Florida
Department of Environmental Protection

Biological Assessment of

City of Bradenton Wastewater Treatment Plant & Tropicana Products, Inc.

Manatee County

NPDES #FL0021369 (Bradenton) and #FL0000043 (Tropicana)

Sampled January and February 1993

October 1993

Biology Section
Division of Technical Services

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: Bradenton WWTP and Tropicana Products, Inc.
County: Manatee
NPDES Number: FL0021369 (Bradenton) and FL0000043 (Tropicana)
State Permit Expiration Date: 12-31-93 (Bradenton) and 8-15-95 (Tropicana)

Toxics Sampling Inspection (XSI)

Date Sampled: 15 February 1993

Results: Bradenton WWTP: atrazine (1.2 µg/L). Tropicana Products, Inc.: ametryn (0.24 µg/L), bromacil (1.3 µg/L), ethion (0.05 µg/L), simazine (1.6 µg/L), and potentially toxic petroleum hydrocarbons with a pattern similar to diesel fuel (7000 µg/L). Bradenton: metals values were within Class II water quality standards. Tropicana: iron (529 µg/L), nickel (14 µg/L), and zinc (88 µg/L) were in violation of Class II marine water quality standards (Rules 17-302.550 (23), 17-302.550 (27), and 17-302.550 (44) FAC, respectively).

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 15 February 1993

Results: Bradenton WWTP: not acutely toxic to the invertebrate, *Ceriodaphnia dubia,* or to the fish, *Notropis leedsi*. Tropicana: not toxic to *Notropis leedsi*, but complete mortality (100%) to *Ceriodaphnia dubia* occurred in the full strength sample. Although this suggests that the Tropicana effluent is acutely toxic, excessive mortality (15%) occurred in the controls, thereby invalidating the results of this bioassay.

Impact Bioassessment Inspection (IBI)

Date Sampled: 15 February 1993

Results: Benthic biota at test site 1, closest to the Tropicana outfall, were greatly degraded. Taxa richness and Shannon-Weaver diversity were reduced (by 41.2% and 52.8%, respectively) at test site 1, compared with the reference site. The reduction in diversity is a violation of the biological integrity criterion (Rule 17-302.550(7) FAC). The pollution tolerant polychaete, *Mediomastus ambiseta,* made up 68.6% of the benthic population at test site 1, interpreted to be a violation of Rule 17-302.510(q) FAC, dominance of nuisance species. Phytoplankton communities did not appear to be negatively affected by the discharges from the two facilities. The chlorophyll *a* levels at the three sites were higher than 60% to 74% of other Florida estuaries, reflecting the somewhat elevated phosphorus concentrations.

Water Quality Inspection (WQI)

Date Sampled: 5 January 1993 and 15 February 1993

Results: Bradenton effluent: nutrients were relatively low, well within the facility's permit requirements. Tropicana: total phosphorus (20.0 mg/L) sampled on 5 January 1993, was extremely elevated. Receiving water stations were higher than 81% to 88% of typical Florida estuaries in ortho-phosphate. Algal growth potential (AGP) results suggested no eutrophication problems in the Manatee River during this sampling, although the very elevated AGP in the Tropicana effluent is cause for concern. Coliform bacteria were within Class II standards at all receiving water stations.

Introduction

The City of Bradenton Wastewater Treatment Plant and Tropicana Products, Inc., are both located in Bradenton, Manatee County, Florida (see map in Appendix). The outfalls for the two facilities are located within 100 meters of one another on the south shore of the Manatee River, just east of the Highway 41 bridge. Both facilities were sampled during this study to determine their relative influences on receiving water conditions.

The Bradenton WWTP has a design capacity of 6 MGD, which has been exceeded slightly in recent months. The Bradenton advanced domestic wastewater treatment facility utilizes a carousel type oxidation ditch, with de-nitrification, filtration, disinfection, de-chlorination, and sludge digestion. Permit limits are as follows: BOD (5 mg/L, as an annual average), TSS (5 mg/L, as an annual average), total nitrogen (3 mg/L, as an annual average), total phosphorus (1 mg/L, as an annual average), fecal coliform bacteria (non-detectable in 75% of samples, 25 organisms/100mL maximum), pH (6-8.5), and total residual chlorine (1.0 mg/L for disinfection, 0.01 mg/L after dechlorination) (see Facility Summary in Appendix for details).

Tropicana Products, Inc. is a citrus processing plant, which produces juice, concentrate, and animal feeds, manufactures containers, and recovers solvents and waste oils. Its design capacity is 2 MGD. Tropicana's primary discharge (outfall 001) consists of combined treated boiler blowdown, cooling tower blowdown, evaporative condenser bleed-off water, as well as other process wastewater. Permit limits for this discharge are in the Appendix. Wastewater is treated in three lagoons. A 350,000 gallon clarifier is located between lagoons "A" and "B", where solids are settled, removed, and pumped to the feedmill operation. The clarified effluent is then routed to "B" lagoon, where it is pumped through two dissolved air flotation units for additional solids removal (which are also incorporated into cattle feed). Polished effluent then enters lagoon "C", where it is pumped to a sand filtration system and thence to a series of holding tanks with a combined 75,000 gallon capacity. After chlorination, this treated wastewater is re-used in non-product operations throughout the facility. Excess treated wastewater from lagoon "C" is discharged to the Manatee River. Tropicana's 002 outfall is for emergency discharge only. It connects with the City of Bradenton's outfall prior to discharge.

The Bradenton WWTP has been operating satisfactorily, with the exception of occasionally exceeding their flow limit. Tropicana Products, Inc., is currently under enforcement

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	34	20	40
Marine Biotic Index	2.9	1.3	2.1
Shannon-Weaver Diversity	3.6	1.7	3.8
% Cumacea	6.3	10.8	30.0
% Pelecypoda	13.7	0.4	26.6
% Malacostraca	42.1	0.9	7.0
% Polychaeta	8.8	86.3	21.0
% Tanaidacea	26.1	0.5	0.2
% Gastropoda	1.2	0.5	12.8
% Predators/ Carnivores	2.0	0.7	3.0
% Deposit feeders (above surface)/ Collector-Gatherers	51.1	9.9	17.1
% Deposit feeders (below surface)	5.7	77.8	8.0
% Suspension feeders/ Collector-Filterers	34.5	11.5	58.2
% Scavengers	5.3	0	0.1
% Plant piercers	0	0	0.4
% Scrapers	1.2	0.2	13.2
% Shredders	0.2	0	0.1
Phytoplankton Algae			
Number of Taxa	11	15	12
% Contribution of Dominant Taxon	64.9	52.7	42.7
Chlorophyll a (mg/m2)	9.1	10.5	7.9
Diatom/Blue-green Abundance Ratio	1.0	0.99	0.96
% Blue-green	0	1.1	3.6
% Green	0	3.3	5.5
% Pyrrophyta	1.1	2.2	4.5
% Cryptophyta	0	5.5	0
% Diatoms	98.9	87.9	86.4
Algal Growth Potential (mg dry wt/L)	3.4	4.3	4.6

actions due to numerous violations of permit limits for total nitrogen, TSS, and BOD.

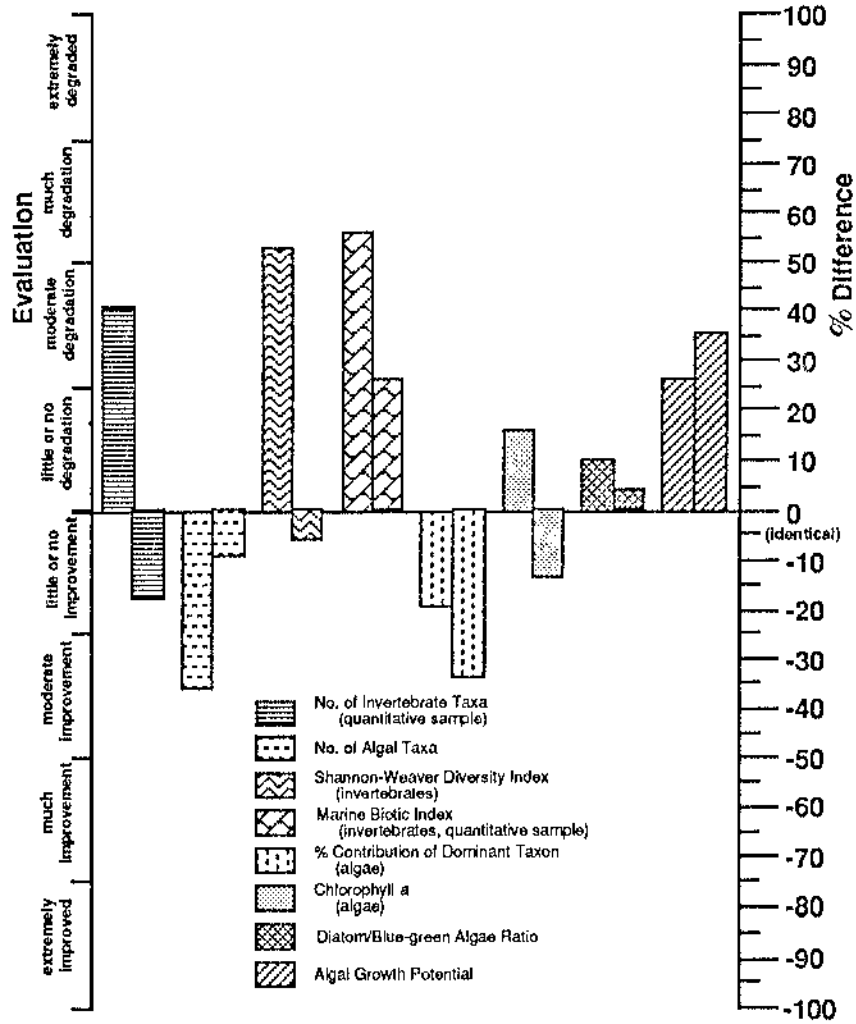
Methods

The focus of this investigation was to determine the dischargers' effects on the receiving waters. A comparison of biological community health was made between a reference site (located about 1 mile northeast of the two outfalls in the Manatee River) and two Manatee River test sites (test site 1 was located 100 meters east of the Tropicana discharge, and test site 2 was 100 meters west of the Bradenton WWTP outfall (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 effluent samples from both facilities (Weber 1991). The effluents were analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on both effluent samples, as well as water from the 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 using a Petite Ponar dredge (3 replicates) (Ross 1990). Phytoplankton was sampled at both reference and test sites via sub-surface grab samples. Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). Algal Growth Potential tests, using *Selenastrum capricornutum* for the freshwater effluent and *Dunaliella tertiolecta* as the test organism for the estuarine receiving water stations, followed Miller *et al.* (1978) and 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. A marine biotic index, currently under development, assigns points to estuarine macroinvertebrates based on their sensitivity to pollution (Dr. Doug Farrell, FDEP, personal communication). A site with a higher marine biotic index score is considered healthy (*i.e.*, many clean-water organisms are present), whereas sites with lower scores suggests disturbance. Excessive numerical dominance of a single type of organism (a high % contribution of dominant tax-

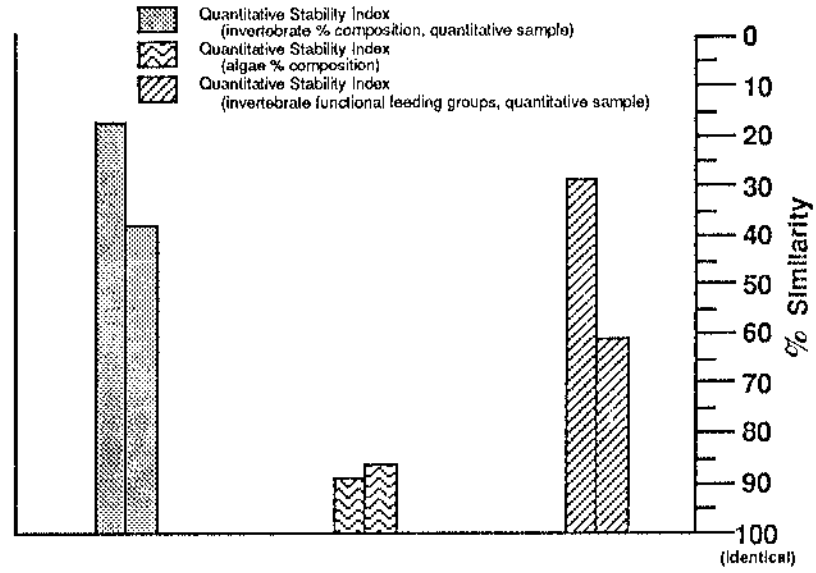


Effect of discharge on receiving stream
(measured as difference between control and test sites).

on) is usually associated with perturbation. 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, marine biotic index, and the diatom to blue-green algae ratio are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving the percent contribution of dominant taxon, chlorophyll *a*, and algal growth potential are measured as the test site minus reference site divided by the reference site.

The following personnel were involved in this investigation: Pat Fricano, Jim Snitgen, Doug Farrell, and Kathryn Hicks (DEP Southwest District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Kathleen Lurding, Kim Pearce, Urania Quintana, Landon Ross, and Greg Wynn (Tallahassee Biology Laboratory). The report was reviewed by the Point Source Bioassessment Review Committee, consisting of Jan Mandrup-Poulsen, Wayne Magley, and Mike Tanski, as well as District representatives.



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

Results and Discussion

The study area could be described as a mangrove-lined, moderate wave energy estuary, with a heavily urbanized watershed. Habitat quality was somewhat lower at the test sites, compared to the reference site (habitat scores were 63, 50 and 54 for the reference, test site 1, and test site 2, respectively, Appendix). The reference site had more available community types in the vicinity and somewhat less artificial shoreline alterations than did the test sites. Sediments at both test sites had a petroleum odor, and slight oily residue. The pH at the study sites was slightly acidic (6.6 at the reference, 6.4 at test site 1, and 5.7 at test site 2). Conductivity was highest at test site 2 (29,000 µmhos/cm, or approximately 21 ppt salinity) and lowest at the reference (24,800 µmhos/cm, or approximately 15 ppt salinity). Dissolved oxygen was adequate at all sites, ranging from 7.5 mg/L to 8.0 mg/L.

The Bradenton Wastewater Treatment Plant effluent was not acutely toxic to the invertebrate, *Ceriodaphnia dubia*, or to the fish, *Notropis leedsi*. (Appendix). While the Tropicana effluent was not toxic to *Notropis leedsi*, complete mortality (100%) to *Ceriodaphnia dubia* occurred in the full strength sample. Although this suggests that the Tropicana effluent is acutely toxic, excessive mortality (15%) occurred in the controls, thereby invalidating the results of this bioassay.

Atrazine was detected in the Bradenton WWTP effluent, at 1.2 µg/L. Several organic contaminants, including ametryn (0.24 µg/L), bromacil (1.3 µg/L), ethion (0.05 µg/L), simazine (1.6 µg/L), and petroleum hydrocarbons with a pattern similar to diesel fuel (7000 µg/L), were measured in the Tropicana effluent. The estimated concentration of petroleum hydrocarbons (suspected diesel fuel) is cause for concern, since levels of 500 µg/L may be acutely and/or chronically toxic to invertebrates and fish.

In the Bradenton effluent sample, the metals iron (57 µg/L), and zinc (15 µg/L) were found. These metals values were within Class II water quality standards. In the Tropicana effluent sample, the metals aluminum (208 µg/L), iron (529 µg/L), nickel (14 µg/L), and zinc (88 µg/L) were detected at levels above practical quantitation limits. The concentrations of iron, nickel, and zinc in the Tropicana discharge represent violations of Class II marine water quality standards (Rules 17-302.550 (23), 17-302.550 (27), and 17-302.550 (44) FAC, respectively).

Fecal coliforms were 26 organisms/100mL at the reference site, 220 organisms/100mL at test site 1, and 28 organisms/100mL at test site 2, respectively. Total coliform bacteria results were 37 organisms/100mL at the reference site, 1050 organisms/100mL at test site1, and 200 organisms/100mL at test site 2, respectively. Even though all samples were held beyond normal holding times, the results suggest that there were no violations of water quality standards.

Nutrients were relatively low in the Bradenton effluent sample, and were well within the facility's permit requirements (see Chemistry Summary Table in Appendix). Tropicana's total phosphorus concentration (20.0 mg/L) sampled on 5 January 1993, was extremely elevated, indicating a substantial nutrient contribution from this facility. On a subsequent sampling (15 February 1993), Tropicana's total phosphorus was 0.77 mg/L, nitrate-nitrite was 2.4 mg/L and TKN was 4.7 mg/L. With the exception of ortho-phosphate and total phosphorus, nutrient concentrations of the receiving water stations were fairly average for Florida estuary systems (see table of Typical Water Quality Parameters in Appendix). Ortho-phosphate concentrations, which were 0.19 mg/L at both the reference site and test site 1, and 0.13 mg/L at test site 2, were higher than approximately 88% and 81%, respectively, of typical Florida estuaries. Total phosphorus results were analogous. Although it is likely that non-point sources are responsible for much of the phosphorus enrichment in this portion of the Manatee River, the Tropicana discharge also appears to be a contributor.

Algal growth potential (AGP) results suggested no eutrophication problems in the Manatee River during this sampling. Reference site AGP was 3.4 mg dry wt/L, test site 1 AGP was 4.3 mg dry wt/L, and test site 2 AGP was 4.6 mg dry wt/L. According to Ron Raschke (USEPA, personal communication), saltwater AGP levels above 10 mg dry wt/L, indicate the likelihood of enrichment problems such as excessive algal growth and D.O. sags. Bradenton's effluent AGP (4.1 mg dry wt/L) was the same as, or lower than, those observed at receiving water stations. In contrast, the AGP of Tropicana's effluent was 144.5 mg dry wt/L.

Measurements of macroinvertebrate community health suggested that biota at test site 1, closest to the Tropicana outfall, were greatly degraded. Far lesser effects were seen at test site 2, closest to the City of Bradenton WWTP. 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. The figure on p. 3 summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation. A complete taxa list is in the Appendix.

Taxa richness at the reference site (34) was slightly above average for a typical Florida estuary system (near the 69th percentile, compared to other Florida estuaries). While taxa richness was actually higher at test site 2 (with 40 taxa), a large decrease (by 41.2%) in this measurement occurred at test site 1 (with 20 taxa), compared with the reference site. Shannon-Weaver diversity at the reference site was also higher than average (in the 70th percentile, compared to other estuaries). Shannon-Weaver diversity was greatly reduced (by 52.8%) at test site 1, compared with the reference site. This is a violation of the biological integrity criterion (Rule 17-302.550(7) FAC). Diversity at test site 2 was 3.8, suggesting no disturbance from the Bradenton outfall.

While crustaceans (74.5%) dominated the reference site, polychaetes (86.3%) were most numerous at test site 1, and mollusks (39.4%) dominated test site 2. The variation in community structure between the test sites and the reference site was evident in the Quantitative Stability Index scores for percent composition. Unusually low QSI's (for % composition) of 17.4% and 37.2% were calculated for test sites 1 and 2, respectively.

As stated earlier, the marine biotic index, which is currently under development, assigns points to estuarine macroinvertebrates based on their sensitivity to pollution (Dr. Doug Farrell, FDEP, personal communication). Marine biotic index scores of 2.9, 1.3, and 2.1 were calculated for the reference site, test site1, and test site 2, respectively. This further reinforces the above measurements of benthic health in demonstrating that degraded conditions prevailed at test site 1 (near Tropicana). Interestingly however, this

index also suggests that conditions at test site 2 (near Bradenton) may not be as undisturbed as the other measurements indicated, since there was a 27.6% decrease in the relative abundance of pollution sensitive taxa there.

The pollution tolerant polychaete, *Mediomastus ambiseta,* made up 68.6% of the benthic population at test site 1. The dominance of organisms typical of polluted conditions, coupled with the reduction of other forms, is the classical biological response to organic waste contamination (Mackenthun and Ingram 1967). This is interpreted to be a violation of Rule 17-302.510(q) FAC, which prohibits the discharge of substances which result in the dominance of nuisance species.

The Quantitative Stability Index for functional feeding groups showed that major differences in trophic functioning existed between the reference site and test site 1, further emphasizing the degraded conditions there. The benthic data, in corroboration with the effluent chemistry, suggest that the problems at test site 1 may be attributed to the Tropicana discharge. For example, BOD (63 mg/L) and TSS (66 mg/L) were both very elevated in the Tropicana discharge. It is suspected that the decline in benthic communities near the Tropicana outfall may be related to the deposition of these detrimental particulates in the vicinity of the discharge.

Phytoplankton communities did not appear to be negatively affected by the discharge from the two facilities. While 11 taxa were collected at the reference site, 15 were represented in the test site 1 sample, and 12 taxa were found at test site 2 (see taxa list in Appendix). The percent contribution of the dominant taxon was lower at the tests sites than at the reference site. The dominant species at the reference site, *Chaetoceros* sp., is a ubiquitous marine diatom, whose abundant presence at the reference site would not be considered unusual. Diatoms were most numerous at all stations (98.6% at the reference site, 89.9% at test site 1, and 86.4% at test site 2). The QSI for percent composition indicated a close similarity between the sites, as did the diatom to blue-green ratio. Chlorophyll *a* was highest at test site 1 (10.5 µg/L) and lowest at test site 2 (7.9 µg/L). These chlorophyll *a* levels are higher than 74% to 60% of other Florida estuaries, reflecting the somewhat elevated phosphorus concentrations.

Conclusions

The Bradenton Wastewater Treatment Plant effluent was not acutely toxic to the invertebrate, *Ceriodaphnia dubia,* or to the fish, *Notropis leedsi.* (Appendix). While the Tropicana effluent was not toxic to *Notropis leedsi,* complete mortality (100%) to *Ceriodaphnia dubia* occurred in the full strength sample. Although this suggests that the Tropicana effluent is acutely toxic, excessive mortality (15%) occurred in the controls, thereby invalidating the results of this bioassay.

Atrazine was detected in the Bradenton WWTP effluent, at 1.2 µg/L. Several organic contaminants, including ametryn (0.24 µg/L), bromacil (1.3 µg/L), ethion (0.05 µg/L), simazine (1.6 µg/L), and petroleum hydrocarbons with a pattern similar to diesel fuel (7000 µg/L), were measured in the Tropicana effluent. The estimated concentration of petroleum hydrocarbons (suspected diesel fuel) is cause for concern, since levels of 500 µg/L may be acutely and/or chronically toxic to invertebrates and fish.

In the Bradenton effluent sample, metals values were within Class II water quality standards. In the Tropicana effluent sample, the concentrations of iron (529 µg/L), nickel (14 µg/L), and zinc (88 µg/L) were in violation of Class II marine water quality standards (Rules 17-302.550 (23), 17-302.550 (27), and 17-302.550 (44) FAC, respectively).

Even though all fecal and total coliform samples were held beyond normal holding times, the results suggest that there were no violations of water quality standards.

Nutrients were relatively low in the Bradenton effluent sample, and were well within the facility's permit requirements. Tropicana's total phosphorus concentration (20.0 mg/L) sampled on 5 January 1993, was extremely elevated, indicating a substantial nutrient contribution from this facility. With the exception of ortho-phosphate and total phosphorus, nutrient concentrations of the receiving water stations were fairly average for Florida estuary systems. Ortho-phosphate concentrations were higher than approximately 81% to 88% of typical Florida estuaries. Total phosphorus results were analogous. Although it is likely that nonpoint sources are responsible for much of the phosphorus enrichment in this portion of the Manatee River, the Tropicana discharge is also appears to be a contributor.

Algal growth potential (AGP) results suggested no eutrophication problems in the Manatee River during this sampling, although the very elevated AGP in the Tropicana effluent is cause for concern.

Measurements of macroinvertebrate community health indicated that biota at test site 1, closest to the Tropicana outfall, were greatly degraded. Far lesser effects were seen at test site 2, closest to the City of Bradenton WWTP. Taxa richness and Shannon-Weaver diversity were greatly reduced (by 41.2% and 52.8%, respectively) at test site 1, compared with the reference site. The reduction in diversity is a violation of the biological integrity criterion (Rule 17-302.550(7) FAC). The pollution tolerant polychaete, *Mediomastus ambiseta,* made up 68.6% of the benthic population at test site 1. This is interpreted to be a violation of Rule 17-302.510(q) FAC, which prohibits the discharge of substances which result in the dominance of nuisance species.

The marine biotic index (a population sensitivity index currently under development) further reinforced the above measurements of benthic health in demonstrating that degraded conditions prevailed at test site 1 (near Tropicana). Interestingly however, this index also suggested that conditions at test site 2 (near Bradenton) may not be as undisturbed as the other measurements indicated, since there was a 27.6% decrease in the relative abundance of pollution sensitive taxa there. The benthic data, in corroboration with the effluent chemistry, suggest that the problems at test site 1 may be attributed to the Tropicana discharge.

Phytoplankton communities did not appear to be negatively affected by the discharge from the two facilities. Diatoms were most numerous at all stations and the QSI for percent composition indicated a close similarity between the sites, as did the diatom to blue-green ratio. The chlorophyll *a* levels at the three sites were higher than 60% to 74% of other Florida estuaries, reflecting the somewhat elevated phosphorus concentrations.

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Chemistry summary table for Bradenton WWTP and Tropicana (sampled on 15 February 1993 unless indicated otherwise).

	Bradenton Effluent	Tropicana Effluent	Control Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)					
Ametryn		0.24 T			
Atrazine	1.2				
Bromacil		1.3 T			
Ethion		0.05 K			
Simazine		1.6			
Petroleum hydrocarbons (pattern similar to diesel fuel)		7000 J			
Metals (ug/L)					
Aluminum	50 U	208			
Arsenic	20 U	20 U			
Cadmium	0.16 U	0.16 U			
Copper	5 U	5 U			
Chromium	10 U	11 T			
Iron	57 A	529			
Lead	15 U	15 U			
Mercury	0.1 U	0.1 U			
Nickel	5 U	14			
Silver	0.05 U	0.1 U			
Zinc	15 A	88			
Nutrients (mg/L)					
Ortho-phosphate	0.066 A		0.19	0.19	0.13
Total phosphorus	0.1	0.77 (2-15-93) 20 (1-5-93)	0.25	0.24 A	0.18
Ammonia	0.046	0.22	0.02 U	0.02 U	0.02 U
Nitrate+Nitrite	0.024 T	2.4	0.03 U	0.03 U	0.035 T
TOC		35 (Grab) 131 (Composite)			
TKN	0.86	4.7	0.6	0.64	0.6
Other Parameters					
Habitat Assessment			63	50	54
D.O. (mg/L)	6.0	7.4	7.6	8.0	7.5
pH (SU's)	6.8	7.3	6.6	6.4	5.7
Conductivity (µmhos/cm)	990	1840	24800	26000	29000
Temperature (°C)	25.0	25.0	17.3	17.7	19.1
AGP (mg dry wt/L)	4.1	144.5	3.4	4.3	4.6
Bioassay Fish	not toxic	not toxic			
Bioassay Invertebrate	not toxic	100% mortality, test invalidated			
BOD	15	63			
TSS	1	66			
Fecal coliform (org/100 ml)	0		26 AQ	220 Q	28 Q
Total coliform (org/100 ml)	10 J		37 AQ	1050 Q	200 Q

A - Value reported is the mean of two or more determinations
J - Estimated value
K - Actual value is known to be less than value given
Q - Sample held beyond normal holding time
U - Material analyzed for but not detected; value reported is the minimum detection limit
T- Value reported is less than the practical quantitation limit

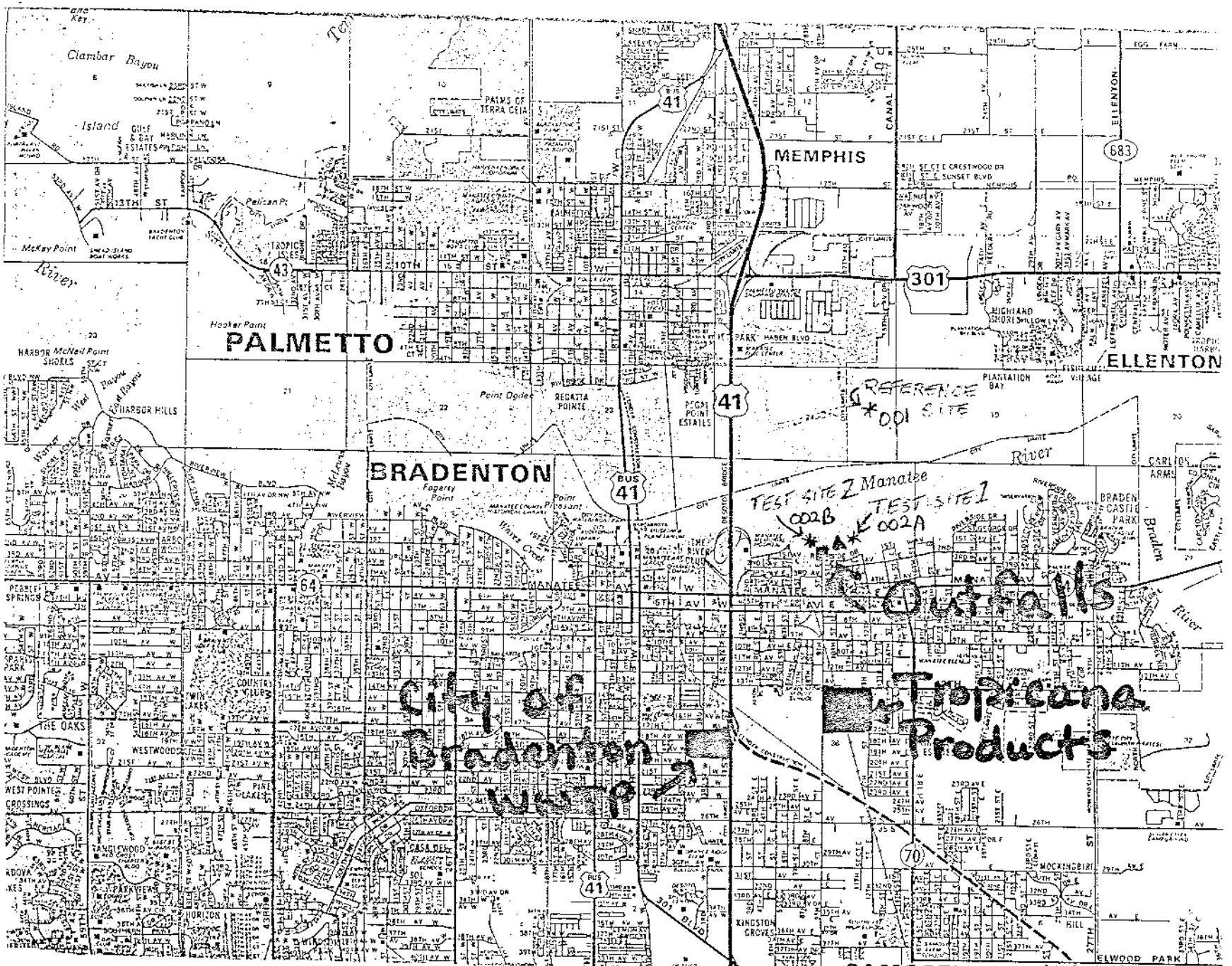
Typical Values for Selected Parameters in Florida Waters

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



* FY1 Sampling Stations

■ City of Bradenton WWTP Outfall

▲ Tropicana Outfall

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: Tropicana Products Inc.		Date Summary Prepared: 2-5-93
Location (attach detailed map): 1001 13th Ave. East Bradenton, FL	County: Manatee	District: SWD
Federal Permit # and expiration date: FL0000043	State GMS # and State expiration date: 4041P0011 Aug. 15, 1995	Facility Type: (Industrial) Municipal Federal Agricultural Other (list):

Function of facility:
Citrus processing plant which includes juice & concentrate production, containers manufacturing, animal feed production, packaging & shipping, and related activities.

Description of treatment process:
The wastewater is treated in a three cell lagoon system with a total design capacity of 28.0 million gallons. A 550,000 gal. clarifier is located between lagoons "A" and "B" where the settled solids are removed and pumped to the Bradwell operation. The clarified effluent is then routed to "B" lagoon. Wastewater from "B" lagoon is pumped through 2 dissolved air flotation units, where by agglutination, solids are skimmed off & pumped to the clarifier for further processing. Polished effluent from this unit is gravity fed into the final "C" lagoon. Treated wastewater from "C" lagoon is pumped to a canal for irrigation purposes into the Manatee River.

Receiving waters: Manatee River	Classification: I II (III)	
Design Flow: 2.0 MGD	Mean Flow:	Flow during survey:

Discharge is: Continuous Intermittent (Seasonal) Rainfall dependent
Other (describe) Daily max flow is 0.9 MGD. (Some flow Nov. and Dec. from orange processing and slightly different process)
therefore, the best time to sample is:

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

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

Parameter	Limit (units)
See attached.	

Describe special permit conditions and permit modifications:
There is a construction permit in effect to construct an anaerobic treatment system. (#41-199079).

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Tropicana Products Inc.
(Facility)

Description of permitted outfall(s):

Outfall 001 – combined treated boiler blowdown, cooling tower blowdown evaporative condenser bleed-off water, other process wastewater. Discharges to Manatee River.

Outfall 002 – emergency discharge consisting of a spillway from lagoon "C" to Robinson's Ditch + thence to the Manatee River via City of Bradenton

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

There seems to have been a problem with Total Nitrogen compliance in 1992. Although, the fourth quarter of 1992 appears to be OK. (Sample results 4th quarter 1992 attached)

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

There is an active enforcement case open with this facility. The draft Consent Order is attached – it has not been executed yet. The enforcement case was initiated due to Total Nitrogen, TSS and BOD5 violations found in monitoring reports for Oct. 1990 thru Sept. 91

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

Additional information:

Mailing Address:
Tropicana Products, Inc.
P.O. Box 338
Bradenton, FL 34206

Staff contributing to this review (signature):

(Biologist)

K. Michelle Hardin (Inspector)

(Engineer)

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SPECIFIC CONDITIONS (Cont'd):

15. The permittee shall ensure that the effluent from this facility, discharged through Outfall 001 during the months June through November, shall not exceed the effluent limitations and shall be monitored as specified below; if there is no discharge, the sample shall be collected on the day of the next discharge.

EFFLUENT LIMITATIONS

EFFLUENT CHARACTERISTICS	DAILY MINIMUM	AVERAGE	DAILY MAXIMUM	SAMPLE FREQUENCY/TYPE
Flow (MGD)	N/A	Report	0.80	Continuous/ Recorder
Dissolved Oxygen (mg/l)	6.0	Report	N/A	2/week/grab
pH (Std. Units)	6.5	Report	8.5	2/week/grab
Temperature (°F)	N/A	Report	Report	2/week/grab
CBOD 5-Day (mg/l)	N/A	Report	15.0	2/week/24-hr composite
CBOD 5-Day (lbs/day)	N/A	100	200	2/week/ calculation
Total Suspended Solids [TSS] (mg/l)	N/A	Report	Report	2/week/24-hr composite
Total Suspended Solids [TSS] (lbs/day)	N/A	1800	3600	2/week/ calculation
Total Nitrogen (mg/l)	N/A	Report	7.5	2/week/24-hr composite
Total Nitrogen (lbs/day)	N/A	50	100	2/week/ calculation
Total Ammonia as N (mg/l)	N/A	Report	5.0	2/week/24-hr composite
Total Ammonia as N (lbs/day)	N/A	33	66	2/week/ calculation
Un-ionized Ammonia as N (mg/l)	N/A	Report	Report	2/week/ calculation
Total Organic Carbon (mg/l)	N/A	N/A	Report	1/month/ 24-hr composite
Total Residual Chlorine (mg/l)	N/A	N/A	0.01	1/month/grab
Oil & Grease (mg/l)	N/A	N/A	5.0	1/month/grab

16. The permittee shall ensure that the effluent from this facility, discharged through Outfall 001 during the months of December through May, shall not exceed the effluent limitations and shall be monitored as specified below; if there is no discharge, the sample shall be collected on the day of the discharge.

TROPICANA PRODUCTS, INC.

SPECIFIC CONDITIONS (Cont'd):

16. (Cont'd)

EFFLUENT LIMITATIONS

EFFLUENT CHARACTERISTICS	DAILY MINIMUM	AVERAGE	DAILY MAXIMUM	SAMPLE FREQUENCY/TYPE
Flow (MGD)	N/A	Report	0.80	Continuous/ Recorder
Dissolved Oxygen (mg/l)	6.0	Report	N/A	2/week/grab
pH (Std. Units)	6.5	Report	8.5	2/week/grab
Temperature (°F)	N/A	Report	Report	2/week/grab
BOD_5 (mg/l)	N/A	Report	Report	2/week/24-hr composite
BOD_5 (lbs/day)	N/A	1260	2520	2/week/ calculation
Total Suspended Solids [TSS] (mg/l)	N/A	Report	Report	2/week/24-hr composite
Total Suspended Solids [TSS] (lbs/day)	N/A	1800	3600	2/week/ calculation
Total Nitrogen (mg/l)	N/A	Report	7.5	2/week/24-hr composite
Total Nitrogen (lbs/day)	N/A	Report	Report	2/week/ calculation
Total Ammonia as N (mg/l)	N/A	Report	5.0	2/week/24-hr composite
Total Ammonia as N (lbs/day)	N/A	Report	Report	2/week/ calculation
Un-ionized Ammonia as N (mg/l)	N/A	Report	Report	2/week/ calculation
Total Organic Carbon (mg/l)	N/A	N/A	Report	1/month/ 24-hr composite
Total Residual Chlorine (mg/l)	N/A	N/A	0.01	1/month/grab
Oil & Grease (mg/l)	N/A	N/A	5.0	1/month/grab

17. The permittee shall submit quarterly the results of the water quality monitoring analyses, as stated above, no later than the twenty-eighth (28) day of the month immediately following the end of the reporting period. The results shall be sent to The State of Florida, Department of Environmental Regulation, Southwest District Office, Industrial Waste Program, 4520 Oak Fair Boulevard, Tampa, Florida 33610-7347 and the Manatee County Public Health Unit (MCPHU) Pollution Control Division, 202 - Sixth Avenue East, Bradenton, FL 34208-1986. For the purpose of this permit, the permittee shall submit a report for surface water monitoring during months of zero discharge also.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: City of Bradenton WWTP		Date Summary Prepared: 02/01/93
Location (attach detailed map): 1ST St & 17th Ave Bradenton	County: Manatee	District: Southwest
Federal Permit # FL0021369. and expiration date: Sept 30, 1994	State GMS # and 4104 M00757 State expiration date: 12/31/93 D041-187073 A	Facility Type: Industrial (Municipal) Federal Agricultural Other (list):

Function of facility: Treatment of domestic sewage within City of Bradenton, FL.

Description of treatment process: 6.0 MGD Carrousel type oxydation ditch Advanced Wastewater Treatment (AWT) plant, headworks, disinfection, de-nitrifying filtration, and de-clorination. Also sludge digestion and filter presses.

Construction permit to implement urban re-use

Receiving waters: Manatee River	Classification: I (II) III	
Design Flow: 6.0 MGD	Mean Flow: 5.8 - 6.1	Flow during survey:

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.): None

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

Parameter	Limit (units)
CBODs / TSS	5 ann aver.
Total N	3 ann aver
Total Phosphorous	1 ann Aver.
Fecal Coliform	non-detect >75% 25 max
D.O.	4
pH	6 - 8.5
Cl_2	1.0 min disinfection
Cl_2	0.01 after de-clor.

Describe special permit conditions and permit modifications:

Hourly dr clor using EPA approved field kit verified twice daily by lab titration

City of Bradenton
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Description of permitted outfall(s):
South side of manatee River in seawall east of U.S. 41 Bridge at approximately 5th St. east.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: Monthly ADF exceeded permitted capacity Jun - Oct 1992 and 3 mo ADF exceeded permitted capacity Jul - Oct 92. No new collection system GPs will be approved and very likely no wetline connections approved until I/I action plan to correct has been received and reviewed.

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

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

Additional information:

Staff contributing to this review (signature):

(Biologist)

(Inspector)

Hilbert D. Hardman (Engineer)

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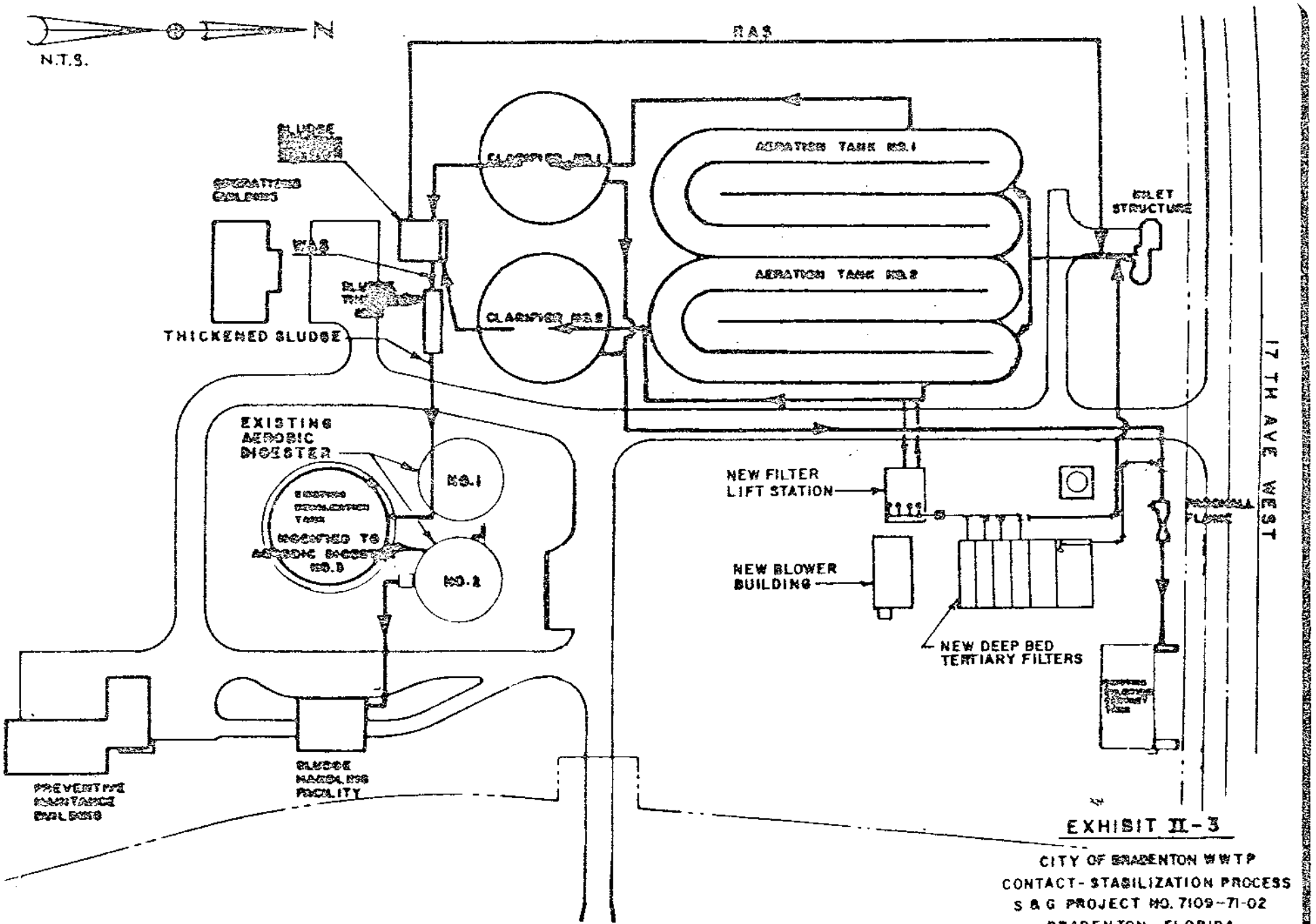


EXHIBIT II-3

CITY OF BRADENTON WWTP
CONTACT-STABILIZATION PROCESS
S & G PROJECT NO. 7109-71-02
BRADENTON, FLORIDA

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	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 (Specify)

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):

Estimated System Width (range, m):	Estimated System Depth (range, m):	yes Impounded ☐
High Water Mark (m above bed):	Velocity (range, m/s):	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)				Riffles			
Leaf Packs				Sand			
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble				Benthic leaf mats			
Undercut Banks/Roots				Other:			

WATER QUALITY

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

System Type : Stream: ☐ (Sand Bottomed, Sand Bot w/ Spring, Swamp & Bog, Calcareous, Alluvial, Misc.) Lake: ☐ Wetland: ☐ Estuary: ☒ Other: ☐ _____

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

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

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

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

Weather Conditions:

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

SAMPLING TEAM:	SIGNATURE:	DATE:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	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 (Specify)

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):

Estimated System Width (range, m):	Estimated System Depth (range, m):	yes
High Water Mark (m above bed):	Velocity (range, m/s):	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)				Riffles			
Leaf Packs				Sand			
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble				Benthic leaf mats			
Undercut Banks/Roots				Other:			

WATER QUALITY

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

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

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

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

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

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

Weather Conditions:

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

SAMPLING TEAM:	SIGNATURE:	DATE:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME:	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 (Specify)

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):

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

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)				Riffles			
Leaf Packs				Sand			
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble				Benthic leaf mats			
Undercut Banks/Roots				Other:			

WATER QUALITY

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

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

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

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

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

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

Weather Conditions:

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

SAMPLING TEAM:	SIGNATURE:	DATE:

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	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	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	>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	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	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	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

COMMENTS:

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 [ ]	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 [ ]	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 [ ]	>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 [ ]	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 [ ]	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 [ ]	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 [ ]

COMMENTS:

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	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	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	>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	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	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	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

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Tropicana
Location:
County: Manatee
Contact/District: Pat Fricano / SW
NPDES Permit #: FL00 Outfall #:
L/MS 49810 93F-6 16 20 01

Sample Collection: Date 2/15/93 Time 1151
Test Beginning: Date 2/16/93 Time 1430
Test Ending: Date 2/18/93 Time 1400
Organism Batch #: 8 Diluent Batch #: 3
Organism Age: < 24 hours
Test Organism: Ceriodaphnia dubia

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

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
0 hr	7.0 @ 7.0	22.8 @ 22.9	8.4 @ 23.6	975 @ 1,000
	10.0 @ 10.0			9250 @ 10,000
24 hr	7.0 @ 7.0	21.2 @ 21.4	8.7 @ 22.0	950 @ 1,000 @ 23.0°C
	10.0 @ 10.0			9560 @ 10,000
48 hr	7.0 @ 7.0	22.0 @ 22.1	8.7 @ 22.5	950 @ 1,000 @ 22.5°C
	10.0 @ 10.0			9490 @ 10,000

Invalid @ 48 hours mortality control/treatment (15%)

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			Cond. (mmhos/cm) Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	A	5	5	5	8.3		8.3	23.0		21.7	7.9		8.0	170		195
Control	B	5	5	4			8.3						8.0			160
Control	C	5	5	3			8.3						8.0			156
Control	D	5	5	5			8.3						8.0			150
100%	A	5	5	0.	8.0		8.0	22.9		21.7	8.0		7.7	1980		2140
100%	B	5	2	0			8.0						7.7			2200
100%	C	5	2	0			8.0						7.7			2180
100%	D	5	5	0			8.0						7.7			2150
Measured/Loaded by:		MF	TM	MF	MF		ME	MF		ME	MF		ME	MF		ME
Recorded by:		TR	TM	MF	TR		TM	TR		TM	TR		TM	TR		TM

Investigators' Signatures

Reviewer

	Salt Water/ Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:					
Lab Total Residual Cl2:	.00	.07	.06	DR100	TR
Alkalinity:	125	75	385	Hach	TR
Hardness:	120	70	175	Hach	TR
Total Ammonia:	<0.01	<0.01	<0.01	Orion	MF

Cl_2 Blank: _____ Ammonia Meter Slope: -54.3 Ammonia Blank: <0.01 Sample Salinity: _____ ppt

form updated 10/20/92

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Tampa Bay Water
Location:
County: Manatee
Contact/District: Pat Evans / SW
NPDES Permit #: FL00 Outfall #:
Lims 49810 93 Feb 16 20 01

Sample Collection: Date 2/15/93 Time 1151
Test Beginning: Date 2/16/93 Time 1420
Test Ending: Date 2/18/93 Time 1400
Organism Batch #: 6 Diluent Batch #: Hubbell
Organism Age: 11 Days
Test Organism: Mysidopsis bahia

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

Test Number: 2 of 2

Remarks:

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
0 hr	7.0 @ 7.0	22.8 @ 22.9	8.4 @ 23.6	975 @ 1,000
	10.0 @ 10.0			9750 @ 10,000
24 hr	7.0 @ 7.0	21.2 @ 21.4	8.7 @ 22.0	950 @ 1,000 @ 22.0
	10.0 @ 10.0			9540 @ 10,000
48 hr	7.0 @ 7.0	22.0 @ 22.1	8.7 @ 22.5	950 @ 1,000 @ 22.5
	10.0 @ 10.0			9490 @ 10,000

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temperature (°C) 0	24	48	D.O. (mg/L) 0	24	48	Cond. (mmhos/cm) Cond. (µmhos/cm) 0	24	48
Control	32	5	5	5	7.9	8.2	8.2	23.0	21.7	21.0	8.0	8.1	8.0	240	240	235
control	88	5	5	5	7.9	8.2	8.2				8.4	8.2	8.2	240	235	230
100%	98	5	5	5	8.0	8.0	8.1	23.0	21.8	21.0	8.0	4.7	5.9	2140	2020	1965
100%	55	5	5	5	8.0	8.0	8.1				8.0	4.7	5.8	2140	2050	2030
											*8.4					
											recd w/ readings	recd w/ #s				
Measured/Loaded by:		TR	TM	TM	MF	TM	MF	MF	TM		MF	TM		MF	TM	MF
Recorded by:		TR	TM	TM	TR	TR	TM	TR	TR		TR	TR		TR	TR	TM

Investigators' Signatures

Reviewer

form updated 10/20/92

Water Quality Parameters	Salt Water/ Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:					
Lab Total Residual Cl2:	.02	.02	.06	DR 100	TR
Alkalinity:	125	75	385	Hach	TR
Hardness:	120	70	175	Hach	TR
Total Ammonia:	<0.01	<0.01	<0.01	Orion	MF

Cl_2 Blank: _____ Ammonia Meter Slope: -54.3 Ammonia Blank: <0.01 Sample Salinity: _____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Bradenton
Location: Bradenton
County: Manatee
Contact/District: Rafferty / SW
NPDES Permit #: FL00 Outfall #: 001
LIMS 49808 93-6-16 15:01

Sample Collection: Date 2/15/93 Time 0930-1030
Test Beginning: Date 2/16/93 Time 1400
Test Ending: Date 2/19/93 Time 1400
Organism Batch #: 6 Diluent Batch #: Well
Organism Age: 11 days
Test Organism: Nitrogen loaders

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

Test Number: 2 of 2
Remarks:

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
0 hr	7.0 @ 7.0 10.0 @ 10.0	22.8 @ 22.9	8.4 @ 23.2	975 @ 1,000 @23. 9750 @ 10,000
24 hr	7.0 @ 7.0 10.0 @ 10.0	21.2 @ 21.4	8.7 @ 22.0	950 @ 1,000 @22. 9560 @ 10,000
48 hr	7.0 @ 7.0 10.0 @ 10.0	22.0 @ 22.1	8.7 @ 22.5	950 @ 1,000 @23 9490 @ 10,000

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temperature (°C) 0	24	48	D.O. (mg/L) 0	24	48	Cond. (mmhos/cm) Cond. (µmhos/cm) 0	24	48
Control	26	5	5	5	7.9	8.1	8.2	23.0	21.7	21.0	8.3	7.9	7.8	240	235	235
Control	10	5	5	5	7.9	8.1	8.2				8.3	8.0	7.8	240	235	235
100%	147	5	5	5	7.0	7.6	7.9	23.1	21.7	21.0	7.0	7.6	7.9	1030	985	950
100%	76	5	5	4	7.0	7.6	7.9				7.0	7.6	7.9	1035	990	990
Measured/Loaded by:		TR	TM	TM	MF	TM	MF	MF	TM	MF	MF	TM	MF	MF	TM	MF
Recorded by:		TR	TR	TM	TR	TR	TM	TR	TR	TM	TR	TR	TM	TR	TR	TM

Investigators' Signatures

Marshall Faircloth
Tobin Radin
Teresa Mikulasky

Reviewer

form updated 10/20/92

	Salt Water/ (Well Water)	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:					
Lab Total Residual Cl2:	.02	.02	.02	DR100	TR
Alkalinity:	125	75	120	Hach	TR
Hardness:	120	70	215	Hach	TR
Total Ammonia:	<0.01	<0.01	<0.01	Orion	MF

Cl_2 Blank: _____ Ammonia Meter Slope: -54.3 Ammonia Blank: <0.01 Sample Salinity: _____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Bradenton WWTP
Location: Bradenton
County: Manatee
Contact/District: Ed Fillmore / SW
NPDES Permit #: FL00 Outfall #:
Cims 4980S 73fed/01801

Sample Collection: Date 2/15/93 Time 0930-1030
Test Beginning: Date 2/16/93 Time 1400
Test Ending: Date 2/18/93 Time 1400
Organism Batch #: 8 Diluent Batch #: 3
Organism Age: Ceriodaphnia < 24 hours
Test Organism: Ceriodaphnia dubia

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

Test Number: 1 of 2
Remarks:

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos
0 hr	7.0 @ 7.0	22.6 @ 22.9	8.4 @ 23.6	975 @ 1,000
	10 @ 10			9750 @ 10,000
24 hr	7.0 @ 7.0	21.2 @ 21.4	8.7 @ 22.0	950 @ 1,000
	10.0 @ 10.0			9560 @ 10,000
48 hr	7.0 @ 7.0	22.0 @ 22.1	8.7 @ 22.5	950 @ 1,000
	10.0 @ 10.0			9490 @ 10,000

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temperature (°C) 0	24	48	D.O. (mg/L) 0	24	48	Cond. (mmhos/cm) Cond. (µmhos/cm) 0	24	48
Control	A	5	5	5	8.3		8.3	22.9		22.1	8.4		7.8	1065		1170
Control	B	5	5	3			8.3						7.8			1490
Control	C	5	5	5			8.3						7.8			1180
Control	D	5	5	5			8.3						7.8			1330
100%	A	5	5	5	7.2		8.2	22.8		21.9	7.6		7.8	985		1035
100%	B	5	5	5			8.2						7.9			1030
100%	C	5	3	3			8.2						7.9			1035
100%	D	5	5	5			8.2						7.9			1020
Measured/Loaded by:		MF	TM	MF	MF		MF	MF		MF	MF		MF	MF		MF
Recorded by:		TR	TM	MF	TR		TM	TR		TM	TR		TM	TR		TM

Investigators' Signatures

Marshall Faircloth
Robin Rachel
Terry Mikeska
Reviewer

	Salt Water/ Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:					
Lab Total Residual Cl2:	.02	.02	.02	DR100	TR
Alkalinity:	125	75	~~75~~	Hach	TR
Hardness:	120	70	~~76~~	Hach	TR
Total Ammonia:	<0.01	<0.01	<0.01	Orion	MF

Cl2 Blank: _____ Ammonia Meter Slope: -54.3 Ammonia Blank: <0.01 Sample Salinity: ppt

Taxa list for Bradenton WWTP and Tropicana Products, Inc., collected via Ponar dredge (3 replicates per station) on 15 February 1993. Test sites were located in the Manatee River near the outfalls, while the reference site was located a few miles north in a less disturbed part of the estuary. Numbers for each taxon represent the individuals collected per square meter.

	Reference site	Test site 1	Test site 2
Cumacea			
Cyclaspis varians	262	2221	1622
Oxyurostylis smithi	187	37	250
Gastropoda			
Acteocina canaliculata	50	62	250
Acteon punctostriatus	–	–	37
Haminoea succinea	–	37	437
Odostomia sp.	–	–	50
Sayella fusca	25	–	25
Strombiformis sp.	12	–	–
Malacostraca			
Acuminodeutopus nagleyi	362	37	–
Ampelisca abdita	299	62	100
Ampelisca holmesi	150	–	112
Ampelisca vadorum	1697	12	50
Cyathura polita	37	–	12
Edotea montosa	–	–	25
Erichthonius brasiliensis	–	12	–
Gammarus mucronatus	37	–	12
Grandidierella bonnieroides	25	–	–
Monoculoides sp.	175	62	100
Mysidopsis almyra	25	–	–
Taphromysis bowmani	50	–	–
Xenanthura brevitelson	137	–	25
Nemertea			
Undetermined nemertean sp.	125	150	112
Oligochaeta			
Limnodriloides sp.	–	–	37
Pelecypoda			
Amygdalum papyrium	736	50	1148
Ensis minor	12	–	12
Mulinia lateralis	–	25	287
Mysella planulata	25	–	12
Parastarte triquetra	–	–	12
Tagelus divisus	–	–	12
Tellidora cristata	12	–	–
Tellina tampaensis	–	–	12
Tellina texana	125	–	12
Tellina versicolor	62	–	150
Polychaeta			
Capitella capitata	37	1747	25
Eulalia sanguinea	–	–	25
Goniada sp.	–	–	37
Leitoscoloplos foliosus	–	–	12

Mediomastus ambiseta	337	14384	399
Megalomma bioculatum	–	–	12
Melinna maculata	50	–	112
Minuspio pygmaea	12	–	–
Neanthes succinea	25	–	37
Paraprionospio pinnata	37	87	12
Pectinaria gouldii	–	12	12
Phyllodoce fragilis	–	–	50
Polydora ligni	12	75	–
Spiochaetopterus oculatus	–	549	37
Streblospio benedicti	100	1235	536
Travisia sp.	12	–	–
Tanaidacea			
Halmyrapseudes bahamensis	1834	100	–
Leptochelia rapax	25	–	12

Phytoplankton taxa list and densities (#/mL) for Bradenton WWTP, collected via subsurface grabs in the Manatee River, on 15 February, 1993.

	Reference Site	Test Site 1	Test Site 2
Diatoms			
Achnanthes sp.	125	–	–
Amphora sp.	125	–	–
Chaetoceros sp.	5018	2022	1079
Coscinodiscus sp.	–	84	–
Cyclotella sp.	251	126	83
Gyrosigma sp.	–	42	–
Leptocylindrus sp.	293	168	415
Navicula sp.	–	42	–
Nitzschia sp.	42	84	–
N. closterium	–	126	42
N. longissima	125	84	–
Rhizosolenia sp.	42	126	125
Skeletonema costatum	1547	463	1951
Thalassiosira sp.	84	–	249
Chlorophyta			
Pyramimonas sp.	–	126	83
Unknown chlorophyte flagellate	–	–	166
Cryptophyta			
Cryptomonas sp.	–	211	–
Cyanophyta			
Chroococcus sp.	–	–	166
Merismopedia sp.	–	42	–
Pyrrhophyta			
Prorocentrum gracile	–	–	42
P. minimum	84	84	166
Total	7,736	3,830	4,567

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

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 FL0021369 11	12 930215 17	18 X	19 S	20 1

Remarks

21 66

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

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 FL0021369 11	12 930215 17	18 B	19 S	20 1

Remarks

21 66

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

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 FL0000043 11	12 930215 17	18 X	19 S	20 2

Remarks

21 66

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

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 FL0000043 11	12 930215 17	18 B	19 S	20 2

Remarks

21 66