

Biological Assessment of

Daytona Beach/Westside Regional Wastewater Treatment Facility

Volusia County

NPDES #FL0025984

Sampled October 1994

April 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: Daytona Beach/Westside Regional WWTF
County: Volusia
NPDES Number: FL0025984
State Permit Expiration Date: August 1, 1995

Toxics Sampling Inspection (XSI)

Date Sampled: 10 October, 1994

Results: No problem levels of organic priority pollutants were detected in the grab sample. Silver was detected in the effluent (0.09 µg/L) at a level below quantitation limits. Therefore, for regulatory purposes, the silver concentration was set at the minimum detection limit (0.05 µg/L). This concentration is equal to the Class III water quality standard.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 10 October, 1994

Results: The effluent sample was not toxic to either the cladoceran, *Ceriodaphnia dubia,* or the fish, *Cyprinella leedsi.*

Impact Bioassessment Inspection (IBI)

Date Sampled: 10 October, 1994

Results: Quantitative measures of benthic macroinvertebrate community health indicated degradation associated with the discharge. Substantial reductions in macroinvertebrate taxa richness and diversity occurred between the reference and test sites. The diversity reductions represent violations of the biological integrity criterion (Rule 62-302.530(11) FAC). Phytoplankton communities at all three study sites had similar diversity and community structure. Overall, the discharge did not appear to be having a negative effect on the phytoplankton community. Chlorophyll *a* was elevated at all three stations: 12.2 µg/L at the reference site, 11.3 µg/L at test site 1, and 15.7 µg/l at test site 2. These levels are higher than 80% of other Florida estuaries.

Water Quality Inspection (WQI)

Date Sampled: 10 October, 1994

Results: Total residual chlorine (0.12 mg/L) violated the facility's permit limits. Moderate phosphorus enrichment was noted at all three stations. However, the phosphorus concentration in the discharge approached the proposed 1.0 mg/L P limit, which takes effect in 1997. Effluent nitrate-nitrite was 10.0 mg/L, which is considerably higher than the proposed total nitrogen limit of 3.0 mg/L, and appeared to be contributing to elevated nitrate-nitrite levels at both tests sites. The nitrate-nitrate concentration at the reference site (0.15 mg/L) was higher than approximately 85% of other Florida estuaries. The nitrate-nitrite level at test site 1 (0.31 mg/L) was double that of the reference site, and higher than those found in 95% of other Florida estuaries. At test site 2, nitrate-nitrite (0.22 mg/L) exceeded the values found in approximately 90% of other Florida estuaries. Algal growth potential was above the "problem threshold" of 10 mg dry wt/L for marine waters at all stations.

Introduction

The Daytona Beach/Westside Regional Wastewater Treatment Facility is located in Volusia County, Florida (see map in Appendix). This facility is a 10.0 MGD design capacity activated sludge wastewater treatment facility which incorporates nitrification and tertiary filtration. Disinfected reclaimed water is dechlorinated, combined with effluent from the City of Daytona's Bethune Point WWTF, and then discharged to the Class III Halifax River. Up to 7.662 MGD of the Westside Regional WWTF's reclaimed water can also be delivered to an unrestricted public access reuse system.

The following permit limits apply to the combined discharge from the Westside Regional and the Bethune Point facilities: carbonaceous BOD_5 (10.0 mg/L as a monthly average, 16.0 mg/L daily maximum), TSS (5 mg/L maximum), D.O. (2 mg/L minimum), total residual chlorine (1.0 mg/L minimum for disinfection in the reuse system, 0.01 mg/L maximum in the surface water discharge), pH (6.0 to 8.5 S.U.), total nitrogen (630 lbs/day monthly average), total phosphorus (200 lbs/day monthly average), and flow (10.0 MGD).

A Water Quality Based Effluent Limit Study, performed on this combined discharge in 1990, formulated the following effluent limits: BOD_5 (10.0 mg/L), total nitrogen (3 mg/L), total phosphorus (1 mg/L), and dissolved oxygen (> 2.0 mg/L). By 1997, the surface water discharge to the Halifax River must meet these advanced wastewater treatment limits.

This facility has exceeded the residual chlorine limit on several occasions between October, 1993, and June, 1994. The City of Daytona Beach installed an additional dechlorination system at the regional facility in order to solve this problem. Past Monthly Operating Report data indicates that limits for total nitrogen were exceeded in February, 1994 (TN = 856.2 lbs/day). The facility is to submit a construction permit application for a new denitrification/filtration system to better meet the nutrient limits to the river.

The USEPA issued an administrative order in August, 1992, because the facility's effluent failed

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	25	8	7
Shannon-Weaver Diversity	3.4	1.7	1.8
% Polychaeta	35.7	67.6	51.8
% Gastropoda	38	11.8	8.9
% Amphipoda	20	0	0
% Decapoda	0	0	1.8
% Isopoda	1.2	0	0
% Mysidacea	0.6	0	3.6
% Pelecypoda	4	19	33.9
% Cumacea	0	1.5	0
% Predator/Carnivores	9.5	57.9	52.7
% Above-Surface Deposit Feeders	28.4	0.6	0
% Below Surface Deposit Feeders	4.7	1.3	0
% Scavengers	1.1	0	0
% Suspension Feeders	17.7	1.9	38.2
% Scrapers	38.5	38.3	9.1
Phytoplankton Algae			
Number of Taxa	19	18	27
Shannon-Weaver Diversity	3.7	3.4	3.6
Chlorophyll a (µg/L)	12.2	11.3	15.7
Algal Density (#/mL)	10,457	10,779	24,197
% Blue-green	0	0	4.2
% Green	16.9	10.5	17.4
% Diatoms	76.9	74.6	69.4
Algal Growth Potential (mg dry wt/l)	25.5	35.7	28.5

toxicity tests (performed during February, March, and April of 1989). The order stated that the facility must comply with the whole effluent toxicity limits indicated in the NPDES permit by May 31, 1994. USEPA also issued a notice of violation in November, 1992, regarding total residual chlorine and fecal coliform violations.

Methods

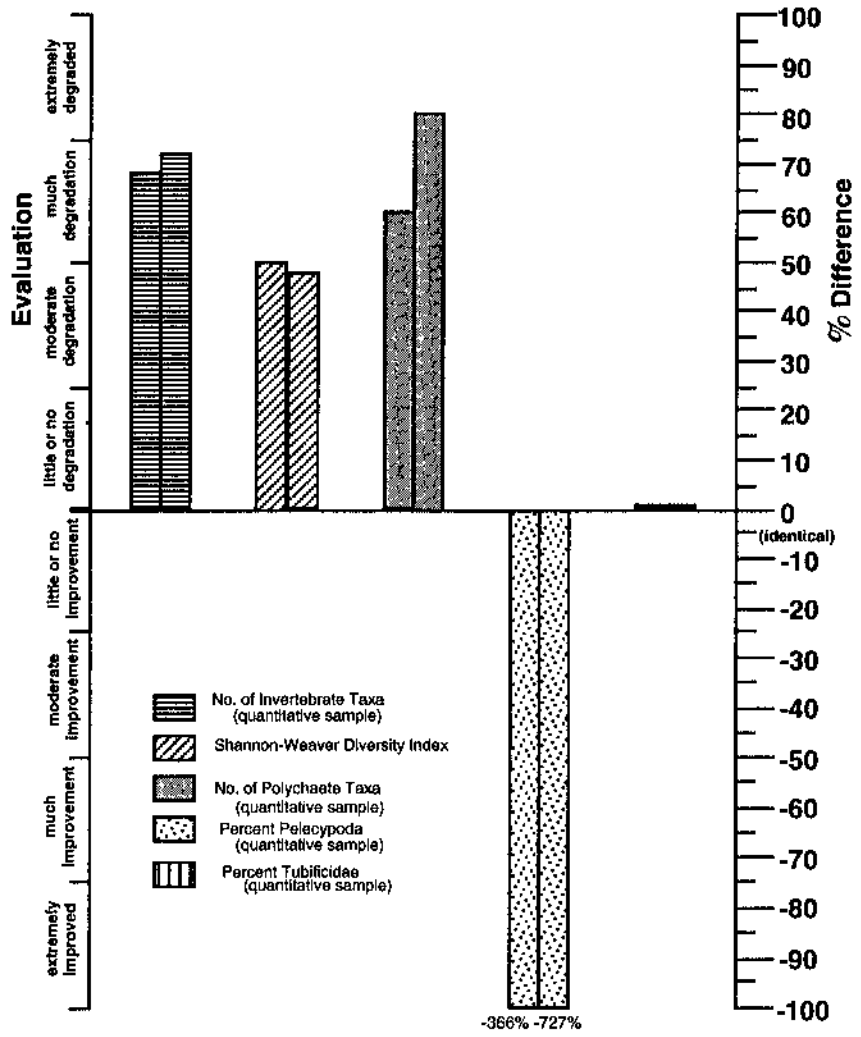
The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located 200 yards north of the Silver Beach Memorial Bridge) and two test sites bracketing the discharge (see map in Appendix). The combined discharge from the Bethune Point and the Daytona Regional facilities was sampled as "effluent" in this study. 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 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 sampled using three replicate petite Ponar grabs per station. 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* with the freshwater effluent, and *Dunaliella tertiolecta* with saline 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 to determine the effects of a discharge. These are briefly discussed here.

Taxa richness: It is generally accepted that taxa richness is



Effect of discharge on the benthic macroinvertebrate community.

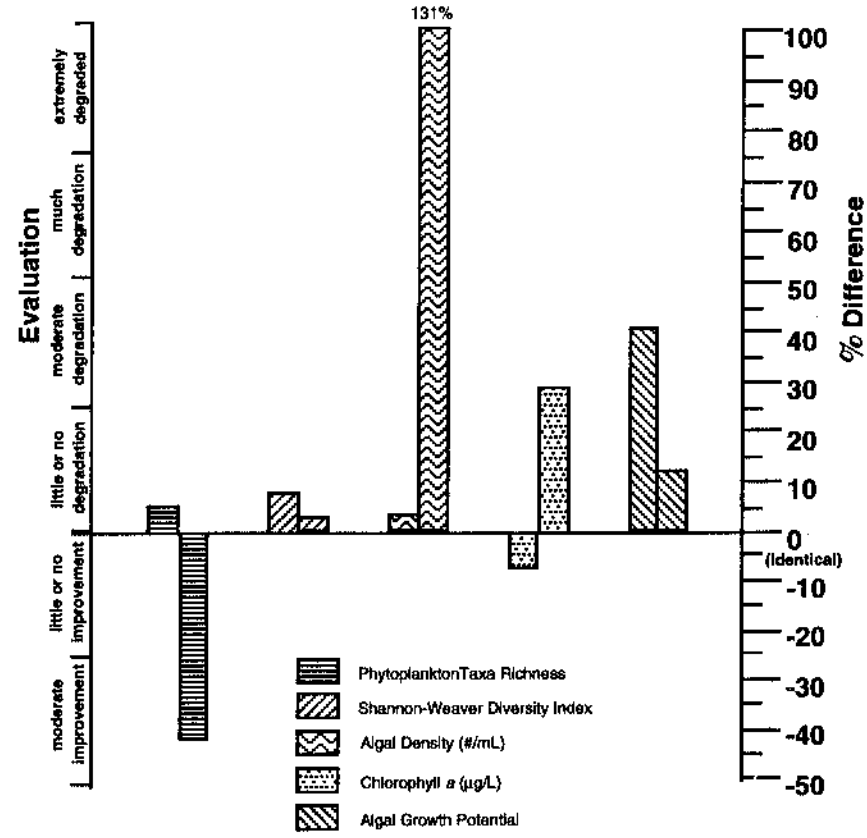
The left bar for each parameter shows differences between the reference site and test site 1. The right bar shows differences between the reference site and test site 2.

among the most robust measures of benthic community health. Anthropogenic stress has a tendency to reduce the number of different types of invertebrates present in a system. Algal taxa richness may increase with moderate nutrient enrichment, compared to an oligotrophic natural background, but becomes reduced with extreme nutrient enrichment or toxicity.

Shannon-Weaver diversity: This index is specified in the Florida Administrative Code as a measure of biological integrity. Low diversity scores are undesirable, in that they represent conditions where only a few organisms are abundant, to the exclusion of other taxa. Such scores may be associated with organic/nutrient enrichment and decreased dissolved oxygen. Excessive numerical dominance of a single type of organism (a high % contribution of the dominant taxon) is also associated with disturbance.

Numbers of pollution sensitive taxa: Unpolluted sites have characteristic numbers and types of taxa which are sensitive to anthropogenic stress. These organisms become rare or absent as the intensity or duration of the 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 (*e.g.*, around 20 or more in the Panhandle, around 15 or more in the Peninsula). 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: A system is generally considered degraded if a substantial shift in the proportions of the major taxonomic groups (*e.g.*, mayflies, riffle beetles, etc.) is observed when compared to a reference site. In marine systems, an increase in the % tubificid oligochaetes, a decrease in the % pelecypods, and a decrease in the number of polychaete taxa are all considered indicators of disturbance.



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.

Algal biomass: The density of algal cells and the chlorophyll *a* concentration are used as estimators of biomass. A system has traditionally been considered nutrient stressed when biomass exceeds problem threshold levels, often resulting in visible algal blooms, nuisance scums, and low dissolved oxygen from the decomposition of the decaying algal tissue. 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: Undisturbed aquatic systems possess characteristic proportions of organisms using various functional feeding strategies, and human disturbance shifts these established feeding strategies. In Florida for example, pollution is known to reduce the numbers of fil-

ter-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 (DEP Central District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Christy LeDuc, Kathleen Lurding, Tina Mikulski, Elizabeth Miller, Urania Quintana, Landon Ross, David Whiting, Vicki Whiting, Greg Wynn, 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.

Results and Discussion

Habitat quality was essentially the same at all three sites with the reference site scoring 51 points and both test sites scoring 50 points. All three sites were about 400 m wide and 4 m deep. Sediments throughout the study area consisted of a mixture of mud, sand, and shell. Waters were slightly turbid and green throughout the study area. Both test sites, as well as the reference site, had considerable stormwater discharge from local roads, parking lots, etc.

Dissolved oxygen at the reference site (7.2 mg/L) was slightly higher than at either test site (6.8 and 7.0 mg/L at test sites 1 and 2, respectively). These levels are sufficient to support aquatic life. Other measurements which were similar at all sites included conductivity (between 28,000 and 30,000 µhmos/cm), temperature (between 26 °C and 27 °C), and pH (7.5 to 7.7 S.U.'s). TSS was higher at test site 1 (26 mg/L) than at either the reference site (18 mg/L) or test site 2 (19 mg/L). BOD_5 was below 1.6 mg/L at all sites.

The effluent sample did not show toxicity to either the cladoceran, *Ceriodaphnia dubia,* or the fish, *Cyprinella leedsi*. Total residual chlorine (measured in the field with the facility's Hach chlorine meter) was 0.12 mg/L. This is in violation of the facility's permit limits and Class III water quality standards (Rule 62-302.530(19) FAC).

The pesticide atrazine (0.1 µg/L) was detected in the effluent at a concentration below the criterion for detection. Since the Lowest Observed Effect Level for atrazine is 2 µg/L, this is not a cause for concern (AQUIRE 1994). No other organic priority pollutants were detected in this grab sample.

Metals detected in the effluent included silver (0.09 µg/L), iron (66 µg/L), nickel (7 µg/L), and zinc (25 µg/L). The concentrations of silver and nickel were below practical quantitation limits. For regulatory purposes, the values of these metals are then set at the minimum detection limit (0.05 µg/L for silver, 0.08 µg/L for nickel). While the other metal concentrations do not represent violations, the silver concentration was at a level equal to the Class III water quality standard.

The effluent total phosphorus concentration was 1.5 mg/L, which is slightly higher than the proposed 1.0 mg/L limit (which takes effect in 1997). Total phosphorus values at the test sites were only slightly higher than that found at the reference site. Total phosphorus at all three stations was higher than the concentrations found in approximately 80% of other Florida estuaries (see Table of Typical Water Quality Values in Appendix). Effluent nitrate-nitrite was 10 mg/L, which is considerably higher than the proposed total nitrogen limit of 3.0 mg/L, and appeared to be contributing to elevated nitrate-nitrite levels at both test sites. The nitrate-nitrate concentration at the reference site (0.15 mg/L) was higher than approximately 85% of other Florida estuaries. The nitrate-nitrite level at test site 1 (0.31 mg/L) was double that of the reference site, and higher than those levels found in 95% of other Florida estuaries. At test site 2, nitrate-nitrite (0.22 mg/L) exceeded the values found in approximately 90% of other Florida estuaries.

Algal growth potential was above the "problem threshold" of 10 mg dry wt/L for marine waters (Ron Raschke, USEPA, personal communication) at all stations, with 25.5 mg dry wt/L at the reference site, 35.7 mg dry wt/L at test site 1, and 28.5 mg dry wt/L at test site 2.

Quantitative measures of benthic macroinvertebrate community health indicated degradation associated with the discharge (see table and figures). The figure on p. 2 indicates the degree of difference between the reference and test

sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. Negative values mean that the test site is better than the reference.

Macroinvertebrate taxa richness (25 taxa) and diversity (3.4) values at the reference site were much better than those found at test site 1 (with 8 taxa and a diversity of 1.7) or test site 2 (with 7 taxa and a diversity of 1.8). These reductions in taxa richness (68% and 72% at test sites 1 and 2, respectively) and in diversity (50% and 47% at test sites 1 and 2, respectively), are cause for concern, as these values are lower than those found in 80% of other Florida estuaries. The diversity reductions represent violations of Rule 62-302.530(11) FAC.

Communities at both test sites exhibited decreases in the number of polychaete taxa, the % amphipods, the % isopods, and the % gastropods when compared to the reference site. The pollution tolerant polychaete, *Streblospio benedicti*, was the dominant taxon at the test sites. Although pelecypods were more abundant at the test sites than the reference site (usually a sign of improvement), the weight of other evidence clearly points to degradation at the test sites.

The figure on p. 3 represents changes in the algal community. As was noted with the macroinvertebrates, larger differences (that is, higher percentages) correspond with greater degrees of degradation. Phytoplankton communities at all three study sites had similar diversity and community structure. Overall the discharge did not appear to be having a negative effect on the phytoplankton community. Chlorophyll *a* was elevated at all three stations: 12.2 µg/L at the reference site, 11.3 µg/L at test site 1, and 15.7 µg/l at test site 2. These levels are higher than 80% of other Florida estuaries.

Conclusions

The effluent sample did not show toxicity to either the cladoceran, *Ceriodaphnia dubia*, or the fish, *Cyprinella leedsi*. Total residual chlorine (measured in the field with the facility's Hach chlorine meter) was 0.12 mg/L. This is in violation of the facility's permit limits and Class III water quality standards (Rule 62-302.530(19) FAC).

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Phytoplankton populations at all three study sites had similar diversity and community structure. Overall the discharge did not appear to be having a negative effect on the phytoplankton community. Chlorophyll *a* was elevated at all three stations: 12.2 µg/L at the reference site, 11.3 µg/L at test site 1, and 15.7 µg/l at test site 2. These levels are higher than 80% of other Florida estuaries.

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Chemistry summary table for Dayton Beach/Westside Regional WWTF.

	Effluent	Reference Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
Atrazine	0.10 T			
Metals (ug/L)				
Aluminum	100 U			
Arsenic	10 U			
Cadmium	0.08 U			
Chromium	10 U			
Copper	3 U			
Iron	66			
Lead	10 U			
Mercury	0.10 U			
Nickel	7 I			
Selenium	30 U			
Silver	0.09 I			
Zinc	25			
Nutrients (mg/L)				
Ortho-phosphate	1.3	0.11	0.14	0.11
Total phosphorus	1.5	0.15 A	0.18	0.17
Ammonia	0.065	0.18	0.19	0.18
Nitrate+Nitrite	10	0.15	0.31	0.22
TKN	1.2	0.74	0.78	0.77
General Phys-Chem Parameters				
Habitat Assessment				
D. O. (mg/L)	8.08	7.21	6.78	6.99
pH (SU's)	6.85	7.67	7.54	7.64
Specific Conductance (µmhos/cm)	692	30000	28800	30000
Temperature (°C)	26.82	26.8	26.65	26.52
Total Suspended Solids (mg/L)	2 U	18	26	19
Biological Oxygen Demand, 5 day (mg/L)	1.6	1.45 A	1.27	1.28
Hardness (mg CaCO3)	157.9			
Algal Growth Potential (mg dry wt/L)	224.8	25.5	35.7	28.5
Toxicity				
Bioassay Fish	No Mortality			
Bioassay Invertebrate	No Mortality			

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

T - Value reported is less than the criterion of detection

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

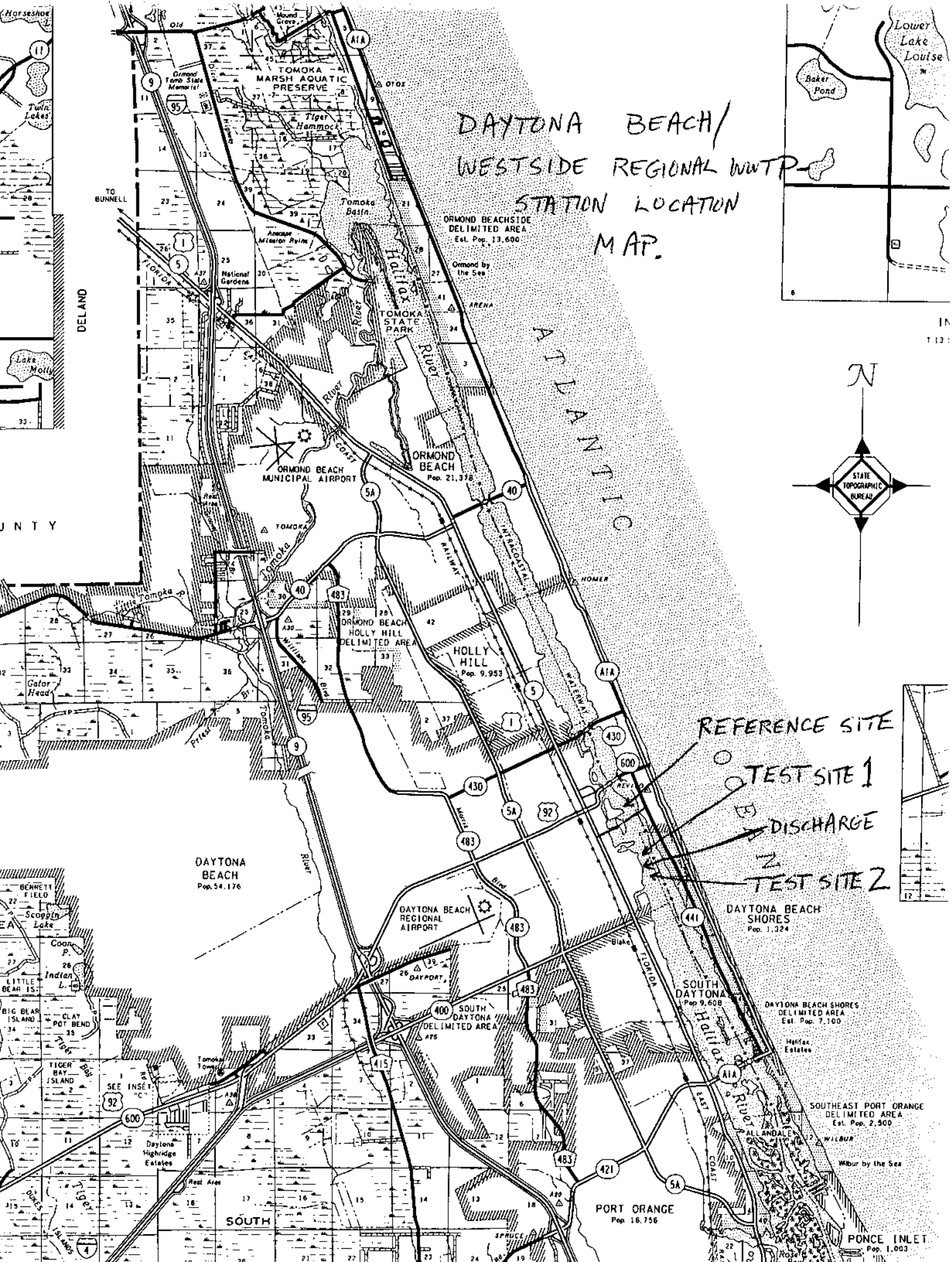
Typical Values for Selected Parameters in Florida Waters

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

Percentile Distribution

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


DAYTONA BEACH/
WESTSIDE REGIONAL WWTP
STATION LOCATION
MAP.
REFERENCE SITE
TEST SITE 1
DISCHARGE
TEST SITE 2
TOMOKA MARSH AQUATIC PRESERVE
TOMOKA STATE PARK
ORMOND BEACH
Pop. 21,378
ORMOND BEACHSIDE DELIMITED AREA
Est. Pop. 13,600
ORMOND BEACH MUNICIPAL AIRPORT
ORMOND BEACH HOLLY HILL DELIMITED AREA
HOLLY HILL
Pop. 9,953
DAYTONA BEACH
Pop. 54,176
DAYTONA BEACH REGIONAL AIRPORT
DAYTONA BEACH SHORES
Pop. 1,324
DAYTONA BEACH SHORES DELIMITED AREA
Est. Pop. 7,100
SOUTH DAYTONA
Pop. 9,608
SOUTH DAYTONA DELIMITED AREA
PORT ORANGE
Pop. 18,756
SOUTHEAST PORT ORANGE DELIMITED AREA
Est. Pop. 2,500
PONCE INLET
Pop. 1,003
DELAND
TO BUNNELL
ATLANTIC
Halifax River
Tomoka River
Intracoastal Waterway
Lower Lake Louise
Baker Pond
STATE TOPOGRAPHIC BUREAU

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: Daytona Beach/Westside Regional WWTF		Date Summary Prepared: 9/22/94
Location (attach detailed map): See attached map	County: Volusia	District: Central
Federal Permit # FL0025984 and expiration date: 5/31/97	State GMS # and State expiration date: 3069M02142 3069-181441 (Exp. 8/1/95 DC64-181488 (Exp. 12/1/95	Facility Type: Industrial (Municipal) Federal Agricultural Other (list):

Function of facility: Domestic Wastewater Treatment Facility

Description of treatment process: This facility is a 10.0 MGD design capacity activated sludge wastewater treatment facility incorporating nitrification and Tertiary filtration. Disinfected treatment water is discharged to the Halifax River via outfall pipe following dechlorination and to an 2.662 MGD (Total design capacity) reuse water system (authorized by construction permit # DC 64-181488). Reclaimed water discharged to surface water from this facility is combined with effluent from the City's Bethune Point Wastewater Treatment facility (10.0 MGD annual design cap.) prior to discharge to the River.

Receiving waters: Halifax River	Classification: I II (III)	
Design Flow: 10.0 MGD Total (Westside WWTF only) Reuse + S.W.*	Mean Flow: 4.22 MGD S.W. for Westside 9/93 to 6/94 9.33 MGD combined	Flow during survey: 7 MGD (influent)

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):

State	Parameter (*For combined discharge to Halifax)	Limit (units)
C	BOD_5	10 mg/l (monthly Avg., S.W.)
	TSS	5 mg/l (max., Reuse)
	TN	63 lb#/day (monthly Avg. S.W.)
	TP	200 lb#/day (monthly Avg. S.W.)
	DO	2 mg/l (minimum, S.W.)
	TCR	0.01 mg/l (maximum, S.W.)
	TCR	1.0 mg/l (maximum, Reuse)
	pH	6-8.5 S.U.

* S.W. - Surface waters

Describe special permit conditions and permit modifications:
The adjacent water limits apply to the combined discharge from both the Westside Regional and Bethune PT. facilities.
By 1997 any surface discharge to the Halifax River from the wastewater facilities for the City of Daytona Beach will meet advanced wastewater Treatment (AWT) limits (TN = 3 mg/l, TP = 1 mg/l

See attached sheet for NPDES Permit Limits

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

Daytona Beach/Westside Regional WWTF (Facility)

FACILITY SUMMARY

Description of permitted outfall(s): The outfall extends approximately 350 feet (60"ϕ pipe) from the shoreline and continues ± 640 feet of 42"ϕ pipe with diffusers in the 42"ϕ section.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: This facility has exceeded the Total Residual Chlorine limit to the river on numerous occasions between 10/93 - 6/94. These violations have been addressed through previous Department correspondences with the City and the City has taken measures to correct this matter (see below). Review of the submitted MORs for the combined effluent to the River revealed that after the City placed into service an upgraded advanced wastewater treatment (AWT) facility at Bethune Point the limits for TN were only exceeded one month (Feb 1994 TN = 8362 #/day) only. The City is also addressing additional measures to better meet the nutrient limits (see below).

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions: A WQBEL Report dated August 1990 states the following WQBELs for this facility: cBOD5 ≤ 10 mg/l; TN ≤ 3 mg/l; TP ≤ 1.0 mg/l and DO ≥ 2 mg/l. The facility must meet the above mentioned limitations by 1997. There have been no previous or pending enforcement actions by FDEP. USEPA issued an administrative order (No. 92-0034) dated Aug. 13, 1992 to the facility because their effluent failed toxicity tests (performed 1/94, 3/94, 4/94). The order stated that the facility must comply with the whole effluent toxicity limits indicate in the NPDES Permit, by May 31, 1994. USEPA also issued a Notice of Violation on 11/17/92 regarding TRC and fecal coliform violations.

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 12/93 to 6/94 show reduction in TN (5271 #/day on 12/93 to 4447 #/day on 6/94 and no violations for TP (TP < 230 #/day). Cl_2 Residual after dechlorination was above required limits during several months. The City installed an additional dechlorination system at the Regional Facility to solve the Cl_2 Res. problem. The facility must submit a construction permit application for new dechlorination system at the Regional facility to better meet the nutrient limits to the River.

Additional information:

Staff contributing to this review (signature):

Dri Phu Kar	(Biologist)
[illegible]	(Inspector)
Al Carlos	(Engineer)
Chris Fenaro	(P.E.)
	( )
	( )

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - INTERIM

3. During the period beginning upon completion of construction of the upgraded Bethune Point WWTP and lasting until completion of construction of the upgraded Westside Regional WWTF, the permittee is authorized to discharge from outfall serial number 001 - Treated Domestic Wastewater Which Is the Combined Effluent of the Westside Regional WWTF and the Bethune Point WWTP. (CONTINUED)

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

PARAMETERS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	Annual Average	Monthly Average	Weekly Average	Daily Maximum	Measurement Frequency	Sample Type	Sampling Point
Dissolved Oxygen, mg/l		See Item 8 on Page I-7			Daily, 7/Week	Grab	Effluent
Acute Whole Effluent Toxicity		See Item 9 on Page I-7			See Part IV	Composite	Effluent
Chronic Whole Effluent Toxicity		See Item 9 on Page I-7			See Part IV	Composite	Effluent

1/ The monthly average effluent concentration shall not exceed 15% of the respective influent value (85 removal).

2/ See Item 6 on Page I-7.

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - FINAL

4. During the period beginning upon completion of construction of the upgraded Westside Regional WWTF and lasting through expiration of this permit, the permittee is authorized to discharge from outfall serial number 001 - Treated Domestic Wastewater Which Is the Combined Effluent of the Westside Regional WWTF and the Bethune Point WWTP.

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

PARAMETERS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	Annual Average	Monthly Average	Weekly Average	Daily Maximum	Measurement Frequency	Sample Type	Sampling Point
Flow, MGD	Report	Report	Report	Report	Continuous	Calculated	Effluent
Carbonaceous Biochemical Oxygen Demand (5 Day), mg/l	N/A	10.0	12.0	16.0	Daily, 7/Week	Composite	Effluent
Total Suspended Solids, mg/l	N/A	Report	N/A	N/A	Daily, 7/Week	Composite	Influent
mg/l 1/	20.0	30.0	36.0	N/A	Daily, 7/Week	Composite	Effluent
Total Nitrogen as N, mg/l	N/A	3.0	3.6	4.8	Daily, 7/Week	Composite	Effluent
Total Phosphorus, mg/l	N/A	1.0	1.2	1.6	Daily, 7/Week	Composite	Effluent
Total Residual Chlorine, mg/l	N/A	N/A	N/A	0.01	Daily, 7/Week	Grab	Effluent
Fecal Coliform, N/100 ml 2/	200	200	N/A	800	Daily, 7/Week	Grab	Effluent
pH, Standard Units	See Item 7 on Page I-7				Hourly	Grab	Effluent

CONTINUED

DAYTONA REGIONAL AND BETHUNE POINT COMBINED EFFLUENT.

Combined Effluent Monthly Operating Report Summaries

Month 1994	Average Daily Flow MGD	$CBOD_5$ mg/l	TSS mg/l	TN mg/l	TKN mg/l	NH_3 mg/l	NO_3 mg/l	TP mg/l	Fecal Coliform #/100 ml
February	11.4	2.2	2.4	9.03	1.91	0.2	7.12	2.13	5
March	11.5	6.2	1.8	5.19	1.20	0.1	4.08	0.47	4
April	8.8	2.5	1.0	3.52	1.13	0.1	2.39	1.71	2
May	8.7	2.4	1.4	4.91	1.41	0.1	3.58	1.88	5
June	10.5	2.9	1.8	5.09	1.34	0.1	3.75	2.10	13
July	11.5	3.2	1.6	8.36	2.27	1.0	6.09	1.78	2
August	12.4	2.1	1.2	4.39	0.94	0.1	3.45	1.41	3
September	11.3	2.4	1.6	5.60	1.43	0.4	4.17	1.49	7
October	12.5	1.7	1.2	5.36	1.26	4.1	4.01	0.90	4
November	14.8	3.4	2.3	7.18	3.58	2.0	3.60	0.94	8
December	13.5	1.5	1.5	4.54	0.99	0.1	3.54	0.78	3

Discharge characteristics on October 10, 1994 based upon the facilities monthly operating reports.

Parameter	Combined	Bethune Point	DAYTONA Regional
Daily flow (mgd)	14.16	5.9	8.1
Chlorine residual (mg/l)	ND	0.78	1.8
$CBOD_5$ (mg/l)	1.6	1.9	1.2
DO (mg/l)	ND	5.5	8.2
TSS (mg/l)	1.3	1.0	2.6
Minimum pH (s.u.)	6.3	6.1	7.2
Maximum pH (s.u.)	6.9	6.7	7.3
TKN (mg/l)	1.18	1.13	1.48
Total N (mg/l)	5.53	2.30	12.68
Nitrate (mg/l)	4.35	1.17	11.20
Total P (mg/l)	0.87	0.44	1.63
Fecal coliform (#/100 ml)	1.0	1.0	ND

Where ND represents not determined

CITY OF DAYTONA BEACH STP
WEST REGIONAL

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDEP CENTRAL	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER: HALIFAX RIVER

REMARKS:	LOCATION: 200 YARDS NORTH OF SILVER BEACH MEMORIAL BRIDGE	FIELD ID/NAME:

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
			80%		20%	

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): N/A

Estimated System Width (range, m): 400 M	Estimated System Depth (range, m): 0-4 M	N/A / yes
High Water Mark (m above bed) N/A	Velocity (range, m/s): N/A	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 N/A	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Riffles			
Leaf Packs				Sand			
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble				Benthic leaf mats			
Undercut Banks/Roots				Other:			

WATER QUALITY

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

N/A

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: OVERCAST / LIGHT WIND

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

SAMPLING TEAM: KANE, PLUCHINO	SIGNATURE: Phil Kane	DATE:

CITY OF DAYTONA BEACH STP WEST REGIONAL

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

SUBMITTING AGENCY CODE: 352 / SUBMITTING AGENCY NAME: FDEP CENTRAL	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER: HALIFAX RIVER

REMARKS:	LOCATION: REFERENCE	FIELD ID/NAME:

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 26	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 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 3	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 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 5	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 31

COMMENTS:

ANALYSIS DATE:	ANALYST: PHIL KANE	SIGNATURE: Phil Kane

CITY OF DAYTONA BEACH STP

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

WEST REGIONAL

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDEP CENTRAL	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER: HALIFAX RIVER

REMARKS:	LOCATION: TEST A 100 YDS NORTH OF OUTFALL	FIELD ID/NAME:

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify) UNW
			50%	25%		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): N/A

Estimated System Width (range, m): 400M	Estimated System Depth (range, m): 0-4m	N/A yes
High Water Mark (m above bed) N/A	Velocity (range, m/s): N/A	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:			

N/A

WATER QUALITY

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

N/A

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: OVERCAST/LIGHT WIND

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

SAMPLING TEAM: KANE, PLANCHINO	SIGNATURE: Phil Kane	DATE:

CITY OF DAYTONA BEACH STP WEST REGIONAL

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

SUBMITTING AGENCY CODE: 30 SUBMITTING AGENCY NAME: FDEP CENTRAL	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER: HALIFAX RIVER

REMARKS:	LOCATION: TEST A 100 YDS NORTH OF OUTFALL.	FIELD ID/NAME:

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 26	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 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 3	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 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 5	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 50

COMMENTS:

ANALYSIS DATE:	ANALYST: PHIL KANE	SIGNATURE: Phil Kane

CITY OF DAYTONA BEACH STP WEST REGIONAL

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 32 / SUBMITTING AGENCY NAME: FDEP CENTRAL	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER: HALIFAX RIVER

REMARKS:	LOCATION: TEST B 100 YDS SOUTH OF OUTFALL	FIELD ID/NAME:

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify) MWT
			50%	25%		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): N/A

Estimated System Width (range, m): 400m	Estimated System Depth (range, m): 0-4m	yes
High Water Mark (m above bed) N/A	Velocity (range, m/s): N/A	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:			

N/A

WATER QUALITY

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

N/A

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: OVERCAST / LIGHT WIND

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

SAMPLING TEAM: KANG, PLUCHINO	SIGNATURE: Phil Kang	DATE:

CITY OF DAYTONA BEACH STP WEST REGIONAL

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

SUBMITTING AGENCY CODE: 35 SUBMITTING AGENCY NAME: FDER CENTRAL	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER: HALIFAX RIVER

REMARKS:	LOCATION: TEST B 100 YDS SOUTH OF OUTFALL	FIELD ID/NAME:

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 26	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 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 3	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 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 5	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 56

COMMENTS:

ANALYSIS DATE:	ANALYST: PHIL KANE	SIGNATURE: Phil Kane

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: "CDBSTP"
County: Volusia
Contact / District: Kane / Central
NPDES Permit #: FL0025984
LIMS Sample #: 91341 LIMS Job #: 94-OCT-11-27-01

Sample Collection: Date 10/10/94 Time 1046
Test Beginning: Date 10/11/94 Time 1100
Test Ending: Date 10/18/94 Time 1115
Organism Batch #: 41 Diluent Batch #: well
Organism Age: 11 days Old
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	7.8 @ 7.0	22.6 @ 22.7	8.5 @ 23.2	100.3 @ 98.6
	9.0 @ 9.0			1018 @ 1047 @ 23.7 °C
24 hr	7.0 @ 7.0	22.6 @ 22.7	8.5 @ 23.2 °C	101 @ 95.6
	9.0 @ 9.0			1014 @ 1047 @ 23.6 °C
48 hr	7.0 @ 7.0	22.6 @ 22.7	8.6 @ 22.6 °C	99.7 @ 98.6
	9.0 @ 9.0			1017 @ 1047 @ 23.6 °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	28	5	5	5	7.9	8.2	8.5	23.4	22.8	22.7	8.0	7.9	8.4	250	255	255
Control B	198	5	5	5	8.0	8.2	8.5			22.7	8.0	7.9	8.4	250	245	245
Control C	87	5	5	5	8.0	8.3	8.5			22.5	8.0	7.9	8.4	250	245	245
Control D	24	5	5	5	8.0	8.3	8.5			22.4	8.0	7.9	8.3	250	245	245
100% A	476	5	5	5	7.2	7.8	8.2	25.0	22.7	22.5	7.6	7.9	8.5	730	690	690
100% B	114	5	5	5	7.2	7.8	8.2			22.4	7.6	7.9	8.5	735	690	695
100% C	27	5	5	5	7.2	7.8	8.2			22.4	7.6	7.9	8.4	735	690	695
100% D	116	5	5	5	7.2	7.8	8.2			22.3	7.6	7.9	8.4	735	690	690
Recorded by:		TM	TM	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF
Measured/Loaded by:		TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM

Investigators' Signatures
Tina M. Kubale
Marshall Faircloth
Jennifer Sarapani
Krista C. Ruder
Reviewer

Salt Water / Well Water

Water Quality Parameters	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):		0.12	-	Phil Kane
Lab Total Residual Cl2 (mg/L):	<0.03	0.05	DR-100	TM
Alkalinity (mg/L as $CaCO_3$):	80	105	HACH	JAS
Hardness (mg/L as $CaCO_3$):	85	105	HACH	JAS
Total ammonia (mg/L as N):	<0.017	<0.017	Orion	TM

Ammonia Meter #98136 Ammonia Meter Slope: -55.3 Ammonia Blank: <0.017 Control Salinity: ( ) ppt Sample Salinity: ( )

form updated 10/05/94

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: "CDBSTP"
County: Volusia
Contact / District: Kane / Central
NPDES Permit #: FL0025984
LIMS Sample #: 91341 LIMS Job #: 94-Oct-11-27-01

Sample Collection: Date 10/10/94 Time 1046
Test Beginning: Date 10/11/94 Time 1100
Test Ending: Date 10/13/94 Time 1115
Organism Batch #: 39 Diluent Batch #: 39
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 9.0 @ 9.0	22.6 @ 22.7	8.5 @ 23.2°C	100.3 @ 98.6 1018 @ 1047 @ 23.7°C
24 hr	7.0 @ 7.0 9.0 @ 9.0	22.6 @ 22.7	8.5 @ 23.2°C	101 @ 98.6 1014 @ 1047 @ 23.6°C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.6 @ 22.7	8.6 @ 22.6°C	99.7 @ 98.6 1017 @ 1047 @ 23.6 °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	5	5	5	8.3		8.4	23.5		23.7	8.1		8.0	165		180
Control	B	5	5	5			8.4			23.7			8.0			180
Control	C	5	5	5			8.4			23.6			8.0			180
Control	D	5	5	5			8.4			23.0			8.0			190
100%	A	5	5	5	7.2		8.5	24.9		23.5	7.5		8.1	640		755
100%	B	5	5	5			8.5			23.4			8.0			770
100%	C	5	5	5			8.5			23.2			8.1			770
100%	D	5	5	5			8.5			22.6			8.1			755
Recorded by:		TM	MF	MF	MF		MF	MF		MF	MF		MF	MF		MF
Measured/Loaded by:		MF	TM	MF	TM		TM	TM		TM	TM		TM	TM		TM

Investigators' Signatures

Tina Mikulski
Marshall Faircloth
Jennifer Sarapan
Tobin G. Kader
Reviewer

Water Quality Parameters

Salt Water / (Well Water)

	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):		0.12	-	Phil Kane
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	0.05	PR-100	TM
Alkalinity (mg/L as $CaCO_3$):	120	80	105	HACH	J&S
Hardness (mg/L as $CaCO_3$):	125	85	165	HACH	J&S
Total ammonia (mg/L as N):	<0.017	<0.017	<0.017	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: -55.3 Ammonia Blank: <0.017 Control Salinity: ( ) ppt Sample Salinity: ( ) ppt

form updated 10/05/94

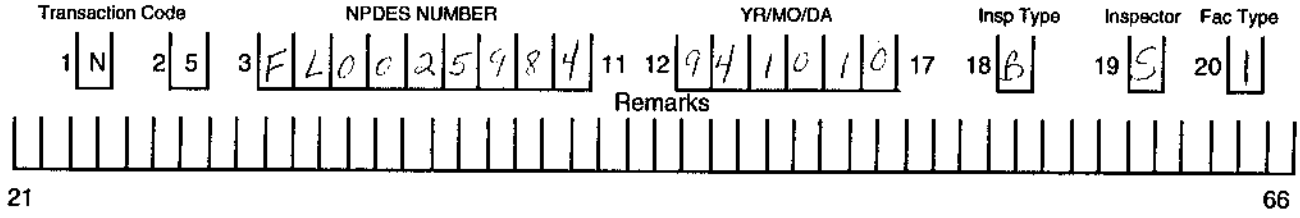
Benthic macroinvertebrate taxa list for Daytona Beach/Westside Regional WWTF, collected via Ponar grab samples in the Halifax River, on 10 October, 1994. Densities, in number/m^2, represent the mean of three replicates.

	Reference Site	Test Site 1	Test Site 2
Amphipoda			
Cerapus sp.	312	–	–
Corophium sp.	50	–	–
Grandidierella bonnieroides	37	–	–
Melita nitida	25	–	–
Cumacea			
Cyclaspis varians	–	12	–
Decapoda			
Ogyrides alphaerostris	–	–	12
Gastropoda			
Odostomia sp.	12	–	–
Retusa sp.	187	–	–
Undetermined Retusidae	574	25	25
Undetermined Gastropoda	37	75	37
Isopoda			
Sphaeroma quadridentata	25	–	–
Mysidacea			
Mysidopsis sp.	12	–	–
Undetermined Mysidacea	–	–	25
Pelecypoda			
Tellina sp.	25	–	–
Undetermined Mactridae	37	162	237
Undetermined Mytillidae	25	–	–
Phoronida			
Phoronis architecta	12	–	–
Polychaeta			
Cistena gouldii	12	–	–
Diopatra cuprea	12	–	–
Gyptis brevipalpa	12	12	12
Leitoscoloplos fragilis	25	–	–
Leitoscoloplos robustus	–	12	–
Neanthes succinea	12	–	–
Nereis sp.	12	–	–
Onuphis sp.	12	–	–
Polydora socialis	12	–	–
Spiochaetopterus costarum	412	12	–
Streblospio benedicti	175	536	349
Undetermined Capitellidae	62	–	–
Total	2128	846	697

Phytoplankton taxa list and densities (#/mL) for Daytona Beach/Westside Regional WWTF, collected via subsurface grabs in the Halifax River, on 10 October, 1994.

	Reference Site	Test Site 1	Test Site 2
Diatoms			
Achnanthes sp.	483	–	–
Chaetoceros sp.	322	322	1176
Coscinodiscus sp.	483	322	336
Cylindrotheca closterium	–	483	–
Cylindrotheca sp.	322	–	840
Delphineis sp.	644	–	–
Ditylum sp.	–	–	168
Entomoneis sp.	322	322	336
Gyrosigma sp.	–	161	168
Leptocylindrus sp.	1287	4022	6217
Melosira sp.	161	161	168
Navicula sp.	322	322	504
Nitzschia constricta	–	161	–
Nitzschia longissima	161	–	168
Nitzschia sp.	804	161	336
Rhizosolenia setigera	644	322	504
Thalassiosira sp.	2092	1126	5209
Thalassionema sp.	–	161	–
Unidentified pennate diatom	–	–	672
Chlorophyta			
Chlorella sp.	161	644	–
Dunaliella sp.	1126	322	1008
Pyramimonas sp.	483	–	2689
Tetraselmis sp.	–	–	504
Unknown chlorophyte flagellate	–	161	–
Chrysophyta			
Mallomonas sp.	–	–	336
Cryptophyta			
Chroomonas sp.	–	483	840
Cryptomonas sp.	322	804	504
Cyanophyta			
Aphanocapsa sp.	–	–	168
Gloeothece sp.	–	–	336
Johannesbaptista sp.	–	–	168
Microcystis sp.	–	–	168
Oscillatoria sp.	–	–	168
Euglenophyta			
Euglena sp.	161	–	168
Phacus sp.	–	–	168
Trachelomonas sp.	161	322	–
Pyrrhophyta			
Protoperidinium sp.	–	–	168

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)

