

Biological Assessment of

ITT Rayonier, Inc.

Nassau County

NPDES #FL0000701

Sampled 25 July, 1991

December 1991

Biology Section
Division of Technical Services

Department of Environmental Regulation
Results of Fifth Year Inspections

Discharger: ITT Rayonier, Inc.
County: Nassau
NPDES Number: FL0000701
State Permit Expiration Date:

Toxics Sampling Inspection (XSI)

Date Sampled: 25 July 1991

Results: Many organic constituents were detected in the effluent (see Chemistry summary in Appendix). Contaminants which were present in quantities high enough to be of possible concern include aliphatic hydrocarbons (950 µg/L) and unidentified organics (910 µg/L). Several metals were also measured in the effluent (Appendix). The concentrations of aluminum (1770 µg/L) and iron (1600 µg/L) were in violation of Class III standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 25 July 1991

Results: Chronically toxic to the sea urchin, *Arbacia punctulata*, at an effluent concentration of 5%. NOEC = 1%. Because the facility has a mixing zone which theoretically achieves a dilution to 1%, this level of chronic toxicity is not a violation.

Impact Bioassessment Inspection (IBI)

Date Sampled: 25 July 1991

Results: A 64% decrease in macroinvertebrate Shannon-Weaver diversity at test site #2 (compared to the reference site) constituted a violation of the biological integrity criterion (17-302.560(7) FAC). Algal growth potential results (ranging from 14.5 mg/dry wt/L to 21.5 mg/dry wt/L) indicate that the waters near the ITT outfall may be subject to eutrophication effects. Phytoplankton taxa richness at the three ITT stations was considerably less than that found in other east coast estuaries. It is possible that algal populations were inhibited by components of the ITT discharge (e.g., color).

Water Quality Inspection (WQI)

Date Sampled: 25 July 1991

Results: Low dissolved oxygen (3.2 mg/L) was observed at the test sites. Ammonia (34 mg/L) and TKN (200 mg/L) were exceptionally elevated in the effluent. Total phosphorus (5.6 mg/L) was also high. Unionized ammonia was calculated to be 1.7 mg/L, which is acutely toxic. The concentrations of ammonia and TKN at the stations near the ITT outfall (including the Lanceford Creek station and 2 test sites) were higher than those found in 95% of Florida estuaries.

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

ITT Rayonier, Inc. is a chemical cellulose pulp mill (sulfite process) located in Fernandina Beach, Nassau County. The main 26.31 MGD industrial waste treatment system consists of primary clarification and mechanical aeration in a 34 acre lagoon. Effluent (outfall 001) is discharged only on outgoing tide to the Amelia River (see map in Appendix). A 125,000 m^2 mixing zone has been granted for outfall 001, which theoretically achieves a dilution ratio of 100:1 (Appendix). Another permitted outfall (002) discharges 8 MGD of backwash and regeneration water to Jackson Creek and thence to the Amelia River. The 001 outfall was emphasized in this study. Permit limits for the 001 outfall are as follows: flow (26.31 MGD maximum), pH (6 to 8.5), TSS (42,500 lbs/day maximum, 31,100 lbs/day as daily average), BOD (47,250 lbs/day maximum, 27,000 lbs/day as daily average), toxicity bioassays (conducted monthly). Additionally, tide, temperature, and ammonia must be recorded daily. Permit requirements for the 002 outfall are: flow (8.0 MGD max), arsenic (0.05 mg/L maximum), copper (0.5 mg/L maximum), TSS (measure twice/week), and that selenium and silver be sampled once per month. The dissolved oxygen standard 17-4.244(4) FAC is applicable within the mixing zone, whereas chronic toxicity 17-3.021(3) FAC shall be met at the edge of the mixing zone. A dissolved oxygen SSAC of 3.2 mg/L has been granted to this facility.

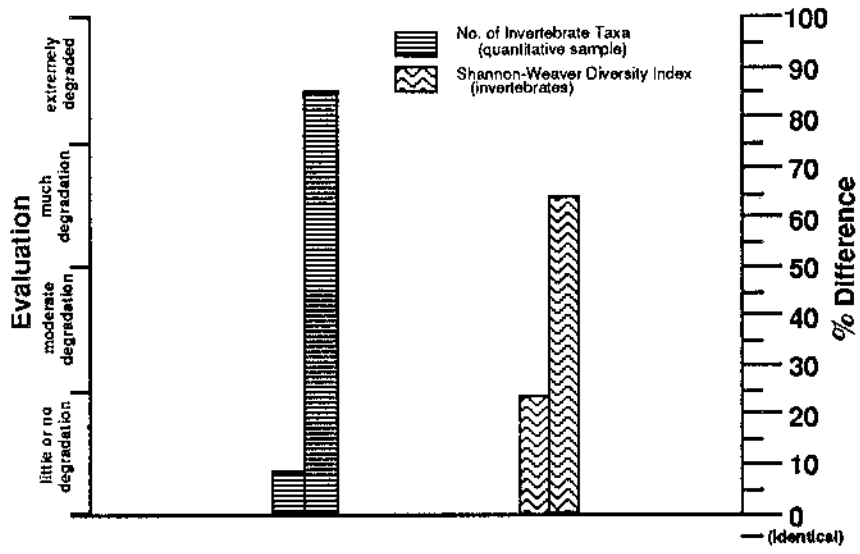
Several exceedances of permit limits in the past few years, including BOD and TSS, have resulted in enforcement action from DER. Other problems at the facility, such as releases of large amounts of hot and cold spent sulfite liquor into the Amelia River, have also resulted in enforcement proceedings. Bioassays conducted by the DER Biology Section indicate that the effluent from the 001 outfall has been acutely toxic on all five samplings between 1981 through 1987. Samples from the 002 outfall sometimes contain high levels of silver, arsenic, and selenium, in violation of Class III standards (Appendix).

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of macroinvertebrate community health was made between a reference site (located in the St. Marys River between the North River and Cumberland Sound) and two test sites (located 100 meters west of and 615 meters east of the discharge in the Amelia River). An additional station for phytoplankton and other chemical parameters was established in Lanceford Creek. However, data collected there indicate probable influence from the ITT effluent plume. Historical macroinvertebrate reference data from the St. Marys River were used due to the apparent contamination at the Lanceford Creek Site. A habitat assessment was performed to establish comparability between sites. Supplemental physical/chemical data were

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	24	22	3
Shannon-Weaver Diversity	4.2	3.2	1.5
%Polychaeta	60.9	81.4	75.5
%Pelecypoda	2.7	8.1	0
%Malacostraca	8.1	7.0	0
% Nemertea	0	1.8	0
% Oligochaeta	18.2	0.9	0
% Other	10.1	0.9	24.5
% Predators	9.6	6.7	25
% Collector-Gatherers	57.7	80.9	75
% Collector-Filterers	2.7	12.4	0
Phytoplankton Algae	**Lanceford Creek Site**	**Test Site 1**	**Test Site 2**
Number of Taxa	7	17	18
% Contribution of Dominant Taxon	91.4	23.6	23.0
Chlorophyll a (mg/m2)	15.5	6.5	8.0
Diatom/Blue-green Abundance Ratio	1.0	0.71	0.69
% Blue-green	0	26.4	23.0
% Green	0.8	9.1	20.1
% Diatoms	96.1	63.6	51.8
Algal Growth Potential (mg dry wt/l)	16.3	21.5	14.5



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.)

also collected on the effluent and study sites. A chronic bioassay, using *Arbacia punctulata* as the test organism, was performed on an effluent sample (EPA 1988). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on 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. Collection methods consisted of three petite ponar grabs per station. Phytoplankton was sampled at test sites via a subsurface grab sample. Chlorophyll a was also determined for phytoplankton communities (Ross 1990). Bacterial populations were analyzed for total and fecal coliforms following the methods of APHA (1989). Algal Growth Potential tests, using *Dunaliella tertiolecta* as the test organism, followed EPA (1974).

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. 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 and the diversity index are measured as the reference site minus test site divided by the reference site.

The following personnel were involved in this investigation: Lee Banks and Jim Wright (DER Northeast District), Mike Tanski (DER Water Facilities) and Lyn Burton, Russel Frydenborg, Kathleen Lurding, and Sandy McClure (Tallahassee Biology Laboratory).

Results and Discussion

The receiving water for the ITT Rayonier discharge, the Amelia River, is a marine tidal estuary (Appendix). The shores of the Amelia River, Lanceford Creek, and also the St. Marys River are dominated by *Spartina* and *Juncus*. Macroinvertebrate data from the St. Marys site was used for this study due to evidence (discussed later) that the Lanceford Creek site was highly contaminated with effluent. Habitat quality at the St. Marys Reference Site (69 points) was comparable to that of the test sites (test site 1 = 63, test site 2 = 60). Conductivity was similar between sites, ranging from 32000 µmhos/cm to 34500 µmhos/cm. Low dissolved oxygen (3.2 mg/L) was observed at the test sites. Since the facility has been granted a Site Specific Alternative Criterion (SSAC) for a minimum of 3.2 mg/L of dissovled oxygen, this is not a violation.

Many organic constituents were detected in the effluent (see Chemistry summary in Appendix). Contaminants which were present in quantities high enough to be of possible concern include aliphatic hydrocarbons (950 µg/L) and unidentified organics (910 µg/L). Aliphatic hydro-

carbons (e.g., #2 fuel oil) may produce toxicity at concentrations as low as 100 µg/L (Dye and Frydenborg 1980).

Several metals were also measured in the effluent (Appendix). The concentrations of aluminum (1770 µg/L) and iron (1600 µg/L) were in violation of Class III standards.

The effluent was chronically toxic to the sea urchin, *Arbacia punctulata*. Reproductive impairment was observed as low as the 5% concentration of effluent. The no observable effect concentration (NOEC) was 1%. Because the facility has a mixing zone which achieves a 100:1 dilution, this level of chronic toxicity is not a violation.

Ammonia (34 mg/L) and TKN (200 mg/L) were exceptionally elevated in the effluent. Total phosphorus (5.6 mg/L) was also high. Unionized ammonia (based on effluent parameters measured during bioassay) was calculated to be 1.7 mg/L. This level of unionized ammonia is acutely toxic.

The concentrations of ammonia and TKN at the stations near the ITT outfall (including the Lanceford Creek station and 2 test sites) were much higher than those found in typical Florida estuaries (see Appendix). STORET data from 700 estuary stations, for the period of 1980 to 1989, have been compiled into a percentile distribution (Joe Hand, personal communication). Data from this present investigation were evaluated against these (see table in Appendix).

The three stations in the vicinity of the outfall (Lanceford Creek and the two Amelia River sites) were similar with regard to the degree of enrichment exhibited. Ammonia and TKN found in this area were greater than 95% of all other Florida estuaries. Nitrate+nitrite and total phosphorus values detected there were higher than 70% and 60% of other estuaries statewide, respectively.

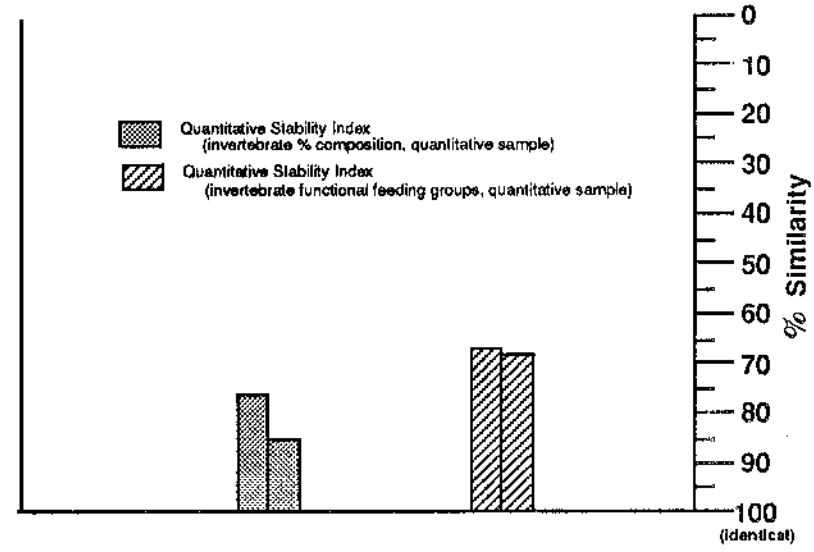
It appears that Lanceford Creek is subject to contamination with the ITT effluent, which is probably transported there by wind and tidal effects. The elevated nature and the intrastation similarity of the values (between the Lanceford Creek site and the two test sites) make this particularly noticeable.

Algal growth potential results (ranging from 14.5 mg/dry wt/L to 21.5 mg/dry wt/L) indicate that the waters near the ITT outfall may be subject to eutrophication effects. In marine systems (using *Dunaliella tertiolecta)*, values of 10 mg dry wt/L or above are considered indicative of nutrient enrichment problems, which are generally associated with algae blooms, D.O. sags, and fish kills (Ron Raschke, U.S. EPA, personal communication)

Fecal coliform bacteria (< 20 organisms/100 mL) and total coliform bacteria (80 organisms/100 mL and 90 organisms/100 mL) measured at the test sites were well within standards.

Macroinvertebrate taxa richness and Shannon-Weaver diversity values were slightly reduced at test site #1, but greatly reduced at test site #2. 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. The figure on this page summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation. In this particular case, the lack of similarity between macroinvertebrate communities at the reference and test sites is indicative of degradation.

The 64% decrease in diversity at test site #2 (compared to the reference site) constitutes a violation of the biological integrity criterion (17-302.560(7) FAC). The test sites were both somewhat different from the reference site with respect to trophic



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.)

composition (QSI function feeding group = 67%).

Phytoplankton taxa richness at the three ITT stations was considerably less than that found in other east coast estuaries. While taxa richness ranged from only 7 to 18 near ITT, 108 different taxa were collected during the summer in Chesapeake Bay (Marshall 1980). Chlorophyll *a* near ITT was also lower than expected when compared to the high nutrient content of the waters. It is possible that algal populations were inhibited by components of the ITT discharge (e.g., color). This has been shown in other investegations on the effects of pulp mill effluents on phytoplankton populations (Stockner *et al.* 1975).

Due to the complexity of this estuary system, further and more intensive biological study seems appropriate to better characterize the extent of the influence of ITT's discharge.

Conclusions

Several environmental problems associated with the ITT Rayonier discharge were observed during this investigation. Dissolved oxygen was low (3.2 mg/L) at the test sites, but within the facility's SSAC requirement. Aliphatic hydrocarbons were present in the effluent in concentrations high enough to be potentially toxic. Aluminum and iron in the discharge violated Class III standards. The effluent was chronically toxic to the sea urchin, *Arbacia punctulata*, at an effluent concentration of 5%. Because the facility has a mixing zone which theoretically achieves a dilution to 1%, this level of chronic toxicity is not a violation.

Unionized ammonia in the effluent was measured at concentrations high enough to be acutely toxic to fish. The extraordinarily high levels of ammonia (34 mg/L) and TKN (200 mg/L) present in the effluent contributed to nitrogen enrichment problems in the receiving waters. The concentrations of ammonia and TKN found at the Amelia River test sites and in Lanceford Creek were greater than 95% of all other Florida estuaries. Algal growth potential results indicate that the water in the vicinity of ITT may be subject to eutrophication effects.

Total and fecal coliform bacteria were within standards.

Macroinvertebrate taxa richness and diversity at one of the ITT test sites were greatly reduced compared to a St. Marys River reference site. The biological integrity criterion was violated. Phytoplankton communities in the receiving waters appeared to be inhibited. Due to the complexity of this estuary system, further and more intensive biological study seems appropriate to better characterize the extent of the influence of ITT's 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.

Dye, C. W. and R B. Frydenborg. 1980. Oil dispersants and the environmental consequences of their usage: A literature review. Fla. Dept. Environmental Regulation Technical Series 5(1): 1-51.

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.

Environmental Protection Agency. 1988. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to marine and estuarine organisms. EPA/600/4-87/028. Environmental Monitoring and Support Laboratory, Office of Res. and Dev., U.S. EPA, Cincinnati, Ohio. 417 p.

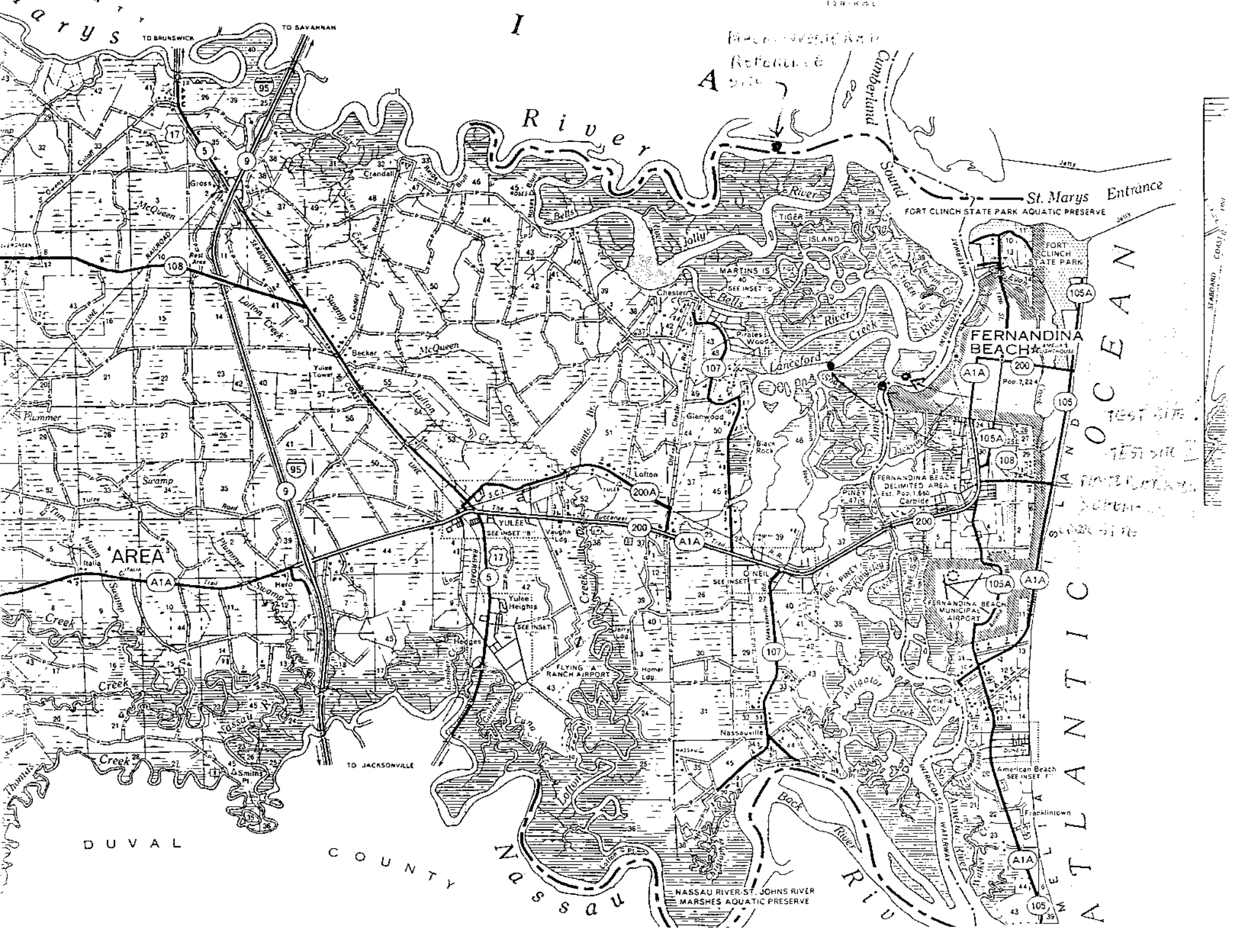
Marshall, H. G. 1980. Seasonal phytoplankton composition in the lower Chesapeake Bay and Old Plantation Creek, Cape Charles, Virginia. Estuaries 3 (3): 207-216.

Stockner, J. G., D. D. Cliff, and K. Munro. 1975. The effects of papermill effluent on phytoplankton production in coastal waters of British Columbia. Environment Canada Fisheries and Marine Science. Tech. Rep. 578.

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

Chemistry summary table for ITT Rayonier.

	Effluent (Outfall 001)			
Organic Constituents (ug/L)				
Di-n-butyl phthalate	6.5 T			
2,4-Dichlorophenol	3 K			
2,4,6-Trichlorophenol	14 J			
methyl pyrazine	30			
camphor	20			
4-hydroxy-3-methoxybenaldehyde	50			
sub. phenol	40			
aliphatics	950			
unidentified organics	910			
petroleum residue	present			
aromatics	190			
Metals (ug/L)				
Aluminum	1770			
Arsenic	20 U			
Cadmium	0.2 U			
Copper	8 T			
Chromium	134			
Iron	1600			
Lead	18 U			
Mercury	0.2 K			
Nickel	28 J			
Silver	0.2 U			
Zinc	102 J			
Nutrients (mg/L)		**Lanceford Creek Site**	**Test Site 1**	**Test Site 2**
Ortho-phosphorus		0.05	0.05	0.06
Total phosphorus	5.6	0.14	0.17	0.13
Ammonia	**34**	**0.27**	**0.38**	**0.39**
Nitrate+Nitrite	0.5	0.05	0.05	0.06
TKN	**200**	**2.0**	**1.9**	**2.3**
Other Parameters		**Reference Site**	**Test Site 1**	**Test Site 2**
Habitat Assessment		69	63	60
D.O. (mg/L)		7.6	3.2	3.2
pH		7.8	7.3	7.3
Conductivity (umhos/cm2)		32000	34000	35500
Temperature (° C)			30.2	31.0
Chonic bioassay- Arbacia	NOEC = 1%			
Fecal coliform (org/100 ml)			< 20	< 20
Total coliform (org/100 ml)			90	80
Total Organic Carbon (mg/L)	939			


TO BRUNSWICK
TO SAVANNAH
St. Marys River
Cumberland Sound
St. Marys Entrance
FORT CLINCH STATE PARK AQUATIC PRESERVE
FORT CLINCH STATE PARK
TIGER ISLAND
MARTINS IS
SEE INSET
FERNANDINA BEACH
Pop. 7,224
FERNANDINA BEACH DELIMITED AREA
Est. Pop. 1,690
Carbide
Pirates Woods
Lancaford
Glenwood
Black Rock
Chester
Becker
McQueen
Yulee Tower
Lofton
Lofton Creek
Bells River
Jolly
Bells
Crandall
Gross
Plummer
Swamp
Creek
Yulee
SEE INSET "B"
Vaucha Ldg.
Yulee Heights
SEE INSET
Hero
Italia
AREA
Hodges
Homer Ldg.
FLYING "A" RANCH AIRPORT
O'NEIL
SEE INSET "E"
FERNANDINA BEACH MUNICIPAL AIRPORT
Nassauville
American Beach
SEE INSET "F"
Franklintown
Cassa
Smiths Pl.
Thomas
Lofton Pt.
Back River
NASSAU RIVER-ST. JOHNS RIVER MARSHES AQUATIC PRESERVE
TO JACKSONVILLE
DUVAL COUNTY
Nassau
ATLANTIC OCEAN
INTRACOASTAL WATERWAY
SEABOARD COAST LINE
RAILROAD
Rest Area
Jetty
A1A
105A
105
107
108
200
200A
95
17
5
9

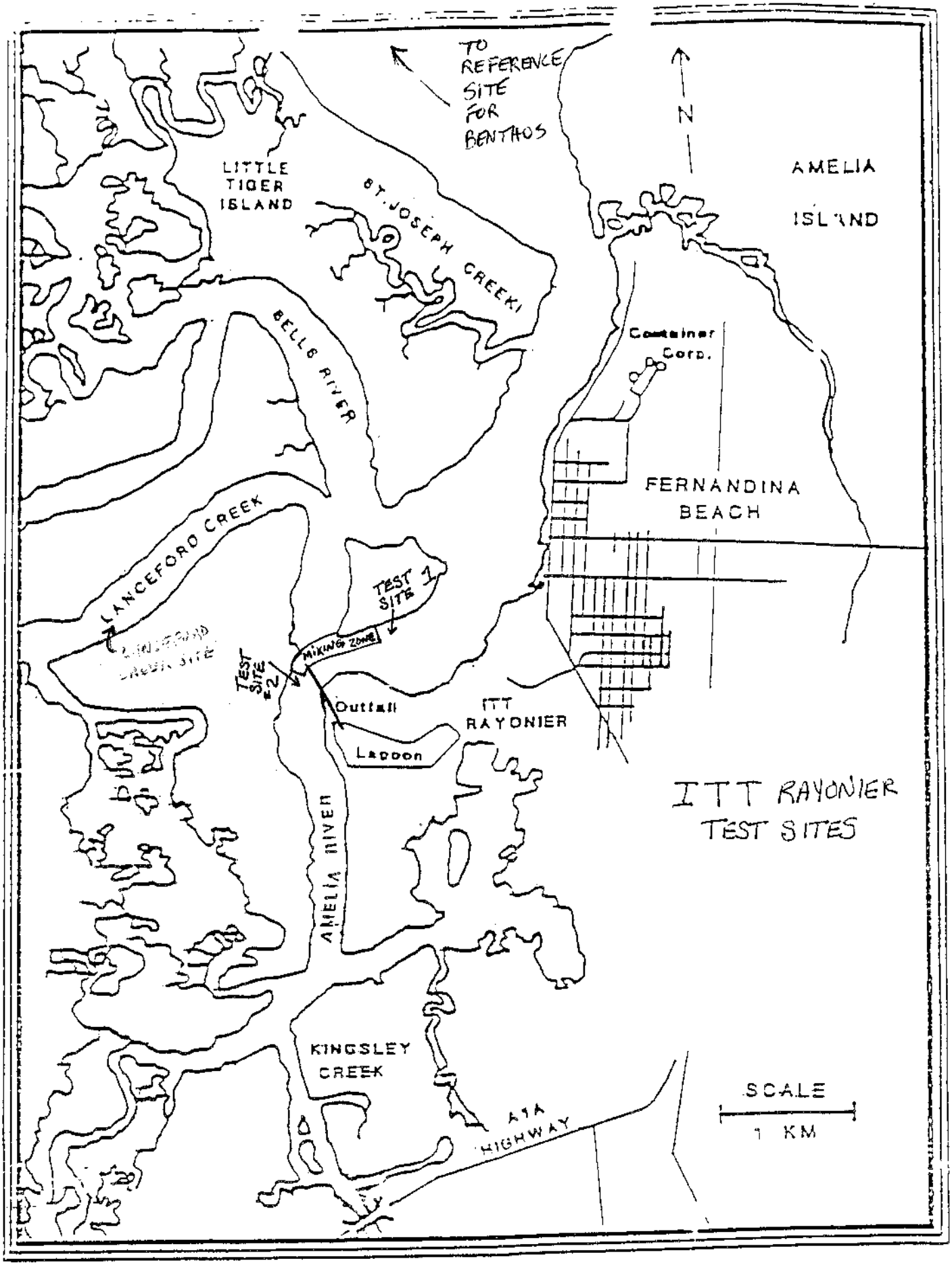
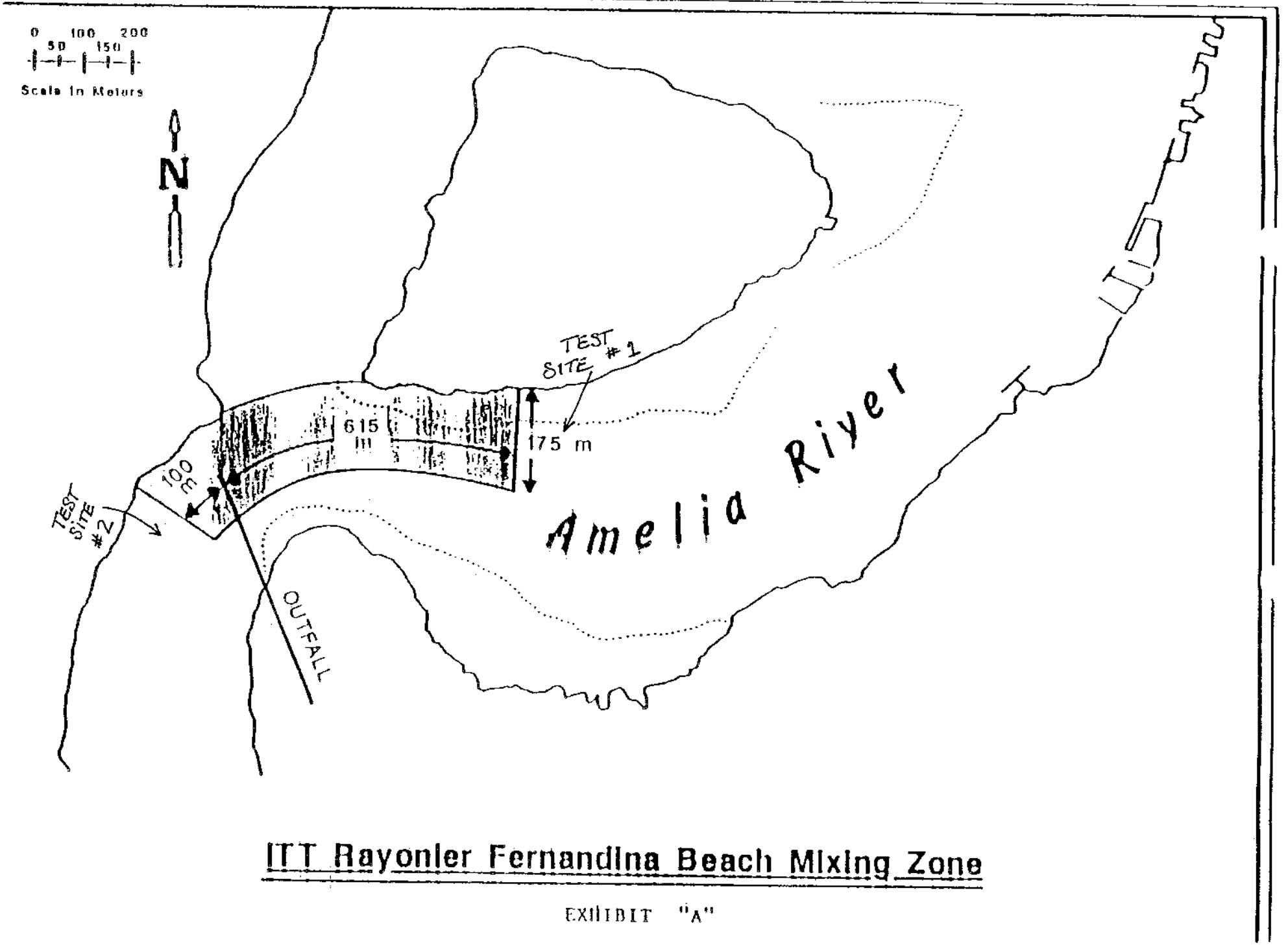


FIGURE 1. AMBIENT SAMPLING STATIONS



ITT Rayonier Fernandina Beach Mixing Zone

EXHIBIT "A"

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: ITT RAYONIER, INC.		Prepared by: M. KLEPANSKI Date: 7/19/91
Location (attach detailed map): Gum Street Fernandina Beach	County NASSAU	District NORTHEAST
Federal Permit # FL0000701 and expiration date: 9/30/95	State GMS # and 3145P00018 State expiration date: 3/3/92	Facility Type: (Industrial) Municipal Federal Agricultural Other (list):

Function of facility:

a chemical cellulose pulp mill (sulfite process)

Description of treatment process:

Design 26.31 MGD IW Treatment system, primary clarifier, 34 acre mechanical aeration lagoon to outfall 001 that consists of a 125,000 sq. meter mixing zone in the Amelia River, discharging only on the outgoing tide. Also 8 MGD design (3.67 MGD Average) discharge to 002 to Jackson Creek to Amelia R. consisting of backwashing, regeneration, and rinsing of zeolite softening units.

Receiving waters: 001 Amelia R. 002 Jackson Creek to Amelia	Classification: III
Design Flow: 26.31 MGD to 001, 8 MGD to 002	Actual Mean Flow: 001 ? 002 3.67 MGD

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

therefore, the best time to sample is: outgoing tides

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

The mixing zone extends 175 meters in width southeasterly from the Northwest bank of the intracoastal waterway; with the centerline starting 100 meters southerly from the outer end of Rayonier outfall diffuser and extending 615 meters northerly from the outfall for a total centerline length of 715 meters. This mixing zone contains 125,000 square meters, more or less, and otherwise complies with the physical requirements of FAC Section 17-4.244.

Dilution ratio 100:1

List effluent limits:

Parameter	Limit (units)
~~2,3,7,8-TCDD~~	Report
~~Total Ammonia~~	Report
Unionized ammonia	
FLOW MGD	26.31 MGD (MAX)
Tide Height (ft)	Report
pH (std. units)	6 to 8.5
TSS (lbs/day)	MAX 42,500 D/Average 31,100
BOD_5 (lbs/day) 2	Max. 47,250 " " 27,000
Temperature	— Report —
Biomass	monthly
Flow (MGD)	MAX 8.0 MGD
TSS mg/L	— report —
Arsenic mg/L	MAX .05
Copper mg/L	MAX .5
Selenium	— report —

Describe special permit conditions and permit modifications:

00 std in 17-4.244(4) and toxicity as in Rule 17-4.244(4)(b) shall apply in mixing zone Acute Tox. as in Rule 17-3.021(1) and Toxicity as in rule 17-4.244(4)(b)(6) shall be achieved in mixing zone using mysid shrimp.

Chronic requirements as in 17-3.021(3) shall be met at the outside of the mixing zone using mysid shrimp.

Ambient monitoring requirements

DO
Water Temp.
Air
Cloud Cover
Time

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

ITT Rayonier

Description of permitted outfall(s):

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

3/91 outfall 002, Arsenic reported as 167 ug/L for the month sample retested and found to be within permit limits.

12/24/90 HOT Sulfite Spent Liquor discharged to sewer & the treatment system.

12/25/89 BOD 530221bs 1/27/90 TSS Exceeded Daily Max

12/26/89 BOD 497231bs 3/8/91 Cool Spent Sulfite Liquor

1/25/90 TSS Exceeded Daily Max Spill (21200gals. to Amelia Rive

1/26/90 TSS " " " = 7,000 lbs BOD to RIVER

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

March 5 1990, WN90-0015-IW45-NED was issued for TSS daily maximum exceedances on 1/25, 1/26, and 1/27.

April 19, 1991, WN91-0019-IW45-NED was issued for 3/8/91 Spent Liquor Spill (21200 gallons into Amelia River).

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

MOR results tend to compare with DER results during CSI's. Outfall 001 MOR results appear to be about the same during the last year (see attached 3W report).

Additional information:

Outfall 002, high Silver and Selenium results in the month of February 91.

See attached 3W report

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

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

REMARKS:	LOCATION:	FIELD ID/NAME:

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
			30			

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

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

Point-Source Pollution (list location and describe):

Estimated Stream Width (range, m):	Estimated Stream Depth (range, m):	yes
High Water Mark (m above bed):	Velocity (range, m/s):	Impounded [ ] Channelized [ ]

Canopy Cover % (check box): Open: [X] Lightly Shaded: [ ] Moderately Shaded: [ ] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

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

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

Sediment Deposits: Sludge: [ ] Paper Fiber: [ ] Mud: [X] Sand: [ ] Shell: [ ] Other: [ ]

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell	30	Coarse Organic Debris:	
Sand:		Mud/Muck (organic):	

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	30.2	3.2	Secchi Depth (m):	
Mid-depth			pH (SU):	
Bottom			Conductivity (µmho/cm):	
			Other Parameters:	

Stream Type (check box): Blackwater: [ ] Deep Aquifer Fed: [ ] Surficial Aquifer Fed: [ ] Alluvial: [ ] Other: [X] _____

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

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

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

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

Weather Conditions: Partly Cloudy Hot Humid

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
7/25/91	M. Tanski	

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

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

REMARKS:	LOCATION:	FIELD ID/NAME:
T.T. Rawlings	[illegible] Point	[illegible] #1

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 29	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 5	>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 10	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 3	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 [illegible]

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
7/23/91	M. Tonski	[signature]

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

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

REMARKS:	LOCATION:	FIELD ID/NAME:
I.T. Riparian	Effluent junction	

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other

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

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

Point-Source Pollution (list location and describe):

Marina and Recreational Beach Land Operations

Estimated Stream Width (range, m): 360 m	Estimated Stream Depth (range, m):		yes
High Water Mark (m above bed):	Velocity (range, m/s):	Impounded [ ] Channelized [ ]	

Canopy Cover % (check box): Open: [X] Lightly Shaded: [ ] Moderately Shaded: [ ] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

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

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

Sediment Deposits: Sludge: [ ] Paper Fiber: [ ] Mud: [X] Sand: [ ] Shell: [ ] Other: [ ]

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell	25	Coarse Organic Debris:	
Sand:		Mud/Muck (organic):	

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	31	3.1	Secchi Depth (m):	
Mid-depth			pH (SU):	8.1
Bottom			Conductivity (µmho/cm):	
			Other Parameters:	

Stream Type (check box): Blackwater: [ ] Deep Aquifer Fed: [ ] Surficial Aquifer Fed: [ ] Alluvial: [ ] Other: [ ] _____

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

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

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

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

Weather Conditions:
Partly Cloudy
Hazy Humid

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
7/23/91	M. Trulski	Michael Trulski

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

SUBMITTING AGENCY CODE SUBMITTING AGENCY NAME	STORET STATION NUMBER	DATE (M/D/Y)	RECEIVING BODY OF WATER

REMARKS	LOCATION	FIELD ID/NAME

Habitat Parameter score	Excellent	Good	Fair	Poor
Littoral Alterations 1	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 20	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 5	>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 10	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 3	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:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
7/23/01	M. TANSKI	

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		10-30-91	1000	ST MARYS RIVER

REMARKS:	LOCATION:	FIELD ID/NAME:
	BETWEEN NORTH R. & CUMBERLAND SOUND	REFERENCE SITE

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
					10	90

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

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

Point-Source Pollution (list location and describe): GELMAN PAPER MILL ~ 2 MILES AWAY

Estimated Stream Width (range, m): 75 M	Estimated Stream Depth (range, m): 4 M		yes
High Water Mark (m above bed):	Velocity (range, m/s): TIDALLY INDUCED 0 - 1.2 M/S	Impounded [ ] Channelized [ ]	

Canopy Cover % (check box): Open: [X] Lightly Shaded: [ ] Moderately Shaded: [ ] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

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

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

Sediment Deposits: Sludge: [ ] Paper Fiber: [ ] Mud: [X] Sand: [X] Shell: [X] Other: [ ]

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Rock or Shell Rubble	20		PONAR	Woody Debris (Snags)			
Aquatic Vegetation				Leaf Packs/Roots			
Sand	50		PONAR	Undercut Banks			
Other: CLAY	10		PONAR	Mud/Muck	20		PONAR

3 PONAR GRABS

WATER QUALITY

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

Stream Type (check box): Blackwater: [ ] Deep Aquifer Fed: [ ] Surficial Aquifer Fed: [ ] Alluvial: [ ] Other: [X] ESTUARY

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

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

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

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

Weather Conditions:

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10-30-91	LEE BANKS OVERPHONE	personal communication to Russell Frydenborg

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		10-30-91	ST. MARYS RIVER

REMARKS:	LOCATION:	FIELD ID/NAME:
	BETWEEN NORTH RIVER & CUMBERLAND SOUND	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 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 5	>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 10	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 8	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: THIS IS AN OLD PNS STATION WHICH LEE BANKS HAS SAMPLED. INFO IS FROM PAST FIELD SHEETS & MEMORY.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10-30-91	LEE BANKS OVER PHONE	Personal communication to Rural Synderhauf

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

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

REMARKS:	LOCATION:	FIELD ID/NAME:
ITT OUTFALL ~ 3 KM EAST	Fernandina Beach	

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 37	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 4	>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 10	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 3	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 77

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
7/23/91	M. Tanski	

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

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

REMARKS: ITT OUTFALL ~ 3 KM EAST	LOCATION:	FIELD ID/NAME:

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other

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

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

Point-Source Pollution (list location and describe): ITT OUTFALL ~ 3 KM EAST

Estimated Stream Width (range, m):		Estimated Stream Depth (range, m):	yes
High Water Mark (m above bed):		Velocity (range, m/s):	Impounded [ ] Channelized [ ]

Canopy Cover % (check box): Open: [X] Lightly Shaded: [ ] Moderately Shaded: [ ] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

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

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

Sediment Deposits: Sludge: [ ] Paper Fiber: [ ] Mud: [X] Sand: [ ] Shell: [ ] Other: [ ]

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell	20	Coarse Organic Debris:	
Sand:		Mud/Muck (organic):	

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	30.5	3.1	Secchi Depth (m):	
Mid-depth			pH (SU):	
Bottom			Conductivity (µmho/cm):	
			Other Parameters:	

Stream Type (check box): Blackwater: [ ] Deep Aquifer Fed: [ ] Surficial Aquifer Fed: [ ] Alluvial: [ ] Other: [X] Tidal Creek

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

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

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

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

Weather Conditions: Partly Cloudy Hot / Humid

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:

Typical Estuarine STORET Values Based on 1980 - 1989 Period
(Produced by Joe Hand DER Standards & Monitoring)

Parameter	Percentile Distribution				
	10	**30**	**50**	**70**	**95**
BOD5 (mg/L)	0.70	1.10	1.50	1.90	4.00
Chl *a* - corrected (µg/L)	3.28	5.13	6.93	9.60	22.20
DO (mg/L)	5.00	6.10	6.60	7.10	9.00
TKN (mg/L)	0.34	0.50	0.69	0.82	1.49
NH3 +NH4 (mg/L	0.02	0.04	0.06	0.09	0.28
NO2+NO3 (mg/L)	0.00	0.01	0.02	0.05	0.23
TP (mg/L)	0.02	0.07	0.11	0.17	0.59
FC (MFM/100 mL)	4.0	10.0	15.0	40.0	396.0
TC (MFI/100 mL)	7.0	24.0	65.0	100.0	1300.0
Total Residual (NFLT mg/L)	7.0	11.5	19.0	25.6	76.0
Secchi (m)	0.60	0.80	1.0	1.2	2.6
Water Temp (°C)	20.27	24.00	25.00	26.20	29.10

NOEC = 1.0%

Sample Source: ITT RAYONIER
Address/City:
County: NASSAU
Contact/District: RITA FELTON / NE
NPDES Permit #: FL0000701   Outfall #:

Sample Collection: Date 7/25/91 Time 1245
Test Beginning: Date 7/26/91 Time 1310
Test Ending: Date 7/26/91 Time 1430
Test Organism: ARBACIA PUNCTULATA
Test Conditions: Salinity: 30 ± 2‰ Temperature: 20 ± 1°C

Test Number(s): 2 of 2   Test Type: Screening (Definitive) Static

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	707,909	9.0@21	1350@23	20.3@22.7

Remarks: SALINITY OF SAMPLE ADJUSTED TO 31 PPT W HYPERSALINE BRINE

TOTAL and UNFERTILIZED EGG Count at END of TEST

Sample ID	Concentration	1 Total	1 Unfertilized	2 Total	2 Unfertilized	3 Total	3 Unfertilized	4 Total	4 Unfertilized	5 Total	5 Unfertilized
	CONTROL	101	73	109	74	111	75				
ITT	0.5%	118	83	108	79	107	80				
	1.0%	103	80	103	74	120	88				
	5.0%	102	24	103	27	110	32				
	66.7%	100	19	101	20	110	20				
	CONTROL	100	95	112	105	119	108				
SRT	10 ppb	102	67	131	114	108	89				
CUPRIC	20 ppb	110	83	128	95	103	77				
SULFATE	40 ppb	101	39	106	46	101	28				
80ppb	80 ppb	112	48	105	39	105	35				

Measured by:
Recorded by:

Investigators' Signatures
Kim Pearce
[signature]

[signature]
Reviewer

Water-quality Parameters

	Control Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:				
Lab Tot. Resid. Cl2:	0.0	0.0	Hach	KWP
Salinity:	31 / 38,800	31 / 43,400	~~35~~	KWP
Salinity adjustment (y/n):	yes	yes		
pH / DO:	7.7 / 6.3	7.8 / 6.0		

Taxa List for ITT collected via ponar grabs on 23 July, 1991, at the edges of the mixin zone in the Amelia River. Reference site was located in the St. Marys River an collected via ponar on 1 April, 1987.

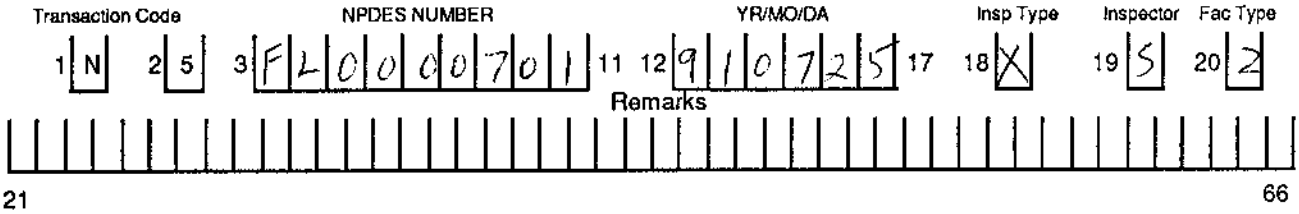
	Reference Site	Test Site 1	Test Site 2
Actiniaria			
Undetermined Actiniarian sp.	–	12	–
Hirudinea			
Cystobranchus viridus	10	–	–
Malacostraca			
Aeginina longicornis	–	12	–
Corophium lacustre	–	12	–
Edotea sp.	10	37	–
Grandidierella sp.	–	37	–
Melita nitidia	31	–	–
Monoculodes edwardsi	10	–	–
cf. *Siriella thompsoni*	10	–	–
Nemertea			
Amphiporus caecus	10	–	–
Cerebratulias lacteus	21	–	–
Tubulanus pellucides	31	–	–
Undetermined Nemertean sp.	–	25	–
Oligochaeta			
Peloscolex gabrielloe	52	–	–
Undetermined Oligochaete sp.	83	12	–
Ophiurida			
Undetermined Ophiurid sp.	–	–	12
Pelecypoda			
Gemma sp.	–	50	–
Mulinia lateralis	10	–	–
Petricola pholoiformis	10	–	–
Undetermined Pelecypod sp.	–	62	–
Polychaeta			
Capitella capitata	12	12	–
Cauleriella sp.	–	25	–
Diopatra cuperea	10	–	–
Eteone heteropoda	31	–	–
Glycera sp.	–	12	–
Glycera dibrachiata	42	–	–
Glycera americana	52	–	–
Laeonereis culveri	31	–	–
Undetermined Lumbrinerid sp.	–	25	–
Malmgrenia sp.	10	–	–
Mediomastus sp.	83	175	–
Neanthes acuminata	21	–	–

Ninoe sp.	–	12	–
Paraprinospio pinnata	52	–	–
Polydora ligni	31	12	–
Polydora socialis	12	12	–
Scoloplos rubra	10	–	–
Sigambra sp.	–	37	–
Undetermined Nereid sp.	–	12	–
Undetermined Polychaete sp.	12	487	25
Undetermined Spionid sp.	–	–	12
Streblospio benedicti	83	299	–
Tharyx sp.	–	12	–

Phytoplankton taxa list for ITT Rayonier, Nassau County, Florida, collected from the Amelia Riverand Lanceford Creek on 24 July, 1991.

	Lanceford Creek Site	Test Site 1	Test Site 2
Diatoms			
Amphora sp.	–	172	132
Asterionella japonica	–	387	1055
Chaetoceros sp.	147	–	88
Cymatosira sp.	–	43	44
Cocconeis sp.	–	43	–
Coscinodiscus sp.	–	86	–
Cyclotella sp.	–	–	44
Leptocylindrus sp.	–	86	88
Melosira sp.	–	86	–
Navicula sp.	–	172	88
Nitzschia sp. 1	17145	1117	923
Nitzschia sp. 2	147	215	–
Nitzschia sp. 3	–	–	88
Nitzschia sp.	–	473	440
Rhizosolenia sp.	–	86	88
Skeletonema sp.	293	43	88
Unidentified Pennate Diatom	293	–	–
Chlorophyta			
Chlamydomonas sp.	–	–	132
Pyramimonas sp.	–	–	176
Unknown Chlorophyte Flagellate	147	430	923
Cyanophyta			
Chroococcus sp.	–	816	1407
Merismopedium sp.	–	430	–
Euglenophyta			
Euglena sp.	586	–	88
Pyrrhophyta			
Peridinium sp.	–	43	220

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)

