Biological Assessment of

Cargill Fertilizer, Inc. – Hooker's Prairie Mine

Polk County

NPDES #FL0033294

Sampled August 2002

March 2003

Biology Section

Bureau of Laboratories

Division of Resource Assessment and Management

Comprehensive Quality Assurance Manual No. 870346G

NELAC Certification # E31780

Florida Department of Environmental Protection

Fifth Year Inspection Summary

Discharger:	Cargill Fertilizer, Inc. – Hooker's Prairie Mine
County:	Polk
NPDES Number:	FL0033294
Permit Expiration:	March 1, 2003

Toxics Sampling Inspection **(XSI)**

Date Sampled: August 5, 2002

Results: Aluminum, arsenic, iron and nickel were detected in the effluents at levels that complied with Class III Water Quality Criteria at both outfalls. The algacide simazine (0.074 µg/L) was detected in the effluent from Outfall 002 at a level that is not usually toxic. No organic constituents were detected in the effluent sample from Outfall 004.

Compliance Biomonitoring Inspection **(CBI)**

Date Sampled: August 5, 2002

Results: The effluent samples from Outfall 002 and 004 were not toxic to the fish, *Cyprinella leedsi*, or to the water flea, *Ceriodaphnia dubia*, during the 48-hour acute screening bioassays.

Water Quality Inspection **(WQI)**

Date Sampled: August 5, 2002

Results: Dissolved oxygen (DO as mg/L) at both the Test and Control Sites was <4.0 mg/L and did not meet Class III Water Quality Criteria (62-302.530 (31) F.A.C.). Phosphorus in the effluent contributed to elevated levels at the Test Site. Test Site levels of total phosphorus were greater than those in 95% of typical Florida streams while Control Site levels were greater than those in 80% of typical Florida streams. The Control Site AGP value (9.7 mg dry weight/L) was above the suggested 5.0 mg dry weight/L "problem" threshold and indicated nutrient enrichment from sources other than the facility. The AGP values at the Test Site (5.4 mg dry weight/L) and in the two effluent samples (14.1, 11.1 mg dry weight/L) were also above this threshold. This indicates nutrient enrichment related to the discharge in this portion of the South Fork of the Alafia River. Fecal and total coliforms were not collected for this study.

Impact Bioassessment Inspection **(IBI)**

Date Sampled: August 5, 2002

Results: Effluent chlorophyll *a* levels were 1.1 ug/L at Outfall 002 and 51 ug/L at Outfall 004. The difference in chlorophyll results from the two outfalls may be related to the presence of the algacide simazine in effluent from Outfall 002. These data suggest that Outfall 004 may be releasing nutrients in the form of phytoplankton or organic chemical compounds, while Outfall 002 is releasing nutrients in inorganic form. There was a significant shift towards green algae in the periphyton sample from the Test Site as compared with the Control Site, although chlorophyll data were of the same order of magnitude at both sites. Quantitative measures of benthic macroinvertebrate assemblages from Hester-Dendy samplers showed approximately equal Shannon-Weaver diversity at the Test and Control Sites. In qualitative samples, the Control Site SCI score of 23 placed it in the "good" category while the Test Site SCI score of 29 placed it in the "excellent" category. However, both Hester-Dendy and dipnet samples indicated significantly fewer Ephemeroptera and Trichoptera at the Test Site as compared to the Control Site. The difference in the proportion of green algae and EPT at the Test Site as compared with the Control Site may be an indication of nutrient impacts from the facility.

Biological assessments are prepared by FDEP staff to provide information for review of NPDES permit renewal applications. Biological assessments, in conjunction with other information concerning the subject facility and its receiving-water body, are used to determine appropriate permit conditions.

Introduction

Cargill Fertilizers, Inc.- Hooker's Prairie Mine is located in Bradley Junction, Polk County, Florida (Appendix 1). This facility's operations include phosphate mining and beneficiation, phosphatic clay settling areas, sand tailings disposal areas, and a mine water recirculation system (see Facility Summary in Appendix 2). Process wastewater from mining and beneficiation is sent to clay settling areas where phosphatic clays settle out. The decanted outflow from the settling areas is clarified water that is reused in the mining operation. Excess re-circulation water and stormwater are discharged, depending on antecedent rainfall conditions and for very large rainfall events. There are no flow limits for the facility. There are three outfalls; two of these were sampled in the current study (002, 004). Flow from Outfall 002 in 2002 was an average of 7.25 MGD for 175 days between January 22 and December 30, while flow from Outfall 004 was 2.56 MGD for 63 days between July 3 and December 30. The effluent is not chlorinated prior to being discharged into the Alafia and Peace Rivers, both Class III fresh waters. Outfall 002 is a large outfall for process water, with 3.2 MGD of flow during the time of the study. Outfall 004 releases water that has been held in ponds, some of which are vegetated; Outfall 004 was discharging 1.6 MGD during the time of this study (per B. Hall, FDEP). There are no mixing zones for either outfall. Effluent from Outfalls 002 and 004 combine to form the headwaters of the South Prong of the Alafia River above the Test Site (Appendix 1). Outfall 003 discharges into Whidden Creek which flows to the Peace River; Outfall 003 was not sampled in the current inspection. Both Outfall 002 and 004 had been discharging for more than six weeks at the time of sampling.

State Surface Water Quality Criteria and facility permit limits are listed in Table 1; Class III Water Quality Criteria follow Florida Administrative Code (F.A.C.) 62-302. According to the facility's monthly operating reports, the plant has had no violations since 1999 (Appendix 2).

Methods

The purpose of this investigation was to determine the discharger's effects on the biota of the receiving waters. Chemical and biological comparisons were made between a Control Site, located in Bell Creek, a tributary of the South Prong of the Alafia River, and a Test Site, located in the South Prong of the Alafia River approximately 1.5 miles downstream of the two discharges. On August 5, 2002, Outfall 002 comprised approximately 66% of the receiving water while Outfall 004 was approximately 33% of the receiving water flow. Detailed methods are given in Appendix 3.

All field and laboratory biological methods followed Biology Section Standard Operating Procedures (SOPs, see http://www.floridadep.org/labs/qa/2002sops.htm for details) and met DEP quality assurance/quality control standards (see http://www.floridadep.org/labs/qa/index.htm).

The following personnel were involved in this investigation: Bonnie Hall and David Clowes (FDEP Phosphate Management Program), and DEP Central Laboratory in Tallahassee. The report was reviewed by District representatives and the Point Source Studies Review Committee (Wayne Magley, Chuck Ziegmont and Michael Tanski).

Results and Discussion

- Chemical results for metals, nutrients and other compounds are reported in Table 1; a list of all analytes tested, the minimum detection limit and the practical quantitation level are given in Appendix 4. Effluent metals complied with Class III Water Quality Criteria (62-302.530 F.A.C.) and facility permit limits at both outfalls. The algacide simazine was detected in the effluent sample from Outfall 002 (0.074 mg/L), but the level detected was below the laboratory practical quantitation limit. No base, neutral, or acid extractable organic pollutants were detected in the effluent sample from Outfall 004. Effluent conductivity (mmhos/cm), pH (Standard units) and dissolved oxygen (mg/L) were not in violation of Class III Water Quality Criteria (62-302.530 F.A.C.) or facility permit limits at either outfall. Dissolved oxygen was supersaturated in effluent from both outfalls. Water temperature (degrees Celsius) was within normal ranges in both effluents.
- Habitat assessment scores were 129 at the Control Site and 107 at the Test Site (Table 1, Appendices 5 and 8), placing the Control Site in the "optimal" category and the Test Site in the "suboptimal" category. The Test Site lost points for substrate diversity and availability, smothering, water velocity and disturbed riparian buffer. The Control Site lost points for substrate availability, smothering and water velocity.
- Dissolved oxygen (DO) at both the Test and Control Site was <4.0 mg/L and did not meet Class III Water Quality Criteria (Table 1, 62-302.530(31) F.A.C.). The pH (Standard Units) at Test and Control Sites complied with Class III Water Quality Criteria (Table 1, 62-302.530 F.A.C.); pH and water temperature (degrees Celsius) were within normal ranges. Effluent and Test Site conductivity (~500 µmhos/cm) were more than doubled relative to the Control Site (197 mhos/cm) but did not violate Class III Water Quality Criteria.
- The effluent samples collected from Outfalls 002 and 004 were not toxic

Table 1. Effluent limits, Class III Criteria, chemical and toxicological data.

Cargill Fertilizer: Hooker's Prairie	Class III Criteria	Effluent Limits OO2	Effluent Limits OO4	Effluent Outfall 002	Effluent Outfall 004	Control Site	Test Site
Organic Constituents (ug/L)							
Simazine				0.074 I	0.048 U	-	-
Metals (ug/L unless otherwise noted, Class III Criteria are less than or equal to the value given)							
Aluminum	1500	-	-	49	70	-	-
Arsenic	50	-	-	2.2 I	1.9	-	-
Cadmium		2.36 b	2.04 b	0.025 U	0.025 U	-	-
Calcium (mg/L)	-	-	-	51.8	40.8	-	-
Chromium		443.7 b	382.7 b	2.0 U	2.0 U	-	-
Copper		26.2 b	22.5 b	0.75 U	0.75 U	-	-
Iron	1000	-	-	34 I	97	-	-
Lead		10.4 b	8.3 b	0.10 U	0.10 U	-	-
Magnesium (mg/L)	-	-	-	30.2	26.7	-	-
Nickel		346.6 b	297.5 b	2.0 I	2.0 I	-	-
Selenium	5.0	-	-	1.0 U	1.0 U	-	-
Silver	0.07	-	-	0.020 U	0.020 U	-	-
Zinc		233.3 b	200.2 b	4.0 U	4.0 U	-	-
Nutrients and other compounds (mg/L)							
Ortho-phosphate	-	-	-	0.92	0.42	0.38	1.7
Total Phosphorus	-	5.0 s	5.0 s	1.0 A	0.6	0.47	1.8
Ammonia	-	-	-	0.094	0.018 I	0.065	0.018 I
Un-ionized Ammonia	? 0.02 s	-	-	<0.017	<0.017	<0.017	<0.017
Nitrate and Nitrite	-	-	-	0.16	0.004 U	0.096	0.026
Total Kjeldahl Nitrogen	-	-	-	0.47	1.4	1.0	0.77
Organic Nitrogen	-	-	-	0.376	1.38	0.935	0.75
Total Nitrogen	-	3.0 s	3.0 s	0.63	1.4	1.096	0.796
Sodium	-	Report	Report	23.4	28.0	-	-
Fluoride	10.0	10.0	10.0	1.9	2.0	-	-
Sulfate	-	Report	Report	140	85 A	-	-
General Physical and Chemical Parameters							
Habitat Assessment	-	-	-	-	-	129	107
Dissolved Oxygen (mg/L)	? 5.0 s	5.0 s	5.0 s	8.1	9.2	3.6	3.5
pH (SU)	6.0-8.5 s	6.0-8.5 s	6.0-8.5 s	8.3	8.2	6.9	7.5
Conductivity (µmhos/cm)	1275 s	-	-	528	472	197	554
Temperature (°C)	-	Report	Report	31.6	32	28.8	28.1
Total Suspended Solids (mg/L)	-	60.0 s	60.0 s	-	-	-	-
Fixed Suspended Solids (mg/L)	-	25.0 s	25.0 s	-	-	-	-
Flow (MGD)	-	Report	Report	3.2	1.6	-	-
Hardness (mg $CaCO_3$)	-	-	-	253.7	211.8	-	-
Toxicity (48-hour static, screening bioassay, percent mortality in 100% effluent)							
Bioassay - Water flea	-	LC50>100%	LC50>100%	no mortality	no mortality	-	-
Bioassay - Fish	-	LC50>100%	LC50>100%	no mortality	no mortality	-	-
Algal biomass, phytoplankton (ug/L)							
Chlorophyll *a*	-	Report	Report	1.1 I	51 A	2.0 I	2.6
Phaeophytin	-	Report	Report	1.9 J	9.4 A	4.4 J	0.88

b - Value is calculated based on hardness

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

I - Value reported is < the minimum quantitation limit, and ? the minimum detection limit

J - Estimated value

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

s - Single sample

LC50>100% - 96 hour acute toxicity tests

Table 2. Measured and predicted algal growth potential (AGP) for total soluble inorganic nitrogen (TSIN) limitation: Cargill Fertilizer-- Hooker's Prairie

Location	AGP (measured)	Predicted AGP (TSIN) ± 20%	TSIN:OP ratio
Control	9.7	6.1 ± 1.2	0.4
Test	5.4	1.7 ± 0.3	0.03
Effluent 002	14.1	9.7 ± 1.9	0.3
Effluent 004	11.1	0.8 ± 0.2	0.1

to the fish, *Cyprinella leedsi,* or to the water flea, *Ceriodaphnia dubia,* during 48-hour acute screening bioassays (Table 1, Appendix 7).

- Fecal and total coliforms were not collected as part of this inspection.
- Effluent nutrient concentrations differed between samples from Outfall 002 and 004 (Table 1). The effluent total nitrogen concentration in Outfall 002 (0.63 mg/L) was less than half that of Outfall 004 (1.4 mg/L), while the effluent total phosphorus concentration was higher in the Outfall 002 sample (1.0 mg/L) compared to Outfall 004 (0.6 mg/L). Almost all of the nitrogen released by Outfall 004 was in organic forms while 40% of the nitrogen from Outfall 002 was inorganic. Effluents from both outfalls combine before reaching the Test Site, contributing the majority of the receiving waterbody flow at the Test Site. Phosphorus in the combined effluent sample contributed to elevated levels at the Test Site. Nutrient levels at the Test Site as compared with the Control Site were slightly lower for nitrogen compounds and higher for phosphorus compounds. Test Site levels of total phosphorus and ortho-phosphate were greater than those in 95% of typical Florida streams while at the Control Site, levels were greater than those in 80% of typical Florida streams (Appendix 6). Control Site levels of nitrogen compounds were greater than those at 40-50% of typical Florida streams, while at the Test Site levels were greater than those at 5-30% of typical Florida streams.
- Effluent chlorophyll *a* levels were 1.1 ug/L at Outfall 002, but were 51 ug/L at Outfall 004 (Table 1). The difference in chlorophyll results from the two outfalls may be related to the presence of the algacide simazine in effluent from Outfall 002. These data also suggest that Outfall 004 is releasing nutrients in the form of phytoplankton.
- Algal growth potential (AGP) is a measure of nutrients available for algal growth (Miller *et al.* 1978). Raschke and Shultz (1987) found that AGP above 5.0 mg dry weight/L represent a "problem" threshold for fresh receiving waters, implying nutrient enrichment. The AGP value at the Control Site was 9.7 mg dry weight/L (Table 2), above the problem threshold. The AGP values of the Test Site sample (5.4 mg dry weight/L) and in the Outfall 002 and 004 effluents (14.1, 11.1 mg dry weight/L, respectively) were also above this threshold. This indicates there is nutrient enrichment related to the discharge in the South Prong of the Alafia River, but the Control Site in Bell Creek was also nutrient enriched from other sources. There was no evidence of growth inhibition in AGP data (Table 2, see explanation of calculations in Appendix 5).
- The higher than expected AGP value in the effluent from Outfall 004 (Table 2) supports the interpretation that the Outfall 004 is exporting nutrients in the form of plankton. Water samples are first autoclaved before they are inoculated with *Pseudokirchneriella subcapitata*, formerly *Selenastrum capricornutum* (Appendices 3 and 5). This process lyses the phytoplankton in the sample and potentially releases the nutrients they contain. This is the most likely explanation for the order of magnitude difference between expected and observed AGP results from the effluent sample taken at Outfall 004.
- There were differences between the Test and Control Sites in algal community composition on the periphytometers (Table 3, Appendix 9). The proportion of green algae in the Test Site periphyton sample was signifi-

Table 3. Periphyton composition at control and test sites.

Cargill Fertilizer: Hooker's Prairie	Control Site	Test Site
Number of Taxa	18	21
Shannon-Weaver Diversity	2.3	2.7
Chlorophyll *a* (mg/m^2)	20	27
Phaeophytin (mg/m^2)	1.5	3.8
Algal Density ($number/cm^2$)	239,013	320,542
Number of Algal Units Identified	555	584
Percentage Composition:		
Blue-green algae	3.1	0.9
Green algae	2.3	9.1
Diatoms	94.6	90.1

cantly higher than that of the Control Site sample (see Appendix 3 for an explanation of significance testing methodologies), and diatom relative abundance was reduced. Periphyton chlorophyll *a* concentration was greater than that of 80% of typical Florida streams at both Test and Control Sites, but was of the same order of magnitude at both sites.

- Phytoplankton chlorophyll *a* concentration was of the same order of magnitude at both sites (Table 1).
- Quantitative measures of benthic macroinvertebrate assemblages from Hester-Dendy samplers showed approximately equal Shannon-Weaver diversity at the Test Site compared to the Control Site (Table 4, Appendix 10). There was a shift in the major groups present, with gastropods and algal scrapers the major components of the assemblage at the Test Site compared to the Control Site, where Ephemeroptera, Diptera, shredders, and surface-deposit feeders were abundant. There were twice as many EPT taxa at the Control Site compared with the Test Site. The difference in proportional abundance of Ephemeroptera and Trichoptera between Test (6% of total) and Control (23%) Sites was significant (see Appendix 3 for an explanation of statistical methods). The difference in feeding groups and in EPT taxa and proportional abundance of EPT between the Test and Control Sites may be related to nutrient enrichment from the facility and may be a warning sign of biological impacts from the facility.
- Qualitative measures of benthic macroinvertebrate assemblages from dipnet samples are summarized in Tables 5 and 6 and in Appendix 11. The Control Site SCI score of 23 placed it in the "good" category while the Test Site SCI score of 29 placed it in the "excellent" category. However, dipnet samples also indicated significantly fewer Ephemeroptera and Trichoptera at the Test Site as compared to the Control Site (17.9% of the total at the Test Site vs. 45.5%, Control Site, see Appendix 3 for statistical methods). There were twice as many EPT taxa at the Control Site compared with the Test Site. The most abundant taxon at the Control Site was a mayfly, *Caenis* sp. while the grazing gastropod family Ancylidae was most abundant at the Test Site. *Caenis* sp. is relatively insensitive to nutrient enrichment (L. Fore Statistical Design, in preparation). These results parallel those from Hester-Dendy samplers.

Table 4. Macroinvertebrate Hester-Dendy Samples (Quantitative)

Cargill Fertilizer: Hooker's Prairie	Control Site	Test Site
Summary Statistics		
Shannon-Weaver Diversity	3.8	3.6
Number of Taxa	39	29
Florida Index	19	9
Number of EPT Taxa	9	4
Total Number of Individuals	888	386
Community Composition: Percent of total		
Amphipoda	0.2	0.3
Coleoptera	8.6	1.3
Diptera	67.6	45.6
Ephemeroptera	19.3	5.2
Gastropoda	0.7	46.9
Trichoptera	3.7	0.8
Functional Feeding Groups: Percent of total		
Predators	8.7	4.4
Surface Deposit Feeders	46.6	29.1
Suspension Feeders	5.3	13.1
Scrapers	14.7	49.5
Shredders	23.3	3.2
Unknown	1.2	0.3

Summary

Effluent metals complied with Class III Water Quality Criteria (62-302 F.A.C.) and facility permit limits at both outfalls. The algacide simazine was detected in the effluent from Outfall 002 (0.074mg/L). Dissolved oxygen (DO as mg/L) at both the Test and Control Sites was <4.0 mg/L and did not meet Class III Water Quality Criteria (Table 1, 62-302.530 (31) F.A.C.). Phosphorus in the effluent contributed to elevated levels at the Test Site. Test Site levels of total phosphorus and ortho-phosphate were greater than those in 95% of typical Florida streams while at the Control Site, levels were greater than those in 80% of typical Florida streams. Control Site levels of nitrogen compounds were greater than those at 40-50% of typical Florida streams, while at the Test Site levels were greater than those at 5-30% of typical Florida streams. The AGP value at the Control Site was 9.7 mg dry weight/L, above the 5.0 mg dry weight/L suggested "problem" threshold. The AGP values at the Test Site (5.4 mg dry weight/L) and in the Outfall 002 and 004 effluents (14.1, 11.1 mg dry weight/L) were also above this threshold. This indicates there is nutrient enrichment related to the discharge in this portion of the South Prong of the Alafia River, but

Table 5. Macroinvertebrate Dipnet Samples (Qualitative)

Cargill Fertilizer: Hooker's Prairie	Control Site	Test Site
Stream Condition Index (value)	23	29
Stream Condition Index (word)	Good	Excellent
Stream Condition Index Metrics		
Florida Index	8	8
Number of EPT Taxa	8	4
Number of Taxa	21	28
Number of Chironomid Taxa	6	13
Percent Dominant Taxon	31.3	26.8
Percent Dipterans	16.4	21.4
Percent Suspension Feeders and Filterers	3.4	2.7
Total Number of Individuals	134	112
Community Composition: Percent of total		
Coleoptera	32.1	6.3
Diptera	16.4	21.4
Ephemeroptera	38.8	16.1
Gastropoda	0.0	50.0
Trichoptera	6.7	1.8
Other	6.0	4.4
Functional Feeding Groups: Percent of total		
Burrowing Deposit Feeders	0.0	0.9
Predators	3.7	5.4
Surface Deposit Feeders	42.2	22.8
Suspension Feeders and Filterers	3.4	2.7
Scrapers	38.4	60.7
Shredders	6.3	2.7
Parasites	0.8	0.9
Unknown	5.2	2.7

the control stream was also nutrient enriched from other sources.

Chlorophyll data suggest that Outfall 004 is releasing nutrients in the form of plankton. There were significantly more green algae in periphyton samples from the Test Site as compared with the Control Site, although chlorophyll data were of the same order of magnitude at both sites. Quantitative measures of benthic macroinvertebrate assemblages from Hester-Dendy samplers showed approximately equal Shannon-Weaver diversity at the Test Site compared to the Control Site. In qualitative dipnet samples, the Control Site SCI score of 23 placed it in the "Good" category while the Test Site SCI score of 29 placed it in the "Excellent" category. However, both Hester-Dendy and dipnet samples showed there were significantly fewer Ephemeroptera and Trichoptera at the Test Site as compared to the Control Site. The difference in the proportion of green algae and the abundance in EPT at the Test Site as compared with the Control Site combined with high levels of nutrient inputs from the facility may be a sign of biological impacts from nutrients released by the facility.

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Cargill Fertilizer- Hooker's Prairie: Control Site

Table 6. Stream Condition Index Metrics: Peninsula, Summer Index					
Metric:	Value	5	3	1	Score
Total Number of Taxa	21	≥26	25-14	<14	3
Number of EPT Taxa	8	≥4	3-2	<2	5
Number of Chironomid Taxa	6	≥7	6-4	<4	3
Percent Contribution of Dominant Taxon	31.3	≤29	30-64	>64	3
Percent Diptera	16.4	-	≤37	>37	3
Florida Index	8	≥7	6-4	<4	5
Percent Suspension Feeders and Filterers	3.4	-	≥7	<7	1
Total Score		Hooker's Prairie: Control Site			23
Interpretation of Scores		Excellent			26-31
		Good			20-25
		Poor			13-19
		Very Poor			7-12

Cargill Fertilizer- Hooker's Prairie: Test Site

Table 6. Stream Condition Index Metrics: Peninsula, Summer Index					
Metric:	Value	5	3	1	Score
Total Number of Taxa	28	≥26	25-14	<14	5
Number of EPT Taxa	4	≥4	3-2	<2	5
Number of Chironomid Taxa	13	≥7	6-4	<4	5
Percent Contribution of Dominant Taxon	26.8	≤29	30-64	>64	5
Percent Diptera	21.4	-	≤37	>37	3
Florida Index	8	≥7	6-4	<4	5
Percent Suspension Feeders and Filterers	2.7	-	≥7	<7	1
Total Score		Hooker's Prairie Test Site			29
Interpretation of Scores		Excellent			26-31
		Good			20-25
		Poor			13-19
		Very Poor			7-12

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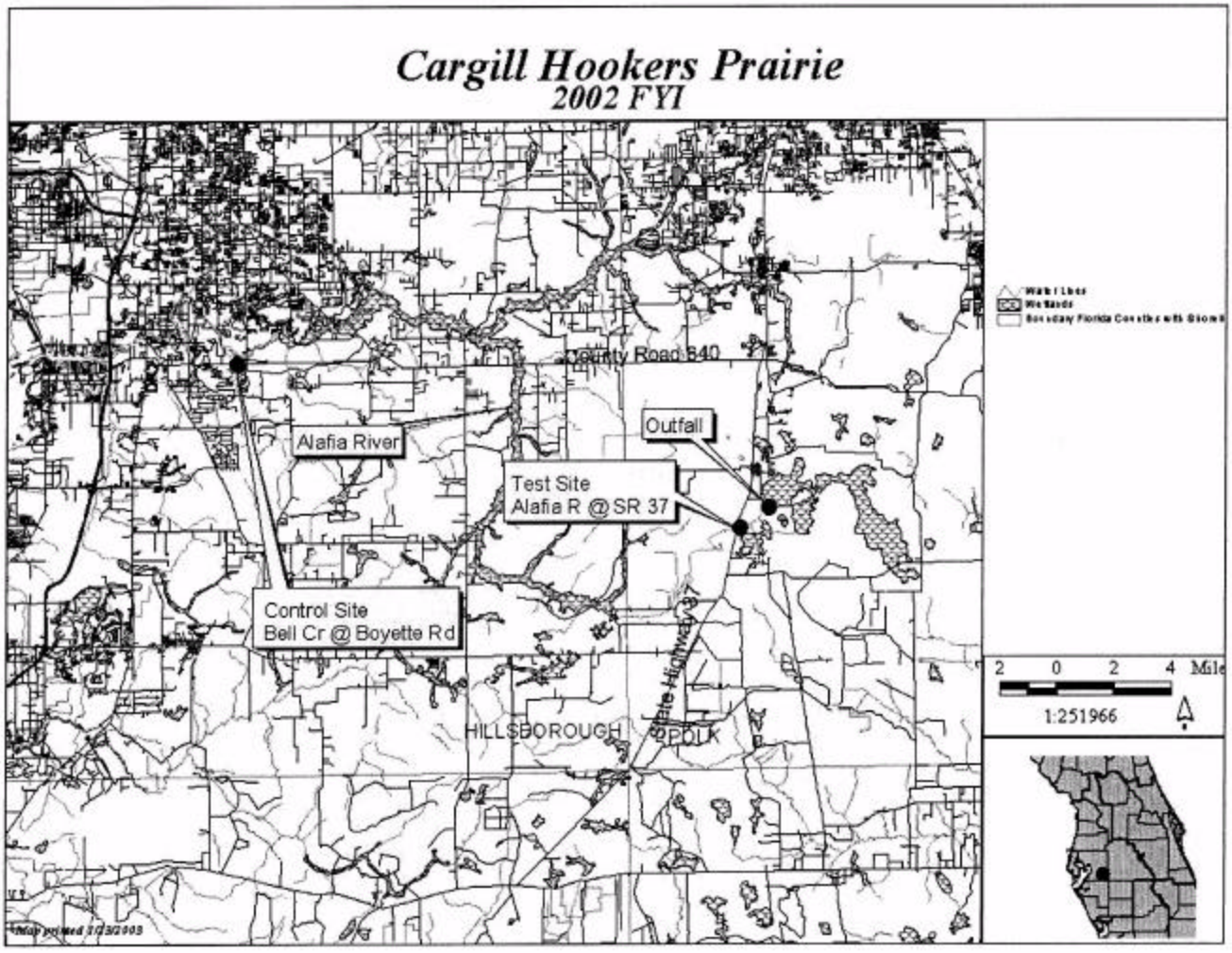
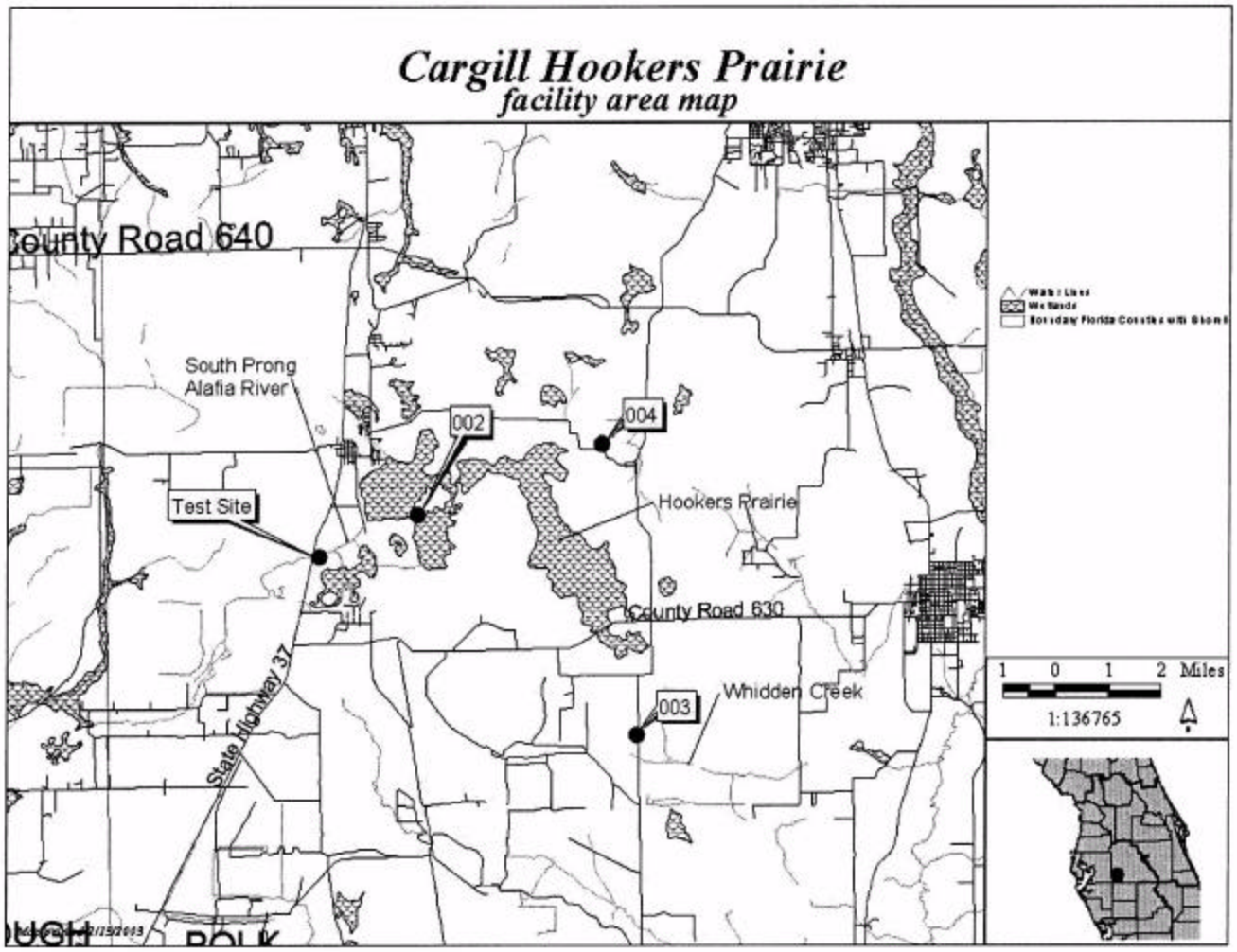
Appendices

- Appendix 1. Map of facility
- Appendix 2. Facility summary
- Appendix 3. Methods
- Appendix 4. Chemical analyses of effluent and receiving water.
- Appendix 5. Explanation of biological measurements
- Appendix 6. Typical values for selected parameters in Florida waters
- Appendix 7. Additional physical, chemical, toxicological and microbiological results
- Appendix 8. Habitat Assessment field sheets
- Appendix 9. Periphyton: Unit counts and taxa lists
- Appendix 10. Hester-Dendy multi-plate samplers: macroinvertebrate density and taxa lists
- Appendix 11. Dipnet samples: macroinvertebrate counts and taxa lists

Appendix 1



Large scale map of study area



Small scale map of study area

Appendix 2

State of Florida
Department of Environmental Protection
Facility Summary

Facility Name: Cargill Crop Nutrition- Hookers Prairie		Prepared By: Bonnie Hall
Location: Post Office Box 508 Bradley Junction, FL 33835	County: Polk	District: SWD
Federal Permit No.: FL0033294 (Major) Expiration Date: March 1, 2003	State Permit No.: FL0033294 (Major) Expiration Date: March 1, 2003	Facility Type: Phosphate Mine
Function of Facility: The Hookers Prairie Mine operations include phosphate mining and beneficiation facilities, phosphatic clay settling areas, sand tailings disposal areas and a mine water recirculation system. The activities include mining of phosphate ore. The mined ore is slurried into a pit and pumped to the beneficiation plant where the fine clays and sand are separated from the phosphate rock (product) by washing, screening and double flotation. The generated wet phosphate rock is transported to another location for further processing. The separated clays are pumped to settling areas. Sand tailings are pumped to mined areas to be used as reclamation fill.		
Description of treatment process: Decanted water from the clay settling areas is returned to the beneficiation plant for reuse and discharged, as necessary		
Receiving Waters: Outfalls 002 and 004 discharge into Hookers Prairie (Headwaters of the South Prong of the Alafia River), and Outfall 003 discharges into reclaimed lakes belonging to IMC Phosphates Company, which in turn discharge into Whidden Creek a tributary of the Peace River. (Class III fresh waters)		Classification: Class III Water Bodies
Design Flow: Flow volume is unlimited	Mean Flow: outfall 002- 6.9 MGD, outfall 003- 7.1 MGD, outfall 004- 2.8 MGD	Flow During Survey:
Discharge is: Rainfall Dependent		
Facility Mixing Zone Details: no mixing zone		

List Effluent Limits:

Parameters (units)	Discharge Limitations			Monitoring Requirements	
	Daily Minimum	Monthly Average	Daily Maximum	Frequency	Sample Type
Flow (MGD)	N/A	Report	Report	1/Week	Instantaneous
Total Non-filterable Residue [TSS] (mg/l)	N/A	30.0	60.0	1/Week	Grab
Total Non-volatile, Non-filterable Residue [FS](mg/l)	N/A	12.0	25.0	1/Week	Grab
Total Phosphorus [as P] * (mg/l)	N/A	3.0	5.0	1/Week	Grab
pH (standard units) (See I.A.2)	6.0	Report	8.5	1/Week	Grab
Dissolved Oxygen (mg/l)	5.0	Report	N/A	1/Week	Grab
Temperature (°F)	N/A	Report	Report	1/Week	Grab
Specific Conductance (umhos/centimeter)	N/A	N/A	See I.A.3	1/Month	Grab

Total Nitrogen [as N] ** (mg/l)	N/A	N/A	3.0	1/Month	Grab
Chlorophyll-a (µg/l)	N/A	N/A	Report	1/Month	Grab
Fluorides (mg/l)	N/A	N/A	10.0	1/Quarter	Grab
Total Sodium (mg/l)	N/A	N/A	Report	1/Quarter	Grab
Total Sulfates (mg/l)	N/A	N/A	Report	1/Quarter	Grab
Toxicity	See Specific Condition I.A.4				

* Total phosphorus shall be for monitoring and reporting only, except: if monitoring data shows total phosphorus levels exceed 3 mg/l monthly average for more than one 30-day period per calendar year, the permittee, upon written notification by the Department, shall prepare and file within 120 days (unless the time is extended by the Department) a study consisting of the following: (1) a chronology of at least one year's discharge data; (2) an assessment of the cause and origin of the phosphorus constituent of the discharge; (3) description of the discharger's current maintenance operation and management practices directly related to the control of phosphorus; (4) an evaluation of the environmental significance of the phosphorus levels; and (5) an identity of reasonable methods to abate, to the extent practicable, the influx of phosphorus into the discharge. Upon receipt of the report, the Department shall require the applicant to publish a public notice in a newspaper of general circulation in the affected area which states that the report was received and where it is available for public inspection. The Department shall evaluate the report and may amend the discharger's permit to reflect additional requirements (subject to administrative and judicial review), including the implementation of cost-effective management practices or technological advances which reduce or eliminate the phosphorus in the discharge to the maximum extent practicable.

** Total nitrogen shall be for monitoring and reporting only, except: if monitoring data shows total nitrogen levels exceed 3 mg/l monthly maximum for more than one 30-day period per calendar year, the permittee, upon written notification by the Department, shall prepare and file within 120 days (unless the time is extended by the Department) a study consisting of the following: (1) a chronology of at least one year's discharge data; (2) an assessment of the cause and origin of the nitrogen constituent of the discharge; (3) description of the discharger's current maintenance operation and management practices directly related to the control of nitrogen; (4) an evaluation of the environmental significance of the nitrogen levels; and (5) an identity of reasonable methods to abate, to the extent practicable, the influx of nitrogen into the discharge. Upon receipt of the report, the Department shall require the applicant to publish a public notice in a newspaper of general circulation in the affected area which states that the report was received and where it is available for public inspection. The Department shall evaluate the report and may amend the discharger's permit to reflect additional requirements (subject to administrative and judicial review), including the implementation of cost-effective management practices or technological advances which reduce or eliminate the nitrogen in the discharge to the maximum extent practicable.

2. pH of the discharge shall be limited in accordance with Rule 62-302.530(52)(c), F.A.C.

3. Specific Conductance shall not be increased more than 50% above background or to 1275 umhos/cm. whichever is greater. Background stations for each outfall shall be proposed for Departmental review within 30 days of issuance. Once approved, these stations will be made part of the permit for the purpose of determining background water quality.

4. The permittee shall initiate the series of tests described below to evaluate whole effluent toxicity of the discharge from Outfalls 002, 003 and 004. All test species, procedures and quality assurance criteria used shall be in accordance with Methods for Measuring Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA/600/4-90/027F, or the most current edition. The control water and dilution water used will be moderately hard water as described in EPA/600/4-90/027F, Table 6, or the most current edition. A standard reference toxicant (SRT) quality assurance (QA) acute toxicity test shall be conducted concurrently or no greater than 30 days before the date of the "routine" test, with each species used in the toxicity tests. The results of all toxicity tests shall be submitted with the discharge monitoring report (DMR). Any deviation of the bioassay procedures outlined herein shall be submitted in writing to the Department for review and approval prior to use.

a. 1. The permittee shall conduct 96-hour acute static renewal toxicity tests using the daphnid, Ceriodaphnia dubia, and the bannerfin shiner, Cyprinella leedsi. All tests will be conducted on four separate grab samples collected at evenly-spaced (6-hr) intervals over a 24-hour period and used in four separate tests in order to catch any peaks of toxicity and to account for daily variations in effluent quality.

2. If control mortality exceeds 10% for either species in any test, the test(s) for that species (including the control) shall be repeated. A test will be considered valid only if control mortality does not exceed 10% for either species. If, in any separate grab sample test, 100% mortality occurs prior to the end of the test, and control mortality is less than 10% at that time, that test (including the control) shall be terminated with the conclusion that the sample demonstrates unacceptable acute toxicity.

b. 1. The routine tests shall be performed on a bi-annual basis, once during the wet season (July through September) and once during the dry season (December through February). These tests are referred to as routine tests.

2. Results from routine tests shall be reported according to EPA/600/4-90/027F, Section 12, Report Preparation (or the most current edition), and shall be submitted in accordance with I.E.3. below.

c. 1. All routine test shall be conducted using a control (0% effluent) and a test concentration of 100% final

effluent.

2. Mortalities of greater than 50% in a 100% effluent in any routine sample or an LC50 of less than 100% effluent in any additional definitive test will constitute a violation of these permit conditions, and Rule 62-302.200(1), Rule 62-302.500(1)(d) and Rule 62-4.244(3)(a), F. A. C.

d. 1. If unacceptable acute toxicity (greater than 20% mortality of either test species in any grab sample test) is found in a routine test, the permittee shall conduct three additional tests on each species indicating unacceptable toxicity. The first additional test will include four grab samples taken as described in 1.a. and run as four separate definitive analyses. The second and third additional definitive tests will be run on a single grab sample collected on the day and time when the greatest toxicity was identified in the first additional definitive test. Results for each additional test will include the determination of LC50 values with 95% confidence limits.

2. The first additional test shall be conducted using a control (0% effluent) and a minimum of five dilutions: 100%, 50%, 25%, 12.5% and 6.25% effluent. The dilution series may be modified in the second and third test to more accurately identify the toxicity, such that at least two dilutions above and two dilutions below the target toxicity and a control (0% effluent) are run.

3. For each additional test, the sample collection requirements and the test acceptability criteria specified in Section 1 above must be met for the test to be considered valid. The first test shall begin within two weeks of the end of the routine tests, and shall be conducted weekly thereafter until 3 additional, valid tests are completed. The additional tests will be used to determine if the toxicity found in the routine test is still present.

4. Results from additional tests, required due to unacceptable acute toxicity in the routine tests, shall be submitted in a single report prepared according to EPA/600/4-90/027F, Section 12, or the most current edition and submitted within 45 days of completion of the additional, valid tests. Upon completion of the third additional test, the permittee will meet with the Department within 30 days of the report submittal to identify corrective actions necessary to remedy the unacceptable acute toxicity.

e. If tests for acute toxicity fail, the Department may modify the permit to include chronic toxicity testing.

Description of permitted outfall: Outfalls 002 and 004 discharge into Hookers Prairie (Headwaters of the South Prong of the Alafia River), and Outfall 003 discharges into reclaimed lakes belonging to IMC Phosphates Company, which in turn discharge into Whidden Creek a tributary of the Peace River. Mean Flow for outfall 002is 6.9 MGD, outfall 003 is 7.1 MGD, and outfall 004 is 2.8 MGD. Discharge is rainfall dependent.		
List permit violations (DMR data) and plant upsets that occurred at the plant within the last year: none		
Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions: none		
Discuss MOR trends to prior data; is trend improving or declining: N/a		
Additional Information:		

Appendix 3

Methods

The purpose of this investigation was to determine the discharger's effects on the biota of the receiving waters. Chemical and biological comparisons were made between a control site and a test site. A habitat assessment was performed *in situ* to compare biological conditions at the control and test sites. The resulting scores were based upon the examinations of the physical structure and extent of disturbance at the study sites and aid in the interpretation of biological community data. Supplemental physical and chemical data were collected on the effluent and at both study sites. Data for this report were collected on 5 August 2002.

The effluent was analyzed for nutrients, metals, organic constituents (base, neutral and acid extractables) and pesticides. The results from these analyses were compared with Water Quality Limits (FAC 62-302) and facility permit limits (Table 1, Appendix 2). A list of the analytes tested for, the minimum detection limit and the practical quantitation level are given in Appendix 4. Methods used for all chemical analyses are on file at the FDEP Central Chemistry Laboratory in Tallahassee and may be viewed on the web at http://www.floridadep.org/labs/sop/index.htm.

Acute screening toxicity bioassays were performed on the effluent sample using the water flea, *Ceriodaphnia dubia,* and the fish, *Cyprinella leedsi* (Weber 1993). Effluent samples and water samples from the control and test sites were autoclaved, filtered (0.45 μm), inoculated with the unicellular green alga, *Pseudokirchneriella subcapitata* (formerly *Selanastrum capricornutum,* USEPA 2002), and incubated for 14 days (Miller et al. 1978). The algal growth potential (AGP) value is the peak growth of the alga within that 14-day period, recorded as mg dry weight/L (Miller et al. 1978). To measure possible inhibition of algal growth based on possible toxicants in effluent or site water, AGP results were compared to expected levels of dry weight production based on the nutrient content of the water (Miller et al. 1978, Appendix 5).

Periphyton were sampled at both control and test sites by incubating glass microscope slides in a standard periphytometer for 28 days (APHA 1992, Method 1033). Phytoplankton were sampled using 1 L grab samples (APHA 1992, Method 10200B). Periphyton and phytoplankton were subsampled and identified to the lowest practicable level, usually species. Algal assemblages were examined for (1) cell density, (2) community composition, (3) taxa richness, and (4) Shannon-Weaver Diversity Index. To estimate algal biomass, chlorophyll *a* concentration was measured on a subsample of the slides from the periphytometer or on a separate grab sample of site water (APHA 1992, Method 10200H).

Benthic macroinvertebrates were collected from multiple substrates (*e.g.* snags, leaf packs, vegetation) using discrete dipnet sweeps (qualitative samples, method modified from Plafkin *et al.* 1989). Collections were also made with Hester-Dendy multi-plate samplers incubated for 28 days (quantitative samples, method modified from APHA 1992, method 10500.5). Benthic macroinvertebrates were sorted and identified to the lowest practical taxonomic level, usually species. Eight measures were calculated from benthic macroinvertebrate data to determine the effects of the discharge on receiving waters. These measures included: (1) taxa richness, (2) community composition, (3) functional feeding groups, (4) percent dominant taxon, (5) Shannon-Weaver Diversity Index, (6) the Florida Index, (7) the number of Ephemeroptera, Plecoptera and Trichoptera (EPT) taxa, and (8) the Stream Condition Index (SCI). For a discussion of each biological measure and its potential relationship to Florida Administrative Code, see Appendix 5.

Statistical comparisons of the proportions of taxa, major groups or feeding groups were made using 95% confidence intervals on proportions. A 95% confidence interval is the range of values above and below a given proportion that has a 95% chance of containing the true proportion (Sokal and Rohlf 1995). If the 95% confidence intervals for two proportions do not overlap, then the proportion of X in sample 1 is significantly different from the proportion of X in sample 2 at $p<0.05$. A "$p<0.05$" level of significance means that there is less than a 5% chance that the true proportions in the two samples are the same. All comparisons that are labeled as significant in the text have a probability <0.05 that the proportions are the same.

Appendix 4

Chemical Analyses of Effluent and Receiving Water

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
08/05/02	BELL CR @ BOYETTE RD	Bio-AGP/LimNut	Algal Growth Potential	9.72	mg DryWt/L		0.1	0.3
08/05/02	BELL CR @ BOYETTE RD	Bio-Chl-a	Chlorophyll-A, Monochromatic, Periphyton	20	mg/m2		0.67	2
08/05/02	BELL CR @ BOYETTE RD	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	2	ug/L	I	0.85	2.6
08/05/02	BELL CR @ BOYETTE RD	Bio-Chl-a	Phaeophytin-A, Monochromatic, Periphyton	1.5	mg/m2		0.67	2
08/05/02	BELL CR @ BOYETTE RD	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	4.4	ug/L	J	0.85	2.6
08/05/02	BELL CR @ BOYETTE RD	Bio-Invertebrates	Macroinvert-FW-Qual-Dipnetx20-# Taxa	21	# Taxa			
08/05/02	BELL CR @ BOYETTE RD	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	32	# Taxa			
08/05/02	BELL CR @ BOYETTE RD	Bio-Peri/Phyto	Periphyton-Quantitative-# Diatom Taxa	7	#Taxa			
08/05/02	BELL CR @ BOYETTE RD	Bio-Peri/Phyto	Periphyton-Quantitative-# Wet Taxa	11	#Taxa			
08/05/02	BELL CR @ BOYETTE RD	Bio-Peri/Phyto	Phytoplankton-Quantitative-# Wet Taxa	28	#Taxa			
08/05/02	BELL CR @ BOYETTE RD	Bio-Peri/Phyto	Phytoplankton-Quantitative-#Diatom Taxa	11	#Taxa			
08/05/02	BELL CR @ BOYETTE RD	Nutrients-Liquid	Ammonia-N	0.065	mg N/L		0.01	0.02
08/05/02	BELL CR @ BOYETTE RD	Nutrients-Liquid	NO2NO3-N	0.096	mg N/L		0.004	0.01
08/05/02	BELL CR @ BOYETTE RD	Nutrients-Liquid	N_KJEL_TOT	1	mg N/L		0.06	0.2
08/05/02	BELL CR @ BOYETTE RD	Nutrients-Liquid	O-Phosphate-P	0.38	mg P/L		0.024	0.06
08/05/02	BELL CR @ BOYETTE RD	Nutrients-Liquid	Total-P	0.47	mg P/L		0.04	0.1
08/05/02	BELL CR @BOYETT RD REP-2	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	28	# Taxa			
08/05/02	BELL CR @BOYETT RD REP-3	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	20	# Taxa			
08/05/02	OUTFALL 002	BNA-Water	1,2,4,5-Tetrachlorobenzene	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	1,2,4-Trichlorobenzene	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	1,2-Dichlorobenzene	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	1,3,5-Trinitrobenzene	3.8	ug/L	U	3.8	15
08/05/02	OUTFALL 002	BNA-Water	1,3-Dichlorobenzene	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	1,3-Dinitrobenzene	1.9	ug/L	U	1.9	7.7
08/05/02	OUTFALL 002	BNA-Water	1,4-Dichlorobenzene	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	1,4-Naphthoquinone	19	ug/L	U	19	77
08/05/02	OUTFALL 002	BNA-Water	1-Naphthylamine	9.6	ug/L	U	9.6	38
08/05/02	OUTFALL 002	BNA-Water	2,3,4,6-Tetrachlorophenol	1.9	ug/L	U	1.9	7.7
08/05/02	OUTFALL 002	BNA-Water	2,4,5-Trichlorophenol	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	2,4,6-Trichlorophenol	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	2,4-Dichlorophenol	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	2,4-Dimethylphenol	48	ug/L	U	48	190
08/05/02	OUTFALL 002	BNA-Water	2,4-Dinitrophenol	14	ug/L	U	14	58
08/05/02	OUTFALL 002	BNA-Water	2,4-Dinitrotoluene	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	2,6-Dichlorophenol	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	2,6-Dinitrotoluene	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	2-Acetylaminofluorene	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	2-Chloronaphthalene	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	2-Chlorophenol	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	2-Methyl-4,6-dinitrophenol	2.9	ug/L	U	2.9	12
08/05/02	OUTFALL 002	BNA-Water	2-Methylnaphthalene	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	2-Naphthylamine	9.6	ug/L	U	9.6	38
08/05/02	OUTFALL 002	BNA-Water	2-Nitroaniline	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	2-Nitrophenol	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	2-Picoline	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	3,3'-Dichlorobenzidine	38	ug/L	U	38	150
08/05/02	OUTFALL 002	BNA-Water	3,3'-Dimethylbenzidine	19	ug/L	U	19	77
08/05/02	OUTFALL 002	BNA-Water	3-Methylcholanthrene	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	3-Nitroaniline	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	4,4'-DDD	1.4	ug/L	U	1.4	5.8
08/05/02	OUTFALL 002	BNA-Water	4,4'-DDE	1.4	ug/L	U	1.4	5.8
08/05/02	OUTFALL 002	BNA-Water	4,4'-DDT	1.4	ug/L	U	1.4	5.8
08/05/02	OUTFALL 002	BNA-Water	4-Aminobiphenyl	3.8	ug/L	U	3.8	15
08/05/02	OUTFALL 002	BNA-Water	4-Bromophenyl phenyl ether	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	4-Chloro-3-methylphenol	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	4-Chloroaniline	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.7
08/05/02	OUTFALL 002	BNA-Water	4-Nitroaniline	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	4-Nitrophenol	14	ug/L	U	14	58
08/05/02	OUTFALL 002	BNA-Water	5-Nitro-o-toluidine	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	7,12-Dimethylbenz(a)anthracene	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	Acenaphthene	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	Acenaphthylene	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	Acetophenone	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	Aldrin	1.4	ug/L	U	1.4	5.8
08/05/02	OUTFALL 002	BNA-Water	Aniline	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	Anthracene	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	0.96	ug/L	U	0.96	3.8
08/05/02	OUTFALL 002	BNA-Water	Benzidine	96	ug/L	U	96	380
08/05/02	OUTFALL 002	BNA-Water	Benzo(a)anthracene	0.96	ug/L	U	0.96	3.8

08/05/02 OUTFALL 002	BNA-Water	Benzo(a)pyrene	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Benzo(b)fluoranthene	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Benzo(g,h,i)perylene	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Benzo(k)fluoranthene	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Benzyl alcohol	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Bis(2-chloroethoxy)methane	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Bis(2-chloroethyl)ether	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Bis(2-chloroisopropyl)ether	2.9	ug/L	U	2.9	12
08/05/02 OUTFALL 002	BNA-Water	Bis(2-ethylhexyl)phthalate	14	ug/L	U	14	58
08/05/02 OUTFALL 002	BNA-Water	Butyl benzyl phthalate	4.8	ug/L	U	4.8	19
08/05/02 OUTFALL 002	BNA-Water	Chrysene	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Di-n-butyl phthalate	4.8	ug/L	U	4.8	19
08/05/02 OUTFALL 002	BNA-Water	Di-n-octyl phthalate	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Dibenzo(a,h)anthracene	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Dibenzofuran	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Dieldrin	1.4	ug/L	U	1.4	5.8
08/05/02 OUTFALL 002	BNA-Water	Diethyl phthalate	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Dimethyl phthalate	48	ug/L	U	48	190
08/05/02 OUTFALL 002	BNA-Water	Dimethylaminoazobenzene	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Dinoseb	3.8	ug/L	U	3.8	15
08/05/02 OUTFALL 002	BNA-Water	Diphenylamine	2.9	ug/L	U	2.9	12
08/05/02 OUTFALL 002	BNA-Water	Endosulfan I	3.8	ug/L	U	3.8	15
08/05/02 OUTFALL 002	BNA-Water	Endosulfan II	3.8	ug/L	U	3.8	15
08/05/02 OUTFALL 002	BNA-Water	Endosulfan sulfate	1.4	ug/L	U	1.4	5.8
08/05/02 OUTFALL 002	BNA-Water	Endrin	1.4	ug/L	U	1.4	5.8
08/05/02 OUTFALL 002	BNA-Water	Endrin aldehyde	3.8	ug/L	U	3.8	15
08/05/02 OUTFALL 002	BNA-Water	Ethyl methanesulfonate	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Fluoranthene	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Fluorene	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Heptachlor	1.4	ug/L	U	1.4	5.8
08/05/02 OUTFALL 002	BNA-Water	Heptachlor epoxide	1.4	ug/L	U	1.4	5.8
08/05/02 OUTFALL 002	BNA-Water	Hexachlorobenzene	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Hexachlorobutadiene	2.9	ug/L	U	2.9	12
08/05/02 OUTFALL 002	BNA-Water	Hexachlorocyclopentadiene	2.9	ug/L	U	2.9	12
08/05/02 OUTFALL 002	BNA-Water	Hexachloroethane	2.9	ug/L	U	2.9	12
08/05/02 OUTFALL 002	BNA-Water	Hexachloropropene	1.9	ug/L	U	1.9	7.7
08/05/02 OUTFALL 002	BNA-Water	Indeno(1,2,3-cd)pyrene	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Isophorone	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Isosafrole	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Methapyrilene	3.8	ug/L	U	3.8	15
08/05/02 OUTFALL 002	BNA-Water	Methyl methanesulfonate	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	N-Nitrosodi-n-butylamine	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	U	1.9	7.7
08/05/02 OUTFALL 002	BNA-Water	N-Nitrosodiethylamine	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.7
08/05/02 OUTFALL 002	BNA-Water	N-Nitrosodiphenylamine	2.9	ug/L	U	2.9	12
08/05/02 OUTFALL 002	BNA-Water	N-Nitrosomethylethylamine	1.9	ug/L	U	1.9	7.7
08/05/02 OUTFALL 002	BNA-Water	N-Nitrosomorpholine	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	N-Nitrosopiperidine	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	N-Nitrosopyrrolidine	1.9	ug/L	U	1.9	7.7
08/05/02 OUTFALL 002	BNA-Water	Naphthalene	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.7
08/05/02 OUTFALL 002	BNA-Water	Nitroquinoline-1-oxide	19	ug/L	U	19	77
08/05/02 OUTFALL 002	BNA-Water	Pentachlorobenzene	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Pentachloroethane	48	ug/L	U	48	190
08/05/02 OUTFALL 002	BNA-Water	Pentachloronitrobenzene	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Pentachlorophenol	2.9	ug/L	U	2.9	12
08/05/02 OUTFALL 002	BNA-Water	Phenacetin	3.8	ug/L	U	3.8	12
08/05/02 OUTFALL 002	BNA-Water	Phenanthrene	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Phenol	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Pyrene	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	Pyridine	3.8	ug/L	U	3.8	15
08/05/02 OUTFALL 002	BNA-Water	Safrole	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	BNA-Water	alpha-BHC	1.4	ug/L	U	1.4	5.8
08/05/02 OUTFALL 002	BNA-Water	beta-BHC	1.4	ug/L	U	1.4	5.8
08/05/02 OUTFALL 002	BNA-Water	delta-BHC	1.4	ug/L	U	1.4	5.8
08/05/02 OUTFALL 002	BNA-Water	gamma-BHC	1.4	ug/L	U	1.4	5.8
08/05/02 OUTFALL 002	BNA-Water	m,p-Cresols	1.9	ug/L	U	1.9	7.7
08/05/02 OUTFALL 002	BNA-Water	o-Cresol	1.9	ug/L	U	1.9	7.7
08/05/02 OUTFALL 002	BNA-Water	o-Toluidine	0.96	ug/L	U	0.96	3.8
08/05/02 OUTFALL 002	Bio-AGP/LimNut	Algal Growth Potential	14.1	mg DryWt/L		0.1	0.3

08/05/02 OUTFALL 002	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	1.1	ug/L	I	0.85	2.6
08/05/02 OUTFALL 002	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	1.9	ug/L	J	0.85	2.6
08/05/02 OUTFALL 002	Bio-Toxicology	Bioassay-Acute-Screen-FW-C.dubia, LC50	100	LC50	L		
08/05/02 OUTFALL 002	Bio-Toxicology	Bioassay-Acute-Screen-FW-Fish, LC50	100	LC50	L		
08/05/02 OUTFALL 002	GC-Water	Alachlor	0.57	ug/L	U	0.57	2.28
08/05/02 OUTFALL 002	GC-Water	Ametryn	0.048	ug/L	U	0.048	0.192
08/05/02 OUTFALL 002	GC-Water	Atrazine	0.048	ug/L	U	0.048	0.192
08/05/02 OUTFALL 002	GC-Water	Azinphos Methyl	0.048	ug/L	U	0.048	0.192
08/05/02 OUTFALL 002	GC-Water	Bromacil	0.19	ug/L	U	0.19	0.76
08/05/02 OUTFALL 002	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
08/05/02 OUTFALL 002	GC-Water	Chlorpyrifos Ethyl	0.048	ug/L	U	0.048	0.192
08/05/02 OUTFALL 002	GC-Water	Chlorpyrifos Methyl	0.095	ug/L	U	0.095	0.38
08/05/02 OUTFALL 002	GC-Water	Diazinon	0.048	ug/L	U	0.048	0.192
08/05/02 OUTFALL 002	GC-Water	Ethion	0.048	ug/L	U	0.048	0.192
08/05/02 OUTFALL 002	GC-Water	Ethoprop	0.095	ug/L	U	0.095	0.38
08/05/02 OUTFALL 002	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
08/05/02 OUTFALL 002	GC-Water	Fonofos	0.095	ug/L	U	0.095	0.38
08/05/02 OUTFALL 002	GC-Water	Hexazinone	0.095	ug/L	U	0.095	0.38
08/05/02 OUTFALL 002	GC-Water	Malathion	0.14	ug/L	U	0.14	0.56
08/05/02 OUTFALL 002	GC-Water	Metalaxyl	0.24	ug/L	U	0.24	0.96
08/05/02 OUTFALL 002	GC-Water	Metolachlor	0.48	ug/L	U	0.48	1.92
08/05/02 OUTFALL 002	GC-Water	Metribuzin	0.095	ug/L	U	0.095	0.38
08/05/02 OUTFALL 002	GC-Water	Mevinphos	0.19	ug/L	U	0.19	0.76
08/05/02 OUTFALL 002	GC-Water	Naled	0.76	ug/L	U	0.76	3.04
08/05/02 OUTFALL 002	GC-Water	Norflurazon	0.095	ug/L	U	0.095	0.38
08/05/02 OUTFALL 002	GC-Water	Parathion Ethyl	0.14	ug/L	U	0.14	0.56
08/05/02 OUTFALL 002	GC-Water	Parathion Methyl	0.095	ug/L	U	0.095	0.38
08/05/02 OUTFALL 002	GC-Water	Phorate	0.048	ug/L	U	0.048	0.192
08/05/02 OUTFALL 002	GC-Water	Prometryn	0.14	ug/L	U	0.14	0.56
08/05/02 OUTFALL 002	GC-Water	Simazine	0.074	ug/L	I	0.048	0.192
08/05/02 OUTFALL 002	Metals-Water	Aluminum	49	ug/L		10	40
08/05/02 OUTFALL 002	Metals-Water	Arsenic	2.2	ug/L	I	0.75	3
08/05/02 OUTFALL 002	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
08/05/02 OUTFALL 002	Metals-Water	Calcium	51.8	mg/L		0.05	0.3
08/05/02 OUTFALL 002	Metals-Water	Chromium	2	ug/L	U	2	8
08/05/02 OUTFALL 002	Metals-Water	Copper	0.75	ug/L	U	0.75	3
08/05/02 OUTFALL 002	Metals-Water	Iron	34	ug/L	I	10	40
08/05/02 OUTFALL 002	Metals-Water	Lead	0.1	ug/L	U	0.1	0.4
08/05/02 OUTFALL 002	Metals-Water	Magnesium	30.2	mg/L		0.01	0.04
08/05/02 OUTFALL 002	Metals-Water	Nickel	2	ug/L	I	2	8
08/05/02 OUTFALL 002	Metals-Water	Selenium	1	ug/L	U	1	4
08/05/02 OUTFALL 002	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
08/05/02 OUTFALL 002	Metals-Water	Sodium	23.4	mg/L		0.075	0.3
08/05/02 OUTFALL 002	Metals-Water	Zinc	4	ug/L	U	4	12
08/05/02 OUTFALL 002	Nutrients-Liquid	Ammonia-N	0.094	mg N/L		0.01	0.02
08/05/02 OUTFALL 002	Nutrients-Liquid	Fluoride	1.9	mg F/L		0.05	0.1
08/05/02 OUTFALL 002	Nutrients-Liquid	NO2NO3-N	0.16	mg N/L		0.004	0.01
08/05/02 OUTFALL 002	Nutrients-Liquid	N_KJEL_TOT	0.47	mg N/L		0.06	0.2
08/05/02 OUTFALL 002	Nutrients-Liquid	O-Phosphate-P	0.92	mg P/L		0.08	0.2
08/05/02 OUTFALL 002	Nutrients-Liquid	Sulfate	140	mg SO4/L		1	2.5
08/05/02 OUTFALL 002	Nutrients-Liquid	Total-P	1	mg P/L	A	0.08	0.2
08/05/02 OUTFALL 004	BNA-Water	1,2,4,5-Tetrachlorobenzene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	1,2,4-Trichlorobenzene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	1,2-Dichlorobenzene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	1,3,5-Trinitrobenzene	3.8	ug/L	U	3.8	15
08/05/02 OUTFALL 004	BNA-Water	1,3-Dichlorobenzene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	1,3-Dinitrobenzene	1.9	ug/L	U	1.9	7.5
08/05/02 OUTFALL 004	BNA-Water	1,4-Dichlorobenzene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	1,4-Naphthoquinone	19	ug/L	U	19	75
08/05/02 OUTFALL 004	BNA-Water	1-Naphthylamine	9.4	ug/L	U	9.4	38
08/05/02 OUTFALL 004	BNA-Water	2,3,4,6-Tetrachlorophenol	1.9	ug/L	U	1.9	7.5
08/05/02 OUTFALL 004	BNA-Water	2,4,5-Trichlorophenol	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	2,4,6-Trichlorophenol	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	2,4-Dichlorophenol	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	2,4-Dimethylphenol	47	ug/L	U	47	190
08/05/02 OUTFALL 004	BNA-Water	2,4-Dinitrophenol	14	ug/L	U	14	57
08/05/02 OUTFALL 004	BNA-Water	2,4-Dinitrotoluene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	2,6-Dichlorophenol	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	2,6-Dinitrotoluene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	2-Acetylaminofluorene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	2-Chloronaphthalene	0.94	ug/L	U	0.94	3.8

08/05/02 OUTFALL 004	BNA-Water	2-Chlorophenol	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	2-Methyl-4,6-dinitrophenol	2.8	ug/L	U	2.8	11
08/05/02 OUTFALL 004	BNA-Water	2-Methylnaphthalene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	2-Naphthylamine	9.4	ug/L	U	9.4	38
08/05/02 OUTFALL 004	BNA-Water	2-Nitroaniline	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	2-Nitrophenol	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	2-Picoline	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	3,3'-Dichlorobenzidine	38	ug/L	U	38	150
08/05/02 OUTFALL 004	BNA-Water	3,3'-Dimethylbenzidine	19	ug/L	U	19	75
08/05/02 OUTFALL 004	BNA-Water	3-Methylcholanthrene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	3-Nitroaniline	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	4,4'-DDD	1.4	ug/L	U	1.4	5.7
08/05/02 OUTFALL 004	BNA-Water	4,4'-DDE	1.4	ug/L	U	1.4	5.7
08/05/02 OUTFALL 004	BNA-Water	4,4'-DDT	1.4	ug/L	U	1.4	5.7
08/05/02 OUTFALL 004	BNA-Water	4-Aminobiphenyl	3.8	ug/L	U	3.8	15
08/05/02 OUTFALL 004	BNA-Water	4-Bromophenyl phenyl ether	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	4-Chloro-3-methylphenol	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	4-Chloroaniline	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.5
08/05/02 OUTFALL 004	BNA-Water	4-Nitroaniline	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	4-Nitrophenol	14	ug/L	U	14	57
08/05/02 OUTFALL 004	BNA-Water	5-Nitro-o-toluidine	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	7,12-Dimethylbenz(a)anthracene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Acenaphthene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Acenaphthylene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Acetophenone	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Aldrin	1.4	ug/L	U	1.4	5.7
08/05/02 OUTFALL 004	BNA-Water	Aniline	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Anthracene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Benzidine	94	ug/L	U	94	380
08/05/02 OUTFALL 004	BNA-Water	Benzo(a)anthracene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Benzo(a)pyrene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Benzo(b)fluoranthene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Benzo(g,h,i)perylene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Benzo(k)fluoranthene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Benzyl alcohol	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Bis(2-chloroethoxy)methane	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Bis(2-chloroethyl)ether	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Bis(2-chloroisopropyl)ether	2.8	ug/L	U	2.8	11
08/05/02 OUTFALL 004	BNA-Water	Bis(2-ethylhexyl)phthalate	14	ug/L	U	14	57
08/05/02 OUTFALL 004	BNA-Water	Butyl benzyl phthalate	4.7	ug/L	U	4.7	19
08/05/02 OUTFALL 004	BNA-Water	Chrysene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Di-n-butyl phthalate	4.7	ug/L	U	4.7	19
08/05/02 OUTFALL 004	BNA-Water	Di-n-octyl phthalate	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Dibenzo(a,h)anthracene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Dibenzofuran	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Dieldrin	1.4	ug/L	U	1.4	5.7
08/05/02 OUTFALL 004	BNA-Water	Diethyl phthalate	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Dimethyl phthalate	47	ug/L	U	47	190
08/05/02 OUTFALL 004	BNA-Water	Dimethylaminoazobenzene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Dinoseb	3.8	ug/L	U	3.8	15
08/05/02 OUTFALL 004	BNA-Water	Diphenylamine	2.8	ug/L	U	2.8	11
08/05/02 OUTFALL 004	BNA-Water	Endosulfan I	3.8	ug/L	U	3.8	15
08/05/02 OUTFALL 004	BNA-Water	Endosulfan II	3.8	ug/L	U	3.8	15
08/05/02 OUTFALL 004	BNA-Water	Endosulfan sulfate	1.4	ug/L	U	1.4	5.7
08/05/02 OUTFALL 004	BNA-Water	Endrin	1.4	ug/L	U	1.4	5.7
08/05/02 OUTFALL 004	BNA-Water	Endrin aldehyde	3.8	ug/L	U	3.8	15
08/05/02 OUTFALL 004	BNA-Water	Ethyl methanesulfonate	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Fluoranthene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Fluorene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Heptachlor	1.4	ug/L	U	1.4	5.7
08/05/02 OUTFALL 004	BNA-Water	Heptachlor epoxide	1.4	ug/L	U	1.4	5.7
08/05/02 OUTFALL 004	BNA-Water	Hexachlorobenzene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Hexachlorobutadiene	2.8	ug/L	U	2.8	11
08/05/02 OUTFALL 004	BNA-Water	Hexachlorocyclopentadiene	2.8	ug/L	U	2.8	11
08/05/02 OUTFALL 004	BNA-Water	Hexachloroethane	2.8	ug/L	U	2.8	11
08/05/02 OUTFALL 004	BNA-Water	Hexachloropropene	1.9	ug/L	U	1.9	7.5
08/05/02 OUTFALL 004	BNA-Water	Indeno(1,2,3-cd)pyrene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Isophorone	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Isosafrole	0.94	ug/L	U	0.94	3.8

08/05/02 OUTFALL 004	BNA-Water	Methapyrilene	3.8	ug/L	U	3.8	15
08/05/02 OUTFALL 004	BNA-Water	Methyl methanesulfonate	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	N-Nitrosodi-n-butylamine	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	U	1.9	7.5
08/05/02 OUTFALL 004	BNA-Water	N-Nitrosodiethylamine	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.5
08/05/02 OUTFALL 004	BNA-Water	N-Nitrosodiphenylamine	2.8	ug/L	U	2.8	11
08/05/02 OUTFALL 004	BNA-Water	N-Nitrosomethylethylamine	1.9	ug/L	U	1.9	7.5
08/05/02 OUTFALL 004	BNA-Water	N-Nitrosomorpholine	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	N-Nitrosopiperidine	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	N-Nitrosopyrrolidine	1.9	ug/L	U	1.9	7.5
08/05/02 OUTFALL 004	BNA-Water	Naphthalene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.5
08/05/02 OUTFALL 004	BNA-Water	Nitroquinoline-1-oxide	19	ug/L	U	19	75
08/05/02 OUTFALL 004	BNA-Water	Pentachlorobenzene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Pentachloroethane	47	ug/L	U	47	190
08/05/02 OUTFALL 004	BNA-Water	Pentachloronitrobenzene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Pentachlorophenol	2.8	ug/L	U	2.8	11
08/05/02 OUTFALL 004	BNA-Water	Phenacetin	3.8	ug/L	U	3.8	11
08/05/02 OUTFALL 004	BNA-Water	Phenanthrene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Phenol	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Pyrene	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	Pyridine	3.8	ug/L	U	3.8	15
08/05/02 OUTFALL 004	BNA-Water	Safrole	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	BNA-Water	alpha-BHC	1.4	ug/L	U	1.4	5.7
08/05/02 OUTFALL 004	BNA-Water	beta-BHC	1.4	ug/L	U	1.4	5.7
08/05/02 OUTFALL 004	BNA-Water	delta-BHC	1.4	ug/L	U	1.4	5.7
08/05/02 OUTFALL 004	BNA-Water	gamma-BHC	1.4	ug/L	U	1.4	5.7
08/05/02 OUTFALL 004	BNA-Water	m,p-Cresols	1.9	ug/L	U	1.9	7.5
08/05/02 OUTFALL 004	BNA-Water	o-Cresol	1.9	ug/L	U	1.9	7.5
08/05/02 OUTFALL 004	BNA-Water	o-Toluidine	0.94	ug/L	U	0.94	3.8
08/05/02 OUTFALL 004	Bio-AGP/LimNut	Algal Growth Potential	11.1	mg DryWt/L		0.1	0.3
08/05/02 OUTFALL 004	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	51	ug/L	A	1.2	3.7
08/05/02 OUTFALL 004	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	9.4	ug/L	A	1.2	3.7
08/05/02 OUTFALL 004	Bio-Toxicology	Bioassay-Acute-Screen-FW-C.dubia, LC50	100	LC50	L		
08/05/02 OUTFALL 004	Bio-Toxicology	Bioassay-Acute-Screen-FW-Fish, LC50	100	LC50	L		
08/05/02 OUTFALL 004	GC-Water	Alachlor	0.65	ug/L	U	0.65	2.6
08/05/02 OUTFALL 004	GC-Water	Ametryn	0.054	ug/L	U	0.054	0.216
08/05/02 OUTFALL 004	GC-Water	Atrazine	0.054	ug/L	U	0.054	0.216
08/05/02 OUTFALL 004	GC-Water	Azinphos Methyl	0.054	ug/L	U	0.054	0.216
08/05/02 OUTFALL 004	GC-Water	Bromacil	0.22	ug/L	U	0.22	0.88
08/05/02 OUTFALL 004	GC-Water	Butylate	0.22	ug/L	U	0.22	0.88
08/05/02 OUTFALL 004	GC-Water	Chlorpyrifos Ethyl	0.054	ug/L	U	0.054	0.216
08/05/02 OUTFALL 004	GC-Water	Chlorpyrifos Methyl	0.11	ug/L	U	0.11	0.44
08/05/02 OUTFALL 004	GC-Water	Diazinon	0.054	ug/L	U	0.054	0.216
08/05/02 OUTFALL 004	GC-Water	Ethion	0.054	ug/L	U	0.054	0.216
08/05/02 OUTFALL 004	GC-Water	Ethoprop	0.11	ug/L	U	0.11	0.44
08/05/02 OUTFALL 004	GC-Water	Fenamiphos	0.22	ug/L	U	0.22	0.88
08/05/02 OUTFALL 004	GC-Water	Fonofos	0.11	ug/L	U	0.11	0.44
08/05/02 OUTFALL 004	GC-Water	Hexazinone	0.11	ug/L	U	0.11	0.44
08/05/02 OUTFALL 004	GC-Water	Malathion	0.16	ug/L	U	0.16	0.64
08/05/02 OUTFALL 004	GC-Water	Metalaxyl	0.27	ug/L	U	0.27	1.08
08/05/02 OUTFALL 004	GC-Water	Metolachlor	0.54	ug/L	U	0.54	2.16
08/05/02 OUTFALL 004	GC-Water	Metribuzin	0.11	ug/L	U	0.11	0.44
08/05/02 OUTFALL 004	GC-Water	Mevinphos	0.22	ug/L	U	0.22	0.88
08/05/02 OUTFALL 004	GC-Water	Naled	0.86	ug/L	U	0.86	3.44
08/05/02 OUTFALL 004	GC-Water	Norflurazon	0.11	ug/L	U	0.11	0.44
08/05/02 OUTFALL 004	GC-Water	Parathion Ethyl	0.16	ug/L	U	0.16	0.64
08/05/02 OUTFALL 004	GC-Water	Parathion Methyl	0.11	ug/L	U	0.11	0.44
08/05/02 OUTFALL 004	GC-Water	Phorate	0.054	ug/L	U	0.054	0.216
08/05/02 OUTFALL 004	GC-Water	Prometryn	0.16	ug/L	U	0.16	0.64
08/05/02 OUTFALL 004	GC-Water	Simazine	0.054	ug/L	U	0.054	0.216
08/05/02 OUTFALL 004	Metals-Water	Aluminum	70	ug/L		10	40
08/05/02 OUTFALL 004	Metals-Water	Arsenic	1.9	ug/L	I	0.75	3
08/05/02 OUTFALL 004	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
08/05/02 OUTFALL 004	Metals-Water	Calcium	40.8	mg/L		0.05	0.3
08/05/02 OUTFALL 004	Metals-Water	Chromium	2	ug/L	U	2	8
08/05/02 OUTFALL 004	Metals-Water	Copper	0.75	ug/L	U	0.75	3
08/05/02 OUTFALL 004	Metals-Water	Iron	97	ug/L		10	40
08/05/02 OUTFALL 004	Metals-Water	Lead	0.1	ug/L	U	0.1	0.4
08/05/02 OUTFALL 004	Metals-Water	Magnesium	26.7	mg/L		0.01	0.04

08/05/02 OUTFALL 004	Metals-Water	Nickel	2	ug/L	I	2	8
08/05/02 OUTFALL 004	Metals-Water	Selenium	1	ug/L	U	1	4
08/05/02 OUTFALL 004	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
08/05/02 OUTFALL 004	Metals-Water	Sodium	28	mg/L		0.075	0.3
08/05/02 OUTFALL 004	Metals-Water	Zinc	4	ug/L	U	4	12
08/05/02 OUTFALL 004	Nutrients-Liquid	Ammonia-N	0.018	mg N/L	I	0.01	0.02
08/05/02 OUTFALL 004	Nutrients-Liquid	Fluoride	2	mg F/L		0.05	0.1
08/05/02 OUTFALL 004	Nutrients-Liquid	NO2NO3-N	0.004	mg N/L	U	0.004	0.01
08/05/02 OUTFALL 004	Nutrients-Liquid	N_KJEL_TOT	1.4	mg N/L		0.06	0.2
08/05/02 OUTFALL 004	Nutrients-Liquid	O-Phosphate-P	0.42	mg P/L		0.02	0.05
08/05/02 OUTFALL 004	Nutrients-Liquid	Sulfate	85	mg SO4/L	A	1	2.5
08/05/02 OUTFALL 004	Nutrients-Liquid	Total-P	0.6	mg P/L		0.04	0.1
08/05/02 TEST SITE	Bio-AGP/LimNut	Algal Growth Potential	5.36	mg DryWt/L		0.1	0.3
08/05/02 TEST SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Periphyton	27	mg/m2		1.4	4.1
08/05/02 TEST SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	2.6	ug/L		0.85	2.6
08/05/02 TEST SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Periphyton	3.8	mg/m2		1.4	4.1
08/05/02 TEST SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0.88	ug/L		0.85	2.6
08/05/02 TEST SITE	Bio-Invertebrates	Macroinvert-FW-Qual-Dipnetx20-# Taxa	27	# Taxa			
08/05/02 TEST SITE	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	18	# Taxa			
08/05/02 TEST SITE	Bio-Peri/Phyto	Periphyton-Quantitative-# Diatom Taxa	14	#Taxa			
08/05/02 TEST SITE	Bio-Peri/Phyto	Periphyton-Quantitative-# Wet Taxa	7	#Taxa			
08/05/02 TEST SITE	Bio-Peri/Phyto	Phytoplankton-Quantitative-# Wet Taxa	24	#Taxa			
08/05/02 TEST SITE	Bio-Peri/Phyto	Phytoplankton-Quantitative-#Diatom Taxa	18	#Taxa			
08/05/02 TEST SITE	Nutrients-Liquid	Ammonia-N	0.018	mg N/L	I	0.01	0.02
08/05/02 TEST SITE	Nutrients-Liquid	NO2NO3-N	0.026	mg N/L		0.004	0.01
08/05/02 TEST SITE	Nutrients-Liquid	N_KJEL_TOT	0.77	mg N/L		0.06	0.2
08/05/02 TEST SITE	Nutrients-Liquid	O-Phosphate-P	1.7	mg P/L		0.04	0.1
08/05/02 TEST SITE	Nutrients-Liquid	Total-P	1.8	mg P/L		0.08	0.2
08/05/02 TEST SITE REP-2	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	27	# Taxa			
08/05/02 TEST SITE REP-3	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	25	# Taxa			
08/05/02 EQUIPMENT BLK	BNA-Water	1,2,4,5-Tetrachlorobenzene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	1,2,4-Trichlorobenzene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	1,2-Dichlorobenzene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	1,3,5-Trinitrobenzene	3.8	ug/L	U	3.8	15
08/05/02 EQUIPMENT BLK	BNA-Water	1,3-Dichlorobenzene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	1,3-Dinitrobenzene	1.9	ug/L	U	1.9	7.7
08/05/02 EQUIPMENT BLK	BNA-Water	1,4-Dichlorobenzene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	1,4-Naphthoquinone	19	ug/L	U	19	77
08/05/02 EQUIPMENT BLK	BNA-Water	1-Naphthylamine	9.6	ug/L	U	9.6	38
08/05/02 EQUIPMENT BLK	BNA-Water	2,3,4,6-Tetrachlorophenol	1.9	ug/L	U	1.9	7.7
08/05/02 EQUIPMENT BLK	BNA-Water	2,4,5-Trichlorophenol	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	2,4,6-Trichlorophenol	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	2,4-Dichlorophenol	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	2,4-Dimethylphenol	48	ug/L	U	48	190
08/05/02 EQUIPMENT BLK	BNA-Water	2,4-Dinitrophenol	14	ug/L	U	14	58
08/05/02 EQUIPMENT BLK	BNA-Water	2,4-Dinitrotoluene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	2,6-Dichlorophenol	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	2,6-Dinitrotoluene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	2-Acetylaminofluorene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	2-Chloronaphthalene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	2-Chlorophenol	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	2-Methyl-4,6-dinitrophenol	2.9	ug/L	U	2.9	12
08/05/02 EQUIPMENT BLK	BNA-Water	2-Methylnaphthalene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	2-Naphthylamine	9.6	ug/L	U	9.6	38
08/05/02 EQUIPMENT BLK	BNA-Water	2-Nitroaniline	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	2-Nitrophenol	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	2-Picoline	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	3,3'-Dichlorobenzidine	38	ug/L	U	38	150
08/05/02 EQUIPMENT BLK	BNA-Water	3,3'-Dimethylbenzidine	19	ug/L	U	19	77
08/05/02 EQUIPMENT BLK	BNA-Water	3-Methylcholanthrene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	3-Nitroaniline	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	4,4'-DDD	1.4	ug/L	U	1.4	5.8
08/05/02 EQUIPMENT BLK	BNA-Water	4,4'-DDE	1.4	ug/L	U	1.4	5.8
08/05/02 EQUIPMENT BLK	BNA-Water	4,4'-DDT	1.4	ug/L	U	1.4	5.8
08/05/02 EQUIPMENT BLK	BNA-Water	4-Aminobiphenyl	3.8	ug/L	U	3.8	15
08/05/02 EQUIPMENT BLK	BNA-Water	4-Bromophenyl phenyl ether	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	4-Chloro-3-methylphenol	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	4-Chloroaniline	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.7
08/05/02 EQUIPMENT BLK	BNA-Water	4-Nitroaniline	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	4-Nitrophenol	14	ug/L	U	14	58

08/05/02 EQUIPMENT BLK	BNA-Water	5-Nitro-o-toluidine	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	7,12-Dimethylbenz(a)anthracene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Acenaphthene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Acenaphthylene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Acetophenone	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Aldrin	1.4	ug/L	U	1.4	5.8
08/05/02 EQUIPMENT BLK	BNA-Water	Aniline	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Anthracene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Benzidine	96	ug/L	U	96	380
08/05/02 EQUIPMENT BLK	BNA-Water	Benzo(a)anthracene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Benzo(a)pyrene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Benzo(b)fluoranthene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Benzo(g,h,i)perylene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Benzo(k)fluoranthene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Benzyl alcohol	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Bis(2-chloroethoxy)methane	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Bis(2-chloroethyl)ether	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Bis(2-chloroisopropyl)ether	2.9	ug/L	U	2.9	12
08/05/02 EQUIPMENT BLK	BNA-Water	Bis(2-ethylhexyl)phthalate	14	ug/L	U	14	58
08/05/02 EQUIPMENT BLK	BNA-Water	Butyl benzyl phthalate	4.8	ug/L	U	4.8	19
08/05/02 EQUIPMENT BLK	BNA-Water	Chrysene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Di-n-butyl phthalate	4.8	ug/L	U	4.8	19
08/05/02 EQUIPMENT BLK	BNA-Water	Di-n-octyl phthalate	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Dibenzo(a,h)anthracene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Dibenzofuran	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Dieldrin	1.4	ug/L	U	1.4	5.8
08/05/02 EQUIPMENT BLK	BNA-Water	Diethyl phthalate	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Dimethyl phthalate	48	ug/L	U	48	190
08/05/02 EQUIPMENT BLK	BNA-Water	Dimethylaminoazobenzene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Dinoseb	3.8	ug/L	U	3.8	15
08/05/02 EQUIPMENT BLK	BNA-Water	Diphenylamine	2.9	ug/L	U	2.9	12
08/05/02 EQUIPMENT BLK	BNA-Water	Endosulfan I	3.8	ug/L	U	3.8	15
08/05/02 EQUIPMENT BLK	BNA-Water	Endosulfan II	3.8	ug/L	U	3.8	15
08/05/02 EQUIPMENT BLK	BNA-Water	Endosulfan sulfate	1.4	ug/L	U	1.4	5.8
08/05/02 EQUIPMENT BLK	BNA-Water	Endrin	1.4	ug/L	U	1.4	5.8
08/05/02 EQUIPMENT BLK	BNA-Water	Endrin aldehyde	3.8	ug/L	U	3.8	15
08/05/02 EQUIPMENT BLK	BNA-Water	Ethyl methanesulfonate	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Fluoranthene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Fluorene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Heptachlor	1.4	ug/L	U	1.4	5.8
08/05/02 EQUIPMENT BLK	BNA-Water	Heptachlor epoxide	1.4	ug/L	U	1.4	5.8
08/05/02 EQUIPMENT BLK	BNA-Water	Hexachlorobenzene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Hexachlorobutadiene	2.9	ug/L	U	2.9	12
08/05/02 EQUIPMENT BLK	BNA-Water	Hexachlorocyclopentadiene	2.9	ug/L	U	2.9	12
08/05/02 EQUIPMENT BLK	BNA-Water	Hexachloroethane	2.9	ug/L	U	2.9	12
08/05/02 EQUIPMENT BLK	BNA-Water	Hexachloropropene	1.9	ug/L	U	1.9	7.7
08/05/02 EQUIPMENT BLK	BNA-Water	Indeno(1,2,3-cd)pyrene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Isophorone	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Isosafrole	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Methapyrilene	3.8	ug/L	U	3.8	15
08/05/02 EQUIPMENT BLK	BNA-Water	Methyl methanesulfonate	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	N-Nitrosodi-n-butylamine	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	U	1.9	7.7
08/05/02 EQUIPMENT BLK	BNA-Water	N-Nitrosodiethylamine	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.7
08/05/02 EQUIPMENT BLK	BNA-Water	N-Nitrosodiphenylamine	2.9	ug/L	U	2.9	12
08/05/02 EQUIPMENT BLK	BNA-Water	N-Nitrosomethylethylamine	1.9	ug/L	U	1.9	7.7
08/05/02 EQUIPMENT BLK	BNA-Water	N-Nitrosomorpholine	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	N-Nitrosopiperidine	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	N-Nitrosopyrrolidine	1.9	ug/L	U	1.9	7.7
08/05/02 EQUIPMENT BLK	BNA-Water	Naphthalene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.7
08/05/02 EQUIPMENT BLK	BNA-Water	Nitroquinoline-1-oxide	19	ug/L	U	19	77
08/05/02 EQUIPMENT BLK	BNA-Water	Pentachlorobenzene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Pentachloroethane	48	ug/L	U	48	190
08/05/02 EQUIPMENT BLK	BNA-Water	Pentachloronitrobenzene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Pentachlorophenol	2.9	ug/L	U	2.9	12
08/05/02 EQUIPMENT BLK	BNA-Water	Phenacetin	3.8	ug/L	U	3.8	12
08/05/02 EQUIPMENT BLK	BNA-Water	Phenanthrene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Phenol	0.96	ug/L	U	0.96	3.8

08/05/02 EQUIPMENT BLK	BNA-Water	Pyrene	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	Pyridine	3.8	ug/L	U	3.8	15
08/05/02 EQUIPMENT BLK	BNA-Water	Safrole	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	BNA-Water	alpha-BHC	1.4	ug/L	U	1.4	5.8
08/05/02 EQUIPMENT BLK	BNA-Water	beta-BHC	1.4	ug/L	U	1.4	5.8
08/05/02 EQUIPMENT BLK	BNA-Water	delta-BHC	1.4	ug/L	U	1.4	5.8
08/05/02 EQUIPMENT BLK	BNA-Water	gamma-BHC	1.4	ug/L	U	1.4	5.8
08/05/02 EQUIPMENT BLK	BNA-Water	m,p-Cresols	1.9	ug/L	U	1.9	7.7
08/05/02 EQUIPMENT BLK	BNA-Water	o-Cresol	1.9	ug/L	U	1.9	7.7
08/05/02 EQUIPMENT BLK	BNA-Water	o-Toluidine	0.96	ug/L	U	0.96	3.8
08/05/02 EQUIPMENT BLK	Bio-AGP/LimNut	Algal Growth Potential	0.1	mg DryWt/L	U	0.1	0.3
08/05/02 EQUIPMENT BLK	GC-Water	Alachlor	0.58	ug/L	U	0.58	2.32
08/05/02 EQUIPMENT BLK	GC-Water	Ametryn	0.048	ug/L	U	0.048	0.192
08/05/02 EQUIPMENT BLK	GC-Water	Atrazine	0.048	ug/L	U	0.048	0.192
08/05/02 EQUIPMENT BLK	GC-Water	Azinphos Methyl	0.048	ug/L	U	0.048	0.192
08/05/02 EQUIPMENT BLK	GC-Water	Bromacil	0.19	ug/L	U	0.19	0.76
08/05/02 EQUIPMENT BLK	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
08/05/02 EQUIPMENT BLK	GC-Water	Chlorpyrifos Ethyl	0.048	ug/L	U	0.048	0.192
08/05/02 EQUIPMENT BLK	GC-Water	Chlorpyrifos Methyl	0.096	ug/L	U	0.096	0.384
08/05/02 EQUIPMENT BLK	GC-Water	Diazinon	0.048	ug/L	U	0.048	0.192
08/05/02 EQUIPMENT BLK	GC-Water	Ethion	0.048	ug/L	U	0.048	0.192
08/05/02 EQUIPMENT BLK	GC-Water	Ethoprop	0.096	ug/L	U	0.096	0.384
08/05/02 EQUIPMENT BLK	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
08/05/02 EQUIPMENT BLK	GC-Water	Fonofos	0.096	ug/L	U	0.096	0.384
08/05/02 EQUIPMENT BLK	GC-Water	Hexazinone	0.096	ug/L	U	0.096	0.384
08/05/02 EQUIPMENT BLK	GC-Water	Malathion	0.14	ug/L	U	0.14	0.56
08/05/02 EQUIPMENT BLK	GC-Water	Metalaxyl	0.24	ug/L	U	0.24	0.96
08/05/02 EQUIPMENT BLK	GC-Water	Metolachlor	0.48	ug/L	U	0.48	1.92
08/05/02 EQUIPMENT BLK	GC-Water	Metribuzin	0.096	ug/L	U	0.096	0.384
08/05/02 EQUIPMENT BLK	GC-Water	Mevinphos	0.19	ug/L	U	0.19	0.76
08/05/02 EQUIPMENT BLK	GC-Water	Naled	0.77	ug/L	U	0.77	3.08
08/05/02 EQUIPMENT BLK	GC-Water	Norflurazon	0.096	ug/L	U	0.096	0.384
08/05/02 EQUIPMENT BLK	GC-Water	Parathion Ethyl	0.14	ug/L	U	0.14	0.56
08/05/02 EQUIPMENT BLK	GC-Water	Parathion Methyl	0.096	ug/L	U	0.096	0.384
08/05/02 EQUIPMENT BLK	GC-Water	Phorate	0.048	ug/L	U	0.048	0.192
08/05/02 EQUIPMENT BLK	GC-Water	Prometryn	0.14	ug/L	U	0.14	0.56
08/05/02 EQUIPMENT BLK	GC-Water	Simazine	0.048	ug/L	U	0.048	0.192
08/05/02 EQUIPMENT BLK	Metals-Water	Aluminum	10	ug/L	U	10	40
08/05/02 EQUIPMENT BLK	Metals-Water	Arsenic	0.75	ug/L	U	0.75	3
08/05/02 EQUIPMENT BLK	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
08/05/02 EQUIPMENT BLK	Metals-Water	Calcium	0.05	mg/L	U	0.05	0.3
08/05/02 EQUIPMENT BLK	Metals-Water	Chromium	2	ug/L	U	2	8
08/05/02 EQUIPMENT BLK	Metals-Water	Copper	0.75	ug/L	U	0.75	3
08/05/02 EQUIPMENT BLK	Metals-Water	Iron	10	ug/L	U	10	40
08/05/02 EQUIPMENT BLK	Metals-Water	Lead	0.1	ug/L	U	0.1	0.4
08/05/02 EQUIPMENT BLK	Metals-Water	Magnesium	0.01	mg/L	U	0.01	0.04
08/05/02 EQUIPMENT BLK	Metals-Water	Nickel	2	ug/L	U	2	8
08/05/02 EQUIPMENT BLK	Metals-Water	Selenium	1	ug/L	U	1	4
08/05/02 EQUIPMENT BLK	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
08/05/02 EQUIPMENT BLK	Metals-Water	Sodium	0.075	mg/L	U	0.075	0.3
08/05/02 EQUIPMENT BLK	Metals-Water	Zinc	4	ug/L	U	4	12
08/05/02 EQUIPMENT BLK	Nutrients-Liquid	Ammonia-N	0.01	mg N/L	U	0.01	0.02
08/05/02 EQUIPMENT BLK	Nutrients-Liquid	Fluoride	0.05	mg F/L	U	0.05	0.1
08/05/02 EQUIPMENT BLK	Nutrients-Liquid	NO2NO3-N	0.004	mg N/L	U	0.004	0.01
08/05/02 EQUIPMENT BLK	Nutrients-Liquid	N_KJEL_TOT	0.06	mg N/L	U	0.06	0.2
08/05/02 EQUIPMENT BLK	Nutrients-Liquid	O-Phosphate-P	0.004	mg P/L	U	0.004	0.01
08/05/02 EQUIPMENT BLK	Nutrients-Liquid	Sulfate	0.2	mg SO4/L	U	0.2	0.5
08/05/02 EQUIPMENT BLK	Nutrients-Liquid	Total-P	0.004	mg P/L	U	0.004	0.01

Appendix 5

Explanation of Biological Measures

(1) Habitat Assessment:

Eight aspects of the physical structure and extent of disturbance are ranked, with 20 possible points for each factor (FDEP SOP FT 3100, based on Plafkin *et al.*, 1989 and Barbour and Stribling, 1994). The Habitat Assessment score includes types and amounts of benthic substrates, water velocity, amount of sand or silt accumulation, extent of artificial channelization, bank stability, and riparian zone width and vegetation type. All scores are summed to yield an overall Habitat Assessment score. Habitat Assessment score ranges from 11-160 and overall habitat quality is assigned to one of four categories: Optimal (120-160 points), Suboptimal (80-119 points), Marginal (40-79 points), and Poor (11-39 points).

(2) Effluent and Water Samples from Control and Test Sites

Algal Growth Potential (AGP): The effluent and water from control and test sites are autoclaved, filtered (0.45μm), inoculated with the unicellular green alga, *Pseudokirchneriella subcapitata* (formerly *Selenastrum capricornutum,* USEPA 2002), and incubated for 14 days. The algal growth potential (AGP) value is the peak growth of the alga within that 14-day period, recorded as mg dry weight/L (Miller *et al.* 1978). Raschke and Shultz (1987) found that an AGP above 5.0 mg dry weight/L represents a "problem" threshold for fresh receiving waters, implying nutrient enrichment. High AGP values may constitute one line of evidence for violation of FAC 62-302.530(47), FAC 62-302.530(48)(a) and/or 62-302.530(48)(b).

The concentration of nutrients in a water sample may be used to calculate the expected yield of AGP under the assumption that other required nutrients (e.g. silicon, micronutrients) are present in excess (Miller *et al.* 1978). The expected amount of production is calculated as 38 times the total soluble inorganic nitrogen (nitrate and nitrite plus ammonia) under nitrogen limitation or 430 times the ortho-phosphate (OP) concentration under phosphorus limitation with an error of ± 20%. When the ratio of nitrogen to phosphorus (N:P) is less than 11:1, nitrogen limitation of algal production is likely. When the N:P ratio is above 11:1, phosphorus limitation is likely. Production of lower biomass than expected may be evidence of growth inhibition related to toxic compounds present in the water sample tested and may be a violation of FAC 62-302.530(62).

(3) Phytoplankton and Periphyton Assemblages

Chlorophyll *a* Content: Chlorophyll *a* content is measured in both phytoplankton and periphyton samples to estimate algal biomass (APHA 1992, modified from *Standard Methods* 10200H). High algal biomass implies nutrient stress (Stevenson and Bahls 1999) and may be a violation of FAC 62-302.530(47), 62-302.530(48)(a) and/or 62-302.530(48)(b).

Cell Density: Cell density is estimated as number/ml for phytoplankton samples and number/cm^2 for periphyton samples (APHA 1992, modified from *Standard Methods* 10200F and 10900G).

Taxa richness: Taxa richness is the number of distinct algal taxa present in a sample. Stress tends to reduce the number of different types of algae present in a sample, but moderate nutrient enrichment of nutrient poor waters may sometimes be correlated with increased algal taxa richness (Stevenson and Bahls 1999).

Community Composition: Shifts in relative proportions of major groups of algae downstream of a point source, compared to upstream, control conditions, may indicate negative effects of a discharge (Stevenson and Bahls 1999) and may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

Shannon-Weaver Diversity Index: This index is specified in the Florida Administrative Code 62-302 as a measure of biological integrity. Low diversity scores are undesirable. Where diversity is low, only a few taxa are abundant as compared to an area where many taxa are present with more equitable abundance among taxa (Magurran 1988). Low diversity scores related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

(4) Benthic Macroinvertebrate Assemblages

Taxa richness: Taxa richness is the number of distinct macroinvertebrate taxa present in a sample. Stress, habitat destruction and pollution tend to reduce the number of different types of organisms present (Karr and Chu 1998). Decreases in taxa richness related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

Percent Contribution of Dominant Taxon: Percent contribution of the dominant taxon is calculated by dividing the number of individuals in the most abundant taxa by the total number of individuals counted. Percent contribution of the dominant taxon tends to increase with increasing perturbation (Plafkin *et al.*, 1989). Increases in the percent contribution of the dominant taxon related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) and/or 62-302.530(48)(b).

Shannon-Weaver Diversity Index: This index is specified in the Florida Administrative Code 62-302 as a measure of biological integrity. Low diversity scores are undesirable. Where diversity is low, only a few taxa are abundant as compared to an area where many taxa are present in equitable abundance among taxa (Magurran 1988). A difference of 25% in Shannon-Weaver diversity between results from Hester-Dendy multiplate samplers incubated for 28 days at test and control sites constitutes a violation of FAC 62-302.530(11).

The Florida Index: Some organisms become rare or absent as the intensity or duration of disturbance increases. The Florida Index assigns points to stream-dwelling macroinvertebrates based on their ranked sensitivity to pollution (Beck 1954). A site with a high Florida Index score is considered healthy (Ross 1990). Decreases in Florida Index points related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

Ephemeroptera/Plecoptera/Trichoptera (EPT) Taxa: This value is the number of EPT taxa present. More EPT taxa are usually present in unpolluted waters (Plafkin *et al.*, 1989, Wallace *et al.*, 1996). Decreases in the number of EPT taxa related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

Community Composition: Shifts in proportions of major groups of organisms downstream of a point source, compared to upstream, control conditions, may indicate negative effects of a discharge (Karr and Chu 1998). Shifts in community composition related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

Functional Feeding Groups: Environmental degradation may differentially affect groups of invertebrates based on how the group feeds (e.g. predators, deposit feeders, etc.). In Florida, pollution may be responsible for reducing the numbers of filter feeders (FDEP 1994) and shredders (EA Engineering 1994). Changes in the proportions of functional feeding groups related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

The Stream Condition Index (SCI): The SCI is a composite macroinvertebrate metric (Barbour *et al.* 1996a, b) developed for Florida. Using data from qualitative dipnet samples, the SCI assigns points to seven parameters, depending on how closely each parameter approaches an expected reference condition (Barbour *et al.* 1996a, b and FDEP SOP FS 7420, LT 7200). Points are summed to yield a final SCI score (range 7-33, depending on region and index period). Included in the calculation of SCI are taxa richness, number of EPT taxa, number of Chironomid taxa, percent contribution of the dominant taxon, the Florida Index, percent contribution of Diptera, and the percent contribution of suspension and filter feeders. Scores are broken into four ordinal groups: Excellent, Good, Poor and Very Poor. A decrease in ordinal SCI score from the control to the test site may be evidence of degradation related to a facility's effluent. An SCI score of "Poor" or "Very Poor" related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

Appendix 6

Typical Values for Selected Parameters in Florida Waters

Percentile Distribution (1617 stations)

CONTROL SITE

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	Measured
Periphyton Chlorophyll *a* (mg/m^2)	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	**17.0**	39.51	60.85	**20**
Hester-Dendy Diversity	0.84	2.12	2.48	2.74	2.88	3.09	3.25	3.40	3.52	**3.76**	3.90	**3.8**
Hester-Dendy Taxa Richness	6	6.5	9	11.5	13	15	17	21.5	26	29	**32**	**39**
Dipnet Taxa Richness	9	12	17	**20**	22	24.5	26	28	31	37	53	**21**
Total Kjeldahl Nitrogen	0.30	0.39	0.56	0.73	0.87	**1.00**	1.11	1.26	1.49	1.93	2.80	**1.0**
Ammonia	0.02	0.02	0.04	0.05	**0.06**	0.08	0.11	0.14	0.20	0.34	0.60	**0.065**
Nitrate plus nitrite	0.01	0.01	0.03	0.05	**0.07**	0.10	0.14	0.20	0.32	0.64	1.05	**0.096**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	**0.39**	0.74	1.51	**0.47**
Orthophosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	**0.27**	0.59	1.37	**0.38**
Turbidity (NTU)	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30	**ND**

TEST SITE

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	Measured
Periphyton Chlorophyll *a* (mg/m^2)	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	**17.0**	39.51	60.85	**27**
Hester-Dendy Diversity	0.84	2.12	2.48	2.74	2.88	3.09	3.25	3.40	**3.52**	3.76	3.90	**3.6**
Hester-Dendy Taxa Richness	6	6.5	9	11.5	13	15	17	21.5	26	**29**	32	**29**
Dipnet Taxa Richness	9	12	17	20	22	24.5	26	**28**	31	37	53	**28**
Total Kjeldahl Nitrogen	0.30	0.39	0.56	**0.73**	0.87	1.00	1.11	1.26	1.49	1.93	2.80	**0.77**
Ammonia	**0.02**	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60	**0.018**
Nitrate plus nitrite	0.01	**0.01**	0.03	0.05	0.07	0.10	0.14	0.20	0.32	0.64	1.05	**0.026**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	0.39	0.74	**1.51**	**1.8**
Orthophosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	0.27	0.59	**1.37**	**1.7**
Turbidity (NTU)	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30	**ND**

Taxa richness and diversity values are for benthic macroinvertebrates. Hester-Dendy sample= benthic macroinvertebrates collected from a standardized multi-plate sampler. Dipnet taxa richness = number of taxa collected in standardized dipnet sweep samples. Diversity = Shannon-Weaver H'. NTU = Nephelometric turbidity units. Adapted from Joe Hand, FDER, personal communication, 1991 (data collected 1980-1989). ND = No data.

Appendix 7

Additional physical, chemical, toxicological and microbiological results

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Cargill Fertilizer, Inc.-Hookers Prairie Mine Outfall #2, Agricola Mine Road, Bradley, Polk County, Florida, NPDES# FL0033294, performed from 6 to 8 August 2002.

Facility:	**Cargill Fertilizer, Inc-Outfall #2**		**NPDES #**	**FL0033294**	Facility Type:	**Phosphate Mine**	**Analysts:** Jacquelyn Brynda
Location:	Agricola Mine Road, Bradley		Contact/District:	Hall/SW			Joshua Ayres
County:	Polk		Test type:	static acute screen			Gary Hardie
Sample Collection Date:	8/5/2002	Time: 1450	# tests:	2	Receiving Water:	Alafia River/Peace River	Marshall Faircloth
Test Beginning Date:	8/6/2002	Time: 1500	Chlorination Type:	Non-chlorinated		Class III Fresh	
Test Ending Date:	8/8/2002	Time: 1405				**Page 1 of 1**	**Reviewer:** David Whiting

Organism: ***Ceriodaphnia dubia*** Life stage: <24 hours

Concentrations	Sample/Diluent Volume(mL)	SURVIVAL # Alive 0 hr	24 hr	48 hr	pH 0 hour	24 hour	48 hour	Temperature[A] 0 hour	24 hour	48 hour	Dissolved Oxygen 0 hour	24 hour	48 hour	Conductivity Uncorrected µmhos/cm 0 hour	48 hour
Control A	0/20	5	5	5	8.0	-	8.2	23.0	-	23.8	7.9	-	7.8	180	290
Control B	0/20	5	5	5	-	-	8.5	-	-	23.8	-	-	7.8	-	215
Control C	0/20	5	5	5	-	-	8.4	-	-	24.1	-	-	7.8	-	205
Control D	0/20	5	5	5	-	-	8.4	-	-	24.4	-	-	7.8	-	210
100% A	20/0	5	5	5	8.3	-	8.4	22.9	-	24.1	7.9	-	7.8	530	635
100% B	20/0	5	5	5	-	-	8.4	-	-	24.1	-	-	7.8	-	625
100% C	20/0	5	5	5	-	-	8.5	-	-	24.4	-	-	7.8	-	610
100% D	20/0	5	5	5	-	-	8.5	-	-	24.8	-	-	7.7	-	605

[A] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.5-25.0°C.
Incubator #3 temperature range for the test period was 24.5-25.5°C.

LIMS	
Job number:	TLH-2002-08-06-06
sample number:	611782

Data Transcription Verification	
date:	12/16/2002
by:	Cathy Oaks
	Brad Richardson

Total Residual CL2	mg/L	Method
Field:	-	-
Lab:	<0.03	Hach

Ammonia	Total (mg/L)	Unionized (mg/L)
Control water (fish):	<0.017	<0.017
Control water (water flea):	<0.017	<0.017
100% Sample:	<0.017	<0.017

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control water (fish):	135	135
Control water (water flea):	80	81
100% Sample:	120	258

Organism: ***Cyprinella leedsi*** Life stage: 13 days

Concentrations	Sample/Diluent Volume(mL)	SURVIVAL # Alive 0 hr	24 hr	48 hr	pH 0 hour	24 hour	48 hour	Temperature[B] 0 hour	24 hour	48 hour	Dissolved Oxygen 0 hour	24 hour	48 hour	Conductivity Uncorrected µmhos/cm 0 hour	48 hour
Control A	0/500	5	5	5	7.9	8.3	8.5	23.6	25.8	25.9	7.7	7.2	7.5	270	345
Control B	0/500	5	5	5	7.9	8.3	8.6	23.5	25.1	25.0	7.6	7.1	7.5	270	290
Control C	0/500	5	5	5	7.9	8.3	8.5	23.6	24.3	24.9	7.6	7.5	7.6	260	290
Control D	0/500	5	5	5	7.9	8.3	8.5	23.6	24.1	24.6	7.5	7.5	7.6	260	285
100% A	500/0	5	5	5	8.3	8.4	8.4	23.4	24.5	25.8	7.6	7.5	7.4	535	635
100% B	500/0	5	5	5	8.3	8.4	8.4	23.5	25.1	24.6	7.6	7.5	7.4	545	600
100 % C	500/0	5	5	5	8.3	8.4	8.4	23.5	24.8	24.5	7.6	7.4	7.7	550	595
100% D	500/0	5	5	5	8.3	8.4	8.4	23.4	25.1	25.1	7.5	7.5	7.7	550	605

[B] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.5-25.0°C.
Incubator #3 temperature range for the test period was 24.5-25.5°C.

Appendix 7

Additional physical, chemical, toxicological and microbiological results

Table 2. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Cargill Fertilizer, Inc.-Hookers Prairie Mine Outfall #4, Agricola Mine Road, Bradley, Polk County, Florida, NPDES# FL0033294, performed from 6 to 8 August 2002.

Facility:	**Cargill Fertilizer, Inc-Outfall #4**		**NPDES #**	**FL0033294**	Facility Type:	**Phosphate Mine**	**Analysts:** Jacquelyn Brynda
Location:	Agricola Mine Road, Bradley		Contact/District:	Hall/SW			Joshua Ayres
County:	Polk		Test type:	static acute screen			Gary Hardie
Sample Collection Date:	8/5/2002	Time: 1410	# tests:	2	Receiving Water:	Alafia River/Peace River	Marshall Faircloth
Test Beginning Date:	8/6/2002	Time: 1500	Chlorination Type:	Non-chlorinated		Class III Fresh	
Test Ending Date:	8/8/2002	Time: 1410				**Page 1 of 1**	**Reviewer:** David Whiting

Organism: ***Ceriodaphnia dubia*** Life stage: <24 hours

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[A]			Dissolved Oxygen			Conductivity Uncorrected µmhos/cm	
Concentrations	Volume(mL)	0 hr	24 hr	48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control A	0/20	5	5	5	8.2	-	8.5	22.9	-	24.0	7.9	-	7.7	165	235
Control B	0/20	5	5	5	-	-	8.5	-	-	24.3	-	-	7.7	-	195
Control C	0/20	5	5	5	-	-	8.5	-	-	24.6	-	-	7.6	-	190
Control D	0/20	5	5	5	-	-	8.3	-	-	25.2	-	-	7.6	-	230
100% A	20/0	5	5	5	8.2	-	8.5	22.8	-	24.0	7.9	-	7.7	465	605
100% B	20/0	5	5	5	-	-	8.6	-	-	24.1	-	-	7.8	-	565
100% C	20/0	5	5	5	-	-	8.6	-	-	24.6	-	-	7.8	-	550
100% D	20/0	5	5	5	-	-	8.6	-	-	24.8	-	-	7.7	-	560

[A] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.5-25.0°C.
Incubator #3 temperature range for the test period was 24.5-25.5°C.

LIMS	
Job number:	TLH-2002-08-06-06
sample number:	611783

Data Transcription Verification	
date:	12/16/2002
by:	Cathy Oaks
	Brad Richardson

Total Residual CL2	mg/L	Method
Field:	-	-
Lab:	0.04	Hach

Ammonia	Total (mg/L)	Unionized (mg/L)
Control water (fish):	<0.017	<0.017
Control water (water flea):	<0.017	<0.017
100% Sample:	<0.017	<0.017

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control water (fish):	135	135
Control water (water flea):	80	81
100% Sample:	150	210

Organism: ***Cyprinella leedsi*** Life stage: 13 days

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[B]			Dissolved Oxygen			Conductivity Uncorrected µmhos/cm	
Concentrations	Volume(mL)	0 hr	24 hr	48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control A	0/500	5	5	5	8.0	8.4	8.5	23.5	25.5	25.5	7.6	7.3	7.5	270	295
Control B	0/500	5	5	5	8.0	8.4	8.5	23.5	24.3	25.8	7.6	7.2	7.5	260	300
Control C	0/500	5	5	5	8.0	8.4	8.5	23.5	24.0	24.5	7.6	7.6	7.7	260	285
Control D	0/500	5	5	5	8.0	8.4	8.5	23.6	25.5	24.0	7.6	7.8	7.7	260	290
100% A	500/0	5	5	5	8.2	8.3	8.3	23.4	25.5	25.0	7.7	7.2	7.4	480	545
100% B	500/0	5	5	5	8.2	8.3	8.4	23.2	24.7	24.4	7.7	7.1	7.4	485	530
100 % C	500/0	5	5	5	8.2	8.3	8.4	23.2	24.9	25.0	7.7	7.2	7.4	485	535
100% D	500/0	5	5	5	8.2	8.3	8.4	23.1	24.4	24.5	7.7	7.2	7.5	485	525

[B] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.5-25.0°C.
Incubator #3 temperature range for the test period was 24.5-25.5°C.

Appendix 8

Habitat Assessment Field Sheets.

FDEP-SOP-001/01: Form FD 9000-3 (June 1, 2001)

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (MM/DD/YY): 8-5-02	TIME: 17:00	RECEIVING BODY OF WATER: Alafia R.
REMARKS:	COUNTY: Hillsborough	LOCATION: Bell Cr. @ Bayette Rd	FIELD DESIGNATION: Control site for Hookers Prairie FYI

RIPARIAN ZONE/STREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
10			80	240	5	2	25 upland

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: 18

List & map dominant Vegetation on back

Typical Width (m) Depth (m)/Velocity (m/sec) Transect: 9 m wide

0.05 m/s | 0.1 m/s | 0.2 m/s

0.4 m deep | 0.5 m deep | 0.7 m deep

Artificially Channelized ☒ no ☐ ☐ ☐ (recent, severe scour recovery mostly recovered scour absent)

Artificially Impounded ☐ yes

High Water Mark: 2.0 (on above pictured water level) + 0.5 (present depth in m) = 2.5 (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 moderate severe Silt smothering: none slight moderate severe Other:

Substrate Type	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	1111	12%		Sand (S)	1111	78%	
Leaf Packs or Mats	111	1		Mud/Muck/Silt			
Aquatic Vegetation	1	1		Other:			
Rock or Shell Rubble	1	1		Other:			
Undercut banks/Roots	1111	7%		*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (S.U.):	D.O. (mg/l):	Cond. (umho/cm) Or Salinity (ppt).			Secchi (m):
Top								0.35
Mid-depth	0.3	28.81	6.86	3.55				
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:

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

SAMPLING TEAM

SIGNATURE: [signature]

DATE: 8-5-02

N 27 51 11.87

W 82 16 25.68

FDEP-SOP-001/01: Form FD 9000-5 (June 1, 2001)

STREAM/RIVER HABITAT ASSESSMENT FIELD SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STREET STATION NUMBER:	DATE (M/D/Y): 6-27-02	RECEIVING BODY OF WATER: S Prong Alafia

REMARKS:	COUNTY:	LOCATION: Control site S. Cargill Horton	FIELD ID/NAME: Bell Creek Bayette Rd.

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components **Substrate Diversity** 18	Four or more productive habitats present (snags, tree roots/undercut banks, aquatic vegetation, leaf packs (partially decayed), rock). 20 19 18 17 16	Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	Two productive habitats present. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	One or less productive habitat. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Substrate Availability 13	Greater than 30% productive habitat present at site. 20 19 18 17 16	16% to 30% productive habitat, by areal extent. 22% 15 14 (13) 12 11	6% to 15% productive habitat 10 9 8 7 6	Less than 5% productive habitat. 5 4 3 2 1
Water Velocity 14	Max. observed at typical transect: > 0.25 m/sec. But < 1 m/sec 20 19 18 17 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 0.2 m/s 15 (14) 13 12 11	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed at typical transect: <0.05 m/sec. Or sheet occurring: > 1 m/sec 5 4 3 2 1
Habitat Smothering 10 Primary Score (55)	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of the habitats with sand or silt, pools shallow, frequent sediment movement (10) 9 8 7 6	Smothering of >80% of habitats with sand or silt, as severe problem, pools absent 5 4 3 2 1
Secondary Habitat Components **Artificial Channelization** 18	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	Many have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Bank Stability Right Bank 9 Left Bank 9	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 7 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank 10 Left Bank 10	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12m to 18 m 8 7 6	Width of native vegetation 6 to 12 m, human activities still close to system 5 4	Less than 6 m of native buffer zone due to intensive human activities 3 2 1
Riparian Zone Vegetation Quality Right Bank 9 Left Bank 9 Secondary Score 74	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. 10 9	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 8 7 6	25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of streambank surfaces are vegetated and/or poor plant community (e.g. grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 3 2 1

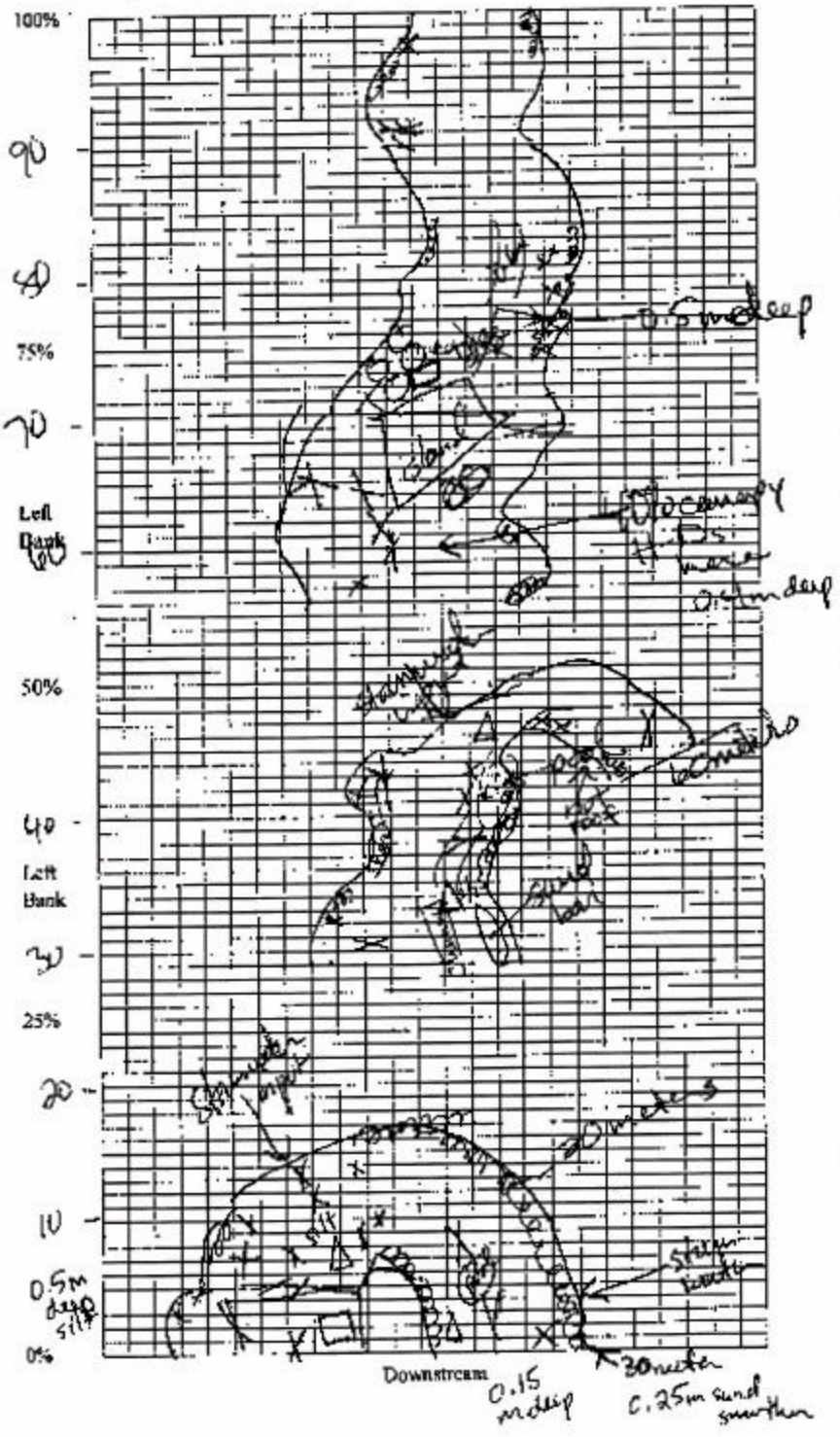
(129) **TOTAL SCORE**

ANALYSIS DATE: 6-27-02	ANALYST: B Hall	SIGNATURE: B Hall

Bell Cr. Riverbend Rd. Control Site for Cogon Hollow Prairie

Stream/River Habitat Sketch Sheet, Form FD 9000-4 (June 1, 2001)

Length of grid represents 100 m of stream (not linear meters).
(Horizontal scale is double vertical scale, draw proportionately).



Substrates: Code key, draw proportionate habitat abundance.

- [X] Snags 12
- [ ] Roots/undercut banks 7
- [ ] Leaf Packs (or mats) 1
- [ ] Macrophytes 1
- [ ] Rock-Rubble 1
- [ ] Sand
- [ ]

Velocity: 0.2 m/s
Note where velocity measures were taken.

Habitat Smothering:
Note areas (on map) where sand or silt is something substrates, limiting habitability.

Bank Stability:
Note areas (on map) with unstable, eroding banks.

Riparian Buffer Width:
Note areas (on map) where natural vegetation is altered or eliminated.

Plants observed/other notes:
Laston Ivy, grasses
Acer. Sweetgum,
Palmetto Palm
Pennyroyal, False Nettle
2m hum wattrock
cypress, ironwood
hickory ash
dogfennel ferns

Killifish

FDEP-SOP-001/01: Form FD 9000-3 (June 1, 2001)

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD SHEET

SUBMITTING AGENCY (CODE): / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (MODYY): 8-5-02	TIME: 11:20	RECEIVING BODY OF WATER: S.P. Alafia
REMARKS:	COUNTY: Polk	LOCATION: S. Prong Alafia 2a SR 37		FIELD ID NAME: Cargill Hookers Prairie Test Site FYI

RIPARIAN ZONE/STREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
10				8		2	80 excavated mines

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: 8 Right

List & map dominant Vegetation on back

Artificially Channelized ☐ no ☐ recent, severe scars ☐ recovery mostly recovered ☒ more or less natural

Artificially Impounded ☐ yes

Typical Width (m) Depth (m)/Velocity (m/sec) Transect: 35 m wide

0.05 m/s | 0.1 m/s | 0.1 m/s

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

0.2 m deep | 0.5 m deep | 0.5 m deep

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 moderate slight severe Silt smothering: none moderate slight severe Other: ____

Substrate Type	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	1	HH	DN	Sand	HH 50	5	DN
Leaf Packs of Mats	< 1	II		Mud/Muck/Silt	20	3	
Aquatic Vegetation	15	HH		Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots	1	II		Draw aerial view sketch of habitat found in 100 m section			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (mmho/cm) Or Salinity (ppt):			Secchi (m):
Top								
Mid-depth	0.4	28.1	7.46	3.48	550			0.5L
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:

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

SAMPLING TEAM: SIGNATURE: DATE: 8-5-02

N 27 46 02.75
W 81 59 06.32

FDEP-SOP-001/01: Form FD 9000-5 (June 1, 2001)

STREAM/RIVER HABITAT ASSESSMENT FIELD SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 6-27-02	RECEIVING BODY OF WATER: Alafia S. Prong

REMARKS:	COUNTY	LOCATION: S Prong Alafia @ 37 Trail site ft. Cargill Hookers	FIELD ID/NAME:

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components **Substrate Diversity** 11	Four or more productive habitats present (snags, tree roots/undercut banks, aquatic vegetation, leaf packs (partially decayed), rock). 20 19 18 17 16	Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	Two productive habitats present. Less than desirable habitat., frequently disturbed or removed. 10 9 8 7 6	One or less productive habitat. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Substrate Availability 14	Greater than 30% productive habitat present at site. 20 19 18 17 16	16% to 30% productive habitat, by areial extent. 15 14 13 12 11	6% to 15% productive habitat 10 9 8 7 6	Less than 5% productive habitat. 5 4 3 2 1
Water Velocity 11	Max. observed at typical transect > 0.25 m/sec. Plus < 1 m/sec 20 19 18 17 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed at typical transect: <0.05 m/sec. Or sheet occurring > 1 m/sec 5 4 3 2 1
Habitat Smothering 9 Primary Score: 45	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 35 → 15 14 13 12 11	Smothering of 50%-80% of the habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, as severe problem, pools absent 5 4 3 2 1
Secondary Habitat Components **Artificial Channelization** 15	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	Many have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, substrate habitat highly altered 5 4 3 2 1
Bank Stability Right Bank 8 Left Bank 8	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 7 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank 5 Left Bank 10	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12m to 18 m 8 7 6	Width of native vegetation 6 to 12 m, human activities still close to system 5 4	Less than 6 m of native buffer zone due to intensive human activities 3 2 1
Riparian Zone Vegetation Quality Right Bank 7 Left Bank 9 Secondary Score 62	Over 50% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. 10 9	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 8 7 6	25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of streambank surfaces are vegetated and/or poor plant community (e.g. grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 3 2 1

107 TOTAL SCORE

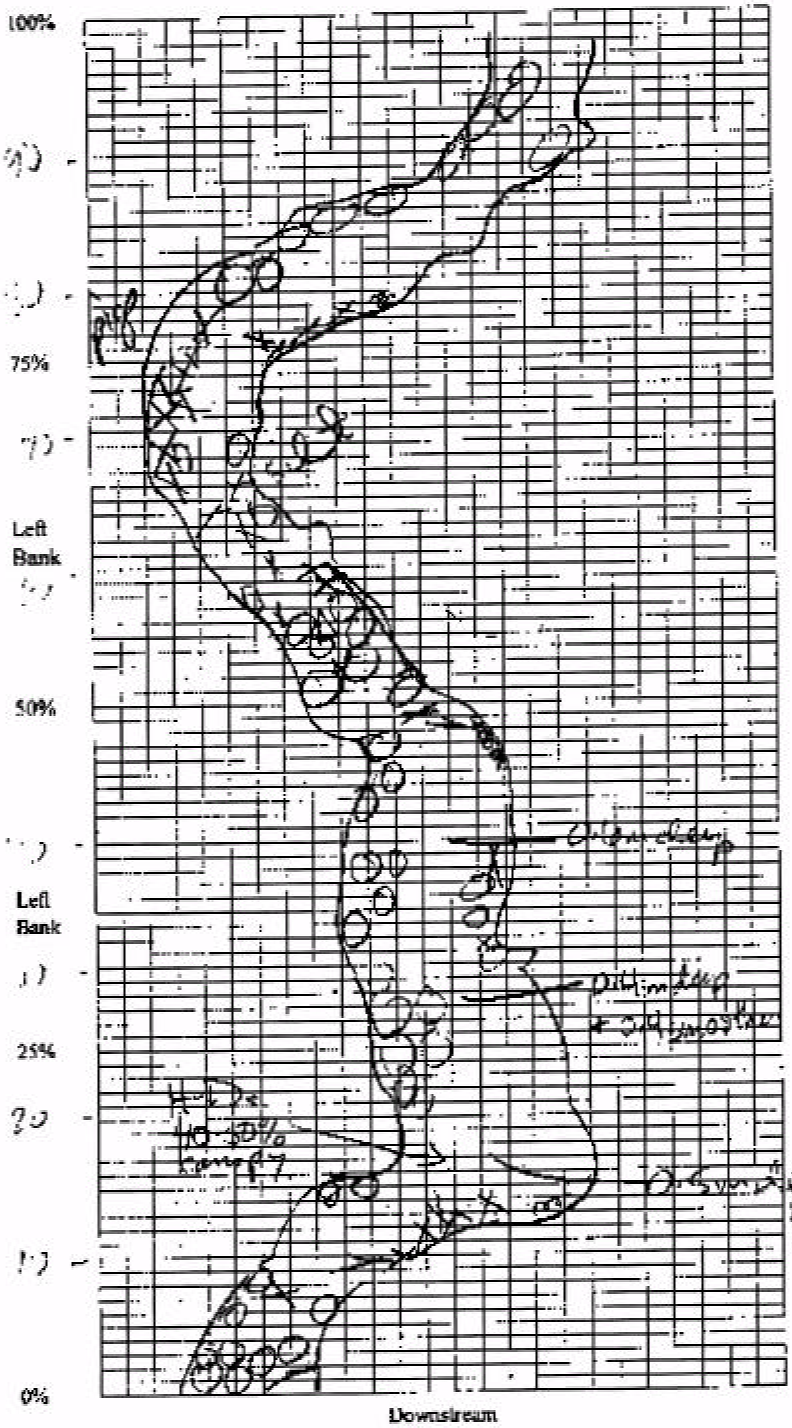
ANALYSIS DATE: 6-27-02	ANALYST: B. Hall	SIGNATURE:

S. Prong Alafia @ 37 … test site Cargill Hookers Prairie

Stream/River Habitat Sketch Sheet, Form FD 9000-4 (June 1, 2001)

Length of grid represents 100 m of stream (not linear meters).

(Horizontal scale is double vertical scale, draw proportionately).



Substrates: Code key, draw proportionate habitat abundance.

- Snags 11%
- Roots/undercut banks 1%
- Leaf Packs (or mats) 2%
- Macrophytes 18%
- sand 30%

Velocity: 0.1 m/s

Note where velocity measures were taken.

Habitat Smothering:
Note areas (on map) where sand or silt is something substrates, limiting habitability.

Bank Stability:
Note areas (on map) with unstable, eroding banks.

Riparian Buffer Width:
Note areas (on map) where natural vegetation is altered or eliminated.

Plants observed/other notes:

Commelina diffusa (common day flower)

Polygonum, ludw,

bog hemp,

citrus oak

no pools

Appendix 9

Density (number/cm^2) and taxa list for periphyton collected from glass microscope slides incubated for 28 days at a control site and downstream of Cargill Fertilizer, Inc. – Hooker's Prairie Mine discharge, August 5, 2002.

	Control Site	Test Site
Bacillariophyceae:		
Achnanthes exigua	19810	9331
Achnanthes lanceolata	17226	92760
Bacillaria paxillifer	-	1098
Capartogramma crucicula	-	2195
Cocconeis placentula	54693	96053
Eunotia sp.	117999	62572
Fragilariaceae	-	1098
Gomphonema parvulum	861	-
Melosira sp.	-	6038
Navicula sp.	6460	4391
Navicula cryptocephala	-	2195
Navicula minima	9044	4391
Nitzschia sp.	-	2195
Terpsinoe sp.	-	1098
Terpsinoe musica	-	3293
Chlorophyceae:		
Characium sp.	-	21955
Chlorella sp.	1723	1647
Closterium gracile elongatum	431	-
Cosmarium phaseolus phaseolus	1292	-
Oedogonium sp.	-	1647
Scenedesmus sp.	-	549
Scenedesmus quadricauda	431	-
Selenastrum sp.	431	-
Stigeoclonium sp.	861	2744
Tetraedron minimum	431	549
Cyanophyceae:		
Cyanobium parvum	2153	2744
Cyanobium plancticum	431	-
Lyngbya sp.	3876	-
Oscillatoria sp.	861	-

Appendix 10.

Benthic macroinvertebrates collected from Hester-Dendy artificial substrates incubated at a Control Site and downstream of the Cargill Fertilizer Inc. –Hooker's Prairie Mine for 28 days (8/5/02). Taxa collected and density (individuals/m^2) rounded to the nearest individual (n = 3 samples).

	Control Site	Test Site
Amphipoda:		
Hyalella azteca	5	3
Gastropoda:		
Ancylidae	5	228
Ferrissia sp.	-	32
Ferrissia hendersoni	-	37
Hebetancylus excentricus	11	-
Laevapex sp.	-	3
Micromenetus sp.	-	56
Pyrogophorus platyrachis	-	124
Coleoptera:		
Coptotomus sp.	-	3
Dineutus sp.	11	11
Dubiraphia vittata	13	-
Microcylloepus sp.	3	-
Microcylloepus pusillus	34	-
Stenelmis sp.	140	-
Diptera:		
Ablabesmyia mallochi	19	21
Ablabesmyia rhamphe grp.	3	13
Beardius sp.	5	-
Ceratopogonidae	3	-
Chironomidae	53	8
Chironomus sp.	-	5
Cladotanytarsus sp.	13	19
Corynoneura sp.	11	-
Cryptochironomus sp.	-	3
Dicrotendipes sp.	5	-
Dicrotendipes modestus	5	3
Dicrotendipes neomodestus	8	-
Dicrotendipes simpsoni	5	82
Glyptotendipes sp.	-	5
Goeldichironomus sp.	3	-
Goeldichironomus amazonicus	8	-
Goeldichironomus natans	-	3
Kiefferulus sp.	-	5
Labrundinia pilosella	-	13
Palpomyia/bezzia grp.	3	-
Pentaneura inconspicua	132	-
Polypedilum sp.	11	3
Polypedilum beckae	19	71
Polypedilum flavum	481	-
Polypedilum halterale grp.	3	19
Polypedilum illinoense grp.	11	29
Polypedilum scalaenum grp.	95	3

Rheotanytarsus exiguus grp.	5	-
Rheotanytarsus pellucidus	19	-
Stelechomyia perpulchra	29	-
Stenochironomus sp.	484	5
Tanytarsus sp.	8	-
Tanytarsus sp. A Epler	42	-
Tanytarsus sp. C Epler	11	-
Tanytarsus sp. T Epler	-	146
Thienemanniella sp.	40	-
Tribelos fuscicornis	56	11
Ephemeroptera:		
Acerpenna pygmaea	5	-
Baetidae	-	3
Caenis sp.	323	42
Heptageniidae	32	3
Stenacron sp.	34	5
Stenonema sp.	11	-
Stenonema exiguum	48	-
Trichoptera:		
Cernotina sp.	8	-
Cheumatopsyche sp.	53	-
Cyrnellus sp.	8	-
Cyrnellus fraternus	5	5
Neotrichia sp.	8	-
Oecetis sp.	3	-
Polycentropodidae	3	3

Appendix 11

Qualitative benthic macroinvertebrate collections (n = 20 discrete dipnet sweeps) at a Control Site and downstream of Cargill Fertilizer, Inc.—Hooker's Prairie Mine (8/5/2002). Taxa lists and number of individuals counted.

	Control Site	Test Site
Amphipoda:		
Hyalella azteca	3	1
Coleoptera:		
Dineutus sp.	-	3
Dubiraphia vittata	11	1
Elmidae	9	1
Microcylloepus pusillus	17	-
Stenelmis sp.	6	2
Diptera:		
Chironomidae	3	1
Cladotanytarsus cf. *daviesi*	-	2
Cryptochironomus sp.	-	2
Dicrotendipes modestus	-	1
Goeldichironomus sp.	-	1
Polypedilum beckae	-	4
Polypedilum flavum	11	1
Polypedilum halterale grp.	-	3
Rheotanytarsus exiguus grp.	2	-
Rheotanytarsus pellucidus	4	2
Stelechomyia perpulchra	1	-
Stenochironomus sp.	-	1
Tanytarsus sp.	-	1
Tanytarsus sp. C Epler	1	-
Tanytarsus sp. M Epler	-	2
Tanytarsus sp. T Epler	-	2
Thienemanniella sp.	-	1
Ephemeroptera:		
Baetidae	-	14
Caenidae	4	-
Caenis sp.	38	4
Heptageniidae	3	-
Pseudocloeon sp.	7	-
Gastropoda:		
Ancylidae	-	29
Gastropoda	-	1
Micromenetus sp.	-	1
Pyrogophorus platyrachis	-	25
Odonata:		
Arigomphus pallidus	-	1
Coenagrionidae	3	-
Macromia taeniolata	1	-
Pachydiplax longipennis	-	1
Oligochaeta:		
Desserobdella phalera	1	-
Helobdella triserialis	-	1
Limnodrilus hoffmeisteri	-	1
Trichoptera:		
Cheumatopsyche sp.	2	-
Nectopsyche sp.	1	-
Neotrichia sp.	4	1
Oecetis georgia	1	-
Oecetis persimilis	1	-
Oxyethira sp.	-	1

The Bioassay of Cargill Fertilizer, Inc.-- Hooker's Prairie Mine effluent sampled on August 5, 2002, NPDES #FL0033294.

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

Transaction Code		NPDES NUMBER									YR/MO/DA						Insp Type	Inspector	Fac Type
1	N	2	5	3	F	L	0	0	3	3	2	9	4	#	0	2	0	9	0	5	B	S	1

Remarks

#

The Priority Pollutants Analysis for Bioassay of Cargill Fertilizer, Inc.-- Hooker's Prairie Mine effluent sampled on August 5, 2002, NPDES #FL0033294.

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

Transaction Code		NPDES NUMBER									YR/MO/DA						Insp Type	Inspector	Fac Type
1	N	2	5	3	F	L	0	0	3	3	2	9	4	#	0	2	0	9	0	5	X	S	1

Remarks

#