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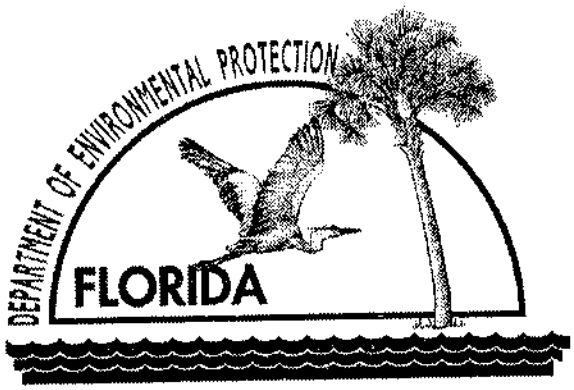

Biological Assessment of

IMC-Agrico Nichols Chemical Plant

Polk County

NPDES #FL0030139

Sampled October 1997

August 1998

Biology Section

Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: IMC-Agrico Nichols Chemical Plant
County: Polk County
NPDES Number: FL0030139
State Permit Expiration Date: 2 July 1998

Toxics Sampling Inspection (XSI)

Date Sampled: 6 October 1997

Results: No organic pollutants were detected in the effluent. Effluent metals complied with Class III water quality standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 6 October 1997

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

Impact Bioassessment Inspection (IBI)

Date Sampled: 6 October 1997

Results: While quantitative measures of macroinvertebrate community health showed no significant differences between sites, dipnet samples indicated degradation at the test site in comparison with the control site. In the dipnet samples, taxa richness, the number of chironomid taxa, the Florida Index, and % suspension filters all decreased at the test site. The control site SCI score (25 points) placed it in the "good" category, while the test site scored 15 SCI points, placing it in the "poor" category. The fact that the test site community fared worse in the natural substrate samples than in the artificial substrate samples suggests that habitat, rather than water quality, was the limiting factor there.

While algal diversity decreased substantially from the control site to the test site, algal density was low and chlorophyll *a* was undetected at both sites Examining the phytoplankton community data in conjunction with the high AGP values, it appears that other factors, such as water flow or light limitation, have prevented algal blooms in Thirtymile Creek. However, the high AGP values in Thirtymile Creek suggest that this system contributes to the nutrient loading in Hillsborough/Tampa Bay, where algal blooms have been a historical problem.

Water Quality Inspection (WQI)

Date Sampled: 6 October 1997

Results: The effluent total nitrogen concentration (5.4 mg/L) exceeded the permit limit (≤ 3.0 mg/L). Effluent total phosphorus (1.4 mg/L), ortho-phosphate (1.5 mg/L), and nitrate+nitrite concentrations (5.0 mg/L) appeared high enough to cause nutrient enrichment problems in Thirtymile Creek. AGP values at both the control site (74.2 mg dry wt/L) and the test site (96.0 mg dry wt/L) substantially exceeded the 5 mg dry wt/L "problem threshold". This indicates there is significant nutrient enrichment in this portion of Thirtymile Creek, which was moderately exacerbated by the discharge.

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

Introduction

The IMC Fertilizer, Inc., Nichols Plant, is located in Polk County, Florida (see maps in Appendix). This facility manufactures phosphate chemical fertilizers. Activities at this plant include production of sulfuric acid, phosphoric acid, di-ammonium phosphate, and triple superphosphate. Associated co-generation facilities, phosphogypsum disposal areas, and storage and shipping facilities are also present.

Wastewater is discharged to an unnamed ditch which flows into Thirtymile Creek and then to the North Prong of the Alafia River. The wastewater consists of once-through, non-contact cooling water, boiler blowdown, and contaminated non-process wastewater. While the design flow of the wastewater system is greater than 5 MGD, the actual mean flow has been 2 MGD. During the sampling period the flow was 3 MGD.

State Permit limits for the IMC Fertilizer, Inc., Nichols Plant are listed in Table 1. According to the facility's Monthly Operating Reports, the plant has consistently met permit standards for discharge to Thirtymile Creek as of the sampling date.

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a control site (located in Thirtymile Creek approximately 30 meters North of Nichols Road Bridge) and a test site (located in Thirtymile Creek downstream of the discharge). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. The effluent was analyzed for nutrients, metals, and for organic constituents (base neutral and acid extractables). Methods used for all chemical analyses are on file at the DEP Central Chemistry Laboratory in Tallahassee.

Acute screening toxicity bioassays, using the water flea, *Ceriodaphnia dubia* and the fish, *Cyprinella leedsi* as test organisms, were performed on an effluent sample.

Benthic macroinvertebrate communities were evaluated at control and test sites. Invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip-net sweeps. Additional invertebrate collections were accomplished using Hester-Dendy multiplate samplers which were incubated for 28 days. Periphyton would normally be sampled at both control and test sites by incubating glass microscope slides in a standard periphytometer for 28 days. However, the periphyton racks were destroyed at the test site and the control-site periphyton ranks were not processed. Chlorophyll *a* was determined for phytoplankton communities. Algal Growth Potential tests, used *Selenastrum capricornutum* as the test organism.

All biological field and lab procedures were carried out following Biology Section Standard Operating Procedures (SOP's). The latest version of the SOP's can be viewed on our web site at: www.dep.state.fl.us/labs/biology/sops.htm

Explanation of Measurements of Community Health

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

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

Shannon-Weaver diversity: This index is specified in the Florida Administrative Code as a measure of biological integrity. Low diversity scores are undesirable. They represent conditions where only a few organisms are abundant, to the exclusion of other taxa.

Numbers of pollution sensitive taxa: Some organisms become rare or absent as the intensity or duration of disturbance increases. For example, the Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990).

Ephemeroptera/Plecoptera/Trichoptera (EPT) Index: This index is the sum of the number of EPT taxa present. Higher EPT values are associated with healthier systems.

Community structure: Substantial shifts in proportions of major groups of organisms, compared to control conditions, may indicate degradation.

Algal biomass: High algal biomass (algal density or chlorophyll *a*) implies nutrient stress. A decreased diatom to blue-green algae ratio (calculated by dividing the

number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta + Cyanophyta) is often indicative of nutrient enriched conditions in flowing streams.

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

The Stream Condition Index (SCI) for Florida is a composite macroinvertebrate metric (Barbour *et al.* 1996). The SCI assigns points to a variety of parameters, depending on how closely each parameter approaches an expected control condition (see SCI calculation table in Appendix).

For graphical purposes, the percent differences between the control and test sites involving the number of taxa, the diversity index, the Florida Index, the EPT Index, the diatom to blue-green algae ratio, the % filter-feeders, the number of polychaete taxa, and the % pelecypods are measured as the control site minus test site divided by the control site. The percent differences between sites involving the % tubificids, algal density, chlorophyll *a*, and algal growth potential are measured as the test site minus control site divided by the control site.

The following personnel were involved in this investigation: Brad Lamb and Jay Spencer (DEP Southwest District) and Ken Espy, Marshall Faircloth, Russel Frydenborg, Joy Jackson, Scott Lashbrook, Elizabeth Miller, Urania Quintana, Johnny Richardson, Lisa Tamburello, Steve Wolfe, David Whiting, and Vicki Whiting (DEP Central Biology Laboratory in Tallahassee). The report was reviewed by the Point Source Studies Review Committee, consisting of Wayne Magley, Jan Mandrup-Poulsen, and Michael Tanski, as well as District representatives.

Results and Discussion

Habitat quality was "suboptimal" due to the lack of habitat at both the control (83 points) and test (85 points) sites (see Habitat Assessment Field Data Sheets in Appendix). Substrate at both sites consisted of 90% sand and 10% woody debris. Physical/chemical measurements were comparable at the control and test sites (Table 1). Dissolved oxygen levels were 5.7 mg/L at the control site and 6.2 mg/L at the test site. The pH (6.6 SU at the control site and 6.8 SU at the test site), temperature (26.4 °C at the control site and 26.2 °C at the test site) and conductivity (927 µmhos/cm at the control site and 902 µmhos/cm at the test site) were virtually the same at both sites.

Iron (110 µg/L) was detected in the effluent at levels that complied with Class III water quality standards (Table 1). Aluminum (79 µg/L), cadmium (0.05 µg/L), copper (1.0 µg/L), lead (0.3 µg/L), and silver (0.05 µg/L) were detected in the effluent at concentrations that were less than the minimum quantitation limit, but greater than or equal to the minimum detection limit. For regulatory purposes, the above metals' concentrations are set at the minimum detection limits, which comply with their respective Class III water quality standards.

The effluent sample was not acutely toxic to the fish, *Cyprinella leedsi,* or to the water flea, *Ceriodaphnia dubia,* during the 48-hour bioassay (Appendix).

Nutrient levels are shown in Table 1. The effluent total nitrogen concentration (5.4 mg/L) exceeded the monthly maximum permit limit (≤ 3.0 mg/L). Effluent total phosphorus (1.4 mg/L), orthophosphate (1.5 mg/L), and nitrate+nitrite concentrations (5.0 mg/L) appeared high enough to cause nutrient enrichment problems in Thirtymile Creek. Unfortunately, nutrient samples were not collected at the control or test sites, so these levels could not be determined. However, AGP, which measures bioavailable nutrients via algal response, was sampled at the receiving water sites. AGP values at both the control site (74.2 mg dry wt/L) and the test site (96.0 mg dry wt/L) substantially exceeded the 5 mg dry wt/L "problem threshold" (Raschke and Schultz 1987).

Since the periphytometer was destroyed at the test site, phytoplankton data were used to assess algal community health. While taxa richness was identical at both sites (20 taxa), diversity decreased from 3.7 at the control site to 2.5 at the test site. The decrease in diversity is a reflection of the 51% dominance of *Kirchneriella* sp. at the test site. The dominant organism at the control site, *Nitzschia* sp., only comprised 17% of the population. Although algal density at the test site was more than double that of the control site, actual values for algal density were low at both sites. Similarly, chlorophyll *a* was undetected at both sites.

While quantitative measures of macroinvertebrate community health (using Hester-Dendys) showed no significant differences between sites, dip-net samples demonstrated additional degrada-

Table 1. Effluent limits and summary of chemistry data.

IMC-Agrico Nichols Chemical Plant	Effluent Limits	Effluent Sample	Control Site	Test Site
Organic Constituents				
none detected	-	-	-	-
Metals (µg/L)				
Aluminum	≤ 1,500 **	79 I	-	-
Arsenic	≤ 50 **	40 U	-	-
Cadmium	≤ 1.8 **c	0.05 I	-	-
Chromium	≤ 1,000 *b	10 U	-	-
Copper	≤ 19.1 **c	1 I	-	-
Iron	≤ 1,000 **	110	-	-
Lead	≤ 6.5 **c	0.3 I	-	-
Mercury	≤ 0.012 **	0.10 U	-	-
Nickel	≤ 253.9 **c	7 U	-	-
Selenium	≤ 5.0 **	50 U	-	-
Silver	≤ 0.07 **	0.05 I	-	-
Zinc	≤ 30 *b	10 U	-	-
Nutrients (mg/L)				
Ortho-phosphate	-	1.5	-	-
Total phosphorus	report *b	1.4 A	-	-
Ammonia	report *b	0.13 A	-	-
Unionized Ammonia	0.02 *b	-	-	-
Nitrate+Nitrite	-	5.0 J	-	-
TKN	-	0.44 A	-	-
Total Nitrogen	≤ 3.0 *b	5.4	-	-
General Phys-Chem Parameters				
Habitat Assessment	-	-	83	85
D.O. (mg/L)	≥ 5.0 *	7.6	5.7	6.2
pH (SU)	6.0-8.5 *	7.7	6.6	6.8
Conductivity (µmhos/cm)	≤ 1275.0 *d	260	927	902
Temperature (°C)	report *b	25.8	26.4	26.2
B.O.D., 5 day (mg/L)	report *b	-	-	-
Tot. Residual Chlorine (mg/L)	≤ 0.01 *b	≤ 0.03	-	-
Flow (MGD)	report *b	3	-	-
Hardness (mg $CaCO_3$)	-	175.6	-	-
Fluorides (mg/L)	≤ 10.0 *b	1.4 A	-	-
Total Sulfate (mg/L)	report *b	-	-	-
TSS (mg/L)	report *b	-	-	-
AGP (mg dry wt/L)	-	3.4	74.2	96.0
Radium 226 (pCi/L)	***	0.4 J	-	-
Radium 228 (pCi/L)	***	-	-	-
Gross Alpha Particle Activity (pCi/l)	≤ 15.0 *b	-	-	-
Toxicity				
Bioassay Fish	report *	no mortality	-	-
Bioassay Invertebrate	report *	no mortality	-	-

* Permit limit
** Class III water quality standard
*** Monitoring for Radium 226 and 228 will only be required if the Gross alpha Particle Activity exceeds 15 pCi/L
a - Annual average
b - Monthly maximum
c - Value is calculated based on hardness
d - Daily maximum
A - Value reported is the mean of two or more determinations
J - Estimated value
I - Value reported is less than the minimum quantitation limit, and greater than or equal to the minimum detection limit
U - Material analyzed for but not detected; value reported is the minimum detection limit

Table 2. Major characteristics of phytoplankton community structure of control and test sites.

IMC-Agrico Nichols Chemical Plant	Control Site	Test Site
Phytoplankton Algae		
Number of Taxa	20	20
Shannon-Weaver Diversity	3.7	2.5
Chlorophyll a (µg/L)	0.88 U	0.88 U
Algal Density (#/mL)	460	1,008
% Blue-green	8	7.5
% Green	15	87
% Diatoms	52	4
%Cryptophytes	9	1
%Euglenophytes	16	0.5
AGP (mg dry wt/L)	74.2	96.0

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

tion at the test site compared with the control site (Table 2). Figure 2 indicates the degree of difference between the invertebrate populations between the test and control sites. Larger differences (that is higher percentages) correspond with greater degrees of degradation at the test site. Negative values suggest the test site is healthier than the control site.

In the Hester-Dendy samples, 19 taxa were found at the control site and 21 taxa were recovered from the test site. Shannon-Weaver diversity was similar at both sites: 3.3 at the control site and 3.4 at the test site. The Florida Index decreased from 9 points at the control site to 6 points at the test site. The EPT Index results were the same (n = 5) at both the control and test sites. Suspension/filter-feeders, indicators of good water quality, made up 5% of the control community and 4% of the test community.

In the qualitative samples, taxa richness decreased from 25 at the control site to 17 at the test site. The EPT Index was 2 at the control site and 3 at the test site. Chironomid taxa richness decreased from 11 at the control site to 3 at the test site. The percent contribution of dominant taxon increased from 21% at the control site to 33% at the test site. The Florida Index decreased from 6 points at the control site to 0 points at the test site (a substantial reduction). Suspension/filter-feeders made up 9% of the control community and 1% of the test community. The SCI score decreased from 25 points at the control site (in the "good" category) to 15 points at the test site, placing it in the "poor" category.

Conclusions

Habitat quality was "suboptimal" at both the control and test sites.

Effluent metals complied with Class III water quality standards. No organic pollutants were detected in the effluent.

The effluent sample was not acutely toxic to the fish, *Cyprinella leedsi*, or to the invertebrate, *Ceriodaphnia dubia*, during the 48-hour bioassay.

The effluent total nitrogen concentration (5.4 mg/L) exceeded the monthly maximum permit limit (≤ 3.0 mg/L). Effluent total phosphorus (1.4 mg/L), ortho-phosphate (1.5 mg/L), and nitrate+nitrite concentrations (5.0 mg/L) appeared high enough to cause nutrient enrichment problems in Thirtymile Creek. AGP values at both the control site (74.2 mg dry wt/L) and the test site (96.0 mg dry wt/L) substantially exceeded the 5 mg dry wt/L "problem threshold". This indicates that there is significant nutrient enrichment in this portion of Thirtymile Creek, which was moderately exacerbated by the discharge.

While algal diversity decreased substantially from the control site to the test site, algal density was low and chlorophyll *a* was undetected at both sites. Examining the phytoplankton community data in conjunction with the high AGP values, it appears that other factors may have prevented algal blooms have been a historical problem.

While quantitative measures of macroinvertebrate community health showed no significant differences between sites, dip-net samples demonstrated additional degradation at the test site compared with the control site. In the dip-net samples, taxa richness, number of chironomid taxa, the Florida Index, and % suspension filters all decreased at the test site. The control site SCI score (25 points) placed it in the "good" category, while the test site scored 15 SCI points, placing it in the "poor" category. The fact that the test site community fared worse in the natural substrate samples than in the artificial substrate samples suggests that habitat, rather than water quality, was the limiting factor there.

Literature Cited

Barbour, M. T., J. Gerritsen, and J. S. White. 1996. Development of the Stream Condition Index for Florida. Prepared for the Fla. Dept. Environ. Protection. 105 p.

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

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

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Table 3. Major characteristics of community structure of control and test sites.

IMC-Agrico Nichols Chemical Plant	Control Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	25	17
Florida Index	6	0
SCI	25	15
EPT Index	2	3
% Dominant Taxon	21	33
Community Composition		
% Amphipoda	12	8
% Coleoptera	4	2
% Diptera	34	19
% Ephemeroptera	2	6
% Gastropoda	19	2
% Odonata	1	0.0
% Oligochaeta	23	59
% Pelecypoda	1	1
% Trichoptera	1	1
% Other	3	2
Functional Feeding Groups		
% Predators	7	3
% Burrowing Deposit Feeders	23	59
% Surface Deposit Feeders	26	16
% Suspension Feeders	9	1
% Scrapers	22	6
% Shredders	9	12
Macroinvertebrate Hester-Dendy		
Number of Taxa	19	21
Florida Index	9	6
Shannon-Weaver Diversity	3.3	3.4
EPT Index	5	5
Community Composition		
% Amphipoda	1	16
% Coleoptera	21	16
% Diptera	62	48
% Ephemeroptera	6	3
% Gastropoda	0	12
% Megaloptera	5	0
% Trichoptera	6	4
% Other	0	0
Functional Feeding Groups		
% Predators	5	17
% Surface Deposit Feeders	44	35
% Suspension/Filter Feeders	5	4
% Scrapers	14	13
% Shredders	25	22

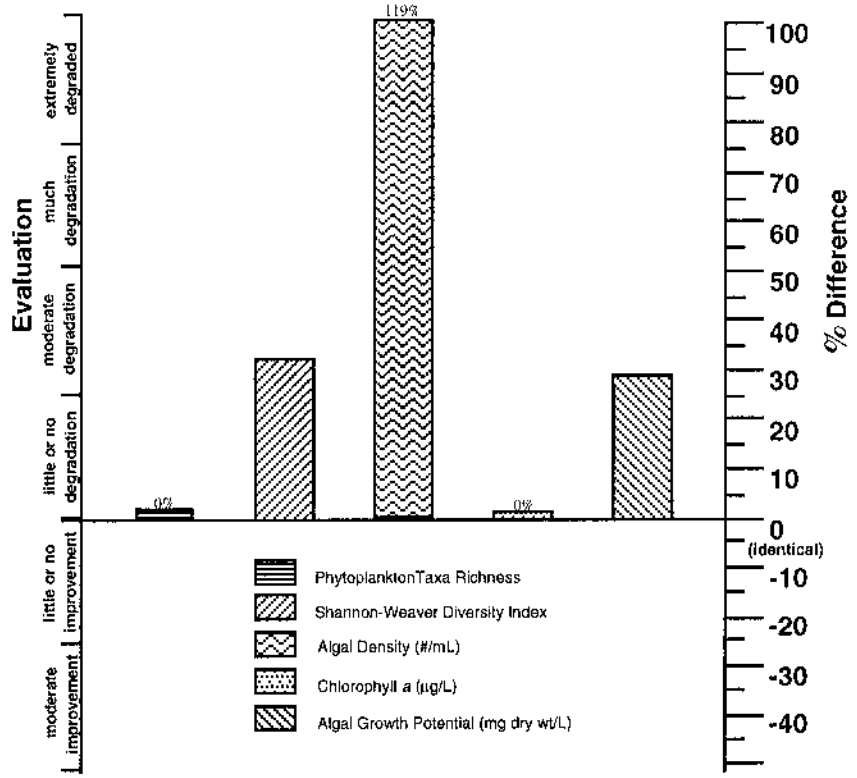


Figure 1. Effect of discharge on the algae community.

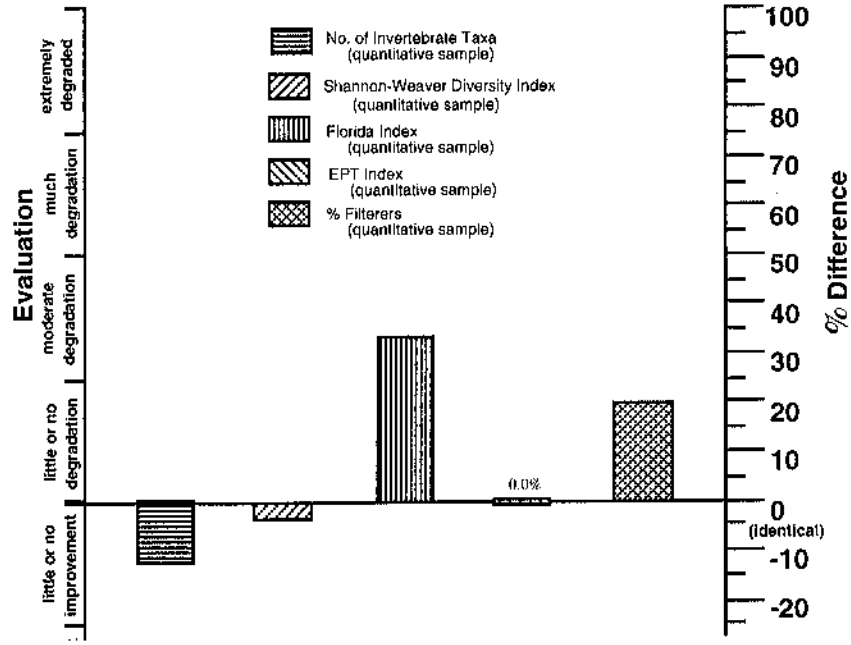


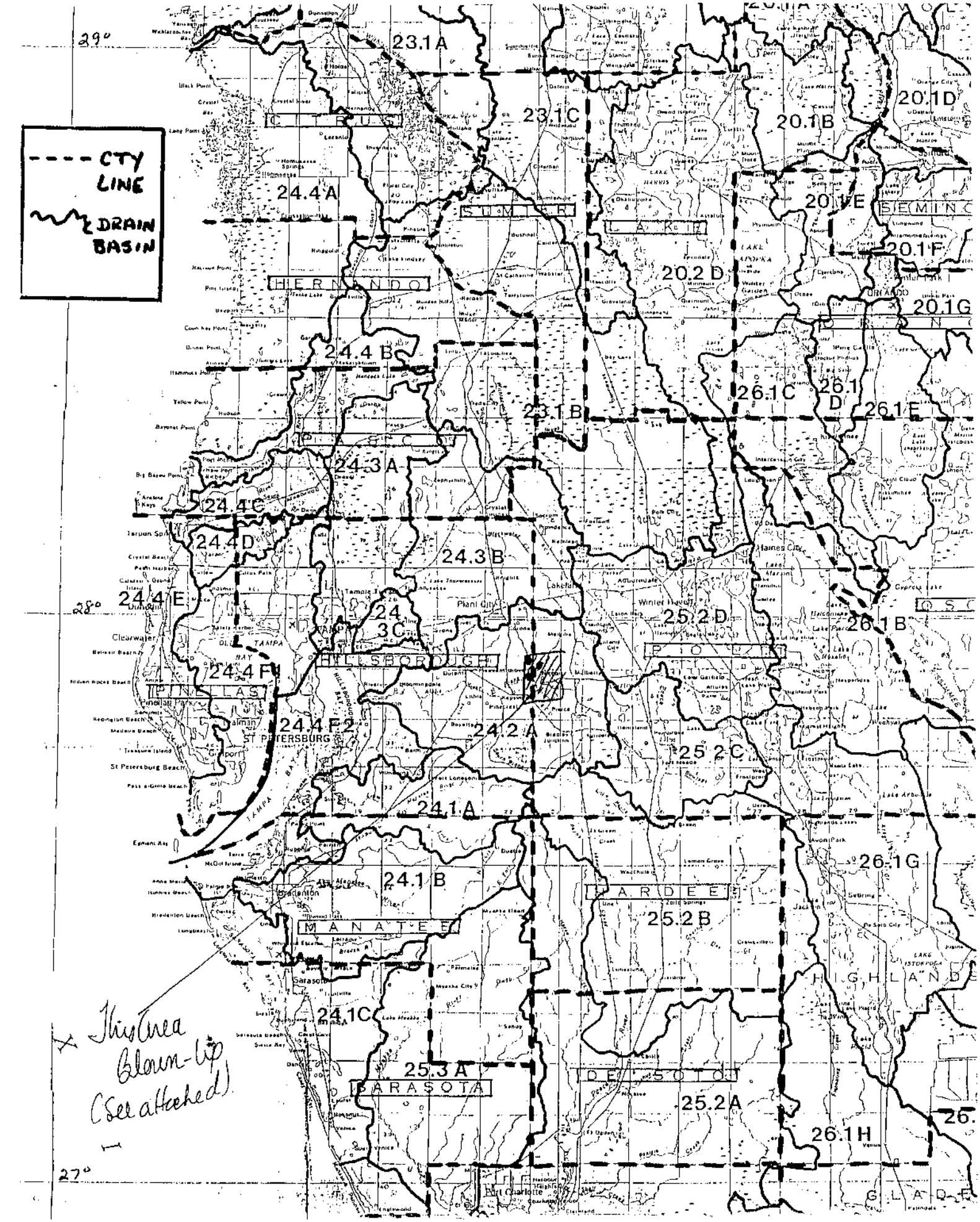
Figure 2. Effect of discharge on the benthic macroinvertebrate community

Typical Values for Selected Parameters in Florida Waters

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

Parameter	Percentile Distribution										
	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
STREAMS (1617 stations)											
Phytoplankton Chlorophyll *a*	0.22	0.52	0.94	1.60	3.02	4.63	6.72	9.87	14.68	27.35	48.70
Periphyton Chlorophyll *a*	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85
H-D Diversity	0.84	2.12	2.48	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90
Qualitative Taxa Richness	9.00	12.00	17.00	20.00	22.00	24.50	26.00	28.00	31.00	37.00	53.00
H-D Taxa Richness	6.00	6.50	9.00	11.50	13.00	15.00	17.00	21.50	26.00	29.00	32.00
TKN	0.30	0.39	0.56	0.73	0.87	1.00	1.11	1.26	1.49	1.93	2.80
Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60
NO2-NO3	0.01	0.01	0.03	0.05	0.07	0.10	0.14	0.20	0.32	0.64	1.05
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	0.39	0.74	1.51
Ortho Phosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	0.27	0.59	1.37
Turbidity	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30

Units:
Phytoplankton Chlorophyll *a* (ug/L), Periphyton Chlorophyll *a* (mg/m^2), Nutrients (mg/L), Turbidity (NTU), Taxa richness and diversity values are for macroinvertebrates


CTY LINE
DRAIN BASIN
29°
28°
27°
23.1A
23.1C
23.1B
20.1D
20.1B
20.1E
20.1F
20.1G
20.2D
24.4A
24.4B
24.4C
24.4D
24.4E
24.4F1
24.4F2
24.3A
24.3B
24.3C
24.2A
24.1A
24.1B
24.1C
25.3A
25.2A
25.2B
25.2C
25.2D
26.1C
26.1D
26.1E
26.1B
26.1G
26.1H
CITRUS
SUMTER
LAKE
HERNANDO
PASCO
PINELLAS
HILLSBOROUGH
POLK
MANATEE
SARASOTA
HARDEE
DESOTO
HIGHLANDS
GLADES
ORANGE
SEMINOLE
OSCEOLA
Clearwater
St Petersburg
Tampa
Lakeland
Plant City
Winter Haven
Haines City
Sarasota
Bradenton
Port Charlotte
This Area Blown-Up (See attached)

DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: IMC-Agrico Company Nichols Chemical Plant		Date Summary Prepared: 10/4/97
Location (attach detailed map): attached	County: Polk (53)	Bureau: BMR Phosphate Mgmt.
Federal Permit # and expiration date: 9/30/99 NPDES FL0030139	State GMS # and 4053P20044 State expiration date: 7/2/98	Facility Type: (Industrial) Municipal Federal Agricultural Other (list):

Function of facility: Production of Phosphatic fertilizer, phosphoric and sulfuric acids

Description of treatment process:

See attached permit cover page (Federal & State)

Receiving waters: Thirty-Mile Creek	Classification: I II (III)	
Design Flow: >5mgd	Mean Flow: 2 mgd	Flow during survey: 3mgd

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

therefore, the best time to sample is: when discharging, check with facility

If facility has a mixing zone, give details (size, parameters affected, etc.):

n/a

List effluent limits (if necessary, attach relevant paperwork):

Parameter	Limit (units)
See attached from permits	

Describe special permit conditions and permit modifications:

n/a

PERMITTEE:
IMC-AGRICO COMPANY
Nichols Plant

GMS ID No.: 4053P20044
Permit No.: IO53-215299C

SPECIFIC CONDITIONS: (cont'd.)

13. (cont'd.)

EFFLUENT LIMITATIONS/
WATER QUALITY STANDARDS

EFFLUENT CHARACTERISTIC	MONTHLY MINIMUM	MONTHLY MAXIMUM	30-DAY AVERAGE	SAMPLING FREQUENCY	SAMPLE TYPE
Flow (MGD)	N/A	Report	Report	Continuous	Recorder
Total Chromium* (mg/l)	N/A	1.0	Report	1/week	24 hr/Comp
Total Zinc* (mg/l)	N/A	0.03	Report	1/week	24 hr/Comp
Total Residual Chlorine (mg/l)	N/A	0.01	Report	1/week	Grab
pH (standard units)	6.0	8.5	Report	1/week	Grab
Fluorides (mg/l)	N/A	10.0	Report	1/week	24 hr/Comp
Specific Conductance (umhos/cm)	N/A	**	Report	1/week	24 hr/Comp
Ammonia (un-ionized) mg/l	N/A	0.02	Report	1/week	Grab
Dissolved Oxygen (mg/l)	5.0	N/A	Report	1/week	Grab
Total Ammonia as N (mg/l)	N/A	Report	Report	1/week	Grab
Total Sulfate (mg/l)	N/A	Report	Report	1/week	24 hr/Comp
Gross Alpha Particle Activity (pCi/l) [w/Error]	N/A	15.0	N/A	1/month	24 hr/Comp
Radium 226 & 228 (pCi/l) [w/Error]	N/A	***	N/A	1/month	24 hr/Comp
Total Non-Filterable Residue [TSS] (mg/l)	N/A	Report	N/A	1/month	24 hr/Comp
Total Nitrogen as N	N/A	3.0	N/A	1/month	24 hr/Comp
Total Phosphorus as P (mg/l)≠	N/A	Report	N/A	1/month	24 hr/Comp
Temperature (°F)	N/A	Report	Report	1/week	Grab
BOD (mg/l)≠	N/A	Report	N/A	1/month	24 hr/Comp

* Parameter to be monitored only if it is contained in substances or compounds added to the water by the permittee. During a given reporting period, if substances or compounds are not added by the permittee, the Discharge Monitoring Report should state "not added".

** Specific conductance shall not be increased more than 50% above background levels or to 1275 micromhos per centimeter, whichever is greater.

*** Monitoring for Radium 226 and 228 will only be required if the Gross alpha Particle Activity exceeds 15 pCi/l.

≠ The maximum limits for total phosphorus and BOD will be established after the completion of the WQBEL Study.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		10/6/97		THIRTY MILE CREEK

REMARKS:	LOCATION:	FIELD ID/NAME:
UPSTREAM OUTFALL DOWNSTREAM	IMC NICHOLS CHEMICAL PLANT	UPSTREAM /

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
40%	20%				40%	

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

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

Point-Source Pollution (list location and describe): Mining and Chemical Plant, under Permit and being studied as part of this FYI.

Estimated Stream Width (range, m):	2m	Estimated Stream Depth (range, m):	1m	yes
High Water Mark (m above bed):	.3m	Velocity (range, m/s):	/u	Impounded ☐ Channelized ☐

Canopy Cover % (check box): Open: ☑ 90% Lightly Shaded: ☑ 10% Moderately Shaded: ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

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

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

Sediment Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☐ Sand: ☑ Shell: ☐ Other: ☐

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Rock or Shell Rubble				Woody Debris (Snags)	10%	19	DIPNET
Aquatic Vegetation				Leaf Packs/Roots			
Sand	90%	1	DIPNET	Undercut Banks			
Other:				Mud/Muck			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top			Secchi Depth (m):	n/a
Mid-depth	26.4°	5.7	pH (SU):	6.60
Bottom			Conductivity (µmho/cm):	927
			Other Parameters:	

.5

Stream Type (check box): Blackwater: ☐ Deep Aquifer Fed: ☐ Surficial Aquifer Fed: ☑ Alluvial: ☐ Other: ☐

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

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

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

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

Weather Conditions: Clear, Hot, light wind

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/16/97	J. Lamb	Brad Vail

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		10/6/97	THIRTY MILE CREEK

REMARKS:	LOCATION:	FIELD ID/NAME:
UPSTREAM, OUTFALL, DOWNSTREAM	IMC NICHOLS CHEMICAL PLANT	UPSTREAM /

Habitat Parameter (score)	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover (15)	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity (30)	Max. observed: >0.3 m/sec. but < 1 m/sec **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec **0-7 points**
Artificial Channel/ Flow Alteration (15)	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability (8)	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality (10)	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments (5)		TOTAL SCORE (83)
	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	

COMMENTS: UPSTREAM OF OUTFALL ADJ. TO BRIDGE OVER RWB

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/6/97	B. Lamb	Brad Lamb

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		10/6/97		THIRTY MILE CREEK

REMARKS:	LOCATION:	FIELD ID/NAME:
UPSTREAM, OUTFALL, DOWNSTREAM	IMC NICHOLS CHEMICAL PLANT	OUTFALL /

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
40%	20%				40%	

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

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

Point-Source Pollution (list location and describe):
Mining and Chemical Plant, under Permit and being studied as part of this FY1.

Estimated Stream Width (range, m): 2m	Estimated Stream Depth (range, m): 1 m		yes
High Water Mark (m above bed): .3m	Velocity (range, m/s):	Impounded ☐	Channelized ☐

Canopy Cover % (check box): Open: ☑ 90% Lightly Shaded: ☑ 10% Moderately Shaded: ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

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

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

Sediment Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☐ Sand: ☑ Shell: ☐ Other: ☐

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Rock or Shell Rubble				Woody Debris (Snags)	~10%	~4	DIP
Aquatic Vegetation				Leaf Packs/Roots			
Sand	~90%	~4	DIP	Undercut Banks			
Other:				Mud/Muck			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	Secchi Depth (m):
Top			pH (SU):
Mid-depth			Conductivity (µmho/cm):
Bottom			Other Parameters:

Stream Type (check box): Blackwater: ☐ Deep Aquifer Fed: ☐ Surficial Aquifer Fed: ☐ Alluvial: ☐ Other: ☐

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

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

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

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

Weather Conditions:
Clear / Hot / Light winds

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/6/97	B. Lamb	Brad Lamb

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		10/6/97		THIRTY MILE CREEK

REMARKS:	LOCATION:	FIELD ID/NAME:
UPSTREAM ~~OUTFALL~~ DOWNSTREAM	IMC NICHOLS CHEMICAL PLANT	DOWNSTREAM /

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
40%	20%				40%	

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

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

Point-Source Pollution (list location and describe):
Mining and Chemical Plant, under Permit and being studied as part of this FYI.

Estimated Stream Width (range, m):	2m	Estimated Stream Depth (range, m):	1m	yes
High Water Mark (m above bed):	.3m	Velocity (range, m/s):	.15m	Impounded ☐ Channelized ☐

Canopy Cover % (check box): Open: ☑ 90% Lightly Shaded: ☑ 10% Moderately Shaded: ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

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

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

Sediment Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☐ Sand: ☑ Shell: ☐ Other: ☐

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Rock or Shell Rubble				Woody Debris (Snags)	10%	19	DIPNET
Aquatic Vegetation				Leaf Packs/Roots			
Sand	90%	1	DIPNET	Undercut Banks			
Other:				Mud/Muck			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top			Secchi Depth (m):	n/a
Mid-depth	26.2°	6.16	pH (SU):	6.79
Bottom			Conductivity (µmho/cm):	902
			Other Parameters:	

Stream Type (check box): Blackwater: ☐ Deep Aquifer Fed: ☐ Surficial Aquifer Fed: ☑ Alluvial: ☐ Other: ☐ _____

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

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

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

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

Weather Conditions:

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/6/97	B. Lamb	Brad Lamb

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		10/6/97	THIRTY MILE CREEK

REMARKS:	LOCATION:	FIELD ID/NAME:
UPSTREAM, OUTFALL, DOWNSTREAM	IMC NICHOLS CHEMICAL PLANT	DOWNSTREAM

Habitat Parameter — score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover — 15	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity — 30	Max. observed: >0.3 m/sec. but < 1 m/sec **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec **0-7 points**
Artificial Channel/ Flow Alteration — 15	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability — 10	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality — 10	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments		TOTAL SCORE
5	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	85

COMMENTS: DOWNSTREAM OF OUTFALL ADJ. TO RECLAMATION AREA

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/6/97	B. Lamb	Brad Lamb

Sample Source: IMC Nichols Outfall 1
County: Polk
Contact / District: J. Spencer / SWD
NPDES Permit #: FL00 30139
LIMS Sample #: 193524 LIMS Job #: 97-OCT-07-22
sample log: 10-597CR
Test Type: Screening / Definitive
Static / Static Renewal / Flow-through
Temperature range: room 24.5-25.5°C
incubator 25.5-26.5°C
Test Number: 2 of 2
Remarks: D = dead, M = missing

Sample Collection: Date 10-6-97 Time 9:50
Test Beginning: Date 10-7-97 Time 14:00
Test Ending: Date 10-14-97 Time 14:20
Organism Batch #: 76 Diluent Batch #: Well
Organism Age: 12 days
Test Organism: Cyprinella leedsi

	Instrument Calibrations: pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
	meter # 7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	24.2 @ 24.3	8.4 @ 24.0 °C	107.4 @ 103.6 1018 @ 1005 @ 25.4 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.7 @ 24.8	8.3 @ 24.7 °C	105.1 @ 103.6 1012 @ 1005 @ 25.3 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	25.2 @ 25.3	8.1 @ 26.0 °C	105.4 @ 103.6 1014 @ 1005 @ 25.6 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Ctrl A	D1	5	5	5	7.7	8.0	8.1	25.5	24.9	25.2	7.6	7.4	7.5	260	255	260
Ctrl B	D2	5	5	5	7.7	8.0	8.1	25.3	25.0	24.8	7.6	7.5	7.5	260	255	260
Ctrl C	D3	5	5	5	7.7	8.0	8.1	25.8	25.1	25.0	7.7	7.6	7.6	260	260	260
Ctrl D	D4	5	5	5	7.7	8.0	8.1	25.8	25.0	24.9	7.7	7.5	7.5	260	255	260
100% A	D5	5	5	5	7.6	7.7	7.9	25.3	25.4	25.4	7.6	7.3	7.7	400	405	410
100% B	D6	5	5	5	7.6	7.7	7.9	25.1	25.2	25.0	7.5	7.3	7.6	400	405	405
100% C	D7	5	5	5	7.6	7.7	7.9	25.1	25.2	25.6	7.6	7.3	7.4	400	410	415
100% D	D8	5	5	5	7.6	7.7	7.9	25.1	25.3	25.6	7.6	7.3	7.4	400	405	410
Measured/Loaded by:		DW	DW	ND	MF	MF	ND	MF	MF	ND	MF	MF	ND	ME	ME	ND
Recorded by:		MF	MF	ND	DW	DW	MF	DW	DW	MF	DW	DW	MF	DW	DW	MF

Investigators' Signatures

Kellie Kabitor

Marshall Faircloth

reviewer

form updated 4/01/96

Water Quality Parameters verified by MF

	Salt Water / Well Water / 20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):		not measured		
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	DR100	ND/MF
Alkalinity (mg/L as $CaCO_3$):	125	85	Hach	ND
Hardness (mg/L as $CaCO_3$):	125	170	Hach	ND
Total ammonia (mg/L as N):	<0.017	0.051	Orion	KR

Ammonia Meter #98136 Ammonia Meter Slope: -56.3 Ammonia Blank: <0.017

Control Salinity: 0 ppt

Sample Salinity: 4 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: IMC Nichols Outfall 1
County: Polk
Contact / District: J. Spencer / SWD
NPDES Permit #: FL0030139
LIMS Sample #: 193524 LIMS Job #: 97-OCT-07-22
sample log: 10-15-97 VR
Test Type: Screening / Definitive
Static / Static Renewal / Flow-through
Temperature range: room 24.5-25.5°C
incubator 25.5-26.5°C
Test Number: 1 of 2
Remarks: D = dead, M = missing

Sample Collection: Date 10-6-97 Time 9:50
Test Beginning: Date 10-7-97 Time 14:00
Test Ending: Date 10-7-97 Time 1430
Organism Batch #: 40 Diluent Batch #: 44
Organism Age: < 24 hr
Test Organism: Ceriodaphnia dubia

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	24.2 @ 24.3	8.1 @ 24.0 °C	101.4 @ 103.6 1018 @ 1005 @ 25.4 °C 10140 SD 10044
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.7 @ 24.8	8.3 @ 24.7 °C	105.1 @ 103.6 1017 @ 1005 @ 25.3 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	25.2 @ 25.3	8.1 @ 26.0 °C	1054 @ 103.6 1014 @ 1005 @ 25.6 °C 10140 @ 10044

A subset of 10 contains D.O.

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) 0 hr	UNCORRECTED Cond. (mmhos/cm) 24 h	UNCORRECTED Cond. (mmhos/cm) 48 h
Ctr	A	5	5	5	8.0		8.3	25.0	24.7	24.7	7.9		7.8	170		175
Ctr	B	5	4	4			8.3			24.5			7.8			175
Ctr	C	5	5	5			8.3			24.4			7.9			170
Ctr	D	5	5	5			8.3			24.4			7.9			185
100%	A	5	5	5	7.3		8.3	24.8	24.7	24.8	7.9		8.5	375		390
100%	B	5	5	5			8.3			24.4			8.5			400
100%	C	5	5	5			8.5			24.4			8.5			395
100%	D	5	5	5			8.6			24.3			8.6			390
Measured/Loaded by:		MF	MF	MF	MF		ND	MF		ND	MF		ND	MF		ND
Recorded by:		MF	MF	MF	DW		MF	DW		MF	DW		MF	DW		MF

Investigators' Signatures

Kellie Ralston

Marshall Faircloth

Water Quality Parameters verified by MF

	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			not measured		
Lab Total Residual Cl2 (mg/L):		<0.03	<0.03	Hach	ND/MF
Alkalinity (mg/L as $CaCO_3$):		10	85	Hach	ND
Hardness (mg/L as $CaCO_3$):		30	170	Hach	ND
Total ammonia (mg/L as N):		<0.017	0.051	Orion	KR

Ammonia Meter #98136 Ammonia Meter Slope: -56.3 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 41 ppt

IMC-Agrico Nichols Chemical Plant (Control Site)

Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	5	3	1	Score
Total Number of Taxa	25	≥26	25-14	<14	3
EPT Index	2	≥4	3-2	<2	3
# Chironomid Taxa	11	≥7	6-4	<4	5
% Contribution of Dominant Taxon	21	≤29	30-64	>64	5
% Diptera	34	-	≤37	>37	3
Florida Index	6	≥7	6-4	<4	3
% Suspension feeders/Filterers	9	-	≥7	<7	3
Total Score		**Peninsula**			**25**
Interpretation of Scores		**Excellent**			26-32
		Good			**20-25**
		Poor			13-19
		Severely Degraded			7-12

Summer Index Period: Stream Condition Index (SCI) for Florida Peninsula (April 1996)

IMC-Agrico Nichols Chemical Plant (Test Site)

Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	5	3	1	Score
Total Number of Taxa	17	≥26	25-14	<14	3
EPT Index	3	≥4	3-2	<2	3
# Chironomid Taxa	3	≥7	6-4	<4	1
% Contribution of Dominant Taxon	33	≤29	30-64	>64	3
% Diptera	19	-	≤37	>37	3
Florida Index	0	≥7	6-4	<4	1
% Suspension feeders/Filterers	1	-	≥7	<7	1
Total Score		**Peninsula**			**15**
Interpretation of Scores		**Excellent**			26-32
		Good			20-25
		Poor			**13-19**
		Severely Degraded			7-12

Summer Index Period: Stream Condition Index (SCI) for Florida Peninsula (April 1996)

Phytoplankton taxa list and densities (#/mL) for IMC-Agrico Nichols Chemical Plant, collected via subsurface grabs in Thirty Mile Creek, on 6 October, 1997.

	Control Site	Test Site
Bacillariophyceae		
Cocconeis sp.	8	4
Cyclotella sp.	57	–
Gomphonema sp.	4	–
Melosira sp.	11	–
Navicula sp.	60	9
Nitzschia sp.	68	13
Pinnularia sp.	4	4
Surirella sp.	4	–
Undetermined Diatomaceae	–	9
Undetermined Pennales	23	4
Chlorophyceae		
Characium sp.	–	4
Chlamydomonas sp.	11	75
Chlorococcum sp.	–	18
Crucigenia sp.	8	13
Dictyosphaerium sp.	–	9
Kirchneriella sp.	–	497
Oocystis sp.	–	58
Scenedesmus sp.	38	164
Tetraedron sp.	11	4
Undetermined Chlorophyceae	–	31
Cryptophyceae		
Chroomonas sp.	4	–
Cryptomonas sp.	38	9
Cyanophyceae		
Aphanocapsa sp.	4	–
Dactylococcopsis sp.	8	62
Gloeocapsa sp.	–	4
Lyngbya sp.	–	4
Oscillatoria sp.	26	4
Euglenophyceae		
Euglena sp.	49	4
Lepocinclis sp.	15	–
Trachelomonas sp.	11	–

Benthic macroinvertebrate taxa list for IMC-Agrico Nichols Chemical Plant, collected via Hester-Dendy artificial substrates in receiving water, on 06 August, 1997 reported as densities, in number/m^2.

	Contol Site	Test Site
Amphipoda		
Hyalella azteca	3	130
Coleoptera		
Dineutus sp.	–	3
Dubiraphia vittata	3	5
Macronychus glabratus	3	–
Microcylloepus pusillus	32	8
Stenelmis sp.	21	106
Undetermined Elmidae	–	3
Decapoda		
Procambarus sp.	3	–
Diptera		
Ablabesmyia rhamphe grp.	–	3
Palpomyia/Bezzia grp.	–	3
Pentaneura inconspicua	–	24
Polypedilum convictum grp.	69	26
Polypedilum scalaenum grp.	5	34
Polypedilum sp.	3	–
Stelechomyia perpulchra	8	24
Stenochironomus sp.	63	159
Thienemanniella similis	5	–
Thienemanniella sp. A Epler	3	–
Undetermined Chironomidae	19	108
Ephemeroptera		
Baetis intercalaris	3	–
Caenis sp.	8	3
Callibaetis floridanus	3	–
Labiobaetis sp.	3	–
Stenacron sp.	–	21
Gastropoda		
Amnicola dalli johnsoni	–	61
Hebetancylus excentricus	–	11
Undetermined Ancylidae	–	21
Hirudinea		
Desserobdella phalera	–	3
Megaloptera		
Corydalus cornutus	13	–
Odonata		
Ischnura sp.	–	3
Trichoptera		
Cheumatopsyche sp.	13	8
Cyrnellus fraternus	–	24
Neotrichia sp.	3	–
Orthotrichia sp.	–	3

Benthic macroinvertebrate taxa list for IMC-Agrico Nichols Chemical Plant, collected via Hester-Dendy artificial substrates in receiving water, on 06 August, 1997 reported as densities, in number/m^2.

	Contol Site	Test Site
Amphipoda		
Hyalella azteca	3	130
Coleoptera		
Dineutus sp.	–	3
Dubiraphia vittata	3	5
Macronychus glabratus	3	–
Microcylloepus pusillus	32	8
Stenelmis sp.	21	106
Undetermined Elmidae	–	3
Decapoda		
Procambarus sp.	3	–
Diptera		
Ablabesmyia rhamphe grp.	–	3
Palpomyia/Bezzia grp.	–	3
Pentaneura inconspicua	–	24
Polypedilum convictum grp.	69	26
Polypedilum scalaenum grp.	5	34
Polypedilum sp.	3	–
Stelechomyia perpulchra	8	24
Stenochironomus sp.	63	159
Thienemanniella similis	5	–
Thienemanniella sp. A Epler	3	–
Undetermined Chironomidae	19	108
Ephemeroptera		
Baetis intercalaris	3	–
Caenis sp.	8	3
Callibaetis floridanus	3	–
Labiobaetis sp.	3	–
Stenacron sp.	–	21
Gastropoda		
Amnicola dalli johnsoni	–	61
Hebetancylus excentricus	–	11
Undetermined Ancylidae	–	21
Hirudinea		
Desserobdella phalera	–	3
Megaloptera		
Corydalus cornutus	13	–
Odonata		
Ischnura sp.	–	3
Trichoptera		
Cheumatopsyche sp.	13	8
Cyrnellus fraternus	–	24
Neotrichia sp.	3	–
Orthotrichia sp.	–	3

Benthic macroinvertebrate taxa list for IMC Nichols Chemical Plant, collected via 20 discrete dip net sweeps in receiving water, on 06 August, 1997.

	Control Site	Test Site
Amphipoda		
Hyalella azteca	11	9
Coleoptera		
Dubiraphia vittata	4	–
Microcylloepus pusillus	–	1
Stenelmis sp.	–	1
Decapoda		
Palaemonetes sp.	–	1
Diptera		
Cladotanytarsus sp.	6	–
Cryptotendipes sp.	4	–
Goeldichironomus sp.	2	–
Goeldichironomus fluctuans	1	–
Palpomyia/Bezzia grp.	–	1
Paralauterborniella nigrohalterale	1	–
Pentaneura inconspicua	1	–
Polypedilum convictum grp.	–	12
Polypedilum halterale grp.	1	–
Polypedilum illinoense	3	–
Polypedilum scalaenum grp.	2	5
Tanytarsus sp.	1	–
Tanytarsus sp. A Epler	2	–
Tanytarsus sp. G Epler	4	–
Tanytarsus sp. R Epler	1	–
Undetermined Chironomidae	3	2
Undetermined Dolichopodidae	–	1
Ephemeroptera		
Baetis sp.	–	4
Caenis sp.	2	3
Gastropoda		
Ferrissia sp.	2	–
Hebetancylus excentricus	1	–
Pyrogophorus platyrachis	15	2
Hemiptera		
Neoplea sp.	1	–
Odonata		
Enallagma sp.	1	1
Undetermined Corduliidae	1	–
Oligochaeta		
Aulodrilus pigueti	1	–
Eclipidrilus palustris	1	–
Limnodrilus hoffmeisteri	20	37
Pristina plumaseta	–	28

Pelecypoda		
Undetermined Sphaeriidae	1	1
Trichoptera		
Cernotina sp.	–	1
Oxyethira sp.	1	–

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

1	2	3	11	12	17	18	19	20
Transaction Code		NPDES NUMBER		YR/MO/DA		Insp Type	Inspector	Fac Type
N	5	FL0030139		970610		X	5	2

Remarks

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

1	2	3	11	12	17	18	19	20
Transaction Code		NPDES NUMBER		YR/MO/DA		Insp Type	Inspector	Fac Type
N	5	FL0030139		970610		B	5	2

Remarks

21 66