Biological Assessment of

Mosaic Fertilizer, Inc. - Wingate Creek Mine
(formerly Cargill Fertilizer)

Manatee County

NPDES #FL0032522

Sampled August 16, 2004

January 2005

Biology Section

Bureau of Laboratories

Division of Resource Assessment and Management

Quality Manual No. 870346G

NELAC Certification No. E31780

Florida Department of Environmental Protection

Fifth Year Inspection Summary

Discharger:	Mosaic Fertilizer, Inc., Wingate Creek Mine
County:	Manatee
NPDES Number:	FL0032522
Permit Expiration:	April 5, 2005

Toxics Sampling Inspection **(XSI)**

Date Sampled: August 16, 2004

Results: Aluminum was detected in the effluent. Iron and lead were detected in the effluent at levels that complied with Class III Fresh Water Quality Criteria. Copper was detected in the effluent at a level between the laboratory minimum detection limit (MDL) and practical quantitation limit (PQL).

Compliance Biomonitoring Inspection **(CBI)**

Date Sampled: August 16, 2004

Results: The effluent sample was not acutely toxic to the fish, *Cyprinella leedsi,* or to the water flea, *Ceriodaphnia dubia,* during the 96-hour acute screening bioassays.

Water Quality Inspection **(WQI)**

Date Sampled: August 16, 2004

Results: Effluent conductivity, pH, and dissolved oxygen complied with Class III Water Quality Criteria (62-302, F.A.C.) and facility permit limits. However, dissolved oxygen levels at the Control and Test Sites (3.5 and 4.5 mg/L) were below the Class III Surface Water Quality Criterion (5.0 mg/L, 62-302.530(31), F.A.C.). Effluent concentrations of total nitrogen (1.3 mg/L) and total phosphorus (0.28 mg/L) complied with facility permit limits. Concentrations of these nutrients were similar at the Control and Test Sites; total phosphorus ranked in the 60^{th} percentile of typical values for Florida streams, while ammonia and nitrate+nitrite ranked in the 5^{th} percentile. AGP values at the upstream Control Site (3.88 mg dry weight/L), the downstream Test Site (3.26 mg dry weight/L), and the effluent (4.89 mg dry weight/L) were all below the “problem” threshold (5.0 mg dry weight/L) for fresh waters. Bacteria sampling was not part of this study.

Impact Bioassessment Inspection **(IBI)**

Date Sampled: August 16, 2004

Results: The effluent chlorophyll *a* (85 μg/L) level is a cause for concern. If this trend were to continue throughout the year, the facility's effluent could potentially cause the receiving waters to exceed the 20 μg/L annual average threshold for listing waterbodies under the Impaired Waters Rule (IWR). The high effluent chlorophyll-*a* concentration contributed to higher levels at the Test Site (10 μg/L) than at the Control Site (4.3 μg/L). The phytoplankton community showed a shift toward more blue-green algae, higher algal density, and lower species diversity at the Test Site compared to the Control Site, and the community composition of the Test Site was similar to that of the effluent. Attempts to collect benthic macroinvertebrate data at the Control and Test Sites failed due to high flows.

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

Wingate Creek Mine is located in Myakka City, Manatee County, Florida (Appendix 1). Facility operations include phosphate mining and beneficiation facilities, phosphatic clay settling area, sand tailings disposal areas and a mine water recirculation system (see Facility Summary, Appendix 2). The mined ore is slurried into a pit and pumped to the beneficiation plant where the fine clays and sand are separated from the phosphate rock (product) by washing, screening and double flotation. The generated wet phosphate rock is transported to another location for further processing. The separated clays are pumped to the settling area. Sand tailings are pumped as a slurry to mined areas for use as reclamation fill. Decanted water from the clay settling areas is returned to the beneficiation plant for reuse and discharged, as necessary, through outfalls authorized by this permit. Stormwater runoff from each area, including the plant, as well as deep well water utilized for the amine flotation process, is also combined with other industrial wastewater streams. Each of these portions is managed in the water recovery and recirculation system. During operation activities, heavy equipment is periodically rinsed on the concrete floor of the flotation plant utilizing high-pressure deep well water as the only cleaning agent. This rinse/wash water is conveyed to the clay settling area. Raw materials fed to the plant are ore matrix and water pumped through pipelines. Reagents utilized during the feed preparation and flotation processes occurring in the beneficiation plant include caustic soda for pH control, fatty acid blends, fuel oils, amines and sulfuric acid. Both Outfalls 001 and 002 discharge mine recirculation water and stormwater. Outfall 002 was sampled. Its discharge is intermittent, via a rectangular weir structure, and flows into Johnson Creek to the Myakka River, Class III fresh waters. There is no design flow. The mean flow from 7/03 through 12/03 (with the exception of 11/03, for which there was no flow) was 9.1 million gallons per day (MGD). The outfall did not flow for the first half of 2004 (1/04-6/04), and the average monthly flows for 7/04 and 8/04 were 2.8 and 19.1 MGD, respectively (PCS Discharge Monitoring Report). The flow during the survey was 9.4 MGD (Facility Summary, Appendix 2).

Surface Water Quality Criteria and facility permit limits are listed in Table 1. According to the facility's monthly discharge monitoring reports, the plant has not had any permit violations within the past year (Appendix 2).

Methods

The purpose of this investigation was to determine the potential effects of the facility's effluent on the water quality and biota of receiving waters. Only analytical chemistry and phytoplankton samples were collected from outfall D-002, Control, and Test sites due to high flow conditions following Hurricane Charlie, which made landfall August 13, 2004. Chemical comparisons were made between a Control Site (located in Johnson Creek approximately 30 meters upstream from the discharge) and a Test Site (located in Johnson Creek approximately 70 meters downstream of the discharge). Detailed methods and their relationship to Florida Administrative Code 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 were involved in this investigation: Jacki Champion, Brian Irsch, and Frank Cardinale (DEP Southwest District), and DEP Central Laboratory in Tallahassee. The report was reviewed by District representatives and the Point Source Studies Review Committee (Wayne Magley, Shannan Gunnoe 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. Effluent metals complied with Class III Water Quality Criteria (62-302, F.A.C.). The metals aluminum, iron, and lead were found at levels above the PQL, while the metal copper was detected at a level above the MDL and below the PQL. No organic pollutants were detected in the effluent.
- Effluent conductivity, pH, and dissolved oxygen complied with Class III Water Quality Criteria (62-302, F.A.C.) and facility permit limits (Table 1).
- Conductivity and pH at the Test and Control Sites complied with Class III Water Quality Criteria (Table 1, 62-302.530, F.A.C.), while dissolved oxygen levels were lower than the criterion (= 5 mg/L, 62-302.530(31), F.A.C.) at both the Control (3.5 mg/L) and Test (4.5 mg/L) Sites.
- The effluent sample was not acutely toxic to the fish, *Cyprinella leedsi*, or to the water flea, *Ceriodaphnia dubia*, during 96-hour acute screening bioassays (See Table 1 for percent mortality and Appendix 6 for bioassay bench sheets).
- Effluent concentrations of total nitrogen (1.31 mg/L) and total

Table 1. Effluent limits, Class III Freshwater Criteria, and chemical and toxicological data for samples collected on August 16, 2004.

Mosaic Fertilizer, Inc., Wingate Creek Mine	Class III Stds	Effluent Limits	Effluent Samples	Control Site	Test Site
Organic Constituents (µg/L)					
None Detected	-	-	-	-	-
Metals (µg/L unless otherwise noted)					
Aluminum	-	-	335	-	-
Arsenic	≤ 50	-	6 U	-	-
Cadmium	≤ 1.9 b	-	0.052 U	-	-
Calcium (mg/L)	-	-	43.7	-	-
Chromium-III	≤ 144.9 b	-	2 U	-	-
Copper	≤ 16 b	-	1.3 I	-	-
Iron	≤ 1000	-	203	-	-
Lead	≤ 7.1 b	-	0.56	-	-
Magnesium (mg/L)	-	-	19.3	-	-
Nickel	≤ 89.2 b	-	2 U	-	-
Selenium	≤ 5	-	0.5 U	-	-
Silver	≤ 0.07	-	0.01 U	-	-
Zinc	≤ 205.1 b	-	3 U	-	-
Nutrients (mg/L)					
Ortho-phosphate	-	-	0.17	0.19	0.17
Total Phosphorus	-	< 5.0 s	0.28	0.2	0.24
Ammonia	-	-	0.012 I	0.018 I	0.017 I
Unionized Ammonia	≤ 0.02	-	< 0.02 c	< 0.02 c	< 0.02 c
Nitrate+Nitrite	-	-	0.004 U	0.004 U	0.008 I
Total Kjeldahl Nitrogen	-	-	1.3	1	1.1
Organic Nitrogen	-	-	1.312 c	1.018 c	1.117 c
Total Nitrogen	-	< 4.0 s	1.312 c	1.018 c	1.117 c
General Physical and Chemical Parameters					
Alpha, Total (pCi/L)	≤ 15	≤ 15	1.7	-	-
Alpha-Counting Error (pCi/L)	-	-	1.1	-	-
Radium 226 (pCi/L)	-	-	0.3	-	-
Radium 226-Counting Error (pCi/L)	-	-	0.1	-	-
Radium 228 (pCi/L)	-	-	0.8 U	-	-
Radium 228-Counting Error (pCi/L)	-	-	0.5	-	-
Radium 226 + 228 (pCi/L)	≤ 5	≤ 5	0.7	-	-
Dissolved Oxygen (mg/L)	≥ 5	≥ 5	6.9	3.5	4.5
pH (S.U.)	6.0 - 8.5	6.0 - 8.5	7.5	7	7.1
Conductivity (umhos/cm)	≤ 1275	-	422	68	169
Temperature (C)	-	-	29.5	26.7	26.8
Chloride (mg/L)	-	-	7.5	-	-
Total dissolved solids (mg/L)	-	-	306	-	-
Total suspended solids (mg/L)	-	≤ 60 s	11 I	4 U	6 I
Color (PCU)	-	-	100	-	-
Turbidity (NTU)	30.8	-	13 A	1.8	4.3
Fluoride (mg F/L)	≤ 10	-	0.4	0.12	0.18
Sulfate (mg SO_4/L)	-	-	130	9.2	38
Oil and Grease (mg/l)	≤ 5	≤ 5	0.69 U	-	-
Hardness (mg/L)	-	-	188.6 c	-	-
Total Residual Chlorine (mg/L, lab)	≤ 0.01	-	0.03 I	-	-
Toxicology Bioassays (96-hr acute screening, % mortality in 100% effluent)					
Fish (*Cyprinella leedsi*)	-	< 50	0	-	-
Water flea (*Ceriodaphnia dubia*)	-	< 50	0	-	-

Value exceeds the Class III Fresh Water Quality Criteria (62-302, F.A.C.)

b - Value is calculated based on hardness

c - calculated value

s - Single sample

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

I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

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

Table 2. Measured and predicted algal growth potential (AGP) for total soluble nitrogen (TSIN) limitation of Pseudokirchneriella subcapitata *for samples collected on August 16, 2004, at Mosaic Fertilizer, Inc., Wingate Creek Mine.*

Location	AGP (measured; mg dry wt/L)	Predicted AGP (TSIN; mg dry wt/L) ± 20%	Inorganic N:P ratio
Effluent Samples	4.89	0.46 ± 0.092	0.07
Control Site	3.88	0.68 ± 0.136	0.09
Test Site	3.26	0.95 ± 0.19	0.15

phosphorus (0.28 mg/L) complied with facility's single sample permit limits (Table 1). Effluent total nitrogen (1.31 mg/L), total phosphorus (0.28 mg/L), and sulfate concentrations (130 mg/L, Table 1) contributed to slightly elevated levels at the Test Site. However, Control and Test Site nutrient levels fell within the same rankings among the typical values for Florida streams (Appendix 5). Total phosphorus ranked in the 60th percentile of typical values for Florida streams, and orthophosphate ranked in the 70th percentile. Total Kjeldahl nitrogen ranked in the 50th percentile for both sites, while ammonia and nitrate+nitrite ranked in the 5th percentile. Turbidity levels at the Test Site (4.3 NTU) were higher than at the Control Site (1.8 NTU), with the Test Site levels ranking in the 60th percentile of typical values for Florida streams, compared with the Control Site, ranked in the 30th percentile (Appendix 5).

- 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 wt/L represent a "problem" threshold for fresh receiving waters, implying nutrient enrichment. The AGP value at the upstream Control Site was 3.88 mg dry wt/L (Table 2). The AGP values of the downstream Test Site (3.26 mg dry wt/L) and the effluent (4.89 mg dry wt/L) were not above the "problem" threshold. This suggests there is no nutrient enrichment related to the Wingate Creek Mine discharge in this portion of Johnson Creek. The analytical chemistry data suggest that this system is severely nitrogen-limited, as most of the nitrogen in the effluent and receiving waters was in an organic form and not readily available for uptake by test algae. There was no evidence of growth inhibition in the AGP data (Table 2).

- The effluent chlorophyll *a* (85 mg/L) level is a cause for concern. If this trend were to continue throughout the year, the facility's effluent could potentially cause the receiving waters to exceed the 20 mg/L annual average threshold for listing waterbodies under the Impaired Waters Rule (IWR). The chlorophyll *a* concentration was more than twice as high in the Test Site sample (10 µg/L) as in the Control Site sample (4.3 µg/L, Table 3). Effluent algal growth likely contributed to elevated levels of chlorophyll *a* at the Test Site.

- There were differences between Control and Test Sites in phytoplankton community composition (Table 3, Appendix 8). The number of algal taxa declined from 42 at the Control Site to 29 at the Test Site, and there was an 18% reduction in the Shannon-Weaver diversity index from the Control Site (4.52) to the Test Site (3.7; Table 3). Algal density per mL was greater (5,576 vs. 1,496) and blue-green algae made up a greater percentage of the algal community (32.5% vs. 17.4%) at the Test Site when compared to the Control Site (Table 3). The community composition in the effluent was similar to that of the Test Site, suggesting that the algal communities of the effluent are being carried into the receiving waters and influencing downstream phytoplankton communities, including a higher proportion of blue-green algae. Both the Test Site and effluent samples were dominated by the blue-green alga, *Planktothrix* (formerly *Oscillatoria*).

Summary

Effluent water quality did not violate permit limits or exceed Class III Water Quality Criteria. Nutrient levels were very similar between the Control and Test Sites, but there was increased turbidity at the Test Site. The effluent AGP was higher than that at the Control and Test Sites, but it was still below the "problem" threshold for fresh waters. However, high algal biomass in the effluent is contributing to a shift in the phytoplankton community of Johnson Creek downstream from the outfall. The Test Site has reduced taxa richness and diversity, higher density, and a greater percentage of blue-green algae, compared to the Control Site. The Wingate Creek Mine outfall and Test Site both have proportionally twice as many blue-green algae as the Control Site.

Table 3. Phytoplankton composition of samples collected at Mosaic Fertilizer, Inc., Wingate Creek Mine, on August 16, 2004.

Mosaic Fertilizer, Inc., Wingate Creek Mine	**Effluent Samples**	**Control Site**	**Test Site**
Number of Taxa	24	42	29
Shannon-Weaver Diversity	3.51	4.52	3.7
Chlorophyll a (µg/L)	85	4.3	10
Phaeophytin (µg/L)	0	0.96	0.2
Algal Density (number/cm²)	8472	1496	5576
Percent Dominant Taxon	27	13	22.9
Dominant Taxon (name)	*Planktothrix*	*Chlamydomonas*	*Planktothrix*
Number of Algal Units Identified	311	308	301
Percentage Composition			
Blue-green algae	35.7	17.4	32.5
Cryptomonads	17.7	22	23.6
Diatoms	0.6	10.9	4.6
Dinoflagellates	12.6	0	1
Euglenoids	1	8.8	1.4
Green algae	32.5	34.8	34.2
Other	0	6.1	2.7

Literature Cited

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.

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.

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.

Stevenson, R. J. and J. P. Smol. 2003. Use of algae in environmental assessments, pp. 775-803, in: Freshwater algae of North America, edited by J. D. Wehr and R. G. Sheath, Academic Press, San Diego. 918 pp.

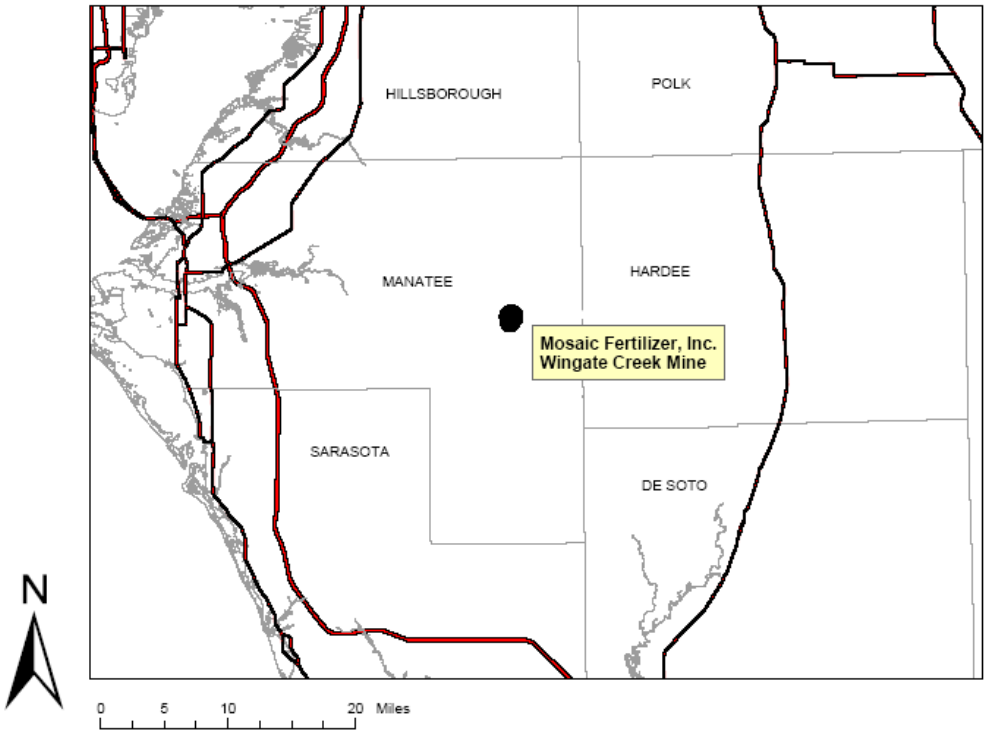
USEPA. 2000. Nutrient Criteria Technical Guidance Manual – River and Streams. EPA-822-B-00-002.

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.

Appendices

- Appendix 1. Map of facility
- Appendix 2. Facility summary
- Appendix 3. Explanation of measurements
- Appendix 4. Chemical analyses of effluent and receiving water.
- Appendix 5. Typical values for selected parameters in Florida waters
- Appendix 6. Additional physical, chemical, toxicological and microbiological results
- Appendix 7a. Phytoplankton: Taxa list and density (number of individuals per mL)
- Appendix 7b. Phytoplankton: Taxa list and number of individuals counted

Appendix 1. Map of facility and sampling sites



Wingate Creek Mine FYI Sampling Sites

Appendix 2

Facility Summary

State of Florida
Department of Environmental Protection
Facility Summary

Facility Name: Mosaic Fertilizer – Wingate Creek Mine		**Prepared By: J. Champion**
Location: 38651 State Road 64 East Myakka City, Florida 34251	**County: Manatee**	**District: SWD**
Federal Permit No.: Fl0032522 Expiration Date: 4/5/05	**State Permit No.:** FL0032522 **Expiration Date: 4/5/05**	**Facility Type: IW**
Function of Facility: Mining and washing of phosphate ore. The mine is currently inactive.		
Description of treatment process: Wingate Creek Mine operations include phosphate mining and beneficiation facilities, phosphatic clay settling area, sand tailings disposal areas and a mine water recirculation system. The mined ore is slurried into a pit and pumped to the beneficiation plant where the fine clays and sand are separated from the phosphate rock (product) by washing, screening and double flotation. The generated wet phosphate rock is transported to another location for further processing. The separated clays are pumped to the settling area. Sand tailings are pumped as a slurry to mined areas for use as reclamation fill. Decanted water from the clay settling areas is returned to the beneficiation plant for reuse and discharged, as necessary, through outfalls authorized by this permit. Stormwater runoff from each area, including the plant, as well as deep well water utilized for the amine flotation process is also combined with other industrial wastewater streams. Each of these portions are managed in the water recovery and recirculation system. During operation activities, heavy equipment is periodically rinsed on the concrete floor of the flotation plant utilizing high-pressure deep well water as the only cleaning agent. This rinse/ wash water is conveyed to the clay settling area. Raw materials fed to the plant area ore matrix and water pumped through pipelines. Reagents utilized during the feed preparation and flotation processes occurring in the beneficiation plant include caustic soda for pH control, fatty acid blends, fuel oils, amines and sulfuric acid. Both Outfalls 001 and 002 discharge mine recirculation water and stormwater.		
Receiving Waters: Johnson Creek to the Myakka River (Outfall 002) Wingate Creek to the Myakka River (Outfall 001)		**Classification: Class III - Fresh**
Design Flow: N/A	**Mean Flow: 3.5 MGD from 6/03-9/03 (Outfall 002)**	**Flow During Survey: 9.4 MGD**
Discharge is: Intermittent		
Facility Mixing Zone Details: None		
List Effluent Limits: See Attached Table below.		
Description of permitted outfall: Rectangular Weir structure-both outfalls		
List permit violations (DMR data) and plant upsets that occurred at the plant within the last year: None		
Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:		
Discuss MOR trends to prior data; is trend improving or declining:		

Page 1 of 3

Additional Information: Only Outfall 002 was sampled, Outfall 001 was being moved to accommodate a new housing development under construction south of the mine. Both outfalls monitor the same list of parameters.

I. Effluent Limitations and Monitoring Requirements

A. Surface Water Discharge, Outfall 002:

1. **During the period beginning on the effective date and lasting through the expiration date of this permit, the permittee is authorized to discharge process generated wastewaters and mine dewatering discharges from the mining and beneficiation of phosphate rock, storm water runoff, and treated sanitary wastewater from Outfalls 001 and 002. Such discharge shall be monitored by the permittee as specified below. If there is no discharge from the facility on a day scheduled for sampling, the sample shall be collected on the day of the next discharge.**

Outfall 002:

Parameters (units)	Discharge Limitations			Monitoring Requirements	
	Monthly Minimum	Monthly Average	Monthly Maximum	Frequency	Sample Type
Flow (MGD)	N/A	Report	Report	Continuous	Recorder
Total Non-filterable Residue [TSS] (mg/l)	N/A	30	60	1/Week	24-Hour Composite
Total Non-volatile, Non-filterable Residue [FS] *** (mg/l)	N/A	12	25	1/Week	24-Hour Composite
Total Phosphorus [as P] * (mg/l)	N/A	3.0	5.0	1/Week	24-Hour Composite
Total Phosphorus [as P] (lbs/day) [See Condition I.A.2 below]	N/A	N/A	Report	1/Week	Calculation
pH (standard units)	6.0	Report	8.5	1/Week	Grab
Specific Conductance (µmhos/centimeter)	N/A	Report	See Condition I.A.5	1/Week	Grab
Dissolved Oxygen (mg/l)	5.0	Report	N/A	1/Week	Grab
Temperature (°F)	N/A	Report	Report	1/Week	Grab
Oil and Grease (mg/l)	N/A	Report	5.0	1/Week	Grab
Total Nitrogen [as N] (mg/l)	N/A	3.0 **	4.0 **	1/Week	Grab
Total Nitrogen [as N] (lbs/day) [See Condition I.A.2 below]	N/A	Report	Report	1/Week	Calculation
Total Nitrogen [as N] (lbs/year)	N/A	N/A	41,571**	1/Year	Calculation
Chlorophyll-a (µg/l)	N/A	N/A	Report	1/Month	Grab
Gross Alpha Particle Activity (pCi/l)	N/A	N/A	15.0 See Condition I.A.10.	1/Month	24-Hour Composite
Combined Radium [$Ra^{226+228}$] (pCi/l)	N/A	N/A	5.0 See Condition I.A.11.	1/Month	24-Hour Composite
Toxicity	See Condition I.A.4				

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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 (FDEP 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 limit and the practical quantitation limit 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) 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 (USEPA 2000). 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..

(5) Algal Phytoplankton Assemblages

Methods: Phytoplankton were sampled using a 1 L grab sample (QA Rule SOP FS7100). 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 phytoplankton 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: Algal density is estimated as number of natural units/ml for phytoplankton samples. Although algal density of a single site is highly variable and depends on a number of factors, comparison of algal density at a control site to algal 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..

Appendix 4

Chemical analysis of effluent and receiving water

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
8/16/2004 11:00	DOWNSTREAM TEST SITE	Bio-AGP/LimNut	Algal Growth Potential	3.26	mg DryWt/L		0.1	0.3
8/16/2004 13:15	OUTFALL 002	Bio-AGP/LimNut	Algal Growth Potential	4.89	mg DryWt/L		0.1	0.3
8/16/2004 12:15	UPSTREAM CONTROL	Bio-AGP/LimNut	Algal Growth Potential	3.88	mg DryWt/L		0.1	0.3
8/16/2004 11:00	DOWNSTREAM TEST SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	10	ug/L		0.85	2.6
8/16/2004 11:00	DOWNSTREAM TEST SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0.2	ug/L		0.85	2.6
8/16/2004 13:15	OUTFALL 002	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	85	ug/L		2.8	8.5
8/16/2004 13:15	OUTFALL 002	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0	ug/L		2.8	8.5
8/16/2004 12:15	UPSTREAM CONTROL	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	4.3	ug/L		0.85	2.6
8/16/2004 12:15	UPSTREAM CONTROL	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0.96	ug/L		0.85	2.6
8/16/2004 11:00	DOWNSTREAM TEST SITE	Bio-Peri/Phyto	Phytoplankton-Quantitative-# Wet Taxa	28	#Taxa			
8/16/2004 11:00	DOWNSTREAM TEST SITE	Bio-Peri/Phyto	Phytoplankton-Quantitative-#Diatom Taxa		#Taxa			
8/16/2004 13:15	OUTFALL 002	Bio-Peri/Phyto	Phytoplankton-Quantitative-# Wet Taxa	24	#Taxa			
8/16/2004 13:15	OUTFALL 002	Bio-Peri/Phyto	Phytoplankton-Quantitative-#Diatom Taxa		#Taxa			
8/16/2004 12:15	UPSTREAM CONTROL	Bio-Peri/Phyto	Phytoplankton-Quantitative-# Wet Taxa	31	#Taxa			
8/16/2004 12:15	UPSTREAM CONTROL	Bio-Peri/Phyto	Phytoplankton-Quantitative-#Diatom Taxa	11	#Taxa			
8/16/2004 13:15	OUTFALL 002	Bio-Toxicology	Bioassay-Acute-Screen-FW-C.dubia, LC50	100	LC50	L		
8/16/2004 13:15	OUTFALL 002	Bio-Toxicology	Bioassay-Acute-Screen-FW-Fish, LC50	100	LC50	L		
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	1,2,4-Trichlorobenzene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	1,2-Dichlorobenzene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	1,3-Dichlorobenzene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	1,4-Dichlorobenzene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	2,4,6-Trichlorophenol	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	2,4-Dichlorophenol	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	2,4-Dimethylphenol	63	ug/L	U	63	250
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	2,4-Dinitrophenol	19	ug/L	U	19	76
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	2,4-Dinitrotoluene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	2,6-Dinitrotoluene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	2-Chloronaphthalene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	2-Chlorophenol	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	2-Methyl-4,6-dinitrophenol	3.8	ug/L	U	3.8	15
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	2-Nitrophenol	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	3,3'-Dichlorobenzidine	51	ug/L	U	51	200
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	4,4'-DDD	1.9	ug/L	U	1.9	7.6
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	4,4'-DDE	1.9	ug/L	U	1.9	7.6
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	4,4'-DDT	1.9	ug/L	U	1.9	7.6
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	4-Bromophenyl phenyl ether	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	4-Chloro-3-methylphenol	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	4-Chlorophenyl phenyl ether	2.5	ug/L	U	2.5	10
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	4-Nitrophenol	19	ug/L	U	19	76
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Acenaphthene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Acenaphthylene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Aldrin	1.9	ug/L	U	1.9	7.6
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Anthracene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Benzidine	130	ug/L	U	130	510

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Benzo(a)anthracene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Benzo(a)pyrene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Benzo(b)fluoranthene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Benzo(g,h,i)perylene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Benzo(k)fluoranthene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Bis(2-chloroethoxy)methane	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Bis(2-chloroethyl)ether	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Bis(2-chloroisopropyl)ether	3.8	ug/L	U	3.8	15
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Bis(2-ethylhexyl)phthalate	19	ug/L	U	19	76
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Butyl benzyl phthalate	6.3	ug/L	U	6.3	25
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Chrysene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Di-n-butyl phthalate	6.3	ug/L	U	6.3	25
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Di-n-octyl phthalate	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Dibenzo(a,h)anthracene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Dieldrin	1.9	ug/L	U	1.9	7.6
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Diethyl phthalate	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Dimethyl phthalate	63	ug/L	U	63	250
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Endosulfan I	5.1	ug/L	U	5.1	20
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Endosulfan II	5.1	ug/L	U	5.1	20
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Endosulfan sulfate	1.9	ug/L	U	1.9	7.6
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Endrin	1.9	ug/L	U	1.9	7.6
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Endrin aldehyde	5.1	ug/L	U	5.1	20
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Fluoranthene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Fluorene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Heptachlor	1.9	ug/L	U	1.9	7.6
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Heptachlor epoxide	1.9	ug/L	U	1.9	7.6
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Hexachlorobenzene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Hexachlorobutadiene	3.8	ug/L	U	3.8	15
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Hexachlorocyclopentadiene	3.8	ug/L	U	3.8	15
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Hexachloroethane	3.8	ug/L	U	3.8	15
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Indeno(1,2,3-cd)pyrene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Isophorone	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	N-Nitrosodi-n-propylamine	2.5	ug/L	U	2.5	10
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	N-Nitrosodimethylamine	2.5	ug/L	U	2.5	10
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	N-Nitrosodiphenylamine	3.8	ug/L	U	3.8	15
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Naphthalene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Nitrobenzene	2.5	ug/L	U	2.5	10
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Pentachlorophenol	3.8	ug/L	U	3.8	15
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Phenanthrene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Phenol	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	Pyrene	1.3	ug/L	U	1.3	5.1
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	alpha-BHC	1.9	ug/L	U	1.9	7.6
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	beta-BHC	1.9	ug/L	U	1.9	7.6
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	delta-BHC	1.9	ug/L	U	1.9	7.6
8/16/2004 14:00	EQUIPMENT BLK	BNA-Water	gamma-BHC	1.9	ug/L	U	1.9	7.6
8/16/2004 13:15	OUTFALL 002	BNA-Water	1,2,4-Trichlorobenzene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	1,2-Dichlorobenzene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	1,3-Dichlorobenzene	0.97	ug/L	U	0.97	3.9

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
8/16/2004 13:15	OUTFALL 002	BNA-Water	1,4-Dichlorobenzene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	2,4,6-Trichlorophenol	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	2,4-Dichlorophenol	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	2,4-Dimethylphenol	49	ug/L	U	49	190
8/16/2004 13:15	OUTFALL 002	BNA-Water	2,4-Dinitrophenol	15	ug/L	U	15	58
8/16/2004 13:15	OUTFALL 002	BNA-Water	2,4-Dinitrotoluene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	2,6-Dinitrotoluene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	2-Chloronaphthalene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	2-Chlorophenol	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	2-Methyl-4,6-dinitrophenol	2.9	ug/L	U	2.9	12
8/16/2004 13:15	OUTFALL 002	BNA-Water	2-Nitrophenol	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	3,3'-Dichlorobenzidine	39	ug/L	U	39	160
8/16/2004 13:15	OUTFALL 002	BNA-Water	4,4'-DDD	1.5	ug/L	U	1.5	5.8
8/16/2004 13:15	OUTFALL 002	BNA-Water	4,4'-DDE	1.5	ug/L	U	1.5	5.8
8/16/2004 13:15	OUTFALL 002	BNA-Water	4,4'-DDT	1.5	ug/L	U	1.5	5.8
8/16/2004 13:15	OUTFALL 002	BNA-Water	4-Bromophenyl phenyl ether	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	4-Chloro-3-methylphenol	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.8
8/16/2004 13:15	OUTFALL 002	BNA-Water	4-Nitrophenol	15	ug/L	U	15	58
8/16/2004 13:15	OUTFALL 002	BNA-Water	Acenaphthene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Acenaphthylene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Aldrin	1.5	ug/L	U	1.5	5.8
8/16/2004 13:15	OUTFALL 002	BNA-Water	Anthracene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Benzidine	97	ug/L	U	97	390
8/16/2004 13:15	OUTFALL 002	BNA-Water	Benzo(a)anthracene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Benzo(a)pyrene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Benzo(b)fluoranthene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Benzo(g,h,i)perylene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Benzo(k)fluoranthene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Bis(2-chloroethoxy)methane	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Bis(2-chloroethyl)ether	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Bis(2-chloroisopropyl)ether	2.9	ug/L	U	2.9	12
8/16/2004 13:15	OUTFALL 002	BNA-Water	Bis(2-ethylhexyl)phthalate	15	ug/L	U	15	58
8/16/2004 13:15	OUTFALL 002	BNA-Water	Butyl benzyl phthalate	4.9	ug/L	U	4.9	19
8/16/2004 13:15	OUTFALL 002	BNA-Water	Chrysene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Di-n-butyl phthalate	4.9	ug/L	U	4.9	19
8/16/2004 13:15	OUTFALL 002	BNA-Water	Di-n-octyl phthalate	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Dibenzo(a,h)anthracene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Dieldrin	1.5	ug/L	U	1.5	5.8
8/16/2004 13:15	OUTFALL 002	BNA-Water	Diethyl phthalate	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Dimethyl phthalate	49	ug/L	U	49	190
8/16/2004 13:15	OUTFALL 002	BNA-Water	Endosulfan I	3.9	ug/L	U	3.9	16
8/16/2004 13:15	OUTFALL 002	BNA-Water	Endosulfan II	3.9	ug/L	U	3.9	16
8/16/2004 13:15	OUTFALL 002	BNA-Water	Endosulfan sulfate	1.5	ug/L	U	1.5	5.8
8/16/2004 13:15	OUTFALL 002	BNA-Water	Endrin	1.5	ug/L	U	1.5	5.8
8/16/2004 13:15	OUTFALL 002	BNA-Water	Endrin aldehyde	3.9	ug/L	U	3.9	16
8/16/2004 13:15	OUTFALL 002	BNA-Water	Fluoranthene	0.97	ug/L	U	0.97	3.9

8/16/2004 13:15	OUTFALL 002	BNA-Water	Fluorene	0.97	ug/L	U	0.97	3.9

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
8/16/2004 13:15	OUTFALL 002	BNA-Water	Heptachlor	1.5	ug/L	U	1.5	5.8
8/16/2004 13:15	OUTFALL 002	BNA-Water	Heptachlor epoxide	1.5	ug/L	U	1.5	5.8
8/16/2004 13:15	OUTFALL 002	BNA-Water	Hexachlorobenzene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Hexachlorobutadiene	2.9	ug/L	U	2.9	12
8/16/2004 13:15	OUTFALL 002	BNA-Water	Hexachlorocyclopentadiene	2.9	ug/L	U	2.9	12
8/16/2004 13:15	OUTFALL 002	BNA-Water	Hexachloroethane	2.9	ug/L	U	2.9	12
8/16/2004 13:15	OUTFALL 002	BNA-Water	Indeno(1,2,3-cd)pyrene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Isophorone	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	U	1.9	7.8
8/16/2004 13:15	OUTFALL 002	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.8
8/16/2004 13:15	OUTFALL 002	BNA-Water	N-Nitrosodiphenylamine	2.9	ug/L	U	2.9	12
8/16/2004 13:15	OUTFALL 002	BNA-Water	Naphthalene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.8
8/16/2004 13:15	OUTFALL 002	BNA-Water	Pentachlorophenol	2.9	ug/L	U	2.9	12
8/16/2004 13:15	OUTFALL 002	BNA-Water	Phenanthrene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Phenol	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	Pyrene	0.97	ug/L	U	0.97	3.9
8/16/2004 13:15	OUTFALL 002	BNA-Water	alpha-BHC	1.5	ug/L	U	1.5	5.8
8/16/2004 13:15	OUTFALL 002	BNA-Water	beta-BHC	1.5	ug/L	U	1.5	5.8
8/16/2004 13:15	OUTFALL 002	BNA-Water	delta-BHC	1.5	ug/L	U	1.5	5.8
8/16/2004 13:15	OUTFALL 002	BNA-Water	gamma-BHC	1.5	ug/L	U	1.5	5.8
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Alachlor	0.71	ug/L	U	0.71	2.8
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Ametryn	0.06	ug/L	U	0.06	0.24
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Atrazine	0.06	ug/L	U	0.06	0.24
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Azinphos Methyl	0.06	ug/L	U	0.06	0.24
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Bromacil	0.24	ug/L	U	0.24	0.96
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Butylate	0.24	ug/L	U	0.24	0.96
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Chlorpyrifos Ethyl	0.06	ug/L	U	0.06	0.24
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Chlorpyrifos Methyl	0.12	ug/L	U	0.12	0.48
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Diazinon	0.06	ug/L	UJ	0.06	0.24
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Ethion	0.06	ug/L	U	0.06	0.24
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Ethoprop	0.12	ug/L	U	0.12	0.48
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Fenamiphos	0.24	ug/L	U	0.24	0.96
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Fonofos	0.12	ug/L	U	0.12	0.48
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Hexazinone	0.12	ug/L	U	0.12	0.48
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Malathion	0.18	ug/L	U	0.18	0.72
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Metalaxyl	0.3	ug/L	U	0.3	1.2
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Metolachlor	0.6	ug/L	U	0.6	2.4
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Metribuzin	0.12	ug/L	U	0.12	0.48
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Mevinphos	0.24	ug/L	U	0.24	0.96
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Naled	0.95	ug/L	UJ	0.95	3.8
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Norflurazon	0.12	ug/L	U	0.12	0.48
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Parathion Ethyl	0.18	ug/L	U	0.18	0.72
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Parathion Methyl	0.12	ug/L	U	0.12	0.48
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Phorate	0.06	ug/L	U	0.06	0.24
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Prometryn	0.18	ug/L	U	0.18	0.72

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
8/16/2004 14:00	EQUIPMENT BLK	GC-Water	Simazine	0.06	ug/L	U	0.06	0.24
8/16/2004 13:15	OUTFALL 002	GC-Water	Alachlor	0.6	ug/L	U	0.6	2.4
8/16/2004 13:15	OUTFALL 002	GC-Water	Ametryn	0.05	ug/L	U	0.05	0.2
8/16/2004 13:15	OUTFALL 002	GC-Water	Atrazine	0.05	ug/L	U	0.05	0.2
8/16/2004 13:15	OUTFALL 002	GC-Water	Azinphos Methyl	0.05	ug/L	U	0.05	0.2
8/16/2004 13:15	OUTFALL 002	GC-Water	Bromacil	0.2	ug/L	U	0.2	0.8
8/16/2004 13:15	OUTFALL 002	GC-Water	Butylate	0.2	ug/L	U	0.2	0.8
8/16/2004 13:15	OUTFALL 002	GC-Water	Chlorpyrifos Ethyl	0.05	ug/L	U	0.05	0.2
8/16/2004 13:15	OUTFALL 002	GC-Water	Chlorpyrifos Methyl	0.1	ug/L	U	0.1	0.4
8/16/2004 13:15	OUTFALL 002	GC-Water	Diazinon	0.05	ug/L	UJ	0.05	0.2
8/16/2004 13:15	OUTFALL 002	GC-Water	Ethion	0.05	ug/L	U	0.05	0.2
8/16/2004 13:15	OUTFALL 002	GC-Water	Ethoprop	0.1	ug/L	U	0.1	0.4
8/16/2004 13:15	OUTFALL 002	GC-Water	Fenamiphos	0.2	ug/L	U	0.2	0.8
8/16/2004 13:15	OUTFALL 002	GC-Water	Fonofos	0.1	ug/L	U	0.1	0.4
8/16/2004 13:15	OUTFALL 002	GC-Water	Hexazinone	0.1	ug/L	U	0.1	0.4
8/16/2004 13:15	OUTFALL 002	GC-Water	Malathion	0.15	ug/L	U	0.15	0.6
8/16/2004 13:15	OUTFALL 002	GC-Water	Metalaxyl	0.25	ug/L	U	0.25	1
8/16/2004 13:15	OUTFALL 002	GC-Water	Metolachlor	0.5	ug/L	U	0.5	2
8/16/2004 13:15	OUTFALL 002	GC-Water	Metribuzin	0.1	ug/L	U	0.1	0.4
8/16/2004 13:15	OUTFALL 002	GC-Water	Mevinphos	0.2	ug/L	U	0.2	0.8
8/16/2004 13:15	OUTFALL 002	GC-Water	Naled	0.8	ug/L	UJ	0.8	3.2
8/16/2004 13:15	OUTFALL 002	GC-Water	Norflurazon	0.1	ug/L	U	0.1	0.4
8/16/2004 13:15	OUTFALL 002	GC-Water	Parathion Ethyl	0.15	ug/L	U	0.15	0.6
8/16/2004 13:15	OUTFALL 002	GC-Water	Parathion Methyl	0.1	ug/L	U	0.1	0.4
8/16/2004 13:15	OUTFALL 002	GC-Water	Phorate	0.05	ug/L	U	0.05	0.2
8/16/2004 13:15	OUTFALL 002	GC-Water	Prometryn	0.15	ug/L	U	0.15	0.6
8/16/2004 13:15	OUTFALL 002	GC-Water	Simazine	0.05	ug/L	U	0.05	0.2
8/16/2004 14:00	EQUIPMENT BLK	Metals-Water	Aluminum	18	ug/L	U	18	72
8/16/2004 14:00	EQUIPMENT BLK	Metals-Water	Arsenic	6	ug/L	U	6	24
8/16/2004 14:00	EQUIPMENT BLK	Metals-Water	Cadmium	0.052	ug/L	U	0.052	0.21
8/16/2004 14:00	EQUIPMENT BLK	Metals-Water	Calcium	0.05	mg/L	U	0.05	0.2
8/16/2004 14:00	EQUIPMENT BLK	Metals-Water	Chromium	2	ug/L	U	2	8
8/16/2004 14:00	EQUIPMENT BLK	Metals-Water	Copper	1	ug/L	U	1	4
8/16/2004 14:00	EQUIPMENT BLK	Metals-Water	Iron	10	ug/L	U	10	40
8/16/2004 14:00	EQUIPMENT BLK	Metals-Water	Lead	0.05	ug/L	U	0.05	0.2
8/16/2004 14:00	EQUIPMENT BLK	Metals-Water	Magnesium	0.02	mg/L	U	0.02	0.08
8/16/2004 14:00	EQUIPMENT BLK	Metals-Water	Nickel	2	ug/L	U	2	8
8/16/2004 14:00	EQUIPMENT BLK	Metals-Water	Selenium	0.5	ug/L	U	0.5	2
8/16/2004 14:00	EQUIPMENT BLK	Metals-Water	Silver	0.01	ug/L	U	0.01	0.04
8/16/2004 14:00	EQUIPMENT BLK	Metals-Water	Zinc	3	ug/L	U	3	12
8/16/2004 13:15	OUTFALL 002	Metals-Water	Aluminum	335	ug/L		5	20
8/16/2004 13:15	OUTFALL 002	Metals-Water	Arsenic	6	ug/L	U	6	24
8/16/2004 13:15	OUTFALL 002	Metals-Water	Cadmium	0.052	ug/L	U	0.052	0.21
8/16/2004 13:15	OUTFALL 002	Metals-Water	Calcium	43.7	mg/L		0.05	0.2
8/16/2004 13:15	OUTFALL 002	Metals-Water	Chromium	2	ug/L	U	2	8
8/16/2004 13:15	OUTFALL 002	Metals-Water	Copper	1.3	ug/L	I	1	4
8/16/2004 13:15	OUTFALL 002	Metals-Water	Iron	203	ug/L		10	40

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
8/16/2004 13:15	OUTFALL 002	Metals-Water	Lead	0.56	ug/L		0.05	0.2
8/16/2004 13:15	OUTFALL 002	Metals-Water	Magnesium	19.3	mg/L		0.02	0.08
8/16/2004 13:15	OUTFALL 002	Metals-Water	Nickel	2	ug/L	U	2	8
8/16/2004 13:15	OUTFALL 002	Metals-Water	Selenium	0.5	ug/L	U	0.5	2
8/16/2004 13:15	OUTFALL 002	Metals-Water	Silver	0.01	ug/L	U	0.01	0.04
8/16/2004 13:15	OUTFALL 002	Metals-Water	Zinc	3	ug/L	U	3	12
8/16/2004 11:00	DOWNSTREAM TEST SITE	Nutrients-Liquid	Ammonia-N	0.017	mg N/L	I	0.01	0.02
8/16/2004 11:00	DOWNSTREAM TEST SITE	Nutrients-Liquid	Fluoride	0.18	mg F/L		0.05	0.1
8/16/2004 11:00	DOWNSTREAM TEST SITE	Nutrients-Liquid	Kjeldahl Nitrogen	1.1	mg N/L		0.06	0.2
8/16/2004 11:00	DOWNSTREAM TEST SITE	Nutrients-Liquid	NO2NO3-N	0.008	mg N/L	I	0.004	0.01
8/16/2004 11:00	DOWNSTREAM TEST SITE	Nutrients-Liquid	O-Phosphate-P	0.17	mg P/L		0.012	0.03
8/16/2004 11:00	DOWNSTREAM TEST SITE	Nutrients-Liquid	Sulfate	38	mg SO4/L		0.2	0.5
8/16/2004 11:00	DOWNSTREAM TEST SITE	Nutrients-Liquid	TSS	6	mg/L	I	4	16
8/16/2004 11:00	DOWNSTREAM TEST SITE	Nutrients-Liquid	Total-P	0.24	mg P/L		0.02	0.06
8/16/2004 11:00	DOWNSTREAM TEST SITE	Nutrients-Liquid	Turbidity	4.3	NTU		0.05	0.05
8/16/2004 14:00	EQUIPMENT BLK	Nutrients-Liquid	Ammonia-N	0.01	mg N/L	U	0.01	0.02
8/16/2004 14:00	EQUIPMENT BLK	Nutrients-Liquid	Kjeldahl Nitrogen	0.06	mg N/L	U	0.06	0.2
8/16/2004 14:00	EQUIPMENT BLK	Nutrients-Liquid	NO2NO3-N	0.004	mg N/L	U	0.004	0.01
8/16/2004 14:00	EQUIPMENT BLK	Nutrients-Liquid	O-Phosphate-P	0.013	mg P/L		0.004	0.01
8/16/2004 14:00	EQUIPMENT BLK	Nutrients-Liquid	Total-P	0.02	mg P/L	U	0.02	0.06
8/16/2004 13:15	OUTFALL 002	Nutrients-Liquid	Ammonia-N	0.012	mg N/L	I	0.01	0.02
8/16/2004 13:15	OUTFALL 002	Nutrients-Liquid	Chloride	7.5	mg Cl/L		1	2.5
8/16/2004 13:15	OUTFALL 002	Nutrients-Liquid	Color	100	PCU		10	10
8/16/2004 13:15	OUTFALL 002	Nutrients-Liquid	Fluoride	0.4	mg F/L		0.05	0.1
8/16/2004 13:15	OUTFALL 002	Nutrients-Liquid	Kjeldahl Nitrogen	1.3	mg N/L		0.06	0.2
8/16/2004 13:15	OUTFALL 002	Nutrients-Liquid	NO2NO3-N	0.004	mg N/L	U	0.004	0.01
8/16/2004 13:15	OUTFALL 002	Nutrients-Liquid	O-Phosphate-P	0.17	mg P/L		0.012	0.03
8/16/2004 13:15	OUTFALL 002	Nutrients-Liquid	Sulfate	130	mg SO4/L		1	2.5
8/16/2004 13:15	OUTFALL 002	Nutrients-Liquid	TDS	306	mg/L		15	60
8/16/2004 13:15	OUTFALL 002	Nutrients-Liquid	TSS	11	mg/L	I	4	16
8/16/2004 13:15	OUTFALL 002	Nutrients-Liquid	Total-P	0.28	mg P/L		0.02	0.06
8/16/2004 13:15	OUTFALL 002	Nutrients-Liquid	Turbidity	13	NTU	A	0.05	0.05
8/16/2004 12:15	UPSTREAM CONTROL	Nutrients-Liquid	Ammonia-N	0.018	mg N/L	I	0.01	0.02
8/16/2004 12:15	UPSTREAM CONTROL	Nutrients-Liquid	Fluoride	0.12	mg F/L		0.05	0.1
8/16/2004 12:15	UPSTREAM CONTROL	Nutrients-Liquid	Kjeldahl Nitrogen	1	mg N/L		0.06	0.2
8/16/2004 12:15	UPSTREAM CONTROL	Nutrients-Liquid	NO2NO3-N	0.004	mg N/L	U	0.004	0.01
8/16/2004 12:15	UPSTREAM CONTROL	Nutrients-Liquid	O-Phosphate-P	0.19	mg P/L		0.012	0.03
8/16/2004 12:15	UPSTREAM CONTROL	Nutrients-Liquid	Sulfate	9.2	mg SO4/L		0.2	0.5
8/16/2004 12:15	UPSTREAM CONTROL	Nutrients-Liquid	TSS	4	mg/L	U	4	16
8/16/2004 12:15	UPSTREAM CONTROL	Nutrients-Liquid	Total-P	0.2	mg P/L		0.02	0.06
8/16/2004 12:15	UPSTREAM CONTROL	Nutrients-Liquid	Turbidity	1.8	NTU		0.05	0.05
8/16/2004 13:15	OUTFALL 002	Overflow	Alpha, Total	1.7	pCi/L			
8/16/2004 13:15	OUTFALL 002	Overflow	Alpha-Counting Error	1.1	pCi/L			
8/16/2004 13:15	OUTFALL 002	Overflow	Oil and Grease	0.69	mg/l	U		
8/16/2004 13:15	OUTFALL 002	Overflow	Radium 226	0.3	pCi/L			
8/16/2004 13:15	OUTFALL 002	Overflow	Radium 226-Counting Error	0.1	pCi/L			
8/16/2004 13:15	OUTFALL 002	Overflow	Radium 228	0.8	pCi/L	U		

8/16/2004 13:15	OUTFALL 002	Overflow	Radium 228-Counting Error	0.5	pCi/L
8/16/2004 13:15	OUTFALL 002	Overflow	TSS		mg/L

Appendix 5

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
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**
Total Ammonia	**0.02**	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60	**0.018 I**
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	**0.004 U**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	**0.18**	0.25	0.39	0.74	1.51	**0.2**
Orthophosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	**0.17**	0.27	0.59	1.37	**0.19**
Turbidity (NTU)	0.60	0.90	1.20	**1.45**	2.10	2.80	3.60	4.50	6.65	10.45	16.30	**1.8**

TEST SITE

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	Measured
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	**1.1**
Total Ammonia	**0.02**	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60	**0.017 I**
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	**0.008 I**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	**0.18**	0.25	0.39	0.74	1.51	**0.24**
Orthophosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	**0.17**	0.27	0.59	1.37	**0.17**
Turbidity (NTU)	0.60	0.90	1.20	1.45	2.10	2.80	**3.60**	4.50	6.65	10.45	16.30	**4.3**

NTU = Nephelometric turbidity units. I = The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit. U = Material analyzed for but not detected; value reported is the minimum detection limit. Adapted from Joe Hand, FDER, personal communication, 1991 (data collected 1980-1989).

FDEP Biology Section - Acute Bioassay Bench Sheets

Facility: Cargill – Wingate Creek

Address: 3 miles N of S.R. 64 & 5 miles west of Hardee/Manatee Co. line (NPDES) 16 MF incorrect data

City: Myakka **County:** Manatee

Contact/District: Jacki Champion

NPDES Permit #: FL 0032522

LIMS Job #: TLH-2004-08-17-09 **LIMS Sample #:** 774934

Sample Collection: Date: 08/16/04 Time: 1315

Hold time Start: Date: 08/17/04 Time: 1315

Comments: Performed Per NPDES Permit

Sample Collected from Outfall 002 - NPDES site.

Lims Data Entry: 8-27-04 MF Data Entry Verification: DN 8/27/04

Instructions (for below): Circle appropriate wording. If yes is circled complete blanks.

Test Type: (Screening)/Definitive

(Static)/ Static Renewal/ Flow-through

Test Duration: 48 (96) Hours.

Light Intensity : 50 - 100 ft. candles.

Photoperiod : 16 hours light 8 hours dark.

Initial sample handling:

Test 1 validation:
Control survival ≥90%: (Yes) No
Temperature Range ≤3°C: (Yes) No

Test 2 validation:
Control survival ≥90%: (Yes) No
Temperature Range ≤3°C: (Yes) No

PH adjustment : yes (no) Initial pH NaOH N HCl N Drops mL Final pH

Aeration : yes (no) Initial DO: mg/L Final DO: mg/L Duration: minutes Rate: ~ bubbles/min

Salinity adjusted (Test 1): yes (no) Initial Salinity: Final Salinity: Salts Hypersaline brine

Salinity adjusted (Test 2): yes (no) Initial Salinity: Final Salinity: Salts Hypersaline brine

Dechlorination: yes (no) mL of 0.025N Sodium Thiosulfate per liter of sample. Final TRC

Sample Validation:

Temperature: Shipped ≤6°C (Yes) No Hand Delivered: Cooling (received °C < collected °C) Yes No

Holding Time: ≤36 Hours (Yes) No (Composite-end of collection; grab-when collected; 4 in 24 - time last sample collected)

Temperature Range °C

Incubator # 3 Range 24.9 - 25.3

Room B246: 23.1 - 24.0

Waterbath: N/A

Investigators' Signatures

Deanna Nicholson

Sarah Pritchard

James Daniels

Marshall Faircloth

Nicole Wilbanks

REVIEWER

V.2 2/26/04

Water Quality Parameters	20% DMW	Well Water	Salt Water ASW NSW Test 1	Salt Water ASW NSW Test 2	Moderately Hard Water	Original Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):	N/A	N/A	N/A	N/A	N/A	Not measured		MF	
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03				0.03	HACH	SP	DN
Alkalinity (mg/L as $CaCO_3$):	82	143				93	HACH	"	DN
Hardness (mg/L as $CaCO_3$):	89	141				199	HACH	"	DN
Total Ammonia (mg/L as N):	<0.017	<0.017				<0.017	DENVER	MF	DN
Salinity (ppt):	<1	<1				<1	YSI	DN	SP

FDEP Biology Section - - Bioassay Bench Sheet

Survival

LIMS Sample #: 774934 **Test #:** 1 **Test Started: Date** 8/17/04 **Time:** 1300

Organism: C. dubia **Test Ended: Date** 8/21/04 **Time:** 1100

Organism Batch: 32 **Diluent/ Batch:** 2d. DMW / 28

Organism Age: <24hr **Food:** (YCT) (P. subcapitata) *Artemia*

Chamber Size 30 mL **Batch:** 5 35/36

Test Volume 20 mL **Feeding:** Prior to test - Prior to renewal - Daily

Concentration	Replicate	Chamber #	Test Hour 0 hr	24 hr	48 hr BR	48 hr AR	72 hr	96 hr
CTRL	A	D.M. 5	5	5	5	5	5	5
	B	5	5	5	5	5	5	5
	C	5	5	5	5	5	5	5
	D	5	5	5	5	5	5	5
100%	A	5	5	5	5	5	5	5
	B	5	5	5	5	5	5	5
	C	5	5	5	5	5	5	5
	D	5	5	5	5	5	5	5
Organisms loaded by: MF		Checked by: JD	DN	DN	DN	DN	MF	
Loading Verified by: JD		(initials)						

Comments:

m = missing d = dead BR = before renewal AR = after renewal

Test Results:

% mortality in 100% sample 0

LC_{50}: >100% If Calculated: 95% CI _____ Method: _____

Screening Tests: Report LC50 as >100%, =100%, or <100%.

Substitue highest test concentration used if other than 100% (example: Ocean outfall tested at 30% concentration).

FDEP Biology Section - - Bioassay Bench Sheet

Survival

LIMS Sample #: 774934 **Test #:** 2 **Test Started: Date** 08/17/04 **Time:** 1330

Organism: C. leedsi **Test Ended: Date** 8/21/04 **Time:** 1100

Organism Batch: #19 **Diluent/ Batch:** Well H2O 1 N/A

Organism Age: 8 days **Food:** YCT *P. subcapitata* (*Artemia*, circled)

Chamber Size 1000 **mL** **Batch:** ___ ___ 019404256

Test Volume 500 **mL** **Feeding:** (Prior to test) (Prior to renewal) Daily

Concentration	Replicate	Chamber #	Test Hour: 0 hr	24 hr	48 hr BR	48 hr AR	72 hr	96 hr
CTRL	A	D17	5	5	5	5	5	5
	B	D18	5	5	5	5	5	5
	C	D19	5	5	5	5	5	5
	D	D20	5	5	5	5	5	5
100%	A	D21	5	5	5	5	5	5
	B	D22	5	5	5	5	5	5
	C	D23	5	5	5	5	5	5
	D	D24	5	5	5	5	5	5

Organisms loaded by: JD	Checked by: (initials)	JD	DN	JD	DN	MF	MF
Loading Verified by: MF							

Comments:

m = missing d = dead BR = before renewal AR = after renewal

Test Results:

% mortality in 100% sample 0

LC_{50}: >100% If Calculated: 95% CI ____________ Method: ____________

Screening Tests: Report LC50 as >100%, =100%, or <100%.

Substitue highest test concentration used if other than 100% (example: Ocean outfall tested at 30% concentration).

LIMS Sample # : 774934 **Test # :** 1 **of** 2

TEST SOP: TA07_ 01 **Test Species:** (Ceriodaphnia dubia) *Cyprinella leedsi Pimephales promelas Americamysis bahia Menidia beryllina* Other:_____

V.1 2/24/04

Concentration CTRL	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate A	A		B	B		D
pH (S.U.)	8.2		8.2	8.2		8.4
Temperature °C	24.0		24.7	24.1		24.0
Dissolved Oxygen mg/L	8.4		7.6	7.4		8.3
Conductivity (µmhos) mmhos	200		210	275		280
(initials) Measured by:	DN		JD	JD		MF
(initials) Recorded by:	DN		JD	JD		MF

Comments:

Concentration 100%	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate	A		B	B		D
pH (S.U.)	7.8		8.3	8.0		8.4
Temperature °C	24.0		24.7	24.4		24.2
Dissolved Oxygen mg/L	9.1		7.3	7.5		8.4
Conductivity (µmhos) mmhos	415		390	385		500
(initials) Measured by:	DN		JD	JD		MF
(initials) Recorded by:	DN		JD	JD		MF

Comments:

Concentration	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate						
pH (S.U.)						
Temperature °C						
Dissolved Oxygen mg/L						
Conductivity µmhos mmhos						
(initials) Measured by:						
(initials) Recorded by:						

Comments:

Concentration	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate						
pH (S.U.)						
Temperature °C						
Dissolved Oxygen mg/L						
Conductivity µmhos mmhos						
(initials) Measured by:						
(initials) Recorded by:						

Comments:

Bioassay Parameters

LIMS Sample # : 774934 **Test # :** 2 **of** 2

TEST SOP: TA07_ 02 **Test Species:** *Ceriodaphnia dubia* (*Cyprinella leedsi*) *Pimephales promelas* *Americamysis bahia* *Menidia beryllina* Other:

V.1 2/24/04

Concentration CTRL	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate	A	B	A (SD)	C	D	D
pH (S.U.)	8.1	8.2	8.4	7.9	8.2	8.4
Temperature °C	24.2	24.4	24.8	24.0	24.3	24.6
Dissolved Oxygen mg/L	8.6	8.1	7.3	7.5	7.1	7.5
Conductivity ~~µmhos~~ mmhos	260	290	290	270	260	285
(initials) Measured by:	DN	DN	SD	SD	DN	MK
(initials) Recorded by:	DN	DN	SD	SD	DN	MK

Comments:

Concentration 100%	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate	A	B	A (SD) C	C	D	D
pH (S.U.)	7.8	7.9	8.0	7.7	7.8	8.0
Temperature °C	24.2	25.1	25.0	24.0	24.1	25.4
Dissolved Oxygen mg/L	9.3	7.6	~~25.0~~ 7.1 SD	7.3	6.5	7.0
Conductivity (µmhos) mmhos	425	450	435	415	420	475
(initials) Measured by:	DN	DN	SD	SD	DN	MK
(initials) Recorded by:	DN	DN	SD	SD	DN	MK

Comments:

SD - Water Temp in DO. place
"Transcription error" 8.19.04 48 hr Before

Concentration	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	~~72 Hr.~~	96 Hr.
Replicate						
pH (S.U.)						
Temperature °C						
Dissolved Oxygen mg/L						
Conductivity µmhos ~~mmhos~~						
~~(initials)~~ Measured by:						
~~(initials)~~ Recorded by:						

Comments:

Concentration	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	~~72 Hr.~~	96 Hr.
Replicate						
pH (S.U.)						
Temperature °C						
Dissolved Oxygen mg/L						
Conductivity µmhos ~~mmhos~~						
~~(initials)~~ Measured by:						
~~(initials)~~ Recorded by:						

Comments:

V.1 2/24/04

Appendix 7a

Taxa list and density (number/mL) for phytoplankton collected from the effluent, upstream, and downstream of Mosaic Fertilizer, Inc., Wingate Creek Mine D-002, August 16, 2004.

	Effluent	Control Site	Test Site
Bacillariophyta			
Bacillariophyceae	54	15	259
Bacillariophyta	-	15	-
Cocconeis sp.	-	5	-
Cocconeis placentula	-	15	-
Coscinodiscophyceae	-	15	-
Cyclotella sp.	-	10	-
Cymbellaceae	-	10	-
Eunotia sp.	-	15	-
Navicula sp.	-	5	-
Naviculaceae	-	10	-
Nitzschia sp.	-	48	-
Chlorophycota			
Actinastrum sp.	-	-	56
Ankistrodesmus falcatus	245	24	74
Carteria sp.	-	-	37
Chlamydomonas sp.	27	194	370
Chlorella sp.	463	82	370
Chlorococcum sp.	-	-	19
Chlorogonium sp.	109	15	93
Chlorophyceae	-	39	74
Closterium gracile gracile	-	19	19
Coelastrum microporum	27	-	-
Crucigenia crucifera	-	15	-
Dictyosphaerium ehrenbergianum	245	-	-
Dictyosphaerium pulchellum	436	15	167
Dimorphococcus sp.	-	5	-
Elakatothrix viridis	-	5	-
Euastrum sp.	-	5	-
Golenkinia paucispina	-	-	19
Golenkinia radiata	109	-	-
Kirchneriella obesa	-	15	-
Mougeotia sp.	-	10	-
Oocystis sp.	109	15	37
Scenedesmus sp.	109	10	74
Scenedesmus bijuga	54	19	37
Selenastrum sp.	681	19	463
Staurastrum sp.	-	15	-
Tetrastrum elegans	136	-	-
Chrysophyta			
Chrysophyceae	-	92	111
Mallomonas sp.	-	-	37
Cryptophycophyta			
Chroomonas sp.	-	-	93
Cryptomonas sp.	1,499	140	1,222
Cryptophyceae	-	189	-
Cyanophycota			
Anabaena sp.	-	19	-
Glaucospira sp.	27	-	-
Jaaginema sp.	136	145	278
Merismopedia warmingiana	136	-	-
Microcystis sp.	109	-	-

Planktothrix sp.	2,289	34	1,277
Pseudanabaena sp.	-	19	74
Rhabdogloea sp.	-	19	74
Romeria sp.	82	-	-
Synechocystis sp.	245	24	111
Euglenophycota			
Euglena sp.	-	5	-
Lepocinclis sp.	82	53	37
Phacus sp.	-	58	19
Trachelomonas sp.	-	15	19
Pyrrophycophyta			
Peridinium sp.	1,063	-	56

Appendix 7b

Taxa list and number of individuals counted for phytoplankton collected from the effluent, upstream, and downstream of Mosaic Fertilizer, Inc., Wingate Creek Mine D-002, August 16, 2004.

	Effluent	Control Site	Test Site
Bacillariophyta			
Bacillariophyceae	2	3	14
Bacillariophyta	-	3	-
Cocconeis sp.	-	1	-
Cocconeis placentula	-	3	-
Coscinodiscophyceae	-	3	-
Cyclotella sp.	-	2	-
Cymbellaceae	-	2	-
Eunotia sp.	-	3	-
Navicula sp.	-	1	-
Naviculaceae	-	2	-
Nitzschia sp.	-	10	-
Chlorophycota			
Actinastrum sp.	-	-	3
Ankistrodesmus falcatus	9	5	4
Carteria sp.	-	-	2
Chlamydomonas sp.	1	40	20
Chlorella sp.	17	17	20
Chlorococcum sp.	-	-	1
Chlorogonium sp.	4	3	5
Chlorophyceae	-	8	4
Closterium gracile gracile	-	4	1
Coelastrum microporum	1	-	-
Crucigenia crucifera	-	3	-
Dictyosphaerium ehrenbergianum	9	-	-
Dictyosphaerium pulchellum	16	3	9
Dimorphococcus sp.	-	1	-
Elakatothrix viridis	-	1	-
Euastrum sp.	-	1	-
Golenkinia paucispina	-	-	1
Golenkinia radiata	4	-	-
Kirchneriella obesa	-	3	-
Mougeotia sp.	-	2	-
Oocystis sp.	4	3	2
Scenedesmus sp.	4	2	4
Scenedesmus bijuga	2	4	2
Selenastrum sp.	25	4	25
Staurastrum sp.	-	3	-
Tetrastrum elegans	5	-	-
Chrysophyta			
Chrysophyceae	-	19	6
Mallomonas sp.	-	-	2
Cryptophycophyta			
Chroomonas sp.	-	-	5
Cryptomonas sp.	55	29	66
Cryptophyceae	-	39	-
Cyanophycota			
Anabaena sp.	-	4	-
Glaucospira sp.	1	-	-
Jaaginema sp.	5	30	15
Merismopedia warmingiana	5	-	-
Microcystis sp.	4	-	-

Planktothrix sp.	84	7	69
Pseudanabaena sp.	-	4	4
Rhabdogloea sp.	-	4	4
Romeria sp.	3	-	-
Synechocystis sp.	9	5	6
Euglenophycota			
Euglena sp.	-	1	-
Lepocinclis sp.	3	11	2
Phacus sp.	-	12	1
Trachelomonas sp.	-	3	1
Pyrrophycophyta			
Peridinium sp.	39	-	3

The Bioassay of Mosaic Fertilizer, Inc. - Wingate Creek Mine effluent sampled on August 16, 2004, NPDES #FL0032522.

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

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 F L 0 0 3 2 5 2 2 11	12 0 4 0 8 1 6	18 **B**	19 **S**	20 1

Remarks

66

The Priority Pollutants Analysis for Bioassay of Mosaic Fertilizer, Inc. - Wingate Creek Mine effluent sampled on August 16, 2004, NPDES #FL0032522.

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

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 F L 0 0 3 2 5 2 2 11	12 0 4 0 8 1 6	18 **X**	19 **S**	20 1

Remarks

66