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Biological Assessment of

City of St. Augustine - Facility #2

St. Johns County

NPDES #FL0021989

Sampled April 1998

February 1999

Biology Section
Division of Administrative and Technical Services
Bureau of Laboratories

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection

Results of Fifth Year Inspections

Discharger:	City of St. Augustine Facility #2
County:	St. Johns
NPDES Number:	FL0021989
Permit Expiration Date:	31 July 1999

Toxics Sampling Inspection (XSI)

Date Sampled: 7 April 1998

Results: No organic pollutants were detected in the effluent sample. Arsenic, lead, iron, aluminum, silver, and zinc were detected at levels that complied with Class III water quality limits. Copper (3.7 µg/L) exceeded the Class III marine water quality standard (Rule 62-302.530(24) FAC).

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 7 April 1998

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

Impact Bioassessment Inspection (IBI)

Date Sampled: 7 April 1998

Results: Measures of macroinvertebrate community health indicated that the discharge was not adversely affecting the receiving water communities. Several benthic community parameters at both the test sites were either similar to or better than the control site. Pollution-sensitive organisms were represented at all three study sites. Algal densities were low at all three study sites and chlorophyll *a* was undetected. Overall, the facility did not appear to have and adverse effect on the receiving water algal communities.

Water Quality Inspection (WQI)

Date Sampled: 7 April 1998

Results: Nutrient concentrations were elevated in the effluent sample. The receiving-water sites had fairly low nutrient levels, with the exception of the nitrate + nitrite levels at test site 1 (0.037 mg/L) which was higher than those levels normally found in 60% of other Florida estuaries. Algal growth potential did not exceed the 10 mg dry wt/L problem threshold at any of the study sites. Effluent total coliforms (2,700 counts/100ml) exceeded Class III water quality standards of ≤ 2,400 counts/100ml (Rule 62-302.530(7) FAC).

This Biological Assessment was prepared by DEP staff to provide information to be used in reviewing an NPDES permit renewal application for the subject facility. This assessment will be used in conjunction with other information concerning the facility and its receiving water body to determine appropriate final permit conditions.

Introduction

The St. Augustine Wastewater Treatment Facility #2, is located in St. Johns County, on the Matanzas River (see map in the Appendix). This municipal facility handles domestic waste and has a design capacity of 1.0 MGD. The facility is a complete mix activated sludge with chlorination, subsequent dechlorination, followed by post-aeration and final discharge to the Class III Matanzas River. The discharge pipe is located 63 meters from the shoreline. The actual flow during the survey was 0.481 MGD.

The state permit limits for the facility are listed in Table 1. The facility has maintained a good quality effluent in the past, and monthly operating report data are consistent with sampling results obtained during past inspections.

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 control site (located at marker 37 within the Intercoastal Waterway) 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. The effluent was analyzed for nutrients, metals, and for organic constituents (base neutral and acid extractables, and pesticide extractables). Methods used for all chemical analyses are on file at the DEP Central Chemistry Laboratory in Tallahassee.

Acute screening bioassays, using the fresh-water invertebrate, *Ceriodaphnia dubia,* and the fresh-water fish, *Cyprinella leedsi,* as test organisms, were performed on an effluent sample.

Benthic macroinvertebrate communities were evaluated at control and test sites. Invertebrates were collected using three replicate petite Ponar grabs.

Phytoplankton were sampled at both control and test sites via subsurface grabs. Chlorophyll *a* was also determined for phytoplankton communities. Algal Growth Potential (AGP) tests were performed using *Selenastrum capricornutum* as the test organism for the fresh-water effluent and *Dunaliella tertiolecta* for the marine receiving-water sites. Bacterial populations were analyzed for total and fecal coliforms. Sediment from control and test sites was analyzed for particle grain size. All field and laboratory biological methods were carried out following Biology Section Standard Operating Procedures (SOP's). The latest version of the SOP's can be viewed on our web site at 'www.dep.state.fl.us/labs/sops.htm'.

Several different measurements of macroinvertebrate and algal community health have been employed to determine the effects of the discharge. These measurements include: habitat assessment, taxa richness, Shannon-Weaver Diversity Index, community composition, functional feeding groups, and algal biomass. For a discussion of each of these measures see *Explanation of Measurements of Community Health* in the Appendix.

For graphical purposes, the percent differences between the control and test sites involving the number of taxa, the diversity index, the number of polychaete taxa, and the % pelecypods are measured as the control site minus test site divided by the control site. The percent differences between sites involving the % tubificids, algal density, chlorophyll *a*, and algal growth potential are measured as the test site minus control site divided by the control site.

The following personnel were involved in this investigation: Tim McKelvey, Pat O'Connor, and Kathleen Gerard (DEP Northeast District) and Julie Baughman, Ken Espy, Marshall Faircloth, Russel Frydenborg, Joy Jackson, Scott Lashbrook, Elizabeth Miller, Urania Quintana, Johnny Richardson, Lisa Tamburello, Steve Wolfe, David Whiting, and Vicki Whiting (DEP Central Biology Laboratory in Tallahassee). The report was reviewed by the Point Source Studies Review Committee, consisting of Wayne Magley, Chuck Ziegmont, and Michael Tanski, as well as District representatives.

Results and Discussion

Habitat quality at the control site (96 points) was higher than test site 1 (78 points) and test site 2 (74 points) (see Habitat Assessment Field Data Sheets in Appendix). Shorelines at all three study sites consisted mostly of natural non-altered shoreline. Substrates at the control and test site 1 consisted primarily of sand with some areas of silt, while test site 2 was a mixture of sand and silt, with the majority of the substrate consisting of silt (see Marine Habitat Assessment Sheets in Appendix). Physical/

chemical measurements were similar between the three study sites with the exception of salinity (Table 1). Salinity levels were highest at test site 1 (31 ppt), lowest at the control site (24 ppt), and intermediate at test site 2 (30 ppt).

Arsenic (40 µg/L), lead (1.03 µg/L), and iron (111 µg/L) were detected in the effluent at levels that complied with Class III marine water quality standards. Aluminum (91 µg/L), silver (0.06 µg/L), and zinc (26 µg/L) were detected in the effluent at levels which were less than the minimum quantitation limit, and greater than or equal to the minimum detection limit. Copper (3.7 µg/L) was detected in the effluent at a level that exceeded Class III water quality standards of 2.9 µg/L (Rule 62-302.530(24) FAC).

The effluent sample was not toxic to the fish, *Cyprinella leedsi,* or to the invertebrate, *Ceriodaphnia dubia,* during the 48-hour bioassay (Appendix).

Nutrient levels are shown in Table 1. The plant's total nitrogen (22.2 mg/L) and nitrate+nitrite (21 mg/L) concentrations were elevated. Effluent total phosphorus (2.5 mg/L) and ortho-phosphate (2.3 mg/L) were also elevated. These levels did not appear to affect the receiving-water nutrients, with the exception of the nitrate+nitrite concentration, which increased from 0.008 mg/L at the control site, to 0.037 mg/L at test site 1, and 0.019 mg/L at test site 2. The concentration at test site 1 is higher than levels in 60% of Florida estuaries (see *"Typical Values for Selected Parameters in Florida Waters"* in Appendix).

AGP, which measures bioavailable nutrients via algal response, was analyzed on samples from the receiving water sites. AGP values at both the control site (2.6 mg dry wt/L), test site 1 (5.3 mg dry wt/L), and test site 2 (3.8 mg dry wt/L) were below the 10 mg dry wt/L "problem threshold" (Ron Raschke, USEPA, pers. comm.).

Phytoplankton data were used to assess algal community health (Figure 1). Taxa richness was high at all three study sites, with 26 taxa at test site 2, 20 taxa at test site 1, and 19 taxa at the control site (Table 2). Similarly, Shannon-Weaver diversity was highest at the two test sites, with 3.8 at test site 2, 3.2 at test site 1, and 2.7 at the control site. Algal densities were fairly low for a marine system and similar among the three sites. Chlorophyll *a* was undetected at all three sites.

Effluent total coliforms (2,700 counts/100 ml) exceeded Class III water quality standards for a marine system (≤ 2,400 counts/100 ml) (Rule 62-302.530 (7) FAC). Fecal coliforms (190 counts/ 100 ml) complied with Class III marine water quality standards. Coliforms in the receiving water samples were within acceptable limits (Table 1).

Sediments at all three study sites were similar. They were mostly sand with some areas of silt (see Marine Habitat Assessment Sheets in Appendix). Sediment particle sizes at the control site were slightly larger than the two test sites. At the control site 86% of the substrate was 0.5 mm in diameter or smaller, while the substrate at the two test sites was mostly 0.25 mm in diameter or smaller.

Quantitative measures of macroinvertebrate community health showed little or no degradation at the test sites (Figure 2). Taxa richness was highest at test site 2 (35 taxa), lowest at the control site (13 taxa), and intermediate at test site 1 (29 taxa) (Table 2). Similarly, Shannon-Weaver diversity was highest at test site 2 (3.6), lowest at the

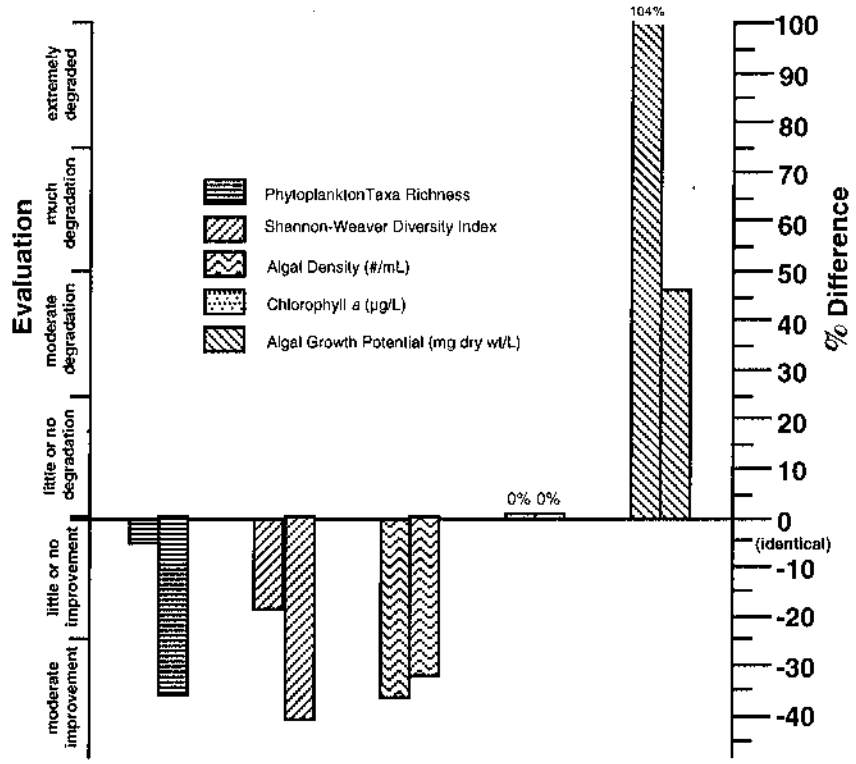


Figure 1. Effect of discharge on the phytoplankton community.

Table 1. Effluent limits and summary of chemistry data.

St. Augustine WWTP #2	Effluent Limits	Effluent Samples	Control Site	Test Site 1	Test Site 2
Organic Constituents (µg/L)					
None Detected	–	–	–	–	–
Metals (µgL)					
Aluminum	≤ 1500 **	91 I	–	–	–
Arsenic	≤ 50 **	40	–	–	–
Cadmium	≤ 9.3 **	0.02 U	–	–	–
Chromium	≤ 50 **	10 U	–	–	–
Copper	≤ 2.9 **	3.7	–	–	–
Iron	≤ 300 **	111	–	–	–
Lead	≤ 5.6 **	1.03	–	–	–
Mercury	≤ 0.025 **	0.1 U	–	–	–
Nickel	≤ 8.3 **	7 U	–	–	–
Selenium	≤ 71 **	50 U	–	–	–
Silver	≤ 2.3 **	0.06 I	–	–	–
Zinc	≤ 86 **	26 I	–	–	–
Nutrients (mg/L)					
Ortho-phosphate	–	2.3	0.027	0.032	0.03
Total phosphorus	–	2.5	0.094	0.071 Q	0.13
Ammonia	–	0.062	0.043 I	0.04 U	0.04 U
Nitrate+nitrite	–	21	0.008 I	0.037	0.019
TKN	14 a*	1.2	0.49	0.49 Q	0.35
Organic Nitrogen	–	11.9	0.45	0.45	0.31
Total Nitrogen	–	22.2	0.5	0.53	0.37
General Phys-Chem Parameters					
Habitat Assessment	–	–	96	78	74
D.O. (mg/L)	5.1 min b*	8.2	6.7	6.4	6.2
pH (SU)	6.0 min b*	7	7.4	7.5	7.5
Conductivity (µmhos/cm)	–	100.7	38,387	47,226	45,924
Salinity (ppt)	–	–	24	31	30
C.B.O.D., 5 day (mg/L)	20 a*	–	–	–	–
Chlorine (mg/L)	8.5 max b*	–	–	–	–
Residual Chlorine (mg/L)	0.01 max b*	≤ 0.02	–	–	–
T.S.S. (mg/L)	20 a*	–	–	–	–
Temperature (°C)	–	23.5	22.4	20.6	21.2
Flow (MGD)	1 a*	0.048	–	–	–
AGP (mg dry wt/L)	–	8.4	2.6	5.3	3.8
Toxicity					
Bioassay - Fish	–	Not Toxic	–	–	–
Bioassay - Invertebrate	–	Not Toxic	–	–	–
Microbiology (# counts/100mL)					
Fecal Coliforms	200 a*	190	≤ 3	7	20
Total Coliforms	≤ 2,400 **	2700	10	7	180

a - Annual average
b - Monthly average
c - Value is calculated based on hardness
A - Value reported is the mean of two or more determinations
I - Value reported is less than the minimum quantitation limit, and ≥ the minimum detection limit
U - Material analyzed for but not detected; value reported is the minimum detection limit

* Permit Limit
** Class III water quality standard

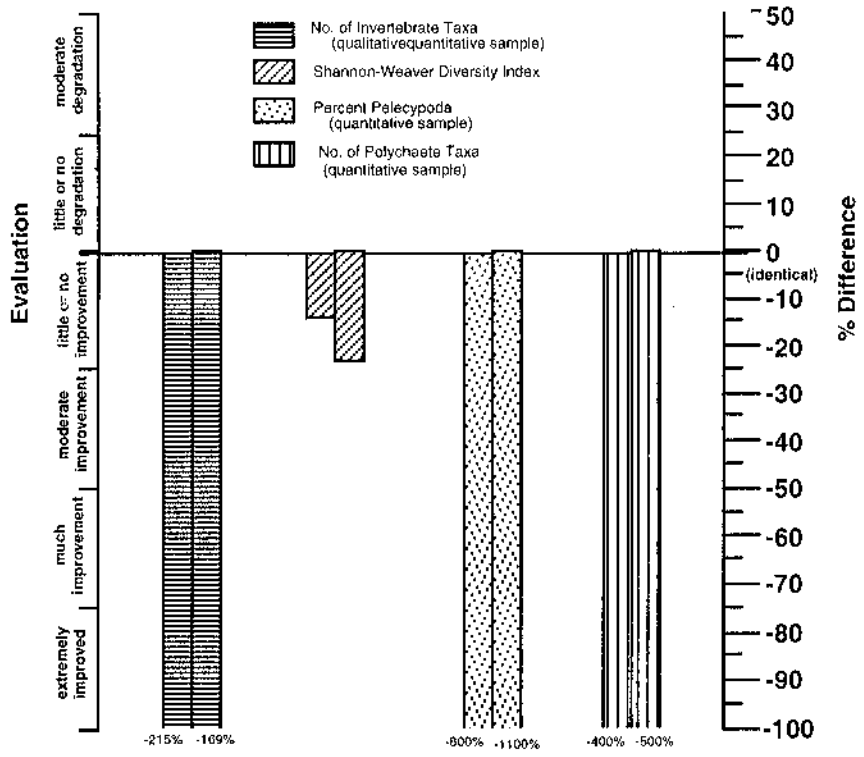


Figure 2. Effect of discharge on the benthic macroinvertebrate community.

control site (2.9), and intermediate at test site 1 (3.3). Polychaete taxa richness was highest at test site 2 (18 taxa), intermediate at test site 1 (15 taxa), and lowest at the control site (3 taxa) (Table 2). All three study sites contained pollution-sensitive groups such as amphipods, cumaceans, and pelecypods. The control site was dominated by the pollution-sensitive amphipod, *Protohaustorius deichmannae.* Test site 1 was dominated by the pollution-tolerant polychaete, *Streblospio benedicti.* This site also contained several good water quality organisms such as the amphipod, *Ampelisca abdita.* Similarly, test site 2 was dominated by the pollution-tolerant polychaete, *Capitella* sp., yet also contained sensitive groups such as amphipods and cumaceans. All three study sites contained pelecypods, normally considered "good water quality indicators". Pelecypods made up 1% of the control site, 9% of test site 1 and 12% of test site 2, respectively.

Conclusions

Effluent metals such as arsenic, iron, lead, aluminum, silver, and zinc were detected at levels that complied with Class III water quality standards for marine systems. Copper (3.7 µg/L) was detected at a level that exceeded Class III water quality standards (Rule 62-302.530(24) FAC).

The effluent sample was not toxic to the fish, *Cyprinella leedsi,* or to the invertebrate, *Ceriodaphnia dubia,* during the 48-hour bioassay.

Effluent total coliforms (2,700 counts/100 ml) exceeded Class III marine water quality standards (≤ 2,400 counts/100ml) and therefore violated Rule 62-302.530(7) FAC. Fecal coliforms (190 counts/ 100 ml) complied with Class III marine water quality standards. All receiving water coliforms were in compliance with Class III water quality limits.

The effluent nutrient levels were elevated, while nutrient levels at the study sites seemed fairly low, with the exception of nitrate+nitrite levels at test site 1.

The phytoplankton data did not suggest any degradation to the algal communites as a result of the St. Augustine discharge. Chlorophyll *a* corresponded with the low algal densities, and was undetected at the control and test sites. AGP values at both the control and test sites were below the 10 mg dry wt/ L "problem threshold". Examining the phytoplankton community data in conjunction with the AGP values, it appears that the effluent was not adversely affecting the algal communities.

Habitat quality was "good" to "fair" at all three study sites. Quantitative measures of macroinvertebrate community health showed no adverse affects on the benthic community, all three study areas contained both pollution-sensitive and pollution-tolerant organisms. Although the control site contained fewer pelecypods and had lower diversity and taxa richness, the site was dominated by pollution-sensitive organisms. The two test sites were dominated by pollution-tolerant and less-sensitive organisms, a possible indication of impairment, although it is difficult to say if this is a result of the discharge.

Table 2. Major characteristics of community structure of control and test sites.

St. Augustine WWTP #2	Control Site	Test Site 1	Test Site 2
Macroinvertebrate Quantitative			
Number of Taxa	13	29	35
Shannon-Weaver Diversity	2.9	3.3	3.6
Number of Polychaete Taxa	3	15	18
Community Composition			
% Amphipoda	66	7	9
% Cumacea	18	3	3
% Decapoda	4	0	0.3
% Echinodermata	0	9	1
% Gastropoda	0	0.3	0
% Isopoda	0	2	1
% Nemertea	1	6	7
% Pelecypoda	1	9	12
% Polychaeta	11	63	67
% Tanaidacea	0	1	0
% Other	0	0	0
Functional Feeding Groups			
% Browsers-grazers	8	3	5
% Burrowing Deposit Feeders	8	14	31
% Predators/Carnivores	3	12	13
% Scavengers	8	8	5
% Surface Deposit Feeders	1	24	15
% Suspension Feeders	72	37	30
% Unknown	0	2	1
Phytoplankton Algae			
Number of Taxa	19	20	26
Shannon-Weaver Diversity	2.7	3.2	3.8
Chlorophyll *a* (µg/L)	1.12 U	1.12 U	1.12 U
Algal Density (#/mL)	1,899	1,197	1,265
% Blue-green	0.5	0	7
% Cryptophytes	2	2	2
% Diatoms	94	91	77
% Green	2	1	10
AGP (mg dry wt/L)	2.6	5.3	3.8

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

Literature Cited

EA Engineering, Science, and Technology and Tetra Tech, Inc. 1994. Bioassessment for the nonpoint source program (draft). Prepared for the Fla. Dept. Environ. Protection. Unpaginated.

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.

Raschke, R. L. and D. A. Schultz. 1987. The use of the algal growth potential test for data assessment. J. Wat. Poll. Cont. Fed. 59(4): 222-227.

Weber, C. I. 1993. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. 4th edition. EPA/600/4-90/027. U. S. EPA, Cincinnati, Ohio. 216 pp.

Explanation of Measurements of Community Health

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

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

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

Numbers of pollution sensitive taxa: Some organisms become rare or absent as the intensity or duration of disturbance increases. Species sensitivity data from other sources, such as Chang *et al.* (1992), Farrell (1992), Hudson *et al.* (1990), Hulbert (1990), Lenat (1993), and Whitmore (1989), are used as appropriate.

Community structure: Substantial shifts in proportions of major groups of organisms, compared to control conditions, may indicate degradation. 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 (Engel *et al.* 1994).

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

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

Typical Values for Selected Parameters in Florida Waters

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

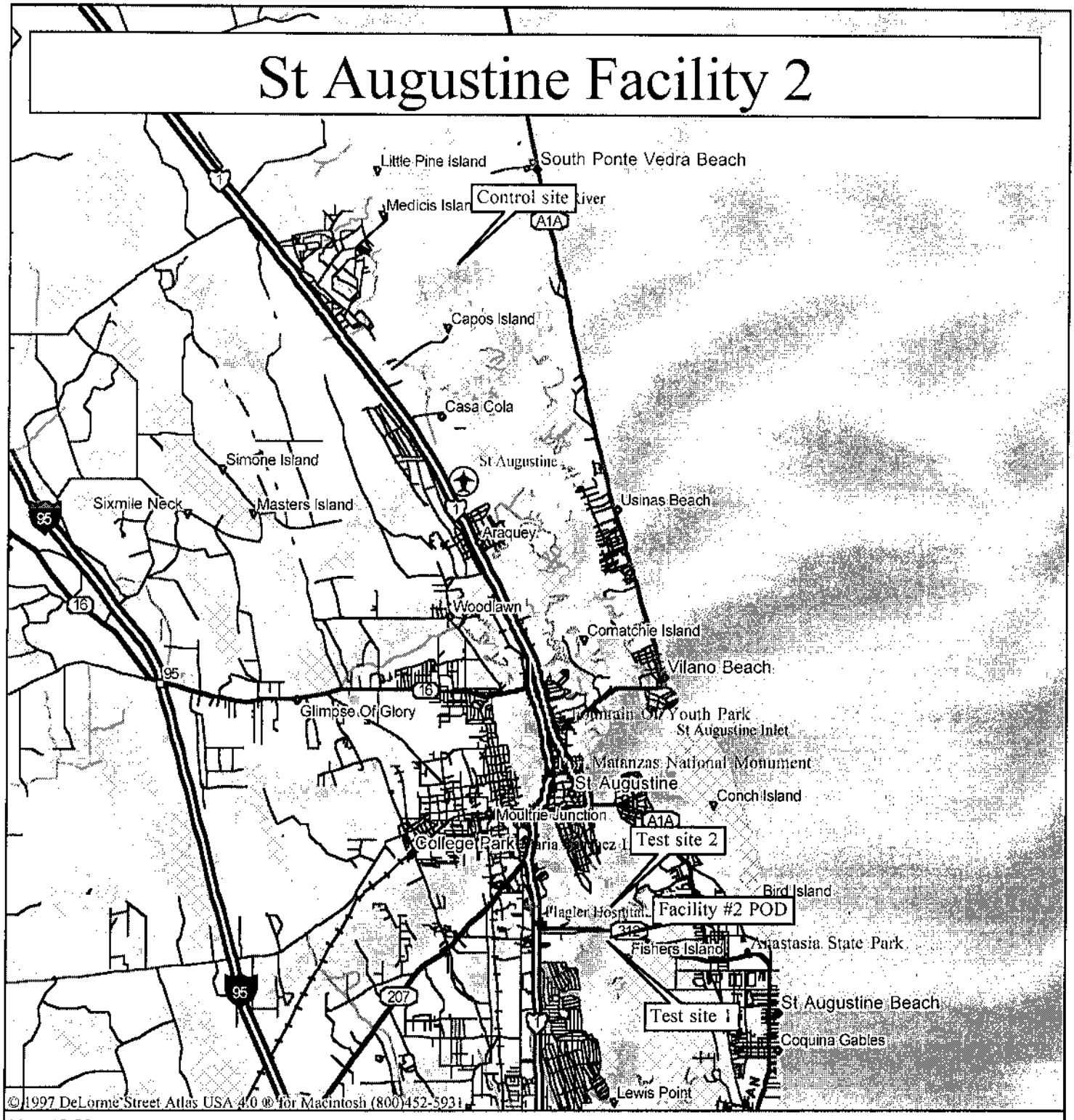
Percentile Distribution

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

St Augustine Facility 2



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Mag 12.00
Thu Jan 28 08:29 1999
Scale 1:125,000 (at center)

2 Miles

2 KM

- Local Road
- Major Connector
- State Route
- Primary State Route
- Trail
- Interstate/Limited Access
- US Highway
- Railroad
- Small Town
- Geographic Feature
- Hospital
- Park/Reservation
- Locale
- City

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: City of St. Augustine #2 WWTP		Prepared by: KATHLEEN GERARD Date: April 21, 1998
Location (attach detailed map): See attachment	County: St. Johns	District: Northeast District
Federal Permit # FL 002 1989 and expiration date:	State GMS # and 3155M 0081 State expiration date: October 28, 1998	Facility Type: Industrial (Municipal) Federal Agricultural Other (list):

Function of facility:
Wastewater Treatment facility.

Description of treatment process:
this facility is permitted as a 1.0 MGD Complete mix activated sludge wastewater treatment with chlorination, dechlorination, postaeration and discharge to the MATANZAS River.

Receiving waters: MATANZAS RIVER.	Classification: III
Design Flow: 1.0 MGD.	Actual Mean Flow: 0.481 MGD

Discharge is: (Continuous) Intermittent Seasonal Rainfall dependent
Other (describe)
therefore, the best time to sample is:

If facility has a mixing zone, give details (size, parameters affected, etc.):
no mixing zone.

List effluent limits:

Parameter	Limit (units)	
	Annual	Monthly
CBOD5.	20 ✓	30 mg/L
TSS	20 ✓	30 mg/L
TKN	14 ✓	17.5 mg/L
Fecal Coliforms ✓	200 No/100 mL	200
pH ✓	minimum	6.0 ✓
	maximum	8.5
Chlorine ✓	minimum	0.5 mg/L
Chlorine ✓ (after dech.)	maximum	0.01 mg/L
DO. ✓	minimum	5.0 mg/L

Describe special permit conditions and permit modifications:
See attached Specific Conditions 17, 18 and 19 regarding Toxicity monitoring and quarterly monitoring of the river and WWTP on State Permit DO55-238552 and Condition IA.1 of Federal Permit FL0021989

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

City of St. Augustine #2 WWTP (Facility) FACILITY SUMMARY

Description of permitted outfall(s):

A 24" R.C.P. pipe extends approximately 4545' from the plant. the 24" C.M.P. outfall extends another 190 feet from the shore into the Matanzas River. The total lenghth of the outfall line is approximately 4,845.

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

the facility maintains a good quality of effluent.

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

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

Data submitted by WWTF personnel on DMRs/MORs is consistent with sampling results obtained during past inspections by department personnel

Additional information:

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - FINAL

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

PARAMETERS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	ANNUAL AVG.	MONTHLY AVG.	WEEKLY AVG.	DAILY MAXIMUM	SAMPLING POINT	MEASUREMENT FREQUENCY	SAMPLE TYPE
Flow, MGD	Report	Report	Report	Report	Effluent	Continuous	Recording Flow Meter and Totalizer
Carbonaceous Biochemical Oxygen Demand (5-day) ($CBOD_5$), mg/l	20.0	25.0	40.0	60.0	Effluent	Weekly	16-hour composite
Carbonaceous Biochemical Oxygen Demand (5-day) ($CBOD_5$), mg/l	----	REPORT*	----	----	Influent	Weekly	16-hour composite
Total Suspended Solids (TSS), mg/l	20.0	30.0	45.0	60.0	Effluent	Weekly	16-hour composite
Total Suspended Solids (TSS), mg/l	----	REPORT*	----	----	Influent	Weekly	16-hour composite
Total Kjeldahl Nitrogen, as N, mg/l	14.0	17.5	21.0	28.0	Effluent	Weekly	16-hour composite
Total Residual Chlorine (TRC), mg/l	See Item 2 on Page I-2				Effluent	Weekly	Grab
Fecal Coliform, #/100 ml	See Item 3 on Page I-2				Effluent	Weekly	Grab
pH, std. units	See Item 4 on Page I-2				Effluent	See Item 4	Recorder or Hourly Grab
Dissolved Oxygen, mg/l	See Item 5 on Page I-2				Effluent	Hourly	Grab
Acute Whole Effluent Toxicity	See Item 6 on Page I-2 and Part IV				Effluent	See Part IV	Grab

* See Item 7 on Page I-3

19. 2. Station #5A; not listed on "Exhibit 2" but located at the WWTP, end of post aeration/dechlorination unit.

b. Monitoring at the station locations described in 19a shall be conducted in accordance with 19c, 19d, 19e and 19f for the following parameters:

Dissolved oxygen	$CBOD_5$
pH	ammonia-nitrogen
*salinity	TKN
*secchi depth	nitrate/nitrite nitrogen
specific conductivity	total phosphorus
temperature	orthophosphorus
chlorophyll a	fecal and total coliforms
	*tide stage (flow direction)

*Not required for Station #5A.

c. The minimum detection limit is 0.25 mg/l for $CBOD_5$ and TKN and 0.02 mg/l for ammonia-nitrogen, nitrate/nitrite nitrogen, total phosphorus and orthophosphorus. Metered parameters (DO, pH, temperature, conductivity, salinity, chlorine residual) shall be analyzed or collected (grab sample) at the surface, mid-depth, and near bottom (2 feet from the bottom is acceptable) levels of the river. The sample collection point for chlorophyll a shall be at mid-secchi depth. Samples for other chemical analysis shall be grab samples and collected at mid-depth.

All parameters shall be analyzed or collected before 10:00 a.m. The date and time of sample collection, sampling depths and test procedures shall also be submitted with the results of the analysis.

d. The quarterly river monitoring and analytical reporting shall be in accordance with the following schedule:

Sample Period	Report Due
1st Quarter (July)	August 28
2nd Quarter (October)	November 28
3rd Quarter (January)	February 28
4th Quarter (April)	May 28

A report summarizing all of the ambient water quality monitoring required by Specific Condition No. 19 of this permit shall be submitted six months prior to the expiration of this permit.

e. Whenever possible, the Department will conduct 3 of the 4 quarterly river monitoring events provided the Department is requested to conduct a quarterly sampling event within 30 days of the required sampling schedule and the Department agrees to conduct sampling. Monitoring of the WWTP effluent is the sole responsibility of the Permittee as is all river monitoring during those quarters for which the Department does not agree to conduct sampling for the Permittee.

18. f. If unacceptable acute toxicity (greater than 20% lethality in a sample of 100% effluent to either test species in any of the tests within the specified time) is found in a "routine" test, the Permittee shall conduct two 96-hour acute definitive toxicity tests on both species. The 96-hour acute definitive toxicity test shall be conducted using a control (0% effluent) and test concentrations of 100%, 75%, 50%, 25%, 12.5% and 6.25% final effluent. For these tests, the sample collection requirements and test acceptability criteria specified in sections "b" and "c" above must be met for the test to be considered valid. The test shall begin within two weeks of the end of the failed "routine" test.

g. Results from the definitive tests, required due to unacceptable acute toxicity in the "routine" tests, shall be submitted in a single report prepared according to EPA/600/4-90/027 (4th edition) Section 12, Report Preparation (or the most current edition) and submitted within 45 days of completion of the valid definitive test. Upon review of the definitive toxicity test results, test concentrations may be modified by the Department to improve the statistical confidence of the analyses. In this case, the Permittee shall be notified and will have 30 days to comply with such changes.

h. Should any valid definitive test indicate the characteristic of toxicity, the Permittee shall prepare a plan of study to identify the cause(s) or source(s) of toxicity of the effluent and evaluate feasible methodologies to reduce or eliminate the toxicity. The plan may include a chemical analysis of the effluent including priority pollutants (metals, volatile and nonvolatile organics) and nonpriority pollutant peaks, along with total and unionized ammonia, nitrate and nitrite nitrogen, TKN and total and ortho phosphorus.

i. The Permittee shall submit the plan of study to the Department for review and comments within 60 days of determination of acute toxicity by the valid definitive test (outlined in item f above). The Permittee shall implement the agreed upon plan of study within 30 days of receipt of written Department approval. A detailed final report shall be submitted to the Department upon completion of the plan of study including conclusions and recommendations regarding the toxicity of the effluent and measures to reduce or eliminate it.

19. a. The Permittee shall conduct quarterly monitoring of the Matanzas River at Station 1 and monitoring stations ASD5, and ASD5A as identified on the attached "Exhibit 2" to this permit and described as follows:

1. Station ASD5; located at St. Augustine #2 WWTP point of discharge and at the center of channel.

17. (i) The arithmetic mean of the monthly fecal coliform values collected during an annual period shall not exceed 200 per 100 ml. Any one sample shall not exceed 800 fecal coliform values per 100 ml.

B. Hourly measurements during the period of required operator attendance may be substituted for continuous measurement where such devices are not available.

C. 24-hour flow proportioned composite sample.

18. a. In accordance with Rule 17-302.500(1)(d) and 17-302.510(5)(p), FAC, the Permittee shall initiate the series of tests described below beginning 60 days from the issue date of this permit to evaluate whole effluent toxicity of the discharge from outfalls. All test species, procedures and quality assurance criteria used shall be in accordance with Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA/600/4-90/027 (4th edition), or the most current edition. A standard reference toxicant quality assurance test shall be conducted concurrently with each species used in the toxicity tests and the results submitted with the monthly operating report (MOR). Alternatively, if monthly QA/QC reference toxicant tests are conducted, these results must be submitted with the MOR.

b. The Permittee shall conduct 96-hour acute screening static renewal toxicity tests using the Ceriodaphnia dubia (water flea) and the Notropis leedsi (bannerfin Shiner). All tests will be conducted on four separate grab samples collected at evenly spaced (6-hour) intervals over a 24-hour period and used in four separate tests in order to account for variations in effluent quality. Results of the four tests are not to be combined or averaged, but reported separately.

c. If control mortality exceeds 10% for either species in any test, the test(s) for that species (including the control) shall be repeated. A test will be considered valid only if control mortality does not exceed 10% for either species. If, in any separate grab sample test, 100% mortality occurs prior to the end of the test, and control mortality is less than 10% at that time, that test (including the control) shall be terminated with the conclusion that the sample demonstrates unacceptable acute toxicity.

d. The Toxicity test specified above shall be conducted using a control (0% effluent) and one test concentration of 100% final effluent. The toxicity tests specified above shall be conducted once every two months until six consecutive valid bi-monthly tests have been passed, and once every six months thereafter for the duration of the permit, unless notified otherwise by the Department. These tests are referred to as "routine tests".

e. Results from "routine" tests shall be reported according to EPA/600/4-90/027 (4th edition) Section 12, Report Preparation (or the most current edition), and shall be submitted as an attachment to the monthly operation report.

PERMITTEE:

Jack E. Cubbedge
City of St. Augustine WWTP #2

I.D. Number: 3155M00811
Permit Number: DO55-238552
Date of Issue: October 28, 1993
Expiration Date: October 28, 1998

17. The monitoring requirements and effluent limitations for this plant are as follows:

PARAMETER	EFFLUENT LIMIT	MINIMUM FREQUENCY	SAMPLE TYPE	SAMPLE LOCATION
Flow (mgd)	1.0 (b) Annual Average	Continuous	A	Influent or Effluent
$CBOD_5$ (mg/l)	(a)	Weekly	C	Influent (c) & Effluent (d)
TSS (mg/l)	(a)	Weekly	C	Influent (c) & Effluent (d)
TKN (mg/l)	(a)	Weekly	C	Effluent (d)
DO (mg/l)	5.1 Minimum	Continuous	B Instrument	Effluent (d)
pH Units	Minimum 6.0 Maximum 8.5	Continuous	B Instrument	Effluent (d)
Chlorine Residual (mg/l)	0.5 Minimum 0.01 Maximum	Continuous (e) Daily, 5/week (f)	B Meter or Instrument	ccc Dechlor. Effluent
Fecal Coliform no./100 (ml)	200 (i)	Weekly	Grab	Effluent (d)
Toxicity	See Specific Condition Number 18			
Nutrient/Stream Monitoring	See Specific Condition Number 19			

(a)

	ANNUAL	MONTHLY	WEEKLY	ONE TIME MAXIMUM
$CBOD_5$	20	30*	45*	60*
TSS	20	30*	45*	60*
TKN	14	17.5	21	28

* Rule 17-600.740(1)(b), FAC

A. Recording flowmeter and totalizer required.

(b) Annual average daily flow shall not exceed value shown.

(c) Influent samples shall be collected so that they do not contain digester supernatant or returned activated sludge, or any other plant process waters.

(d) Effluent samples shall be collected after final treatment and immediately before discharge to the Matanzas River.

(e) The total residual chlorine content of the effluent at the exit of the chlorine contact chamber shall at all times not be less than 0.5 mg/l.

(f) The total residual chlorine content of the effluent after dechlorination and pior to discharge to the Matanzas River shall at all times not exceed 0.01 mg/l.

GMST36 3155X00028 050053 080082 000530 031616 04/20/98
PARAMETER RESULT TRENDS 17:03:35

0 Y FOR 3155M00811 - ST. AUGUSTINE, CITY OF #2
SITE NAME - S.T.P. FINAL EFFLUENT - ST. AUGUSTI

RPT DATE	FLOW,MONTH AVG 050053 MGD	BIOCHEM OXY DEM 080082 MG/L	RES SUSP 000530 MG/L	FECAL COLI MF 031616 #/100
02/00/98	.712	3.0	4.	37.0
01/00/98	.574	4.0	3.	13.0
12/00/97	.753	6.0	4.	7.0
11/00/97	.585	3.0	3.	24.0
10/00/97	.391	4.0	3.	24.0
09/00/97	.465	4.0	4.	38.0
08/00/97	.414	4.0	3.	16.0
07/00/97	.355	4.0	3.	21.0
06/00/97	.424	3.0	3.	23.0
05/00/97	.400	4.0	3.	22.0
04/00/97	.384	4.0	3.	26.0
03/00/97	.317	5.0	3.	27.0
02/00/97	.362 .481	3.0	3.	18.0
01/00/97	.354	4.0	3.	7.0
AVERAGE:	0.53211	3.36508	4.14286	27.04762
STD DEV:	0.12438	1.57911	1.43523	18.45170

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GMST36 3155X00028 000625 900243 900244 000300 04/20/98
PARAMETER RESULT TRENDS 17:04:36

0 Y FOR 3155M00811 - ST. AUGUSTINE, CITY OF #2
SITE NAME - S.T.P. FINAL EFFLUENT - ST. AUGUSTI

RPT DATE	NITROGEN(N)KJEL 000625 MG/L	CHLOR RES, MIN 900243 MG/L	CHLOR RES, MAX 900244 MG/L		DO 000300 MG/L
02/00/98	1.500	.5	.02	<	7.9
01/00/98	1.800	.5	.02	<	8.1
12/00/97	1.700	.5	.02	K	5.9
11/00/97	2.100	.5	.02	<	7.6
10/00/97	2.100	.5	.02	K	7.3
09/00/97	2.000	.5	.02	<	7.4
08/00/97	1.800	.5	.02	K	7.4
07/00/97	1.300	.5	.02	K	7.4
06/00/97	1.400	.5	.02	K	7.3
05/00/97	NO RESULT	.5	.02	K	7.5
04/00/97	1.400	.5	.02	K	7.9
03/00/97	1.300	.5	.02	K	7.9
02/00/97	1.100	.5	.02	K	7.6
01/00/97	1.000	.5	.02	K	8.3
AVERAGE:	1.32419	0.50317	0.01873		7.36984
STD DEV:	0.43332	0.01789	0.00548		0.67982

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STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: DEP	STORET STATION NUMBER: 27010202	DATE (M/D/Y): 4-7-98	TIME: 1430	RECEIVING BODY OF WATER: INTRACOASTAL WATER
REMARKS: FWIS for both St Aug #1 and #2	COUNTY: St. Johns	LOCATION: MARKER 37, ICW		FIELD ID/NAME: Reference Site

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Spec
100							MARSH

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

Local Watershed NPS Pollution (check box): No evidence ☒ Slight ☐ Moderate potential ☐ Obvious sources ☐

Width of riparian vegetation (m) on least buffered side: 218

List & map dominant vegetation on back

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect: m wide

Artificially Channelized ☐ no ☐ recent, severe ☐ some recovery ☒ mostly recovered, more sinuous

Artificially Impounded ☐ yes

High Water Mark: ____ (m above present water level) + ____ (present depth in m) = ____ (m above bed)

m/s	m/s	m/s
m deep	m deep	m deep

tidally influenced

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 Deposition: Sludge: ☐ Sand smothering: none slight moderate severe Silt smothering: none slight moderate severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand	80	1	ponar
Leaf Packs or Mats				Mud/Muck/Silt	10	1	ponar
Aquatic Vegetation				Other:			
Rock or Shell Rubble	10	1	ponar	Other:			
Undercut banks/Roots							

Draw aerial view sketch of habitats found in 100 m section

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):	SAL.		Secchi (m):
Top	0		7.44					
Mid-depth	.8	22.44	6.71	6.70	38387	24.4		.6
Bottom	1.5							

System Type: Stream: ☐ (1st - 2nd order, 3rd - 4th order, 5th - 6th order, 7th order or greater) 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): Slightly Tannic: ☒ Green (algae): ☐ Clear: ☒ Other: ☐

Weather Conditions/Notes: Windy, SE 15-20 Knots
Mostly Cloudy

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

SAMPLING TEAM: Tim McKelvey / Pat O'Connor

SIGNATURE: Tim McKelvey

DATE:

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

SUBMITTING AGENCY CODE: 803 / SUBMITTING AGENCY NAME: NERR	STORET STATION NUMBER: 27010202	DATE (M/D/Y): 4-7-98	RECEIVING BODY OF WATER: INTRACOASTAL WATERWAY

REMARKS: FYI'S reference for both SR #1 and #2.	LOCATION: MARKER 37, ICW 100 ft eastern shore	FIELD ID/NAME: REFERENCE SITE

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations: 10	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: 50	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation: 5	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations: 10	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. 8-10 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: ~~15~~ 11	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: 96

COMMENTS: falling tide

ANALYSIS DATE: 4/7/98	ANALYST: Tim McKelvey	SIGNATURE: Tim McKelvey

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96) Matanzas River

SUBMITTING AGENCY CODE: 8131 / SUBMITTING AGENCY NAME: NED	STORET STATION NUMBER: 27010201	DATE (M/D/Y): 4-7-98	TIME: 1130	RECEIVING BODY OF WATER: Intracoastal Waterway

REMARKS: ST. AUG #2 FMIS	COUNTY: ST. JOHNS	LOCATION: 300 YARDS SOUTH OF 312 BRIDGE, 100 FEET OFF EAST SHORE	FIELD ID/NAME: TEST SITE #1 SOUTH OF POD

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
5				50	40	5	

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

Local Watershed NPS Pollution (check box): No evidence ☐ Slight ☐ Moderate potential ☒ Obvious sources ☐

Width of riparian vegetation (m) on least buffered side: 7.18m — *List & map dominant vegetation on back*

Artificially Channelized ☐ no ☐ recent, severe ☐ some recovery ☒ mostly recovered, more sinuous

Artificially Impounded ☐ yes

High Water Mark: 1.0 (m above present water level) + ' (present depth in m) = (m above bed)

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect

m wide

m/s	m/s	m/s
m deep	m deep	m deep

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 Deposition: Sludge: ☐ Sand smothering: none (slight) moderate severe Silt smothering: none (slight) moderate severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand	25	1	ponar
Leaf Packs or Mats				Mud/Muck/Silt	50	1	ponar
Aquatic Vegetation				Other:			
Rock or Shell Rubble	25	1	ponar	Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):	SAL.		Secchi (m):
Top	.0							
Mid-depth	.7	20.58	7.46	6.4	47226	30.8		
Bottom	1.3							

System Type : Stream: ☐ (1st - 2nd order, 3rd - 4th order, 5th - 6th order, 7th order or greater) 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/Notes: Windy, SE @ 10-15 Knots. Sunny w/ partly cloudy.

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

SAMPLING TEAM: McKelvey / O'Connor

SIGNATURE: McKelvey

DATE:

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: NERO	STORET STATION NUMBER: 27010201	DATE (M/D/Y): 4-7-98	RECEIVING BODY OF WATER: INTRACOASTAL WATERWAY

REMARKS: ST. AUG. #2 FY15	LOCATION: 300 YARDS SOUTH OF 312 BRIDGE, 100 ~~YARDS~~ FEET OFF EAST SHORE.	FIELD ID/NAME: TEST SITE #1 - SOUTH OF POD

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 10	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed 40	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation 5	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations 10	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 2	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. 9-10 points	———	——— bridge @ 312 under construction	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 11	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 78

COMMENTS: Falling tide

ANALYSIS DATE: 4/7/98	ANALYST: Tim McKelvey	SIGNATURE: Tim McKelvey

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: NED	STORET STATION NUMBER: 27010153	DATE (M/D/Y): 4-7-98	TIME: 1230	RECEIVING BODY OF WATER: INTRACOASTAL WATERWAY

REMARKS: ST AUG #1 & #2 FYI's combined.	COUNTY: ST JOHNS	LOCATION: 500 yards north of 312 bridge midway between POD's 100ft. off west bank.	FIELD ID/NAME: TEST SITE #2 - MID

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
15				25	60		

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

Local Watershed NPS Pollution (check box): No evidence ☐ Slight ☐ Moderate potential ☒ Obvious sources ☐

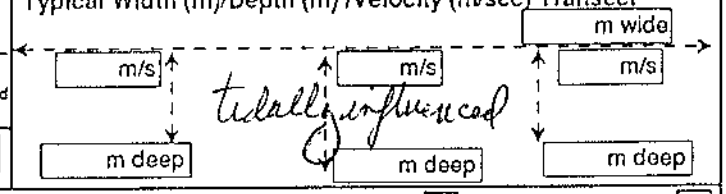
Width of riparian vegetation (m) on least buffered side: 18m — *List & map dominant vegetation on back*

Artificially Channelized ☐ no ☐ ☐ ☒ (recent, severe / some recovery / mostly recovered, more sinuous)

Artificially Impounded ☐ yes

High Water Mark: _____ (m above present water level) + _____ (present depth in m) = _____ (m above bed)

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect



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 Deposition: Sludge: ☐ Sand smothering: none / slight / moderate / severe — Silt smothering: none / slight / moderate / severe — Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand	10	1	PONAR
Leaf Packs or Mats				Mud/Muck/Silt	80	1	PONAR
Aquatic Vegetation				Other:			
Rock or Shell Rubble	10	1	PONAR	Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):	SAL.		Secchi (m):
Top	0							.6
Mid-depth	1	21.18	7.48	6.22	45924	29.9		
Bottom	2							

System Type : Stream: ☐ (1st - 2nd order / 3rd - 4th order / 5th - 6th order / 7th order or greater) 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/Notes: WINDY 15 KNOTS SE
500 YARDS NORTH OF 312 BRIDGE.
MID POINT BETWEEN OUTFALLS OF ST. AUG #1 and ST. AUG #2, WESTERN SHORE, 100 FT OFF.

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

SAMPLING TEAM:	SIGNATURE:	DATE:
McKelvey / O'CONNOR	McKelvey	

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

SUBMITTING AGENCY CODE: 3031 / SUBMITTING AGENCY NAME: NED	STORET STATION NUMBER: 27010153	DATE (M/D/Y): 4-7-98	RECEIVING BODY OF WATER: INTRACOASTAL WATERWAY

REMARKS: MIDPOINT BETWEEN ST. AUG #1 & ST AUG. #2 POD'S	LOCATION: 500 YARDS NORTH OF 312 BRIDGE, MID POINT BETWEEN POD'S 100 FT off WEST BANK	FIELD ID/NAME: TEST SITE #2 - MID MIDPOINT

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations — 10	None—Unaltered shoreline. 9-10 points (Marina across waterway)	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed — 40	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation — 5	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations — 10	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 — 2	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 74

COMMENTS: ST. AUG #1 & ST. AUG #2 EYES (COMBINED) OUTGOING TIDE

ANALYSIS DATE:	ANALYST:	SIGNATURE:
4-7-98	McKelvey	Tim McKelvey

FDEP Biology Section

Sample Source: St. Augustine Effluent #2
County: Flagler
Contact / District: Tim McKelvey / Northeast
NPDES Permit #: FL00 21989
LIMS Sample #: 317173 LIMS Job #: TLH-1998-04-07-11-02
sample log: BT 4/13/98

Sample Collection: Date 4/6/98 Time 13:00
Test Beginning: Date 4/7/98 Time 1420
Test Ending: Date 4/9/98 Time 13:40
Organism Batch #: 24 Diluent Batch #: well H2O
Organism Age: 12 days
Test Organism: Cyprinella leedsi

Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through
Temperature range: room 24.0-25.0 °C
incubator 25.0-26.5 °C
Test Number: 2 of 2
Remarks: D = dead, M = missing

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.5 @ 23.6	8.2 @ 25.1 °C	100.7 @ 96.3 997 @ 1005 @ 25.5 °C 9950 @ 10107 101.3 @ 96.3
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.5 @ 24.6	8.1 @ 25.5 °C	995 @ 1005 @ 25.0 °C 9950 @ 10107 100.1 @ 96.3
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.7 @ 24.7	5.2 @ 25.9 °C	995 @ 1005 @ 25.1 °C 9990 @ 10107

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	E9	5	5	5	7.9	8.1	8.3	24.7	27.0	26.6	8.0	7.2	7.7	255	260	330
Control B	E10	5	5	5	7.9	8.1	8.4	24.6	26.1	25.7	8.1	7.3	7.8	255	260	280
Control C	E11	5	5	5	7.9	8.2	8.4	24.6	26.0	25.8	8.1	7.2	8.0	255	260	270
Control D	E12	5	5	5	7.9	8.2	8.4	24.7	26.1	25.5	8.1	7.4	8.0	255	265	265
100 % A	E13	5	5	5	7.6	7.9	8.0	25.5	27.2	25.7	8.8	6.9	7.9	1820	1845	1530
100 % B	E14	5	5	5	7.6	7.9	8.0	25.5	25.8	25.9	8.9	7.3	7.4	1870	1915	1940
100 % C	E15	5	5	5	7.6	7.9	8.0	25.5	26.0	25.8	8.9	7.0	7.9	1870	1910	1915
100 % D	E16	5	5	5	7.6	7.9	8.0	25.4	25.7	25.6	9.0	7.1	8.0	1870	1895	1910
Measured/Loaded by:		FW	DAW	FW	MF	DAW	DAW	MF	DAW	DAW	MF	DAW	DAW	MF	DAW	DAW
Recorded by:		MF	DAW	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW

Investigators' Signatures

Marshall Faircloth
Tim McKelvey
David Washington

reviewer

form updated 4/01/98

Water Quality Parameters (verified by MF)

	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			<0.02	—	Tim McKelvey
Lab Total Residual Cl2 (mg/L):	<0.03		<0.03	DR-100	DAW
Alkalinity (mg/L as $CaCO_3$):	119		72	Hach	DAW
Hardness (mg/L as $CaCO_3$):	127		358	Hach	DAW
Total ammonia (mg/L as N):	<0.017		<0.017	ORION	FW

Ammonia Meter #98136 Ammonia Meter Slope: −60.0 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 21 ppt

FDEP Biology Section — Acute Bioassay B

Sample Source: St. Augustine Effluent #2
County: Flagler
Contact / District: Tim McKelvey / Northeast
NPDES Permit #: FL0021989
LIMS Sample #: 317173 (4/13/98) LIMS Job #: FLA 1998-04-07-11-02

Sample Collection: Date 4/6/98 Time 13:00
Test Beginning: Date 4/7/98 Time 1400
Test Ending: Date 4/9/98 Time 13:40
Organism Batch #: 17 Diluent Batch #: 16
Organism Age: < 24 hours
Test Organism: Ceriodaphnia dubia

sample log:
Test Type: Screening | Definitive
Static | Static Renewal | Flow-through
Temperature range: room 24.0-25.0°C
incubator 23.3-24.4°C
Test Number: 1 of 2
Remarks: D = dead, M = missing

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.5 @ 23.6	8.2 @ 25.1 °C	100.7 @ 96.3 997 @ 1005 @ 25.5 °C 9950 @ 10107 1013 @ 96.3
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.5 @ 24.6	8.1 @ 25.5 °C	995 @ 1005 @ 25.0 °C 9980 @ 10107
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.7 @ 24.7	8.2 @ 25.5 °C	100.1 @ 96.3 995 @ 1005 @ 25.1 °C 9990 @ 10107

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) (µmhos/cm) 0 hr	UNCORRECTED Cond. (mmhos/cm) (µmhos/cm) 24 h	UNCORRECTED Cond. (mmhos/cm) (µmhos/cm) 48 h
Control A	A	5	5	5	8.0		7.9	24.8		24.8	8.1		8.3	170		150
Control B	B	5	5	5			8.0			24.7			8.4			150
Control C	C	5	5	5			8.1			24.7			8.4			150
Control D	D	5	5	5			8.1			24.7			8.5			185
100% A	A	5	5	5	7.5		8.0	25.4		24.6	8.4		8.5	1820		1700
100% B	B	5	5	5			8.1			24.5			8.6			1795
100% C	C	5	5	5			8.1			24.5			8.5			1935
100% D	D	5	5	5			8.1			24.4			8.5			1905
Measured/Loaded by:		MF	MF	FW	MF		DAW	MF		DAW	MF		DAW	MF		DAW
Recorded by:		MF	MF	FW	MF		FW	MF		FW	MF		FW	MF		FW

Investigators' Signatures
Marshall Faircloth
David Wainright
Tim McKelvey

Water Quality Parameters (Salt Water / Well Water / 20% Min Water)	Sample (verified by MF)	Method	Measured by
Field Total Residual Cl2 (mg/L):	<0.02	—	Tim McKelvey
Lab Total Residual Cl2 (mg/L):	<0.03	DR-100	DAW
Alkalinity (mg/L as $CaCO_3$):	72	Hach	DAW
Hardness (mg/L as $CaCO_3$):	358	Hach	DAW
			FW

Benthic macroinvertebrate taxa list for St. Augustine Facility #2, collected via Ponar grab samples in the Matanza River, on 7 April, 1998. Densities, in number/m^2, represent the mean of three replicates.

	Control Site	Test Site 1	Test Site 2
Amphipoda			
Acanthohaustorius sp.	139	-	-
Ampelisca abdita	-	56	-
Ampelisca cristata	-	28	-
Ampelisca sp.	-	139	97
Batea catharinensis	-	-	28
Cerapus sp.	-	28	-
Corophium sp.	-	-	28
Grandidierella bonnieroides	-	-	14
Metharpinia floridana	-	-	56
Monoculodes sp.	28	-	-
Protohaustorius deichmannae	139	-	-
Protohaustorius sp.	181	-	-
Synchelidium americanum	14	42	-
Undetermined Ampeliscidae	-	69	-
Undetermined Corophiidae	-	14	-
Undetermined Haustoriidae	167	-	-
Undetermined Oedicerotidae	97	14	83
Undetermined Phoxocephalidae	14	-	181
Bryozoa			
Undetermined Bryozoa	-	-	28
Cumacea			
Cyclaspis varians	42	-	-
Cyclaspis sp.	42	-	-
Oxyurostylis sp.	125	153	167
Undetermined Cumacea	-	14	-
Decapoda			
Undetermined Decapoda	-	-	14
Undetermined Penaeidae	42	-	-
Echinodermata			
Amphioplus sp.	-	250	28
Undetermined Amphiuridae	-	236	-
Undetermined Ophiuroidea	-	-	14
Gastropoda			
Nassarius sp.	-	14	-
Isopoda			
Cyathura polita	-	97	42
Nemertea			
Undetermined Nemertea	14	361	361
Oligochaeta			
Undetermined Oligochaeta	-	-	14
Pelecypoda			
Corbula contracta	-	-	42

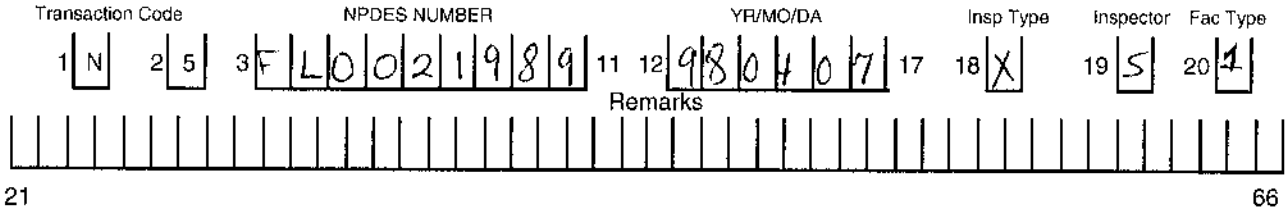
Lucina radians	-	111	-
Mactra fragilis	-	-	56
Tellina versicolor	-	125	42
Tellina sp.	14	111	472
Undetermined Mactridae	-	167	-
Polychaeta			
Aglaophamus verrilli	-	-	56
Capitella sp.	-	181	1597
Eteone heteropoda	-	-	14
Glycera sp.	14	-	42
Hobsonia florida	-	14	-
Laeonereis culveri	-	-	14
Leitoscoloplos sp.	97	-	-
Maldane sp.	-	69	-
Malmgreniella sp.	-	-	28
Minuspio sp.	-	-	444
Naineris sp.	-	-	14
Nephtys picta	-	14	56
Nephtys sp.	-	14	28
Owenia fusiformis	-	14	-
Pectinaria gouldi	-	14	-
Phyllodoce sp.	-	-	28
Prionospio sp.	-	111	-
Sigambra tentaculata	-	14	42
Spiophanes bombyx	-	97	97
Sthenelais sp.	-	14	-
Streblospio benedicti	-	2181	528
Synelmis sp.	-	-	14
Undetermined Ampharetidae	-	14	14
Undetermined Capitellidae	-	500	-
Undetermined Cirratulidae	-	14	14
Undetermined Lumbrineridae	-	14	-
Undetermined Maldanidae	-	14	42
Undetermined Phyllodocidae	-	-	28
Undetermined Polychaeta	-	14	-
Undetermined Polynoidae	-	14	28
Undetermined Sabellidae	-	42	14
Undetermined Sigalionidae	-	14	-
Undetermined Spionidae	-	236	431
Websterinereis tridentata	14	-	-
Thoracica			
Balanus sp.	-	14	-
Tanaidacea			
Apseudes sp.	-	69	-

Phytoplankton taxa list and densities (#/mL) for St. Augustine faciliy #2, collected via subsurface grabs in the Matanza River on 7 April, 1998.

	Control Site	Test Site 1	Test Site 2
Bacillariophyceae			
Achnanthes sp.	-	-	15
Anomoeneis sp.	-	7	-
Asterionella sp.	-	170	23
Biddulphia sp.	-	30	8
Chaetoceros sp.	974	-	-
Cocconeis sp.	10	-	15
Corethron sp.	68	7	-
Coscinodiscus sp.	49	37	31
Cyclotella sp.	127	44	108
Cylindrotheca sp.	58	214	39
Entomoneis sp.	10	-	-
Fragilaria sp.	-	-	31
Leptocylindrus sp.	97	-	-
Melosira sp.	-	7	131
Navicula sp.	10	22	-
Nitzschia sp.	78	103	85
Pennales sp.	58	22	77
Rhizosolenia sp.	10	15	8
Skeletonema sp.	234	362	370
Thalassiosira sp.	-	37	15
Thalassiothrix sp.	-	7	15
Chlorophyceae			
Chlamydomonas sp.	19	-	39
Cosmarium sp.	-	7	-
Dunaliella sp.	-	-	15
Pediastrum sp.	-	-	8
Pyramimonas sp.	19	22	-
Scenedesmus sp.	-	-	46
Selenastrum sp.	10	-	-
Spermatozoopsis sp.	-	-	8
Tetraedron sp.	-	-	8
Tetraselmis sp.	19	44	54
Tetrastrum sp.	-	-	8
Chrysophyceae			
Undetermined Chrysophyceae	10	-	-
Cryptophyceae			
Chroomonas sp.	29	22	23
Cyanophyceae			
Aphanocapsa sp.	-	-	8
Dactylococcopsis sp.	10	-	69
Lyngbya contorta	-	-	8

Dinophyceae			
Undetermined Dinophyceae	-	7	-
Euglenophyceae			
Euglena sp.	-	7	-

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)

