

Biological Assessment of

Edgewater Wastewater Treatment Plant

Volusia County

NPDES #FL0021431

Sampled May 1994

October 1994

Biology Section

Division of Administrative and Technical Services

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: Edgewater WWTP
County: Volusia
NPDES Number: FL0021431
State Permit Expiration Date: 30 June 1995

Toxics Sampling Inspection (XSI)

Date Sampled: 17 May 1994

Results: Atrazine was detected in the effluent (0.14 µg/L). While there is no surface water standard for atrazine, this concentration is well below toxic levels (2 µg/L). No harmful levels of metals were detected in the effluent.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 17 May 1994

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

Impact Bioassessment Inspection (IBI)

Date Sampled: 17 May 1994

Results: Quantitative measures of benthic macroinvertebrate community health suggested no adverse effects caused by the discharge. Taxa richness and diversity were higher at test site A, compared to the reference site, while these same parameters were somewhat lower at test site B. Amphipods, generally indicative of healthy conditions, were well represented at all three receiving water stations. Many other organisms considered moderately sensitive to pollution (*e.g., Leitoscoloplos fragilis, L. robustus, Nereis falsa*) were present at the test sites, also suggesting no perturbation from the discharge. The phytoplankton assemblages found at all three sites were similar, being dominated by diatoms. Chlorophyll *a* was only calculated at the reference site, at 11.5 µg/L. This value is higher than those found in approximately 75% of other Florida estuaries. There was no evidence that the facility was responsible for adverse changes in algal communities.

Water Quality Inspection (WQI)

Date Sampled: 17 May 1994

Results: Of the nutrients measured in the Edgewater effluent, only the concentrations of total phosphorus (1.9 mg/L) and ortho-phosphate (1.9 mg/L) appeared to be elevated. The permit limit for total phosphorus (as a monthly average) is 1.0 mg/L. However, total phosphorus at the test sites was lower than that found in the majority of other Florida estuaries. Nitrate-nitrite, ammonia, ortho-phosphate, and TKN were low at the test sites. In summary, nutrient concentrations in the City of Edgewater WWTP discharge did not have an observed enrichment effect at the Indian River North test sites. AGP measured at the reference site (4.4 mg dry wt/L), test site A (4.7 mg dry wt/L) and test site B (3.8 mg dry wt/L) were all lower than the "problem threshold" of 10 mg dry wt/L for saltwaters (Ron Raschke, USEPA, personal communication). Effluent AGP was 20.0 mg dry wt/L. Total suspended solids and BOD of the effluent were within permit limits.

Introduction

The Edgewater Wastewater Treatment Plant, a domestic wastewater treatment facility, is located in Edgewater, Volusia County, Florida (see maps in Appendix). The Edgewater WWTP utilizes the Bardenpho activated sludge process for nutrient removal, clarification, and filtration. Disinfected, dechlorinated wastewater is discharged to the Class III marine waters of the Indian River North, approximately 250 feet from shore, via a 20 inch pipe. The discharge point is 0.2 miles north of boundary of the Mosquito Lagoon Aquatic Preserve, an Outstanding Florida Water. Since April, 1994, this 2.25 MGD design flow facility has been authorized to discharge a portion of the highly disinfected reclaimed water via irrigation. Between April, 1993, and March, 1994, the mean discharge flow was 0.95 MGD. The flow measured during the survey was 1.66 MGD.

Permit limits for the Edgewater WWTP are as follows: flow (2.0 MGD), TSS (5.0 mg/L monthly average), BOD (5.0 mg/L monthly average), total nitrogen (3.0 mg/L monthly average), total phosphorus (1.0 mg/L monthly average), dissolved oxygen (5.0 mg/L minimum), total residual chlorine (0.01 mg/L maximum to surface water, 1.0 mg/L minimum to reuse), and pH (6.0 - 8.5 SU's). In accordance with the Indian River Lagoon Act, the Edgewater WWTP must cease discharge to the river before July 1, 1995, unless it qualifies for an exception as provided in the act.

Facility Monthly Operating Reports indicate no surface water violations or plant upsets in the past year, although the facility did not report nutrient results from October, 1993 to December, 1993. Monitoring results show significant decreases in effluent BOD and TSS concentrations since September, 1993, when the facility began advanced wastewater treatment. Slight increases in flow (0.2 MGD, as an annual average) have occurred since April, 1992.

In March, 1994, the USEPA issued an administrative complaint to the City of Edgewater for exceeding effluent residual chlorine limits and failing to submit results for toxicity tests. In 1990, the city and state concurred on advanced wastewater treatment.

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 one-quarter mile northeast of the discharge) and two test sites (located approximately 50 feet north and 50 feet south of the discharge) (see maps in Appendix). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site A	Test Site B
Macroinvertebrate Ponar			
Number of Taxa	17	35	10
Shannon-Weaver Diversity	2.0	3.5	2.5
% Amphipoda	47.5	22.7	28.6
% Cnidaria	2.0	13.9	0.0
% Cumacea	10.1	4.1	0.0
% Gastropoda	2.0	0.0	0.0
% Pelecypoda	23.2	0.0	0.0
% Polychaeta	15.2	57.7	70.4
% Other	0.0	1.5	1.0
% Predator/Carnivore	52.5	23.6	52.9
% Above Surface Collector-Gatherer/Deposit Feeders	10.6	33.5	22.5
% Below Surface Collector-Gatherer/Deposit Feeders	5.9	3.1	7.9
% Collector-Filterer/Suspension Feeder	30.9	33.1	15.9
% Other	0.0	6.7	0.8
Phytoplankton Algae			
Number of Taxa	12	9	12
% Contribution of Dominant Taxon	60.6	58.8	40.4
Chlorophyll a (µg/L)	11.5	–	–
Diatom/Blue-green Abundance Ratio	0.0	0.0	0.99
% Blue-green	0.0	0.0	1.6
% Diatoms	100	100	98.4
Algal Growth Potential (mg dry wt/l)	4.4	4.7	3.8

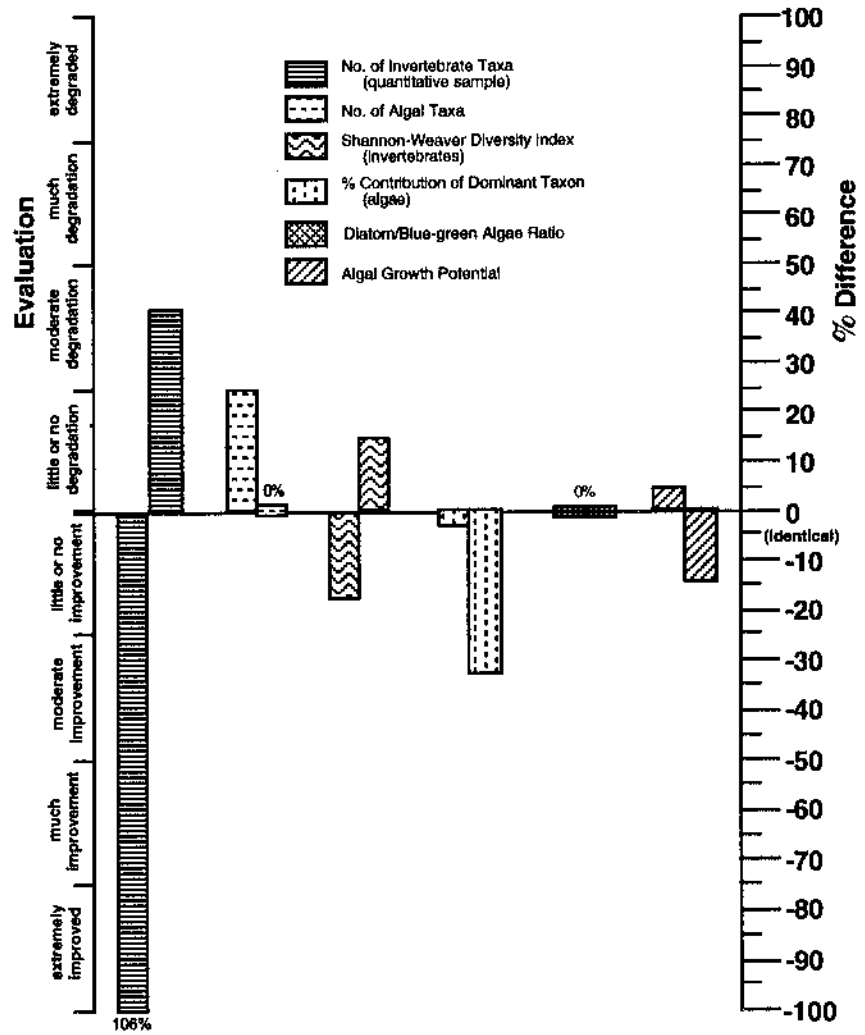
study sites. Acute screening toxicity bioassays, using *Cyprinella leedsi* and *Ceriodaphnia dubia* as test organisms, were performed on an effluent sample (Weber 1993). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on effluent, reference, and test sites. Methods used for all chemical analyses are on file at the Tallahassee FDEP Chemistry Laboratory.

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

Explanation of Measurements of Community Health

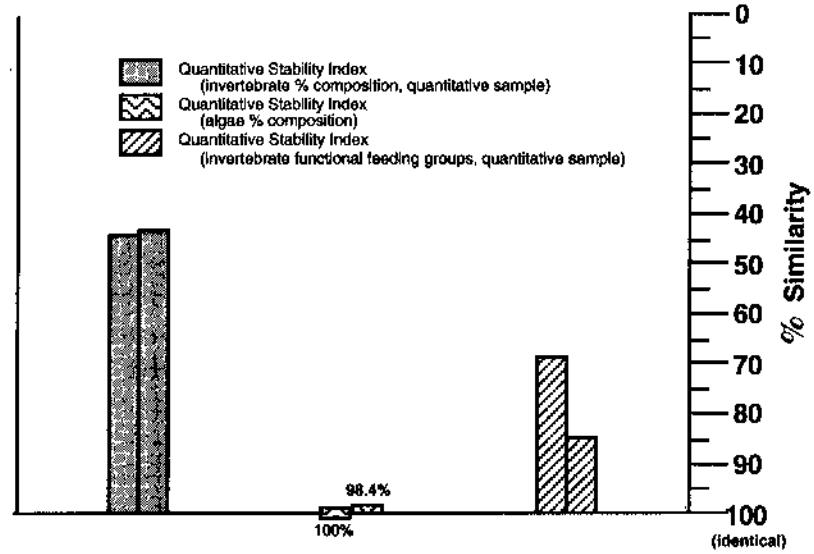
Several different measurements of macroinvertebrate and algal community health have been employed in this report. Many of these, such as the number of taxa, Shannon-Weaver Diversity Index, and chlorophyll *a* are well known. Others are briefly explained here. Excessive numerical dominance of a single type of organism (a high % contribution of dominant taxon) is usually associated with disturbance. A decreased diatom to blue-green algae ratio (calculated by dividing the number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta + Cyanophyta) is often indicative of nutrient enriched conditions. The determination of the Quantitative Stability Index (for taxonomic % composition) is a two step process. First, the relative proportions of major taxonomic groups are calculated for each site. Then, the lesser of the two percentages for each discrete taxonomic group is selected, and their cumulative total is the QSI. A QSI (for % composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (for functional feeding groups).

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



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

The following personnel were involved in this investigation: Phil Kane and Steve Kent (FDEP Central District) and Marshall Faircloth, Russel Frydenborg, Kathleen Lurding, Tina Mikulski, Ed Miller, Liz Miller, Landon Ross, Jack Taylor, David Whiting, and David Young (Tallahassee Biology Laboratory). The report was reviewed by the Point Source Studies Review Committee, consisting of Wayne Magley, Jan Mandrup-Poulsen, and Michael 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 can best be characterized as a high salinity, coast parallel, estuarine lagoon. Habitat quality was similar at all sites, with 80 points at the reference site and 72 points at the two test sites (Appendix). Half of the land in the area was listed as natural (the Mosquito Lagoon Aquatic Preserve), while the remainder was used for residential purposes. The reference and two study sites were comparable regarding most physical/chemical parameters, such as: secchi depth (0.9 m at all sites), temperature (ranging from 28.6 °C to 28.9 °C), dissolved oxygen (7.5 mg/L at the reference site, 7.1 at test site A, and 6.9 mg/L at test site B), and pH (8.0 SU's at all sites). Most importantly, salinity was similar at all sites (approximately 34.5 ppt). While the predominant substrate type was sand throughout the study area, additional habitats present at all sites included emergent marsh vegetation, oyster bars, and grass beds.

Atrazine was detected in the effluent (0.14 µg/L). While there is no surface water standard for atrazine, this concentration is well below toxic levels (2 µg/L) (AQUIRE 1994). The metals calcium (40.2 µg/L), iron (30 µg/L), magnesium (8.2 µg/L), and zinc (40 µg/L) were found in the effluent at levels within Class III standards for marine waters.

The sample of effluent was not acutely toxic to the invertebrate, *Ceriodaphnia dubia*, or to the fish, *Cyprinella leedsi* (Appendix).

Of the nutrients measured in the Edgewater effluent, only the concentrations of total phosphorus (1.9 mg/L) and ortho-phosphate (1.9 mg/L) appeared to be elevated. The permit limit for total phosphorus (as a monthly average) is 1.0 mg/L. However, total phosphorus at the test sites (0.096 mg/L at test site A and 0.093 mg/L at test site B) was lower than that found in the majority of other Florida estuaries (see table of typical water quality values in Appendix). Ortho-phosphate in the receiving water stations was below practical quantitation limits. Nitrate-nitrite of the effluent was low (0.16 mg/L), and was undetected in the receiving water stations. TKN concentrations of the test sites were fairly average for a Florida estuary. Ammonia was undetected in the effluent, and very low (below 0.03 mg/L) at all study sites. In summary, nutrient concentrations in the City of Edgewater WWTP discharge did not have an observed enrichment effect at the Indian River North test sites.

Algal growth potential (AGP) measured at the reference site (4.4 mg dry wt/L), test site A (4.7 mg dry wt/L), and test site B (3.8 mg dry wt/L) were all lower than the "problem threshold" of 10 mg dry wt/L for marine waters (Ron Raschke, USEPA, personal communication). Effluent AGP was 20.0 mg dry wt/L.

Total suspended solids of the effluent was measured at 1.5 mg/L, which was within permit limits, as was BOD (2.1 mg/L).

Quantitative measures of benthic macroinvertebrate community health suggested no adverse effects caused by the discharge. The figure on page 2 indicates the

degree of difference between the reference and test sites. Larger differences (that is higher percentages) correspond with greater degrees of degradation. Negative values mean that the test site is better than the reference. The figure on page 3 summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

Taxa richness was higher at test site A (with 35 taxa) than at the reference site (with 17 taxa). Taxa richness at test site B (with 10 taxa) was reduced by 41.2% compared to the reference site. Shannon-Weaver diversity was also highest at test site A (3.5), intermediate at the reference site (3.0), and lowest at test site B (2.5). The 16.7% decrease in diversity between the reference site and test site B is within the 25% variance allowed for in the biological integrity criterion.

The community structure at the two test sites was somewhat similar to the reference site. Amphipods, generally indicative of healthy conditions, were the most numerous group at the reference site (with 48% of the total population). Amphipods were also well represented at test site A (22.7%) and test site B (28.6%). The reference site population also consisted of pelecypods (23.2%), polychaetes (15.2%), and cumaceans (10.1%), as well as other groups. At test site A, polychaetes (57.7%), cnidarians (13.9%), and cumaceans (4.1%) were also present. In addition to the previously mentioned amphipod population at test site B, Polychaeta (70.4% of the total) was the only other group found there.

Eudevenopsus honduranus, the dominant amphipod at the reference site, is considered very sensitive to organic enrichment (Farrell 1991). Other amphipods, such as haustorids (*e.g., Protohaustorius* sp.) and the caprellids (*Paracaprella tenuis*) found at both test sites, are considered sensitive to organic enrichment, suggesting no negative effects from the discharge. Polychaete communities at the test sites consisted mainly of organisms which are considered moderately sensitive to pollution (*e.g., Leitoscoloplos fragilis, L. robustus, Nereis falsa*), as well as some moderately tolerant taxa (*Arabella iricolor, Axiothella mucosa, Cirriformia* sp.) and a few tolerant organisms (*Streblopsio benedicti, Capitella capitata, Mediomastus* sp.). Differences observed between the reference and test sites included the loss of gastropod and pelecypod taxa at the test sites when compared to the reference site, and the presence of terebellid polychaetes at test site A, which were absent at the other two sites. In summary, the benthic data suggest no adverse effects caused by the discharge.

The phytoplankton assemblages found at the reference site and test site B were identical in taxa richness (12 taxa). Phytoplankton taxa richness was slightly lower at test site A (9 taxa). The percent contribution of the dominant taxon (*Skeletonema* sp.) was slightly higher at the reference site (60.6%) than at test site A, which was also dominated by *Skeletonema* sp. (58.8%). *Chaetoceros* sp. (40.4%) was the most numerous phytoplankter at test site B. Diatoms were most common at all sites, with cyanophytes also represented at test site B. Chlorophyll *a* was only calculated at the reference site, at 11.5 µg/L. This value is higher than those found in approximately 75% of other Florida estuaries.

Conclusions

Atrazine was detected in the effluent (0.14 µg/L). While there is no surface water standard for atrazine, this concentration is well below toxic levels (2 µg/L). The metals calcium (40.2 µg/L), iron (30 µg/L), magnesium (8.2 µg/L), and zinc (40 µg/L) were found in the effluent at levels within Class III standards for marine waters.

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

Of the nutrients measured in the Edgewater effluent, only the concentrations of total phosphorus (1.9 mg/L) and ortho-phosphate (1.9 mg/L) appeared to be elevated. The permit limit for total phosphorus (as a monthly average) is 1.0 mg/L. However, total phosphorus at the test sites was lower than that found in the majority of other Florida estuaries. Nitrate-nitrite, ammonia, ortho-phosphate, and TKN were low at the test sites. In summary, nutrient concentrations in the City of Edgewater WWTP discharge did not have an observed enrichment effect at the Indian River North test sites.

AGP measured at the reference site (4.4 mg dry wt/L), test site A (4.7 mg dry wt/L) and test site B (3.8 mg dry wt/L) were all lower than the "problem threshold" of 10 mg dry wt/L for marine waters. Effluent AGP was 20.0 mg dry wt/L.

Effluent TSS and BOD were within permit limits.

Quantitative measures of benthic macroinvertebrate community health suggested no adverse effects caused by the discharge.

Taxa richness and diversity were higher at test site A, compared to the reference site, while these same parameters were somewhat lower at test site B. Amphipods, generally indicative of healthy conditions, were well represented at all three receiving water stations. Many other organisms considered moderately sensitive to pollution (*e.g., Leitoscoloplos fragilis, L. robustus, Nereis falsa*) were present at the test sites, also suggesting no perturbation from the discharge.

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Literature Cited

Aquatic Toxicity Information Retrieval Data Base (AQUIRE). 1991. U.S. EPA Environmental Research Laboratory, Duluth, Mn.

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.

Farrell, D. H. 1991. A community based metric for marine benthos. DEP Southwest District. Unpublished draft. 15 p.

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

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

Weber, C. I. 1991. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. 4th edition. EPA/600/4-90/027. U. S. EPA, Cincinnati, Ohio. 216 pp.

Chemistry summary table for Edgewater WWTP.

	Effluent	Control Site	Test Site A	Test Site B
Organic Constituents (ug/L)				
Atrazine	0.14 N			
Metals (ug/L)				
Aluminum	100 U			
Arsenic	20 U			
Antimony	8 U			
Calcium	40.2 A			
Copper	10 U			
Iron	30 A			
Lead	15 U			
Magnesium	8.2 A			
Mercury	0.1 U			
Nickel	5 U			
Silver	0.05 U			
Zinc	40 A			
Nutrients (mg/L)				
Ortho-phosphate	1.9	0.01 U	0.01 U	0.037 I
Total phosphorous	1.9	0.11	0.096	0.093
Ammonia	0.01 U	0.023	0.027	0.026
Nitrate+Nitrite	0.16	0.02 U	0.02 U	0.02 U
TKN	1.0	0.55	0.56	0.54
Other Parameters				
Habitat Assessment		80	72	72
D.O. (mg/L)	7.9	7.5	7.1	6.9
pH (SU's)	7.7	8.0	8.0	8.0
Conductivity (µmhos/cm)	700	52,700	52,200	52,600
Approximate Salinity (ppt)		34.5	34.5	34.5
Temperature (°C)	26.6	28.6	28.8	28.9
AGP (mg dry wt/L)	20.0	4.4	4.7	3.8
TSS (mg/L)	1.5	25	21	19
BOD5 (mg/L)	2.1	1.6	1.7	1.7
Bioassay Fish-Dechlorinated	Not toxic			
Bioassay Invertebrate-Dechlorinated	Not toxic			

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

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

N - Presumptive evidence of presence of material

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


INSET "H"
T 17 S—R 34 E, R 35 E
Edgewater WWTF
Reference
Test A
Test B
Outfall
NEW SMYRNA BEACH SOUTHWEST DELIMITED AREA
Est. Pop. 4,400
Browns Bay
SEE INSET "H"
EDGEWATER
Pop. 6,725
MASSEY RANCH AIRPARK (PVT.)
Edgewater Jct.
FLORIDA EAST COAST RAILWAY
SEE INSET "I"
Hucomer
Parkwood Place
Turtle Mound
SHIPYARD IS.
Orange Is.
ORANGE
APOLLO STATE PARK
Eldora
Pumphrey Pt.
Dissette Hunt
GAINES IS.
Gaines Slough
SEE INSET "J"
Ariel
Valco
Godfrey
Hammock Road
Creighton
PLANTATION IS.
Channel
MIDDLE IS.
LAGOON
OAK HILL
Pop. 938
RAILWAY
INTRACOASTAL WATERWAY
MOSQUITO LAGOON AQUATIC PRESERVE
CANAVERAL NATIONAL SEASHORE
Indian River Lagoon
George Slough
JOHN F. KENNEDY SPACE CENTER
Glory Hole
Atlantic Ocean
Turner Flats
CEDAR ISLAND
WILDLIFE AREA
ENT

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: City of Edgewater Wastewater Treatment Facility		Date Summary Prepared: 4/29/94
Location (attach detailed map): See Attached Maps	County: Volusia	District: Central
Federal Permit # FL0021431 and expiration date: 6/30/95	State GMS # and 3064 MO1435 State expiration date: 4/30/94 DC64-177792.	Facility Type: Industrial (Municipal) Federal Agricultural Other (list):

Function of facility: Domestic Wastewater Treatment Facility

Description of treatment process: A 2.25 MGD (design capacity) advanced wastewater treatment facility utilizing the Bardenpho activated sludge process for nutrient removal, clarification and filtration. Disinfected reclaimed water is discharged to the Indian River after dechlorination. Since April 6, 1994 this facility has be authorized to discharge a portion of the reclaimed water to groundwater via irrigation to an off-site reclaimed water system after achieving high-level disinfection. The city currently has a reuse service area construction permit application in house to expand public access reuse.

Receiving waters: Indian River	Classification: I II (III) ← at point of discharge but immediately adjacent to Mosquito Lagoon Aquatic Preserve (OFW's).	
Design Flow: 2.25 MGD	Mean Flow: 0.95 MGD (4/93 - 3/94)	Flow during survey: 1.66 MGD

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.): N/A

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

Parameter	Limit (units)
BOD5	5.0 mg/l (monthly Avg.)
TSS	5.0 mg/l (monthly Avg.)
TN as N	3.0 mg/l (monthly Avg.)
TP as P	1.0 mg/l (monthly Avg.)
DO	5.0 mg/l (minimum)
TCR	0.01 mg/l (maximum to surface water)
TCR	1.0 mg/l (minimum to Reuse)
pH	6.0 - 8.5 S.U.
* See attached Sheet for NPDES Permit Limits.	

Describe special permit conditions and permit modifications: Specific Condition no. 4 of permit DC64-177792 limits the surface water discharge from this facility to 2.0 MGD during the period of time prior to DEP approval of a reclaimed water use plan to study alternatives for reclaimed water use, in order to be in compliance with the Indian River Lagoon Act (Ch. 90-262, Section 2).

* DC64-177792 also authorized upgrading of this facility to produce unrestricted access reclaimed water for irrigation.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

City of Edgewater WWTF (Facility)

FACILITY SUMMARY

Description of permitted outfall(s):
20 inch Ductile Iron Pipe at Indian River North Maynard Park located approximately 250 feet from shore.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: Review of the MOR File for the period 4/93-3/94 revealed that the City has been in substantial compliance with FDEP effluent permit limits prior to and after the new Bardenpho facility was put on line (≈ 9/93). The City did not report effluent nutrient concentrations (TN and TP) between 10/1/93 - 12/31/93. Review of the files revealed no reported or observed plant upsets.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions: Review of the Files revealed no indication that previous impact bioassessments have been performed for this facility. There have been no previous or pending enforcement actions by FDEP. On 3/15/94, the U.S.E.P.A. issued an administrative complaint to the City for exceedence of residual chlorine NPDES effluent limits and failure to submit in timely fashion results for toxicity performance samples (Monitoring Report/Quality Assurance (DMR/QA) study 13). Review of the Permit Files revealed that a WQBEL study for the City's discharge was attempted back in 1989-1990 but major errors contained in USEPA water Quality model (WASP4) resulted in delay of the study. As a result, the City voluntarily agreed to provide advance wastewater treatment with the majority of the current effluent limitations (FDEP) volunteered by the City.

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set: The new advanced wastewater treatment facility has only been on-line since 9/93 making it difficult to establish trends for the new facility. However, reported MOR values for the effluent parameters for the period 1/94-3/94 have consistently met permit limits. The old plant that this facility replaced (DO64-175057) had to meet only secondary treatment, basic disinfection, followed by dechlorination for discharge to the river. The MORs show a significant decrease in BOD5 and TSS effluent concentrations since the new facility went on line. Reported flows on the MORs have increased appx. 200,000 gpd (annual average) between the periods 4/92-3/93 and 4/93-3/94.

Additional information: The City of Edgewater must comply with all applicable requirements of the Indian River Lagoon Bill (The Act).

Staff contributing to this review (signature):

DR. Dick Kane	(Biologist)
	(Inspector)
Al Castro	(Engineer)
Chris Tevaro	(Engineer)
	( )
	( )

* EFFLUENT LIMITATIONS For Federal NPDES PERMIT

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Final

1. During the period beginning on the effective date and lasting through the expiration date of this permit, the permittee is authorized to discharge from outfall(s) 001, sanitary wastewater

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

PARAMETERS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	Monthly Average	Weekly Avg.	Monthly Average	Weekly Average	Measurement Frequency	Sample Type	Sample Point
	lbs/day		mg/l				
Flow, MGD	Report	----	----	----	Continuous	Recording Flow & Totalizer	Effluent
Carbonaceous Biochemical Oxygen Demand (5 Day) $CBOD_5$	----	----	5.0	6.0	1/week	8-hr composite	Effluent
Total Suspended Solids (TSS)	----	----	5.0	6.0	1/week	8-hr composite	Effluent
Total Nitrogen as N	56.3	67.5	3.0	3.6	1/week	8-hr composite	Effluent
Total Phosphorus as P	18.7	22.5	1.0	1.2	1/week	8-hr composite	Effluent
Fecal Coliform Bacteria, N/100 ml	(See Item 4, page I-2)				1/week	Grab	Effluent
Dissolved Oxygen	Shall not be less than 5.0 mg/l				5/week	Grab	Effluent
pH, standard units	(See Item 5, page I-2)				Continuous	Recorder	Effluent
Total Residual Chlorine (TRC), mg/l	(See Item 11, Page I-3 for final effluent limits and approved testing procedures.)				5/week	Grab	Effluent
Total Recoverable Copper, ug/l	---	---	Report	---	1/month	8-hr composite	Effluent
Acute Whole Effluent Toxicity	(See Item 7 on Page I-2)				See Part IV	Grab	Effluent

MARINE BIOASSESSMENT

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 05/17/94	TIME 1030	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: REFERENCE	LOCATION: CITY OF EDGEWATER STP 500 WEST OCEAN AVENUE EDGEWATER, FL. 32032	FIELD ID/NAME: EDGEWATER

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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

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

Point-Source Pollution (list location and describe):

1/4 mi NE OF EDGEWATER STP DISCHARGE

Estimated System Width (range, m): 300	Estimated System Depth (range, m): 0-2	yes
High Water Mark (m above bed): 1.5	Velocity (range, m/s): 0.25	Impounded [ ] Channelized [ ]

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Riffles			
Leaf Packs				Sand		3	Ponar
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								0.9
Mid-depth	0.5	28.61	7.97	7.50	52 700			
Bottom								

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

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

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

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

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

Weather Conditions:

SUNNY 50% clouds

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

SAMPLING TEAM: KANE, Kent	SIGNATURE: Phil Kane	DATE: 05/17/94

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

SUBMITTING AGENCY CODE: 30 SUBMITTING AGENCY NAME: CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 05/17/94	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: REFERENCE	LOCATION: CITY OF EDGEWATER ST 500 WEST OCEAN AVENUE EDGEWATER, FLORIDA 32032	FIELD ID/NAME: EDGEWATER

Habitat Parameter score	Excellent	Good	Fair	Poor
Littoral Alterations 9	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 43	At least four communities observed from the following list: mangrove, swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 3	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 6	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 10	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 80

COMMENTS: MOSQUITO LAGOON AQUATIC PRESERVE

ANALYSIS DATE: 05/17/94	ANALYST: PHIL KANE	SIGNATURE: Phil Kane

MARINE BIOASSESSMENT

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 05/17/94	TIME: 1045	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: TEST A	LOCATION: CITY OF EDGEWATER STP 500 WEST OLENO AVENUE EDGEWATER, FL. 32032	FIELD ID/NAME: EDGEWATER

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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

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

Point-Source Pollution (list location and describe):

EDGEWATER STP DISCHARGE 50' SOUTH

Estimated System Width (range, m): 300	Estimated System Depth (range, m): 6-4m	yes
High Water Mark (m above bed): 4.85	Velocity (range, m/s): 0.25	Impounded [ ] Channelized [ ]

Canopy Cover % : Open : [X] 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: [X] 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		3	POWAR
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	0.3	28.75	7.95	7.07	52,200			0.9
Mid-depth								
Bottom								

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

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

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

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

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

Weather Conditions: Clear 90% cloud HOT

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

SAMPLING TEAM: KANE, KENT	SIGNATURE: Phil Kane	DATE: 05/17/94

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

SUBMITTING AGENCY CODE: 30 SUBMITTING AGENCY NAME: CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 05/17/94	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: TEST A	LOCATION: CITY OF EDGEWATER STP 500 WEST OCEAN AVENUE EDGEWATER, FL. 32032	FIELD ID/NAME: EDGEWATER

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 38	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 3	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 5	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 10	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 72

COMMENTS: MANATEE IN OUTFALL

ANALYSIS DATE: 05/17/94	ANALYST: PHIL KANE/STEVE KENT	SIGNATURE: Phil Kane Steve Kent

MARINE BIOASSESSMENT

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 05/17/94	TIME 1115	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON
REMARKS: TEST B	LOCATION: CITY OF EDGEWATER STP 500 WEST OCEAN AVENUE EDGEWATER, FL. 32032			FIELD ID/NAME: EDGEWATER

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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

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

Point-Source Pollution (list location and describe):

EDGEWATER STP DISCHARGE 50' TO NORTH

Estimated System Width (range, m): 300	Estimated System Depth (range, m): 0-4	yes
High Water Mark (m above bed):	Velocity (range, m/s): 0.25	Impounded [ ] Channelized [ ]

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Riffles			
Leaf Packs				Sand & SHELL	100	3	PONAR
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	0.3	28.88	8.01	6.90	52,600			0.9
Mid-depth								
Bottom								

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

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

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

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

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

Weather Conditions: CLEAR 50% cloudy HOT

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

SAMPLING TEAM:	SIGNATURE:	DATE:
KANE, KENT	Phil Kane / Steve Kent	05/17/94

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

SUBMITTING AGENCY CODE: JO SUBMITTING AGENCY NAME: CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 05/17/94	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: TEST B	LOCATION: CITY OF EDGEWATER STP 500 WEST OCEAN AVENUE EDGEWATER, FLORIDA 32032	FIELD ID/NAME: EDGEWATER

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 3 3	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 3	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 5	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 10	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 72

COMMENTS: MANATEE IN OUTFALL LOTS OF BAIT FISH

ANALYSIS DATE: 05/17/94	ANALYST: PHIL KANE/Kent	SIGNATURE: Phil Kane/Steve Kent

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Edgewater STP
Location:
County: Volusia
Contact/District: Phil Kane / Central
NPDES Permit #: FL0021431 Outfall #:

Sample Collection: Date 5/17/94 Time 0945
Test Beginning: Date 5/18/94 Time 1130
Test Ending: Date 5/20/94 Time 1130
Organism Batch #: 19 Diluent Batch #: 17
Organism Age: < 24 hrs.
Test Organism: Ceriodaphnia dubia

94-May-18-13-01 80213

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

Test Number: 1 of 2

Remarks:

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.5 @ 23.5	8.4 @ 23.7	960 @ 1,000 9670 @ 10,000 @ 23.8 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.0 @ 24.0	8.2 @ 24.6	976 @ 1,000 9740 @ 10,000 @ 24.2 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	23.0 @ 23.1	8.5 @ 23.4	970 @ 1,000 9680 @ 10,000 @ 23.0 °C

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm)		
Conc.	Chamber #	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
Control	A	5	5	5	8.4		8.1	23.8		22.8	8.4		8.4	170		195
Control	B	5	5	5			8.1			22.7			8.4			200
Control	C	5	5	5			8.1			23.0			8.4			195
Control	D	5	5	5			8.1			23.5			8.4			195
100%	A	5	5	5	7.9		8.4	24.0		23.6	7.9		8.3	670		690
100%	B	5	5	5			8.4			23.7			8.3			685
100%	C	5	5	5			8.4			23.8			8.4			680
100%	D	5	5	5			8.4			23.9			8.4			715
Measured/Loaded by:		MF	TM	MF	MF		MF	MF		MF	MF		MF	MF		MF
Recorded by:		TM	TM	TM	TM		TM	TM		TM	TM		TM	TM		TM

Investigators' Signatures

Tina Mikulski
Marshall Faircloth
Robin C. Rader

Reviewer

form updated 7/8/93

	Salt Water/ (Well Water)	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:					
Lab Total Residual Cl2:	<0.03	<0.03	0.03	DR-(30	TM
Alkalinity:	120	70	125	Hach	TM
Hardness:	115	75	130	Hach	TM
Total Ammonia:	<0.017	<0.017	<0.017	Orion	TM

Water Quality Parameters

Ammonia Meter #98136 Ammonia Meter Slope: -59.0 Ammonia Blank: <0.017 Control Salinity: ( ) ppt Sample Salinity: ( ) ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

0945 MF

Sample Source: City of Edgewater STP
Location:
County: Volusia
Contact/District: Phil Kane / Central
NPDES Permit #: FL0021431 Outfall #:

Sample Collection: Date 5/17/94 Time ~~1430~~ 1000 5/18
Test Beginning: Date 5/18/94 Time 1130
Test Ending: Date 5/20/94 Time 1130
Organism Batch #: 19 Diluent Batch #: well
Organism Age: 12 days old
Test Organism: Cyprinella leedsi

94-May-18-13-01 80213

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

Test Number: 2 of 2

Remarks:

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.5 @ 23.5	8.4 @ 23.7	960 @ 1,000 9620 @ 10,000 @ 23.8°C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.0 @ 24.0	8.2 @ 24.6	975 @ 1,000 9740 @ 10,000 @ 24.2°C
48 hr	7.0 @ 7.0 9.0 @ 9.0	23.0 @ 23.1	8.5 @ 23.4	970 @ 1,000 9680 @ 10,000 @ 23.0°C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Control A	10	5	5	5	7.9	8.2	8.2	23.3	23.3	22.8	8.3	8.0	8.2	245	245	240
Control B	2603	5	5	5	7.9	8.2	8.2			22.8	8.3	7.9	8.2	245	245	240
100% A	891	5	5	5	7.8	8.1	8.2	24.5	23.1	22.7	7.8	7.9	8.3	700	695	690
100% B	147	5	5	5	7.8	8.1	8.1			22.7	7.8	7.8	8.3	700	685	685
Measured/Loaded by:		TM	TM	TM	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF
Recorded by:		TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM

Investigators' Signatures

Tina Mikulski

Marshall Faircloth

Reviewer

form updated 7/0/93

Water Quality Parameters	Salt Water/ Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:					
Lab Total Residual Cl2:	<0.03	<0.03	0.03	D2-100	TM
Alkalinity:	120	70	125	Hach	TM
Hardness:	115	75	130	Hach	TM
Total Ammonia:	<0.01	<0.01	<0.01	Orion	TM

Ammonia Meter #98136 Ammonia Meter Slope: -59.0 Ammonia Blank: 0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

Typical Values for Selected Parameters in Florida Waters

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

Percentile Distribution

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
STREAMS (1617 stations)											
Phytoplankton Chlorophyll *a*	0.22	0.52	0.94	1.60	3.02	4.63	6.72	9.87	14.68	27.35	48.70
Periphyton Chlorophyll *a*	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85
H-D Diversity	0.84	2.12	2.48	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90
Qualitative Taxa Richness	9.00	12.00	17.00	20.00	22.00	24.50	26.00	28.00	31.00	37.00	53.00
H-D Taxa Richness	6.00	6.50	9.00	11.50	13.00	15.00	17.00	21.50	26.00	29.00	32.00
TKN	0.30	0.39	0.56	0.73	0.87	1.00	1.11	1.26	1.49	1.93	2.80
Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60
NO2-NO3	0.01	0.01	0.03	0.05	0.07	0.10	0.14	0.20	0.32	0.64	1.05
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	0.39	0.74	1.51
Ortho 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

Benthic macroinvertebrate taxa list for Edgewater WWTP, collected via Ponar grab samples in the Indian River North on 17 May, 1994. Densities, in numbers.m^2, represent the mean of three replicates.

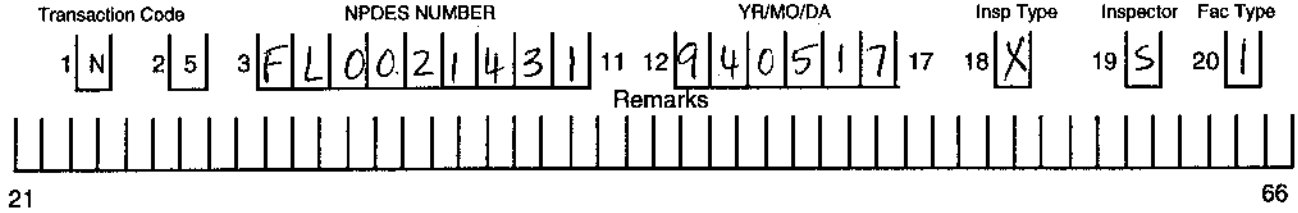
	Reference Site	Test A	Test B
Amphipoda			
Ampelisca sp.	12	12	–
Eudevenopsus honduranus	499	212	250
Gammarus sp.	–	75	–
Grandidierella bonnieroides	–	25	–
Harpinia sp.	–	12	–
Melita dentata	–	12	–
Metharpinia floridanus	–	25	–
Paracaprella tenuis	–	187	424
Protohaustorius sp.	50	25	–
Trichophoxus floridanus	–	187	–
Undetermined Eusiridae	25	200	–
Undetermined Lysianassidae	–	125	–
Cnidaria			
Undetermined Anthozoa	12	574	–
Undetermined Hydrozoa	12	100	–
Cumacea			
Oxyurostylis smithi	125	200	–
Gastropoda			
Trivia sp.	25	–	–
Isopoda			
Ancinnus depressus	–	75	–
Cyathura polita	–	–	12
Pelecypoda			
Parastarte triquetra	62	–	–
Undetermined Veneridae	12	–	–
Polychaeta			
Arabella iricolor	–	25	–
Axiothella mucosa	–	12	–
Capitella capitata	25	–	–
Cirrophorus lyriformis	–	62	–
Cirriformia sp.	62	–	–
Clymenella torquata	–	–	12
Eumida sanguinea	–	37	–
Exogone sp.	–	12	–
Glycinde solitaria	–	62	–
Gyptis brevipalpa	–	25	–
Hesiospina sp.	–	62	–
Hydroides dianthus	–	75	–
Leitoscoloplos foliosus	62	–	–
Leitoscoloplos fragilis	12	–	–

Leitoscoloplos robustus	12	–	–
Marphysa sanguinea	–	25	–
Mediomastus sp.	–	–	87
Neanthes acuminata	–	12	–
Nereis falsa	–	37	–
Notomastus latericeus	–	–	87
Onuphis rebulosa	–	12	–
Orbinia riseri	12	–	–
Polycirrus carolinensis	–	2021	749
Polydora colonia	–	12	–
Sabella microphthalma	–	12	–
Schistomeringos rudolphi	–	12	–
Streblospio benedicti	25	150	574
Tharyx sp.	37	87	150
Undetermined Capitellidae	–	37	–
Sipunculida			
Phascolion strombi	–	–	12
Total	1081	4835	2357

Phytoplankton taxa list and densities (#/mL) for Edgewater WWTP, collected via subsurface grabs in the Indian River North, on 17 May, 1994.

	Reference Site	Test Site A	Test Site B
Diatoms			
Amphora sp.	287	326	237
Asterionella sp.	1720	4884	5103
Chaetoceros sp.	2293	11721	12461
Chaetoceros concavicorne	143	–	–
Chaetoceros sp. B	–	–	356
Ditylum sp.	287	–	–
Nitzschia sp.	573	326	–
Nitzschia pungens	1433	3582	237
Nitzschia reversa	287	977	831
Rhizosolenia sp.	1003	1302	1424
Rhizosolenia stolterforthi	–	–	119
Skeletonema sp.	15,194	34,839	8664
Tabellaria sp.	–	–	237
Thalassionema sp.	1147	1302	831
Thalassiosira sp.	717	–	–
Cyanophyta			
Oscillatoria sp.	–	–	356
Total	25,084	59,259	30,856

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)

