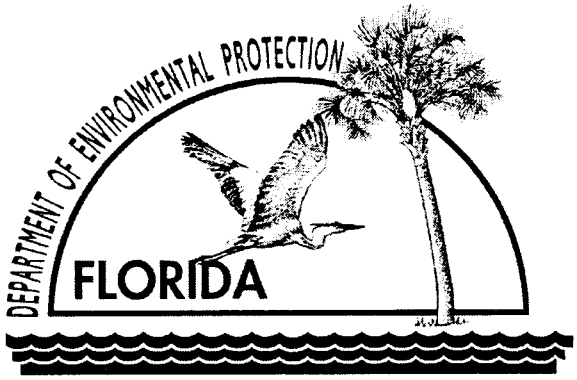


Biological Assessment of

Beverly Beach WWTP

Flagler County

NPDES #FL0039756

Sampled April 1999

January 2000

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:	Beverly Beach WWTF
County:	Flagler
NPDES Number:	FL0039756
Permit Expiration Date:	6/11/2001

Toxics Sampling Inspection (XSI)

Date Sampled: 12 April 1999

Results: Copper was detected in the effluent (3.8 µg/L) at a level that violated the Class III marine water quality standard of 2.9 µg/L (Rule 62-302.530 (24) FAC). Aluminum, iron, lead, and zinc were detected at levels that complied with Class III standards. No organic priority pollutants were detected in the effluent sample.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 12 April 1999

Results: The effluent sample was toxic to the fish, *Cyprinella leedsi,* and to both invertebrates, *Ceriodaphnia dubia* and *Americamysis bahia,* during the first fifteen minutes of the 48-hour bioassay and violates Class III water quality standards (Rules 62.302-530(62), 62-302.500(1)(d) and 62-4.244(3)(a) FAC). An extremely elevated un-ionized ammonia level in the effluent (3.3 mg/L) may be responsible for the toxicity.

Impact Bioassessment Inspection (IBI)

Date Sampled: 12 April 1999

Results: Shannon-Weaver diversity was 26% lower at test site 1 than at the control site and violated the biological integrity criterion for Class III waters (Rule 62-302.530(11) FAC). The diversity at test site 2 was 16% lower than the control site. Macroinvertebrate taxa richness declined by 29% at test site 1 and by 20% at test site 2 compared to the control site. Polychaete taxa richness declined 36% at both of the test sites compared to the control site. The phytoplankton community did not appear to be negatively affected by the effluent, and phytoplankton diversity and taxa richness were higher at the test sites compared to the control site.

Water Quality Inspection (WQI)

Date Sampled: 12 April 1999

Results: The effluent dissolved oxygen concentration (3.8 mg/L) not meet the facility's permit limit of 6.0 mg/L. The ammonia concentration in the effluent (51 mg/L) was extremely elevated. However, ammonia was undetected at all of the study sites. Algal Growth Potential (AGP) was below the 10 mg dry wt/L "problem threshold" at all three study sites. The effluent AGP was 125.1 mg dry wt/L. Chlorophyll *a* was undetected at all three study sites.

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 Beverly Beach Wastewater Treatment Plant is located in Flagler County, Florida (see maps in the Appendix). The facility's discharge is a submerged PVC pipe with continuous flow into the Intracoastal Waterway. The design flow of the wastewater system is a 0.215 MGD facility consisting of three plants that operate in parallel; 1) 0.03 MGD extended aeration with influent screening, aeration, and secondary clarification, 2) 0.035 MGD extended aeration activated sludge, and 3) 0.15 MGD contact stabilization plant. Final effluent from all three plants is combined and sent to filtration, chlorination, dechlorination, and a dual effluent pump station with post aeration. The actual mean flow during this survey was 0.07 MGD.

State permit limits for the WWTP are listed in Table 1. According to the facility's monthly operating reports, the plant has appeared to be operating within the stated permit limits.

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 in the Intracoastal Waterway, due west of Channel Marker #3 at the south end of Fox Cut) and two test sites bracketing the discharge (each located 100 yards north and south of the POD) (see map in the Appendix). A habitat assessment was performed *in situ* to establish comparability between sites, and supplemental physical/chemical data were 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 toxicity bioassays, using the freshwater invertebrate, *Ceriodaphnia dubia,* the saltwater invertebrate *Americamysis bahia,* and the fish, *Cyprinella leedsi*, as test organisms, were performed on an effluent sample. Sediments from control and test sites were analyzed for grain size and percent organic matter.

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 freshwater effluent and *Dunaliella tertiolecta* for the marine receiving-water sites.

Benthic macroinvertebrate communities were evaluated at control and test sites using three replicate petite Ponar grabs. Several different measures of macroinvertebrate and algal community health have been employed to determine the effects of the discharge. These measurements include: taxa richness, Shannon-Weaver Diversity Index, community composition, functional feeding groups, and algal biomass. For discussion of each of these measures see the *Explanation of Measurements of Community Health* in the Appendix. All field and laboratory biological methods followed Biology Section Standard Operating Procedures (SOP's). The SOP's can be viewed on our web site at <www.dep.state.fl.us/labs/sops.htm>.

The following personnel were involved in this investigation: Pat O'Connor, Jim Wright, and Belinda Bishop (DEP Northeast District), and Julie Baughman, Ken Espy, Marshall Faircloth, Joy Jackson, Michael Heyn, Elizabeth Miller, Urania Quintana, Johnny Richardson, Lisa Homann, Amy Weaver, Steve Wolfe, David Whiting, and Vicki McGee (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

Shorelines were mostly natural at all study sites (see Habitat Assessment Field Data Sheets in Appendix). At least three community types were observed at the control and test sites. Seventy–eight percent of the control site, 61% of test site 1, and 54% of test site 2, consisted of sediment particle sizes 0.25–2.0 mm in diameter. Habitat scores were in the "good" category at all three study sites, with a score of 66 points at the control site and 65 points at both test sites. The remaining results are in Tables 1 and 2.

Discussion

All of the *in situ* physical/chemical parameters were similar at the three study sites as were the habitat assessment scores (Table 1). The effluent dissolved oxygen level of 3.8 mg/L failed to comply with the facility's permit limit (6.0 mg/

Table 1. Effluent limits and summary of chemistry data.

Beverly Beach WWTP	Effluent Limits	Effluent Sample	Control Site	Test Site 1	Test Site 2
Organic Constituents (µg/L)					
None Detected	-	-	-	-	-
Metals (µg/L)					
Aluminum	1500 **	73 I	-	-	-
Arsenic	50 **	20 U	-	-	-
Cadmium	9.3 **	0.05 U	-	-	-
Chromium	50 **	10 U	-	-	-
Copper	2.9 **	3.8 I	-	-	-
Iron	300 **	127	-	-	-
Lead	5.6 **	0.36 I	-	-	-
Mercury	0.025 **	0.1 U	-	-	-
Nickel	8.3 **	6 U	-	-	-
Selenium	71 **	35 U	-	-	-
Silver	2.3 **	0.04 U	-	-	-
Zinc	86 **	43 J	-	-	-
Nutrients (mg/L)					
Ortho-phosphate	-	7.6	0.4 U	0.4 U	0.4 U
Total phosphorus	-	7.8	0.084	0.089	0.083
Ammonia	-	51 A	0.1 U	0.1 U	0.1 U
Un-ionized ammonia	-	3.3	-	-	-
Nitrate+Nitrite	-	0.13	0.004 I	0.005 I	0.004 U
TKN	-	50	0.5	0.48	0.44
Organic Nitrogen	-	0	0.4	0.38	0.34
Total Nitrogen	-	50.13	0.504	0.485	0.444
General Phys-Chem Parameters					
Habitat Assessment	-	-	67	65	65
DO (mg/L)	6.0 *	3.8	5.9	6.0	5.7
pH (SU)	6.0-8.5 **	7.6	7.5	7.4	7.5
Conductivity (µmhos/cm)	-	1,980	50,470	50,280	50,320
Salinity (ppt)	-	1.0	33	33	33
Temperature (°C)	-	24.1	26.2	25.9	26.24
Turbidity (NTU)	-	-	1.8	1.7	1.9
CBOD, 5 day (mg/L)	20 a	10	2 K	2	2 K
Flow (MGD)	0.21 *	0.07	-	-	-
AGP (mg dry wt/L)	-	125.1	1.2	3.6	1.9
Toxicity (48-hour static, screening bioassay)					
Bioassay - Fish	-	Toxic	-	-	-
Bioassay - Invertebrate	-	Toxic	-	-	-

A - Value is the mean of two or more determinations
I - Value is < the MQL, and ≥ the MDL
J - Estimated value
K - Actual value is known to be less than value given
U - Analyzed for but not detected; value is the MDL

* Permit Limit
** Class III water quality standard
a - Single sample

L). Copper was detected in the effluent (3.8 µg/L) at a level that violated Class III marine water quality standards (2.9 µg/L) (Rule 62-302.530(24) FAC). Aluminum, iron, lead, and zinc were detected at levels that complied with Class III marine water quality standards (Table 1). No organic priority pollutants were detected in the effluent sample.

The effluent sample resulted in 100% mortality of the fish, *Cyprinella leedsi,* and to both invertebrates, *Ceriodaphnia dubia* and *Americamysis bahia,* in the first fifteen minutes of the 48-hour bioassay (Appendix) and violates Class III marine water quality standards (Rules 62-302.530(62), 62-302.500(1)(d), and 62-4.244(3)(a) FAC). The effluent un-ionized ammonia (3.3 mg/L) was extremely elevated and may have responsible for the toxicity.

All of the effluent nutrients were elevated (Table 1); however, the control site nutrient levels were similar to those of the test sites. The effluent ammonia level was extremely elevated (51 mg/L) but did not appear to cause an increase at the test sites, where ammonia was undetected. AGP, which measures bioavailable nutrients via algal response, was below the 10 mg dry wt/L "problem threshold" (Ron Raschke, U.S. EPA, pers. comm.) at all three study sites (Table 1). Effluent AGP was 125.1 mg dry wt/L.

The high effluent ammonia level did not appear to have altered the phytoplankton communities at the test sites (Figure 1). Algal densities were very low and chlorophyll *a* was undetected at all three study sites (Table 2).

Macroinvertebrate taxa richness declined 29% at test site 1 and 20% at test site 2 relative to the control site (Figure 2). Shannon-Weaver diversity decreased by 26% at test site 1 and 16% at test site 2.

The reduction in diversity at test site 1 compared to the control site violates the Class III marine water quality biological integrity criteria (Rule 62-302.530 (11) FAC). Polychaete taxa richness declined by 36% at both test areas compared to the control site (Table 2). All three sites were dominated by the somewhat pollution–sensitive amphipod, *Cerapus* sp. (see Macroinvertebrate Taxa Lists in the Appendix). Amphipods made up nearly 80% of all invertebrates collected at the study sites (Table 2). Pelecypods, normally indicators of "good water quality", were collected at all study sites, but in low percentages.

Table 2. Community structure of control and test site

Beverly Beach WWTP	Control Site	Test Site 1	Test Site 2
Macroinvertebrate Quantitative			
Number of Taxa	34	24	27
Shannon-Weaver diversity	2.33	1.73	1.95
No. Polychaete Taxa	14	9	9
Community Composition			
% Amphipoda	78.0	79.0	81.0
% Actiniaria	0.1	3.0	1.0
% Cumacea	2.0	4.0	4.0
% Isopoda	2.0	1.0	2.0
% Gastropoda	0.4	2.0	0.6
% Nemertea	2.0	0.1	2.0
% Pelecypoda	0.4	0.4	0.5
% Polychaeta	12.0	10.0	4.0
% Tubificidae	0.5	0.0	0.0
% Other	2.6	0.5	4.9
Functional Feeding Groups			
% Browsers-grazers	37.0	39.0	38.0
% Burrowing Deposit Feeders	9.0	3.0	3.0
% Predators/Carnivores	8.0	5.0	8.0
% Scavengers	37.0	39.0	38.0
% Scrapers	0.3	2.0	0.6
% Surface Deposit Feeders	1.5	3.0	0.2
% Suspension Feeders	6.0	9.0	11.0
% Unknown	1.2	0.0	1.2
Phytoplankton Algae			
Number of Taxa	8	12	10
Shannon-Weaver diversity	2.75	3.38	3.06
Chlorophyll *a* (µg/L)	1 U	1.12 U	1.12 U
Algal Density (#/mL)	722	718	998
% Blue-green	8.0	22.0	18.0
% Xanthophytes	19.0	11.0	18.0
% Diatoms	51.0	53.0	44.0
% Green	22.0	14.0	20.0
AGP (mg dry wt/L)	1.2	3.6	1.9

U - Aanalyzed for but not detected; value is the minimum detection limit

In general, the macroinvertebrate community health at the test sites seems to have been negatively affected by the discharge, as seen by decreases in diversity, number of polychaete taxa, and overall number of taxa.

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.

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

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.

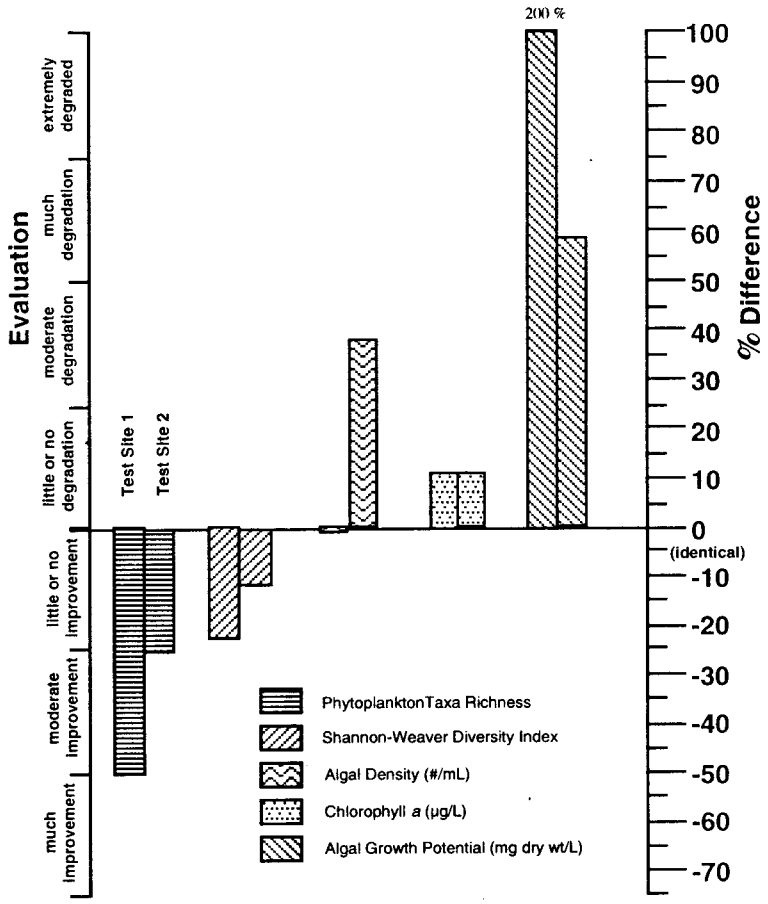


Figure 1. Effect of discharge on the phytoplankton community.

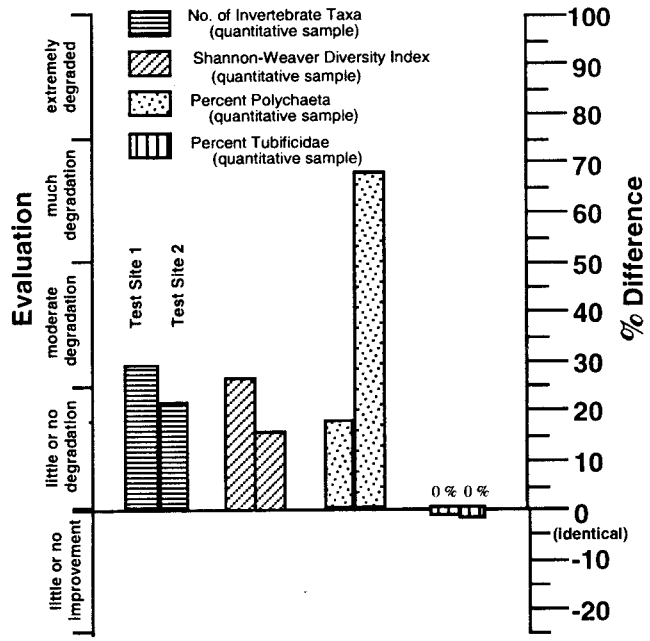


Figure 2. Effect of discharge on benthic community.

Typical Values for Selected Parameters in Florida Waters

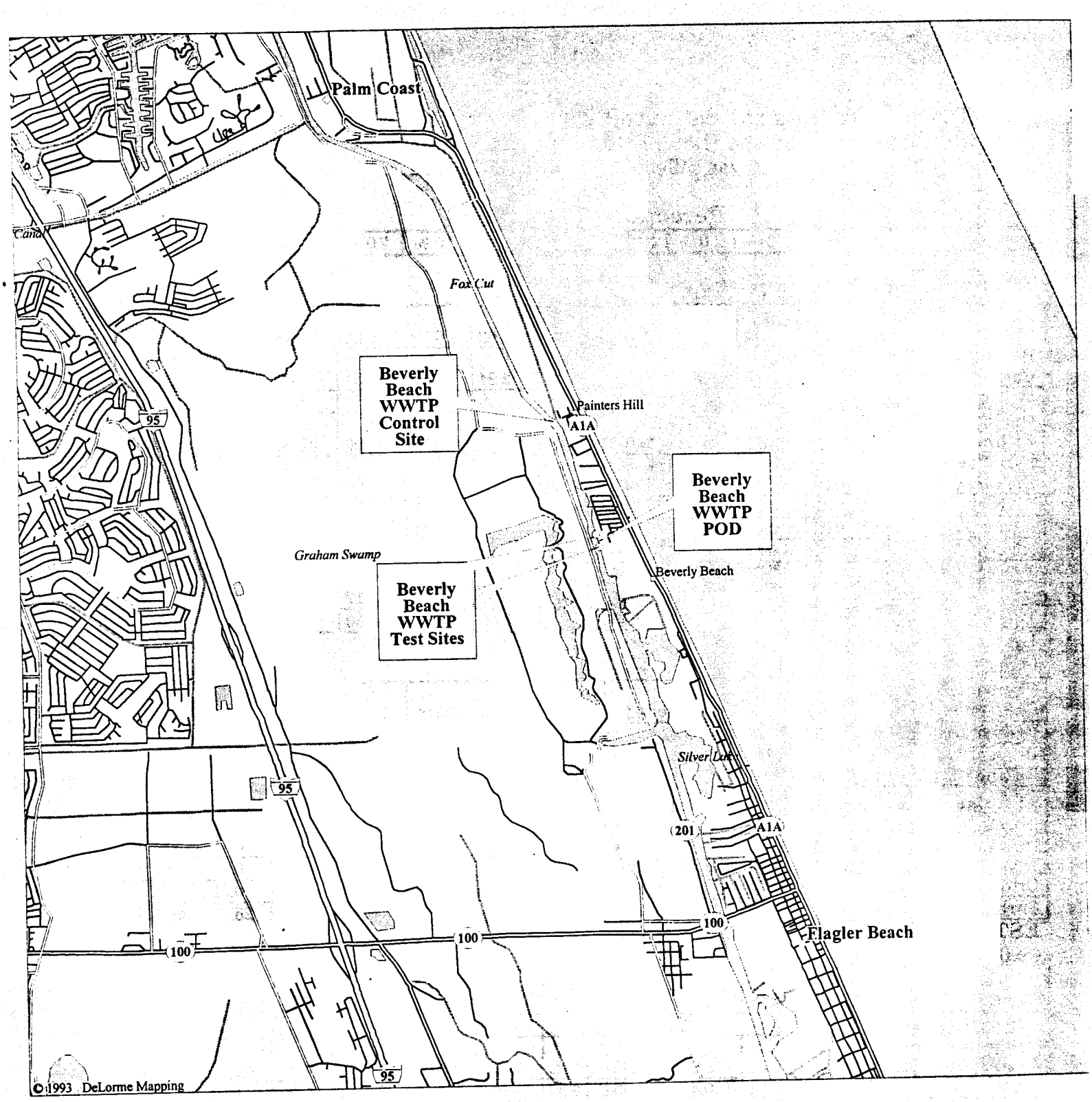
Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

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



LEGEND

- Population Center
- State Route
- Geo Feature
- Town, Small City
- Interstate, Turnpike
- County Boundary
- Street, Road
- Hwy Ramps
- Major Street/Road
- State Route
- Interstate Highway
- River
- Land Mass
- Open Water

Scale 1:62,500 (at center)

1 Miles

2 KM

Mag 13.00
Mon Apr 19 13:01:01 1999

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: Beverly Beach WWTF	**Date Summary Prepared:** 4/9/99	
Location (attach detailed map): No map in files. West side of A1A in Beverly Beach	**County** Flagler	**District** NED
~~Federal~~ Permit # FL0039756 and expiration date:	State GMS # and 3118X1255) State expiration date: FL0039756 June 11, 2001	**Facility Type:** Industrial Municipal Federal Agricultural Other (list): Private

Function of facility:
Wastewater Treatment Facility

Description of treatment process:
0.215 MGD facility consisting of three plants that operate in parallel.
#1) .03 MGD extended aeration w/ influent screening, aeration + 2nd ary Clarifi cation
2) .035 MGD extended aeration activated Sludge.
3) .15 MGD contact stabilization plant
Final effluent from all three plants is combined + sent to filtration, chlorination, dechlorination + dual effluent pump station w/ post aeration

Receiving waters: IntraCoastal Waterway	**Classification:** I II (III)

Design Flow: .215 MGD	**Mean Flow:** Current flow ~.07 MGD	**Flow during survey:**

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 (if necessary, attach relevant paperwork):

Parameter	Limit (units)			Describe special permit conditions and permit modifications:
	Annual	Monthly	Weekly	Single sample
CBOD	10	12.5	15	20
TSS	5	6.25	7.5	10
Fecals: $\frac{200}{100}$ mL annual				
$\frac{800}{100}$ mL Single Sample				

pH: 6 - 8.5 Do: 6
TRC: (disinf.) .5

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

(Facility)

Description of permitted outfall(s):

PVC : to Intracoastal Waterway, submerged discharge

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

Power outage: 3/31/99, pumped out L.S.

Appears to be operating w/in permitted limits

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

- Not running toxicities @ specified salinities (not in accordance w/permit)
- have been passing toxicities

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

Additional information:

The department has rec'd several odor complaints in reference to this facility. ~~In~~ the influent tanks + the L.S. were coverd in efforts to control odor. This will be monitored & if not sufficient an odor control system will be necessary

Staff contributing to this review (signature):

(Biologist)

(Inspector)

(Engineer)

( )

( )

( )

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Beverly Beach WWTP
County: Flagler
Contact / District: P. O'Connor / Northeast
NPDES Permit #: FL0039756
LIMS Sample #: 379228 LIMS Job #: TLH-1999-04-13-07
sample log 4/13/99 pd

Sample Collection: Date 4/12/99 Time 1030
Test Beginning: Date 4/13/99 Time 16:20
Test Ending: Date 4/17/99 Time 0800
Organism Batch #: 97 Diluent Batch #: 18
Organism Age: 4 days SRT toxicant batch #: N/A

Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through
Test Number: 3 of 3
Incubator #3 temperature range 24.0-25.5°C, Room Temperature range 24.0-25.0°C.

Test organism: Americamysis bahia

Remarks: Initial D.O. of sample was 4.3 mg/L. After 25 minutes of aeration sample D.O. was 7.3 mg/L. FW 4/13/99,

Conc.	Chamber #	Number Live 0 hr	24 h	48 h	pH 0 hr	24 h	48 h	Temperature (°C) 0 hr	24 h	48 h	D.O. (mg/L) 0 hr	24 h	48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Ctl A	E9	5	4		8.8	8.5		24.0	25.9		7.0	6.8		11.07	12.83	
Ctl B	E10	5	5		8.9	8.5		24.0	25.3		6.5	6.8		11.52	12.67	
Ctl C	E11	5	5		8.9	8.5		24.0	25.3		6.5	7.2		11.22	12.70	
Ctl D	E12	5	4		8.9	8.5		24.0	25.1		6.4	7.2		11.49	12.76	
100% A	E13	5	0		8.2	8.2		24.0	25.6		6.3	6.4		11.48	12.86	
100% B	E14	5	0		8.2	8.1		23.8	24.9		6.5	6.5		11.62	12.69	
100% C	E15	5	0		8.2	8.2		23.8	24.9		6.5	6.6		11.69	12.65	
100% D	E16	5	0		8.2	8.2		23.8	26.0		6.7	6.3		11.74	13.03	
		Control is 40 F seawater @ 1. ppt adjusted to 7‰ with sea salts. FW 4/13/99														
		100% sample was adjusted from 1 ppt to 7 ppt with sea salts. FW 4/13/99														
		Test was terminated @ 24 hrs due to 100% mortality in the 100% sample. FW 4/14/99														
measured by:		FW	mf		CH	MF		CH	MF		CH	MF		CH	MF	
recorded by:		AS	mf		AS	AS		AS	AS		AS	AS		AS	AS	

Investigators' Signatures

Amber S Shumate
Sean Mitchell
Marshall Faircloth
Counting Hand

reviewer

form updated 5/22/98

Test organisms adjusted to lower salinity by initial reduction to 15‰ then reduction in salinity of ≈3‰ every two hours until test salinity reached. MF 4/14/99

Lab started to aerate @ 4/13/99 comment 16 hr total Ammonia was 37.9 mg/L MF 4/14/99

Water Quality Parameters	Salt Water Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):						
Lab Total Residual Cl2 (mg/L):	<0.03		<0.03	DR-100	CH	MF
Alkalinity (mg/L as $CaCO_3$):	25		375	Hach	CH	MF
Hardness (mg/L as $CaCO_3$):	—		—			
Total ammonia (mg/L as N):	<0.017		44.3	Doman	MF	AS
Salinity:	7		7 ppt	YCT	MF	AS

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Beverly Beach WWTP
County: Flagler
ntact / District: P. O'Connor / Northeast
PDES Permit #: FL0039756
IMS Sample #: 379228 LIMS Job #: TLH-1999-04307
sample log 4/12/99 PW
est Type: (Screening) Definitive
Static I Static Renewal I Flow-through
est Number: 2 of 3
incubator # 3 Temperature Range 24.0-25.5°C
Room Temperature Range 24.0-25.0°C

Sample Collection: Date 4/12/99 Time 1030
Test Beginning: Date 4/13/99 Time 1500
Test Ending: Date 4-13-99 Time 1515
Organism Batch #: 25 Diluent Batch #: Well
Organism Age: 15 days SRT toxicant batch #: N/A
Test organism: Cyprinella leedsi

Remarks: Initial D.O. of sample was 4.3 mg/L. After 25 minutes of aeration, D.O. of sample was 7.3 mg/L. FW 4/13/99.

Conc.	Chamber #	Number Live 0 hr	Number Live ~~24 h~~ 25 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
C+1 A	E1	5	5		7.8			24.0			7.2			220		
C+1 B	E2	5	5		7.8			24.0			7.1			235		
C+1 C	E3	5	5		7.8			24.0			7.1			240		
C+1 D	E4	5	5		7.8			24.0			7.1			230		
100% A	E5	5	0 SD		8.1			24.1			7.2			1735		
100% B	E6	5	0 SD		8.1			24.1			7.1			1850		
100% C	E7	5	0 SD		8.1			24.0			7.1			1900		
100% D	E8	5	0 SD		8.1			24.0			7.1			1890		
			* All organisms in 100% sample were dead within 15 minutes of loading FW 4/13/99													
measured by:		FW	FW		CH			CH			CH			CH		
recorded by:		AS	FW		AS			AS			AS			AS		

Investigators' Signatures

Amber S. Shumaker
Tom Mead
Marshall Faircloth
Courtney Kay

Water Quality Parameters	Salt Water / (Well Water)	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):						
Lab Total Residual Cl2 (mg/L):	<0.03		<0.03	DR100	CH	MF
Alkalinity (mg/L as $CaCO_3$):	132		320	Hach	CH	MF
Hardness (mg/L as $CaCO_3$):	130		290	Hach	CH	MF
Total ammonia (mg/L as N):	<0.017		44.35	Denver	MF	AS
Salinity:	0		1	YCT	FW	MF

reviewer

form updated 5/22/98

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Beverly Beach WWTP
County: Flagler
Contact / District: P. O'Connell / Northeast
NPDES Permit #: FL0039756
LIMS Sample #: 379228 LIMS Job #: TLH-1999-04-13-07
sample log 4/13/99 DW

Sample Collection: Date 4/12/99 Time 1030
Test Beginning: Date 4/13/99 Time 1445
Test Ending: Date 4/14/99 Time 0800
Organism Batch #: 22 Diluent Batch #: 15
Organism Age: <24 hrs SRT toxicant batch #: N/A
Test organism: Ceriodaphnia dubia

Test Type: (Screening) / Definitive
(Static) / Static Renewal / Flow-through
Test Number: 1 of 3
Incubator #2 Temperature Range 24.0-25.5°C
Room Temperature Range 24.0-25.0°C

Remarks: Initial D.O. of sample was 4.3 mg/L. Sample was aerated for 25 minutes after which the D.O. was 7.3 mg/L. FW 4/13/99

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	Cond. (µmhos/cm) 24 h	Cond. (µmhos/cm) 48 h
Ctl A	A	5	5		8.0	8.0		24.0	23.8		7.5	7.9		150	175	
Ctl B	B	5	5			8.0			23.8			7.9			180	
Ctl C	C	5	5			8.0			23.9			7.8			185	
Ctl D	D	5	5			8.0			23.8			7.9			185	
100% A	A	5	0		8.1	8.3		24.0	24.1		7.5	7.9		1855	1845	
100% B	B	5	0			8.1		~~24.0~~	24.1		~~7.5~~	7.6			2040	
100% C	C	5	0			8.2			23.9			7.6			1960	
100% D	D	5	0			8.4			23.8			7.6			1905	
measured by:		AS	MF		FW	MF		FW	MF		FW	MF		FW	MF	
recorded by:		FW	MF		AS	AS		AS	AS		AS	AS		AS	AS	

(*) Test was terminated @ 24 hrs. due to 100% mortality in the 100% Sample. FW 4/14/99

18 hour Total Ammonia w/A's 38.85 mg/L mf 4/14/99

Investigators' Signatures

Amber E. Shumate
Mary Wachob
Marshall Faircloth

	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):						
Lab Total Residual Cl2 (mg/L):		<0.03	<0.03	DR-100	CH	mf
Alkalinity (mg/L as $CaCO_3$):		75	320	Hach	CH	mf
Hardness (mg/L as $CaCO_3$):		85	290	Hach	CH	mf
Total ammonia (mg/L as N):		<0.017	44.35	Denver	mf	AS
Salinity:	0	0	1	YCT	FW	MF

reviewer

form updated 5/22/98

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5/21/98)

SUBMITTING AGENCY CODE: SUBMITTING AGENCY NAME:	STORET STATION NUMBER: 27010105	DATE: 4/12/99	TIME: 1400	RECEIVING BODY OF WATER: ICW Flagler Co

REMARKS: ICW CONTRUCTED 1940-42 Last DREDGED 1979	COUNTY: FLAGLER	LOCATION: ICW DUE WEST of CR 3 South END of FOX CUT	FIELD NAME: Control Site

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commericial	Industrial	Other (specify)
20 %				65 %			

Local Watershed Erosion: None: ☐ Slight: ☐ Moderate: ☒ Heavy: ☐

Local Watershed NPS Pollution: No evidence: ☐ Slight: ☐ Moderate potential: ☒ Obvious sources: ☐

Width of riparian vegetation (m) on least buffered side: 10

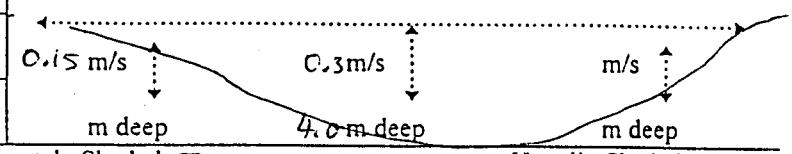
List & map dominant vegetation on back

Artificially Channelized ☐ NO Artificially Impounded ☐ YES none

High Water Mark: 1.0 + 4.0 = 5.0
(m above present water level) (present depth in m) (m above bed)

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

30-40 m wide



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 Silt smothering: none Other: ☐

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation				Other: SAND MUD	100%	3	P. PLANAR
Rock or Shell Rubble				~~Other:~~ SHELL HASH			
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):	Time		Secchi (m):
Top								0.8
Mid-depth	0.6	26.2	7.51	5.9	50,470 (33)	1400		
Bottom								

System Type: Stream: ☐ 1st - 2nd order Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☒ ICW

Water Odors: Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐

Water Surface Oils: None: ☒ Sheen: ☐ Globs: ☐ Slick: ☐

Clarity: Clear: ☒ Slightly Turbid: ☐ Turbid: ☐ Opaque: ☐

Color: Tannic: ☐ Green (algae): ☐ Clear: ☒ Other: ☐

Weather Conditions/Notes: WARM, CLEAR WINDY

Outgoing tide

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

Sampling Team: WRIGHT, O'CONNOR

Signature: [signature]

Date:

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
	27010105	4/12/99	ICW Flagler Co

REMARKS:	LOCATION:	FIELD ID/NAME:
Outgoing tide	ICW due west of channel marker #3 near south end of Fox Cut	Control Site

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations: 8	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: 5	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action: 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: 12	Combination of sand, gravel, and shell. 12-15 points NO GRAVEL	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: 66

COMMENTS: CONSIDERABLE BOAT TRAFFIC (LARGE BOATS) W/ ASSOCIATED WAKES

ANALYSIS DATE:	ANALYST:	SIGNATURE:
4/12/99	O'CONNOR	[signature]

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5/21/98)

SUBMITTING AGENCY CODE: SUBMITTING AGENCY NAME:	STORET STATION NUMBER: 27010196	DATE: 4/12/99	TIME: 1330	RECEIVING BODY OF WATER: ICW FLAGLER CO

REMARKS: ICW CONSTRUCTED 1960-62 LAST DREDGED 1979	COUNTY: FLAGLER	LOCATION: BEVERLY BEACH WWTP 100YDS SOUTH OF POD	FIELD NAME: TEST SITE

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commericial	Industrial	Other (specify)
15%				80%			golf course 5%

Local Watershed Erosion: None: ☐ Slight: ☐ Moderate: ☒ Heavy: ☐

Local Watershed NPS Pollution: No evidence: ☐ Slight: ☐ Moderate potential: ☒ Obvious sources: ☐

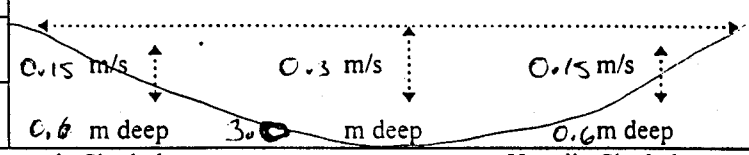
Width of riparian vegetation (m) on least buffered side: 10

List & map dominant vegetation on back

Artificially Channelized ☐ NO Artificially Impounded ☒ YES — none

High Water Mark: 1.0 + 3 = 4.0
(m above present water level) (present depth in m) (m above bed)

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



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 Silt smothering: none Other: ☐

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation				Other: SAND MUD	100%	3	P. PONAR
Rock or Shell Rubble				~~Other:~~ AND SHELL HASH			
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):	Time		Secchi (m):
Top								0.8
Mid-depth	0.6	26.24	7.53	5.72	~~50,320~~ 50,320 (33)	1330		
Bottom								

System Type: Stream: ☐ 1st - 2nd order Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☑ ICW

Water Odors: Normal: ☑ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐

Water Surface Oils: None: ☒ Sheen: ☐ Globs: ☐ Slick: ☐

Clarity: Clear: ☒ Slightly Turbid: ☐ Turbid: ☐ Opaque: ☐

Color: Tannic: ☐ Green (algae): ☐ Clear: ☒ Other: ☐

Weather Conditions/Notes: WARM CLEAR WINDY
INCOMING TIDE

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

Sampling Team: WRIGHT O'CONNOR

Signature: Patrick W Obrien

Date: 4/12/99

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
	27010186	4/12/99	ICW FLAGLER CO

REMARKS:	LOCATION:	FIELD ID/NAME:
INCOMING TIDE	BEVERLY BEACH WITH 100 YDS SOUTH OF R00	TEST SITE

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 7	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed 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 ~~2~~ 25	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 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 65

COMMENTS: THIS SEGMENT OF ICW CONSTRICTED 1940-42 LAST DREDGED 1979

ANALYSIS DATE:	ANALYST:	SIGNATURE:
4/12/99	D'CONNOR	

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5/21/98)

SUBMITTING AGENCY CODE: SUBMITTING AGENCY NAME:	STORET STATION NUMBER: 27010187	DATE: 4/12/99	TIME: 1300	RECEIVING BODY OF WATER: ICW FLAGLER CO

REMARKS: ICW CONSTRUCTED 1940-42 LAST DREDGED 1979	COUNTY: FLAGLER	LOCATION: BEVERLY BEACH WWTP 100YDS NORTH OF POD	FIELD NAME: TEST SITE

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commericial	Industrial	Other (specify)
15%				80%			5% golf courses

Local Watershed Erosion: None: ☐ Slight: ☐ Moderate: ☒ Heavy: ☐

Local Watershed NPS Pollution: No evidence: ☐ Slight: ☐ Moderate potential: ☒ Obvious sources: ☐

Width of riparian vegetation (m) on least buffered side: 10

List & map dominant vegetation on back

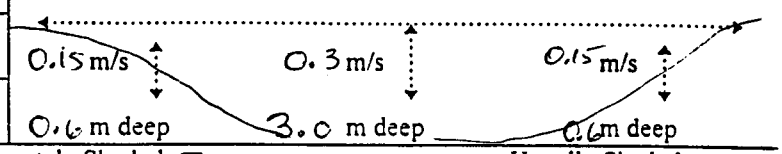
Artificially Channelized: ☐ NO

Artificially Impounded: ☒ YES none

High Water Mark: 1.0 + 3 = 4.0
(m above present water level) ~~1.0~~% (present depth in m) (m above bed)

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

30-40 m wide



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: ☐ Silt smothering: ☐ Other: ☐

ONGOING DEVELOPMENT none AND CONSIDERABLE BOAT TRAFFIC none PROMOTE SILT MOVEMENT

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation				Other: SAND MUD	100	3	P. PONAR
Rock or Shell Rubble				~~Other:~~ SAND SHELL HASH			
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):	Time		Secchi (m):
Top								
Mid-depth	0.6	25.9	7.44	5.99	50,280 (33)	1300		0.8
Bottom								

System Type: Stream: ☐ 1st - 2nd order Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☒ ICW

Water Odors: Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐

Water Surface Oils: None: ☒ Sheen: ☐ Globs: ☐ Slick: ☐

Clarity: Clear: ☒ Slightly Turbid: ☐ Turbid: ☐ Opaque: ☐

Color: Tannic: ☐ Green (algae): ☐ Clear: ☒ Other: ☐

Weather Conditions/Notes: WARM, CLEAR, WINDY
INCOMING TIDE

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐ ☐	☒	☐	☐
Fish	☐ ☐	☐	☐	☒
Aquatic Macrophytes SPARTINA		☐	☐	☒
Iron/sulfur Bacteria		IRON SULFUR BACT		ABSENT

Sampling Team: WRIGHT O'CONNOR

Signature: Patrick W O'Connor

Date: 4/12/99

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
	27010187	4/12/98	ICW FLAGLER Co

REMARKS:	LOCATION:	FIELD ID/NAME:
INCOMING TIDE	BEVERLY BEACH WWTP 100 YDS North of POD	TEST SITE

Habitat Parameter (score)	Excellent	Good	Fair	Poor
Littoral Alterations (7)	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed (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 (5)	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Palm Coast Parkway 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	This segment of ICW was constructed by COE and receives considerable boat traffic w/ associated wakes	—	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 65

COMMENTS: This portion of ICW was constructed 1940-42 and was last dredged 1979
WARM CLEAR WINDY 10-15 mph out of NW

ANALYSIS DATE:	ANALYST:	SIGNATURE:
4/12/99	OICONNOR	

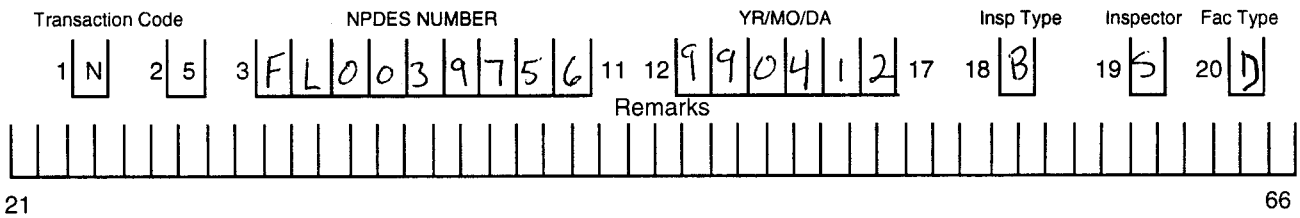
Phytoplankton taxa list and densities (#/mL) for Beverly Beach WWTP, collected via subsurface grabs in the Intracoastal Waterway on 12 April, 1999.

	Control Site	Test Site 1	Test Site 2
Bacillariophyceae			
Achnanthes sp.	–	–	40
Anomoeneis sp.	20	–	–
Centrales sp.	20	–	20
Chaetoceros sp.	117	–	20
Cocconeis sp.	–	40	40
Cymbella sp.	–	–	20
Undetermined Diatomaceae	–	20	–
Diploneis sp.	–	20	–
Navicula sp.	59	80	–
Nitzschia sp.	39	40	100
Pennales sp.	117	180	200
Chlorophyceae			
Chlamydomonas sp.	–	40	80
Chlorella sp.	39	20	60
Scenedesmus sp.	–	20	–
Undetermined Chlorophyceae	117	20	60
Chrysophyceae			
Ophiocytium capitatum	137	80	180
Cyanophyceae			
Chroococcus sp.	39	40	–
Oscillatoria sp.	–	40	20
Synechococcus sp.	20	80	160

Benthic macroinvertebrate taxa list for Beverly Beach WWTF, collected via Ponar grab samples in the eastern coast Intracoastal Waterway, on 12 April, 1999. Densities, in number/m^2, represent the mean of three replicates.

	Control Site	Test Site 1	Test Site 2
Actiniaria			
Undetemined Actiniaria	14	264	111
Amphipoda			
Ampelisca sp.	528	181	264
Undetemined Ampeliscidae	56	–	–
Aoridae	14	–	–
Caprella sp.	389	236	486
Cerapus sp.	6097	6972	7431
Undetemined Corophiidae	569	583	653
Corophium acutum	28	14	208
Corophium sp.	14	–	–
Grandidierella bonnieroides	250	42	222
Cumacea			
Oxyurostylis sp.	222	431	431
Undetermined Cumacea	14	14	14
Gastropoda			
Acteocina sp.	–	–	14
Undetemined Acteonidae	–	56	–
Busycon canaliculatum	14	–	–
Nassarius sp.	14	–	–
Nassarius vibex	14	–	14
Undetermined Gastropoda	–	97	42
Isopoda			
Cyathura polita	111	28	125
Edotea montosa	56	42	42
Mysidacea			
Bowmaniella floridana	111	14	–
Bowmaniella sp.	14	–	–
Undetermined Mysidacea	–	28	–
Nemertea			
Undetermined Nemertea	236	14	250
Oligochaeta			
Undetemined Tubificidae	56	–	–
Pelecypoda			
Abra aequalis	–	14	–
Mercenaria campechiensis	–	–	14
Undetemined Nuculidae	14	–	–
Parvilucina multilineata	14	28	14
Tagelus divisus	–	–	14
Tellina sp.	–	–	14
Tellina versicolor	14	–	–

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)

