

Biological Assessment of

IMC Phosphates Company – Noralyn/Phosphoria/Clear Springs Mine & Pierce Mill

Polk County, Florida

NPDES #FL0000230

Sampled September 16, 2002

September 2003

Biology Section

Bureau of Laboratories

Division of Resource Assessment & Management

Quality Manual No. 870346G
NELAC Certification No. E31780

Florida Department of Environmental Protection
Fifth Year Inspection Summary

Discharger:	IMC Phosphates Co. – Noralyn/Phosphoria/Clear Springs Mine & Pierce Mill
County:	Polk
NPDES Number:	FL0000230
Permit Expiration:	03/08/2003

Toxics Sampling Inspection **(XSI)**

Date Sampled: 9 September 2002

Results: Aluminum and iron were detected in samples from Outfalls 003, 004 and 005 and arsenic and nickel were detected in the sample from Outfall 003. All levels were above the minimum detection limit but above the practical quantitation limit and complied with permit limits and Class III Fresh Water Quality Criteria. No organic constituents were detected in the effluent samples.

Compliance Biomonitoring Inspection **(CBI)**

Date Sampled: 9 September 2002

Results: The effluent sample was not toxic to the fish, *Cyprinella leedsi,* or to the water flea, *Ceriodaphnia dubia,* during the 48-hour acute screening bioassays.

Impact Bioassessment Inspection **(IBI)**

Date Sampled: 9 September 2002

Results: Quantitative measures of benthic macroinvertebrate community health did not suggest any degradation associated with the discharge. Taxa richness and diversity were higher at the Test Site compared to the Control Site. Qualitative measures were also higher at the Test Site compared to the Control Site. The Test Site, SCI score of 21 points, was rated as "Good" and the Control Site SCI score of 17 was rated as "Poor". There was no evidence that the facility was impairing the periphyton community in the receiving waters.

Water Quality Inspection **(WQI)**

Date Sampled: 9 September 2002

Results: Dissolved oxygen values were below Class III Water Quality Criteria and violated the facility's permit limit at Outfalls 004 and 005 (FAC 62 302.550(31) and Table1). The dissolved oxygen concentration at the Control and Test Sites were also below Class III Fresh Water Quality Criteria. Test Site levels of ortho-phosphate and total phosphorus were 62% and 50% higher than Control Site levels, respectively and Test Site nitrate+nitrite was 89% higher than the Control Site concentration. Chlorophyll-*a* concentration in the Outfall 004 (42.0 µg/L) and Test Site (20 µg/L) water samples were higher than that of the Control Site sample (3.7 µg/L).

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

IMC Phosphates Company – Noralyn/ Phosphoria/Clear Springs Mine & Pierce Mill is located in Polk County, Florida (Appendix 1). The facility has not been operating as a production facility for approximately five years (J. Champion, pers. comm.). Current operations consist of managing the mine recirculation and discharge system. All of the settling areas have stopped receiving clays. Previous treatment at the facility has involved transferring phosphate rock, clay, and sand via pipeline to the beneficiation plant in the form of a slurry. The phosphate rock is separated from the clay and sand mix in a flotation and wash process. The sands are hydraulically pumped to a tailings disposal area. The clays are hydraulically pumped to clay settling areas (CSA)'s. The clays settle in the CSA and the clarified water is discharged from the CSA into the plant water recirculation system for reuse in the process (see Facility Summary in Appendix 2). Surplus water from the mine water recirculation system is discharged through permitted NPDES Outfalls described here. Sampling Locations: Outfall 001 – discharges surplus water from settling areas into Hooker's Prairie then to the South Prong of the Alafia River; Outfall 003 – discharges surplus water from the settling area to Six Mile Creek, approximately 200 meters above its confluence with the Peace River; Outfall 004 – discharges surplus water from the settling area to Barber Branch and travels approximately 15 meters before emptying into the Peace River; Outfall 005 – discharges from the settling area into a ditch approximately 800 meters upstream of the confluence with the Peace River; Outfall 006 – discharges into the North Prong of the Alafia River. At the time of deployment, only Outfalls 003, 004, and 005 were discharging. The flow the day of sampling was: Outfall 003: 14.15 MGD, Outfall 004: 5.81 MGD, and Outfall 005: 1.09 MGD (see Facility Summary in Appendix 2). The mean flow during the 28-day survey period was: Outfall 003: 1.88 MGD, Outfall 004: 17.61 MGD, and Outfall 005: 1.22 MGD. Surface Water Quality Criteria and facility permit limits are listed in Table 1.

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. The Control Site was located in the Peace River above the confluence with the northernmost outfall, Outfall 003. The Test Site was located in the Peace River just below the confluence with the southernmost outfall, Outfall 004. Outfall 005 is located between Outfalls 003 and 004 (see map in Appendix 1). 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, George Sharrock, and David Clowes (FDEP Phosphate Management District), and FDEP 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

- Specific chemical results are reported in Table 1 and a complete list of chemical analytes can be reviewed in Appendix 4. Aluminum and iron were detected in samples from Outfalls 003, 004 and 005 and arsenic and nickel were detected in the sample from Outfall 003. All levels were above the minimum detection limit but above the practical quantitation limit and complied with permit limits and Class III Fresh Water Quality Criteria (FAC 62-302). No organic constituents were detected in the effluent samples.
- Sulfate and fluoride concentrations were elevated in the effluent samples and appeared to contribute to elevated levels at the Test Site (Table 1).
- Habitat assessment scores were 132 at the Control Site and 130 at the Test Site (Table 1, data sheets in Appendix 8) placing both sites in the "Optimal" category.
- Dissolved oxygen values were below Class III Water Quality Criteria and the facility's permit limit (5.0 mg/L) at Outfalls 004 (4.0 mg/L) and 005 (4.3 mg/L) as well as the Control (0.8 mg/L) and Test Sites (2.6 mg/L) (FAC 62 302.550(31). All the other in situ physical/chemical measurements at the Test and Control Sites complied with Class III Water Quality Criteria (Table 1, 62-302.530 F.A.C.)
- The effluent sample from Outfall O03 was not toxic to the fish, *Cyprinella leedsi,* or to the water flea, *Ceriodaphnia dubia,* during 48-hour acute screening bioassays (See Table 1 for percent mortality and Appendix 7 for bioassay bench sheets).

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

IMC - Noralyn	Class III Criteria	Effluent Limits 003	Effluent Limits 004	Effluent Limits 005	Effluent Sample 003	Effluent Sample 004	Effluent Sample 005	Control Site	Test Site
Organic Constituents (µg/L)									
none detected	-	-	-	-	-	-	-	-	-
Metals (µg/L unless otherwise noted, Class III Freshwater Criteria are less than or equal to the value given)									
Aluminum	1500	-	-	-	28	70	58 A	-	-
Arsenic	50	-	-	-	3.7 I	3 U	3 U	-	-
Cadmium	b	1.87 b	1.74 b	1.32 b	0.025 U	0.025 U	0.025 U	-	-
Calcium (mg/L)	-	-	-	-	41	36.6	21.7 A	-	-
Chromium	b	145.06 b	324.15 b	243.13 b	2 U	2 U	2 U	-	-
Copper	b	16.06 b	18.88 b	13.99 b	0.75 U	0.75 U	0.75 U	-	-
Iron	1000	-	-	-	79	188	174 A	-	-
Lead	b	7.15 b	6.39 b	4.09 b	0.1 U	0.1 U	0.1 U	-	-
Magnesium (mg/L)	-	-	-	-	21	19.8	16.4 A	-	-
Nickel	b	89.32 b	250.59 b	186.19 b	1.6 I	1.5 U	1.5 U	-	-
Selenium	5.0	-	-	-	1 U	1 U	1 U	-	-
Silver	0.07	-	-	-	0.02 U	0.02 U	0.02 U	-	-
Zinc	b	205.34 b	168.58 b	125.20 b	2 U	2 U	2 U	-	-
Nutrients (mg/L)									
Ortho-phosphate	-	-	-	-	2.7	1.3	0.86	0.47	0.76
Total Phosphorus	-	5 s	5 s	5 s	3.6	2	1.1	0.56	0.84
Ammonia	-	-	-	-	0.21	0.061	0.097	0.11	0.04
Un-ionized Ammonia	0.02 s	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrate and Nitrite	-	-	-	-	0.46	0.026	0.022	0.095	0.18
Total Kjeldahl Nitrogen	-	-	-	-	1.3	1.4	1	1.9	1.7
Organic Nitrogen	-	-	-	-	1.09	1.339	0.903	1.79	1.66
Total Nitrogen	-	3 s	3 s	3 s	1.76	1.426	1.022	1.995	1.88
General Physical and Chemical Parameters									
Habitat Assessment	-	-	-	-	-	-	-	132	130
Dissolved Oxygen (mg/L)	5.0 s	5.0 s	5.0 s	5.0 s	5.2	**4.0**	**4.3**	**0.83**	**2.6**
pH (SU)	6.0-8.5 s	6.0-8.5 s	6.0-8.5 s	6.0-8.5 s	7.4	7.4	7.2	6.7	6.9
Conductivity (µmhos/cm)	1275 s	1275 s	1275 s	1275 s	604	516	351	189	242
Temperature (°C)	-	Report	Report	Report	29.0	28.2	28.4	27.6	28.1
Chlorophyll *a* (µg/L)	-	Report	Report	Report	0.85 U	42 A	0.85 U	3.7 I	20 A
Phaeophytin (µg/L)	-	-	-	-	0.85 U	0 A	0.85 U	0 J	0 A
Sulfate	-	Report	Report	Report	140	82	21	12	27
Fluoride	10 s	10 s	10 s	10 s	1.9	1.6	1.2	0.44	0.63
Oils and Greases (mg/L)	5 s	5 s	5 s	5 s	0.55 U	0.55 U	1.5 I	-	-
Flow (MGD)	-	Report	Report	Report	14.1547	5.8085	1.0948	-	-
Hardness (mg $CaCO_3$)	-	-	-	-	188.9	172.9	121.7	-	-
Toxicity (48-hour static, screening bioassay, percent mortality in 100% effluent)									
Bioassay - Water flea	*	*	*	*	0%	-	-	-	-
Bioassay - Fish	*	*	*	*	0%	-	-	-	-

Bold face indicates violation of Class III water quality criteria

Chlorophyll a value exceeds the annual average Impaired Water Rule listing criteria.

For multiple outfalls Class III Criteria are shown under Effluent Limits.

* No toxicity in a 96 hour acute static renewal, definitive (for definitions see 62.302.200)

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

Report - facility is required to report value

Table 2. Measured and predicted algal growth potential (AGP) for total soluble inorganic nitrogen (TSIN) limitation

Location	AGP (measured)	Predicted AGP (TSIN) ± 20%	N:P ratio
Control	16.3	7.8 ± 1.6	0.4
Test	20.1 A	8.4 ± 1.7	0.3
Outfall 003	38.0	25.5 ± 5.1	0.2
Outfall 004	14.4	3.3 ± 0.7	0.1
Outfall 005	9.5	4.5 ± 0.9	0.1

- Effluent total phosphorus in Outfalls 003, 004, and 005 contributed to a 50% greater concentration at the Test Site (0.84 mg/L) compared to the Control Site (0.56 mg/L). The Control Site total phosphorus level was higher than 80% of typical Florida streams while the Test Site level, was higher than 90% of the same Florida streams (Appendix 6). Ortho-phosphate concentrations from Outfalls 003, 004, and 005 were elevated and contributed to elevated levels at the Test Site (0.76 mg/L) compared to the Control Site (0.47 mg/L). In addition, nitrate+ nitrite was nearly 90% greater at the Test Site (0.18 mg/L) compared to the Control Site (0.095 mg/L).

- 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 represents a "problem" threshold for fresh receiving waters, implying nutrient enrichment. The receiving water AGP values were above the "problem" threshold at the Control (16.3 mg dry weight/L) and Test sites (20.1 mg dry weight/L) (Table 2). AGP values in Outfalls 003 (38.0 mg dry wt/L), 004 (14.4 mg dry wt/L) and 005 (9.5 mg dry wt/L) were also above this threshold. This indicates nutrient enrichment already present in this portion of the Peace River, with additional enrichment related to the discharge.

- There was no evidence of growth inhibition in the AGP data (Table 2). In fact, AGP results were twice as high as expected based on nutrient chemistry at the Test and Control Sites and one and a half, two and four times higher than expected in samples from Outfalls 003, 005 and 004, respectively (Table 2). The higher than expected AGP values suggest the presence of additional nutrients in the water column in the form of phyto- and zooplankton. These nutrients are released when the water samples are autoclaved prior to inoculation with the unicellular algae, *Pseudokirchneriella subcapitata* (formerly *Selenastrum capricornutum*, Appendix 4). This process lyses the plankton in the sample and releases the nutrients they contain. This is the most likely explanation for the higher than expected production. This may have been important in AGP results from the Test Site, where a high chlorophyll *a* concentration was found in samples of the receiving water (see below) and no nitrate plus nitrite was detected in the water sample.

- The periphyton community at the Test Site did not appear impaired compared to that of the Control Site (Table 3, Appendix 9).

- Test Site chlorophyll-*a* concentration (20 µg/L) in the water sample was elevated compared to that of the Control Site sample (3.7 µg/L), suggesting nutrient enrichment. If the chlorophyll-*a* concentrations from Outfall 004 (42 µg/L) and the Test Site (20 mg/L) were representative of conditions throughout the year, this waterbody segment would meet the threshold for

Table 3. Periphyton composition at control and test sites.

IMC Phosphates Company - Noralyn/Phosphoria/Clear Springs Mine & Pierce Mill	Control Site	Test Site
Number of Taxa	39	25
Shannon-Weaver Diversity	4.73	4.38
Chlorophyll *a* (mg/m^2)	2.7	0.12 U
Phaeophytin (mg/m^2)	0	0.12 U
Algal Density ($number/cm^2$)	181,685	70,870
Percent Dominant Taxon	9.2	10.9
Dominant Taxon (name)	*Cyanobium parvum*	*Nitzschia* sp.
Number of Algal Units Identified	141	55
Percentage Composition:		
Blue-green algae	29.8	30.9
Green algae	16.3	21.8
Diatoms	53.9	45.5
Dinoflagellates	0.0	1.8

nutrient impairment under the Impaired Waters Rule (62-303 F.A.C.) (Table 1). Over the 28-day incubation period, Outfall 004 contributed the majority of the flow and had higher nutrient loads than the other outfalls. On the day of sampling, however, Outfall 003 constituted the majority of the discharge volume.

- Quantitative measures of benthic macroinvertebrate assemblages from Hester-Dendy samplers suggested no degradation associated with the discharge. Taxa richness and diversity were higher at the Test Site compared to the Control Site (Table 4, Appendix 10). Assemblages were very poor at both locations and had high percentages of tolerant taxa (Tables 5 and 6 and Appendix 10).
- Qualitative measures of macroinvertebrate community health from dipnet samples were also higher at the Test Site compared to the Control Site. The Test Site, with 21 SCI points, was considered "Good", while the Control Site was placed in the "Poor" category with a score of 17 points. Assemblages were very poor at both locations and had high percentages of tolerant taxa (Tables 5 and 6 and in Appendix 11).

Table 4. Macroinvertebrate Hester-Dendy Samples

IMC Phosphates Company - Noralyn/Phosphoria/Clear Springs Mine & Pierce Mill	Control Site	Test Site
Summary Statistics		
Shannon-Weaver Diversity	2.91	3.31
Number of Taxa	16	31
Florida Index	0	11
Number of EPT Taxa	0	5
Percent Dominant Taxon	21.56	32.42
Dominant Taxon (name)	*Kiefferulus* sp.	Ancylidae
Total Number of Individuals	552	667
Community Composition: Percent of total		
Amphipoda	0.73	22.3
Diptera	66.3	32.2
Ephemeroptera	0.0	3.2
Gastropoda	32.4	38.4
Trichoptera	0.0	3.8
Other	0.5	0.2
Functional Feeding Groups: Percent of total		
Predators	3.9	5.3
Surface Deposit Feeders	62.9	37.3
Suspension Feeders	0.3	6.9
Scrapers	32.4	33.9
Shredders	0.4	11.5
Other	0.2	0.6
Unknown	0.0	4.4

Summary

Effluent levels of several nutrients contributed to elevated levels at the Test Site. Ortho-phosphate, total phosphorus, and nitrate+nitrite levels were 62%, 50% and 89% greater, respectively, at the Test Site compared to Control Site levels. Chlorophyll-*a* concentration was more than five times as high in the Test Site sample compared to the Control Site, indicating nutrient enrichment. AGP values were above the 5.0 mg dry wt/L "problem threshold" in all receiving water and Outfall samples, a further indication of nutrient enriched conditions in the Peace River being exacerbated by the discharge.

Dissolved oxygen concentrations in Outfalls 004 and 005 violated permit limits and Class III Water Quality Criteria. Levels of dissolved oxygen at the Test (2.6 mg/L) and Control Sites (0.8 mg/L) also failed to comply with Class III Water Quality Criteria. The low dissolved oxygen concentration at the Control Site may explain the degraded macroinvertebrate community at this site compared to the Test Site.

Test Site chlorophyll-*a* concentration (30 µg/L) in the water sample was much higher than that of the Control Site sample (4.8 µg/L), suggesting nutrient enrichment. If chlorophyll-*a* concentrations from Outfall 004 (42 µg/L) and the Test Site (20 mg/L) were representative of conditions throughout the year, this segment of the Peace River would meet the threshold for nutrient impairment under the Impaired Waters Rule (62-303 F.A.C.)(Table 1).

Literature Cited

American Public Health Association (APHA). 1992. Standard methods for the examination of water and wastewater. 18th edition.

Barbour, M. T., J. Gerritsen, G. E. Griffith, R. Frydenborg, E. McCarron, J. S. White and M. L. Bastian. 1996a. A framework for biological criteria for Florida streams using benthic macroinvertebrates. J. N. Am. Benthol. Soc. 15(2): 185-211.

Barbour, M. T., J. Gerritsen, and J. S. White. 1996b. Development of the Stream Condition Index for Florida. Prepared for the Florida Department of Environmental Protection. 105 p.

Barbour, M. T. and J. B. Stribling. 1994. A technique for assessing stream habitat structure. In: Proceedings of Riparian Ecosystems in the Humid United States: Functions and Values. U. S. Dept. Agriculture. 15-18 March 1993, Atlanta, Ga. 22 pp.

Beck, W. M. Jr. 1954. Studies in stream pollution biology 1. A simplified ecological classification of organisms. Quart. J. Fla. Acad. Sci. 17(4): 211-227.

EA Engineering, Science, and Technology and Tetra Tech, Inc. 1994. Bioassessment for the nonpoint source program (draft). Prepared for the Florida Department of Environmental Protection. Unpaginated.

FDEP. 1994. Lake bioassessments for the determination of nonpoint source impairment in Florida. Florida Department of Environmental Protection, Biology Section, Tallahassee, Fla. 73 p.

Magurran, A. E. 1988. Ecological diversity and its measurement. Princeton University Press, Princeton, New Jersey.

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

Table 5. Macroinvertebrate Dipnet Samples

IMC Phosphates Company - Noralyn/Phosphoria/Clear Springs Mine & Pierce Mill	Control Site	Test Site
Stream Condition Index (value)	17	21
Stream Condition Index (word)	poor	good
Stream Condition Index Metrics		
Florida Index	1	4
Number of EPT Taxa	1	5
Number of Taxa	18	24
Number of Chironomid Taxa	7	4
Percent Dominant Taxon	55.7	32.4
Percent Dipterans	23.7	19.1
Percent Suspension Feeders and Filterers	1.0	1.9
Total Number of Individuals	97	105
Community Composition: Percent of total		
Dominant Taxon (name)	*Hyalella azteca*	*Hyalella azteca*
Amphipoda	55.7	32.4
Coleoptera	3.1	6.7
Diptera	23.7	19.1
Ephemeroptera	3.1	26.7
Gastropoda	5.2	4.8
Trichoptera	0.0	1.9
Other	9.3	8.6
Functional Feeding Groups: Percent of total		
Burrowing Deposit Feeders	3.1	3.8
Predators	3.6	11.9
Surface Deposit Feeders	50.5	41.4
Suspension Feeders and Filterers	1.0	1.9
Scrapers	8.3	17.1
Shredders	28.9	22.9
Other	4.6	1.0

Plafkin, J. L., M. T. Barbour, K. D. Porter, S. K. Gross and R. M. Hughes. 1989. Rapid bioassessment protocols for use in streams and rivers: Benthic macroinvertebrates and fish. U. S. EPA, Office of Water Regulations and Standards, Washington D.C., EPA 440-4-89-001

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

Ross, L. T. 1990. Methods for aquatic biology. Florida Department of Environmental Regulation Technical Series 10(1): 1-47.

Sokal, R. R. and F. J. Rohlf. 1995. Biometry, Third edition. W. H. Freeman and Company, New York.

Stevenson, R. J. and L. L. Bahls. 1999. Periphyton protocols. Pp. 6.1-6.22 in: Rapid bioassessment protocols for use in wadeable streams and rivers. 2nd edition. By: M. T. Barbour, J. Gerritsen, B. D. Snyder and J. B. Stribling. EPA 841-B-99-002. U. S. Environmental Protection Agency, Office of Water, Washington, D. C.

Wallace, J. B., J. W. Grubaugh and M. R. Whiles. 1996. Biotic indices and stream ecosystem processes: results from an experimental study. Ecol. Appl. 6(1): 140-151.

Weber, C. I. 1993. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. 4th edition. EPA/600/4-90/027. U. S. EPA, Cincinnati, Ohio. 216 pp.

USEPA. 2002. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. 4th Edition. EPA-821-R-02-013

IMC Noralyn Control Site

Table 6a. Stream Condition Index Metrics: Peninsula, Summer Index					
Metric:	Value	5	3	1	Score
Total Number of Taxa	18	≥26	25-14	<14	3
Number of EPT Taxa	1	≥4	3-2	<2	1
Number of Chironomid Taxa	7	≥7	6-4	<4	5
Percent Contribution of Dominant Taxon	55.67	≤29	30-64	>64	3
Percent Diptera	23.71	-	≤37	>37	3
Florida Index	1	≥7	6-4	<4	1
Percent Suspension Feeders and Filterers	1.03	-	≥7	<7	1
Total Score		IMC Noralyn Control Site			**17**
Interpretation of Scores		Excellent			26-31
		Good			20-25
		Poor			**13-19**
		Very Poor			7-12

IMC Noralyn Test Site

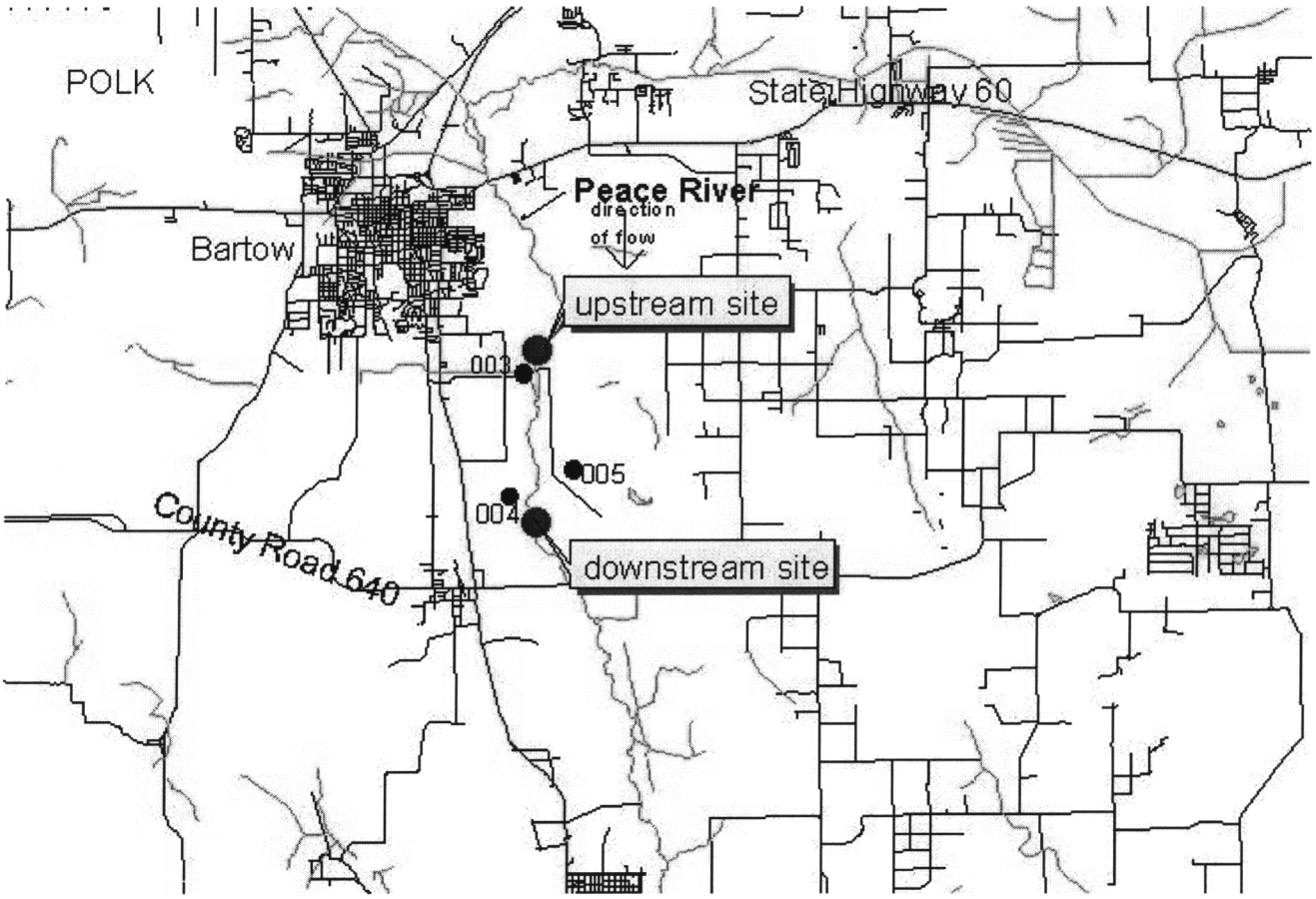
Table 6b. Stream Condition Index Metrics: Peninsula, Summer Index					
Metric:	Value	5	3	1	Score
Total Number of Taxa	24	≥26	25-14	<14	3
Number of EPT Taxa	5	≥4	3-2	<2	5
Number of Chironomid Taxa	4	≥7	6-4	<4	3
Percent Contribution of Dominant Taxon	32.38	≤29	30-64	>64	3
Percent Diptera	19.05	-	≤37	>37	3
Florida Index	4	≥7	6-4	<4	3
Percent Suspension Feeders and Filterers	1.9	-	≥7	<7	1
Total Score		IMC Noralyn Test Site			**21**
Interpretation of Scores		Excellent			26-31
		Good			**20-25**
		Poor			13-19
		Very Poor			7-12

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: Taxa list and density (number of individuals per cm^2)
- Appendix 10. Hester-Dendy multi-plate samplers: Taxa list and macroinvertebrate density (average number of individuals per m^2)
- Appendix 11. Dipnet samples: Taxa list and number of macroinvertebrates counted

Appendix 1

IMC Phosphates Company – Noralyn/Phosphoria/Clear Springs Mine & Pierce Mill



Appendix 2
Facility Summary

<table>
<tr><td colspan="2">Facility Name: IMC Phosphates Company – Noralyn Mine</td><td>Prepared By:</td></tr>
<tr><td>Location: 3301 Noralyn Mine Rd.</td><td>County: Polk</td><td>District: SWD</td></tr>
<tr><td>Federal Permit No.:
FL0000230
Expiration Date: 03/08/2003</td><td>State Permit No.: FL0000230
Expiration Date: 03/08/2003</td><td>Facility Type: Industrial</td></tr>
<tr><td colspan="3">Function of Facility: Phosphate rock drying, grinding and loading</td></tr>
<tr><td colspan="3">Description of treatment process: Settling and natural filtration.</td></tr>
<tr><td colspan="2">Receiving Waters: North Prong Alafia River
South Prong Alafia River
Peace River</td><td>Classification: Class III</td></tr>
<tr><td>Design Flow:
N/A</td><td>Mean Flow:
001: 0.2791 mgd
003: 1.884 mgd
004: 17.608 mgd
005: 1.215 mgd</td><td>Flow During Survey:
001: 2.827 mgd
003: 14.1547 mgd
004: 5.8085 mgd
005: 1.0948</td></tr>
<tr><td colspan="3">Discharge is: Continuous <u>Intermittent</u> Seasonal <u>Rainfall Dependent</u> Other</td></tr>
<tr><td colspan="3">Facility Mixing Zone Details: N/A</td></tr>
<tr><td colspan="3">List Effluent Limits:</td></tr>
<tr><td>SEE ATTACHED SHEET</td><td>Limit</td><td>Describe special permit conditions and permit modifications:</td></tr>
<tr><td colspan="3">Description of permitted outfall: Outfalls are sharp crest wier structures with Stevens continuous flow recorders and staff gage measurement.</td></tr>
<tr><td colspan="3">List permit violations (DMR data) and plant upsets that occurred at the plant within the last year:
N/A</td></tr>
<tr><td colspan="3">Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:</td></tr>
<tr><td colspan="3">Discuss MOR trends to prior data; is trend improving or declining:</td></tr>
<tr><td colspan="3">Additional Information: Active mining has been discontinued at this facility. Also the beneficiation processing plant has been dismantled and removed.</td></tr>
</table>

IMC Phosphates Company
Noralyn Mine – FL0000230

EFFLUENT LIMITATIONS

Parameters (units)	Discharge Limitations			Monitoring Requirements	
	Monthly Average	Daily Maximum	Daily Minimum	Monitoring Frequency	Sample Type
Flow (MGD)	Report	Report	N/A	Continuous	Recorder
Total Non-filterable Residue (TSS) (mg/l)	30.0	60.0	N/A	1/Week	Grab
Total Non-volatile, Non-filterable Residue (FS) (mg/l) *	12.0	25.0	N/A	1/Week	Grab
Phosphorus, Total (as P) (mg/l)	3.0	5.0	N/A	1/Week	Grab
pH (std. units)	Report	8.5	6.0	1/Week	Grab
Nitrogen, Total (as N) (mg/l)	N/A	3.0	N/A	1/Month	Grab
Specific Conductance (μmhos/centimeter)	N/A	1275 See Permit Condition I.A.3.	N/A	1/Month	Grab
Oxygen, Dissolved (DO) (mg/l)	N/A	N/A	5.0	1/Month	Grab
Oil and Grease (mg/l)	N/A	N/A	5.0	1/Month	Grab
Temperature Water (deg.F)	N/A	Report	N/A	1/Month	Grab
Fluorides (mg/l)	N/A	10.0	N/A	1/Quarter	Grab
Sulfate, Total (mg/l)	N/A	Report	N/A	1/Quarter	Grab
Chlorophyll-a (ug/l)	N/A	Report	N/A	1/Quarter	Grab
Toxicity	96 hr. acute static renewal, definitive – Bi Annual				

I.A.3. – Specific Conductance shall not be increased more than 50% above background or to 1275 umhos/cm whichever is greater.

Appendix 3

Explanation of Measurements

(1) Quality Assurance and Quality Control

FDEP's quality assurance requirements for analytical laboratories and field activities are codified in Chapter 62-160, F.A.C., Quality Assurance (QA Rule) and in internal Standard Operating Procedures (SOPs). Methods for all analyses are on file at the FDEP Central Laboratory in Tallahassee and may be viewed on the web at http://www.floridadep.org/labs/sop/index.htm and/or http://www.floridadep.org/labs/qa/index.htm .

(2) Chemical Analyses of the Effluent

The effluent was analyzed for nutrients, metals, organic constituents (base, neutral, and acid extractables) and pesticides following FDEP SOPs. A list of the analytes tested for, results, data qualifiers, the minimum detection limits and the practical quantitation limits are given in Appendix 4. The results from these analyses were compared with Water Quality Criteria (62-302 F.A.C.) and facility permit limits (Table 1, Appendix 2). Exceedances of Water Quality Criteria may be violations of specific provisions of Chapter 62-302 (F.A.C.) and/ or facility permit limits.

(3) Toxicity Bioassays

Acute screening toxicity bioassays were performed on the effluent sample using the water flea, *Ceriodaphnia dubia,* and the fish, *Cyprinella leedsi* following FDEP SOPs TA07_01 and TA07_02. Failure of toxicity testing may constitute a violation of 62-302.520(21), 62-302.530(62) and/or facility permit limits.

(4) Bacteriological Testing

The effluent and water from control and test sites were analyzed for the presence and concentration of total and fecal coliform bacteria following FDEP SOPs MB1_0 and MB1_1. High levels of fecal or total coliform bacteria may constitute violation of 62-302.530(6), 62-302.530(7) and/or facility permit limits.

(5) Habitat Assessment

Habitat assessment is used to evaluate the physical structure and extent of disturbance in a waterbody. Eight aspects are ranked, with 20 possible points for each aspect (QA Rule SOP FT 3100). 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).

(6) 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 (FDEP SOP TA08_05). The algal growth potential (AGP) value is the peak growth of the alga within that 14-day period, recorded as mg dry weight/L. 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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C. and/or 62-302.530(48)(b) F.A.C..

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 10:1, nitrogen limitation of algal production is likely. When the N:P ratio is 20:1 or greater, phosphorus limitation is likely (EPA-822-B-00-002). For ratios in-between, co-limitation may occur. 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 62-302.530(62) F.A.C..

(7) Algal Phytoplankton and Periphyton Assemblages

Methods: Periphyton were sampled at both control and test sites by incubating glass microscope slides in a standard periphytometer for 28 days (QA Rule SOP FS7210). Phytoplankton were sampled using a 1 L grab sample (QA Rule SOP

FS7100). Periphyton and phytoplankton were subsampled and identified to the lowest practical level, usually species (FDEP SOPs AB03, AB03_1 and AB05).
Chlorophyll *a* Content: Chlorophyll *a* content is measured in both phytoplankton and periphyton samples to estimate algal biomass (FDEP SOP BB05). High algal biomass implies nutrient stress (Stevenson and Bahls 1999) and may be a violation of 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C. and/or 62-302.530(48)(b) F.A.C..
Algal Density: Cell density is estimated as number/ml for phytoplankton samples and number/cm^2 for periphyton samples. Although cell density of a single site is highly variable and depends on a number of factors, comparison of cell density at a control site to cell density at a related test site gives a partial comparison of algal biomass at the two sites (Stevenson and Smol, 2003).

Taxa richness: Taxa richness is the number of distinct algal taxa present in a sample. Extreme nutrient enrichment tends to reduce the number of different types of algae present in a sample because a few tolerant taxa tend to reproduce rapidly and constitute the majority of the cells present. However, moderate nutrient enrichment of nutrient poor waters may sometimes be correlated with increased algal taxa richness (Stevenson and Bahls 1999) as the algal community begins to respond to the increased input of nutrients.

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..
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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

(8) Benthic Macroinvertebrate Assemblages

Methods: Benthic macroinvertebrates were collected using two methods. Quantitative samples were collected from Hester-Dendy multi-plate samplers incubated for 28 days (QA Rule SOP FS7430). Qualitative collections are made using 20 dipnet sweeps (QA Rule SOP FS7420). Benthic macroinvertebrates were sorted and identified to the lowest practical taxonomic level, usually species (FDEP SOP IZ06).

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C. and/or 62-302.530(48)(b) F.A.C..

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 62-302.530(11) F.A.C..

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..
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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

The Stream Condition Index (SCI): The SCI is a composite macroinvertebrate metric 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 (QA Rule SOP 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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

(9) Statistical Comparisons

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 analysis of effluent and receiving water

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/16/02	3	BNA-Water	1,2,4,5-Tetrachlorobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	1,2,4-Trichlorobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	1,2-Dichlorobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	1,3,5-Trinitrobenzene	3.8	ug/L	U	3.8	15
9/16/02	3	BNA-Water	1,3-Dichlorobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	1,3-Dinitrobenzene	1.9	ug/L	U	1.9	7.6
9/16/02	3	BNA-Water	1,4-Dichlorobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	1,4-Naphthoquinone	19	ug/L	U	19	76
9/16/02	3	BNA-Water	1-Naphthylamine	9.5	ug/L	U	9.5	38
9/16/02	3	BNA-Water	2,3,4,6-Tetrachlorophenol	1.9	ug/L	U	1.9	7.6
9/16/02	3	BNA-Water	2,4,5-Trichlorophenol	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	2,4,6-Trichlorophenol	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	2,4-Dichlorophenol	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	2,4-Dimethylphenol	48	ug/L	U	48	190
9/16/02	3	BNA-Water	2,4-Dinitrophenol	14	ug/L	U	14	57
9/16/02	3	BNA-Water	2,4-Dinitrotoluene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	2,6-Dichlorophenol	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	2,6-Dinitrotoluene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	2-Acetylaminofluorene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	2-Chloronaphthalene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	2-Chlorophenol	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	2-Methyl-4,6-dinitrophenol	2.9	ug/L	U	2.9	11
9/16/02	3	BNA-Water	2-Methylnaphthalene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	2-Naphthylamine	9.5	ug/L	U	9.5	38
9/16/02	3	BNA-Water	2-Nitroaniline	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	2-Nitrophenol	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	2-Picoline	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	3,3'-Dichlorobenzidine	38	ug/L	U	38	150
9/16/02	3	BNA-Water	3,3'-Dimethylbenzidine	19	ug/L	U	19	76
9/16/02	3	BNA-Water	3-Methylcholanthrene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	3-Nitroaniline	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	4,4'-DDD	1.4	ug/L	U	1.4	5.7
9/16/02	3	BNA-Water	4,4'-DDE	1.4	ug/L	U	1.4	5.7
9/16/02	3	BNA-Water	4,4'-DDT	1.4	ug/L	U	1.4	5.7
9/16/02	3	BNA-Water	4-Aminobiphenyl	3.8	ug/L	U	3.8	15
9/16/02	3	BNA-Water	4-Bromophenyl phenyl ether	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	4-Chloro-3-methylphenol	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	4-Chloroaniline	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.6
9/16/02	3	BNA-Water	4-Nitroaniline	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	4-Nitrophenol	14	ug/L	U	14	57
9/16/02	3	BNA-Water	5-Nitro-o-toluidine	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	7,12-Dimethylbenz(a)anthracene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Acenaphthene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Acenaphthylene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Acetophenone	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Aldrin	1.4	ug/L	U	1.4	5.7
9/16/02	3	BNA-Water	Aniline	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Anthracene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Benzidine	95	ug/L	U	95	380
9/16/02	3	BNA-Water	Benzo(a)anthracene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Benzo(a)pyrene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Benzo(b)fluoranthene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Benzo(g,h,i)perylene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Benzo(k)fluoranthene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Benzyl alcohol	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Bis(2-chloroethoxy)methane	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Bis(2-chloroethyl)ether	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Bis(2-chloroisopropyl)ether	2.9	ug/L	U	2.9	11
9/16/02	3	BNA-Water	Bis(2-ethylhexyl)phthalate	14	ug/L	U	14	57
9/16/02	3	BNA-Water	Butyl benzyl phthalate	4.8	ug/L	U	4.8	19
9/16/02	3	BNA-Water	Chrysene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Di-n-butyl phthalate	4.8	ug/L	U	4.8	19
9/16/02	3	BNA-Water	Di-n-octyl phthalate	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Dibenzo(a,h)anthracene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Dibenzofuran	0.95	ug/L	U	0.95	3.8

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/16/02	3	BNA-Water	Dieldrin	1.4	ug/L	U	1.4	5.7
9/16/02	3	BNA-Water	Diethyl phthalate	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Dimethyl phthalate	48	ug/L	U	48	190
9/16/02	3	BNA-Water	Dimethylaminoazobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Dinoseb	3.8	ug/L	U	3.8	15
9/16/02	3	BNA-Water	Diphenylamine	2.9	ug/L	U	2.9	11
9/16/02	3	BNA-Water	Endosulfan I	3.8	ug/L	U	3.8	15
9/16/02	3	BNA-Water	Endosulfan II	3.8	ug/L	U	3.8	15
9/16/02	3	BNA-Water	Endosulfan sulfate	1.4	ug/L	U	1.4	5.7
9/16/02	3	BNA-Water	Endrin	1.4	ug/L	U	1.4	5.7
9/16/02	3	BNA-Water	Endrin aldehyde	3.8	ug/L	U	3.8	15
9/16/02	3	BNA-Water	Ethyl methanesulfonate	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Fluoranthene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Fluorene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Heptachlor	1.4	ug/L	U	1.4	5.7
9/16/02	3	BNA-Water	Heptachlor epoxide	1.4	ug/L	U	1.4	5.7
9/16/02	3	BNA-Water	Hexachlorobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Hexachlorobutadiene	2.9	ug/L	U	2.9	11
9/16/02	3	BNA-Water	Hexachlorocyclopentadiene	2.9	ug/L	U	2.9	11
9/16/02	3	BNA-Water	Hexachloroethane	2.9	ug/L	U	2.9	11
9/16/02	3	BNA-Water	Hexachloropropene	1.9	ug/L	U	1.9	7.6
9/16/02	3	BNA-Water	Indeno(1,2,3-cd)pyrene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Isophorone	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Isosafrole	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Methapyrilene	3.8	ug/L	U	3.8	15
9/16/02	3	BNA-Water	Methyl methanesulfonate	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	N-Nitrosodi-n-butylamine	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	U	1.9	7.6
9/16/02	3	BNA-Water	N-Nitrosodiethylamine	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.6
9/16/02	3	BNA-Water	N-Nitrosodiphenylamine	2.9	ug/L	U	2.9	11
9/16/02	3	BNA-Water	N-Nitrosomethylethylamine	1.9	ug/L	U	1.9	7.6
9/16/02	3	BNA-Water	N-Nitrosomorpholine	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	N-Nitrosopiperidine	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	N-Nitrosopyrrolidine	1.9	ug/L	U	1.9	7.6
9/16/02	3	BNA-Water	Naphthalene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.6
9/16/02	3	BNA-Water	Nitroquinoline-1-oxide	19	ug/L	U	19	76
9/16/02	3	BNA-Water	Pentachlorobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Pentachloroethane	48	ug/L	U	48	190
9/16/02	3	BNA-Water	Pentachloronitrobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Pentachlorophenol	2.9	ug/L	U	2.9	11
9/16/02	3	BNA-Water	Phenacetin	3.8	ug/L	U	3.8	11
9/16/02	3	BNA-Water	Phenanthrene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Phenol	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Pyrene	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	Pyridine	3.8	ug/L	U	3.8	15
9/16/02	3	BNA-Water	Safrole	0.95	ug/L	U	0.95	3.8
9/16/02	3	BNA-Water	alpha-BHC	1.4	ug/L	U	1.4	5.7
9/16/02	3	BNA-Water	beta-BHC	1.4	ug/L	U	1.4	5.7
9/16/02	3	BNA-Water	delta-BHC	1.4	ug/L	U	1.4	5.7
9/16/02	3	BNA-Water	gamma-BHC	1.4	ug/L	U	1.4	5.7
9/16/02	3	BNA-Water	m,p-Cresols	1.9	ug/L	U	1.9	7.6
9/16/02	3	BNA-Water	o-Cresol	1.9	ug/L	U	1.9	7.6
9/16/02	3	BNA-Water	o-Toluidine	0.95	ug/L	U	0.95	3.8
9/16/02	3	Bio-AGP/LimNut	Algal Growth Potential	38	mg DryWt/L		0.1	0.3
9/16/02	3	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
9/16/02	3	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
9/16/02	3	Bio-Peri/Phyto	Phytoplankton-Quantitative-# Wet Taxa		#Taxa			
9/16/02	3	Bio-Peri/Phyto	Phytoplankton-Quantitative-#Diatom Taxa		#Taxa			
9/16/02	3	Bio-Toxicology	Bioassay-Acute-Screen-FW-C.dubia, LC50	100	LC50	L		
9/16/02	3	Bio-Toxicology	Bioassay-Acute-Screen-FW-Fish, LC50	100	LC50	L		
9/16/02	3	GC-Water	Alachlor	0.58	ug/L	U	0.58	2.32
9/16/02	3	GC-Water	Ametryn	0.048	ug/L	U	0.048	0.192
9/16/02	3	GC-Water	Atrazine	0.048	ug/L	U	0.048	0.192
9/16/02	3	GC-Water	Azinphos Methyl	0.048	ug/L	U	0.048	0.192
9/16/02	3	GC-Water	Bromacil	0.19	ug/L	U	0.19	0.76
9/16/02	3	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
9/16/02	3	GC-Water	Chlorpyrifos Ethyl	0.048	ug/L	U	0.048	0.192

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/16/02	3	GC-Water	Chlorpyrifos Methyl	0.096	ug/L	U	0.096	0.384
9/16/02	3	GC-Water	Diazinon	0.048	ug/L	U	0.048	0.192
9/16/02	3	GC-Water	Ethion	0.048	ug/L	U	0.048	0.192
9/16/02	3	GC-Water	Ethoprop	0.096	ug/L	U	0.096	0.384
9/16/02	3	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
9/16/02	3	GC-Water	Fonofos	0.096	ug/L	U	0.096	0.384
9/16/02	3	GC-Water	Hexazinone	0.096	ug/L	U	0.096	0.384
9/16/02	3	GC-Water	Malathion	0.14	ug/L	U	0.14	0.56
9/16/02	3	GC-Water	Metalaxyl	0.24	ug/L	U	0.24	0.96
9/16/02	3	GC-Water	Metolachlor	0.48	ug/L	U	0.48	1.92
9/16/02	3	GC-Water	Metribuzin	0.096	ug/L	U	0.096	0.384
9/16/02	3	GC-Water	Mevinphos	0.19	ug/L	U	0.19	0.76
9/16/02	3	GC-Water	Naled	0.77	ug/L	U	0.77	3.08
9/16/02	3	GC-Water	Norflurazon	0.096	ug/L	U	0.096	0.384
9/16/02	3	GC-Water	Parathion Ethyl	0.14	ug/L	U	0.14	0.56
9/16/02	3	GC-Water	Parathion Methyl	0.096	ug/L	U	0.096	0.384
9/16/02	3	GC-Water	Phorate	0.048	ug/L	U	0.048	0.192
9/16/02	3	GC-Water	Prometryn	0.14	ug/L	U	0.14	0.56
9/16/02	3	GC-Water	Simazine	0.048	ug/L	U	0.048	0.192
9/16/02	3	Metals-Water	Aluminum	28	ug/L		5	20
9/16/02	3	Metals-Water	Arsenic	3.7	ug/L	I	3	12
9/16/02	3	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
9/16/02	3	Metals-Water	Calcium	41	mg/L		0.02	0.08
9/16/02	3	Metals-Water	Chromium	2	ug/L	U	2	8
9/16/02	3	Metals-Water	Copper	0.75	ug/L	U	0.75	3
9/16/02	3	Metals-Water	Iron	79	ug/L		7	28
9/16/02	3	Metals-Water	Lead	0.1	ug/L	U	0.1	0.4
9/16/02	3	Metals-Water	Magnesium	21	mg/L		0.01	0.04
9/16/02	3	Metals-Water	Nickel	1.6	ug/L	I	1.5	6
9/16/02	3	Metals-Water	Selenium	1	ug/L	U	1	4
9/16/02	3	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
9/16/02	3	Metals-Water	Zinc	2	ug/L	U	2	8
9/16/02	3	Nutrients-Liquid	Ammonia-N	0.21	mg N/L		0.01	0.02
9/16/02	3	Nutrients-Liquid	Fluoride	1.9	mg F/L		0.05	0.1
9/16/02	3	Nutrients-Liquid	NO2NO3-N	0.46	mg N/L		0.004	0.01
9/16/02	3	Nutrients-Liquid	N_KJEL_TOT	1.3	mg N/L		0.06	0.2
9/16/02	3	Nutrients-Liquid	O-Phosphate-P	2.7	mg P/L		0.08	0.4
9/16/02	3	Nutrients-Liquid	Sulfate	140	mg SO4/L		1	2.5
9/16/02	3	Nutrients-Liquid	Total-P	3.6	mg P/L		0.3	0.8
9/16/02	3	Overflow	Oil and Grease	0.55	mg/l	U		
9/16/02	4	BNA-Water	1,2,4,5-Tetrachlorobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	1,2,4-Trichlorobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	1,2-Dichlorobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	1,3,5-Trinitrobenzene	3.8	ug/L	U	3.8	15
9/16/02	4	BNA-Water	1,3-Dichlorobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	1,3-Dinitrobenzene	1.9	ug/L	U	1.9	7.6
9/16/02	4	BNA-Water	1,4-Dichlorobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	1,4-Naphthoquinone	19	ug/L	U	19	76
9/16/02	4	BNA-Water	1-Naphthylamine	9.5	ug/L	U	9.5	38
9/16/02	4	BNA-Water	2,3,4,6-Tetrachlorophenol	1.9	ug/L	U	1.9	7.6
9/16/02	4	BNA-Water	2,4,5-Trichlorophenol	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	2,4,6-Trichlorophenol	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	2,4-Dichlorophenol	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	2,4-Dimethylphenol	48	ug/L	U	48	190
9/16/02	4	BNA-Water	2,4-Dinitrophenol	14	ug/L	U	14	57
9/16/02	4	BNA-Water	2,4-Dinitrotoluene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	2,6-Dichlorophenol	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	2,6-Dinitrotoluene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	2-Acetylaminofluorene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	2-Chloronaphthalene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	2-Chlorophenol	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	2-Methyl-4,6-dinitrophenol	2.9	ug/L	U	2.9	11
9/16/02	4	BNA-Water	2-Methylnaphthalene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	2-Naphthylamine	9.5	ug/L	U	9.5	38
9/16/02	4	BNA-Water	2-Nitroaniline	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	2-Nitrophenol	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	2-Picoline	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	3,3'-Dichlorobenzidine	38	ug/L	U	38	150
9/16/02	4	BNA-Water	3,3'-Dimethylbenzidine	19	ug/L	U	19	76

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/16/02	4	BNA-Water	3-Methylcholanthrene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	3-Nitroaniline	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	4,4'-DDD	1.4	ug/L	U	1.4	5.7
9/16/02	4	BNA-Water	4,4'-DDE	1.4	ug/L	U	1.4	5.7
9/16/02	4	BNA-Water	4,4'-DDT	1.4	ug/L	U	1.4	5.7
9/16/02	4	BNA-Water	4-Aminobiphenyl	3.8	ug/L	U	3.8	15
9/16/02	4	BNA-Water	4-Bromophenyl phenyl ether	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	4-Chloro-3-methylphenol	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	4-Chloroaniline	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.6
9/16/02	4	BNA-Water	4-Nitroaniline	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	4-Nitrophenol	14	ug/L	U	14	57
9/16/02	4	BNA-Water	5-Nitro-o-toluidine	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	7,12-Dimethylbenz(a)anthracene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Acenaphthene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Acenaphthylene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Acetophenone	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Aldrin	1.4	ug/L	U	1.4	5.7
9/16/02	4	BNA-Water	Aniline	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Anthracene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Benzidine	95	ug/L	U	95	380
9/16/02	4	BNA-Water	Benzo(a)anthracene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Benzo(a)pyrene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Benzo(b)fluoranthene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Benzo(g,h,i)perylene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Benzo(k)fluoranthene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Benzyl alcohol	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Bis(2-chloroethoxy)methane	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Bis(2-chloroethyl)ether	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Bis(2-chloroisopropyl)ether	2.9	ug/L	U	2.9	11
9/16/02	4	BNA-Water	Bis(2-ethylhexyl)phthalate	14	ug/L	U	14	57
9/16/02	4	BNA-Water	Butyl benzyl phthalate	4.8	ug/L	U	4.8	19
9/16/02	4	BNA-Water	Chrysene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Di-n-butyl phthalate	4.8	ug/L	U	4.8	19
9/16/02	4	BNA-Water	Di-n-octyl phthalate	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Dibenzo(a,h)anthracene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Dibenzofuran	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Dieldrin	1.4	ug/L	U	1.4	5.7
9/16/02	4	BNA-Water	Diethyl phthalate	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Dimethyl phthalate	48	ug/L	U	48	190
9/16/02	4	BNA-Water	Dimethylaminoazobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Dinoseb	3.8	ug/L	U	3.8	15
9/16/02	4	BNA-Water	Diphenylamine	2.9	ug/L	U	2.9	11
9/16/02	4	BNA-Water	Endosulfan I	3.8	ug/L	U	3.8	15
9/16/02	4	BNA-Water	Endosulfan II	3.8	ug/L	U	3.8	15
9/16/02	4	BNA-Water	Endosulfan sulfate	1.4	ug/L	U	1.4	5.7
9/16/02	4	BNA-Water	Endrin	1.4	ug/L	U	1.4	5.7
9/16/02	4	BNA-Water	Endrin aldehyde	3.8	ug/L	U	3.8	15
9/16/02	4	BNA-Water	Ethyl methanesulfonate	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Fluoranthene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Fluorene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Heptachlor	1.4	ug/L	U	1.4	5.7
9/16/02	4	BNA-Water	Heptachlor epoxide	1.4	ug/L	U	1.4	5.7
9/16/02	4	BNA-Water	Hexachlorobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Hexachlorobutadiene	2.9	ug/L	U	2.9	11
9/16/02	4	BNA-Water	Hexachlorocyclopentadiene	2.9	ug/L	U	2.9	11
9/16/02	4	BNA-Water	Hexachloroethane	2.9	ug/L	U	2.9	11
9/16/02	4	BNA-Water	Hexachloropropene	1.9	ug/L	U	1.9	7.6
9/16/02	4	BNA-Water	Indeno(1,2,3-cd)pyrene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Isophorone	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Isosafrole	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Methapyrilene	3.8	ug/L	U	3.8	15
9/16/02	4	BNA-Water	Methyl methanesulfonate	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	N-Nitrosodi-n-butylamine	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	U	1.9	7.6
9/16/02	4	BNA-Water	N-Nitrosodiethylamine	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.6
9/16/02	4	BNA-Water	N-Nitrosodiphenylamine	2.9	ug/L	U	2.9	11

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/16/02	4	BNA-Water	N-Nitrosomethylethylamine	1.9	ug/L	U	1.9	7.6
9/16/02	4	BNA-Water	N-Nitrosomorpholine	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	N-Nitrosopiperidine	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	N-Nitrosopyrrolidine	1.9	ug/L	U	1.9	7.6
9/16/02	4	BNA-Water	Naphthalene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.6
9/16/02	4	BNA-Water	Nitroquinoline-1-oxide	19	ug/L	U	19	76
9/16/02	4	BNA-Water	Pentachlorobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Pentachloroethane	48	ug/L	U	48	190
9/16/02	4	BNA-Water	Pentachloronitrobenzene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Pentachlorophenol	2.9	ug/L	U	2.9	11
9/16/02	4	BNA-Water	Phenacetin	3.8	ug/L	U	3.8	11
9/16/02	4	BNA-Water	Phenanthrene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Phenol	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Pyrene	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	Pyridine	3.8	ug/L	U	3.8	15
9/16/02	4	BNA-Water	Safrole	0.95	ug/L	U	0.95	3.8
9/16/02	4	BNA-Water	alpha-BHC	1.4	ug/L	U	1.4	5.7
9/16/02	4	BNA-Water	beta-BHC	1.4	ug/L	U	1.4	5.7
9/16/02	4	BNA-Water	delta-BHC	1.4	ug/L	U	1.4	5.7
9/16/02	4	BNA-Water	gamma-BHC	1.4	ug/L	U	1.4	5.7
9/16/02	4	BNA-Water	m,p-Cresols	1.9	ug/L	U	1.9	7.6
9/16/02	4	BNA-Water	o-Cresol	1.9	ug/L	U	1.9	7.6
9/16/02	4	BNA-Water	o-Toluidine	0.95	ug/L	U	0.95	3.8
9/16/02	4	Bio-AGP/LimNut	Algal Growth Potential	14.4	mg DryWt/L		0.1	0.3
9/16/02	4	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	42	ug/L	A	0.85	2.6
9/16/02	4	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0	ug/L	A	0.85	2.6
9/16/02	4	Bio-Peri/Phyto	Phytoplankton-Quantitative-# Wet Taxa		#Taxa			
9/16/02	4	Bio-Peri/Phyto	Phytoplankton-Quantitative-#Diatom Taxa		#Taxa			
9/16/02	4	GC-Water	Alachlor	0.57	ug/L	U	0.57	2.28
9/16/02	4	GC-Water	Ametryn	0.048	ug/L	U	0.048	0.192
9/16/02	4	GC-Water	Atrazine	0.048	ug/L	U	0.048	0.192
9/16/02	4	GC-Water	Azinphos Methyl	0.048	ug/L	U	0.048	0.192
9/16/02	4	GC-Water	Bromacil	0.19	ug/L	U	0.19	0.76
9/16/02	4	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
9/16/02	4	GC-Water	Chlorpyrifos Ethyl	0.048	ug/L	U	0.048	0.192
9/16/02	4	GC-Water	Chlorpyrifos Methyl	0.095	ug/L	U	0.095	0.38
9/16/02	4	GC-Water	Diazinon	0.048	ug/L	U	0.048	0.192
9/16/02	4	GC-Water	Ethion	0.048	ug/L	U	0.048	0.192
9/16/02	4	GC-Water	Ethoprop	0.095	ug/L	U	0.095	0.38
9/16/02	4	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
9/16/02	4	GC-Water	Fonofos	0.095	ug/L	U	0.095	0.38
9/16/02	4	GC-Water	Hexazinone	0.095	ug/L	U	0.095	0.38
9/16/02	4	GC-Water	Malathion	0.14	ug/L	U	0.14	0.56
9/16/02	4	GC-Water	Metalaxyl	0.24	ug/L	U	0.24	0.96
9/16/02	4	GC-Water	Metolachlor	0.48	ug/L	U	0.48	1.92
9/16/02	4	GC-Water	Metribuzin	0.095	ug/L	U	0.095	0.38
9/16/02	4	GC-Water	Mevinphos	0.19	ug/L	U	0.19	0.76
9/16/02	4	GC-Water	Naled	0.76	ug/L	U	0.76	3.04
9/16/02	4	GC-Water	Norflurazon	0.095	ug/L	U	0.095	0.38
9/16/02	4	GC-Water	Parathion Ethyl	0.14	ug/L	U	0.14	0.56
9/16/02	4	GC-Water	Parathion Methyl	0.095	ug/L	U	0.095	0.38
9/16/02	4	GC-Water	Phorate	0.048	ug/L	U	0.048	0.192
9/16/02	4	GC-Water	Prometryn	0.14	ug/L	U	0.14	0.56
9/16/02	4	GC-Water	Simazine	0.048	ug/L	U	0.048	0.192
9/16/02	4	Metals-Water	Aluminum	70	ug/L		5	20
9/16/02	4	Metals-Water	Arsenic	3	ug/L	U	3	12
9/16/02	4	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
9/16/02	4	Metals-Water	Calcium	36.6	mg/L		0.02	0.08
9/16/02	4	Metals-Water	Chromium	2	ug/L	U	2	8
9/16/02	4	Metals-Water	Copper	0.75	ug/L	U	0.75	3
9/16/02	4	Metals-Water	Iron	188	ug/L		7	28
9/16/02	4	Metals-Water	Lead	0.1	ug/L	U	0.1	0.4
9/16/02	4	Metals-Water	Magnesium	19.8	mg/L		0.01	0.04
9/16/02	4	Metals-Water	Nickel	1.5	ug/L	U	1.5	6
9/16/02	4	Metals-Water	Selenium	1	ug/L	U	1	4
9/16/02	4	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
9/16/02	4	Metals-Water	Zinc	2	ug/L	U	2	8
9/16/02	4	Nutrients-Liquid	Ammonia-N	0.061	mg N/L		0.01	0.02

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/16/02	4	Nutrients-Liquid	Fluoride	1.6	mg F/L		0.05	0.1
9/16/02	4	Nutrients-Liquid	NO2NO3-N	0.026	mg N/L		0.004	0.01
9/16/02	4	Nutrients-Liquid	N_KJEL_TOT	1.4	mg N/L		0.06	0.2
9/16/02	4	Nutrients-Liquid	O-Phosphate-P	1.3	mg P/L		0.04	0.2
9/16/02	4	Nutrients-Liquid	Sulfate	82	mg SO4/L		0.4	1
9/16/02	4	Nutrients-Liquid	Total-P	2	mg P/L		0.3	0.8
9/16/02	4	Overflow	Oil and Grease	0.55	mg/l	U		
9/16/02	5	BNA-Water	1,2,4,5-Tetrachlorobenzene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	1,2,4-Trichlorobenzene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	1,2-Dichlorobenzene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	1,3,5-Trinitrobenzene	3.9	ug/L	U	3.9	16
9/16/02	5	BNA-Water	1,3-Dichlorobenzene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	1,3-Dinitrobenzene	2	ug/L	U	2	7.8
9/16/02	5	BNA-Water	1,4-Dichlorobenzene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	1,4-Naphthoquinone	20	ug/L	U	20	78
9/16/02	5	BNA-Water	1-Naphthylamine	9.8	ug/L	U	9.8	39
9/16/02	5	BNA-Water	2,3,4,6-Tetrachlorophenol	2	ug/L	U	2	7.8
9/16/02	5	BNA-Water	2,4,5-Trichlorophenol	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	2,4,6-Trichlorophenol	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	2,4-Dichlorophenol	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	2,4-Dimethylphenol	49	ug/L	U	49	200
9/16/02	5	BNA-Water	2,4-Dinitrophenol	15	ug/L	U	15	59
9/16/02	5	BNA-Water	2,4-Dinitrotoluene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	2,6-Dichlorophenol	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	2,6-Dinitrotoluene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	2-Acetylaminofluorene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	2-Chloronaphthalene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	2-Chlorophenol	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	2-Methyl-4,6-dinitrophenol	2.9	ug/L	U	2.9	12
9/16/02	5	BNA-Water	2-Methylnaphthalene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	2-Naphthylamine	9.8	ug/L	U	9.8	39
9/16/02	5	BNA-Water	2-Nitroaniline	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	2-Nitrophenol	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	2-Picoline	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	3,3'-Dichlorobenzidine	39	ug/L	U	39	160
9/16/02	5	BNA-Water	3,3'-Dimethylbenzidine	20	ug/L	U	20	78
9/16/02	5	BNA-Water	3-Methylcholanthrene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	3-Nitroaniline	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	4,4'-DDD	1.5	ug/L	U	1.5	5.9
9/16/02	5	BNA-Water	4,4'-DDE	1.5	ug/L	U	1.5	5.9
9/16/02	5	BNA-Water	4,4'-DDT	1.5	ug/L	U	1.5	5.9
9/16/02	5	BNA-Water	4-Aminobiphenyl	3.9	ug/L	U	3.9	16
9/16/02	5	BNA-Water	4-Bromophenyl phenyl ether	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	4-Chloro-3-methylphenol	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	4-Chloroaniline	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	4-Chlorophenyl phenyl ether	2	ug/L	U	2	7.8
9/16/02	5	BNA-Water	4-Nitroaniline	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	4-Nitrophenol	15	ug/L	U	15	59
9/16/02	5	BNA-Water	5-Nitro-o-toluidine	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	7,12-Dimethylbenz(a)anthracene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Acenaphthene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Acenaphthylene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Acetophenone	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Aldrin	1.5	ug/L	U	1.5	5.9
9/16/02	5	BNA-Water	Aniline	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Anthracene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Benzidine	98	ug/L	U	98	390
9/16/02	5	BNA-Water	Benzo(a)anthracene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Benzo(a)pyrene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Benzo(b)fluoranthene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Benzo(g,h,i)perylene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Benzo(k)fluoranthene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Benzyl alcohol	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Bis(2-chloroethoxy)methane	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Bis(2-chloroethyl)ether	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Bis(2-chloroisopropyl)ether	2.9	ug/L	U	2.9	12
9/16/02	5	BNA-Water	Bis(2-ethylhexyl)phthalate	15	ug/L	U	15	59
9/16/02	5	BNA-Water	Butyl benzyl phthalate	4.9	ug/L	U	4.9	20

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/16/02	5	BNA-Water	Chrysene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Di-n-butyl phthalate	4.9	ug/L	U	4.9	20
9/16/02	5	BNA-Water	Di-n-octyl phthalate	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Dibenzo(a,h)anthracene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Dibenzofuran	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Dieldrin	1.5	ug/L	U	1.5	5.9
9/16/02	5	BNA-Water	Diethyl phthalate	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Dimethyl phthalate	49	ug/L	U	49	200
9/16/02	5	BNA-Water	Dimethylaminoazobenzene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Dinoseb	3.9	ug/L	U	3.9	16
9/16/02	5	BNA-Water	Diphenylamine	2.9	ug/L	U	2.9	12
9/16/02	5	BNA-Water	Endosulfan I	3.9	ug/L	U	3.9	16
9/16/02	5	BNA-Water	Endosulfan II	3.9	ug/L	U	3.9	16
9/16/02	5	BNA-Water	Endosulfan sulfate	1.5	ug/L	U	1.5	5.9
9/16/02	5	BNA-Water	Endrin	1.5	ug/L	U	1.5	5.9
9/16/02	5	BNA-Water	Endrin aldehyde	3.9	ug/L	U	3.9	16
9/16/02	5	BNA-Water	Ethyl methanesulfonate	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Fluoranthene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Fluorene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Heptachlor	1.5	ug/L	U	1.5	5.9
9/16/02	5	BNA-Water	Heptachlor epoxide	1.5	ug/L	U	1.5	5.9
9/16/02	5	BNA-Water	Hexachlorobenzene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Hexachlorobutadiene	2.9	ug/L	U	2.9	12
9/16/02	5	BNA-Water	Hexachlorocyclopentadiene	2.9	ug/L	U	2.9	12
9/16/02	5	BNA-Water	Hexachloroethane	2.9	ug/L	U	2.9	12
9/16/02	5	BNA-Water	Hexachloropropene	2	ug/L	U	2	7.8
9/16/02	5	BNA-Water	Indeno(1,2,3-cd)pyrene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Isophorone	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Isosafrole	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Methapyrilene	3.9	ug/L	U	3.9	16
9/16/02	5	BNA-Water	Methyl methanesulfonate	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	N-Nitrosodi-n-butylamine	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	N-Nitrosodi-n-propylamine	2	ug/L	U	2	7.8
9/16/02	5	BNA-Water	N-Nitrosodiethylamine	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	N-Nitrosodimethylamine	2	ug/L	U	2	7.8
9/16/02	5	BNA-Water	N-Nitrosodiphenylamine	2.9	ug/L	U	2.9	12
9/16/02	5	BNA-Water	N-Nitrosomethylethylamine	2	ug/L	U	2	7.8
9/16/02	5	BNA-Water	N-Nitrosomorpholine	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	N-Nitrosopiperidine	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	N-Nitrosopyrrolidine	2	ug/L	U	2	7.8
9/16/02	5	BNA-Water	Naphthalene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Nitrobenzene	2	ug/L	U	2	7.8
9/16/02	5	BNA-Water	Nitroquinoline-1-oxide	20	ug/L	U	20	78
9/16/02	5	BNA-Water	Pentachlorobenzene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Pentachloroethane	49	ug/L	U	49	200
9/16/02	5	BNA-Water	Pentachloronitrobenzene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Pentachlorophenol	2.9	ug/L	U	2.9	12
9/16/02	5	BNA-Water	Phenacetin	3.9	ug/L	U	3.9	12
9/16/02	5	BNA-Water	Phenanthrene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Phenol	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Pyrene	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	Pyridine	3.9	ug/L	U	3.9	16
9/16/02	5	BNA-Water	Safrole	0.98	ug/L	U	0.98	3.9
9/16/02	5	BNA-Water	alpha-BHC	1.5	ug/L	U	1.5	5.9
9/16/02	5	BNA-Water	beta-BHC	1.5	ug/L	U	1.5	5.9
9/16/02	5	BNA-Water	delta-BHC	1.5	ug/L	U	1.5	5.9
9/16/02	5	BNA-Water	gamma-BHC	1.5	ug/L	U	1.5	5.9
9/16/02	5	BNA-Water	m,p-Cresols	2	ug/L	U	2	7.8
9/16/02	5	BNA-Water	o-Cresol	2	ug/L	U	2	7.8
9/16/02	5	BNA-Water	o-Toluidine	0.98	ug/L	U	0.98	3.9
9/16/02	5	Bio-AGP/LimNut	Algal Growth Potential	9.51	mg DryWt/L		0.1	0.3
9/16/02	5	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
9/16/02	5	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
9/16/02	5	Bio-Peri/Phyto	Phytoplankton-Quantitative-# Wet Taxa		#Taxa			
9/16/02	5	Bio-Peri/Phyto	Phytoplankton-Quantitative-#Diatom Taxa		#Taxa			
9/16/02	5	GC-Water	Alachlor	0.57	ug/L	U	0.57	2.28
9/16/02	5	GC-Water	Ametryn	0.048	ug/L	U	0.048	0.192
9/16/02	5	GC-Water	Atrazine	0.048	ug/L	U	0.048	0.192
9/16/02	5	GC-Water	Azinphos Methyl	0.048	ug/L	U	0.048	0.192

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/16/02	5	GC-Water	Bromacil	0.19	ug/L	U	0.19	0.76
9/16/02	5	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
9/16/02	5	GC-Water	Chlorpyrifos Ethyl	0.048	ug/L	U	0.048	0.192
9/16/02	5	GC-Water	Chlorpyrifos Methyl	0.095	ug/L	U	0.095	0.38
9/16/02	5	GC-Water	Diazinon	0.048	ug/L	U	0.048	0.192
9/16/02	5	GC-Water	Ethion	0.048	ug/L	U	0.048	0.192
9/16/02	5	GC-Water	Ethoprop	0.095	ug/L	U	0.095	0.38
9/16/02	5	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
9/16/02	5	GC-Water	Fonofos	0.095	ug/L	U	0.095	0.38
9/16/02	5	GC-Water	Hexazinone	0.095	ug/L	U	0.095	0.38
9/16/02	5	GC-Water	Malathion	0.14	ug/L	U	0.14	0.56
9/16/02	5	GC-Water	Metalaxyl	0.24	ug/L	U	0.24	0.96
9/16/02	5	GC-Water	Metolachlor	0.48	ug/L	U	0.48	1.92
9/16/02	5	GC-Water	Metribuzin	0.095	ug/L	U	0.095	0.38
9/16/02	5	GC-Water	Mevinphos	0.19	ug/L	U	0.19	0.76
9/16/02	5	GC-Water	Naled	0.76	ug/L	U	0.76	3.04
9/16/02	5	GC-Water	Norflurazon	0.095	ug/L	U	0.095	0.38
9/16/02	5	GC-Water	Parathion Ethyl	0.14	ug/L	U	0.14	0.56
9/16/02	5	GC-Water	Parathion Methyl	0.095	ug/L	U	0.095	0.38
9/16/02	5	GC-Water	Phorate	0.048	ug/L	U	0.048	0.192
9/16/02	5	GC-Water	Prometryn	0.14	ug/L	U	0.14	0.56
9/16/02	5	GC-Water	Simazine	0.048	ug/L	U	0.048	0.192
9/16/02	5	Metals-Water	Aluminum	58	ug/L	A	5	20
9/16/02	5	Metals-Water	Arsenic	3	ug/L	U	3	12
9/16/02	5	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
9/16/02	5	Metals-Water	Calcium	21.7	mg/L	A	0.02	0.08
9/16/02	5	Metals-Water	Chromium	2	ug/L	U	2	8
9/16/02	5	Metals-Water	Copper	0.75	ug/L	U	0.75	3
9/16/02	5	Metals-Water	Iron	174	ug/L	A	7	28
9/16/02	5	Metals-Water	Lead	0.1	ug/L	U	0.1	0.4
9/16/02	5	Metals-Water	Magnesium	16.4	mg/L	A	0.01	0.04
9/16/02	5	Metals-Water	Nickel	1.5	ug/L	U	1.5	6
9/16/02	5	Metals-Water	Selenium	1	ug/L	U	1	4
9/16/02	5	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
9/16/02	5	Metals-Water	Zinc	2	ug/L	U	2	8
9/16/02	5	Nutrients-Liquid	Ammonia-N	0.097	mg N/L		0.01	0.02
9/16/02	5	Nutrients-Liquid	Fluoride	1.2	mg F/L		0.05	0.1
9/16/02	5	Nutrients-Liquid	NO2NO3-N	0.022	mg N/L		0.004	0.01
9/16/02	5	Nutrients-Liquid	N_KJEL_TOT	1	mg N/L		0.06	0.2
9/16/02	5	Nutrients-Liquid	O-Phosphate-P	0.86	mg P/L		0.08	0.4
9/16/02	5	Nutrients-Liquid	Sulfate	21	mg SO4/L		0.2	0.5
9/16/02	5	Nutrients-Liquid	Total-P	1.1	mg P/L		0.03	0.08
9/16/02	5	Overflow	Oil and Grease	1.5	mg/l	I		
9/16/02	BLANK	BNA-Water	1,2,4,5-Tetrachlorobenzene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	1,2,4-Trichlorobenzene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	1,2-Dichlorobenzene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	1,3,5-Trinitrobenzene	3.8	ug/L	U	3.8	15
9/16/02	BLANK	BNA-Water	1,3-Dichlorobenzene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	1,3-Dinitrobenzene	1.9	ug/L	U	1.9	7.5
9/16/02	BLANK	BNA-Water	1,4-Dichlorobenzene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	1,4-Naphthoquinone	19	ug/L	U	19	75
9/16/02	BLANK	BNA-Water	1-Naphthylamine	9.4	ug/L	U	9.4	38
9/16/02	BLANK	BNA-Water	2,3,4,6-Tetrachlorophenol	1.9	ug/L	U	1.9	7.5
9/16/02	BLANK	BNA-Water	2,4,5-Trichlorophenol	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	2,4,6-Trichlorophenol	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	2,4-Dichlorophenol	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	2,4-Dimethylphenol	47	ug/L	U	47	190
9/16/02	BLANK	BNA-Water	2,4-Dinitrophenol	14	ug/L	U	14	57
9/16/02	BLANK	BNA-Water	2,4-Dinitrotoluene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	2,6-Dichlorophenol	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	2,6-Dinitrotoluene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	2-Acetylaminofluorene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	2-Chloronaphthalene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	2-Chlorophenol	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	2-Methyl-4,6-dinitrophenol	2.8	ug/L	U	2.8	11
9/16/02	BLANK	BNA-Water	2-Methylnaphthalene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	2-Naphthylamine	9.4	ug/L	U	9.4	38
9/16/02	BLANK	BNA-Water	2-Nitroaniline	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	2-Nitrophenol	0.94	ug/L	U	0.94	3.8

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/16/02	BLANK	BNA-Water	2-Picoline	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	3,3'-Dichlorobenzidine	38	ug/L	U	38	150
9/16/02	BLANK	BNA-Water	3,3'-Dimethylbenzidine	19	ug/L	U	19	75
9/16/02	BLANK	BNA-Water	3-Methylcholanthrene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	3-Nitroaniline	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	4,4'-DDD	1.4	ug/L	U	1.4	5.7
9/16/02	BLANK	BNA-Water	4,4'-DDE	1.4	ug/L	U	1.4	5.7
9/16/02	BLANK	BNA-Water	4,4'-DDT	1.4	ug/L	U	1.4	5.7
9/16/02	BLANK	BNA-Water	4-Aminobiphenyl	3.8	ug/L	U	3.8	15
9/16/02	BLANK	BNA-Water	4-Bromophenyl phenyl ether	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	4-Chloro-3-methylphenol	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	4-Chloroaniline	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.5
9/16/02	BLANK	BNA-Water	4-Nitroaniline	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	4-Nitrophenol	14	ug/L	U	14	57
9/16/02	BLANK	BNA-Water	5-Nitro-o-toluidine	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	7,12-Dimethylbenz(a)anthracene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Acenaphthene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Acenaphthylene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Acetophenone	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Aldrin	1.4	ug/L	U	1.4	5.7
9/16/02	BLANK	BNA-Water	Aniline	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Anthracene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Benzidine	94	ug/L	U	94	380
9/16/02	BLANK	BNA-Water	Benzo(a)anthracene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Benzo(a)pyrene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Benzo(b)fluoranthene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Benzo(g,h,i)perylene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Benzo(k)fluoranthene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Benzyl alcohol	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Bis(2-chloroethoxy)methane	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Bis(2-chloroethyl)ether	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Bis(2-chloroisopropyl)ether	2.8	ug/L	U	2.8	11
9/16/02	BLANK	BNA-Water	Bis(2-ethylhexyl)phthalate	14	ug/L	U	14	57
9/16/02	BLANK	BNA-Water	Butyl benzyl phthalate	4.7	ug/L	U	4.7	19
9/16/02	BLANK	BNA-Water	Chrysene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Di-n-butyl phthalate	4.7	ug/L	U	4.7	19
9/16/02	BLANK	BNA-Water	Di-n-octyl phthalate	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Dibenzo(a,h)anthracene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Dibenzofuran	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Dieldrin	1.4	ug/L	U	1.4	5.7
9/16/02	BLANK	BNA-Water	Diethyl phthalate	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Dimethyl phthalate	47	ug/L	U	47	190
9/16/02	BLANK	BNA-Water	Dimethylaminoazobenzene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Dinoseb	3.8	ug/L	U	3.8	15
9/16/02	BLANK	BNA-Water	Diphenylamine	2.8	ug/L	U	2.8	11
9/16/02	BLANK	BNA-Water	Endosulfan I	3.8	ug/L	U	3.8	15
9/16/02	BLANK	BNA-Water	Endosulfan II	3.8	ug/L	U	3.8	15
9/16/02	BLANK	BNA-Water	Endosulfan sulfate	1.4	ug/L	U	1.4	5.7
9/16/02	BLANK	BNA-Water	Endrin	1.4	ug/L	U	1.4	5.7
9/16/02	BLANK	BNA-Water	Endrin aldehyde	3.8	ug/L	U	3.8	15
9/16/02	BLANK	BNA-Water	Ethyl methanesulfonate	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Fluoranthene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Fluorene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Heptachlor	1.4	ug/L	U	1.4	5.7
9/16/02	BLANK	BNA-Water	Heptachlor epoxide	1.4	ug/L	U	1.4	5.7
9/16/02	BLANK	BNA-Water	Hexachlorobenzene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Hexachlorobutadiene	2.8	ug/L	U	2.8	11
9/16/02	BLANK	BNA-Water	Hexachlorocyclopentadiene	2.8	ug/L	U	2.8	11
9/16/02	BLANK	BNA-Water	Hexachloroethane	2.8	ug/L	U	2.8	11
9/16/02	BLANK	BNA-Water	Hexachloropropene	1.9	ug/L	U	1.9	7.5
9/16/02	BLANK	BNA-Water	Indeno(1,2,3-cd)pyrene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Isophorone	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Isosafrole	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Methapyrilene	3.8	ug/L	U	3.8	15
9/16/02	BLANK	BNA-Water	Methyl methanesulfonate	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	N-Nitrosodi-n-butylamine	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	U	1.9	7.5

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/16/02	BLANK	BNA-Water	N-Nitrosodiethylamine	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.5
9/16/02	BLANK	BNA-Water	N-Nitrosodiphenylamine	2.8	ug/L	U	2.8	11
9/16/02	BLANK	BNA-Water	N-Nitrosomethylethylamine	1.9	ug/L	U	1.9	7.5
9/16/02	BLANK	BNA-Water	N-Nitrosomorpholine	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	N-Nitrosopiperidine	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	N-Nitrosopyrrolidine	1.9	ug/L	U	1.9	7.5
9/16/02	BLANK	BNA-Water	Naphthalene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.5
9/16/02	BLANK	BNA-Water	Nitroquinoline-1-oxide	19	ug/L	U	19	75
9/16/02	BLANK	BNA-Water	Pentachlorobenzene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Pentachloroethane	47	ug/L	U	47	190
9/16/02	BLANK	BNA-Water	Pentachloronitrobenzene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Pentachlorophenol	2.8	ug/L	U	2.8	11
9/16/02	BLANK	BNA-Water	Phenacetin	3.8	ug/L	U	3.8	11
9/16/02	BLANK	BNA-Water	Phenanthrene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Phenol	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Pyrene	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	Pyridine	3.8	ug/L	U	3.8	15
9/16/02	BLANK	BNA-Water	Safrole	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	BNA-Water	alpha-BHC	1.4	ug/L	U	1.4	5.7
9/16/02	BLANK	BNA-Water	beta-BHC	1.4	ug/L	U	1.4	5.7
9/16/02	BLANK	BNA-Water	delta-BHC	1.4	ug/L	U	1.4	5.7
9/16/02	BLANK	BNA-Water	gamma-BHC	1.4	ug/L	U	1.4	5.7
9/16/02	BLANK	BNA-Water	m,p-Cresols	1.9	ug/L	U	1.9	7.5
9/16/02	BLANK	BNA-Water	o-Cresol	1.9	ug/L	U	1.9	7.5
9/16/02	BLANK	BNA-Water	o-Toluidine	0.94	ug/L	U	0.94	3.8
9/16/02	BLANK	GC-Water	Alachlor	0.57	ug/L	U	0.57	2.28
9/16/02	BLANK	GC-Water	Ametryn	0.047	ug/L	U	0.047	0.188
9/16/02	BLANK	GC-Water	Atrazine	0.047	ug/L	U	0.047	0.188
9/16/02	BLANK	GC-Water	Azinphos Methyl	0.047	ug/L	U	0.047	0.188
9/16/02	BLANK	GC-Water	Bromacil	0.19	ug/L	U	0.19	0.76
9/16/02	BLANK	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
9/16/02	BLANK	GC-Water	Chlorpyrifos Ethyl	0.047	ug/L	U	0.047	0.188
9/16/02	BLANK	GC-Water	Chlorpyrifos Methyl	0.094	ug/L	U	0.094	0.376
9/16/02	BLANK	GC-Water	Diazinon	0.047	ug/L	U	0.047	0.188
9/16/02	BLANK	GC-Water	Ethion	0.047	ug/L	U	0.047	0.188
9/16/02	BLANK	GC-Water	Ethoprop	0.094	ug/L	U	0.094	0.376
9/16/02	BLANK	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
9/16/02	BLANK	GC-Water	Fonofos	0.094	ug/L	U	0.094	0.376
9/16/02	BLANK	GC-Water	Hexazinone	0.094	ug/L	U	0.094	0.376
9/16/02	BLANK	GC-Water	Malathion	0.14	ug/L	U	0.14	0.56
9/16/02	BLANK	GC-Water	Metalaxyl	0.24	ug/L	U	0.24	0.96
9/16/02	BLANK	GC-Water	Metolachlor	0.47	ug/L	U	0.47	1.88
9/16/02	BLANK	GC-Water	Metribuzin	0.094	ug/L	U	0.094	0.376
9/16/02	BLANK	GC-Water	Mevinphos	0.19	ug/L	U	0.19	0.76
9/16/02	BLANK	GC-Water	Naled	0.75	ug/L	U	0.75	3
9/16/02	BLANK	GC-Water	Norflurazon	0.094	ug/L	U	0.094	0.376
9/16/02	BLANK	GC-Water	Parathion Ethyl	0.14	ug/L	U	0.14	0.56
9/16/02	BLANK	GC-Water	Parathion Methyl	0.094	ug/L	U	0.094	0.376
9/16/02	BLANK	GC-Water	Phorate	0.047	ug/L	U	0.047	0.188
9/16/02	BLANK	GC-Water	Prometryn	0.14	ug/L	U	0.14	0.56
9/16/02	BLANK	GC-Water	Simazine	0.047	ug/L	U	0.047	0.188
9/16/02	BLANK	Metals-Water	Aluminum	5	ug/L	U	5	20
9/16/02	BLANK	Metals-Water	Arsenic	3	ug/L	U	3	12
9/16/02	BLANK	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
9/16/02	BLANK	Metals-Water	Calcium	0.02	mg/L	U	0.02	0.08
9/16/02	BLANK	Metals-Water	Chromium	2	ug/L	U	2	8
9/16/02	BLANK	Metals-Water	Copper	0.75	ug/L	U	0.75	3
9/16/02	BLANK	Metals-Water	Iron	7	ug/L	U	7	28
9/16/02	BLANK	Metals-Water	Lead	0.1	ug/L	U	0.1	0.4
9/16/02	BLANK	Metals-Water	Magnesium	0.01	mg/L	U	0.01	0.04
9/16/02	BLANK	Metals-Water	Nickel	1.5	ug/L	U	1.5	6
9/16/02	BLANK	Metals-Water	Selenium	1	ug/L	U	1	4
9/16/02	BLANK	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
9/16/02	BLANK	Metals-Water	Zinc	2	ug/L	U	2	8
9/16/02	BLANK	Nutrients-Liquid	Ammonia-N	0.01	mg N/L	U	0.01	0.02
9/16/02	BLANK	Nutrients-Liquid	Fluoride	0.05	mg F/L	U	0.05	0.1
9/16/02	BLANK	Nutrients-Liquid	NO2NO3-N	0.004	mg N/L	U	0.004	0.01

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/16/02	BLANK	Nutrients-Liquid	N_KJEL_TOT	0.06	mg N/L	U	0.06	0.2
9/16/02	BLANK	Nutrients-Liquid	O-Phosphate-P	0.004	mg P/L	U	0.004	0.02
9/16/02	BLANK	Nutrients-Liquid	Sulfate	0.2	mg SO4/L	U	0.2	0.5
9/16/02	BLANK	Nutrients-Liquid	Total-P	0.015	mg P/L	U	0.015	0.04
9/16/02	BLANK	Overflow	Oil and Grease	1.1	mg/l	I		
9/16/02	CONTROL	Bio-AGP/LimNut	Algal Growth Potential	16.3	mg DryWt/L		0.1	0.3
9/16/02	CONTROL	Bio-Chl-a	Chlorophyll-A, Monochromatic, Periphyton	2.7	mg/m2		0.14	0.43
9/16/02	CONTROL	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	3.7	ug/L	I	1.4	4.3
9/16/02	CONTROL	Bio-Chl-a	Phaeophytin-A, Monochromatic, Periphyton	0	mg/m2		0.14	0.43
9/16/02	CONTROL	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0	ug/L	J	1.4	4.3
9/16/02	CONTROL	Bio-Invertebrates	Macroinvert-FW-Qual-Dipnetx20-# Taxa	18	# Taxa			
9/16/02	CONTROL	Bio-Peri/Phyto	Periphyton-Quantitative-# Diatom Taxa	25	#Taxa			
9/16/02	CONTROL	Bio-Peri/Phyto	Periphyton-Quantitative-# Wet Taxa	15	#Taxa			
9/16/02	CONTROL	Bio-Peri/Phyto	Phytoplankton-Quantitative-# Wet Taxa		#Taxa			
9/16/02	CONTROL	Bio-Peri/Phyto	Phytoplankton-Quantitative-#Diatom Taxa		#Taxa			
9/16/02	CONTROL	Nutrients-Liquid	Ammonia-N	0.11	mg N/L		0.01	0.02
9/16/02	CONTROL	Nutrients-Liquid	Fluoride	0.44	mg F/L		0.05	0.1
9/16/02	CONTROL	Nutrients-Liquid	NO2NO3-N	0.095	mg N/L		0.004	0.01
9/16/02	CONTROL	Nutrients-Liquid	N_KJEL_TOT	1.9	mg N/L		0.06	0.2
9/16/02	CONTROL	Nutrients-Liquid	O-Phosphate-P	0.47	mg P/L		0.04	0.2
9/16/02	CONTROL	Nutrients-Liquid	Sulfate	12	mg SO4/L		0.2	0.5
9/16/02	CONTROL	Nutrients-Liquid	Total-P	0.56	mg P/L		0.015	0.04
9/16/02	CONTROL REP.1	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	10	# Taxa			
9/16/02	CONTROL REP.2	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	13	# Taxa			
9/16/02	CONTROL REP.3	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	13	# Taxa			
9/16/02	TEST SITE	Bio-AGP/LimNut	Algal Growth Potential	20.1	mg DryWt/L	A	0.1	0.3
9/16/02	TEST SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Periphyton	0.12	mg/m2	U	0.12	0.37
9/16/02	TEST SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	20	ug/L	A	0.85	2.6
9/16/02	TEST SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Periphyton	0.12	mg/m2	U	0.12	0.37
9/16/02	TEST SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0	ug/L	A	0.85	2.6
9/16/02	TEST SITE	Bio-Invertebrates	Macroinvert-FW-Qual-Dipnetx20-# Taxa	26	# Taxa			
9/16/02	TEST SITE	Bio-Peri/Phyto	Periphyton-Quantitative-# Diatom Taxa	12	#Taxa			
9/16/02	TEST SITE	Bio-Peri/Phyto	Periphyton-Quantitative-# Wet Taxa	13	#Taxa			
9/16/02	TEST SITE	Bio-Peri/Phyto	Phytoplankton-Quantitative-# Wet Taxa		#Taxa			
9/16/02	TEST SITE	Bio-Peri/Phyto	Phytoplankton-Quantitative-#Diatom Taxa		#Taxa			
9/16/02	TEST SITE	Nutrients-Liquid	Ammonia-N	0.04	mg N/L		0.01	0.02
9/16/02	TEST SITE	Nutrients-Liquid	Fluoride	0.63	mg F/L		0.05	0.1
9/16/02	TEST SITE	Nutrients-Liquid	NO2NO3-N	0.18	mg N/L		0.004	0.01
9/16/02	TEST SITE	Nutrients-Liquid	N_KJEL_TOT	1.7	mg N/L		0.06	0.2
9/16/02	TEST SITE	Nutrients-Liquid	O-Phosphate-P	0.76	mg P/L		0.04	0.2
9/16/02	TEST SITE	Nutrients-Liquid	Sulfate	27	mg SO4/L		0.2	0.5
9/16/02	TEST SITE	Nutrients-Liquid	Total-P	0.84	mg P/L		0.015	0.04
9/16/02	TEST SITE REP.1	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	24	# Taxa			
9/16/02	TEST SITE REP.2	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	25	# Taxa			
9/16/02	TEST SITE REP.3	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	23	# Taxa			

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C. and/or 62-302.530(48)(b) F.A.C..

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 62-302.530(62) F.A.C..

(3) Algal 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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C. and/or 62-302.530(48)(b) F.A.C..

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

(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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C. and/or 62-302.530(48)(b) F.A.C..

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 62-302.530(11) F.A.C..

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

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	17.00	39.51	60.85	**2.7**
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	**2.91**
Hester-Dendy Taxa Richness	6	6.5	9	11.5	13	**15**	**17**	21.5	26	29	32	**16**
Dipnet Taxa Richness	9	12	**17**	**20**	22	24.5	26	28	31	37	53	**18**
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	**1.9**
Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	**0.11**	0.14	0.20	0.34	0.60	**0.11**
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	**0.095**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	**0.39**	**0.74**	1.51	**0.56**
Orthophosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	**0.27**	**0.59**	1.37	**0.47**
Turbidity (NTU)	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30	-

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	17.00	39.51	60.85	**0.12 U**
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	**3.31**
Hester-Dendy Taxa Richness	6	6.5	9	11.5	13	15	17	21.5	26	**29**	**32**	**31**
Dipnet Taxa Richness	9	12	17	20	**22**	**24.5**	26	28	31	37	53	**24**
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	**1.7**
Ammonia	0.02	0.02	**0.04**	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60	**0.04**
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	**0.18**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	0.39	**0.74**	**1.51**	**0.84**
Orthophosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	0.27	**0.59**	**1.37**	**0.76**
Turbidity (NTU)	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30	-

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. U = not detected. Value is the detection limit.

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 IMC-Noralyn/Phosphoria/Clear Springs Mine and Pierce Noralyn Mine Rd, Bartow, Polk County, Florida, NPDES# FL0000230, performed from 17 to 19 September, 2002.

Facility:	**IMC-Mine and Mill**		**NPDES #:**	**FL0000230**	Facility Type:	**Phosphate Mine**	**Analysts:** Jacquelyn Bry
Location:	3301 Noralyn Mine Rd., Bartow		Contact/District:	Hall/SW			Joshua Ayres
County:	Polk		Test type:	static acute screen	Receiving Water:	Peace River	James Daniels
Sample Collection Date:	9/16/2002	Time: 1051	# tests:	2		Alafia River (North and South Prongs)	Marshall Fairc
Test Beginning Date:	9/17/2002	Time: 1400	Chlorination Type:	Non-chlorinated		Class III Fresh Waters	
Test Ending Date:	9/19/2002	Time: 1400	FDEP SOP#:	TA07_01/TA07_02		**Page 1 of 1**	**Reviewer:** David Whiting

Organism: ***Ceriodaphnia dubia*** Life stage: <24 hours [B]Feeding: YCT/Algae Chamber size: 30mL

	Sample/Diluen	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	8.0	-	8.2	24.3	-	24.1	7.8	-	7.9	160	370
Control B	0/20	5	5	5	-	-	8.2	-	-	24.1	-	-	8.0	-	260
Control C	0/20	5	4	4	-	-	8.2	-	-	24.0	-	-	7.9	-	270
Control D	0/20	5	5	5	-	-	8.2	-	-	24.1	-	-	7.9	-	225
100% A	20/0	5	5	5	7.6	-	8.6	24.3	-	24.0	6.5	-	7.9	510	820
100% B	20/0	5	5	5	-	-	8.6	-	-	23.8	-	-	7.9	-	880
100% C	20/0	5	5	5	-	-	8.6	-	-	23.8	-	-	8.0	-	735
100% D	20/0	5	5	5	-	-	8.6	-	-	23.9	-	-	7.9	-	780

[A] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 25.0-26.5°C.
Incubator #3 temperature range for the test period was 23.5-24.0°C.

[B] Organisms fed prior to testing.

Organism: ***Cyprinella leedsi*** Life stage: 5 days [D]Feeding: artemia Chamber size: 1L

	Sample/Diluen	SURVIVAL # Alive			pH			Temperature[C]			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	7.8	8.3	8.5	24.4	24.2	25.5	7.7	7.4	7.4	280	290
Control B	0/500	5	5	5	7.9	8.3	8.5	24.4	24.8	24.7	7.7	7.4	7.4	260	275
Control C	0/500	5	5	5	7.8	8.3	8.5	24.4	24.8	24.5	7.5	7.3	7.7	260	270
Control D	0/500	5	5	5	7.8	8.3	8.5	24.4	24.2	24.4	7.6	7.4	7.7	260	280
100% A	500/0	5	5	5	7.6	8.2	8.4	24.7	24.0	25.4	6.4	7.4	7.4	540	570
100% B	500/0	5	5	5	7.6	8.2	8.4	24.9	25.0	24.8	6.4	7.4	7.3	570	595
100 % C	500/0	5	5	5	7.6	8.2	8.4	24.9	24.6	24.6	6.3	7.1	7.5	580	610
100% D	500/0	5	5	5	7.6	8.2	8.4	24.9	24.0	24.5	6.4	7.3	7.5	580	610

[C] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 25.0-26.5°C.
Incubator #3 temperature range for the test period was 23.5-24.0°C.

[D] Organisms fed prior to testing.

LIMS	
Job number:	TLH-2002-09-1
sample number:	622515

Data Transcription Verifi	
date:	2/10
by:	James Trav

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

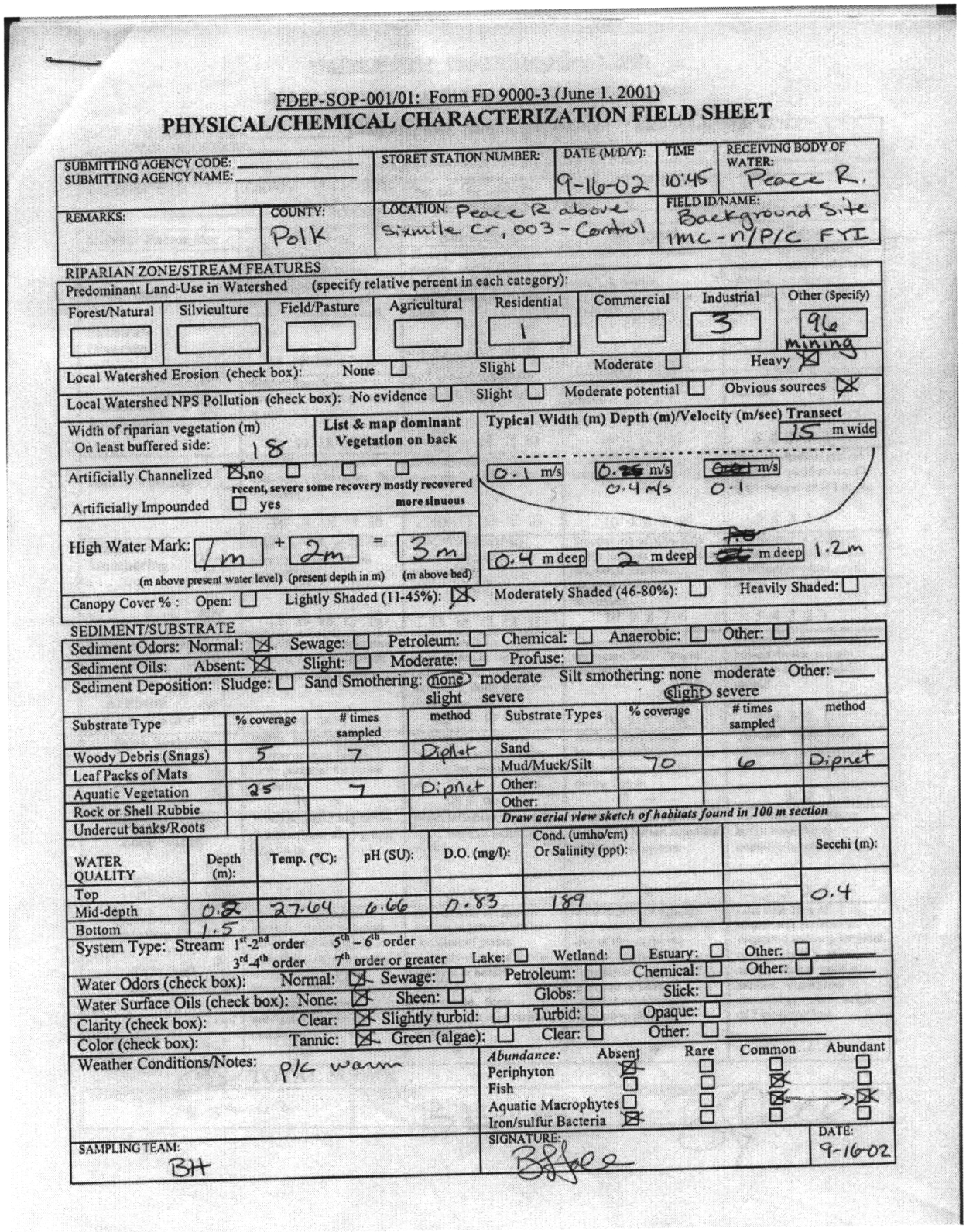
Ammonia	Total (mg/L)
Control water (fish):	<0.017
Control water (water flea):	<0.017
100% Sample:	1.73

Alk & Hardness	Alkalinity (mg/L)
Control water (fish):	146
Control water (water flea):	80
100% Sample:	134

Photoperiod during the test was 16 hour hours of dark.

Appendix 8

Physical/Chemical Characterization and 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 (M/D/Y): 9-16-02	TIME: 10:45	RECEIVING BODY OF WATER: Peace R.
REMARKS:	COUNTY: Polk	LOCATION: Peace R above Sixmile Cr, 003 - Control	FIELD ID/NAME: Background Site IMC-N/P/C 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)
				1		3	96 mining

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: 15 m wide

0.1 m/s — 0.4 m/s — 0.1 m/s

0.4 m deep — 2 m deep — 1.2 m deep

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

Artificially Impounded ☐ yes more sinuous

High Water Mark: 1m (m above present water level) + 2m (present depth in m) = 3m (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 slight severe Silt smothering: none moderate (slight) severe Other:

Substrate Type	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	5	7	Dipnet	Sand			
Leaf Packs of Mats				Mud/Muck/Silt	70	6	Dipnet
Aquatic Vegetation	25	7	Dipnet	Other:			
Rock or Shell Rubbie				Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (umho/cm) Or Salinity (ppt):			Secchi (m):
Top								0.4
Mid-depth	0.8	27.64	6.66	0.83	189			
Bottom	1.5							

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: P/C warm

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

SAMPLING TEAM: BH

SIGNATURE: BFlee

DATE: 9-16-02

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

STREAM/RIVER HABITAT ASSESSMENT FIELD SHEET

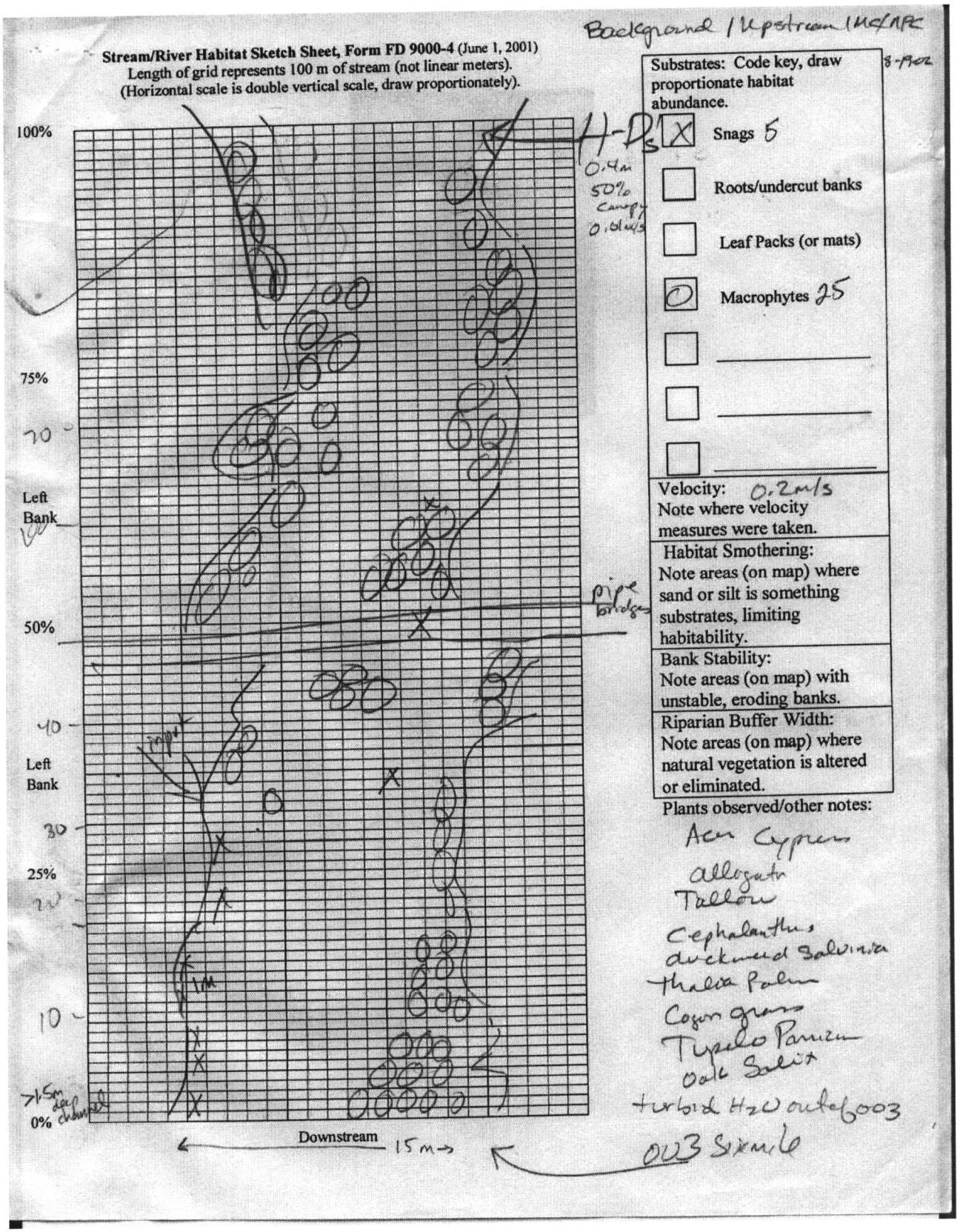
SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 8-19-02	RECEIVING BODY OF WATER:

REMARKS:	COUNTY:	LOCATION: Peace R above Similee Cr Background Site Imcnps Fy1	FIELD ID/NAME:

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components **Substrate Diversity** 8	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 15	Greater than 30% productive habitat present at site. 20 19 18 17 16	16% to 30% productive habitat, by aerial 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 15	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 (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 spate occurring: > 1 m/sec 5 4 3 2 1
Habitat Smothering 16 Primary Score 54	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** 20	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 10 Left Bank 10	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 78	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody machrophytes. 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 ozone 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

(132) **TOTAL SCORE**

ANALYSIS DATE: 8-19-02	ANALYST: B Hall	SIGNATURE: B Hall


Background / Upstream MC/MPC
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).
8-9-02
100%
75%
50%
25%
0%
Left Bank
Left Bank
H-D
0.4m
50% canopy
0 blw/s
pipe bridge
1M
>1.5m deep channel
Downstream
15m
Substrates: Code key, draw proportionate habitat abundance.
Snags 5
Roots/undercut banks
Leaf Packs (or mats)
Macrophytes 25
Velocity: 0.2m/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:
Ace Cyperus
alligator
Tallow
Cephalanthus
duckweed Salvinia
thalia Palm
Cogon grass
Tupelo Panicum
Oak Salix
turbid H2O outfall 003
003 Similar

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 (M/D/Y):	TIME	RECEIVING BODY OF WATER:
	25020311	9-16-02	13:15	

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
	Polk	Peace R. (below 004 Barber Br)	IMC-N/PIC FY1 Test Site

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)
		1				1	9.7 mining

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

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

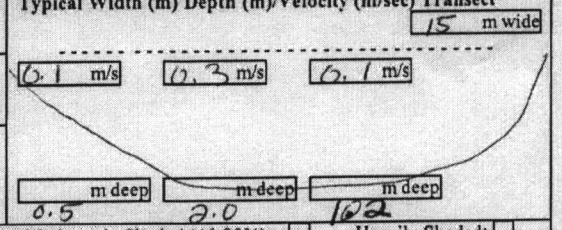
Width of riparian vegetation (m) On least buffered side: >18

List & map dominant Vegetation on back

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

Artificially Impounded ☐ yes more sinuous

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



High Water Mark: 1 m (m above present water level) + 2m (present depth in m) = 3.0m (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 slight severe Silt smothering: none moderate (slight) severe Other: _____

Substrate Type	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	5	7	DN	Sand			
Leaf Packs of Mats				Mud/Muck/Silt	75	6	DN
Aquatic Vegetation	20	7	DN	Other:			
Rock or Shell Rubbie				Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (umho/cm) Or Salinity (ppt):			Secchi (m):
Top								
Mid-depth	0.15	28.08	6.91	0.55	242			
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:
BH	Bonnie Hall	9-16-02

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): 8-19-02	RECEIVING BODY OF WATER:

REMARKS:	COUNTY: Polk	LOCATION: Peace R. below Barbers Test Site IMC-NPC FY1	FIELD ID/NAME:

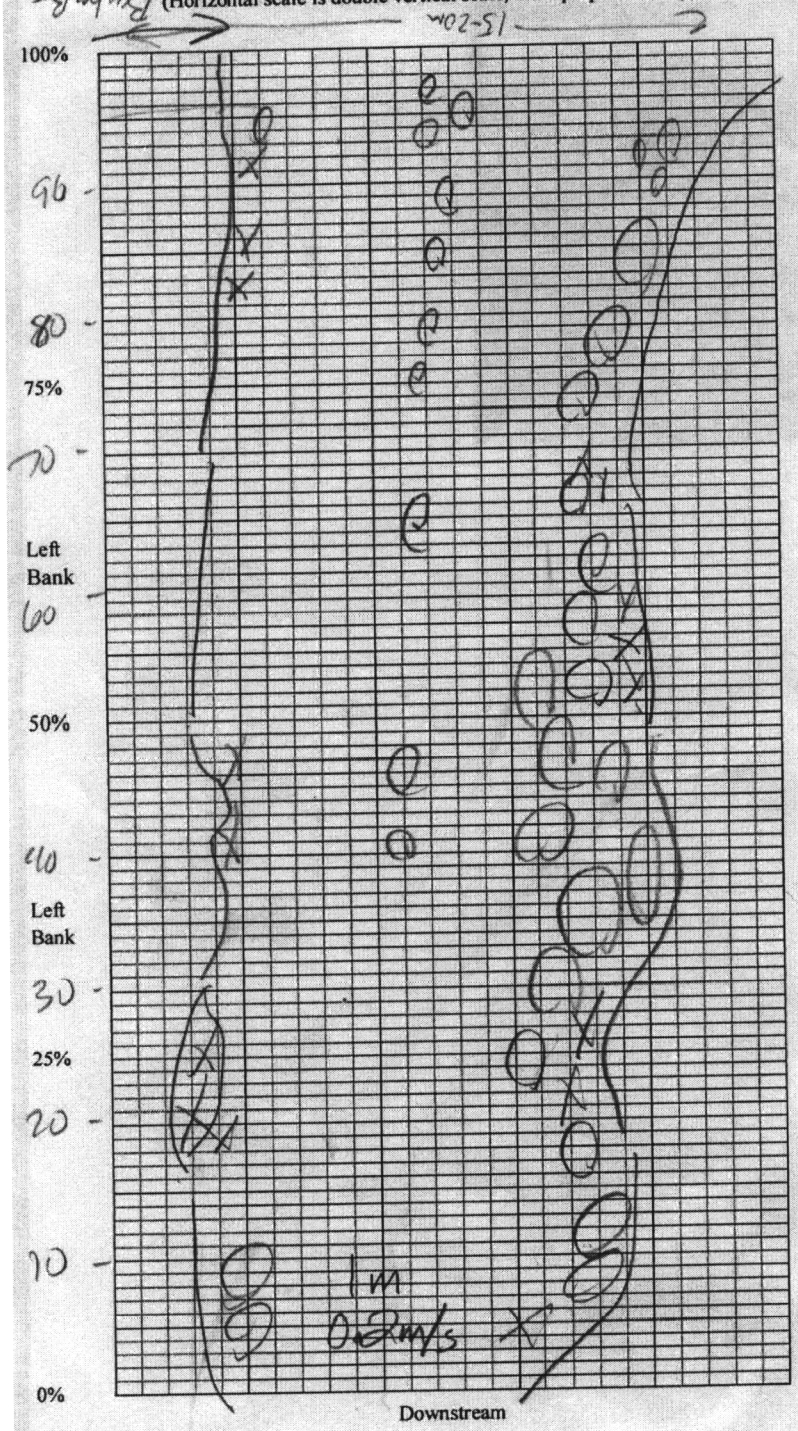
Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components **Substrate Diversity** 8	Four or more productive habitats present (snags, tree roots/undercut banks, aquatic vegetation, leaf packs (partially decayed), rock). 20 19 18 17 16	Three productive habitats present. Adequate habitat. 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 aerial 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 15	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 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 spate occurring: > 1 m/sec 5 4 3 2 1
Habitat Smothering 16 Primary Score 52	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** 20	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 10 Left Bank 10	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 78	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody machrophytes. 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 ozone 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

(130) **TOTAL SCORE**

ANALYSIS DATE: 8-19-02	ANALYST: B Hall	SIGNATURE:

Test Site

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 5
- [ ] Roots/undercut banks
- [ ] Leaf Packs (or mats)
- [O] Macrophytes 20
- [ ] _____
- [ ] _____
- [ ] _____

Velocity:
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:

floating veg

upstream of Barbour input
≈ 5.03 mg/L DO.

Appendix 9

Taxa list and density (number/cm^2) for periphyton collected from glass microscope slides incubated for 28 days upstream and downstream of IMC Phosphates Company – Noralyn/Phosphoria/Clear Springs Mine & Pierce Mill discharge, 9/16/02.

	Control Site	Test Site
Bacillariophyta:		
Achnanthes exigua	-	2577
Achnanthes hungarica	1289	-
Achnanthes inflata	-	1289
Achnanthes lanceolata	1289	-
Aulacoseira sp.	1289	-
Cocconeis placentula	5154	2577
Cyclotella sp.	6443	3866
Cymbella sp.	1289	-
Cymbellaceae	1289	-
Encyonema neomesianum	1289	-
Encyonema sp.	1289	-
Eunotia sp.	14174	2577
Fallacia sp.	1289	-
Fragilaria construens	-	1289
Fragilaria pinnata	5154	-
Fragilaria pinnata trigona	9020	2577
Fragilariaceae	11597	-
Gomphonema gracile	9020	-
Gomphonema parvulum	2577	1289
Gomphonema sp.	2577	-
Navicula sp.	1289	3866
Naviculaceae	1289	-
Nitzschia amphibia	2577	1289
Nitzschia frustulum	1289	-
Nitzschia palea	1289	-
Nitzschia sp.	11597	7731
Opephora sp.	1289	-
Pinnularia sp.	1289	1289
Chlorophycota:		
Ankistrodesmus sp.	-	1289
Characium sp.	2577	-
Chlorella sp.	3866	1289
Oocystis sp.	1289	-
Scenedesmus abundans	6443	1289
Scenedesmus armatus	2577	3866
Scenedesmus quadricauda	10308	6443
Scenedesmus sp.	-	1289
Selenastrum sp.	1289	-
Stigeoclonium sp.	1289	-
Cyanophycota:		
Anabaena sp.	3866	-
Cyanobium parvum	16751	3866
Cyanobium plancticum	9020	-
Lyngbya contorta	14174	5154
Lyngbya sp.	6443	5154
Merismopedia tenuissima	-	1289
Oscillatoria sp.	3866	2577
Rhabdogloea sp.	-	3866
Pyrrophycophyta:		
Glenodinium sp.	-	1289

Appendix 10.

Benthic macroinvertebrates collected from Hester-Dendy artificial substrates incubated upstream and downstream of the IMC Phosphates Company – Noralyn/Phosphoria/Clear Springs Mine & Pierce Mill facility for 28 days (9/16/02). Taxa collected and density (individuals/m^2) rounded to the nearest individual (n = 3 samples).

	Control Site	Test Site
Annelida:		
Hirudinea		
Desserobdella phalera	-	3
Arthropoda:		
Crustacea		
Amphipoda		
Hyalella azteca	8	392
undetermined Amphipoda	3	3
Insecta		
Coleoptera		
Dineutus sp.	5	-
Diptera		
Ablabesmyia mallochi	-	3
Ablabesmyia rhamphe grp.	-	53
Ceratopogonidae	-	8
Chironomidae	40	66
Chironomus sp.	238	19
Corynoneura sp.	-	8
Dicrotendipes simpsoni	-	45
Dicrotendipes sp.	-	5
Glyptotendipes sp.	-	11
Goeldichironomus amazonicus	42	-
Goeldichironomus carus	267	167
Goeldichironomus natans	8	19
Goeldichironomus sp.	11	11
Kiefferulus sp.	315	3
Labrundinia pilosella	-	5
Parachironomus sp.	8	5
Paramerina sp.	8	-
Pentaneura inconspicua	-	13
Polypedilum beckae	13	26
Polypedilum scalaenum grp.	-	3
Polypedilum sp.	11	-
Tanytarsus sp.	3	19
Tanytarsus sp. A Epler	-	3
Tanytarsus sp. B Epler	5	-
Tanytarsus sp. O Epler	-	3
Tanytarsus sp. T Epler	-	53
Thienemanniella sp.	-	3
Tribelos fuscicornis	-	21
Ephemeroptera		
Caenis sp.	-	45
Callibaetis sp.	-	3
Stenacron sp.	-	8
Odonata		
Enallagma sp.	3	-
Trichoptera		
Cyrnellus fraternus	-	58
Orthotrichia sp.	-	8
Mollusca:		
Gastropoda		
Ancylidae	196	561
Ferrissia sp.	143	-
Hydrobiidae	-	26
Laevapex sp.	85	-
Micromenetus dilatatus avus	-	11
Micromenetus sp.	11	16
Planorbella sp.	-	40
Planorbella trivolvis intertexta	-	3
Planorbidae	3	8
Pyrogophorus platyrachis	8	-
undetermined Gastropoda	29	13

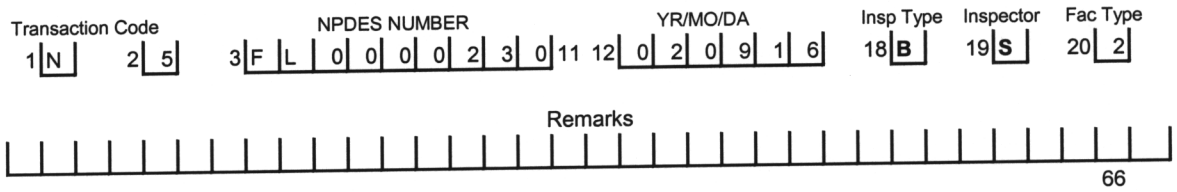
Appendix 11

Qualitative benthic macroinvertebrate collections (n = 20 discrete dipnet sweeps) upstream and downstream of IMC Phosphates Company – Noralyn/Phosphoria/Clear Springs Mine & Pierce Mill facility (9/16/02). Taxa list and number of individuals counted.

	Control Site	Test Site
Annelida:		
Hirudinea		
Helobdella stagnalis	-	1
Oligochaeta		
Allonais paraguayensis	-	1
Dero sp.	3	1
Dero lodeni	-	1
Enchytraeidae	-	1
Arthropoda:		
Crustacea		
Amphipoda		
Hyalella azteca	54	33
undetermined Amphipoda	-	1
Decapoda		
Palaemonetes paludosus	4	-
Procambarus sp.	-	1
Insecta		
Coleoptera		
Coptotomus sp.	-	1
Dineutus sp.	-	1
Dryopidae	-	2
Enochrus sp.	1	-
Pelonomus obscurus	-	2
Scirtes sp.	1	1
Suphisellus sp.	1	-
Diptera		
Ablabesmyia rhamphe grp.	-	1
Atrichopogon sp.	-	5
Beardius reissi	1	-
Ceratopogonidae	1	1
Chironomidae	-	2
Chironomus sp.	10	-
Dasyhelea sp.	1	-
Glyptotendipes sp.	-	2
Goeldichironomus sp.	-	5
Goeldichironomus fluctuans	-	3
Goeldichironomus natans	5	-
Monopelopia boliekae	1	-
Polypedilum beckae	2	1
Tanytarsus sp. C Epler	1	-
Tanytarsus sp. G Epler	1	-
Ephemeroptera		
Caenis sp.	3	17
Callibaetis sp.	-	2
Pseudocloeon sp.	-	8
Stenonema sp.	-	1
Heteroptera		
Pelocoris sp.	1	-
Lepidoptera		
undetermined Lepidoptera	-	1
Odonata		
Boyeria vinosa	-	1
Coenagrionidae	-	1
Enallagma sp.	1	-
Trichoptera		
Cheumatopsyche sp.	-	2
Mollusca:		
Gastropoda		
Ancylidae	-	5
Pyrogophorus platyrachis	5	-

The Bioassay of IMC Phosphates Company - Noralyn/Phosphoria/Clear Springs Mine & Pierce Mill effluent sampled on September 16, 2002 NPDES #FL0000230.

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



The Priority Pollutants Analysis of IMC Phosphates Company - Noralyn/Phosphoria/Clear Springs Mine & Pierce Mill effluent sampled on September 16, 2002 NPDES #FL0000230.

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

