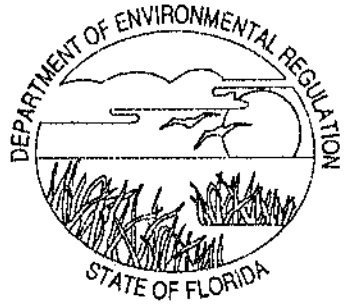


Biological Assessment of

Seminole Kraft Corp.

Duval County

NPDES #FL0000400

Sampled October 1992

March 1993

Biology Section
Division of Technical Services

Department of Environmental Regulation
Results of Fifth Year Inspections

Discharger: Seminole Kraft Corp.
County: Duval
NPDES Number: FL0000400
State Permit Expiration Date: 3 April 1996

Toxics Sampling Inspection (XSI)

Date Sampled: 20 October 1992

Results: Polycyclic aromatic hydrocarbons (18 µg/L) and unidentifiable organics (28 µg/L) were detected in the discharge. This level of PAH is in violation of Rule 17-302.560(36) FAC, which prohibits a concentration of more than 0.031 µg/L of total PAH. Aluminum (601 µg/L) and iron (225 µg/L) were detected in the discharge at levels above quantitation limits. These concentrations of metals are well within Class III standards for marine waters.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 20 October 1992

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

Impact Bioassessment Inspection (IBI)

Date Sampled: 20 October 1992

Results: Quantitative measures of benthic macroinvertebrate community health suggested moderate degradation associated with the discharge. Reductions in taxa richness and Shannon-Weaver diversity occurred at both test sites when compared to the reference site. The decrease in diversity represents a violation of the biological integrity criterion (Rule 17-302.560(9) FAC). Most algal related measurements, such as taxa richness, chlorophyll *a*, and the blue-green to diatom ratio, indicated no major differences between the reference and test sites. It was noteworthy that chlorophyll *a* was low, given the nutrient and AGP levels at all stations. This may have been due to the flow regime or other factors.

Water Quality Inspection (WQI)

Date Sampled: 20 October 1992

Results: Effluent levels of both fecal coliforms (23,000 organisms/100ml) and total coliform bacteria (105,000 organisms/100ml) greatly exceeded Class III standards. Bacteria measured at all receiving water stations were within water quality standards. The Seminole Kraft effluent was relatively low in nutrients. In contrast, nitrate-nitrite concentrations in the receiving waters were remarkably elevated, and higher than 95% of other Florida estuaries. Receiving water ortho-phosphate levels were in excess of 75% of other estuaries. This nutrient enrichment is more probably attributable to other sources (urban and agricultural runoff, a variety of point source discharges) than to the Seminole Kraft discharge. Algal growth potential at the reference site and at both test sites was above the "problem threshold" for marine waters, suggesting the possibility of the negative effects associated with cultural eutrophication.

Introduction

Seminole Kraft Corp. is located on Eastport Road in Jacksonville, Duval County, Florida (see maps in Appendix). The company manufactures unbleached pulp and paper. In October, 1992, the mill was reconfigured to produce linerboard from 100% recycled fiber rather than from kraft pulp. The 20 MGD industrial wastewater treatment facility consists of primary clarification and biological treatment in an aerated stabilization basin. The treated process water is discharged through a 72 inch diameter pipe and four 26 inch diameter diffusers into the Class III St. Johns River (see maps in Appendix). Until October of 1992, the facility had been discharging treated process wastewater and non-contact cooling water at an average flow of 50.95 MGD (for the seven months prior to October). Since October of 1992, the facility has eliminated the use of non-contact cooling water due to the reconfiguration of the mill. Therefore, the intake from the Broward River and the discharge of non-contact cooling water into the St. Johns River has been eliminated. The average flow for treated process water discharged from October to January 1993 has been 10.5 MGD, which is approximately a 75% reduction in the total discharge.

Permit limits are fairly extensive, and include provisions for the non-contact cooling water (outfall 001-b) and the treated process wastewater (outfall 001-a) (see detailed list in Appendix). In addition to limits on standard parameters, such as BOD and TSS, biomonitoring is also required by the NPDES permit. The effluent is not allowed to produce an acute LC_{50} of 100% or less, or a chronic LOEC of 9% or less. Mixing zones of 7,472 m^2 for aluminum, and 2,827 m^2 for chronic toxicity, have been granted to this facility. During this investigation, effluent was sampled at the combined outfall 001, which consisted primarily of treated process wastewater, since the cooling water discharge was being phased out at the time.

A review of Monthly Operating Report data showed that the facility has been in compliance with permit conditions for the past two years. Although there have been a few sporadic problems (*e.g.*, fuel spills into groundwater, BOD exceedence in 1990), overall, the plant has been operating satisfactorily (see Appendix). A consent order was issued for groundwater clean-up. Although the facility had been failing acute toxicity tests, recent bioassays (since 1991) indicated no toxicity. Effluent quality is expected to improve since the facility has converted to processing only recycled material.

Methods

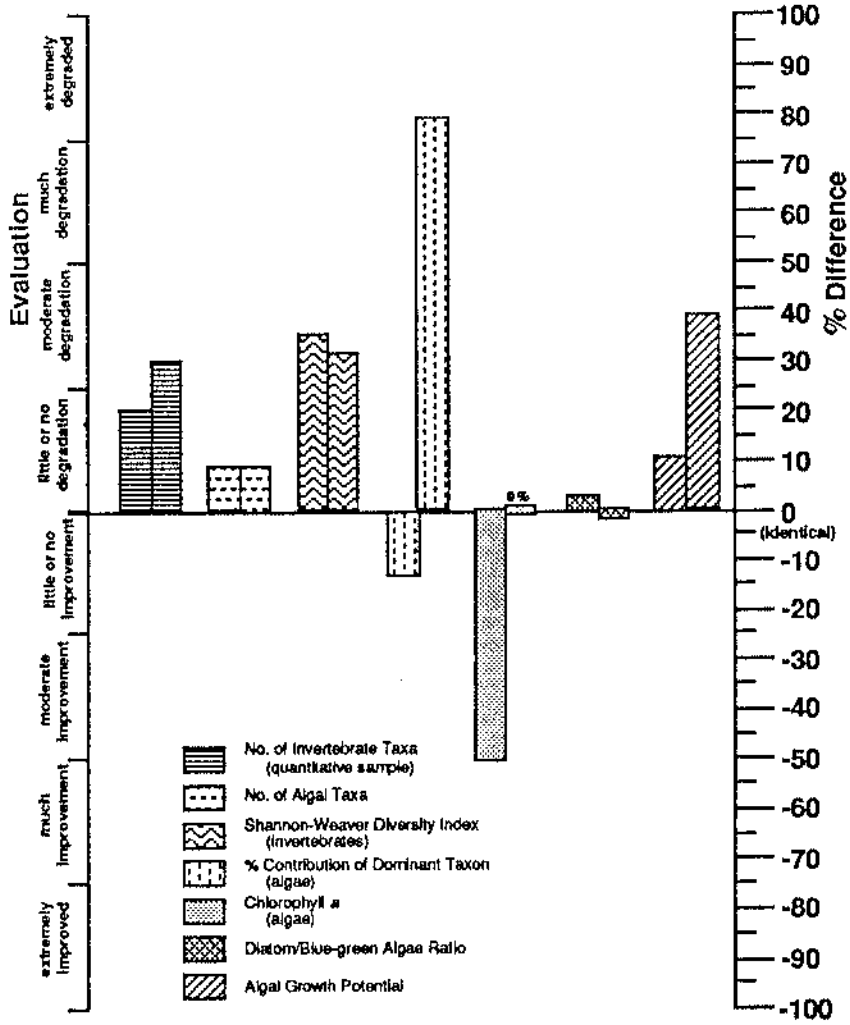
The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located approximately one mile southeast of the outfall) and two test

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	10	8	7
Shannon-Weaver Diversity	3.1	2.0	2.1
% Polychaeta	47.1	84.8	45.2
% Malacostraca	41.2	2.2	48.4
% Gastropoda	0	6.5	0
% Cumacea	11.7	0	0
% Nemertina	0	2.2	3.2
% Other	0	4.9	3.2
% Carnivores	0	2.2	3.1
% Deposit Feeders	72.7	75.5	48.3
% Suspension Feeders	11.8	18.1	0
% Browsers	0	3.2	48.6
% Scavengers	15.5	1.1	0
Phytoplankton Algae			
Number of Taxa	22	20	20
% Contribution of Dominant Taxon	15.4	13.3	27.5
Chlorophyll a (µg/L)	1.2	0.6	1.2
Diatom/Blue-green Abundance Ratio	0.93	0.90	0.95
% Diatoms	80.8	84.4	78.4
% Blue-green	5.8	8.9	3.9
% Chlorophytes	13.5	6.7	17.6
Algal Growth Potential (mg dry wt/l)	10.6	11.7	14.8

sites bracketing the discharge (see map 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 *Notropis leedsi* as test organisms, were performed on an effluent sample (Weber 1991). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on effluent, reference, and test sites. Methods used for all chemical analyses are on file at the Tallahassee DER Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at reference and test sites. Invertebrates were collected via three Ponar grabs per site (Ross 1990). Phytoplankton was sampled at reference and test sites by subsurface grabs. Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). Algal Growth Potential tests, using *Selenastrum capricornutum* with the freshwater effluent, and *Dunaliella tertiolecta* with saline receiving waters, followed Miller *et al.* (1978) and EPA (1974).

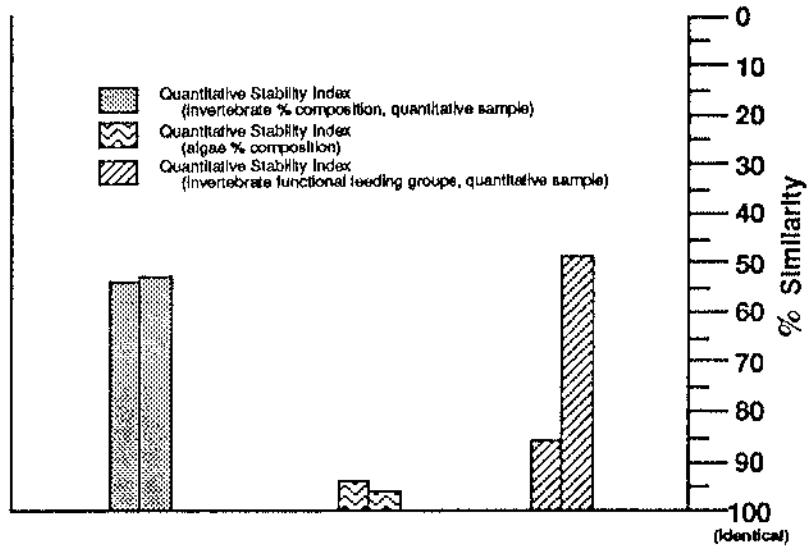


Effect of discharge on receiving water
(measured as difference between control and test sites).
(Left bar represents comparison between control site and test site 1; right bar represents comparison between control site and test site 2.)

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health have been employed. Many of these, such as the number of taxa, Shannon-Weaver Diversity Index, and chlorophyll *a* are well known. Others are briefly explained here. Excessive numerical dominance of a single type of organism (a high % contribution of dominant taxon) is usually associated with disturbance. 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. 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 totaled. A QSI (% composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (functional feeding groups).

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, the diversity 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



Effect of discharge on receiving water
(measured as similarity between control and test sites).
(Left bar represents comparison between control site and test site 1; right bar represents comparison between control site and test site 2.)

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: Scott Bulgrin and Lindy Payne (DER Northeast District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Roberto Llanso, Kathleen Lurding, Kim Pearce, Urania Quintana, Landon Ross, and Greg Wynn (Tallahassee Biology Laboratory).

Results and Discussion

The study area is situated near the saline mouth of the St. Johns River. Numerous pollution sources are present in this portion of the river, which is subject to tidally induced flow reversals. Habitat quality was higher at the reference site (with 69 points) than at the test sites (both with 56 points). Land use near the test sites was predominantly industrial or natural (salt marsh), while the reference site was surrounded mostly by native *Spartina* salt marsh with some residential land uses. The study sites were similar with respect to many physical/chemical parameters, such as salinity (between 9 ppt and 10 ppt), temperature (near 22° C), pH (between 7.6 and 8.0), and substrate composition (sand, mud, woody debris, and shoreline aquatic vegetation at all sites).

Analysis for effluent organic constituents revealed the presence of 18 µg/L of polycyclic aromatic hydrocarbons (PAH) and unidentifiable organics (28 µg/L). This level of PAH is in violation of Rule 17-302.560(36) FAC, which prohibits a concentration of more than 0.031 µg/L of total PAH. Aluminum (601 µg/L) and iron (225 µg/L) were detected in the discharge at levels above quantitation limits. These concentrations of metals are well within Class III standards for marine waters.

The sample of effluent was not acutely toxic to the invertebrate, *Ceriodaphnia dubia*, or to the fish, *Notropis leedsi*. No significant mortality occurred in either test.

Effluent levels of both fecal coliforms (23,000 organisms/100ml) and total coliform bacteria (105,000 organisms/100ml) greatly exceeded Class III standards. Bacteria measured at all receiving water stations were within water quality standards (see Chemistry Summary Table).

The Seminole Kraft effluent was relatively low in nutrients (see Chemistry Summary Table). For example, ortho-phosphate was 0.14 mg/L and nitrate-nitrite was undetected. In contrast, nitrate-nitrite concentrations in the receiving waters (0.23 mg/L at the reference site and 0.25 mg/L at both test sites) were remarkably elevated, and higher than 95% of other Florida estuaries (see Table of Typical Water Quality Values in Appendix). Receiving water ortho-phosphate levels were in excess of 75% of other estuaries. This nutrient enrichment is more probably attributable to other sources (urban and agricultural runoff, a variety of point source discharges) than to the Seminole Kraft discharge.

Algal growth potential at the reference site, was 10.6 mg dry wt/L, while waters from test sites 1 and 2 yielded 11.7 mg dry wt/L and 14.8 mg dry wt/L, respectively. These levels are above the "problem threshold" of 10 mg dry wt/L for marine waters, above which cultural eutrophication and its consequences are likely to occur (Ron Raschke, US EPA, personal communication).

Quantitative measures of benthic macroinvertebrate community health suggested moderate degradation associated with the discharge (see table and figures). The figure on p. 2 indicates the degree of difference between the reference and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. Negative values mean that the test site is better than the reference. The figure on page 3 indicates similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

Taxa richness was reduced by 20% at test site 1 and by 30% at test site 2, compared to the reference site. Similarly, Shannon-Weaver diversity decreased at the test sites (by 35.5% at test site 1 and by 32.3% at test site 2), when compared to the reference site. This is a violation of the biological integrity criterion (Rule 17-302,560(9) FAC). Community structure at all three sites was fairly dissimilar. It is noteworthy, however, that the abundance of epibenthic crustaceans (*e.g., Alpheus viridari, Mysidopsis* sp.) which were found at the reference site, were reduced at both test sites (in fact, no epibenthic crustaceans were found at test site 2).

The phytoplankton assemblage found in this portion of the St. Johns River was dominated by diatoms (greater than 78% of the population) at all three receiving water stations. Many algal related measurements, such as taxa richness, chlorophyll *a*, and the blue-green to diatom ratio, indicated no major differences between the reference and test sites. Although the % contribution of the dominant taxon at test site 2 was higher than that of the control, the fact that 27% of the population at test site 2 was composed of *Nitzschia* spp. is not considered an alarming finding (Livingston and Prasad 1989). It was noteworthy that chlorophyll *a* was low in comparison to the nutrient and AGP levels at all stations. This may have been due to the flow regime or other factors.

Conclusions

Polycyclic aromatic hydrocarbons (18 µg/L) and unidentifiable organics (28 µg/L) were detected in the discharge. This level of PAH is in violation of Rule 17-302.560(36) FAC, which prohibits a concentration of more than 0.031 µg/L of total PAH. Aluminum (601 µg/L) and iron (225 µg/L) were detected in the discharge at levels above quantitation limits. These concentrations of metals are well within Class III standards for marine waters.

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Algal growth potential at the reference site and at both test sites was above the "problem threshold" for marine waters, suggesting the possibility of the negative effects associated with cultural eutrophication.

Quantitative measures of benthic macroinvertebrate community health suggested moderate degradation associated with the discharge. Reductions in taxa richness and Shannon-Weaver diversity occurred at both test sites when compared to the reference site. The decrease in diversity represents a violation of the biological integrity criterion (Rule 17-302.560(9) FAC).

Most algal related measurements, such as taxa richness, chlorophyll *a*, and the blue-green to diatom ratio, indicated no major differences between the reference and test sites. It was noteworthy that chlorophyll *a* was low, given the nutrient and AGP levels at all stations. This may have been due to the flow regime or other factors.

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.

Environmental Protection Agency. 1974. Marine algal assay procedure: Bottle test. Nat'l Environ. Res. Center, Office of Res. and Dev., U.S. EPA, Corvallis, Oregon. 43 p.

Livingston, R. J. and A. K. S. K. Prasad. 1989. A photographic atlas of North Florida estuarine phytoplankton and a summary of life history relationships with various environmental conditions. FSU Center for Aquatic Research and Resource Management. 306 p.

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.

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

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Chemistry summary table for

Seminole Kraft	Effluent	Reference Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
Polycyclic Aromatic Hydrocarbons	18			
Unidentifiable organics	28			
Metals (ug/L)				
Aluminum	601			
Antimony	15 U			
Arsenic	20 U			
Cadmium	0.8 U			
Copper	5 U			
Chromium	10 U			
Iron	225			
Lead	15 U			
Mercury	0.1 U			
Nickel	9 T			
Selenium	30 U			
Silver	0.1 U			
Zinc	9 T			
Nutrients (mg/L)				
Ortho-phosphate	0.14	0.1	0.1	0.11
Total phosphorus	0.21	0.13	0.17 A	0.071
Ammonia	0.042	0.030 U	0.067	0.030 U
Nitrate+Nitrite	0.02 U	0.23	0.25 A	0.25
TKN	2.2	0.67	1.0 A	0.78
Other Parameters				
Habitat Assessment		69	56	56
D.O. (mg/L)		meter malfunction	6.3	meter malfunction
pH (SU's)	7.8	7.6	7.6	8.0
Salinity (ppt)	0	10	10	9
Temperature (°C)		22.5	21.7	22.5
BOD (mg/L)	13	0.35	0.75	0.1
Algal Growth Potential (mg dry wt/L)	0.8	10.6	11.7	14.8
TSS (mg/L)	9	7	2	7
Color(PtCo)	150	150	150	150
Bioassay - Fish	Not toxic			
Bioassay - Invertebrate	Not toxic			
Fecal coliform (org/100 ml)	23,000	40	135	20
Total coliform (org/100 ml)	105,000	85	200	170

T - Value reported is less than the practical quantitation limit

A - Average of 2 or more determinations

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

Typical Values for Selected Parameters in Florida Waters

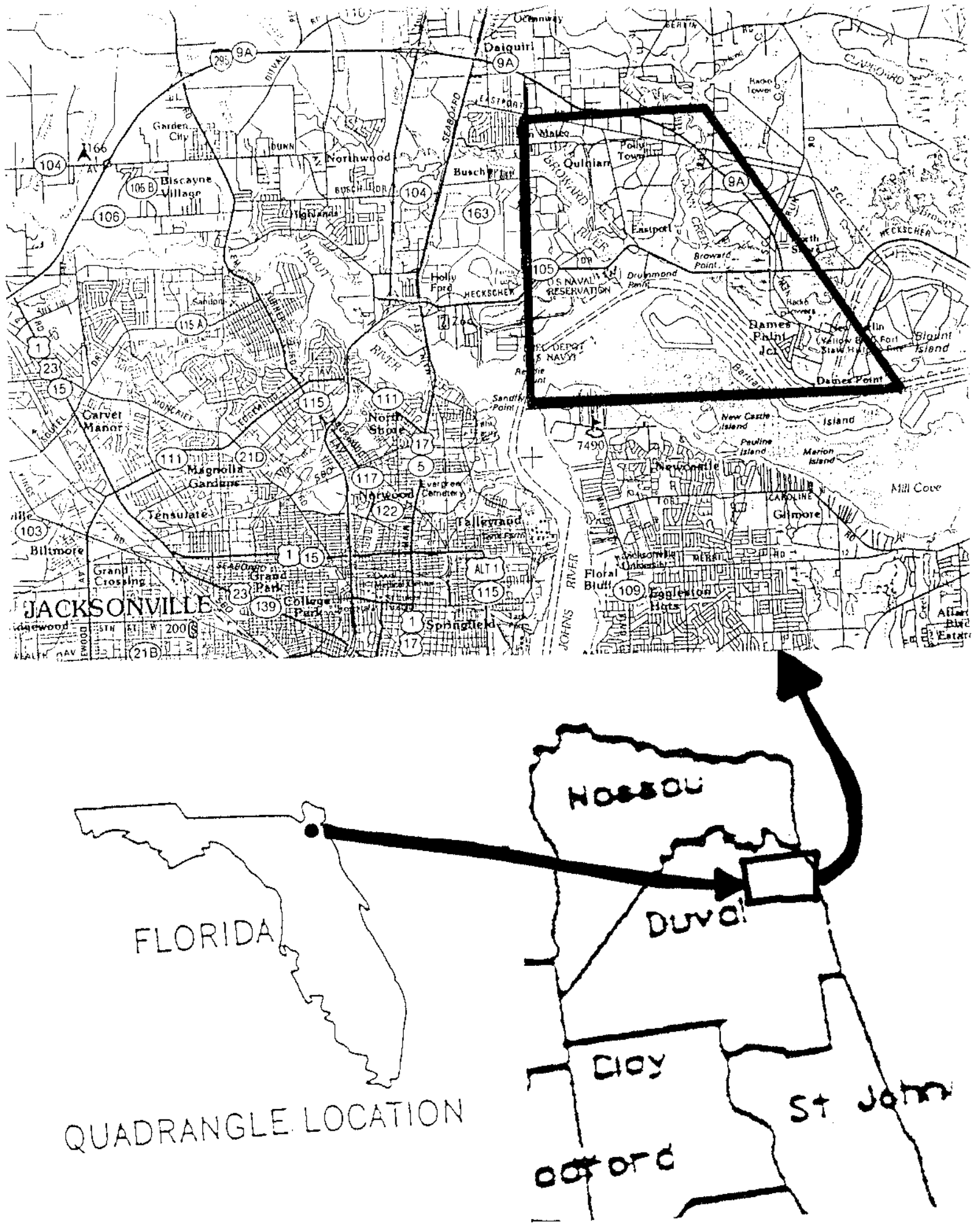
Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

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 Phosphorus	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-Phosphorus	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-Phosphorus	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

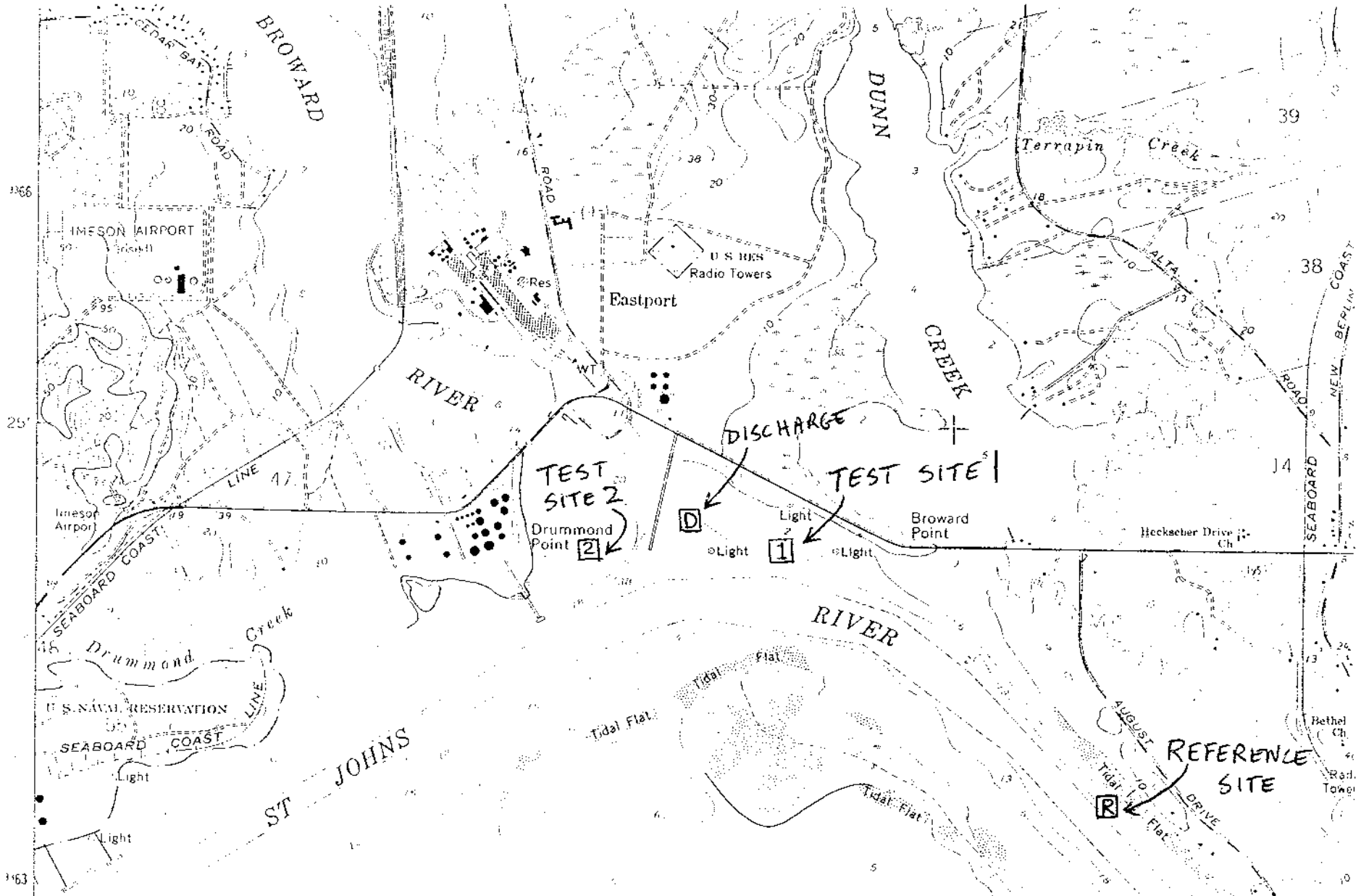
Units:

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



General Map of Seminole-Kraft Corp. Study Area

Map of Seminole Kraft Corp. Study Area.



D - Seminole Kraft, Inc. area of effluent discharge.

1 - Test site #1/ St. Johns River half-way between markers, 150ft North of seminole kraft effluent (upstream)

2 - Test site #2/ St. Johns River South of Seminole Kraft effluent at Broward River confluence between piers (downstream)

R - Reference site/St. Johns River half-way between Dunn's Creek and Dames Point, about 200ft off west bank.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: SEMINOLE KRAFT CORP.		Date Summary Prepared: 11/20/92
Location (attach detailed map): 9469 Eastport Road Jacksonville, FL 32218	County: DUVAL	District: NORTHEAST DISTRICT
Federal Permit # FL0000400 and expiration date: April 30, 1996	State GMS # and 3116P06063 State expiration date: IO16-200147 IO16-184685 Both WWTF modifications April 3, 1996	Facility Type: (Industrial) Municipal Federal Agricultural Other (list):

Function of facility: Unbleached Kraft Pulp and Paper Operation
The mill is being reconfigured to produce linerboard from 100% recycle fiber instead of from kraft pulp.

Description of treatment process: The industrial Wastewater Treatment Facility (WWTF) consists of primary clarification and biological treatment in an aerated stabilization basin. The components of the industrial WWTF include four main mill sewers that collect wastewater from the powerhouse, boiler and caustic area, pulp mill and the woodyard and paper mill; a diversion pit, travelling bar screen, grit chambers, four lift pumps, back-up power generator, primary clarifier, a CO_2/sulfuric acid injection system for pH control, two 3.5 acre unlined holding ponds (one dedicated as emergency storage), a 60 acre unlined aerated stabilization basin with fifteen surface splash aerators and a peripheral sprinkler system for foam control, and a Parshall flume.

Receiving waters: ST. Johns River	Classification: I II (III)	
Design Flow: 20 MGD (Average Process Design WWTF Wastewater Flow)	Mean Flow: 47.7 MGD (Average over 4 months)	Flow during survey:

3.5 GD and in-ntact ating ater istem

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.): Mixing zones in the St. Johns River have been granted for aluminum (granted in operation permit No. IO16-184685) and chronic toxicity pursuant to Rule 17-4.244, FAC, for each of the four 0.9 meter diameter outfall diffusers. The total area of the combined mixing zones for aluminum is 7,472 square meters. The total area of the combined mixing zones for chronic toxicity is 2,827 square meters.

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

Parameter	Limit (units)
See Attached Sheets	
A. State Permit	
B. NPDES for	

Describe special permit conditions and permit modifications:
Permit # IO16-200147 is being modified to add monitoring for mercury at outfall 001. This modification is in accordance with the result of the Mercury Plan of Study conducted by Seminole Kraft Corporation.
NPDES permit requires Acute and Chronic Toxicity Testing.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

SEMINOLE KRAFT CORP. (Facility)

FACILITY SUMMARY

Description of permitted outfall(s): The non-contact cooling water (NPDES permit outfall serial no. 001-b) is intermittently chlorinated and combines with the treated process wastewater (NPDES permit outfall serial no. 001-a) to form the total facility wastewater discharge (NPDES Permit outfall serial no. 001) to the St. Johns River via a 72 inch diameter reinforced concrete pipe branching into four 36 inch diameter diffusers in the St. Johns River.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year:

Review of the MOR and DMR data show no permit violations and compliance with both permits has been good for the past 2 years.

Warning notice issued in February 1990 for BOD limit exceedence on DMR report.

02/20/90 Fuel line may have leaked a not reportable quantity released amount of #6 Fuel oil into the soil and groundwater. DER notified.

Several river studies are available for review of the St. Johns River, Broward River, and Seminole Kraft Corp. Area. Data on river available.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:

Consent order for groundwater cleanup.
Mercury Plan of study conducted by Seminole Kraft corporation showed mercury in the Broward River and in discharge. Continue to monitor in effluent.
↳ Elevated metals, organics found in temporary monitoring wells set up near the building of the AES Power Plant along with oil contamination. Seminole Kraft Corp. currently putting this together for resolvement.
Seminole Kraft had been failing acute toxicity and studied for a mixing zone which was granted for chronic toxicity. Aluminum was present in the process water and Technology can't help so a mixing zone was granted for aluminum.

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:

August 19, 1991 FDER NE district personnel conducted a Compliance Sampling Inspection (CSI) and a Compliance Biomonitoring Inspection (CBI). Results not toxic to Notropis leedsi or Mysidopsis bahia. Copper and silver detected. Seminole Kraft did some sampling in October 1991 and found copper was okay and silver was detected in the Broward River but not in discharge.
June 18, 1991 FDER NE district personnel conducted a Compliance Evaluation Inspection (CEI). Overall the facility was considered to be in compliance
Seminole Kraft continues to improve their compliance with the state permit and are cooperative in their environmental efforts. Seminole Kraft Corporation has gone to 100% recycle but have yet to notify the FDER for modifications and this will reduce the effluent load.

Additional information: Primary clarifier sludge is pumped to a blend tank in the dewatering facility that feeds two vacuum coil dewatering filters with filtrate return to the clarifier and waste sludge trucked to a landfill on-site. Lime wastewater from the causticizing area is placed in a series of concrete basins for settling and pumping of clarified liquid back to the stabilization basin. Nov. 1990 Seminole Kraft Corp. dredged the lime mud ponds.

Staff contributing to this review (signature):

SCOTT BULGRIN Scott Bulgrin (Biologist)
Lindy Payne Lindy Payne (Inspector)
(Engineer)
( )
( )
( )

A. State Permit Effluent Limits

PERMITTEE:

Seminole Kraft Corporation
Industrial WWTF

I.D. Number: 3116P06063
Permit Number: IO16-200147
Date of Issue: January 31, 1992
Expiration Date: April 3, 1996
Modification Date: January 31, 1992
Modification Date: November 17, 1992

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 wastewater treatment facility. The reports shall include all data required from the General and Specific Conditions of this permit. Reports shall be submitted on a monthly basis to the Florida Department of Environmental Regulation, Northeast District Office, 7825 Baymeadows Way, Suite 200B, Jacksonville, Florida 32256 and to City of Jacksonville, Department of Environmental and Regulatory Services, Water Quality Division (WQD), 421 W. Church Street, Suite 412, Jacksonville, Florida 32202.

2. The discharge is subject to federal technology based effluent limits, and guidelines as contained in 40 CFR 430 which are adopted by reference in Rule 17-660.400, FAC. At this time the technology based limits are considered adequate to maintain compliance with water quality standards. If new water quality based effluent limitations are established, the permittee shall be notified of any such determination.

3. Upon certification of construction completion, effluent limits for BOD, Copper, Silver and TSS shall be as indicated below. All other limits included in Specific Condition #4 shall remain in effect until the expiration of the permit.

PARAMETERS	EFFLUENT SAMPLING LOCATION Note (1)	DISCHARGE LIMITATIONS Min.	Max.	Daily Average	MEASURE FREQUENCY	SAMPLE METHOD/ TYPE
BOD (lbs/day)	Outfall 001-a	-	14,284	7,016	Daily (5/wk)	24-hr. composite
TSS (lbs/day)	Outfall 001-a	-	23,055	11,527	Daily (5/wk)	24-hr. composite
Copper (mg/l)	Outfall 001	---	< than or = to 0.015 mg/l		Monthly	Grab
Silver (ug/l)	Outfall 001	---	< than or = to 0.05 ug/l		Monthly	Grab

PERMITTEE:

Seminole Kraft Corporation
Industrial WWTF

I.D. Number: 3116P06063
Permit Number: I016-200147
Date of Issue: January 31, 1992
Expiration Date: April 3, 1996
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4. The monitoring requirements and effluent limitations are as follows:

PARAMETERS	EFFLUENT SAMPLING LOCATION Note (1)	DISCHARGE LIMITATIONS Min.	Max.	Daily Average	MEASURE FREQUENCY	SAMPLE METHOD/ TYPE
Flow (MGD)	Outfall 001-a	---	28.0	20.0	Continuous	Parshall Flume/ Recorder
Temperature (°F)	Outfall 001-a	---	100	95	Daily (5/wk)	Grab
pH (units)	Outfall 001-a	6.0 See Note 2	9.0	---	Continuous	Recorder
BOD_5 (lbs/day)	Outfall 001-a	--- See Note 6	15,120 lbs/day	7,560 lbs/day	Daily (5/wk)	24-hr. Composite
TSS (lbs/day)	Outfall 001-a	--- See Note 6	32,400 lbs/day	16,200 lbs/day	Daily (5/wk)	24-hr. Composite
Flow (MGD)	Outfall 001-b	---	43.5	----	Weekly	24-hr. Represent.
Temperature (°F)	Outfall 001-b	---	100	95	Daily (5/wk)	Grab
pH (units)	Outfall 001-b	6.5	8.5	----	Weekly See Note (3)	Grab
Total Residual Chlorine (mg/l)	Outfall 001	---	0.01 mg/l	----	Weekly See Note (3)	Grab
Temperature (°F)	Outfall 001	---	*	----	Daily (5/wk)	Flow Weighted
Flow (MGD)	Outfall 001	---	71.5	----	Weekly	See Note (4)
Chronic Toxicity Test	Outfall 001	---	See Specific Condition 6		See Specific Condition 6	

*See 17-302.520(1)

4. (continued)

PARAMETERS	EFFLUENT SAMPLING LOCATION Note (1)	DISCHARGE LIMITATIONS Min.	Max.	Daily Average	MEASURE FREQUENCY	SAMPLE METHOD/ TYPE
Aluminum (mg/l)	Outfall 001	---	2.2 Maximum See Specific Conditions 6 and 7		Monthly	Grab
Mercury (ug/l)	Outfall 001	---	0.025 Note (7)	-----	Monthly	Grab

NOTE (1) The sampling locations are identified as follows:

Outfall 001a - process wastewater; samples shall be taken after treatment of all process wastewater and prior to mixing with the non-contact cooling water discharge.

Outfall 001b - non-contact cooling water; samples shall be taken in the non-contact cooling water effluent stream prior to mixing with the process wastewater effluent.

Outfall 001 - total facility discharge; samples shall be taken in the combined effluent of process wastewater and non-contact cooling water prior to actual discharge or mixing with the receiving body of water (RBW).

Process Intake - samples shall be taken at the intake point prior to use of any process water at the facility.

Cooling Water Intake - samples shall be taken at the point of intake in the Broward River.

NOTE (2) The pH of the effluent shall not be less than 6.0 standard units or greater than 9.0 standard units and shall be monitored continuously with a recorder. The pH values shall not deviate outside the required range more than 1% of the time (7 hours and 26 minutes) in any calendar month and no individual excursion shall exceed 60 minutes. An "excursion" is an unintentional and temporary incident in which the pH value of discharge wastewater exceeds the range set forth in this permit.

B. NPDES Permit Effluent Limits

B. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Unbleached Kraft Pulp & Paper Operation

1. These effluent limitations for outfall serial number 001-b, non-contact cooling water (internal monitoring point) are to be achieved by the effective date of this permit and shall remain in effect until commencement of discharge for the proposed paperboard from wastepaper operation.

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

PARAMETER	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS		
	Daily Average	Daily Maximum	Measurement Frequency	Sample Type	Sample Point
Flow, MGD	Report	Report	1/Week	24 hr Representative	See item 6, page I-4 for all parameters
Temperature, °F	95	100	1/Week	Grab	
Total Residual Chlorine, mg/l	--	0.01	1/Week	Grab	
pH, Standard Units	See item 4, page I-4		1/week	Grab	
Mercury, micrograms/l	See item 9, page I-4				

*Total residual chlorine monitoring is required only when the discharge will be affected by chlorine addition.

C. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Unbleached Kraft Pulp & Paper Operation

1. These effluent limitations for outfall serial number 001 - total facility discharge, combined process wastewater and non-contact cooling water, are to be achieved by the effective date of this permit and shall remain in effect until commencement of discharge for the proposed paperboard from wastepaper operation.

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

PARAMETER	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS		
	Daily Average	Daily Maximum	Measurement Frequency	Sample Type	Sampling Point
Flow, MGD	Report	Report	1/Week	*	Effluent
Chronic Whole Effluent Toxicity	See item 2. a.		See Part IV	24 hr. comp.	Effluent
Acute Whole Effluent Toxicity	See item 2. b.		See Part IV	24 hr. comp.	Effluent
Aluminum, mg/l	--	2.2	1/month	Grab	Effluent
Mercury, micrograms/l	See item 9, page I-2				

*Reported flow shall be the summation of the individual flow values for the process wastewater stream and the non contact cooling water stream.

2. a. The effluent shall not be chronically toxic to, or produce adverse physiological or behavioral responses in aquatic animals. An effluent no observable effect concentration (NOEC) of less than 9% for any test species will constitute a violation of Florida Administrative Code (FAC) Section 17-302.510(3)(p) (dated May 29, 1990) and the terms of this permit. The testing for this requirement shall conform with Part IV of this permit.

b. Lethality to more than 50% of any test species in 100% effluent in a test of 96 hours duration or less will constitute a violation of FAC Section 17-4.244(3)(a) (dated July 11, 1990) and the terms of this permit. The testing for this requirement must conform with Part IV of this permit.

D. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Paperboard from Wastepaper Operation

1. These effluent limitations for outfall serial number 001-a, process wastewater (internal monitoring point) are to be achieved upon commencement of discharge and shall remain in effect until permit expiration. Written notification of the scheduled discharge date shall be submitted at least 45 days prior to discharge.

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

PARAMETER	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS		
	Daily Average	Daily Maximum	Measurement Frequency	Sample Type	Sampling Point
Flow, MGD	Report	Report	Continuous	Recorder	See item 4, page I-7 for all parameters
Biochemical Oxygen Demand (5 day), lbs/day	7,017	14,284	Daily	24-hr. comp.	
Total Suspended Solids, lbs/day	11,528	23,056	Daily	24-hr. comp.	
Oil and Grease, mg/l	--	Report	1/week	Grab	
Lead, mg/l	--	Report	1/week	Grab	
Zinc, mg/l	--	Report	1/week	Grab	
Aluminum, mg/l	--	1.50	1/week	Grab	
Mercury, micrograms/l	--	0.10	1/week	Grab	
pH, Standard Units	See item 2, page I-7		Continuous	Recorder	

E. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Paperboard from Wastepaper Operation

1. These effluent limitations for outfall serial number 001, process wastewater, are to be achieved upon commencement of discharge and shall remain in effect until permit expiration. Written notification of the scheduled discharge date shall be submitted at least 45 days prior to discharge.

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

PARAMETER	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS		
	Daily Average	Daily Maximum	Measurement Frequency	Sample Type	Sampling Point
Chronic Whole Effluent Toxicity	See item 2.a.		See Part V	24-hr. comp.	Effluent
Acute Whole Effluent Toxicity	See item 2.b.		See Part V	24-hr. comp.	Effluent
Copper, mg/l	--	≤0.015	Monthly	Grab	Effluent
Silver, mg/l	--	≤0.05	Monthly	Grab	Effluent

2.a. The effluent shall not be chronically toxic to, or produce adverse physiological or behavioral responses in aquatic animals. An effluent no observable effect concentration (NOEC) of less than 1.9% for any test species will constitute a violation of Florida Administrative Code (FAC) Section 17-302.510(3)(p) (dated May 29, 1990) and the terms of this permit. The testing for this requirement shall conform with Part V of this permit

2.b. Lethality to more than 50% of any test species in 100% effluent in a test of 96 hours duration or less will constitute a violation of FAC Section 17-4.244(3)(a) (dated July 11, 1990) and the terms of this permit. The testing for this requirement must conform with Part V of this permit.

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

SUBMITTING AGENCY CODE: 80031 / SUBMITTING AGENCY NAME: FLDER Northeast District	STORET STATION NUMBER:	DATE (M/D/Y): 10/20/92	RECEIVING BODY OF WATER: ST. Johns River

REMARKS: Sunny, Eastern Wind	LOCATION: St. Johns River half-way between Dunn Creek and Oamas Point about 200ft off west bank	FIELD NAME: SEMINOLE KRAFT's (Reference Site)

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 10	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed 31	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation 3	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations 8	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action 10	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. 9-10 points	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. 0-2 points
Sediment Type 7	Combination of sand, gravel, and shell. 12-15 points	Primarily sand, with small areas of mud. 8-11 points	Mixture of sand and mud, or well-aerated mud only. 4-7 points	Anaerobic mud. 0-3 points

TOTAL SCORE 69

COMMENTS: Area was most unimpacted for a Reference Site. Dunn Creek flows into area on outgoing tide. No major development in area. Shoreline unaltered. Best Site in vicinity for comparison

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/20/92	Scott Bulgrin Lindy Payne	Scott Bulgrin Lindy B. Payne

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 3)

SUBMITTING AGENCY CODE: 8021 / SUBMITTING AGENCY NAME: FL DER Northeast District	STORET STATION NUMBER:	DATE (M/D/Y): 10/20/92	TIME: 1600	RECEIVING BODY OF WATER: St. Johns River

REMARKS: Best Site for comparison. Unimpacted for the vicinity. No major development in area.	LOCATION: St. Johns River half-way between Dunn Creek and Dames Point about 200ft off west Bank	FIELD ID/NAME: SEMINOLE KRAFT (Reference Site)

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
			20			80

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

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

Point-Source Pollution (list location and describe): DUNN CREEK flows into along with the Broward, Mill Cove, and Dames Point Area — Stormwater Runoff, SEPTIC TANKS, RECREATIONAL

Estimated System Width (range, m): 40 - 55	Estimated System Depth (range, m): 1 - 6	yes
High Water Mark (m above bed): 0.3	Velocity (range, m/s): 0.2↑ (upward)	Impounded ☐ Channelized ☐

Canopy Cover %: Open: ☒ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	15	4	DIP NET	Rock or Shell Rubble			
Leaf Packs				Sand	20	4	DIP NET
Aquatic Vegetation				Mud/Muck	20	4	DIP NET
Submerged Roots				Other: marsh plants along shore	45	8	DIP NET
Undercut Banks				Other:			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	pH (SU):	Cond. (µmho/cm):	SALINITY			Secchi (m):
Top	22.5	* METER	7.60	15,050	10 ‰			0.8
Mid-depth	21.3	NOT WORK	7.48	15,000				
Bottom	TOO DEEP							

System Type: Stream: ☐ (Surficial Aquifer Fed / Deep Aquifer Fed / Alluvial / Blackwater) Lake: ☐ Wetland: ☐ Estuary: ☒ Other: ☒ MAJOR RIVER

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: ☒ (To slight Green/Brown) Other: ☐

Weather Conditions: Sunny, Eastern Wind

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☐	☒	☐
Fish	☐	☐	☒	☐
Aquatic Macrophytes (MARSH Plants on Shoreline)	☐	☐	☒	☐
Iron/sulfur Bacteria	☒	☐	☐	☐

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/20/92	SCOTT Bulgrin, Lindy Payne	Scott Bulgrin, Lindy Payne

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FLDER Northeast District	STORET STATION NUMBER:	DATE (M/D/Y): 10/20/92	RECEIVING BODY OF WATER: Seminole Kraft Corp. Effluent into the St. Johns River

REMARKS: Sunny, Eastern wind	LOCATION: St. Johns River, half-way between marker and concrete pillar, 150ft North of Seminole Kraft Effluent (upstream)	FIELD ID/NAME: (TEST SITE #1)

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations **6**	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed **26**	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation **3**	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations **5**	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action **9**	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. 9-10 points	———	———	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. 0-2 points
Sediment Type **7**	Combination of sand, gravel, and shell. 12-15 points	Primarily sand, with small areas of mud. 8-11 points	Mixture of sand and mud, or well-aerated mud only. 4-7 points	Anaerobic mud. 0-3 points

TOTAL SCORE **56**

BULK Gas

COMMENTS: Area is industrialized with paper mill and Terminals. The Broward River flows out into the area during an outgoing tide. Several piers, rip/rap and concrete markers are in area.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/20/92	SCOTT Bulgrin	Scott Bulgrin
	Lindy Payne	Lindy B. Payne

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 3)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL DER Northeast District	STORET STATION NUMBER:	DATE (M/D/Y): 10/20/92	TIME: 1100	RECEIVING BODY OF WATER: Seminole Kraft Corp. Effluent into the St. Johns River

REMARKS: Area is industrialized with Paper mill and Bulk Gas Terminal Plus Flushing of the Broward River	LOCATION: St. Johns River, half-way between marker and concrete pillar, 150 ft North of Seminole Kraft Effluent (upstream)	FIELD ID/NAME: (TEST SITE #1)

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
					30	70 SALT MARSH

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

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

Point-Source Pollution (list location and describe): SEMINOLE Kraft Corporation — AMAREDA HESS Terminal discharges into river near here. — Stormwater Runoff BROWARD Creek Flows Into Recreational

Estimated System Width (range, m): 40-55	Estimated System Depth (range, m): 1-7	yes
High Water Mark (m above bed): 0.3	Velocity (range, m/s): 0.2 ↑ upstream	Impounded ☐ Channelized ☐

Canopy Cover % : Open : ☒ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	20	6	DIPNET	Rock or Shell Rubble			
Leaf Packs				Sand	20	3	DIPNET
Aquatic Vegetation				Mud/Muck	30	4	DIPNET
Submerged Roots				Other: Marsh Plants	30	7	DIPNET
Undercut Banks				Other: along shoreline			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	pH (SU):	Cond. (µmho/cm):	SALINITY			Secchi (m):
Top	21.7	6.30	7.58	15,900	10 ‰			0.8
Mid-depth	21.0	6.45	7.53	15,900				
Bottom	Too Deep							

System Type : Stream: ☐ (Surficial Aquifer Fed / Deep Aquifer Fed / Alluvial / Blackwater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☒ major River

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: ☒ Slight Green ☐ Other: ☐

Weather Conditions: Sunny, Eastern Wind

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☐	☒	☐
Fish	☐	☐	☒	☐
Aquatic Macrophytes (MARSH Plants on shoreline)	☐	☐	☒	☐
Iron/sulfur Bacteria	☒	☐	☐	☐

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/20/92	SCOTT Bulgin / Lindy Payne	Scott Bulgin / Lindy Payne

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

SUBMITTING AGENCY CODE: 80031 / SUBMITTING AGENCY NAME: FLDER Northeast District	STORET STATION NUMBER:	DATE (M/DY): 10/20/92	RECEIVING BODY OF WATER: Seminole Kraft Corp Effluent into the St. Johns River

REMARKS: Sunny, Eastern wind	LOCATION: St. Johns River, South of Seminole Kraft effluent at Broward River Confluence between piers.	FIELD ID/NAME: (TEST SITE #2)

(Downstream)

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations: 6	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed: 26	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation: 3	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations: 5	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action: 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. 8-10 points	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. 0-2 points
Sediment Type: 7	Combination of sand, gravel, and shell. 12-15 points	Primarily sand, with small areas of mud. 8-11 points	Mixture of sand and mud, or well-aerated mud only. 4-7 points	Anaerobic mud. 0-3 points

TOTAL SCORE: 56

BULK Gas

COMMENTS: Area is industrialized with paper mill and Terminals Broward River flushes out into the area also. Several piers and Concrete Markers are in area.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/20/92	Scott Bulgrin	Scott Bulgrin
	Lindy Payne	Lindy B. Payne

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 3)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL DER NorthEast DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 10/20/92	TIME: 1230	RECEIVING BODY OF WATER: Seminole Kraft Corp. Effluent into the St. Johns River

REMARKS: Area is industrialized with Paper mill and Buck Grass Terminal Plus flushing of Broward River	LOCATION: St. Johns River, South of Seminole Kraft effluent at Broward River Confluence between pipes (downstream)	FIELD ID/NAME: (TEST SITE #2)

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
					90	10 SALT MARSH

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

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

Point-Source Pollution (list location and describe): SEMINOLE KRAFT CORPORATION Broward River; AMAREDA HESS TERMINAL Discharges into river near here; Broward River Recreational Stormwater Runoff

Estimated System Width (range, m): 40 - 55	Estimated System Depth (range, m): 1 - 8	Impounded ☐ yes
High Water Mark (m above bed): 0,4	Velocity (range, m/s): ↑ upward 0.2 ↑	Channelized ☐

Canopy Cover %: Open: ☒ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	35	7	DIPNET	Rock or Shell Rubble			
Leaf Packs				Sand	20	3	DIPNET
Aquatic Vegetation				Mud/Muck	30	4	DIPNET
Submerged Roots				Other: marsh plants along shoreline	15	6	DIPNET
Undercut Banks				Other:			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	pH (SU):	Cond. (µmho/cm):	SALINITY			Secchi (m):
Top	22.5	*METER	8.08	14,000	9 °/oo			0.75
Mid-depth	21.2	NOT WORK	7.91	13,900				
Bottom	TOO	DEEP						

System Type: Stream: ☐ (Surficial Aquifer Fed / Deep Aquifer Fed / Alluvial / Blackwater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☒ MAJOR RIVER

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: ☒ Slight Brown/Green Other: ☐ _____

Weather Conditions: Sunny, Eastern Wind

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☐	☒	☐
Fish	☐	☐	☒	☐
Aquatic Macrophytes (MARSH Plants on Shoreline)	☐	☐	☒	☐
Iron/sulfur Bacteria	☒	☐	☐	☐

ANALYSIS DATE: 10/20/92	ANALYST: SCOTT Bulgrin, Lindy Payne	SIGNATURE: Scott Bulgrin, Lindy Payne

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Seminole Kraft
Address/City:
County: Duval
Contact/District: Judy Payne
NPDES Permit #: FL00 Outfall #:

Sample Collection: Date ____ Time 1100
Test Beginning: Date 10/16/92 Time 1530
Test Ending: Date 10/22/92 Time 1530
Test Organism: Ceriodaphnia dubia
Life Stage/Age: < 24hrs

Test Number: 1 of 2 Test Type: Screening | Definitive
Static | Static Renewal | Flow-through

92-OCT-20-18 43526
verified 10/23/92 RP

Remarks:

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7.9 @ 7.9	8.2 @ 23°C	22.8 @ 22.8	970 @ 1K @ 23.4°C / 9700 @ 10K
24 hr	7.9 @ 7.9	8.5 @ 24°C	22.9 @ 22.9	947 / 9750 @ 22.9°C
48 hr	7.9 @ 7.9	8.5 @ 24°C	22.9 @ 22.9°C	974 / 9750 @ 23.4°C

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48	Cond. (µmhos/cm) 0	24	48
Control	A	5	5	5	8.2		8.1	22.9		23.9	8.6		7.4	149		173
Control	B	5	5	5			8.1						7.4			
Control	C	5	5	3			8.1						7.4			
Control	D	5	5	5			8.1						7.4			
25%	A	5	5	5	8.0		8.3	22.9		23.8	8.4		7.5	385		395
25%	B	5	5	5			8.3						7.5			
25%	C	5	5	5			8.3						7.5			
25%	D	5	5	5			8.3						7.5			
50%	A	5	5	5	7.9		8.4	22.8		23.7	8.3		7.6	595		650
50%	B	5	5	5			8.4						7.6			
50%	C	5	5	5			8.4						7.6			
50%	D	5	5	5			8.4						7.6			
75%	A	5	5	5	7.8		8.5	22.7		23.8	8.0		7.5	815		855
75%	B	5	5	5			8.5						7.5			
75%	C	5	5	5			8.5						7.5			
75%	D	5	5	5			8.5						7.5			
100%	A	5	5	5	7.8		8.6	22.3		23.8	8.0		7.5	1015		1090
100%	B	5	5	5			8.6						7.5			
100%	C	5	5	5			8.6						7.5			
100%	D	5	5	5			8.6						7.5			
Measured/Loaded by:		MF	MF	MF	MF		MF	MF		MF	MF		MF	MF		MF
Recorded by:		MF	MF	MF	TR		TR	TR		TR	TR		TR	TR		TR

Investigators' Signatures

Marshall Faircloth

Tobin Rader

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Clz:					
Lab Tot. Resid. Clz:	0.0	0.0	0.0	Hach	MF
Alkalinity:	125	72	227	Hach	TR
Hardness:	126	78	229	Hach	TR
Total Ammonia:	0	0	1.2	Hach	TR

Ammonia Meter Slope: ____

Ammonia Blank: ____

Salinity Sample: ____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Seminole Kraft
Address/City:
County: Duval
Contact/District: Lindy Payne
NPDES Permit #: FL00 Outfall #:

Sample Collection: Date ____ Time 1100
Test Beginning: Date 10/20/92 Time 1530
Test Ending: Date 10/22/92 Time 1530
Test Organism: Nothopsis loadsi
Life Stage/Age: 11 days

Test Number: 2 of 2 Test Type: Screening | Definitive
Static | Static Renewal | Flow-Through

92-OCT-20-18 43526
verified 10/23/92 KP

Remarks:

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7.0 7.9	8.7 @ 23°C	22.8 @ 22.8	970 @ 1K 9700 @ 10K @ 23.4°C
24 hr	7.0 7.9	8.5 @ 24°C	22.9 @ 22.9°C	967 9750 @ 22.9°C
48 hr	7.0 7.9	8.5 @ 24°C	22.9 @ 22.9°C	974 9750 @ 23.4°C

		Number Live			pH			Temp. (°C)			DO (mg/L)			Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	30	5	4	4	7.8	8.1	8.3	22.8	22.8	22.9	8.2	8.1	8.0	240	240	240
Control	33	5	5	5	7.8	8.1	8.3				8.2	8.1	8.0	240	240	240
25%	26	5	5	5	7.8	8.2	8.3	22.6	22.8	22.8	8.1	8.0	8.0*	440	445	450
25%	153	5	5	4	7.8	8.2	8.3				8.1	8.0	8.0*	440	445	450
50%	17	5	5	5	7.8	8.2	8.3	22.3	22.7	22.7	8.1	7.8	7.9*	650	650	655
50%	34	5	4	4	7.8	8.2	8.3				8.1	7.8	7.8*	650	650	655
75%	147	5	5	5	7.7	8.1	8.3	22.0	22.7	22.7	7.8	7.6	7.6	850	850	860
75%	27	5	5	5	7.7	8.1	8.3				7.8	7.6	7.6	850	850	860
100%	16	5	5	4	7.7	8.1	8.3	22.0	22.8	22.8	7.4	7.5	7.3	1040	1050	1060
100%	82	5	5	5	7.7	8.1	8.3				7.4	7.4	7.3	1040	1050	1060
													* Recorded in wrong place MF 10/26/92			
Measured/Loaded by:		ONF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF
Recorded by:		MF	MF	MF	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR

Investigators' Signatures

Marshall Faircloth

Tobin Rader

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:	0.0	0.0	0.0	Hach	MF
Alkalinity:	125	72	227	Hach	TR
Hardness:	126	78	229	Hach	TR
Total Ammonia:	0.0	0.0	1.2	Hach	TMF
	Ammonia	Ammonia	Salinity		

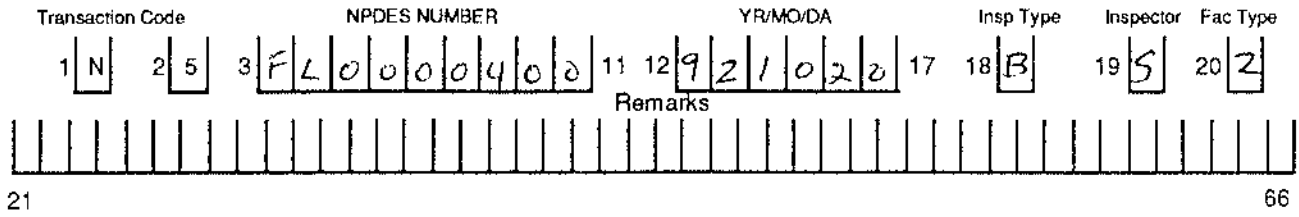
Benthic macroinvertebrate taxa list for Seminole Kraft, collected by ponar dredge in the St. Johns River, Duval County, on 20 October, 1992. Values represent the average number of individuals per m^2 out of three replicates.

	Reference Site	Test Site 1	Test Site 2
Cumacea			
Cyclaspis varians	25	–	–
Diptera			
Polypedilum tritum	–	12	–
Gastropoda			
Ilyanassa obsoleta	–	12	12
Melongena corona	–	–	175
Malacostraca			
Alpheus viridari	12	–	–
Ampelisca sp.	12	–	–
Undetermined amphipod	12	–	–
Edotea montosa	–	25	–
Mysidopsis sp.	12	–	–
Undetermined oedicerotid	37	12	–
Nemertina			
Undetermined Nemertina	–	12	12
Oligochaeta			
Undetermined tubificid w/o capilliform setae	–	12	–
Platyhelminthes			
Undetermined polyclad	–	–	12
Polychaeta			
Boccardiella hamata	–	200	–
Capitella capitata	25	37	87
Leitoscolopos fragillis	12	–	–
Nereis succinea	–	250	–
Undetermined nerieid	–	–	12
Undetermined paronid	12	–	–
Streblospio benedicti	50	–	75

Phytoplankton taxa list and density (#/ml) for Seminole Kraft Corporation, collected by subsurface grabs in the St. Johns River, Duval County, on 20 October, 1992

	Reference Site	Test Site 1	Test Site 2
Diatoms			
Amphora sp.	25	–	50
Asterionella japonica	202	104	25
Chaetoceros sp.	25	52	50
Cocconeis sp.	–	26	25
Coscinodiscus sp.	76	52	25
Cyclotella sp.	101	52	125
Cymatosira sp.	126	26	25
Diploneis sp.	25	–	25
Leptocylindrus sp.	–	26	25
Melosira sp.	51	–	25
Navicula sp.	25	26	–
Nitzschia sp.	101	130	351
N. reversa	–	26	–
N. seriata	101	–	–
Operophora sp.	25	–	–
Rhaphoneis sp.	–	26	25
Rhizosolenia sp.	101	156	75
R. stolterforthi	25	–	–
Skeletonema sp.	51	156	150
Thalassionema nitzschiodes	–	78	–
Unidentified pennate diatom	–	52	–
Chlorophyta			
Ankistrodesmus sp.	25	26	50
Chlamydomonas sp.	–	–	25
Scenedesmus sp.	76	26	100
Tetraedron sp.	25	–	25
Tetraspora sp.	25	–	25
Unknown chlorophyte flagellate	25	26	–
Cyanophyta			
Chroococcus sp.	–	52	–
Lyngbya sp.	25	–	–
L. contorta	–	–	50
Merismopedia sp.	51	26	–
Oscillatoria sp.	–	26	–

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)

