

Biological Assessment of

St. Augustine Wastewater Treatment Plant #2

St. Johns County

NPDES #FL0021989

Sampled January and February 1993

June 1993

Biology Section
Division of Technical Services

Department of Environmental Regulation

Results of Fifth Year Inspections

Discharger: City of St. Augustine Wastewater Treatment Plant #2
County: St. Johns
NPDES Number: FL0021989
State Permit Expiration Date: 28 November 1993

Toxics Sampling Inspection (XSI)

Date Sampled: 25 January 1993

Results: No organic constituents were detected in the effluent sample above practical quantitation limits. The only metal found above practical quantitation limits was an innocuous concentration of iron, at 31 µg/L.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 25 January 1993

Results: The sample of final effluent was not toxic to either the cladoceran, *Ceriodaphnia dubia,* or to the fish, *Notropis leedsi.* No mortality occurred during the 48 hour bioassays.

Impact Bioassessment Inspection (IBI)

Date Sampled: 25 January and 1 February 1993

Results: Benthic macroinvertebrate populations were not degraded, as demonstrated by high taxa richness and Shannon-Weaver diversity. The phytoplankton community was not adversely affected by the discharge. Populations were typical of oligotrophic conditions, and were strongly dominated by diatoms (mainly *Skeletonema* sp.). Chlorophyll *a* was below detection limits at all study sites. Total and fecal coliform bacteria were well below Class III standards in the effluent, and study sites.

Water Quality Inspection (WQI)

Date Sampled: 25 January and 1 February 1993

Results: Phosphorus-containing compounds and nitrate-nitrite were relatively high in the effluent, but were low or undetected at the study sites. Algal growth potential results corresponded with nutrient concentrations. Growth of *Selenastrum capricornutum* was high in the discharge, but the marine alga, *Dunaliella tertiolecta,* indicated no enrichment problems in receiving waters.

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

Introduction

The City of St. Augustine Wastewater Treatment Plant #2 is located on Fish Island Road in St. Augustine, St. Johns County, Florida (see maps in Appendix). This 1.0 MGD design flow facility is one of two that serve the city of St. Augustine. Domestic waste is treated by a complete mix activated sludge system, with disinfection, sulfur dioxide dechlorination, and post aeration before discharge to the Matanzas River (Intracoastal Waterway).

State permit limits are as follows: BOD_5 and TSS (maximum of 60 mg/L, weekly average of 45 mg/L, annual average of 20 mg/L), TKN (annual average of 14 mg/L), dissolved oxygen (minimum of 5.1 mg/L), pH (6.0 to 8.5), fecal coliforms (daily maximum of 800 organisms/100 mL, annual average of 200 organisms/100 mL), and total residual chlorine (minimum of 0.5 mg/L for disinfection, maximum of 0.01 mg/L at discharge).

During the past year, no permit violations have been noted, although a routine inspection in June, 1992, revealed some minor deficiencies in sample collection and recording of data. In June, 1990, the effluent was toxic to *Mysidopsis bahia* (see Facility Summary in Appendix). Generally, problems with this facility have been promptly addressed and solved.

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 in the Intracoastal Waterway at Channel Marker 32) and two test sites bracketing the discharge (see maps in Appendix). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *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, 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. Collection methods consisted of three Ponar dredges per station. Phytoplankton was collected via subsurface grabs. Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). Bacterial populations were analyzed for total and fecal coliforms follow-

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	62	74	66
Shannon-Weaver Diversity	4.2	4.3	3.9
% Polychaeta	40.8	64.9	64.0
% Phoronida	18.3	1.0	1.5
% Crustacea	12.6	11.1	13.4
% Pelecypoda	7.7	13.1	14.4
% Chordata	8.2	0	0
% Nemertina	2.5	3.8	3.2
% Other	9.9	6.1	3.5
% Surface Deposit Feeders	19.8	28.4	49.7
% Suspension Feeders	46.8	21.7	24.4
% Sub-surface Deposit Feeders	28.1	35.7	15.4
% Predator/Carnivores	3.3	7.7	4.7
% Plant Piercers	1.0	5.2	3.4
% Other	1.0	1.3	2.4
Phytoplankton Algae			
Number of Taxa	9	16	17
% Contribution of Dominant Taxon	63.6	59.4	72.5
Chlorophyll a (µg/L)	< 0.5 U	< 0.6 U	< 0.6 U
% Diatoms	100	93.5	97.8
% Green	0	5.7	0.7
% Dinoflagellates	0	0	1.4
% Other	0	0.6	0
Algal Growth Potential (mg dry wt/l)	6.54	0.57	2.29

ing the methods of APHA (1989). Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism for the freshwater effluent and *Dunaliella tertiolecta* for the estuarine study sites, followed Miller *et al.* (1978) and EPA (1974). Sediment from reference and test sites was analyzed for grain size and percent organic matter (Ross 1990).

Explanation of Measurements of Community Health

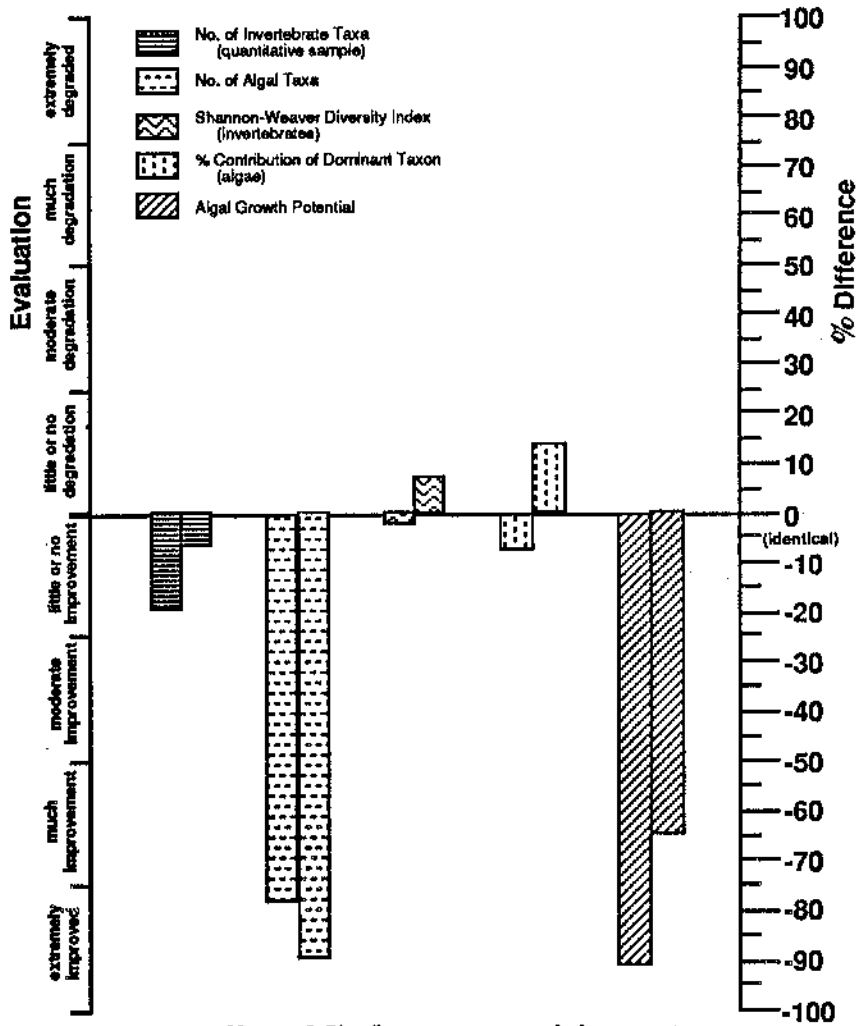
Several different measurements of macroinvertebrate and algal community health have been employed in this report. Many of these, such as the number of taxa, Shannon-Weaver Diversity Index, and chlorophyll *a* are well known. Others are briefly explained here. Excessive numerical dominance of a single 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 (for % composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (for functional feeding groups).

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, and the diversity index are measured as the reference site minus test site divided by the reference site. The 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: Scott Bulgrin and Lindy Payne (DER Northeast District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Roberto Llánso, Kathleen Lurding, Elizabeth Miller, Kim Pearce, Landon Ross, Urania Quintana, and Greg Wynn (Tallahassee Biology Laboratory).

Results and Discussion

All three study sites were located in fairly high salinity areas of the Intracoastal Waterway, bordered by



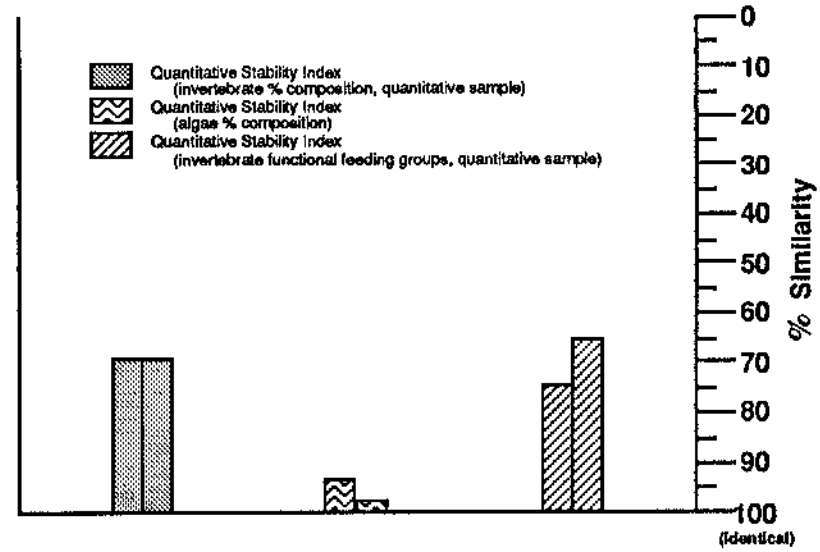
Effect of discharge on receiving water
(measured as difference between control and test sites).
(Left bar represents comparison between control site and test site 1; right bar represents comparison between control site and test site 2.)

Spartina marsh. The two test sites were subject to stormwater runoff from nearby residential areas, as well as the influence of the wastewater treatment facility. Habitat scores were relatively high for all sites, with 84 points for the reference and 72 points for each test site (Appendix). Dissolved oxygen was adequate at the three stations (7.7 to 8.5 mg/L), and temperature ranged from 13.1 to 15.6 °C. The pH was similar at all study sites: 7.6 at the reference site, 8.2 at test site 1, and 8.1 at test site 2. Salinity was lower at the reference site (19 ppt, compared to 29 ppt at both test sites) (Appendix).

The only organic constituent detected in the effluent sample was atrazine, at a level below the practical quantitation limit (0.12 µg/L). Metals were also largely undetected, as iron was found at 31 µg/L, and zinc was detected below the quantitation limit at 8 µg/L.

The sample of final effluent was not toxic to either test organism, *Ceriodaphnia dubia* or *Notropis leedsi*. No mortality occurred during the 48 hour bioassays (Appendix).

Some nutrients were relatively high in the effluent, particularly nitrate-nitrite (8.8 mg/L) and phosphorus (1.9 and 1.7 mg/L for ortho and total phosphorus, respectively). The effluent did not negatively affect the nutrient regime of the test sites, since nutrient compounds there were either undetected, below quantitation limits, or at levels that do not cause enrichment problems (see Chemistry Summary Table). A previous water quality study conducted in this area of the Matanzas River also concluded that there were no problems with nutrient enrichment, probably because of the rapid dilution in the receiving waters (Daigle 1992). As expected, the reference site was also low in nutrients.



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.)

Algal growth potential corresponded to the observed nutrient concentrations. Growth of *Selenastrum capricornutum* was elevated in the effluent, yielding 77.2 mg dry wt/L. However, dry weights of *Dunaliella tertiolecta* at the test sites (0.57 mg dry wt/L and 2.3 mg dry wt/L at test sites 1 and 2, respectively) were substantially below the "problem threshold" of 10 mg dry wt/L. Dilution or rapid assimilation probably accounts for the low AGP's adjacent to the discharge. The AGP at the reference site was 6.5 mg dry wt/L, still below levels expected to contribute to eutrophication.

Total and fecal coliform bacteria were well within Class III standards in the effluent, and at reference and test sites (see Chemistry Summary Table).

Benthic macroinvertebrate populations were healthy and diverse at all study sites. 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 similarities (lower percentages) generally correspond with greater degradation, unless the test sites are better than the reference site. The average abundance of each individual taxon appears in the Appendix.

Taxa richness was excellent at the reference site (62 species), as well as at both test sites (66 to 74 species), being greater than 90% of typical Florida estuaries. Similarly, Shannon-Weaver diversity also indicated healthy conditions at all study sites (ranging from 3.8 to 4.3). These diversity values exceeded 77% to 85% of other Florida estuaries (see list of typical values in Appendix). All stations were dominated by a rich polychaete fauna (40% to 60% of the population). While 18% of the reference site community was composed of phoronids (*Phoronis* sp.), only 1% to 1.5% of the test site populations consisted of this taxon. However, all

three stations were quite similar with respect to the numbers of pollution sensitive epi-benthic crustaceans present, ranging from 11% to 13% of the total community. Taxa considered sensitive to contaminant stress, such as *Ampelisca* sp., *Corophium* sp., Cirratulidae spp., and *Sthenelais limicola*, were represented at all stations (Chang et al. 1992), further suggesting the lack of anthropogenic effects. The relatively minor differences in macroinvertebrate assemblages observed between the reference and test sites shown by the Quantitative Stability Indices were probably related to variations in substrate or salinity regime.

The phytoplankton community was composed almost exclusively of diatoms at the two test sites. Diatoms were the only group found at the reference site. The dominant taxon throughout the study area was *Skeletonema* sp., a cosmopolitan diatom capable of tolerating a wide range of environmental conditions (Livingston and Prasad 1989). Quantitative stability indices further demonstrated the close similarity of phytoplankton assemblages. Species richness at the reference site (9) was a bit lower than the 16 and 17 taxa found at test sites 1 and 2, respectively. Chlorophyll *a* was undetected at all study sites, indicating that oligotrophic conditions currently prevailed. Historic data from the 305(b) Report show this reach of the Matanzas River to be relatively low in chlorophyll *a* (with a median value of 2 µg/L) (Hand and Paulic 1992). The median chlorophyll *a* value throughout the 10 Matanzas River stations studied by Daigle (1992) was 5.7 µg/L, also a non-problem level.

Conclusions

The sample of final effluent was not toxic to either the cladoceran, *Ceriodaphnia dubia*, or to the fish, *Notropis leedsi*. No mortality occurred during the 48 hour bioassays.

No organic constituents were detected in the effluent sample above the practical quantitation limit. The only metal found above this limit was an innocuous concentration of iron, at 31 µg/L.

Phosphorus-containing compounds and nitrate-nitrite were relatively high in the effluent, but were low or undetected at the study sites. Algal growth potential results corresponded with nutrient concentrations. Growth of *Selenastrum capricornutum* was high in the discharge, but the marine alga, *Dunaliella tertiolecta*, indicated no enrichment problems.

Total and fecal coliform bacteria were well within Class III Water Quality Standards in the effluent, and at reference and test sites.

Benthic macroinvertebrate populations showed no signs of degradation at the reference site, or in the vicinity of the discharge. Taxa richness and diversity were higher than most typical estuarine systems.

No detrimental effects on the phytoplankton community were noted in this study. Populations were typical of oligotrophic conditions, with very low biomass as chlorophyll *a*. Diatoms dominated at test sites, and were the only group found at the reference site, particularly *Skeletonema* sp., a very common and cosmopolitan taxon.

Literature Cited

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Chemistry summary table for

City of St. Augustine WWTP	Effluent	Reference Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
Atrazine	0.12 T			
Metals (ug/L)				
Aluminum	50 U			
Antimony	15 U			
Arsenic	20 U			
Cadmium	0.08 U			
Copper	5 U			
Chromium	10 U			
Iron	31 A			
Lead	15 U			
Mercury	0.1 U			
Nickel	5 U			
Selenium	30 U			
Silver	0.08 U			
Zinc	8 T			
Nutrients (mg/L)				
Ortho-phosphate	1.9	0.031 TQ	0.020 U	0.020 U
Total phosphorus	1.7	0.065	0.040 T	0.048 T
Ammonia	0.051	0:20 K	0.020 U	0.020 U
Nitrate+Nitrite	8.8	0.083	0.056 T	0.050 T
TKN	0.90	0.57	0.36 A	0.31
Other Parameters				
Habitat Assessment		84	72	72
D. O. (mg/L)	6.6	8.5	7.7	8.0
pH (SU's)	7.1	7.6	8.2	8.1
Specific Conductance or Salinity	1280 µmhos/cm	19 ppt	29 ppt	29 ppt
Temperature (°C)	18.3	13.1	15.6	15.4
Algal Growth Potential (mg dry wt/L)	77.2	6.5 Q	0.6	2.3
BOD5 (mg/L)	1.0	0.6	0.6	0.5
TSS (mg/L)	2	3	20	19
Bioassay Fish	Not Toxic			
Bioassay Invertebrate	Not Toxic			
Fecal Coliform (org/100 mL)	< 20	80	40	< 20
Total Coliform (org/100 mL)	80	80	40	20

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

K - Actual value is known to be less than value given

Q - Sample held beyond normal holding time

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

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: City of St Augustine #2		**Date Summary Prepared :** Feb 2, 1993
Location (attach detailed map): Fish Island Rd. St Augustine, FL	**County** St. Johns County	**District** FDER Northeast District
Federal Permit # FL0021989 **and expiration date:** exp. 04/30/94	**State GMS # and** 3155MC0311 **State expiration date:** exp. 11/28/93	**Facility Type:** Industrial [Municipal] Federal Agricultural Other (list):

Function of facility: A domestic waste water treatment facility/ 1 of 2 waste water treatment facilities serving the City of St Augustine.

Description of treatment process:
Treatment process consists of a 1.0 MGD complete mix activated sludge sewage treatment plant with sulphur dioxide dechlorination and post aeration effluent discharge to existing outfall to the Matanzas River (Intracoastal Waterway). See attached flow diagram.

Receiving waters: Matanzas River (Intracoastal Waterway)		**Classification:** I II [III]	
Design Flow: 1.0 MGD	**Mean Flow:** .5316 MGD	**Flow during survey:** .425	

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

therefore, the best time to sample is: Anytime

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

N/A Facility has no mixing zone.

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

Parameter	Limit (units)
A. See attachment A for NPDES effluent limits.	
B. See attachment B for FDER effluent limits.	

Describe special permit conditions and permit modifications:
1. FDER permit requires facility to provide assistance in the cooperative Matanzas River monitoring program under negotiation with the Department for generating data for WQBEL's.

City of St. Aug. #2
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s): Discharge of treated effluent is to the Matanzas River (ICW) directly southeast of the SR 312 bridge. The outfall is near channel marker 15, 450 feet south of the 312 bridge and 100 feet from the east bank.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: No permit violations or permit non-compliance actions have been recorded for St. Aug. WWTP #2 within the past year. Monthly Operating Reports are in compliance with permit specifications. One plant upset occurred. On 5/5/90 the Department was notified by John Black, WWTP supervisor, that the chain link rake problem with its sludge collecting arm. Flow was diverted to Anastasia Sanitary District. The Department was informed on 5/11/90, that all repairs were completed and influent had been returned back to the proper plant.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
A Routine Inspection on 6/19/92 revealed:
1. effluent samples are hand composited at 150 mLs each regardless of flow. Samples should be flow proportioned per FAC 17-160.
2. Composite sample data not logged. Collection times, volumes and collectors' names should be recorded.
A letter was received on 8/21/92 from the city of St. Augustine stating that these problems had been addressed and were being corrected.

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:
There are no problems in the data set. Permit parameters and conditions are being met and complied with. St. Augustine WWTP #2 personnel continue to be helpful and cooperative during FDER inspections. In addition, they are quick to correct any deficiencies.

Additional information: A WQI on several sites on the Matanzas River (ICW) is currently being conducted by the FDER, Northeast District, Water Facilities Section.
2. A bioassay toxicity test report dated 6/28/90 indicated toxicity to Mysidopsis bahia. These results are in non-compliance with their NPDES permit #FL0021989.

Staff contributing to this review (signature):

Scott Bulgin	(Biologist)
Cindy Payne	ES.I [redacted]
	(Engineer)
	( )
	( )
	( )

PERMITTEE:

City of St. Augustine #2

I.D. Number: 3155M00811
Permit Number: D055-154937
Date of Issue: November 28, 1988
Expiration Date: November 28, 1993

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

PARAMETER	ANNUAL AVERAGE	MINIMUM FREQUENCY	SAMPLE TYPE	SAMPLE LOCATION
Flow (mgd)	1.0	Continuous	See A	Influent or Effluent
*BOD_5 (mg/l)	20	Weekly	16-hour composite	Influent and Effluent
*TSS (mg/l)	20	Weekly	16-hour composite	Influent or Effluent
TKN (mg/l)	14	Weekly	See B	Effluent
DO (mg/l)	5.1 Minimum	Continuous	See B	Effluent
pH Units	6.0 - 8.5	Continuous	See B	Effluent
Chlorine**** Residual(mg/l)	0.5 Minimum 1.0 Maximum	Continuous	See B	Effluent
Fecal Coliform no./100 (ml)	200***	Weekly	Grab	Effluent

* or 90% removal, whichever is more stringent.

	ANNUAL	MONTHLY	WEEKLY	ONE TIME MAXIMUM
BOD_5	20	30**	45**	60**
TSS	20	30**	45**	60**

** Rule 17-6.180

*** Monthly average

**** Chlorine residual after dechlorination 0.01 mg/l

A. Recording flowmeter and totalizer required.

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

13. Prior to sixty (60) days before the expiration of this permit, the permittee shall apply for a renewal of the permit on forms and in a manner prescribed by the Department, Section 17-4.09, FAC.

14. Waste sludge disposal shall be in accordance with Part IV of Chapter 17-7, FAC. Sludge which has not been analyzed pursuant to FAC Rule 17-7.54(2) shall be disposed of at permitted or exempted solid waste disposal sites pursuant to FAC Rule 17-7.03(2), or as otherwise provided in FAC Rule 17-7.54(6).

Attachment B

PART I

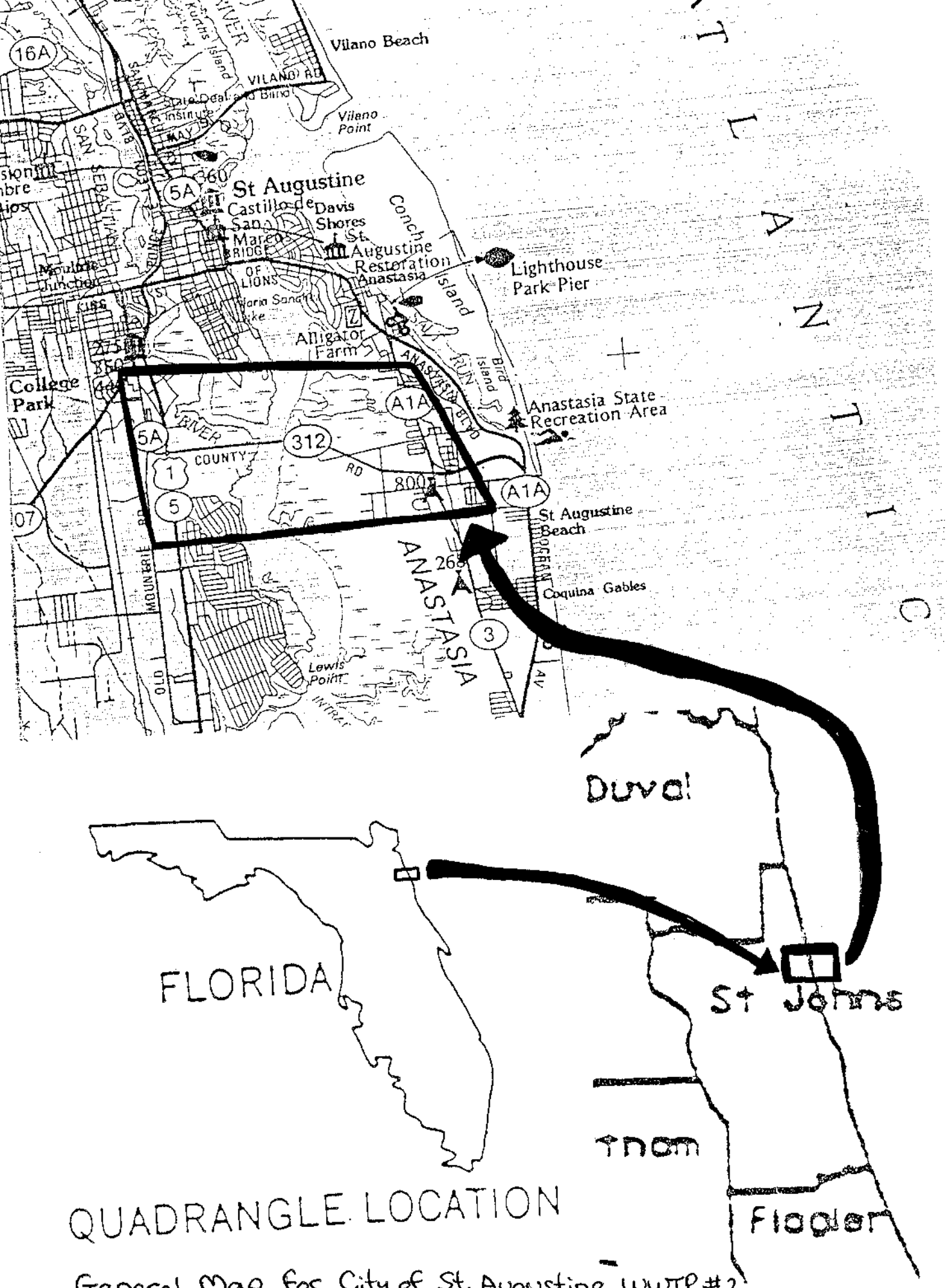
A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - FINAL

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 001, sanitary wastewater.

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

PARAMETER	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	Annual Average	Monthly Average	Weekly Average	Daily Maximum	Measurement Frequency	Sample Type	Sample Point
Flow, MGD	--	Report	Report	--	Continuous	Recording Flow Meter & Totalizer	Effluent
Biochemical Oxygen Demand (5 Day), mg/l	20.0	30.0	45.0	60.0	Weekly	16 hr. composite	Influent & Effluent
Total Suspended Solids, mg/l	20.0	30.0	45.0	60.0	Weekly	16 hr. composite	Influent & Effluent
Total Kjeldahl Nitrogen, as N, mg/l	14.0	17.5	--	28.0	Weekly	16 hr. composite	Effluent
Fecal Coliform Bacteria, N/100 ml	200	--	--	800	Weekly	Grab	Effluent
Total Residual Chlorine, mg/l	--	--	--	0.01	Hourly*	Grab*	Effluent
pH	See Item 5 on Page I-2				Hourly*	Grab*	Effluent
Dissolved Oxygen shall not be less than 5.1 mg/l					Hourly*	Grab*	Effluent

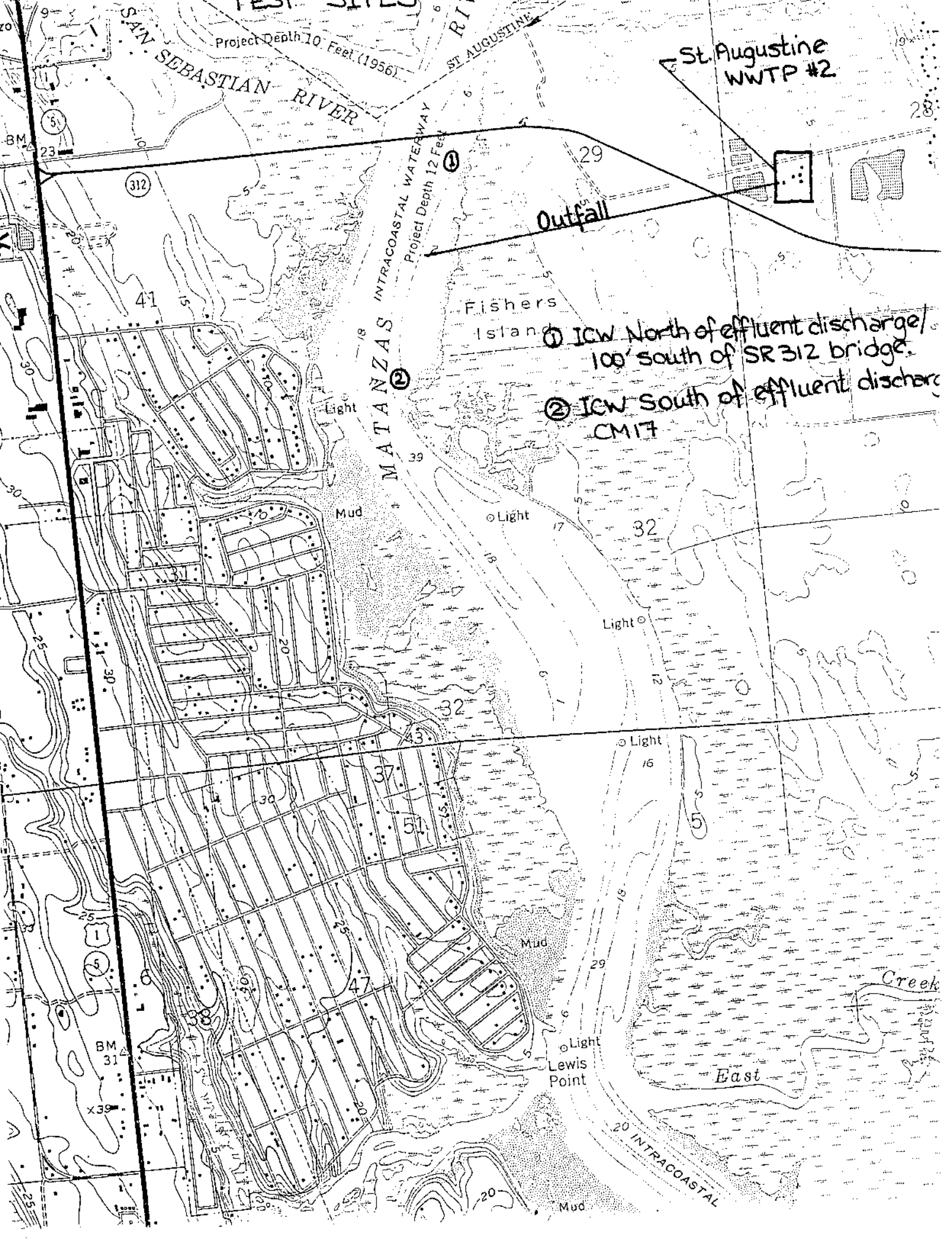
* Hourly grab measurements during the period of required operator attendance.

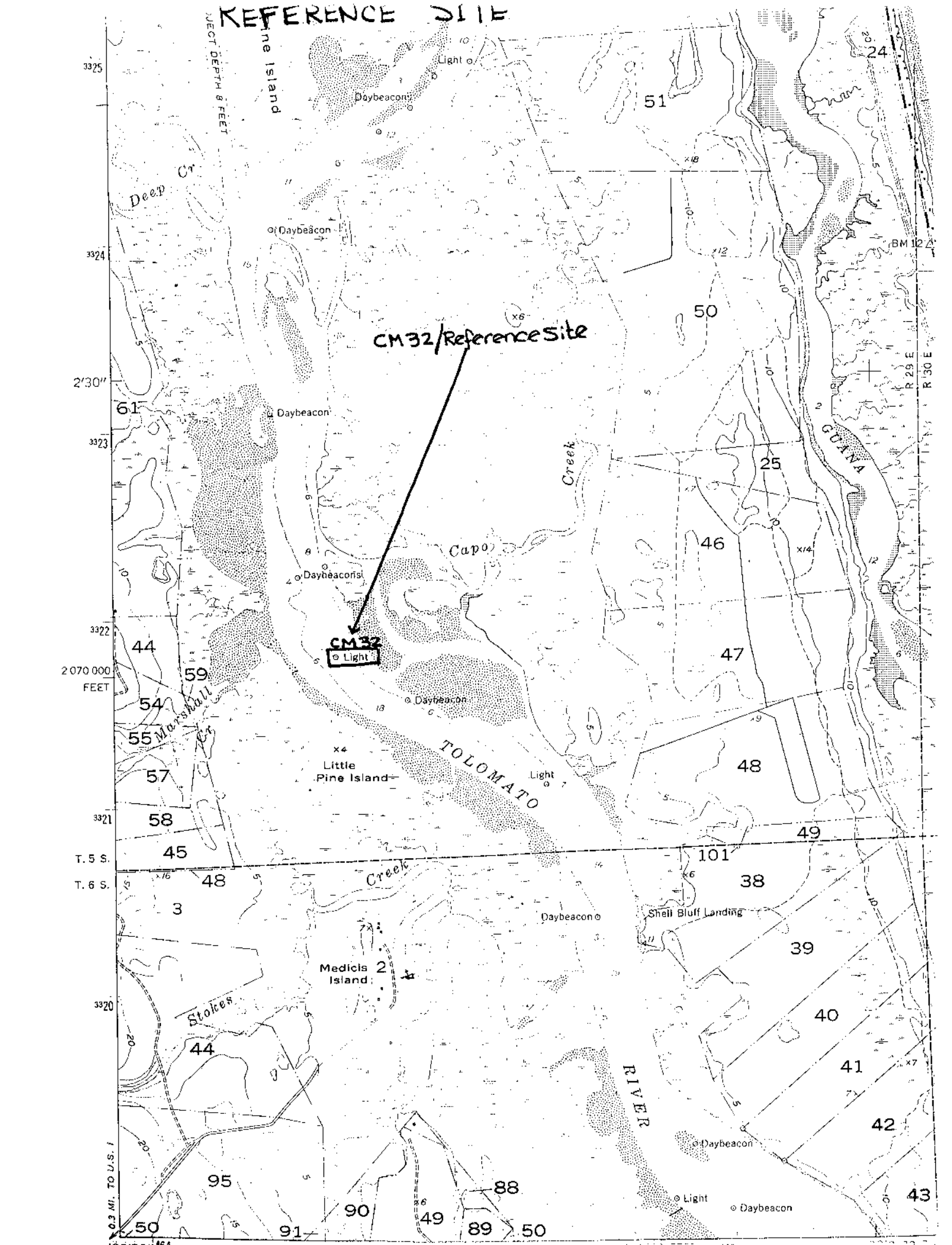


QUADRANGLE LOCATION

General Map for City of St. Augustine WWTP #2
Fifth Year Study


TO JACKSONVILLE
REFERENCE SITE
TEST SITE 1
TEST SITE 2
ST. AUGUSTINE
Pop. 11,985
CASTILLO DE SAN MARCOS NATIONAL MONUMENT
ST. AUGUSTINE DELIMITED AREA Est. Pop. 9,750
ST. AUGUSTINE AIRPORT
TOLOMOTO RIVER SEAPLANE BASE
GUANO RIVER WILDLIFE MANAGEMENT AREA
Guano Lake
Twelvemile Swamp
Big Island Swamp
Cabbage Swamp
Dry Bay
Smeden Bay
Durbin
Hilden
Sampson
Bakersville
Molasses Jct. 33
Tocoi Junction
College Park
Usinas Beach
Vilano Beach
St. Augustine Inlet
South Ponte Vedra Beach
ANASTASIA
FLORIDA
EAST COAST RAILWAY
Twelvemile Creek
Turnbull Creek
Sixmile Creek
Fivemile Swamp
Nine Mile Road
Palm Valley Road
Durbin Creek
Sampson Road
Mill Creek Road
Trestle
Couch Swamp
Cowpen Swamp
Whites Ford
Durbin Tower
Bakersville Tower
Glimpse of Glory
Spanish Landing
Shell Bluff Landing
Cook's Landing
Booth Landing
Casa Cola
Capos Is.
Pine Is.
Little Pine Island
Simone Is.
Masters Is.
Sixmile Neck
Red House
Sampson Cem.
Rest Area
Twentymile Road
Jenkins Rd
A1A
US 1
US 5
US 9
US 95
US 210
US 16
US 13A
US 208
US 214
US 207
US 312
SR 5A
SR A1A


St. Augustine
WWTP #2
Outfall
Project Depth 10 Feet (1956)
SAN SEBASTIAN RIVER
ST AUGUSTINE
INTRACOASTAL WATERWAY
Project Depth 12 Feet
MATANZAS
Fishers
Island
① ICW North of effluent discharge/
100' south of SR 312 bridge.
② ICW South of effluent discharg
CM17
Mud
Light
Lewis
Point
East
Creek
INTRACOASTAL
BM
312


REFERENCE SITE
CM32/Reference Site
CM32
Light
Daybeacon
Deep Cr
Pine Island
Creek
Capo
Marshall Cr
TOLOMATO
Little Pine Island
Medicis Island
Stokes
Shell Bluff Landing
GUANA
RIVER
BM 12
R 29 E
R 30 E
T. 5 S.
T. 6 S.
2'30"
2 070 000 FEET
0.3 MI. TO U.S. 1

MARINE BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL DEP Northeast District	STORET STATION NUMBER: 27010202	DATE (M/D/Y): 02/01/93	RECEIVING BODY OF WATER: Intracoastal waterway

REMARKS: Latitude 30° 01' 41.9" Longitude 081° 21' 45.8"	LOCATION: Intracoastal waterway at channel marker 32	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 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 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 9	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 84

COMMENTS: This site was chosen for the City of St. Augustine WWTP #2 study as a reference site. Area unimpacted and tidally influenced. Marsh, natural beach and oysterbars present

ANALYSIS DATE:	ANALYST:	SIGNATURE:
02/01/93	SCOTT BULGRIN	Scott Bulgrin

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL DER NorthEast District	STORET STATION NUMBER: 27010202	DATE (M/D/Y): 02/01/93	TIME: 1130	RECEIVING BODY OF WATER: Intracoastal Waterway

REMARKS: Latitude 30°01'41.9" Longitude 081°21'45.8" Area tidally influenced and mostly saturated	LOCATION: Intracoastal Waterway at Channel Marker 32	FIELD ID/NAME: (Reference Site)

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
						100

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

Local Watershed NPS Pollution (check box): No evidence ☒ Some potential sources ☐ Obvious sources ☐
- STORMWATER Runoff

Point-Source Pollution (list location and describe): None

Estimated System Width (range, m): 300m-500	Estimated System Depth (range, m): 0.2-7	Impounded ☐ yes ☐ NO
High Water Mark (m above bed): 0.4-0.8	Velocity (range, m/s): 0.2-0.3	Channelized ☐ yes ☐ NO

Canopy Cover % : Open : ☒ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐

Sediment Oils: Absent: ☒ Slight: ☐ Moderate: ☐ Profuse: ☐

Sediment Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☒ Sand: ☒ Shell: ☒ Other: ☐

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Riffles			
Leaf Packs				Sand	60	3	PONAR
Aquatic Vegetation				Mud/Muck/Silt	30	3	PONAR
Rock or Shell Rubble	10	3	PONAR	Benthic leaf mats			
Undercut Banks/Roots				Other:			

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):	SALINITY *		Secchi (m):
Top	1	13.1	7.57	8.45	23,025	19		1.0
Mid-depth	6.5	13	7.45	8.38	23,000	16		
Bottom	13	13	7.41	8.58	18,000	15		

System Type : Stream: ☐ (Sand Bottomed / Sand Bot w/ Spring / Swamp & Bog / Calcareous / Alluvial / Misc.) Lake: ☐ Wetland: ☐ Estuary: ☒ Other: ☒ MARINE RIVER

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): ☒ Slight Clear: ☒ Other: ☐

Weather Conditions: NW WIND Partly Cloudy, water rough Salinity low due to weather conditions

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

SAMPLING TEAM: SCOTT BULGRIN, Lindy Payne	SIGNATURE: Scott Bulgrin, Lindy Payne	DATE: 02/01/93

* Salinity usually higher under normal conditions 33 ‰ - 35 ‰

MARINE BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL DER Northeast District	STORET STATION NUMBER: 27010200	DATE (M/D/Y): 01/25/93	RECEIVING BODY OF WATER: St. Augustine WWTP Effluent discharge to Intracoastal waterway

REMARKS: Latitude 29° 51' 58.5" Longitude 081° 18' 32.5"	LOCATION: Intracoastal Waterway North of St. Augustine WWTP # 2 Discharge, 100' south of SR 312.	FIELD ID/NAME: (TEST SITE #1)

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 9	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 35	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 6	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 72

COMMENTS: Sampling taken on East Bank of Intracoastal Waterway. Area is mainly marsh with no development on the east bank. Close to SR 312 Bridge. Area tidally influenced.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
01/25/93	SCOTT BULGRIN	Scott Bulgrin

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL DER NorthEast District	STORET STATION NUMBER: 27010200	DATE (M/D/Y): 01/25/93	TIME: 0845	RECEIVING BODY OF WATER: St. Augustine WWTP Effluent discharge to Intracoastal Waterway

REMARKS: Latitude 29°51'58.8" Longitude 081°18'32.3" Samples taken on East Bank of Icw.	LOCATION: Intracoastal Waterway North of St. Augustine WWTP #2 Discharge, 100' South of SR 312	FIELD ID/NAME: (TEST SITE #1)

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
			40			60

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

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

Point-Source Pollution (list location and describe): City of St. Augustine WWTP #2; City of St. Augustine WWTP #1 (above SR 312); Also Anastasia Sanitary District WWTP (South of SR 312); → Stormwater Runoff From SR 312

Estimated System Width (range, m): 600-800m	Estimated System Depth (range, m): 0.2-8	Impounded ☐ yes ☐ NO
High Water Mark (m above bed): 0.6-1.0	Velocity (range, m/s): usually 0.35 too rough 1/25/93	Channelized ☐ yes ☐ NO

Canopy Cover % : Open : ☒ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐

Sediment Oils: Absent: ☒ Slight: ☐ Moderate: ☐ Profuse: ☐

Sediment Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☒ Sand: ☒ Shell: ☒ Other: ☐

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Riffles			
Leaf Packs				Sand	60	3	PONAR
Aquatic Vegetation				Mud/Muck/Silt	30	3	PONAR
Rock or Shell Rubble	10	3	PONAR	Benthic leaf mats			
Undercut Banks/Roots				Other:			

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):	SALINITY		Secchi (m):
Top	1	15.6	8.10	7.70	37050	29		1.6
Mid-depth	6	15.6	8.18	7.75	37050	29		
Bottom	12	15.6	8.06	7.60	37000	28		

System Type : Stream: ☐ (Sand Bottomed, Sand Bot w/ Spring, Swamp & Bog, Calcareous, Alluvial, Misc.) Lake: ☐ Wetland: ☐ Estuary: ☒ Other: ☒ MARINE RIVER

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): ☒ Slight Clear: ☒ Other: ☐

Weather Conditions: Sunny, Cold. (Partly cloudy) Northeast winds, Seas rough.

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

SAMPLING TEAM: SCOTT BULGRIN, Lindy Payne	SIGNATURE: Scott Bulgrin, Lindy Payne	DATE: 01/25/93

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL DER Northeast DISTRICT	STORET STATION NUMBER: 27010201	DATE (M/D/Y): 01/25/93	RECEIVING BODY OF WATER: St. Augustine WWTP effluent discharge to Intracoastal Waterway
REMARKS: Latitude 29°51'25.1" Longitude 081°18'49.2"	LOCATION: Intracoastal Waterway South of St. Augustine WWTP #2 Discharge at Channel Marker 17		FIELD ID/NAME: (TEST SITE #2)

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 9	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 35	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 6	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 72

COMMENTS: Sampling taken on East bank of Intracoastal waterway. Area is mainly marsh with no development on the east bank. Area tidally influenced.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
01/25/93	SCOTT BULGRIN	Scott Bulgrin

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL DER NorthEast District	STORET STATION NUMBER: 27010201	DATE (M/D/Y): 01/25/93	TIME: 0945	RECEIVING BODY OF WATER: St. Augustine WWTP effluent discharge to Intracoastal waterway

REMARKS: Latitude 29°51'25.9" Longitude 081° 18' 44.2" mainly Samples taken on East Bank. Marsh Plants	LOCATION: Intracoastal Waterway South of St. Augustine WWTP #2 Discharge at channel marker 17	FIELD ID/NAME: (TEST SITE #2)

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
			40			60

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

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

Point-Source Pollution (list location and describe): City of St. Augustine WWTP #2 along with City of St. Augustine WWTP #1 (Colonial SR 312) Also Sanitary District Annexation WWTP discharge (South) → Stormwater Runoff from SR 312

Estimated System Width (range, m): 600-800m	Estimated System Depth (range, m): 1-8	Impounded ☐ yes ☐ NO
High Water Mark (m above bed): 0.6-1.0	Velocity (range, m/s): 0.3L	Channelized ☐ yes ☐ NO

Canopy Cover % : Open : ☒ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐ _____

Sediment Oils: Absent: ☒ Slight: ☐ Moderate: ☐ Profuse: ☐

Sediment Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☒ Sand: ☒ Shell: ☒ Other: ☐

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Riffles			
Leaf Packs				Sand	60	3	PONAR
Aquatic Vegetation				Mud/Muck/Silt	30	3	PONAR
Rock or Shell Rubble	10	3	PONAR	Benthic leaf mats			
Undercut Banks/Roots				Other:			

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):	Salinity		Secchi (m):
Top	1	15.4	8.10	8.00	37000	29		1.6
Mid-depth	8.0	15.4	8.26	8.02	37050	29		
Bottom	16	15.4	8.10	7.95	37000	29		

System Type : Stream: ☐ (Sand Bottomed, Sand Bot w/ Spring, Swamp & Bog, Calcareous, Alluvial, Misc.) Lake: ☐ Wetland: ☐ Estuary: ☒ Other: ☒ MARINE RIVER

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): ☒ Slight Clear: ☒ Other: ☐ _____

Weather Conditions: Sunny (Partly cloudy) Cold. NorthEast winds. Seas rough.

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

SAMPLING TEAM: SCOTT BULGRIN, Lindy Payne	SIGNATURE: Scott Bulgrin, Lindy Payne	DATE: 01/25/93

Sample Source: St. Augustine WWTP #2
Location:
County:
Contact/District: Lindy Peyton / NE
NPDES Permit #: FL00 ~~45~~ LIMS# KWP 1-27-93 Outfall #:

Sample Collection: Date 1-25-93 Time 12:00
Test Beginning: Date 1-26-93 Time 12:30
Test Ending: Date 1-28-93 Time 1400
Organism Batch #: Diluent Batch #:
Organism Age: < 24 hrs
Test Organism: Ceriodaphnia Dubia

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

Test Number: 1 of 2

Remarks:
48589 93 JAN 26-22

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
0 hr	7.0 @ 7.0 10.0 @ 10.0	21.6 @ 21.7	8.6 @ 22.5	970 @ 1,000 9650 @ 10,000 @23.3
24 hr	7.0 @ 7.0 10.0 @ 10.0	21.6 @ 21.7	8.6 @ 22.5	970 @ 1,000 9700 @ 10,000 @23.2
48 hr	7.0 @ 7.0 10.0 @ 10.0	21.8 @ 21.7	8.5 @ 22.1	965 @ 1,000 9700 @ 10,000 @23.3

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			Cond. (mmhos/cm) Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	A	5	5	5	~~*8.3~~		8.3	22.4		22.7	7.1		7.3	180		170
Control	B	5	5	5			8.3						7.3			175
Control	C	5	5	5			8.3						7.3			175
Control	D	5	5	5			8.3						7.3			190
100%	A	5	5	5	~~*7.8~~		8.5	22.2		22.8	6.9		7.2	1320		1265
100%	B	5	5	5			8.5						7.2			1310
100%	C	5	5	5			8.5						7.2			1340
100%	D	5	5	5			8.5						7.2			1380
			Control A		*8.1	TR										
			100% A		*7.9	1-26-93										
			recorded wrong #													
Measured/Loaded by:		TR	TR	TR	TM		MF	TM		MF	TM		MF	TM		MF
Recorded by:		TR	TR	TR	TR		TR	TR		TR	TR		TR	TR		TR

Investigators' Signatures
Tobin Rader
Marty Fandel
Tara Mikulski
Kim Pearce
Reviewer

20% DMW KWP 1-27-93

Water Quality Parameters	Salt Water/ Well Water	~~Phosphate Buffer~~ 20% Mln Water	Sample	Method	Measured by
Field Total Residual Cl2:			<0.01	DR-IQ	LP
Lab Total Residual Cl2:	.02	.01	.08	DR100	TR
Alkalinity:	120	70	1105	Hach	TM
Hardness:	120	80	400	Hach	TM
Total Ammonia:	0.0	0.0	0.17	Orion	MF

Cl_2 Blank: _____ Ammonia Meter Slope: -56.7 Ammonia Blank: 0.0 Sample Salinity: _____ ppt

form updated 10/20/92

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: St. Augustine WWTP #2
Location:
County:
Contact/District: Lindy Perryman/NE
NPDES Permit #: FL00 ~~48589~~ LIMS # Outfall #:
KWP 1-27-93

Sample Collection: Date 1-25-93 Time 12:00
Test Beginning: Date 1-26-93 Time 12:30
Test Ending: Date 1-28-93 Time 13:00
Organism Batch #: Diluent Batch #: WELL
Organism Age: 12 days
Test Organism: Notropis Leedsi

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

Test Number: 2 of 2

Remarks: 48589 93 JAN 26 22

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
0 hr	7.0 @ 7.0 10.0 @ 10.0	21.6 @ 21.7	8.6 @ 22.5	970 @ 1,000 9650 @ 10,000 @ 23.3
24 hr	7.0 @ 7.0 10.0 @ 10.0	21.6 @ 21.7	8.6 @ 22.5	970 @ 1,000 9700 @ 10,000 @ 23.2
48 hr	7.0 @ 7.0 10.0 @ 10.0	21.8 @ 21.7	8.5 @ 22.1	965 @ 1,000 9700 @ 10,000 @ 23.3

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temperature (°C) 0	24	48	D.O. (mg/L) 0	24	48	Cond. (mmhos/cm) Cond. (µmhos/cm) 0	24	48
Control	47	5	5	5	8.0	8.1	8.3	21.2	21.4	22.1	7.5	7.2	7.4	235	240	245
Control	219	5	5	5	8.0	8.2	8.3				7.5	7.2	7.4	240	250	250
100%	2	5	5	5	7.7	8.1	8.3	22.9	21.4	21.9	7.4	7.2	7.4	1405	1375	1400
100%	69	5	5	5	7.7	8.1	8.3				7.4	7.2	7.4	1405	1375	1400
Measured/Loaded by:		TM	TR	TR	TM	TR	MF	TM	TR	MF	TM	TR	MF	TM	TR	MF
Recorded by:		TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR

Investigators' Signatures
Tobin Rader
Mandi Faircloth
Tina Mikulasky
Kim Pearce
Reviewer

20% DMW KWP 1-27-93

Water Quality Parameters	Salt Water/ Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			<.01	DR 100	LB
Lab Total Residual Cl2:	.02	.01	.05	DR100	TR
Alkalinity:	120	40	1605	titrn	TM
Hardness:	120	80	400	titrn	TM
Total Ammonia:	0.0	0.1	0.156	Orion	MF

Cl2 Blank: Ammonia Meter Slope: -57 Ammonia Blank: 0.0 Sample Salinity: ppt

Phytoplankton taxa list for City of St. Augustine Wastewater Treatment Plant #2, collected via subsurface grabs in the Intracoastal Waterway, on 25 January, 1993. Densities are in number/mL.

	Reference Site	Test Site 1	Test Site 2
Diatoms			
Amphora sp.	32	–	–
Asterionella japonica	–	727	32
Biddulphia sp.	–	–	32
Chaetoceros sp.	–	253	253
Coscinodiscus sp.	–	32	32
Cyclotella sp.	32	–	32
Delphineis sp.	–	–	32
Diploneis sp.	32	–	32
Ditylum sp.	–	63	–
Eucampia sp.	–	–	95
Leptocylindrus sp.	–	32	126
Mastogloia sp.	–	–	32
Navicula sp.	32	32	63
Nitzschia spp.	190	411	221
N. closterium	32	126	95
N. longissima	–	32	–
N. seriata	–	32	–
Pleurosigma sp.	63	–	–
Rhizosolenia sp.	–	32	–
Skeletonema sp.	885	3191	3159
Synedra sp.	32	32	–
Thalassionema sp.	–	–	32
Thalassiosira sp.	–	32	–
Unidentified pennate diatom	63	–	–
Chlorophyta			
Unknown chlorophyte flagellates	–	316	32
Cryptophyta			
Cryptomonas sp.	–	32	–
Pyrrhophyta			
Peridinium sp.	–	–	32
Dinoflagellate cyst	–	–	32

Benthic macroinvertebrate taxa list for St Augustine Wastewater Treatment Plant #2, collected via Ponar grab samples in the Intracoastal Waterway, on 25 January, 1993. Densities represent the mean of three replicates, expressed as number/m^2.

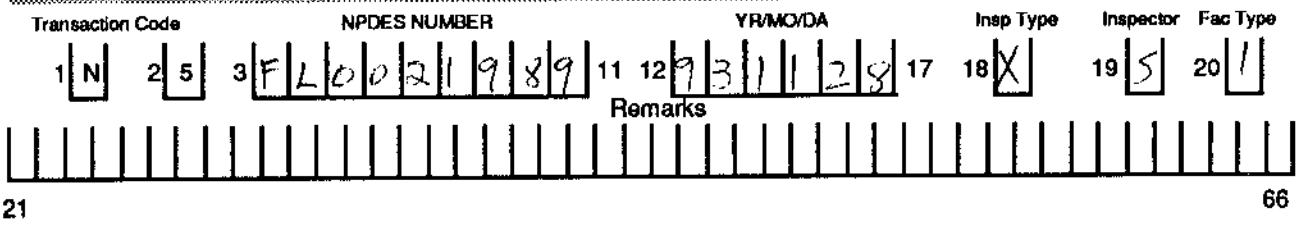
	Reference Site	Test Site 1	Test Site 2
Chordata			
Undetermined Ascidiacea	286.9	–	–
Molgula sp.	286.9	–	–
M. manhatensis	49.9	–	–
Cnidaria			
Ectopleura dumortieri ?	12.5	–	12.5
Undetermined anthozoan	237.0	12.5	–
Undetermined hydrozoan	12.5	12.5	12.5
Undetermined Nolellidae	12.5	–	–
Undetermined Edwardsiidae	–	25.0	12.5
Diptera			
Chironomus sp.	–	12.5	–
Polypedilum illinoense	–	25.0	–
Undetermined chironomid pupa	–	12.5	–
Echinodermata			
Amphipholis squamata	–	12.5	–
Hemipholis elongata	12.5	–	–
Leptosynapta tenuis	12.5	–	–
Undetermined ophiuroid	12.5	50.0	–
Ectoprocta			
Electra hastingsae	12.5	–	–
Ephemeroptera			
Caenis sp.	–	12.5	–
Gastropoda			
Acteocina canaliculata	–	12.5	37.4
Crepidula fornicata	–	–	12.5
Nassarius vibex	49.9	–	–
Odostomia sp.	12.5	–	–
Undetermined Planorbidae	–	–	12.5
Hemichordata			
Undetermined enteropneust	99.8	–	–
Crustacea			
Cirrepedia			
Balanus sp.	12.5	12.5	12.5
Malacostraca			
Amphipoda			
Ampelisca sp.	37.4	99.8	224.6
Batea catharinensis	–	12.5	–
Cerapus tubularis	74.9	–	25.0
Corophium sp.	–	–	25.0
C. acherusicum	686.1	249.5	87.3
Erichthonius brasiliensis	62.4	37.4	–
Gammarus sp.	–	12.5	–

Grandidierella bonnieroides	12.5	–	–
Monoculodes cf. *edwardsi*	12.5	–	–
Paracaprella tenuis	12.5	–	–
Paraphoxus spinosus	–	12.5	–
Protohaustorius deichmannae	–	–	12.5
Synchelidium americanum	12.5	12.5	–
Trichophoxus epistomus	–	–	37.4
Unciola sp.	–	12.5	–
Undetermined Aoridae	–	49.9	–
Undetermined Caprellidae	12.5	–	–
Undetermined Haustoridae	–	–	224.6
Undetermined Oedicerotidae	12.5	–	–
Undetermined amphipod	–	12.5	–
Cumacea			
Cyclaspis varians	12.5	–	–
Leucon americanus	25.0	–	–
Oxyurostylis smithi	62.4	37.4	37.4
Undetermined cumacean	–	–	12.5
Decapoda			
Pinnixa sp.	–	–	12.5
Undetermined decapod	12.5	–	–
Undetermined Paguridae	–	–	25.0
Isopoda			
Cyathura polita	12.5	–	–
Edotea montosa	–	12.5	62.4
Undetermined Anthuridae	–	12.5	–
Tanaidacea			
Undetermined Tanaidacea	–	12.5	37.4
Nemertina			
Cerebratulus sp.	12.5	–	–
Undetermined Nemertina spp.	174.7	187.1	187.1
Oligochaeta			
Undetermined Tubificidae	162.2	–	12.5
Pelecypoda			
Corbula sp.	–	–	12.5
C. swiftiana	–	12.5	–
Cyrtopleura costata	137.2	–	12.5
Ensis sp.	25.0	–	49.9
Macoma sp.	–	424.2	49.9
M. tenta	–	–	237.0
Mercenaria sp.	12.5	62.4	49.9
Nucula crenulata	–	25.0	–
N. proxima	–	–	12.5
Rangia cuneata ?	212.1	62.4	–
Sphenia antillensis	37.4	–	–
Undetermined Pholadidae	12.5	–	–
Undetermined Tellinidae	37.4	–	–
Undetermined pelecypod spp.	112.3	62.4	411.9
Phoronida			
Phoronis sp.	1397.2	49.9	87.3

Platyhelminthes			
Stylochus ellipticus	–	25.0	–
Undetermined turbellarian	–	12.5	–
Polychaeta			
Amphitrite sp.	–	–	87.3
Arabella mutans	–	–	12.5
Armandia maculata	–	49.9	49.9
Cauleriella sp.	12.5	–	12.5
Cistena gouldii	25.0	12.5	25.0
Clymenella torquata	12.5	–	–
Diopatra cuprea	12.5	12.5	–
Dispio sp. ?	–	12.5	–
Drilonereis magna	–	–	12.5
Eteone heteropoda	12.5	–	–
E. lactea	12.5	–	–
Eumida sanguinea	–	12.5	–
Glycinde solitaria	12.5	12.5	–
Hydroides dianthus	–	37.4	–
Kimbergonuphus simoni	–	–	12.5
Leitoscoloplos sp.	37.4	–	12.5
L. fragilis	–	–	62.4
Lumbrinereis sp.	–	25.0	–
L. tenuis	–	74.9	62.4
Magelona sp.	–	12.5	–
Mediomastus ambiseta	1509.5	1546.9	561.4
Nereis succinea	–	37.4	112.3
Owenia fusiformis	–	12.5	12.5
Paraprionospio pinnata	162.2	37.4	–
Pherusa plumosa	–	12.5	–
Polycirrus sp.	–	49.9	–
Paranaitis speciosa	–	12.5	–
Polydora sp.	–	12.5	–
P. ligni	37.4	12.5	12.5
Prionospio sp.	–	25.0	12.5
P. cirrifera	–	62.4	–
Sabella microphthalma	–	25.0	12.5
Sabellaria vulgaris	12.5	–	12.5
Scoloplos rubra	262.0	12.5	12.5
Sigambra tentaculata	–	37.4	12.5
Spiophanes bombyx	–	25.0	–
Sthenelais limicola	–	–	12.5
Streblospio benedicti	810.9	661.2	2382.7
Syllis hyalina	–	74.9	–
Terebella sp.	12.5	–	–
T. lapidaria ?	–	12.5	12.5
Undetermined Ampharetidae	–	12.5	–
Undetermined Capitellidae	–	–	12.5
Undetermined Cirratulidae	124.8	149.7	25.0
Undetermined Glyceridae	–	12.5	–
Undetermined Lumbrineridae	–	–	87.3
Undetermined Maldanidae	–	–	25.0

Undetermined Paronidae	12.5	–	12.5
Undetermined Serpulidae	–	12.5	–
Undetermined Syllidae	12.5	49.9	–
Undetermined Terebellidae	12.5	25.0	25.0
Undetermined polychaete	–	12.5	–
Sipuncula			
Undetermined sipunculid juvenile	–	12.5	–
Phascolion strombi	–	12.5	25.0

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)

