Biological Assessment of

Tampa Electric Company (TECO) – Hooker's Point

Hillsborough County

NPDES #FL0000825

Sampled: November/December 1999

September 2000

Biology Section
Bureau of Laboratories
Division of Resource Assessment and Management

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection

Results of Fifth Year Inspections

Discharger:	TECO-Hooker's Point Plant
County:	Hillsborough
NPDES Number:	FL0000825
Permit Expiration Date:	September 30, 1999

Toxics Sampling Inspection (**XSI**)

Date Sampled: 30 November 1999, 02 December 1999

Results: Iron and manganese were detected in the effluent at a level that complied with Class III marine water quality standards. No organic pollutants were detected in the effluent sample.

Compliance Biomonitoring Inspection (**CBI**)

Date Sampled: November 30 and December 02, 1999

Results: The effluent sample was not toxic to the invertebrate, *Americamysis bahia,* or to the fish, *Menidia beryllina.*

Impact Bioassessment Inspection (**IBI**)

Date Sampled: 30 November 1999, 02 December 1999

Results: Diversity at test site 2 was in violation of Class III water quality standards (Rule 62-302.530 (11) FAC). The effluent did not appear to negatively affect the biological communities at the test sites, and several measures of phytoplankton and macroinvertebrate community health were better at the test sites compared to the control site. For example, macroinvertebrate taxa richness was 44% lower at the control site compared to both test sites. The number of Polychaete taxa at test site 1 was 133% higher than at the control site and 100% higher at test site 2 compared to the control site. The differences among study areas may be due to substrate differences rather than an effluent effect. The sediments at test site 1 were primarily coarse sands, while those at the control site and test site 2 were predominantly silt–clay sized particles.

Water Quality Inspection (**WQI**)

Date Sampled: 30 November 1999, 02 December 1999

Results: Nutrient levels at the test site were comparable to the control site, but were greater than 70-80% of levels (with the exception of ammonia 40-50% higher) typically found in Florida's estuaries, suggesting sources of nutrients other than the effluent in the study area. AGP, which measures bioavailable nutrients via algal response, was below the 10 mg dry wt/L "problem threshold" at all three study sites. The effluent AGP was 5.2 mg dry wt/L.

Biological assessments are prepared by DEP staff to provide information useful in reviewing an NPDES permit renewal application for the subject facility. This assessment will be used in conjunction with other information concerning the facility and its receiving water body to determine appropriate final permit conditions.

Introduction

The Tampa Electric Company (TECO)-Hooker's Point Steam Plant is located in Hillsborough County, Florida (see map in the Appendix). The TECO plant is an electric power generating facility, and consists of six fuel-oil fired boilers and five steam turbine generator units. The generators have nameplate ratings from 33 MW to 81.6 MW, with a station total of 232.6 MW. Once-through condenser cooling is achieved at each of the steam turbine units by using water from Sparkman Channel. The used, heated, circulating water is released into a discharge canal via Outfall 003, which flows into Sparkman Channel and then into Hillsborough Bay. Other TECO plant wastewater streams, such as the non-contact once-through cooling water, are collected in a 320,000 gallon wastewater tank and then discharged into the City of Tampa Sanitary Sewer system in accordance with permit No. 1048 or its successor. The design flow of the cooling system is 256.9 MGD; flow during this survey was approximately 122 MGD.

State and NPDES permits for the facility do not contain a numeric limit for temperature. The permits do state that the temperature rise shall not cause harm to the aquatic life or vegetation in the receiving body of water (see Facility Summary in Appendix). All other permit limits are listed in Table 1.

Methods

The purpose of this investigation was to determine the effects of the TECO cooling water discharge on the receiving water. To establish discharge effects, a comparison of biological community health was made between field designated sites. A control site, located in Sparkman Channel 2.76 km south of the two test sites, and the outfall site. The control site is closer to Hillsborough Bay so it may be more tidally influenced than either of the test sites or the outfall site. Two test sites were placed to bracket the outfall; test site 1 is located east of the outfall and test site 2 is located west of the outfall. A Habitat Assessment was performed in situ establishing comparability between sites. Supplemental physical and chemical data were also collected from the effluent and field sites. Effluent from the TECO plant was analyzed for nutrients, metals, and organic constituents (base neutral and acid extractables and pesticide extractables). Data for this report were collected on November 30, 1999, and December 2, 1999.

Using the invertebrate *Americamysis bahia* and the fish *Menidia beryllina* as test organisms, acute screening toxicity bioassays were conducted on an effluent sample.

Benthic macroinvertebrate communities from the control site and both test sites were evaluated. Quantitative invertebrate collections were made using petite Ponar sampling gear. Sediments from the control site and each test site were analyzed for grain size, percent organic matter, and metals. Sampling for phytoplankton was conducted at the three sites by subsurface grabs using water bottles. Chlorophyll *a* was also determined for phytoplankton communities. The test organism *Dunaliella tertiolecta* was used for algal growth potential. All field and laboratory methods for DEP investigations are carried out following the Bureau of Laboratory's Standard Operating Procedures (SOP's) which may be reviewed at www.floridadep.org/labs/sops.htm.

Nine measurements of macroinvertebrate and algal community health have been used to determine the effects of the discharge on those community assemblages in the receiving water. These measurements are: marine benthic habitat assessment; taxa richness; Shannon-Weaver Diversity Index; % filter feeder; % pelecypoda; algal density; chlorophyll *a*; Algal Growth Potential (AGP) and % tubificids. For a discussion of each of these measures, see *Explanation of Measurements of Community Health* in the Appendix.

For graphical purposes, the percent difference for number of taxa, diversity index, % filter-feeders, and % pelecypoda is calculated as

Table 1. Effluent limits and summary of chemistry data.

TECO -- Hooker's Point	Effluent Limits	Influent Sample	Effluent Sample	Control Site	Test Site 1	Test Site 2
Organic Constituents (µg/L)						
None Detected	-	-	-	-	-	-
Metals (µg/L) - Water						
Aluminum	≤ 1500 **	-	500 U	-	-	-
Arsenic	≤ 50 **	-	40 U	-	-	-
Cadmium	≤ 9.3 **	-	0.4 U	-	-	-
Chromium	-	-	20.0 U	-	-	-
Copper	≤ 2.9 **	-	20 U	-	-	-
Iron	≤ 300 **	-	340 I	-	-	-
Lead	≤ 5.6 **	-	2.5 U	-	-	-
Manganese	-	-	13 I	-	-	-
Nickel	≤ 8.3 **	-	13 U	-	-	-
Selenium	≤ 71 **	-	30 U	-	-	-
Silver	≤ 2.3 **	-	0.3 U	-	-	-
Zinc	≤ 86 **	-	100 U	-	-	-
Metals (µg/Kg) - Sediments						
Aluminum	-	-	-	11,200	9,330	16,666
Calcium	-	-	-	720	108,000	77,000
Chromium	-	-	-	5.7 J	85.6 J	68.6 J
Copper	-	-	-	1.24 I	83.4	222
Iron	-	-	-	4,300	58,800	28,800
Lead	-	-	-	2,010 J	2,010 J	432 J
Magnesium	-	-	-	978	4,100	11,300
Manganese	-	-	-	6.6 J	1.090 J	183 J
Potasium	-	-	-	479	817	3,550
Sodium	-	-	-	4,210	7,040	30,800
Zinc	-	-	-	16 U	718 J	550 J
Sediment Particle Size (%Vol)						
<0.063 mm	-	-	-	38.9	17.9	68.3
0.063--0.125 mm	-	-	-	9.58	2.53	9.20
0.125--0.25 mm	-	-	-	32.9	6.33	6.66
0.25--0.50 mm	-	-	-	13.4	11.1	5.23
0.50-- 2.00 mm	-	-	-	5.23	62.2	10.3
Sediment Percent Organic	-	-	-	1.23	5.11	13.4
Nutrients (mg/L)						
Ortho-phosphate	-	-	0.12	0.11 Q	0.12	0.13
Total phosphorus	-	-	0.19	0.19	0.18	0.18 A
Ammonia	-	-	0.05 J	0.05 J	0.06 J	0.07 J
Nitrate+Nitrite	-	-	0.05 I	0.07	0.05	0.09
TKN	-	-	0.78	0.88	0.83	0.82 A
Organic Nitrogen	-	-	0.73	0.83	0.77	0.75
Total Nitrogen	-	-	0.83	0.95	0.88	0.91
General Phys-Chem Parameters						
DO (mg/L) bottom	≤ 5.0 **	5.9	5.8	-	5.7	5.8
pH (SU) bottom	6.5-8.5 **	7.6	7.5	-	7.2	6.5
Conductivity (µmhos/cm) bottom	-	39,500	39,900	-	40,874	40,577
Salinity (ppt) bottom	-	27.5	≤ 25.7	-	29.3	29.1
Temperature (°C) surface	-	23.9	32.2	21.6	24.7	26.1
BOD, 5 day (mg/L)	-	-	2 U	2 U	2 U	2 U
Total Suspended Solids (mg/L)	-	-	13	11	16	13
Turbidity (mg/L)	-	-	5	3.9	3.4	3.3
Chlorophyll *a*	-	-	-	5.1	3.1	2.9
AGP (mg dry wt/L)	-	-	5.2	5.7	4.6	6.6
Toxicity (48-hour static, screening bioassy)						
Bioassay - Fish	-	-	Not Toxic	-	-	-
Bioassay - Invertebrate	-	-	Not Toxic	-	-	-

** Class III water quality standard
A - Value is the mean of two or more determinations
I - Value is < the MQL, and ≥ the MDL
J - Estimated value
Q - Sample held beyond normal holding time
U - Analyzed for but not detected; value is the MDL
J - Estimated value

the control site minus the test site divided by the control site. The percent difference for algal density, chlorophyll *a*, AGP, and % tubificidae is calculated as the test site minus the control site divided by the control site.

The Florida Department of Environmental Protection personnel involved in this investigation were: Andrea Grainger and Cindy Cathey (DEP Southwest District), and Meiquin Chin, Ken Espy, Marshall Faircloth, Russell Frydenborg, Michael Heyn, Maosen Hua, Joy Jackson, Edwin Loschi, Vicki McGee, Elizabeth Miller, Urania Quintana, Johnny Richardson, Julie Riley, and Steve Wolfe (DEP Central Biology Laboratory in Tallahassee). The report was reviewed by the Point Source Studies Review Committee: Wayne Magley, Michael Tanski, Chuck Ziegmont, and, District representatives.

Results

Shorelines at all study sites consisted of seawalls (see Habitat Assessment Field Data Sheets in Appendix). Oyster bars were the only community type observed at the control and test sites. There were differences in the sediment grain size among the study sites (Table 1). The silt-clay component (particles 0.063 mm in diameter or smaller) made up a much larger portion of the samples from the control site and test site 2. Thirty-nine percent and 68% of the control site and test site 2, respectively, were silt-clay sized particles compared to 17.9% of test site 1. In contrast, 73.3% of the particles at test site 1 were coarser sands (0.25–2.0 mm in diameter), while only 18.6% of the control site and 15.5% of test site 2 were coarse sands.

Habitat scores were in the "fair" category at all study sites (see Habitat Assessment Field Data Sheets in Appendix). Due to the presence of oyster bars, the control site received a higher Habitat Assessment score (40 points) than either test site (31 points each). The remaining results are in Tables 1 and 2.

Table 2. Community structure of control and test sites.

TECO - Hooker's Point	Control Site	Test Site 1	Test Site 2
Macroinvertebrate Quantitative			
Number of Taxa	9	13	13
Shannon-Weaver diversity	2.95	2.85	2.17
No. Polychaete Taxa	3	7	6
Habitat Assessment	40	31	31
Community Composition			
% Amphipoda	0.0	3.6	2.1
% Ophiuroidea	7.1	0.0	0.0
% Decapoda	21.4	0.0	2.1
% Gastropoda	0.0	0.0	10.6
% Mysidacea	7.1	0.0	0.0
% Nemertea	0.0	7.1	4.3
% Pelecypoda	28.6	3.6	0.0
% Polychaeta	28.6	55.4	14.9
% Thoracica	7.1	1.8	0.0
% Tubificidae	0.0	25.0	63.8
% Other	0.1	3.5	2.2
Functional Feeding Groups			
% Browsers-grazers	3.6	0.0	1.1
% Burrowing Deposit Feeders	0.0	64.3	63.8
% Predators/Carnivores	14.3	17.9	14.9
% Scavengers	10.7	0.0	1.1
% Scrapers	0.0	0.0	10.6
% Surface Deposit Feeders	21.4	11.6	5.3
% Suspension Feeders	50.0	6.2	3.2
Phytoplankton Algae			
Number of Taxa	16	20	16
Shannon-Weaver diversity	1.44	1.51	2.11
Algal Density (#/mL)	2,948	3,024	2,194
% Blue-green	5.2	5.0	8.3
% Cryptophytes	4.0	3.2	4.2
% Diatoms	81.9	82.9	71.3
% Dinoflagellates	0.0	0.3	0.0
% Green	8.0	8.0	15.4

Discussion

Iron and manganese were detected in the effluent at a level that was less than the minimum quantitation limit (Table 1). The surface water temperature at test site 1 (24.7°C) and test site 2 (26.1°C), was significantly warmer than the temperature of the control site (21.6°C); an effect apparently due to the effluent (32.2°C). All other physical or chemical measures were similar among the study sites (Table 1).

The effluent sample was not toxic to the fish, *Menidia be-*

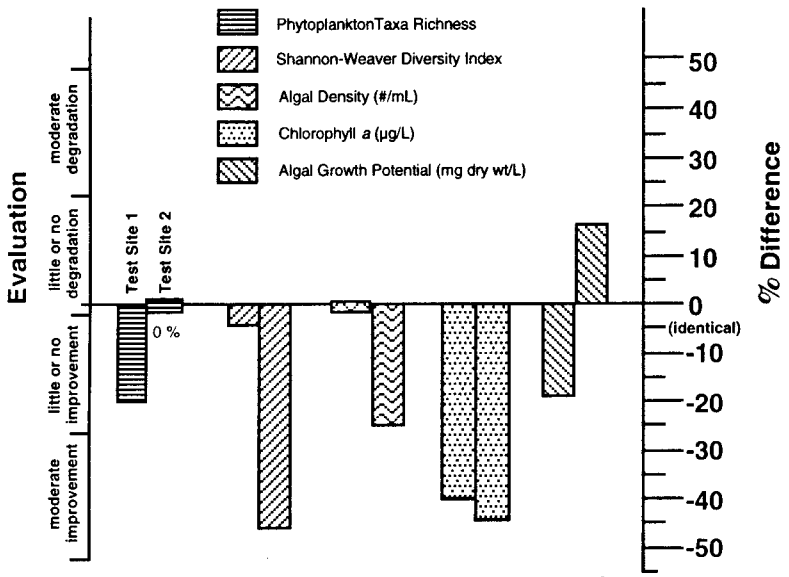

Figure 1. Effect of discharge on the phytoplankton community.

ryllina, or to the invertebrate, *Americamysis bahia,* during the 48-hour bioassay (Appendix).

Nutrient levels at all three study sites were comparable and were greater than 70-80% of levels typically found in Florida's estuaries levels, with the exception of ammonia which was 40-50% higher (see *Typical Values for Selected Parameters in Florida Waters* in the Appendix). These results suggest that nutrient sources, other than the effluent, are responsible for the elevated levels in this portion of Sparkman Channel. AGP, which measures bioavailable nutrients via algal response, was below the 10 mg dry wt/L "problem threshold" (Ron Raschke, U.S. EPA, pers. comm.) at all three study sites (Table 1). The effluent AGP was 5.2 mg dry wt/L.

The effluent did not appear to negatively affect the phytoplankton communities at the test sites (Figure 1). In fact, some measurements of phytoplankton community health showed moderate improvement at the test sites. Both, taxa richness and species diversity showed slightly improved values at test site 1 and test site 2 in comparison to the control site (Table 2).

Some measures of macroinvertebrate community health showed moderate improvements at test sites when compared to the control site (Figure 2). The number of polychaete taxa at test site 1 was 133% higher than at the control site and 100% higher at test site 2 compared to the control site. Overall taxa richness was 44% lower at the control site compared to either test site (Figure 2). The control site diversity, on the other hand, was 3% higher than test site 1 and 26% higher than test site 2. The diversity at test site 2 violates Class III water quality standards (Rule 62-302.530 (11) FAC). Pelecypods, typically good water quality indicators, were in greater abundance at the control site than at either test site (Table 2). The pelecypods made up 28.6% of the control site community, 3.6% of test site 1, and were absent from test site 2. The facility does not appear to have negatively affected the recieving water sites and any differences in the macroinvertebrate community are probably due to differences in the sediments at the study sites.

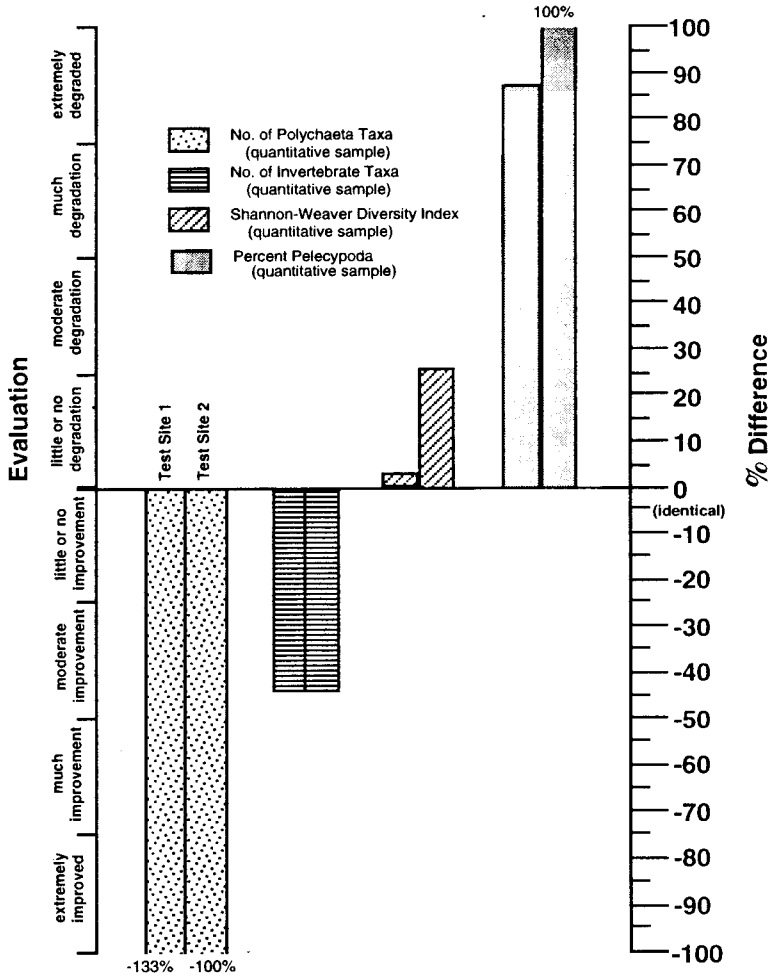

Figure 2. Effect of discharge on the benthic community.

References

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Miller, W. E., T. E. Maloney, and J. C. Greene. 1978. The *Selenastrum capricornutum* Printz algal assay bottle test. U. S. Environ. Prot. Agency, EPA-600/9-78-018. 126 p.

Raschke, R. L. and D. A. Schultz. 1987. The use of the algal growth potential test for data assessment. J. Wat. Poll. Cont. Fed. 59(4): 222-227.

Ross, L. T. 1990. Methods for aquatic biology. Fla. Dept. Environ. Reg. Tech. Ser. 10(1): 1-47.

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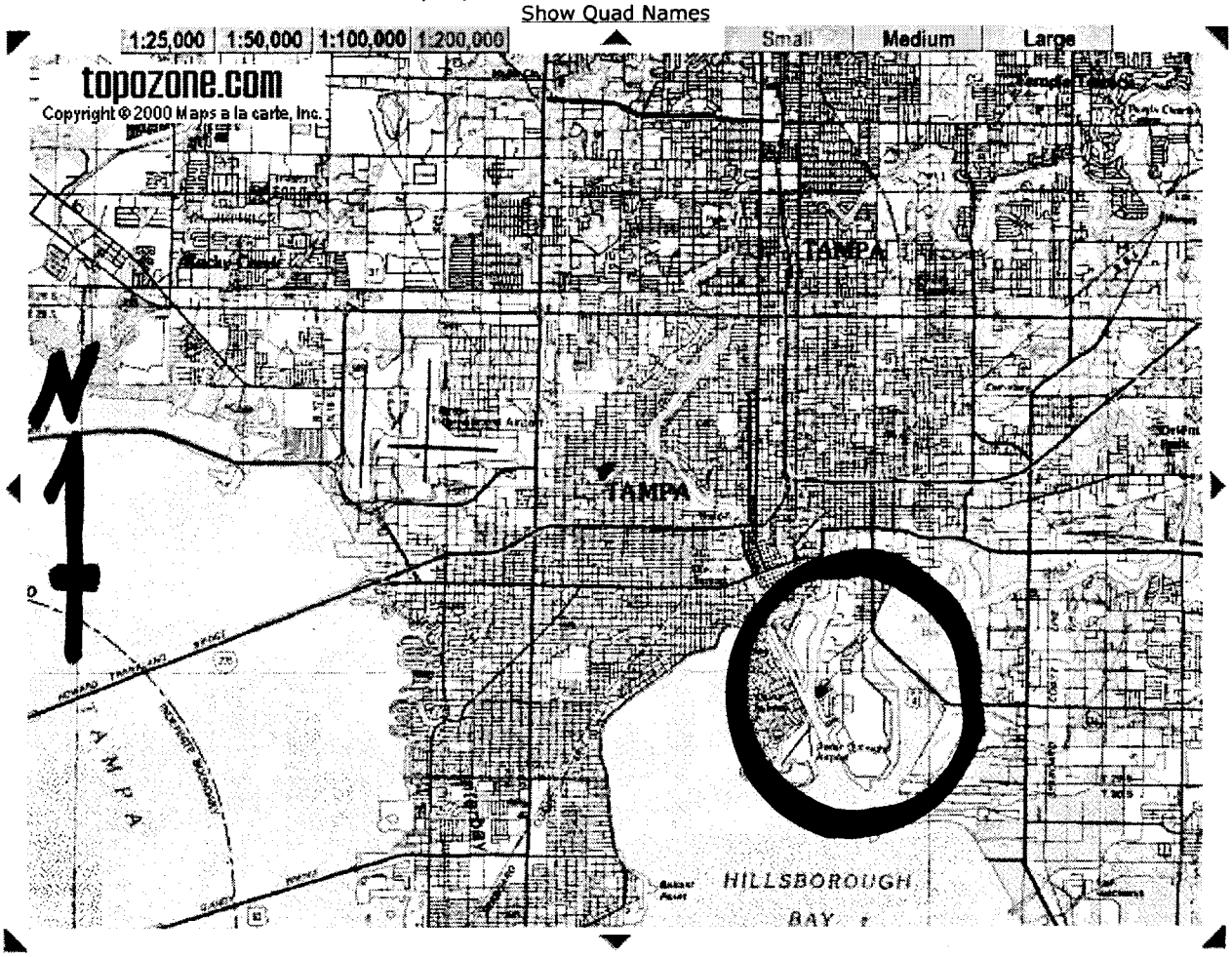
Map target is 27.9468°N, 82.4582°W - UTM Zone 17, N 3091993, E 356544

Exact center of display is UTM Zone 17, N 3093720, E 353568

Show Quad Names



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meters 0 4000 8000 12000 16000

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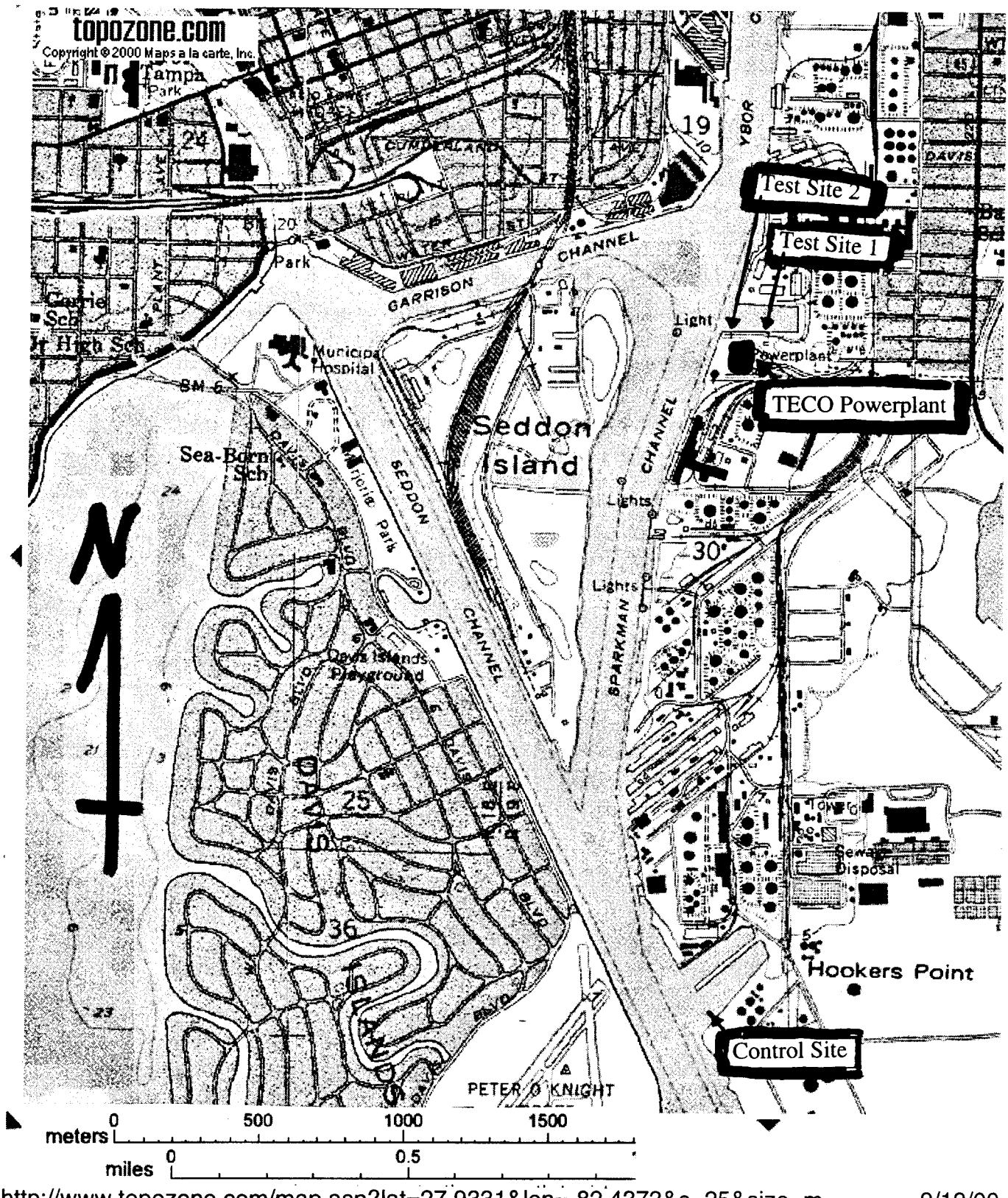
Click anywhere on the map to recenter the map on that point.

Take a look at our **Map Legend** for help with topographic map symbols

TECO-Hookers Point Locus Map

Tampa Electric Co. (TECO) Study Area



http://www.topozone.com/map.asp?lat=27.9331&lon=-82.4373&s=25&size=m 9/13/00

Typical Values for Selected Parameters in Florida Waters

Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

Parameter	Percentile Distribution 5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
ESTUARIES (690 stations)											
Phytoplankton Chlorophyll *a*	2.14	3.28	4.49	5.13	6.00	6.93	7.94	9.60	12.40	17.60	22.20
Dredge Diversity	1.34	1.53	1.91	2.28	2.56	2.90	3.15	3.59	4.01	4.53	4.98
Dredge Taxa Richness	4.00	6.00	9.00	11.00	15.00	18.50	25.00	35.00	41.00	62.00	90.00
TKN	0.26	0.34	0.42	0.50	0.59	0.69	0.76	0.82	0.95	1.30	1.49
NH3+NH4	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.09	0.13	0.22	0.28
NO2-NO3	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.05	0.08	0.17	0.23
Total Phosphorus	0.01	0.02	0.06	0.07	0.10	0.11	0.14	0.17	0.23	0.43	0.59
Ortho-Phosphate	0.01	0.02	0.03	0.04	0.04	0.05	0.07	0.09	0.12	0.21	0.44
Turbidity	3.50	4.00	4.50	5.05	5.40	5.60	6.30	6.80	8.00	11.40	11.75

Units:
Phytoplankton Chlorophyll *a* (ug/L), Nutrients (mg/L), Turbidity (NTU), Taxa richness and diversity values are for macroinvertebrates

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health have been employed to determine the effects of a discharge. These are briefly discussed here.

Taxa richness: Stress tends to reduce the number of different types of organisms present in a system, although moderate nutrient enrichment may sometimes be correlated with increased algal taxa richness.

Shannon-Weaver diversity: This index is specified in the Florida Administrative Code as a measure of biological integrity. Low diversity scores are undesirable. They represent conditions where only a few organisms are abundant, to the exclusion of other taxa. Excessive numerical dominance of a single type of organism (a high % contribution of the dominant taxon) is a related measure which is also associated with disturbance.

Numbers of pollution sensitive taxa: Some organisms become rare or absent as the intensity or duration of disturbance increases. Species sensitivity data from other sources, such as Chang *et al.* (1992), Farrell (1992), Hudson *et al.* (1990), Hulbert (1990), Lenat (1993), and Whitmore (1989), are used as appropriate.

Community structure: Substantial shifts in proportions of major groups of organisms, compared to control conditions, may indicate degradation. In marine systems, an increase in the % tubificid oligochaetes, a decrease in the % pelecypods, and a decrease in the number of polychaete taxa are all considered indicators of disturbance (Engel *et al.* 1994).

Trophic composition/feeding guilds: Disturbance can shift the feeding strategies of invertebrates. In Florida for example, pollution may be responsible for reducing the numbers of filter-feeders (FDEP 1994) and shredders (EA Engineering 1994).

Algal biomass: High algal biomass (algal density or chlorophyll *a*) implies nutrient stress.

FACILITY SHEET FOR FYI-5

Facility Name: TECO-Hookers Point Steam

Date Summary Prepared: November 19, 1999 1999

Federal Permit Data: FL0000825 expires 9/30/99

State GMS Data: 4029P20124 expires 11/28/93 (in petition)

Facility Type: Industrial

Location: Hemlock Road in Port Tampa

County: Hillsborough District: SW

Function of Facility: Electric power generating system

Description of Treatment Process: The site consists of 6 fuel-oil fired boilers and 5 steam turbine generator units. These generators have nameplate ratings from 33 MW to 81.6 MW with a station total of 232.6 MW. Once-through condenser cooling is effected at each of the steam turbine units with water withdrawn from Sparkman Channel. The used, heated circulating water for each unit is then released into a discharge canal via Outfall 003, which flows into Sparkman Channel and then into Hillsborough Bay. Plant wastewater streams other than the non-contact once-through cooling water are collected in a 320,000 gallon wastewater tank and then discharged to the City of Tampa Sanitary Sewer system in accordance with permit No. 1048 or its successor.

Receiving Waters: Hillsborough Bay

Water Classification: Class III Marine

Design Flow: 256.9 mgd

Average Flow: 122 mgd (winter) and 187 mgd (summer)

Discharge Frequency: Intermittent

Does facility have a mixing zone: No mixing zone

Permit Effluent Limits: No physical sampling involved. Flow and temperature readings only. The facility is using an in line Ashcroft themometer.

Description of permitted outfall(s): Outfall 003 is located near a seawall on the northern section of TECO s property.

List permit violations and plant upsets that occurred within past 3 years: The State and NPDES permits for the facility do not contain a numeric limit for temperature. The permits do state that the temperature rise shall not cause harm to the aquatic life or vegetation in the receiving body of water. It has not been evaluated by the Department or the facility if the aquatic life in the receiving water body has been affected.

Staff contributing to this review:

Andrea Grainger (Biologist)
Cindy Cathey (Inspector)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME:	RECEIVING BODY OF WATER:
	24040200	11/30/99	10[illegible]	Hillsborough Bay

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
	Hills	Tampa Electric - Hookers Point Steam	control / Reference Site

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Land-Use in Watershed (specify relative percent in each category):

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
–	–	–	–	–	20	80	–

Local Watershed Erosion (check box): None ☐ Slight ☒ Moderate ☐ Heavy ☐

Local Watershed NPS Pollution (check box): No evidence ☐ Slight ☐ Moderate potential ☐ Obvious sources ☒

Width of riparian vegetation (m) on least buffered side: –

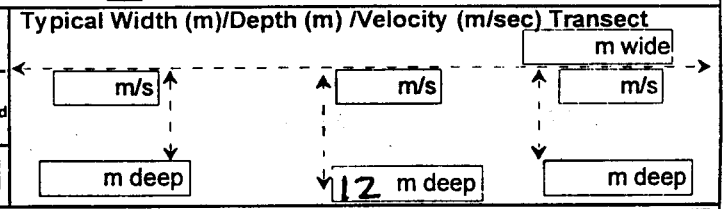
List & map dominant vegetation on back

Artificially Channelized ☒ no ☐ recent, severe ☐ some recovery ☐ mostly recovered

Artificially Impounded ☐ yes more sinuous

High Water Mark: 0.35 (m above present water level) + 12 (present depth in m) = 12.35 (m above bed)

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect



Canopy Cover % : Open : ☒ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐ _____

Sediment Oils: Absent: ☒ Slight: ☐ Moderate: ☐ Profuse: ☐

Sediment Deposition: Sludge: ☐ Sand smothering: none slight / moderate severe Silt smothering: none slight / moderate severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top	0.1	21.64						1.5
Mid-depth	5	21.43						
Bottom	16	21.35						

System Type : Stream: ☐ (1st - 2nd order / 3rd - 4th order / 5th - 6th order / 7th order or greater) Lake: ☐ Wetland: ☐ Estuary: ☒ Other: ☐ _____

Water Odors (check box): Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐ _____

Water Surface Oils (check box): None: ☒ Sheen: ☐ Globs: ☐ Slick: ☐

Clarity (check box): Clear: ☐ Slightly turbid: ☐ Turbid: ☒ Opaque: ☐

Color (check box): Tannic: ☐ Green (algae): ☒ Clear: ☐ Other: ☐ _____

Weather Conditions/Notes:

Windy, Sunny, Cold.

Total depth is >10 m

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☒	☐	☐
Fish	☐	☐	☒	☐
Aquatic Macrophytes	☒	☐	☐	☐
Iron/sulfur Bacteria	☒	☐	☐	☐

SAMPLING TEAM:	SIGNATURE:	DATE:
Kovach, Granger	[signature]	12/9/99

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
MARINE BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
	24040200	11/30/99	Hillsborough Bay

REMARKS:	LOCATION:	FIELD ID/NAME:
A ship moored over our site within 20 minutes of sampling	Tampa Electric - Hookers Point Steam.	Reference Site

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations: 0	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed: 13	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points — oysters & barnacles on seawalls	No communities observed from those listed. 0-12 points
Tidal Fluctuation: 2	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations: 4	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action: 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. 9-10 points	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. 0-2 points
Sediment Type: 12	Combination of sand, gravel, and shell. 12-15 points	Primarily sand, with small areas of mud. 8-11 points	Mixture of sand and mud, or well-aerated mud only. 4-7 points	Anaerobic mud. 0-3 points

TOTAL SCORE: 40

COMMENTS: This site is in the industrialized section of Hillsboro' Bay. There are ship yards present.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
11/30/99	Kovach/Grainger	Candace Grainger

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		12/2/99 11/30/99	0910 1100	Hillsborough Bay

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Station was discharging 12/2/99	Hills	Tampa Electric - Hookers Point Steam	Test Site 1

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Land-Use in Watershed (specify relative percent in each category):

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
					20	80	

Local Watershed Erosion (check box): None ☐ Slight ☒ Moderate ☐ Heavy ☐

Local Watershed NPS Pollution (check box): No evidence ☐ Slight ☐ Moderate potential ☐ Obvious sources ☒

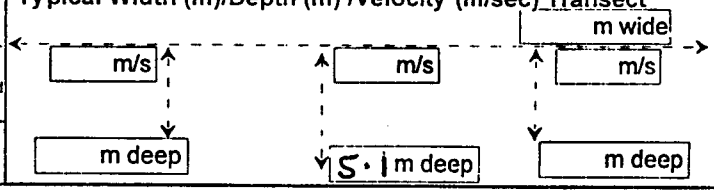
Width of riparian vegetation (m) on least buffered side: | *List & map dominant vegetation on back*

Artificially Channelized ☐ no ☐ ☐ ☐ recent, severe / some recovery / mostly recovered

Artificially Impounded ☐ yes more sinuous

High Water Mark: 0.35 (m above present water level) + 5.1 (present depth in m) = 5.45 (m above bed)

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect



Canopy Cover % : Open : ☒ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☒ Anaerobic: ☐ Other: ☐

Sediment Oils: Absent: ☐ Slight: ☐ Moderate: ☐ Profuse: ☒

Sediment Deposition: Sludge: ☒ Sand smothering: none slight moderate severe Silt smothering: none slight moderate severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top	0.1	24.68	7.64	5.99	38,606			1.4
Mid-depth	2.5	22.41	7.55	5.84	40,499			
Bottom	5.1	19.99	7.17	5.73	40,874			

System Type : Stream: ☐ (1st - 2nd order / 3rd - 4th order / 5th - 6th order / 7th order or greater) Lake: ☐ Wetland: ☐ Estuary: ☒ Other: ☐

Water Odors (check box): Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☒ Other: ☐

Water Surface Oils (check box): None: ☐ Sheen: ☒ Globs: ☐ Slick: ☐

Clarity (check box): Clear: ☐ Slightly turbid: ☐ Turbid: ☒ Opaque: ☐

Color (check box): Tannic: ☐ Green (algae): ☒ Clear: ☐ Other: ☐

Weather Conditions/Notes:
Macroinvertebrates collected 11/30/99.
Inst tu, grab samples + phyto plankton collected 12/2/99.
Cool, windy

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☒	☐	☐
Fish	☐	☐	☒	☐
Aquatic Macrophytes	☒	☐	☐	☐
Iron/sulfur Bacteria	☒	☐	☐	☐

SAMPLING TEAM:	SIGNATURE:	DATE:
Kovach, Granger		12/9/99

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
MARINE BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		11/30/99 12/2/99	Hillsborough Bay

REMARKS:	LOCATION:	FIELD ID/NAME:
cold, windy	Tampa Electric - Hookers Point Stream	Test Site 1

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 0	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 13	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points** oysters + barnacles on seawalls	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 2	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 4	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 3	Combination of sand, gravel, and shell. **12-15 points**	Primarily sand, with small areas of mud. **8-11 points**	Mixture of sand and mud, or well-aerated mud only. **4-7 points**	Anaerobic mud. **0-3 points**

TOTAL SCORE 31

COMMENTS: There are ships moored constantly in the vicinity of the outfall.

ANALYSIS DATE: 12/2/99 11/30/99	ANALYST: Kovach/Grainger	SIGNATURE: Conrad Kovach Jr.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 11/30/99 12/2/99	TIME	RECEIVING BODY OF WATER:
			0830	Hillsborough Bay

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
power station was discharging 12/2/99.	Hills	Tampa Electric - Hookers Point Stream	Test Site 2

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Land-Use in Watershed (specify relative percent in each category):

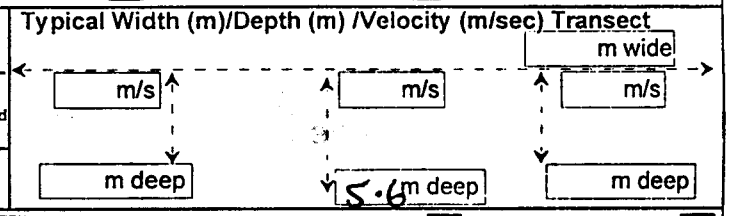
Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
					20	80	

Local Watershed Erosion (check box): None ☐ Slight ☒ Moderate ☐ Heavy ☐

Local Watershed NPS Pollution (check box): No evidence ☐ Slight ☐ Moderate potential ☐ Obvious sources ☒

Width of riparian vegetation (m) on least buffered side: *List & map dominant vegetation on back*

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect



Artificially Channelized ☐ no ☐ recent, severe ☐ some recovery ☐ mostly recovered

Artificially Impounded ☐ yes more sinuous

High Water Mark: 5.6 (m above present water level) + 0.35 (present depth in m) = 5.95 (m above bed)

Canopy Cover % : Open : ☒ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☒ Anaerobic: ☐ Other: ☐

Sediment Oils: Absent: ☐ Slight: ☐ Moderate: ☒ Profuse: ☐

Sediment Deposition: Sludge: ☒ Sand smothering: none ☐ slight ☐ moderate ☐ severe Silt smothering: none ☐ slight ☐ moderate ☐ severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top	0.1	26.12	7.47	5.36	39,510			1.7
Mid-depth	2.7	19.99	7.22	5.48	40,875			
Bottom	5.6	19.99	6.47	5.76	40,577			

System Type : Stream: ☐ (1st - 2nd order, 3rd - 4th order, 5th - 6th order, 7th order or greater) Lake: ☐ Wetland: ☐ Estuary: ☒ Other: ☐

Water Odors (check box): Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☒ Other: ☐

Water Surface Oils (check box): None: ☐ Sheen: ☒ Globs: ☐ Slick: ☐

Clarity (check box): Clear: ☐ Slightly turbid: ☐ Turbid: ☒ Opaque: ☐

Color (check box): Tannic: ☐ Green (algae): ☒ Clear: ☐ Other: ☐

Weather Conditions/Notes:
Macroinvertebrates collected 11/30/99.
Insitu, grab samples + phytoplankton collected 12/2/99.
Cold, windy.

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☒	☐	☐
Fish	☐	☐	☒	☐
Aquatic Macrophytes	☒	☐	☐	☐
Iron/sulfur Bacteria	☒	☐	☐	☐

SAMPLING TEAM:	SIGNATURE:	DATE:
Kovach / Granger	Andrea Granger	12/9/99

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
MARINE BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 11/30/99 12/2/99	RECEIVING BODY OF WATER: Hillsborough Bay.

REMARKS: cold, windy	LOCATION: Tampa Electric - Hookers Point Steam	FIELD ID/NAME: Test Site 2

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 0	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 13	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points** oysters & barnacles.	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 2	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 4	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 3	Combination of sand, gravel, and shell. **12-15 points**	Primarily sand, with small areas of mud. **8-11 points**	Mixture of sand and mud, or well-aerated mud only. **4-7 points**	Anaerobic mud. **0-3 points**

TOTAL SCORE 31

COMMENTS: There are ships moored constantly in the vicinity vicinity of the outfall.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
11/30/99 12/2/99	Roach / Granger	

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		12/2/99	0930	Hillsborough Bay

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
In-situ parameters	Hills	Tampa Electric - Hookers Point Stream	Outfall - ~~Control~~ Effluent

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Land-Use in Watershed (specify relative percent in each category):

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)

Local Watershed Erosion (check box): None ☐ Slight ☐ Moderate ☐ Heavy ☐

Local Watershed NPS Pollution (check box): No evidence ☐ Slight ☐ Moderate potential ☐ Obvious sources ☐

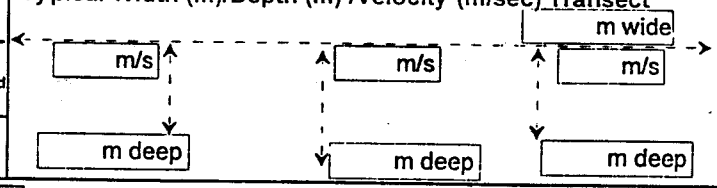
Width of riparian vegetation (m) on least buffered side: | *List & map dominant vegetation on back*

Artificially Channelized ☐ no ☐ recent, severe ☐ some recovery ☐ mostly recovered, more sinuous

Artificially Impounded ☐ yes

High Water Mark: _____ (m above present water level) + _____ (present depth in m) = _____ (m above bed)

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect



Canopy Cover % : Open : ☐ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐ _____

Sediment Oils: Absent: ☐ Slight: ☐ Moderate: ☐ Profuse: ☐

Sediment Deposition: Sludge: ☐ Sand smothering: none ☐ slight ☐ moderate ☐ severe ☐ Silt smothering: none ☐ slight ☐ moderate ☐ severe ☐ Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots				***Draw aerial view sketch of habitats found in 100 m section***			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top	0.1	32.17	7.82	5.78	39,953			
Mid-depth	3.5	29.87	7.78	5.88	39,636			
Bottom	7.5	28.68	7.55	5.85	39,900			

System Type : Stream: ☐ (1st - 2nd order, 3rd - 4th order, 5th - 6th order, 7th order or greater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☐ _____

Water Odors (check box): Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐ _____

Water Surface Oils (check box): None: ☐ Sheen: ☐ Globs: ☐ Slick: ☐

Clarity (check box): Clear: ☐ Slightly turbid: ☐ Turbid: ☐ Opaque: ☐

Color (check box): Tannic: ☐ Green (algae): ☐ Clear: ☐ Other: ☐ _____

Weather Conditions/Notes:
The power station was discharging when the above in-situ parameters were collected

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☐	☐	☐
Fish	☐	☐	☐	☐
Aquatic Macrophytes	☐	☐	☐	☐
Iron/sulfur Bacteria	☐	☐	☐	☐

SAMPLING TEAM:	SIGNATURE:	DATE:
Cramer	Andreasen for	12/9/99

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		12/1/99	0935	Hillsborough Bay

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
In-situ parameters for influent	Hills	Tampa Electric - Hookers Point Stream	Influent

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Land-Use in Watershed (specify relative percent in each category):

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)

Local Watershed Erosion (check box): None ☐ Slight ☐ Moderate ☐ Heavy ☐

Local Watershed NPS Pollution (check box): No evidence ☐ Slight ☐ Moderate potential ☐ Obvious sources ☐

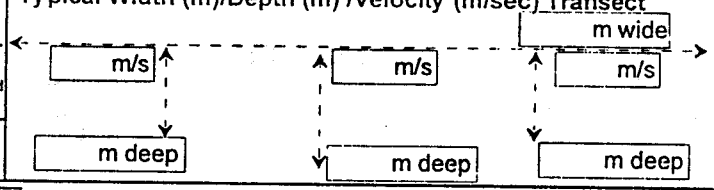
Width of riparian vegetation (m) on least buffered side: | *List & map dominant vegetation on back*

Artificially Channelized ☐ no ☐ recent, severe ☐ some recovery ☐ mostly recovered

Artificially Impounded ☐ yes more sinuous

High Water Mark: ____ (m above present water level) + ____ (present depth in m) = ____ (m above bed)

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect



Canopy Cover % : Open : ☐ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐ ____

Sediment Oils: Absent: ☐ Slight: ☐ Moderate: ☐ Profuse: ☐

Sediment Deposition: Sludge: ☐ Sand smothering: none slight moderate severe Silt smothering: none slight moderate severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots				***Draw aerial view sketch of habitats found in 100 m section***			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top	0.1	23.87	7.56	5.14	39,000			
Mid-depth	4.0	21.25	7.59	4.29	39,400			
Bottom	9.5	21.00	7.57	5.91	39,500			

System Type : Stream: ☐ (1st - 2nd order, 3rd - 4th order, 5th - 6th order, 7th order or greater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☐ ____

Water Odors (check box): Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐ ____

Water Surface Oils (check box): None: ☐ Sheen: ☐ Globs: ☐ Slick: ☐

Clarity (check box): Clear: ☐ Slightly turbid: ☐ Turbid: ☐ Opaque: ☐

Color (check box): Tannic: ☐ Green (algae): ☐ Clear: ☐ Other: ☐ ____

Weather Conditions/Notes:
Data was collected while amb. water was being used as cooling water. Power plant was operating

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☐	☐	☐
Fish	☐	☐	☐	☐
Aquatic Macrophytes	☐	☐	☐	☐
Iron/sulfur Bacteria	☐	☐	☐	☐

SAMPLING TEAM:	SIGNATURE:	DATE:
Grainger	Grainger	12/9/99

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		12/2/99	1000	Hillsborough Bay

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
In-situ parameters for influent	Hills	Tampa Electric - Hookers Point Steam	Influent

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Land-Use in Watershed (specify relative percent in each category):

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)

Local Watershed Erosion (check box): None ☐ Slight ☐ Moderate ☐ Heavy ☐

Local Watershed NPS Pollution (check box): No evidence ☐ Slight ☐ Moderate potential ☐ Obvious sources ☐

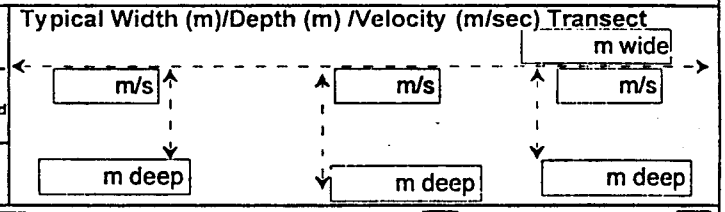
Width of riparian vegetation (m) on least buffered side: | *List & map dominant vegetation on back*

Artificially Channelized ☐ no ☐ recent ☐ severe ☐ some recovery ☐ mostly recovered

Artificially Impounded ☐ yes more sinuous

High Water Mark: _____ (m above present water level) + _____ (present depth in m) = _____ (m above bed)

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect



Canopy Cover % : Open : ☐ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐ _____

Sediment Oils: Absent: ☐ Slight: ☐ Moderate: ☐ Profuse: ☐

Sediment Deposition: Sludge: ☐ Sand smothering: none ☐ slight ☐ moderate ☐ severe Silt smothering: none ☐ slight ☐ moderate ☐ severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots				***Draw aerial view sketch of habitats found in 100 m section***			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top	0.1	23.25	7.62	5.7	40,020			
Mid-depth	4.3	19.97	7.44	5.81	40,763			
Bottom	8.5	19.49	7.03	6.37	41,159			

System Type : Stream: ☐ (1st - 2nd order ☐ 3rd - 4th order ☐ 5th - 6th order ☐ 7th order or greater ☐) Lake: ☐ Wetland: ☐ Estuary: ☒ Other: ☐ _____

Water Odors (check box): Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐ _____

Water Surface Oils (check box): None: ☐ Sheen: ☐ Globs: ☐ Slick: ☐

Clarity (check box): Clear: ☐ Slightly turbid: ☐ Turbid: ☐ Opaque: ☐

Color (check box): Tannic: ☐ Green (algae): ☐ Clear: ☐ Other: ☐ _____

Weather Conditions/Notes:
Data was collected ~~while~~ after the power plant had shut down for the day.

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☐	☐	☐
Fish	☐	☐	☐	☐
Aquatic Macrophytes	☐	☐	☐	☐
Iron/sulfur Bacteria	☐	☐	☐	☐

SAMPLING TEAM:	SIGNATURE:	DATE:
Granger	[signature]	12/9/99

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Tampa Electric
County: Hillsborough
Contact / District: Kovach / SW-Dist
NPDES Permit #: FL0000825
LIMS Sample #: 420988 LIMS Job #: ZH199912031301
sample log 12-20-99 mr
Test Type: Screening (Definitive)
(Static) Static Renewal | Flow-through
Test Number: 1 of 2

Sample Collection: Date 12/2/99 Time 0730
Test Beginning: Date 12/3/99 Time 1600
Test Ending: Date 12/5/99 Time 1100
Organism Batch #: ~~#4733~~ Diluent Batch #: ASW# 60
Organism Age: 1 day SRT toxicant
* wrong place 12/3/99 (SG) b batch #:
Test organism: A. Bahia
EBM 12/3/99 spelling

Remarks: 12/4/99
Large amounts of undissolved salts in control. CH

Conc.	Chamber #	Number Live 0 hr	24 h	48 h	pH 0 hr	24 h	48 h	Temperature (°C) 0 hr	24 h	48 h	D.O. (mg/L) 0 hr	24 h	48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h	D.O. 0hr
Ctrl A	C1	5	5	5	8.5	8.5	8.4	22.8	24.5	24.2	~~7.6~~*	6.3	5.3	35.7	41.3	40.1	6.4
B	C2	5	5	5	8.5	8.5	8.3	22.5	24.4	24.2	~~7.6~~*	6.1	5.4	37.6	40.9	40.5	6.4
C	C3	5	5	5	8.5	8.4	8.3	22.5	24.5	24.9	~~7.7~~*	6.1	5.6	38.3	40.6	41.9	6.4
D	C4	5	5	5	8.5	8.4	8.3	22.5	24.7	24.9	~~7.7~~*	6.1	5.4	38.7	41.0	41.3	6.5
100% A	C5	5	5	5	8.0	8.1	8.0	24.3	24.0	24.4	~~6.9~~*	5.7	5.4	40.8	42.4	42.4	6.5
B	C6	5	5	5	7.9	8.0	8.0	24.5	24.2	24.4	~~6.8~~*	5.9	5.6	41.4	42.2	42.4	6.1
C	C7	5	5	5	7.9	8.0	8.0	24.5	24.6	24.4	~~6.7~~*	6.1	5.6	41.5	42.4	42.3	6.0
D	C8	5	4 im	4	7.9	8.0	8.0	24.6	24.5	24.6	~~6.6~~*	6.1	5.6	41.8	42.4	42.5	5.8
	C9 EBM 12/3/99 ur																
measured by:		SG	SG	CH	DPH	CH	CH	DPH	CH	CH	DPH	CH	CH	DPH	CH	CH	
recorded by:		DPH	SG	CH	EBM	SG	CH	EBM	SG	CH	EBM	SG	CH	EBM	SG	CH	

*EBM 12/3/99 D.O. taken at wrong salinity

Investigators' Signatures
Elizabeth B Miller
Shannon Gerardi
Counting Help
Della Parker Howard

Temperature Range °C
Incubator # 3 24.5-27.5 °C
Room B246 20.0-24.9 °C

Water Quality Parameters

	(Salt Water) Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			N/A	N/A	N/A	NA
Total Residual Cl2 (mg/L):	<0.03		<0.03	88-100	CH	SG
Alkalinity (mg/L as $CaCO_3$):	260		140	Hach	SG/DPH	SG
Hardness (mg/L as $CaCO_3$):	N/A		N/A	Hach	SG/DPH	SG
Total ammonia (mg/L as N):	<0.034		<0.034	Denver	DPH	SG
Salinity:	25		27	YSI	DPH	SG

Marshall Faircloth
reviewer

form updated 3/3/99

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Tampa Electric
County: Hillsborough
Contact / District: Kovach / SW-Dist
NPDES Permit #: FL0000825
LIMS Sample #: 420988 **LIMS Job #:** RH199912031301
sample log 12.20.99 [illegible]

Sample Collection: Date 12/2/99 Time 0730
Test Beginning: Date 12/3/99 Time 1600
Test Ending: Date 12/5/99 Time 1100
Organism Batch #: 47 **Diluent Batch #:** ASL.
Organism Age: 7days **SRT toxicant batch #:**

Test Type: Screening I (Definitive) [illegible]
(Static) I Static Renewal I Flow-through
Test Number: 2 of 2

Remarks: Large Amount of undissolved Salts in controls. CH 12/4/99

Test organism: M. beryllina

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) 0 hr	Cond. 24 h	Cond. 48 h
Ctrl A	C9	5	5	1 40	8.5	8.4	8.3	22.8	24.3	24.5	~~7.4~~ *	5.7	5.7	39.2	40.1	41..
B	C10	5	5	4 10	8.5	8.4	8.3	22.5	24.2	24.5	~~7.4~~ *	5.7	5.8	38.9	40.4	41..
C	C11	5	5	5	8.5	8.4	8.3	22.5	24.2	24.2	~~7.6~~ *	6.2	5.8	38.9	40.4	41.
D	C12	5	5	5	8.5	8.4	8.3	22.5	24.3	24.2	~~7.6~~ *	6.2	5.9	38.3	40.5	41..
100% A	C13	5	4 1D	4	7.9	8.1	8.2	23.9	24.3	25.5	~~7.3~~ *	6.3	6.2	41.0	41.9	42..
B	C14	5	5	2 30	7.9	8.1	8.1	24.7	24.0	25.5	~~7.0~~ *	6.3	5.9	41.8	42.4	43..
C	C15	5	4 1D	3 1D	7.9	8.1	8.1	24.7	24.0	25.4	~~6.7~~ *	6.4	5.9	41.9	41.8	42..
D	C16	5	5	3 2D	7.9	8.1	8.1	24.8	24.1	25.1	~~6.6~~ *	6.4	5.9	41.8	41.6	42..
measured by:		DPH	CH	CH	DPH	CH	CH	DPH	CH	CH	DPH	CH	CH	DPH	CH	C..
recorded by:		SG	CH	CH	EBM	SG	CH	EBM	SG	CH	EBM	SG	CH	EBM	SG	..

* EBM 12/3/99 D.O. taken at wrong salinity

Investigators' Signatures

Elizabeth B. Miller
Shannon Gerardi
Courtney Hess
Della Pauley Hanson

Marshall Faircloth
reviewer

Temperature Range °C
Incubator # 3 24.5-27.5°C
Room 3246 20.0-24.9°C

Water Quality Parameters

	(Salt Water) Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			N/A	N/A	N/A
Lab Total Residual Cl2 (mg/L):	<0.03		<0.03	~~<0.03~~ DR100	CH
Alkalinity (mg/L as $CaCO_3$):	~~140~~ 240		140	Hach	SG/DPH
Hardness (mg/L as $CaCO_3$):	N/A		N/A	N/A	SG/DPH
Total ammonia (mg/L as N):	<0.034		<0.034	Denver	DPH
Salinity:	25		27	YSI	DPH

form updated 3/3/99.

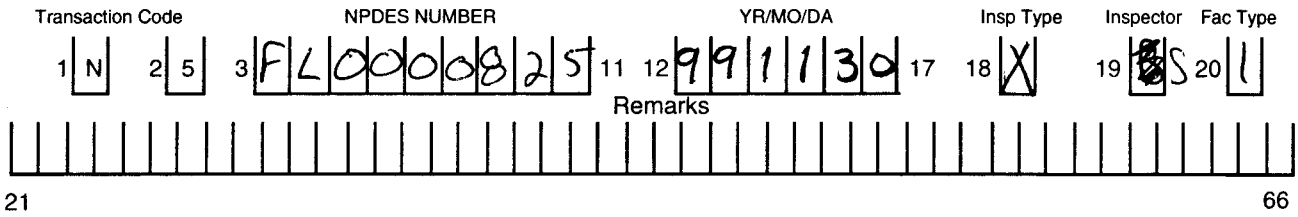
Phytoplankton taxa list and densities (#/cm^2) for Tampa Electric (TECO) Hooker's Point Plant, collected via subsurface water bottle grabs on 30 November, 1999.

	Control Site	Test Site 1	Test Site 2
Bacillariophyceae			
Coscinodiscus sp.	1	–	1
Cyclotella sp.	–	1	–
Diploneis sp.	–	1	–
Fragilaria sp.	2	1	1
Gyrosigma sp.	–	1	–
Melosira sp.	3	–	–
Navicula sp.	1	3	–
Nitzschia sp.	2	5	3
Pennales	–	2	2
Rhizosolenia sp.	–	1	–
Skeletonema sp.	257	266	157
Tabellaria sp.	–	–	7
Chlorophyceae			
Ankistrodesmus sp.	–	1	–
Chlamydomonas sp.	3	6	8
Chlorella sp.	2	–	1
Scenedesmus sp.	2	1	3
Selenastrum sp.	5	8	7
Tetraedron minimum	1	1	3
Undetermined Chlorophyceae	13	10	15
Chrysophyceae			
Ophiocytium sp.	3	–	1
Cryptophyceae			
Cryptomonas sp.	13	11	10
Cyanophycaea			
Dactylococcopsis sp.	–	1	–
Lyngbya contorta	–	1	1
Lyngbya sp.	1	–	1
Oscillatoria sp.	1	1	4
Synechococcus sp.	15	14	14
Dinophyceae			
Glenodinium sp.	–	1	–
Euglenophycaea			
Lepocinclis sp.	–	2	1

Benthic macroinvertebrate taxa list for Tampa Electric (TECO) Hooker's Point, collected via Ponar grab samples in Hillsborough Bay, on 30 November, 1999. Densities, in number/m^2, represent the mean of three replicates.

	Control Site	Test Site 1	Test Site 2
Amphipoda			
Undetermined Caprellidae	–	2	–
Cnidaria			
Undetermined Actiniaria	–	2	–
Decapoda			
Pinnixa sp.	–	–	1
Undetermined Palaemonidae	1	–	–
Undetermined Xanthidae	2	–	–
Gastropoda			
Nassarius vibex	–	–	1
Undetermined Melitidae	–	–	1
Undetermined Vitrinellidae	–	–	4
Hemichordata			
Undetermined Enteropneusta	–	–	1
Mysidacea			
Americamysis bigelowi	1	–	–
Nemertea			
Undetermined Nemertea	–	4	2
Oligochaeta			
Undetermined Tubificidae	–	14	30
Ophiurida			
Undetermined Ophiuroidea	1	–	–
Pelecypoda			
Crassostrea virginica	–	2	–
Undetermined Pelecypoda	4	–	–
Polychaeta			
Armandia sp.	–	2	–
Minuspio sp.	–	–	1
Paramphinome sp.	–	1	–
Polydora sp.	1	–	–
Pseudopolydora sp.	1	–	–
Sigambra bassi	–	–	2
Sigambra sp.	–	1	–
Streblospio benedicti	–	1	1
Tharyx sp.	–	4	–
Undetermined Aricidea	–	1	–
Undetermined Capitellidae	–	19	–
Undetermined Cirratulidae	2	2	–
Undetermined Dorvilleidae	–	–	1
Undetermined Glyceridae	–	–	1
Undetermined Goniadidae	–	–	1
Thoracica			
Balanus sp.	–	1	–
Undetermined Thoracica sp.	1	–	–

Fill Out This Section For All Surface Water Discharger Inspections (CEI, CSI, CBI, PAI, XSI - RI Optional)



Fill Out This Section For All Surface Water Discharger Inspections (CEI, CSI, CBI, PAI, XSI - RI Optional)