

Biological Assessment of

Port Orange Sewage Treatment Plant

Volusia County

NPDES #FL0020559

Sampled 25 June 1991

February 1992

Biology Section
Division of Technical Services

Department of Environmental Regulation
Results of Fifth Year Inspections

Discharger: Port Orange Sewage Treatment Plant
County: Volusia
NPDES Number: FL0020559
State Permit Expiration Date: 1 February 1996

Toxics Sampling Inspection (XSI)	
Date Sampled:	25 June 1991
Results:	No organic priority pollutants or metals were found in the effluent in amounts violating ambient standards.

Compliance Biomonitoring Inspection (CBI)	
Date Sampled:	25 June 1991
Results:	Toxic to *Ceriodaphnia dubia* (LC_{50} < 100%), not toxic to *Notropis leedsi*. This is a violation of 17-302.510(3)(p) FAC.

Impact Bioassessment Inspection (IBI)	
Date Sampled:	25 June 1991
Results:	A 48% reduction in Shannon-Weaver diversity was noted in ponar samples. Macroinvertebrate community shifted from pollution sensitive (mostly amphipods) at the reference site to pollution tolerant (nearly all polychaetes) at the test site.

Water Quality Inspection (WQI)	
Date Sampled:	25 June 1991
Results:	Effluent nutrient levels were as follows: NO_2NO_3 (7.3 mg/L); NH_3 (0.047 mg/L); TKN (1.6 mg/L); and Total-P (1.0 mg/L). The algal growth potential of the effluent was very high, (52.7 mg dry weight/L) indicating the enrichment contribution of this discharge.

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 Sewage Treatment Plant is located at 817 Oak St., in Port Orange, Volusia County, Florida. This 12.0 MGD capacity plant uses an anoxic/oxic activated sludge treatment system with chemical feed facilities, denitrification, and tertiary filtration. Actual mean flow ranges from 2.06 MGD in dry weather to 5.03 MGD during wet conditions. Treated effluent is dechlorinated prior to discharge, and some of it is reused by irrigation at the City Hall/ Sports Complex. The remainder is routed through an outfall pipe to the Halifax River (see map in Appendix).

Violations of permit limits include exceeding the daily maximum limit for total residual chlorine (September 1990), and the maximum 30 day average loading for total phosphorus (July 1991). Acute toxicity bioassays were performed by the DER Biology Section in May 1986. At that time, the chlorinated effluent was extremely toxic to *Daphnia pulex* (24 hour $LC_{50} < 10\%$) and *Notropis leedsi* (24 hour $LC_{50} = 15.8\%$). The dechlorinated sample was also toxic to *N. leedsi*, producing a 48 hour LC_{50} of 74.8%. This toxicity was partially attributed to the ammonia concentration in the effluent.

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 upstream of the discharge outfall) and a test site (the area near the discharge outfall, see map in Appendix). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Notropis leedsi* as test organisms, were performed on an effluent sample (Weber 1991). The effluent was also analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on the effluent. Methods used for all chemical analyses are on file at the Tallahassee DER Chemistry Laboratory.

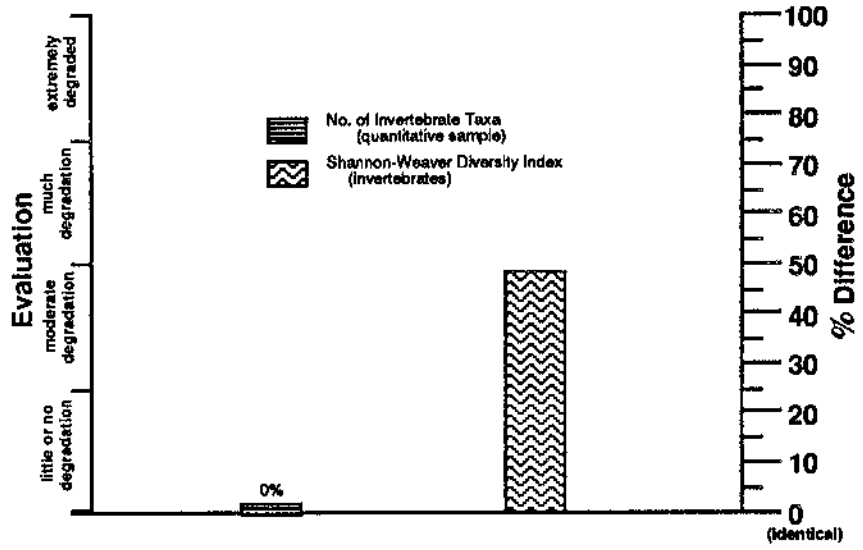
Benthic macroinvertebrate communities were evaluated at reference and test sites. Collection method consisted of one ponar grab sample (quantitative) taken at each site. Algal growth potential tests were performed on the effluent, using *Dunaliella tertiolecta* as the test organism (EPA 1974).

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate community health have been employed. Many of these, such as the number of taxa and Shannon-Weaver Diversity Index are well known. Others are briefly explained here. The determination of the Quantitative Stability Index (for taxonomic % composition) is a two step process. First, the relative proportions of major taxonomic groups are calculated for each site. Then, the lesser of the two percentages for each discrete taxonomic group is totaled. A QSI (% composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (functional feeding groups).

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site
Macroinvertebrate Ponar Grab		
Number of Taxa	8	8
Shannon-Weaver Diversity	2.5	1.3
% Polychaeta	24.2	89.5
% Malacostraca	66.6	2.9
% Nemertea	3.0	5.7
% Pelecypoda	0	1.9
% Decapoda	3.0	0
% Gastropoda	3.0	0
% Other	0.2	0
% Predators	24.2	10.0
% Collector-Gatherers	48.5	86.2
% Collector-Filterers	24.2	2.9
% Scrapers	3.0	0
% Shredders	0	0
% Parasites	0	1.0



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

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa and the diversity index are measured as the reference site minus test site divided by the reference site.

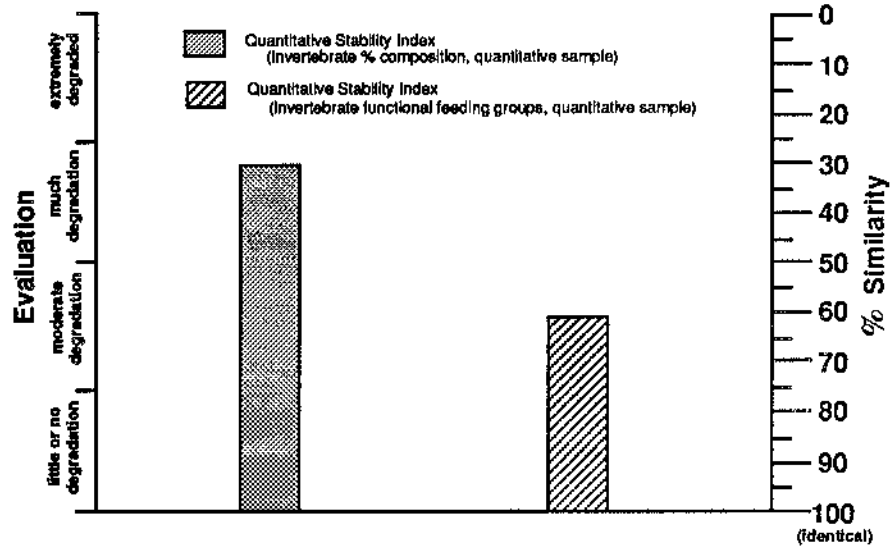
The following personnel were involved in this investigation: Philip Kane, (DER Central District) and Lyn Burton, Russel Frydenborg, Kathleen Lurding, and Sandy McClure (Tallahassee Biology Laboratory).

Results and Discussion

Assessment of habitat quality resulted in nearly identical scores for the reference and test sites, 80 and 82 respectively (Appendix). The shoreline at both areas consisted mostly of vertical seawalls and riprap, but each supported at least four types of communities. The test site received a larger amount of storm-water runoff, and the bottom substrate consisted of a higher percentage of coarser particles, such as gravel and shell. Both sites were slightly alkaline (pH 7.5 at reference and 7.4 at test), equally saline at the surface (22.9-23.0 ppt), and somewhat turbid due to the density of algae in the water (secchi depth was 0.7 at both sites). Dissolved oxygen was 6.2 mg/L and 6.1 mg/L at reference and test sites, respectively, but decreased to 5.5 mg/L at the bottom in the area of the discharge (Appendix).

The discharge sample was not toxic to the fish, *Notropis leedsi*, but produced a 48 hour LC_{50} of < 100% in the *Ceriodaphnia dubia* bioassay (Appendix). This is a violation of 17-302.510(3)(p) FAC. No organic priority pollutants or metals were found in the effluent in amounts violating ambient standards (see chemistry summary table).

Some nutrient concentrations were relatively high in the effluent sample. The most elevated nutrient concentration was that of NO_2-NO_3, at 7.3 mg/L. Total phosphorus (1.0 mg/L), TKN (1.6 mg/L), and ammonia (0.047 mg/L) were also measured in the effluent sample. Although no nutrient chemistry was collected on the reference or test sites to determine comparative enrichment in the receiving waters, the algal growth potential (AGP) of the discharge was quite high (52.7 mg dry wt/L). This indicates that a substantial amount of bioavailable nutrients were present in the effluent sample, which suggests that this facility may contribute to the enrichment of the Halifax River.



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

Ponar grab samples indicated some major macroinvertebrate community shifts between the reference and test sites (see table and figures). The upper left figure on p. 2 indicates the degree of difference between the reference and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. The lower right figure on p. 2 summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

Species richness was the same at both sites. However, eight taxa (see list in Appendix) is considered low for a Florida estuary. Shannon-Weaver diversity was reduced by 48% at the test site. Had three Ponar replicates been taken per site (rather than only one), this would have constituted a violation of the Biological Integrity Criterion, 17-302.560(7) FAC. Large differences existed between the reference and test site involving adverse changes in community composition and the relative abundances of epifauna. There was a distinct decrease in predominantly sensitive groups (e.g., Malacostraca) with a corresponding increase in pollution tolerant forms (polychaetes) between the reference and test site. For example, while polychaetes made up 24.2 % of the benthic population at the reference site, this pollution tolerant group accounted for 89.5% of the total organisms found at the test site. Similarly, the percentage of pollution sensitive epi-benthic malacostracans (e.g., *Eudevenopsis* sp.) (Doug Farrell, DER SW District, personal communication) decreased from 66.7% at the reference to 2.9% at the test site. These negative changes in community composition are summarized in the QSI (% composition) metric. The Quantitative Stability Index for functional feeding groups also indicated trophic imbalances near the outfall.

Conclusions

The sample of effluent from the Port Orange Sewage Treatment Plant was toxic to the cladoceran, *Ceriodaphnia dubia,* but not toxic to the fish, *Notropis leedsi.* This is a violation of 17-4.244(3)(a) FAC. No organic priority pollutants or metals were found in the effluent.

Nutrients measured in the effluent were somewhat elevated, particularly nitrate-nitrite. An algal growth potential of 52.7 mg dry wt/L was measured in the effluent, which suggests that this facility may contribute to the enrichment of the Halifax River.

Benthic macroinvertebrate communities were characterized by low taxa richness and diversity. Shannon-Weaver diversity was reduced by 48%. The benthic population shifted from one dominated by a pollution sensitive amphipod, *Eudevenopsis* sp., to one in which the majority of individuals were pollution tolerant polychaetes.

Literature Cited

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.

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

Port Orange STP	Effluent	Reference Site	Test Site
Organic Constituents (ug/L)			
Tentative identification of:			
Chlorinated alkane (<C5)	trace		
Metals (ug/L)			
Aluminum	50 U		
Arsenic	20 U		
Cadmium	0.2 U		
Copper	5 U		
Chromium	10 U		
Iron	50		
Mercury	0.2 U		
Nickel	5 U		
Selenium	5 U		
Silver	0.5 U		
Zinc	9 T		
Nutrients (mg/L)			
Ortho-phosphorus			
Total phosphorus	1.0		
Ammonia	0.047 A		
Nitrate+Nitrite	7.3 A		
TKN	1.6		
Other Parameters			
Habitat Assessment		80	82
D.O. (mg/L)	8.9	6.2	6.1
pH (SU's)	7.3	7.5	7.4
Conductivity/Salinity (µmhos/cm or ppt)	700	36250/22.9	36400/23.0
Temperature (°C)	19.5	30.1	29.2
Bioassay Fish-Dechlorinated	Not toxic		
Bioassay Invertebrate-Dechlorinated	LC50 < 100%		
AGP (mg algal dry wt/L)	52.7		

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

T - Value reported is less than the practical quantitation limit

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

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: CITY OF PORT ORANGE STP	Prepared by: ~~[illegible]~~ Date: 11/5/91	
Location (attach detailed map): 817 OAK STREET PORT ORANGE, FLORIDA 32129	County VOLUSIA	District CENTRAL
Federal Permit # FL0020559 and expiration date:	State GMS # and 3064M01776 State expiration date: 2/1/96 FDER PERMIT# D064-192287	Facility Type: Industrial (Municipal) Federal Agricultural Other (list):
Function of facility: DOMESTIC WASTEWATER TREATMENT FACILITY		

Description of treatment process: A 12.0 MGD Capacity Anoxic/Oxic Activated Sludge wastewater treatment plant with chemical feed facilities, denitification and tertiary filtration. Disinfected reclaimed water is discharged to groundwater by irrigation at the city Hall/sports complex. Disinfected/dechlorinated effluent is discharged to the Halifax River, via an outfall pipe. (Mike's Bay)

Receiving waters: HALIFAX RIVER	Classification: CLASS III
Design Flow: 12.0 MGD	Actual Mean Flow: 5.00 MGD (9/90 - 8/91) (surface water Discharge)

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: See Attached Sheets

Parameter	Limit (units)

Describe special permit conditions and permit modifications:

- Specific Condition No. 11 of current operating permit (D064-192287) requires submittal of a "Surface water Impact Summary Report" at least 60 days prior to expiration of permit. The report will summarize the previous five years of water quality data and indicate changes in ambient receiving water characteristics.
- The public access reuse capacity for the facility was revised from 0.15 MGD to 0.42 MGD on 9/13/91

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY CITY OF PORT ORANGE STP

permitted outfall(s): 36" diameter Ductile Iron pipe (approximately 4000 feet south of the Dunlawton Avenue Bridge) into the Halifax River. See Attached Location Map.

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

- Based on the Average flow and Total Phosphorous concentration reported on the July, 1991 monthly Operating report, the maximum 30 day Average Loading for Total phosphorous (150 lbs/day) was exceeded (Approx. 185 lbs/day)

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

Wasteload Allocations for this facility was conducted in June, 1988 resulting in the water Quality Based Effluent limitations denoted by the attached sheet.

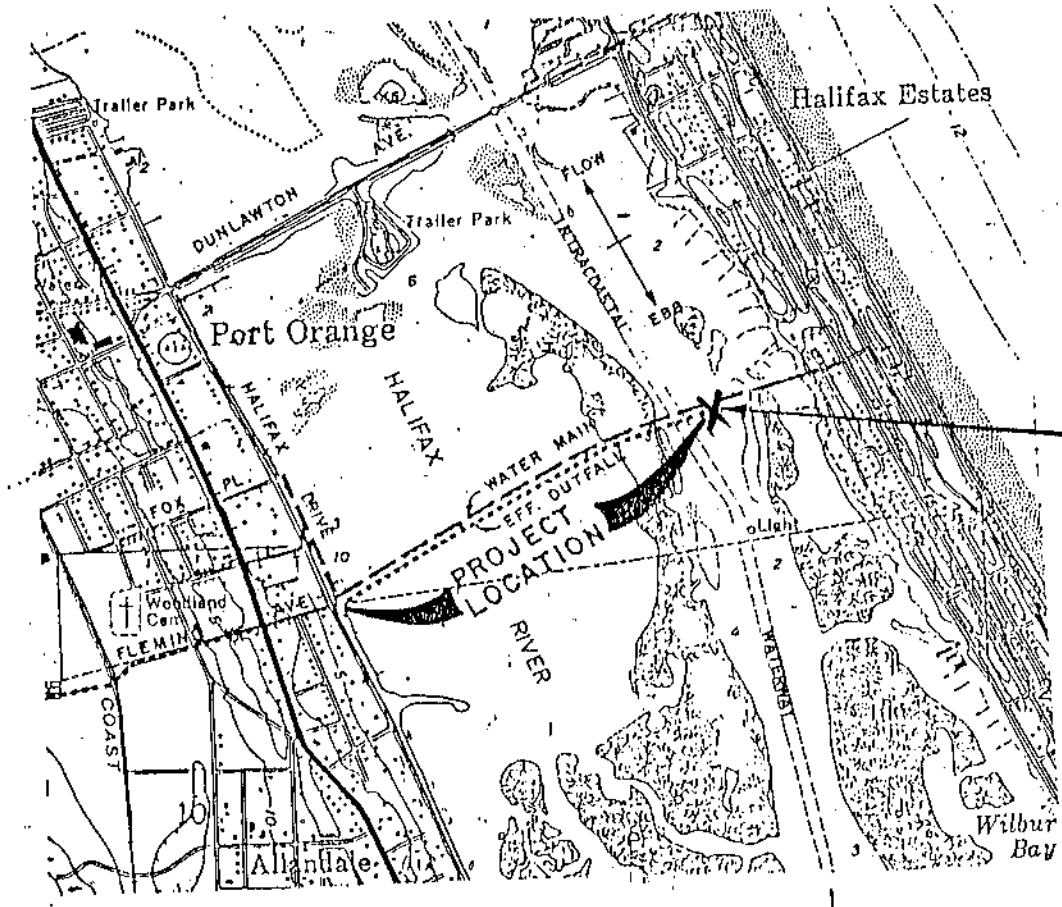
On 9/25/90 the EPA filed an Administrative Complaint against the City due to discharge from the facility exceeding the daily maximum limit for TOTAL Residual Chlorine stipulated in the NPDES Permit

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

N/A

Additional information:

N/A

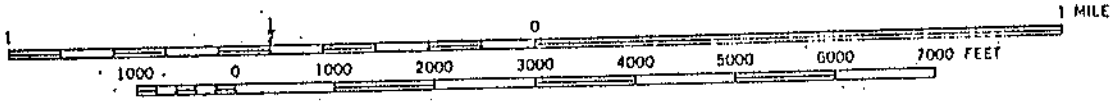


FROM: PORT ORANGE
USC & GS QUADRANGLE
PORT ORANGE, FLORIDA

COMPARABLE SITE

LOCATION MAP

SCALE:



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 5/21/88

SHEET 1 OF 6 REV. DATE 2/6/89

COMPARABLE

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

SUBMITTING AGENCY CODE: 30 SUBMITTING AGENCY NAME: FDER CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 06/25/91	RECEIVING BODY OF WATER: HALIFAX RIVER

ID MARK: FDER PERMIT # DO64-192287 NPDES PERMIT # FL0020559	LOCATION: CITY OF PORT ORANGE STP 817 OAK STREET PORT ORANGE, FL. 32129	FIELD ID/NAME: CITY OF PORT ORANGE STP

Habitat Parameter score	Excellent	Good	Fair	Poor
Littoral Alterations 5	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 45	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 5	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 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 8	Combination of sand, gravel, and shell. **12-15 points**	Primarily sand, with small areas of mud. **8-11 points**	Mixture of sand and mud, or well-aerated mud only. **4-7 points**	Anaerobic mud. **0-3 points**

TOTAL SCORE 80

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
06/25/91	PHILIP N. KANE, Ed.D.	Philip N. Kane

DISCHARGE

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

OUTFALL

SUBMITTING AGENCY CODE: 30 SUBMITTING AGENCY NAME: FDER CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 06/25/91	RECEIVING BODY OF WATER: HALIFAX RIVER

ID MARK: FDER PERMIT # D064-192287 NPDES PERMIT # FL0020559	LOCATION: CITY OF PORT ORANGE STP 817 OAK STREET PORT ORANGE, FL. 32129	FIELD ID/NAME: CITY OF PORT ORANGE STP

Habitat Parameter score	Excellent	Good	Fair	Poor
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Community Types Observed 45	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 5	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 4	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 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 14	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 82

COMMENTS:

ANALYSIS DATE: 06/25/91	ANALYST: PHILIP N. KANE, Ed.D.	SIGNATURE: Philip N. Kane

COMPARABLE

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDER CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 06/25/91	RECEIVING BODY OF WATER: HALIFAX RIVER

REMARKS: FDER PERMIT # D064-192287 / NPDES PERMIT # FL0020559	LOCATION: CITY OF PORT ORANGE STP 817 OAK STREET PORT ORANGE, FL 32129	FIELD ID/NAME: CITY OF PORT ORANGE STP

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
			75%	25%		

Local Watershed Erosion (check box): None ☐ Moderate ☑ Heavy ☐

Local Watershed NPS Pollution (check box): No evidence ☐ Some potential sources ☑ Obvious sources ☐

Point-Source Pollution (list location and describe):

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

Canopy Cover % (check box): Open: ☑ Lightly Shaded: ☐ Moderately Shaded: ☐ 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 (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell		Coarse Organic Debris:	
Sand:	100%	Mud/Muck (organic):	

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	Secchi Depth (m):	0.9 M
Top	30.1	6.2	pH (SU):	7.5/7.5/7.5
Mid-depth	30.1	6.2	Conductivity (µmho/cm):	7625/7625/7650
Bottom	30.1	6.2	Other Parameters: SALINITY	22.9/22.9/22.9

~~Stream Type~~ (check box): Blackwater: ☐ Deep Aquifer Fed: ☐ Surficial Aquifer Fed: ☐ Alluvial: ☐ Other: ☐ _____

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

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

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

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

Weather Conditions: SUN/CLOUDY

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
06/25/91	PHILIP N. KANE, Ed.D.	Philip N. Kane

DISCHARGE

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

OUTFALL

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDER CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 06/25/91	RECEIVING BODY OF WATER: HALIFAX RIVER

REMARKS: FDER PERMIT # D064-192287 / NPDES PERMIT # FL0020559	LOCATION: CITY OF PORT ORANGE STP, 817 OAK STREET, PORT ORANGE, FL 32129	FIELD ID/NAME: CITY OF PORT ORANGE STP

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
			75%	25%		

Local Watershed Erosion (check box): None ☐ Moderate ☑ Heavy ☐

Local Watershed NPS Pollution (check box): No evidence ☐ Some potential sources ☑ Obvious sources ☐

Point-Source Pollution (list location and describe):

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

Canopy Cover % (check box): Open: ☑ Lightly Shaded: ☐ Moderately Shaded: ☐ 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 (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell	50	Coarse Organic Debris:	
Sand:	50	Mud/Muck (organic):	

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
			Secchi Depth (m):	0.9M
Top	29.2	6.1	pH (SU):	7.4/7.5/7.5
Mid-depth	28.8	5.5	Conductivity (µmho/cm):	36,400/40,800/41,000
Bottom	28.7	5.5	Other Parameters: SAL ‰ 23/26.2/26.1	

~~Stream Type (check box):~~ Blackwater: ☐ Deep Aquifer Fed: ☐ Surficial Aquifer Fed: ☐ Alluvial: ☐ Other: ☐

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

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

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

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

Weather Conditions: SUN / CLOUDY

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
06/25/91	PHILIP N. KANE, Ed.D.	Philip N. Kane

* wrok incorrect name

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Port Orange ~~WWTP~~ STP* [illegible]
Address/City: Port Orange 814 Oak St.
County: Volusia
Contact/District: Philip Karo / Central
NPDES Permit #: FL0020559 Outfall #:

Sample Collection: Date 6/25/91 Time [illegible]
Test Beginning: Date 6/26/91 Time 11:31
Test Ending. Date [illegible] Time [illegible]
Test Organism: N. leedsi
Life Stage/Age: [illegible]

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

Remarks:

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7@7.9@9	8.9@21	1356@23.3 1364	20.7@23.2
24 hr	7@7.9@9	8.5@22	1358@23.5 @1367	20.5@23.3
48 hr	[illegible]	[illegible]	[illegible]	[illegible]

Conc.	Chamber #	Number Live			DO (mg/l)			pH			Temp. (°C)			Cond. (µmhos/cm)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	62	5	5	5	9.2	8.0	[illegible]	7.8	8.0	[illegible]	~~20~~	20.5	[illegible]			
Control	92	5	5	5	9.2	8.0	[illegible]	7.8	8.0	[illegible]				240	241	[illegible]
100%	68	5	5	5	8.9	7.9	[illegible]	7.3	7.8	[illegible]	19.5	20.3	[illegible]			
100%	188	5	5	5	8.9	8.0	[illegible]	7.3	7.8	[illegible]				700	706	[illegible]
Measured/Loaded by:		mf	mf	MF	MF	MF	[illegible]	MF	MF	[illegible]	MF	MF	[illegible]	MF	MF	[illegible]
Recorded by:		mf	mf	MF	BJ	BJ	[illegible]	BJ	BJ	[illegible]	BJ	BJ	[illegible]	BJ	BJ	[illegible]

*wrote incorrect value

Investigators' Signatures

[signature]
[signature]

[signature]
Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:	[illegible]			Hach	MF
Lab Tot. Resid. Cl2:			0	HACH	MF
Alkalinity:	~~150~~ 172	70	106	Hach	BJ
Hardness:	125	100	165	Hach	BJ
Total Ammonia:	[illegible]	[illegible]	1.1	[illegible]	[illegible]

Ammonia meter slope:

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Port Orange STP
Address/City: 840 Oak St Port Orange, FL
County: Volusia
Contact/District: Phillip Kane / Central
NPDES Permit #: FL0025593 Outfall #:

Sample Collection: Date 6/25/97 Time 0920
Test Beginning: Date 6/26/97 Time 1130
Test Ending: Date 6/27/97 Time 1230
Test Organism: C. dubia
Life Stage/Age: < 24 hours

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

Remarks:

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7.0, 7.09	8.7 @ 21	1356 @ 25.3 01364	20.7 @ 23.2
24 hr	7.07, 7.09	8.5 @ 22	1355 @ 23.3 01367	20.8 @ 23.2
48 hr	7.01, 7.09	8.5 @ 21	1355 @ 23.5 01352	20.8 @ 23.4

Conc.	Chamber #	Number Live 0	24	48	DO (mg/l) 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	Cond. (µmhos/cm) 0	24	48
Control		5	5	5	7.2	8.7		8.3	8.3		20.2	20.0		171	180	
Control		5	5	5												
Control		5	5	5												
Control		5	5	5												
12.5%		5	5	4	8.9	9.0		7.3	8.4		19.0	21.0		669	711	
100%		5	4	3												
50%		5	5	5												
100%		5	3	2												
Measured/Loaded by		MF	AF	MF	MF	MF		MF	MF		MF	MF		MF	MF	
Recorded by		MF	MF	MF	MF	MF		MF	MF		MF	MF		MF	MF	

Investigators' Signatures:
Alison Jordan
Marshall Faircloth

Reviewer

Water-quality Parameters

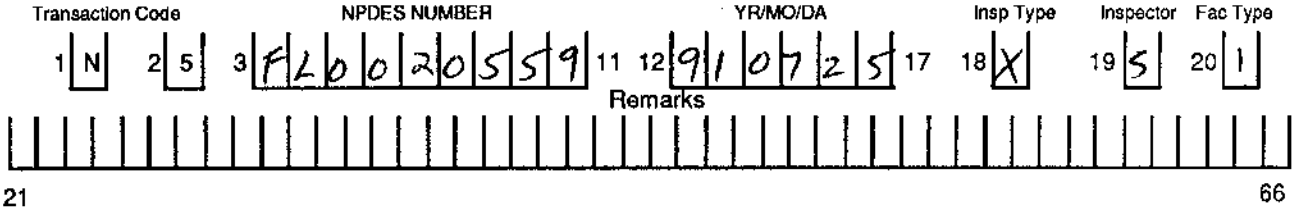
	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:	[illegible]			Hach	MF
Lab Tot. Resid. Cl2:			0	Hach	MF
Alkalinity:	122	70	106	Hach	AJ
Hardness:	125	100	165	Hach	AJ
Total Ammonia:				Hach	MF

Ammonia meter slope:

Macroinvertebrate taxa list for City of Port Orange STP, Volusia County, Florida, collected via quantitative methodology (ponar) at a reference site and a test site (near the discharge plume) in the Halifax River on 25 June, 1991.

	Reference Site	Test Site
Decapoda		
Clibanarius vittatus	37	–
Gastropoda		
Crepidula plana	37	–
Malacostraca		
Cyclaspis varians	37	–
Edotea montosa	–	75
Eudevenopsis sp.	374	–
Stenothoe minuta	262	–
undetermined haustorid	150	–
undetermined malacostracan	–	37
Nemertea		
undetermined nemertean	37	225
Pelecypoda		
Lucina multilineata	–	75
Polychaeta		
Brania sp.	–	412
Glycinde solitaria	–	37
Leitoscoloplos fragilis	299	3031
Mediomastus ambiseta	–	37

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)

