

Biological Assessment of

DuPont de Nemours, Inc.– Highland Plant

Clay County

NPDES #FL0000035

Sampled March 1994

October 1994

Biology Section
Division of Administrative and Technical Services

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: DuPont de Nemours, Inc.– Highland Plant
County Clay
NPDES Number FL0000035
State Permit Expiration Date: 7 December 1994

Toxics Sampling Inspection (XSI)

Date Sampled: 7 March 1994

Results: No organic pollutants were detected in the effluent. Aluminum (724 µg/L) and iron (50 µg/L) were found in the effluent at levels within Class III standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 7 March, 1994

Results: The sample of final effluent was toxic to *Ceriodaphnia dubia*, causing 100% mortality in the 48 hour bioassay. This level of toxicity is in violation of Rules 62-302.530(62), 62-302.500(1)(d), and 62-4.244(3)(a) FAC, as well as permit limits. No mortality occurred in the *Cyprinella leedsi* test.

Impact Bioassessment Inspection (IBI)

Date Sampled: 7 March 1994

Results: Substantial decreases in taxa richness, the Florida Index, Shannon Weaver diversity, the Stream Invertebrate Index for Florida, and the EPT Index occurred between the reference and test sites. The decrease in diversity represents a violation of the biological integrity criterion (Rule 62-302.530(11) FAC). Since favorable habitat and flow were present at the test site, the problems found in Boggy Branch appeared to be related to the discharge, which was found to be acutely toxic during this study. Measurements of periphyton community health, such as very low taxa richness and complete absence of diatoms, also indicated degradation associated with the discharge.

Water Quality Inspection (WQI)

Date Sampled: 7 March 1994

Results: With the exception of TKN, nutrients were below practical quantitation limits in the effluent sample, and at the reference and test sites. TKN was detected only at the reference site (0.59 mg/L). Nutrient enrichment was not a problem with this facility or in the receiving waters. Algal Growth Potential was well below the 5 mg dry wt/L "problem threshold" at all stations. Total and fecal coliforms were well within Class III standards in all samples.

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 E. I. DuPont de Nemours, Inc. - Highland Plant is located on State Road 125, near Lawtey, Clay County, Florida. This plant discharges mining wastewater, which contains heavy minerals and humates generated from the facility's dry mill, as well as stormwater runoff collected from the mill site. The wastewater treatment consists of acidification with ferric chloride, sulfuric acid, or ferric sulfate to facilitate flocculation of the humates and other solids. The acidified water is then retained in the site's "levee system" which contains 13 separate ponds used to collect the settling solids. The clarified wastewater then flows to a "caustic addition station" where a lime slurry is added and mixed to adjust the pH to between 6.0 and 8.5 SU's. After detention in a caustic settling/reaction pond, the wastewater is conveyed to a stilling pond prior to final discharge into the Class III freshwaters of Boggy Branch, which flows into Black Creek.

Effluent limits are as follows: TSS (30 mg/L daily max.), iron (1.0 mg/L daily max.), pH (6.0 to 8.5), flow (10.0 MGD). Chronic toxicity testing is also required. Flow during the survey was between 8.9 MGD (facility measurement) and 10.7 MGD (DEP measurement). While there have been no plant upsets during the past year, there have been three instances of permit violations within the last four years. In June, 1990, a fish kill occurred in the receiving waters due to discharge of acidic wastewater, violating permit limits and water quality standards (the pH ranged from 3.4 to 4.1 SU's). This incident

Major characteristics of community structure of control and test sites.

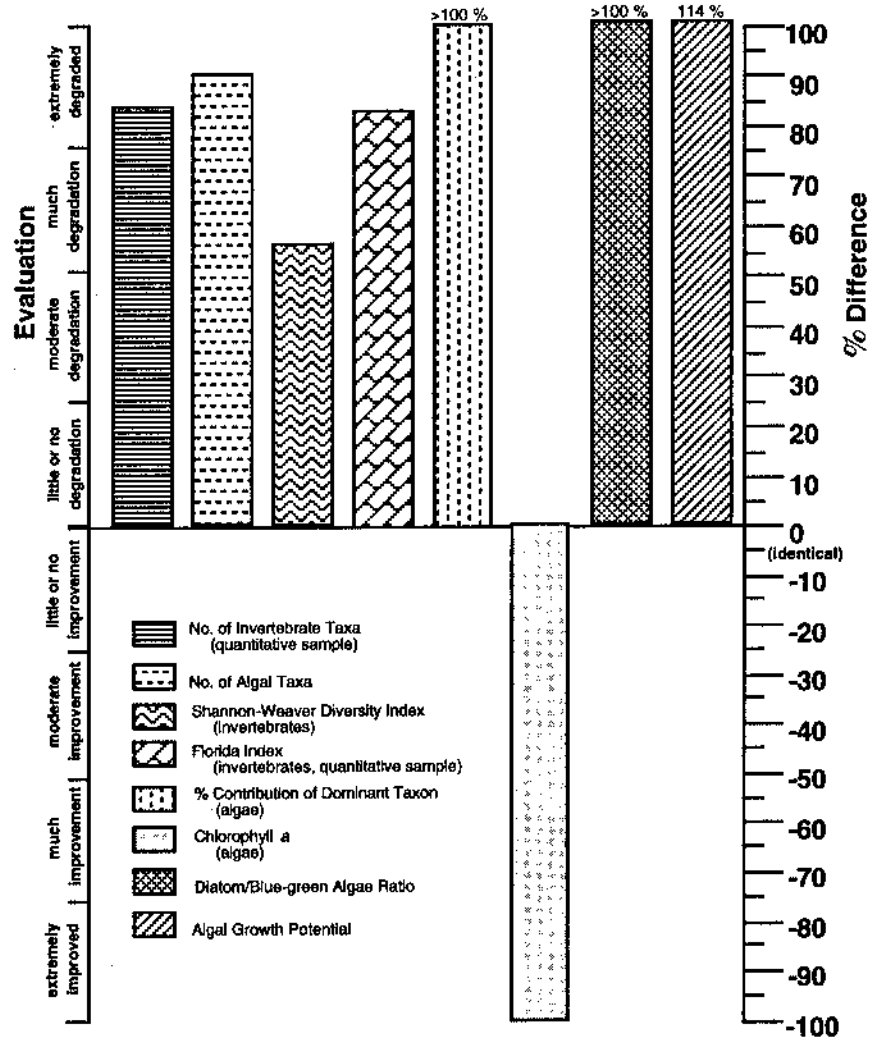
	Reference Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	31	4
Florida Index	12	3
SIIF	19	9
E-P-T Index	6	1
% Contribution of Dominant Taxon	33.3	28.6
% Oligochaeta	19.9	0
% Diptera	61.4	85.7
% Ephemeroptera	9.4	0
% Trichoptera	2.6	14.3
% Coleoptera	2.6	0
% Other	1.9	0
% Predators	8.1	25.0
% Above Surface Deposit Feeders	19.4	35.0
% Below Surface Deposit Feeders	20.6	0
% Suspension Feeders	39.7	5.0
% Scrapers	6.8	15.0
% Shredders	48.3	20.0
% Scavengers	1.2	2.0
Macroinvertebrate Hester-Dendy		
Number of Taxa	18	3
Florida Index	6	1
E-P-T Index	4	1
Shannon-Weaver Diversity	3.6	1.5
% Diptera	61.5	80
% Ephemeroptera	28.2	0
% Trichoptera	0	20
% Coleoptera	3.9	0
% Predators	9.7	34
% Above Surface Deposit Feeders	47.3	32
% Suspension Feeders	24.2	0
% Scrapers	12.5	0
% Shredders	3.5	34
% Scavengers	2.9	0
Periphyton Algae		
Number of Taxa	20	2
% Contribution of Dominant Taxon	22.7	50
Chlorophyll a (mg/sq. m)	0.80	0.01 AU
Diatom/Diatom + B-G Abundance Ratio	0.67	0
% Blue-green	32	100
% Green	2	0
% Diatoms	64	0
% Euglenophytes	2	0
Algal Growth Potential (mg dry wt/l)	0.1	0.3

resulted in a Consent Order (#90-1096). The other two instances were minor violations of pH and iron limits. DuPont has responded quickly to any actions requested of them.

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located in Black Creek, approximately 3.5 miles from the mining operation and upstream of the discharge) and a test site in Boggy Branch (approximately 25 yards downstream of the discharge) (see maps in Appendix). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Cyprinella leedsi* as test organisms, were performed on an effluent sample (Weber 1993). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, and volatile organic compounds). Additionally, nutrient analyses were performed on effluent, reference, and test sites. Methods used for all chemical analyses are on file at the Tallahassee DEP Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at reference and test sites. Invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using 20 discrete dip net sweeps. Additionally, Hester-Dendy multiplate samplers were incubated for 28 days (Ross 1990). Periphyton was sampled at both reference and test sites by incubating glass microscope slides in a standard periphytometer for 28 days (Ross 1990). Chlorophyll *a* was also determined for algal communities (Ross 1990). Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism, followed Miller *et al.* (1978). Bacterial populations were analyzed for total and fecal coliforms in the effluent and at receiving water sites (APHA 1989).



Effect of discharge on receiving stream
(measured as difference between control and test sites).

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health have been employed in this report. Many of these, such as the number of taxa and Shannon-Weaver Diversity Index are well known. Others are briefly explained here. The Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index score is considered healthy (*i.e.*, many clean-water or-

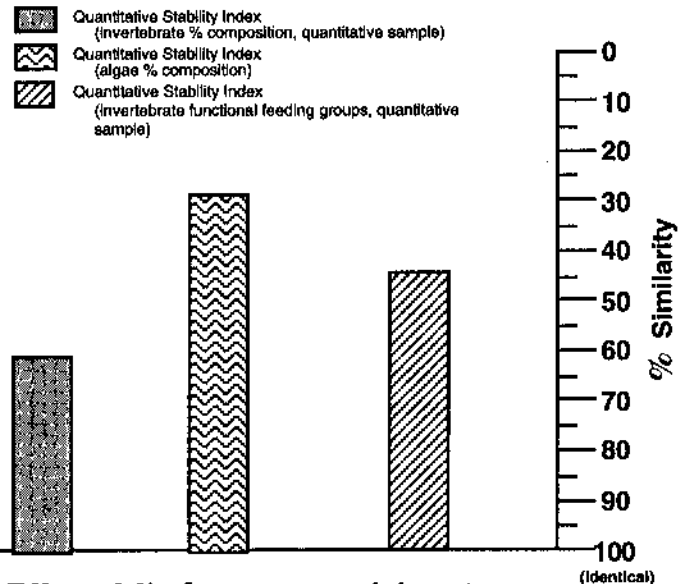
ganisms are present). The Ephemeroptera/Plecoptera/Trichoptera (EPT) Index is calculated by summing the number of distinct taxa of EPT's represented in a sample. A higher EPT Index is associated with good water quality. Excessive numerical dominance of a single type of organism (a high % contribution of dominant taxon) is usually associated with disturbance. The determination of the Quantitative Stability Index (for taxonomic % composition) is a two step process. First, the relative proportions of major taxonomic groups are calculated for each site. Then, the lesser of the two percentages for each discrete taxonomic group is selected, and their cumulative total is the QSI. A QSI (for % composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (for functional feeding groups). The Stream Invertebrate Index for Florida (SIIF) is a composite metric which is based upon the macroinvertebrate communities found at Florida Eco-regional reference sites sampled with dip net sweeps (EA Engineering 1994). The SIIF assigns 5, 3, or 1 point(s) to a variety of invertebrate parameters, depending on how closely that parameter approaches the expected Eco-regional reference condition. Five points is the best score for metrics which are particularly strong at discriminating between healthy and impaired sites (see SIIF calculation table in Appendix). The following parameters are used in calculating the SIIF for the Panhandle: taxa richness, EPT Index, % contribution of the dominant taxa, % Diptera, Florida Index, % suspension feeders/filterers, and % shredders (EA Engineering 1994). In the Panhandle, 23-29 SIIF points indicates no impairment, 15-22 points indicates moderate impairment, and 7-14 points is clear evidence of severe degradation. In the Florida Peninsula, these same parameters, along with the number of crustacean and mollusk taxa and the % of crustacean and mollusk taxa, are used to calculate the SIIF. In the Peninsula, 27-33 SIIF points indicates no impairment, 17-26 points indicates moderate impairment, and 9-16 points is clear evidence of severe degradation. Although the SIIF is based on samples collected during the summer, similar relationships should apply in other seasons.

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, the diversity index, the Florida Index, and the diatom to blue-green algae ratio are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving the percent contribution of dominant taxon, chlorophyll *a*, and algal growth potential are measured as the test site minus reference site divided by the reference site.

The following personnel were involved in this investigation: Jan Brewer, Michael Dunbar, Lindy Payne (DEP Northeast District) and Chris Barge, Lyn Burton, Marshall Faircloth, Russel Frydenborg, Christy LeDuc, Kathleen Lurding, Elizabeth Miller, Kim Pearce, Urania Quintana, Landon Ross, Greg Wynn, and David Young (Tallahassee Biology Laboratory). The report was reviewed by the Point Source Bioassessment Review Committee, consisting of Jan Mandrup-Poulsen, Wayne Magley, and Mike Tanski, as well as District representatives.

Results and Discussion

Habitat quality was slightly better at the reference site (with 82



Effect of discharge on receiving stream
(measured as similarity between control and test sites).

points) than at the test site (with 75 points) (Appendix). Benthic substrates at the Black Creek reference site consisted of woody debris, leaf packs, vegetation, roots, and leaf mats. Productive habitat at the test site consisted primarily of aquatic vegetation and leaf packs. Land in the vicinity of the reference site was primarily natural (90% wetlands), with agricultural and residential uses consisting of 5% each. At the test site, half of the surrounding land was industrial, while 45% was natural (wetlands), and 5% was used for agricultural purposes. Water velocity was slightly more favorable for rheophilic taxa at the test site (0.3 m/sec) than at the reference site (0.16 to 0.25 m/sec). While both stations were shallow (0.5 to 2.0 m), the reference site was very narrow (up to 2.5 m), compared to the test site (up to 30 m). Some potential runoff from non-point sources (agriculture) was noted at both sites.

While dissolved oxygen was slightly higher at the reference site (8.0 mg/L) than that of the test site (6.7 mg/L), specific conductance was lower at the reference site (50 µmhos/cm) than at the test site (255 µmhos/cm). The water was very acidic (4.4 SU's) at the reference site but was close to neutral (6.8 SU's) at the test site, attributable to the discharge. Temperature increased slightly from the reference site to the test site (16 °C and 18 °C, respectively).

The sample of final effluent was toxic to *Ceriodaphnia dubia*, causing 100% mortality in the 48 hour bioassay. This level of toxicity is in violation of Class III standards, Rules 62-302.530(62), 62-302.500(1)(d), and 62-4.244(3)(a) FAC, as well as permit limits. No mortality occurred in the *Cyprinella leedsi* test.

No organic pollutants were detected in the effluent. Of the metals analyzed for, only aluminum (724 µg/L) and iron (50 µg/L) were found in the effluent, but at levels within Class III standards. The concentration of iron at the reference site (239 µg/L) was higher than that found at the test site (53 µg/L).

With the exception of TKN, nutrients were below practical quantitation limits in the effluent sample, and at the reference and test sites. TKN was detected only at the reference site (0.59 mg/L). Nutrient enrichment was not a problem with this facility or in the receiving waters.

The algal growth potential (AGP) measured at all stations was well below the 5 mg dry wt/L "problem threshold" (Raschke and Schultz 1987). Although the graph indicates an increase of over 100% between the reference and test sites, the actual AGP values (0.1 mg dry wt/L at the reference site and 0.3 mg dry wt/L at the test site) were very small, demonstrating no enrichment from the facility.

Total and fecal coliforms were found to be less than 20 organisms/100 mL in the effluent and at the test site. While total coliform bacteria (800 organisms/100 mL) and fecal coliforms (140 organisms/100 mL) were present at the reference site, they were well within Class III standards.

Measures of benthic macroinvertebrate community health indicate severely stressed conditions at the test site. The figure on p. 2 indicates the degree of difference between the control and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. Negative values usually mean that the test site is better than the control. The figure on page 3 summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation, unless the test site is better than the reference site. The average abundance of each individual taxon appears in the Appendix.

In the Hester-Dendy data, taxa richness at the reference site (with 18 taxa) was somewhat below normal for a Florida stream. However, a large decrease (by 83.3%) in taxa richness was observed at the test site, where only three species were present. For comparison, the taxa richness at the test site was less than that found in 95% of other streams throughout Florida (see Appendix). The reference site received only 6 Florida Index points, which is less than the 18 Florida Index points generally expected from a stream in this part of the state. The test site scored only 1 Florida Index point, suggesting that conditions were more stressed there. Shannon-Weaver diversity was reduced by 57% between the reference and test sites, decreasing from 3.6 to 1.5. This represents a violation of the biological integrity criterion (Rule 62-302.530(11) FAC). Further, the EPT Index decreased from 6 (a typical value) at the reference site to 1 at the test site, providing another example of the degraded conditions in Boggy Branch. Pollution sensitive groups, such as riffle beetles and mayflies, were well represented at the reference site, but completely eliminated at the test site.

These trends were analogous in the dip net data. The Stream Invertebrate Index for Florida (SIIF), decreased from 19 points at the reference site (moderately impaired), to only 9 points at the test site, in-

dicating severe degradation. Since favorable habitat and flow were present at the test site, the problems found in Boggy Branch appeared to be related to the discharge, which was found to be acutely toxic during this study.

Measurements of periphyton community health also indicated degradation associated with the discharge. Periphyton taxa richness was decreased by 90% between the reference and test sites. An unusually low number of algal taxa (only two) was found at the test site, suggesting that conditions there were inhospitable. Chlorophyll *a* was low at both sites (0.80 mg/m^2 at the reference site and 0.1 mg/m^2 at the test site). The test site population was dominated completely by the blue-greens, *Chroococcus* sp. (50% of the total), and *Gloeothece* sp. (also 50%). The reference site population was made up of bacillariophytes (64%), cyanophytes (32%), chlorophytes (2%), and euglenophytes (2%). The diatom/blue-green ratio was essentially zero at the test site, since no diatoms were present (a very unusual situation). Conversely, this ratio was 0.67 at the reference site, a fairly normal value. The QSI for algal percent composition (32%) corresponded with the differences in the algal populations between the two sites. The data suggest the algal community of Boggy Creek has been affected by the discharge.

Conclusions

The sample of final effluent was toxic to *Ceriodaphnia dubia*, causing 100% mortality in the 48 hour bioassay. This level of toxicity is in violation of Class III standards, Rules 62-302.530(62), 62-302.500(1)(d), and 62-4.244(3)(a) FAC, as well as permit limits. No mortality occurred in the *Cyprinella leedsi* test.

No organic pollutants were detected in the effluent. Aluminum (724 µg/L) and iron (50 µg/L) were found in the effluent at levels within Class III standards.

With the exception of TKN, nutrients were below practical quantitation limits in the effluent sample, and at the reference and test sites. TKN was detected only at the reference site (0.59 mg/L). Nutrient enrichment was not a problem with this facility or in the receiving waters.

The algal growth potential measured at all stations was well below the 5 mg dry wt/L "problem threshold".

Total and fecal coliforms were well within Class III standards in all samples.

Substantial decreases in taxa richness, the Florida Index, Shannon Weaver diversity, the Stream Invertebrate Index for Florida, and the EPT Index occurred between the reference and test sites. The decrease in diversity represents a violation of the biological integrity criterion (Rule 62-302.530(11) FAC). Since favorable habitat and flow were present at the test site, the problems found in Boggy Branch appeared to be related to discharge, which was found to be acutely toxic during this study.

Measurements of periphyton community health, such as very low taxa richness and complete absence of diatoms, also indicated degradation associated with the discharge.

Literature Cited

American Public Health Assoc., American Water Works Assoc., and Water Pollution Control Federation. 1989. Standard Methods for the Examination of Water and Wastewater, 17th ed. New York, N.Y. 1268 p.

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

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

Weber, C. 1993. Methods for measuring the acute toxicity of effluents and receiving waters to freshwater and marine organisms. 4th edition. EPA/600/4-90/027F. 216 pp.

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

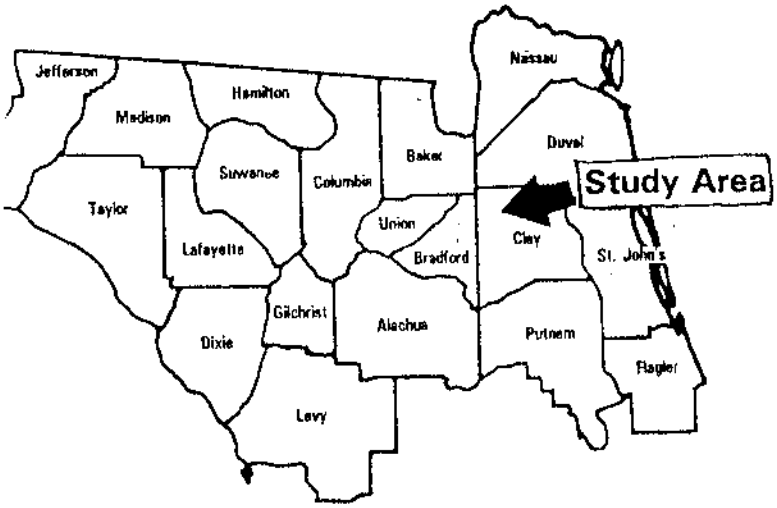
Chemistry summary table for

Dupont De Nemours Highland	**Effluent**	**Reference Site**	**Test Site**
Organic Constituents (ug/L)			
None Detected			
Metals (ug/L)			
Aluminum	724 A	487	742
Antimony	8 U	8 U	8 U
Arsenic	20 U	20 U	20 U
Cadmium	0.08 U		
Calcium	27 A	2.8	27.1
Copper	10 U	10 U	10 U
Chromium	10 U	10 U	10 U
Iron	50 A	239	53
Lead	15 U	15 U	15 U
Magnesium	1.8 A	0.6	1.8
Mercury	0.10 U		
Nickel	5 U	5 U	5 U
Selenium	30 U	30 U	30 U
Silver	0.05 U		
Zinc	4 I	4 I	4 I
Nutrients (mg/L)			
Ortho-phosphate	0.02 U	0.02 I	0.02 U
Total phosphorus	0.02 U	0.02 U	0.02 U
Ammonia	0.02 U	0.04 I	0.02 I
Nitrate+Nitrite	0.02 U	0.02 U	0.02 U
TKN	0.05 U	0.59	0.05 U
Other Parameters			
Habitat Assessment		82	75
D.O. (mg/L)	9.2	6.7	8.0
pH (SU's)	6.9	4.4	6.8
Conductivity (µmhos/cm)	250	50	255
Temperature (°C)	18	16	18
Hardness (mg CaCO3)	74.8		
TSS (mg/L)	2	NA	2
Bioassay Fish	No Mortality		
Bioassay Invertebrate	Toxic		
Fecal coliform (org/100 ml)	<20	140	<20
Total coliform (org/100 ml)	<20	800	<20
Algal Growth Potential (mg dry wt/L)	0.3	0.1	0.3

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

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

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

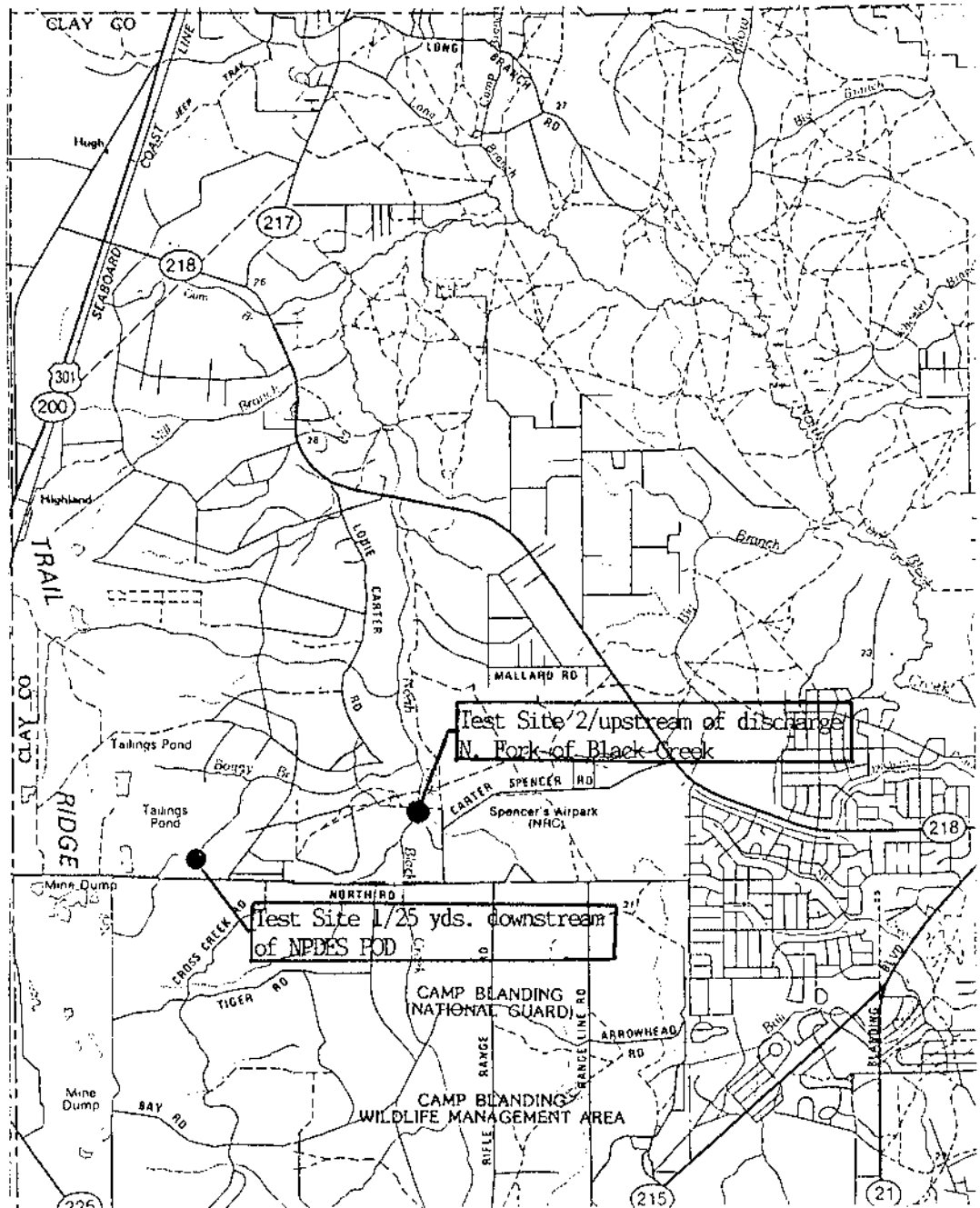


State of Florida

Department of Environmental Protectio

Northeast District

Dupont Highland FYI



STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: Dupont DeNemours, Trail Ridge		Date Summary Prepared: 05-11e-94
Location (attach detailed map): State Road 125 Lawtey, FL	County: Clay	District: N E District
Federal Permit #FL0000035 and expiration date: September 30, 1998	State GMS # and 3110P000067 State expiration date: December 7, 1994 -	Facility Type: (Industrial) Municipal Federal Agricultural Other (list):

Function of facility: Industrial wastewater facility permitted to treat heavy minerals mining wastewater containing humates from the facility's Dry Mill along with stormwater runoff collected from the site.

Description of treatment process: Heavy minerals mining wastewater treatment system providing acidification with ferric chloride, sulfuric acid, or ferric sulfate for flocculation of colloidal material, followed by settling in a series of diked ponds, neutralization with lime to a pH of between 6.0 to 8.5, and additional settling with final discharge to Boggy Branch connecting with North Prong, Black Creek. see Appendix 1.

Receiving waters: Boggy branch to North Prong Black Creek	Classification: I II (III)	
Design Flow: 10.0 MGD	Mean Flow: 6.10MGD	Flow during survey: 8.9MGD

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

therefore, the best time to sample is: Anytime

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

Facility has no mixing zone.

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

Parameter	Limit (units)
See attachments detailing required parameters A. State Permit B. NPDES Permit	

Describe special permit conditions and permit modifications:
State permit # IO10-166788 was modified on 01-20-94. Modification made to reflect the option to use either ferric chloride or ferric sulfate as a floculating agent in the treatment facilities.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Dupont DeNemours Highland
(Facility)

Description of permitted outfall(s): Discharge occurred only from the facility's 001 outfall point. This discharge point has a Parshall flume that exits to Boggy Branch which connects to the North Prong, Black Creek.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: No plant upsets have occurred in the last year. Heavy rains occurred on 10-05-92 causing stormwater to be released off site. Samples were taken at the two bypass points. This incident did not result in any type of Warning Notice to be issued, however the Department did request that any unforeseen "bypass" incident be followed up by sampling in the area where the discharge would have occurred.
03/12/91 - Total iron concentrations were in excess of permitted limits. Later that day it was back to normal.
01/29/91 - A pH excursion below permit limitations occurred. It was caused by a plug up in the lime slurry line. It was corrected within an hour and 15 minutes.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
On June 9, 1990 a fish kill was reported on Black Creek. The kill was due to water with a pH ranging from 3.4 su to 4.1 su exiting the facility and entering Boggy Branch. This incident resulted in Consent Order #90-1096 being issued on 07-20-90. The respondent signed the order on 07-20-90. The penalty was paid on 08-09-90 and applicable reports were submitted. The case was closed on 05-09-91.
No current enforcement actions are pending.

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:
With the exception of the high flow noted in the above section (10-05-92) the MOR's show that Dupont is within their permit parameters. Inspections note that everything appears to be in compliance and the company is very co-operative when something does need to be taken care of.

Additional information:
Refer to RQ-94-MAR-07-03,04 and FYI Inspection Summary

Staff contributing to this review (signature):

Jan Brewer	ES II (Biologist)
Lindy Payne	ES I (Inspector)
Michael Dunbar	(Engineer)
	( )
	( )
	( )

PERMITTEE:

E.I. DuPont de Nemours & Co., Inc.
Highland Plant

I.D. Number: 3110P00067
Permit Number: IO10-166788
Date of Issue: December 7, 1989
Expiration Date: December 7, 1994

SPECIFIC CONDITIONS:

1. During the period of operation allowed by this permit, the Permittee shall furnish one copy of the monthly operation report on the operation of the pollution control plant and quarterly groundwater monitoring data. These reports shall include all data and information required from the General and Specific Conditions of this permit. Such reports shall also contain information on the quantities of waste sludge generated at the source, type and degree of its treatment and the site of its ultimate disposal. Reports shall be submitted on a monthly and quarterly basis and postmarked no later than the 15th day of the month following the completed calendar month and quarter. (For example, surface water data for the month of March shall be submitted by April 15 and groundwater data for the first quarter shall be submitted by April 15.) Reports shall be submitted to the Department of Environmental Regulation, Northeast District Office, 3426 Bills Road, Jacksonville, Florida 32207.

2. The discharge authorized by this permit shall be consistent at all times with the water quality standards set forth in Chapter 17-3, FAC, except as provided for otherwise in this permit.

3. No additional connections shall be made to this facility without prior approval from the Department.

4. The permit holder shall also comply with county, municipal, federal or other state regulations.

5. Waste sludge or other solid wastes shall not be discharged into the receiving waters either directly or indirectly and disposal of waste sludge shall be at permitted solid waste facilities or otherwise in a manner approved by the Department.

6. The effluent limitations for this plant are as follows:

PARAMETERS	EFFLUENT SAMPLING LOCATION Note (1)	DISCHARGE LIMITATIONS Min	DAILY Max	MONTHLY Daily	MEASURE FREQUENCY	SAMPLE METHOD/TYPE
Flow (mgd)	Effluent Weir	- -	10.00	- - -	Continuous	Recorder
pH (S.U.)	Effluent Weir	6.0	8.5	- - -	Continuous	Recorder
TSS (mg/l)	Effluent Weir	- -	30.00	20.00	1/week	24-hour Composite
Iron (mg/l)	Effluent Weir	- -	1.0	- - -	1/week	24-hour Composite

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - FINAL

1. During the period beginning on the effective date and lasting through the expiration date of this permit, the permittee is authorized to discharge from Outfall 001 and Outfall 002 - storm water and treated process wastewater.

Such discharges shall be limited and monitored by the permittee as specified below:

PARAMETERS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS		
	Monthly Average	Daily Maximum	Measurement Frequency	Sample Type	Sampling Point
Flow, MGD	---	40.0	Continuous	Recorder	Effluent
pH (standard units)	See Item 4 on Page I-2		Continuous	Recorder	Effluent
Total Suspended Suspended Solids, mg/l	20.0	30.0	See Item 5 on Page I-2	24 hr. Composite	Effluent
Total Recoverable Iron, mg/l	1.0	1.0	See Item 5 on Page I-2	24 hr. Composite	Effluent
Chronic Whole Effluent Toxicity	(See Item 9 on Page I-2)		See Part IV	24 hr. Composite	Effluent

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 2031 / SUBMITTING AGENCY NAME: FDEP/ NE District	STORET STATION NUMBER:	DATE (M/D/Y): 03/07/94	TIME 1115	RECEIVING BODY OF WATER: Boggy Branch to N Fork of Black Creek
REMARKS:	LOCATION: Dupont Highland			FIELD ID/NAME: Test Site 1/25yd downstream of NPDES POD

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
		5			50	45 Wetlands

Local Watershed Erosion (check box): None [X] Moderate [ ] Heavy [ ]

Local Watershed NPS Pollution (check box): No evidence [ ] Some potential sources [X] Obvious sources [ ]

Point-Source Pollution (list location and describe): discharger only.

Estimated System Width (range, m): 10-30	Estimated System Depth (range, m): 1.5-.5		yes
High Water Mark (m above bed): .5	Velocity (range, m/s): .3 m/sec	Impounded [ ] Channelized [ ]	

Canopy Cover % : Open : [X] Lightly Shaded (11-45%): [ ] Moderately Shaded (46-80%): [ ] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: [ ] Sewage: [ ] Petroleum: [ ] Chemical: [X] Anaerobic: [ ] Other: [ ]

Sediment Oils: Absent: [X] Slight: [ ] Moderate: [ ] Profuse: [ ]

Sediment Deposits: Sludge: [ ] Paper Fiber: [ ] Mud: [ ] Sand: [ ] Shell: [ ] Other: [X] None

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	N/A	N/A	N/A	Riffles	N/A	N/A	N/A
Leaf Packs	10	1	direct	Sand	20	2	direct
Aquatic Vegetation	30	1	direct	Mud/Muck/Silt	10	3	direct
Rock or Shell Rubble	N/A	N/A	N/A	Benthic leaf mats	30	3	direct
Undercut Banks/Roots	N/A	N/A	N/A	Other:	N/A	N/A	N/A

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top N/A								
Mid-depth	1 ft	18°	6.70	6.0	255			.6 L
Bottom N/A								

too shallow

System Type : Stream: [X] (Sand Bottomed / Swamp & Bog / Alluvial / Sand Bot w/ Spring / Calcareous / Misc.) Lake: [ ] Wetland: [ ] Estuary: [ ] Other: [ ]

Water Odors (check box): Normal: [X] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Other: [ ]

Water Surface Oils (check box): None: [X] Sheen: [ ] Globs: [ ] Slick: [ ]

Clarity (check box): Clear: [X] Slightly turbid: [ ] Turbid: [ ] Opaque: [ ]

Color (check box): Tannic: [ ] Green (algae): [ ] Clear: [X] Other: [ ]

Weather Conditions: sunny, mid 70's

Abundance:	Absent	Rare	Common	Abundant
Periphyton	[X]	[ ]	[ ]	[ ]
Fish	[X]	[ ]	[ ]	[ ]
Aquatic Macrophytes	[ ]	[ ]	[X]	[ ]
Iron/sulfur Bacteria	[ ]	[ ]	[X]	[ ]

SAMPLING TEAM:	SIGNATURE:	DATE:
J. Brewer / L. Payne	J Brewer / L Payne	03/07/94

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

SUBMITTING AGENCY CODE: 8631 / SUBMITTING AGENCY NAME: FDEP/ NE District	STORET STATION NUMBER:	DATE (M/D/Y): 03/07/94	RECEIVING BODY OF WATER: Boggy Branch to N. Fork of Black Creek

REMARKS:	LOCATION: Dupont Highland	FIELD ID/NAME: Test site 1/ 25yds downstream of NPDES POD

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 22	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 22	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 3	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	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	**TOTAL SCORE** 75

COMMENTS:

ANALYSIS DATE: 03/07/94	ANALYST: J. Brewer L. Payne	SIGNATURE: J. Brewer / L. Payne

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 20051 / SUBMITTING AGENCY NAME: FDEP/ NE District	STORET STATION NUMBER:	DATE (M/DY): 03/07/04	TIME: 1300	RECEIVING BODY OF WATER: N. Fork of Black Creek
REMARKS:	LOCATION: Dupont Highland	FIELD ID/NAME: ~~Reference site~~ / up-stream of discharge N. Fork of Black Creek		

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
		5%	5%			90% woods

Local Watershed Erosion (check box): None [X] Moderate [ ] Heavy [ ]

Local Watershed NPS Pollution (check box): No evidence [ ] Some potential sources [X] Obvious sources [ ]

Point-Source Pollution (list location and describe): none noted.

Estimated System Width (range, m): 2.0-2.5	Estimated System Depth (range, m): 2.0-0.5	N/A	yes
High Water Mark (m above bed): .5	Velocity (range, m/s): .25-.1	Impounded	[ ]
		Channelized	[ ]

Canopy Cover % : Open : [ ] Lightly Shaded (11-45%): [ ] Moderately Shaded (46-80%): [ ] Heavily Shaded: [X]

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: [X] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Anaerobic: [ ] Other: [ ]

Sediment Oils: Absent: [X] Slight: [ ] Moderate: [ ] Profuse: [ ]

Sediment Deposits: Sludge: [ ] Paper Fiber: [ ] Mud: [ ] Sand: [ ] Shell: [ ] Other: [X] None

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	20	4	dipnet	Riffles	N/A	N/A	N/A
Leaf Packs	20	4	dipnet	Sand	N/A	N/A	N/A
Aquatic Vegetation	10	4	dipnet	Mud/Muck/Silt	15	2	dipnet
Rock or Shell Rubble	N/A	N/A	N/A	Benthic leaf mats	20	2	dipnet
Undercut Banks/Roots	15	4	dipnet	Other:	N/A	N/A	N/A

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top N/A								.6 L
Mid-depth	1ft	16	4.40	6.7	50			
Bottom N/A								

System Type : Stream: [ ] (Sand Bottomed / Sand Bot w/ Soring / Swamp & Bog / Calcareous / Alluvial / Misc) Lake: [ ] Wetland: [ ] Estuary: [ ] Other: [ ]

Water Odors (check box): Normal: [X] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Other: [ ]

Water Surface Oils (check box): None: [X] Sheen: [ ] Globs: [ ] Slick: [ ]

Clarity (check box): Clear: [X] Slightly turbid: [ ] Turbid: [ ] Opaque: [ ]

Color (check box): Tannic: [X] Green (algae): [ ] Clear: [ ] Other: [ ]

Weather Conditions: Sunny, mid 70's.

Abundance:	Absent	Rare	Common	Abundant
Periphyton	[ ]	[X]	[ ]	[ ]
Fish	[ ]	[ ]	[X]	[ ]
Aquatic Macrophytes	[ ]	[X]	[ ]	[ ]
Iron/sulfur Bacteria	[X]	[ ]	[ ]	[ ]

SAMPLING TEAM:	SIGNATURE:	DATE:
Jan Brewer / Lindy Payne	J Brewer / Lindy Payne	03/07/04

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP/NE District	STORET STATION NUMBER:	DATE (M/D/Y): 03/07/94	RECEIVING BODY OF WATER: N. Fork of Black Creek

REMARKS:	LOCATION: Dupont Highland	FIELD ID/NAME: ~~[illegible]~~ Reference Site 2/up-stream of discharge N. Fork of Black Creek

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 30	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 12	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: 5 — Add 5 **points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	TOTAL SCORE: 82

COMMENTS: Test area is a small creek surrounded by wetlands.

ANALYSIS DATE: 03/07/94	ANALYST: J. Brewer / L. Payne	SIGNATURE: J. Brewer / L. Payne

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Dupont - HIGHLAND
Location:
County: CLAY
Contact/District: LINDY PAYNE NE
NPDES Permit #: FL00 00035 Outfall #: 001

Sample Collection: Date 3-7-94 Time 1045
Test Beginning: Date 3-8-94 Time 1600
Test Ending: Date 3/8/94 Time 1600
Organism Batch #: 7 Diluent Batch #: 8
Organism Age: <24hrs
Test Organism: Ceriodaphnia dubia

94-MAR-08-AA 73394

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

Test Number: 1 of 2

Remarks:

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.1 @ 23.3	8.4 @ 23.5	990 @ 1,000 (9845) 9040 @ ~~10,000~~ @ 23.6 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.0 @ 24.1	8.4 @ 23.6	990 @ 1,000 (9845) 9560 @ ~~10,000~~ @ 23.9 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.6 @ 22.7	8.4 @ 23.1	990 @ 1,000 (9845) 9450 @ ~~10,000~~ @ 23.1 °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	UNCORRECTED 24 h	UNCORRECTED 48 h
Control	A	5	5	5	8.4		8.3	22.9		23.9	8.9		8.1	165		185
Control	B	5	5	5	"		8.3			24.2			8.1			190
Control	C	5	5	5	"		8.3			24.3			8.2			185
Control	D	5	5	5	"		8.3			23.7			8.2			180
100%	A	5	5	0	7.5		7.5	21.5		23.4	9.7		8.5	265		320
100%	B	5	5	0			7.5			23.4			8.3			300
100%	C KP	~~6~~	6	0			7.4			23.4			8.3			320
100%	D	5	5	0			7.4			23.1			8.3			335
	miscount															
	KP	3/9/94														
Measured/Loaded by:		KP	KP	KP	KP		DW	KP		DW	KP		DW	KP		DW
Recorded by:		TR	KP	DW	TR		KP	TR		KP	TR		KP	TR		KP

Investigators' Signatures

Robin Allen Ruder

Kim Pearce

Reviewer

form updated 7/8/93

Water Quality Parameters	Salt Water/ (Well Water)	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			0.01	—	JB/LP
Lab Total Residual Cl2:	<0.03	<0.03	<0.03	DR-100	TR
Alkalinity:	125	70	10	Hach	TR
Hardness:	120	80	80	Hach	TR
Total Ammonia:	<0.017	<0.017	<0.017	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: -57.9 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Dupont - HIGHLAND
Location:
County: CLAY
Contact/District: LINDY PAYNE NE
NPDES Permit #: FL0000035 Outfall #: 001

Sample Collection: Date 3.7.94 Time 1045
Test Beginning: Date 3.8.94 Time 1600
Test Ending: Date 3/10/94 Time 1640
Organism Batch #: 9 Diluent Batch #: well
Organism Age: 10 days
Test Organism: Cyprinella leedsi

94-MAR-08-44 73394

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

Test Number: 2 of 2

Remarks:

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.1 @ 23.3	8.4 @ 23.5	990 @ 1,000 9540 @ ~~10,000~~ 9545 @ 23.6 °C
24 hr	7.0 @ 7.0 9.0 @	24.0 @ 24.1	8.4 @ 23.6	990 @ 1,000 9560 @ ~~10,000~~ 7895 @ 23.9 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.6 @ 22.7	8.4 @ 23.1	990 @ 1,000 9450 @ ~~10,000~~ 7895 @ 23.1 °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~~ µmhos/cm) 0 hr	UNCORRECTED Cond. (µmhos/cm) 24 h	UNCORRECTED Cond. (µmhos/cm) 48 h
Control A	883	5	5	5	7.9	8.3	8.4	21.7	22.9	22.9	8.5	8.1	8.4	235	240	240
Control B	26	5	5	5	7.9	8.3	8.4			22.9	8.5	8.1	8.2	235	240	240
100% A	29	5	5	5	7.6	7.6	7.6	20.8	22.9	22.9	10.2	8.4	8.2	270	285	290
100% B	57	5	5	5	7.6	7.6	7.5			22.8	10.2	8.4	8.2	270	285	290
Measured/Loaded by:		TR	JM	KP	KP	TR	DW	KP	TR	DW	KP	TR	DW	KP	TR	DW
Recorded by:		TR	TM	KP	TR	TM	KP	TR	TM	KP	TR	TM	KP	TR	TM	KP

Investigators' Signatures
Tobin Alan Rader
Kim Pearce

Reviewer

form updated 7/8/93

Water Quality Parameters	Salt Water/ (Well Water)	20% Mln Water	Sample	Method	Measured by
Field Total Residual Cl2:			0.01	—	JB/LP
Lab Total Residual Cl2:	<0.03	<0.03	<0.03	DR-100	TR
Alkalinity:	125	70	10	Hach	TR
Hardness:	120	80	80	Hach	TR
Total Ammonia:	<0.017	<0.017	<0.017	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: -57.9 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

Typical Values for Selected Parameters in Florida Waters

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

Percentile Distribution

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
STREAMS (1617 stations)											
Phytoplankton Chlorophyll *a*	0.22	0.52	0.94	1.60	3.02	4.63	6.72	9.87	14.68	27.35	48.70
Periphyton Chlorophyll *a*	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85
H-D Diversity	0.84	2.12	2.48	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90
Qualitative Taxa Richness	9.00	12.00	17.00	20.00	22.00	24.50	26.00	28.00	31.00	37.00	53.00
H-D Taxa Richness	6.00	6.50	9.00	11.50	13.00	15.00	17.00	21.50	26.00	29.00	32.00
TKN	0.30	0.39	0.56	0.73	0.87	1.00	1.11	1.26	1.49	1.93	2.80
Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60
NO2-NO3	0.01	0.01	0.03	0.05	0.07	0.10	0.14	0.20	0.32	0.64	1.05
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	0.39	0.74	1.51
Ortho 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
LAKES (477 stations)											
Phytoplankton Chlorophyll *a*	0.80	1.71	2.88	4.28	10.06	13.40	20.00	30.10	47.20	65.44	113.90
Dredge Diversity	0.71	0.97	1.43	1.74	1.98	2.12	2.21	2.59	2.85	3.15	3.17
Dredge Taxa Richness	3.00	5.00	6.50	7.00	9.00	10.00	11.00	13.00	15.00	17.00	21.00
TKN	0.36	0.49	0.67	0.83	1.08	1.26	1.40	1.51	1.68	2.11	3.46
NH3+NH4	0.01	0.02	0.02	0.03	0.04	0.06	0.08	0.12	0.15	0.21	0.28
NO2-NO3	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.05	0.10	0.14	0.23
Total Phosphorus	0.01	0.02	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.23	0.42
Ortho-Phosphate	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.21	0.32
Turbidity	1.00	1.25	1.55	2.05	2.75	4.50	6.45	9.60	14.10	26.00	40.00
ESTUARIES (690 stations)											
Phytoplankton Chlorophyll *a*	2.14	3.28	4.49	5.13	6.00	6.93	7.94	9.60	12.40	17.60	22.20
Dredge Diversity	1.34	1.53	1.91	2.28	2.56	2.90	3.15	3.59	4.01	4.53	4.98
Dredge Taxa Richness	4.00	6.00	9.00	11.00	15.00	18.50	25.00	35.00	41.00	62.00	90.00
TKN	0.26	0.34	0.42	0.50	0.59	0.69	0.76	0.82	0.95	1.30	1.49
NH3+NH4	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.09	0.13	0.22	0.28
NO2-NO3	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.05	0.08	0.17	0.23
Total Phosphorus	0.01	0.02	0.06	0.07	0.10	0.11	0.14	0.17	0.23	0.43	0.59
Ortho-Phosphate	0.01	0.02	0.03	0.04	0.04	0.05	0.07	0.09	0.12	0.21	0.44
Turbidity	3.50	4.00	4.50	5.05	5.40	5.60	6.30	6.80	8.00	11.40	11.75

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

Reference Site

Calculation & Interpretation of the Stream Invertebrate Index for Florida (SIIF) (Draft 1994)									
Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	**Panhandle (65, 75a)**					**Peninsula (75b, c, d)**			
	Value	5	3	1	Score	5	3	1	Score
Number of Taxa	31	≥ 31	16–30	0–15	5	≥ 27	14–26	0–13	
EPT Index	6	≥ 7	4–6	0–3	3		≥ 4	0–3	
% Contribution of Dominant Taxon	33		≤ 20	> 20	1		≤ 37	> 37	
Florida Index	12	≥ 18	9–17	0–8	3	≥ 7	4–6	0–3	
% Diptera	61		≤ 38	> 38	1		≤ 32	> 32	
% Suspension feeders/ Collector-Filterers	40	≥ 12	7–11	0–6	5	≥ 8	4–7	0–3	
% Shredders	7		≥ 10	0–9	1		≥ 13	0–12	
% Crustacean+Mollusks (Peninsula only)		–	–	–			≥ 16	0–15	
# Crustacean+Mollusks (Peninsula only)		–	–	–			≥ 4	0–3	
Total Score	**Panhandle**				19	**Peninsula**			
Interpretation of Score	**No Impairment**				**29-23**	**No Impairment**			**33-27**
	Moderate Impairment				**22-15**	**Moderate Impairment**			**26-17**
	Severe Degradation				**14-7**	**Severe Degradation**			**16-9**

Test Site

Calculation & Interpretation of the Stream Invertebrate Index for Florida (SIIF) (Draft 1994)									
Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	**Panhandle (65, 75a)**					**Peninsula (75b, c, d)**			
	Value	5	3	1	Score	5	3	1	Score
Number of Taxa	4	≥ 31	16–30	0–15	1	≥ 27	14–26	0–13	
EPT Index	1	≥ 7	4–6	0–3	1		≥ 4	0–3	
% Contribution of Dominant Taxon	29		≤ 20	> 20	1		≤ 37	> 37	
Florida Index	3	≥ 18	9–17	0–8	1	≥ 7	4–6	0–3	
% Diptera	86		≤ 38	> 38	1		≤ 32	> 32	
% Suspension feeders/ Collector-Filterers	5	≥ 12	7–11	0–6	1	≥ 8	4–7	0–3	
% Shredders	15		≥ 10	0–9	3		≥ 13	0–12	
% Crustacean+Mollusks (Peninsula only)		–	–	–			≥ 16	0–15	
# Crustacean+Mollusks (Peninsula only)		–	–	–			≥ 4	0–3	
Total Score	**Panhandle**				9	**Peninsula**			
Interpretation of Score	**No Impairment**				**29-23**	**No Impairment**			**33-27**
	Moderate Impairment				**22-15**	**Moderate Impairment**			**26-17**
	Severe Degradation				**14-7**	**Severe Degradation**			**16-9**

Benthic macroinvertebrate taxa list for DuPont de Nemours, Inc.– Highland Plant, collected via Hester-Dendy samplers in Black Creek (reference site) and Boggy Creek (test site), on 3 March, 1994.

	Reference Site	Test Site
Amphipoda		
Hyalella azteca	5	–
Coleoptera		
Hydroporus sp.	2	–
Undetermined Curculionidae	1	–
Diptera		
Ablabesmyia mallochi	1	–
Chironomus sp.	–	2
Helopelopia sp.	1	–
Labrundinia pilosella	1	–
Polypedilum illinoense	1	2
Procladius sp.	1	–
Tanytarsus sp. E (Epler)	1	–
Tanytarsus sp. C (Epler)	5	–
Tanytarsus sp. L (Epler)	10	–
Tanytarsus sp. M (Epler)	11	–
Tanytarsus sp. S (Epler)	2	–
Tribelos jucundum	1	–
Undetermined dipteran pupa	12	–
Undetermined dipteran species	1	–
Ephemeroptera		
Eurylophella temporalis	3	–
Leptophlebia bradleyi	1	–
Leptophlebia intermedia	13	–
Stenonema smithae	1	–
Undetermined Leptophlebiidae	4	–
Trichoptera		
Cernotina sp.	–	1

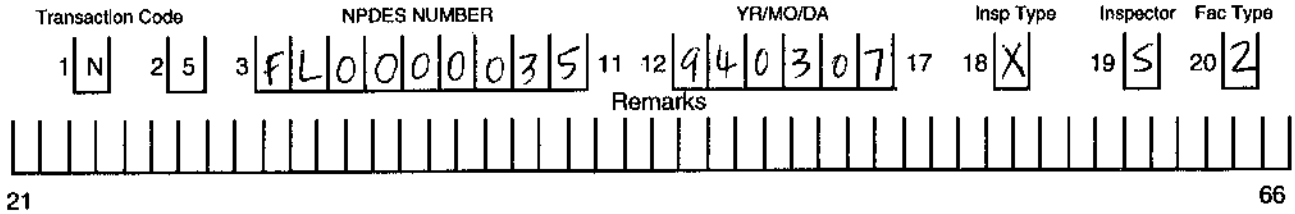
Benthic macroinvertebrate taxa list for DuPont de Nemours, Inc.– Highland Plant, collected via 20 discrete dip net sweeps in Black Creek (reference site) and Boggy Creek (test site), on 3 March, 1994.

	Reference Site	Test Site
Amphipoda		
Hyalella azteca	47	–
Coleoptera		
Ancyronyx variagata	24	–
Hydroporus sp.	12	–
Diptera		
Conchapelopia sp.	36	–
Corynoneura sp.	36	–
Dasyhelia sp.	–	6
Helopelopia sp.	12	–
Hemerodromia sp.	12	–
Palpomyia grp. sp.	36	–
Phaenopsectra punctipes grp.	12	–
Polypedilum convictum grp.	12	–
Polypedilum illinoense	36	3
Polypedilum tritum	12	9
Rheotanytarsus exiguus grp.	12	–
Simulium sp.	468	–
Stenochironomus s p.	96	–
Tanytarsus sp. C (Epler)	12	–
Tanytarsus sp. L (Epler)	12	–
Unniella multivirga	12	–
Tanytarsus sp. M (Epler)	12	–
Undetermined Tipulidae	12	–
Undetermined dipteran pupae	24	–
Ephemeroptera		
Eurylophella temporalis	24	–
Habrophlebiodes brunneipennis	72	–
Stenonema smithae	36	–
Gastropoda		
Undetermined Ancylidae sp.	12	–
Oligochaeta		
Branchiura sowerbyi	48	–
Undetermined Enchytraeidae	96	–
Limnodrilus hoffmeisteri	12	–
Nais communis	16	–
Pristinella osborni	108	–
Trichoptera		
Nectopsyche sp.	12	–
Polycentropus sp.	–	3
Pycnopsyche sp.	24	–

Periphyton taxa list and densities (#/mm^2) for Dupont De Nemours Highland, collected via glass microscope slides in receiving water, on 27 April, 1994.

	Reference Site	Test Site
Bacillariophyta		
Achnanthes exigua	1	–
Achnanthes linearis	1	–
Achnanthes minutissima	1	–
Achnanthes lanceolata v. apiculata	1	–
Bacillaria paradoxa	1	–
Eunotia exigua	4	–
Eunotia incisa	1	–
Eunotia naegelii	1	–
Eunotia pectinalis	5	–
Eunotia sp.	3	–
Eunotia vanheurckii	1	–
Frustulia rhomboides v. amphipleuroides	2	–
Navicula cocconeiformis	2	–
Navicula minima	6	–
Chlorophyta		
Unknown chlorophyte flagellate	1	–
Cyanophyta		
Chroococcus sp.	1	1
Gloeothece sp.	–	1
Lyngbya contorta	2	–
Microcystis sp.	10	–
Phormidium sp.	2	–
Trachelomonas sp.	1	–
Total	47	2

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



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

