

Biological Assessment of

Container Corporation of America

Nassau County

NPDES #FL0001104

Sampled July, 1991

January 1992

Biology Section
Division of Technical Services

Department of Environmental Regulation
Results of Fifth Year Inspections

Discharger: Container Corporation of America
County: Nassau
NPDES Number: FL0001104
State Permit Expiration Date:

Toxics Sampling Inspection (XSI)

Date Sampled: 23 and 24 July 1991

Results: The concentration of silver in the sample (collected on 24 July 1991) was in violation of Class III standards. Hydrocarbons were present in the effluent in concentrations which may have contributed to the observed toxicity. Unionized ammonia in the effluent was measured at concentrations high enough to be acutely toxic to fish.

Results:

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 22, 24, and 26 July 1991

Results: The effluent sample was chronically toxic to the water flea, *Ceriodaphnia dubia*, producing an LOEC (lowest observed effect concentration) of 12.5%. The NOEC was 6.25%. This is a violation of 17-302.510(3)(p) FAC.

Impact Bioassessment Inspection (IBI)

Date Sampled: 23 July 1991

Results: Measurements of macroinvertebrate community health suggested that biota at the test sites experienced little degradation. However, 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 CCA's discharge.

Water Quality Inspection (WQI)

Date Sampled: 24 July 1991

Results: The high levels of ammonia (7.4 mg/L) and TKN (14 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 (when averaged) were greater than 95% of all other Florida estuaries. Algal growth potential results indicate that the water in the vicinity of CCA may be subject to eutrophication effects. Total and fecal coliform bacteria were within required levels.

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

Container Corporation of America, located in Fernandina Beach, Nassau County, is an integrated pulp and paper mill which produces unbleached kraft linerboard. Approximately 30 MGD of wastewater is treated using grit chambers, primary clarifiers, a cooling tower, sludge dewatering equipment, an activated sludge treatment system (including a UNOX reactor), two secondary clarifiers, oxygen injection, and chlorination. The final effluent is discharged via outfall 001 to the Amelia River, a Class III water (see map in Appendix). The facility does not have a mixing zone.

Permit limits are as follows: flow (maximum of 30 MGD), BOD (maximum of 23,120 lbs./day, average of 11,560 lbs./day), TSS (maximum of 82,500 lbs./day, average of 21,250 lbs./day), temperature (maximum of 100° F), pH (6 to 9), and dissolved oxygen (minimum of 4.0 mg/L).

During the past year, several problems with the plant have been documented, including several spills of untreated waste, numerous violations of BOD limits, and violations of both pH and TSS limits. A Notice of Violation was issued in April, 1991, and a draft Consent Order is currently being processed.

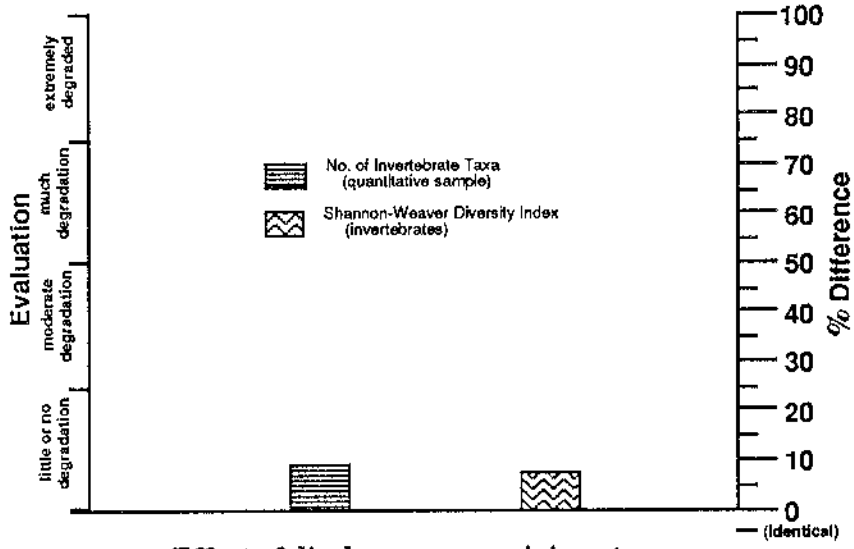
Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located in the St. Marys River between the North River and Cumberland Sound) and two test sites (located in the Amelia River approximately 400 meters north of and 400 meters southwest of the discharge). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. A chronic toxicity bioassay, using *Ceriodaphnia dubia* 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 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. Collection methods consisted of 3 ponar grabs per site (Ross 1990). Phytoplankton was sampled at the test sites via a subsurface grab (Ross 1990). 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).

Major characteristics of community structure of control and test sites.

	Reference Site	Combined Test Sites
Macroinvertebrate Ponar		
Number of Taxa	24	22
Shannon-Weaver Diversity	4.2	3.9
% Polychaeta	60.9	59.6
%Malacostraca	8.1	16.5
% Oligochaeta	18.2	6.0
% Pelecypoda	2.7	10.5
%Decapoda	0	4.5
% Nemertia	0	1.4
% Other	10.1	1.4
% Predators	9.6	4.3
% Collector-Gatherers	57.7	83.4
% Collector-Filterers	2.7	12.3
Periphyton Algae	**Test Site 1**	**Test Site 2**
Number of Taxa	15	17
% Contribution of Dominant Taxon	28.9	21.2
Chlorophyll a (mg/sq. m)	4.8	6.5
Diatom/B-G Abundance Ratio	0.65	0.80
% Blue-green	33.7	17.3
% Green	9.6	13.5
% Diatoms	55.4	67.3
% Other	1.2	1.9
Algal Growth Potential (mg dry wt/l)	14.4	19.2



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

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health have been employed. 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 waters for the Container Corporation of America (CCA) discharge, the Amelia River, is a marine, *Spartina* and *Juncus* dominated, tidal estuary (Appendix). Macroinvertebrate data from a nearby St. Marys River station were used for reference purposes. Both the Amelia River test sites (with 60 and 63 points) and the St. Marys River reference site (with 69 points) were similar regarding habitat quality. Dissolved oxygen at test site 2 (4.2 mg/L) was somewhat depressed.

The effluent sample was chronically toxic to the water flea, *Ceriodaphnia dubia*, producing an LOEC (lowest observed effect concentration) of 12.5%. The NOEC was 6.25%. This is a violation of 17-302.510(3)(p) FAC.

Organic constituents in the effluent included aliphatic hydrocarbons (140 µg/L), aromatic hydrocarbons (80 µg/L), sub-phenol (20 µg/L), and bis (2-ethylhexyl) phthalate (4.5 µg/L). A petroleum hydrocarbon residue was present. It is possible that the hydrocarbon components of the effluent contributed to the observed chronic toxicity.

Metals detected in the effluent included aluminum (655 µg/L), copper (6 µg/L), iron (211 µg/L), mercury (less than 0.2 µg/L), silver (0.3 µg/L, estimated), and zinc (11 µg/L). The concentration of silver in the sample (collected on 24 July 1991) was in violation of Class III standards.

Ammonia (7.4 mg/L) and TKN (14 mg/L) measured in the effluent were particularly elevated. An unionized ammonia concentration of 0.2 mg/L was calculated for the effluent, which could have contributed to the chronic toxicity observed.

The concentrations of ammonia and TKN at the stations near the CCA outfall 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 this table (in Appendix). The two stations in the vicinity of the outfall were similar with regard to the degree of enrichment exhibited, although the values at test site 2 were slightly higher. When the ammonia and TKN values from these two sites were

averaged, they were found to be greater than 95% of all other Florida estuaries. In contrast, nitrate+nitrite and total phosphorus values detected at the test sites were not unusually elevated.

Algal growth potential results (14.5 mg/dry wt/L at test site 1 and 19.1 mg/dry wt/L at test site 2) indicate that the waters near the CCA outfall may be subject to eutrophication effects. In ambient estuarine waters, *Dunaliella* is the preferred test organism for AGP studies. *Dunaliella* AGP results above 10 mg dry wt/L, indicate that the negative consequences associated with nutrient enrichment (D.O. depletion, algal blooms, fish kills) will be manifest (Ron Raschke, personal communication).

Fecal coliform bacteria (less than 20 org/100 mL) and total coliform bacteria (less than 90 org/100 mL) were within standards at both test locations.

Measurements of macroinvertebrate community health suggested that biota at the test sites experienced little degradation. The upper left figure indicates the degree of difference between the reference and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. The lower right figure summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

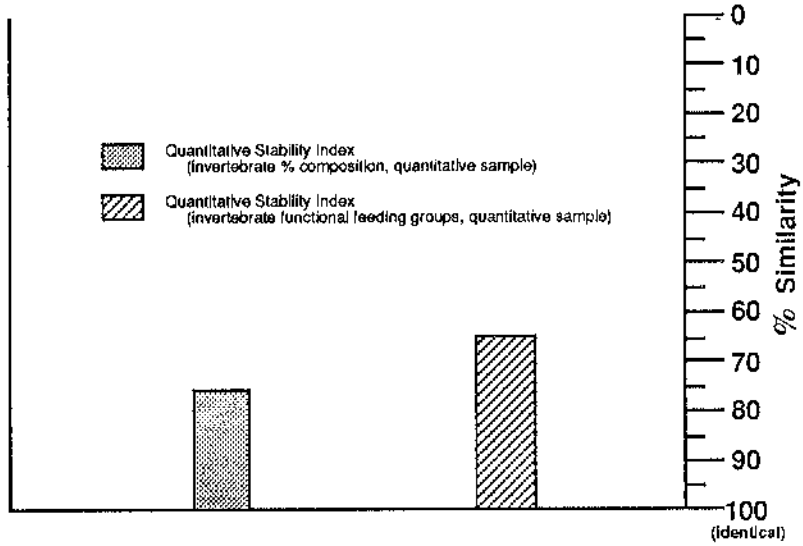
Although taxa richness and Shannon-Weaver diversity were slightly reduced at the test sites, they were within the acceptable range. One confounding factor involved in this analysis was the inadvertent combining of the 6 ponar dredge samples (3 per site) from the two test sites into a single composite sample. Since only 3 replicates were taken at the reference site, and the combined test sites had six, one would normally expect the station with more replicates to yield more taxa, etc. This was not the case. Twenty-four taxa were found at the reference site and 22 at the combined test sites. Both the reference and test sites were dominated by polychaetes, although a few epi-benthic crustaceans (considered more pollution sensitive) were also encountered. At this time, there are insufficient data to indicate that the CCA discharge is adversely affecting the receiving water macroinvertebrate community.

Phytoplankton taxa richness at the two CCA stations was considerably less than that found in other east coast estuaries. While taxa richness ranged from only 15 to 17 near CCA, 108 different taxa were collected during the summer in Chesapeake Bay (Marshall 1980). Chlorophyll *a* near CCA (4.8 µg/L and 6.5 µg/L at the two test sites) 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 CCA 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 nature and extent of the influence of CCA's discharge.

Conclusions

Several environmental problems associated with the CCA discharge were observed during this investigation. Dissolved oxygen at test site 2 (4.2 mg/L) was somewhat depressed, but not in violation of water quality standards. The effluent sample was chronically toxic to the water flea, Ceriodaphnia dubia, producing an LOEC (lowest observed effect concentration) of 12.5%. The NOEC was 6.25%. This is a violation of 17-



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

302.510(3)(p) FAC. The concentration of silver in the sample (collected on 24 July 1991) was in violation of Class III standards. Hydrocarbons were present in the effluent in concentrations which may have contributed to the observed toxicity.

Unionized ammonia in the effluent was measured at concentrations high enough to be acutely toxic to fish. The high levels of ammonia (7.4 mg/L) and TKN (14 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 (when averaged) were greater than 95% of all other Florida estuaries. Algal growth potential results indicate that the water in the vicinity of CCA may be subject to eutrophication effects.

Total and fecal coliform bacteria were within required levels.

Measurements of macroinvertebrate community health suggested that biota at the test sites experienced little degradation. However, 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 CCA'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.

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.


REFERENCE A SITE
CONTAINER CORP
TEST SITE 1
OUTFALL
TEST SITE 2
St. Marys Entrance
FORT CLINCH STATE PARK AQUATIC PRESERVE
FERNANDINA BEACH
FERNANDINA BEACH MUNICIPAL AIRPORT
FERNANDINA BEACH DELIMITED AREA
YULEE
AREA
MARTINS IS
TIGER ISLAND
FORT CLINCH STATE PARK
FLYING "A" RANCH AIRPORT
NASSAU RIVER-ST. JOHNS RIVER MARSHES AQUATIC PRESERVE
TO BRUNSWICK
TO SAVANNAH
TO JACKSONVILLE
DUVAL COUNTY
Nassau
St. Marys River
Cumberland Sound
Amelia River
Back River
Lofton Creek
Bells River
Jolly River
Pirates Woods
Lanceford Creek
Plummer Creek
Nassau Creek
Thomas Creek
Crane Island
Big Piney Island
Alligator Creek
Amelia City
Nassauville
Yulee Heights
Glenwood
Black Rock
Chesters
Becker
McQueen
Crandall
Gross
Pop-7,224
INSET "A"
T 2 N - R 25 E

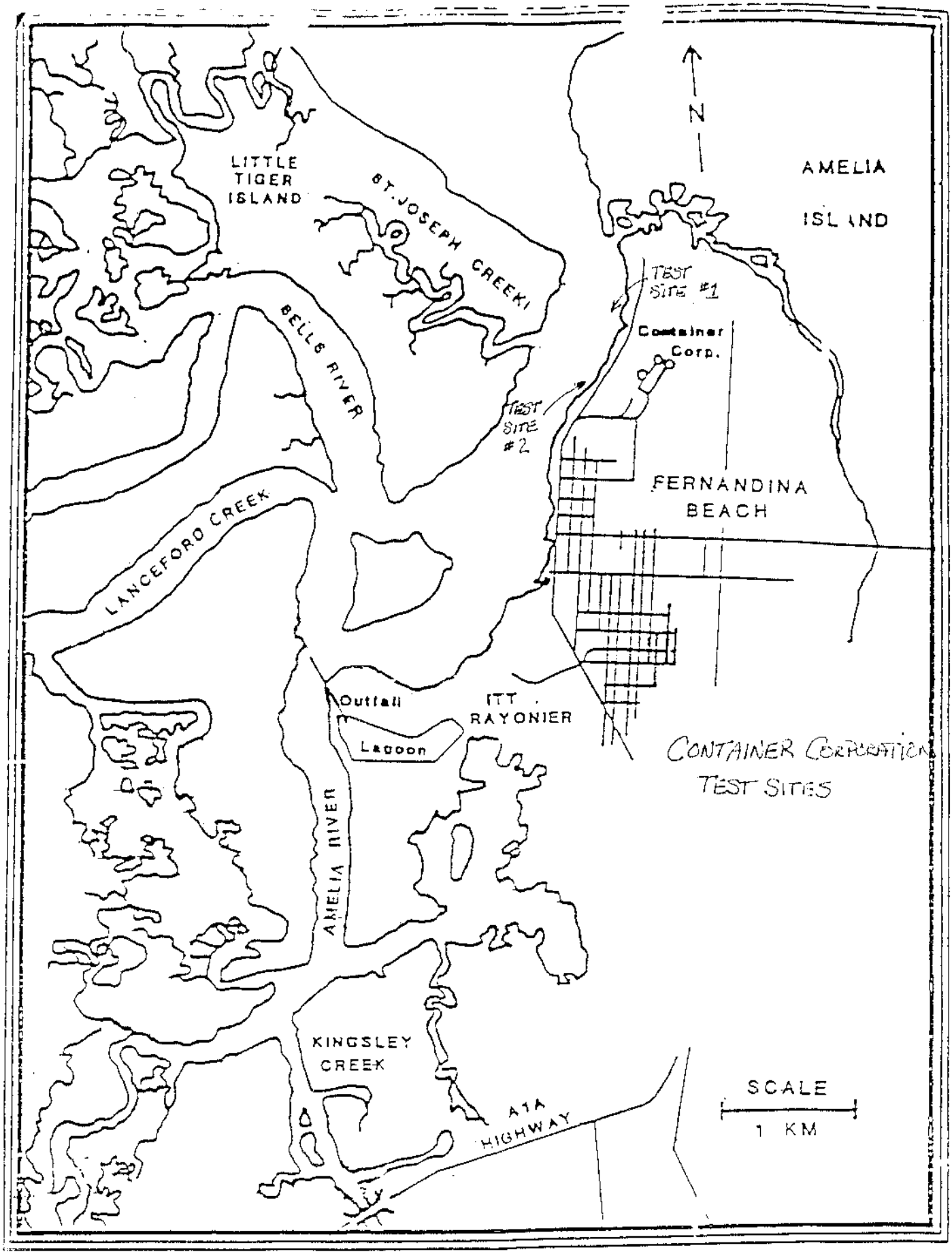


FIGURE 1. AMBIENT SAMPLING STATIONS


PROJECT DEPTH 8.2 METERS (27 FEET) JAN 1976
CONTAINER CORP.
TO REFERENCE SITE
RIVER
CREEK
BELLS
LANCEFORD
AMELIA
Old Fernandina
Fernandina Beach
Amelia Island
Joseph Lee
Park
Light
Conveyor
Lancaster
Tiger

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: Containers Corporation of America	Prepared by: Mike Tarsi Date: 7/19/91	
Location (attach detailed map): North 5th Street Fernandina Beach	County: NASSAU	District: Northeast
Federal Permit # FL0001104 and expiration date: 10/31/93	State GMS # and 3145P00251 State expiration date: 4/20/94	Facility Type: (Industrial) Municipal Federal Agricultural Other (list):

Function of facility:

Intergrated Pulp & Paper Mill which produces unbleached kraft linerboard.

Description of treatment process:

30 design MGD plant using grit chambers, primary clarifiers, ^ 3 cell cooling tower, sludge dewatering equip., and activated sludge treatment system including a UNOX reactor, two secondary clarifiers, an oxy. generation plant, nutrient chemical system, and chlorine addition with final effluent to 001, Amelia River.

Receiving waters: Amelia River	Classification: ~~III~~ I
Design Flow: 30 MGD	Actual Mean Flow:

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

therefore, the best time to sample is:

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

No mixing zone

List effluent limits:

Parameter	Limit (units)
Flow MGD	MAX 30 mgd
BOD_5 lbs/day	max 23,120 Avg/R 11,560
TSS lbs/day	max/d. 42,500 D/Avg. 21,250
Temperature (°F)	D/max 100
pH (SU)	6 to 9
DO mg/L	min/D 4.0

Describe special permit conditions and permit modifications:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s):

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: 1/2/90 POWER OUTAGE WHICH CAUSE A GRIT CHAMBER OVERFLOW RELEASING ≈ 100,000 GALLONS. INFLUENT TO TREATMENT SYSTEM WAS 11631 lbs FOR BOD5 & 2294 lbs FOR TSS.

BOD5

- 1/3/90 20.3 MGD 825 mg/L 139674 lbs/day
- 1/4/90 21.6 MGD 870 mg/L 156725 lbs/day
- 1/5/90 19.4 MGD 330 mg/L 53393 lbs/day
- 1/6/90 19.9 MGD 141 mg/L 23401 lbs/day

TSS
600 mg/L 101581 lbs/DAY

2/22/90 SPILL, BOD5 = 2180 lbs/DAY
5/29/90 GRIT CHAMBER OVERFLOW

6/16/90 BOD5 DAILY AVG. EXCEEDANCE
5/6/91 BOD5 - 63285 #/DAY

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
NOV ISSUED 4/20/90 FOR MONITORING VIOLATIONS IN 12/89, BOD VIOLATIONS IN 12/89 AND BOD5 & TSS VIOLATIONS IN 1/90, & PH PROBLEMS.
Draft CO. in works (at OGC). Facility has not signed.

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:
Overall, BOD has come down in value over the past year, however, there have been several upsets and spills causing BOD & TSS problems.

Additional information:
A PAI was conducted by DER on JULY 1, 1991. Samples were collected and split with facility for BOD5 & TSS at following locations

Outfall 001: BOD 5603 lbs
TSS 13740 lbs

River: BOD 5202 lbs
TSS: 8538 lbs

Flume: BOD 5336 lbs
TSS 9072 lbs

FACILITY WILL SUBMIT THEIR RESULTS FROM THE SPLIT SAMPLES WHEN MADE AVAILABLE.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/DY):	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
			20			

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

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

Point-Source Pollution (list location and describe):

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: [ ] Chemical: [X] Anaerobic: [ ] Other: [ ] _____

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

Sediment Deposits: Sludge: [ ] Paper Fiber: [ ] Mud: [X] Sand: [ ] Shell: [X] 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		7	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: [ ] _____

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 95°F

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
7/93	M. Tonsi	

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME: DER	STORET STATION NUMBER:	DATE (M/D/Y): 7/23/	RECEIVING BODY OF WATER:

REMARKS:	LOCATION:	FIELD ID/NAME:

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 7	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 35	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 3	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 12	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 63

COMMENTS:

ANALYSIS DATE: 7/23/91	ANALYST: M Tonk.	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:

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
			20			

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

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

Point-Source Pollution (list location and describe):

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: [ ] 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	2%	Coarse Organic Debris:	
Sand:		Mud/Muck (organic):	

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top			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: [ ] _____

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

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

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

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

Weather Conditions:

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:

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 8	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 30	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 4	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 60

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
7/27/11	M. Tuski	Michael Tuski

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): GEORGIA PACIFIC 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):		
Top			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] 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	[ ]
Aquatic Macrophytes	[ ]	[ ]	[X] SPARTINA	[ ]
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 Russ Frydenborg

NPDES Permit #: [redacted] Outfall: CONTAINER CORP. BIOLOGY LABORATORY CHRONIC BIOASSAY

Log #: 129 Chow Batch #: S Algae Batch #: _____ *Ceriodaphnia dubia* BENCH SHEET

CHCM ID 2435

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	# Young	# Adults	Young/Adult
Control	1											0	10	
	2											0	10	
	3											0	10	
	4											0	10	
	5	4	3	6	4	4	5	6	5	6	0	43	10	4.3
	6	0	0	0	7	10	9	0	11	7		37	10	3.7
	7	9	9	10	9	0	8	10	9	10	10	64	10	6.4
	8	13	12	10	11	9	10	11	17	12	0	134	10	13.4
	Total	26	24	26	32	27	32	23	20	31	33	277	10	27.7
NOEC = 6.25%	1											0	10	
	2											0	10	
	3											0	10	
	4											0		
	5	3	4	6	3	6	3	4	5	4	4	42	10	4.2
	6	9	0	0	0	0	0	0	0	10	10	29	10	2.9
	7	0	8	11	8	9	11	8	9	9	15	79	10	7.9
	8	12	13	11	13	11	10	13	15	12	0	119	10	11.9
	Total	24	25	31	24	27	24	25	29	26	29	269	10	26.9
LOEC = 12.5%	1											0	10	
	2											0	10	
	3											0	10	
	4											0	10	
	5	3	4	4	0	4	4	4	0	4	4	31	10	3.1
	6	0	0	0	2	2	0	0	4	0	0	14	10	1.4
	7	9	8	10	6	0	10	8	9	8	7	74	10	7.4
	8	10	11	12	10	12	13	13	0	13	12	106	10	10.6
	Total	22	23	26	18	24	27	25	12	25	23	235	10	23.5
25%	1											0	10	
	2											0	10	
	3											0	10	
	4											0	10	
	5	4	3	3	4	4	5	3	0	5	3	34	10	3.4
	6	0	0	0	3	0	0	0	4	0	0	7	10	0.7
	7	5	7	9	4	8	9	9	8	0	9	68	10	6.8
	8	11	10	11	11	10	10	11	0	12	9	97	10	9.7
	Total	20	20	23	19	22	24	23	12	29	21	213	10	21.3
50%	1											0	10	
	2											0	10	
	3											0	10	
	4											0	10	
	5	3	0	2	2	4	3	1	0	5	4	24	10	2.4
	6	0	0	0	0	0	0	0	4	3	0	7	10	0.7
	7	6	5	5	4	7	6	7	6	0	6	52	10	5.2
	8	12	9	10	11	9	7	10	0	10	10	86	10	8.6
	Total	21	14	17	17	20	16	18	7	23	20	174	10	17.4
100%	1											0	10	
	2											0	10	
	3											0	10	
	4													
	5	2	0	0	1	0	X	0	0	1	0	3	8	0.4
	6		2	0	0	0		0	2		0	4	8	0.5
	7	4	2	0	0	4		0	2		0	12	8	1.5
	8	5	0	5	3	1		0	0		7	20	8	2.5
	Total	11	4	5	4	5		0	4		4	39	8	4.9
	Day	0	1	2	3	4	5	6	7	8				
	Counted by	MF	[illegible]	MF	[illegible]	KP	[illegible]	MF	[illegible]					

7/21 7/25 8/9

Sample Collection
A: Date 7/22/91 Time 1411
B: Date [illegible] Time 15[illegible]
C: Date 7/24/91 Time 0955

Begin Test: Date 7/23/91 Time 1130

End Test: Date 7/30/91 Time 1330

Instrument Calibrations:

	Day 0	Day 5
pH	7@7.9@9	7.6 7.9
DO	9.2@20.0	9.6 20.5°
Cond	1327@22.4	1346 22.8
Temp	19.7@22.3	20.2@23.7

	Day 1	Day 6
pH	7@7.9@9	7@7.9@9
DO	9.2@20°	9@20.0
Cond	1323@22.3	1331@22.9
Temp	19.2@21.9	20.0@22.5

	Day 2	Day 7
pH	7@7.9@9	7@7.9@9
DO	9.2@20°	[illegible]
Cond	1326@22.9	[illegible]
Temp	20.0@22.5	[illegible]

	Day 3	Day 8
pH	[illegible]	
DO	[illegible]	
Cond	[illegible]	
Temp	[illegible]	

	Day 4
pH	7.2 7.9
DO	9.2@20°
Cond	1346@22.5° & 1350
Temp	20.8°@22.1°C

Remarks:

FLOC IN 100%

* DAY 6 at 50% - ADDED RESERVOIR WATER TO BRING TO 250 ml

Investigators' Signatures

Mark O Cantrell

Kim Pierce

Reviewer

CONTAINER CORP

CCA722

Summary Statistics and ANOVA

Transformation = None

Group	n	Mean	s.d.	cv%
1 = control	10	27.8000	4.5166	16.2
NOEC 2	10	26.9000	2.4698	9.2
LOEC 3*	10	22.5000	4.4535	19.8
4*	10	20.3000	4.8086	23.7
5*	10	17.4000	4.5753	26.3
6*	10	3.9000	3.3813	86.7

*) the mean for this group is significantly less than the control mean at alpha = 0.05 (1-sided) by Dunnett's test

Minumum detectable difference for Dunnett's test = -4.237293
This difference corresponds to -15.24 percent of control

Between groups sum of squares = 3805.200000 with 5 degrees of freedom.

Error mean square = 16.970370 with 54 degrees of freedom.

Bartlett's test p-value for equality of variances = .433

Macroinvertebrate Taxa list for Container Corporation of America, collected in the Amelia River via 6 ponar grabs (3 grabs per test site, but material from the two test sites was inadvertently combined), on 23 July, 1991. Reference site was located in the St. Marys River and collected via 3 ponar grabs on 1 April, 1987.

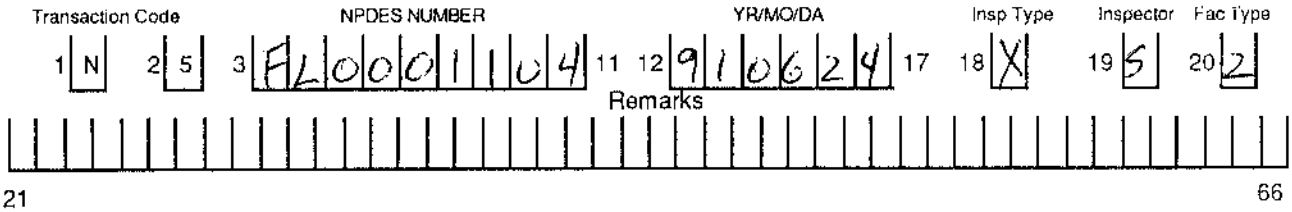
	Control Site	Combined Test Sites
Hirudinea		
Cystobranchus viridus	10	–
Decopoda		
Rhithropanopeus harrisii	–	12
Undetermined Decapod sp.	–	6
Diptera		
Undetermined Dipteran pupae	–	6
Malacostraca		
Corophium lacustre	–	12
Edotea sp.	10	–
Grandidierella bonnieroides	–	56
Melita nitidia	31	–
Monoculodes edwardsi	10	–
cf. *Siriella thompsoni*	10	–
Nemertea		
Amphiporus caecus	10	–
Cerebratulias lacteus	21	–
Tubulanus pellucides	31	–
UndeterminedNemertea	–	6
Oligochaeta		
Peloscolex gabrielloe	52	–
Undetermined Oligochaete sp.	83	25
Pelecypoda		
Gemma sp.	–	25
Mulinia lateralis	10	–
Petricola pholoiformis	10	–
Undetermined marine Pelecypoda	–	6
Tellina sp.	–	12
Polychaeta		
Aricidea sp.	–	6
Capitella capitata	12	–
Cauleriella sp.	–	37
Cirriformia sp.	–	12
Diopatra cuperea	10	–
Eteone heteropoda	31	–
Glycera dibrachiata	42	–
Glycera americana	52	–
Laeonereis culveri	31	–
Lumbrineris tenuis	–	6

Malmgrenia sp.	10	–
Mediomastus sp.	–	31
Paleanotus sp.	–	6
Neanthes acuminata	21	–
Paraprinospio pinnata	52	–
Polydora ligni	31	–
Polydora socialis	12	12
Prionospio sp.	–	6
Scoloplos sp.	–	6
Sigambra sp.	–	6
Undetermined Polychaete sp.	12	31
Scoloplos rubra	10	–
Streblospio benedicti	83	81
Tharyx sp.	–	6

Phytoplankton taxa list for Container Corportion, Nassau County, Florida, collected from the Amelia River, 24 July, 1991

	Test Site 1	Test Site 2
Diatoms		
Amphora sp.	43	220
Asterionella japonica	86	88
Chaetoceros sp.	129	44
Cymatosira sp.	–	44
Coscinodiscus sp.	129	88
Cyclotella sp.	–	–
Leptocylindrus sp.	129	–
Navicula sp.	86	176
Nitzschia sp. 1	644	484
Nitzschia sp. 2	43	44
Nitzschia sp. 3	–	132
Nitzschia sp.	344	88
Rhizosolenia sp.	43	88
Skeletonema sp.	301	44
Chlorophyta		
Chlorella sp.	–	44
Unknown Chlorophyte Flagellate	344	264
Cyanophyta		
Chroococcus sp.	1031	352
Merismopedium sp.	172	–
Oscillatoria sp.	–	44
Euglenophyta		
Euglena sp.	–	–
Pyrrhophyta		
Oxtoxum sp.	–	44
Peridinium sp.	43	–

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)

