

Biological Assessment of

Orange Park Wastewater Treatment Plant

Clay County

NPDES #FL0023922

Sampled November 1992

May 1993

Biology Section
Division of Technical Services

Department of Environmental Regulation

Results of Fifth Year Inspections

Discharger: Orange Park Wastewater Treatment Plant
County: Clay
NPDES Number: FL0023922
State Permit Expiration Date: 5 August 1993

Toxics Sampling Inspection (XSI)

Date Sampled: 9 November 1992

Results: There was presumptive evidence for the presence of the pesticides chlorpyrifos (0.07 µg/L) and diazinon (0.10 µg/L) in the effluent. These are close to toxic levels. Metals found in the effluent above quantitation limit included aluminum (126 µg/L), silver (0.29 µg/L), iron (142 µg/L), and zinc (41 µg/L). This level of silver is greater than four times the Class III standard (Rule 17-302.560 (38) FAC).

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 9 November 1992

Results: Not toxic to the fish *Notropis leedsi*. Caused 25% mortality to the invertebrate, *Ceriodaphnia dubia*. While 25% mortality in a screening test does not represent a violation, this result does suggest that follow-up, definitive toxicity tests should be performed on this discharger.

Impact Bioassessment Inspection (IBI)

Date Sampled: 17 and 24 November 1992

Results: Neither benthic macroinvertebrate nor phytoplankton communities exhibited signs of degradation that could be associated with the plant discharge. Chlorophyll *a* levels were low at all stations.

Water Quality Inspection (WQI)

Date Sampled: 9 November 1992

Results: Total coliforms (14,250 organisms/100 mL) and fecal coliform bacteria (3500 organisms/100 mL) were extremely high in the effluent, in violation of the facility's permit and Rule 17-302.560(6) FAC. However, coliform bacteria were very low at all study sites. Although nutrients were elevated in the effluent, there was no clear pattern of receiving water nutrient enrichment which could be associated with the discharge. Nitrate-nitrite was higher than that found in 95% of typical Florida estuaries, and it was elevated at all three study sites (including the reference site). While orthophosphate concentrations were higher at the two test sites compared to the reference, they were not unusually elevated (around the 65th percentile range compared with other Florida estuaries). Algal growth potential at the study sites exceeded the "problem threshold" of 5 mg dry wt/L, which may have been related to the elevated algal growth potential found in the effluent (30.3 mg dry wt/L). Reference site AGP was 4.5 mg dry wt/L.

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 Town of Orange Park Wastewater Treatment Plant is located on Ash Street in Orange Park, Clay County, Florida (see maps in Appendix). This contact stabilization facility discharges into the St. Johns River through a 16 inch force main (see flow schematic in Appendix). Although the design flow for the plant is 2.5 MGD, mean flow during the six months prior to this survey was 1.14 MGD.

State permit limits are as follows: BOD and TSS (maximum of 60 mg/L, annual average of 20 mg/L, weekly average of 45 mg/L), pH (6.0 to 8.5), fecal coliforms (annual average of 200 organisms/100 mL), and chlorine residual (minimum of 0.5 mg/L for disinfection, maximum of 0.01 mg/L at discharge). The NPDES permit has similar limits, but adds a dissolved oxygen minimum of 5.0 mg/L and a toxicity testing requirement (see Facility Summary in Appendix).

For the most part, the facility has been in compliance with permit parameters, and no major plant upsets have occurred over the past several years. An inspection by FDER and EPA in August of 1992 revealed unsatisfactory results regarding pH, fecal coliform, and total residual chlorine. Facility staff is currently attempting to correct these problems. Water quality testing was performed in the St. Johns River by a private consultant in the vicinity of the outfall. Samples were collected ten times from March, 1989, to March, 1992 (Appendix). Generally, total phosphorus and nitrate in the effluent and surrounding areas was elevated. Most chlorophyll *a* values reported by the consultant were extremely low (much less than the standard detection limit of approximately 0.25 µg/L). STORET data indicates an average chlorophyll *a* of 7 µg/L in this area of the St. Johns River. The consultant's data showed a massive algal bloom (chlorophyll *a* of up to 95 µg/L) in the river in December, 1989.

Methods

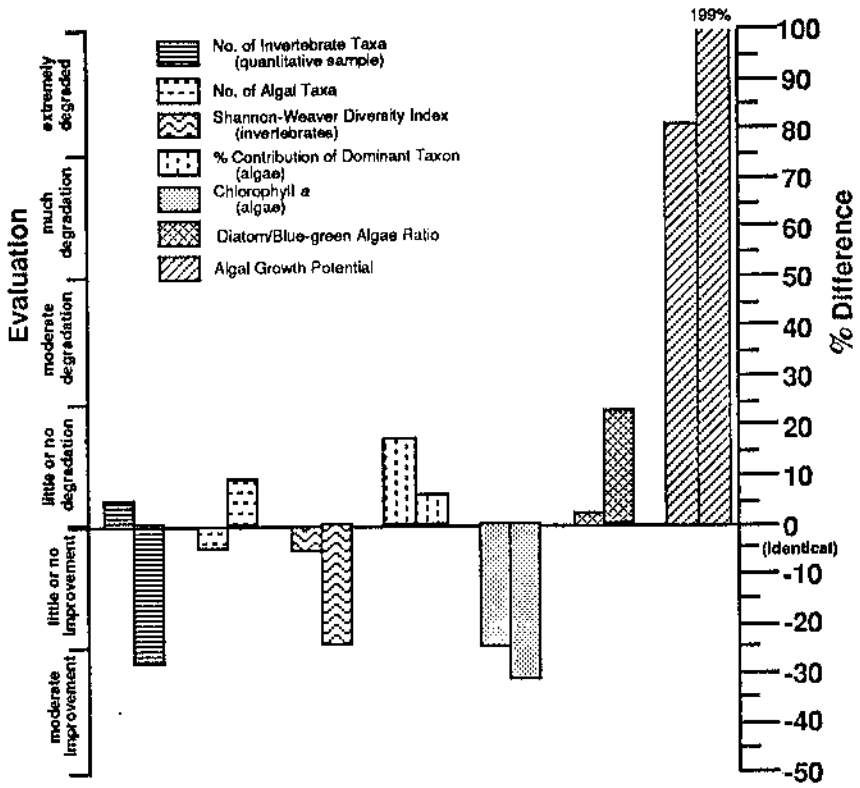
The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located near Hollowes Cove, also known as Marsh Cove, in the St. Johns River) and two test sites (one 150 m north of, and one 150 m south of the discharge) (see map in Appendix). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. 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 ex-

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	18	17	23
Shannon-Weaver Diversity	2.78	2.92	3.46
% Oligochaeta	41.9	66.0	53.7
% Diptera	40.0	22.4	18.9
% Malacostraca	2.9	6.1	16.8
% Ephemeroptera	9.5	0	0
% Pelecypoda	1.0	4.8	5.8
% Other	4.8	0.7	4.7
% Predators	30.9	20.9	20.3
% Collector-Gatherers	55.2	73.7	72.3
% Collector-Filterers	3.1	4.7	7.4
% Shredders	2.9	0.7	0
% Scrapers	7.9	0	0
Phytoplankton Algae			
Number of Taxa	21	22	19
% Contribution of Dominant Taxon	13.7	16.1	14.6
Chlorophyll a (µg/L)	1.6	1.2	1.1
Diatom/Blue-green Abundance Ratio	.70	.68	.54
% Diatoms	53.4	48.4	39.6
% Blue-green	23.3	22.6	33.3
% Green	23.3	27.4	27.1
% Euglenophyta	0	1.6	0
Algal Growth Potential (mg dry wt/l)	4.48	8.10	13.41

tractables, 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. Invertebrates were collected via three Ponar grabs per site (Ross 1990). Although dip net samples were also collected, they were not processed for this study. Phytoplankton was sampled at both reference and test sites through subsurface grabs. Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). Bacterial populations were analyzed for total and fecal coliforms following the methods of APHA (1989). Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism, followed Miller *et al.* (1978). Sediment from reference and test sites was analyzed for grain size and percent organic matter (Ross 1990).



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.)

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

The following personnel were involved in this investigation: Scott Bulgrin and Lindy Payne (DER Northeast District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Roberto Llansó, Kathleen Lurding, Kim Pearce, Landon Ross, and Greg Wynn (Tallahassee Biology Laboratory).

Results and Discussion

The facility discharges into a wide portion of the St. Johns River (over 2 miles across), characterized by a shoreline of docks and seawalls, and subject to urban stormwater runoff, as well as the Orange Park WWTP and other discharges (*e.g.*, the Mandarin STP is across the river). The area is tidally influenced, but was sampled during an outgoing tide. Salinity was only 1 ppt at both study sites. The reference site was situated farther upstream in the river, with less tidal effects and less impact from anthropogenic activities. Salinity at the reference site was zero at the time of sampling. Despite these differences, all three sites were similar with regard to temperature (16.8 to 17.0 °C), surface dissolved oxygen (8.2 to 8.8 mg/L), and pH (7.7 to 7.8 standard units). Habitat scores were 46 for each of the test sites, while the reference site received 69 points, mainly due to an unaltered shoreline and the presence of aquatic macrophytes (Appendix). Based on the habitat evaluation, the health of the biological communities from the reference site should have been better than that of the test sites.

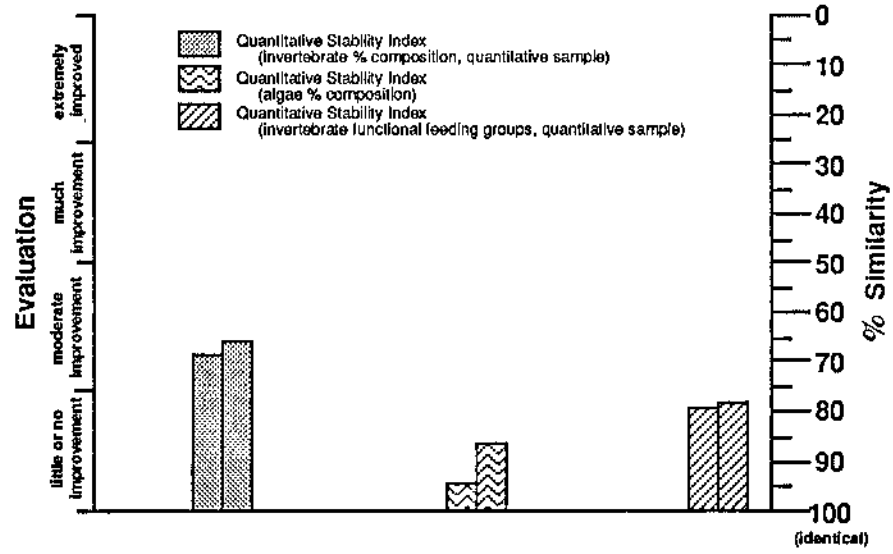
Analysis for organic constituents in the effluent revealed presumptive evidence (*i.e.*, substances were detected, but below the practical quantitation limit) for the presence of the pesticides chlorpyrifos (0.07 µg/L) and diazinon (0.10 µg/L). These levels of pesticides are cause for concern, as they are near or above acutely toxic concentrations. Chlorpyrifos has been found to be toxic to *Daphnia pulex*, (LC_{50} of 0.12 µg/L) and *Mysidopsis bahia* (LC_{50} of 0.035 µg/L) (AQUIRE 1991). Diazinon has been found to be toxic to such invertebrates as *Daphnia pulex*, (LC_{50} of 0.5 µg/L) and *Chironomus* sp. (LC_{50} of 0.1 µg/L) (AQUIRE 1991).

Metals found in the effluent above quantitation limits included aluminum (126 µg/L), silver (0.29 µg/L), iron (142 µg/L), and zinc (41 µg/L, with a trace of zinc in the blank). This concentration of silver is more than four times the Class III standard of 0.07 µg/L in predominately freshwaters, and is a violation of Rule 17-302.560(38) FAC.

The effluent sample was not toxic to the bannerfin shiner, *Notropis leedsi*. The water flea, *Ceriodaphnia dubia*, suffered 25% mortality, which may have been caused by the silver and pesticides detected in the sample (Appendix). While 25% mortality in a screening test does not represent a violation, this result does suggest that follow-up, definitive toxicity tests should be performed on this discharger.

Total and fecal coliform levels were extremely high in the effluent. The reported values for fecal coliforms (3500 organisms/100 mL) and for total coliforms (14,250 organisms/mL) represent the results of two individual samples collected on 24 November 1992. These levels of coliform bacteria are in violation of the facility's permit and also of Rule 17-302.560(6) FAC. Elevated total and fecal coliform populations have also been observed in samples collected on 19 November 1992 (analyzed by HRS) and 6 January 1993 (analyzed by DER). Concentrations of these bacteria were very low at the reference site and both study sites.

Although nutrients were elevated in the effluent, there was no clear pattern of receiving water nutrient enrichment which could be associated with the discharge (see Chemistry Summary Table in Appendix). Orthophosphate concentrations were somewhat higher at the two test sites compared to the reference, but they were not extraordinarily elevated (around the 65th percentile range compared with other Florida estuaries) (see Table of Typical Water Qual-



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.)

ity Values in Appendix). Ammonia levels were actually lower near the discharge, despite the effluent having an ammonia concentration of 7.1 mg/L. Nitrate-nitrite was elevated at all three study sites (including the reference site), being higher than 95% of typical estuary systems in Florida. TKN levels at all receiving water stations were near the 80th percentile range compared with other Florida estuaries (near 1.0 mg/L). The effluent had a TKN concentration of 7.7 mg/L.

Algal growth potential at the study sites (8.1 and 13.4 mg dry wt/L at test sites 1 and 2, respectively) exceeded the "problem threshold" of 5 mg dry wt/L. This is the level at which enrichment problems (algae blooms, dissolved oxygen sags, etc.) are likely to occur (Raschke and Schultz 1987). The elevated AGP at the test sites may have been related to the algal growth potential found in the effluent (30.3 mg dry wt/L). Reference site AGP was 4.5 mg dry wt/L.

Quantitative measures of benthic macroinvertebrate community health indicated little or no degradation, and some parameters suggested a slight amount of improvement at test site 2. 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 relative abundance of each individual taxon appears in the Appendix. The figure on p. 3 summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

Compared to the reference site, taxa richness decreased slightly at test site 1 (by 5.6%), but was 27.8% higher at test site 2. Shannon-Weaver diversity was somewhat improved at both test sites. Macroinvertebrate communities consisted of predominantly freshwater organisms, although approximately 7% to 20% of the taxa found were marine. Dipterans and oligochaetes (particularly *Limnodrilus* spp.) dominated at all three sites. While ephemeropterans made up 9.5% of the benthic population at the reference site, no mayflies at all were recovered from the test sites. This may have been related to the effluent's toxicity, or to the slightly elevated conductivity at the test sites. A larger percentage of marine crustaceans (mostly *Corophium* sp.) was present at test site 2 than at the other two study sites.

Phytoplankton communities were similar at reference and test sites, with no apparent degradation that could be associated with the discharge. Diatoms made up the majority of the algal assemblage at all stations, though this group was most dominant at the reference site. While the differences in chlorophyll *a* values illustrated on the graph appears to indicate a moderate amount of improvement at both test sites, the actual biomass measurements were low at all study areas.

Conclusions

The effluent sample collected from the Orange Park Wastewater Treatment Plant was not toxic to the fish *Notropis leedsi*, but caused 25% mortality to the invertebrate, *Ceriodaphnia dubia*. While 25% mortality in a screening test does not represent a violation, this result does suggest that follow-up, definitive toxicity tests should be performed on this discharger.

Analysis for organic constituents revealed presumptive evidence for the presence of the pesticides chlorpyrifos (0.07 µg/L) and diazinon (0.10 µg/L). These levels are close to toxic concentrations. Metals found in the effluent above quantitation limit included aluminum, silver, iron, and zinc. The silver concentration (0.29 µg/L) was in violation of Class III standards.

Effluent levels of both total coliform (14,250 organisms/100 mL) and fecal coliform bacteria (3,500 organisms/100 mL) violated Water Quality Standards and the facility's permit, while bacterial levels measured at all receiving water stations were within water quality standards.

Although nutrients were elevated in the effluent, there was no clear pattern of receiving water nutrient enrichment which could be associated with the discharge. Nitrate-nitrite was elevated at all three study sites (including the reference site), being higher than 95% of typical estuary systems in Florida. While orthophosphate concentrations were higher at the two test sites compared to the reference, they were not extraordinarily elevated (around the 65th percentile range compared with other Florida estuaries).

Algal growth potential at the study sites exceeded the "problem threshold" of 5 mg dry wt/L, which may have been related to the elevated algal growth potential found in the effluent (30.3 mg dry wt/L). Reference site AGP was 4.5 mg dry wt/L.

No degradation that could conclusively be associated with the discharger was noted. Benthic macroinvertebrate communities at all three study sites were composed primarily of freshwater organisms, mixed with a small percentage of marine taxa.

The communities at all three sites were dominated by chironomid midges and oligochaetes. Mayfly populations were reduced near the outfall. Test site measurements, such as taxa richness and diversity, were either similar to, or slightly higher than, those determined for the reference site.

Phytoplankton assemblages were similar at reference and test sites, and did not appear to be influenced by the effluent. While chlorophyll *a* was highest at the reference station, concentrations were very low at all three sites.

Literature Cited

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

Aquatic Toxicity Information Retrieval Data Base (AQUIRE). 1991. U.S. EPA Environmental Research Laboratory, Duluth, Mn.

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

Typical Values for Selected Parameters in Florida Waters

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

Parameter	Percentile Distribution 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	6.60	6.93	7.94	9.60	12.46	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

Chemistry summary table for

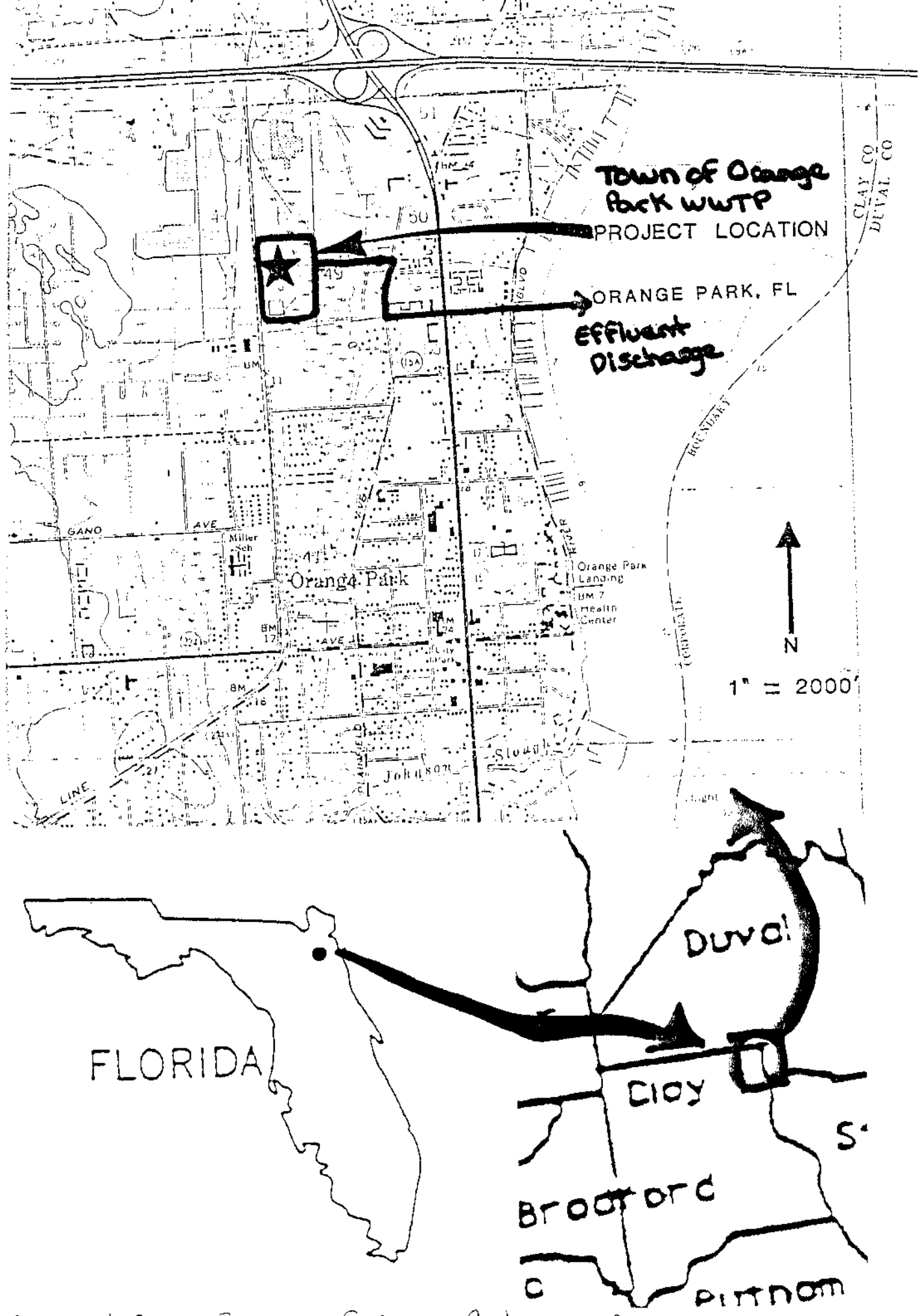
Orange Park WWTP	Effluent	Reference Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
Chlorpyrifos	0.07 N*			
Diazinon	0.10 N*			
*due to other matrix peaks interference in GC-NPD analysis				
Metals (ug/L)				
Aluminum	126			
Antimony	15 U			
Arsenic	20 U			
Cadmium	0.08 U			
Copper	6 T			
Chromium	10 U			
Iron	142			
Lead	15 U			
Mercury	0.1 U			
Nickel	5 U			
Selenium	30 U			
Silver	0.29			
Zinc	41	Trip blank contaminated		
Nutrients (mg/L)				
Ortho-phosphate	1.3	0.049 T	0.082	0.076
Total phosphorus	1.4	0.073	0.082	0.085
Ammonia	7.1	0.061	0.020 T	0.022 T
Nitrate+Nitrite	1.1	0.25	0.31	0.32
TKN	7.7	1.1	1.0	1.1
Other Parameters				
Habitat Assessment		69	46	46
D.O. (mg/L)	4.8	8.0	8.6	8.8
pH (SU's)	7.49	7.66	7.67	7.83
Specific Conductance (µmhos/cm)	680	700	1100	1100
Temperature (°C)	23.5	17.5	17.0	17.0
Algal Growth Potential (mg dry wt/L)	30.26	4.5	8.1	13.4
BOD5 (mg/L)	15	0.75	0.5	1.15
TSS (mg/L)	15	25	9	8
Bioassay Fish-Dechlorinated	Not Toxic			
Bioassay Invertebrate-Dechlorinated	25% mortality			
Fecal coliform (org/100 ml)	3,500 A	40	< 20	20
Total coliform (org/100 ml)	14,250 A	80	130	110

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

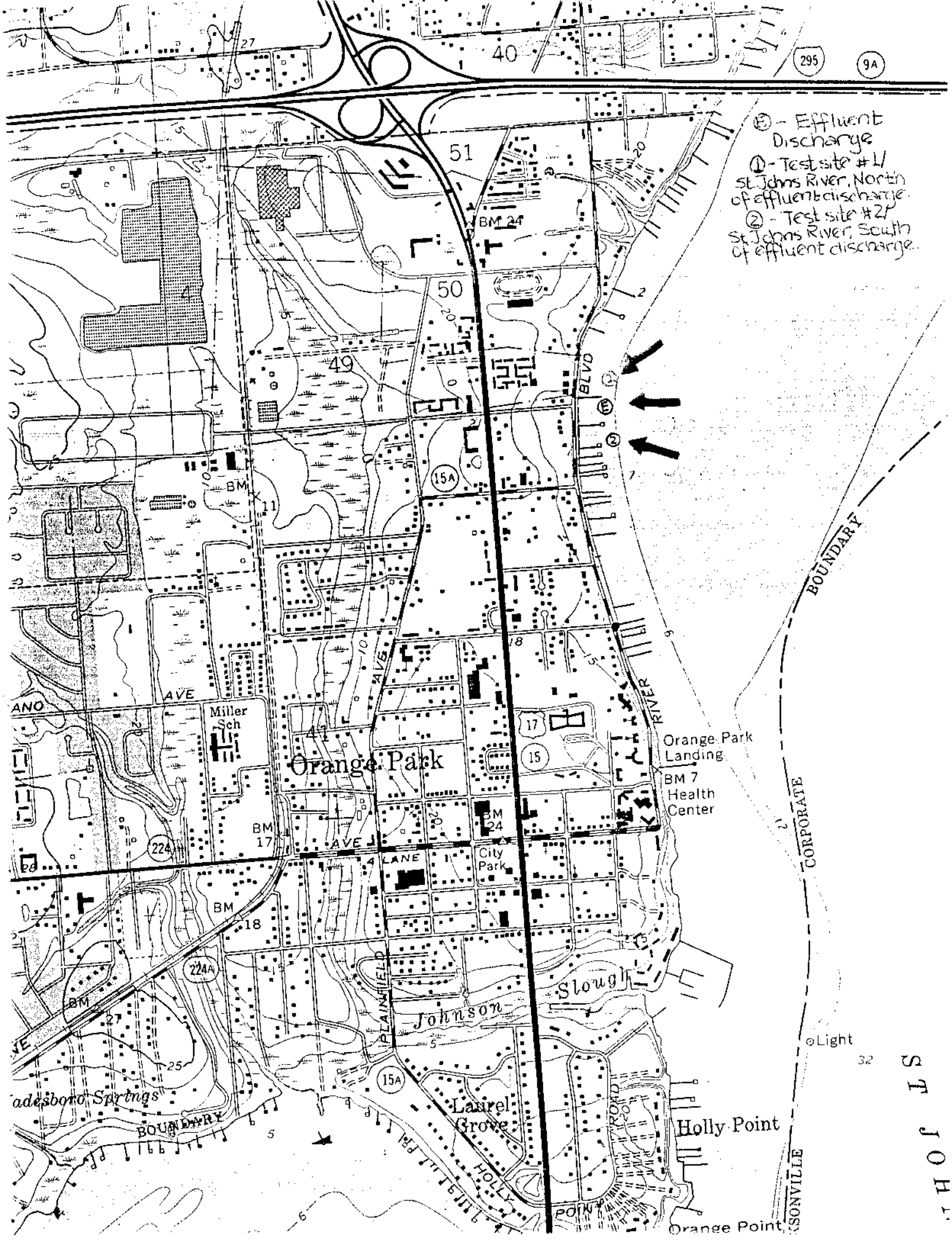
N - Presumptive evidence of presence of material

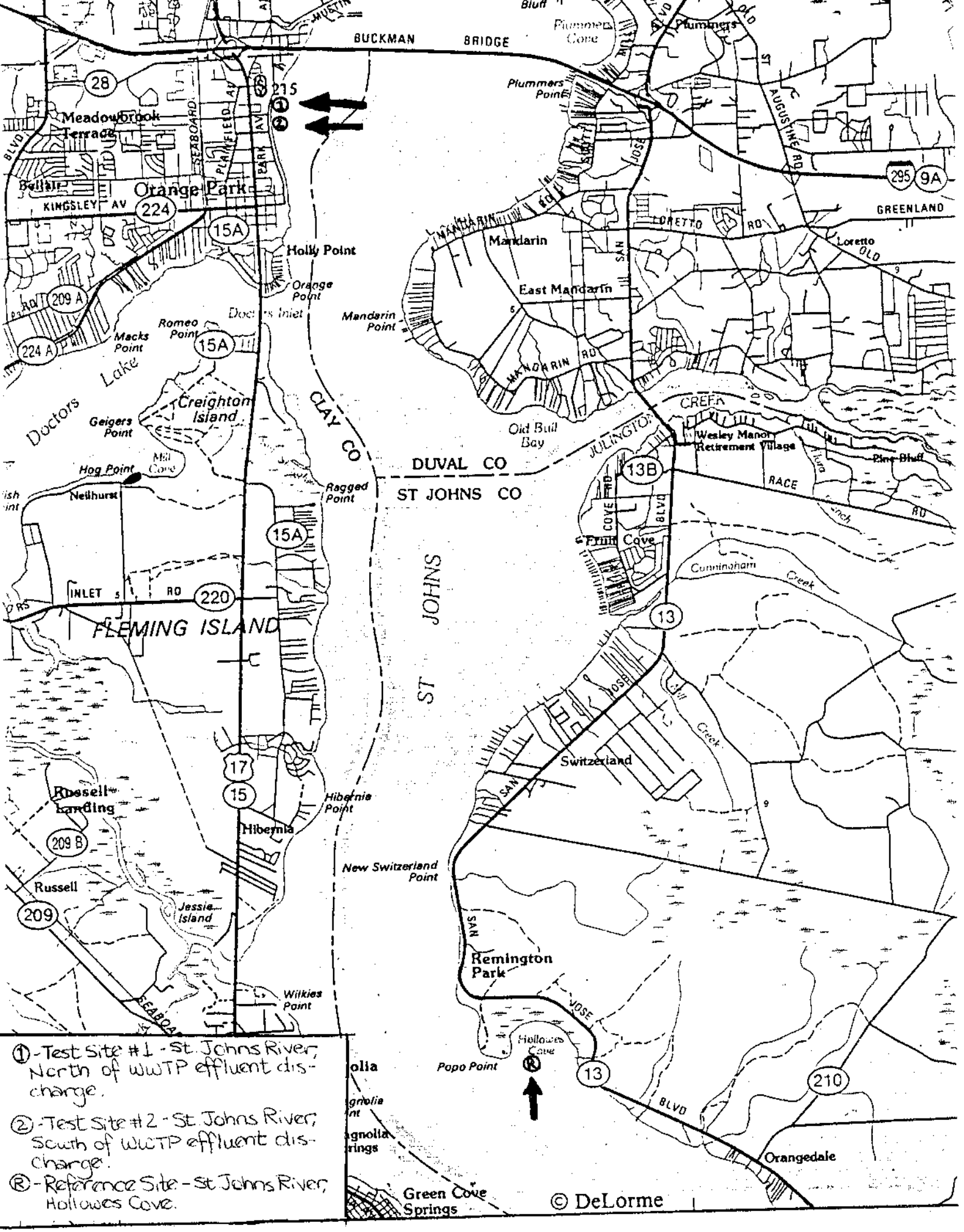
T - Value reported is less than the practical quantitation limit

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



General Map of Town of Orange Park WWTP


E - Effluent Discharge
① - Test site #1/ St. Johns River, North of effluent discharge
② - Test site #2/ St. Johns River, South of effluent discharge
Orange Park
Miller Sch
Orange Park Landing
BM 7 Health Center
City Park
Slough
Johnson
Laurel Grove
Holly Point
Orange Point
BOUNDARY
CORPORATE
PLAINFIELD
HOLLY POINT ROAD
BLVD
AVE
LANE
RIVER
Light
ST JOHNS


BUCKMAN BRIDGE
Plummers Cove
Plummers Point
Plummers
Meadowbrook Terrace
Bellair
Orange Park
KINGSLEY AV
Holly Point
Orange Point
Doctors Inlet
Romeo Point
Macks Point
Doctors Lake
Creighton Island
Geigers Point
Mill Cove
Hog Point
Neilhurst
Ragged Point
CLAY CO
DUVAL CO
ST JOHNS CO
ST JOHNS
FLEMING ISLAND
INLET RD
Mandarin
Mandarin Point
East Mandarin
MANDARIN RD
Old Bull Bay
CREEK
Wesley Manor Retirement Village
JULINGTON
Pine Bluff
RACE
Fruit Cove
COVE RD
Cunningham Creek
Switzerland
Hill Creek
Russell Landing
Hibernia
Hibernia Point
New Switzerland Point
Russell
Jessie Island
Wilkies Point
Remington Park
Hollowes Cove
Popo Point
Orangedale
Green Cove Springs
GREENLAND
Loretto
AUGUSTINE RD
LORETTO RD
BLVD
28
215
224
224 A
209 A
15A
220
17
15
209
209 B
13
13B
295
9A
210
① - Test Site #1 - St. Johns River, North of WWTP effluent discharge.
② - Test Site #2 - St. Johns River, South of WWTP effluent discharge.
Ⓡ - Reference Site - St Johns River, Hollowes Cove.
© DeLorme

A. STATE PERMIT Effluent Limits

PERMITTEE:

Town of Orange Park STP

I.D. Number: 3110M01826
Permit Number: DO10-151427
Date of Issue: August 5, 1988
Expiration Date: August 5, 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)	2.5	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 and Effluent
pH Units	6.0 - 8.5	Continuous***	Grab	Effluent
Chlorine Residual(mg/l)	0.5 Minimum 1.0 Maximum	Continuous***	Grab	Effluent
Fecal Coliform no./100 (ml)	200	Weekly	Grab	Effluent

* or 90% removal, whichever is more stringent.
A. Recording flowmeter and totalizer required.
*** Hourly measurements during the period of required operator attendance may be substituted for continuous measurement where such devices are not available.

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

** Rule 17-6.180

13. By August 5, 1990, the permittee shall complete and have in operation dechlorination facilities which reduce the total residual chlorine (TRC) content of the effluent to 0.01 mg/l or less, as required by FAC Rule 17-3.121(10). This limit which is necessary to prevent toxic effects from chlorine in the receiving waters does not provide for a zone of mixing for TRC in the receiving waters. The permittee may apply for a mixing zone for TRC if the permittee determines such to be a benefit. If a mixing zone is granted by the Department, the permittee may request a modification of the above effluent limit for TRC. The Department's mixing zone regulations are contained in FAC Rule 17-4.244.

    The permittee shall also comply with all TRC effluent limits and dechlorination requirements contained in any EPA National Pollutant Discharge Elimination (NPDES) permit for the facility.

14. The Department reserves the right to modify the effluent limitations placed on this facility pursuant to state rules and regulations should further water quality analysis of the proposed discharge, its volume and character, together with the flow and characteristics of the receiving body of water, indicate that the discharge will not meet and comply with applicable water quality standards contained in Chapter 17-3, FAC.

B. NPDES Permit Effluent Limits

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Final

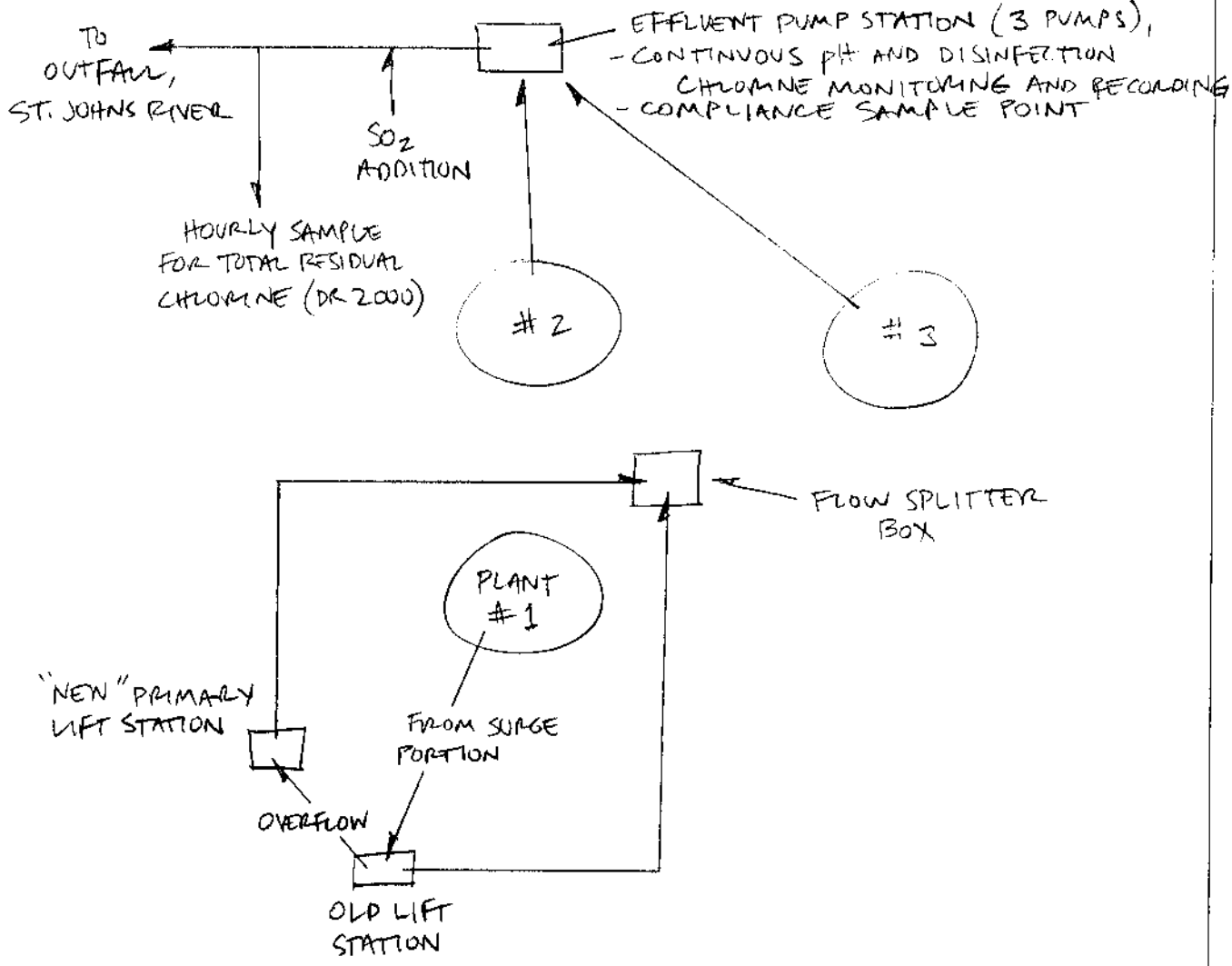
1. During the period beginning on the effective date and lasting through the expiration date of this permit, the permittee is authorized to discharge from outfall(s) 001, sanitary wastewater.

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

PARAMETERS	DISCHARGE LIMITATIONS			MONITORING REQUIREMENTS		
	Annual Average	Monthly Average	Weekly Average	Measurement Frequency	Sample Type	Sample Point
Flow, MGD	---	Report	Report	Continuous	Recording Flow & Totalizer	Effluent
Biochemical Oxygen Demand (5 Day) BOD_5, mg/l	20.0	30.0	45.0	1/week	16-hr composite	Influent & Effluent
Total Suspended Solids (TSS) ,mg/l	20.0	30.0	45.0	1/week	16-hr composite	Influent & Effluent
Fecal Coliform Bacteria, N/100 ml	(See item 4, page I-2)			1/week	Grab	Effluent
Dissolved Oxygen	shall not be less than 5.0 mg/l			1/week	Grab	Effluent
pH	(See item 5, page I-2)			Continuous	Recorder	Effluent
(1) Total Residual Chlorine (TRC)	(See Item 10, Page I-3 for interim and final effluent limits and approved testing procedures. See Page I-5 for compliance schedule and compliance dates.)			Continuous	Grab	Effluent

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

TOWN OF ORANGE PARK | FLOW SCHEMATIC | NOVEMBER 9, 1992



NOTE:

- PLANT 1 IS BEING UTILIZED AS A SURGE TANK AND SLUDGE THICKENER AFTER STABILIZATION IN PLANTS 2 AND 3 DIGESTORS.
- PLANTS 2 AND 3 ARE 1.0 MGD CONTACT STABILIZATION, WITH COMMINUTOR AND MANUAL BAR SCREEN.
- IN EARLY 1993, PLANT 1 IS TO RETURN TO SERVICE AS A 0.5 MGD CONTACT STABILIZATION PLANT.
- PLANTS 2 AND 3 HAVE FLOW METERS WHICH COMBINE SIGNALS TO PROVIDE ONE FLOW READING. INFLUENT AND EFFLUENT COMPOSITE SAMPLERS USE THE COMBINED SIGNAL.

DENNIS CALHOUN
Engineer III

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: WWTP TOWN OF ORANGE PARK	Date Summary Prepared: 11/24/92	
Location (attach detailed map): 700 ASH Street Orange Park, Florida	County: CLAY	District: NORTHEAST DISTRICT
Federal Permit # and expiration date: FL0023922 Sept. 30, 1994	State GMS # and State expiration date: 3110170126 August 5, 1993 DOIC-151437	Facility Type: Industrial (Municipal) Federal Agricultural Other (list):

Function of facility: To operate a 2.5 mgd contact stabilization STP with Chlorinated effluent discharge through a 16" force main to the St. Johns River (now de-chlorinated)

Description of treatment process: This primary treatment consists of manual screen and aerated grit chamber. This is followed by a contact aeration basin, secondary clarifier and chlorine contact unit. An aerobic digester is used to treat the sludge which is sent to sludge drying beds to be dewatered.

SEE Flow SCHEMATIC Attached.

Receiving waters: ST. Johns River	Classification: I II (III)	
Design Flow: 2.5 MGD	Mean Flow: 1.14 MGD (Daily over 6 month Period)	Flow during survey: 1.444 MGD

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.):

Facility has no mixing zone.

List effluent limits (if necessary, attach relevant paperwork):	
Parameter	Limit (units)
See Attached Sheets	
A. State Permit	
B. NPDES	

Describe special permit conditions and permit modifications:

STATE Permit does not require biocessay toxicity test.
July 1990 to July 1993, DOIC-181013 permit revalidation to install the dechlorination system to the existing WWTP. Dechlorination system is required by the State and EPA when we must use Total residual Chlorine to 0.01 mg/l or less prior to discharge. NPDES permit requires a 48 hour static Toxicity test on 3 appropriate test species (a least one is a native invertebrate) 4 separate grabs over 24 hours every other month.

Town of Orange Park
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s): The Town of Orange Park WWTP leaves the effluent pump station through a 16" force main to the St. Johns River.

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

Review of the Monthly Operating Reports (MOR's) and DMR reports show that the Town of Orange Park WWTP had no deficiencies or compliance violations from the past two years.

There have been no major plant upsets over the past several years and historical NPDES compliance Sampling Inspection reports, operation and maintenance reports and Performance Audit Inspection reports are on file in the North East District office.

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

The Town of Orange Park WWTP has had special tests conducted on various sites in the St. Johns River from 1991 to 1992. The attached sheets summarize the important parameters near the effluent discharge point (studies were conducted by First Coast Environmental Laboratory, Inc.).

Various studies on this part of the river are also on file with FL DER with respect to water chemistry on fixed station monitoring.

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

September 11, 1991 EPA did a compliance evaluation inspection (CEI) on the Town of Orange Park. Deficiencies were noted in records and reports, flow measurement, and operation and maintenance.

August 19, 1992 EPA along with FL DER personnel did a performance audit inspection on the Town of Orange Park. Several unsatisfactory deficiencies were noted with respect to pH, fecal coliform, and total residual chlorine. A copy of the report is in the NE district files. The Town of Orange Park is trying to correct these deficiencies.

Additional information: Town of Orange Park WWTP has eliminated the unused evaporation-percolation pond as part of any treatment. The pond will be recreational.

Quality assurance samples sent by the EPA have shown that pH has been "not acceptable" in both the Nov. 1990 study and Dec. 1991 study.

Staff contributing to this review (signature):

Scott Burgess Scott Burgess	(Biologist)
Linda Burgess Linda Burgess	FSI [redacted]
	(Engineer)
	( )
	( )
	( )

Historical Data/Town of Orange Park
St. Johns River
500' North, 100' East of Outfall

Sample Date	Depth feet	NO2-N mg/L	NO3-N mg/L	TSS mg/L	TP-P mg/L	TKNmg/ L	BOD mg/L	Chloro- a mg/m3	Fecal coli/ #/100 ml
03-26-89	3.5	0.70	0.06	30	0.078	0.70	4	0.1620	<1
06-25-89	4.5	0.07	<0.01	20	0.025	0.98	1	<0.010	<1
12-29-89	4.5	<0.05	0.27	13	0.126	2.08	2	20.5	<10
03-11-90	5.0	<0.01	<0.01	18	0.100	1.82	10	0.1109	<1
06-24-90	4.0	0.06	0.03	12	0.180	<0.02	1	0.0603	<1
09-17-90	4.5	0.13	0.12	13	4.760	<0.14	1	0.0307	200
12-12-90	3.5	<0.01	0.18	10	<0.02	0.18	1	0.0052	9
03-26-91	4.5	<0.01	0.05	8	0.110	0.63	2	<0.020	1
06-11-91	4.5	0.02	0.03	25	0.090	0.56	1	0.1600	5
03-15-92	4.0	<0.01	0.11	6	0.060	0.88	2	0.0970	<1

Historical Data/Town of Orange Park
WWTP Effluent

Sample Date	Depth feet	NO2-N mg/L	NO3-N mg/L	TSS mg/L	TP-P mg/L	TKNmg/ L	BOD mg/L	Chloro- a mg/m3	Fecal coli/ #/100 ml
03-26-89	n/a	3.35	4.80	1.5	4.85	1.40	4	n/a	TNTC
06-25-89	n/a	<0.01	2.97	9	3.65	1.40	2	n/a	<1
12-29-89	n/a	<0.05	2.35	4	3.05	0.96	3	n/a	<1
03-11-90	n/a	0.21	2.47	12	5.00	2.10	8	n/a	900
06-24-90	n/a	<0.01	1.66	2	2.20	<0.02	1	n/a	400
09-17-90	n/a	3.03	0.12	4	3.62	1.12	2	n/a	<20
12-12-90	n/a	0.04	5.36	1	2.75	1.53	1	n/a	79
03-26-91	n/a	0.35	2.49	10	3.03	0.24	3	n/a	28
06-11-91	n/a	0.06	4.30	3	0.73	0.98	1	n/a	9
03-15-92	n/a	1.26	1.96	2	2.35	5.07	15	n/a	<1

Historical Data/Town of Orange Park
St. Johns River
50' West of Outfall

Sample Date	Depth feet	NO2-N mg/L	NO3-N mg/L	TSS mg/L	TP-P mg/L	TKN mg/L	BOD mg/L	Chloro- a mg/m3	Fecal coli/ #/100 ml
03-26-89	2.5	<0.01	<0.01	2	0.060	0.28	4	0.0430	20
06-25-89	4.0	0.10	<0.01	21	0.025	0.84	1	0.0280	<1
12-29-89	5.0	<0.05	0.13	12	0.205	0.64	1	25.9	<10
03-11-90	5.0	<0.01	<0.01	10	0.100	0.84	4	1.8540	10
06-24-90	5.0	0.07	0.05	13	0.100	<0.02	1	0.0841	<1
09-17-90	5.0	0.12	0.10	6	5.000	<0.14	1	0.0035	<20
12-12-90	4.0	<0.01	0.14	8	<0.02	0.25	1	0.0210	65
03-26-91	4.5	<0.01	0.08	11	0.140	0.70	1	<0.020	10
06-11-91	6.5	0.02	0.02	27	0.270	0.42	1	0.1550	9
03-15-92	4.5	<0.01	0.22	6	0.050	0.80	2	0.0695	<1

Historical Data/Town of Orange Park
St. Johns River
100' North, 50' East of Outfall

Sample Date	Depth feet	NO2-N mg/L	NO3-N mg/L	TSS mg/L	TP-P mg/L	TKNmg/ L	BOD mg/L	Chloro- a mg/m3	Fecal coli/ #/100 ml
03-26-89	2.0	<0.01	<0.01	9.5	0.082	1.82	4	0.009	<1
06-25-89	3.0	0.05	<0.01	17	0.025	0.77	1	0.026	<1
12-29-89	6.0	<0.05	0.21	9	0.335	1.19	2	15.6	<20
03-11-90	4.0	<0.01	<0.01	40	0.150	0.70	6	1.594	20
06-24-90	4.0	0.05	0.03	13	0.150	<0.02	1	0.065	<1
09-17-90	6.0	0.13	0.13	10	2.200	0.21	1	0.002	320
12-12-90	4.0	<0.01	0.15	4	<0.02	0.32	1	0.056	22
03-26-91	3.5	<0.01	0.06	8	0.110	0.57	2	<0.020	<0.02
06-11-91	5.0	0.02	0.06	13	0.090	0.42	1	0.099	7
03-15-92	3.5	<0.01	0.07	5	0.050	0.59	2	0.112	<1

Historical Data/Town of Orange Park
St. Johns River
500' South, 100' East of Outfall

Sample Date	Depth feet	NO2-N mg/L	NO3-N mg/L	TSS mg/L	TP-P mg/L	TKN mg/L	BOD mg/L	Chloro- a mg/m3	Fecal coli #/100 ml
03-26-89	4.0	<0.01	0.08	2	0.076	3.64	5	0.3487	10
06-25-89	3.5	0.045	<0.01	26	0.025	0.98	2	0.0260	<1
12-29-89	4.0	<0.05	0.110	5	0.043	0.64	2	91.5	<1
03-11-90	5.0	<0.01	<0.01	72	0.150	1.12	7	0.2598	10
06-24-90	5.0	0.063	0.040	12	0.100	<0.02	1	0.0833	20
09-17-90	4.0	0.11	0.09	5	6.360	0.14	7	0.0068	400
12-12-90	4.0	<0.01	0.17	15	0.350	0.25	1	0.0115	6
03-26-91	4.0	<0.01	0.07	8	0.140	0.73	2	<0.020	9
06-11-91	6.0	0.018	0.054	8	0.090	0.35	1	<0.020	3
03-15-92	5.0	<0.01	0.10	3	0.050	0.81	4	1.16	<1

Historical Data/Town of Orange Park
St. Johns River
100' South, 50' East of Outfall

Sample Date	Depth feet	NO2-N mg/L	NO3-N mg/L	TSS mg/L	TP-P mg/L	TKN mg/L	BOD mg/L	Chloro- a mg/m3	Fecal coli/ #/100 ml
03-26-89	3.0	<0.01	<0.01	4	0.080	0.56	4	0.1318	10
06-25-89	4.0	0.07	<0.01	20	0.076	1.40	1	<0.010	<1
12-29-89	4.0	<0.05	0.20	6	0.445	0.84	1	95.0	<1
03-11-90	4.0	<0.01	<0.01	24	0.100	0.56	3	0.0976	10
06-24-90	5.0	0.07	0.03	14	0.100	<0.02	1	0.0860	<1
09-17-90	5.0	0.11	0.10	10	0.180	<0.14	1	0.0747	300
12-12-90	4.5	<0.01	0.15	7	1.350	0.28	1	0.0187	20
03-26-91	4.0	<0.01	0.02	10	0.130	0.87	2	<0.020	18
06-11-91	5.5	0.02	0.04	12	0.100	0.21	1	0.0210	6
03-15-92	4.0	<0.01	0.08	4	0.050	0.31	3	0.0844	<1

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 3)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL DER NorthEast DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 11/17/92	TIME: 1015	RECEIVING BODY OF WATER: Marsh Cove Mixes with St. Johns River

REMARKS: Marsh Cove is mis-named The Site is actually Hollowas most pristine area Cove.	LOCATION: St. Johns River Marsh Cove	FIELD ID/NAME: (Reference Site)

South of Orange Park

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
90			10			

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

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

Point-Source Pollution (list location and describe): except recreational use runoff

Estimated System Width (range, m): ~0.9 mile	Estimated System Depth (range, m): 0.6-6	yes
High Water Mark (m above bed): 0.3	Velocity (range, m/s): 0.2-0.3	Impounded ☐ Channelized ☐

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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	20	7	Dip Net	Rock or Shell Rubble			
Leaf Packs				Sand	10	2	Dip Net
Aquatic Vegetation	20	4	Dip Net	Mud/Muck/Detritus	30	2	Dip Net
Submerged Roots	10	3	Dip Net	Other:			
Undercut Banks	10	2	Dip Net	Other:			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	pH (SU):	Cond. (µmho/cm):	Salinity			Secchi (m
Top	17.0	8.2	7.66	700	0‰			0.7
Mid-depth	16.8	8.0	7.66	700	0‰			
Bottom	16.8	8.0	7.66	700	0‰			

System Type : Stream: ☐ (Surficial Aquifer Fed / Deep Aquifer Fed / Alluvial / Blackwater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☒ Estuarine River

Water Odors (check box): Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐

Water Surface Oils (check box): Slick: ☐ Sheen: ☐ Globs: ☐ None: ☒

Clarity (check box): Clear: ☒ Slightly turbid: ☐ Turbid: ☐ Opaque: ☐

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

Weather Conditions: winds, NE slight chop, outgoing tide area somewhat tidally influenced.

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☒ Didn't notice	☐	☐	☐
Fish	☐	☐	☒ Mullet Bream	☐
Aquatic Macrophytes	☐	☐	☒ Eloden Hydrilla	☐
Iron/sulfur Bacteria	☒	☐	☐	☐

ANALYSIS DATE: 11/17/92	ANALYST: SCOTT Bulgin Lindy Payne	SIGNATURE: Scott Bulgin Lindy Payne

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FLDER Northeast District	STORET STATION NUMBER:	DATE (M/D/Y): 11/17/92	RECEIVING BODY OF WATER: Marsh Cove mixes with St Johns River

REMARKS: WINDS NE slightchop Tidally influenced area somewhat	LOCATION: St. Johns River Marsh Cove	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: 30	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation: 2	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations: 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: 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 69

COMMENTS: Marsh Cove is misnamed, The site is actually Hollewas Cove (Swamp) The cove is a pristine area south of Orange Park. The cove is not developed and is Unimpacted. Physical Geography of area fit Marine Benthic Farm best.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
11/17/92	Scott Bulgrin	Scott Bulgrin
	Lindy Payne	Lindy B. Payne

DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 3)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL DER Northeast District	STORET STATION NUMBER:	DATE (M/D/Y): 11/17/92	TIME: 1330	RECEIVING BODY OF WATER: Town of Orange Park WWTP discharges into St. Johns River

REMARKS: Area of discharge impacted by docks, seawalls, boats and other WWTP discharge	LOCATION: St. Johns River, north of Town of Orange Park WWTP discharge	FIELD ID/NAME: (Test Site #1)

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
			50	40	10	

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

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

Point-Source Pollution (list location and describe): Town of Orange Park WWTP, Kingsley Service WWTP, urban stormwater runoff, dredged

Estimated System Width (range, m): ~2.9 miles

Estimated System Depth (range, m): 0.6 - 6

High Water Mark (m above bed): 0.3

Velocity (range, m/s): 0.14 - 0.3

Impounded: yes ☒

Channelized: yes ☒

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

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☒ Sewage: ☒ (slight) 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)	10	2	Dip Net	Rock or Shell Rubble			
Leaf Packs				Sand	20	2	Dip Net
Aquatic Vegetation	10	2	Dip Net	Mud/Muck	30	5	Dip Net
Submerged Roots				Other: Docks, Piers	30	9	Dip Net
Undercut Banks				Other: Seawalls			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	pH (SU):	Cond. (µmho/cm):	Salinity			Secchi (m)
Top	17.0	9.6	7.67	1100	1 ‰			0.7
Mid-depth	17.0	8.6	7.67	1100	1 ‰			
Bottom	17.0	9.7	7.67	1150	1 ‰			

System Type : Stream: ☐ (Surficial Aquifer Fed / Deep Aquifer Fed / Alluvial / Blackwater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☒ Estuarine River

Water Odors (check box): Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐

Water Surface Oils (check box): Slick: ☐ Sheen: ☐ Globs: ☐ None: ☒

Clarity (check box): Clear: ☒ to → Slightly turbid: ☒ Turbid: ☐ Opaque: ☐

Color (check box): Tannic: ☐ Green (algae): ☒ slight Clear: ☒ Other: ☐

Weather Conditions: Winds, NE choppy, outgoing tide. Area tidally influenced.

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☒ (Diatoms present)	☐	☐	☐
Fish	☐	☐	☒ (mullet, killifish)	☐
Aquatic Macrophytes	☒	☐	☐	☐
Iron/sulfur Bacteria	☒	☐	☐	☐

ANALYSIS DATE:	ANALYST:	SIGNATURE:
11/17/92	SCOTT Bulgrin, Lindy Payne	Scott Bulgrin, Lindy Payne

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FLDER Northeast District	STORET STATION NUMBER:	DATE (M/D/Y): 11/17/92	RECEIVING BODY OF WATER: Town of Orange Park WWTP discharges into St. Johns River

REMARKS: Winds NE Choppy outgoing tide, Tidally influenced	LOCATION: St. Johns River, north of Town of Orange Park WWTP discharges.	FIELD ID/NAME: (Test Site #1)

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations **5**	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed **25**	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation **2**	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations **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 **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 **46**

COMMENTS: Area of discharge impacted by docks, seawalls, boats and other WWTP discharge. FW influence strong at time of sampling. Physical topography of area

ANALYSIS DATE:	ANALYST:	SIGNATURE:
11/17/92	Scott Bulgrin Lindy Payne	Scott Bulgrin Lindy B. Payne

F.I.T. Marine Benthic form basf.

DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 3)

SUBMITTING AGENCY CODE: 803T SUBMITTING AGENCY NAME: FL DER NorthEast DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 11/17/92	TIME 1230	RECEIVING BODY OF WATER: Town of Orange Park WWTP discharges into St. Johns

REMARKS: Area of discharge impacted by docks, seawalls	LOCATION: ST. Johns River, 500 Ft. South of Town of Orange Park WWTP discharge	FIELD ID/NAME: (TEST SITE #2)

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
			50	40	10	

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

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

Point-Source Pollution (list location and describe): TOWN OF ORANGE PARK WWTP; Urban Stormwater runoff

Estimated System Width (range, m): ~2.9 miles	Estimated System Depth (range, m): 0.6 - 6	Impounded ☐ Channelized ☑ (dredged)
High Water Mark (m above bed): 0.3	Velocity (range, m/s): 0.14 - .3	

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

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☒ Sewage: ☑ (slight) 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 samoled	method
Woody Debris (Snags)	10	2	Dip Net	Rock or Shell Rubble			
Leaf Packs				Sand	20	2	Dip Net
Aquatic Vegetation	10	2	Dip Net	Mud/Muck	30	5	Dip Net
Submerged Roots				Other: Rocks, Piers	30	9	Dip Net
Undercut Banks				Other: Seawalls			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	pH (SU):	Cond. (µmho/cm):	Salinity			Secchi (m)
Top	17	8.8	7.83	1050	1 ‰			
Mid-depth	17	8.7	7.83	1100	1 ‰			0.65
Bottom	17	8.8	7.83	1100	1 ‰			

System Type : Stream: ☐ (Surficial Aquifer Fed / Deep Aquifer Fed / Alluvial / Blackwater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☒ Estuarine River

Water Odors (check box): Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐

Water Surface Oils (check box): Slick: ☐ Sheen: ☐ Globs: ☐ None: ☒

Clarity (check box): Clear: ☒ to → Slightly turbid: ☑ Turbid: ☐ Opaque: ☐

Color (check box): Tannic: ☐ Green (algae): ☑ slight Clear: ☒ Other: ☐

Weather Conditions: winds, NE Choppy, outgoing tide. Area tidally influenced.

Abundance:	Absent	Rare	Common	Abundan
Periphyton	☒ (Didn't notice)	☐	☐	☐
Fish	☐	☐	☒ (mullet, killifish)	☐
Aquatic Macrophytes	☒	☐	☐	☐
Iron/sulfur Bacteria	☒	☐	☐	☐

ANALYSIS DATE: 11/17/92	ANALYST: SCOTT Bulgrin Lindy Payne	SIGNATURE: Scott Bulgrin Lindy Payne

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FLDER Northeast District	STORET STATION NUMBER:	DATE (M/DY): 11/17/92	RECEIVING BODY OF WATER: Town of Orange Park WWTP discharges into St Johns River

REMARKS: winds NE choppy outgoing tide, Tidally influenced	LOCATION: St. Johns River, 500 ft. South of Town of Orange Park WWTP discharge.	FIELD ID/NAME: (Test Site # 2)

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 5	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 25	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 2	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 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 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 46

COMMENTS: Area of discharge impacted by docks, seawalls, boats and other WWTP discharge. FW influence strong at time of sampling. Physical Geography of area fit

ANALYSIS DATE:	ANALYST:	SIGNATURE:
11/17/92	SCOTT Bulgrin	Scott Bulgrin (Marine Benthic form used)
	Lindy Payne	Lindy B. Payne

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Orange Park
Address/City:
County: Clay
Contact/District: S. Bulgrin / NE
NPDES Permit #: FL00 23922 Outfall #:

Sample Collection: Date 11/09/92 Time 1110
Test Beginning: Date 11/10/92 Time 1300
Test Ending: Date 11/12/92 Time 1330
Test Organism: Ceriodaphnia dubia
Life Stage/Age: < 24 hours

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

44804 92 NOV 10 15
verified 11-13-92 KP

Remarks:

44804 92 NOV 10 15

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7.7 9.9	8.5 @ 24°C	22.8 @ 22.6°C	955 9500 @ 23.2
24 hr	7.7 9.9	8.4 @ 23.5°C	22.6 @ 22.5	957 9670 @ 22.6
48 hr	7.7 9.9	8.5 @ 24°C	23.5 @ 23.5	960 9550 @ 23.3

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48	Cond. (µmhos/cm) 0	24	48
Control	A	5	5	5	8.4		8.2	22.8		24.3	8.4		7.7	150		190
Control	B	5	5	5			8.2			24.2			7.6			180
Control	C	5	5	5			8.2			24.3			7.7			180
Control	D	5	5	4			8.3			24.2			7.7			175
100%	A	5	5	2	7.8		8.5	22.6		24.1	8.4		7.7	585		630
100%	B	5	5	3			8.4			24.1			7.6			670
100%	C	5	5	5			8.5			24.0			7.6			650
100%	D	5	5	5			8.5			24.0			7.6			670
Measured/Loaded by:		MF	MF	MF	TR		TM	TR		TM	TR		TM	TR		TM
Recorded by:		TM	MF	MF	TM		TR	TM		TR	TM		TR	TM		TR

Investigators' Signatures

L. M. Faircloth
Robin C. Rader
Tina M. Kulakis

Water-quality Parameters

	Well Water	20% ~~Cond.~~ Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:	0.0	0.0	0.06	DR100	TM
Alkalinity:	137	65	160	Hach	TR
Hardness:	113	75	173	Hach	TR
Total Ammonia:	0.0	0.0	7.2	Hach	TM

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Orange Park
Address/City:
County: Clay
Contact/District: S. Bulgin
NPDES Permit #: FL0023922 Outfall #:

Sample Collection: Date 11/09/92 Time 1110
Test Beginning: Date 11/10/92 Time 1300
Test Ending: Date 11/12/92 Time 1330
Test Organism: Mysidopsis bahia
Life Stage/Age: 10 days

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

44804 92 NOV 1015

Remarks:

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7.7-9.9	8.5@24°C	22.8@22.0°	955 9500 @ 22
24 hr	7.7-9.9	8.6@23.5°C	22.6@22.5°C	967 9670 @2
48 hr	7.7-9.9	8.5@24°C	23.5@23.5°	960 9550 @ 5

		Number Live			pH			Temp. (°C)			DO (mg/L)			Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	89	5	5	4	7.9	8.2	8.3	22.1	22.8	23.1	8.3	8.2	7.7	235	350	245
Control	8	5	5	5	7.9	8.2	8.3	22.1			8.2	8.1	7.7	235	350	240
100%	74	5	5	5	7.7	7.5	8.2	22.9	22.8	23.1	8.3	8.2	7.7	635	750	640
100%	147	5	5	5	7.7	7.5	8.2	22.9			8.3	8.3	7.6	640	750	635
Measured/Loaded by:		MF	MF	TM	TR	MF	TM	TR	MF	TM	TR	MF	TM	TR	MF	TM
Recorded by:		TM	MF	TM	TM	MF	TR	TM	MF	TR	TM	MF	TR	TM	MF	TR

Investigators' Signatures

J M Fancher
Tobin Rader
Tina M. Kubalik
Reviewer

Water-quality Parameters

	Well Water	20‰ Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:			<0.06	DR 100	TM
Alkalinity:	137	65	160	Hach	TR
Hardness:	113	75	175	Hach	TR
Total Ammonia:	0.0	0.0	7.2	Hach	TM

Ammonia Meter Slope: _____ Ammonia Blank: _____ Salinity Sample: _____ ppt

Phytoplankton taxa list and densities (#/mL) for Orange Park Wastewater Treatment Plant, collected via subsurface grabs in the St. Johns River, Clay County, on 17 November, 1992.

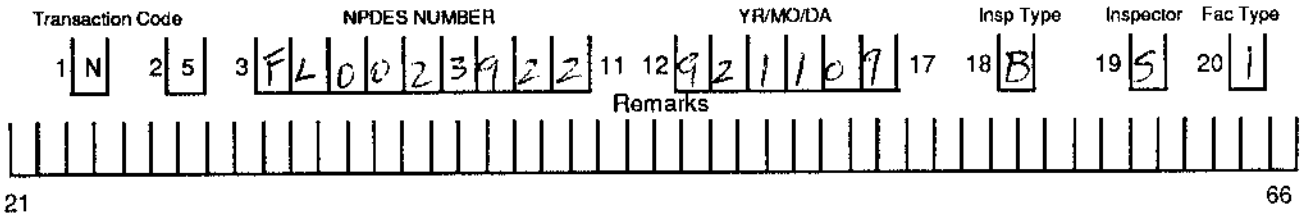
	Reference Site	Test Site 1	Test Site 2
Diatoms			
Achnanthes sp.	24	25	–
Amphora sp.	–	–	26
Cocconeis sp.	122	25	26
Coscinodiscus sp.	122	98	131
Cyclotella sp.	244	147	–
Diploneis sp.	24	–	–
Fragilaria sp.	49	74	26
Frustulia sp.	–	25	–
Melosira sp.	73	172	79
Navicula sp.	24	25	52
Nitzschia sp.	244	98	131
Rhizosolenia sp.	–	25	–
Surirella sp.	24	25	26
Chlorophyta			
Ankistrodesmus sp.	122	–	52
Lagerheimia sp.	24	–	–
Pediastrum sp.	73	49	26
Scenedesmus sp.	122	246	184
Staurastrum sp.	24	–	–
Tetraedron sp.	–	49	26
Tetraspora sp.	49	49	26
Unknown chlorophyte flagellate	–	25	26
Cyanophyta			
Anabaena sp.	73	–	–
Chroococcus sp.	98	123	184
Lyngbya contorta	98	25	52
Lyngbya limnetica	24	25	26
Merismopedia sp.	–	49	26
Microcystis sp.	122	123	131
Euglenophyta			
Phacus sp.	–	25	–

Macroinvertebrate taxa list and mean density (#/m^2) for Orange Park Wastewater Treatment Plant, collected via three Ponar grabs in the St. Johns River on 10 November, 1992.

	Reference Site	Test Site 1	Test Site 2
Decapoda			
Callinectes sapidus	–	–	12.5
Rhithropanopeus harrisii	12.5	–	49.9
Diptera			
Chaoborus punctipennis	–	12.5	12.5
Cladotanytarsus sp.	25.0	–	–
Coelotanypus sp.	299.4	–	124.8
C. concinnus	–	286.9	112.3
C. tricolor	12.5	–	–
Cricotopus bicinctus	–	12.5	–
Cryptochironomus sp.	–	25.0	37.4
Djalmabatista pulcher	–	49.9	112.3
Palpomyia grp. sp.	25.0	–	–
Polypedilum halterale grp.	74.9	–	–
Procladius sp.	25.0	–	37.4
P. bellus	12.5	–	–
Tanytarsus sp. G Epler	25.0	–	–
Tanytarsus sp. L Epler	12.5	–	–
Tanytarsus sp. T Epler	12.5	–	–
Thienemanniella sp.	–	25.0	–
Undetermined dipteran pupa	–	–	12.5
Ephemeroptera			
Caenis sp.	124.8	–	–
Gastropoda			
Odostomia sp.	25.0	–	–
Malacostraca			
Corophium sp.	–	–	311.9
Cyathura polita	25.0	87.3	62.4
Gammarus sp.	–	25.0	25.0
Taphromysis bowmani	12.5	–	–
Oligochaeta			
Bratislava unidentata	–	37.4	12.5
Limnodrilus angustipenis	–	474.1	686.1
L. hoffmeisteri	548.9	524.0	336.8
Potamothrix hammoniensis	–	12.5	162.2
Stylodrilus heringianus	–	149.7	25.0
Undetermined enchytraeid	–	–	12.5
Undetermined tubificid w/o capilliform setae	–	12.5	37.4
Pelecypoda			
Macoma sp.	–	12.5	–
Mytilopsis leucophaeta	–	12.5	49.9

Rangia cuneata	12.5	62.4	87.3
Polychaeta			
Laeonereis culveri	–	12.5	12.5
Thoracica			
Balanus sp.	–	–	25.0
Trichoptera			
Hydropsyche sp.	–	–	12.5
Oecetis sp.	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)

