Stormwater Inlet Protection Device Pilot Study

Prepared for:
Gainesville Clean Water Partnership – City of Gainesville, Florida Department of Transportation and Alachua County

Prepared by:
Alachua County Environmental Protection Department (ACEPD)
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Introduction and Purpose

Stormwater pollution, especially in developed urban areas, is a leading cause of water quality degradation in surface waters. The resulting pollution impacts natural systems in many negative ways (Miller 1993; Tilley and Brown 1998). Automobiles and roadways are a major source of cadmium, copper, lead and zinc in stormwater. Fertilizers used in the landscape add nutrients (mainly nitrogen and phosphorus) to stormwater. Much of the urban areas in Alachua County were constructed when flood control and removal of rainwater were the primary objectives of design engineers. Stormwater conveyance systems were constructed to rapidly move rainwater into the natural drainage systems without any regard for retention or treatment. The consequences of these practices have degraded natural systems and created impaired waters that require expensive monitoring and restoration plans.

New technologies, driven by increased regulation, have emerged to better control pollution entering surface waters (Pitt and Lalor, 2000). Stormwater inlet protection devices that capture sediments and hydrocarbons are commercially available and may be an economical alternative to expensive retrofits, or costly downstream engineering projects. Capturing non-point source pollution as close to its source is the best alternative, after pollution prevention has failed or best management practices (BMPs) prove inadequate or are not effective.

A pilot study was conducted by the Alachua County Environmental Protection Department (ACEPD) in Gainesville, Florida to evaluate the use of stormwater inlet protection devices. The purpose of the study was to measure the effectiveness of drop inlet filters for preventing sediment and pollutants in stormwater runoff from entering natural stream systems. Two sites in Gainesville were chosen for a small scale pilot project, the City of Gainesville Public Works compound/maintenance yard in the Hogtown Creek Watershed and Florida Pest Control & Chemical Company in the Sweetwater Branch Watershed (Figure 1).

Drop stormwater inlet at Florida Pest Control & Chemical Company (FP North)

Sediments collected in the inlet filters were analyzed for nutrient content, selected metals, percent solids, percent volatile solids, total recoverable petroleum hydrocarbons and sediment particle size. This allowed for a small scale quantifiable determination of the potential pollutant loading to the environment. This study provides data that can be used to further evaluate the effectiveness, efficiency and costs of preventing the release of sediments to the stormwater system and receiving waters by the use of drop inlet filter devices.

Geographic Setting and Study Sites

Two study sites were chosen in northwest Gainesville (Figure 2). In this area, the Hawthorn Group sediments overlie the Floridan aquifer and surface drainage to streams and lakes dominates. The feature controlling hydrology is the Cody Escarpment, an area of high relief west of the study sites. Relief in the county generally decreases westward, as the surface water flows west over the Cody Escarpment and onto the karst limestone

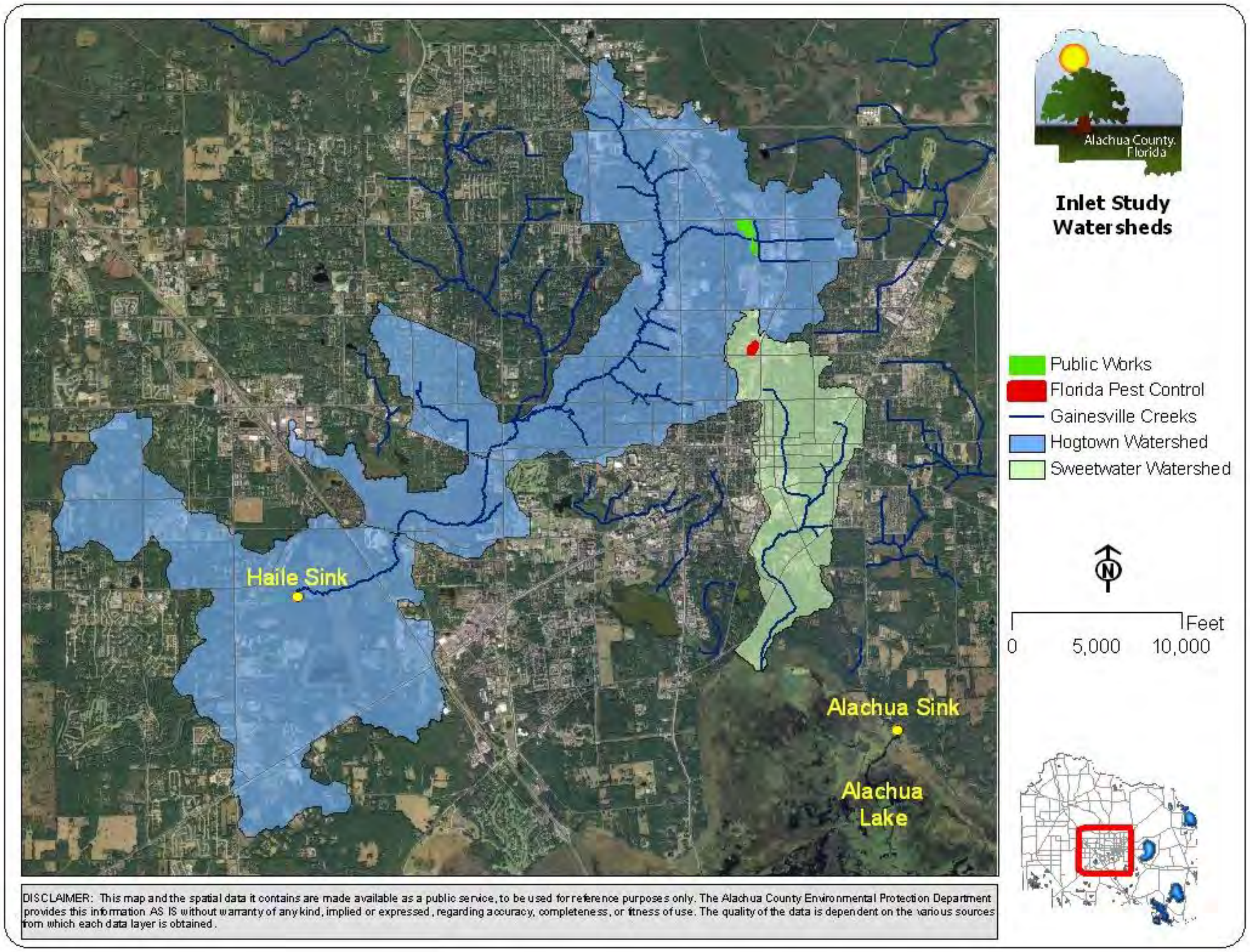


Figure 1. Locations of Study Sites within the Hogtown Creek and Sweetwater Branch Watersheds

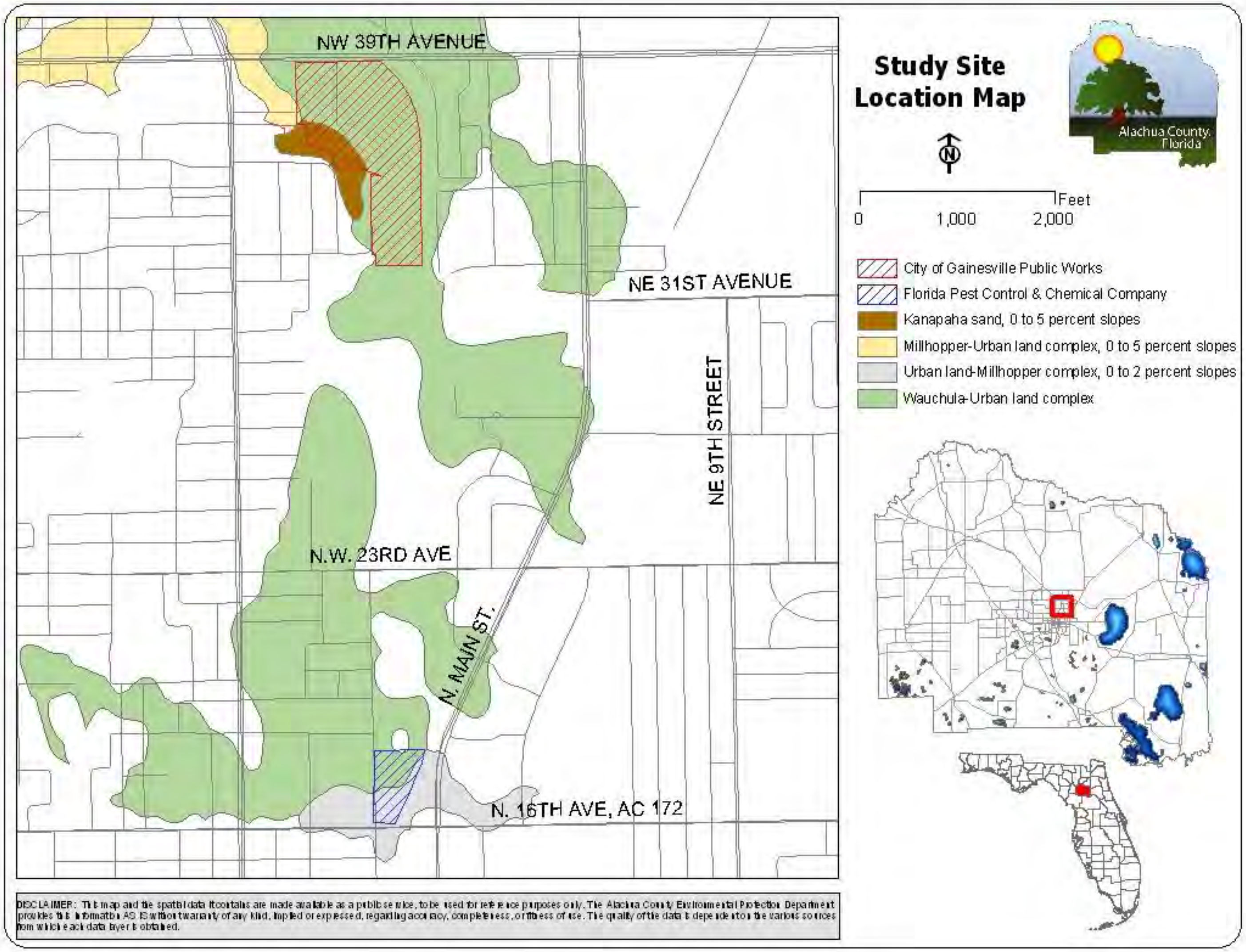
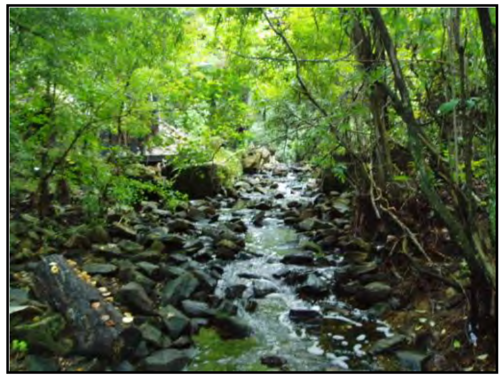


Figure 2. Stormwater Inlet Study Sites, Gainesville, Florida 2006

plain in the west. It is along this escarpment that many of the streams originating in the central and eastern portions of the county recharge the Floridan or intermediate aquifers through sinkholes or swallets. One of the study sites is located in the Hogtown Creek Watershed; the other is located in the Sweetwater Branch Watershed (Figure 1). The streams in both of these watersheds terminate in swallets or sinks, recharging the Floridan aquifer.

The Hogtown Creek Watershed, approximately 20 square miles, is a closed basin discharging to the Floridan aquifer system via Haile Sink on Hogtown Prairie west of the Cody Scarp. There are many tributaries to Hogtown Creek, including Springstead Creek. Hogtown Creek and its associated tributaries drain most of northwestern Gainesville. The direction of flow is generally south and west, although Possum Creek flows south and east to its confluence with Hogtown Creek. Hogtown Creek flows through a series of wetlands between SW 2nd Avenue and its terminus at Haile Sink (Figure 1).



Springstead Creek south of NW 39th Avenue and west of Main Street

Sweetwater Branch east of Main Street and in the median of NE 10th Avenue

Sweetwater Branch flows through the Gainesville urban area to Paynes Prairie and encompasses approximately 3.3 square miles of central Gainesville upstream of the prairie. Sweetwater Branch has one main tributary, Rosewood Branch, and a number of small unnamed tributaries. On the prairie itself there are two major water bodies, Alachua Sink and Alachua Lake, which is a large wetland system on the prairie. The water on Paynes Prairie discharges to the Floridan aquifer system via the Primary Sink Feature adjacent to Alachua Sink (Figure 1).

The City of Gainesville Public Works compound is located between NW 6th Street and Main Street on the south side of NW 39th Avenue. Florida Pest Control & Chemical Company is located between Main Street and NW 2nd Street on the north side of NW 16th Avenue (Figure 2). At each of the sites, two drop inlets with surrounding contributing areas that were well defined were selected for the installation of inlet filter devices.

The City of Gainesville Public Works compound has 17.36 acres of impervious surface (Figure 3). The two study inlets did not collect the flow of that entire surface area. Near the study inlets are eight other stormwater inlets, which effectively fragment the 17.36 acres. The estimate of the area of contribution for each study inlet is based on 1-foot elevation relative to National Geodetic Vertical Datum 1929 (NGVD) contour intervals from the Alachua County Property Appraiser's LIDAR topography data (Alachua County, 2001). The two inlets selected for the study were designated PW

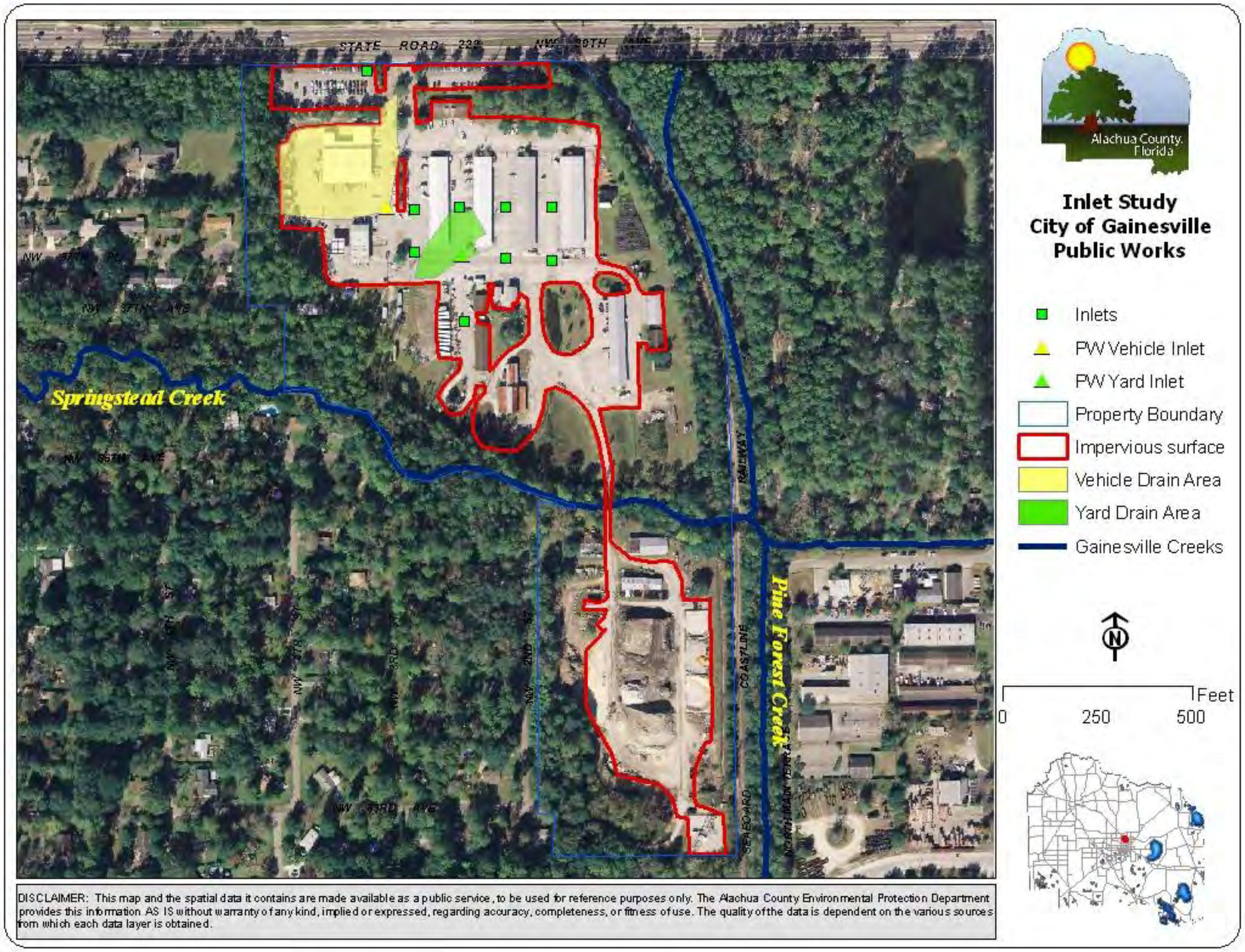


Figure 3. Location Map for the City of Gainesville Public Works Compound Site

Vehicle and PW Yard (Table 1). The PW Vehicle stormwater inlet has an estimated drainage area of 1.71 acres, whereas the drainage area for PW Yard inlet is only 0.43 acres. PW Vehicle is at an elevation of 156 feet NGVD while PW Yard is at 155 feet NGVD. From the inlets, stormwater flows into a series of two stormwater ponds, allowing suspended particulate matter and other potential contaminants to settle out before they discharge to Springstead Creek (Renshaw, 2007). Springstead Creek, a tributary to Hogtown Creek, runs through the Public Works site, having the lowest elevation at 148 feet NGVD. There is a substantial vegetated buffer separating the impervious surface from the creek. This buffer likely abates the discharge of sediments from direct runoff of impervious areas of the site to Springstead Creek.

Table 1. Stormwater Inlet Study Sites, Gainesville, Florida 2006

Location	Sample Site	Contributing Area (acres)	Receiving Waterbody	Inlet Type	Elevation (NGVD)
City of Gainesville Public Works	PW Vehicle	1.71	Springstead Creek*	Drop	156
City of Gainesville Public Works	PW Yard	0.42	Springstead Creek*	Drop	155
Florida Pest Control & Chemical Company	FP North	2.31	Sweetwater Branch	Drop	183
Florida Pest Control & Chemical Company	FP South	2.03	Sweetwater Branch	Drop	184

*Northern most major tributary to Hogtown Creek

The Florida Pest Control & Chemical Company site has a digitized estimate of 4.33 acres of impervious surface based on the Alachua County (2006) aerial imagery, digital six-inch pixel color aerial orthophotography (Figure 4). The site was visually inspected and the two study inlets were found to intercept the majority of the runoff from the impervious area on the property. The two inlets selected for the study were designated FP North and FP South (Table 1). There is a stormwater inlet for the road near the south entrance on NW 16th Avenue and one at the corner of NW 16th Avenue and NW 2nd Street; neither of these inlets appeared to be receiving water from the site (Figure 4). The overlaying of 1-foot elevation contours displayed little variation in the property. There was a slight 1-foot elevation drop near FP South, from 184 to 183 feet NGVD; otherwise the elevation was uniform throughout the site at 184 feet NGVD. Division of the drainage area was created based on the subtle elevation change. This resulted in FP North having a 2.31 acre drainage area, and FP South collecting from a 2.03 acre area. Florida Pest Control & Chemical Company is in the upper reaches of the Sweetwater Branch Watershed, with a channelized section of the creek located along NW 2nd Street, just west of the site.

Stormwater inlet (FP North) collecting runoff from the Florida Pest Control & Chemical Company

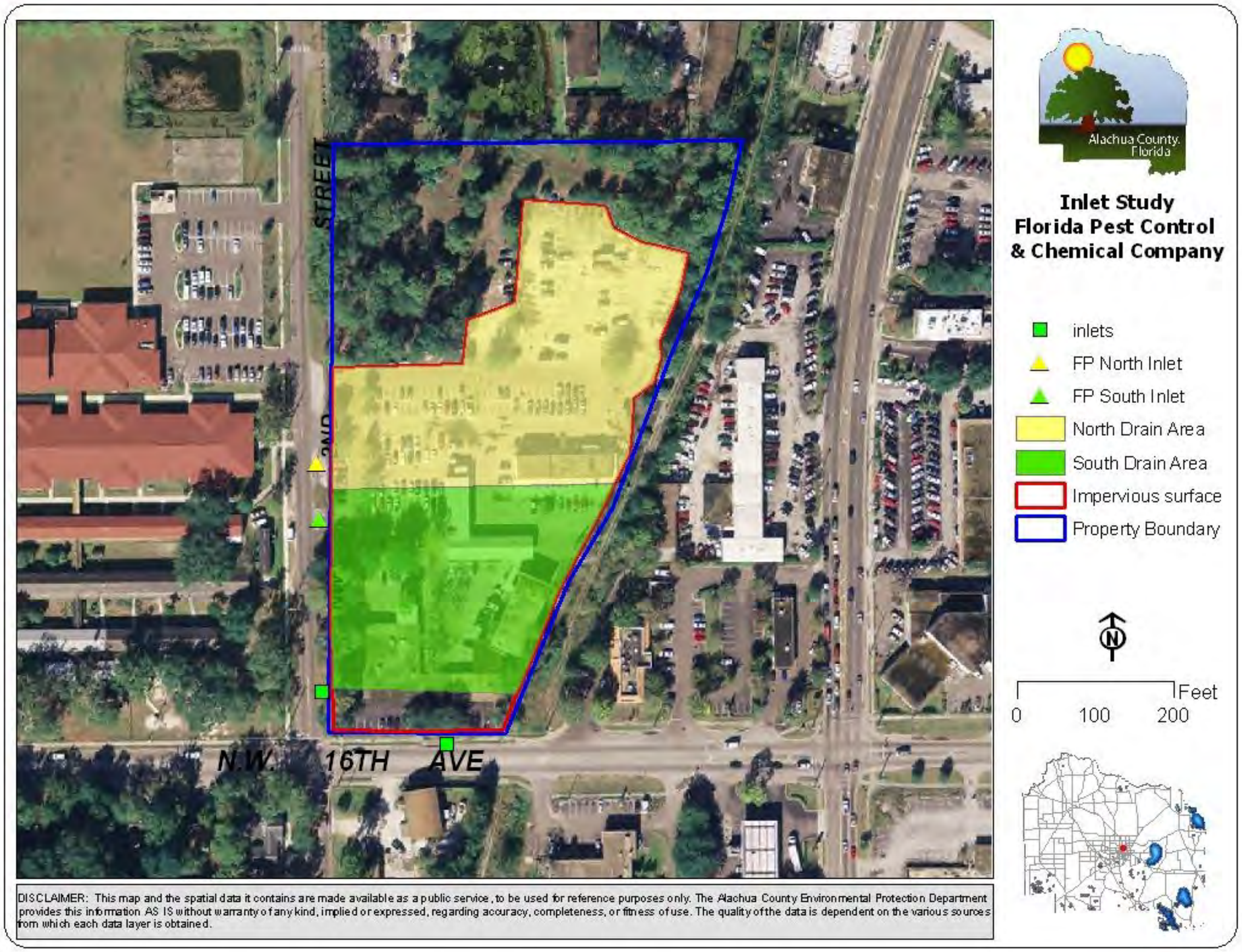


Figure 4. Location Map for the Florida Pest Control & Chemical Company Site

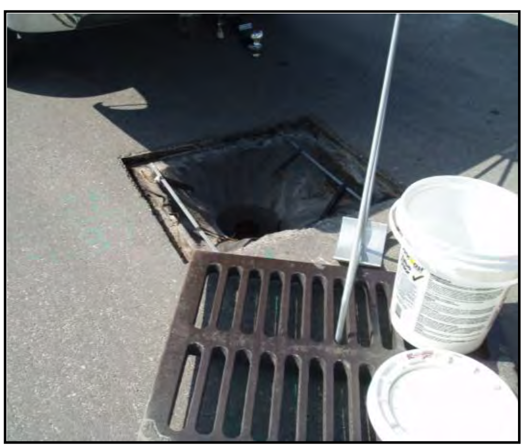
The soils are similar in nature at both study sites. City of Gainesville Public Works compound soils are largely comprised of Wauchula-Urban land complex (map unit symbol 18) and a small portion of Kanapaha Sand, 0 to 5 percent slopes (map unit symbol 7) and an even smaller part is Millhopper-Urban land complex, 0-5 percent slopes. Florida Pest Control & Chemical Company soils are roughly half Wauchula-Urban land complex, and Urban land-Millhopper complex, 0 to 2 percent slopes (map unit symbol 45)(Figure 1).

Materials and Methods

ACEPD purchased Ultra-DrainGuard Oil and Sediment filters manufactured by UltraTech International, Inc. for the study. The filters are simple in structure; consisting of a conical shaped bag comprised of needle-punched polypropylene geotextile material. These filters are designed to fit underneath and attach to the storm drain grating covering the drop inlet to capture parking lot runoff and retain sediments. The Ultra-DrainGuard Oil and Sediment Model (part #9217) inlet protection device is reported to remove hydrocarbons as well as dirt, sand, and other contaminants. Contaminant removal is primarily by sorption onto the filter materials or by sediments captured in the device. The manufacturers specification show that each filter weighs approximately one pound and has dimensions of 48”L x36”W x18”H ; fitting a standard size drop inlet. The filters had a unit cost of $51.50 and were rated to hold 40 pounds of sediment.

Ultra-DrainGuard Oil and Sediment filter and contents after removal from one of the stormwater inlets

After site reconnaissance, the filters were deployed in the four stormwater drop inlets (described above) on March 7, 2006. The inlet filters were installed by first removing the inlet grates. Tension bars for chain link fences were measured and cut to length to fit inside the recessed ledge below the grate where the filters were suspended. The excess filter fabric was stretched outside the inlet opening and laid flat. The inlet grates were then replaced on top of the filter material. Excess filter material was trimmed flush with the top of the inlet grate so as not to interfere with water and sediment movement. Photographs showing the location of inlets and the installation and removal of the filters are located in Appendix A.



Stormwater inlet with inlet grate removed and Ultra-DrainGuard Oil and Sediment filter in place

The filters were deployed for six months without sediment removal or maintenance activities. On September 6, 2006 the filters were collected from the City of Gainesville Public Works compound and Florida Pest Control & Chemical Company and allowed to air dry. The leaf litter and debris (both organic material and garbage) were removed and weighed. The sediment was then removed from the filters and weighed on an Acculab Econ Series portable scale. The sediment from each filter was homogenized by manually mixing the sediment and then a representative sample was taken from each for pollutant analysis. The sediment particle size analysis was performed in-house by sieve analysis.

Laboratory analyses of the sediments obtained from each of the inlet filters were conducted for nutrients, selected metals, percent solids, volatile solids, and total recoverable petroleum hydrocarbons (Table 2). All of the analyses except organic content were conducted by Severn Trent Laboratories, Inc. (STL, now TestAmerica) Tallahassee, Florida and Canton, Ohio. Organic content was assumed to equal results from volatile solids analyses completed by Advanced Environmental Laboratories, Inc. (AEL) Gainesville, Florida. Four metals (cadmium, copper, lead, and zinc) were selected as being representative of metals that are typically found in high concentrations in stormwater runoff and reportedly have high toxicity in the aquatic environment (CRWQCB, 2007). The presence of petroleum hydrocarbon in the sediments was assessed by determining the concentration of total recoverable petroleum hydrocarbons (TRPH) in the alkane range of C_8-C_{40} using the Floridan Residual Petroleum Organic (FL-PRO) method. This analysis is designed to provide a gross concentration of petroleum products in the diesel and motor oil molecular weight range, referred to as polycyclic aromatic hydrocarbons (PAHs); without speciation of individual organic constituents.

Table 2. Laboratory Analyses Methods

Constituent	Method*
Total phosphorus (TP)	MCAWW 353.2
Nitrate plus nitrite as nitrogen (NO_3+NO_2)	MCAWW 353.2
Total Kjeldahl nitrogen (TKN)	MCAWW 351.3
Total nitrogen (TN)	Calculation: NO_3 /NO_2 + TKN
Copper, lead, zinc, cadmium	EPA Method 3050/6010
Percent solids	MCAWW 160.3 modified by STL
Total recoverable petroleum hydrocarbons (TRPH) in the alkane range of C_8-C_{40}	FL-PRO
Volatile solids (residue)/ash free dry weight (VS/AFDW)	MCAWW 160.4

*EPA (1983) *Methods for the Chemical Analysis of Water and Wastewater* (MCAWW)

After the representative sample for laboratory analysis was removed, the remaining sediment collected from the filter was sieved by ACEPD. The procedure involved stacking graduated soil sieves atop one another in descending order #10 to #120 mesh sizes and shaking (Das, 1986). When sieving, the soil particles left in each sieve relates to a specified diameter which determines the soil texture: sand (0.05 to 2.0 mm), silt (0.002 to 0.05 mm) and clay (less than 0.002 mm). The sieve sizes used in this study were: #10, #18, #30, #45, #80, and #120 and were all for the sand texture class. After sieving each fraction was weighed on the Acculab Econ Series portable scale.

Results and Discussion

Most of the rainfall in the Gainesville area occurs in summer from convective storms or during winter cold fronts. During the 180 day (March 6th through September 6th 2006) study period, there were 66 days of rain for a total of 20.45 inches (Table 3). August, in terms of volume, had the most rainfall of the six months at 6.04 inches. However, June held the most days with rain, 17, with a rainfall total of 5.18 inches. The rainfall amounts were determined by averaging the Gainesville Regional Utilities (GRU) John R. Kelly Generating Station gage readings with the St. Johns River Water Management District (SJRWMD) gage readings from the Alachua County Fairgrounds. Daily rainfall values from both locations are included in Appendix B.

Table 3. Monthly Rainfall Data Based on an Average of GRU and SJRWMD Rain Gages

Rainfall 2006	March*	April	May	June	July	August	September*	Totals
Monthly Totals (in.)	0.26	3.00	0.57	5.18	4.92	6.04	0.51	20.45
Number of Rainfall Days	4	6	5	17	16	14	2	66

*March 6th 2006 through September 6th 2006

Capturing sediments before they enter a stormwater system reduces pollutant loading and the impacts of in-stream erosion, exacerbated by high sediment loads in stormwater, in natural stream systems. The filters collected a total of 4,236.1 grams or 9.34 pounds (lbs) of sediment, leaf litter, and debris in the stormwater runoff from a total combined catchment area of 6.48 acres. The amount of sediment and debris collected in the individual filters is shown in Table 4. The filter with the most sediment collected was that of the City of Gainesville Public Works, PW Yard, with 839.3 grams (1.85 lbs) retained in the filter. Both Public Works inlet filters collected the most sediment by mass for a total of 1,418.4 grams (3.18 lbs). The PW Yard inlet filter retained roughly double the amount of sediment collected in any of the remaining three filters. This was due to its proximity to the area where fill dirt and other earthworks materials are stored and truck traffic. This is reinforced by the photograph of the stormwater inlet in Appendix A, which clearly shows accumulated sediment around the inlet. In a similar study involving 165 inlet filters, in 3 different cities in the Puget Sound Area of Washington, it was found that the majority of the filters retained four to 20 lbs of sediment for a similar time frame as this study (Hrachovec, 2001). The most leaf litter and debris, 750 grams, was collected at Florida Pest Control & Chemical Company in the FP South filter.

Table 4. Sediment, Leaf Litter, and Debris Mass Retained Within the Inlet Filters

Sample Site	Sediment Mass		Leaf Litter and Debris Mass		Total Mass		Volatile Solids in Sediment* (% by weight)
	grams	pounds	grams	pounds	grams	pounds	
PW Vehicle	579.1	1.28	510.2	1.12	1089	2.40	3.7
PW Yard	839.3	1.85	438.9	0.97	1278	2.82	4.1
FP North	350.8	0.77	354.9	0.78	706	1.56	15.6
FP South	412.9	0.91	750	1.65	1163	2.56	22.7

* Percent volatile solids were used as an estimate of sediment organic content.

Volatile Solids and Physical Properties

The sediments retained in the inlet filters were of varying size and composition. The materials in all size fractions consisted of both organic material and inorganic material, primarily quartz sand. Volatile solids (residue) analyses were used to estimate the organic content of the sediments. Although this analysis does not "precisely" distinguish between organic and inorganic matter, because there are other constituents that will volatilize at 550°C (APHA, 1985); volatile solids can provide a reasonable estimate of sediment organic content. The overall color of the sediment removed from the filters was dark brownish-grey, with clear to yellow quartz sand grains and small limestone fragments. Some of the quartz sand grains were coated in what appeared to be a dark organic material and a few of the quartz sand grains had visible iron oxide coatings. The larger sieve fractions contained recognizable leaf litter, insects and other organics. The overall sediment volatile solids or organic content ranged from 3.7 to 22.7%, with the highest mineral content and lowest volatile solids or organic content, 3.7% found in the sample from the PW Vehicle inlet filter at the City of Gainesville Public Works compound (Table 4).

Captured sediment is not necessarily indicative of the local soils; sediment can be transferred from other locations to the sites by vehicles. For example, City of Gainesville Public Works moves fill dirt on site, which comes from off-site locations. All four sediment samples showed much higher organic content (based on volatile solids analyses) than the native soils, substantiating that much of the material collected in all four inlet filters is from external sources, such as offsite tracking. Wauchula-Urban land complex organic content is 1.78% in the first soil horizon of 0-13 cm according to the Soil Survey of Alachua County, and the organic content for Millhopper-Urban land complex, 0-5 percent slopes, is 0.73%. Urban land-Millhopper complex, 0 to 2 percent slopes, has an organic content of 0.73%. For comparison purposes Shencks Muck has an organic content of 42.96% (USDA, 1985).

Sediment samples collected from both inlet filters at City of Gainesville Public Works appeared to have the same color and similar contents in each of the fractions retained by the different sieve sizes (Table 5). The fraction of the samples passing through the #120 sieve contained less quartz than some of the coarser samples and appeared darker in color, indicating it was likely organic in nature. The two samples collected at the Florida Pest Control & Chemical Company site also appeared similar to each other; however they were different from the two samples collected at the Public Works site (Table 5).The samples from the inlet filters at Florida Pest Control & Chemical Company were generally darker in nature and likely were primarily organic material, with the coarser fractions having broken leaves and twigs.

Photographs on left show the samples before sieve analysis was conducted; top is contents from the inlet filter at PW Yard and bottom is the contents from the FP South inlet filter. The photograph on right displays the contents retained by each sieve size for each stormwater inlet filter.

Table 5. Description of Sediments by Sieve Size

Sieve Number and Size	City of Gainesville Public Works		Florida Pest Control & Chemical Company	
	Color	**Contents**	**Color**	**Contents**
#10 (2 mm)	N/A	A few coarse sand grains and small fragments of leaves and limestone	N/A	Leafs and leaf fragments
#18 (1 mm)	Light grey to brown	Large quantity of limestone fragments and clear quartz mixed with other sand size particles; but few leaf fragments	Dark grey to brown	Limestone and leaf fragments mixed with sand size particles
#30 (0.6 mm)	Light grey to brown	Large quantity of limestone fragments and clear quartz mixed with other sand size particles and leaf fragments	Dark grey to brown	Limestone and leaf fragments mixed with sand size particles
#45 (0.36 mm)	Light grey	More quartz grains and fewer leaf fragments than #30	Grey	Mixture of quartz sand particles covered in organic matter and other sand size grains; small quantity of limestone and leaf fragments
#80 (0.18 mm)	Very light grey and white mixture	Mostly fine quartz particles mixed with other fine sand size materials	Grey	Mixture of quartz sand particles covered in organic matter and other sand size grains; small quantity of limestone and leaf fragments
#120 (0.125 mm)	Very light grey and white mixture	Mostly fine quartz particles mixed with other fine sand size materials	Dark Grey	Mixture of quartz sand particles covered in organic matter and other sand size grains; small quantity of limestone and leaf fragments
<#120	Light grey	Less quartz; likely organic in nature	Dark grey	Less quartz, likely organic in nature

The ability of a soil or sediment to retain or sorb nutrients, metals or organics is a function of many characteristics including material type and particle size. The material being sorbed to the particles may also go through transformations and in some cases becomes bound to the particulates. A sandy soil generally retains less organic matter (OM) and nitrogen (N) than textures of a finer nature (Brady, 1996). Sandy soils have more void spaces and retain less moisture, which allows for more microbial activity and rapid oxidation of organic matter. Therefore sandier soils are less likely to retain organic matter and nutrients (Manahan, 1983). Finer particles, such as clay, have more surface area thereby more reactivity and adhesion/cohesion capabilities (Brady, 1996). Soil particle composition also affects adsorptive capacities. Clean quartz sand retains few organics, nutrients or metals. However, quartz sand with coatings of hydrated oxides of iron and manganese coatings on the sand gains will have increased adsorptive capacities (Manahan, 1984). Organic particles also have potentially high sorptive capacities. Particulates affect mobility of organic compounds as well as nutrients and metals; the sorption of organic compounds varies with their water solubility (Manahan, 1984).

Most of the sand size material recovered from the filters at all four inlets was organic in nature and likely preferentially sorbed both nutrient and organic constituents. Each sieve number correlates to a specific soil particle diameter size being retained. Mechanical sieving only separates soil to the very fine sand fraction. The silt and clay fraction is determined by a settling rate of the soil being in suspension to the time it takes the particles to settle. This determines the silt and clay fractions, which when in suspension create turbidity in bodies of water and have the potential to clog the gills of aquatic organisms. Turbidity can also decrease the depth light penetrates which reduces photosynthesis in submerged aquatic vegetation. The silt and clay fractions were not differentiated in this study, but were retained in the inlet filters and comprised 9.5 to 19.8 percent of the materials sieved (Figure 5 and Table 6)

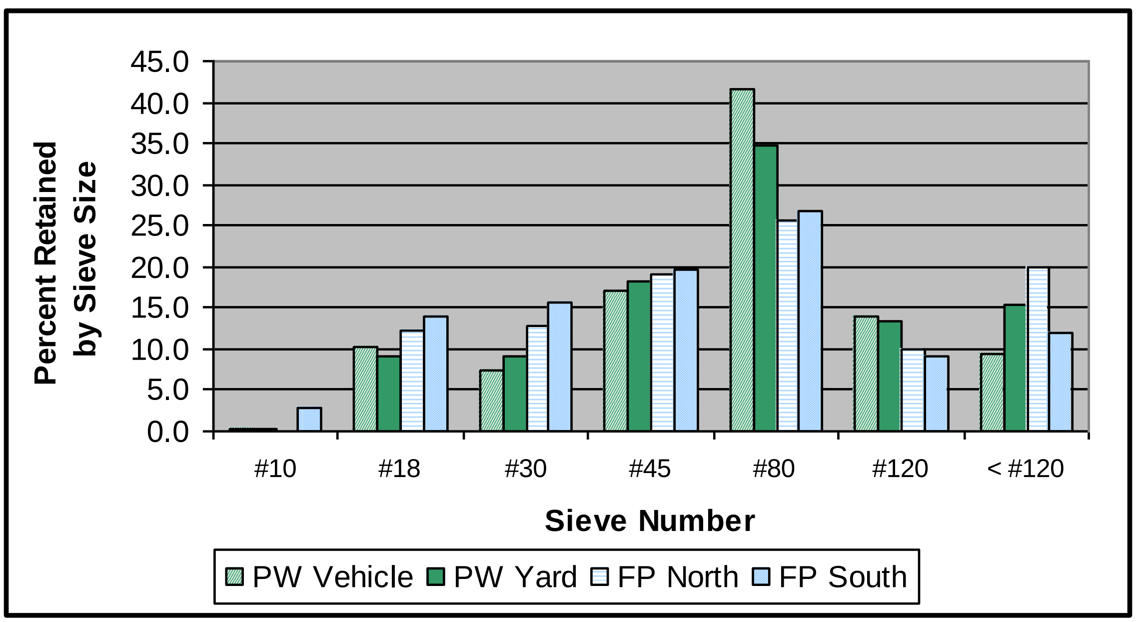


Figure 5. Sieve Analysis Results for Inlet Filters, Shown as Percent Retained by Mass

Table 6. Summary of Sediments Retained on the Inlet Filters by Sieve Size

Site	Sieve Number (Diameter)	USDA Soil Particle Classification	Soil Retained (g)	Percent Retained	Percent Passing
PW Vehicle	#10 (2mm)	very coarse sand/gravel	0.4	**0.2**	99.8
	#18 (1 mm)	coarse/very coarse sand	16.6	**10.3**	89.5
	#30 (0.595 mm)	coarse sand	11.9	**7.4**	82.1
	#45 (0.355 mm)	medium sand	27.5	**17.1**	65.0
	#80 (0.18mm)	fine sand	67.2	**41.7**	23.3
	#120 (0.125 mm)	fine sand	22.3	**13.8**	9.5
	< #120 (<0.125 mm)	clay/silt/very fine/fine sand	15.3	**9.5**	0.0
		Total Mass =	161.2	**100**	
PW Yard	#10 (2mm)	very coarse sand/gravel	0.5	**0.2**	99.8
	#18 (1 mm)	coarse/very coarse sand	18.3	**9.0**	90.8
	#30 (0.595 mm)	coarse sand	18.7	**9.2**	81.6
	#45 (0.355 mm)	medium sand	37	**18.1**	63.5
	#80 (0.18mm)	fine sand	70.7	**34.7**	28.8
	#120 (0.125 mm)	fine sand	27.2	**13.3**	15.4
	< #120 (<0.125 mm)	clay/silt/very fine/fine sand	31.5	**15.4**	0.0
		Total Mass =	203.9	**100**	
FP North	#10 (2mm)	very coarse sand/gravel	0.1	**0.1**	99.9
	#18 (1 mm)	coarse/very coarse sand	16.4	**12.4**	87.6
	#30 (0.595 mm)	coarse sand	17.1	**12.9**	74.7
	#45 (0.355 mm)	medium sand	25.2	**19.0**	55.7
	#80 (0.18mm)	fine sand	34.2	**25.8**	29.9
	#120 (0.125 mm)	fine sand	13.4	**10.1**	19.8
	< #120 (<0.125 mm)	clay/silt/very fine/fine sand	26.3	**19.8**	0.0
		Total Mass =	132.7	**100**	
FP South	#10 (2mm)	very coarse sand/gravel	4.3	**2.8**	97.2
	#18 (1 mm)	coarse/very coarse sand	21.1	**13.9**	83.2
	#30 (0.595 mm)	coarse sand	23.8	**15.7**	67.5
	#45 (0.355 mm)	medium sand	29.9	**19.7**	47.8
	#80 (0.18mm)	fine sand	40.6	**26.8**	21.0
	#120 (0.125 mm)	fine sand	13.6	**9.0**	12.0
	< #120 (<0.125 mm)	clay/silt/very fine/fine sand	18.2	**12.0**	0.0
		Total Mass =	151.5	**100**	

Parking lot stormwater runoff has been shown to contain elevated concentrations of total suspended solids (TSS), trace metals and PAHs as well as significant toxicity characteristics in bioassay experiments. Many of these contaminants are adsorbed onto sediment particles (Tiefenthaler, 2001). Figure 5 and Table 6 indicate that the most prevalent particle size was the 0.180 mm soil particles in the #80 sieve category, corresponding to fine sand textural class. This was true for all four inlets, as was the least prevalent size retained by the #10 sieve, the very coarse sand to gravel textural category. The second most prevalent category, with the exception of FP North sediment, was sediments retained on the #45 sieve, medium grained sand (Figure 5 and Table 6). Calculations for the sieve analysis are included in Appendix C. Further work would be needed to define the size fractions that exist below the #120 sieve. Finer soil fractions, such as clay, have a very large surface-to-volume ratio, giving them a large capacity to adsorb substances on their surfaces. Larger fractions have less surface area and therefore lower adsorption capacity.

Nutrients

The sediment samples were analyzed for nutrients, selected metals, percent solids, organic content, and petroleum hydrocarbons as described above and laboratory reports are provided in Appendix D. The results of nutrient analyses are presented in Table 7, along with the percent solids data. All nutrient laboratory analytical data are reported in milligrams per kilogram (mg/kg) or parts per million on a dry weight basis. The mass fraction of total phosphorus (TP) ranged from 483 mg/kg in sediment samples from the City of Gainesville Public Works yard area (PW Yard) to 743 mg/kg at the Florida Pest Control & Chemical Company inlet FP North. The Total Kjeldahl Nitrogen (TKN) in the sediment samples ranged from 560 mg/kg at PW Yard to 2,600 mg/kg at FP North. The Total Nitrogen (TN) reflected the same measurements due to the organic fraction of the TKN being orders of magnitude larger than the nitrate plus nitrite (NO_3+NO_2) inorganic fraction, ranging from 2.5 to 13 mg/kg (Table 7).

Table 7. Nutrients Found in the Sediment Collected from the Inlet Filters

Site	Percent Solids	TP (mg/kg)	TKN (mg/kg)	NO_3+NO_2 (mg/kg)	TN* (mg/kg)
PW Vehicle	94.9	518	670	10	680
PW Yard	99.2	483	560	2.5	560
FP North	97.7	743	2,600	13	2,600
FP South	99.0	742	670	2.9	670
HOG30[1]	NM	118	233	NM	NM
SWBPP1[2]	NM	8070	1810	NM	NM

*Items less than 2 significant digits are not reported by the lab with respect to differences in TKN and TN
1. SJRWMD data used for comparison; NM = Not Measured; Site located on Hogtown Creek at SW 20th Avenue
2. SJRWMD data used for comparison; NM = Not Measured; Site located on Sweetwater Branch at Paynes Prairie, downstream of Gainesville Regional Utilities Main Street Water Reclamation Facility discharge

Of the TN, the largest portion is that of the organic fraction (TKN) with miniscule amounts of the inorganic constituents (NO_3+NO_2). This is logical in that nitrate and nitrite are more soluble in water and tend to readily leach from soils and sediments. Whereas the organic fraction of TN tends to bind more readily to soil and sediments and is thus more likely to be retained in a filter that collects sediment. Nitrogen is a natural component of leaf litter also contributing to the TN; Greco (2004) reported that leaf litter from swamps and marshes in the southeastern United States contained over 1% nitrogen. This may account for the relatively high amounts of TKN (0.056 to 0.260%) over the six month study period and the low retention of the inorganic fraction, NO_3+NO_2 (0.00025 to 0.0013%). Leaf litter was removed from the sample prior to analyses; however it is likely that leaf litter is the parent material for the sediments that were analyzed. Organic material can be both a source and sink for nitrogen and phosphorus. This is frequently seen in wetlands systems which naturally have soils with high organic content from decaying plant material. Most nutrients in stream and lake sediments are reportedly present due to non-anthropogenic sources, based on a study of sediments completed in

1998 for the St. Johns River Water Management District (Durell *et al.*, 1998). Detrital material naturally contains carbon, nitrogen and phosphorus in its structure. The concentration and speciation of nitrogen as the organic matter decomposes may change based on oxygen availability and microbial decomposition (Manahan, 1985).

The higher TKN and TN (Table 7) observed at the Florida Pest Control & Chemical Company FP North inlet may in part be due to the higher organic content (Table 4) of the sediments retained in the inlet filter. It is also possible the incidental spills or releases of fertilizers to the ground or parking area at Florida Pest Control & Chemical Company contributed to the higher nitrogen content of the material collected in the inlet filters. This should be further evaluated, as ACEPD historical data that indicate relatively high levels of total ammonia (nitrogen), 0.460 mg/L under baseflow conditions in samples collected from Sweetwater Branch at NE 10th Avenue downstream of the site (ACEPD, 2007).

Total phosphorus (TP) concentrations were similar in samples collected from all four filters (Table 7). Phosphorus is naturally occurring in most Florida soils and most of it is derived from the inorganic phosphate materials in the Hawthorn Group (Scott, 1988). Greco (2004) reported that phosphorus is a small component of leaf litter, making up less than 0.02% in leaf litter from swamps and marshes. The average total phosphorus content of samples from all four sites, 621 mg/kg, was found to be approximately five times higher than that reported (Table 7) for sediments from Hogtown Creek (Durell *et al.*, 1998). For comparison, the phosphorus content of sediments from Sweetwater Branch (Table 7) were 13 times higher than samples obtained from the inlet filters, likely due to the discharge of reclaimed water (treated sewage effluent) from the GRU Main Street Water Reclamation Facility to Sweetwater Branch. The sediments in Sweetwater Branch downstream of the discharge from the water reclamation facility contained over 3% organic carbon (Durell *et al.*, 1998), which may have aided in the retention of phosphorus by the sediments. Sediment removal using the inlet filter devices may also function in removal of phosphorus from stormwater runoff before it enters surface waters.

Metals and Petroleum Hydrocarbons

The metals and petroleum products that were detected in the sediment samples collected in the filters are presented in Table 8. The State of Florida Chapter 62-777.170 FAC Soil Cleanup Target Levels for direct exposure in residential and industrial environments and for leachability based on freshwater surface water criteria are also given in Table 8. All four metals (copper, lead, zinc, and cadmium) were detected in samples from each of the four filters (Table 8). Zinc was found in the highest concentrations and was present at concentrations at least one order of magnitude above the levels of copper, lead, and cadmium. In the aquatic environment, especially for invertebrates, copper is considered to be the most toxic of the four analyzed metals (CRWQCB, 2007). The copper concentration in samples from the inlet filters ranged from 8.3 mg/kg at PW Yard to 68 mg/kg at FP North (Table 8). The amount of lead ranged from 21 mg/kg at PW Yard to 47 mg/kg at FP North. Zinc, found in the highest concentrations in all samples, was 190 at PW Yard to 650 mg/kg at FP South (Table 8). Cadmium concentrations ranged from 0.21 mg/kg at PW Yard to 0.85 mg/kg at FP North. None of the metal concentrations exceeded Florida standards for direct exposure in residential and commercial/industrial environments (FDEP, 2005).

Table 8. Results from Metals and Total Recoverable Petroleum Hydrocarbons (TRPH) Analyses

Contaminant	PW Vehicle	PW Yard	FP North	FP South	Direct Exposure[1]		Leachability based on freshwater surface water criteria[1]	Freshwater Threshold Effects Level[2] (TEL)
					Residential	Commercial/ Industrial		
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Copper	33	8.3	68	52	150*	89,000	NA	42
Lead[d]	32	21	47	26	400	1,400	NA	45
Zinc[c]	210	190	440	650	26,000	630,000	NA	135
Cadmium[c,h]	0.49	0.21	0.85	0.66	82	1,700	NA	0.54
TRPH (C8-C40)	1900	580	770	400	460	2,700	340	NA

1. Chapter 62-777.170 Derivation of Cleanup Target Levels, Soil Cleanup Target Levels; NA = Not available at time of rule adoption
* Direct exposure value based on acute toxicity considerations.
2. NA = Not Applicable
(c) = Phytotoxicity must be considered.
(d) = Residential direct exposure value from USEPA Revised Interm Soil Guidance for CERCLA Sites and RCRA Corrective Action Facilities. OSWER Directive 9355.4-12 (1994). The industrial direct exposure value was derived using methodologies outlined in USEPA 'Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil', December 1996; and in 'Blood Lead Concentrations of U.S. Adult Females: Summary Statistics from Phases 1 and 2 of the NHANES III', March 2002.
(h) = Residential chronic SCTL for cadmium should be used as a not-to-exceed value because the residential chronic SCTL for cadmium is indistinguishable from the SCTL based on acute toxicity.

The Freshwater Threshold Effects Levels (TEL) represents the concentration below which harmful effects are expected to occur only rarely in freshwater soils (Smith *et al.*, 1996). The TELs are used here for discussion purposes to show the potential cumulative impacts of nutrients in the stream environment. Using Smith's (1996) TEL, the levels of copper exceed the TEL in the sediment retained in the filters from both Florida Pest Control & Chemical Company inlets. Samples from the FP North inlet slightly exceeded the TEL for lead. Samples from all of the four study sites surpassed the TEL for zinc, with samples from FP South exceeding the TEL nearly five times. Both inlets at Florida Pest Control & Chemical Company exceeded the TEL for cadmium. The high copper, zinc, and cadmium content of the sediments retained in the inlet filters at Florida Pest Control & Chemical Company may be a result of adsorption of metals on the organic particulates.

The metals content of natural waters and wastewater is mostly in the form of particulates; as precipitates or adsorbed on particle surfaces, such as clays or organic detritus (Snoeyink and Jenkins, 1980). Metal can be held to particulates in a number of ways: (1) by cation-exchange of specific ions or compounds, (2) bound to hydrated oxides of iron or manganese, or (3) chelated by insoluble humic (organic) substances (Manahan, 1984). Dean *et al.* (2006) reported that it is not only the total content of these metals in stormwater runoff, but how they partition and speciate in water that affects concentrations. Cadmium and zinc are reportedly less likely to form complexes with organics and carbonates than lead and copper (Dean *et al.*, 2006). The pH of the runoff and entrapped sediments may also function to sequester or mobilize metals. The small limestone fragments observed in the samples from the inlet filter devices may slightly increase pH of the runoff and provide sites for precipitation of metal carbonate minerals.

Vehicle use and roadways are likely the major sources of copper, cadmium, lead and zinc in urban stormwater environments (Pitt and Lalor, 2000). These metals are reported to bioaccumulate in aquatic invertebrates, with copper reportedly the most damaging (CRWQCB, 2007). Major sources from industrial runoff include galvanized metal surfaces and ground areas where motor oil and hydraulic fluid could accumulate (Golding, 2006). TDC Environmental, LLC (2004) reported architectural copper, vehicle break pads, copper pesticides, vehicle fluid leaks and copper algaecides as important to investigate as sources of copper in stormwater runoff in California. Copper, along with chromium and arsenic, is also a component of chromated copper arsenate (CCA) treated wood. Although residential and commercial use of CCA treated wood has declined since the introduction of alkaline copper quaternary (ACQ) wood treatment in Florida, wood for telephone poles is still preserved in this manner. Additionally, the ACQ process uses more copper than the CCA process. Zinc was commonly reported in high concentrations in roof stormwater runoff (Pitt and Lalor, 2000). They report the major sources of zinc as road dust contaminated with wear products and zinc plated (galvanized) metal erosion. Cadmium in stormwater was reportedly observed at the highest concentrations in runoff from vehicle service areas and streets (Pitt and Lalor, 2000). Potential sources of cadmium summarized by the NRDC (1999) also include landscaping activities (fertilizers), electroplating, fuel combustion and disposal of metal containing products. Potential sources of lead reportedly include fuel, exhaust, motor oil and grease, undercoatings, brake linings, rubber and engine wear (Lehner *et al*., 1999). Lead is also used in automobile tire weights. Based on these and other studies, it is safe to conclude that much of the metal loads to the sediments analyzed from the inlet protection device study are derived from vehicular traffic and roadways (Pitt and Lalor, 2000).

The total recoverable petroleum hydrocarbons or TRPH (C_8-C_{40}) in sediment samples from the inlet filters ranged from 400 mg/kg at FP South to 1,900 mg/kg at PW Vehicle (Table 8). This was expected, as these hydrocarbons are related to fuels such as diesel and oil. Their higher molecular weight and hydrophobic properties contribute to their presence in the sediments, where they readily adsorb onto the particulates (Manahan, 1984; USDHHS, 1999). TRPH exceeded the residential exposure level for three inlets and exceeded the freshwater surface water leachability criteria for all four inlets (Table 8). However the TRPH has been concentrating in the filter for six months. The greatest amount 1,900 mg/kg was at the City of Gainesville Public Works vehicle area which has a gas fueling station less than 40 yards from the inlet.

Conclusions and Recommendations

The drop inlet filter devices were found to retain sediments in each of the stormwater inlets. Fine sand was the most prevalent size class of sediments retained. Total nitrogen, 2,600 mg/kg, was greatest in samples from the FP North site. The amount of sediment was greatest at the City of Gainesville Public Works compound, as was the TRPH. The use of this study to locate specific problem areas was very useful. More strict implementation of BMPs for these sites would likely result in a decrease of sediment and nutrient loads. Neither site has a great deal of daily customer traffic, as compared to a shopping center. To further investigate the effectiveness of inlet protection capabilities using filtering devices may warrant a study in a high traffic shopping plaza.

The two sites varied in size of their contributing areas as well as watershed characteristics. The City of Gainesville Public Works site has heavy machinery and trucks moving in and out of the site, as well as its own fueling station. Springstead Creek runs through the property and collects drainage from the site. This creek is a tributary of Hogtown Creek which flows to Haile Sink, through a series of wetlands that filter the pollutants. Sedimentation, from both internal and external sources, is a concern throughout the Hogtown Creek Watershed.

The Florida Pest Control & Chemical Company site is a commercial business with a fleet of trucks. The two inlets at Florida Pest Control & Chemical Company, due to their proximity to the road, also collected runoff from NW 2nd Street. These stormwater inlets discharge into a channelized section of Sweetwater Branch. Sweetwater Branch flows through Gainesville to Paynes Prairie where is discharges to Alachua Sink, which has an established Total Maximum Daily Load (TMDL) of 256,322 lbs/yr TN or 720 lbs/day. Florida Department of Environmental Protection (FDEP) established this TMDL based upon "Nutrient TMDL for Alachua Sink," a report that found TN was the limiting nutrient (Gao *et al.*, 2006). In other words, the flora and fauna of the system remain balanced until this nutrient threshold is surpassed.

In the City of Gainesville there are roughly 2,500 ditch bottom inlets according to the City of Gainesville Public Works (Renshaw, 2007). The cost of the filters alone for all inlets would be $128,750. The average retention of TN for one filter was 0.0011 lbs/180 days. If this is extrapolated to 2,500 filters, it equals a load reduction of 5.6 lbs/year. The average TP collected was 0.0007 lbs/180 days, which could lead to a potential load reduction of 3.5 lbs/year. This amount is minimal at best for nutrients and does not justify the expenditures that would be necessary to implement a comprehensive inlet filter program. However, for the amount of TRPH retained it may be justifiable in areas where fuel contamination is likely since the concentrations were found to exceed the soil cleanup target levels for residential at three inlets and exceeded freshwater leachability at all four inlets.

Manufacturer's guidelines for inlet protection devices suggest maintenance of the filters, in order to remove trash and debris that may reduce the filter's effectiveness. This was not necessary, since the filters were installed for a six month period and did not even come close to the capacity of the filter. The amount of sediment, leaf litter, and debris collected at all four sites combined was 9.34 lbs. There may have been some inaccuracy in the study due to the leaf litter adsorbing/absorbing some of the pollutants, and the litter was not analyzed.

In a similar study involving 50 inlet filters, it was estimated to cost $12,330, including the filters, monitoring equipment and maintenance to implement a catch basin inlet filter program (Vancouver, 2005). Their study located the problem areas in a particular basin and allowed them to pinpoint and correct the problems. The study did not promote the long term use of the filters.

The longevity of the Ultra-DrainGuard Oil and Sediment filters is six months to a year (according to the manufacturer's description) but it is dependant upon the location's terrain and site characteristics. The filters have the capacity to contain 40 lbs of pollutants, sediment, and debris. The filters are typically replaced; however they may be re-used under certain circumstances. For example, filters may be emptied and re-used at construction sites where clean sand is prevalent; however the flow may be reduced due to remaining fine particles. Using an inlet filter as a long term solution to non-point source pollution may create issues of disposal. The concentration of TRPH above the leachability criteria (Table 8) requires proper disposal.

Based on the inlet protection pilot study, ACEPD has the following recommendations:

1. Evaluate the BMPs in place at Florida Pest Control & Chemical Company to assure that nutrients are not being released to the stormwater system from the commercial operation.
2. To evaluate the BMPs in place at the City of Gainesville Public Works compound where inorganic sediments and TRPH were the highest, consider continued use of the inlet filters for a two year period of study.
3. Conduct an additional study at the City of Gainesville Public Works compound, and possibly other sites, using the Ultra DrainGuard Oil & Sediment Plus Model which utilizes X-TEX filter strips (a hydrophobic/hydrophilic material made from recycled synthetic fibers which are manufactured in order to increase surface area and interstitial spaces). These filters are specially designed to increase hydrocarbon removal from runoff.
4. Conduct a larger scale project in a large retail area.
5. Conduct a storm event monitoring study to evaluate concentrations and loading of selected metals and TRPH to the urban creeks.
6. Use deployment of the inlet filter devices to investigate complaints and problem sites where sediments, nutrients or TRPH are a potential problem.
7. Encourage "green businesses" to use and maintain inlet filters at their own expense to protect water quality.

Stormwater inlet filter devices have many benefits; they are commercially available, relatively low cost, generally require minimal periodic maintenance depending on the application, are effective under intermittent flow conditions, are easily installed below grade, require no inlet reconfiguration and function under gravity flow. Their use to supplement, not replace, BMPs provides another tool in the tool box for improving water quality in the urban environment. Their use to evaluate areas of concern as part of BMP implementation can provide direct feedback on the success or failure of the BMPs implemented. This would allow regulators and property managers to see tangible evidence in improving water quality.

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Appendix A. Photographs Showing the Location of Inlets and the Installation and Removal of the Filters

City of Gainesville Public Works Vehicle Inlet

City of Gainesville Public Works Yard Inlet: note sediment

Florida Pest Control & Chemical Company North Inlet next to NW 2nd Street

Florida Pest Control & Chemical Company South Inlet next to NW 2nd Street

Installation of inlet filter and trimming excess filter material

Removal of stormwater inlet grate

Inlet filter in place and attached to tension bars, immediately prior to removal

Appendix B-1. 2006 Rainfall Data (inches) Collected at Gainesville Regional Utilites John R. Kelly Generating Station (GRU JRK)

Day	March	April	May	June	July	August	September
1	NA	0.00	0.00	0.00	0.00	0.00	0.25
2	NA	0.00	0.00	0.35	0.54	0.00	0.00
3	NA	0.00	0.00	0.15	0.27	1.40	0.00
4	NA	0.00	0.00	0.20	0.03	0.01	0.00
5	NA	0.00	0.00	0.01	0.00	3.95	0.00
6	NA	0.00	0.00	0.00	0.00	0.01	0.29
7	0.00	0.00	0.00	0.36	0.00	0.02	NA
8	0.00	1.40	0.06	0.53	0.00	0.24	NA
9	0.00	0.00	0.10	0.02	1.03	0.00	NA
10	0.00	0.00	0.11	0.00	1.20	0.40	NA
11	0.00	0.00	0.21	0.65	0.04	0.00	NA
12	0.00	0.00	0.00	0.20	1.01	0.00	NA
13	0.00	0.00	0.00	0.00	0.35	0.00	NA
14	0.04	0.00	0.00	0.18	0.35	0.10	NA
15	0.00	0.00	0.00	0.11	0.00	0.00	NA
16	0.00	0.00	0.00	0.10	0.00	0.00	NA
17	0.00	0.00	0.00	0.00	0.00	0.00	NA
18	0.00	0.00	0.00	0.10	0.00	0.00	NA
19	0.00	0.00	0.05	0.00	0.20	0.00	NA
20	0.00	0.00	0.00	0.00	0.00	1.10	NA
21	0.10	0.60	0.00	0.00	0.00	0.00	NA
22	0.00	0.10	0.00	0.22	0.21	0.00	NA
23	0.10	0.00	0.00	0.00	0.06	0.00	NA
24	0.00	0.00	0.00	0.09	0.16	0.00	NA
25	0.00	0.00	0.00	0.19	0.00	0.00	NA
26	0.00	0.90	0.00	0.03	0.00	0.76	NA
27	0.00	0.35	0.00	2.30	0.00	0.00	NA
28	0.00	0.00	0.00	0.00	0.00	0.00	NA
29	0.00	0.00	0.00	0.00	0.10	0.07	NA
30	0.00	0.00	0.00	1.05	0.02	0.67	NA
31	0.00	NA	0.00	NA	0.36	0.35	NA
monthly total	0.24	3.35	0.53	6.84	5.93	9.08	0.54
rainfall days	3	5	5	19	16	13	2
> 1.0 inch	0	1	0	2	3	3	0

Appendix B-2. 2006 Rainfall Data (inches) Collected at Alachua County Fairgrounds by St. Johns River Water Management District (SJRWMD)

Day	March	April	May	June	July	August	September
1	NA	0.00	0.00	0.09	0.00	0.01	0.00
2	NA	0.00	0.00	0.33	0.24	0.00	0.00
3	NA	0.00	0.00	0.16	0.01	0.00	0.00
4	NA	0.00	0.00	0.01	0.00	0.00	0.00
5	NA	0.00	0.00	0.07	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	2.02	0.00	0.00
7	0.00	0.00	0.00	0.00	0.07	0.00	NA
8	0.00	1.83	0.18	0.00	0.00	0.70	NA
9	0.00	0.01	0.11	0.00	0.00	0.05	NA
10	0.00	0.00	0.06	0.00	0.00	0.00	NA
11	0.00	0.00	0.24	0.00	0.00	0.00	NA
12	0.17	0.00	0.00	1.30	0.06	0.00	NA
13	0.01	0.00	0.00	2.00	0.01	0.04	NA
14	0.00	0.00	0.00	0.26	0.00	0.19	NA
15	0.00	0.00	0.00	0.05	0.00	0.01	NA
16	0.00	0.00	0.00	0.00	0.00	0.00	NA
17	0.00	0.00	0.00	0.00	0.14	0.00	NA
18	0.00	0.00	0.00	0.00	0.01	0.20	NA
19	0.06	0.00	0.01	0.17	0.00	0.48	NA
20	0.00	0.11	0.00	0.02	0.00	0.01	NA
21	0.02	0.43	0.00	0.00	0.00	0.00	NA
22	0.01	0.08	0.00	0.00	0.02	0.00	NA
23	0.00	0.00	0.00	0.00	0.56	0.60	NA
24	0.00	0.00	0.00	0.04	0.01	0.44	NA
25	0.00	0.00	0.00	0.08	0.15	0.08	NA
26	0.00	0.04	0.00	0.00	0.01	0.01	NA
27	0.00	0.14	0.00	0.31	0.00	0.06	NA
28	0.00	0.00	0.00	0.15	0.00	0.00	NA
29	0.00	0.00	0.00	0.00	0.08	0.00	NA
30	0.00	0.00	0.00	0.00	0.13	0.10	NA
31	0.00	NA	0.00	NA	0.38	0.01	NA
monthly total	0.27	2.64	0.6	5.04	3.9	2.99	0.00
rainfall days	5	7	5	15	16	16	0
> 1.0 inch	0	1	0	2	1	0	0

Appendix C. Calculations from Sieve Analysis

Site	Sieve Number	Diameter (mm)	USDA Soil Particle Classification	Mass of Empty Sieve	Mass of Sieve + Soil Retained (g)	Soil Retained (g)	Percent Retained	Percent Passing
PW Vehicle	#10	2	very coarse sand/gravel	467.9	468.3	0.4	0.2	99.8
	#18	1	coarse/very coarse sand	636	652.6	16.6	10.3	89.5
	#30	0.595	coarse sand	418	429.9	11.9	7.4	82.1
	#45	0.355	medium sand	551.5	579	27.5	17.1	65.0
	#80	0.18	fine sand	528.7	595.9	67.2	41.7	23.3
	#120	0.125	fine sand	516.9	539.2	22.3	13.8	9.5
	< #120	< .125	clay/silt/very fine/fine sand	376.4	391.7	15.3	9.5	0.0
					Total Weight =	161.2		
PW Yard	#10	2	very coarse sand/gravel	467.9	468.4	0.5	0.2	99.8
	#18	1	coarse/very coarse sand	636.1	654.4	18.3	9.0	90.8
	#30	0.595	coarse sand	418	436.7	18.7	9.2	81.6
	#45	0.355	medium sand	551.5	588.5	37	18.1	63.5
	#80	0.18	fine sand	528.7	599.4	70.7	34.7	28.8
	#120	0.125	fine sand	516.9	544.1	27.2	13.3	15.4
	< #120	< .125	clay/silt/very fine/fine sand	376.4	407.9	31.5	15.4	0.0
					Total Weight =	203.9		
FPC North	#10	2	very coarse sand/gravel	468	468.1	0.1	0.1	99.9
	#18	1	coarse/very coarse sand	636	652.4	16.4	12.4	87.6
	#30	0.595	coarse sand	417.9	435	17.1	12.9	74.7
	#45	0.355	medium sand	551.5	576.7	25.2	19.0	55.7
	#80	0.18	fine sand	528.7	562.9	34.2	25.8	29.9
	#120	0.125	fine sand	516.9	530.3	13.4	10.1	19.8
	< #120	< .125	clay/silt/very fine/fine sand	376.4	402.7	26.3	19.8	0.0
					Total Weight =	132.7		
FPC South	#10	2	very coarse sand/gravel	467.9	472.2	4.3	2.8	97.2
	#18	1	coarse/very coarse sand	636	657.1	21.1	13.9	83.2
	#30	0.595	coarse sand	417.9	441.7	23.8	15.7	67.5
	#45	0.355	medium sand	551.5	581.4	29.9	19.7	47.8
	#80	0.18	fine sand	528.7	569.3	40.6	26.8	21.0
	#120	0.125	fine sand	516.9	530.5	13.6	9.0	12.0
	< #120	< .125	clay/silt/very fine/fine sand	376.4	394.6	18.2	12.0	0.0
					Total Weight =	151.5		

Appendix D. Laboratory Results

- **D-1. Test America: C8-C40, Cadmium, Copper, Lead, Zinc, Percent Solids, Total Nitrogen**
- **D-2. Test America: Total Phosphorus, Total Kjeldahl Nitrogen, Nitrate/Nitrite as Nitrogen, Percent Solids**
- **D-3. Advanced Environmental Laboratories: Volatile Solids in Sediment**

ANALYTICAL REPORT

Job Number: 640-8584-1

Job Description: Inlet Filter

For:
Alachua Co. Dept. of Envir. Services
201 SE 2nd Ave.
Suite 201
Gainesville, FL 32601

Attention: Mr. Sergio Quintana

Amy Marks
Project Manager I
amy.marks@testamericainc.com

12/12/2007
Revision: 2

These test results meet all the requirements of NELAC. All questions regarding this test report should be directed to the TestAmerica Project Manager who signed this test report.

TestAmerica Tallahassee Florida Department of Health Certification No. E81005
TestAmerica North Canton Florida Department of Health Certification No. E87225

Measurement uncertainty data, as referenced in Section 8.6 of the STL Tallahassee LQM, are available upon request.

Solid samples are reported on a dry weight basis unless otherwise qualified.

CASE NARRATIVE

TestAmerica Lab Reference No. / SDG.______640-8584

Project: ___ Inlet Filter

COMMENTS

The Total Nitrogen calculation was performed by TestAmerica Tallahassee using results obtained at TestAmerica North Canton. This report has been revised to include Cadmium upon client request.

RECEIPT

No exceptions were encountered.

HOLDING TIMES

All holding times were met.

PREPARATION

FL-PRO - Due to the matrix of the samples, the final volume after extraction was 50mL. The samples were reduced to a final volume of 5mL by concentrating 10mL aliquots down to 1mL separately and combining the concentrated extracts.

All other sample preparation proceeded normally.

ANALYSIS

Calibration

All acceptance criteria were met.

Blanks
FL-PRO was detected below the Practical Quantitation Limit in the Method Blank associated with batch 640-24399.

All acceptance criteria were met.

Spikes
All QC criteria were met with the following exception: The laboratory received insufficient volume to analyze batch matrix spikes with FL-PRO batch 640-24399.

Surrogates
FL-PRO - No surrogates could be recovered for sample PW Vehicle due to the sample requiring a dilution prior to analysis. The 0% surrogate recoveries are flagged “J”. One or both of the surrogates recovered outside of the method control limits in samples FP South and FP North due to sample matrix interference. The failing surrogate recoveries are flagged “J”.

FL-PRO - Both surrogates recovered above the method control limits in the Method Blank associated with batch 640-24399. The failing recoveries are flagged “J”. Reanalysis of the Method Blank confirmed these results. All associated samples had much higher detections for FL-PRO and are flagged “V”.

EXECUTIVE SUMMARY - Detections

Client: Alachua Co. Dept. of Envir. Services

Job Number: 640-8584-1

Lab Sample ID / Analyte	Client Sample ID	Result / Qualifier		Reporting Limit	Units	Method
640-8584-1	**FP SOUTH**					
C8-C40		400		25	mg/Kg	FL-PRO
Cadmium		0.66		0.50	mg/Kg	6010B
Copper		52		2.0	mg/Kg	6010B
Lead		26		0.50	mg/Kg	6010B
Zinc		650		2.0	mg/Kg	6010B
Percent Solids		99		0.00010	%	PercentMoisture
Nitrogen, Total		670		55	mg/Kg	Total Nitrogen
640-8584-2	**FP NORTH**					
C8-C40		770		26	mg/Kg	FL-PRO
Cadmium		0.85		0.47	mg/Kg	6010B
Copper		68		1.9	mg/Kg	6010B
Lead		47		0.47	mg/Kg	6010B
Zinc		440		1.9	mg/Kg	6010B
Percent Solids		97		0.00010	%	PercentMoisture
Nitrogen, Total		2600		55	mg/Kg	Total Nitrogen
640-8584-3	**PW VEHICLE**					
C8-C40		1900	V	100	mg/Kg	FL-PRO
Cadmium		0.49		0.44	mg/Kg	6010B
Copper		33		1.8	mg/Kg	6010B
Lead		32		0.44	mg/Kg	6010B
Zinc		210		1.8	mg/Kg	6010B
Percent Solids		96		0.00010	%	PercentMoisture
Nitrogen, Total		680		55	mg/Kg	Total Nitrogen
640-8584-4	**PW YARD**					
C8-C40		580		25	mg/Kg	FL-PRO
Cadmium		0.21	I	0.48	mg/Kg	6010B
Copper		8.3		1.9	mg/Kg	6010B
Lead		21		0.48	mg/Kg	6010B
Zinc		190		1.9	mg/Kg	6010B
Percent Solids		100		0.00010	%	PercentMoisture
Nitrogen, Total		560		55	mg/Kg	Total Nitrogen

METHOD SUMMARY

Client: Alachua Co. Dept. of Envir. Services

Job Number: 640-8584-1

Description	Lab Location	Method	Preparation Method
Matrix: Solid			
Florida Method for Determination of Petroleum Range Organics by GC/FID	TAL TAL	FL-DEP FL-PRO	
Ultrasonic Extraction	TAL TAL		SW846 3550B
Inductively Coupled Plasma - Atomic Emission Spectrometry	TAL TAL	SW846 6010B	
Acid Digestion of Sediments, Sludges, and Soils	TAL TAL		SW846 3050B
Total Nitrogen	TAL TAL	EPA Total Nitrogen	
General Sub Contract Method	TAL NC	Subcontract	

Lab References:

TAL NC = TestAmerica North Canton

TAL TAL = TestAmerica Tallahassee

Method References:

EPA = US Environmental Protection Agency

FL-DEP = State Of Florida Department Of Environmental Protection, Florida Administrative Code.

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

SAMPLE SUMMARY

Client: Alachua Co. Dept. of Envir. Services

Job Number: 640-8584-1

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
640-8584-1	FP South	Solid	09/26/2006 1130	09/27/2006 0930
640-8584-2	FP North	Solid	09/26/2006 1100	09/27/2006 0930
640-8584-3	PW Vehicle	Solid	09/26/2006 1200	09/27/2006 0930
640-8584-4	PW Yard	Solid	09/26/2006 1230	09/27/2006 0930

SAMPLE RESULTS

Analytical Data

Client: Alachua Co. Dept. of Envir. Services | Job Number: 640-8584-1

Client Sample ID: FP South

Lab Sample ID:	640-8584-1			Date Sampled:	09/26/2006 1130
Client Matrix:	Solid	% Moisture:	1.0	Date Received:	09/27/2006 0930

FL-PRO Florida Method for Determination of Petroleum Range Organics by GC/FID

Method:	FL-PRO	Analysis Batch: 640-24768	Instrument ID:	SGH HP 5890
Preparation:	3550B	Prep Batch: 640-24399	Lab File ID:	1J09H10.d
Dilution:	1.0		Initial Weight/Volume:	30.01 g
Date Analyzed:	10/09/2006 1230		Final Weight/Volume:	5.0 mL
Date Prepared:	09/29/2006 1000		Injection Volume:	
			Column ID:	PRIMARY

Analyte	DryWt Corrected: Y Result (mg/Kg)	Qualifier	MDL	PQL
C8-C40	400		5.8	25

Surrogate	%Rec		Acceptance Limits
o-Terphenyl	71		62 - 109
n-C39	57	J	60 - 118

Client: Alachua Co. Dept. of Envir. Services | Job Number: 640-8584-1

Client Sample ID: FP North

Lab Sample ID: 640-8584-2 | Date Sampled: 09/26/2006 1100
Client Matrix: Solid | % Moisture: 2.8 | Date Received: 09/27/2006 0930

FL-PRO Florida Method for Determination of Petroleum Range Organics by GC/FID

Method:	FL-PRO	Analysis Batch: 640-24768		Instrument ID:	SGH HP 5890
Preparation:	3550B	Prep Batch: 640-24399		Lab File ID:	1J09H12.d
Dilution:	1.0			Initial Weight/Volume:	30.0 g
Date Analyzed:	10/09/2006 1323			Final Weight/Volume:	5.0 mL
Date Prepared:	09/29/2006 1000			Injection Volume:	
				Column ID:	PRIMARY

Analyte	DryWt Corrected: Y Result (mg/Kg)	Qualifier	MDL	PQL
C8-C40	770		5.9	26

Surrogate	%Rec		Acceptance Limits
o-Terphenyl	25	J	62 - 109
n-C39	22	J	60 - 118

Analytical Data

Client: Alachua Co. Dept. of Envir. Services | Job Number: 640-8584-1

Client Sample ID: PW Vehicle

Lab Sample ID:	640-8584-3			Date Sampled:	09/26/2006 1200
Client Matrix:	Solid	% Moisture:	4.0	Date Received:	09/27/2006 0930

FL-PRO Florida Method for Determination of Petroleum Range Organics by GC/FID

Method:	FL-PRO	Analysis Batch: 640-24768	Instrument ID:	SGH HP 5890
Preparation:	3550B	Prep Batch: 640-24399	Lab File ID:	1J09H22.d
Dilution:	4.0		Initial Weight/Volume:	30.04 g
Date Analyzed:	10/09/2006 1449		Final Weight/Volume:	5.0 mL
Date Prepared:	09/29/2006 1000		Injection Volume:	
			Column ID:	PRIMARY

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	PQL
C8-C40		1900	V	24	100

Surrogate	%Rec		Acceptance Limits
o-Terphenyl	0	J	62 - 109
n-C39	0	J	60 - 118

Analytical Data

Client: Alachua Co. Dept. of Envir. Services | Job Number: 640-8584-1

Client Sample ID: **PW Yard**

Lab Sample ID:	640-8584-4			Date Sampled:	09/26/2006 1230
Client Matrix:	Solid	% Moisture:	0.4	Date Received:	09/27/2006 0930

FL-PRO Florida Method for Determination of Petroleum Range Organics by GC/FID

Method:	FL-PRO	Analysis Batch: 640-24768	Instrument ID:	SGH HP 5890
Preparation:	3550B	Prep Batch: 640-24399	Lab File ID:	1J09H17.d
Dilution:	1.0		Initial Weight/Volume:	30.01 g
Date Analyzed:	10/09/2006 1405		Final Weight/Volume:	5.0 mL
Date Prepared:	09/29/2006 1000		Injection Volume:	
			Column ID:	PRIMARY

Analyte	DryWt Corrected: Y Result (mg/Kg)	Qualifier	MDL	PQL
C8-C40	580		5.8	25

Surrogate	%Rec	Acceptance Limits
o-Terphenyl	79	62 - 109
n-C39	61	60 - 118

Analytical Data

Client: Alachua Co. Dept. of Envir. Services

Job Number: 640-8584-1

Client Sample ID: FP South

Lab Sample ID:	640-8584-1			Date Sampled:	09/26/2006 1130
Client Matrix:	Solid	% Moisture:	1.0	Date Received:	09/27/2006 0930

6010B Inductively Coupled Plasma - Atomic Emission Spectrometry

Method:	6010B	Analysis Batch: 640-24774	Instrument ID:	ICP Trace
Preparation:	3050B	Prep Batch: 640-24700	Lab File ID:	OCT06
Dilution:	1.0		Initial Weight/Volume:	0.503 g
Date Analyzed:	10/09/2006 2314		Final Weight/Volume:	50 mL
Date Prepared:	10/09/2006 1030			

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	PQL
Cadmium		0.66		0.060	0.50
Copper		52		0.18	2.0
Lead		26		0.28	0.50
Zinc		650		0.35	2.0

Analytical Data

Client: Alachua Co. Dept. of Envir. Services | Job Number: 640-8584-1

Client Sample ID: FP North

Lab Sample ID:	640-8584-2			Date Sampled:	09/26/2006 1100
Client Matrix:	Solid	% Moisture:	2.8	Date Received:	09/27/2006 0930

6010B Inductively Coupled Plasma - Atomic Emission Spectrometry

Method:	6010B	Analysis Batch: 640-24774	Instrument ID:	ICP Trace
Preparation:	3050B	Prep Batch: 640-24700	Lab File ID:	OCT06
Dilution:	1.0		Initial Weight/Volume:	0.551 g
Date Analyzed:	10/09/2006 2320		Final Weight/Volume:	50 mL
Date Prepared:	10/09/2006 1030			

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	PQL
Cadmium		0.85		0.056	0.47
Copper		68		0.17	1.9
Lead		47		0.26	0.47
Zinc		440		0.33	1.9

Analytical Data

Client: Alachua Co. Dept. of Envir. Services | Job Number: 640-8584-1

Client Sample ID: PW Vehicle

Lab Sample ID:	640-8584-3			Date Sampled:	09/26/2006 1200
Client Matrix:	Solid	% Moisture:	4.0	Date Received:	09/27/2006 0930

6010B Inductively Coupled Plasma - Atomic Emission Spectrometry

Method:	6010B	Analysis Batch: 640-24774	Instrument ID:	ICP Trace
Preparation:	3050B	Prep Batch: 640-24700	Lab File ID:	OCT06
Dilution:	1.0		Initial Weight/Volume:	0.592 g
Date Analyzed:	10/09/2006 2326		Final Weight/Volume:	50 mL
Date Prepared:	10/09/2006 1030			

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	PQL
Cadmium		0.49		0.053	0.44
Copper		33		0.16	1.8
Lead		32		0.25	0.44
Zinc		210		0.31	1.8

Analytical Data

Client: Alachua Co. Dept. of Envir. Services

Job Number: 640-8584-1

Client Sample ID: PW Yard

Lab Sample ID:	640-8584-4			Date Sampled:	09/26/2006 1230
Client Matrix:	Solid	% Moisture:	0.4	Date Received:	09/27/2006 0930

6010B Inductively Coupled Plasma - Atomic Emission Spectrometry

Method:	6010B	Analysis Batch: 640-24774	Instrument ID:	ICP Trace
Preparation:	3050B	Prep Batch: 640-24700	Lab File ID:	OCT06
Dilution:	1.0		Initial Weight/Volume:	0.525 g
Date Analyzed:	10/09/2006 2333		Final Weight/Volume:	50 mL
Date Prepared:	10/09/2006 1030			

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	PQL
Cadmium		0.21	I	0.057	0.48
Copper		8.3		0.17	1.9
Lead		21		0.27	0.48
Zinc		190		0.33	1.9

General Chemistry

Client Sample ID: FP South

Lab Sample ID: 640-8584-1 | Date Sampled: 09/26/2006 1130
Client Matrix: Solid | Date Received: 09/27/2006 0930

Analyte	Result	Qual	Units	PQL	PQL	Dil	Method
Percent Solids	99		%	0.00010	0.00010	1.0	PercentMoisture
Anly Batch: 640-24535	Date Analyzed		09/29/2006 1400				
Nitrogen, Total	670		mg/Kg	55	55	1.0	Total Nitrogen
Anly Batch: 640-24769	Date Analyzed		10/10/2006 0818				DryWt Corrected: N

Client Sample ID: FP North

Lab Sample ID: 640-8584-2 | Date Sampled: 09/26/2006 1100
Client Matrix: Solid | Date Received: 09/27/2006 0930

Analyte	Result	Qual	Units	PQL	PQL	Dil	Method
Percent Solids	97		%	0.00010	0.00010	1.0	PercentMoisture
Anly Batch: 640-24535	Date Analyzed		09/29/2006 1400				
Nitrogen, Total	2600		mg/Kg	55	55	1.0	Total Nitrogen
Anly Batch: 640-24769	Date Analyzed		10/10/2006 0818				DryWt Corrected: N

Client Sample ID: PW Vehicle

Lab Sample ID: 640-8584-3 | Date Sampled: 09/26/2006 1200
Client Matrix: Solid | Date Received: 09/27/2006 0930

Analyte	Result	Qual	Units	PQL	PQL	Dil	Method
Percent Solids	96		%	0.00010	0.00010	1.0	PercentMoisture
Anly Batch: 640-24535	Date Analyzed		09/29/2006 1400				
Nitrogen, Total	680		mg/Kg	55	55	1.0	Total Nitrogen
Anly Batch: 640-24769	Date Analyzed		10/10/2006 0818				DryWt Corrected: N

Client Sample ID: PW Yard

Lab Sample ID: 640-8584-4 | Date Sampled: 09/26/2006 1230
Client Matrix: Solid | Date Received: 09/27/2006 0930

Analyte	Result	Qual	Units	PQL	PQL	Dil	Method
Percent Solids	100		%	0.00010	0.00010	1.0	PercentMoisture
Anly Batch: 640-24535	Date Analyzed		09/29/2006 1400				
Nitrogen, Total	560		mg/Kg	55	55	1.0	Total Nitrogen
Anly Batch: 640-24769	Date Analyzed		10/10/2006 0818				DryWt Corrected: N

DATA REPORTING QUALIFIERS

Client: Alachua Co. Dept. of Envir. Services

Job Number: 640-8584-1

Lab Section	Qualifier	Description
GC Semi VOA		
	J	Estimated value; value may not be accurate.
	V	Indicates the analyte was detected in both the sample and the associated method blank.
	I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
Metals		
	U	Indicates that the compound was analyzed for but not detected.
	I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

QUALITY CONTROL RESULTS

Surrogate Recovery Report

FL-PRO Florida Method for Determination of Petroleum Range Organics by GC/FID

Client Matrix: Solid

Lab Sample ID	Client Sample ID	OTPH %Rec	NC39 %Rec
640-8584-1	FP South	71	57J
640-8584-2	FP North	25J	22J
640-8584-3	PW Vehicle	0J	0J
640-8584-4	PW Yard	79	61
MB 640-24399/1-A		120J	122J
LCS 640-24399/2-A		89	103
LCSD 640-24399/3-A		107	99

Surrogate	Acceptance Limits
OTPH = o-Terphenyl	62-109
NC39 = n-C39	60-118

Client: Alachua Co. Dept. of Envir. Services

Job Number: 640-8584-1

Method Blank - Batch: 640-24399

Method: FL-PRO
Preparation: 3550B

Lab Sample ID:	MB 640-24399/1-A	Analysis Batch:	640-24768	Instrument ID:	SGH HP 5890
Client Matrix:	Solid	Prep Batch:	640-24399	Lab File ID:	1J09H6.d
Dilution:	1.0	Units:	mg/Kg	Initial Weight/Volume:	30.0 g
Date Analyzed:	10/09/2006 1124			Final Weight/Volume:	2.0 mL
Date Prepared:	09/29/2006 1000			Injection Volume:	

Analyte	Result	Qual	MDL	PQL
C8-C40	2.4	I	2.3	10

Surrogate	% Rec		Acceptance Limits
o-Terphenyl	120	J	62 - 109
n-C39	122	J	60 - 118

Lab Control Spike/
Lab Control Spike Duplicate Recovery Report - Batch: 640-24399

Method: FL-PRO
Preparation: 3550B

LCS Lab Sample ID:	LCS 640-24399/2-A	Analysis Batch:	640-24767	Instrument ID:	SGJ Varian 3400
Client Matrix:	Solid	Prep Batch:	640-24399	Lab File ID:	1J03J38.d
Dilution:	1.0	Units:	mg/Kg	Initial Weight/Volume:	30.01 g
Date Analyzed:	10/03/2006 1755			Final Weight/Volume:	2.0 mL
Date Prepared:	09/29/2006 1000			Injection Volume:	

LCSD Lab Sample ID:	LCSD 640-24399/3-A	Analysis Batch:	640-24767	Instrument ID:	SGJ Varian 3400
Client Matrix:	Solid	Prep Batch:	640-24399	Lab File ID:	1J03J40.d
Dilution:	1.0	Units:	mg/Kg	Initial Weight/Volume:	30.0 g
Date Analyzed:	10/03/2006 1821			Final Weight/Volume:	2.0 mL
Date Prepared:	09/29/2006 1000			Injection Volume:	

	% Rec.						
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
C8-C40	78	87	63 - 153	11	25		

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

Quality Control Results

Client: Alachua Co. Dept. of Envir. Services | Job Number: 640-8584-1

Method Blank - Batch: 640-24700

Method: 6010B
Preparation: 3050B

Lab Sample ID:	MB 640-24700/1-A	Analysis Batch:	640-24774	Instrument ID:	ICP Trace
Client Matrix:	Solid	Prep Batch:	640-24700	Lab File ID:	OCT06
Dilution:	1.0	Units:	mg/Kg	Initial Weight/Volume:	0.503 g
Date Analyzed:	10/09/2006 2236			Final Weight/Volume:	50 mL
Date Prepared:	10/09/2006 1030				

Analyte	Result	Qual	MDL	PQL
Cadmium	0.060	U	0.060	0.50
Copper	0.18	U	0.18	2.0
Lead	0.28	U	0.28	0.50
Zinc	0.35	U	0.35	2.0

Lab Control Spike/ Lab Control Spike Duplicate Recovery Report - Batch: 640-24700

Method: 6010B
Preparation: 3050B

LCS Lab Sample ID:	LCS 640-24700/2-A	Analysis Batch:	640-24774	Instrument ID:	ICP Trace
Client Matrix:	Solid	Prep Batch:	640-24700	Lab File ID:	OCT06
Dilution:	1.0	Units:	mg/Kg	Initial Weight/Volume:	0.500 g
Date Analyzed:	10/09/2006 2242			Final Weight/Volume:	50 mL
Date Prepared:	10/09/2006 1030				

LCSD Lab Sample ID:	LCSD 640-24700/3-A	Analysis Batch:	640-24774	Instrument ID:	ICP Trace
Client Matrix:	Solid	Prep Batch:	640-24700	Lab File ID:	OCT06
Dilution:	1.0	Units:	mg/Kg	Initial Weight/Volume:	0.502 g
Date Analyzed:	10/09/2006 2249			Final Weight/Volume:	50 mL
Date Prepared:	10/09/2006 1030				

	% Rec.						
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Cadmium	94	92	80 - 120	2	20		
Copper	99	96	80 - 120	3	20		
Lead	93	92	80 - 120	2	20		
Zinc	94	92	80 - 120	2	20		

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

Serial Number 41759

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

SEVERN TRENT **STL**

STL ~~Savannah~~ Tallahassee
5102 LaRoche Avenue
Savannah, GA 31404

Website: www.stl-inc.com
Phone: (912) 354-7858
Fax: (912) 352-0165

Alternate Laboratory Name/Location
Phone:
Fax:

PROJECT REFERENCE	PROJECT NO.	PROJECT LOCATION (STATE)	PAGE	OF
Inlet Filter		FL		

STL (LAB) PROJECT MANAGER	P.O. NUMBER	CONTRACT NO.
Amy MARKS		

CLIENT (SITE) PM	CLIENT PHONE	CLIENT FAX
	352 264 6340	

CLIENT NAME	CLIENT E-MAIL
ACEPD	sqalntanc@alachua.fl.us

CLIENT ADDRESS: 200 SE 2nd AV #201 GV, FL 32601

COMPANY CONTRACTING THIS WORK (if applicable):

REQUIRED ANALYSIS: Metals; Total N+P; Fl. PRO → 2X 40ml vials (Call if could Anal) — NA

STANDARD REPORT DELIVERY — DATE DUE ______
EXPEDITED REPORT DELIVERY (SURCHARGE) — DATE DUE ______
NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	Metals	Total N+P	Fl. PRO	REMARKS
9/26/06	11:30 am	FP South			X			1	1	2	
9/26/06	11 am	FP North			X			1	1	2	
9/26/06	12 pm	PW Vehicle			X			1	1	2	
9/26/06	12:30 pm	PW YARD			X			1	1	2	

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
RECEIVED BY: (SIGNATURE)	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	STL SAVANNAH LOG NO.	LABORATORY REMARKS
Myron Owens	9/27/06	0930	YES ✓ NO	NA	640-8584	

STL8240-680 (12/02)

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

REVISED

PROJECT NO. 640-8584

640-8584

Lot #: A6I290430

Amy Marks

STL Tallahassee
2846 Industrial Plaza Drive
Tallahassee, FL 32301

TESTAMERICA LABORATORIES, INC.

Lois D. Ezzo
Project Manager

December 5, 2007

4101 Shuffel Street, N.W. North Canton, OH 44720 **tel** 330.497.9396 **fax** 330.497.0772 **www.testamericainc.com**

CASE NARRATIVE

A6I290430

The following report contains the analytical results for four solid samples submitted to STL North Canton by STL Tallahassee from the 640-8584 Site, project number 640-8584. The samples were received September 28, 2006, according to documented sample acceptance procedures.

STL utilizes USEPA approved methods in all analytical work. The samples presented in this report were analyzed for the parameter(s) listed on the analytical methods summary page in accordance with the method(s) indicated. Preliminary results were provided to Amy Marks on October 09, 2006. A summary of QC data for these analyses is included at the back of the report.

STL North Canton attests to the validity of the laboratory data generated by STL facilities reported herein. All analyses performed by STL facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the applicable methods. STL's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

All solid sample results are reported on an "as received" basis unless otherwise indicated by a dry weight adjustment footnote at the bottom of the analytical report page. The list of parameters, which are never reported on a dry weight basis, is included on the Sample Summary.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

If you have any questions, please call the Project Manager, Lois D. Ezzo, at 330-497-9396.

This report is sequentially paginated. The final page of the report is labeled as "END OF REPORT." The total number of pages in this report is 20.

SUPPLEMENTAL QC INFORMATION

SAMPLE RECEIVING

The temperature of the cooler upon sample receipt was 2.8°C.

CASE NARRATIVE (continued)

GENERAL CHEMISTRY

Matrix spike recovery and relative percent difference (RPD) data were not calculated for some analytes for FP SOUTH due to the sample concentration reading greater than four times the spike amount. See the Matrix Spike Report for the affected analytes which will be flagged with "NC, MSB".

EXECUTIVE SUMMARY - Detection Highlights

A6I290430

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
FP SOUTH 09/26/06 11:00 001				
Total Phosphorus	742	101	mg/kg	MCAWW 365.1
Total Kjeldahl Nitrogen	670	150	mg/kg	MCAWW 351.3
Nitrate/Nitrite as N	2.9	1.0	mg/kg	MCAWW 353.2
Percent Solids	99.0	10.0	%	MCAWW 160.3 MOD
FP NORTH 09/26/06 11:00 002				
Total Phosphorus	743	102	mg/kg	MCAWW 365.1
Total Kjeldahl Nitrogen	2600	150	mg/kg	MCAWW 351.3
Nitrate/Nitrite as N	13	1.0	mg/kg	MCAWW 353.2
Percent Solids	97.7	10.0	%	MCAWW 160.3 MOD
PW VEHICLE 09/26/06 12:00 003				
Total Phosphorus	518	52.7	mg/kg	MCAWW 365.1
Total Kjeldahl Nitrogen	670	160	mg/kg	MCAWW 351.3
Nitrate/Nitrite as N	10	1.1	mg/kg	MCAWW 353.2
Percent Solids	94.9	10.0	%	MCAWW 160.3 MOD
PW YARD 09/26/06 12:00 004				
Total Phosphorus	483	50.4	mg/kg	MCAWW 365.1
Total Kjeldahl Nitrogen	560	150	mg/kg	MCAWW 351.3
Nitrate/Nitrite as N	2.5	1.0	mg/kg	MCAWW 353.2
Percent Solids	99.2	10.0	%	MCAWW 160.3 MOD

ANALYTICAL METHODS SUMMARY

A6I290430

PARAMETER	ANALYTICAL METHOD
Nitrate-Nitrite	MCAWW 353.2
Total Kjeldahl Nitrogen	MCAWW 351.3
Total Phosphorus	MCAWW 365.1
Total Residue as Percent Solids	MCAWW 160.3 MOD

References:

MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

SAMPLE SUMMARY

A6I290430

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
JFE1K	001	FP SOUTH	09/26/06	11:00
JFE1L	002	FP NORTH	09/26/06	11:00
JFE1M	003	PW VEHICLE	09/26/06	12:00
JFE1N	004	PW YARD	09/26/06	12:00

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

TestAmerica Tallahassee

Client Sample ID: FP SOUTH

General Chemistry

Lot-Sample #...: A6I290430-001 **Work Order #...:** JFE1K **Matrix.........:** SO
Date Sampled...: 09/26/06 11:00 **Date Received..:** 09/28/06
% Moisture.....: 0.98

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Nitrate/Nitrite as N	**2.9**	**1.0**	**mg/kg**	**MCAWW 353.2**	**10/04/06**	**6277342**
		Dilution Factor: 1		MDL...........: 0.3		
Percent Solids	**99.0**	**10.0**	**%**	**MCAWW 160.3 MOD**	**10/05-10/06/06**	**6278586**
		Dilution Factor: 1		MDL...........: 10.0		
Total Kjeldahl Nitrogen	**670**	**150**	**mg/kg**	**MCAWW 351.3**	**10/05-10/06/06**	**6278455**
		Dilution Factor: 1		MDL...........: 48		
Total Phosphorus	**742**	**101**	**mg/kg**	**MCAWW 365.1**	**10/06/06**	**6279365**
		Dilution Factor: 10		MDL...........: 46.5		

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

TestAmerica Tallahassee

Client Sample ID: FP NORTH

General Chemistry

Lot-Sample #...: A6I290430-002 **Work Order #...:** JFE1L **Matrix.........:** SO
Date Sampled...: 09/26/06 11:00 **Date Received..:** 09/28/06
% Moisture.....: 2.4

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Nitrate/Nitrite as N	**13**	**1.0**	**mg/kg**	**MCAWW 353.2**	**10/04/06**	**6277342**
		Dilution Factor: 1		MDL...........: 0.3		
Percent Solids	**97.7**	**10.0**	**%**	**MCAWW 160.3 MOD**	**10/05-10/06/06**	**6278586**
		Dilution Factor: 1		MDL...........: 10.0		
Total Kjeldahl Nitrogen	**2600**	**150**	**mg/kg**	**MCAWW 351.3**	**10/05-10/06/06**	**6278455**
		Dilution Factor: 1		MDL...........: 49		
Total Phosphorus	**743**	**102**	**mg/kg**	**MCAWW 365.1**	**10/06/06**	**6279365**
		Dilution Factor: 10		MDL...........: 47.1		

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

TestAmerica Tallahassee

Client Sample ID: PW VEHICLE

General Chemistry

Lot-Sample #...: A6I290430-003 **Work Order #...:** JFE1M **Matrix.........:** SO
Date Sampled...: 09/26/06 12:00 **Date Received..:** 09/28/06
% Moisture.....: 5.1

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Nitrate/Nitrite as N	**10**	**1.1**	**mg/kg**	**MCAWW 353.2**	**10/04/06**	**6277342**
		Dilution Factor: 1		MDL............: 0.3		
Percent Solids	**94.9**	**10.0**	**%**	**MCAWW 160.3 MOD**	**10/05-10/06/06**	**6278586**
		Dilution Factor: 1		MDL............: 10.0		
Total Kjeldahl Nitrogen	**670**	**160**	**mg/kg**	**MCAWW 351.3**	**10/05-10/06/06**	**6278455**
		Dilution Factor: 1		MDL............: 51		
Total Phosphorus	**518**	**52.7**	**mg/kg**	**MCAWW 365.1**	**10/06/06**	**6279365**
		Dilution Factor: 5		MDL............: 24.2		

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

TestAmerica Tallahassee

Client Sample ID: PW YARD

General Chemistry

Lot-Sample #...: A6I290430-004 **Work Order #...:** JFE1N **Matrix.........:** SO
Date Sampled...: 09/26/06 12:00 **Date Received..:** 09/28/06
% Moisture.....: 0.85

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Nitrate/Nitrite as N	**2.5**	**1.0**	**mg/kg**	**MCAWW 353.2**	**10/04/06**	**6277342**
		Dilution Factor: 1		MDL...........: 0.3		
Percent Solids	**99.2**	**10.0**	**%**	**MCAWW 160.3 MOD**	**10/05-10/06/06**	**6278586**
		Dilution Factor: 1		MDL...........: 10.0		
Total Kjeldahl Nitrogen	**560**	**150**	**mg/kg**	**MCAWW 351.3**	**10/05-10/06/06**	**6278455**
		Dilution Factor: 1		MDL...........: 48		
Total Phosphorus	**483**	**50.4**	**mg/kg**	**MCAWW 365.1**	**10/06/06**	**6279365**
		Dilution Factor: 5		MDL...........: 23.2		

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

METHOD BLANK REPORT

General Chemistry

Client Lot #...: A6I290430 **Matrix.........:** SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Nitrate/Nitrite as N		Work Order #: JFMX01AA		MB Lot-Sample #: A6J040000-342		
	ND	1.0	mg/kg	MCAWW 353.2	10/04/06	6277342
		Dilution Factor: 1				
Percent Solids		Work Order #: JFT4E1AA		MB Lot-Sample #: A6J050000-586		
	ND	10.0	%	MCAWW 160.3 MOD	10/05-10/06/06	6278586
		Dilution Factor: 1				
Total Kjeldahl Nitrogen		Work Order #: JFREJ1AA		MB Lot-Sample #: A6J050000-455		
	ND	150	mg/kg	MCAWW 351.3	10/05-10/06/06	6278455
		Dilution Factor: 1				
Total Phosphorus		Work Order #: JFWCA1AA		MB Lot-Sample #: A6J060000-365		
	ND	10.0	mg/kg	MCAWW 365.1	10/06/06	6279365
		Dilution Factor: 1				

NOTE(S):

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

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: A6I290430 **Matrix.........:** SOLID

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Nitrate/Nitrite as N		Work Order #: JFMX01AC	LCS Lot-Sample#: A6J040000-342		
	98	(85 - 115)	MCAWW 353.2	10/04/06	6277342
		Dilution Factor: 1			
Total Kjeldahl Nitrogen		Work Order #: JFREJ1AC	LCS Lot-Sample#: A6J050000-455		
	80	(70 - 133)	MCAWW 351.3	10/05-10/06/06	6278455
		Dilution Factor: 1			
Total Phosphorus		Work Order #: JFWCA1AC	LCS Lot-Sample#: A6J060000-365		
	84	(75 - 125)	MCAWW 365.1	10/06/06	6279365
		Dilution Factor: 1			

NOTE(S):

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

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: A6I290430 **Matrix.........:** SO
Date Sampled...: 09/26/06 11:00 **Date Received..:** 09/28/06

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Nitrate/Nitrite as N		WO#: JFE1K1AF-MS/JFE1K1AG-MSD			MS Lot-Sample #: A6I290430-001		
	99	(85 - 115)			MCAWW 353.2	10/04/06	6277342
	98	(85 - 115)	0.41	(0-20)	MCAWW 353.2	10/04/06	6277342
		Dilution Factor: 1					
Total Phosphorus		WO#: JFE1K1AJ-MS/JFE1K1AK-MSD			MS Lot-Sample #: A6I290430-001		
	NC,MSB	(75 - 125)			MCAWW 365.1	10/06/06	6279365
	NC,MSB	(75 - 125)		(0-20)	MCAWW 365.1	10/06/06	6279365
		Dilution Factor: 1					

NOTE(S):

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

Results and reporting limits have been adjusted for dry weight.

NC The recovery and/or RPD were not calculated.

MSB The recovery and RPD were not calculated because the sample amount was greater than four times the spike amount.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: A6I290430 **Matrix.........:** SOLID
Date Sampled...: 09/19/06 15:05 **Date Received..:** 09/20/06

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
						% Moisture.....: 68	
Total Kjeldahl Nitrogen		WO#: JEMD31D0-MS/JEMD31D1-MSD			MS Lot-Sample #: C6I200133-003		
	64	(50 - 120)			MCAWW 351.3	10/05-10/06/06	6278455
	61	(50 - 120)	2.2	(0-50)	MCAWW 351.3	10/05-10/06/06	6278455
		Dilution Factor: 1					

NOTE(S):

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

Results and reporting limits have been adjusted for dry weight.

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: A6I290430 **Work Order #...:** JE57P-SMP JE57P-DUP **Matrix.......:** SOLID

Date Sampled...: 09/26/06 14:20 **Date Received..:** 09/27/06

% Moisture.....: 9.0

PARAM RESULT	DUPLICATE RESULT	UNITS	RPD	RPD LIMIT	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids					SD Lot-Sample #: A6I270253-003		
91.0	93.5	%	2.7	(0-20)	MCAWW 160.3 MOD	10/05-10/06/06	6278586

Dilution Factor: 1

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: A6I290430 **Work Order #...:** JFE1K-SMP JFE1K-DUP **Matrix.......:** SO

Date Sampled...: 09/26/06 11:00 **Date Received..:** 09/28/06

% Moisture.....: 0.98

PARAM RESULT	DUPLICATE RESULT	UNITS	RPD	RPD LIMIT	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids					SD Lot-Sample #: A6I290430-001		
99.0	99.1	%	0.13	(0-20)	MCAWW 160.3 MOD	10/05-10/06/06	6278586
		Dilution Factor: 1					

NOTE(S):

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

Results and reporting limits have been adjusted for dry weight.

Serial Number 41759

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

SEVERN TRENT **STL** N. Canton

STL ~~Savannah~~ Tallahassee
5102 LaRoche Avenue
Savannah, GA 31404
Website: www.stl-inc.com
Phone: (912) 354-7858
Fax: (912) 352-0165

Alternate Laboratory Name/Location
Phone:
Fax:

PROJECT REFERENCE: Inlet Filter	PROJECT NO.	PROJECT LOCATION (STATE): FL	PAGE ___ OF ___
STL (LAB) PROJECT MANAGER: Amy MARKS	P.O. NUMBER	CONTRACT NO.	STANDARD REPORT DELIVERY / DATE DUE
CLIENT (SITE) PM	CLIENT PHONE: 352 264 6840	CLIENT FAX	EXPEDITED REPORT DELIVERY (SURCHARGE) / DATE DUE
CLIENT NAME: ACEPD	CLIENT E-MAIL: squintana@alachua.fl.us		
CLIENT ADDRESS: 200 SE 2nd AV #201 GVL, FL 32601			
COMPANY CONTRACTING THIS WORK (if applicable)			NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

REQUIRED ANALYSIS: Metals | Total N+P | FLO PRO → 2X 40ml vials (all I could find)

MATRIX TYPE: COMPOSITE (C) OR GRAB (G) INDICATE; AQUEOUS (WATER); SOLID OR SEMISOLID; AIR; NONAQUEOUS LIQUID (OIL, SOLVENT,...)

NA ——

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G)	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID	Metals	Total N+P	FLO PRO	REMARKS
9/26/06	11:30 am	FP South			X			1	1	2	
9/26/06	11 am	FP North			X			1	1	2	
9/26/06	12:30 pm	PW Vehicle			X			1	1	2	
9/26/06	12 pm	PW YARD			X			1	1	2	

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
			[signature]	9/27/06	1800			
RECEIVED BY: (SIGNATURE)	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**
			[signature]	9-28-06	9:20			

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	STL SAVANNAH LOG NO.	LABORATORY REMARKS
Myron Owens	9/27/06	0930	YES (marked) / NO	NA	640-8584	

STL8240-680 (12/02)

STL Cooler Receipt Form/Narrative **Lot Number:** A6I290430
North Canton Facility

Client: STL TALLAHASSEE Project: INLET FILTER Quote#: 67306
Cooler Received on: 9-28-06 Opened on: 9-28-06 by: MJL (Signature)
Fedx ☒ Client Drop Off ☐ UPS ☐ DHL ☐ FAS ☐ STL Courier ☐
Stetson ☐ US Cargo ☐ Other: ________
STL Cooler No#________ Foam Box ☐ Client Cooler ☒ Other ________

1. Were custody seals on the outside of the cooler? Yes ☐ No ☒ Intact? Yes ☐ No ☐ NA ☒
   If YES, Quantity________
   Were the custody seals signed and dated? Yes ☐ No ☐ NA ☒
2. Shipper's packing slip attached to this form? Yes ☒ No ☐ NA ☐
3. Did custody papers accompany the samples? Yes ☒ No ☐ Relinquished by client? Yes ☒ No ☐
4. Did you sign the custody papers in the appropriate place? Yes ☒ No ☐
5. Packing material used: Bubble Wrap ☒ Foam ☐ None ☐ Other :________
6. Cooler temperature upon receipt 2.8 °C (see back of form for multiple coolers/temp)

METHOD: Temp Vial ☐ Coolant & Sample ☐ Against Bottles ☒ IR ☐ ICE/H_2O Slurry ☐
COOLANT: Wet Ice ☒ Blue Ice ☐ Dry Ice ☐ Water ☐ None ☐

7. Did all bottles arrive in good condition (Unbroken)? Yes ☒ No ☐
8. Could all bottle labels and/or tags be reconciled with the COC? Yes ☒ No ☐
9. Were samples at the correct pH upon receipt? Yes ☐ No ☐ NA ☒
10. Were correct bottles used for the tests indicated? Yes ☒ No ☐
11. Were air bubbles >6 mm in any VOA vials? Yes ☐ No ☐ NA ☒
12. Sufficient quantity received to perform indicated analyses? Yes ☒ No ☐
13. Was a Trip Blank present in the cooler? Yes ☐ No ☒ Were VOAs on the COC? Yes ☐ No ☒

Contacted PM ________ Date:________ by:________ via Voice Mail ☐ Verbal ☐ Other ☐
Concerning: ________

√

1. CHAIN OF CUSTODY

The following discrepancies occurred:

2. SAMPLE CONDITION

Sample(s) ________ were received after the recommended holding time had expired.
Sample(s) ________ were received in a broken container.

3. SAMPLE PRESERVATION

Sample(s) ________ were further preserved in sample receiving to meet recommended pH level(s). *Nitric Acid Lot #* 122805-*HNO3; Sulfuric Acid Lot #* 071805-*H2SO4; Sodium Hydroxide Lot #* -100405 -*NaOH; Hydrochloric Acid Lot #* 100504-*HCl; Sodium Hydroxide and Zinc Acetate Lot #* 071604-*CH3COO2ZN/NaOH*

Sample(s) ________ were received with bubble > 6 mm in diameter (cc: PM)

4. Other (see below or back)

Client ID	pH	Date	Initials

STL Cooler Receipt Form/Narrative
North Canton Facility

Client ID	pH	Date	Initials

Cooler	Temp	Method	Coolant

Discrepancies Cont.

END OF REPORT

Advanced Environmental Laboratories, Inc.

6815 SW Archer Road
Gainesville, Florida 32608
(352) 377-2349
FAX (352) 395-6639

December 12, 2007

Serial: LAB-0712

Stacie Greco
Alachua County Environmental Protection Dept.
201 SE 2nd Avenue Suite 201
Gainesville, FL 32601
RE: Inlet Study
Work Order: 0712105

Enclosed are the results of analyses for samples received by the laboratory on December 6, 2007.

All data were determined in accordance with published procedures (EPA Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Rev March 1983; and Standard Methods for the Examination of Water and Wastewater, 18th Edition, 1992). Our laboratory is certified by Florida Department of Health (FDH No. E82001).

All results were determined in accordance with NELAP requirements and in accordance with the chain of custody document unless noted in the report case narrative or data report. The results relate only to the samples listed on the chain of custody. All data is subject to a degree of uncertainty. For a discussion of laboratory uncertainty, please contact your project manager. This analytical report must be reproduced in its entirety. The report pages are numbered separately from the chain of custody and any sample receipt documentation, which, if appropriate, are included in an unnumbered appendix.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Karen Daniels
Operations Manager
kdaniels@aellab.com

Advanced Environmental Laboratories, Inc.

6815 SW Archer Rd
Gainesville, FL 32608
352.377.2349 Phone
352.395.6639 Fax
NELAP Certified - FDH #E82001

Alachua County Environmental Protection Dept. 201 SE 2nd Avenue Suite 201 Gainesville, FL 32601	Project: Inlet Study Project Manager: Stacie Greco	**Reported:** 12/12/07 10:33

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
PW Vehicle	0712105-01	Soil	12/06/07 00:00	12/06/07 16:28
PW Yard	0712105-02	Soil	12/06/07 00:00	12/06/07 16:28
FP North	0712105-03	Soil	12/06/07 00:00	12/06/07 16:28
FP South	0712105-04	Soil	12/06/07 00:00	12/06/07 16:28

REPORT OF RESULTS

PW Vehicle
0712105-01 (Soil)

Analysis	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Volatile Solids in Sediment	3.7	0.1	% by Weight	1	7121018	12/10/07	12/10/07 13:01	

PW Yard
0712105-02 (Soil)

Analysis	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Volatile Solids in Sediment	4.1	0.1	% by Weight	1	7121018	12/10/07	12/10/07 13:01	

FP North
0712105-03 (Soil)

Analysis	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Volatile Solids in Sediment	15.6	0.1	% by Weight	1	7121018	12/10/07	12/10/07 13:01	

FP South
0712105-04 (Soil)

Analysis	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Volatile Solids in Sediment	22.7	0.1	% by Weight	1	7121018	12/10/07	12/10/07 13:01	

Advanced Environmental Laboratories, Inc.

6815 SW Archer Rd
Gainesville, FL 32608
352.377.2349 Phone
352.395.6639 Fax
NELAP Certified - FDH #E82001

Alachua County Environmental Protection Dept.
201 SE 2nd Avenue Suite 201
Gainesville, FL 32601

Project: Inlet Study
Project Manager: Stacie Greco

Reported:
12/12/07 10:33

QUALITY CONTROL FOR SAMPLES

Solids - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 7121018 = Volatile Solids in Sediment										
Blank (7121018-BLK1)										
Volatile Solids in Sediment	0.1 U	0.1	% by Weight							
Duplicate (7121018-DUP1)	**Source: 0712105-01**									
Volatile Solids in Sediment	4.1	0.1	% by Weight		3.7			10	20	

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NOTES AND DEFINITIONS

U	Analyte not detected at or above the method detection limit
I	Analyte not detected above the practical quantitation limit.
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Advanced Environmental Laboratories, Inc.

- ❑ Jacksonville: 6601 Southpoint Parkway, Jacksonville, FL 32216 • (904) 363-9350 Fax (904) 363-9354
- ❑ Tampa: 9610 Princess Palm Avenue, Tampa, FL 33619 • (813) 630-9616 Fax (813) 630-4327
- ❑ Gainesville: 6815 SW Archer Road, Gainesville, FL 32608 • (352) 377-2349 Fax (352) 395-6639
- ❑ Orlando: 528 S. North Lake Blvd., Suite 1016, Altamonte Springs, FL 32701 • (407) 937-1594 Fax (407) 937-1597

CHAIN OF CUSTODY RECORD

LAB NUMBER: 0712105

Page ____ of ____

CLIENT NAME: ACEPD

PROJECT NAME: Inlet Study

ADDRESS: 201 SE 2nd Ave, Ste 20

P.O. NUMBER / PROJECT NUMBER:

PROJECT LOCATION:

PHONE: 264-6800 FAX:

CONTACT: Robin Hallbourg

SAMPLED BY:

TURN AROUND TIME:

❑ STANDARD

❑ RUSH ____

REMARKS / SPECIAL INSTRUCTIONS:

BOTTLE SIZE & TYPE

ANALYSIS REQUIRED: VS/AFDW

Preserv

WW= waste water **SW**=surface water **GW**=ground water **DW**=drinking water **OIL** **A**=air **SO**=soil **SL**=sludge

SAMPLE ID	SAMPLE DESCRIPTION	Grab Composite	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. CONT.	Preserv	VS/AFDW							LAB NUMBER
PW Vehicle			12/6/07		SO	1		1							-01
PW Yard			↓		↓	↓		1							-02
FPC North			↓		↓	↓		1							-03
FPC South			↓		↓	↓		1							-04

I = Ice H = (HCl) S = (H_2SO_4) N = (HNO_3) T = (Sodium Thiosulfate)

	Relinquished by:	Date	Time	Received by:	Date	Time
1	Pearl Breckenridge	12/6/07	4:28	[signature]	12-6-07	1628
2						
3						
4						

Shipment Out: / / Ret: / /

Method Via: ____ Via: ____

Sample Kit RB ____ D/T ____ AB ____ D/T ____ Trip Bl. ❑ ❑

Cooler # ____

Received on ice: ❑ yes ❑ no QC ❑ sent ❑ received

Advanced Environmental Labs Inc

Advanced Environmental Labs
6815 SW Archer Rd.
Gainesville, FL 32608

Client: ACE PD

Project name: Inlet Study

Date/Time Rcvd: 12-6-07/1628

Log-In request number: 0712105

Received by: CSTL

Completed by: CSTL

Cooler/Shipping Information:

Courier: ☐ AEL ☑ Client ☐ UPS ☐ Pony Express ☐ FedEx ☐ Blue Streak ☐ ASAP ☐ Other (describe): ______

Type: ☐ Cooler ☑ Box ☐ Other (describe) Used LT-1 mini temp. F.S.

Cooler temperature: Identify the cooler and document the temperature blank or ice water measurement

Cooler ID	N/A				
Temp (°C)					
Temp taken from	☐ Temp blank ☐ Sample bottle	☐ Temp blank ☐ Sample bottle	☐ Temp blank ☐ Sample bottle	☐ Temp blank ☐ Sample bottle	☐ Temp blank ☐ Sample bottle
Temp measured with	☐ IR gun ☐ Thermometer (enter ID):	☐ IR gun ☐ Thermometer (enter ID):	☐ IR gun ☐ Thermometer (enter ID):	☐ IR gun ☐ Thermometer (enter ID):	☐ IR gun ☐ Thermometer (enter ID):

Other Information:

Any "NO" responses or discrepancies should be explained in the "Comments" section below.

CHECKLIST	YES	NO	NA
1. Were custody seals on shipping container(s) intact?			X
2. Were custody papers properly included with samples?	X		
3. Were custody papers properly filled out (ink, signed, match labels)?	X		
4. Did all bottles arrive in good condition (unbroken)?	X		
5. Were all bottle labels complete (sample #, date, signed, analysis, preservatives)?	X		
6. Did the sample labels agree with the chain of custody?	X		
7. Were correct bottles used for the tests indicated?	X		
8. Were proper sample preservation techniques indicated on the label?	X		
9. Were samples received within holding times?	X		
10. Were all VOA vials checked for the presence of air bubbles?			X
11. Were there air bubbles present in the VOA vials?			X
12. Were samples in direct contact with wet ice? If "No," check one: ☐ NO ICE ☐ BLUE ICE			X
13. Was the cooler temperature less than 6°C?			X
14. Were sample pHs checked and recorded by Sample Control? *NOTE: VOA samples are checked by laboratory analysis.*			X
15. Were the sample containers provided by AEL?	X		
16. Were samples accepted into the laboratory?	X		

Comments:

C:\Documents and Settings\TWilliams\Desktop\Login Checklist.doc

Karen Daniels

From: Water Quality Temp [wqtemp@AlachuaCounty.US]

Sent: Monday, December 10, 2007 3:11 PM

To: kdaniels@aellab.com

Subject: soil samples

Karen
If it is not a problem, can you change the sample name for the report and EDD?
The soil samples being analyzed today:
FPC North and South should be FP North and South (no "C")
Thank you
Pearl
