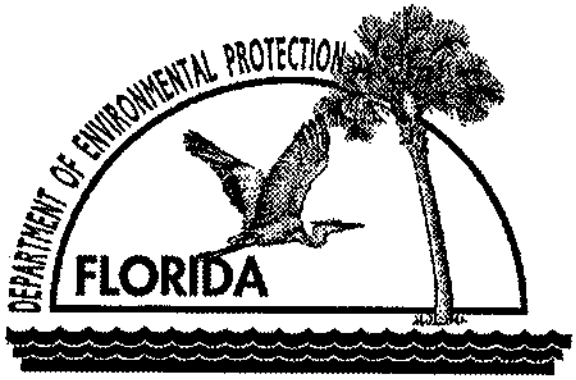


Biological Assessment of

City of Port Orange Wastewater Treatment Facility

Volusia County

NPDES #FL0020559

Sampled May 1995

September 1995

Biology Section
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: City of Port Orange
County: Volusia
NPDES Number: FL0020559
State Permit Expiration Date: 1 February 1996

Toxics Sampling Inspection (XSI)	
Date Sampled:	1 May 1995
Results:	No problem levels of organic priority pollutants or metals were detected in the effluent.

Compliance Biomonitoring Inspection (CBI)	
Date Sampled:	1 May 1995
Results:	The effluent was not acutely toxic to the cladoceran, *Ceriodaphnia dubia*, or to the fish, *Cyprinella leedsi*.

Impact Bioassessment Inspection (IBI)	
Date Sampled:	1 May 1995
Results:	The presence of many pollution sensitive macroinvertebrate taxa, as well as favorable diversity values, suggests that the test sites were largely unaffected by the discharge. Similarly, the facility did not appear to have an adverse effect on the receiving water algal communities.

Water Quality Inspection (WQI)	
Date Sampled:	1 May 1995
Results:	Some nutrient concentrations in the effluent were relatively high (*e.g.*, nitrate-nitrite was 11 mg/L and total phosphorus was 1.4 mg/L). However, the discharge did not appear to have an enrichment effect upon the receiving waters. Nutrient levels found at the test sites were very similar to the reference site values, and all were fairly average for a Florida estuary. Although the algal growth potential (AGP) of the effluent was quite elevated (392.6 mg dry wt/L), all receiving water AGP values were below the "problem threshold" of 10 mg dry wt/L for marine waters.

These fifth year inspections provide the necessary information to evaluate the facility's impact on its receiving waters and to provide the basis for specific condition recommendations for permit renewal.

Introduction

The Port Orange Wastewater Treatment Facility is located in Volusia County, Florida (see maps in Appendix). It is a 12.0 MGD design capacity activated sludge wastewater treatment facility, with chemical addition for nutrient removal, denitrification, and tertiary filtration. The effluent is disinfected, dechlorinated, and discharged into the Class III Halifax River, a high salinity estuary. During the past year, an average of 1.157 MGD of the Port Orange WWTF's reclaimed water has been delivered to an unrestricted public access irrigation system, while an average of 5.077 MGD of effluent has been discharged to the Halifax River. Combined flow during the present survey was approximately 5.5 MGD.

In 1988, a Water Quality Based Effluent Limit study performed on this facility established the following effluent limits: carbonaceous BOD (30 mg/L as a monthly average, 36 mg/L as a weekly average), total nitrogen (801 lbs/day as a monthly average), nitrate-nitrite (501 lbs/day as a monthly average), organic nitrogen (250 lbs/day as a monthly average), ammonia (50 lbs/day as a monthly average), total phosphorus (150.3 lbs/day as a monthly average), TSS (30 mg/L as a monthly average, 45 mg/L as a weekly average), dissolved oxygen (6.0 mg/L minimum).

In 1992, FDEP required a six month toxicity testing program for the Port Orange discharge. Results of this study have indicated that the facility's effluent exhibits intermittent toxicity problems. In 1993, the U.S. Environmental Protection Agency and the City of Port Orange entered into a consent order assessing administrative fines ($9,500) for violations of NPDES permit limits. Between June, 1994, and December, 1994, the facility, on several occasions, exceeded permit limits for ammonia, nitrate-nitrite, and total nitrogen.

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 400 yards south of the outfall), and two test sites (bracketing 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 study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Cyprinella leedsi* as test organisms, were performed on an effluent sample (Weber 1991). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient

Major characteristics of community structure of reference and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	29	16	25
Shannon-Weaver Diversity	2.13	2.73	3.82
% Polychaeta	5.3	9.0	21.9
% Amphipoda	29.5	44.3	32.4
% Cumacea	6.0	41.9	23.8
% Pelecypoda	58.4	3.59	7.62
% Anthozoa	0.13	0.6	7.6
% Isopoda	0	0.6	2.9
% Other	0.6	0	3.8
% Predator/Carnivores	3.7	6	10.5
% Above-Surface Deposit Feeders	3.3	15.3	23.4
% Below Surface Deposit Feeders	0.8	3.0	2.9
% Suspension Feeders	92	75.7	62.4
Phytoplankton Algae			
Number of Taxa	16	18	19
Shannon-Weaver Diversity	2.49	2.72	3.07
Algal Density (#/mL)	4,027	2,500	2,188
% Blue-green	0	.9	.5
% Green	1.5	0.9	0.5
% Cryptophyceae	6.6	6.4	8.0
% Diatoms	91.8	91.3	85.9
% Other	0	0	5.6
Algal Growth Potential (mg dry wt/l)	6.2	8.0	5.6

analyses were performed on effluent, reference, and test sites. Methods used for all chemical analyses are on file at the Tallahassee DEP Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at reference and test sites. Invertebrates were collected from three replicate petite Ponar grabs. Phytoplankton was sampled at both reference and test sites. Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). Algal Growth Potential tests, using *Selenastrum capricornutum* for the freshwater effluent, and *Dunaliella tertiolecta* for the marine receiving water sites, followed Miller *et al.* (1978) and EPA (1974). Some parameters normally associated with these studies, including fecal and total coliforms, TSS, and total residual chlorine were not sampled.

Explanation of Measurements of Community Health

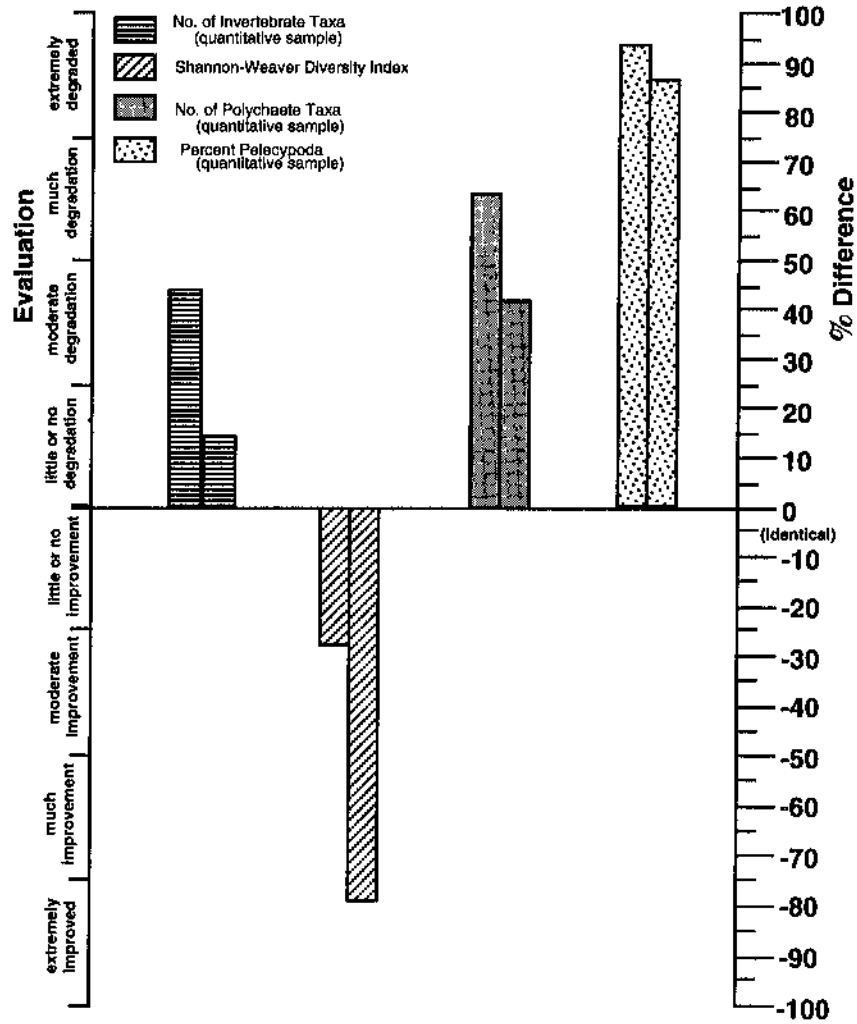
Several different measurements of macroinvertebrate and algal community health have been employed to determine the effects of a discharge. These are briefly discussed here.

Taxa richness: Stress tends to reduce the number of different types of organisms present in a system, although moderate nutrient enrichment may sometimes be correlated with increased algal taxa richness.

Shannon-Weaver diversity: This index is specified in the Florida Administrative Code as a measure of biological integrity. Low diversity scores are undesirable. They represent conditions where only a few organisms are abundant, to the exclusion of other taxa. Excessive numerical dominance of a single type of organism (a high % contribution of the dominant taxon) is a related measure which is also associated with disturbance.

Numbers of pollution sensitive taxa: Some organisms become rare or absent as the intensity or duration of disturbance increases. For example, the Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index score is considered healthy. Species sensitivity data from other sources, such as Hulbert (1990), Hudson *et al.* (1990), Lenat (1993), Farrell (1992), Chang *et al.* (1992), and Whitmore (1989), are used as appropriate.

Community structure: Substantial shifts in proportions of major groups of organisms, compared to reference conditions, may indicate degradation. In marine systems, an increase in the % tubificid oligochaetes, a decrease in the % pelecypods, and a decrease in the



Effect of discharge on the benthic macroinvertebrate community.

The left bar for each parameter shows differences between the reference site and test site 1. The right bar shows differences between the reference site and test site 2.

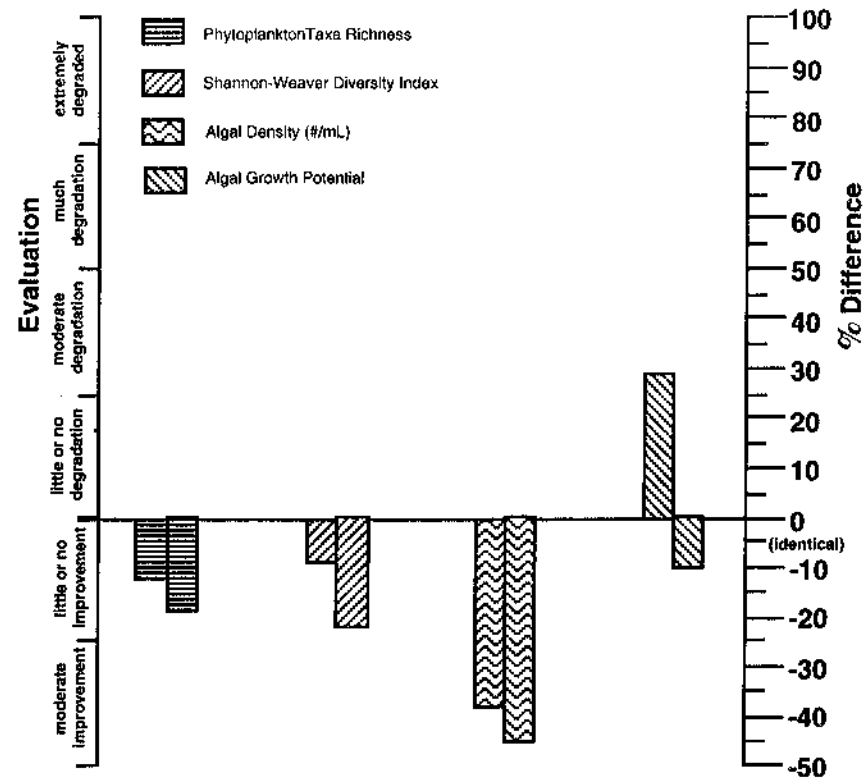
number of polychaete taxa are all considered indicators of disturbance (Engel *et al.* 1994).

Algal biomass: High algal biomass (algal density or chlorophyll *a*) implies nutrient stress. 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 in flowing streams.

Trophic composition/feeding guilds: Disturbance can shift the feeding strategies of invertebrates. In Florida for example, pollution may be responsible for reducing the numbers of filter-feeders (FDEP 1994) and shredders (EA Engineering 1994).

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, the diversity index, the number of polychaete taxa, and the % pelecypods are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving the % tubificids, algal density, 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: Phil Kane, Steve Kent, and Heriberto Collado (DEP Central District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Christy LeDuc, Kathleen Lurding, Tina Mikulski, Elizabeth Miller, Urania Quintana, Bart Richard, Lisa Tamburello, David Whiting, Vicki Whiting, and Greg Wynn (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 the algal community.

The left bar for each parameter shows differences between the reference site and test site 1. The right bar shows differences between the reference site and test site 2.

Results and Discussion

Habitat quality at the test sites (with 74 points each) was similar to that of the reference site (with 81 points). The Halifax River is a wide (1000 m), high salinity (circa 30 ppt), coast parallel, estuarine lagoon. All three sampling sites were 3 m deep, with sediments consisting of shell rubble and fine sand. Waters were clear and slightly green at all stations, with Secchi depths between 1.2 m and 1.3 m. Dissolved oxygen was adequate at each station, ranging from 7.4 mg/L at the reference site to 6.8 mg/L at test site 1. Specific conductance (ranging from 44,200 µhmos/cm to 45,700 µhmos/cm), temperature (between 25.6 °C and 25.9 °C), and pH (between 7.7 and 7.8 S.U.'s) were very similar at all three receiving water stations.

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

The pesticide atrazine (0.23 µg/L) was detected in the effluent at a concentration below the minimum quantitation limit. Since the Lowest Observed Effect Concentration (LOEC) for atrazine is 2 µg/L (AQUIRE 1994), the sample concentration is not a cause for con-

cern. No other organic priority pollutants were detected in the effluent.

Metals detected in the effluent included iron (51 µg/L), and zinc (30 µg/L). Neither of these values represent violations of Class III water quality standards.

Some nutrient concentrations in the effluent were relatively high (*e.g.*, nitrate-nitrite was 11 mg/L and total phosphorus was 1.4 mg/L). At a flow of 5.5 MGD, the nitrate-nitrite loading during the present study was equivalent to 505 lbs/day. This may be cause for concern, as the permit limit for nitrate-nitrite is 501 lbs/day as a monthly average. However, the discharge did not appear to have an enrichment effect upon the receiving waters. Nutrient levels found at the test sites were very similar to the reference site values, and all were fairly average for a Florida estuary (see Table of Typical Water Quality Values in Appendix).

As expected from the nutrient analyses, algal growth potential (AGP) of the effluent was quite elevated (392.6 mg dry wt/L). However, all receiving water AGP values were below the "problem threshold" of 10 mg dry wt/L for marine waters (Ron Raschke, USEPA, personal communication). AGP was 6.2 mg dry wt/L at the reference site, 8.0 mg dry wt/L at test site 1, and 5.6 mg dry wt/L at test site 2.

Quantitative measures of benthic macroinvertebrate community health were somewhat inconclusive, however, little or no degradation could be associated with the discharge. The Figure on page 2 indicates the degree of difference between the invertebrate populations of 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.

Macroinvertebrate taxa richness was highest at the reference site with 29 taxa, decreasing to 16 taxa at test site 1, and 25 taxa at test site 2. However, Shannon-Weaver diversity was lowest at the reference site (2.1), increasing to 2.7 at test site 1 and 3.8 at test site 2. The lower diversity at the reference site can be attributed to the extreme dominance of the pelecypod, *Gemma gemma*, since the diversity index is driven by both taxa richness and population density. Consequently, the % Pelecypoda (a measure, reported by Engle *et al.* (1994), that decreases in polluted situations) was substantially lower at the test sites, where, in actuality, fairly adequate numbers of bivalves were found. Pollution sensitive taxa, such as the amphipods, *Cerapus* sp. and *Eudevenopsus honduranus*, the polychaetes, *Leitoscoloplos fragilis, Owenia fusiformis,* and *Sabellaria* sp., and the cumacean, *Oxyurostylis* sp. were recovered from one or both test sites, suggesting healthy conditions there (Farrell 1992). The number of polychaete taxa was somewhat reduced at the two test sites (with 5 and 8 polychaete taxa at test sites 1 and 2, respectively) when compared with the reference site (with 14 polychaete taxa). However, the presence of many pollution sensitive taxa, as well as favorable diversity values, suggests that the test sites were largely unaffected by the discharge.

The Figure on page 3 represents changes in the phytoplankton algal community. As was noted with the macroinvertebrates, larger differences (that is, higher percentages) correspond with greater degrees of degradation. Phytoplankton taxa richness was similar at the three study sites, where it was 16 at the reference site, 18 at test site 1, and 19 at test site 2. Algal Shannon-Weaver diversity, with a value of 2.5 at the reference site, 2.7 at test site 1, and 3.1 at test site 2, followed a similar trend. Diatoms were the most abundant algal group at all three sites, with chlorophytes and cryptophytes also found at each station. A low proportion of cyanophytes was found at the test sites, while none were found at the reference site. Chlorophyll *a* data were not available due to incorrect preservation of the samples. Algal abundance decreased by 38% at test site 1 and by 46% at test site 2, when compared to the reference site. Overall, the facility did not appear to have an adverse effect on the receiving water algal communities.

Conclusions

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

The pesticide atrazine (0.23 µg/L) was detected in the effluent at a concentration below the minimum quantitation limit. Since the Lowest Observed Effect Concentration (LOEC) for atrazine is 2 µg/L, the sample concentration is not a cause for concern. No other organic priority pollutants were detected in the effluent.

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µg/L). Neither of these values represent violations of Class III water quality standards.

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Although the algal growth potential (AGP) of the effluent was quite elevated (392.6 mg dry wt/L), all receiving water AGP values were below the "problem threshold" of 10 mg dry wt/L for marine waters.

The presence of many pollution sensitive macroinvertebrate taxa, as well as favorable diversity values, suggests that the test sites were largely unaffected by the discharge.

Similarly, the facility did not appear to have an adverse effect on the receiving water algal communities.

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Chemistry summary table for

City of Port Orange WWTF	Effluent	Reference Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
Atrazine	0.23 I			
Metals (ug/L)				
Aluminum	100 U			
Arsenic	10 U			
Cadmium	0.1 U			
Calcium	31.5 A			
Copper	3 U			
Chromium	10 U			
Iron	51 A			
Lead	10 U			
Magnesium	5.24 A			
Mercury	0.10 U			
Nickel	4 U			
Selenium	30 U			
Silver	0.05 U			
Zinc	30 A			
Nutrients (mg/L)				
Ortho-phosphate	1.3 A	0.034 I	0.036 I	0.038 I
Total phosphorus	1.4	0.09	0.1	0.1
Ammonia	0.4 A	0.01 U	0.028 A	0.02 I
Nitrate+Nitrite	11	0.02 U	0.02 U	0.02 U
TKN	1.7	0.53	0.69	0.64
General Phys-Chem Parameters				
Habitat Assessment		81	74	74
D. O. (mg/L)		7.4	6.8	7.1
pH (SU's)		7.8	7.7	7.8
Salinity (ppt)		29.6	28.6	29.0
Specific Conductance (µmhos/cm)		45,700	44,200	44,800
Temperature (°C)		25.6	25.9	25.9
Biological Oxygen Demand, 5 day (mg/L)		1.54	*	*
Algal Growth Potential (mg dry wt/L)	392.6	6.2	8.0	5.6
Toxicity				
Bioassay Fish	Not Toxic			
Bioassay Invertebrate	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

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

* - Dilution water for test contaminated. No result for this sample

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

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: PORT ORANGE WWTP		Date Summary Prepared: MARCH 21, 1995
Location (attach detailed map): SEE ATTACHED MAPS	County: VOLUSIA	District: CENTRAL
Federal Permit # FL0020559 and expiration date: 6/30/96	State GMS # and 3064M01776 State expiration date: D064-192267 BOTH EXPIRE 2/1/96; DC64-186775	Facility Type: Industrial (Municipal) Federal Agricultural Other (list):

Function of facility: DOMESTIC WASTEWATER TREATMENT PLANT

Description of treatment process: THIS FACILITY IS A 12.0 MGD DESIGN CAPACITY ACTIVATED SLUDGE WASTEWATER TREATMENT FACILITY WHICH INCLUDES CHEMICAL FEED FACILITIES, DENITRIFICATION AND TERTIARY FILTRATION. THE DISINFECTED EFFLUENT IS DISCHARGED TO THE HALIFAX RIVER VIA OUTFALL PIPE FOLLOWING DECHLORINATION. DISINFECTED RECLAIMED WATER IS DISCHARGED TO AN UNRESTRICTED PUBLIC ACCESS IRRIGATION SYSTEM WITH A PERMITTED REUSE CAPACITY (ANTICIPATED) OF 5.458 MGD

Receiving waters: HALIFAX RIVER	Classification: I II (III)	
Design Flow: 12.0MGD	Mean Flow: 1.152 MGD (REUSE) 3/94–2/95 5.077MGD S.W.	Flow during survey: ~5.5 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): See Attached Sheet for Federal Limits

STATE Parameter	Limit (units)
$CBOD_5$ (S.W.)	30.0 mg/L (TBEL)
TSS (S.W.)	30.0 mg/L
TN (S.W.)	801 #/day (Max. 30 day Avg.)
NITRATE + NITRITE (S.W.) NITROGEN AS N (S.W.)	501 #/day (max. 30day Avg.)
(S.W.) ORGANIC NITROGEN AS N	250 #/day (Max. 30day Avg.)
(S.W.) AMMONIA NITROGEN AS N	50 # (day) (Max. 30day Avg.)
TP (S.W.)	150 # (day) (max. 30 day Avg.)
DO (S.W.)	6.0 mg/L
S.W. = SURFACE WATERS	
TSS (REUSE)	5.0 mg/L (max.)
TCO (REUSE)	(min.)

Describe special permit conditions and permit modifications:
Spec. Cond. #11 of D064-192267 requires submittal of a "SWISR" (SURFACE WATER IMPACT SUMMARY REPORT) 60 days prior to exp. date (2-1-96)
PERMIT DC 64-186775 WAS MODIFIED ON 5/27/94 FOR THE CONSTRUCTION OF A 3 MILLION GALLON GROUND STORAGE TANK AND 3,000 GPM HIGH SERVICE PUMP

PORT ORANGE WWTP
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s): THE OUTFALL IS A 36"ϕ DUCTILE IRON/FLEXIBLE JOINT PIPE, APPROXIMATELY 4,000 FEET LONG FROM THE SHORELINE INTO THE HALIFAX RIVER AND LOCATED APPROX. 4000 FEET SOUTH OF THE DUNLAWTON AVENUE BRIDGE.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year:
SEVERAL EFFLUENT LIMITS VIOLATIONS OCCURRED DURING 1994 PARTICULARLY AMMONIA NITROGEN LIMITS WERE EXCEEDED DURING JUNE AND JULY DUE TO HIGHER THAN NORMAL FLOWS ASSOCIATED WITH MAJOR RAINFALL EVENTS. SAME OCCURRED IN DOV. AND DEC. FOR NITRATE, NITRITE, AMMONIA AND TN (LIMITS WERE EXCEEDED).

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
A WQBEL REPORT (DRAFT) DATED 6/14/88 ESTABLISHED THE EFFLUENT LIMITATIONS FOR THIS FACILITY AS DESCRIBED ON PAGE 1 OF THIS FACILITY SUMMARY. THERE HAVE BEEN NO PREVIOUS OR PENDING ENFORCEMENT ACTIONS BY FDEP, USEPA AND THE CITY OF PORT ORANGE ENTERED INTO A CONSENT AGREEMENT AND ORDER ASSESSING ADMINISTRATIVE PENALTIES ON JULY 1993 ($9500.00 PENALTY) FOR VIOLATIONS OF THE CITY'S NPDES PERMIT. INFORMATION ON SPECIFIC VIOLATIONS NOT AVAILABLE ON FILES. ON JUNE 10, 1992 THE DEPARTMENT REQUIRED A SIX (6) MONTH BIOASSAY TOXICITY TESTING PROGRAM COMMENCED DURING JULY 1992. THE PROGRAM ALSO INCLUDED AN EXTENSIVE PUBLIC EDUCATION EFFORT BY THE CITY. RESULTS OBTAINED FROM THIS PROGRAM PLUS RESULTS OF ADDITIONAL TOXICITY TESTING REQUIRED BY THE CURRENT PERMIT DOES INDICATE THAT THE CITY'S EFFLUENT CONTINUES TO EXHIBIT INTERMITTENT TOXICITY PROBLEMS.

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:
REVIEW OF MOR RESULTS FROM 2/94 – 1/95 SHOW A SLIGHT INCREASE IN TN FOR THE LAST 3 MONTHS BUT STILL BELOW THE PERMITTED LIMIT (501#/day) WHEREAS, THE FLOW AVERAGED 74% OF PERMITTED CAPACITY. ALL THE REST OF THE PARAMETERS REMAINED CONSTANT EXCEPT AMMONIA WHICH WAS EXCEEDED DURING JUNE/94, JULY/94 AND NOV./94.

Additional information:

Staff contributing to this review (signature):

Philip N. Kane, Ed.D.	(Biologist)
Heriberto Collado	(Inspector)
Al Coates	(Engineer)
Chris Fleming	(P.E.)
	( )
	( )

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - FINAL

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

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

PARAMETER	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS		
	Monthly Average	Weekly Average	Sample Point	Measurement Frequency	Sample Type
Flow, MGD	REPORT	REPORT	Effluent	Continuous	Recording Flow Meter
Biochemical Oxygen Demand, 5-day (BOD_5), mg/l	30.0	36.0	Effluent	Daily	24-Hour Composite
	REPORT	----	Influent	Daily	24-Hour Composite
Carbonaceous Biochemical Oxygen Demand, 5-day, ($CBOD_5$), mg/l	REPORT	REPORT	Effluent	Daily	24-Hour Composite
Total Suspended Solids, mg/l	30.0	45.0	Effluent	Daily	24-Hour Composite
	REPORT	----	Influent	Daily	24-Hour Composite
Total Nitrogen, as N, lb/day	801.0	----	Effluent	Daily	24-Hour Composite
Nitrate plus Nitrite Nitrogen, as N, lb/day	501.0	----	Effluent	Daily	24-Hour Composite
Organic Nitrogen, lb/day	250.0	----	Effluent	Daily	24-Hour Composite
Ammonia, as N, lb/day	50.0	----	Effluent	Daily	24-Hour Composite
Total Phosphorus, lb/day	150.3	----	Effluent	Daily	24-Hour Composite

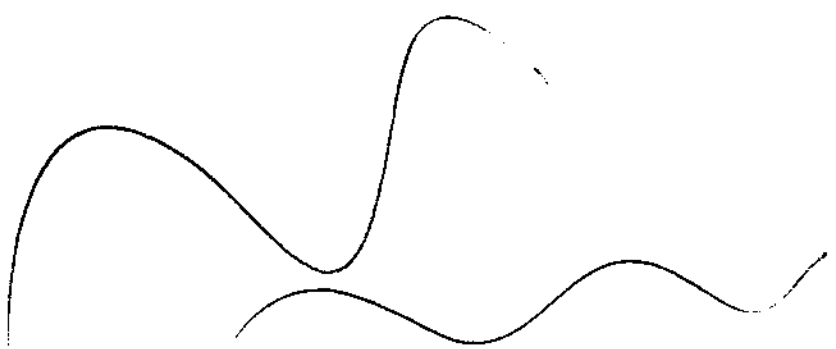
PART I

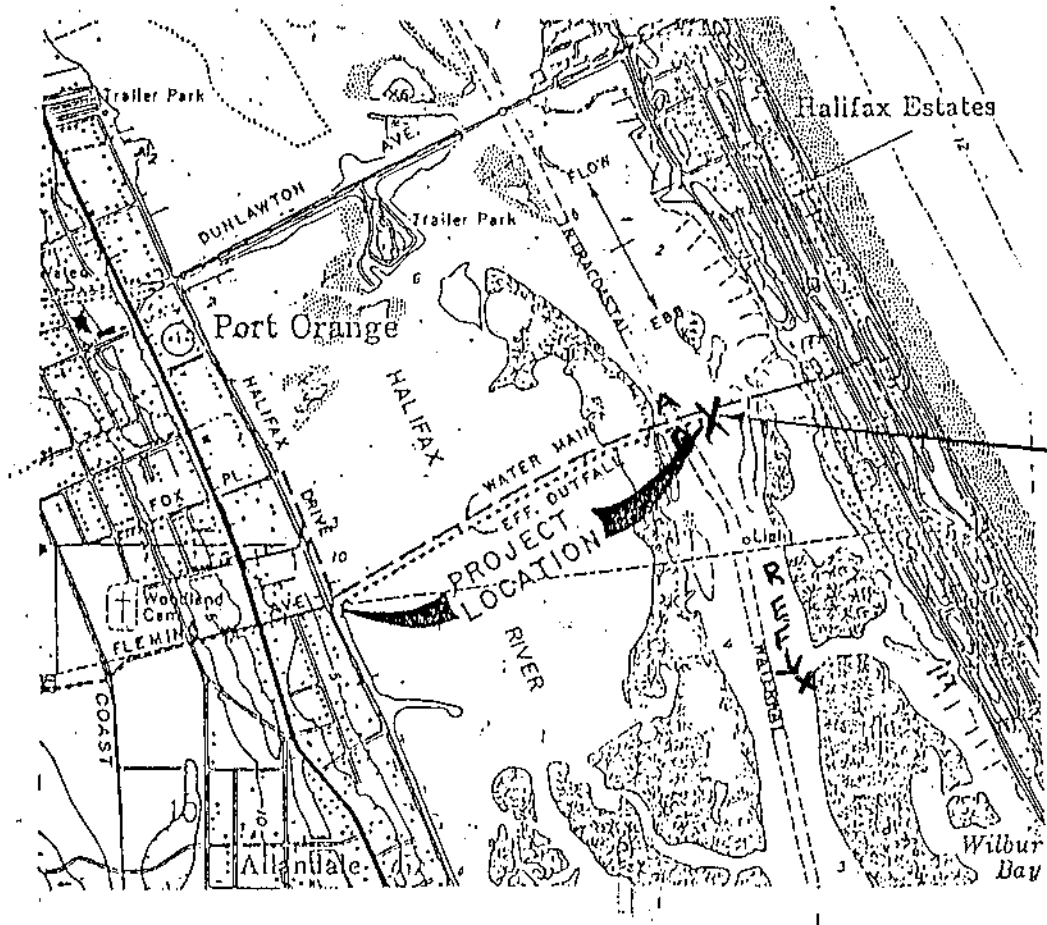
A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - FINAL (continued)

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

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

PARAMETER	DISCHARGE LIMITATIONS Monthly Average	Weekly Average	MONITORING REQUIREMENTS Sample Point	Measurement Frequency	Sample Type
Dissolved Oxygen, mg/l	(See Page I-3, Item 7.)		Effluent	Daily	Grab
Fecal Coliform, #/100 ml	(See Page I-3, Item 8.)		Effluent	Daily	Grab
pH, std. units	(See Page I-4, Item 9.)		Effluent	Continuous	Meter
Total Residual Chlorine, mg/l	(See Page I-4, Item 10.)		Effluent	Daily	Grab
Acute Whole Effluent Toxicity	(See Page I-4, Item 11.)		Effluent	See Part IV	Grab





FROM: PORT ORANGE
USC & GS QUADRANGLE
PORT ORANGE, FLORIDA

LOCATION MAP

SCALE:

1 MILE 0 1

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

PURPOSE: 36" D.I.P. EFFLUENT OUTFALL
16" D.I.P. WATER MAIN

DATUM: MEAN SEA LEVEL

ADJACENT PROPERTY OWNERS:
(SEE APPLICATION)

IN: INTRACOASTAL WATERWAY & HALIFAX RIVER

AT: FLEMING AVE. & HALIFAX DR.
PORT ORANGE
COUNTY OF VOLUSIA, STATE OF FLORIDA

APPLICATION BY: CITY OF PORT ORANGE

SHEET 1 OF 3 DATE 3/21/88

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 30	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT		05/01/95	1125	INDIAN RIVER LAGOON

REMARKS:	LOCATION:	FIELD ID/NAME:
TEST A	CITY OF PORT ORANGE STP OAK STREET PORT ORANGE, FL.	COPSTP

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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): CITY OF PORT ORANGE EFFLUENT

Estimated System Width (range, m):	1000 m	Estimated System Depth (range, m):	0-3	yes
High Water Mark (m above bed):	0.5	Velocity (range, m/s): TIDE N	0.3	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	0.3	26.01	7.66	7.26	44,200			1.2
Mid-depth	2.5	25.80	7.74	6.75	44,200			
Bottom	5.0	25.80	7.72	6.76	44,20			

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: CLEAR, HOT

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

SAMPLING TEAM:	SIGNATURE:	DATE:
KANE, KENT	Phil Kane	05/01/95

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 05/01/95	TIME 1145	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: TEST B	LOCATION: CITY OF PORT ORANGE STP, OAK STREET, PORT ORANGE, FL.	FIELD ID/NAME: COPSTP

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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): CITY OF PORT ORANGE EFFLUENT

Estimated System Width (range, m): 1000	Estimated System Depth (range, m): 0-3	yes
High Water Mark (m above bed): 5.5	Velocity (range, m/s): TIDE N. 0.3	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: ☒ FINE 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	0.2	26.12	7.68	7.25	44,700			1.2
Mid-depth	2.5	25.94	7.75	7.06	44,800			
Bottom	5.0	25.95	7.72	7.05	44,800			

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: Clear Hot

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

SAMPLING TEAM: KANE, KENT	SIGNATURE: Phil Kane	DATE: 05/01/95

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/DY): 05/01/95	TIME 1215	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: REFERENCE	LOCATION: CITY OF PORT ORANGE STP, OAK STREET, PORT ORANGE, FL	FIELD ID/NAME: COPSTP

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
						SOD STRIP IS SOUTHERN

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): NONE

Estimated System Width (range, m): 400 M	Estimated System Depth (range, m): 0-3	yes
High Water Mark (m above bed): 6.1	Velocity (range, m/s): TIDAL N 0.3	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	75		
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble		25		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	25.84	7.71	7.56	45,800			1.3
Mid-depth	1.9	25.60	7.78	7.43	45,700			
Bottom	3.5	25.56	7.76	7.43	45,400			

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: WIND 5 K @ 150° Clear, Hot

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

SAMPLING TEAM: KANE, KENT	SIGNATURE: Phil Kane	DATE: 05/01/95

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

SUBMITTING AGENCY CODE: 30 SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 05/01/95	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: REFERENCE	LOCATION: CITY OF PORT ORANGE STP OAK STREET PORT ORANGE, FL.	FIELD ID/NAME: COPSTP

Habitat Parameter score	Excellent	Good	Fair	Poor
Littoral Alterations 8	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 42	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 2	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 8	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 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 12	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 81

COMMENTS:

ANALYSIS DATE: 05/01/95	ANALYST: DR. PHIL KANE	SIGNATURE: Phil Kane

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

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 05/01/95	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS:	LOCATION:	FIELD ID/NAME:
TEST A	CITY OF PORT ORANGE STP OAK STREET PORT ORANGE, FL.	COPSTP

Habitat Parameter score	Excellent	Good	Fair	Poor
Littoral Alterations 6	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 40	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 2	>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 12	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 74

COMMENTS: 50' EAST OF SPOIL ISLAND North of outfall pipe

ANALYSIS DATE:	ANALYST:	SIGNATURE:
05/01/95	DR. PHIL KANE	Phil Kane

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

SUBMITTING AGENCY CODE: 38	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT		05/01/95	INDIAN RIVER LAGOON

REMARKS:	LOCATION:	FIELD ID/NAME:
TEST B	CITY OF PORT ORANGE STP OAK STREET PORT ORANGE, FL.	COPSTP

Habitat Parameter score	Excellent	Good	Fair	Poor
Littoral Alterations 6	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 40	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 2	>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 12	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 74

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
05/01/95	DR. PHIL KANE	Phil Kane

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Port Orange WWTP
County: Volusia
Contact / District: Phil Kane / CE
NPDES Permit #: FL0020559
LIMS Sample #: 105290 **LIMS Job #:** 95-May-02-12
per log 5/5/95

Sample Collection: Date 5-1-95 Time 1410
Test Beginning: Date 5-2-95 Time 1300
Test Ending: Date 5-4-95 Time 1300
Organism Batch #: 24 **Diluent Batch #:** 19
Organism Age: <24 hrs
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
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 10.0 @ 10.0	24.4 @ 24.5	8.3 @ 24.1°C	107.9 @ 98.6 1000 @ 1004 @ 24.6 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.9 @ 24.0	8.4 @ 23.5 °C	105.9 @ 98.6 993 @ 1004 @ 24.0 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.3 @ 24.4	8.3 @ 24.5 °C	106.8 @ 98.6 993 @ 1004 @ 24.3 °C

Conc.	Chamber #	Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm)		
		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	8.1		8.2	24.1		24.1	7.9		7.0	170		195
Control	B	5	5	5			8.2			24.0			7.0			180
Control	C	5	5	5			8.2			23.9			6.9			180
Control	D	5	5	5			8.2			24.1			7.1			175
100%	A	5	5	5	6.1		7.6	24.0		24.1	5.8		6.9	620		630
100%	B	5	5	5			7.6			24.2			7.0			655
100%	C	5	5	5			7.6			24.1			7.1			715
100%	D	5	5	5			7.6			24.1			7.1			750
Recorded by:		TR	mt	TR	JN		TR	JN		TR	JN		TR	JN		TR
Measured/Loaded by:		TR	mt	TR	TR		TR	TR		TR	TR		TR	TR		TR

Investigators' Signatures
Robin A. Rader
Joseph W. Roth
Marbel Faircloth

Reviewer

form updated 10/05/94

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):					
Lab Total Residual Cl2 (mg/L):		<0.03	<0.03	DR-100	JN TR MJ
Alkalinity (mg/L as $CaCO_3$):		75	35	Hach	TR
Hardness (mg/L as $CaCO_3$):		80	100	Hach	TR
Total ammonia (mg/L as N):		<0.017	<0.017	orion	JN

Ammonia Meter #98136 Meter Slope: -57.9
Ammonia Blank: <0.017
Control Salinity: 0 ppt
Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Port Orange WWTP
County: Volusia
Contact/District: Phil Keine / CE
NPDES Permit #: FL0020559
LIMS Sample #: 105290 **LIMS Job #:** 95-May-02-12

Sample Collection: Date 5-1-95 Time 1410
Test Beginning: Date 5-2-95 Time 1300
Test Ending: Date 5-4-95 Time 1300
Organism Batch #: 17 **Diluent Batch #:** Well
Organism Age: 12 days
Test Organism: Cyprinella leedsi

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 10.0 @ 10.0	24.4 @ 24.5	8.3 @ 24.1 °C	107.9 @ 98.6 1000 @ 1004 @ 24.6
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.9 @ 24.0	8.4 @ 22.5 °C	105.9 @ 98.6 993 @ 1004 @ 24.0
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.3 @ 24.4	8.3 @ 24.5 °C	106.8 @ 98.6 993 @ 1004 @ 24.3

Conc.	Chamber #	Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm)		
		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	114	5	5	5	7.8	8.2	8.3	23.6	22.7	23.6	7.8	7.8	7.4	245	245	255
Control B	165	5	5	5	7.7	8.2	8.3	23.6		23.4	7.8	7.8	7.4	245	245	250
Control C	62	5	5	5	7.7	8.2	8.3	23.6		23.4	7.9	7.8	7.5	245	245	250
Control D	351	5	5	5	7.7	8.2	8.3	23.6		23.5	8.0	7.8	7.5	245	245	250
100% A	506	5	5	5	6.1	6.8	7.3	24.3	22.6	23.7	5.8	7.8	7.4	650	635	655
100% B	28	5	5	5	6.1	6.8	7.3	24.4		23.5	5.8	7.7	7.4	655	640	660
100% C	2190	5	5	5	6.1	6.8	7.3	24.3		23.5	5.6	7.7	7.3	655	640	660
100% D	883	5	5	5	6.0	6.8	7.3	24.4		23.7	5.6	7.6	7.3	655	650	670
Recorded by:		TR	MF	TR	JN	TR	TR	JN	TR	TR	JN	TR	TR	JN	TR	TR
Measured/Loaded by:		TR	MF	TR	TR	MF	TR	TR	MF	TR	TR	MF	TR	TR	MF	TR

Investigators' Signatures

Reviewer

form updated 10/05/94

Water Quality Parameters

Salt Water | (Well Water) | 20% Min Water

		Sample	Method	Measured
Field Total Residual Cl2 (mg/L):				
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	DR-100	TR
Alkalinity (mg/L as $CaCO_3$):	125	35	Hach	TR
Hardness (mg/L as $CaCO_3$):	120	100	Hach	TR
Total ammonia (mg/L as N):	<0.017	<0.017	Orion	JN

Ammonia Meter #98136 Meter Slope: -57.9 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity

Benthic macroinvertebrate taxa list for the City of Port Orange WWTF, collected via Ponar grab samples in the Halifax River, on 1 May, 1995. Densities, in number/m^2, represent the mean of three replicates.

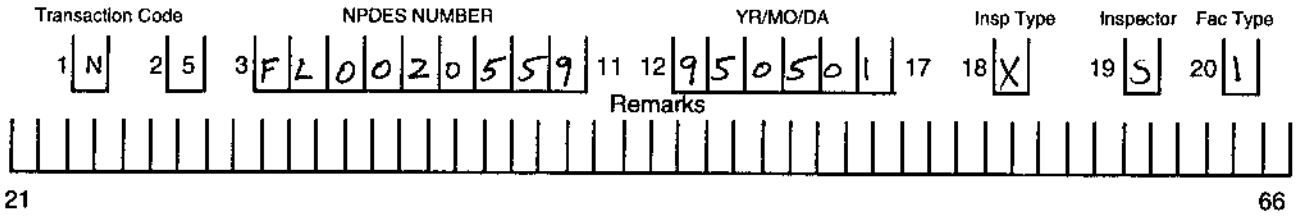
	Reference Site	Test Site 1	Test Site 2
Anthozoa			
Actiniaria sp.	14	14	111
Nemertina			
Rhynchocoela sp.	28	–	–
Polychaeta			
Ampharetidae	–	–	14
Cirrophorus sp.	56	–	–
Fabricia sp.	14	–	–
Glycera sp.	14	–	–
Leitoscoloplos	14	–	–
Leitoscoloplos fragilis	14	42	14
Magelona sp.	28	–	–
Nephtys picta	125	83	–
Owenia fusiformis	–	28	28
Paranaitis sp.	14	–	14
Paraonidae	14	–	–
Paraonis fulgens	181	42	–
Polydora sp.	–	–	28
Sabellaria sp.	–	–	153
Spionidae	28	–	–
Spiophanes bombyx	56	14	56
Streblospio benedicti	14	–	–
Syllidae	–	–	14
Tharyx sp.	14	–	–
Pelecypoda			
Brachidontes exustus	–	–	28
Gemma gemma	5986	–	–
Mactra fragilis	–	–	42
Nucula sp.	83	–	–
Parastarte sp.	167	–	–
Sphenia antillensis	–	–	14
Tellina sp.	139	83	14
Tellinidae	–	–	14
Cerripedia			
Balanus sp.	–	–	14
Mysidacea			
Bowmaniella sp.	14	–	14
Cumacea			
Almyracuma proximoculi	42	–	–
Cumacea	–	14	–
Cyclaspis sp.	–	139	28

Cyclaspis unicornis	56	83	14
Cyclaspis varians	28	–	–
Oxyurostylis sp.	500	722	306
Spilocuma watlingi	28	14	–
Isopoda			
Cyathura polita	–	–	28
Edotea sp.	–	14	14
Amphipoda			
Cerapus sp.	42	14	28
Eudevenopus honduranus	–	14	–
Gitanopsis sp.	28	–	–
Haustoriidae	83	–	–
Monoculodes sp.	14	–	83
Monoculodes edwardsi	139	–	69
Monoculodes intermedius	–	–	14
Oedicerotidae	–	278	42
Parahaustorius sp.	–	14	–
Phoxocephalidae	28	28	14
Protohaustorius deichmannae	2889	681	222
Decapoda			
Palaemonetes paludosus	28	–	–
Penaeidae	–	–	28

Phytoplankton taxa list and densities (#/mL) for the City of Port Orange WWTF, collected via subsurface grabs in the Halifax River, on 1 May, 1995.

	Refernce Site	Test Site 1	Test Site 2
Cyanophyceae			
Chroococcus sp.	–	11	–
Johannesbaptistia sp.	–	11	–
Chrysophyceae			
Ochromonas	–	11	–
Bacillariophyceae			
Achnanthes sp.	21	–	–
Amphora sp.	–	34	–
Bacillariophyceae	–	11	21
Chaetoceros sp.	288	263	175
Cocconeis sp.	21	23	10
Coscinodiscus sp.	41	57	21
Entomoneis sp.	21	11	–
Guinardia sp.	–	11	10
Leptocylindrus sp.	62	–	–
Melosira sp.	41	–	10
Navicula sp.	41	46	31
Nitzschia sp.	164	148	185
Nitzschia constricta	–	–	10
Nitzschia longissima	185	126	195
Nitzschia pungens	164	34	82
Pennales	–	126	–
Rhizosolenia sp.	21	68	123
Skeletonema sp.	493	137	216
Thalassiosira sp.	2137	1187	791
Chlorophyceae			
Chlorophyceae	–	11	–
Dunaliella sp.	62	11	10
Euglenophyceae			
Euglena sp.	–	–	21
Lepocinclis sp.	–	–	82
Dinophyceae			
Gymnodinium sp.	–	–	21
Cryptophyceae			
Chroomonas sp.	205	148	134
Cryptomonas sp.	–	11	10
Pyramimonas sp.	62	–	31

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)

