Biological Assessment of

Cargill Fertilizer

Hillsborough County

NPDES #FL0000761

Sampled September 1995

January 1996

Biology Section
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: Cargill Fertilizer
County: Hillsborough
NPDES Number: FL0000761
State Permit Expiration Date: 15 June 1998

Toxics Sampling Inspection (**XSI**)

Date Sampled: 5 September 1995

Results: No organic priority pollutants were detected in the effluent sample. No metals were found above Class III standards.

Compliance Biomonitoring Inspection (**CBI**)

Date Sampled: 5 September 1995

Results: The effluent was not toxic to the invertebrate, *Ceriodaphnia dubia*, or the fish, *Cyprinella leedsi*.

Impact Bioassessment Inspection (**IBI**)

Date Sampled: 5 September 1995

Results: Reductions in macroinvertebrate taxa richness, diversity, and pollution sensitive taxa between the reference and test sites indicated disturbance associated with the discharge. The biological integrity criterion (Rule 62-302.530(11) FAC) was violated at test site 2, which receives effluent during the outgoing tide. The facility appeared to have no negative effects on the receiving water phytoplankton community. The elevated nutrient and AGP values at all three sites suggests that symptoms of eutrophication may occur elsewhere in Hillsborough Bay, where flow from the streams (potentially flushing the phytoplankton community) is diminished.

Water Quality Inspection (**WQI**)

Date Sampled: 5 September 1995

Results: Fecal coliform bacteria counts in the effluent were elevated (8,600 organisms/100 mL). Fecal coliforms were lower at the reference site (1,800 organisms/100 mL) than at test site 1 (2,200 organisms/100 mL) or test site 2 (2,800 organisms/100 mL). Although these values all exceeded Class III standards, they do not represent violations because the samples were not analyzed within the required 6 hour holding time. The discharge appeared to contribute to phosphorus and nitrate-nitrite enrichment of the receiving waters. Effluent concentrations of ortho-phosphate (9.6 mg/L), total phosphorus (9.5 mg/L), and nitrate-nitrite (4.7 mg/L) were of particular interest. Concentrations of these nutrients at both test sites were two to three times higher than those found at the reference site. AGP at all three sites exceeded the "problem threshold" of 10 mg dry wt/L for marine waters. AGP was 22.4 mg dry wt/L at the reference site, 19.9 mg dry wt/L at test site 1, and 21.2 mg dry wt/L at test site 2. Effluent AGP was 56.9 mg dry wt/L.

These fifth year inspections provide the necessary information to evaluate the facility's impact on its receiving waters and to provide the basis for specific condition recommendations for permit renewal.

Introduction

The Cargill Fertilizer Inc., East Tampa Plant, is located west of Highway 41 in Hillsborough County, Florida (see Appendix). The plant produces phosphate fertilizer, as well as phosphoric and sulfuric acids. Effluent from the facility consists of non-contact wastewater and local stormwater drainage. The plant may discharge through several outfalls if needed, however, outfall 005 B is the primary point of discharge for the facility. Effluent flows via a 24 inch perforated pipeline which extends into a deepwater barge slip on the Alafia River, a Class III waterway. Flow during the survey was 0.634 MGD.

Permit limits are as follows: TSS (150.0 mg/L maximum, 50.0 mg/L as a monthly average), oil and grease (5.0 mg/L maximum), pH (6.0-8.5 SU), fluoride (5.0 maximum), total residual chlorine (0.01 mg/L maximum), dissolved oxygen (4.0 mg/L minimum, 5.0 mg/L as a daily average), aluminum (1,500 µg/L maximum), trivalent chromium (673 µg/L maximum), hexavalent chromium (50 µg/L maximum), copper (33 µg/L or 0.55 lbs/day as a daily maximum), iron (1.3 mg/L or 25.6 lbs/ day as a daily maximum), nickel (8.3 µg/day maximum), zinc (86 µg/L maximum), combined radium$^{226 + 228}$ (5.0 pCi/L maximum), total phosphorus (120 lbs/day as a monthly average, 55 lbs/day as an annual average), total nitrogen (100 lbs/day as a monthly average, 55 lbs/day as an annual average), ammonia (20 lbs/day as a monthly average, 10 lbs/day as an annual average). The facility has been granted a 125,000 square meter mixing zone for copper and iron (see Facility Summary in Appendix).

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	24	8	13
Shannon-Weaver Diversity	3.63	2.92	1.77
% Polychaeta	38.9	60.0	80.8
% Diptera	24.4	0	5.8
% Isopoda	3.3	10.0	0
% Amphipoda	22.2	10.0	1.9
% Pelecypoda	0	10.0	1.9
% Decapoda	1.1	10.0	1.9
% Other	6.7	0	5.7
% Predator/Carnivores	9.7	10.0	40.4
% Above-Surface Deposit Feeders	29.7	20.0	40.4
% Browsers	12.5	10.0	0.1
% Scavengers	12.5	10.0	0.1
% Suspension Feeders	22.5	20.0	4.8
% Shredders	6.9	0	2.9
% Other	5.0	0	5.8
% Unknown	0	30.0	1.9
Phytoplankton Algae			
Number of Taxa	30	28	26
Shannon-Weaver Diversity	3.92	3.80	3.94
Chlorophyll a (µg/L)	15.0	5.9	3.5
Algal Density (#/mL)	2568	1289	1883
% Blue-green	48.7	51.3	27.9
% Green	24.7	20.4	38.8
% Diatoms	13.3	10.6	17.6
% Cryptophyceae	7.3	15.0	14.6
% Other	4.7	1.8	1.2
Algal Growth Potential (mg dry wt/l)	22.4	19.9	21.2

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located in the estuarine portion of Bullfrog Creek) and two test sites bracketing the point of discharge, but outside the mixing zone. A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Cyprinella leedsi* as test organisms, were performed on an effluent sample (Weber 1991). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on effluent, reference, and test sites. Methods used for all

chemical analyses are on file at the Tallahassee DEP Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at reference and test sites. Invertebrates were collected from three replicate petite Ponar grabs. Phytoplankton was sampled at both reference and test sites by subsurface grabs (Ross 1990). Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). Bacterial populations were analyzed for fecal coliforms following the methods of APHA (1989). Algal Growth Potential tests performed using *Dunaliella tertiolecta* as the test organism for the study sites, and *Selenastrum capricornutum* for the effluent, followed Miller *et al.* (1978) and EPA (1974).

Explanation of Measurements of Community Health

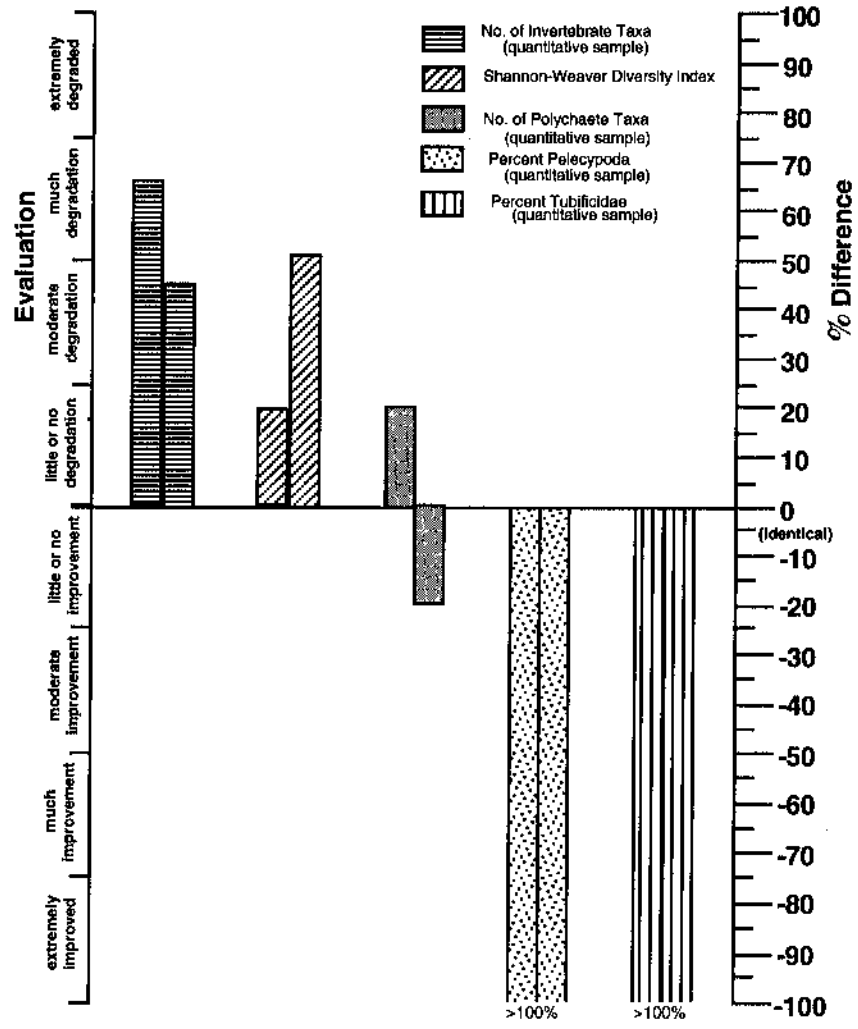
Several different measurements of macroinvertebrate and algal community health have been employed to determine the effects of a discharge. These are briefly discussed here.

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. For example, the Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index score is considered healthy. Species sensitivity data from other sources, such as Hulbert (1990), Hudson *et al.* (1990), Lenat (1993), Farrell (1992), Chang *et al.* (1992), and Whitmore (1989), are used as appropriate.

Community structure: Substantial shifts in the proportions of major groups of organisms, compared to reference conditions, may indicate degradation. In marine systems, an increase in the % tubi-



Effect of discharge on the benthic macroinvertebrate community.

The left bar for each parameter shows differences between the reference site and test site 1. The right bar shows differences between the reference site and test site 2.

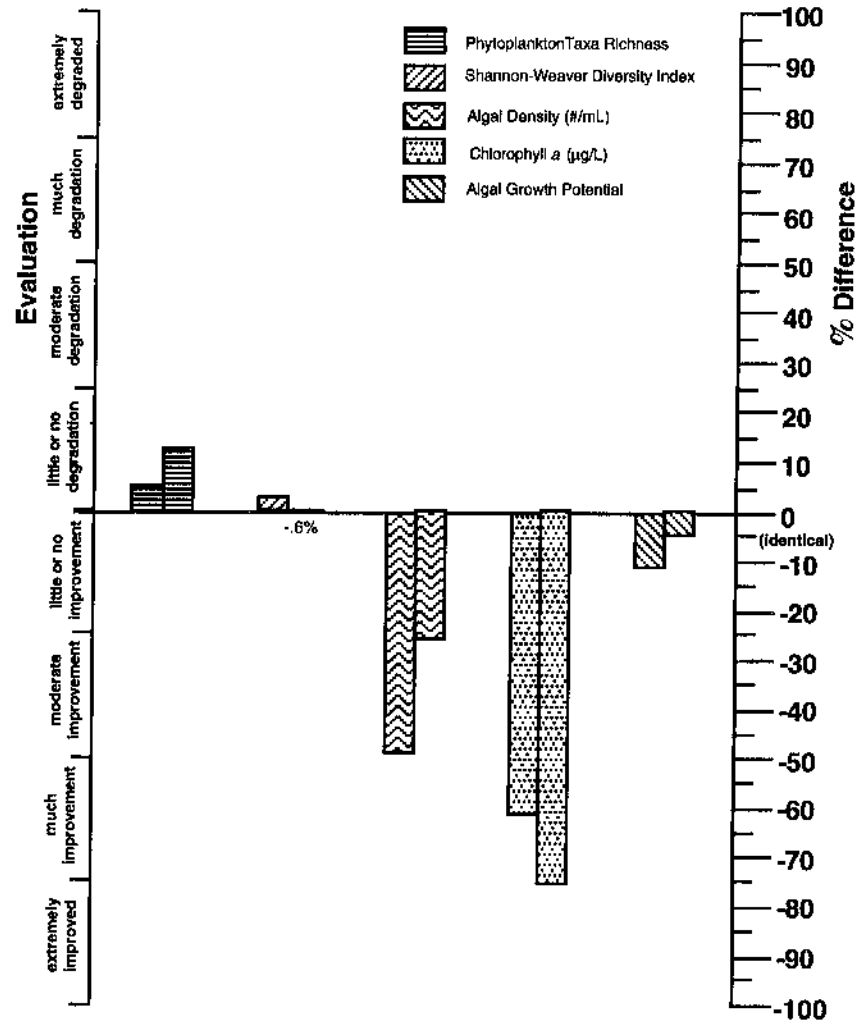
ficid oligochaetes, a decrease in the % pelecypods, and a decrease in the number of polychaete taxa are all considered indicators of disturbance (Engel *et al.* 1994).

Algal biomass: High algal biomass (algal density or chlorophyll *a*) implies nutrient stress. A decreased diatom to bluegreen algae ratio (calculated by dividing the number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta + Cyanophyta) is often indicative of nutrient enriched conditions in flowing streams.

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 filterfeeders (FDEP 1994) and shredders (EA Engineering 1994).

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, the diversity index, the number of polychaete taxa, and the % pelecypods are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving the % tubificids, algal density, chlorophyll *a*, and algal growth potential are measured as the test site minus reference site divided by the reference site.

The following personnel were involved in this investigation: Brad Lamb, George Sharrock, and Jemile Spencer (DEP Tampa District), and Lyn Burton, Melva Campos, Marshall Faircloth, Russel Frydenborg, Christie LeDuc, Kathleen Lurding, Elizabeth Miller, Liz Mould, Joe North, Tobin Rader, Sonia Razzaque, Jennifer Sparapani, Lisa Tamburello, and Vicki Whiting, (Tallahassee Biology Laboratory). The report was reviewed by the Point Source Studies Review Committee, consisting of Wayne Magley, Jan Mandrup-Poulsen, and Michael Tanski, as well as District representatives.



Effect of discharge on the algal community.

The left bar for each parameter shows differences between the reference site and test site 1. The right bar shows differences between the reference site and test site 2.

Results and Discussion

The test sites were situated within the estuarine mouth of the Alafia River, just upstream from its confluence with Hillsborough Bay (see maps in Appendix). The reference site was located approximately one mile south of the test sites in the estuarine area of Bullfrog Creek. All study sites were located in moderately harsh, estuarine sys-

tems characterized by low or fluctuating salinity and limited benthic habitat. Surrounding land at the test sites was dominated by commercial, industrial, and residential uses. Natural forest, with some residential and commercial areas, characterized the reference site drainage basin. Habitat quality was similar between the reference site (which scored 67 points) and test sites 1 and 2 (with 53 points and 58 points, respectively). All three stations were very similar with respect to most physical/chemical parameters, such as dissolved oxygen (ranging from 4.4 mg/L to 4.7 mg/L), pH (6.5 to 6.9 SU), temperature (between 28.7 °C and 29.4 °C), and conductivity (ranging from 9,330 µmhos/cm to 10,569 µmhos/cm). Salinity was 5.5 ppt at the reference site, 6.0 ppt at test site 1, and 5.3 ppt at test site 2. Substrate at each site was composed of mud, muck, and silt.

The effluent was not acutely toxic to the invertebrate *Ceriodaphnia dubia*, or the fish *Cyprinella leedsi* (Appendix).

No organic priority pollutants were detected in the effluent sample. Metals detected in the predominantly freshwater effluent included aluminum (280 µg/L), cadmium (0.2 µg/L), copper (10 µg/L), iron (939 µg/L), and zinc (13 µg/L). At an effluent hardness of 518.2 mg $CaCO_3$/L, none of these values represent violations of Class III standards.

Fecal coliform bacteria counts in the effluent were elevated (8,600 organisms/100 mL). Fecal coliforms were lower at the reference site (1,800 organisms/100 mL) than at test site 1 (2,200 organisms/100 mL) or test site 2 (2,800 organisms/100 mL). Although these values all exceeded Class III standards, they do not represent violations because the samples were not analyzed within the required 6 hour holding time. The samples were analyzed within 24 hours, which is considered adequate for scientific information purposes.

The discharge appeared to contribute to phosphorus and nitrate-nitrite enrichment of the receiving waters. Effluent concentrations of ortho-phosphate (9.6 mg/L), total phosphorus (9.5 mg/L), and nitrate-nitrite (4.7 mg/L) were of particular interest. Permit limits on loading rates for total phosphorus (50.2 lbs/day), total nitrogen (34.9 lbs/day), and ammonia (6.3 lbs/day) were not exceeded. Water at both test sites contained 1.3 mg/L of ortho-phosphate and 1.4 mg/L of total phosphorus. These levels were three times higher than the reference site concentrations of ortho-phosphate (0.5 mg/L) and total phosphorus (0.58 mg/L). Similarly, nitrate-nitrite increased from 0.18 mg/L at the reference site to 0.39 mg/L at test site 1 and 0.3 mg/L at test site 2. The phosphorus concentrations at the reference and test sites were higher than those found in 95% of other Florida estuaries (see Table of Typical Water Quality Values in Appendix). The nitrate-nitrite level at the reference site was higher than the concentrations found in 90% of other estuaries, while the test site values exceeded the 95th percentile.

Algal Growth Potential (AGP) at all three sites exceeded the "problem threshold" of 10 mg dry wt/L for marine waters (Ron Raschke, USEPA, personal communication). AGP was 22.4 mg dry wt/L at the reference site, 19.9 mg dry wt/L at test site 1, and 21.2 mg dry wt/L at test site 2. Effluent AGP was 56.9 mg dry wt/L.

Some measures of macroinvertebrate health indicated that the discharge was having an adverse effect on the community. The Figure on p. 2 indicates the degree of difference between the invertebrate populations of the reference and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. Negative values mean that the test site is better than the reference site.

Substantial reductions in taxa richness and diversity were observed between the reference and test sites. Taxa richness decreased from 24 taxa at the reference site to 8 taxa at test site 1 (a 66.7 % reduction) and to 13 taxa at test site 2 (a 45.8 % decline). Similarly, Shannon-Weaver diversity decreased from 3.6 at the reference site to 2.9 at test site 1 and to 1.8 at test site 2. This 50% reduction in diversity at test site 2 (which receives effluent during the outgoing tide) represents a violation of the biological integrity criterion (Rule 62-302.530(11) FAC).

Another indication of stress at test site 2 was the paucity of suspension feeders there. Only 4.5% of the total population at test site 2 used collecting/filtering as a feeding strategy, while 22.5 % of the reference site population were collector/filterers. Elimination of suspension feeders has been implicated as a symptom of pollution (EA Engineering 1994). Additionally, a few sensitive taxa which were found at the reference site (*e.g.*, *Mysidopsis bahia*, *Cyclaspis* sp., *Procladius* sp., and *Polypedilum halterale* grp.) were not found at either test site.

There were similar numbers of polychaete taxa at all three sites (between 4 and 6). Pelecypods were quite poorly represented at all three

stations, with abundances of 5 pelecypods/m^2 at test sites 1 and 2, and zero at the reference site. Tubificid worms were absent at both test sites, while small numbers of tubificids (1.7% of the total population) were recovered from the reference site. Note that the absolute differences between the reference and test sites with respect to the % Pelecypoda and % Tubificidae parameters are not really as striking as they appear on the graph.

In summary, reductions in taxa richness, diversity, and pollution sensitive taxa between the reference and test sites indicated disturbance associated with the discharge. The biological integrity criterion (Rule 62-302.530(11) FAC) was violated at test site 2, which receives effluent during the outgoing tide.

The Figure on p. 3 represents changes in the algal community. As was noted with the macroinvertebrates, larger differences (that is, higher percentages) correspond with greater degrees of degradation. The facility appeared to have no negative effects on the receiving water phytoplankton community. Measures of phytoplankton taxa richness, diversity, chlorophyll *a*, and density showed either no change or improvement at the test sites, compared with the reference site. Cyanophytes dominated all three sites, while chlorophytes were the second most numerous group. The elevated nutrient and AGP values at all three sites suggests that symptoms of eutrophication may occur elsewhere in Hillsborough Bay, where flow from the streams (potentially flushing the algae community) is diminished.

Conclusions

The effluent was not acutely toxic to the invertebrate *Ceriodaphnia dubia*, or the fish *Cyprinella leedsi*.

No organic priority pollutants were detected in the effluent sample. No metals were found above Class III standards.

Fecal coliform bacteria counts in the effluent were elevated (8,600 organisms/100 mL). Fecal coliforms were lower at the reference site (1,800 organisms/100 mL) than at test site 1 (2,200 organisms/100 mL) or test site 2 (2,800 organisms/100 mL). Although these values all exceeded Class III standards, they do not represent violations because the samples were not analyzed within the required 6 hour holding time.

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AGP at all three sites exceeded the "problem threshold" of 10 mg dry wt/L for marine waters. AGP was 22.4 mg dry wt/L at the reference site, 19.9 mg dry wt/L at test site 1, and 21.2 mg dry wt/L at test site 2. Effluent AGP was 56.9 mg dry wt/L.

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Chemistry summary table for

Cargill Fertilizer	Effluent	Reference Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
None Detected				
Metals (ug/L)				
Aluminum	280 A			
Arsenic	10 U			
Cadmium	0.2 I			
Copper	10 I			
Chromium	10 U			
Iron	939 A			
Lead	10 U			
Mercury	0.10 U			
Nickel	4 U			
Selenium	30 U			
Silver	0.05 U			
Zinc	13 I			
Nutrients (mg/L)				
Ortho-phosphate	9.60	0.50 A	1.30	1.30
Total phosphorus	9.50	0.58	1.40	1.40
Ammonia	1.20 A	0.11	0.01	0.08
Nitrate+Nitrite	4.70	0.18	0.39	0.30
TKN	1.90	1.50	0.98	1.20
General Phys-Chem Parameters				
Habitat Assessment		67	53	58
D. O. (mg/L)	6.5	4.7	4.4	4.6
pH (SU)	7.0	6.5	6.8	6.9
Specific Conductance (µmhos/cm)	1285	9726	10569	9330
Salinity (ppt)		5.5	6.0	5.3
Temperature (°C)		28.7	29.3	29.4
Hardness (mg CaCO3)	518.2			
Algal Growth Potential (mg dry wt/L)	56.9	22.4	19.9	21.2
Toxicity				
Bioassay Fish	Not Toxic			
Bioassay Invertebrate	Not Toxic			
Microbiological Communities (org/100 mL)				
Fecal Coliform	8600 Q	1800 Q	2200 Q	2800 Q

A - Value reported is the mean of two or more determinations

I - Value reported is less than the minimum quantitation limit, and greater than or equal to the minimum detection limit

Q - Sample held beyond normal holding time

U - Material analyzed for but not detected; value reported is the minimum detection limit

Typical Values for Selected Parameters in Florida Waters

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

Percentile Distribution

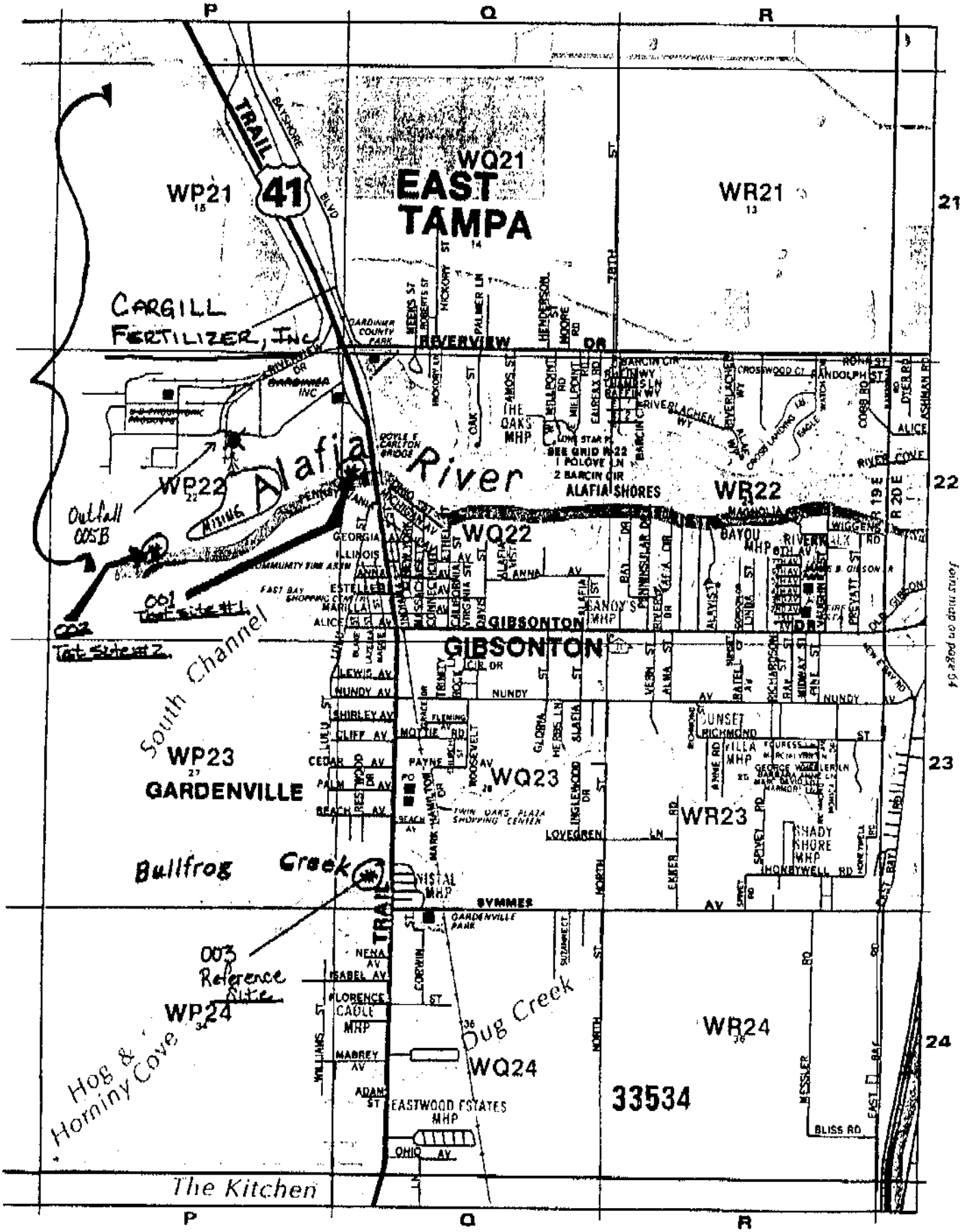
Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
STREAMS (1617 stations)											
Phytoplankton Chlorophyll *a*	0.22	0.52	0.94	1.60	3.02	4.63	6.72	9.87	14.68	27.35	48.70
Periphyton Chlorophyll *a*	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85
H-D Diversity	0.84	2.12	2.48	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90
Qualitative Taxa Richness	9.00	12.00	17.00	20.00	22.00	24.50	26.00	28.00	31.00	37.00	53.00
H-D Taxa Richness	6.00	6.50	9.00	11.50	13.00	15.00	17.00	21.50	26.00	29.00	32.00
TKN	0.30	0.39	0.56	0.73	0.87	1.00	1.11	1.26	1.49	1.93	2.80
Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60
NO2-NO3	0.01	0.01	0.03	0.05	0.07	0.10	0.14	0.20	0.32	0.64	1.05
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	0.39	0.74	1.51
Ortho Phosphorus	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	0.27	0.59	1.37
Turbidity	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30
LAKES (477 stations)											
Phytoplankton Chlorophyll *a*	0.80	1.71	2.88	4.28	10.06	13.40	20.00	30.10	47.20	65.44	113.90
Dredge Diversity	0.71	0.97	1.43	1.74	1.98	2.12	2.21	2.59	2.85	3.15	3.17
Dredge Taxa Richness	3.00	5.00	6.50	7.00	9.00	10.00	11.00	13.00	15.00	17.00	21.00
TKN	0.36	0.49	0.67	0.83	1.08	1.26	1.40	1.51	1.68	2.11	3.46
NH3+NH4	0.01	0.02	0.02	0.03	0.04	0.06	0.08	0.12	0.15	0.21	0.28
NO2-NO3	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.05	0.10	0.14	0.23
Total Phosphorus	0.01	0.02	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.23	0.42
Ortho-Phosphorus	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.21	0.32
Turbidity	1.00	1.25	1.55	2.05	2.75	4.50	6.45	9.60	14.10	26.00	40.00
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-Phosphorus	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), Periphyton Chlorophyll *a* (mg/m^2), Nutrients (mg/L), Turbidity (NTU), Taxa richness and diversity values are for macroinvertebrates

STATION LOCATION MAP FOR CARGILL FERTILIZER BIOASSESSMENT STUDY.

Joins map on page 53



STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: CARGILL FERTILIZER, EAST TAMPA PLANT	Prepared by: S. BRAD LAMB Date: 8/21/95	
Location (attach detailed map):	County: Hillsborough - 29	District: Southwest, Tampa
Federal Permit # and expiration date: FL 0000761 9/30/96	State GMS # and State expiration date: 4029P20038 3/31/99	Facility Type: (Industrial) Municipal Federal Agricultural Other (list):

Function of facility: Manufacturer of Phosphatic fertilizer, including production of phosphoric and sulfuric acid.

Description of treatment process:
Outfall 005B is the primary outfall for the facility. Non-contact wastewater and impacted stormwater from plant operations is discharged through this outfall. Outfall 005B consists of a 24" dia. pipeline that extends into a deepwater barge slip on the Alafia River. The pipeline is perforated to facilitate mixing. Outfall equip. with pH and Temp. sensors and shut-off in emerg. situations.

Receiving waters: Alafia River @ Mouth	Classification: ~~CLASS~~ III MARINE
Design Flow:	Actual Mean Flow:

Discharge is: (Continuous) Intermittent Seasonal Rainfall dependent
Other (describe)

therefore, the best time to sample is: Anytime

If facility has a mixing zone, give details (size, parameters affected, etc.):
125,000 m² for Copper (Cu) and Iron (Fe).
See attachments

List effluent limits:		Describe special permit conditions and permit modifications:
Parameter	Limit (units)	
		See attached effluent limitations

Cargill Fertz
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Description of permitted outfall(s):
005 B - Main Facility outfall - NON-contact process wastewater
001, & 005A - Emergency non-contact Process wastewater outfalls
021 & 022 - Stormwater only outfalls.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year:
n/a GWS

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
n/a GWS

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:
n/a GWS

Additional information: Calculation used for mass loading determination:

8.34 x FLOW(MGD) x concentration (mg/L) = lb/DAY

flow = .634 mgd

Staff contributing to this review (signature):

(Biologist)

(Inspector)

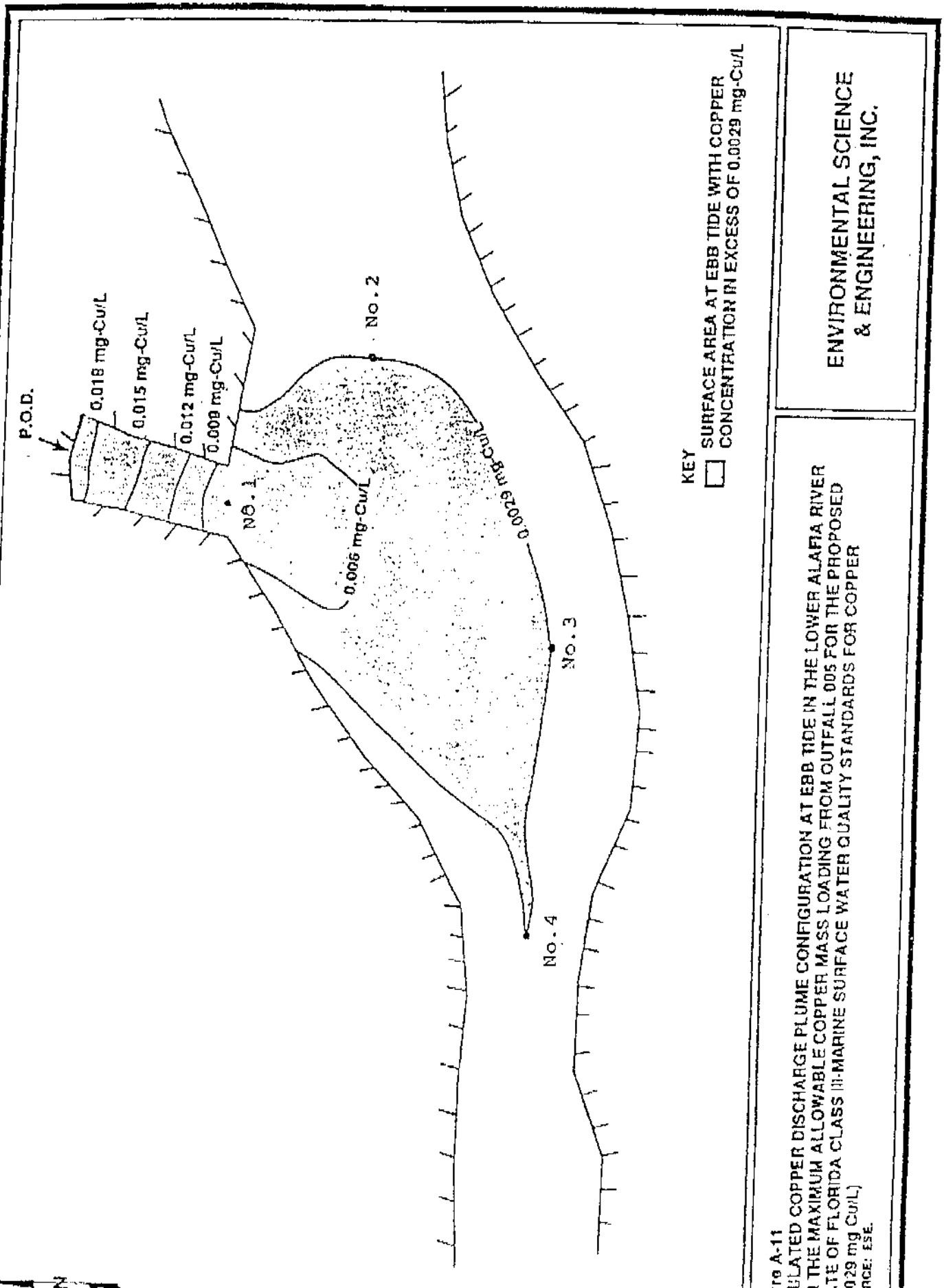
George Sharrock GWS (Engineer)

( )

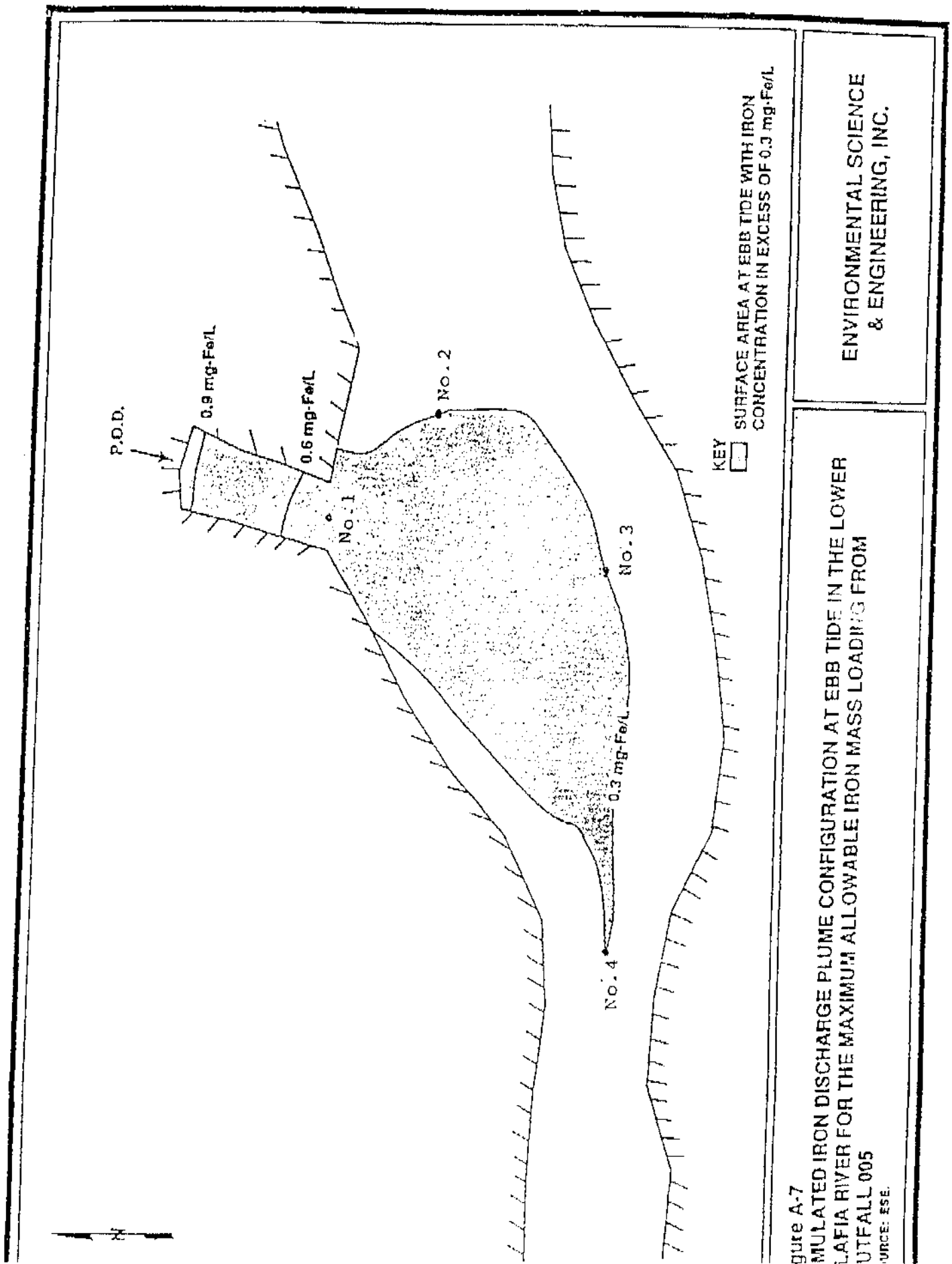
( )

( )

ATTACHMENT B



ATTACHMENT C



PERMITTEE:
CARGILL FERTILIZER, INC.
Riverview Complex

GMS ID Number: 4029P20038
Permit Number: IO29-220552

SPECIFIC CONDITIONS: (cont'd.)

16. The effluent from Outfalls 001, 005A and 005B shall not exceed the effluent limitations and shall be monitored by the permittee as specified below; if there is no discharge, the sample shall be collected on the day of next discharge. The sample shall be taken at the nearest accessible point after treatment but before mixing with the receiving water body.

EFFLUENT LIMITATIONS/
WATER QUALITY STANDARDS

EFFLUENT CHARACTERISTIC	DAILY MINIMUM	30-DAY AVERAGE	DAILY MAXIMUM	SAMPLING FREQUENCY	SAMPLE TYPE
Flow	N/A	Report	Report	Continuous	Recorder
Total Non-Filterable Residue [TSS] (mg/l)	N/A	50	150	1/week	24 hr/Comp
Temperature (°F)**	N/A	Report	Report	1/week	Grab
Oil and Grease (mg/l)	N/A	Report	5.0	1/week	Grab
Ortho-Phosphate (mg/l)	N/A	Report	Report	1/week	24 hr/Comp
pH (standard units)	6.0	Report	8.5	1/week	Grab
Fluorides (mg/l)	N/A	Report	5.0	1/week	24 hr/Comp
Total Residual Chlorine (mg/l)	N/A	Report	0.01	1/week	Grab
Ammonia (un-ionized) (mg/l)	N/A	Report	Report	1/week	Calculation
Dissolved Oxygen (mg/l)	4.0	5.0*	N/A	1/week	Grab
Total Aluminum (ug/l)	N/A	N/A	1500	1/month	24 hr/Comp
Trivalent Chromium (ug/l)	N/A	N/A	673	1/month	24 hr/Comp
Hexavalent Chromium (ug/l)	N/A	N/A	50	1/month	24 hr/Comp
Total Copper (mg/l)***	N/A	N/A	0.033 mg/L	1/month	24 hr/Comp
Total Copper (lb/day)	N/A	N/A	0.55	1/month	24 hr/Comp
Total Iron (mg/l)***	N/A	N/A	1.30	1/month	Calculation
Total Iron (lb/day)	N/A	N/A	25.6	1/month	Calculation
Total Nickel (ug/day)	N/A	N/A	8.3	1/month	Calculation
Total Zinc (mg/l)	N/A	N/A	0.086 mg/L	1/month	24 hr/Comp
Combined Radium 226 & 228 (pCi/l)	N/A	N/A	5.0	1/month	24 hr/Comp
Combined Radium 226 & 228 (pCi/l)	N/A	N/A	Report	1/month	Calculation

16b.

EFFLUENT CHARACTERISTIC	ANNUAL AVERAGE	MONTHLY AVERAGE	DAILY MAXIMUM	SAMPLING FREQUENCY	SAMPLE TYPE
Total Phosphorus (mg/l)	Report	Report	Report	1/week	24 hr/Comp
Total Phosphorus (lb/day)	55	120	Report	1/week	24 hr/Comp
Total Nitrogen as N (mg/l)	Report	Report	Report	1/week	24 hr/Comp
Total Nitrogen as N (lb/day)	55	100	Report	1/week	24 hr/Comp
Total Ammonia Nitrogen as N (mg/l)	Report	Report	Report	1/week	Grab
Total Ammonia Nitrogen as N (lb/day)	10	20	Report	1/week	Grab

PERMITTEE:
CARGILL FERTILIZER, INC.
Riverview Complex

GMS ID Number: 4029P20038
Permit Number: IO29-220552

SPECIFIC CONDITIONS: (cont'd.)

16. (cont'd.)

* Daily average (24 hours) shall not be less than 5.0 mg/l.

** The permittee shall meet the requirements of Section 62-302.520(1)(a), F.A.C.

*** The water quality sample shall be taken at the point of discharge (POD), Outfall 005. If the maximum effluent limitations for Copper (CU) or Iron (FE) are exceeded at the POD, then samples shall be taken at four points on the edge of the mixing zone to determine compliance with the water quality standards as per Section 62-302.560(24) and 62-302.530(39), F.A.C.

17. Outfalls 021 and 022 shall be sampled weekly when discharging. The discharge from these outfalls shall not exceed the prescribed limitations and shall be monitored as specified below.

EFFLUENT LIMITATIONS/
WATER QUALITY STANDARDS

EFFLUENT CHARACTERISTIC	DAILY MINIMUM	DAILY MAXIMUM	SAMPLE TYPE
Flow (MGD)	N/A	Report	Calculated
Dissolved Oxygen (mg/l)	5.0	N/A	Grab
Oil and Grease (mg/l)	N/A	5.0	Grab
Total Non-Filterable Residue [TSS] (mg/l)	N/A	150	Grab
Turbidity (NTU)	N/A	29	Grab
pH (standard units)	6.0	8.5	Grab
Total Phosphorus (mg/l)	N/A	Report	Grab
Total Nitrogen (mg/l)	N/A	Report	Grab
Temperature (°F)	N/A	Report	Grab

18. The permittee shall ensure that the water quality standards for Class III surface waters as defined in Sections 62-302.500, 62-302.510 and 62-302.530, F.A.C., shall not be violated at the point of discharge. For any parameter for which the department has granted a zone of mixing, as defined in Section 62-4.244, F.A.C., the water quality standards as defined in Sections 62-302.510 and 62-302.530, F.A.C. shall apply at the edge of the mixing zone.

19. Pursuant to the provisions of Section 62-4.244, F.A.C., a 125,000 square meter (M^2) zone of mixing for copper (CU) and iron (FE), as shown in Attachments B and C, is granted by the Department.

27°50' 13" N
82° 22' 57" W

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		9/5/95		ALAFIA RIVER

REMARKS:	LOCATION:	FIELD ID/NAME:
REFERENCE SITE	REFERENCE / BULLFROG CRK. REF. SITE	003

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
75				20	5		

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

Local Watershed NPS Pollution (check box): No evidence ☐ Some potential sources ☑ Obvious sources ☐

Width of riparian vegetation (m) on least buffered side: 1 m

List & map dominant vegetation on back

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect (draw cross-section & provide at least 3 velocity & depth values)

Artificially Channelized ☐ no ☐ ☑ ☐ (recent, severe / some recovery / mostly recovered, more sinuous)

Artificially Impounded ☐ yes

High Water Mark (m above bed): 2 m

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	100	3	PONAR
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Shorezone (Roots/Veg.)							

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								
Mid-depth	.4 m	28.66	6.51	4.65	9726			
Bottom								

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:

Sunny, Temp. 89° F, slight ~~wind~~ WIND NW@ 5mph

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

SAMPLING TEAM:	SIGNATURE:	DATE:
GBL / JMS	Edward Lach	9/5/95

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		9/5/95	ALAFIA RIVER

REMARKS:	LOCATION:	FIELD ID/NAME:
CARGILL FERT. REFERENCE SITE	BULLFROG CREEK	

Habitat Parameter (score)	Excellent	Good	Fair	Poor
Littoral Alterations 5	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 37	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**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 5	>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 10	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 4	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 37

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
9/5/95	DBF	Brad Lamb

27° 51' 16" N
82° 23' 47" W

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		9/5/95	1105	ALAFIA River

REMARKS:	LOCATION:	FIELD ID/NAME:
TEST #1	CARGILL TAMPA	001 TEST SITE #1

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
20				30	20	30	

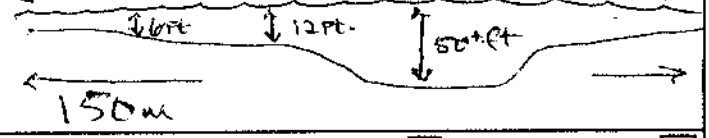
Local Watershed Erosion (check box): None ☐ Slight ☐ Moderate ☑ Heavy ☐

Local Watershed NPS Pollution (check box): No evidence ☐ Some potential sources ☑ Obvious sources ☐

Width of riparian vegetation (m) on least buffered side: 2m

List & map dominant vegetation on back

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect (draw cross-section & provide at least 3 velocity & depth values)



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

Artificially Impounded ☐ yes

High Water Mark (m above bed): 1m

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	100	3	PONAR
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Shorezone (Roots/Veg.)							

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								
Mid-depth	.4	29.29	6.81	4.40	1056.9			
Bottom								

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:
Sunny, Temp 89° F

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

SAMPLING TEAM:	SIGNATURE:	DATE:
GBL / JMS	Brad Lamb	9/5/95

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		9/5/95	ALAFIA RIVER

REMARKS:	LOCATION:	FIELD ID/NAME:
CARGILL TEST #1	CARGILL @ ALAFIA RIVER	CG1 TEST 1

Habitat Parameter (score)	Excellent	Good	Fair	Poor
Littoral Alterations (8)	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 (2-6)	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**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation (3)	>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 (3)	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 (4)	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 53

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
9/5/95	GBL / JMS	M. Brad Hall

27° 51' 33" N
82° 23' 18" W

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
				ALAFIA RIVER

REMARKS:	LOCATION:	FIELD ID/NAME:
TEST #2 ~~DOWNSTREAM~~	CARGILL @ ALAFIA R.M.	002

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
20			[redacted]	20	30	30	

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

Local Watershed NPS Pollution (check box): No evidence ☐ Some potential sources ☑ Obvious sources ☐

Width of riparian vegetation (m) on least buffered side: 2 m

List & map dominant vegetation on back

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect (draw cross-section & provide at least 3 velocity & depth values)

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

Artificially Impounded ☐ yes

High Water Mark (m above bed): 1 m

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	100	3	PONAR
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Shorezone (Roots/Veg.)				***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								
Mid-depth	.4	29.42	6.85	4.60	9330			
Bottom								

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:
Sunny, Temp ~ 89° F

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

SAMPLING TEAM:	SIGNATURE:	DATE:
BRAD / JMS	Brad [illegible]	9/5/95

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER: Alafia River

REMARKS:	LOCATION:	FIELD ID/NAME:
TEST SITE #2	CARGILL @ ALAFIA RIVER	002 TEST #2

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 9	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 30	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**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 5	>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 3	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 4	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 58

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
9/5/95	MBF	J. Brad Hall

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Cargill Fertilizer
County:
Contact / District: Brad Lamb / SW
NPDES Permit #: FL0000761
LIMS Sample #: 115942 LIMS Job #: 95-SEP-06-22
sample log 9/17/95

Sample Collection: Date 9-5-95 Time 1010
Test Beginning: Date 9-6-95 Time 1320
Test Ending: Date 9-8-95 Time 1330
Organism Batch #: 42 Diluent Batch #: 37
Organism Age: <24 hrs
Test Organism: C. dubia (Ceriodaphnia dubia)

Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Test Number: 1 of 2

Remarks:

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0; 9.0 @ 9.0	24.8 @ 24.9	8.3 @ 24.5 °C	141.0 @ 141.3; 1390 @ 1412 @ 24.5 °C
24 hr	7.0 @ 7.0; 9.0 @ 9.0	23.2 @ 23.3	8.4 @ 23.7 °C	145.2 @ 141.3; 1380 @ 1412 @ 24.3 °C
48 hr	7.0 @ 7.0; 9.0 @ 9.0	24.0 @ 24.1	8.2 @ 25.4 °C	145.8 @ 141.3; 1388 @ 1412 @ 24.2 °C

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) (Cond. (µmhos/cm))		
Conc.	Chamber #	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
Control	A	5	5	5	8.1		7.9	24.0		24.8	8.3		8.0	170		190
Control	B	5	5	5			7.9			24.7			8.0			185
Control	C	5	5	5			7.9			24.6			8.1			180
Control	D	5	5	5			8.0			24.6			8.1			180
100%	A	5	4	3	7.0		7.9	23.9		24.6	6.4		8.1	1230		1260
100%	B	5	5	5			7.9			24.3			8.0			1345
100%	C	5	5	5			7.9			24.2			8.1			1340
100%	D	5	5	4			7.9			24.2			8.1			1330
Measured/Loaded by:		MF	MF	MF	TR		MF	TR		MF	TR		MF	TR		MF
Recorded by:		MF	MF	MF	JN		JKS	JN		JKS	JN		JKS	JN		JKS

Investigators' Signatures
[signatures]

Water Quality Parameters

	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			—	—	—
Lab Total Residual Cl2 (mg/L):	—	<0.03	<0.03	DR-100	TR
Alkalinity (mg/L as $CaCO_3$):	—	80	90.	Hach	TR
Hardness (mg/L as $CaCO_3$):	—	105	510	Hach	TR
Total ammonia (mg/L as N):	—	<0.017	0.70	Orion	JN

Ammonia Meter #98136 Ammonia Meter Slope: -57.0 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

reviewer form updated 5/05/95

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Cargill fertilizer
County:
Contact / District: Brad Lamb / SW
NPDES Permit #: FL0000761
LIMS Sample #: 115942 **LIMS Job #:** 95-SEP-06-22
sample log 9/14/95

Test Type: Screening | Definitive
Static | Static Renewal | Flow-through

Test Number: 2 of 2

Remarks:

Sample Collection: Date 9-5-95 Time 1010
Test Beginning: Date 9-6-95 Time 1330
Test Ending: Date 9-8-95 Time 1330
Organism Batch #: 39 **Diluent Batch #:** well
Organism Age: 12 days old
Test Organism: Cyprinella leedsi

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	24.8 @ 24.9	8.3 @ 24.5 °C	146.0 @ 141.3 1390 @ 1412 @ 24.5 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.2 @ 23.3	8.4 @ 23.7 °C	145.2 @ 141.3 1380 @ 1412 @ 24.3 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.0 @ 24.1	8.2 @ 25.4 °C	145.8 @ 141.3 1388 @ 1412 @ 24.2 °C

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) Cond. (µmhos/cm) 0 hr	24 h	48 h
Control A	H18	5	5	5	7.8	8.2	8.0	24.3	23.8	23.9	8.0	7.6	7.7	250	250	250
Control B	85	5	5	5	7.8	8.2	8.0	24.3	23.7	23.7	8.0	7.6	7.9	250	245	245
Control C	H3	5	5	5	7.8	8.2	8.0	~~24.8~~ 23.7	23.7	23.7	8.0	7.7	8.0	250	245	250
Control D	H14	5	5	5	7.8	8.2	8.0	24.3	23.9	23.9	8.0	7.7	8.0	250	245	245
100% A	H2	5	5	5	7.0	7.6	8.0	24.0	23.8	23.8	6.5	7.6	7.8	1285	1280	1295
100% B	26	5	5	5	7.0	7.6	8.0	24.0	23.7	23.8	6.5	7.5	7.8	1285	1280	1290
100% C	88	5	5	5	7.0	7.6	8.0	24.0	23.7	23.7	6.5	7.5	7.9	1285	1285	1290
100% D	3	5	5	5	7.0	7.6	8.0	24.0	23.9	23.8	6.5	7.5	8.0	1290	1290	1290
					Control pH at 48hrs		A 8.5									
							B 8.5									
					My called out incorrect pH's		C 8.5									
							D 8.5									
					100% pH at 48hrs called out incorrect pH's MF-9-8-95		A 8.0									
Measured/Loaded by:		TR	MF	JRS	JR	MF	MF	TR	MF	MF	TR	MF	MF	TR	MF	MF
Recorded by:		TR	MF	JRS	JN	LM	JRS	JN	LM	JRS	JN	LM	JRS	JN	LM	JRS

24.3 KJN 9-6-95 entry error.

Investigators' Signatures

reviewer form updated 5/05/95

Water Quality Parameters	Salt Water: Well Water	Salt Water: 20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			—	—	—
Lab Total Residual Cl2 (mg/L):	<0.03	—	<0.03	DR-100	TR
Alkalinity (mg/L as $CaCO_3$):	125	—	90	Hach	TR
Hardness (mg/L as $CaCO_3$):	120	—	510	Hach	TR
Total ammonia (mg/L as N):	<0.017	—	5.14 9-6-95 JN	Orion	JN

Ammonia Meter #98136 Ammonia Meter Slope: -57.0 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

0.70 entered wrong sample data 9-6-95

Benthic macroinvertebrate taxa list for Cargill Fertilizer, collected via Ponar grab samples in Bulldog Creek, and the Alafia River, on 5 September, 1995. Densities, in number/m^2, represent the mean of three replicates.

	Reference Site	Test Site 1	Test Site 2
Nemertina			
Nemertea	14	–	5
Polychaeta			
Eteone heteropoda	–	–	5
Heteromastus filiformis	–	–	5
Laeonereis culveri	181	–	157
Leitoscoloplos robustus	–	9	5
Nereidae	–	9	19
Paraprionospio sp.	347	5	5
Paraprionospio pinnata	42	–	–
Spionidae	111	–	–
Streblospio benedicti	292	5	–
Oligochaeta			
Enchytraeidae	–	–	5
Limnodrilus hoffmeisteri	42	–	–
Gastropoda			
Littoridinops monroensis	69	–	5
Rissoidae	14	–	–
Pelecypoda			
Corbula swiftiana	–	5	–
Geukensia demissa	–	–	5
Mysidacea			
Mysidopsis bahia	28	–	–
Cumacea			
Almyracuma sp.	42	–	–
Cumacea	14	–	–
Cyclaspis sp.	14	–	–
Tanaidacea			
Apseudes sp.	14	–	5
Isopoda			
Cyathura polita	42	5	–
Edotea montosa	42	–	–
Amphipoda			
Ampelisca abdita	–	5	–
Corophium sp.	14	–	–
Grandidierella bonnieroides	542	–	5
Decapoda			
Decapoda	–	5	–
Rhithropanopeus harrisii	28	–	5
Diptera			
Chironomidae	14	–	–
Chironomus sp.	56	–	14
Cladotanytarsus sp.	56	–	–

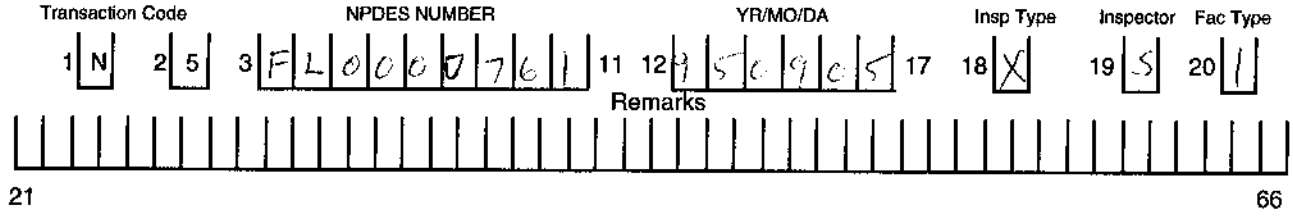
Cryptotendipes sp.	14	–	–
Polypedilum halterale grp.	83	–	–
Polypedilum scalaenum grp.	208	–	–
Procladius sp.	125	–	–
Pseudochironomus sp.	28	–	–
Tanytarsus sp. R Epler	28	–	–

Phytoplankton taxa list and densities (#/mL) for Cargill Fertilizer, collected via subsurface grabs in Bulldog Creek, and the Alafia River, on 5 September, 1995.

	Reference Site	Test Site 1	Test Site 2
Cyanophyceae			
Anabaena sp.	103	–	11
Aphanocapsa sp.	17	34	–
Aphanothece sp.	17	11	–
Chroococcus sp.	86	68	34
Dactylococcopsis sp.	171	68	160
Gloeocapsa sp.	17	–	–
Lyngbya sp.	17	–	–
Lyngbya contorta	–	23	23
Marssoniella sp.	34	11	–
Merismopedia sp.	17	–	–
Microcystis sp.	51	11	34
Oscillatoria sp.	719	377	240
Rhabdoderma sp.	–	23	11
Romeria sp.	–	–	11
Scytonemataceae	–	11	–
Synechococcus sp.	–	23	–
Bacillariophyceae			
Achnanthes sp.	–	11	11
Amphora sp.	17	11	–
Centrales	171	–	46
Chaetoceros sp.	17	11	–
Cyclotella sp.	17	34	46
Guinardia sp.	–	23	–
Melosira sp.	–	–	46
Navicula sp.	17	23	11
Nitzschia sp.	–	–	11
Pennales	51	–	11
Skeletonema sp.	51	23	148
Chlorophyceae			
Ankistrodesmus sp.	34	–	11
Characium sp.	188	–	–
Chlorella sp.	17	23	34
Chlorophyceae	17	23	342
Coelastrum sp.	–	–	11
Crucigenia sp.	17	–	–
Dictyosphaerium sp.	–	–	11
Dunaliella sp.	51	80	103
Golenkinia sp.	–	–	23
Kirchneriella sp.	–	11	–
Scenedesmus sp.	257	68	137
Schroederia sp.	–	34	23
Spermatozoopsis sp.	17	11	–
Tetradesmus sp.	–	11	–

Tetraedron sp.	51	11	34
Tetraselmis sp.	17	–	–
Euglenophyceae			
Euglena sp.	17	–	–
Euglenophyceae	17	–	–
Dinophyceae			
Ceratium sp.	51	23	11
Gymnodinium sp.	17	–	–
Peridinium sp.	17	–	11
Cryptophyceae			
Cryptomonas sp.	188	194	274

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)