table 5**. **Table 5** also includes the calculation of the benzo-a-pyrene toxic equivalents (BaP-TEQ) for the carcinogenic PAH compounds (expressed in units of mg/Kg or parts per million (ppm)), and the laboratory calculated total TCDD Toxic Equivalent (TCDD-TEQ) concentration for the carcinogenic dioxins and furans (expressed in units of ng/Kg or parts per trillion (ppt)) in sediment from selected locations. The total concentration of specific PAH compounds from Method 8270 as well as the total additional PAH compounds identified in the TIC analysis (as tabulated in **Table 6)** for selected samples are also presented. In **Table 5** and all data tables, compounds that were quantitatively identified above the laboratory practical quantitation limit (PQL) are identified in bold type unless indicated otherwise in the table. Compounds that were tentatively identified or had estimated concentrations between the laboratory PQL and the method detection limit (MDL) are presented in italic type.

Estimated concentrations of tentatively identified compounds (TICs), which are compounds that were identified with a sufficient degree of confidence by GC/MS in the SVOC analysis but are not included in the standard analyte list for EPA Method 8270, and other unknown classes of compounds which were potentially present in significant concentrations in selected sediment samples are presented in **Table 6.** In **Table 6** compounds and concentrations in bold type represent PAH type compounds.

Table 7 compares the measured concentration of specific contaminants to default FDEP Soil Clean-up Target Levels (SCTLs) (F.A.C. 62-777) for Residential Direct Exposure and default FDEP SCTLs for Leachability Based on Freshwater and Surface Water Criteria. These SCTLs will be referred to as FDEP Residential Direct Exposure SCTL and FDEP Freshwater Leachability SCTL in the following discussion of the data results. Sediment data that exceeds these FDEP criteria are highlighted

accordingly in **Table 7**. The FDEP Residential Direct Exposure SCTL concentrations are risk based values that are assumed to be protective based on an acceptable incremental risk to humans based on a lifetime exposure to toxic contaminants in soils. The duration and frequency of exposure assumed in developing the FDEP Residential Direct Exposure SCTLs is much longer than the duration and frequency of exposure that would be expected from incidental direct contact with toxic contaminants in the creek sediments. Therefore the use of the FDEP Residential Direct Exposure SCTLs to compare to the sediment concentrations sets a very conservative standard that may not be entirely applicable for evaluation of risks from sediment contamination. However, since the FDEP has not adopted regulatory criteria for sediments, preliminary screening of sediments by comparison to the FDEP Direct Exposure SCTLs as a means of identifying those sediment areas that may have increased environmental concern appears to be appropriate. Comparison to default FDEP Freshwater Leachability SCTLs is also used as a screening tool to potentially identify sediments that may have adverse impacts to water quality and biota.

Table 8 shows a comparison of the measured concentrations of specific contaminants to FDEP Sediment Quality Assessment Guidelines for Protection of Sediment Dwelling Organisms (FDEP, 2003). These specific guidelines will be referred to as the FDEP Sediment Guidelines in the following discussion of data results. These FDEP Sediment Guidelines are not regulatory criteria but were developed by FDEP to evaluate the potential for adverse effects of various organic compounds and metals on sediment dwelling organisms primarily in the near surface layers of sediments. The Threshold Effects Concentration (TEC) is that concentration of contaminant in sediment below which adverse effects on sediment dwelling organisms are unlikely to occur. The Probable Effect Concentration (PEC) is that concentration of contaminant in sediment above which adverse effects are likely to occur to sediment dwelling organisms.

Discussion of the data results presented below for each analyte group evaluates sediment data in two horizon groups, a shallow horizon which is comprised of all samples from the Study Area taken from approximately the 0 to 6 inch depth and a deep horizon which is comprised of samples taken from approximately the 6 to 24 inch depth.

5.1 Metals (As, Cu, Cr, Fe and Al)

The measured concentrations of arsenic (As), chromium (Cr), and copper (Cu) were compared to the sediment concentration of aluminum (Al) and iron (Fe) using the FDEP Interpretive Tool for Assessment of Metal Enrichment in Florida Freshwater Sediment (FDEP, May 2002) to determine whether the concentrations of As, Cr, and Cu were within range of what could be considered natural for Florida stream sediments or were indicative of an enrichment from pollution sources. Using this evaluation tool, the concentrations of As and Cr in all shallow and deep sediments and Cu in all shallow and deep sediment samples except deep samples from locations SS5 and SF were within the range of natural concentrations (see **Appendix B**). The concentration of Cu in SS5D was slightly enriched above the model predicted range for natural concentrations when compared to the Al and Fe concentrations. The concentration of Cu in SFD, the Springstead upstream sample, was less than the model predicted range for natural concentration when compared to the Al concentration. However, since most of the sample location concentrations were within the modeled natural concentrations, enrichment with As, Cr, and Cu does not appear to be present in the Study Area.

Arsenic concentrations in shallow and deep horizon samples are near upstream sample concentration in most samples with only a few samples showing low but slightly higher than upstream concentrations. The highest level of arsenic measured in the shallow horizon was in sample HAS (1.4 mg/Kg). Comparable shallow upstream concentration was <0.25 mg/Kg. The highest level of arsenic

measured in the deep horizon was in sample SDD at 2.1 mg/Kg which meets but does not exceed the FDEP Residential Direct Exposure SCTL concentration. Comparable deep horizon upstream concentration is 0.51 mg/Kg. Arsenic concentrations in all other shallow and deep horizon samples do not exceed FDEP Residential Direct Exposure SCTLs, or FDEP Sediment Guidelines. Based on the limited sampling in this study, arsenic does not appear to be above levels of environmental concern in the Study Area sediments.

Chromium concentrations in shallow and deep horizon samples are near upstream sample concentration in all samples. The highest level of chromium measured in the shallow horizon was in sample HAS (5.2 mg/Kg). Comparable Hogtown upstream concentration was 4.0 mg/Kg. The highest level of chromium measured in the deep horizon was in sample location SC at 12 mg/Kg. Comparable Springstead deep horizon upstream concentration is 8.9 mg/Kg. Chromium concentrations in the shallow and deep horizon sediments do not exceed FDEP Residential Direct Exposure SCTLs or FDEP Sediment Guidelines. **Table 7** shows that the FDEP Freshwater Leaching SCTL criteria are slightly exceeded in several primarily deep horizon samples, with the largest exceedance, by a factor of 3, at sample point SC. Based on the limited sampling in this study, chromium does not appear to be above levels of environmental concern in the Study Area sediments.

Copper concentrations in shallow and deep horizon samples exceed upstream sample concentration at a few sampling locations, with the highest difference being observed at locations SS5, H4 and in direct sample SA. The highest level of copper measured in the shallow horizon was in sample location H4 at approximately 2.0 mg/Kg. Comparable upstream Hogtown concentration was 0.63 mg/Kg. All samples with measured concentrations above the laboratory PQL were found in the deep horizon samples associated with the contamination. The highest level of copper measured in the deep horizon was in sample location SS5 at 12 mg/Kg. Comparable Springstead deep horizon upstream concentration was 0.51 mg/Kg. While the copper concentration at location SS5 shows a greater than 10 fold exceedance above the upstream sample, copper concentrations in the shallow and deep horizon sediments do not exceed the FDEP Residential Direct Exposure SCTL, or FDEP Sediment Guidelines. Based on the limited sampling in this study, copper does not appear to be above levels of environmental concern in the Study Area sediments.

Past stormwater discharges from the Koppers plant into the drainage ditch that discharges into Springstead creek have been documented to contain arsenic, copper and chromium. Based on the limited arsenic, chromium and copper concentration data points in the shallow and deep sediments in the Study Area downstream of the of the Koppers ditch outfall, it does not appear that Koppers plant stormwater discharges have resulted in elevated concentrations of arsenic, copper and chromium in the creek sediments in the Study Area. Any impacts further downstream from the Study Area cannot be determined by the available data.

5.2 Volatile Organic Compounds (VOCs)

Volatile organic compounds were not detected above detection limits in the majority of samples tested. At two shallow depth locations, HA and SD, low level contamination with trimethylbenzene and isopropyl toluene was detected. This contamination could be due to petroleum related contamination runoff from roadways. In one deep sample location, SD, located near the confluence of Springstead and Hogtown Creek , VOC concentrations in the 1 to 2 mg/Kg range were measured for various substituted benzenes (trimethyl-, isopropyl-, butyl- , and propylbenzenes). These concentrations were above the deep upstream sample concentration. These aromatic volatile type compounds may be associated with the tarry material deposited at this location but may also be associated with petroleum related contamination from road runoff. Based on these screening results, VOCs do not exceed FDEP

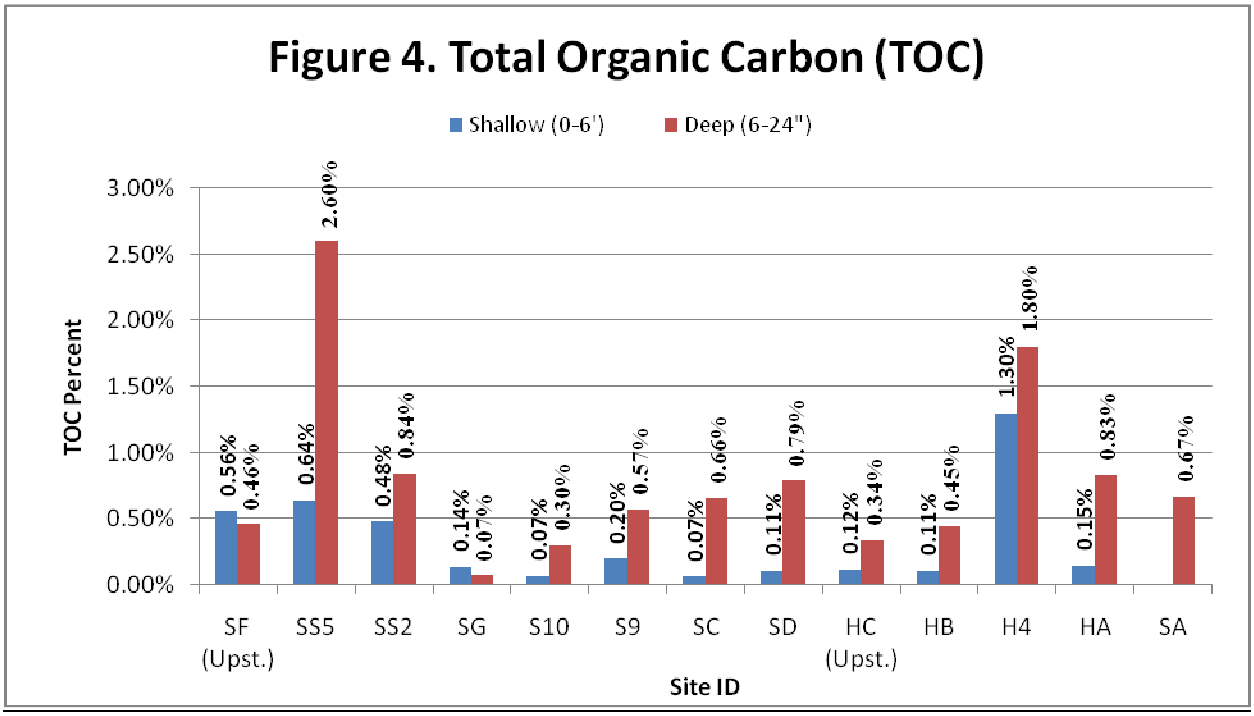
Residential Direct Exposure SCTLs or FDEP Freshwater Leachability SCTLs. There are no FDEP Sediment Guidelines for the VOCs and therefore a comparison was not conducted. Based on the limited sampling in this study, VOCs do not appear to be above levels of environmental concern in the Study Area sediments.

5.3 Pentachlorophenol (PCP)

Pentachlorophenol was not detected above the MDL in any sample tested. The lack of detection of PCP could indicate that historical discharges, if any, of PCP from the Cabot Carbon- Koppers Superfund site may not have occurred in environmentally significant levels in the past. Alternatively, the lack of detection of PCP in the sediments could be related to the high water solubility of PCP which has resulted in PCP and other phenols being dissolved out of the sediments and carried downstream in the stream water. Phenolic compounds may also be subject to biodegradation. Any one or a combination of these factors may be applicable to the stream sediments in the Study Area. Based on the limited sampling in this study, PCP does not appear to be above levels of environmental concern in the Study Area sediments.

5.4 Total Organic Carbon (TOC)

Total Organic Carbon is an important parameter when evaluating potential contamination since many organic contaminants will tend to be adsorbed to and be associated with sediments with higher TOC values. TOC is also a good indicator of the total organic content of the sediments arising from natural and/or contamination sources. A comparison of the range of TOC values (as % TOC) observed in the shallow and deep horizon samples including the targeted sample SA is shown in **Figure 4** below. Based on visual observations in the field during the creek reconnaissance and sediment sampling and the TOC data, the majority of sediments in the study area appear to be quartz sand with low organic content.



The percent TOC in the shallow horizon sediment samples from SS5 (0.64%) and SS2 (0.48%) in the N. Main Terrace ditch were similar to the percent TOC in the upstream sample point SF(0.56%). All of the shallow horizon sediment samples with the exception of sample point H4 on Hogtown Creek

were at or lower than upstream TOC percentage range of (0.07% to 0.20%). The highest percent TOC in the shallow sediment samples (1.30%) was measured at sample location H4, which was one of the most visibly contaminated sample locations. This value was over 10 times higher than the upstream shallow sample at HC (0.12%).

The percent TOC in the deep horizon samples was generally higher than the shallow horizon samples from the same locations and shows a wide degree of variability between sample points. The highest percent TOC in the deep horizon sediments was measured in the N. Main Terrace ditch at sample SS5 (2.6%). Another relatively high TOC percentage in the deep sediments was at H4 (1.8%) in Hogtown Creek. The deep upstream location at HC from Hogtown Creek measured 0.34%. These higher TOC percentages appear to be associated with the higher degree of contamination visually observed from sediments in the deep horizons from these locations. As noted with the shallow sediments, the sediment locations with the lowest percent TOC in the deeper sediments are in the middle part of the Study Area on Springstead Creek.

5.5 Dioxins and Furans

Low levels of various substituted dioxin and furan congeners were measured in the shallow and deep sediment horizons. It is not unusual to find low levels of dioxins and furans in the environment. Dioxin and furans can be formed by various combustion processes in our environment as well as by specific discharges from industrial sources. A few of the major contributors of dioxin to the environment include: incineration of wastes, backyard burning of trash, forest and other fires, coal fired power plants and cement kilns. The principal route by which dioxins are introduced to most rivers, streams and lakes is through soil erosion and runoff from urban areas. Industrial discharges can significantly elevate water concentrations near the point of discharge to rivers and streams (USEPA, Persistent, Bioaccumulative and Toxics Chemical Program, website). Dioxins and furans are known impurities contained in PCP which was used in the past in wood treating processes at the Koppers site.

Table 5 presents all the congeners of dioxins and furans measured by the laboratory and the laboratory calculated Total TCDD Toxic Equivalents (TEQ) in units of parts per trillion (ppt). According to FDEP Guidelines established for calculating the direct exposure risk from each dioxin and furan congener, relative toxicity factors have been established for selected congeners as compared to the most toxic 2,3,7,8-Tetrachlorodibenzodioxin (2,3,7,8-TCDD) and these factors are applied to the measured concentration of each congener to calculate the total TCDD Toxic Equivalent (TEQ) for each congener. FDEP guidelines use the WHO 2005 relative toxicity factors and these factors were utilized by the laboratory to calculate the TCDD TEQs for various dioxin and furan congeners. The total TCDD TEQ in the sample is then compared to the FDEP SCTL for 2,3,7,8- TCDD.

Total dioxin and furan concentrations (TCDD TEQ) were above upstream sample concentrations at all shallow horizon locations that were sampled for dioxins. The highest dioxin (TCDD TEQ) concentration in the shallow sediments was at sample location SD (12 ppt). Deep horizon samples from location SG (20 ppt) and S10 (14 ppt) had the two highest concentration of dioxin (TCDD TEQ). Review of the individual congeners of dioxins and furans measured at each of the sampling locations (**Table 5**) reveals that 2,3,7,8 –TCDD, the most toxic congener of dioxins, was not detected above lab MDL in any of the samples. **Table 7** shows that the total dioxin TCDD TEQ concentration for all sampled locations (including the upstream locations) in the shallow and deep horizons with the exception of the deep sample of the Hogtown upstream location (HC) exceeded the very stringent FDEP Freshwater Leaching SCTL for dioxin (0.6 ppt).

The FDEP Residential Direct Exposure SCTL for dioxin is 7 ppt. The USEPA has established a much higher guideline concentration of 1000 ng/Kg (ppt) for total TCDD TEQ in soil for protection of human health in a residential setting at Superfund sites (USEPA OSWER, 1998). The USEPA guideline is based on a higher acceptable cancer risk range (1×10^{-4} to 1×10^{-6}) than the FDEP SCTL (1×10^{-6}). **0**sediments tested as compared to the FDEP Residential Direct Exposure SCTL and the USEPA OSWER Guideline for Residential Soils.

Table 9. Total Dioxin and Furan (TCDD TEQ) Concentration in Shallow and Deep Horizons (ng/Kg)

Site ID	SF (Upst.)	SS5	SS2	SG	S10	S9	SC	SD	HC (Upst.)	HB	H4	HA	SA	Avg*
Shallow (0-6")	0.95	NA	4.1	8.6	3.9	NA	NA	12.0	0.65	NA	4.9	NA	NA	6.7
Deep (6 -24")	0.78	NA	1.5	20	14	NA	NA	8.2	0.48	NA	6.8	NA	2.8	8.9

FDEP Residential Direct Exposure SCTL = 7 ng/Kg

USEPA OSWER Directive Residential = 1000 ng/Kg

*Avg = average concentration not including upstream samples

NA= Not sampled

All the measured total dioxin (TCDD TEQ) concentrations were significantly below the USEPA OSWER guideline of 1000 ppt. The highest measured total dioxin (TCDD TEQ) concentration in the shallow horizon at SD (12ppt) exceeds the FDEP Residential Direct Exposure SCTL by a factor of 1.7. One other location, SG (8.6 ppt), slightly exceeds the FDEP Residential Direct Exposure SCTL in the shallow horizon. All other shallow horizon samples did not exceed the FDEP Residential Direct Exposure SCTL. Total dioxin (TCDD TEQ) concentrations in the deep horizon at locations SG (20 ppt) and S10 (14 ppt) exceed the FDEP Residential Direct Exposure SCTL for TCDD by a factor of about 3 and 2 respectively. One other sample location, SD (8.2 ppt), slightly exceeds the FDEP Residential Direct Exposure SCTL. All other deep horizon samples including sample SA do not exceed the FDEP Residential Direct Exposure SCTL. The average dioxin (TCDD TEQ) concentration in the shallow and deep horizons (without the upstream samples) based on the limited locations sampled shows that the shallow horizon average (6.7 ppt) does not exceed and the deep horizon average (8.9 ppt) just slightly exceeds the FDEP Residential Direct Exposure SCTL. As discussed previously, because residential exposure assumptions used by FDEP to determine the SCTL for dioxin assumes a much longer exposure duration than the exposure duration that would be expected from incidental human contact with creek sediments, the FDEP SCTL levels are very conservative and may not be entirely suitable for evaluation of risks from sediment concentrations. The fact that the contamination in deeper sediments is currently buried by as much as two feet of sediments reduces the probability and extent of exposure. However, exposure to the deeper sediments may be increased from time to time due to shifting of creek sediments from stormwater flows.

Table 9 and **Table 5** show that the highest levels of dioxin (TCDD TEQ) measured in the shallow sediments was at sample locations SG and SD which have lower concentration of polynuclear aromatic hydrocarbons (PAHs) as compared to the other sample locations. In the deep sediments, the highest total dioxin (TCDD TEQ) was at locations SG and S10 which also have lower concentrations of PAHs than other sample locations. The fact that the highest dioxin concentrations were found at the sampling locations where PAH contaminants (that appear to be associated with the tarry contamination) are low suggests that the observed dioxin levels may not be linked to the tarry contamination observed in other samples but could be due to other sources. The presence of low level dioxins in the sediments could be due to various combustion or industrial discharge sources including discharges from wood treating operations such as those from the Koppers plant. The higher dioxin TCDD TEQ concentrations (20ppt and 14ppt) observed in the deeper sediments at the two locations, SG amd S10, as compared to

the upstream and other sediment concentrations suggests that these exceedances of the FDEP Residential Direct Exposure SCTL could be originating from discharges from the Koppers site. More sampling and testing in this area is needed to better define the source of this contamination.

5.6 Semivolatile Organic Compounds (SVOCs) and Polynuclear Aromatic Hydrocarbons (PAH)

PAH compounds are the specific SVOC contaminants observed with the greatest frequency and highest concentrations in the shallow and deep horizon sediment samples (**Table 5**). Various alkyl substituted PAH compounds not routinely reported by Method 8270 were also detected in the TICs analysis in several sediment samples particularly in the deep horizon **(Table 6).** Other than the PAH compounds, the only other specific Method 8270 compounds reported in the deep and shallow sediments were low concentrations of various substituted phthalates, benzofuran and benzyl alcohol. No detected levels of phenols were reported in any samples. The lack of detection of phenolic compounds in the sediments may be due to higher water solubility and/or higher biodegradability of phenols relative to the PAHs.

PAH Comparison to Upstream Conditions: Various PAH compounds were measured in the Springstead Creek shallow upstream sample SFS ranging from approximately 0.10 to 0.68 mg/Kg. Total specific PAH concentration in the Springstead upstream sample was 4.1 mg/Kg. Approximately 10 fold lower levels of PAH compounds were measured in the Hogtown Creek shallow upstream sample HCS (0.02 to 0.04 mg/Kg). The higher levels of PAH compounds in the SFS upstream sample are not unexpected considering the sample was taken from Springstead Creek about 20 yards east of N. Main Street where there is potential to be impacted by road runoff. Low levels of PAH compounds were measured in the Springstead Creek upstream deep horizon sample SFD (0.20 mg/Kg) and the Hogtown Creek upstream deep horizon sample HCD (0.25 mg/Kg). The lower levels of PAHs observed in these deep upstream samples as compared to the shallow upstream sediment samples is not unexpected since the deeper sediments are less impacted by surface runoff pollution. As shown in **Table 5** and **Table 10** below, the total PAH concentrations in the shallow horizon samples were below or just slightly above the upstream sample concentrations at all sample locations except for sample location H4 on Hogtown Creek, which showed several PAHs (2-methylnapthalene, naphthalene, phenanthrene and pyrene) present at greater than 100 times the upstream concentration. The total specific PAH concentration in sample H4S was 57 mg/Kg versus the Hogtown upstream sample (HCS) concentration of 0.22 mg/Kg. Concentrations of tentatively identified substituted PAH type compounds in the estimated range of 34 to 110 mg/Kg were also identified in sample H4S via the TIC analysis including isomers of dimethyl-, trimethyl and tetramethyl- substituted phenanthrenes (**Table 6**). The total PAH type compounds in sample H4S including TICs was estimated at 390 mg/Kg. Other unknown organic compounds were also present.

Table 10. Total PAH Concentration in Shallow and Deep Horizons (mg/Kg)

Site ID	SF (Upst.)	SS5	SS2	SG	S10	S9	SC	SD	HC (Upst.)	HB	H4	HA	SA
Shallow (0-6")	4.1	6.0	1.5	0.48	ND	0.57	0.27	0.43	0.22	0.10	57	1.3	NA
Shallow w/ PAH TICs	4.5	9.0	NA	0.80	NA	NA	0.37	0.64	0.22	NA	390	NA	NA
Deep (6-24")	0.20	146	25	0.27	3.3	24	8.9	20	0.25	6.5	82	32	32
Deep with w/ PAH TICs	0.48	576	NA	0.27	NA	NA	19	76	0.25	NA	376	NA	257

NA=not analyzed

ND=not detected

The deep horizon sediment samples from all locations except SG showed total PAH concentrations which exceeded upstream levels by more than 10 times. Specifically, locations SS5, SS2, S9, SD, H4 and HA and SA showed levels of total PAHs that were 100 times or greater than upstream concentrations; locations SC, HB and S10 showed levels of total PAHs that were 10 times or greater than upstream concentrations . One location, SG, located downstream of the Koppers ditch outfall showed total PAH levels that were near upstream levels.

The deep horizon sample locations with the highest level of PAHs showed a similar pattern of PAHs with elevated concentrations of acenapthene, acenapthylene, anthracene, benzo(a)anthracene, chrysene, fluoranthene, 2-methylnapthalene, naphthalene, phenanthrene and pyrene. This specific PAH mixture was also similar to that found in the more concentrated sample of tarry material taken in sample SA. The location of significant PAH contamination matches the locations in the field reconnaissance where the most visually contaminated areas in the deep horizon were observed, namely in the middle of the N. Main Terrace ditch near sample location SS5 and in the Hogtown Creek near locations H4 and HA.

The TIC analysis identified elevated levels of substituted PAHs in the deep horizon samples especially in samples from SS5 and H4 which had estimated total PAH concentrations including TICs of 576 mg/Kg and 376 mg/Kg respectively. In these deep horizon samples also, as in shallow horizon sample H4S, dimethyl-, trimethyl and tetramethyl- substituted phenanthrenes were also tentatively identified but in much a broader concentration range of from 20 to 160 mg/Kg as well as other unknowns.

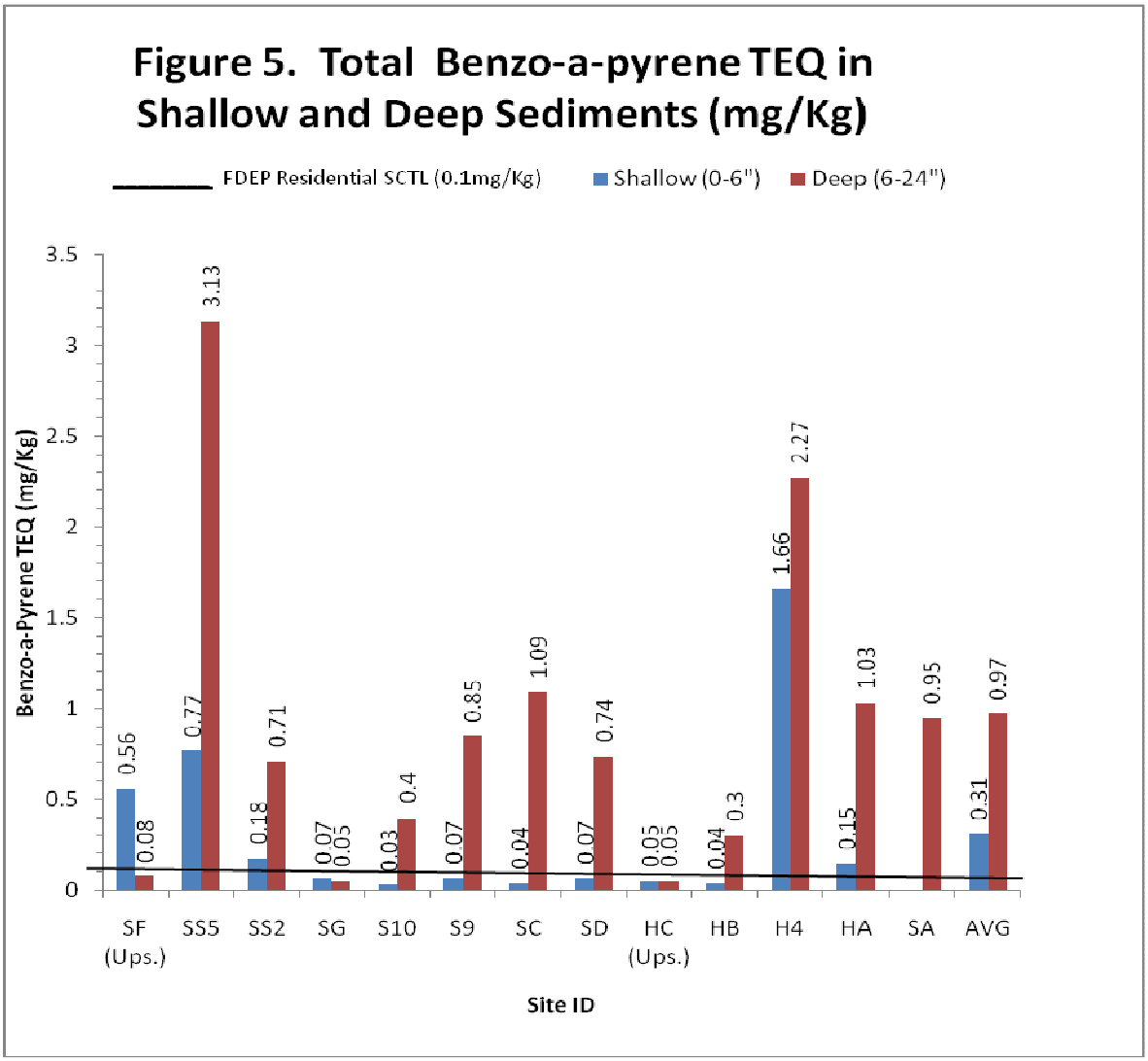
PAH Comparison to FDEP Residential Direct Exposure SCTLs**:** For the non-carcinogenic PAH compounds, **Table 7** shows that no shallow or deep horizon sample exceeded FDEP Direct Exposure SCTLs. Carcinogenic PAHs were compared to the FDEP Residential Direct Exposure SCTL for benzo-a-pyrene after conversion of the measured concentrations to benzo-a-pyrene toxic equivalents (BaP-TEQ). The carcinogenic PAHs with their corresponding BaP-TEQ factor (FDEP, 2005) are shown below.

Carcinogenic PAH Compound	BaP-TEQ Factor
Benzo(a)pyrene	1.0
Benzo(a)anthracene	0.1
Benzo(b)fluoranthene	0.1
Benzo(k)floranthene	0.01
Chrysene	0.001
Dibenz(a,h)anthracene	1.0
Indeno(1,2,3-cd)pyrene	0.1

Figure 5 below shows the comparison between the total BaP-TEQ concentrations in the sediments from the shallow and deep horizons. **Figure 5** also shows the average total PAH concentration (without the upstream samples) across the shallow and deep horizon samples including sample SA in the deep horizon.

Concentrations of carcinogenic PAH compounds in the shallow horizon at location SS5 and SS2 in the N. Main Terrace ditch and the Springstead upstream location (SF) exceeded the FDEP Residential Direct Exposure SCTL (0.1 mg/Kg) for carcinogenic PAHs by factors of 7.7, 1.8 and 5.6 respectively. With the exception of the Springstead upstream sample, all other shallow sediment locations in Springstead Creek did not exceed the FDEP Residential Direct Exposure SCTL for carcinogenic PAHs.

In Hogtown Creek, however, the shallow horizon sediment at location H4 exceeded the FDEP Residential Direct Exposure SCTL criteria by almost 17 times with a calculated BaP-TEQ concentration of 1.66 mg/Kg. The average BaP-TEQ concentration in the shallow sediment horizon samples was approximately 3 times the FDEP Residential Direct Exposure SCTL. However, this average was significantly elevated by sample location H4. As mentioned previously, the TIC analysis data (**Table 6**) also indicated that several methyl- substituted PAH compounds in the 34 to 110 mg/Kg range are present in the sample from the H4 location. The toxicity of these other PAHs in the sample may be more or less than the standard compounds detected in Method 8270.



In the deep horizon sediments, 10 out of the 13 sediment locations including the direct sample SA exceeded the FDEP Residential Direct Exposure SCTL (BaP-TEQ) for total carcinogenic PAHs. The range of exceedance was from 3 times to over 31 times the FDEP Residential Direct Exposure SCTL. The highest exceedance in the deep horizon samples of the FDEP Residential Direct Exposure SCTL (BaP-TEQ) was measured at locations SS5 in the N. Main Terrace ditch and the next highest at location H4, on Hogtown Creek. The Average BaP –TEQ (0.97 mg/Kg) for the deep horizon including the direct sample SA but not the upstream samples was almost 10 times the FDEP Residential Direct Exposure SCTL. These data represent samples taken from approximately 6 to 24 inches below the top of the creek sediments and therefore under most circumstances, direct human contact with these sediments would be limited. However, the strong rainstorms that the Gainesville area experiences during the

summer months and the periodic hurricanes that affect the region yearly provide a real likelihood that stormwater flows will cause shifting of sediments in the Study Area. This shifting of sediments may result in uncovering and transport of the buried contamination thereby increasing the chance of direct exposure to contaminated sediments.

PAH Comparison to FDEP Freshwater Leachability SCTLs : Comparison of specific PAH concentrations in the shallow horizon samples to FDEP Freshwater Leachability SCTLs in **Table 7** reveals only one shallow sample location, H4, where the concentration of any PAH compound exceeds the FDEP Freshwater Leachability SCTL. At this location, five PAH compounds exceed the FDEP Freshwater Leachability SCTLs in the range of 1.1 to 9.7 times the FDEP SCTL.

FDEP Freshwater Leachability SCTLs are exceeded for one or more PAH compounds in eight of the deep horizon locations and also in direct sample SA as shown in **Table 7**. The two upstream samples SFD and HCD and samples S10D and SGD show no exceedance of FDEP Freshwater Leachability criteria. Sample locations SS5 and H4 show the largest number of exceedances (6 out of 7 PAHs with criteria) and also are the locations with three or more PAHs which substantially exceed FDEP criteria by a factor of 10 times or more. The remaining six sample locations in the deep horizon with exceedances (SS2, S9, SC, SD, HB and HA) show exceedance in 4 out 7 PAHs but the exceedances are less than a factor of 10 for each one.

PAH Comparison to FDEP Sediment Guidelines: When applying the FDEP Sediment Guidelines to the evaluation of the sediment data, the average concentration of each PAH that has a specified FDEP Sediment Guideline and the average total PAH concentration (for all PAHs detected in Method 8270) across each of the shallow and deep horizons (not including the upstream samples) was compared to the Threshold Effect Concentrations (TEC). Subsequently, the maximum concentration for each PAH with a Sediment Guideline and the maximum total PAH concentration in each horizon was compared to the Probable Effect Concentration (PEC). The comparison is shown for all sample locations in **Table 8** and summarized in **Table 11** below.

The comparison reveals that the average concentration of eight out of nine individual PAHs in the shallow horizon sediments exceeds the FDEP Sediment Guidelines TEC concentration. The average total PAH concentration for the shallow horizon (not taking into account TICs) (6.92 mg/Kg) exceeds the TEC concentration (1.6 mg/Kg). (When calculating the average concentration for each PAH, ½ of the MDL was used for the PAH concentration where the laboratory reported less than MDL). In the shallow horizon sediments, the maximum reported individual concentration of nine PAH compounds and the maximum total PAH concentration, all at sample location H4, exceed the PEC guideline. These exceedances suggest that the level of contamination in the shallow horizon may be high enough to begin to see an adverse effect on sediment dwelling organisms in the creek system. At location H4S in particular, there may be a stronger adverse effect on sediment dwelling organisms.

Table 11. Comparison to FDEP TEC and PEC Sediment Guidelines

Shallow Horizon (0-6")						
Compound	**FDEP PEC (mg/Kg)**	**Max. Conc (mg/Kg)**	**Site ID**		**FDEP TEC (mg/Kg)**	**Avg. Conc. (mg/Kg)**
Acenapthene	0.089	2.9	H4		0.0067	0.32
Acenapthylene	0.13	3.2	H4		0.0059	0.35
Anthracene	0.85	2.9	H4		0.057	0.31
Benzo(a)anthracene	1.1	1.7	H4		0.11	0.24
Benzo(a)pyrene	1.5	1.2	H4		0.15	0.21
Chrysene	1.3	2.0	H4		0.17	0.31
Dibenz(a,h)anthracene	0.14	0.16	H4		0.033	0.04
Fluoranthene	2.2	3.7	H4		0.42	0.53
Pyrene	1.5	4.6	H4		0.2	0.63
Total PAHs (EPA 8270)	23	58	H4		1.6	6.92
Deep Horizon (6-24")						
Compound	**FDEP PEC (mg/Kg)**	**Max. Conc (mg/Kg)**	**Site ID**		**FDEP TEC (mg/Kg)**	**Avg. Conc. (mg/Kg)**
Acenapthene	0.089	7.7	SS5		0.0067	1.9
Acenapthylene	0.13	9.1	SS5		0.0059	1.7
Anthracene	0.85	6.5	SS5		0.057	1.9
Benzo(a)anthracene	1.1	3.1	SS5		0.11	1.0
Benzo(a)pyrene	1.5	2.2	SS5		0.15	0.7
Chrysene	1.3	3.8	SS5		0.17	1.3
Dibenz(a,h)anthracene	0.14	0.72	SC		0.033	0.17
Fluoranthene	2.2	5.9	H4		0.42	1.9
Pyrene	1.5	11	SS5		0.2	2.7
Total PAHs (EPA 8270)	23	146	SS5		1.6	34.8

The data in **Table 8** and **Table 11** also reveal that the average deep horizon sediment concentrations for all nine individual PAH compounds and the average total PAH concentration exceed the TEC guidelines. The average deep horizon total PAH concentration (34.8 mg/Kg) exceeds the TEC guideline (1.6 mg/Kg). In the deep horizon sediments, the maximum reported individual concentrations of six out of eight PAH compounds was measured at sample point SS5 and these concentrations exceeded the FDEP PEC guideline. The maximum total PAH concentration was also located at SS5 and exceeded the FDEP PEC guideline. Two other locations, SC and H4, each had one of the PAH maximum concentrations and exceeded the PEC guideline.

The fact that the average total PAH concentration across the deep horizon exceeds the FDEP TEC guideline combined with the observation that nine individual PAHs have maximum concentrations which exceed FDEP PEC guidelines at three locations, suggests that the level of contamination in the deep horizon is likely to cause adverse effects on sediment dwelling organisms especially if the deeper contamination is brought up to shallower surface sediment zones after storm events. Locations H4, SS5 and HA in particular appear to be locations where this adverse effect could be the strongest.

5.7 Characterization of Samples—Tentative Identified Compounds

As discussed in the Section 2.0, it is historically documented that wastewater containing pine tar waste from lagoons on the former Cabot site was released to Springstead Creek via the N. Main Terrace ditch north of the Cabot site when the property was cleared for development in the late 1960s. Tarry wastes from these discharges were documented to have migrated downstream into Springstead Creek and Hogtown Creek via the drainage ditches north of the former Cabot site. Therefore, it can be reasonably assumed that a major source of the tarry residue still being observed buried in the Study Area sediments is the former Cabot site wastes. Other potential sources of contamination in the creek may include discharges from the Koppers site which operated for over 80 years as a wood preserving site and discharges of petroleum related products from spills on the roadways crossing the creek beds. The analysis of selected sediment samples for TICs by GC/MS was intended to potentially help identify marker compounds present in the sediment samples that would confirm the source of the contaminants.

Table 6 shows the estimated concentrations of the specific TICs, unknown compound types and total other unknowns measured during GC/MS analysis of the sediments. As discussed previously in the PAH discussion, significant levels of various methyl-substituted PAHs were observed in the most highly contaminated samples SS5D in the N. Main Terrace ditch and H4D, H4S and SDD located downstream in Springstead and Hogtown Creek. Methyl-substituted phenanthrenes were not identified in the upstream samples SFS/SFD and HCS/HCD and were present in very low levels in samples SGS/SGD immediately downstream from Koppers outfall which was collected from a sandy sediment area with no evidence of surface or subsurface contamination.

Terpene compounds are associated with pine tar waste and would be expected to be present in the contaminated sediments if the tarry contamination is related to pine tar waste. However, terpene compounds were not specifically identified in almost all the sediment samples. Very low levels of terpenes (pinenes) were tentatively identified in the Springstead upstream sample and in the shallow horizon sample SS5S from the N. Main Terrace ditch only. The lack of detection of significant levels of terpene compounds in the contaminated sediment samples could have several explanations. One explanation is that the tarry residue is not related to pine tar, although it is documented that a historical discharge of pine tar waste did occur to the Study Area. Other possible explanations include the inability of the laboratory to identify terpenes in the TIC analysis or that terpenes are present, but at very low concentrations that cannot be detected in the TIC analysis. Terpenes are more water soluble and potentially more biodegradable than the PAH type compounds and may have been dissolved or biodegraded from the tarry residue which has been submerged for over 40 years in the stream sediments.

Pine tar has been reported to contain several PAHs including anthracene, benzo-a-pyrene, benz(a)anthracene, pyrene, chrysene, fluoranthene, and phenanthrene in the mg/Kg (ppm) range. (SCCNFP, 0646/03). These specific PAHs were among the compounds present at the highest concentration in the sediments with significant amounts of tarry contamination such as location SS5 and H4. Some of these same compounds can also be found in coal tar and could be related to petroleum discharges or spills from roadways which may have impacted the creek sediments in the past. In the 1990 USEPA Record of Decision document for Cabot Carbon-Koppers Superfund site (USEPA Cabot Carbon-Koppers Record of Decision, 1990) it is stated that the specific compounds (acenapthene, naphthalene, phenanthrene, pyrene, acenapthylene and 2 –methlynapthalene) which have been measured in contaminated sediment samples from the Study Area, were historically reported in samples taken from contaminated soils at the former Cabot site near the former wastewater lagoons. In addition the substituted methyl-, dimethyl-, trimethyl-, and tetramethyl - phenanthrenes were identified as significant TICs in sediment samples from the N. Main Street ditch located on the eastern boundary of the former Cabot site that received discharges from the former Cabot site lagoons. The EPA 1990 ROD document

also presents data which identified a TIC as "phenanthrene-carboxaldehyde isomer" at estimated concentrations of approximately 88 and 320 mg/Kg in sediments taken from the North Main Street ditch. This compound is closely related to a substituted phenanthrene carboxylic acid compound "1-phenanthrenecarboxylic acid, 1,2,3,4,4" that was found at the 100 mg/Kg level in Sample SS5D in the N. Main Terrace ditch and at the approximately 30 mg/Kg estimated concentration level in samples H4S and H4D. Literature references (Peng Wan-xi, et al, May 2008) indicate that phenanthrene carboxylic acids can be formed by high temperature pyrolysis of pine wood. Significant levels of unknown organic acids (at the estimated 185 mg/Kg concentration level) were also detected in Sample SS5D which was located in the N. Main Terrace ditch. This ditch from historical records received a significant amount of the direct discharge from the former Cabot wastewater lagoons when they were breeched.

The measured PAH concentrations in the Study Area sediments could have been partially contributed from multiple sources such as past discharges from the Cabot-Koppers Superfund site, stormwater runoff or roadway petroleum fuel spills. However, the analysis of the TIC data and the specific contaminants detected in the sediments appears to provide additional supporting evidence that the tarry contamination observed in the Study Area sediments is linked to the pine tar waste that was discharged from the former Cabot lagoons over 30 years ago.

6.0 Summary Findings and Recommendations

The key study findings and recommendations from the in-stream survey and sediment sampling and analysis conducted in the Study Area are summarized below.

1) At the time of the stream survey, no visible evidence of contamination was observed on the surface of stream sediments and in the shallow depth horizon (0 to 6" depth) in the Study Area. Tarry contamination was observed in the deeper horizon (6 to 24" depth) at 35 locations in the Study Area. Heaviest visual contamination was generally noted in the deep sediments of the N. Main Terrace ditch, at the confluence of Springstead and Hogtown Creeks and in Hogtown Creek downstream of Springstead Creek. Buried contamination was primarily located in depositional areas such as sand bars located near the edges and middle of stream channels.

2) Concentrations of arsenic, chromium, copper, volatile organic compounds, pentachlorophenol and other phenols were present at low concentrations or not detected in both the shallow and deep horizons and do not appear to be an environmental concern in the study area. Based on the limited data in this study, discharges of metals (arsenic, copper and chromium) and pentachlorophenol from the Koppers plant wood treating operations do not appear to have significantly impacted sediment concentrations of these chemical species in the Study Area. Additional sampling and data would be required to determine if sediment impacts exist further downstream in Hogtown Creek from the Study Area.

3) Dioxin and furan concentrations (TCDD TEQ) were measured at low (ppt) concentrations in the shallow and deep horizon sediments in Springstead Creek. The dioxin and furan (TCDD TEQ) concentration at two locations in the shallow sediments, SGS (8.6 ppt) and SDS (12 ppt), and at three locations in the deep sediments, SGD (20 ppt), S10D (14 ppt) and SDD (8.2 ppt), exceeded the FDEP Residential Direct Exposure SCTL (7 ppt) but were below the USEPA Guideline concentration (1000 ppt). Because of exposure assumptions, the FDEP Residential Direct Exposure SCTL criteria are very conservative and may not be entirely applicable to evaluating risks from contaminated sediments. Direct exposure to dioxins in deeper sediments is limited since deep sediment samples were taken from as much as 2 feet below the top of the sediments. The location of the highest dioxin contamination in Springstead Creek (SGD) does

not appear to be associated with the tarry residue found in several locations in the deep sediments of the Study Area. The preseence of low level dioxins in the sediments could be due to various combustion or industrial discharge sources including discharges from wood treating operations such as those from the Koppers plant. The higher dioxin TCDD TEQ concentrations (20ppt and 14ppt) observed in the deeper sediments at the two locations, SG amd S10, as compared to the upstream and other sediment concentrations suggests that these exceedances of the FDEP Residential Direct Exposure SCTL could be originating from discharges from the Koppers site. More sampling and testing in this area is needed to better define the source of this contamination.

4) Polynuclear aromatic hydrocarbons (PAHs) were frequently detected in the tens to hundreds of mg/Kg concentrations in the shallow and deep sediment samples. The highest concentration of total PAHs was measured in the deep horizon sediments. Similar measureable quantities of methyl-substituted PAHs and other unknown organic compounds were also reported in the most contaminated samples.

5) The FDEP Residential Direct Exposure SCTL for carcinogenic PAHs (0.1mg/Kg) (BaP-TEQ) was exceeded at four locations in the shallow horizon sediments and at nine locations in the deep horizon sediments. In the shallow horizon, the highest concentration was at location H4 (1.66 mg/Kg) in Hogtown Creek. In the deep horizon the highest concentrations were at locations SS5 (3.13 mg/Kg) in the N. Main Terrace ditch and H4 (2.27 mg/Kg) on Hogtown Creek. Because of exposure assumptions, the FDEP Residential Direct Exposure SCTL concentrations are very conservative and may not be entirely applicable to evaluating risks in contaminated sediments. Exposure to carcinogenic PAHs in deeper sediments is limited since contamination is buried under as much as 2 feet of sediment. However, buried contamination may become exposed because of scouring and deposition of sediments during storm events thereby increasing the potential for direct exposure.

6) FDEP Freshwater Leachability SCTLs for PAHs were are exceeded at one shallow horizon location, H4, on Hogtown Creek and at nine locations in the Springstead and Hogtown Creek Study area in the deep horizon samples. Greater than 10 fold exceedance of FDEP Freshwater Leachability SCTLs was noted for several PAHs in the deep sediments at sample point SS5 in the N. Main Terrace ditch and at H4 in Hogtown Creek.

7) The average total PAH concentration in the shallow and deep sediments exceeds the FDEP Sediment Guideline Threshold Effect Concentrations (TEC) in the shallow sediment horizon and in the deep horizon sediments. The FDEP Probable Effect Concentration (PEC) is exceeded by the maximum concentration for multiple PAH compounds in the shallow horizon and in the deep horizon sediments. The exceedance of the FDEP Sediment Guidelines TEC and PEC concentrations indicates an increased potential for detrimental effects to stream biota and sediment dwelling organisms from the elevated PAH concentrations.

8) Review of sampling locations where there are substantial exceedances of FDEP Residential Direct Exposure SCTLs for carcinogenic PAHs, FDEP Freshwater Leachability SCTLs and the FDEP Sediment Quality Assessment Guidelines, shows that PAH contamination in the vicinity of sample point H4 in Hogtown Creek and near SS5 in the N. Main Terrace ditch contribute to increased increased environmental concern in the Study Area. FDEP Sediment Quality PEC concentrations are also exceeded at several other locations. Remediation/management of the

sediments in these locations is necessary to reduce environmental concerns in the study area unless an ecological risk assessment shows that these concentrations are not of concern.

9) The presence of specific PAH compounds in the contaminated sediments from the Study Area and recent literature information which associates specific PAH carboxylic acids found in the contaminated sediments with high temperature processing of pine wood, provide additional supporting evidence that the tarry contamination observed in the Study Area sediments is linked to the pine tar waste that was discharged from the former Cabot lagoons over 40 years ago.

10) Due to the exceedance of the FDEP Residential Direct Exposure SCTLs for dioxins and PAH compounds at several locations, and the exceedance of the FDEP Freshwater Leachability and FDEP Sediment Guidelines for PAH compounds at several locations in this study area, the results of this study are being referred to the Florida Department of Health, the Florida Department of Environmental Protection and the USEPA Region 4 for further evaluation and determination of risks to human health and the environment.

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TABLE 5. Summary of Chemical Analysis Data for Springstead and Hogtown Creek Sediments January-February 2009

Analysis Method- Compound Type	Lab	Lab	Upstrm	Upstrm										Sample Location Concentration (mg/Kg)				Upstrm	Upstrm							Ug/L	VOC
Method 8270C: Semi-volatiles	**MDL(mg/Kg)**	**PQL (mg/Kg)**	**SFS**	**SFD**	**SS5S**	**SS5D**	**SS2S**	**SS2D**	**SGS**	**SGD**	**S10S**	**S10D**	**S9S**	**S9D**	**SCS**	**SCD**	**SDS**	**SDD**	**HCS**	**HCD**	**HBS**	**HBD**	**H4S**	**H4D**	**HAS**	**HAD**	**SA**	**Blank**	**Trip Blank**
SVOC Dilution Factor			1	1	1	10	1	5	1	1	1	2	1	5	1	1	1	1	1	1	1	1	10	5	1	5	5	1	
Acenapthene	0.03	0.4	nd	nd	*0.06*	**7.7**	*0.14*	*1.5*	nd	nd	nd	nd	nd	*1.4*	nd	**0.60**	nd	**1.7**	nd	nd	nd	**0.49**	*2.9*	**4.2**	nd	*1.8*	**2.0**	nd	x
Acenapthylene	0.05	0.4	nd	nd	nd	**9.1**	*0.07*	*1.4*	nd	nd	nd	nd	nd	*0.98*	nd	nd	nd	nd	nd	nd	nd	nd	*3.2*	**4.2**	nd	*1.2*	*1.6*	nd	x
Anthracene	0.03	0.4	nd	nd	*0.04*	**6.5**	*0.06*	*1.6*	nd	nd	nd	*0.36*	nd	*1.6*	nd	**0.69**	nd	**1.4**	nd	nd	nd	**0.48**	*2.9*	**4.1**	*0.03*	*1.9*	*1.8*	nd	x
Benzo(a)anthracene	0.02	0.4	*0.31*	*0.02*	**0.40**	*3.1*	*0.09*	*0.77*	*0.04*	*0.03*	nd	nd	*0.05*	*0.91*	*0.03*	**0.42**	nd	**0.81**	*0.03*	*0.02*	nd	*0.28*	*1.7*	**2.6**	*0.09*	*1.2*	*0.97*	nd	x
Benzo(a)pyrene	0.01	0.4	*0.35*	*0.02*	**0.49**	*2.2*	*0.11*	*0.53*	*0.05*	*0.03*	nd	*0.28*	*0.04*	*0.60*	*0.02*	*0.29*	*0.04*	**0.52**	*0.03*	*0.02*	*0.02*	*0.21*	*1.2*	*1.6*	*0.10*	*0.72*	*0.68*	nd	x
Benzo(b)fluoranthene	0.01	0.4	**0.52**	*0.03*	**0.85**	*1.8*	*0.09*	*0.44*	*0.08*	*0.05*	nd	*0.28*	*0.06*	*0.58*	*0.04*	*0.26*	*0.06*	**0.53**	*0.04*	*0.04*	*0.02*	*0.20*	*1.0*	*1.6*	*0.16*	*0.77*	*0.59*	nd	x
Benzo(g,h,i)perylene	0.02	0.4	*0.32*	nd	**0.50**	*0.7*	*0.08*	*0.15*	*0.04*	*0.03*	nd	*0.14*	*0.04*	*0.17*	*0.03*	*0.12*	*0.04*	0.16	*0.02*	*0.02*	nd	*0.09*	*0.29*	*0.43*	*0.07*	*0.22*	*0.20*	nd	x
Benzo(k)fluoranthene	0.03	0.4	*0.22*	nd	*0.28*	*0.4*	*0.03*	nd	*0.03*	nd	nd	*0.08*	*0.03*	*0.13*	nd	*0.08*	*0.03*	0.16	nd	nd	nd	*0.07*	*0.36*	*0.49*	*0.06*	*0.20*	*0.14*	nd	x
Chrysene	0.03	0.4	**0.43**	nd	**0.64**	*3.8*	*0.11*	*0.93*	*0.06*	*0.03*	nd	*0.43*	*0.06*	*1.2*	*0.03*	**0.51**	*0.05*	**0.96**	nd	*0.03*	nd	*0.37*	*2.0*	**2.9**	*0.15*	*1.4*	*1.2*	nd	x
Dibenz(a,h)anthracene	0.02	0.4	*0.10*	*0.02*	*0.11*	*0.4*	*0.05*	nd	nd	nd	nd	*0.08*	*0.02*	*0.09*	nd	**0.72**	*0.02*	*0.07*	nd	nd	nd	*0.03*	*0.16*	*0.20*	*0.02*	*0.10*	*0.10*	nd	x
Fluoranthene	0.02	0.4	**0.68**	*0.04*	**0.94**	**4.9**	*0.12*	*1.1*	*0.07*	*0.04*	nd	nd	*0.10*	*2.0*	*0.05*	*0.10*	*0.07*	**1.8**	*0.03*	*0.05*	nd	**0.70**	*3.7*	**5.9**	*0.23*	**2.8**	*2.0*	nd	x
Fluorene	0.03	0.4	nd	nd	0.04	nd	nd	nd	nd	nd	nd	nd	nd	*1.4*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	*1.9*	nd	x
Indeno(1,2,3-cd)pyrene	0.18	0.4	0.27	*0.02*	**0.41**	*0.70*	*0.06*	*0.11*	*0.04*	*0.02*	nd	*0.12*	*0.03*	*0.14*	*0.02*	nd	*0.04*	0.14	*0.02*	*0.02*	nd	*0.08*	*0.26*	*0.41*	*0.06*	*0.19*	*0.2*	nd	x
2-methylnapthalene	0.01	0.4	nd	nd	*0.03*	**30**	*0.03*	**4.1**	nd	nd	nd	nd	nd	**1.6**	nd	**0.71**	nd	**1.7**	nd	nd	nd	nd	**10**	**15**	nd	**5.3**	**4.1**	nd	x
Napthalene	0.03	0.4	nd	nd	*0.03*	**26**	*0.10*	*1.7*	nd	nd	nd	nd	nd	*0.13*	nd	*0.04*	nd	*0.37*	nd	nd	nd	nd	**5.2**	**6.5**	nd	*0.19*	*1.3*	nd	x
Phenanthrene	0.03	0.4	0.25	nd	*0.32*	**38**	*0.11*	**9.0**	nd	nd	nd	**1.5**	*0.05*	**9.2**	nd	**3.5**	nd	**7.6**	nd	nd	nd	**2.8**	**18**	**25**	*0.09*	**11**	**11**	nd	x
Pyrene	0.02	0.4	**0.66**	*0.04*	**0.90**	**11**	*0.21*	*1.7*	*0.08*	*0.05*	nd	nd	*0.09*	*1.7*	*0.05*	**0.87**	*0.07*	**1.7**	*0.04*	*0.04*	*0.03*	**0.66**	**4.6**	**7**	*0.25*	*2.6*	*2.3*	nd	x
Bis(2-ethylhexyl)phthalate	0.01	0.4	nd	nd	*0.12*	nd	*0.07*	nd	nd	nd	nd	nd	**0.61**	nd	nd	nd	nd	nd	*0.03*	nd	nd	nd	nd	nd	nd	nd	nd	nd	x
Butyl-benzylphthalate	0.02	0.4	nd	nd	*0.02*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	x
Di-n-butylphthalate	0.10	0.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	*0.24*	nd	nd	nd	nd	nd	nd	*0.03*	nd	nd	nd	nd	nd	nd	nd	nd	nd	x
Dibenzofuran	0.01	0.4	nd	nd	*0.02*	nd	*0.04*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	x
Benzyl Alcohol	0.03	0.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.07	nd	nd	nd	x
Method 8151A :Pentachlorophen	0.0012	0.01	*<0.0012*	*<0.0012*	x	x	*<0.0012*	*<0.0012*	*<0.0012*	*<0.0012*	*<0.0012*	*<0.0012*	x	x	x	x	*<0.0012*	*<0.0012*	*<0.0012*	*<0.0012*	x	x	*<0.0012*	*<0.0012*	x	x	*<0.0012*	*<0.0012*	x
Total Benzo(a) Pyrene Equivalents (mg/Kg)			0.56	0.08	0.77	3.13	0.18	0.71	0.07	0.05	0.03	0.40	0.07	0.85	0.04	1.09	0.07	0.74	0.05	0.04	0.04	0.30	1.66	2.27	0.15	1.03	0.95		x
Total PAHs (EPA 8270) (calculated)			4.1	0.19	6.0	146	*1.5*	25	0.48	0.27		3.3	0.57	24	0.27	8.9	0.43	20	0.22	0.25	0.07	6.5	57	82	1.3	32	32		
Total PAHs (EPA 8270 and TICs) (calculated)			*4.5*	*0.48*	*9.0*	*576*	*x*	*x*	*0.80*	*0.27*	*x*	*x*	*x*	*x*	*0.37*	*18.9*	*0.64*	*76*	*0.22*	*0.25*	*x*	*x*	*390*	*376*	*x*	*x*	*257*		
Method 1613B: Dioxins and Furans														Sample Location Concentration (ng/Kg) (ppt)													pg/L	
Total TCDD Toxic Equivalents (n	na	na	0.95	0.78	x	x	4.1	1.5	8.6	20	3.9	14	x	x	x	x	12	8.2	0.65	0.48	x	x	4.9	6.8	x	x	2.8	x	x
2,3,7,8-TCDD	Variable	Variable	*<0.44*	*<0.40*	x	x	*<1.1*	*<0.74*	*<0.25*	*<0.3*	*<0.12*	*<0.29*	x	x	x	x	*<0.097*	*<0.52*	*<0.3*	*<0.24*	x	x	*<0.77*	*<0.56*	x	x	*<0.87*	*<0.47*	x
1,2,3,7,8-PeCDD	Variable	Variable	*<0.58*	*<0.63*	x	x	*<1.7*	*<0.98*	*<0.57*	*<1.3*	*<0.31*	*<0.55*	x	x	x	x	*<1.4*	*<1.2*	*<0.6*	*<0.41*	x	x	*<0.93*	*<1.2*	x	x	*<0.56*	*<0.59*	x
1,2,3,4,7,8-HxCDD	Variable	Variable	*<0.31*	*<0.36*	x	x	*<1.7*	*<0.5*	*<2.4*	*5.5*	*<1.1*	*<3.7*	x	x	x	x	*4.7*	*<8.5*	*<0.39*	*<0.26*	x	x	*<0.8*	*<0.37*	x	x	*<0.59*	*<0.47*	x
1,2,3,6,7,8-HxCDD	Variable	Variable	*<0.54*	*<0.31*	x	x	*<3.7*	*<1.4*	**8.9**	**22**	*5.0*	*<17*	x	x	x	x	**16**	*<7.5*	*<0.34*	*<0.23*	x	x	*<3*	*<5.9*	x	x	*<3.5*	*<0.47*	x
1,2,3,7,8,9-HxCDD	Variable	Variable	*<1.5*	*<0.32*	x	x	*<3.2*	*<1.8*	*4.3*	**9.9**	*<2.9*	*<7.9*	x	x	x	x	**10**	*<7.6*	*<0.34*	*<0.22*	x	x	*<2.7*	*<6.6*	x	x	*<1.7*	*<0.50*	x
1,2,3,4,6,7,8-HpCDD	Variable	Variable	**15**	*5.2*	x	x	**120**	*<24*	**450**	**980**	**200**	**820**	x	x	x	x	**520**	**410**	*<1.2*	*<2.4*	x	x	**240**	**370**	x	x	*120*	*<1.6*	x
OCDD	Variable	Variable	**190**	**55**	x	x	**1400**	**280**	**4800**	**10000**	**2000**	**8400**	x	x	x	x	**5900**	**4500**	*7.4*	**23**	x	x	**2800**	**3800**	x	x	**1200**	*<6.2*	x
2,3,7,8-TCDF	Variable	Variable	*<0.24*	*<0.27*	x	x	*<4.5*	*<1.9*	*<0.13*	*<0.24*	*<0.086*	*<0.48*	x	x	x	x	*<0.14*	*<0.99*	*<0.21*	*<0.17*	x	x	*<1.7*	*<1*	x	x	*<0.43*	*<0.45*	x
1,2,3,7,8-PeCDF	Variable	Variable	*<0.30*	*<0.37*	x	x	*<0.94*	*<0.46*	*<0.25*	*<0.29*	*<0.061*	*<0.30*	x	x	x	x	*<0.37*	*<0.42*	*<0.38*	*<0.28*	x	x	*<0.57*	*<0.47*	x	x	*<0.26*	*<0.37*	x
2,3,4,7,8-PeCDF	Variable	Variable	*<0.33*	*<0.41*	x	x	*<1.1*	*<0.53*	*<0.28*	*<0.34*	*<0.072*	*<0.39*	x	x	x	x	*<0.37*	*<0.49*	*<0.44*	*<0.28*	x	x	*<0.63*	*<0.51*	x	x	*<0.30*	*<0.38*	x
1,2,3,4,7,8-HxCDF	Variable	Variable	*<0.20*	*<0.30*	x	x	*<0.79*	*<0.53*	*<1.4*	*3.3*	<0.88	*<2.5*	x	x	x	x	*<2.7*	*<2.2*	*<0.26*	*<0.19*	x	x	*<0.78*	*<1.5*	x	x	*<0.52*	*<0.55*	x
1,2,3,6,7,8-HxCDF	Variable	Variable	*<0.18*	*<0.28*	x	x	*<0.79*	*<0.43*	*<0.85*	*<2*	*<0.29*	*<1.0*	x	x	x	x	*<1.7*	*<1.0*	*<0.25*	*<0.19*	x	x	*<0.45*	*<0.61*	x	x	*<0.65*	*<0.39*	x
2,3,4,6,7,8-HxCDF	Variable	Variable	*<0.16*	*<0.25*	x	x	*<0.78*	*<0.42*	*<0.64*	*<1.6*	*<0.60*	*<2.8*	x	x	x	x	*<1.2*	*<0.56*	*<0.23*	*<0.17*	x	x	*<0.7*	*<0.94*	x	x	*<0.61*	*<0.61*	x
1,2,3,7,8,9-HxCDF	Variable	Variable	*<0.17*	*<0.3*	x	x	*<0.99*	*<0.52*	*<0.34*	*<0.9*	*<0.12*	*<0.42*	x	x	x	x	*<0.79*	*<0.50*	*<0.26*	*<0.17*	x	x	*<0.53*	*<0.45*	x	x	*<0.51*	*<0.58*	x
1,2,3,4,6,7,8-HpCDF	Variable	Variable	*<2.0*	*<0.85*	x	x	*<17*	*<3.6*	**58**	**130**	**26**	*92*	x	x	x	x	**65**	*<40*	*<0.38*	*<0.69*	x	x	*<22*	*<33*	x	x	*<12*	*<1.1*	x
1,2,3,4,7,8,9-HpCDF	Variable	Variable	*<0.25*	*<0.45*	x	x	*<2.2*	*<0.95*	*3.0*	**7.0**	*<1.5*	*<4.8*	x	x	x	x	*3.8*	*<3.2*	*<0.53*	*<0.22*	x	x	*<2*	*<1.8*	x	x	*<1.2*	*<1.0*	x
OCDF	Variable	Variable	*<5.0*	*<2.4*	x	x	*<61*	*<10*	**280**	**630**	**140**	**570**	x	x	x	x	**290**	*250*	*<0.78*	**19**	x	x	*110*	*150*	x	x	*<71*	*<3.3*	x
Total TCDD	Variable	Variable	**1.0**	*9.6*	x	x	*<1.1*	*<0.74*	*<0.25*	*<0.30*	<0.12	<0.41	x	x	x	x	*<0.18*	*<0.52*	*<0.3*	*<0.3*	x	x	*<0.77*	*<0.75*	x	x	*<3.4*	*<0.47*	x
Total PeCDD	Variable	Variable	<0.68	*<0.63*	x	x	*<1.7*	*<0.98*	*<0.57*	*<1.7*	<0.53	<1.7	x	x	x	x	*<1.4*	*<1.2*	*<0.73*	*<0.73*	x	x	*<0.93*	*<1.2*	x	x	*<0.66*	*<0.59*	x
Total HxCDD	Variable	Variable	<3.1	*<0.96*	x	x	*<12*	*<3.2*	**76**	**170**	**52**	**74**	x	x	x	x	**130**	*<67*	*<0.39*	*<0.39*	x	x	*<26*	**62**	x	x	*<18*	*<0.50*	x
Total HpCDD	Variable	Variable	**42**	***20.0***	x	x	**330**	*<53*	**1400**	**3000**	**820**	**3000**	x	x	x	x	**1700**	**2500**	*<2.1*	*<2.1*	x	x	**1300**	**2500**	x	x	**540**	*<1.6*	x
Total TCDF	Variable	Variable	<0.24	**1.4**	x	x	*<4.5*	*<1.9*	*<0.18*	*<0.30*	<0.17	<0.56	x	x	x	x	*<0.23*	*<0.99*	*<0.21*	*<0.21*	x	x	*<1.7*	*<1.1*	x	x	*<0.78*	*<0.45*	x
Total PeCDF	Variable	Variable	<0.33	*<0.41*	x	x	*<2.5*	*<1.0*	*<1.1*	**3.5**	<0.60	<0.78	x	x	x	x	*<2.4*	*<2.3*	*<44*	*<44*	x	x	*<1.8*	*<3.8*	x	x	*<3.4*	*<0.38*	x
Total HxCDF	Variable	Variable	<0.61	*<0.35*	x	x	*<7.4*	*<1.4*	*<39*	**88**	**23**	<53	x	x	x	x	**69**	*<24*	*<0.26*	*<0.26*	x	x	*<11*	*<17*	x	x	*<9.4*	*<0.61*	x
Total HpCDF	Variable	Variable	<2.9	*<2.1*	x	x	*<43*	*<7.3*	**230**	**520**	**120**	**520**	x	x	x	x	**250**	**190**	*<0.53*	*<0.53*	x	x	**69**	**94**	x	x	*<56*	*<1.1*	x
Method 8260B: Volatiles (mg/Kg)																												ug/L	
Acetone	0.02	0.048	nd	nd	x	x	x	x	nd	nd	x	x	x	x	x	x	nd	*<0.59*	nd	nd	x	x	nd	nd	x	x	*0.025*	*<9.9*	nd
1,2,4-Trimethylbenzene	0.002	0.0048	nd	nd	x	x	x	x	nd	nd	x	x	x	x	x	x	nd	**1.9**	nd	nd	x	x	*0.12*	*0.35*	x	x	**0.022**	*<0.86*	nd
1,3,5- Trimethylbenzene	0.002	0.0048	nd	nd	x	x	x	x	nd	nd	x	x	x	x	x	x	nd	**0.57**	nd	nd	x	x	nd	nd	x	x	**0.007**	*<0.54*	nd
Isopropylbenzene	0.004	0.0048	nd	nd	x	x	x	x	nd	nd	x	x	x	x	x	x	nd	**1.1**	nd	nd	x	x	nd	*0.37*	x	x	**0.009**	*<0.19*	nd
4-Isopropyltoluene	0.002	0.0048	nd	nd	x	x	x	x	nd	nd	x	x	x	x	x	x	*0.005*	**4.4**	nd	nd	x	x	nd	*1.60*	x	x	**0.015**	*<0.69*	nd
n-butylbenzene	0.002	0.0048	nd	nd	x	x	x	x	nd	nd	x	x	x	x	x	x	nd	**1.6**	nd	nd	x	x	nd	nd	x	x	**0.016**	*<0.67*	nd
N-propylbenzene	0.002	0.0048	nd	nd	x	x	x	x	nd	nd	x	x	x	x	x	x	nd	**1.6**	nd	nd	x	x	nd	*0.78*	x	x	**0.012**	*<0.59*	nd
m-Xylene & p-Xylene	0.003	0.0048	nd	nd	x	x	x	x	nd	nd	x	x	x	x	x	x	nd	**0.59**	nd	nd	x	x	nd	*0.20*	x	x	**0.011**	*<0.60*	nd
Metals Method 6010 (mg/Kg)																													
Aluminum	Variable	Variable	**1500**	**12000**	**1400**	**3800**	**2400**	**4300**	**950**	**940**	**790**	**800**	**830**	**1100**	**690**	**5600**	**810**	**3400**	**1100**	**1100**	**860**	**1700**	**1700**	**1800**	**1500**	**1800**	**1300**	*41*	x
Arsenic	Variable	Variable	*<0.25*	*0.51*	*0.30*	*<0.24*	**1.2**	*0.84*	*0.35*	*0.44*	*<0.26*	*0.69*	*0.55*	*0.69*	*<0.26*	*0.78*	*0.75*	2.1	*0.36*	<0.26	*0.74*	*0.58*	*0.76*	*1.1*	**1.4**	*0.50*	*0.89*	*<4.2*	x
Chromium	Variable	Variable	**2.5**	**8.9**	**2.0**	**4.0**	**2.4**	**4.6**	**2.1**	**2.5**	**2.4**	**2.9**	**3**	**2.8**	**2.3**	**12**	**3.1**	**9.3**	**4**	**3.8**	**2.4**	**5.7**	**3.6**	**4.4**	**5.2**	**3.9**	**4.6**	*<1.5*	x
Copper	Variable	Variable	*<0.37*	*<0.41*	*1.8*	**12**	*1.8*	**2.9**	*<0.39*	*<0.37*	*0.4*	*1.6*	*<0.41*	*1.7*	*<0.39*	**2.7**	*<0.36*	**3.1**	*0.63*	*0.51*	*<0.41*	*<0.41*	*2.0*	**4.4**	*0.50*	*1.1*	**4.7**	*<2.4*	x
Iron	Variable	Variable	**290**	**630**	**270**	**260**	**290**	**200**	**270**	**260**	**340**	**320**	**430**	**400**	**270**	**1400**	**360**	**1600**	**1300**	**660**	**380**	**490**	**570**	**370**	**930**	**560**	**640**	*<4.6*	x
Total Organic Carbon (mg/Kg)	0.62	6.3	**5600**	**4500**	**6400**	**26000**	**4800**	**8400**	**1400**	**740**	**710**	**3000**	**2000**	**5700**	**650**	**6600**	**1100**	**7900**	**1200**	**3400**	**1100**	**4500**	**13000**	**18000**	**1500**	**8300**	**6700**	x	x
Percent Moisture			23.0%	23.0%	19.4%	18.5%	19.1%	17.4%	15.6%	16.4%	19.3%	20.2%	21.3%	16.6%	18.4%	21.1%	18.8%	32.1%	19.6%	20.1%	20.0%	20.5%	21.0%	23.4%	17.1%	18.3%	18.4%		
Percent TOC			0.56%	0.45%	0.64%	2.60%	0.48%	0.84%	0.14%	0.07%	0.07%	0.30%	0.20%	0.57%	0.07%	0.66%	0.11%	0.79%	0.12%	0.34%	0.11%	0.45%	1.30%	1.80%	0.15%	0.83%	0.67%		

na = not available
nd = Not Detected at MDL
x = Sample Not Analyzed
Data in **Bold** is Quantitative Above Lab PQL
Data in *Italics* is Estimated Semiquantitative -Value between the MDL and PQL
ORANGE HIGHLIGHTED DATA IS = OR > 100 x Upstream Sample Concentration
YELLOW HIGHLIGHTED DATA IS = OR > 10 x Upstream Sample Concentration

Table 6. Summary of Tentatively Identified and Unknown Compund Types -- Springstead and Hogtown Creek Sediments January- February 2009

							SAMPLE LOCATION								
							Estimated Concentration (mg/Kg)								
Tentative Identified Compunds (	**SFS**	**SFD**	**HCS**	**HCD**	**SS5S**	**SS5D**	**SGS**	**SGD**	**SCS**	**SCD**	**SDS**	**SDD**	**H4S**	**H4D**	**SA**
alpha-Pinene	*0.53*				*0.05*										
beta-Pinene	*2.6*														
1- Methlynapthalene					***0.05***	***21***				***0.5***		***2.0***			
Caryophyllene	*1.0*														
Carbazole	*0.03*				*0.05*										
Hexadecanoic Acid			*0.10*	*0.19*					*0.09*						
Phenanthrene, 2-methly-															***43***
Phenanthrene, 4-methly-													***42***		
1- napthalenedione, 2-hydroxy-3-(3-methyl)						***50***									
1-Napthalenepropanol, alpha-ethenylde							***0.10***								
Phenanthrene, 3.6-dimethyl-					***0.47***	***99***			***0.10***			***18***	***83***	***98***	
Oleic Acid			*0.29*												
Octadecanoic Acid				*0.09*											
Butylated Hydroxytolune										*9.7*			*36*	*40*	*33*
Phenanthrene, 2,3,5-trimethyl-										***9.6***		***14***	***64***	***44***	***62***
Phenanthrene, 2,4,5,7-tetramethyl-					***1.2***	***160***						***22***	***110***	***120***	***120***
Methylpyrene					***0.22***										
2-methlydiphenylsulphone													*23*		
Phenanthrene, 1-(methyl-7-(1-methlylethyl)							***0.22***				***0.21***				
1-Phenanthrenecarboxylic acid,	***0.36***	***0.28***			***0.59***	***100***							***34***	***32***	
7H-Benzo[de]anthracen-7-one					***0.28***										
Octadecane				*0.17*											
Eicosane				*0.085*	*0.22*										
Vitamin E				*0.09*	*0.36*										
Ergostanol				*0.18*											
s-Indacene-1(2H)-one, 3,5,6,7 tetrahydro															
1,2,3,6 - Tetrahydropyridine, 4-[4-hyroxy]															
Benzo(b)naptho-thiophene					***0.22***										
Total PAH TICs	*0.36*	*0.28*			*3.0*	*430*	*0.32*		*0.10*	*10*	*0.21*	*56*	*333*	*294*	*225*
Other Compound Types															
Unknown Possible Substituted PAHs		*0.32*				*241*	*0.17*		*1.3*	*71*	*0.1*	*5*		*217*	*67*
Unknown Possible Organic Acids	*0.37*	*0.19*			*3.0*	*185*					*0.1*				
Other Unknowns	*30*	*3.1*	*0.6*	*1.6*		*576*	*0.74*	*0.31*	*1.9*	*135*	*1.8*	*128*	*731*	*797*	*534*
Note: Compunds in bold type are considered PAH TICs in this table															
Blank Cells = not detected															

TABLE 7. Comparison of Springstead and Hogtown Creek Sediment Data to FDEP Residential Direct Exposure and Freshwater Leaching SCTL January- February 2009

Analysis Method- Compound Type	Lab	Lab	FDEP DE Res	FDEP Leach FW/SW	Sample Location Concentration (mg/Kg)																						
Method 8270C: Semi-volatiles	MDL(mg/Kg)	PQL (mg/Kg)	(mg/Kg)	(mg/Kg)	Upstrm SFS	Upstrm SFD	SS5S	SS5D	SS2S	SS2D	SGS	SGD	S10S	S10D	S9S	S9D	SCS	SCD	SDS	SDD	Upstrm HCS	Upstrm HCD	HBS	HBD	H4S	H4D	HAS	HAD	SA
SVOC Dilution Factor					1	1	1	10	1	5	1	1	1	2	1	5	1	1	1	1	1	1	1	1	10	5	1	5	5
Acenapthene	0.03	0.4	2400	0.3			*0.06*	**7.7**	*0.14*	*1.5*						*1.4*		**0.60**		**1.7**				**0.49**	*2.9*	**4.2**		*1.8*	**2.0**
Acenapthylene	0.05	0.4	1800	NA				**9.1**	*0.07*	*1.4*						*0.98*									*3.2*	**4.2**		*1.2*	*1.6*
Anthracene	0.03	0.4	21000	0.4			*0.04*	**6.5**	*0.06*	*1.6*				*0.36*		*1.6*		**0.69**		**1.4**				**0.48**	*2.9*	**4.1**	*0.03*	*1.9*	*1.8*
Benzo(a)anthracene	0.02	0.4	*	NA	*0.31*	*0.02*	**0.40**	*3.1*	*0.09*	*0.77*	*0.04*	*0.03*			*0.05*	*0.91*	*0.03*	**0.42**		**0.81**	*0.03*	*0.02*		*0.28*	*1.7*	**2.6**	*0.09*	*1.2*	*0.97*
Benzo(a)pyrene	0.01	0.4	0.1	NA	*0.35*	*0.02*	**0.49**	*2.2*	*0.11*	*0.53*	*0.05*	*0.03*		*0.28*	*0.04*	*0.60*	*0.02*	*0.29*	*0.04*	**0.52**	*0.03*	*0.02*	*0.02*	*0.21*	*1.2*	*1.6*	*0.10*	*0.72*	*0.68*
Benzo(b)fluoranthene	0.01	0.4	*	NA	**0.52**	*0.03*	**0.85**	*1.8*	*0.09*	*0.44*	*0.08*	*0.05*		*0.28*	*0.06*	*0.58*	*0.04*	*0.26*	*0.06*	**0.53**	*0.04*	*0.04*	*0.02*	*0.20*	*1.0*	*1.6*	*0.16*	*0.77*	*0.59*
Benzo(g,h,i)perylene	0.02	0.4	2500	NA	*0.32*		**0.50**	*0.7*	*0.08*	*0.15*	*0.04*	*0.03*		*0.14*	*0.04*	*0.17*	*0.03*	*0.12*	*0.04*	0.16	*0.02*	*0.02*		*0.09*	*0.29*	*0.43*	*0.07*	*0.22*	*0.20*
Benzo(k)fluoranthene	0.03	0.4	*	NA	*0.22*		*0.28*	*0.4*	*0.03*		*0.03*			*0.08*	*0.03*	*0.13*		*0.08*	*0.03*	0.16				*0.07*	*0.36*	*0.49*	*0.06*	*0.20*	*0.14*
Chrysene	0.03	0.4	*	NA	**0.43**		**0.64**	*3.8*	*0.11*	*0.93*	*0.06*	*0.03*		*0.43*	*0.06*	*1.2*	*0.03*	**0.51**	*0.05*	**0.96**		*0.03*		*0.37*	*2.0*	**2.9**	*0.15*	*1.4*	*1.2*
Dibenz(a,h)anthracene	0.02	0.4	*	NA	*0.10*	*0.02*	*0.11*	*0.4*	*0.05*					*0.08*	*0.02*	*0.09*		**0.72**	*0.02*	*0.07*				*0.03*	*0.16*	*0.20*	*0.02*	*0.10*	*0.10*
Fluoranthene	0.02	0.4	3200	1.3	**0.68**	*0.04*	**0.94**	**4.9**	*0.12*	*1.1*	*0.07*	*0.04*			*0.10*	*2.0*	*0.05*	*0.10*	*0.07*	**1.8**	*0.03*	*0.05*		**0.70**	*3.7*	**5.9**	*0.23*	**2.8**	*2.0*
Fluorene	0.03	0.4	2600	17			0.04									*1.4*													*1.9*
Indeno(1,2,3-cd)pyrene	0.18	0.4	*	NA	0.27	*0.02*	**0.41**	*0.70*	*0.06*	*0.11*	*0.04*	*0.02*		*0.12*	*0.03*	*0.14*	*0.02*		*0.04*	0.14	*0.02*	*0.02*		*0.08*	*0.26*	*0.41*	*0.06*	*0.19*	*0.2*
2-methylnapthalene	0.01	0.4	210	9.1			*0.03*	**30**	*0.03*	**4.1**						**1.6**		**0.71**		**1.7**					**10**	**15**		**5.3**	**4.1**
Napthalene	0.03	0.4	55	2.2			*0.03*	**26**	*0.10*	*1.7*						*0.13*		*0.04*		*0.37*					**5.2**	**6.5**		*0.19*	*1.3*
Phenanthrene	0.03	0.4	2200	NA	0.25		*0.32*	**38**	*0.11*	**9.0**				**1.5**	*0.05*	**9.2**		**3.5**		**7.6**				**2.8**	**18**	**25**	*0.09*	**11**	**11**
Pyrene	0.02	0.4	2400	1.3	**0.66**	*0.04*	**0.90**	**11**	*0.21*	*1.7*	*0.08*	*0.05*			*0.09*	*1.7*	*0.05*	**0.87**	*0.07*	**1.7**	*0.04*	*0.04*	*0.03*	**0.66**	**4.6**	**7**	*0.25*	*2.6*	*2.3*
Bis(2-ethylhexyl)phthalate	0.01	0.4	72	1300			*0.12*		*0.07*						**0.61**						*0.03*								
Butyl-benzylphthalate	0.02	0.4	17000	56			*0.02*																						
Di-n-butylphthalate	0.10	0.4	8200	1.5										*0.24*							*0.03*								
Dibenzofuran	0.01	0.4	320	36			*0.02*		*0.04*																				
Benzyl Alcohol	0.03	0.4	26000	2.3																							0.07		
Method 8151A :Pentachlorophen	0.0012	0.01	7.2	0.2	<.0012	<.0012	x	x	<.0012	<.0012	<.0012	<.0012	<.0012	<.0012	x	x	x	x	<.0012	<.0012	<.0012	<.0012	x	x	<.0012	<.0012	x	x	<.0012
Carcinogenic PAHs (calculated)																													
Total Benzo(a) Pyrene Equivalents (mg/Kg)			0.1	NA	0.56	0.08	0.77	3.13	0.18	0.71	0.07	0.05	0.03	0.40	0.07	0.85	0.04	1.09	0.07	0.74	0.05	0.04	0.04	0.30	1.66	2.27	0.15	1.03	0.95
Total PAHs (EPA 8270) (mg/Kg)			NA	NA	*4.1*	*0.2*	*6.0*	*146*	*1.5*	*25*	*0.48*	*0.27*		*3.3*	*0.57*	*24*	*0.27*	*8.9*	*0.43*	*20*	*0.22*	*0.25*	*0.1*	*6.5*	*57*	*82*	*1.3*	*32*	*32*
Total PAHs (EPA 8270 and TICs) (mg/Kg)			NA	NA	*4.5*	*0.48*	*9.0*	*576*	*x*	*x*	*0.80*	*0.27*	*x*	*x*	*x*	*x*	*0.37*	*18.9*	*0.64*	*76*	*0.22*	*0.25*	*x*	*x*	*390*	*376*	*x*	*x*	*257*
Method 1613B: Dioxins and Furans			ng/Kg (ppt)	ng/Kg (ppt)																									
Total TCDD Toxic Equivalents (ng/Kg)(ppt)			7	0.6	0.95	0.78	x	x	4.1	1.5	8.6	20	3.9	14	x	x	x	x	12	8.2	0.65	0.48	x	x	4.9	6.8	x	x	2.8
Method 8260B: Volatiles																													
Acetone	0.02	0.048	11000	6.8	ND	ND	x	x	x	x	ND	ND	x	x	x	x	x	x	ND	ND	ND	ND	x	x	ND	ND	x	x	*0.025*
1,2,4-Trimethylbenzene	0.002	0.0048	18	7.2	ND	ND	x	x	x	x	ND	ND	x	x	x	x	x	x	ND	**1.9**	ND	ND	x	x	*0.12*	*0.35*	x	x	**0.022**
1,3,5- Trimethylbenzene	0.002	0.0048	15	6.7	ND	ND	x	x	x	x	ND	ND	x	x	x	x	x	x	ND	**0.57**	ND	ND	x	x	ND	ND	x	x	**0.007**
Isopropylbenzene	0.004	0.0048	220	56	ND	ND	x	x	x	x	ND	ND	x	x	x	x	x	x	ND	**1.1**	ND	ND	x	x	ND	*0.37*	x	x	**0.009**
4-Isopropyltoluene	0.002	0.0048	NA	NA	ND	ND	x	x	x	x	ND	ND	x	x	x	x	x	x	*0.005*	**4.4**	ND	ND	x	x	ND	*1.60*	x	x	**0.015**
n-butylbenzene	0.002	0.0048	NA	NA	ND	ND	x	x	x	x	ND	ND	x	x	x	x	x	x	ND	**1.6**	ND	ND	x	x	ND	ND	x	x	**0.016**
N-propylbenzene	0.002	0.0048	NA	NA	ND	ND	x	x	x	x	ND	ND	x	x	x	x	x	x	ND	**1.6**	ND	ND	x	x	ND	*0.78*	x	x	**0.012**
m-Xylene & p-Xylene	0.003	0.0048	130	3.9	ND	ND	x	x	x	x	ND	ND	x	x	x	x	x	x	ND	**0.59**	ND	ND	x	x	ND	*0.20*	x	x	**0.011**
Metals Method 6010 (mg/Kg)																													
Aluminum	Variable	Variable	80000	a	**1500**	**12000**	**1400**	**3800**	**2400**	**4300**	**950**	**940**	**790**	**800**	**830**	**1100**	**690**	**5600**	**810**	**3400**	**1100**	**1100**	**860**	**1700**	**1700**	**1800**	**1500**	**1800**	**1300**
Arsenic	Variable	Variable	2.1	a	*<0.25*	*0.51*	*0.30*	*<0.24*	**1.2**	*0.84*	*0.35*	*0.44*	*<0.26*	*0.69*	*0.55*	*0.69*	*<0.26*	*0.78*	*0.75*	2.1	*0.36*	<0.26	*0.74*	*0.58*	*0.76*	*1.1*	**1.4**	*0.50*	*0.89*
Chromium	Variable	Variable	210	4.2	**2.5**	**8.9**	**2.0**	**4.0**	**2.4**	**4.6**	**2.1**	**2.5**	**2.4**	**2.9**	**3**	**2.8**	**2.3**	**12**	**3.1**	**9.3**	**4**	**3.8**	**2.4**	**5.7**	**3.6**	**4.4**	**5.2**	**3.9**	**4.6**
Copper	Variable	Variable	150	a	*<0.37*	*<0.41*	*1.8*	**12**	*1.8*	**2.9**	*<0.39*	*<0.37*	*0.4*	*1.6*	*<0.41*	*1.7*	*<0.39*	**2.7**	*<0.36*	**3.1**	*0.63*	*0.51*	*<0.41*	*<0.41*	*2.0*	**4.4**	*0.50*	*1.1*	**4.7**
Iron	Variable	Variable	53000	a	**290**	**630**	**270**	**260**	**290**	**200**	**270**	**260**	**340**	**320**	**430**	**400**	**270**	**1400**	**360**	**1600**	**1300**	**660**	**380**	**490**	**570**	**370**	**930**	**560**	**640**
Total Organic Carbon (mg/Kg)	0.62	6.3	NA	NA	**5600**	**4500**	**6400**	**26000**	**4800**	**8400**	**1400**	**740**	**710**	**3000**	**2000**	**5700**	**650**	**6600**	**1100**	**7900**	**1200**	**3400**	**1100**	**4500**	**13000**	**18000**	**1500**	**8300**	**6700**

Green Highlight - Exceeds FDEP Residential SCTL
Blue Highlight - Exceeds FDEP SW Leaching SCTL
NA = Not Available
ND = Not Detected at MDL
a = determined by leaching test
Blank Cell = Not Detected at MDL
x = Sample Not Analyzed
* Carcinogenic PAH compounds evaluated as Benzo-a-pyrene equivalents
Data in **Bold** is Quantitative Above PQL
Data in *Italics* is Semiquantitative or Value between the MDL and PQL

TABLE 8. Comparison of Springstead and Hogtown Creek Sediment Data to FDEP Sediment Quality Assessment Guidelines - Protection of Organisms January - February 2009

Analysis Method- Compound Ty	Lab	Lab	FDEP Sed TEC*	FDEP Sed	Sample Location Concentration (mg/Kg)																							Avg (0-6") Horizon (mg/Kg)	Avg (6- 24") Horizon (mg/Kg)
Method 8270C: Semi-volatiles	**MDL(mg/Kg)**	**PQL (mg/Kg)**	**mg/Kg**	**PEC** mg/Kg	Upstrm SFS	Upstrm SFD	SS5S	SS5D	SS2S	SS2D	SGS	SGD	S10S	S10D	S9S	S9D	SCS	SCD	SDS	SDD	Upstrm HCS	Upstrm HCD	HBS	HBD	H4S	H4D	HAS	HAD	SA		
SVOC Dilution Factor					1	1	1	10	1	5	1	1	1	2	1	5	1	1	1	1	1	1	1	1	10	5	1	5	5		
Acenapthene	0.03	0.4	0.0067	0.089	0.015	0.015	*0.06*	**7.7**	*0.14*	*1.5*	0.015	0.015	0.015	0.03	0.015	*1.4*	0.015	**0.60**	0.015	**1.7**	0.015	0.015	0.015	**0.49**	*2.9*	**4.2**	0.015	*1.8*	**2.0**	0.32	1.9
Acenapthylene	0.05	0.4	0.0059	0.13	0.025	0.025	0.025	**9.1**	*0.07*	*1.4*	0.025	0.025	0.025	0.050	0.025	*0.98*	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	*3.2*	**4.2**	0.025	*1.2*	*1.6*	0.35	1.7
Anthracene	0.03	0.4	0.0057	0.85	0.015	0.015	*0.04*	**6.5**	*0.06*	*1.6*	0.015	0.015	0.015	*0.36*	0.015	*1.6*	0.015	**0.69**	0.015	**1.4**	0.015	0.015	0.015	**0.48**	*2.9*	**4.1**	*0.03*	*1.9*	*1.8*	0.31	1.9
Benzo(a)anthracene	0.02	0.4	0.11	1.1	*0.31*	*0.02*	**0.40**	*3.1*	*0.09*	*0.77*	*0.04*	*0.03*	0.01	0.020	*0.05*	*0.91*	*0.03*	**0.42**	0.010	**0.81**	*0.03*	*0.02*	0.010	*0.28*	*1.7*	**2.6**	*0.09*	*1.2*	*0.97*	0.24	1.0
Benzo(a)pyrene	0.01	0.4	0.15	1.5	*0.35*	*0.02*	**0.49**	*2.2*	*0.11*	*0.53*	*0.05*	*0.03*	0.005	*0.28*	*0.04*	*0.60*	*0.02*	*0.29*	*0.04*	**0.52**	*0.03*	*0.02*	*0.02*	*0.21*	*1.2*	*1.6*	*0.10*	*0.72*	*0.68*	0.21	0.70
Benzo(b)fluoranthene	0.01	0.4	na	na	**0.52**	*0.03*	**0.85**	*1.8*	*0.09*	*0.44*	*0.08*	*0.05*	0.005	*0.28*	*0.06*	*0.58*	*0.04*	*0.26*	*0.06*	**0.53**	*0.04*	*0.04*	*0.02*	*0.20*	*1.0*	*1.6*	*0.16*	*0.77*	*0.59*		
Benzo(g,h,i)perylene	0.02	0.4	na	na	*0.32*	0.01	**0.50**	*0.7*	*0.08*	*0.15*	*0.04*	*0.03*	0.01	*0.14*	*0.04*	*0.17*	*0.03*	*0.12*	*0.04*	0.16	*0.02*	*0.02*	0.01	*0.09*	*0.29*	*0.43*	*0.07*	*0.22*	*0.20*		
Benzo(k)fluoranthene	0.03	0.4	na	na	*0.22*	0.015	*0.28*	*0.4*	*0.03*	0.075	*0.03*	0.015	0.015	*0.08*	*0.03*	*0.13*	0.015	*0.08*	*0.03*	0.16	0.015	0.015	0.015	*0.07*	*0.36*	*0.49*	*0.06*	*0.20*	*0.14*		
Chrysene	0.03	0.4	0.17	1.3	**0.43**	0.015	**0.64**	*3.8*	*0.11*	*0.93*	*0.06*	*0.03*	0.015	*0.43*	*0.06*	*1.2*	*0.03*	**0.51**	*0.05*	**0.96**	0.015	*0.03*	0.015	*0.37*	*2.0*	**2.9**	*0.15*	*1.4*	*1.2*	0.31	1.3
Dibenz(a,h)anthracene	0.02	0.4	0.033	0.14	*0.10*	*0.02*	*0.11*	*0.4*	*0.05*	0.050	0.01	0.01	0.01	*0.08*	*0.02*	*0.09*	0.01	**0.72**	*0.02*	*0.07*	0.01	0.01	0.01	*0.03*	*0.16*	*0.20*	*0.02*	*0.10*	*0.10*	0.04	0.17
Fluoranthene	0.02	0.4	0.42	2.2	**0.68**	*0.04*	**0.94**	**4.9**	*0.12*	*1.1*	*0.07*	*0.04*	0.01	0.020	*0.10*	*2.0*	*0.05*	*0.10*	*0.07*	**1.8**	*0.03*	*0.05*	0.010	**0.70**	*3.7*	**5.9**	*0.23*	**2.8**	*2.0*	0.53	1.9
Fluorene	0.03	0.4	na	na	0.015	0.015	0.04	0.15	0.015	0.075	0.015	0.015	0.015	0.030	0.015	*1.4*	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.150	0.075	0.015	0.075	*1.9*		
Indeno(1,2,3-cd)pyrene	0.18	0.4	na	na	0.27	*0.02*	**0.41**	*0.70*	*0.06*	*0.11*	*0.04*	*0.02*	0.009	*0.12*	*0.03*	*0.14*	*0.02*	0.009	*0.04*	0.14	*0.02*	*0.02*	0.009	*0.08*	*0.26*	*0.41*	*0.06*	*0.19*	*0.2*		
2-methylnapthalene	0.01	0.4	na	na	0.005	0.005	*0.03*	**30**	*0.03*	**4.1**	0.005	0.005	0.005	0.010	0.005	**1.6**	0.005	**0.71**	0.005	**1.7**	0.005	0.005	0.005	0.005	**10**	**15**	0.005	**5.3**	**4.1**		
Napthalene	0.03	0.4	na	na	0.015	0.015	*0.03*	**26**	*0.10*	*1.7*	0.015	0.015	0.015	0.030	0.015	*0.13*	0.015	*0.04*	0.015	*0.37*	0.015	0.015	0.015	0.015	**5.2**	**6.5**	0.015	*0.19*	*1.3*		
Phenanthrene	0.03	0.4	na	na	0.25	0.015	*0.32*	**38**	*0.11*	**9.0**	0.015	0.015	0.015	**1.5**	*0.05*	**9.2**	0.015	**3.5**	0.015	**7.6**	0.015	0.015	0.015	**2.8**	**18**	**25**	*0.09*	**11**	**11**		
Pyrene	0.02	0.4	0.2	1.5	**0.66**	*0.04*	**0.90**	**11**	*0.21*	*1.7*	*0.08*	*0.05*	0.01	0.010	*0.09*	*1.7*	*0.05*	**0.87**	*0.07*	**1.7**	*0.04*	*0.04*	*0.03*	**0.66**	**4.6**	**7**	*0.25*	*2.6*	*2.3*	0.63	2.7
Bis(2-ethylhexyl)phthalate	0.01	0.4	0.18	2.6	0.005	0.005	*0.12*	0.005	*0.07*	0.005	0.005	0.005	0.005	0.005	**0.61**	0.005	0.005	0.005	0.005	0.005	*0.03*	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.08	0.01
Butyl-benzylphthalate	0.02	0.4	na	na	0.01	0.01	*0.02*	0.01	0.01	0.01	0.01	0.01	0.01	0.010	0.010	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.010	0.01	0.01		
Di-n-butylphthalate	0.10	0.4	na	0.043	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	*0.24*	0.050	0.05	0.05	0.05	0.05	0.05	*0.03*	0.05	0.05	0.05	0.05	0.05	0.050	0.05	0.05		
Dibenzofuran	0.01	0.4	na	na	0.005	0.005	*0.02*	0.005	*0.04*	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005		
Benzyl Alcohol	0.03	0.4	na	na	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.07	0.015	0.015		
Total PAHs (EPA 8270) (mg/Kg)			1.6	23	4.2	0.33	6.1	146	1.5	25	0.60	0.40	0.20	3.5	0.66	24	0.40	9.0	0.54	20	0.36	0.38	0.25	6.5	58	82	1.4	32	32	6.92	34.8
Metals Method 6010 (mg/Kg)																															
Aluminum	Variable	Variable	NA	NA	**1500**	**12000**	**1400**	**3800**	**2400**	**4300**	**950**	**940**	**790**	**800**	**830**	**1100**	**690**	**5600**	**810**	**3400**	**1100**	**1100**	**860**	**1700**	**1700**	**1800**	**1500**	**1800**	**1300**	1193	2524.0
Arsenic	Variable	Variable	9.8	33	*0.125*	*0.51*	*0.30*	*0.12*	**1.2**	*0.84*	*0.35*	*0.44*	*0.13*	*0.69*	*0.55*	*0.69*	*0.13*	*0.78*	*0.75*	2.1	*0.36*	*0.13*	*0.74*	*0.58*	*0.76*	*1.1*	**1.4**	*0.50*	*0.89*	0.63	0.78
Chromium	Variable	Variable	43	110	**2.5**	**8.9**	**2.0**	**4.0**	**2.4**	**4.6**	**2.1**	**2.5**	**2.4**	**2.9**	**3**	**2.8**	**2.3**	**12**	**3.1**	**9.3**	**4**	**3.8**	**2.4**	**5.7**	**3.6**	**4.4**	**5.2**	**3.9**	**4.6**	2.85	5.2
Copper	Variable	Variable	32	150	*0.185*	*0.205*	*1.8*	**12**	*1.8*	**2.9**	*0.195*	*0.185*	*0.4*	*1.6*	*0.205*	*1.7*	*0.195*	**2.7**	*0.18*	**3.1**	*0.63*	*0.51*	*0.205*	*0.205*	*2.0*	**4.4**	*0.50*	*1.1*	**4.7**	0.75	3.0
Iron	Variable	Variable	NA	NA	**290**	**630**	**270**	**260**	**290**	**200**	**270**	**260**	**340**	**320**	**430**	**400**	**270**	**1400**	**360**	**1600**	**1300**	**660**	**380**	**490**	**570**	**370**	**930**	**560**	**640**	411	586.0
Total Organic Carbon (mg/Kg)	0.62	6.3			**5600**	**4500**	**6400**	**26000**	**4800**	**8400**	**1400**	**740**	**710**	**3000**	**2000**	**5700**	**650**	**6600**	**1100**	**7900**	**1200**	**3400**	**1100**	**4500**	**13000**	**18000**	**1500**	**8300**	**6700**		
Total Organic Carbon %					0.56%	0.45%	0.64%	2.60%	0.48%	0.84%	0.14%	0.07%	0.07%	0.30%	0.20%	0.57%	0.07%	0.66%	0.11%	0.79%	0.12%	0.34%	0.11%	0.45%	1.30%	1.80%	0.15%	0.83%	0.67%		
Percent Moisture %					23.0%	23.0%	19.4%	18.5%	19.1%	17.4%	15.6%	16.4%	19.3%	20.2%	21.3%	16.6%	18.4%	21.1%	18.8%	32.1%	19.6%	20.1%	20.0%	20.5%	21.0%	23.4%	17.1%	18.3%	18.4%		

Orange Highlight - Exceeds FDEP SQAGs TECs

Red Highlight - Exceeds FDEP SQAG PECs

NA = Not Available

small type ($_{0.15}$) = 1/2 MDL for ND

a = determined by leaching test

x = Sample Not Analyzed

Data in **Bold** is Quantitative Above PQL

Data in *Italics* is Semiquantitative or Value between the MDL and PQL

* FDEP Sediment Quality Assessment Guidelines Threshold Effect Concentration (TEC)

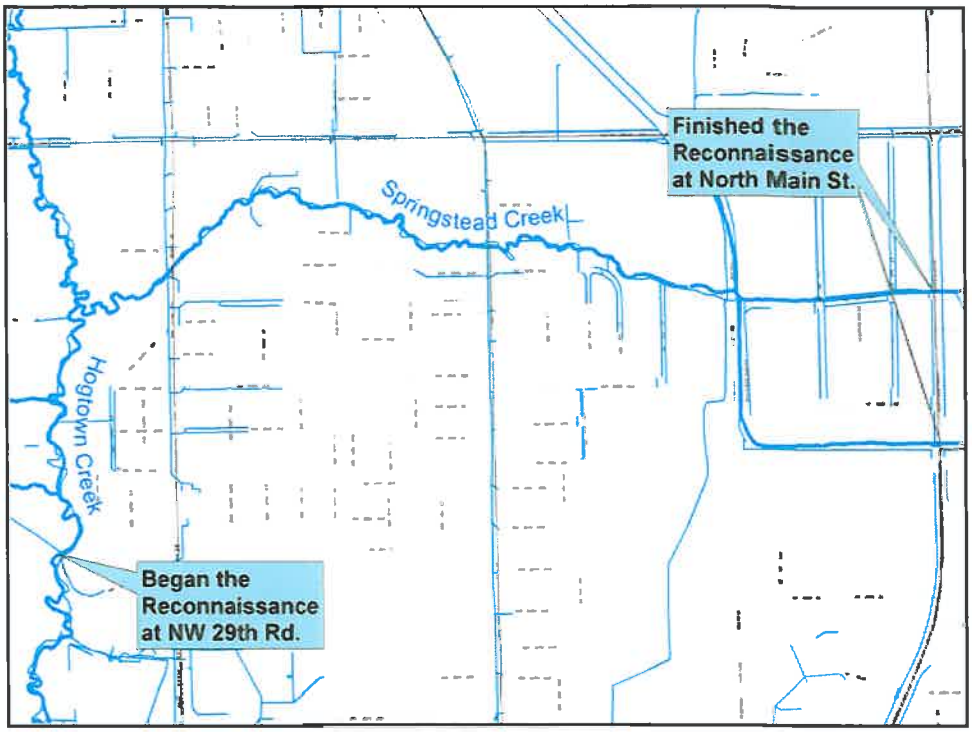
** FDEP Sediment Quality Assessment Guideline Probable Effect Concentration (PEC)

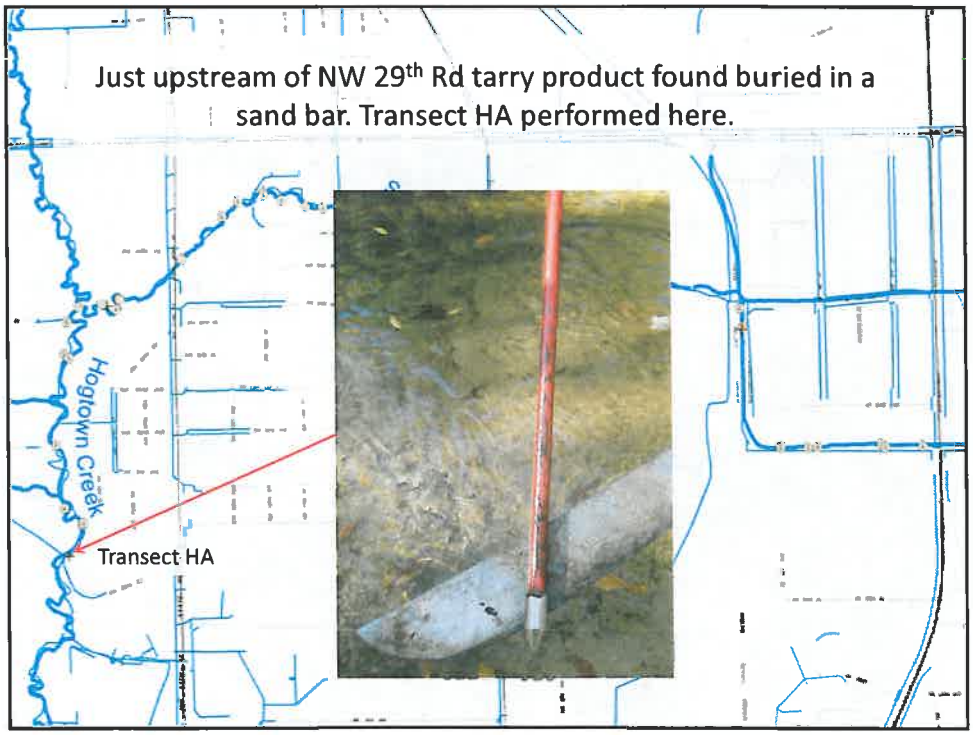
Appendix A

Springstead and Hogtown Creek Reconnaissance Survey – Photographs
December 8 to 11, 2008

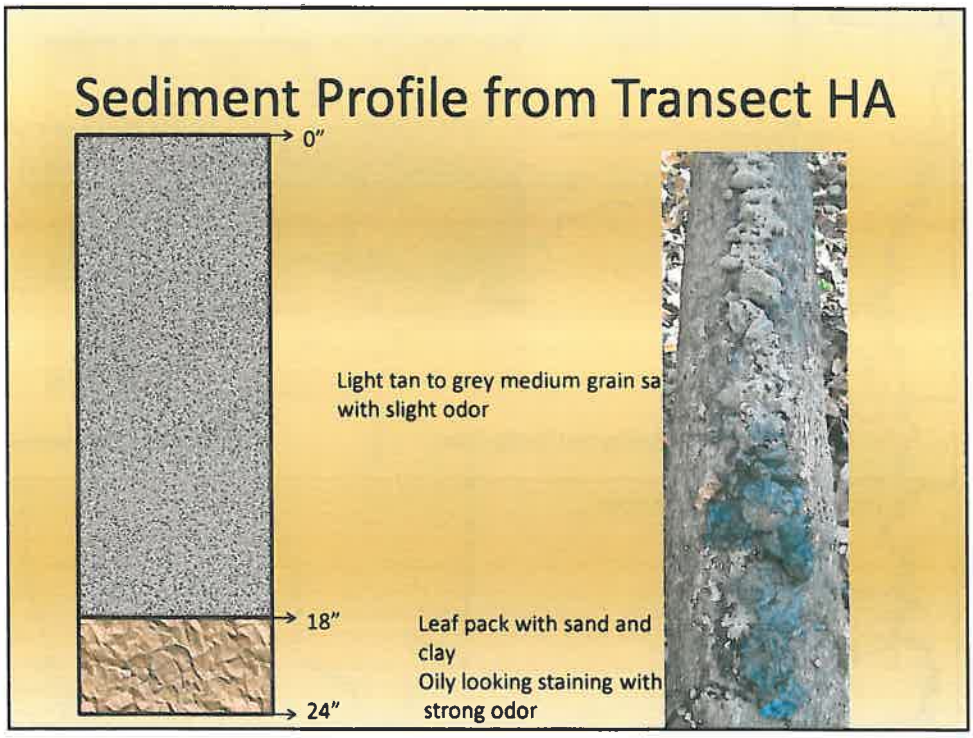
Alachua County Environmental Protection Department
USEPA Cooperative Agreement # V97468702

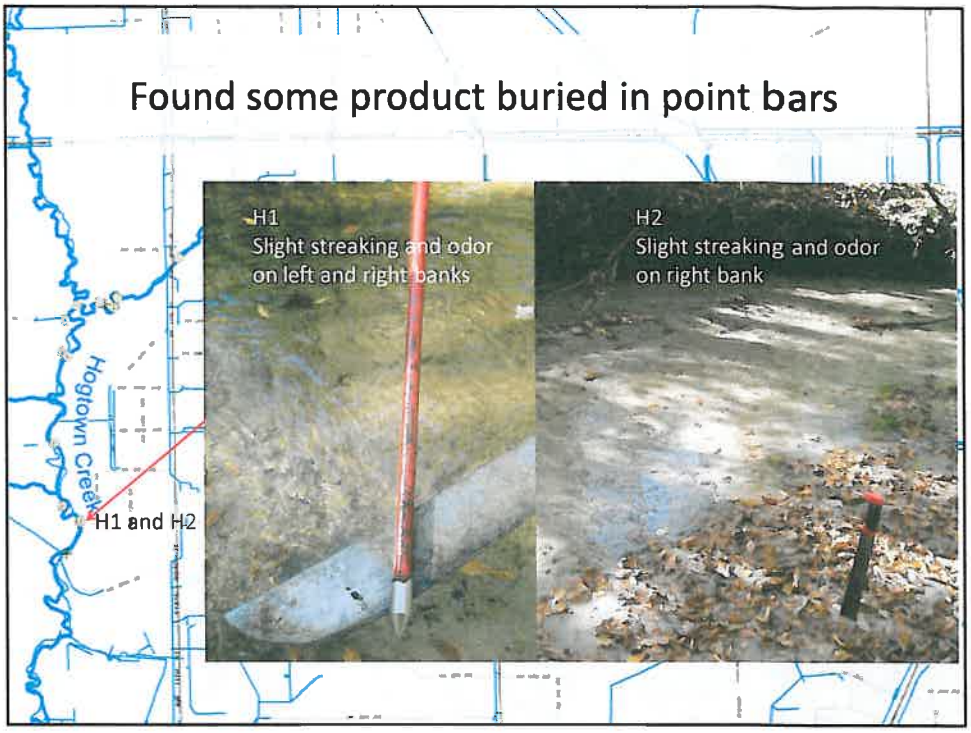


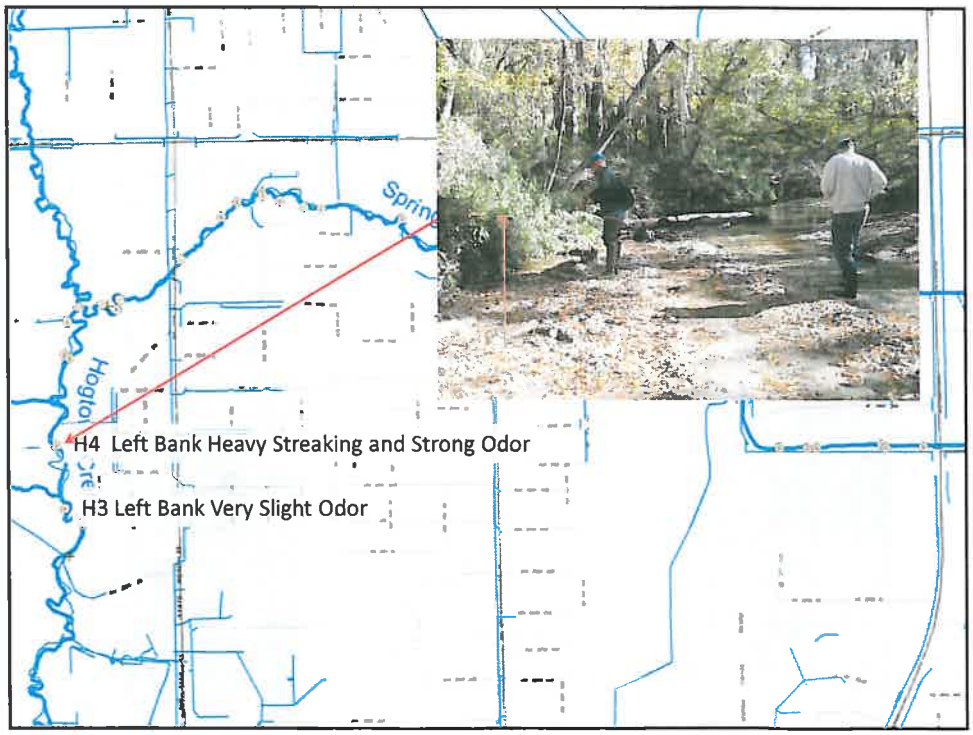

Finished the Reconnaissance at North Main St.
Springstead Creek
Hogtown Creek
Began the Reconnaissance at NW 29th Rd.

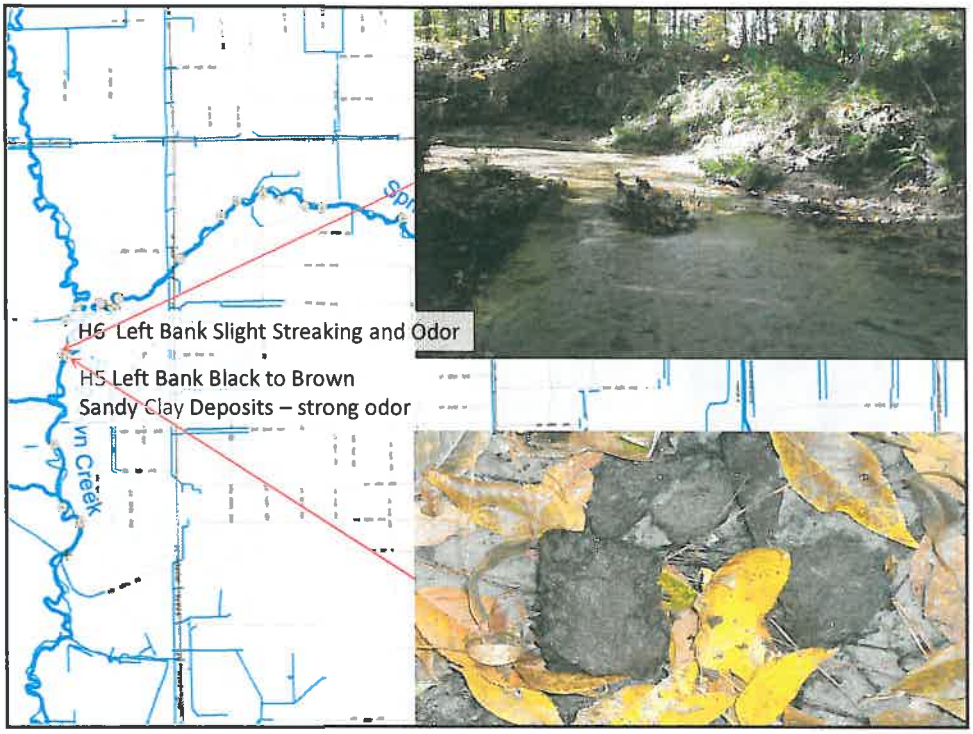

Just upstream of NW 29th Rd tarry product found buried in a sand bar. Transect HA performed here.
Hogtown Creek
Transect HA

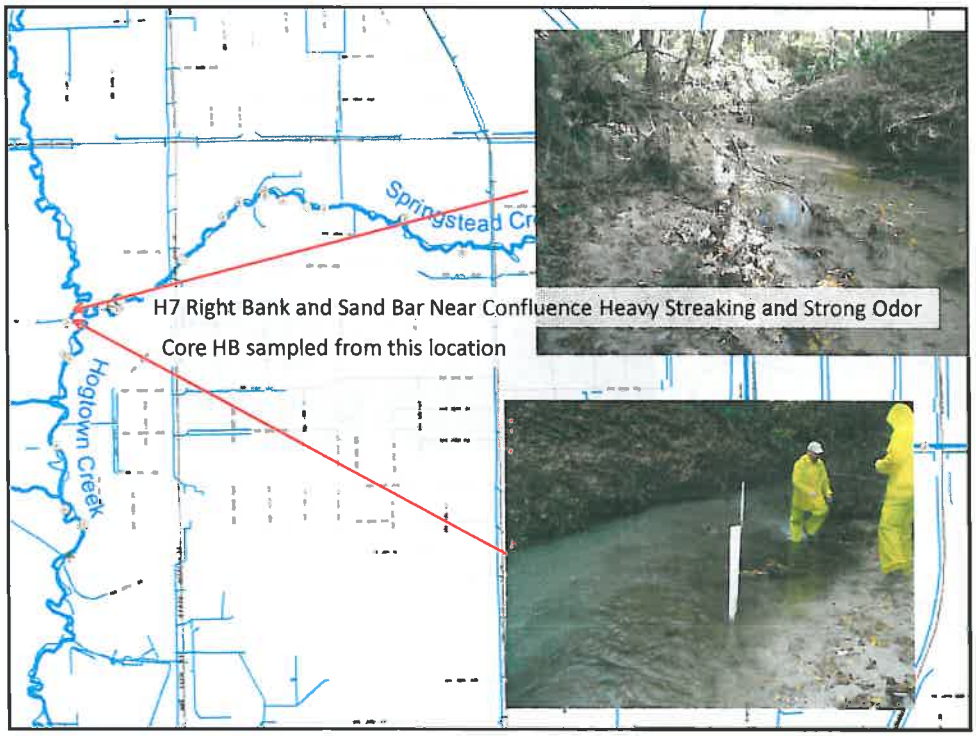

Transect HA


Sediment Profile from Transect HA
0"
18"
24"
Light tan to grey medium grain sa
with slight odor
Leaf pack with sand and
clay
Oily looking staining with
strong odor


Found some product buried in point bars
H1
Slight streaking and odor on left and right banks
H2
Slight streaking and odor on right bank
Hogtown Creek
H1 and H2

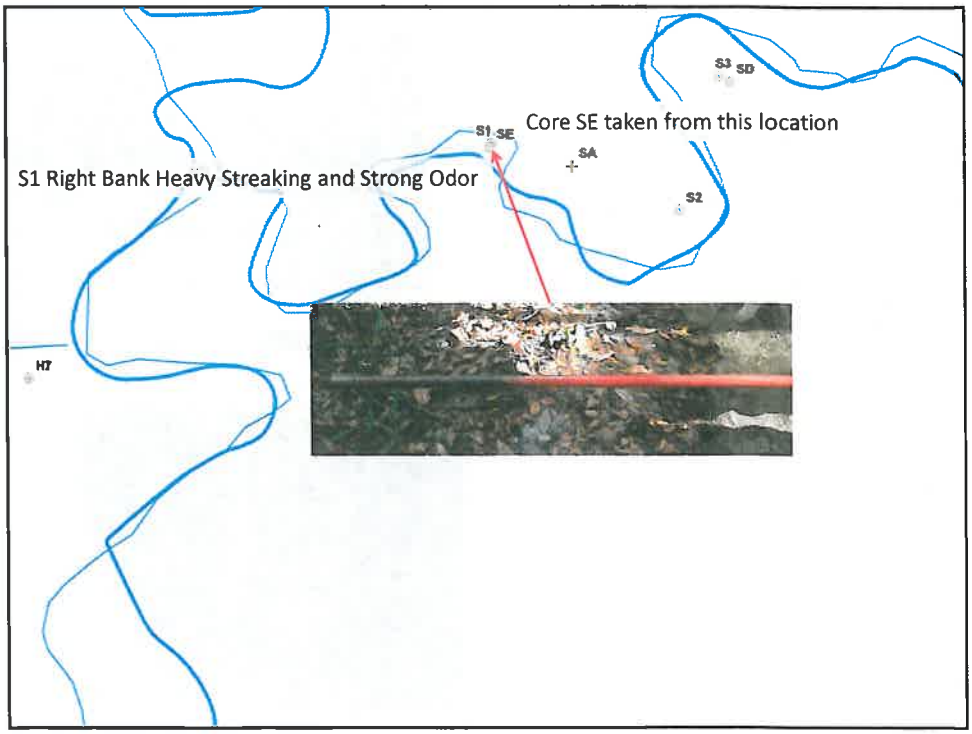

H4 Left Bank Heavy Streaking and Strong Odor
H3 Left Bank Very Slight Odor


H6 Left Bank Slight Streaking and Odor
H5 Left Bank Black to Brown
Sandy Clay Deposits – strong odor
Creek

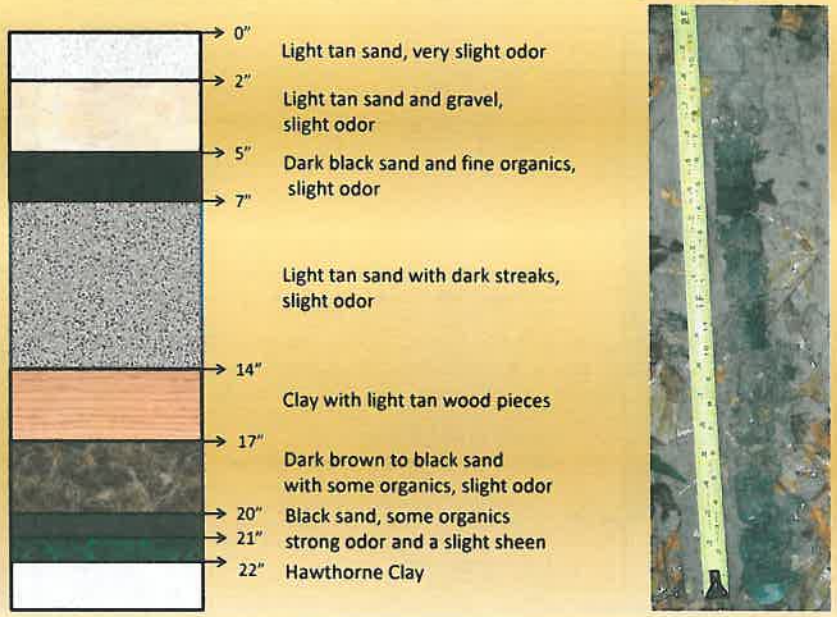

H7 Right Bank and Sand Bar Near Confluence Heavy Streaking and Strong Odor
Core HB sampled from this location
Hoglown Creek

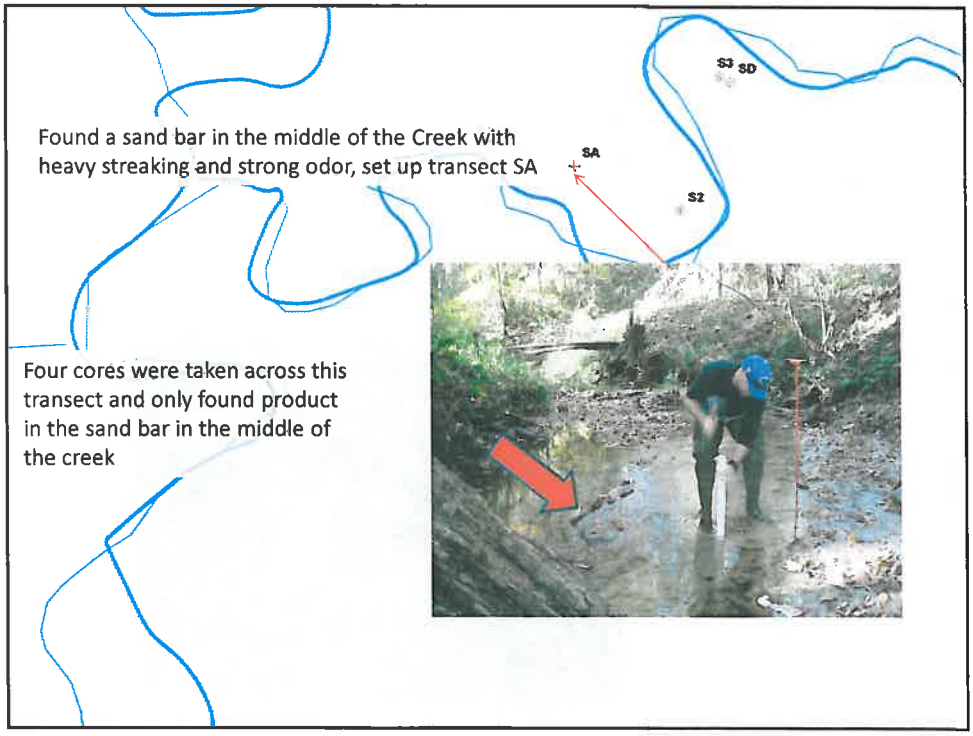
Sediment Profile from Core HB



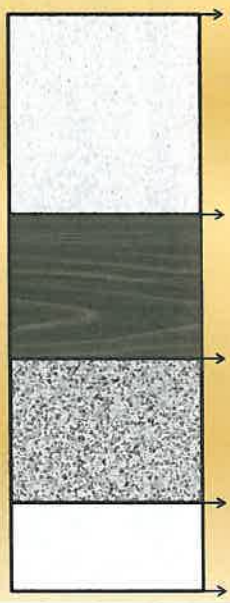


Sediment Profile from Core SE





Sediment Profile from Transect SA



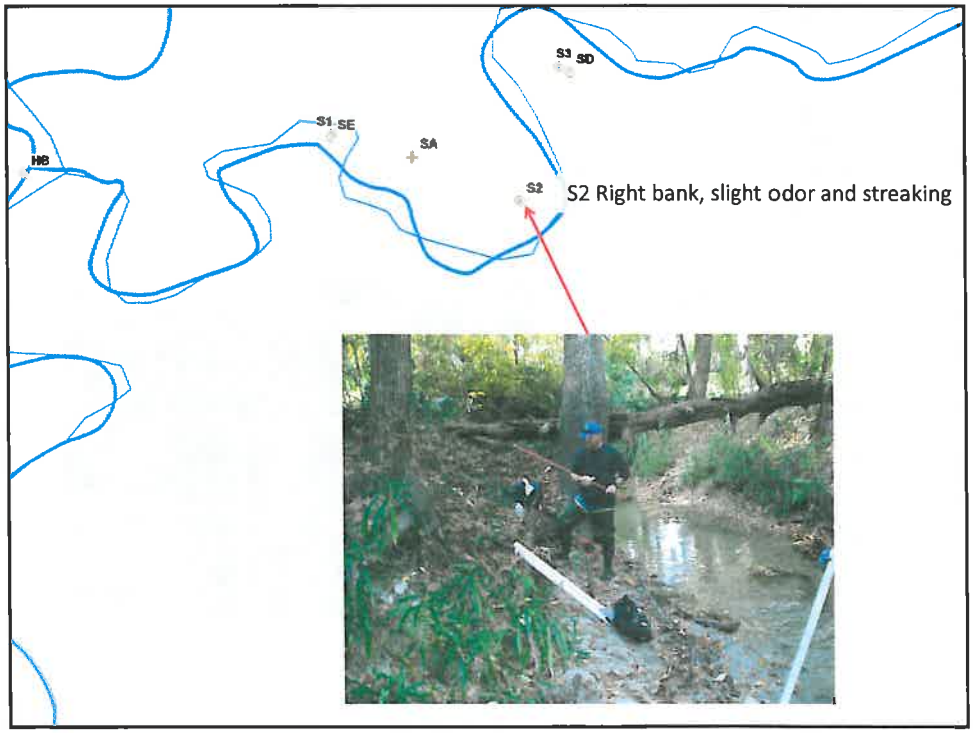
Light tan sand, slight naphthalene-like odor

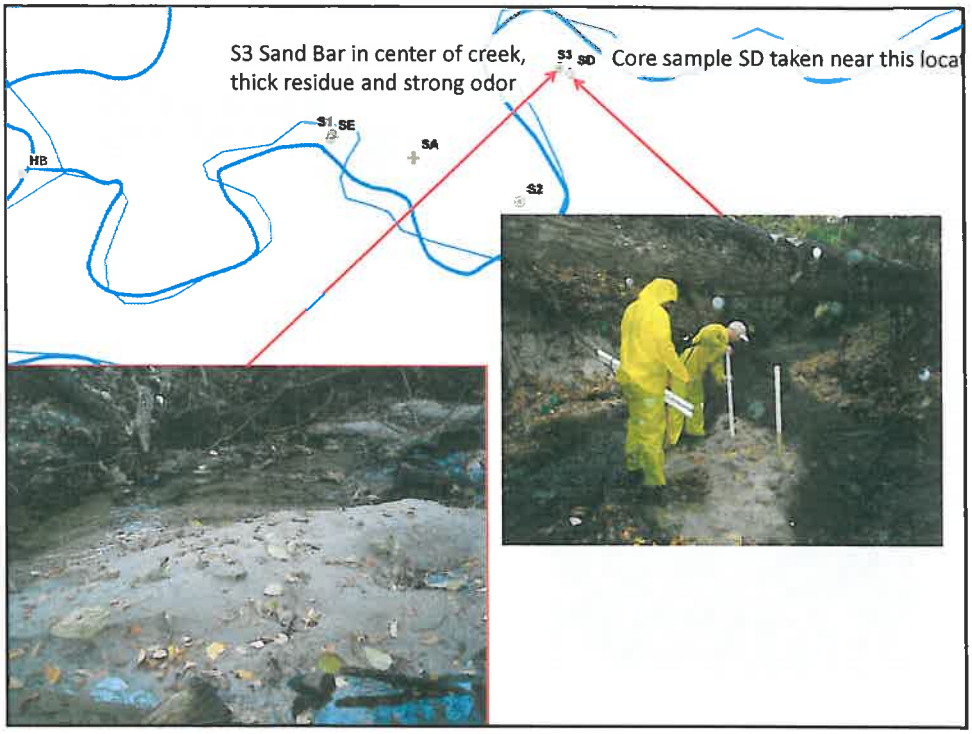
Dark brown to black mottling in clayey sand strong odor and an oily sheen

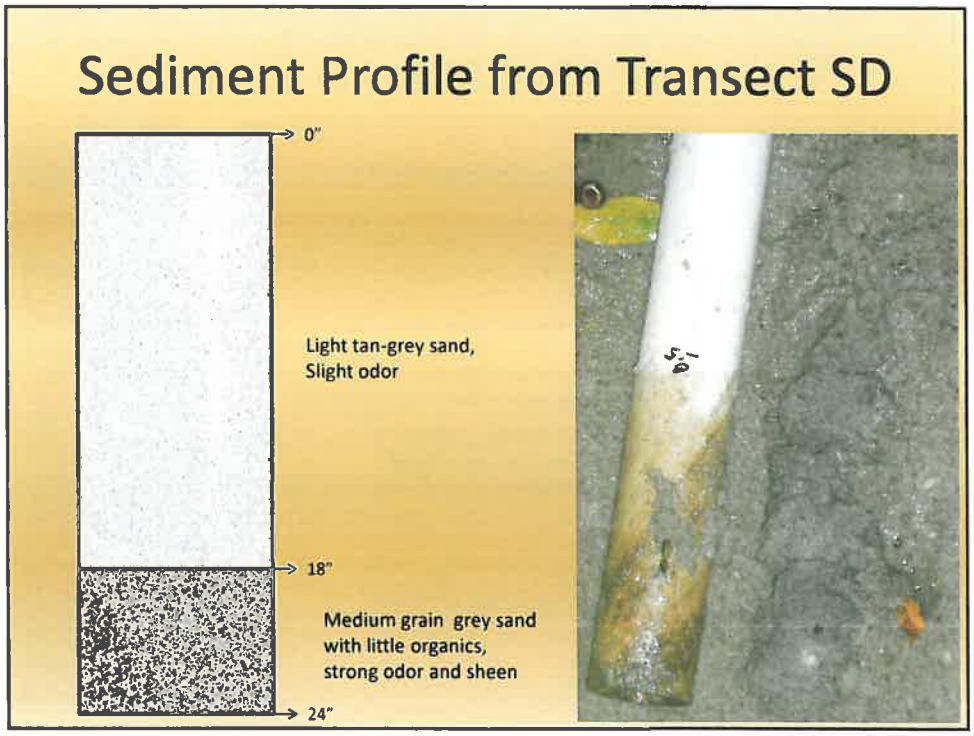
Medium grain grey sand with crushed shell and limestone

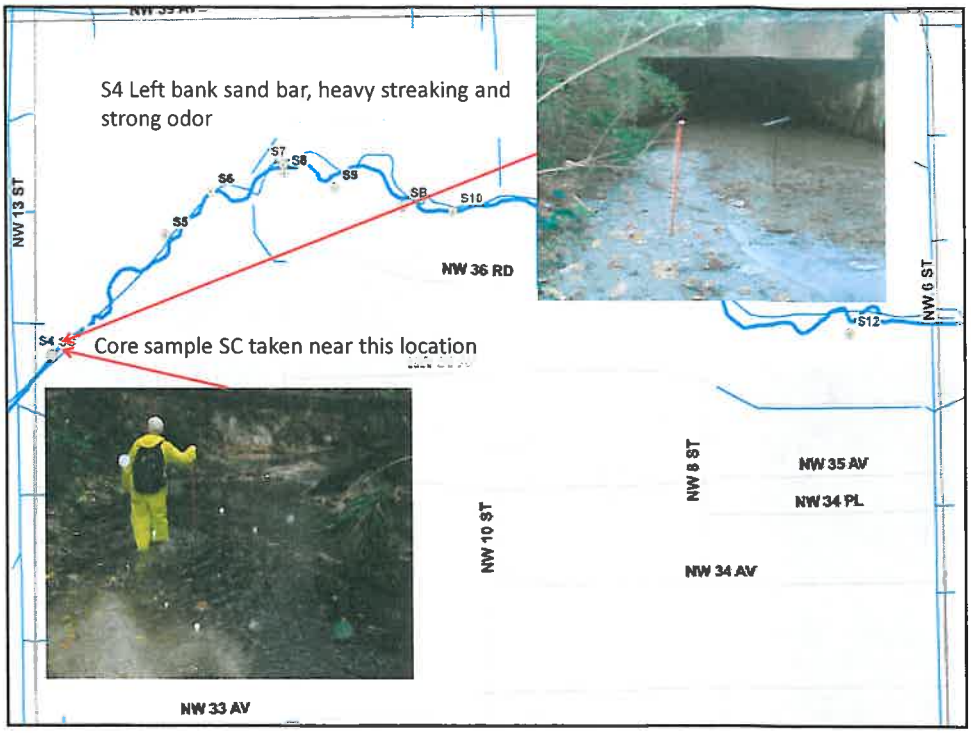
Lost the last 3-4"



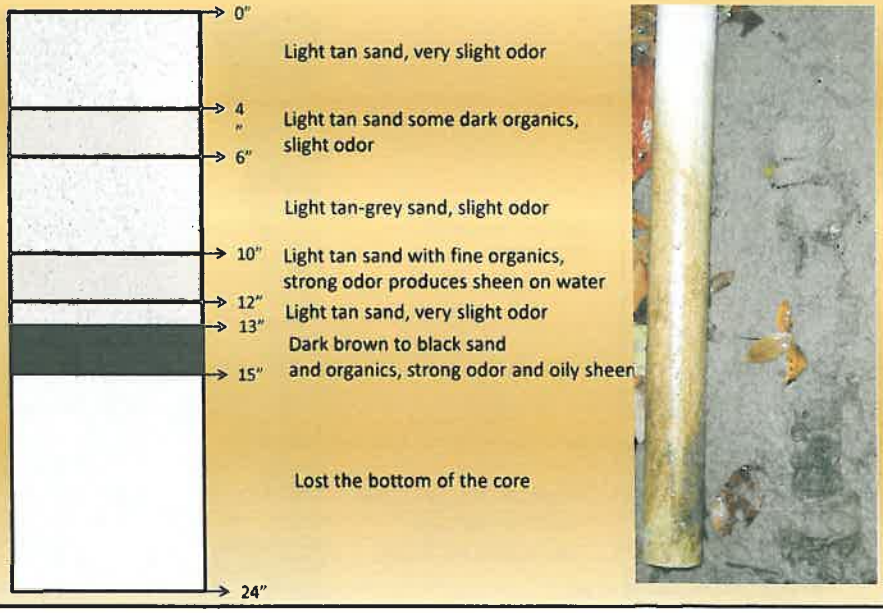


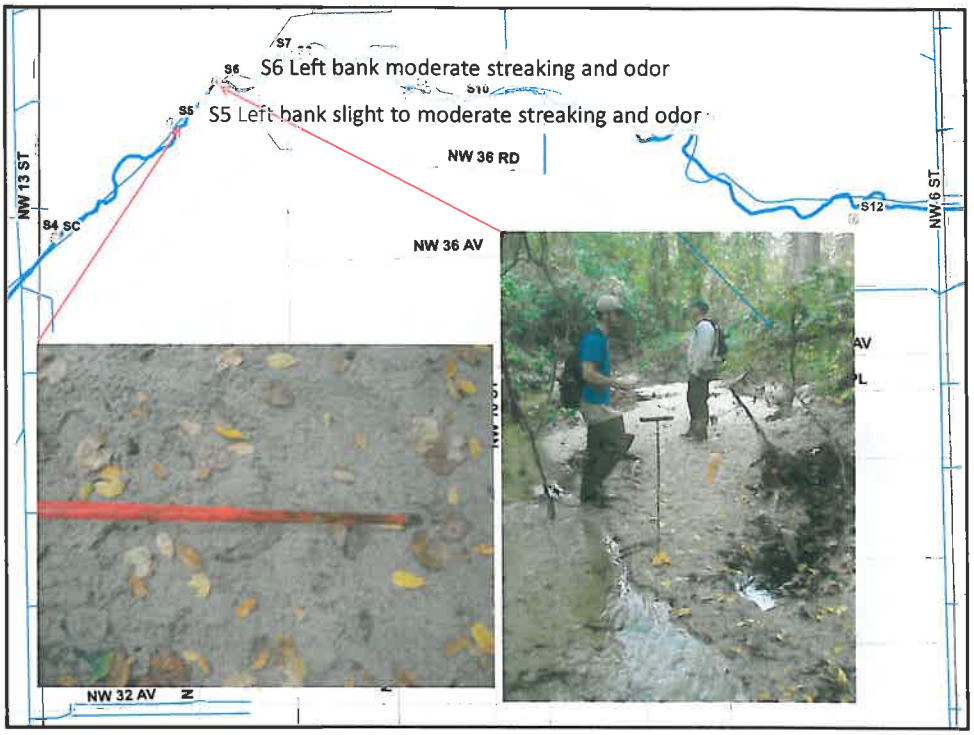

S3 Sand Bar in center of creek, thick residue and strong odor
S3 SD
Core sample SD taken near this loca
S1 SE
SA
HB
S2

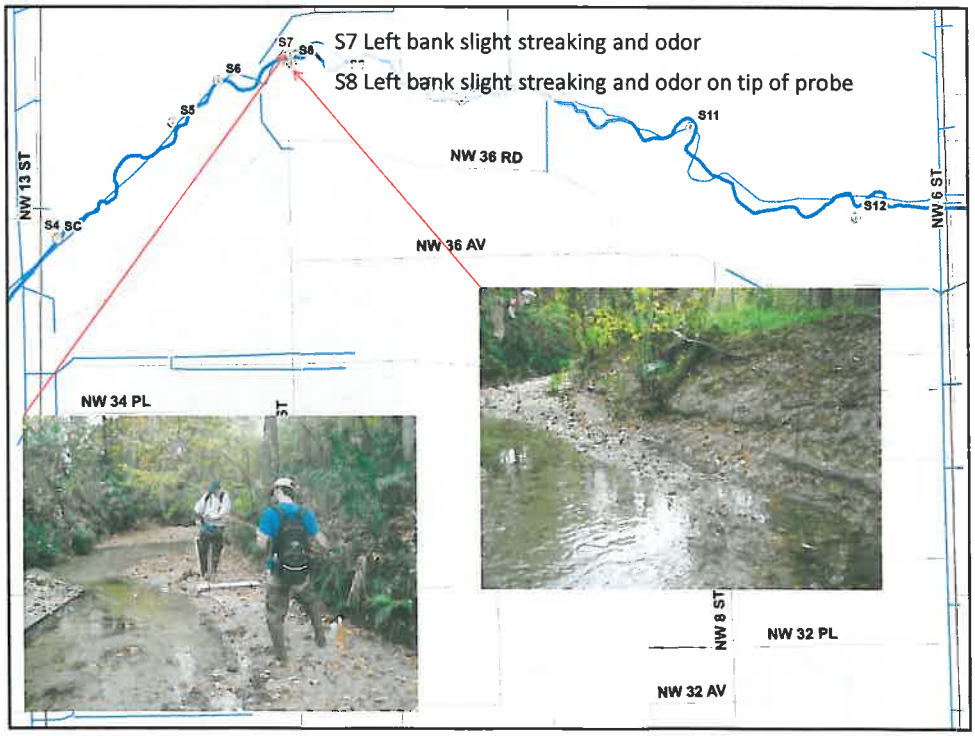

Sediment Profile from Transect SD
0"
Light tan-grey sand,
Slight odor
18"
Medium grain grey sand
with little organics,
strong odor and sheen
24"

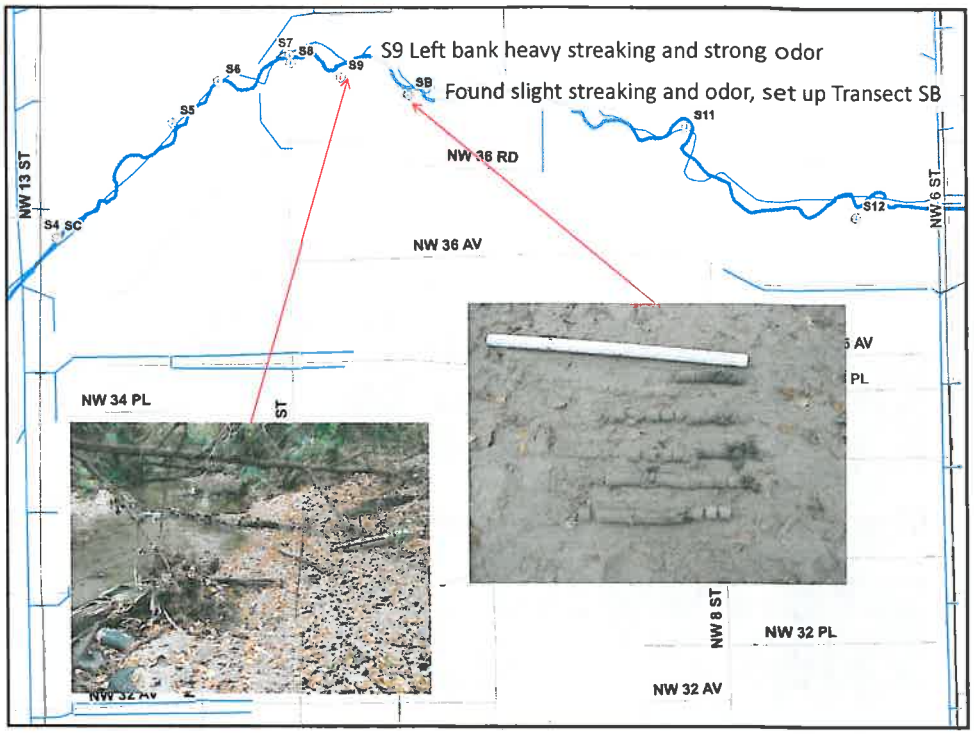


Sediment Profile from Core SC

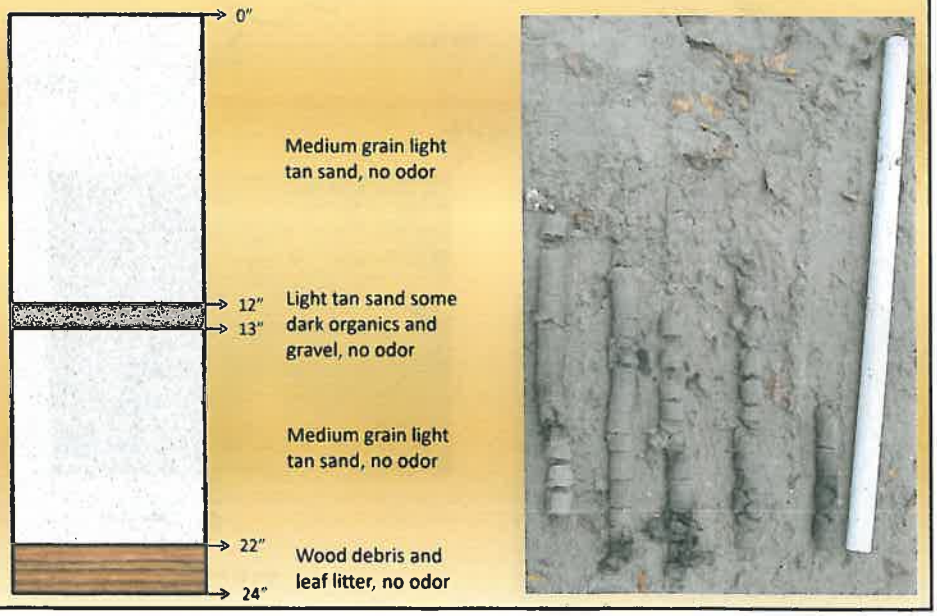


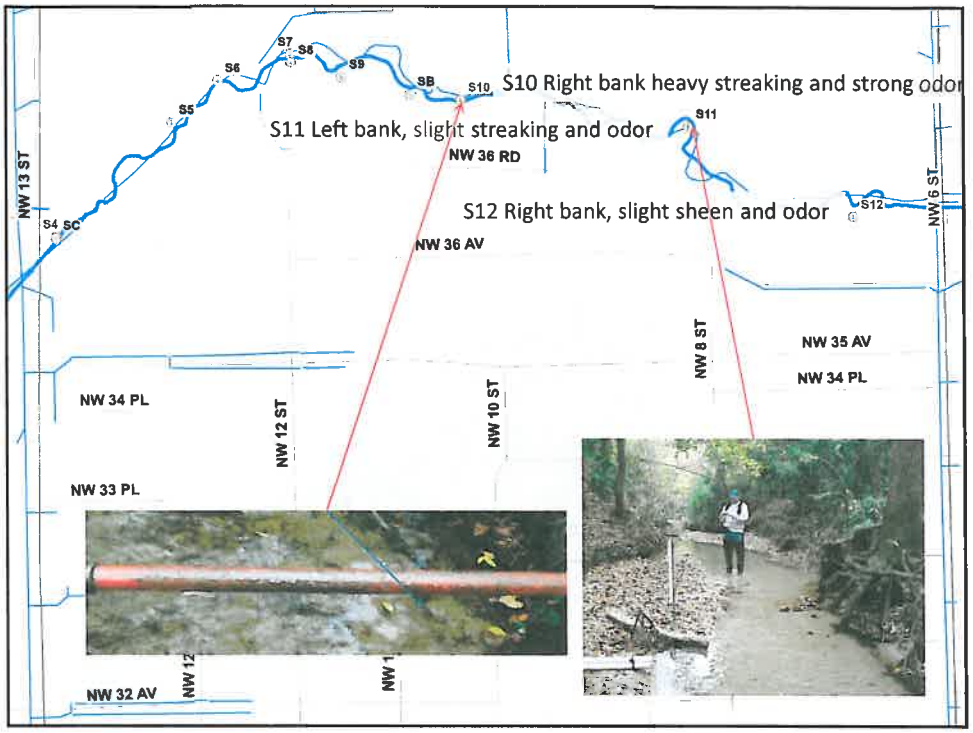

S6 Left bank moderate streaking and odor
S5 Left bank slight to moderate streaking and odor
NW 36 RD
NW 13 ST
NW 6 ST
S4 SC
S12
NW 36 AV
NW 32 AV

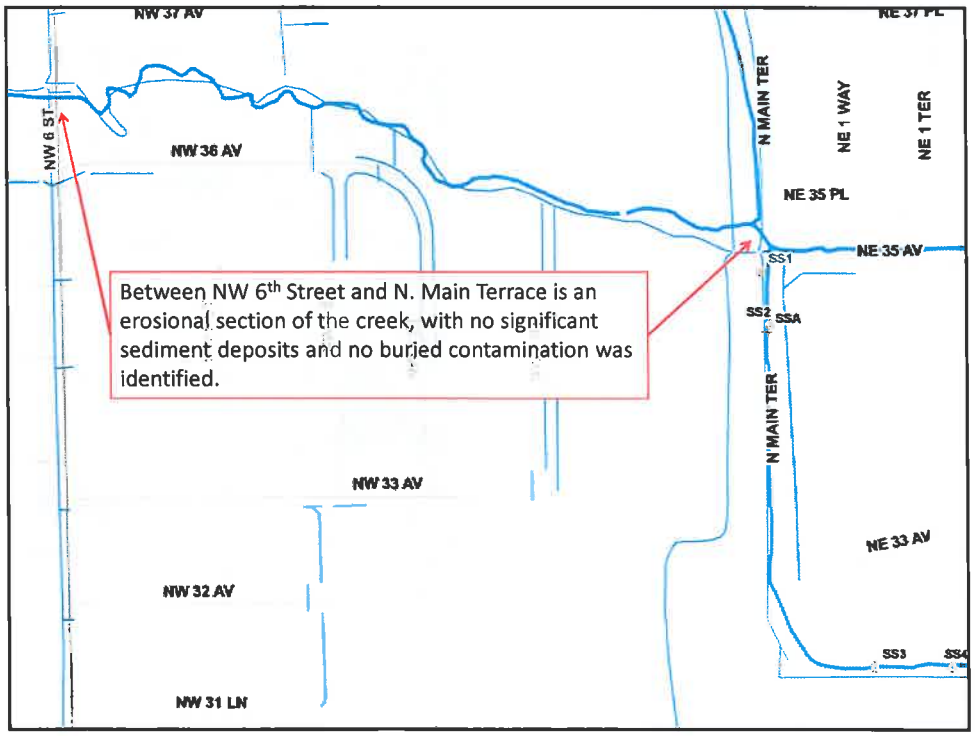

S7 Left bank slight streaking and odor
S8 Left bank slight streaking and odor on tip of probe
NW 36 RD
S11
NW 13 ST
NW 6 ST
S4 SC
S12
NW 36 AV
NW 34 PL
NW 8 ST
NW 32 PL
NW 32 AV

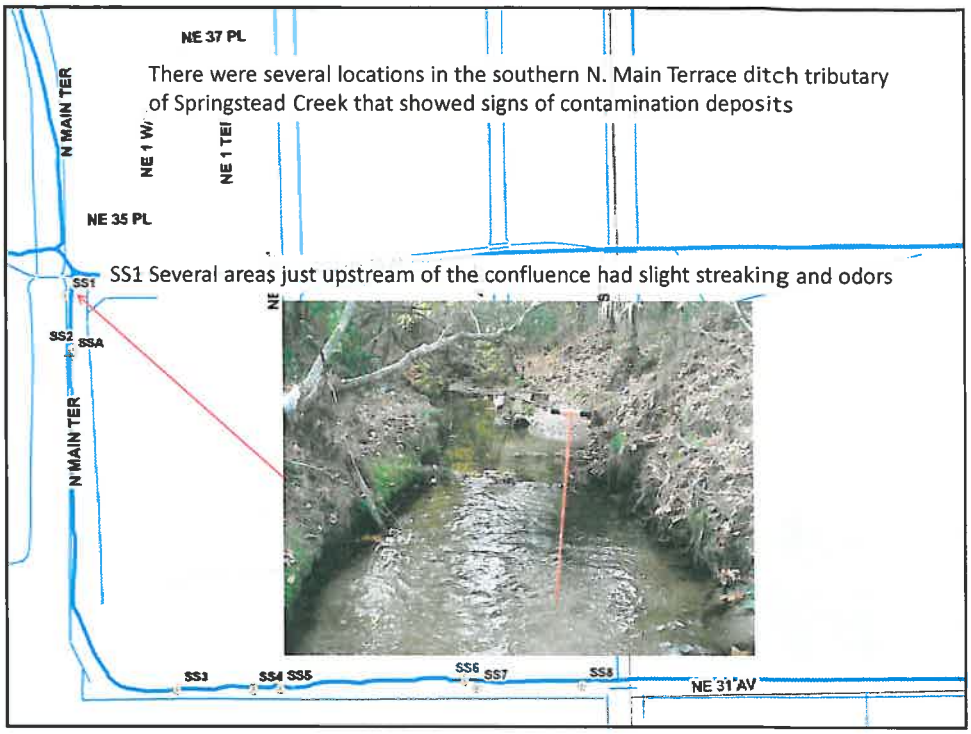


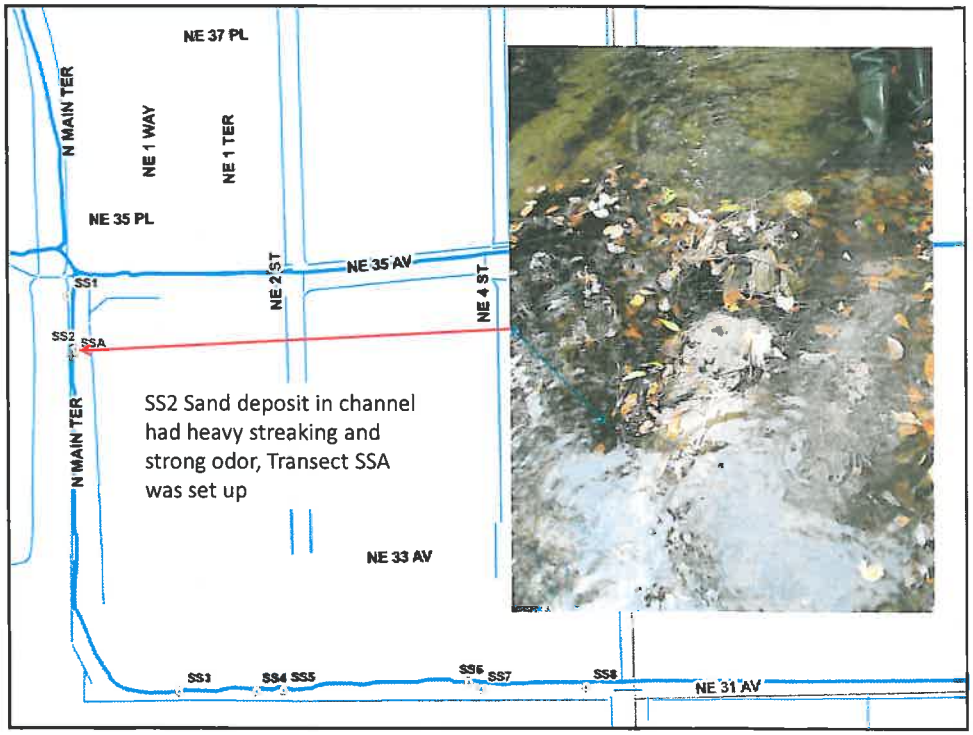
Sediment Profile from Transect SB




S10 Right bank heavy streaking and strong odor
S11 Left bank, slight streaking and odor
S12 Right bank, slight sheen and odor
NW 36 RD
NW 36 AV
NW 13 ST
NW 6 ST
NW 8 ST
NW 10 ST
NW 12 ST
NW 35 AV
NW 34 PL
NW 33 PL
NW 32 AV
S4 SC
S5
S6
S7
S8
S9
S10
S11
S12


Between NW 6th Street and N. Main Terrace is an erosional section of the creek, with no significant sediment deposits and no buried contamination was identified.
NW 37 AV
NW 6 ST
NW 36 AV
N MAIN TER
NE 1 WAY
NE 1 TER
NE 35 PL
NE 35 AV
SS1
SS2
SS4
SS3
NW 33 AV
NE 33 AV
NW 32 AV
NW 31 LN


There were several locations in the southern N. Main Terrace ditch tributary of Springstead Creek that showed signs of contamination deposits
NE 37 PL
N MAIN TER
NE 1 W
NE 1 TER
NE 35 PL
SS1 Several areas just upstream of the confluence had slight streaking and odors
SS1
SS2
SSA
N MAIN TER
SS3
SS4 SS5
SS6
SS7
SS8
NE 31 AV


NE 37 PL
N MAIN TER
NE 1 WAY
NE 1 TER
NE 35 PL
NE 35 AV
NE 2 ST
NE 4 ST
SS1
SS2
SSA
SS2 Sand deposit in channel had heavy streaking and strong odor, Transect SSA was set up
N MAIN TER
NE 33 AV
SS3
SS4 SS5
SS6
SS7
SS8
NE 31 AV

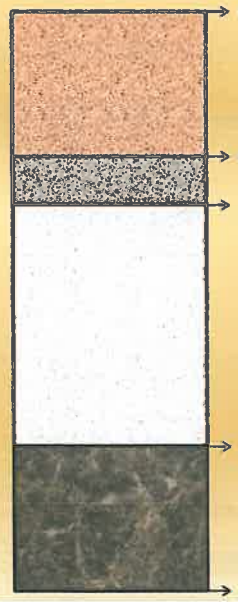
Five cores were extracted from transect SSA





Only one core had a sheen and odor

Sediment Profile from Transect SSA



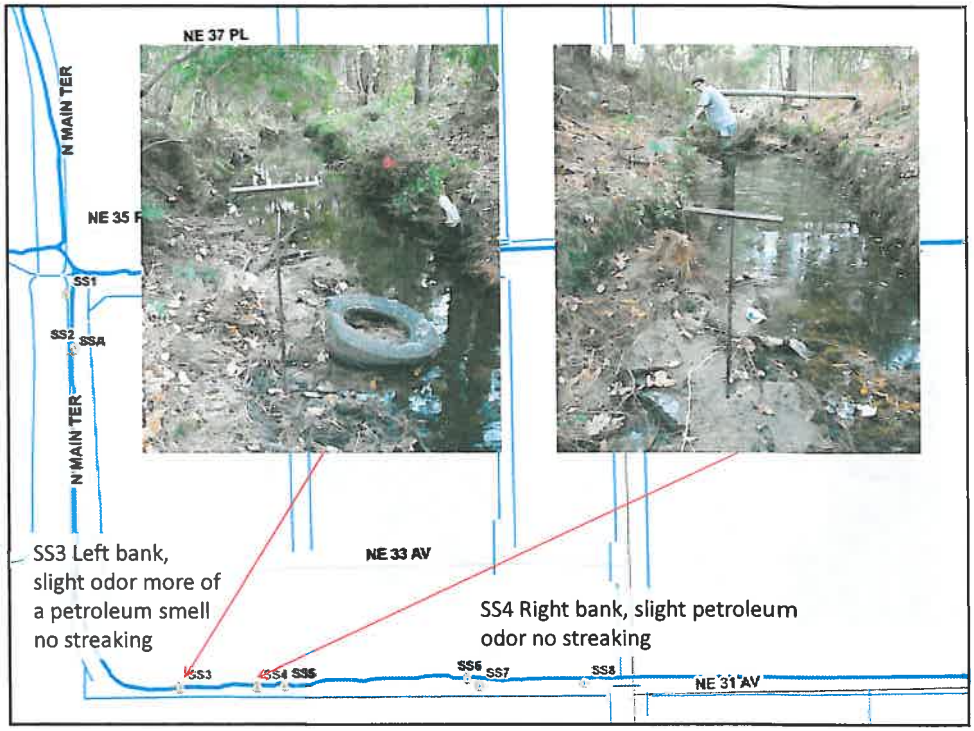
Tan sand with gravel and organics, slight odor

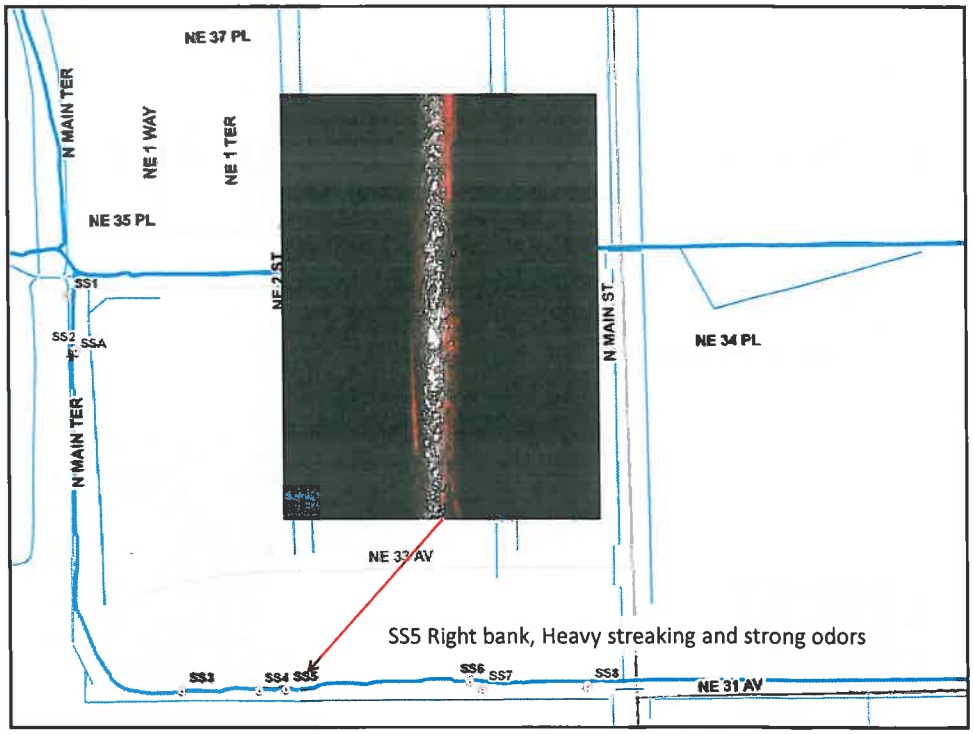
Clayey sand with a sheen and a strong odor

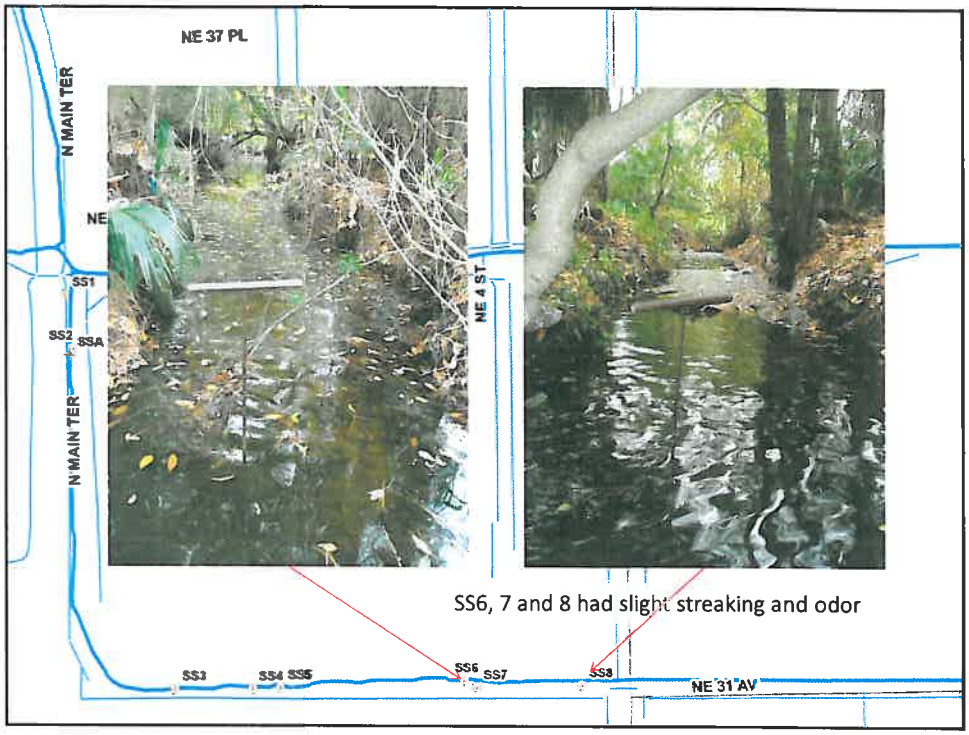
Tan to grey sand, slight odor

Dark brown to black sand slight sheen and odor




NE 37 PL
N MAIN TER
NE 35 P
SS1
SS2
SSA
N MAIN TER
NE 33 AV
SS3 Left bank, slight odor more of a petroleum smell no streaking
SS4 Right bank, slight petroleum odor no streaking
SS3
SS4
SS5
SS6
SS7
SS8
NE 31 AV


NE 37 PL
N MAIN TER
NE 1 WAY
NE 1 TER
NE 35 PL
SS1
SS2
SSA
N MAIN TER
NE 2 ST
N MAIN ST
NE 34 PL
NE 33 AV
SS5 Right bank, Heavy streaking and strong odors
SS3
SS4
SS5
SS6
SS7
SS8
NE 31 AV


NE 37 PL
N MAIN TER
NE
SS1
SS2
SSA
N MAIN TER
NE 4 ST
SS6, 7 and 8 had slight streaking and odor
SS3
SS4
SS5
SS6
SS7
SS8
NE 31 AV

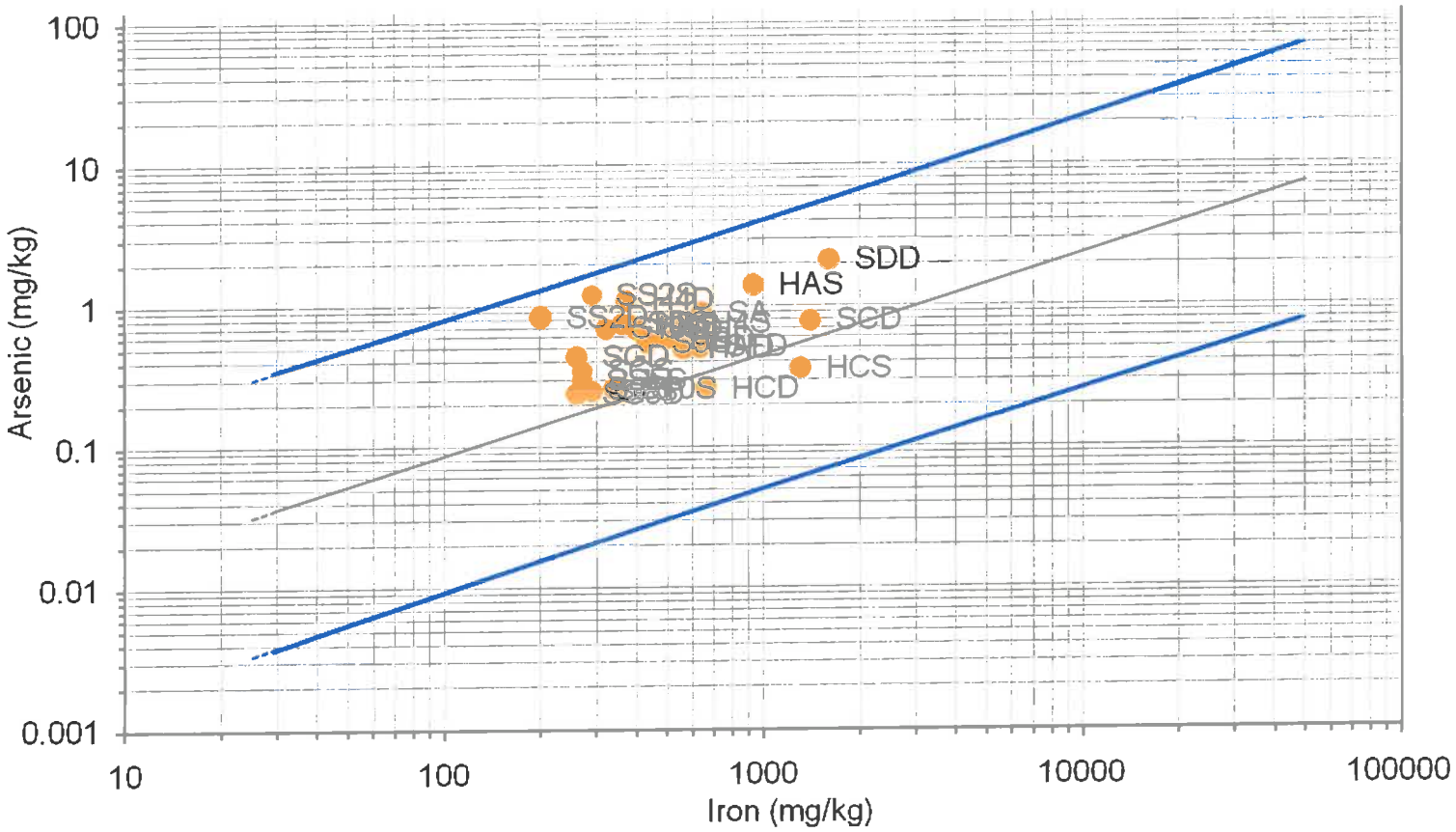
APPENDIX B

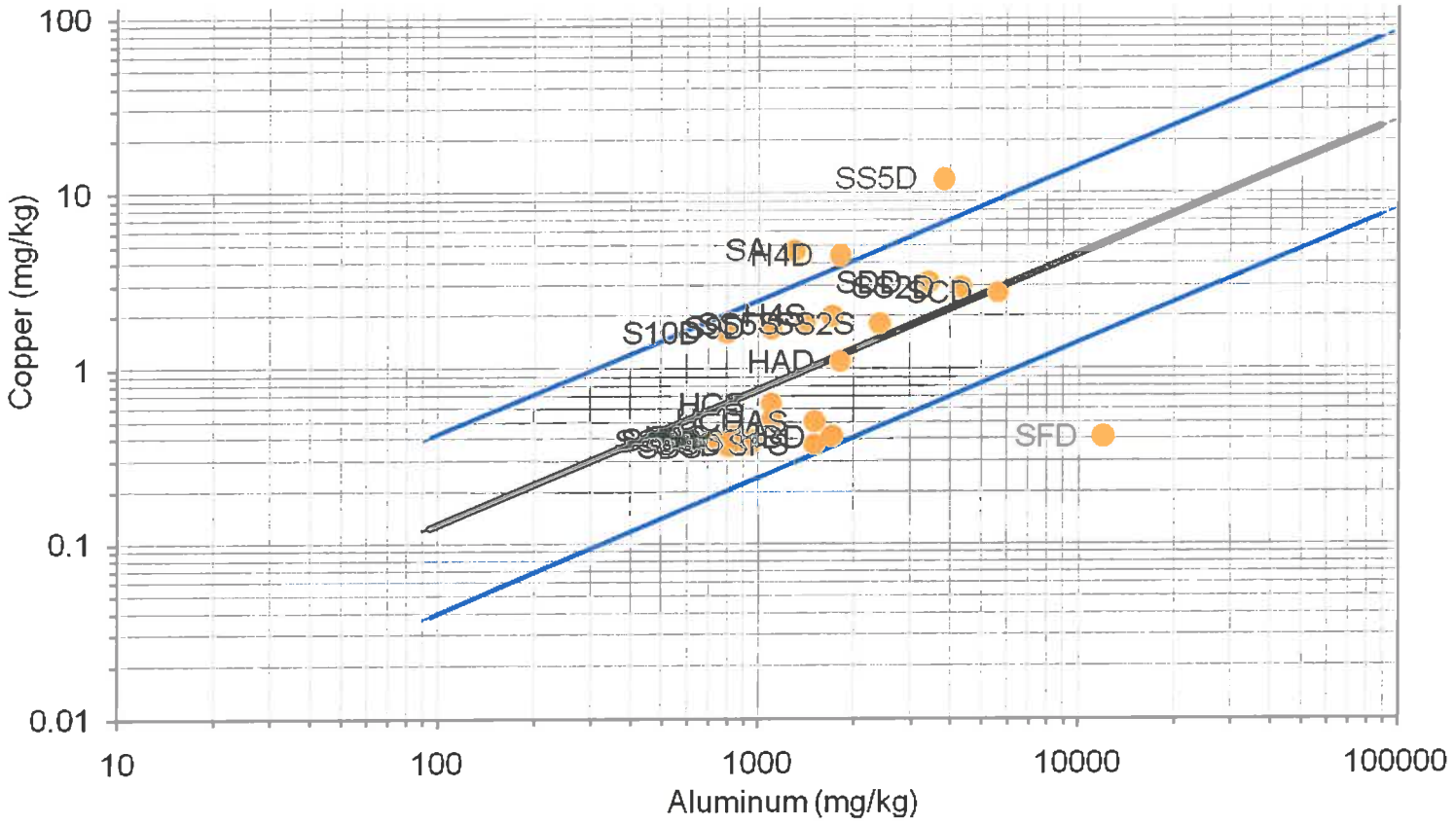
ASSESSMENT OF METAL ENRICHMENT PLOTS

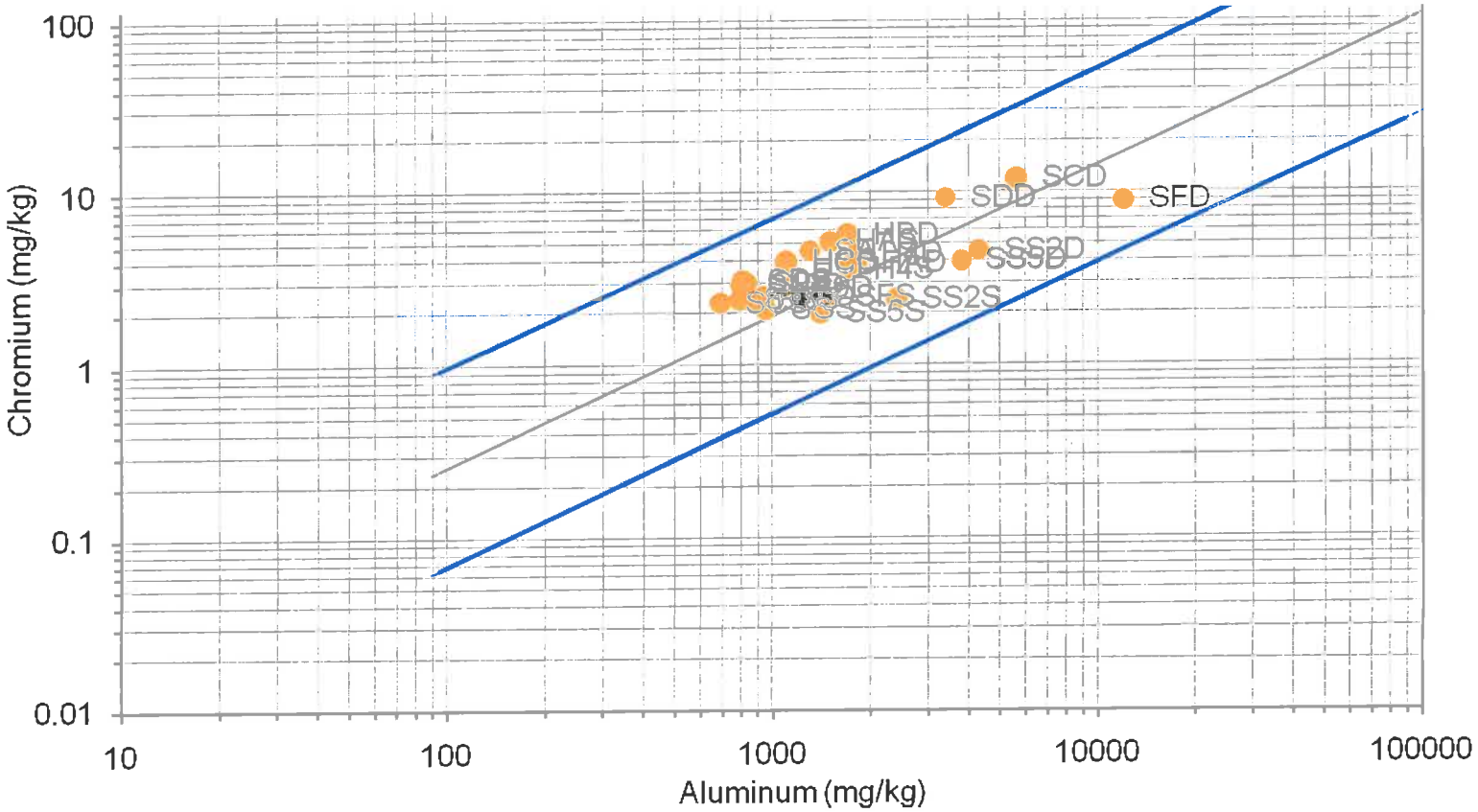
Cu, Cr and As in Springstead and Hogtown Creek Study Area Sediments

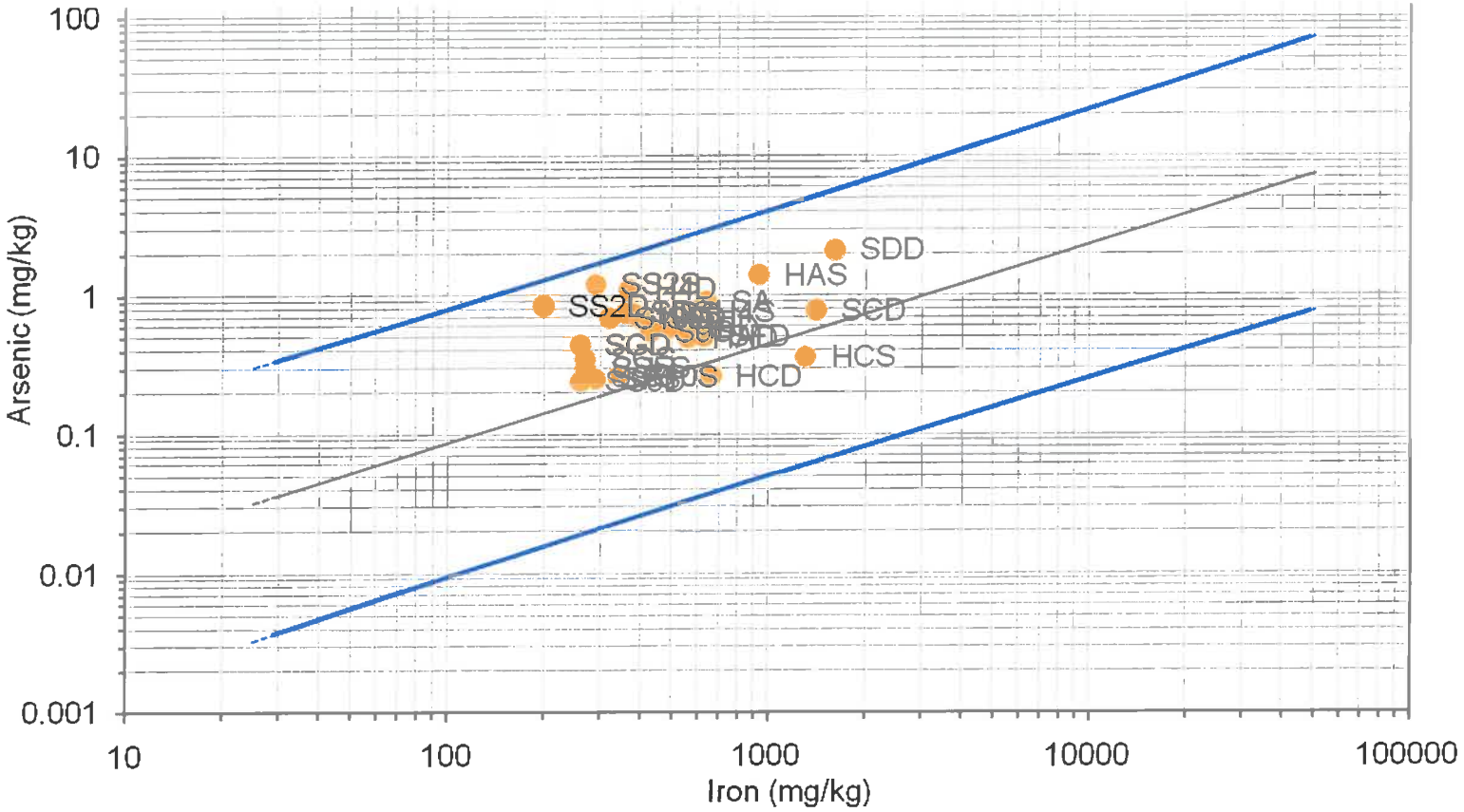
Using

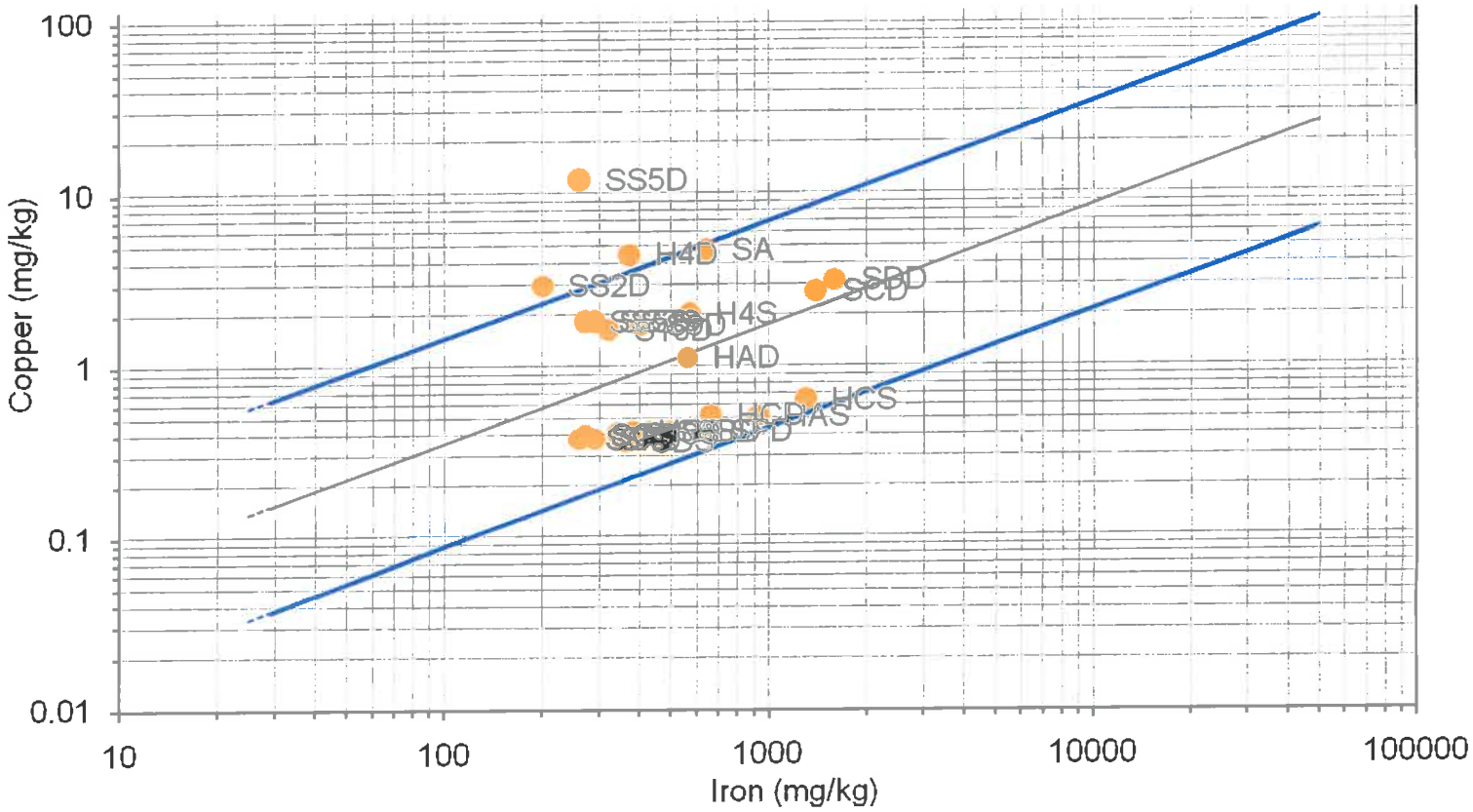
FDEP Interpretive Tool of Assessment of Metal Enrichment in Florida Freshwater Sediment
FDEP, May 2002

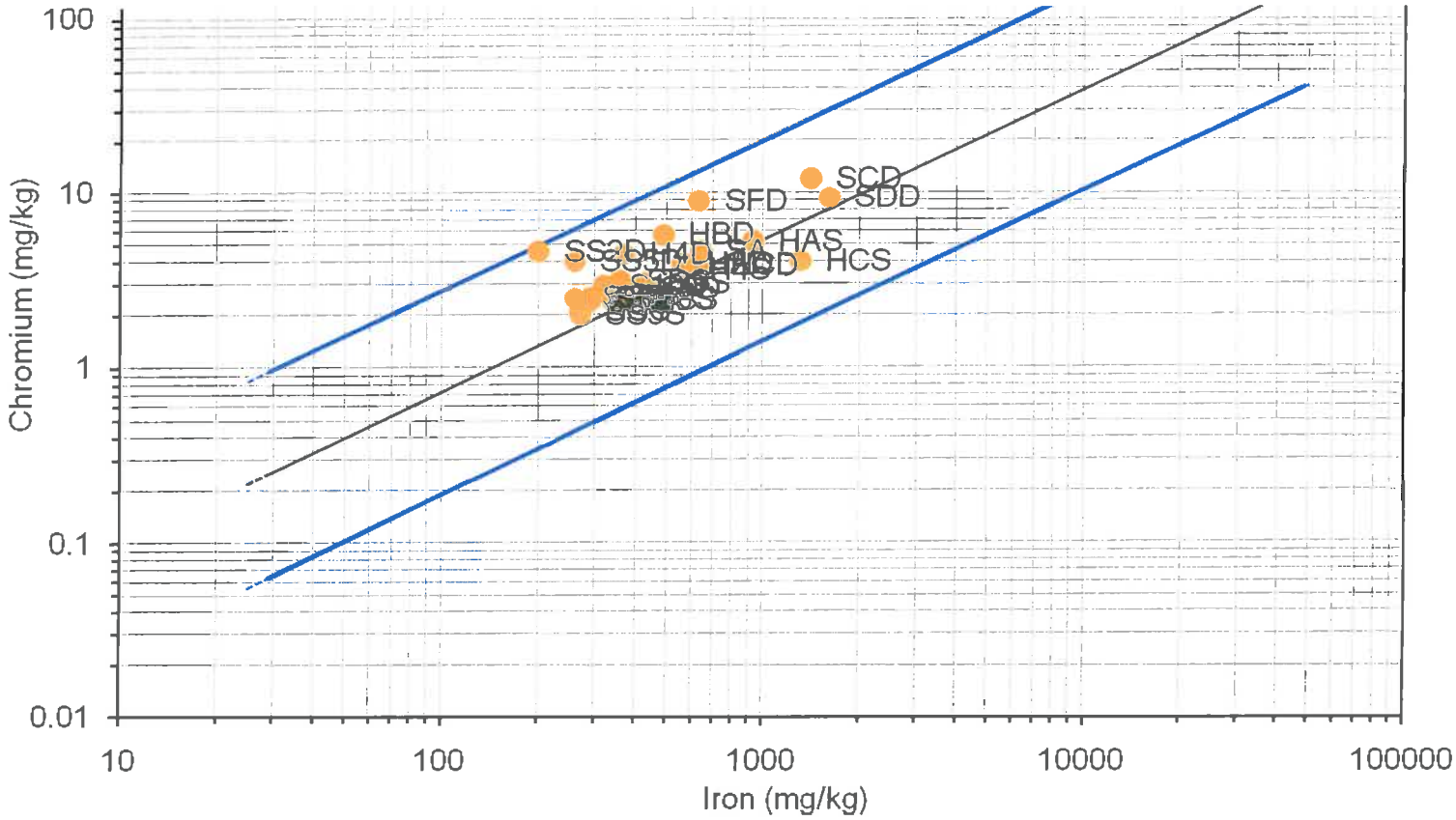

100
10
1
0.1
0.01
0.001
Arsenic (mg/kg)
10
100
1000
10000
100000
Iron (mg/kg)
SDD
HAS
SCD
HCS
HCD


100
10
1
0.1
0.01
Copper (mg/kg)
10
100
1000
10000
100000
Aluminum (mg/kg)
SS5D
SA4D
S10D
HAD
SFD


100
10
1
0.1
0.01
Chromium (mg/kg)
10
100
1000
10000
100000
Aluminum (mg/kg)
SCD
SDD
SFD
SS2D
SS5D
SS2S
SS5S


100
10
1
0.1
0.01
0.001
Arsenic (mg/kg)
10
100
1000
10000
100000
Iron (mg/kg)
SDD
HAS
SCD
HCS
HCD


100
10
1
0.1
0.01
Copper (mg/kg)
10
100
1000
10000
100000
Iron (mg/kg)
SS5D
H4D
SA
SS2D
SBD
SCD
H4S
HAD
HCS
HCD
AS


100
10
1
0.1
0.01
Chromium (mg/kg)
10
100
1000
10000
100000
Iron (mg/kg)
SCD
SDD
SFD
HBD
HAS
HCS

John Mousa

From: John Mousa
Sent: Wednesday, April 14, 2010 11:27 AM
To: 'Anthony_Dennis@doh.state.fl.us'
Subject: FW: Information on Additional Sampling in Springstead Creek
Attachments: COC 10-0079.pdf; Sediment sample locations.jpg; Laboratory Dioxin Sediment Samples 11-2009.pdf; J24810-1 Fl_L2 Final Report Springstead Sed 2009-11-19.pdf

Anthony, here is the data.

From: John Mousa
Sent: Thursday, February 18, 2010 1:18 PM
To: 'lstuchal@ufl.edu'
Subject: FW: Information on Additional Sampling in Springstead Creek

From: John Mousa
Sent: Wednesday, February 10, 2010 4:38 PM
To: 'Kelsey.Helton@dep.state.fl.us'
Cc: Robin Hallbourg; Jim Myles
Subject: Information on Additional Sampling in Springstead Creek

Kelsey,

At the request of two citizens who own property adjacent to Springstead Creek between the Koppers outfall and NW 6th St in Gainesville FL, ACEPD collected two samples of creek sediment and had them analyzed for a list of metal, organics (including dioxin). The samples were collected on November 19, 2009. The citizens requested these due the fact that ACEPD's earlier study did not include samples from this creek area since we did not observe tarry residue in this stretch. Attached please find the raw lab analytical results for the sediment testing along with a map and chain of custody form for the samples.

ACEPD has not finalized our report to the citizens of the data but will need to report this data soon them. We are requesting that this data be reviewed as expeditiously as possible by FDEP in light of the ongoing FDEP risk evaluation of the earlier creek data in ACEPD's April 2009 report to determine if there is any human health risks.

The samples from this sampling were taken from a depth of 0-6" and were collected from areas of point bar deposits where sandy materials had accumulated; these areas were above the water level of the creek. ACEPD noted that no odor or visual evidence of contamination (tarry material) was observed.

The laboratory testing was performed by Test America with the exception of the dioxin analysis that was performed by the USEPA Athens Laboratory. The laboratory data indicate that there were some low level qualified detects of the PAHs; copper, chromium and arsenic were very low or not detected. In addition there was dioxin TEQ detected.

Please let me know if you have any questions.

Thanks

SH1
SH1
NW 4TH ST
NW 2ND ST
STATE ROAD 23
RAILWAY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 10-0079
Project: 10-0079, Cabot Carbon/Koppers - Reported by Charlie Appleby

January 12, 2010

4SESD-MTSB

MEMORANDUM

SUBJECT: FINAL Analytical Report
Project: 10-0079, Cabot Carbon/Koppers
Superfund Remedial

FROM: Charlie Appleby
Quality Assurance Section Chemist

THRU: Marilyn Maycock, Chief
Quality Assurance Section

TO: Scott Miller

Attached are the final results for the analytical groups listed below. These analyses were performed in accordance with the associated contract Statement Of Work (SOW). In general, project data quality objectives have not been used to evaluate these data prior to release by the Quality Assurance Section. For a listing of specific data qualifiers and explanations, please refer to the Data Qualifier Definitions included in this report.

Analyses Included in this report:	Method Used:
Dioxin (DIO)	
Dioxin	Contract SOW

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Report Narrative for Work Order C094801, Project: 10-0079
Site Name: Cabot Carbon/Koppers, Gainesville, FL
ELEMENT Sample Nos. C094801-01 through C094801-02

Dioxin Analysis: SGS Environmental Services, Wilmington, NC

The ESAT Work Team reviewed data for the project cited above consisting of two soil samples analyzed per CLP statement of work DLM02.0 for dioxins and furans. The samples were collected on 11/19/09, and received by the laboratory between on 11/20/09. The final data package was received by the USEPA Quality Assurance Section, Region 4 SESD/MTSB on 12/16/09. A Stage 4 validation consisting of a manual review (S4VM) was performed on the organic samples submitted for this case. The data package presents acceptable technical performance with qualifications.

Certain results among these data are reported as not detected at an elevated detection limit. In general, this may occur when method blank contamination is evident, or when one or more of the qualitative identification criteria have not been met. In the event of method blank contamination, detection limits may be raised as much as five times the level of contamination in order to discount false positive results. If qualitative identification criteria are not met for an analyte, an estimated maximum possible concentration (EMPC) value is reported, and is qualified as non-detect ("U" flag).

The method reporting limit (MRL), as defined elsewhere in this document, is used in dioxin/furan analyses to report the analyte concentration which corresponds to the lowest quantitative point on the calibration curve. Any positive results less than this value are qualified as estimates ("J" flag). The value reported for a 2,3,7,8-substituted PCDD/PCDF analyte that is not detected is either an estimated detection limit (EDL), which is calculated from the instrument signal vs. system noise, or an EMPC value as described above, qualified with a "U" flag.

Toxic equivalent quantities (TEQ) have been reported for these data which have been derived form the most recently available set of toxic equivalent factors (TEF). For mammalian TEQs, these factors were published in 2005 by the World Health Organization (WHO). In the case of the TEQs for birds and fish, the factors were published in 1998, also by WHO.

Toxic equivalent values for non-detect results are determined using the EDL or the EMPC as a proxy value. Thus a sample with non-detect results for all PCDD/PCDF congeners will still have a positive TEQ value. The TEQ is qualified as estimated ("J") when the sum of the contributions from the various PCDD/PCDF analytes that are themselves reported as either estimated ("J") or non-detect ("U") exceeds 10% of the TEQ total. If no positive results are present for any of the 2,3,7,8 congeners, the TEQ is reported as not detected with an estimated detection limit ("UJ").

The laboratory scored within limits for all congeners in the PES spike and blank.

High recovery for the labeled OCDD internal standard was observed in sample C0904801-01 and the results for the OCDD and OCDF congeners were "J" qualified in this sample.

The result for the OCDD congener exceeded the calibration range and was "J" qualified in sample C094801-02. The SOW does not require dilutions for this congener.

All data qualification factors are explained by the Region 4 - specific qualifier definitions which are included elsewhere in this report. Further details are provided in the complete data review report, which is on file in the Region 4 SESD Records Center.

cc: Nardina Turner

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SAMPLES INCLUDED IN THIS REPORT

Project: 10-0079, Cabot Carbon/Koppers

Sample ID	Laboratory ID	Matrix	Date Collected	Date Received
SH1	C094801-01	Sediment	11/19/09 12:45	11/20/09 11:33
SI1	C094801-02	Sediment	11/19/09 13:10	11/20/09 11:33

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DATA QUALIFIER DEFINITIONS

U	The analyte was not detected at or above the reporting limit.
CLP01	Concentration reported is less than the lowest standard on calibration curve
CLP02	Concentration reported is greater than the highest standard on calibration curve
CLP18	Estimated Maximum Possible Concentration (EMPC) Reported
D-5	Estimated quantitation for one or more individual constituents comprising >10% of the total.
J	The identification of the analyte is acceptable; the reported value is an estimate.
Q-3	Instrument not calibrated for all constituents of the total concentration result.
QI-1	Internal standard was outside of method control limits.

ACRONYMS AND ABBREVIATIONS

CAS — Chemical Abstracts Service

Note: Analytes with no known CAS identifiers have been assigned codes beginning with "E", the EPA ID as assigned by the EPA Substance Registry System (www.epa.gov/srs), or beginning with "R4-", a unique identifier assigned by the EPA Region 4 laboratory.

MDL — Method Detection Limit - The minimum concentration of a substance (an analyte) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero.

MRL — Minimum Reporting Limit - Analyte concentration that corresponds to the lowest demonstrated level of acceptable quantitation. The MRL is sample-specific and accounts for preparation weights and volumes, dilutions, and moisture content of soil/sediments.

TIC — Tentatively Identified Compound - An analyte identified based on a match with the instrument software's mass spectral library. A calibration standard has not been analyzed to confirm the compound's identification or the estimated concentration reported.

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Dioxin

Project: 10-0079, Cabot Carbon/Koppers

Sample ID: SH1 **Lab ID:** C094801-01
Station ID: SC001 **Matrix:** Sediment
Date Collected: 11/19/09 12:45

CAS Number	Analyte	Results	Qualifiers	Units	MRL	Prepared	Analyzed	Method
E1644012	% Moisture	18		%		11/24/09	11/30/09	CL DLM02.0
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzodioxin	1700		ng/kg dry	41	11/24/09	12/06/09	CL DLM02.0
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	280		ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	19		ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzodioxin	4.9		ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	12		ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzodioxin	47		ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	3.5	J, CLP01	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzodioxin	11		ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	2.4	J, CLP01	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
40321-76-4	1,2,3,7,8-Pentachlorodibenzodioxin	1.4	J, CLP01	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	0.36	U	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	7.9		ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	1.2	J, CLP01	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
1746-01-6	2,3,7,8-Tetrachlorodibenzodioxin	0.24	U, CLP18	ng/kg dry	0.82	11/24/09	11/30/09	CL DLM02.0
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	0.42	U	ng/kg dry	0.82	11/24/09	11/30/09	CL DLM02.0
37871-00-4	Heptachlorodibenzodioxin (Total)	6000	J, Q-3	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
38998-75-3	Heptachlorodibenzofuran (Total)	1400	J, Q-3	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
34465-46-8	Hexachlorodibenzodioxin (Total)	260	J, Q-3	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
55684-94-1	Hexachlorodibenzofuran (Total)	350	J, Q-3	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
3268-87-9	Octachlorodibenzodioxin	32000	J, QI-1	ng/kg dry	82	11/24/09	12/06/09	CL DLM02.0
39001-02-0	Octachlorodibenzofuran	780	J, QI-1	ng/kg dry	8.2	11/24/09	11/30/09	CL DLM02.0
36088-22-9	Pentachlorodibenzodioxin (Total)	9.1	J, Q-3	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
30402-15-4	Pentachlorodibenzofuran (Total)	16	J, Q-3	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
R4-0428	TEQ (Avian Toxic. Equiv. Value, WHO TEQ-98)	16	J, D-5	ng/kg dry	16	11/24/09	11/30/09	CL DLM02.0
R4-0429	TEQ (Fish Toxic. Equiv. Value, WHO TEQ-98)	16	J, D-5	ng/kg dry	16	11/24/09	11/30/09	CL DLM02.0
R4-0430	TEQ (Mammalian Toxic. Equiv. Value, WHO TEQ-2005)	41	J, D-5	ng/kg dry	41	11/24/09	11/30/09	CL DLM02.0
41903-57-5	Tetrachlorodibenzodioxin (Total)	0.39	J, Q-3	ng/kg dry	0.82	11/24/09	11/30/09	CL DLM02.0

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Project: 10-0079, Cabot Carbon/Koppers - Reported by Charlie Appleby

Dioxin

Project: 10-0079, Cabot Carbon/Koppers

Sample ID: SH1
Station ID: SC001

Lab ID: C094801-01
Matrix: Sediment

Date Collected: 11/19/09 12:45

CAS Number	Analyte	Results	Qualifiers	Units	MRL	Prepared	Analyzed	Method
30402-14-3	Tetrachlorodibenzofuran (Total)	3.5	J, Q-3	ng/kg dry	0.82	11/24/09	11/30/09	CL DLM02.0

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Dioxin

Project: 10-0079, Cabot Carbon/Koppers

Sample ID: SI1
Station ID: SC002
Lab ID: C094801-02
Matrix: Sediment

Date Collected: 11/19/09 13:10

CAS Number	Analyte	Results	Qualifiers	Units	MRL	Prepared	Analyzed	Method
[illegible]1644012	% Moisture	19		%		11/24/09	11/30/09	CL DLM02.0
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzodioxin	520		ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
[illegible]7562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	62		ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	4.2		ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
[illegible]9227-28-6	1,2,3,4,7,8-Hexachlorodibenzodioxin	3.3	J, CLP01	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	1.7	J, CLP01	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
[illegible]7653-85-7	1,2,3,6,7,8-Hexachlorodibenzodioxin	11		ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	1.1	J, CLP01	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
[illegible]9408-74-3	1,2,3,7,8,9-Hexachlorodibenzodioxin	5.4		ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	0.86	U	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
[illegible]0321-76-4	1,2,3,7,8-Pentachlorodibenzodioxin	0.79	J, CLP01	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	0.30	U	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
[illegible]0851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	2.3	J, CLP01	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	0.58	J, CLP01	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
[illegible]746-01-6	2,3,7,8-Tetrachlorodibenzodioxin	0.18	U, CLP18	ng/kg dry	0.82	11/24/09	11/30/09	CL DLM02.0
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	0.41	U	ng/kg dry	0.82	11/24/09	11/30/09	CL DLM02.0
[illegible]7871-00-4	Heptachlorodibenzodioxin (Total)	1800	J, Q-3	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
38998-75-3	Heptachlorodibenzofuran (Total)	270	J, Q-3	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
[illegible]4465-46-8	Hexachlorodibenzodioxin (Total)	130	J, Q-3	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
55684-94-1	Hexachlorodibenzofuran (Total)	64	J, Q-3	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
[illegible]268-87-9	Octachlorodibenzodioxin	5300	J, CLP02	ng/kg dry	8.2	11/24/09	11/30/09	CL DLM02.0
39001-02-0	Octachlorodibenzofuran	240		ng/kg dry	8.2	11/24/09	11/30/09	CL DLM02.0
[illegible]6088-22-9	Pentachlorodibenzodioxin (Total)	6.2	J, Q-3	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
30402-15-4	Pentachlorodibenzofuran (Total)	8.0	J, Q-3	ng/kg dry	4.1	11/24/09	11/30/09	CL DLM02.0
R4-0428	TEQ (Avian Toxic. Equiv. Value, WHO TEQ-98)	5.1	J, D-5	ng/kg dry	5.1	11/24/09	11/30/09	CL DLM02.0
R4-0429	TEQ (Fish Toxic. Equiv. Value, WHO TEQ-98)	5.4	J, D-5	ng/kg dry	5.4	11/24/09	11/30/09	CL DLM02.0
R4-0430	TEQ (Mammalian Toxic. Equiv. Value, WHO TEQ-2005)	11	J, D-5	ng/kg dry	11	11/24/09	11/30/09	CL DLM02.0
41903-57-5	Tetrachlorodibenzodioxin (Total)	0.21	J, Q-3	ng/kg dry	0.82	11/24/09	11/30/09	CL DLM02.0

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Project: 10-0079, Cabot Carbon/Koppers - Reported by Charlie Appleby

Dioxin

Project: 10-0079, Cabot Carbon/Koppers

Sample ID: SI1
Station ID: SC002

Lab ID: C094801-02
Matrix: Sediment

Date Collected: 11/19/09 13:10

CAS Number	Analyte	Results	Qualifiers	Units	MRL	Prepared	Analyzed	Method
30402-14-3	Tetrachlorodibenzofuran (Total)	1.6	J, Q-3	ng/kg dry	0.82	11/24/09	11/30/09	CL DLM02.0

USEPA Contract Laboratory Program
Organic Traffic Report & Chain of Custody Record

1. Case No.: 10-0079
DAS No.: EP08W001873
R

2. Region: 4	3. Date Shipped: 11/19/09	4. Chain of Custody Record	Sampler Signature:
Project Code: 10-0079	Carrier Name: FedEx	Relinquished By: (Date/Time)	Received By: (Date/Time)
Account Code:	Airbill: 798154383267	1) Jim Myles 11/19/09 15:30	
CERCLIS ID:	Shipped To: SGS Environmental Services, Inc. 5500 Business Drive Wilmington, NC 28405	2)	
Spill ID:		3)	
Site Name/State: Cabot/Koppers OU2 / FL		4)	
Project Leader: Jim Myles			
Action:			
Sampling Co.: Alachua County EPD			

5. ORGANIC SAMPLE No.	6. MATRIX/ SAMPLER	7. TYPE	8. ANALYSIS/ TURNAROUND	9. TAG No./ PRESERVATIVE/Bottles	10. STATION LOCATION	11. SAMPLE COLLECT DATE/TIME	12. INORGANIC SAMPLE No.	13. QC Type
SH1	SD/ Jim Myles	Comp	Dioxin/21 day	no preservative / 8 oz glass jar	29.68609 -82.32377	11/19/09 12:45		
SI1	SD/ Jim Myles	Comp	Dioxin/21 day	no preservative / 8oz glass jar	29.68627 -82.32966	11/19/09 13:10		

14. Shipment for Case Complete?	15. Sample(s) to be used for laboratory QC:	16. Additional Sampler Signature(s):	17. Chain of Custody Seal Number:
			1
18. Analysis Key:	Type: (Comp), Grab (from Box 7)		19. Shipment Iced? yes

20. TR Number:

REGION COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Sample Management Office, Attn: Heather Bauer, 15000 Conference Center Dr., Chantilly, VA 20151 Phone 703/818-4200 Fax 703/995-4415

05/04

Summary Report -- Supplemental Sediment Survey for Tarry Deposits in Springstead and Hogtown Creeks Downstream of the Cabot-Koppers Superfund Site

Prepared by
Alachua County Environmental Protection Department (ACEPD)
October 2010

This report summarizes the results of a supplemental creek sediment survey conducted in October 2010 by ACEPD to gather additional information on the extent and depth of tarry contamination in the sediments of Springstead and Hogtown Creeks downstream of the Cabot-Koppers Superfund Site. This survey was conducted as a supplement to an earlier sediment survey performed by ACEPD in December 2008 and subsequent creek investigations conducted in May 2010, July 2010 and September 2010.

The results of the December 2008 survey were reported in the ACEPD report to USEPA Region 4 titled "Sediment Quality in Springstead and Hogtown Creeks near the Cabot Koppers Superfund Site" dated August 2009. This initial December 2008 investigation focused on areas of obvious deposition such as point and mid channel bars. Subsequent to this initial investigation, ACEPD received information from citizens about other potential areas of tarry deposits. As a result, additional reconnaissance activities were undertaken in July 2009 and May 2010 on Hogtown Creek downstream of the NW 29th Road where the previous study ended to document the presence or absence of observable contamination. Additionally, in September 2010, ACEPD staff along with Mr. Mark Taylor of Weston, consultant for the Cabot Corporation, located an additional area of "tar-like material" in Hogtown Creek near but separate from one of the previously reported tarry deposit areas, HA. Upon further investigation, ACEPD staff also located an area of tarry contamination which had not been previously identified in a flat area of stream bed that was not an obvious depositional area. The results of the May, July and September 2010 investigations were reported by ACEPD to USEPA Region 4 in the report titled "Supplemental Creek Sediment Survey of Hogtown Creek Downstream of Cabot -Koppers Superfund Site Task 5- USEPA Cooperative Agreement V97468702 dated September 30, 2010.

Based on the September 2010 findings of the additional tarry deposit area, ACEPD determined that it was necessary to conduct a reexamination of the extent of sediment contamination in the Hogtown and Springstead Creeks especially looking at areas that were not investigated in the initial December 2008 survey. This recent investigation, which is summarized below, was conducted during the second week of October 2010.

A visual and olfactory reconnaissance of Springstead Creek and portions of Hogtown Creek downstream of its confluence with Springstead Creek was conducted to characterize sediments and locate any areas of observable contamination. **Figure 1** shows the segments of the creeks that were surveyed. ACEPD staff conducted the surveys by walking the creeks and noting any areas of observable "tar-like" materials and, using a soil probe, evaluated the buried sediments at all sand bars and within the stream bed. Soil probes were driven into the sediments to 4 feet (unless refusal from clay or other obstructions were encountered) approximately every 2 to 3 feet on center. Two to four staff members from ACEPD transected the stream bed and inserted the soil probes every step as they advanced up the creeks. The survey began on Hogtown Creek at NW 29th Rd on October 5, 2010 and continued upstream to the confluence with Springstead Creek and then up Springstead Creek to NW 6th Street. The sediments

upstream of NW 6th Street were not evaluated again since this is an erosional section of the stream with little sediment deposition and there was no tar like material found in this reach during the initial sediment screening completed in November 2009. Hogtown Creek from NW 23rd Avenue to NW 29th Road was also evaluated for sediment contamination.

Numerous locations that were not previously identified in previous surveys showed evidence of tar-like contamination. **Figure 1** shows the survey area and the locations and estimated relative magnitude of the tar depositions. **Table 1** presents the location coordinates and the numerical estimates of the cubic feet of tar- like material potentially present at that location. The numbered points in Figure 1 correspond to the GPS Point number in Table 1. Photographs were made of several of the locations which contained tarry deposits as referenced in Table 1. When tar like material was observed on a soil probe the area was delineated using clean soil probes and an estimate of the volume was noted. The areas were marked with flagging, GPS coordinates were taken and pictures of the area were also taken. The amount of staining on the soil probes was noted as an indicator of the relative concentration of the tar in the sediments. The areas identified with tar like contaminants ranged from small areas of less than a few cubic feet with slight staining to large areas of approximately 3000 cubic feet that produced heavy staining on the soil probes.

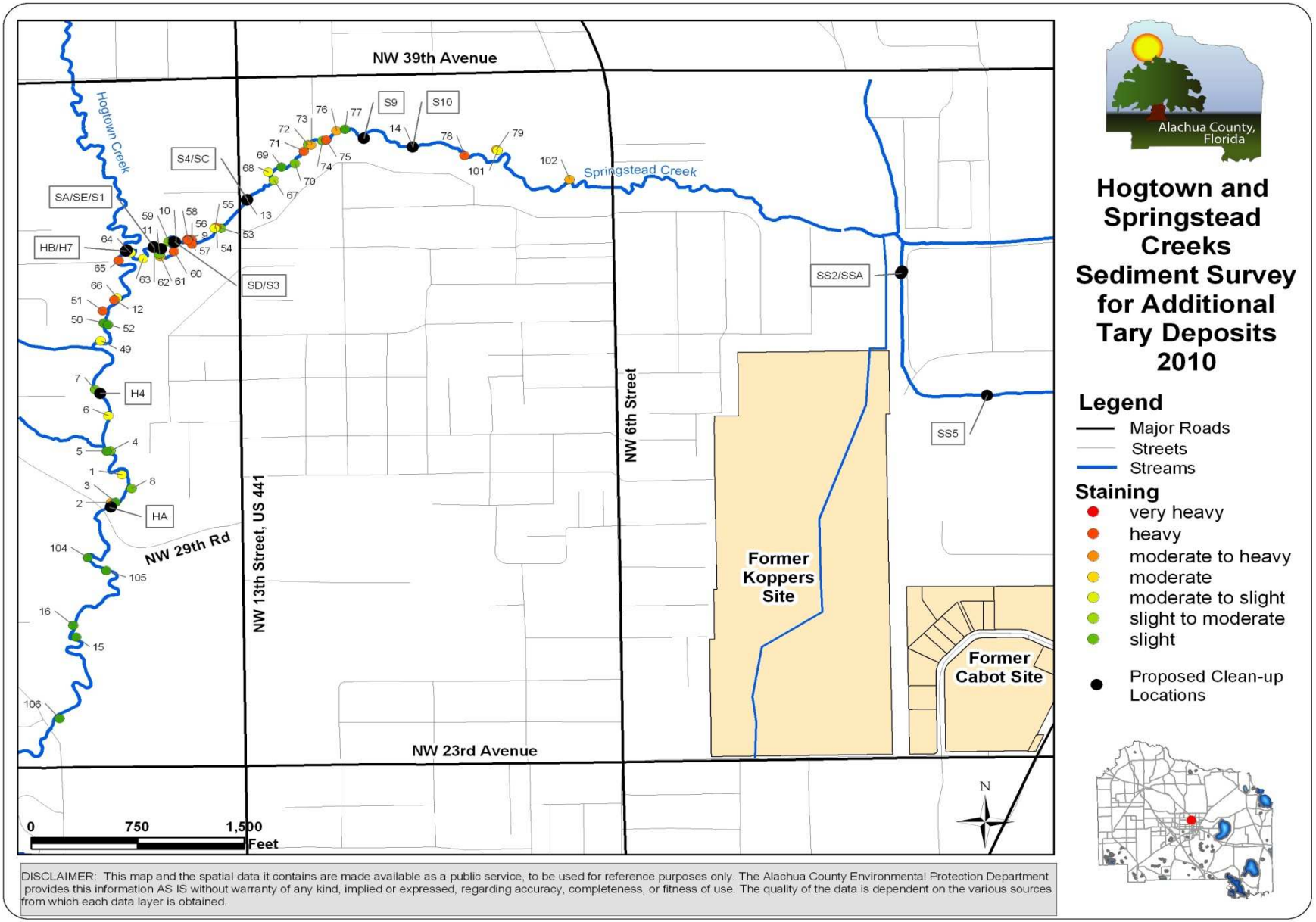


FIGURE 1. Hogtown and Springstead Creeks Sediment Survey for Additional Tar Deposits October 2010

TABLE 1. Data Table with Location Coordinates and Estimated Magnitude of Contamination Found October 2010

GPS Point	Lattitude	Longitude	Staining	Length (feet)	Width (feet)	Depth (feet)	Cubic Feet	Location	Comments	Photos
1	29.68018	-82.34175	moderate	40	10	3	1200	right bank	location found by Greg Owen	349
2	29.67960	-82.34201	moderate to heavy	4	2	3	24	right bank		346-347
3	29.67960	-82.34190	slight	3	2	1	6	mid channel		348
4	29.68069	-82.34199	slight to moderate	3	3	1	9	left bank		
5	29.68069	-82.34208	slight	20	5	2	200	left bank		
6	29.68143	-82.34203	moderate	10	3	3	90	mid channel		
7	29.68199	-82.34231	slight to moderate	10	5	2	100	5' from right bank		
8	29.67989	-82.34155	slight to moderate	12	6	3	216	5' from left bank		289-291
49	29.68302	-82.34216	moderate	1	1	4	4	left bank		
50	29.68339	-82.34209	slight	5	2	4	40	left bank		
51	29.68365	-82.34210	heavy			< 0.5	4	right bank		
52	29.68336	-82.34199	slight	1	1	2	2	left bank		350
53	29.68535	-82.33944	slight to moderate	3	3	3	27	mid channel		
54	29.68538	-82.33955	heavy	6	3	3	54	right bank		
55	29.68536	-82.33958	moderate	1	1	2	2	right bank		
56	29.68513	-82.34010	heavy			2	unknown	left bank		309
9	29.68513	-82.34019	very heavy	10	15	2	300	right bank to left bank		310-315
57	29.68503	-82.34009	heavy	3	3	3	27	left bank	several small spots	316-319
58	29.68512	-82.34019	heavy	15	10	4	600	right bank to left bank		320
10	29.68509	-82.34044	heavy	35	15	3	1575	left bank to mid channel		321-323
59	29.68509	-82.34061	slight to moderate				unknown	left bank	buried in point bar	324
60	29.68488	-82.34049	heavy	20	4	3	240	right bank		325-327
61	29.68478	-82.34080	moderate to heavy	2	2	2	8	right bank		328-329
11	29.68483	-82.34082	slight to moderate	4	2	2	16	right bank		
62	29.68495	-82.34093	moderate			2	10	left and right banks	2 spots on either bank	330-331
63	29.68474	-82.34119	moderate	10	3	2	60	mid channel		332
64	29.68487	-82.34145	moderate	3	3	2	18	mid channel	a little on right bank 10' downstream of flagging	
65	29.68471	-82.34173	heavy	1	1	2	2	left bank		333
66	29.68392	-82.34178	moderate	10	10	2	200	left bank to mid channel		334-335
12	29.68388	-82.34184	heavy	6	4	2	48	right bank		
13	29.68594	-82.33886	heavy	50	20	3	3000	right bank to left bank	Location SC	
67	29.68634	-82.33825	moderate to slight	5	4	2	40	left bank		336
68	29.68652	-82.33836	moderate	1	1	2	2	right bank		337
69	29.68663	-82.33807	slight	6	3	2	36	right bank to mid channel		338
70	29.68670	-82.33778	slight to moderate	2	2	2	8	mid channel		339
71	29.68695	-82.33757	heavy	6	4	2	48	left bank		343
72	29.68709	-82.33748	slight to moderate	6	3	2	36	left bank to mid channel		342
73	29.68708	-82.33741	moderate to heavy	8	5	2	80	left bank		340-341
74	29.68716	-82.33715	slight to moderate			2	4	left and right banks	2 spots on either bank	344-345
75	29.68718	-82.33707	heavy	40	10	3	1200	right bank to mid channel	exposed at surface	346-348
76	29.68737	-82.33684	moderate to heavy	6	3	2	36	left bank		349
77	29.68740	-82.33665	slight	5	2	2	20	right bank		350
14	29.68700	-82.33516	heavy	50	10	3	1500	left bank to right bank	Location S10	352
78	29.68680	-82.33401	heavy	12	4	3	144	right bank		353-354
79	29.68691	-82.33330	moderate to heavy	10	4	3	120	left bank		355
101	29.68689	-82.33327	moderate	2	2	2	8	left bank		356
102	29.68625	-82.33169	moderate to heavy	6	6	3	108	right bank		357
104	29.67844	-82.34255	slight	1	1	2	2	left bank		358-359
105	29.67816	-82.34214	slight	2	2	2	8	mid channel		360
106	29.67506	-82.34325	slight	1	1	1	1	mid channel	could not replicate staining	361-364
15	29.67677	-82.34284	slight	1	1	1	1	left bank	could not replicate staining	365-366
16	29.67702	-82.34290	slight	1	1	1	1	left bank	could not replicate staining	