#227

Biological Assessment of

City of Orange Park WWTP

Clay County

NPDES #FL0023922

Sampled December 1997

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September 1998

Biology Section
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection

Results of Fifth Year Inspections

Discharger:	City of Orange Park WWTP
County:	Clay
NPDES Number:	FL0023922
State Permit Expiration Date:	15 September 1998

Toxics Sampling Inspection (**XSI**)

Date Sampled: 9 December 1997

Results: Effluent silver (0.21 µg/L) exceeded the Class III water quality standard (0.07 µg/L) for freshwater, a violation of Rule 62-302.530(60) FAC. Copper (7.1 µg/L) was detected in the effluent at a concentration that would have exceeded the Class III standard of (2.9µg/L) for marine waters had the receiving waters been predominantly marine during sampling.

Compliance Biomonitoring Inspection (**CBI**)

Date Sampled: 9 December 1997

Results: The effluent sample was not acutely toxic to the cladoceran, *Ceriodaphnia dubia,* or the fish, *Cyprinella leedsi,* in 48-hour static bioassays.

Impact Bioassessment Inspection (**IBI**)

Date Sampled: 9 December 1997

Results: While benthic macroinvertebrate communities appeared stressed throughout the study area, there was no direct evidence that the discharge was exacerbating the already degraded conditions. Most organisms present at the study sites were pollution tolerant. Exceptions were the pollution-sensitive amphipod, *Corophium* sp., found at both the control site and test site 2, and the pollution-sensitive dipterans, *Rheotanytarsus exiguus,* and *Thienemanniella* sp., found at test site 1. Phytoplankton communities did not appear to be negatively affected by the discharge. Most measures of algal community health were comparable at the three sampling stations. Chlorophyll *a* was undetected at all three sites, despite the elevated AGP results. Apparently, other factors, such as water temperature, grazing, light penetration, or elevated copper levels were limiting algal growth in the receiving waters at the time of sampling.

Water Quality Inspection (**WQI**)

Date Sampled: 9 December 1997

Results: Nitrate+nitrite levels at all three sites exceeded the values found in 95% of other Florida estuaries. Ammonia concentrations at the control site and at test site 2 also exceeded those found in 95% of other Florida estuaries. The effluent appeared to be directed toward test site 1 during sampling, contributing to the moderate increases of nitrate+nitrite and total phosphorus found there. Algal Growth Potential (AGP) at all three sites exceeded the 5.0 mg dry wt/L "problem threshold" for fresh waters. AGP at the control site (17.3 mg dry wt/L) was lower than that of both test sites (36.7 mg dry wt/L at test site 1 and 21.6 mg dry wt/L at test site 2). While the elevated AGP's at all three sites reflect the high nutrient levels throughout this area of the St. Johns River, the increased AGP at test site 1, relative to the other sites, may have resulted from the elevated nutrients in the discharge.

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

Introduction

The City of Orange Park Wastewater Treatment Plant is located in Clay County, Florida (see map in Appendix). Treatment at this 2.5 MGD municipal wastewater treatment facility consists of three contact stabilization plants with a combined dechlorinated effluent discharge into the St. Johns River via a pipeline. The actual mean effluent flow during this survey was 1.48 MGD.

The state permit limits for the Orange Park WWTP are listed in Table 1. Monthly operating report data show that the effluent has passed routine toxicity tests during the past two years (see Facility Summary in Appendix). The town of Orange Park is under an USEPA Administrative Order (No. 95-038) that includes rehabilitation of the town's eleven lift stations. A consent order was signed November 28, 1995, with the Florida Department of Environmental Protection, that required placing several collection systems into operation prior to submitting a certificate of completion.

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 500 m off Mandarin Point in Duval county) and two test sites (located 33 m above and below the discharge). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. The effluent was analyzed for metals and for organic constituents (base, neutral, and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on the effluent and samples from control and test sites. Methods used for all chemical analyses are on file at the DEP Central Chemistry Laboratory in Tallahassee.

Benthic macroinvertebrate communities were evaluated at control and test sites. Invertebrates were collected using three replicate petite Ponar grabs. Phytoplankton were sampled at both control and test sites via subsurface grabs. Chlorophyll *a* was also determined for phytoplankton communities. Acute toxicity bioassays were performed on an effluent sample using the water flea, *Ceriodaphnia dubia,* and the fish, *Cyprinella leedsi,* as test organisms. Algal growth potential tests used *Selenastrum capricornutum* as the test organism. Sediments from control and test sites were analyzed for grain size and percent organic matter. All field and laboratory biological methods were carried out following Biology Section Standard Operating Procedures (SOP's). The latest version of the SOP's can be viewed on our web site at: 'www.dep.state.fl.us/labs/sops.htm'.

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

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

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

Results and Discussion

The study area was situated in a low-salinity portion of the St. Johns River which typically has low or fluctuating salinity. During this investigation, the surface waters were predominately fresh. Numerous pollution sources are present in the area, which is subject to tidally-induced flow reversals. The sampling was performed during an outgoing tide. Habitat quality scores were similar between all three study areas, with 55 points at the

control site, and 53 points at both test sites. Shorelines at all three sites consisted mainly of riprap and vertical sea-walls. All three sites received "good" scores for community types present (see Marine Habitat Assessment Sheets in Appendix). Physical/chemical parameters were similar at all three sites. At the control site, mid-depth pH (7.5 SU), dissolved oxygen (9.3 mg/L), and conductivity (807 µmhos/cm) were slightly higher than those found at the test sites (Table 1). Effluent total suspended solids was less than or equal to the levels found at the control site (8 mg/L), test site 2 (7 mg/L), or test site 1 (4 mg/L).

The effluent sample was not acutely toxic to the cladoceran, *Ceriodaphnia dubia,* or the fish, *Cyprinella leedsi,* in 48-hour static bioassays.

No organic pollutants were detected in the effluent sample.

Copper (7.1 µg/L) was detected in the effluent at a concentration that would have exceeded the Class III standard of 2.9 µg/L for marine waters had the receiving waters been predominantly marine during sampling. Effluent silver (0.21 µg/L) exceeded the Class III water quality standard (0.07 µg/L) for freshwater, a violation of Rule 62-302.530(60) FAC. Cadmium and lead were also detected in the effluent at non-problem levels (Table 1).

Nitrate+nitrite levels at the control site (0.27 mg/L), test site 1 (0.68 mg/L), and test site 2 (0.29 mg/L) exceeded the values found in 95% of Florida's estuaries. The relative concentrations suggest that the effluent, with a nitrate+nitrite concentration of 11 mg/L, was directed toward test site 1 during sampling, contributing to the increased enrichment at this site. Total phosphorus at test site 1 (0.2 mg/L) was also higher than the control site (0.096 mg/L) or test site 2 (0.097 mg/L). This was also probably related to the discharge, which had a total phosphorus level of 3.3 mg/L. Ammonia concentrations at the control site (0.4 mg/L) and at test site 2 (0.42 mg/L) exceeded those found in 95% of other Florida estuaries, while ammonia at test site 1 (0.074 µg/L) was fairly typical (Table 1).

Algal Growth Potential (AGP) at all three sites exceeded the 5.0 mg dry wt/L "problem threshold" for fresh waters. Table 2 shows the AGP at the control site (17.3 mg dry wt/L) was lower than that of both test sites (36.7 and 21.6 mg dry wt/L at test sites 1 and 2, respectively). While the elevated AGP's at all three sites reflect the elevated nutrient levels throughout this area of the St. Johns River, the increased AGP at test site 1 may be related to the elevated nutrients in the discharge.

Phytoplankton communities did not appear to be negatively affected by the discharge (Figure 1). Algal taxa richness ranged from 31 taxa at test site 1 to 36 taxa at the control site, while diversity ranged from 3.8 at the control site to 4.2 at test site 1. Diatoms, cyanophytes, chlorophytes, and cryptophytes were well represented at each station. Algal density was relatively low, with the highest density measured at the control site (2,208 cells/mL). Chlorophyll *a* was undetected at all three sites.

Sediments at all three sites consisted mainly of mud, muck, and shell. Sediment particle size was similar at all three sites, with at least 80% of the substrate consisting of particles measuring 0.25 mm and larger.

While benthic macroinvertebrate communities appeared stressed throughout the study area, there was no direct evidence that the discharge was exacerbating the already degraded conditions. Figure 2 indicates the degree of difference between control 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 control.

As Table 2 indicates, taxa richness was lowest at the control site (13 taxa), highest at test site 1 (22 taxa), and intermediate at test site 2 (16 taxa). Shannon-Weaver diversity was similar between sites (3.1 at the control site, 3.2 and 3.5 at test site 1 and 2, respectively). Due to the low salinity during sampling, polychaete taxa richness was low at all three sites, with 1 taxon recovered from both the control site and test site 1, and 2 taxa from test site 2. The control site was co-dominated by spionid polychaetes and pollution-tolerant tubificid oligochaetes, while both test sites were dominated by oligochaetes. *Limnodrilus hoffmeisteri* made up 43% of the test site 1 community, while 28% of the test site 2 consisted of tubificid worms. Stress-tolerant freshwater chironomids made up 2% of the control site population, 17% of the test site 1 sample, and 11% of the test site 2. Small numbers of pelecypods were found at all three sites. Most organisms present at the study sites were pollution tolerant, with the exception of the pollution-sensitive amphipod, *Corophium* sp., which was found at both the control and test site 2 and the pollution-sensitive dipterans, *Rheotanytarsus exiguus* and *Thienemanniella* sp., found at test site 1.

Table 1. Effluent limits and summary of chemistry data.

Orange Park WWTP	Effluent Limits	Effluent Sample	Control Site	Test Site 1	Test Site 2
Organic Constituents (µg/L)					
None detected	-	-	-	-	-
Metals (µg/L)					
Aluminum	≤ 1,500 **	80 U	-	-	-
Arsenic	≤ 50 **	40 U	-	-	-
Cadmium	1.0 **c	0.09 I	-	-	-
Chromium	≤ 11 **	10 U	-	-	-
Copper	≤ 2.9 **	7.1	-	-	-
Iron	≤ 300 **	10 U	-	-	-
Lead	2.6 **c	0.3 I	-	-	-
Mercury	≤ 0.012 **	0.1 U	-	-	-
Nickel	≤ 8.3 **	7 U	-	-	-
Selenium	≤ 5.0 **	50 U	-	-	-
Silver	≤ 0.07 **	0.21	-	-	-
Zinc	≤ 86 **	10 U	-	-	-
Nutrients (mg/L)					
Ortho-phosphate	Report *	2.7	0.044	0.16	0.067
Total phosphorus	Report *	3.3	0.096 A	0.20 A	0.097
Ammonia	Report *	1.2	0.4	0.074	0.42
Organic Nitrogen	Report *	1.3	0.4	0.93	0.48
Nitrate+Nitrite	Report *	11	0.27	0.68	0.29
TKN	Report *	2.5	0.8	1.0 A	0.90
General Phys-Chem Parameters					
Habitat Assessment	-	-	55	53	53
D.O. (mg/L)	4.0 *b	7.4	9.3	8.6	8.4
pH (SU)	6.0 - 8.5 *	6.6	7.5	6.8	6.9
Conductivity (µmhos/cm)	Report *e	621	807	794	794
Temperature (°C)	Report *e	21.7	14.6	15.3	15.1
C.B.O.D., 5 day (mg/L)	20 *a	≤ 2	≤ 2	≤ 2	≤ 2
T.S.S (mg/L)	20 *a	4	8	4	7
Tot. Residual Chlorine (mg/L)	≥ 0.5 *	≤ 0.03	-	-	-
Flow (MGD)	2.5 *a	1.5	-	-	-
Hardness (mg $CaCO_3$)	-	85.5	-	-	-
AGP (mg dry wt/L)	-	27.4	17.3	36.7	21.6
Toxicity					
Bioassay Fish	Report *	Not toxic	-	-	-
Bioassay Invertebrate	Report *	Not toxic	-	-	-
Microbiology (# organisms/100 mL)					
Fecal Coliforms	200 *d	-	-	-	-
Total Coliforms	-	-	-	-	-

* Permit limit
** Class III water quality standard
a - Annual average
b - Daily minimum
c - Value is calculated based on hardness
d - Monitored weekly
e - Monitored quarterly
A - Value reported is the mean of two or more determinations
I - Value reported is less than the minimum quantitation limit, and greater than or equal to the minimum detection limit
U - Material analyzed for but not detected; value reported is the minimum detection limit

Conclusions

The effluent sample was not acutely toxic to the cladoceran, *Ceriodaphnia dubia,* or the fish, *Cyprinella leedsi.*

No organic pollutants were detected in the effluent sample.

Effluent silver (0.21 µg/L) exceeded the Class III water quality standard for freshwater (0.07 µg/L), a violation of Rule 62-302.530(60) FAC. Copper was detected in the effluent at a concentration (7.1 µg/L) that would have exceeded the Class III standard of 2.9 µg/L for marine waters had the receiving waters been predominantly marine during sampling.

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Algal growth potential at all three sites exceeded the 5.0 mg dry wt/L "problem threshold" for fresh waters. AGP at the control site (17.3 mg dry wt/L) was lower than that of both test sites (36.7 mg dry wt/L at test site 1 and 21.6 mg dry wt/L at test site 2). While the elevated AGP's at all three sites reflect the high nutrient levels throughout this area of the St. Johns River, the higher AGP at test site 1 (relative to the other sites) is probably related to the nutrients in the discharge.

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

	Control Site	Test Site 1	Test Site 2
Macroinvertebrate Quantitative			
Number of Taxa	13	22	16
Shannon-Weaver Diversity	3.1	3.2	3.5
No. Polychaete Taxa	1	1	2
Community Composition			
% Amphipoda	5.7	0.8	12.8
% Decapoda	2	1.7	2.1
% Diptera	3.8	43.8	19.2
% Gastropoda	3.8	2.5	4.3
% Isopoda	11.3	0.0	2.1
% Oligochaeta	32.1	47.1	44.7
% Pelecypoda	7.6	4.1	14.9
% Polychaeta	34	0.0	0.0
% Other	0.0	0.0	0.0
Functional Feeding Groups			
% Browser-grazers	7.6	0.4	6.4
% Burrowing Deposit Feeders	32.1	47.1	44.7
% Predators/Carnivores	6.6	19	10.6
% Scavengers	8.5	1.2	6.4
% Scrapers	3.8	2.5	4.3
% Shredder	0.9	4.1	3.2
% Surface Deposit Feeders	17.9	11.2	3.2
% Suspension Feeders	22.6	13.6	19.2
% Unknown	0.0	0.9	2.0
Phytoplankton Algae			
Number of Taxa	36	31	32
Shannon-Weaver Diversity	3.8	4.2	4.1
Chlorophyll a (µg/L)	1.0 U	1.0 U	1.0 U
Algal Density (#/mL)	2,208.7	1,389.2	1072.6
% Blue-green	45	18.1	21.5
% Cryptophytes	17.4	3.7	22.1
% Diatoms	16.7	58.5	39.5
% Dinoflagellates	0.4	0.3	0.6
% Green	19.5	19.4	15.9
AGP (mg dry wt/L)	17.3	36.7	21.6

A - Value reported is the mean of two or more determinations
I - Value reported is less than the minimum quantitation limit, and greater than or equal to the minimum detection limit
U - Material analyzed for but not detected; value reported is the minimum detection limit

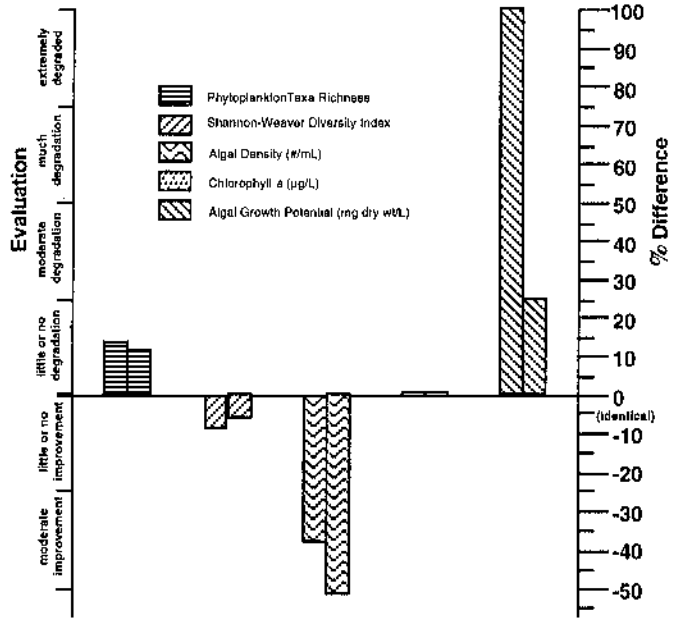


Figure 1. Effect of discharge on the phytoplankton community.

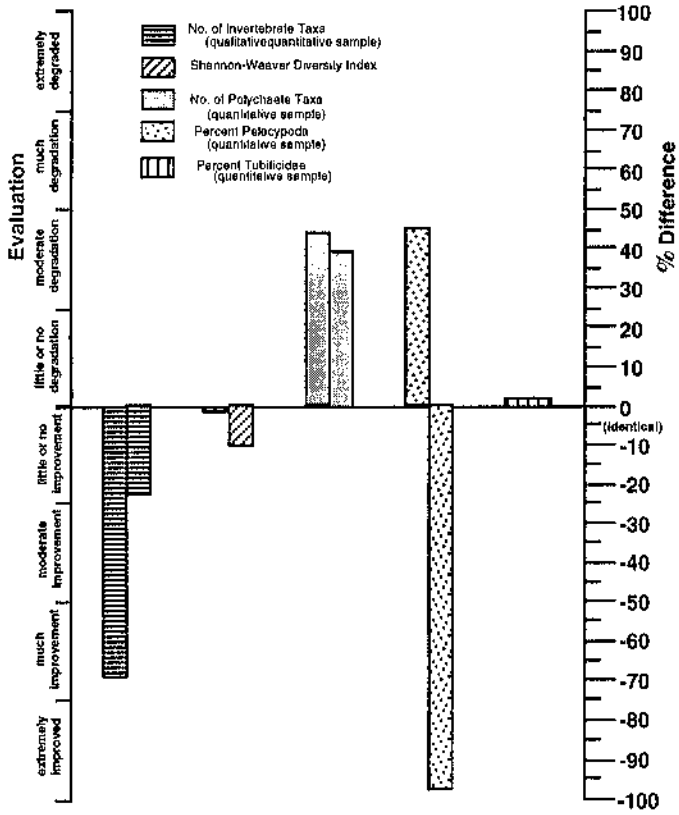


Figure 2. Effect of discharge on the benthic macroinvertebrate community.

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 Phosphate	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-Phosphate	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-Phosphate	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

Explanation of Measurements of Community Health

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

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

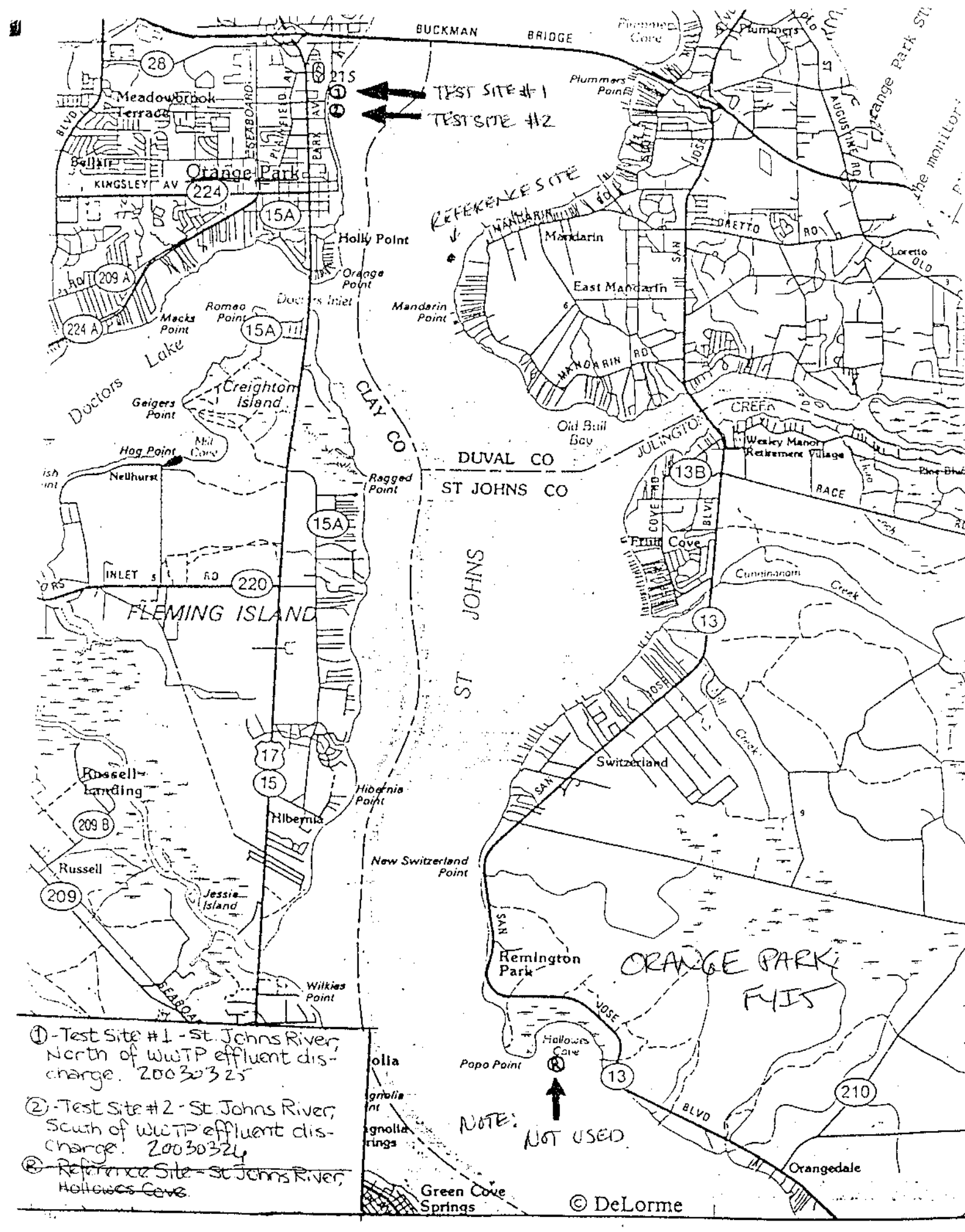
Shannon-Weaver diversity: This index is specified in the Florida Administrative Code as a measure of biological integrity. Low diversity scores are undesirable. They represent conditions where only a few organisms are abundant, to the exclusion of other taxa. Excessive numerical dominance of a single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

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

Community structure: Substantial shifts in proportions of major groups of organisms, compared to control conditions, may indicate degradation. In marine systems, an increase in the % tubificid oligochaetes, a decrease in the % pelecypods, and a decrease in the number of polychaete taxa are all considered indicators of disturbance (Engel *et al.* 1994).

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

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



① - Test Site #1 - St. Johns River North of WWTP effluent discharge. 20030325

② - Test Site #2 - St. Johns River South of WWTP effluent discharge. 20030324

~~® - Reference Site - St. Johns River, Hollowes Cove.~~

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: Town of Orange Park WWTP	Prepared by: Kathleen H. Gerard Date: December 5, 1997	
Location (attach detailed map): 700 Ash Street Orange Park, FL	County: Clay	District: Northeast District
Federal Permit # FL 0023922 and expiration date: September 15, 1998	State GMS # and 311.0M01826 State expiration date: September 15, 1998	Facility Type: Industrial Municipal (circled) Federal Agricultural Other (list):

Function of facility:
Wastewater Treatment Plant

Description of treatment process: This 2.5 MGD facility consists of three contact stabilization plants with combined dechlorinated effluent discharge to a 16-inch force main to the St. Johns River.

Receiving waters: St. Johns River	Classification: Class III
Design Flow: 2.5 MGD	Actual Mean Flow: 1.48 MGD

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

therefore, the best time to sample is:

If facility has a mixing zone, give details (size, parameters affected, etc.):
- None -

List effluent limits:

Parameter	Limit (units)

Describe special permit conditions and permit modifications:
Refer to attachments for effluent limits and quarterly sampling and river monitoring requirements

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Town of Orange Park WWTP
(Facility)

Description of permitted outfall(s):
Dechlorinated effluent is discharge through a 16-inch forcemain to the St. Johns River.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year:
Further review of data submitted on the Discharge Monitoring Reports (DMRs) is necessary to determine compliance with limitations stated in the permit.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
The effluent from this facility has passed routine toxicity tests during the past two years.

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:
Data that was recorded on DMRs is similar to sampling results obtained by the Department.

Additional information:
The Town of Orange Park is under a U.S. EPA Administrative Order No. 95-038 that includes rehabilitation of the town's eleven lift stations.
A Consent Order was also signed on November 28, 1995 with the Department for placing several collection systems into operation prior to submitting a Certification of Completion to the Department.

a. Date of application of the domestic wastewater residuals,
b. Location of the residuals application site,
c. Amount of domestic wastewater residuals applied or delivered,
d. Identification of specific areas of the site where domestic wastewater residuals were applied and acreage of that area,
e. Method of incorporation of residuals (if any),
f. Water table level at time of application, and
g. Concentration of nitrogen and heavy metals in the domestic wastewater residuals solids, and date of last analysis.

18. All applications to renew operation permits shall include a detailed operation and maintenance performance report as described in Rule 17-600.735 FAC.

19. In accordance with Chapter 17-601 FAC, the monitoring requirements and effluent limitations for this plant are as follows:

PARAMETER	EFFLUENT LIMIT	MINIMUM FREQUENCY	SAMPLE TYPE	SAMPLE LOCATION
Flow (mgd)	3.250 Annual Average	Continuous	A	Influent or Effluent
CBODs (mg/l)	(a)	Weekly	(b)	Influent (c) & Effluent (d)
TSS (mg/l)	(a)	Weekly	(b)	Influent (c) & Effluent (d)
DO (mg/l)	4.0 Minimum	Daily, 7/week	Instrument	Effluent (d)
pH Units	Minimum 6.0 Maximum 8.5	Continuous B	Instrument	Effluent (d)
Chlorine Residual (mg/l)	0.5 Minimum (e) 0.01 Maximum	Continuous B Daily, 7/week	Meter or Instrument	ccc Dechlor. Effluent
Fecal Coliform no./100 (ml)	200 (i)	Weekly	Grab	Effluent (d)
Toxicity	See Specific Condition Number 20			
Nutrient Monitoring	See Specific Condition Number 21			
Stream Monitoring	See Specific Condition Number 22			
Testing Methods	See Specific Condition Number 23			

(a)

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

* Rule 17-600.740, FAC

A. Recording flowmeter and totalizer required.

B. Hourly measurements during the period of required operator attendance may be substituted for continuous measurement.

(b) 16-hour minimum flow-proportioned composite sample.

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

(d) Effluent samples shall be collected from the effluent pump station wetwell following final chlorination. Effluent samples to verify the dechlorination shall be collected after dechlorination.

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

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

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

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

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

d. The Toxicity tests specified above shall be conducted using a control (0% reclaimed water) and one test concentration of 100% final reclaimed water. These tests are referred to as "routine tests" and shall be conducted once every two (2) months beginning 60 days from the permit issue date until 6 consecutive valid bi-monthly tests have been passed, and once every six (6) months thereafter for the duration of the permit, unless notified otherwise by the Department.

e. Results from "routine" tests shall be reported according to EPA/600/4-85/013, Section 13, Report Preparation (or the most current edition), and shall be submitted as an attachment to the monthly operation report.

f. If unacceptable acute toxicity (greater than 20% lethality in a sample of 100% reclaimed water to either test species) is found in a "routine" test, the Permittee shall conduct follow-up definitive tests using four new grab samples collected at six-hour intervals over a 24-hour period to generate the data necessary (in an initial set of follow-up tests) to calculate the LC_{50} values with 95% confidence limits. If unacceptable acute toxicity is found in a follow-up test, additional definitive testing will be performed at three subsequent weekly intervals, with grab samples collected at the time of day and day of the week which exhibited the highest toxicity (lowest LC_{50}) in the first set of follow-up definitive tests. The follow-up tests shall be 96-hour acute, static-renewal, definitive toxicity tests and shall be conducted on both test species, using a control (0% reclaimed water) and test concentrations chosen so that at least two concentrations are above and two are below the LC_{50} value found in the initial follow-up definitive test. For these tests, solution renewal shall be at 48 hours. The initial follow-up test shall begin within two weeks of the end of the failed "routine" test. The sample collection requirements and test acceptability criteria specified in Sections 'b' and 'c' above must be met for the tests to be considered valid.

g. Results from the definitive tests, required due to unacceptable acute toxicity in the "routine" tests, shall be submitted in a single report prepared according to EPA/600/4-90/027 (4th edition), Section 17, Report Preparation (or the most current edition) and submitted within 45 days of completion of the valid definitive test. Upon review of the definitive toxicity test results, test concentrations may be modified by the Department to improve the statistical confidence of the analyses. In this case, the Permittee shall be notified and will have 30 days to comply with such changes.

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

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

21. Monitoring on a quarterly basis shall be performed on the effluent with analysis by a certified laboratory and reported to the Jacksonville DER office for the following parameters:

Hardness	TKN
Nitrite and nitrate nitrogen	temperature (average of sample time period)
Total Nitrogen	Unionized ammonia (calculated)
Total Ammonia	Total Phosphorus
Ortho Phosphorus	Organic Nitrogen

A 16-hour minimum flow proportioned composite sample is required. Sampling shall be performed on the same day as the normal plant effluent and river monitoring sampling.

22. In accordance with the approved river sampling program of November 5, 1988, monitoring on a quarterly basis shall be performed on the receiving water body (St. Johns River). The monitoring sites are described as follows:

#1 - 500 feet south, 100 feet east of outfall
#2 - 100 feet south, 50 feet east of outfall
#3 - 50 feet west of outfall
#4 - 100 feet north, 50 feet east of outfall
#5 - 500 feet north, 100 feet east of outfall

The parameters to be measured shall include the following:

DO, pH, temperature, conductivity, $CBOD_5$, TSS, NH_3-N, TP, Organic Nitrogen, TKN, fecal coliform, Chlorophyll A, and Nitrite and Nitrate nitrogen.

Metered parameters (DO, pH, temperature, conductivity) shall be sampled at the surface, mid depth and at the bottom. Grab samples at mid depth for the other parameters is adequate.

23. Field testing, sample collection and preservation, laboratory testing, including quality control procedures, and all record keeping shall comply with Chapter 17-160, FAC. Compliance of reported results shall be in accordance with Rule 17-4.246, FAC. Each parameter has an applicable method detection limit (MDL) and a practical quantitative limit (PQL) as follows:

ANALYTE	RECOMMENDED MDL	TARGETS PQL	EPA METHOD
Silver	0.2	0.2	272.2
Copper	6.0	25.0	200.7
Lead	1.0	2.0	239.2
Nickel	15.0	10.0	200.7
Zinc	10.0	25.0	200.7 or
	5.0	15.0	289.1
D.O.	100.0	500.0	360.1 or 360.2
Total Chlorine Residual	10.0	10.0	330.1 or
	200.0	200.0	330.5

Units are microgram per liter
Equivalent methods are subject to approval by the Department

GMST36 3110X00008 050053 080082 000530 031616 12/05/97

PARAMETER RESULT TRENDS 14:16:44

0 Y FOR 3110M01826 - ORANGE PARK, TOWN OF

SITE NAME - S.T.P. FINAL EFFLUENT - ORANGE PARK

RPT DATE	FLOW,MONTH AVG 050053 MGD		BIOCHEM OXY DEM 080082 MG/L		RES SUSP 000530 MG/L		FECAL COLI MF 031616 #/100	
07/00/97	1.591		2.2	K	1.	L	5.2	K
06/00/97	1.546		2.2	K	4.	L	50.2	K
05/00/97	1.437		1.7		3.	L	4.7	
04/00/97	1.430		1.6		2.	L	7.6	K
03/00/97	1.404		2.8	K	4.	K	3.7	K
02/00/97	1.384		2.0		4.	K	2.0	K
01/00/97	1.411		1.0		3.	L	1.5	K
12/00/96	1.445		2.5		5.	K	2.3	
11/00/96	1.431		1.5		3.	L	2.2	
10/00/96	1.614		2.6		4.		1.4	
09/00/96	1.504		1.0	K	2.	K	13.5	
08/00/96	1.588		1.8	K	2.	K	6.0	
07/00/96	1.563		4.0		3.		1.0	
06/00/96	1.536		2.0		3.		1.9	
AVERAGE:	1.45803		4.28525		3.57143		32.59355	
STD DEV:	0.13802		2.12609		2.72807		40.62009	

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GMST36 3110X00008 900243 900244

12/05/97
14:17:43

PARAMETER RESULT TRENDS

0 Y FOR 3110M01826 - ORANGE PARK, TOWN OF

SITE NAME - S.T.P. FINAL EFFLUENT - ORANGE PARK

RPT DATE	CHLOR RES, MIN 900243	MG/L	CHLOR RES, MAX 900244	MG/L	NITROGEN(N)KJEL 000625	MG/L	NH3 N TOT 000610	MG/L
07/00/97	.8	K	.01		NO RESULT		NO RESULT	
06/00/97	.8	K	.01		4.300		2.970	
05/00/97	.9	K	.01		NO RESULT		NO RESULT	
04/00/97	1.6	L	.01		NO RESULT		NO RESULT	
03/00/97	.9	L	.01		NO RESULT		NO RESULT	
02/00/97	1.4	K	.01		NO RESULT		NO RESULT	
01/00/97	1.2	K	.01		NO RESULT		NO RESULT	
12/00/96	1.3	K	.01		NO RESULT		NO RESULT	
11/00/96	1.0	K	.01		NO RESULT		NO RESULT	
10/00/96	1.0	L	.01		NO RESULT		NO RESULT	
09/00/96	1.8		.01		NO RESULT		NO RESULT	
08/00/96	.8	K	.01		NO RESULT		NO RESULT	
07/00/96	.6		.01		NO RESULT		NO RESULT	
06/00/96	.6	K	.01		NO RESULT		NO RESULT	
AVERAGE:	0.67952		0.02540		4.30000		2.97000	
STD DEV:	0.30374		0.12861		0.00000		0.00000	

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GMST36 3110X00008 000665 000612 000610 000625 12/05/97
PARAMETER RESULT TRENDS 14:27:42
0 Y FOR 3110M01826 - ORANGE PARK, TOWN OF
SITE NAME - S.T.P. FINAL EFFLUENT - ORANGE PARK

RPT DATE	PHOSPHORUS TOT 000665 MG/L	AMMONIA, UNION 000612 MG/L	NH3 N TOT 000610 MG/L	NITROGEN(N)KJEL 000625 MG/L
07/00/97	NO RESULT	NO RESULT	NO RESULT	NO RESULT
06/00/97	2.600	.040	2.970	4.300
05/00/97	NO RESULT	NO RESULT	NO RESULT	NO RESULT
04/00/97	NO RESULT	NO RESULT	NO RESULT	NO RESULT
03/00/97	NO RESULT	NO RESULT	NO RESULT	NO RESULT
02/00/97	NO RESULT	NO RESULT	NO RESULT	NO RESULT
01/00/97	NO RESULT	NO RESULT	NO RESULT	NO RESULT
12/00/96	NO RESULT	NO RESULT	NO RESULT	NO RESULT
11/00/96	NO RESULT	NO RESULT	NO RESULT	NO RESULT
10/00/96	NO RESULT	NO RESULT	NO RESULT	NO RESULT
09/00/96	NO RESULT	NO RESULT	NO RESULT	NO RESULT
08/00/96	NO RESULT	NO RESULT	NO RESULT	NO RESULT
07/00/96	NO RESULT	NO RESULT	NO RESULT	NO RESULT
06/00/96	NO RESULT	NO RESULT	NO RESULT	NO RESULT
AVERAGE:	2.60000	0.04000	2.97000	4.30000
STD DEV:	0.00000	0.00000	0.00000	0.00000

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orange Park

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

SUBMITTING AGENCY CODE: 5031 / SUBMITTING AGENCY NAME: DEP	STORET STATION NUMBER: 20030504	DATE (M/D/Y): 12-9-97	TIME: 1345	RECEIVING BODY OF WATER: St. Johns River

REMARKS:	COUNTY: DUVAL	LOCATION: 500 YARDS OFF MANDARIN POINT.	FIELD ID/NAME: Reference Site

RIPARIAN ZONE/INSTREAM FEATURES

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

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

Local Watershed Erosion (check box): None [✓] Slight [ ] Moderate [ ] Heavy [ ]

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

Width of riparian vegetation (m) on least buffered side: ≥ 18m

List & map dominant vegetation on back

Artificially Channelized [✓] no [ ] recent, severe [ ] some recovery [ ] mostly recovered

Artificially Impounded [ ] yes

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

High Water Mark: 1.5 (m above present water level) + 2.5 (present depth in m) = 3.0 (m above bed)

Canopy Cover % : Open : [✓] Lightly Shaded (11-45%): [ ] Moderately Shaded (46-80%): [ ] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: [✓] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Anaerobic: [ ] Other: [ ]

Sediment Oils: Absent: [✓] Slight: [ ] Moderate: [ ] Profuse: [ ]

Sediment Deposition: Sludge: [ ] Sand smothering: none slight moderate severe Silt smothering: none slight moderate severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt	70	2	grab
Aquatic Vegetation				Other:			
Rock or Shell Rubble	30	1	grab	Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (ft):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):	SAL		Secchi (m):
Top								
Mid-depth	3.0 ft.	14.64	7.49	9.37	807	0.4		.6
Bottom								

System Type : Stream: [✓] 1st - 2nd order [ ] 3rd - 4th order [ ] 5th - 6th order [ ] 7th order or greater) Lake: [ ] Wetland: [ ] Estuary: [ ] Other: [ ]

Water Odors (check box): Normal: [✓] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Other: [ ]

Water Surface Oils (check box): None: [✓] Sheen: [ ] Globs: [ ] Slick: [ ]

Clarity (check box): Clear: [✓] Slightly turbid: [ ] Turbid: [ ] Opaque: [ ]

Color (check box): Tannic: [✓] Green (algae): [ ] Clear: [ ] Other: [ ]

Weather Conditions/Notes:
Same reference site for Orange Park WWTP & Miller Street WWTP FWRI's. Done on same day.

Abundance:	Absent	Rare	Common	Abundant
Periphyton	[ ]	[ ]	[✓]	[ ]
Fish	[ ]	[ ]	[ ]	[✓]
Aquatic Macrophytes	[ ]	[ ]	[✓]	[ ]
Iron/sulfur Bacteria	[✓]	[ ]	[ ]	[ ]

SAMPLING TEAM: Tim McKelvey, Pat O'Connor

SIGNATURE: Tami McKelvey

DATE: 12/9/97

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:
	20030504	12-9-97	St. Johns River

REMARKS:	LOCATION: 500 YARDS OFF MANDARIN POINT	FIELD ID NAME:
		Reference Site

Habitat Parameter (score)	Excellent	Good	Fair	Poor
Littoral Alterations: 2	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: 3	>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: 8	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: 55

COMMENTS: Same reference site for FIES's for Orange Park & Miller Street. Done on same day.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
12-9-97	Tim McKelvey	Tim McKelvey

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: NEO	STORET STATION NUMBER: 20030325	DATE (M/D/Y): 12/9/97	TIME: 1110	RECEIVING BODY OF WATER: St. Johns River
REMARKS: 100 ft. NORTH of POD	COUNTY: Clay	LOCATION: ORANGE PARK POD 100-150 NORTH		FIELD ID/NAME: TEST SITE #1

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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

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

Width of riparian vegetation (m) on least buffered side: <18m

List & map dominant vegetation on back

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

Artificially Impounded ☐ yes

High Water Mark: .5 (m above present water level) + 2.5 (present depth in m) = 3.0 (m above bed)

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

m wide

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

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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt	90	2	PONAR
Aquatic Vegetation				Other:			
Rock or Shell Rubble	10	1	PONAR	Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):	SAL.		Secchi (m):
Top								
Mid-depth	3.5	15.26	6.76	8.58	794	0.4		.7
Bottom								

System Type : Stream: ☑ (1st - 2nd order / 3rd - 4th order / 5th - 6th order / 7th order or greater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☐

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

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

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

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

Weather Conditions/Notes: Overcast, rain, cool.

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Tim McKelvey Pat O'Connor	Tim McKelvey	12/9/97

DEPARTMENT OF ENVIRONMENTAL REGULATION

MARINE BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: HERD	STORET STATION NUMBER: 20030325	DATE (M/D/Y): 12-9-97	RECEIVING BODY OF WATER: ST. JOHN'S RIVER

REMARKS: 100 FT NORTH of POD	LOCATION: TEST SITES #1 & #2 @ Orange Park PUD. 100 FT either side	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 — 3	>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 — 9	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 — 4	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 — 53

COMMENTS: Hab assessments for both test sites will be the same since they are only 200-300 FT apart.

ANALYSIS DATE: 12-9-97	ANALYST(S): Tim McKelvey / Pat O'Connor	SIGNATURE: Tim McKelvey

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

SUBMITTING AGENCY CODE: 5031 / SUBMITTING AGENCY NAME: NEP	STORET STATION NUMBER: 20030326	DATE (M/D/Y): 12/9/97	TIME: 1145	RECEIVING BODY OF WATER: ST. JOHN'S RIVER

REMARKS: 100 FT SOUTH of POD	COUNTY: Clay	LOCATION: ORANGE PARK POD TEST SITE #2	FIELD ID/NAME: TEST SITE #2

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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

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

Width of riparian vegetation (m) on least buffered side: < 8m | *List & map dominant vegetation on back*

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect: ____ m wide; m/s ____ m deep; m/s ____ m deep; m/s ____ m deep

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

Artificially Impounded ☐ yes

High Water Mark: 5 (m above present water level) + 3.0 (present depth in m) = 3.5 (m above bed)

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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt	90	2	PONAR
Aquatic Vegetation				Other:			
Rock or Shell Rubble	10	1	PONAR	Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (~~m~~ ft):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):	SAL.		Secchi (m):
Top								
Mid-depth	~~5.0 ft~~	~~14.94~~	~~6.91~~	~~8.94~~	~~785~~	~~0.4~~		.7
Bottom	4	15.13	6.87	8.38	794	0.4		

System Type : Stream: ☑ (1st - 2nd order, 3rd - 4th order, 5th - 6th order, 7th order or greater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☐

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

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

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

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

Weather Conditions/Notes: Overcast, cloudy, rain cold 60-70°F's

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Tim McKelvey Pat O'Connor	Tim McKelvey	

DEPARTMENT OF ENVIRONMENTAL REGULATION

MARINE BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
SUBMITTING AGENCY NAME:	20030326	12-9-97	ST. Johns River

REMARKS:	LOCATION:	FIELD ID NAME:
100 FT SOUTH OF POD ORANGE PARK WWTP	Orange park POD, South 100 ft.	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 3	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations 6	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action 10	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. 9-10 points	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. 0-2 points
Sediment Type 4	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 53

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
12-9-97	Toni McKelvey	Toni McKelvey

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Orange Park WWTP
County: Clay
Contact / District: Tim Mckelvey / Northeast
NPDES Permit #: FL0023922
LIMS Sample #: 202898 LIMS Job #: 97-DEC-09-16
sample log: 12/10/97 DW

Sample Collection: Date 12-8-97 Time 10:40
Test Beginning: Date 12-9-97 Time 15:30
Test Ending: Date 12-11-97 Time 15:30
Organism Batch #: 48 Diluent Batch #: 55
Organism Age: < 24 hours
Test Organism: Ceriodaphnia dubia

Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through
Temperature range: room 24.8-25.8°C
incubator 24.4-25.5°C
Test Number: ____ of ____
Remarks: D = dead, M = missing

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	22.3 @ 22.3	8.3 @ 24.8°C	101.3 @ 103.6 977 @ 1005 @ 24.5 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.8 @ 23.8	8.2 @ 25.1 °C	9810 @ 10057 103.0 @ 103.6 989 @ 1005 @ 25.0 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.8 @ 22.9	8.3 @ 24.8 °C	102.9 @ 103.6 976 @ 1005 @ 24.2 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) (Cond. (µmhos/cm)) 0 hr	24 h	48 h
ctr	A	5	5	5	8.1		8.3	23.5		23.7	7.8		7.9	170		195
ctr	B	5	5	5			8.3			23.6			7.9			195
ctr	C	5	5	5			8.3			23.5			7.9			200
ctr	D	5	5	5			8.3			23.4			7.9			205
100%	A	5	5	5	7.3		8.3	23.9		23.5	7.8		8.0	570		660
100%	B	5	5	5			8.3			23.5			7.9			625
100%	C	5	5	5			8.3			23.4			7.9			665
100%	D	5	5	5			8.3			23.3			7.9			681
Measured/Loaded by:		MF	MF	MF	MF		MF	MF		MF	MF		MF	MF		MF
Recorded by:		DW	MF	MF	DW		MF	DW		MF	DW		MF	DW		MF

Investigators' Signatures

Marshall Faircloth

Salt Water | Well Water

Water Quality Parameters verified by MF

	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):		Not measured		
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	Orion	DW
Alkalinity (mg/L as $CaCO_3$):	65	65	Hach	MF
Hardness (mg/L as $CaCO_3$):	80	175	Hach	MF
Total ammonia (mg/L as N):	<0.017	0.842	Orion	MF

Ammonia ____ Ammonia ____ Ammonia ____ Control ____ Sample 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Orange Park WWTP
County: Clay
Contact / District: Tim McKelvey / Northeast
NPDES Permit #: FL0023922
LIMS Sample #: 202898 LIMS Job #: 97-DEC-09-16
sample log: 12/12/97 DW

Sample Collection: Date 12-8-97 Time 10:40
Test Beginning: Date 12-9-97 Time 15 20
Test Ending: Date 12-11-97 Time 1530
Organism Batch #: 94 Diluent Batch #: Well
Organism Age: 12 days
Test Organism: Cyprinella leedsi

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

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 7.0 @ 7.0	22.3 @ 22.3	8.3 @ 24.8 °C	101.3 @ 103.6 977 @ 1005 @ 24.5 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.8 @ 23.8	8.2 @ 25.1 °C	9,810 @ 10,057 103.0 @ 103.6 989 @ 1005 @ 25.0 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.8 @ 22.9	8.5 @ 24.8 °C	102.9 @ 103.6 976 @ 1005 @ 24.2 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Ctrl A	E9	5	5	5	7.9	8.4	8.4	24.4	24.9	24.8	7.7	7.8	7.4	255	260	265
Ctrl B	E10	5	5	5	7.9	8.4	8.4	24.5	26.6	24.8	7.8	7.9	7.6	255	275	270
Ctrl C	E11	5	5	5	7.9	8.4	8.4	24.4	25.8	24.4	7.9	7.9	7.7	255	265	260
Ctrl D	E12	5	5	5	7.9	8.4	8.4	24.4	25.4	24.5	7.9	7.8	7.7	255	260	260
100% A	E13	5	5	5	7.2	8.0	8.1	24.9	24.9	24.3	7.7	7.6	7.6	610	610	605
100% B	E14	5	5	5	7.2	8.0	8.1	25.0	25.6	24.1	7.7	7.5	7.5	610	625	615
100% C	E15	5	5	5	7.2	8.0	8.1	25.0	26.8	24.6	7.7	7.6	7.5	610	665	645
100% D	E16	5	5	5	7.2	8.0	8.1	25.0	25.0	24.6	7.7	7.5	7.5	610	620	620
Measured/Loaded by:		DW	DW	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF
Recorded by:		DW	DW	MF	DW	DW	MF	DW	DW	MF	DW	DW	MF	DW	DW	MF

Investigators' Signatures

Marshall Faircloth

Water Quality Parameters verified by MF

	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			NOT MEASURED.		
Lab Total Residual Cl2 (mg/L):	<0.03		<0.03	ORION	DW
Alkalinity (mg/L as $CaCO_3$):	120		65	Hach	MF
Hardness (mg/L as $CaCO_3$):	125		175	Hach	MF
Total ammonia (mg/L as N):	<0.017		0.842	orion	MF

Ammonia Meter #: 02126 Ammonia Meter Slope: -58.4 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

Phytoplankton taxa list and densities (#/mL) for City of Orange Park WWTP, collected via subsurface grabs in St. Johns River on 9 December, 1997.

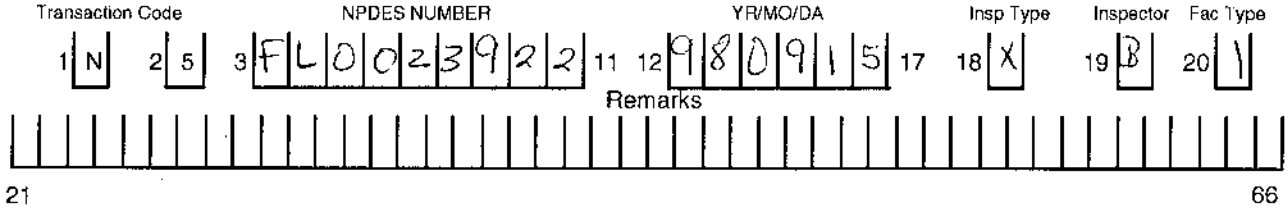
	Control Site	Test Site 1	Test Site 2
Bacillariophyceae			
Bacillaria paradoxa	–	–	3
Chaetoceros sp.	31	–	–
Cocconeis sp.	8	14	6
Coscinodiscus sp.	23	28	9
Cyclotella sp.	123	214	101
Cylindrotheca sp.	–	5	3
Eunotia sp.	8	–	–
Fragilaria sp.	15	42	25
Melosira sp.	8	56	16
Navicula sp.	15	23	32
Nitzschia sp.	123	186	120
Skeletonema sp.	–	139	57
Surirella sp.	–	5	–
Synedra sp.	8	–	–
Undetermined pennate diatom	8	102	51
Chlorophyceae			
Ankistrodesmus sp.	8	14	–
Chlamydomonas sp.	8	28	28
Cosmarium sp.	8	5	–
Crucigenia sp.	–	23	–
Dictyosphaerium sp.	–	–	3
Elakatothrix sp.	8	–	–
Kirchneriella sp.	–	14	–
Oocystis sp.	15	19	3
Pediastrum sp.	23	5	3
Scenedesmus sp.	316	102	89
Schroederia sp.	–	–	3
Selenastrum sp.	8	19	–
Spermatozoopsis sp.	8	–	–
Staurastrum sp.	–	–	3
Tetraedron sp.	15	–	–
Tetrastrum sp.	23	23	19
Undetermined chlorophyceae	–	19	19
Chrysophyceae			
Mallomonas sp.	8	–	3
Cryptophyceae			
Chroomonas sp.	316	51	209
Cryptomonas sp.	69	–	28
Cyanophyceae			
Anabaena sp.	–	–	3
Anabaenopsis sp.	23	–	–
Aphanocapsa sp.	–	33	19
Chroococcus sp.	–	19	16
Cylindrospermopsis sp.	62	–	–
Dactylococcopsis sp.	38	14	35

Gloeocapsa sp.	15	–	–
Gloeothece sp.	38	–	–
Lyngbya contorta	246	–	–
Lyngbya sp.	85	9	9
Merismopedia sp.	477	93	60
Microcystis sp.	8	74	82
Oscillatoria sp.	–	9	6
Dinophyceae			
Peridinium sp.	8	5	6
Euglenophyceae			
Euglena sp.	8	–	–

Benthic macroinvertebrate taxa list for the City of Orange Park WWTP, collected via Ponar grab samples in the St. John's River, on 09 December, 1998. Densities, in number/m^2, represent the mean of three replicates.

	Control Site	Test Site 1	Test Site 2
Amphipoda			
Corophium sp.	14	-	14
Gammarus sp.	28	-	42
Undetermined Oedicerotidae	-	14	28
Decapoda			
Rhithropanopeus harrisii	-	-	14
Undetermined Xanthidae	14	28	-
Diptera			
Chironomus sp.	-	28	-
Coelotanypus sp.	14	208	28
Coelotanypus tricolor	-	56	-
Cricotopus bicinctus	-	28	-
Cryptochironomus sp.	-	42	-
Dicrotendipes modestus	-	69	-
Dicrotendipes neomodestus	-	28	-
Djalmabatista pulcher	-	-	28
Larsia sp.	-	-	14
Paralauterborniella nigrohalterale	-	56	-
Polypedilum convictum grp.	-	14	-
Polypedilum halterale grp.	14	69	42
Rheotanytarsus exiguus grp.	-	111	-
Rheotanytarsus sp.	-	-	14
Thienemanniella sp.	-	14	-
Undetermined Chironomidae	-	14	-
Gastropoda			
Ferrissia sp.	-	14	-
Littoridinops sp.	28	14	28
Undetermined Gastropoda	-	14	-
Pelecypoda			
Mytilopsis sp.	-	-	28
Rangia sp.	56	69	69
Isopoda			
Cyathura sp.	69	-	-
Cyathura polita	14	-	14
Oligochaeta			
Aulodrilus pigueti	-	56	14
Dero pectinata	-	14	-
Limnodrilus hoffmeisteri	111	722	97
Undetermined Tubificidae	125	-	181
Polychaeta			
Laeonereis culveri	56	-	-
Undetermined Spionidae	194	-	-

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)

