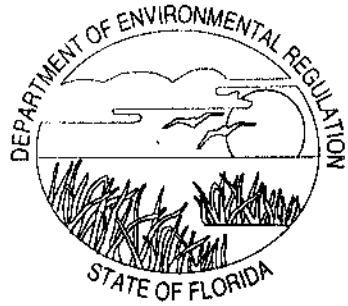


Biological Assessment of

Titusville South Sewage Treatment Plant

Brevard County

NPDES #FL0020371

Sampled August 1992

February 1993

Biology Section
Division of Technical Services

Department of Environmental Regulation

Results of Fifth Year Inspections

Discharger: Titusville South STP
County: Brevard
NPDES Number: FL0020371
State Permit Expiration Date: 31 March 1994

Toxics Sampling Inspection (XSI)

Date Sampled: 18 August 1992

Results: Chlorpyrifos (0.17 µg/L) was found in the effluent in acutely toxic concentrations, and appeared to be primarily responsible for the observed mortality in the bioassays. Methyl parathion (0.18 µg/L) was also present in the effluent at near toxic levels, and probably also contributed to the toxicity of the sample. No metals were found at levels above Class III standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 18 August 1992

Results: The sample of effluent was acutely toxic to the invertebrate, *Ceriodaphnia dubia*. All test organisms were dead within 24 hours. This is a violation of 17-302.510(5)(p) FAC, 17-302.500(1)(d) FAC, and 17-4.244(3)(a) FAC. No mortality occurred during the 48 hour bioassay of the fish, *Notropis leedsi*.

Impact Bioassessment Inspection (IBI)

Date Sampled: 18 August 1992

Results: Quantitative measures of macroinvertebrate community health suggested that no degradation was associated with the discharge. Three algal related measurements indicated that the phytoplankton communities at the test sites were suffering from nitrogen enrichment. The % contribution of the dominant taxon (*Thalassiosira* sp., a form associated with elevated nitrogen concentrations) was substantially higher at the test sites. Both phytoplankton chlorophyll *a* concentrations and AGP were slightly increased at the test sites compared to the reference station. These somewhat stressed conditions appeared to be associated with the nitrogen enrichment caused by the facility. Additional phosphorus inputs to this area of the Indian River would probably exacerbate the situation.

Water Quality Inspection (WQI)

Date Sampled: 18 August 1992

Results: Of the nutrients measured in the effluent, the elevated concentrations of ammonia (12 mg/L) and TKN (14 mg/L) in the discharge had an observed enrichment effect on the receiving waters. Ammonia and TKN measured at the test sites were higher than approximately 88% and 90%, respectively, of other Florida estuaries. Unionized ammonia in the effluent was calculated to be 0.07 mg/L. Nitrate-nitrite concentrations in the receiving waters were higher than approximately 74% of other estuaries. It should be noted that the reference site also exhibited elevated levels of nitrogenous compounds, suggesting influence from this discharge or possibly other sources.

Introduction

The Titusville South Sewage Treatment Plant is located on Knox McRae Drive in Titusville, Brevard County, Florida (see maps in Appendix). In addition to the standard wastewater treatment performed by an advanced secondary treatment facility, this 2.0 MGD plant has enhanced capabilities, including pretreatment and chemical feed for phosphorus removal. The treated, disinfected, and de-chlorinated effluent is discharged through 1.2 miles of 20 inch diameter pipe into the Class III Indian River Lagoon (see maps in Appendix). For the past year, the plant has been operating at less than design capacity (actual mean flow has been 1.84 MGD), although flow was 2.25 MGD during this survey.

Permit limits are as follows: pH (6.0-8.5 S.U.), chlorine residual (0.01 mg/L maximum), BOD (5 mg/L maximum annual average), TSS (5 mg/L maximum annual average), fecal coliform (800 colonies/100 mL maximum), total phosphorus (1.0 mg/L maximum monthly average, 6,096.7 pounds per year), total nitrogen (25 mg/L maximum monthly average, 152,417 pounds per year), and dissolved oxygen (2.0 mg/l minimum). The NPDES permit requires biomonitoring (LC_{50} of not less than 100% using full strength effluent). The nutrient and dissolved oxygen limits were established by a 1983 wasteload allocation.

While the monthly average concentrations for total nitrogen and total phosphorus have occasionally exceeded permit limits, the total loadings for these parameters have not. Design flow of the facility is sometimes exceeded due to collection system inflow/infiltration problems. This is currently being addressed by a collection system study. The Titusville South STP will be phased out and converted to a reclaimed water storage facility by July of 1995.

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 approximately 0.5 miles south of the outfall) and two test sites bracketing the discharge (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. An acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Notropis 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,

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	41	40	33
Shannon-Weaver Diversity	3.31	3.31	3.65
% Echinodermata	38.8	38.1	38.1
% Polychaeta	36.5	24.4	26.4
% Pelecypoda	16.9	23.6	7.0
% Malacostraca	3.0	6.3	2.2
% Gastropoda	1.8	3.5	4.4
% Other	3.0	4.1	21.9
% Carnivores	3.3	4.8	5.6
% Deposit Feeders	61.4	77.2	48.9
% Suspension Feeders	31.1	10.6	42.1
% Browsers	3.3	4.4	3.3
% Scavengers	1.0	2.9	0.1
Phytoplankton Algae			
Number of Taxa	11	11	11
% Contribution of Dominant Taxon	25.3	42.4	69.2
Chlorophyll a (µg/L)	3.4	5.4	4.8
Diatom/Blue-green Abundance Ratio	0.98	0.95	1
% Diatoms	49.4	45.2	73.6
% Green	42.5	48.0	24.5
% Dinoflagellates	6.9	1.7	1.9
% Blue-green	1.1	2.3	0
% Euglenophytes	0	2.8	0
Algal Growth Potential (mg dry wt/l)	3.9	7.0	4.9

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

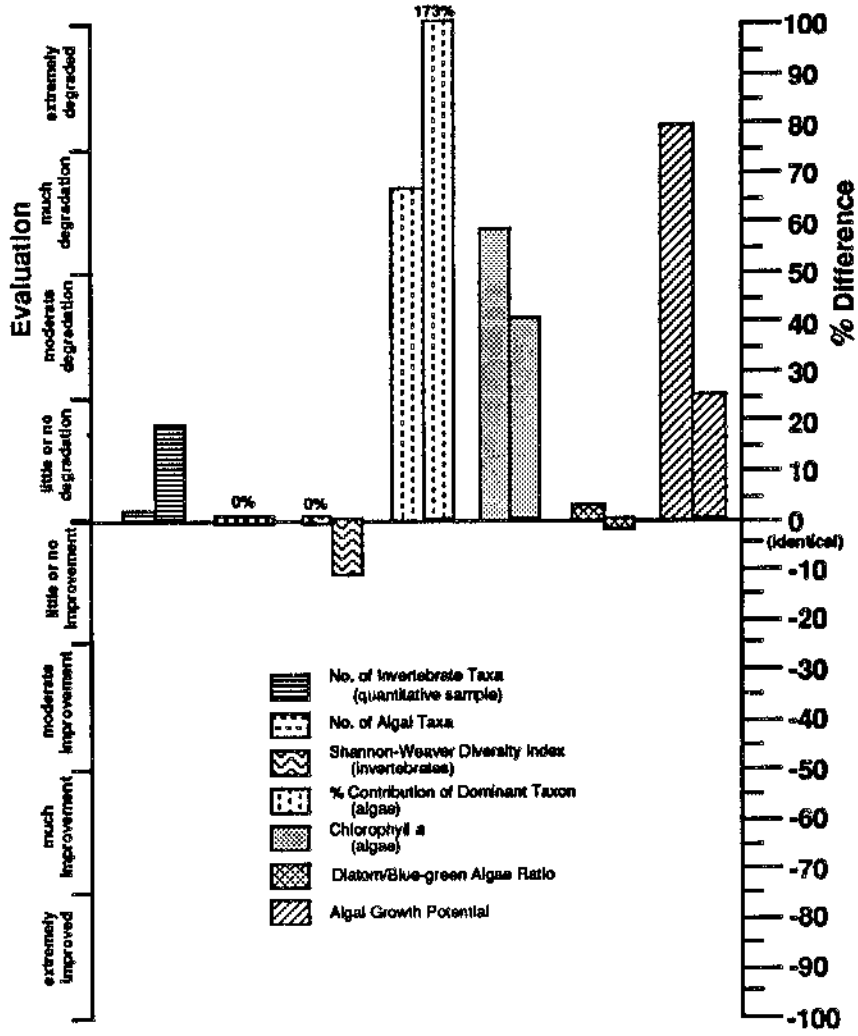
Benthic macroinvertebrate communities were evaluated at reference and test sites. Invertebrates were collected via three Ponar grabs per site (Ross 1990). Phytoplankton was sampled at reference and test sites by subsurface grabs. Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). Algal Growth Potential tests, using Selenastrum capricornutum 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. Many of these, such as the number of taxa, Shannon-Weaver Diversity Index, and chlorophyll *a* are well known. Others are briefly explained here. Excessive numerical dominance of a single type of organism (a high % contribution of dominant taxon) is usually associated with disturbance. A decreased diatom to blue-green algae ratio (calculated by dividing the number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta + Cyanophyta) is often indicative of nutrient enriched conditions. The determination of the Quantitative Stability Index (for taxonomic % composition) is a two step process. First, the relative proportions of major taxonomic groups are calculated for each site. Then, the lesser of the two percentages for each discrete taxonomic group is totaled. A QSI (% composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (functional feeding groups).

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

The following personnel were involved in this investigation: Phil Kane and Steve Kent (DER Central District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Roberto Llanso, Kathleen Lurding, Kim Pearce, Urania Quintana, Landon Ross, and Greg Wynn (Tallahassee Biology Laboratory).



Effect of discharge on receiving water
(measured as difference between control and test sites).
(Left bar represents comparison between control site and test site 1; right bar represents comparison between control site and test site 2.)

Results and Discussion

The study area can best be characterized as a coast-parallel, estuarine lagoon. Habitat quality was identical (with 60 points each) at all sites. Land use in the area was predominantly residential and commercial. The study sites were similar with respect to many physical/chemical parameters, such as specific conductance (between 40,000 µmhos/cm and 40,500 µmhos/cm), temperature (30° C), secchi depth (to the bottom, which was greater than 2 meters), and substrate composition (sand and mud at all sites). Meter malfunctions prevented comparison of dissolved oxygen and pH at the three study sites.

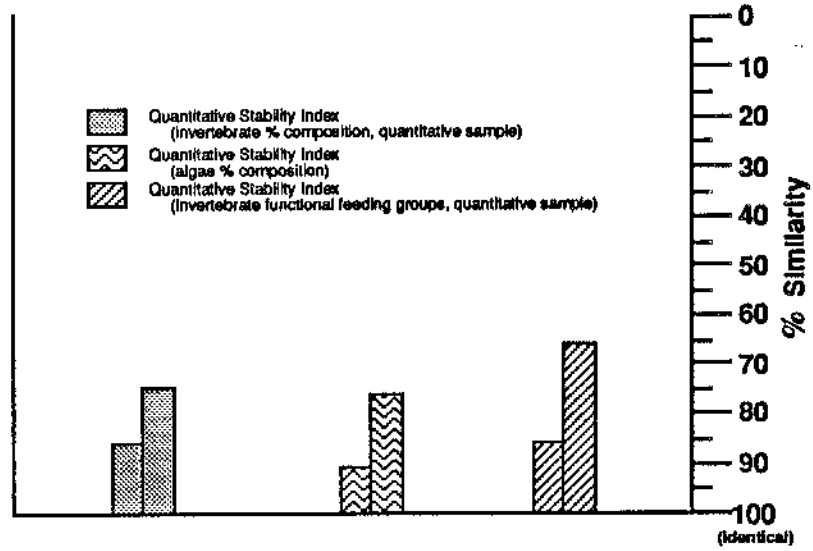
Analysis for organic constituents revealed the presence of chlorpyrifos (0.17 µg/L) and methyl parathion (0.18 µg/L). Chlorpyrifos and methyl parathion are known to produce LC_{50}'s in invertebrates at concentrations as low as 0.11 µg/L and 0.78 µg/L, respectively (AQUIRE 1993). The metals scan detected aluminum (1390 µg/L), iron (233 µg/L), and zinc (13 µg/L). None of these concentrations of metals represents a violation of Class III standards for marine waters.

The sample of effluent was acutely toxic to the invertebrate, *Ceriodaphnia dubia* (Appendix). All test organisms were dead within 24 hours. This is a violation of 17-302.510(5)(p) FAC, 17-302.500(1)(d) FAC, and 17-4.244(3)(a) FAC. This toxicity appeared to be caused by the pesticides (especially the chlorpyrifos) present in the Titusville STP effluent. No mortality occurred during the 48 hour bioassay of the fish, *Notropis leedsi*.

Of the nutrients measured in the effluent, the elevated concentration of ammonia (12 mg/L) and TKN (14 mg/L) in the discharge had an observed enrichment effect on the marine receiving waters. Unionized ammonia in the effluent was calculated to be 0.07 mg/L (the freshwater standard is 0.02 mg/L). Ammonia and TKN measured at the test sites were higher than approximately 88% and 90%, respectively, of other Florida estuaries (see list of typical water quality values in Appendix). Nitrate-nitrite concentrations in the receiving waters were higher than approximately 74% of other estuaries. While the nitrate-nitrite of the effluent was 0.2 mg/L, the elevated nitrate-nitrite in the Indian River may have been related to this direct input or to the decomposition of the other above mentioned nitrogenous compounds. It should be noted that the reference site also exhibited elevated levels of nitrogenous compounds, suggesting influence from this discharge or possibly other sources.

Algal growth potential levels appeared to be influenced by the low amounts of available phosphorus, which was below 0.04 mg/L in the Indian River. At the reference site, AGP was 3.9 mg dry wt/L, while waters from test sites 1 and 2 yielded 7.0 mg dry wt/L and 4.8 mg dry wt/L, respectively. These levels are below the "problem threshold" of 10 mg dry wt/L for marine waters, above which cultural eutrophication and its consequences are likely to occur (Ron Raschke, US EPA, personal communication).

Quantitative measures of benthic macroinvertebrate community health suggested that no degradation was 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. The figure on this page summarizes similarities between the sites. Smaller



Effect of discharge on receiving water
(measured as similarity between control and test sites).
(Left bar represents comparison between control site and test site 1; right bar represents comparison between control site and test site 2.)

similarities (lower percentages) generally correspond with greater degradation.

Taxa richness at test site 1 (with 40 taxa) and at test site 2 (with 33 taxa), was slightly lower than the number of different kinds of organisms recovered from the reference site (41 taxa). Shannon-Weaver diversity was the same or slightly better at the test sites (3.3 and 3.7 at test sites 1 and 2, respectively), when compared to the reference site (3.3). Certain aspects of benthic community structure were remarkably similar at the reference and test sites. For example, 38% of the populations from all three stations sampled were composed of echinoderms (predominately the sea cucumber, *Synaptula hydriformis*, and the brittle star, *Amphipholis squamata*). Polychaetes were the second most abundant group at each site, followed by pelecypods. In general, the benthic data at the study stations were similar enough to suggest that the STP was having no detrimental effects on macroinvertebrate populations.

The phytoplankton assemblage found in the Indian River was somewhat sparse (11 taxa at each station), dominated by diatoms and chlorophytes. Three algal related measurements indicated that the phytoplankton communities at the test sites may have been perturbed, and thus, warrant further discussion. The % contribution of the dominant taxon (*Thalassiosira* sp.) was substantially higher at the test sites. Increased abundance of *Thalassiosira* sp. has previously been correlated with elevated nitrogen concentrations (Livingston and Prasad 1989). Both phytoplankton chlorophyll *a* concentrations and AGP were slightly increased at the test sites compared to the reference station. These somewhat stressed conditions appeared to be associated with the nitrogen enrichment caused by the facility. Additional phosphorus inputs to this area of the Indian River would probably exacerbate the situation.

Conclusions

The sample of effluent was acutely toxic to the invertebrate, *Ceriodaphnia dubia*. All test organisms were dead within 24 hours. This is a violation of 17-302.510(5)(p) FAC, 17-302.500(1)(d) FAC, and 17-4.244(3)(a) FAC. No mortality occurred during the 48 hour bioassay of the fish, *Notropis leedsi*.

Chlorpyrifos (0.17 µg/L) was found in the effluent in acutely toxic concentrations, and appeared to be primarily responsible for the observed mortality in the bioassays. Methyl parathion (0.18 µg/L) was also present in the effluent at near toxic levels, and probably also contributed to the toxicity of the sample. The metals scan detected aluminum (1390 µg/L), iron (233 µg/L), and zinc (13 µg/L). None of these concentrations of metals represents a violation of Class III standards for marine waters.

Of the nutrients measured in the effluent, the elevated concentration of ammonia (12 mg/L) and TKN (14 mg/L) in the discharge appeared to have an observed enrichment effect on the receiving waters. Ammonia and TKN measured at the test sites were higher than approximately 88% and 90%, respectively, of other Florida estuaries. Nitrate-nitrite concentrations in the receiving waters were higher than approximately 74% of other estuaries. While the nitrate-nitrite of the effluent was 0.2 mg/L, the elevated nitrate-nitrite in the Indian River may have been related to this direct input or to the decomposition of the other above mentioned nitrogenous compounds. It should be noted that the reference site also exhibited elevated levels of nitrogenous compounds, suggesting influence from this discharge or possibly other sources.

Quantitative measures of macroinvertebrate community health suggested that no degradation was associated with the discharge. In general, the community structure data at the study stations was similar enough to suggest that the STP was having no detrimental effects on benthic populations.

Three algal related measurements indicated that the phytoplankton communities at the test sites were suffering from nitrogen enrichment. The % contribution of the dominant taxon (*Thalassiosira* sp., a form associated with elevated nitrogen concentrations) was substantially higher at the test sites. Both phytoplankton chlorophyll *a* concentrations and AGP were slightly increased at the test sites compared to the reference station. These somewhat stressed conditions appeared to be associated with the nitrogen enrichment caused by the facility. Additional phosphorus inputs to this area of the Indian River would probably exacerbate the situation.

Literature Cited

American Public Health Assoc., American Water Works Assoc., and Water Pollution Control Federation. 1989. Standard Methods for the Examination of Water and Wastewater, 17th ed. New York, N.Y. 1268 p.

Aquatic Toxicity Information Retrieval Data Base (AQUIRE). 1993. U.S. EPA Environmental Research Laboratory, Duluth, Mn.

Environmental Protection Agency. 1974. Marine algal assay procedure: Bottle test. Nat'l Environ. Res. Center, Office of Res. and Dev., U.S. EPA, Corvallis, Oregon. 43 p.

Livingston, R. J. and A. K. S. K. Prasad. 1989. A photographic atlas of North Florida estuarine phytoplankton and a summary of life history relationships with various environmental conditions. FSU Center for Aquatic Research and Resource Management. 306 p.

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

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

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

Chemistry summary table for

City of Titusville South STP	Effluent	Reference Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
Chlorpyrifos	0.17 A			
Methyl Parathion	0.18 T			
Metals (ug/L)				
Aluminum	1390			
Antimony	15 U			
Arsenic	20 U			
Cadmium	0.08 U			
Copper	5 U			
Chromium	10 U			
Iron	233			
Lead	15 U			
Mercury	0.1 U			
Nickel	5 U			
Selenium	30 U			
Silver	0.07 U			
Zinc	13			
Nutrients (mg/L)				
Ortho-phosphorus				
Total phosphorus	0.29	0.04 U	0.04 U	0.04 U
Ammonia	12	0.16	0.20 A	0.21
Nitrate+Nitrite	0.20	0.064 A	0.068 A	0.060 A
TKN	14	1.3	1.4 A	1.3
Other Parameters				
Habitat Assessment		60	60	60
D.O. (mg/L)		Meter Malf.	5.3	Meter Malf.
pH (SU's)		Meter Malfunction		
Conductivity (µmhos/cm)		40,500	40,000	40,500
Temperature (°C)		30	30	30
Algal Growth Potential (mg dry wt/L)	1.7	3.9	7.0	4.8
Bioassay Fish-Dechlorinated	Not Toxic			
Bioassay Invertebrate-Dechlorinated	24 hour LC50<100%			

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 minimum detection limit

Typical Values for Selected Parameters in Florida Waters

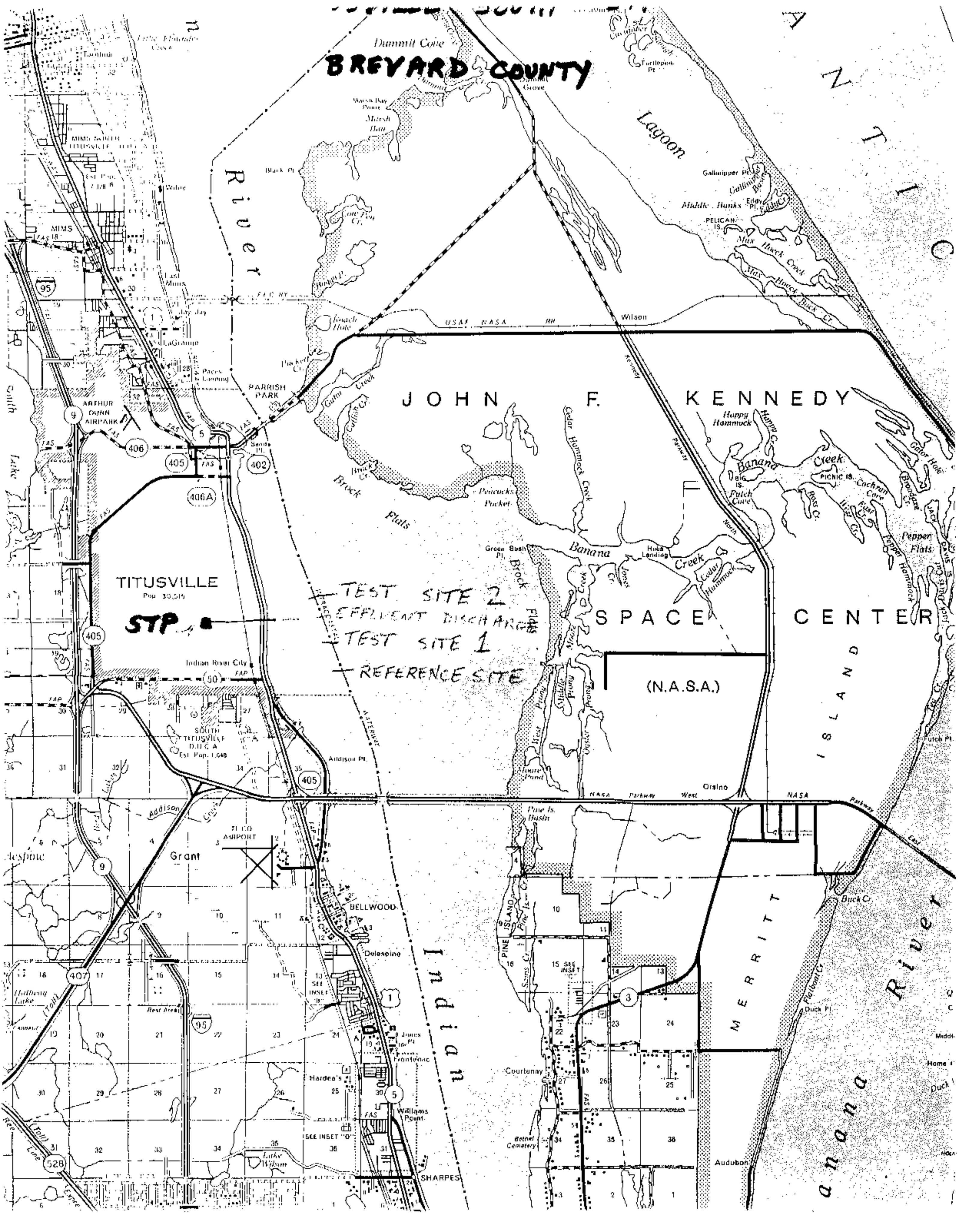
Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

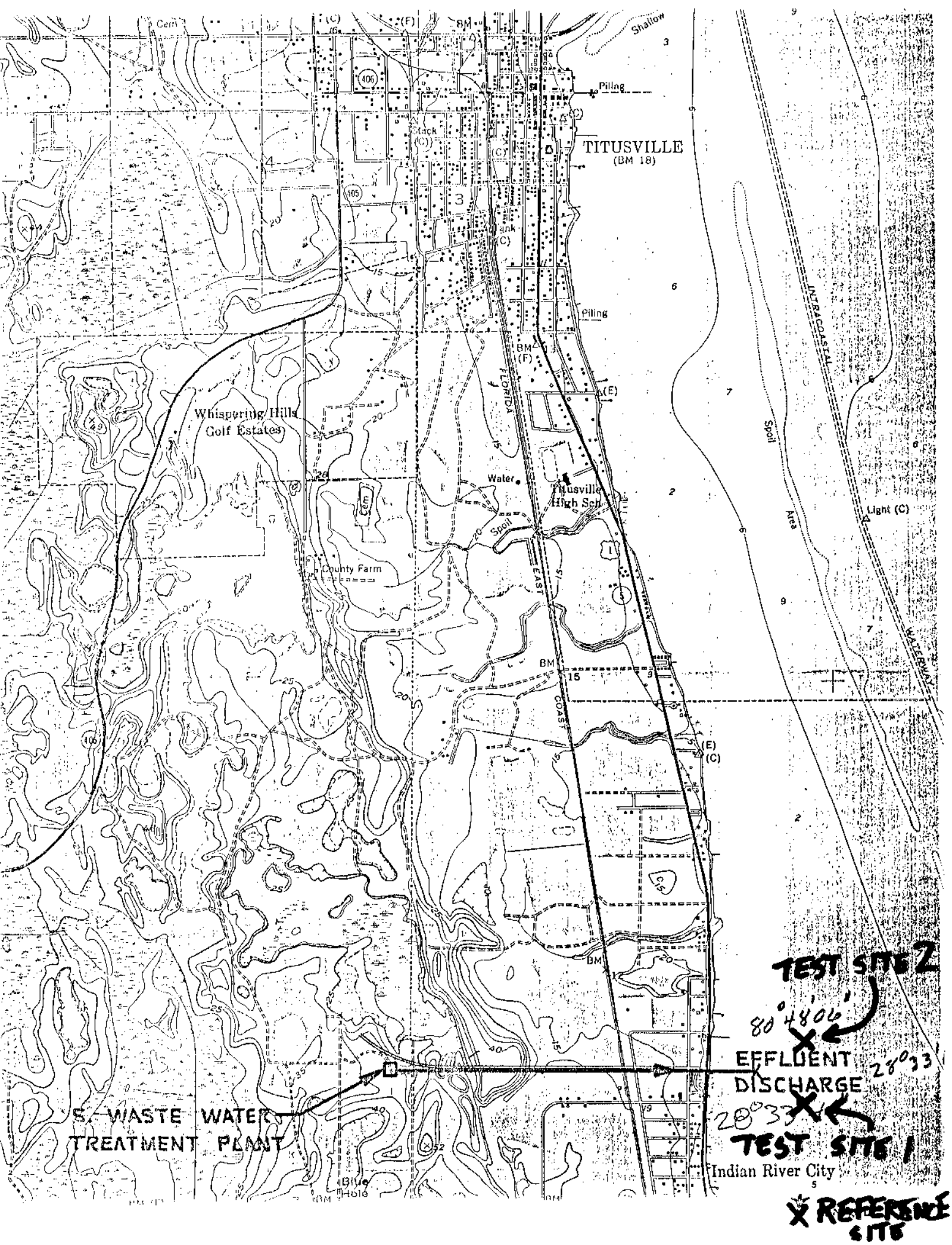
Percentile Distribution

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 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

	Refer-ence Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	41	40	33
Shannon-Weaver Diversity	3.31	3.31	3.65
% Echinodermata	38.8	38.1	38.1
% Polychaeta	36.5	24.4	26.4
% Pelecypoda	16.9	23.6	7.0
% Malacostraca	3.0	6.3	2.2
% Gastropoda	1.8	3.5	4.4
% Other	3.0	4.1	21.9
% Carnivores	3.3	4.8	5.6
% Deposit Feeders	61.4	77.2	48.9
% Suspension Feeders	31.1	10.6	42.1
% Browsers	3.3	4.4	3.3
% Scavengers	1.0	2.9	0.1
Phytoplankton Algae			
Number of Taxa	11	11	11
% Contribution of Dominant Taxon	25.3	42.4	69.2
Chlorophyll a (µg/L)	3.4	5.4	4.8
Diatom/Blue-green Abundance Ratio	0.98	0.95	1
% Diatoms	49.4	45.2	73.6
% Green	42.5	48.0	24.5
% Dinoflagellates	6.9	1.7	1.9
% Blue-green	1.1	2.3	0
% Euglenophytes	0	2.8	0
Algal Growth Potential (mg dry wt/l)	3.9	7.0	4.9


BREVARD COUNTY
TEST SITE 2
EFFLUENT DISCHARGE
TEST SITE 1
REFERENCE SITE
STP
TITUSVILLE
Pop. 30,515
JOHN F. KENNEDY SPACE CENTER
(N.A.S.A.)
MERRITT ISLAND
Indian River
Banana River
Lagoon
Mosquito Lagoon
MIMS
LaGrange
PARRISH PARK
ARTHUR DUNN AIRPARK
Indian River City
SOUTH TITUSVILLE
Addison Pt.
TICO AIRPORT
Grant
BELLWOOD
Delespine
Frontenac
Hardee's
Williams Point
SHARPES
Courtenay
Audubon
Orsino
Wilson
Dummit Cove
Banana Creek
Brock Flats
Peacocks Pocket
Happy Hammock
Pepper Flats
Max Hoeck Creek
Gallinipper Pt.
Middle Banks
PELICAN IS.
Pine Is. Basin
PINE ISLAND
Bethel Cemetery
Lake Wilson
Halfway Lake
Buck Cr.
Duck Pt.
Flatboat Cr.
Green Bush Pt.
Hiats Landing
Cedar Hammock Creek
Kennedy Parkway North
NASA Parkway West
NASA Parkway East
USAF NASA RR


TITUSVILLE
(BM 18)
Piling
Piling
Shallow
Whispering Hills
Golf Estates)
Water
Titusville
High Sch
County Farm
Spoil
EAST
FLORIDA
COAST
INTRACOASTAL
WATERWAY
Spoil
Area
Light (C)
BM
15
TEST SITE 2
80°48'00"
EFFLUENT
DISCHARGE
28°33
28°33
TEST SITE 1
S. WASTE WATER
TREATMENT PLANT
Indian River City
REFERENCE
SITE

PK sent copy 9/10 Tally 9/

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: Titusville South, S.T.P.		Date Summary Prepared: 8/13/92
Location (attach detailed map): 1125 Knox McRae Drive Titusville, FL. 32781-2800	County: Brevard	District: CENTRAL
Federal Permit # FL0020371 and expiration date: 3/31/94	State GMS # and 3005M01162 State expiration date: D005-147197 EXP: 6/1/93	Facility Type: Industrial (Municipal) Federal Agricultural Other (list):

Function of facility: Domestic Wastewater Treatment Facility

Description of treatment process: A 2.0 MGD Capacity advanced Secondary treatment plant with pretreatment facilities, chemical feed facilities (phosphorous removal) and dechlorination facilities. Disinfected/dechlorinated effluent is discharged to the Indian River.

Receiving waters: Indian River	Classification: I II (III)	
Design Flow: 2.0 MGD	Mean Flow: 1.84 MGD (7/91-6/92)	Flow during survey: 2.25 MGD 08/18/92

Discharge is: (Continuous) Intermittent Seasonal Rainfall dependent
Other (describe)

therefore, the best time to sample is:

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

N/A

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

Parameter	Limit (units)	
BOD_5, TSS, pH, Fecal Coliform	} secondary Treatment	
	Concentration (mg/l) 30 day Avg	Loading (lb/day)
Total Nitrogen as N -	25.0	152417.0
Total Phosphorous as P -	1.0	6,096.7
Dissolved Oxygen -	2.0 (minimum)	N/A
Total Residual Chlorine	0.01 (max.)	N/A
Biomonitoring (NPDES) Permit	100% effluent not lethal to > 50% of Test Organisms	

Describe special permit conditions and permit modifications:

N/A

Titusville South, STP
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s): Effluent is pumped from plant to Indian River through 6,545 ft of 20" DIP. (See attached MAP).

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: A review of submitted MORs for the period between 7/91 thru 6/92 revealed that the monthly effluent limits for Total Nitrogen and Total Phosphorous were exceeded between 1/92 - 3/92 and on 7/91, respectively. However, the annual loading effluent limits for these two parameters were not exceeded. The existing plant does experience excessive Inflow/Infiltration during periods of heavy rain which has contributed to daily and monthly average flows in excess of 2.0 MGD, however the 12 month average flow between 7/91 - 6/92 did not exceed the design capacity of 2.0 MGD. (Also, see additional information below). All other effluent parameters during this period as reported were in substantial compliance with treatment limits and monitoring requirements.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
- A wasteload allocation for this facility was derived in March, 1983 establishing the effluent limits for TN, TP, and DO referenced on page 1 of 2.
- There are no past or pending enforcement actions by DER relative to this facility.

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

Comparison of this review period (7/91-6/92) to the last period reviewed (3/90-2/91) show no significant trends. Average flows are slightly higher in the most recent period. However, reported values for BOD_5, TSS are lower overall in the latest period. Reporting/monitoring information has also improved.

Additional information:
- In conjunction with a collection system capacity agreement between the City and DER (7/20/92), the City has implemented a collection system evaluation study to determine sources of and minimize Inflow/Infiltration.
- This facility (S.T.P.) will be phased out and converted to a reclaimed water storage facility by 7/1/95.
- The existing S.T.P. was not designed specifically for Total Nitrogen removal. It does experience problems meeting the Monthly TN limit when influent TN exceeds 30 mg/l (per City).

Staff contributing to this review (signature):

Philip N. Kane, Ed.D.	(Biologist)
	(Inspector)
Al Castro 8/13/92	(Engineer)
	( )
	( )
	( )

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
Physical/Chemical Characterization
Field Data Sheet

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME: FDER	STORET STATION NUMBER:	DATE (M/D/Y): 08/18/92	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON
REMARKS: REFERENCE	LOCATION: TITUSVILLE SOUTH STP 1125 KNOCK MCRAE DRIVE TITUSVILLE, FLORIDA		FIELD ID/NAME: TITUSVILLE SSTP

Riparian Zone/Instream Features

Predominant Surrounding Land-Use: (specify type and relative percent)

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
			50%	50%		

Local Watershed Erosion: None (Moderate) Heavy

Local Watershed NPS Pollution: No evidence (Some potential sources) Obvious sources

Point-Source Pollution: (No evidence) Present (list location and describe):

~~Estimated Stream Width (m):~~ N/A Estimated Stream Depth (m): Shallow Areas: Pools:

High Water Mark (m): 22.25 Impounded? Channelized? Velocity: Shallow Areas: Pools:

Canopy Cover (%): Open: 100 % 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

Inorganic Substrate Type	Size	Percent Comp	Organic Substrate Type	Characteristic	Percent Comp.
Limerock or Consolidated Pipeclay			Detritus	Woody Debris CPOM	
Gravel	2-64 mm				
Sand	0.06-2 mm		Muck	Black, FPOM	
Silt/Clay	< 0.06 mm		Marl	Gray, Shelly	

Water Quality

Top D.O.: METER OFF Top Temp.: 30°C ~~Bottom D.O.:~~ ~~Bottom Temp.:~~ Secchi depth (m) TO BOTTOM 2.1M

Conductivity: 40,500 pH: METER OFF Other parameters:

Stream Type: N/A Blackwater Deep Aquifer Fed Surficial Aquifer Fed Alluvial Other ESTUARY

Water Odors: (Normal) Sewage Petroleum Chemical Other

Water Surface Oils: Slick Sheen Globs (None)

Clarity: Clear (Slightly turbid) Turbid Opaque

Color: Tannic (Green (algae)) Clear Other

Weather conditions (sun? wind?): SUN/CALM

Observations:

Periphyton: (Absent) Rare Common Abundant

Fish: Absent Rare Common (Abundant)

Macrophytes: Absent Rare (Common) Abundant

Iron/sulfur bacteria: (Absent) Rare Common Abundant

ANALYSIS DATE: 08/15/92	ANALYST: Philip N. Kane, Ed.D.	SIGNATURE: Philip N. Kane, Ed.D.

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME: FDER	STORET STATION NUMBER:	DATE (M/DY): 08/18/92	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON
REMARKS: REFERENCE	LOCATION: CITY OF TITUSVILLE SOUTH WWTP 1125 KNOX MCRAE DRIVE ORLANDO, FLORIDA		FIELD ID/NAME: TITUSVILLE SSTP

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations: 7	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed: 30	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 comunities observed from those listed. **26-37 points**	One comunity observed from those listed. **13-25 points**	No comunities observed from those listed. **0-12 points**
Tidal Fluctuation: 1	>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: 10	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: 7	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 60

COMMENTS: 6000' from shore.

ANALYSIS DATE: 08/18/92	ANALYST: P. KANE	SIGNATURE: Philip N. Kane, Ed.D.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
Physical/Chemical Characterization
Field Data Sheet

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME: FDER	STORET STATION NUMBER:	DATE (M/D/Y): 05/18/92	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON
REMARKS: TCJT FL SOUTH OF OUTFALL LINE	LOCATION: CITY OF TITUSVILLE SOUTH STP 1125 KNOX McRAE DRIVE TITUSVILLE, FLORIDA		FIELD ID/NAME: TITUSVILLE SSTP

Riparian Zone/Instream Features

Predominant Surrounding Land-Use: (specify type and relative percent)
Forest | Field/Pasture | Agricultural | Residential 50% | Commercial 50% | Industrial | Other

Local Watershed Erosion: None | (Moderate) | Heavy

Local Watershed NPS Pollution: No evidence | (Some potential sources) | Obvious sources

Point-Source Pollution: (No evidence) | Present (list location and describe):

Estimated Stream Width (m): | Estimated Stream Depth (m): Shallow Areas: | Pools:

High Water Mark (m): <0.25 | Impounded? | Channelized? | Velocity: Shallow Areas: | Pools:

Canopy Cover (%): Open: 100% | 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

Inorganic Substrate Type	Size	Percent Comp	Organic Substrate Type	Characteristic	Percent Comp.
Limerock or Consolidated Pipeclay			Detritus	Woody Debris CPOM	
Gravel	2-64 mm				
Sand	0.06-2 mm		Muck	Black, FPOM	
Silt/Clay	< 0.06 mm		Marl	Gray, Shelly	

Water Quality

Top D.O.: 5.3 | Top Temp.: 30°C | ~~Bottom D.O.~~: N/A | Bottom Temp.: | Secchi depth (m) TO BOTTOM 2.1M

Conductivity: 46,000 | pH: METER OFF | Other parameters:

~~Stream Type: N/A~~ Blackwater | Deep Aquifer Fed | Surficial Aquifer Fed | Alluvial | Other ESTUARY

Water Odors: (Normal) | Sewage | Petroleum | Chemical | Other

Water Surface Oils: Slick | Sheen | Globs | (None)

Clarity: Clear | (Slightly turbid) | Turbid | Opaque

Color: Tannic | (Green (algae)) | Clear | Other

Weather conditions (sun? wind?): SUN / CALM

Observations: 6000 ft from shore WESTSIDE ICW.

Periphyton	(Absent)	Rare	Common	Abundant
Fish	Absent	Rare	Common	(Abundant)
Macrophytes	Absent	Rare	(Common)	Abundant
Iron/sulfur bacteria	(Absent)	Rare	Common	Abundant

ANALYSIS DATE:	ANALYST:	SIGNATURE:
05/18/92	PHILIP N. KANE, Ed.D	Philip N. Kane, Ed.D.

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

SUBMITTING AGENCY CODE: 35 SUBMITTING AGENCY NAME: DER	STORET STATION NUMBER:	DATE (M/D/Y): 08/18/92	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: TEST A SOUTH OF OUTFALL LINE	LOCATION: CITY OF TITUSVILLE SOUTH STP 1125 KNOX McRAE DRIVE TITUSVILLE, FLORIDA	FIELD ID/NAME: TITUSVILLE SSTP

Habitat Parameter score	Excellent	Good	Fair	Poor
Littoral Alterations 7	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 30	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 comunities observed from those listed. **26-37 points**	One comunity observed from those listed. **13-25 points**	No comunities observed from those listed. **0-12 points**
Tidal Fluctuation 1	>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 10	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 7	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 60

COMMENTS: 6000 ft FROM SHORE WEST SIDE ICW.

ANALYSIS DATE: 08/18/92	ANALYST: PKHWE	SIGNATURE: Philip N. Kane, Ed.D.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
Physical/Chemical Characterization
Field Data Sheet

SUBMITTING AGENCY CODE: 3	STORET STATION NUMBER:	DATE (M/D/Y): 08/18/92	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON
SUBMITTING AGENCY NAME: CDM SAMPLE SOURCE			
REMARKS: TEST B NORTH OF MIDDLE LINE	LOCATION: CITY OF TITUSVILLE SOUTH STP 1125 KNOX MCRAE DRIVE TITUSVILLE, FLORIDA		FIELD ID/NAME: TITUSVILLE SSTP

Riparian Zone/Instream Features

Predominant Surrounding Land-Use: (specify type and relative percent)	Forest	Field/Pasture	Agricultural	Residential 50%	Commercial 50%	Industrial	Other
Local Watershed Erosion:	None	(Moderate)	Heavy				
Local Watershed NPS Pollution :	No evidence	(Some potential sources)	Obvious sources				
Point-Source Pollution :	(No evidence)	Present (list location and describe):					
~~Estimated Stream Width (m):~~	Estimated Stream Depth (m): Shallow Areas:		Pools:				
High Water Mark (m): <0.2	Impounded?	Channelized?	Velocity: Shallow Areas:		Pools:		
Canopy Cover (%):	Open: 100%	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

Inorganic Substrate Type	Size	Percent Comp	Organic Substrate Type	Characteristic	Percent Comp.
Limerock or Consolidated Pipeclay			Detritus	Woody Debris CPOM	
Gravel	2-64 mm				
Sand	0.06-2 mm		Muck	Black, FPOM	
Silt/Clay	< 0.06 mm		Marl	Gray,Shelly	

Water Quality

TD 2.4M

Top D.O.: METER OFF	Top Temp.: 30°C	Bottom D.O.:	Bottom Temp.:	Secchi depth (m) ~~TD 2.4M~~ 2.4M
Conductivity: 40,500	pH: METER OFF	Other parameters:		
Stream Type: N/A	Blackwater	Deep Aquifer Fed	Surficial Aquifer Fed	Alluvial	Other
Water Odors:	(Normal)	Sewage	Petroleum	Chemical	Other
Water Surface Oils:	Slick	Sheen	Globs	(None)	
Clarity:	Clear	(Slightly turbid)	Turbid	Opaque	Color: Tannic	(Green (algae))	Clear	Other

Weather conditions (sun? wind?):	Observations:		
SUNNY AM	6000' from shore	Periphyton	(Absent) Rare Common Abundant
		Fish	Absent Rare Common (Abundant)
		Macrophytes	Absent Rare (Common) Abundant
		Iron/sulfur bacteria	(Absent) Rare Common Abundant

ANALYSIS DATE: 08/18/92	ANALYST: PHILIP N. KAWEEL	SIGNATURE: Philip N. Kaweel, Ed.D.

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME: FDER Central District	STORET STATION NUMBER:	DATE (M/D/Y): 03/13/92	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: TEST B	LOCATION: CITY OF TITUSVILLE SOUTH STP 1125 KNOX MCRAE DRIVE TITUSVILLE, FLORIDA	FIELD ID/NAME: TITUSVILLE SSTP

Habitat Parameter score	Excellent	Good	Fair	Poor
Littoral Alterations 7	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 8	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 comunities observed from those listed. **26-37 points**	One comunity observed from those listed. **13-25 points**	No comunities observed from those listed. **0-12 points**
Tidal Fluctuation 4	>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 10	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 7	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 41

COMMENTS: 6000' from shore WEST SIDE IRW

ANALYSIS DATE: 04/18/92	ANALYST: P. KANE	SIGNATURE: Philip N. Kane, Ed.D

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Titusville SST P
Address/City: 1125 Knox McRae Drive, Titusville
County: Brevard
Contact/District: P. Kane / Central
NPDES Permit #: FL00 20371 Outfall #:

Sample Collection: Date 8/18/92 Time 0910
Test Beginning: Date 8/19/92 Time 1330
Test Ending: Date 8/21/92 Time 1330
Test Organism: Mysidopsis bahia
Life Stage/Age: 11 days

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

Remarks:

92-AUG-19-25 39689
Sample log 8/21/92 MF

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7.0 7.0 10.0	8.5 @ 24°C	23.7 @ 23.7	991 @ 23.9 9800
24 hr	7.0 7.0 10.0	8.5 @ 24°C	23.7 @ 22.9	988 9880 @ 24.0
48 hr	7.0 7.0 10.0	8.5 @ 24°C	24.2 @ 24.1	992 9910 @ 24.2

		Number Live			pH			Temp. (°C)			DO (mg/L)			Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
control	326	5	5	5	8.0	8.3	8.4	23.8	23.1	23.3	8.1	7.8	7.8			
control	7	5	5	5	8.0	8.3	8.4				8.1	7.8	7.8	245	240	246
100%	92	5	5	5	6.8	7.4	7.6	24.0	23.2	23.6	7.9	7.4	7.7			
100%	19	5	5	5	6.8	7.4	7.6				7.9	7.4	7.7	861	840	875
Measured/Loaded by:		MF	MF	MF	MF	MF	ME	MF	MF	ME	MF	MF	ME	MF	MF	ME
Recorded by:		MF	MF	MF	MF	MF	LM	MF	MF	LM	MF	MF	LM	MF	MF	LM

Investigators' Signatures
Marshall Faircloth
Liz Miller

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Clz:					
Lab Tot. Resid. Clz:	0.0	0.0	0.0	Hach	MF
Alkalinity:	135	71	34	Hach	MF
Hardness:	123	78	175	Hach	MF
Total Ammonia:	0.0	0.0	12.7	Orion	MF

Ammonia Meter Slope: -57.2
Ammonia Blank: 0.0
Salinity Sample: 0.0 ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Titusville SSTF
Address/City: 1125 KNOX McRae Drive Titusville
County: Brevard
Contact/District: P. KANE / CENTRAL
NPDES Permit #: FL0020371 Outfall #:

Sample Collection: Date 8/18/92 Time 0910
Test Beginning: Date 8/19/92 Time 1330
Test Ending: Date 8/20/92 Time 1330
Test Organism: Ceriodaphnia dubia
Life Stage/Age: < 24 hours

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

92-AUG-19-25 39689
Sample log 8/21/92 MF

Remarks:

Terminated @ 24 hours
100% mortality in 100% test solution

Instrument Calibrations: 8/19/92

	pH	DO	Temp	Cond
0 hr	7.7-10.10	8.5@24°C	MF DO 8.2 23.7 @ 23.7	991 9870 @ 23.9
24 hr	7.01 10.10	8.5@24°C	23.7@23.7	989 9850 @ 24°C
48 hr				992 9910 @ 24.2°C

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48	Cond. (µmhos/cm) 0	24	48
Control	A	5	5	5	8.6	8.4		23.7	24.5	0	8.4	7.8		158		
Control	B	5	5	5		8.4						7.8				
Control	C	5	5	5		8.4						7.8				
Control	D	5	5	5		8.4						7.8		79 MF		
100%	A	5	0		7.0	7.9		23.8	25.2		8.0	7.6		796		
100%	B	5	0			7.9						7.6				
100%	C	5	0			7.9						7.6				
100%	D	5	0			7.9						7.6				
Measured/Loaded by:		MF	MF		MF	MF		MF	MF		MF	MF		MF	MF	
Recorded by:		MF	MF		MF	MF		MF	MF		MF	MF		MF	MF	

Investigators' Signatures
Marshall Faircloth
Liz Mellen

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:	0.0	0.0	0.0	Hach	MF
Alkalinity:	135	71	36	Hach	MF
Hardness:	123	78	175	Hach	MF
Total Ammonia:	0.0	0.0	12.7	Orion	MF

Ammonia Meter Slope: -57.2
Ammonia Blank: 0.0
Salinity Sample: 0.0 ppt

Macroinvertebrate taxa list and densities (#/m^2) for Titusville South STP, collected via ponar grabs (3 replicates per station) in the Indian River on 18 August, 1992.

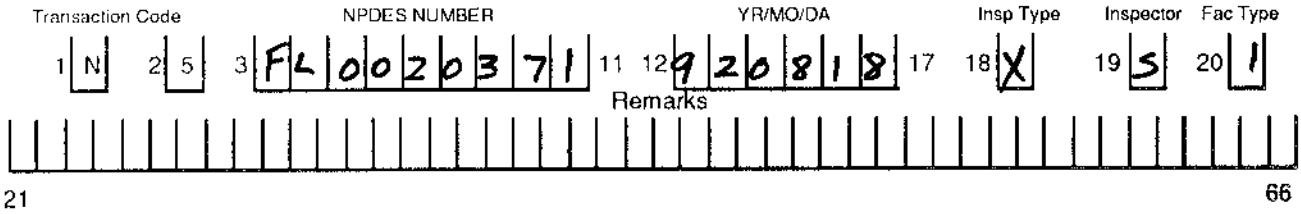
	Reference Site	Test Site 1	Test Site 2
Chordata			
Molgula sp.	25.0	–	–
Cnidaria			
Undetermined anthozoa	37.4	37.4	–
Undetermined Edwardsiidae	12.5	12.5	25.0
Decapoda			
Rhithropanopeus harrisii	–	12.5	–
Echinodermata			
Amphipholis squamata	1197.6	137.2	187.1
Synaptula hydriformis	4590.8	2295.4	1110.3
Gastropoda			
Acteocina canaliculata	74.9	37.4	74.9
Bulla striata	12.5	–	–
Haminoea succinea	74.9	37.4	74.9
Mitrella lunata	99.8	124.8	–
Nassarius vibex	–	12.5	–
Odostomia seminuda	–	12.5	–
Undetermined gastropoda	12.5	–	–
Malacostraca			
Erichsonella attenuata	–	62.4	–
Grandidierella bonnieroides	386.7	224.6	25.0
Harrieta faxoni	–	25.0	–
Oxyurostylis smithi	–	–	49.9
Undetermined amphipoda	62.4	74.9	–
Undetermined sphaeromatidae	–	12.5	–
Nemertina			
Undetermined nemertina	112.3	37.4	49.9
Oligochaeta			
Undetermined tubificid w/o capilliform setae	–	74.9	112.3
Pelecypoda			
Brachiodontes exustus	2307.9	1397.2	–
Chione cancellata	–	49.9	12.5
Nucula crenulata	37.4	12.5	162.2
Rangia cuneata	174.7	49.9	62.4
Phoronida			
Phoronis sp.	174.7	12.5	199.6
Platyhelminthes			
Stylochus ellipticus	–	–	25.0
Undetermined turbellaria	49.9	–	–
Polychaeta			

Arenicola cristata	–	12.5	–
Capitella sp.	37.4	–	–
C. capitata	37.4	648.7	299.4
C. jonesi	–	12.5	12.5
Cistena gouldii	12.5	–	212.1
Demonax microphthalma	461.6	49.9	12.5
Glycinde solitaria	25.0	–	49.9
Kimbergonuphis simoni	12.5	49.9	99.8
Leitoscolopos fragillis	–	–	25.0
Marphysa sanguinea	648.7	12.5	–
Mediomastus sp.	–	–	12.5
M. ambiseta	–	–	12.5
Parahesione luteola	12.5	12.5	–
Paranaitis speciosa	74.9	37.4	–
Paraprionospio pinnata	–	–	25.0
Pista sp.	199.6	37.4	–
Platynereis dumerilii	349.3	37.4	–
Podarke obscura	99.8	124.8	12.5
Podarkeopsis levifuscina	62.4	–	12.5
Prionospio sp.	37.4	25.0	12.5
P. heterobranchia	–	149.7	37.4
Sabella sp.	49.9	25.0	–
S. melanostigma	2956.6	224.6	12.5
Scolelepis sp.	–	–	12.5
Syllis sp.	–	62.4	–
Undetermined ampharetidae	12.5	–	–
Undetermined capitellidae	12.5	12.5	12.5
Undetermined eunicidae	37.4	–	–
Undetermined orbinidae	12.5	–	–
Undetermined polychaete	25.0	–	–
Undetermined spionidae	–	–	12.5
Undetermined syllidae	274.5	25.0	12.5
Sipuncula			
Phascolion strombi	37.4	74.9	336.8

Phytoplankton taxa list for Titusville South Wastewater Treatment Plant, collected via subsurface grabs on 18 August 1992.

	Reference Site	Test Site A	Test Site B
Diatoms			
Amphora sp.	–	–	20
Cocconeis sp.	53	–	20
Cyclotella sp.	421	–	–
Leptocylindrus sp.	79	–	–
Navicula sp.	–	33	–
Nitzschia sp.	–	50	80
Thalassiosira sp.	579	1255	2207
Unidentified pennate diatom	–	–	20
Chlorophyta			
Carteria sp.	158	100	120
Chlamydomonas sp.	–	117	–
Pyramimonas sp.	263	–	100
Schroederia sp.	–	–	40
Unknown chlorophyte flagellate	552	1205	522
Cyanophyta			
Chroococcus sp.	26	33	–
Oscillatoria sp.	–	17	–
Spirulina sp.	–	17	–
Euglenophyta			
Euglena sp.	–	84	–
Pyrhhophyta			
Ceratium sp.	53	–	20
Peridinium sp.	26	–	–
Prorocentrum micans	79	50	40

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)

