

Biological Assessment of

Villa Del Rio Wastewater Treatment Facility

Duval County

NPDES #FL0030449

Sampled November 1994

May 1995

Biology Section
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection

Results of Fifth Year Inspections

Discharger: Villa Del Rio Wastewater Treatment Facility
County: Duval
NPDES Number: FL0030449
State Permit Expiration Date: 31 July, 1995

Toxics Sampling Inspection (XSI)

Date Sampled: 14 November, 1994

Results: No organic priority pollutants or pesticides were detected in the effluent, and the metals concentrations were in compliance with Class III water quality standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 14 November, 1994

Results: The dechlorinated effluent did not show toxicity to either the cladoceran, *Ceriodaphnia dubia*, or the fish, *Cyprinella leedsi*. However, the chlorinated effluent caused 100% mortality in the *C. dubia* at 24 hours and 15% mortality in the *C. leedsi* at 48 hours. This is in violation of Rules 62-302.530(62) FAC, 62-302.500(1)(d) FAC, and 62-4.244(3)(a) FAC. The observed toxicity can be attributed to the presence of total residual chlorine in the effluent, measured in the laboratory at 0.5 mg/L. This violates the facility's permit limit and Rule 62-302.530(19) FAC.

Impact Bioassessment Inspection (IBI)

Date Sampled: 14 November, 1994

Results: Compared with the reference site, large reductions in macroinvertebrate Shannon-Weaver diversity at the test sites represented violations of Rule 62.302.530(11) FAC. The test site populations, however, exhibited increases in the % pelecypods and decreases in the % tubificids compared to the reference site, both of which are considered positive changes. Some of the stress (low diversity) seen at the test sites may be related to stormwater inputs, the somewhat reduced habitat quality, or to rapidly changing salinity due to the proximity of this area to the intermittently marine St. Johns River. The effluent chlorine toxicity may also contribute to the problem. Phytoplankton communities at all three study sites had similar diversity and community structure. Overall, the discharge did not appear to be having a negative effect on the phytoplankton community. Chlorophyll *a* levels were low at all three sites.

Water Quality Inspection (WQI)

Date Sampled: 14 November, 1994

Results: The effluent did not appear to be causing nutrient enrichment at the test sites, except for slightly elevating the nitrate-nitrite levels. Nutrient concentrations throughout the study area were average to slightly above average for a typical Florida estuary. Algal growth potential was above the "problem threshold" at all stations. Bacterial populations in the effluent and at the receiving water stations were within Class III water quality standards, except for test site 1, which exceeded standards for total coliforms, Rule 62-302.530(7) FAC.

Introduction

The Villa Del Rio Wastewater Treatment Facility is a domestic wastewater treatment facility located in Duval County, Florida (see maps in Appendix). The facility provides secondary treatment of domestic wastewater. The treatment process consists of bar screening, extended aeration in three aeration basins, and chlorination. Effluent is dechlorinated and then discharged into an unnamed canal which enters the Class III Ortega River approximately two miles from where it meets the St. Johns River. This facility has a 0.300 MGD design flow capacity, but is permitted for only 0.150 MGD. Mean flow at this facility is approximately 0.090 MGD.

Permit parameters for the Villa Del Rio WWTF are as follows: flow (0.150 MGD maximum), BOD_5 (annual average of 13.6 mg/L, monthly average of 17.0 mg/L, weekly average of 20.4 mg/L, and a maximum of 27.2 mg/L), TSS (annual average of 20 mg/L, monthly average of 30 mg/L, weekly average of 45 mg/L, and a maximum of 60 mg/L), TKN (annual average of 4.2 mg/L, monthly average of 5.3 mg/L, weekly average of 6.3 mg/L, and a maximum of 8.4 mg/L), pH (6.0 to 8.5 SU's), residual chlorine (minimum of 0.5 mg/L for disinfection and maximum of 0.01 mg/L prior to discharge), dissolved oxygen (minimum of 5.0 mg/L), and fecal coliforms (maximum of 800 colonies/100 mL). A permit modification was issued in December, 1991, for the installation of a sulfur dioxide gas dechlorination system.

Past Monthly Operating Reports show no violations of permit limits. The plant has shown good performance for the past year.

Methods

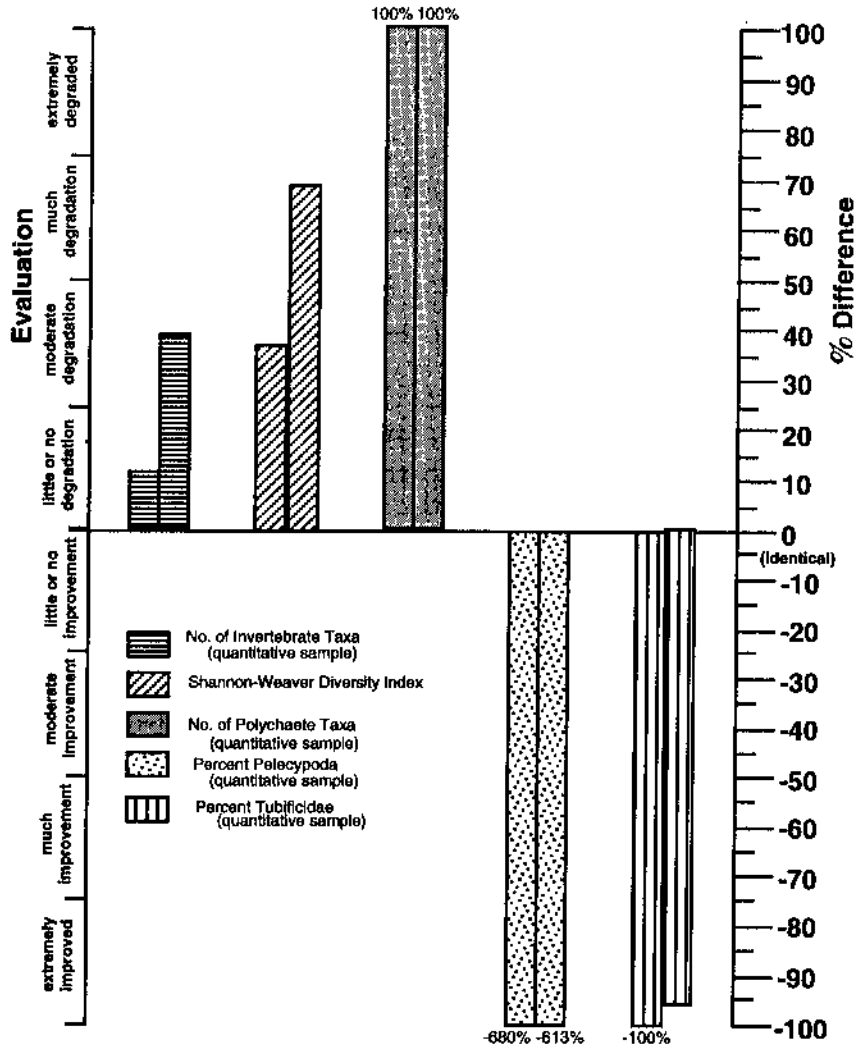
The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located 0.5 mile south of the Timaquana Bridge in the Ortega River) and two test sites bracketing the discharge (see maps in Appendix). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Cyprinella leedsi* as test organisms, were performed on an effluent sample (Weber 1991). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on effluent, reference, and test sites. Methods

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ekman			
Number of Taxa	18	16	11
Shannon-Weaver Diversity	3.2	2.0	1.0
% Polychaeta	0.7	0	0
% Diptera	44.1	60.3	86.3
% Gastropoda	38.2	22.5	1.5
% Malacostraca	8.1	5.1	1.3
% Pelecypoda	1.5	11.7	10.7
% Oligochaetes	6.6	0	0.3
% Predator/Carnivores	40.5	61.0	86.0
% Above-Surface Deposit Feeders	6.1	3.1	1.0
% Below Surface Deposit Feeders	6.7	0	0.3
% Shredders	5.7	0.9	0.4
% Scavengers	0.7	0.2	0
% Suspension Feeders	1.9	12.1	10.8
% Scrapers	38.5	22.6	1.5
Phytoplankton Algae			
Number of Taxa	12	14	15
Shannon-Weaver Diversity	3.2	3.2	3.4
Chlorophyll a (µg/L)	0.8 A	2.4	1.9
Algal Density (#/mL)	4046	7057	4299
% Blue-green	18.7	2.4	14.7
% Green	12.5	19.0	11.8
% Diatoms	65.6	66.7	73.5
% Other	3.1	11.9	0
Algal Growth Potential (mg dry wt/l)	16.6	12.5	22.4

used for all chemical analyses are on file at the Tallahassee DEP Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at reference and test sites. Invertebrates were sampled using nine Ekman grabs (composited into three replicates) per station. Phytoplankton was sampled at reference and test sites by 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* for the freshwater effluent, and *Dunaliella tertiolecta* for the saline receiving waters, followed Miller *et al.* (1978) and EPA (1974).



Effect of discharge on the benthic macroinvertebrate community.

The left bar for each parameter shows differences between the reference site and test site 1. The right bar shows differences between the reference site and test site 2.

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 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. For example, the Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index score is considered healthy. Species sensitivity data from other sources, such as Hulbert (1990), Hudson *et al.* (1990), Lenat (1993), Farrell (1992), Chang *et al.* (1992), and Whitmore (1989), are used as appropriate.

Ephemeroptera/Plecoptera/Trichoptera Index: This index is the

sum of the number of EPT taxa present. Higher EPT values are associated with healthier systems.

Community structure: Substantial shifts in proportions of major groups of organisms, compared to reference 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).

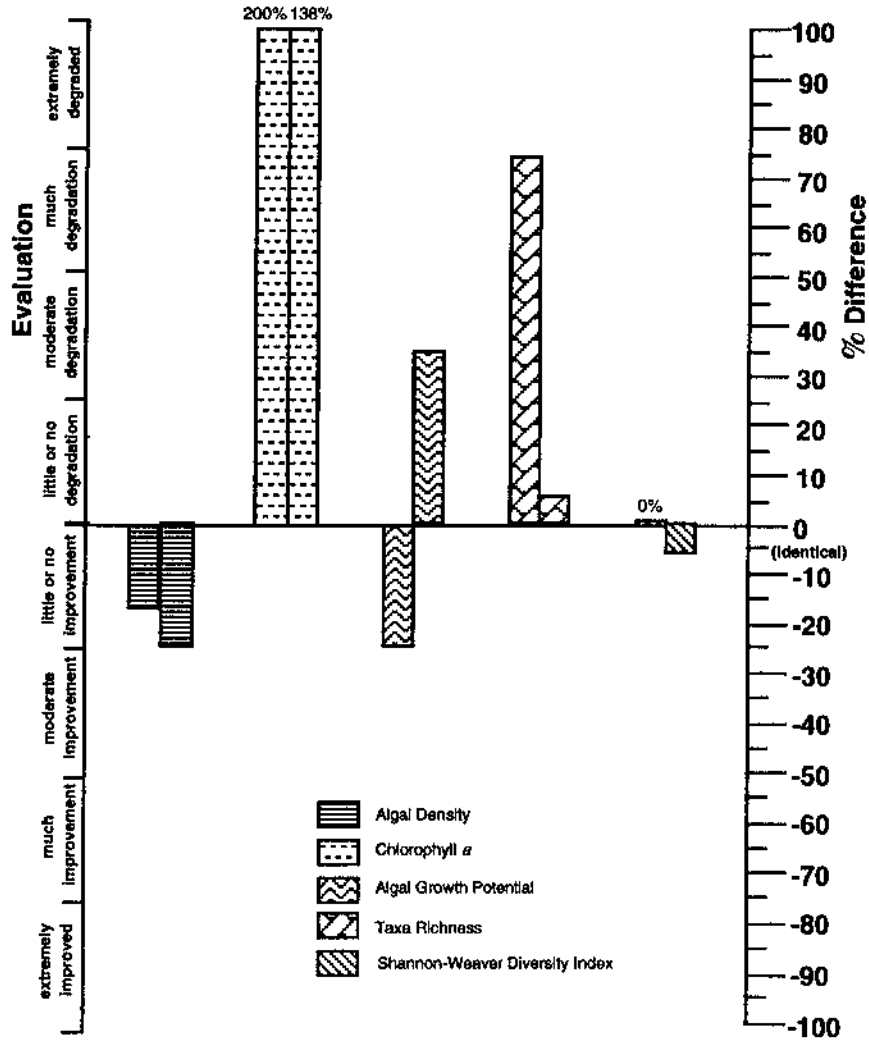
Algal biomass: High algal biomass (algal density or chlorophyll *a* implies nutrient stress. A decreased diatom to blue-green algae ratio (calculated by dividing the number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta + Cyanophyta) is often indicative of nutrient enriched conditions in flowing streams.

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).

The Stream Invertebrate Index for Florida (SIIF) is a composite macroinvertebrate metric (EA Engineering 1994). The SIIF assigns points to a variety of parameters, depending on how closely each parameter approaches an expected reference condition (see SIIF calculation table in Appendix).

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, the diversity index, the % filter-feeders, the number of polychaete taxa, and the % pelecypods are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving the % tubificids, algal density, 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: Tim McKelvey and Amy Kalmbacher (DEP Northeast District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Christy LeDuc, Kathleen Lurding, Tina Mikulski, Elizabeth Miller, Urania Quintana, David Whiting, Vicki Whiting, Greg Wynn, and David Young (Tallahassee Biology Laboratory). 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.



Effect of discharge on the algal community.

The left bar for each parameter shows differences between the reference site and test site 1. The right bar shows differences between the reference site and test site 2.

Results and Discussion

The reference site received a better habitat assessment score (71 points) than either of the test sites (51 and 50 points at test sites 1 and 2, respectively). Littoral zones at both test sites were more altered by human activities than was the reference site littoral zone. Land surrounding the reference site was forested (75%) with some residential use (25%), while both test sites were completely surrounded by residential areas. Only a few, small stormwater runoff sources were noted at the reference site, while considerable stormwater discharge from local roads and residences was noted at both test sites. Some plant communities which were noted at the reference site were absent at both test sites. Water at the reference site was clear and tannic, while water at both test sites was slightly turbid and tannic. All sites were tidally influenced with an outgoing tide noted at the time of sampling.

Dissolved oxygen was lower at the reference site (4.3 mg/L) than at either test site (6.8 and 6.6 mg/L at test sites 1 and 2, respectively). Dissolved oxygen at the reference site was below Class III water quality standards for fresh waters. Other measurements which were similar at all sites included conductivity (between 218 µhmos/cm and 321 µhmos/cm), temperature (between 20.9 °C and 21.8 °C), and pH (6.4 to 6.8 S.U.'s). TSS was higher at test site 1 (12 mg/L) than at either the reference site (4 mg/L) or test site 2 (6 mg/L). BOD_5 at all sites was below 2 mg/L. Effluent BOD_5 (2 mg/L) and TSS (3 mg/L) were well within permit limits.

The dechlorinated effluent was not toxic to either the cladoceran, *Ceriodaphnia dubia*, or the fish, *Cyprinella leedsi*. However, the chlorinated effluent caused 100% mortality to *C. dubia* at 24 hours and 15% mortality to *C. leedsi* at 48 hours. This is in violation of Rules 62-302.530(62) FAC, 62-302.500(1)(d) FAC, and 62-4.244(3)(a) FAC. The observed toxicity can be attributed to the presence of total residual chlorine in the effluent, measured in the laboratory at 0.5 mg/L. This violates the facility's permit limit and Rule 62-302.530(19) FAC.

No organic priority pollutants or pesticides were detected in the effluent grab sample. Metals detected in the effluent included cadmium (0.1 µg/L), copper (4 µg/L), iron (45 µg/L), and zinc (24 µg/L). At a hardness of 131.5 mg $CaCO_3$, these metals concentrations are within Class III water quality standards.

Fecal coliform bacteria at the reference site (800 organisms/100 mL), test site 1 (500 organisms/100 mL), and at test site 2 (800 organisms/100 mL) were within Class III water quality standards. Similarly, total coliform bacteria at the reference site and test site 2 (2,400 organisms/100 mL each) were also within standards. Total coliform bacteria at test site 1, with 9,000 organisms/100 mL, was in excess of Class III water quality standards, Rule 62-302.530(7) FAC. In the effluent, both fecal coliforms (<20 organisms/100 mL) and total coliforms (40 organisms/100 mL) were well within water quality standards and permit limits.

The effluent did not appear to be causing nutrient enrichment at the test sites, except for slightly elevating the nitrate-nitrite levels. Nutrient concentrations throughout the study area were average to slightly above average for a typical Florida estuary. While nitrate-nitrite was very low (0.03 mg/L) at the reference site, it increased to 0.08 mg/L at both test sites, which is higher than approximately 75% of representative Florida estuarine systems (see Table of Typical Water Quality Values in Appendix). Nitrate-nitrite of the effluent was 4.6 mg/L.

Algal growth potential was 16.6 mg dry wt/L at the reference site, 12.5 mg dry wt/L at test site 1, and 22.4 mg dry wt/L at test site 2. All these values are above the "problem threshold" of 10 mg dry wt/L for marine waters (Ron Raschke, USEPA, personal communication).

Quantitative measures of benthic macroinvertebrate community health indicated some degradation in the vicinity of the discharge. 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.

Macroinvertebrate taxa richness decreased from 18 taxa at the reference site to 16 taxa at test site 1 and 11 taxa at test site 2. Similarly, Shannon-Weaver diversity at the reference site (3.2) was higher than the diversity values found at test site 1 (2.0) or test site 2 (1.0). Although the reductions in taxa richness were only slight to moderate, the reductions in diversity (37.5 % and 68.8% and test sites 1 and 2, respectively) represent violations of Rule 62.302.530(11) FAC. The diversity at test site 1 was lower than the values found in 75% of all other Florida estuaries, while the diversity at test site 2 was lower than that found in 95% of all other Florida estuaries.

The decreases in diversity at the test sites can be attributed to the high dominance of the pollution tolerant chironomid, *Coelotanypus* sp., found at both sites. Conversely, the relatively sensitive chironomid, *Stictochironomus devinctus*, was present at the reference site, but absent at both test sites. The large percent difference between the reference and test sites concerning the number of polychaete taxa is misleading, as only 1 taxon was found at the reference site as opposed to zero at the test sites. The test site populations had increases in the % pelecypods and decreases in the % tubificids compared to the reference site, both of which are considered positive changes (Engle *et al.* 1994).

Some of the stress (low diversity) seen at the test sites may be related to stormwater inputs, the somewhat reduced habitat quality, or to rapidly changing salinity due to the proximity of this area to the intermittently marine St. Johns River. The effluent chlorine toxicity may also contribute to the problem.

The figure on p. 3 represents changes in the algal community. As was noted with the macroinvertebrates, larger differences (that is, higher percentages) correspond with greater degrees of degradation. Phytoplankton communities at all three study sites had similar diversity and community structure. Overall, the discharge did not appear to be having a negative effect on the phytoplankton community. As with the number of polychaete taxa in the macroinvertebrate graph, the appearance of large percent differences between the reference site and test sites when comparing chlorophyll *a* is simply an artifact. Chlorophyll *a* levels were low at all three sites (between 0.8 µg/L and 2.4 µg/L, which is lower than 90% to 95% of all other Florida estuaries).

Conclusions

The dechlorinated effluent was not toxic to either the cladoceran, *Ceriodaphnia dubia*, or the fish, *Cyprinella leedsi*. However, the chlorinated effluent caused 100% mortality in the *C. dubia* test at 24 hours and 15% mortality in the *C. leedsi* bioassay at 48 hours. This is in violation of Rules 62-302.530(62) FAC, 62-302.500(1)(d) FAC, and 62-4.244(3)(a) FAC. The observed toxicity can be attributed to the presence of total residual chlorine in the effluent, measured in the laboratory at 0.5 mg/L. This violates the facility's permit limit and Rule 17-302.530(19) FAC.

No organic priority pollutants or pesticides were detected in the effluent, and the metals concentrations were within Class III water quality standards.

Bacterial populations in the effluent and at the receiving water stations were within Class III water quality standards, except for test site 1, which exceeded standards for total coliforms.

The effluent did not appear to be causing nutrient enrichment at the test sites, except for slightly elevating the nitrate-nitrite levels. Nutrient concentrations throughout the study area were average to slightly above average for a typical Florida estuary.

Algal growth potential was above the "problem threshold" at all stations, with 16.6 mg dry wt/L at the reference site, 12.5 mg dry wt/L at test site 1, and 22.4 mg dry wt/L at test site 2.

Compared with the reference site, large reductions in macroinvertebrate Shannon-Weaver diversity at the test sites represented violations of Rule 62-302.530(11) FAC. The test site populations, however, exhibited increases in the % pelecypods and decreases in the % tubificids, compared to the reference site, both of which are considered positive changes. Some of the stress (low diversity) seen at the test sites may be related to stormwater inputs, the somewhat reduced habitat quality, or to rapidly changing salinity due to the proximity of this area to the intermittently marine St. Johns River. The effluent chlorine toxicity may also contribute to the problem.

Phytoplankton communities at all three study sites had similar diversity and community structure. Overall the discharge did not appear to be having a negative effect on the phytoplankton community. Chlorophyll *a* levels were low at all three sites.

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Chemistry summary table for Villa Del Rio Wastewater Treatment Facility

	Effluent	Reference Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
None Detected				
Metals (ug/L)				
Aluminum	100 U			
Arsenic	10 U			
Cadmium	0.1 I			
Copper	4 I			
Chromium	10 U			
Iron	45			
Lead	10 U			
Mercury	0.10 U			
Nickel	4 U			
Selenium	30 U			
Silver	0.05 U			
Zinc	24 A			
Nutrients (mg/L)				
Ortho-phosphate	1.7	0.07	0.07	0.07
Total phosphorus	1.9	0.11	0.11	0.12
Ammonia	0.03 A	0.02	0.05	0.04 A
Nitrate+Nitrite	4.6	0.03 I	0.08	0.08 A
TKN	0.54 A	0.68	0.71	0.71
General Phys-Chem Parameters				
Habitat Assessment		71	51	50
D. O. (mg/L)		4.3	6.8	6.6
pH (SU's)	7.0*	6.4	6.8	6.7
Specific Conductance (µmhos/cm)	391*	218	321	286
Temperature (°C)		20.9	21.8	21.5
Total Suspended Solids (mg/L)	3	4	12	6
Biological Oxygen Demand, 5 day (mg/L)	2	< 2	< 2	< 2
Turbidity (NTU's)	1.5	5.6	8.7	7.5
Color (PCU's)	150	150	150	200
Hardness (mg CaCO3)	131.5			
Algal Growth Potential (mg dry wt/L)	10.8	16.6	12.5	22.4
Toxicity				
Bioassay Fish-Dechlorinated	No Mortality			
Bioassay Invertebrate-Dechlorinated	No Mortality			
Bioassay Fish-Chlorinated	15% Mortality @ 48 hours			
Bioassay Invertebrate-Chlorinated	100% Mortality @ 24 hours			
Microbiological Communities (org/100 mL)				
Fecal Coliform	< 20	800	500	800
Total Coliform	40	2,400	9,000	2,400

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

*These effluent parameters were measured in the laboratory.

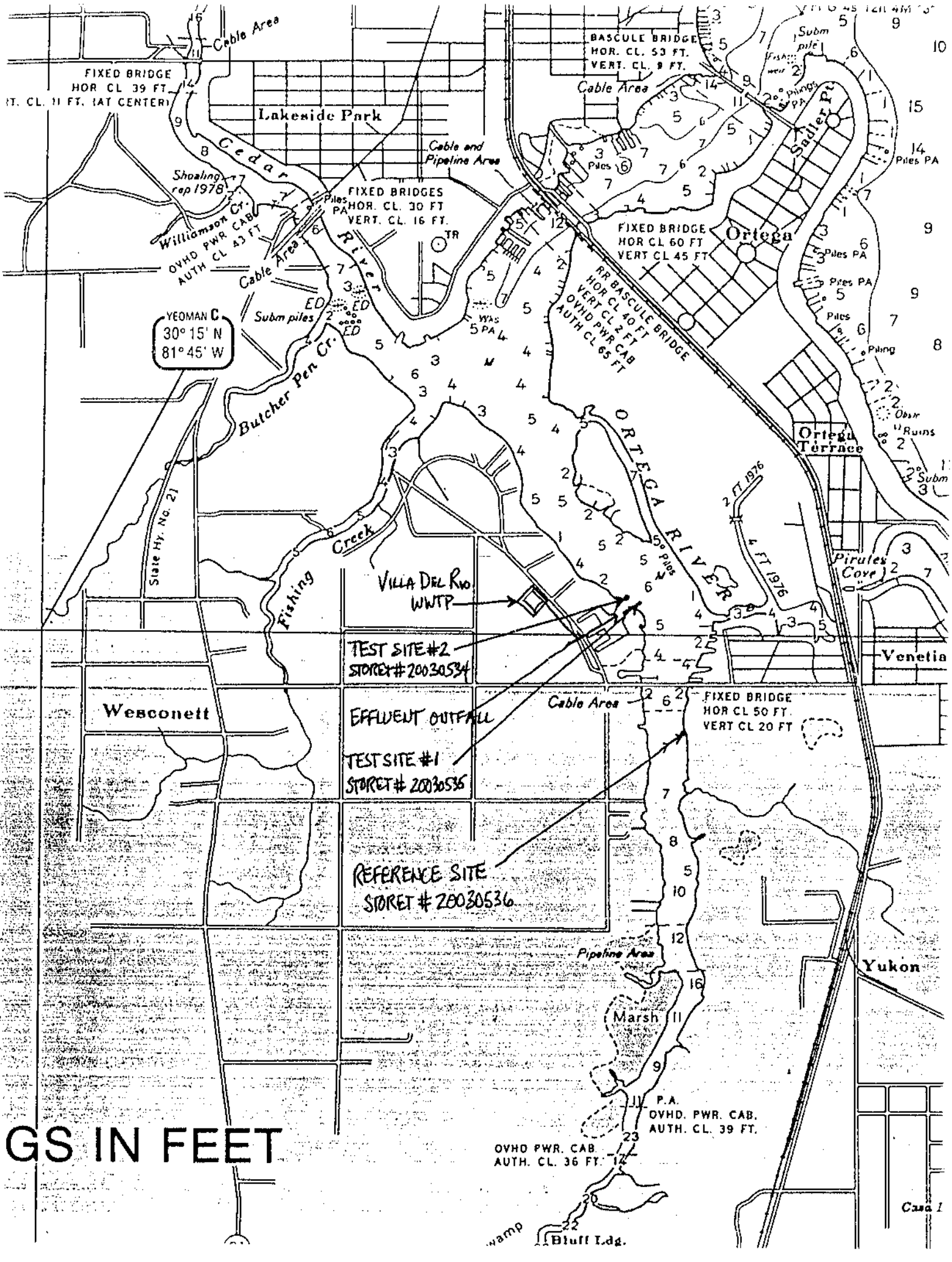
Typical Values for Selected Parameters in Florida Waters

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


FIXED BRIDGE
HOR CL 39 FT
VERT CL 11 FT (AT CENTER)
Cable Area
Lakeside Park
Cedar
Shoaling rep 1978
Williamson Cr.
OVHD PWR CAB
AUTH CL 43 FT
Cable and Pipeline Area
FIXED BRIDGES
HOR CL 30 FT
VERT CL 16 FT
River
Cable Area
YEOMAN C
30° 15' N
81° 45' W
Subm piles
Butcher Pen Cr.
State Hy. No. 21
Fishing Creek
VILLA DEL RIO WWTP
TEST SITE #2
STORET# 20030534
EFFLUENT OUTFALL
TEST SITE #1
STORET # 20030536
REFERENCE SITE
STORET # 20030536
Wesconett
BASCULE BRIDGE
HOR. CL. 53 FT.
VERT. CL. 9 FT.
Cable Area
Sadler Pt
FIXED BRIDGE
HOR CL 60 FT
VERT CL 45 FT
Ortega
RR BASCULE BRIDGE
HOR CL 40 FT
VERT CL 2 FT
OVHD PWR CAB
AUTH CL 65 FT
ORTEGA RIVER
Ortega Terrace
2 FT 1976
4 FT 1976
Pirates Cove
Venetia
FIXED BRIDGE
HOR CL 50 FT
VERT CL 20 FT
Cable Area
Pipeline Area
Yukon
Marsh
P.A.
OVHD. PWR. CAB.
AUTH. CL. 39 FT.
OVHD PWR. CAB.
AUTH. CL. 36 FT.
Bluff Ldg.
Casa I

GS IN FEET

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: Villa Del Rio Wastewater Facility		Prepared by: Jon Dinges Date: 11/10/94
Location (attach detailed map):	County: Duval	District: Northeast
Federal Permit # FL0030449 and expiration date: effective 10/01/94	State GMS # and State expiration date: 3116 P02807 07/31/95	Facility Type: Industrial Municipal, Federal, Agricultural Other (list):

Function of facility: Secondary treatment of domestic wastewater.

Description of treatment process: A 0.150 MGD extended aeration wastewater facility with bar screening, three aeration basins and chlorination, discharging to unnamed canal to Ortega River to St. Johns River.

Receiving waters: St. Johns River	Classification: III
Design Flow: 0.300 mgd (permit - 0.150)	Actual Mean Flow: ≈ 0.090 mgd

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

therefore, the best time to sample is: Any time

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

List effluent limits:

Parameter	Limit (units)
Flow	0.150 MGD
BOD_5	annual avg 13.6; monthly avg 17.0; weekly avg 20.4; 1-time max 27.2 mg/L
TSS	20; 30; 45; 60 mg/L
~~TKN~~	4.2; 5.3; 6.3; 8.4 mg/L
pH	6.0 to 8.5
Cl_2 residual	minimum 0.5 mg/L; maximum <0.01 mg/L
Fecal coliform	Avg. ≤200/100 mL; Max 800/100 mL

Describe special permit conditions and permit modifications:

DC16-201004 was issued on 12/24/91 for the installation of a SO_2 gas dechlorination system.



VILLA DEL RIO REGIONAL WWTF
EXHIBIT "A"

MARCH 1990

ENGINEERS' PROJECT NO.: 90002.00

ee:
C. Demetree
a Del Rio

I. D. Number: 3116P02807
Permit/Certification: DO16-177466
Date of Issue: October 2, 1990
Expiration Date: July 31, 1995

SPECIFIC CONDITIONS:

12. The monitoring requirements and effluent limitations for Villa Del Rio WWF are as follows:

PARAMETER	EFFLUENT LIMIT	MINIMUM FREQUENCY	SAMPLE TYPE	SAMPLE LOCATION
Flow	0.150 **MGD (b)**	Continuous	(e)	**Influent (f)**
BOD_5	**(a) mg/l**	Weekly	Composite (h)	**Influent/ Effluent (g)**
TSS	**(a) mg/l**	Weekly	Composite	Influent/ Effluent
Dissolved Oxygen	Min. 5.0 mg/l	Daily, 5/Week	(i)	Effluent
TKN	(a) mg/l	Weekly	Composite	**Effluent**
pH units	6.0 to 8.5	Continuous	(j)	**Effluent**
Chlorine Residual	**Min. 0.5 mg/l** **~~Max. 1.0 mg/l~~(d)** Max ≤ 0.01 mg/L	Continuous	(j)	**Effluent**
Fecal Coliform	**Avg ≤ 200/100 ml** **Max. 800/100 ml**	Weekly	Grab (c)	**Effluent**

(a) Effluent Limits, Maximum (mg/l)

	annual average	monthly average	weekly average	one time grab max	
BOD_5	13.6	17.0	20.4	27.2	
TSS	20	30	45	60	
TKN	4.2	5.3	6.3	8.4	

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

(c) Grab samples will be collected during periods of minimal wastewater facility pollutant removal efficiencies, or maximum organic loading in the effluent.

(d) By November 1, 1991, 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 at the point of discharge, as required by FAC Rule 17-302.560(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 zones 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 System (NPDES) permit for the facility.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL DEP NED	STORET STATION NUMBER: 20030536	DATE (M/D/Y): 11/14/94	TIME: 1120	RECEIVING BODY OF WATER: ORTEGA RIVER

REMARKS: Reference site for 5th yr. inspection for Villa Del Rio	LOCATION: ORTEGA RIVER ½ mile South of TIMAQUANA BRIDGE	FIELD ID/NAME: REFERENCE SITE

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
75				25			

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

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

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

List & map dominant vegetation on back

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect (draw cross-section & provide at least 3 velocity & depth values)

6ft. depth

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

Artificially Impounded ☐ yes

High Water Mark (m above ~~bed~~ surface): elem (tidal)

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	25	3(3)	Ekeman
Aquatic Vegetation				Other: Detritus	75		Ekeman
Rock or Shell Rubble				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):	Salinity	turb. NTU	Secchi (m):
Top								
Mid-depth	3ft.	20.9	6.39	4.3	21.8	0.0	19.3	.4
Bottom	6ft.							

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: Partly Cloudy, Windy NE 20-25

Warm 75°F +

tide outgoing

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

SAMPLING TEAM:	SIGNATURE:	DATE:
McKelvey / Kalmbacher	Tim McKelvey	

30° 14' 18.84"

3 replicates w/ 3 drops of the Eckman dredge per replicate

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

SUBMITTING AGENCY CODE: 8031	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
SUBMITTING AGENCY NAME: FL DEP NED JAX	20030536	11/14/94	ORTEGA RIVER

REMARKS:	LOCATION: ½ mile South of Timuquana bridge, eastern shore	FIELD ID/NAME: REFERENCE SITE

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 10	None—Unaltered shoreline. 9(10) points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed 35	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation 4	>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 9	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 5	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. detritus 4-7 points	Anaerobic mud. 0-3 points & mud

TOTAL SCORE 71

COMMENTS: Villa del Rio 5th year inspection.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
11/14/94	McKelvey / Kalmbacher	Toni McKelvey

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP NED	STORET STATION NUMBER: 20030535	DATE (M/D/Y): 11/14/14	TIME: 1430	RECEIVING BODY OF WATER: ORTEGA RIVER

REMARKS:	LOCATION: ORTEGA RIVER TEST SITE #1	FIELD ID/NAME:
OUTGOING TIDE	100 yds S of Villa Del Rio P.O.D.	TEST SITE #1

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Surrounding Land-Use (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 ☐ Some potential sources ☑ Obvious sources ☐

Width of riparian vegetation (m) on least buffered side: 40m

List & map dominant vegetation on back

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect (draw cross-section & provide at least 3 velocity & depth values)

5 ft. depth.

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

Artificially Impounded ☐ yes

High Water Mark (m above ~~bed~~ SURFACE): .6m (tidal)

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	20	3(3)	ECKMAN
Aquatic Vegetation				Other: DETRITUS	40		ECKMAN
Rock or Shell Rubble				Other: SHELL	40		ECKMAN
Undercut Banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth ~~(ft)~~ (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):	Salinity	turb.	Secchi (m):
Top								.4
Mid-depth	2.5 ft.	21.76	6.8	6.76	321	0.0	18.7	
Bottom	5.0 ft.							

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

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: Partly Cloudy Warm 75°F+ Wind NE 20-25 outgoing tide

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

SAMPLING TEAM: McKelvey / Kalmbacher

SIGNATURE: [signature]

DATE: 11/14/14

3 replicates w/ 3 drops of the Eckman dredge per replicate

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FLDEP - NED	STORET STATION NUMBER: 20030535	DATE (M/D/Y): 11/14/94	RECEIVING BODY OF WATER: ORTEGA RIVER

REMARKS:	LOCATION:	FIELD ID/NAME:
outgoing tide	100 yds South of Villa del Rio P.O.D.	TEST SITE #1

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations: 6	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: 26	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: 3	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: 9	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: 57

COMMENTS: Villa del Rio 5th year inspection

ANALYSIS DATE:	ANALYST:	SIGNATURE:
11/14/94	McKelvey	Toni McKelvey

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FLDEP NEP JAX	STORET STATION NUMBER: 20030534	DATE (M/D/Y): 11/19/99	TIME: 1400	RECEIVING BODY OF WATER: ORTEGA RIVER

REMARKS:	LOCATION: ORTEGA RIVER TEST SITE #2	FIELD ID/NAME:
outgoing tide	100 yds N of Villa Del Rio P.O.D.	TEST SITE #2

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Surrounding Land-Use (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 ☐ Some potential sources ☐ Obvious sources ☑

Width of riparian vegetation (m) on least buffered side: 40M

List & map dominant vegetation on back

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect (draw cross-section & provide at least 3 velocity & depth values)

5 ft depth.

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

Artificially Impounded ☐ yes

High Water Mark (m above bed): .6m (tidal)

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

3 replicates w/ 3 drops of the Eckman dredge per replicate

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	25	3(3)	Eckman
Aquatic Vegetation				Other: detritus	75		Eckman
Rock or Shell Rubble				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)~~:	Salinity	turb.	Secchi (m):
Top	0							.4
Mid-depth	2.5	21.5	6.65	6.88	286	0.0	10.6	
Bottom	5'							

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

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: partly Cloudy
Windy NE 20-25
outgoing tide

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

SAMPLING TEAM:	SIGNATURE:	DATE:
McKelvey / Kalmbacher	Ann McKelvey	

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FLDEP NED JAX	STORET STATION NUMBER: 20030534	DATE (M/D/Y): 11/14/99	RECEIVING BODY OF WATER: ORTEGA River

REMARKS:	LOCATION: ORTEGA RIVER TEST SITE #2 100 YDS N of Villa Del Rio P.O.D.	FIELD ID/NAME: TEST SITE #2
OUTGOING TIDE		

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 **26**	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 **3**	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 **9**	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. detritus 4-7 points	Anaerobic mud. 0-3 points

TOTAL SCORE **50**

COMMENTS: Villa del Rio 5th year inspection

ANALYSIS DATE:	ANALYST:	SIGNATURE:
11/14/99	McKelvey/Kalmbacher	Tom McKelvey

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Villa Del Rio
County: DUVAL
Contact / District: Tim McKelvey/NORTHEAST
NPDES Permit #: FL00
LIMS Sample #: 93568 LIMS Job #: 94-NOV-15-12
entered 11/22/94

Sample Collection: Date 11/14/94 Time
Test Beginning: Date 11/15/94 Time 1500
Test Ending: Date 11/17/94 Time 1500
Organism Batch #: 44 Diluent Batch #: 44
Organism Age: <24 hrs.
Test Organism: Ceriodaphnia dubia

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

Test Number: 1 of 4

Remarks:
DeCl - 0.6 ml/L
0.025 N Sodium thiosulfate

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	22.1 @ 22.2	8.5 @ 23.4 °C	110 @ 102.6 1021 @ 1047 @ 23.7 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.0 @ 23.1	8.4 @ 24.0 °C	106 @ 102.6 1028 @ 1047 @ 24.0 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.8 @ 22.9	8.6 @ 22.6 °C	107 @ 102.6 1069 @ 1047 @ 24.0 °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
Control	A	5	5	5	8.2		8.3	23.1		23.3	8.0		8.2	170		185
Control	B	5	5	5			8.3			23.3			8.1			190
Control	C	5	5	5			8.3			23.3			8.1			190
Control	D	5	5	5			8.3			23.2			8.1			190
100%	A	5	5	5	7.7		8.4	23.1		23.2	8.2		8.0	430		435
100%	B	5	5	5			8.4			23.2			8.0			440
100%	C	5	5	5			8.4			23.3			8.0			450
100%	D	5	5	5			8.4			23.2			8.0			460
Recorded by:		TM	TM	MF	JRS		TR	JRS		TR	JRS		TR	JRS		TR
Measured/Loaded by:		MF	TM	MF	JM		TM	TM		TM	JM		JM	JM		TM

Investigators' Signatures

Tina M. Kubiski
Jennifer Sarapan
Maybell Fandiño
Tolvin G. Kadel
Reviewer

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):					
Lab Total Residual Cl2 (mg/L):	—	<0.03	0.04	DR-100	TM
Alkalinity (mg/L as $CaCO_3$):	—	75	75	HACH	JRS
Hardness (mg/L as $CaCO_3$):	—	85	140	HACH	JRS
Total ammonia (mg/L as N):	—	<0.07	<0.07	Orion	JM

Ammonia Meter #98136 Ammonia Meter Slope: 57.7 Ammonia Blank: <0.07 Control Salinity: 0 ppt Sample Salinity: ( ) ppt

form updated 10/05/94

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Villa Del Rio
County:
Contact/District:
NPDES Permit #: FL00
LIMS Sample #: 93568 LIMS Job #: 94 NOV -15 -12

Sample Collection: Date 11/14/94 Time
Test Beginning: Date 11/15/94 Time 1500
Test Ending: Date Time
Organism Batch #: 46 Diluent Batch #: well
Organism Age: 11 days Old
Test Organism: Cyprinella leedsi

Test Type: Screening / Definitive
Static / Static Renewal / Flow-through
Test Number: 2 of 4
Remarks:
DeCl-

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	22.1 @ 22.2	8.5 @ 23.4 °C 1021 @ 1047 @ 23.7 °C	110 @ 102.6
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.0 @ 23.1	8.4 @ 24.0 °C 1028 @ 1047 @ 24.0 °C	106 @ 102.6
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.8 @ 22.9	8.6 @ 22.6 °C 1069 @ 1047 @ 24.0 °C	107 @ 102.6

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Control A	504	5	5	5	7.8	8.2	8.3	22.7	23.1	22.8	8.5	8.0	8.2	240	245	240
Control B	505	5	5	5	7.8	8.2	8.3	22.8		22.7	8.5	8.0	8.3	245	245	240
Control C	506	5	5	5	7.8	8.2	8.3	22.8		22.7	8.6	8.0	8.3	245	245	240
Control D	508	5	5	5	7.8	8.2	8.3	22.8		22.8	8.5	8.0	8.3	245	245	245
100% A	500	5	5	5	7.5	8.0	8.1	23.8	23.0	22.8	8.6	8.1	7.9	460	450	450
100% B	501	5	5	5	7.5	8.0	8.1	24.1		22.7	8.6	8.1	7.9	460	445	445
100% C	502	5	5	5	7.5	8.0	8.1	24.1		22.7	8.5	8.1	8.0	460	450	450
100% D	503	5	5	5	7.5	8.0	8.0	24.0		22.8	8.4	8.0	8.0	460	450	450
Recorded by:		TM	TM	MF	JBS	TR	TR	JBS	TR	TR	JBS	TR	TR	JBS	TR	TR
Measured/Loaded by:		MF	TM	MF	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM

Investigators' Signatures

Jennifer Sparagana
Tonia C. Faden
Tina Mikulski
Reviewer

Water Quality Parameters	Salt Water: Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):					
Lab Total Residual Cl2 (mg/L):	<0.03	—	0.04	DR-150	TM
Alkalinity (mg/L as $CaCO_3$):	130	—	75	HACH	JBS
Hardness (mg/L as $CaCO_3$):	130	—	140	HACH	JBS
Total ammonia (mg/L as N):	<0.017	—	<0.017	Orion	TM

Ammonia Meter #98136 Ammonia Meter Slope: -57.7 Ammonia Blank: <0.017 Control Salinity: ppt Sample Salinity: ppt

form updated 10/05/94

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Villa Del Rio
County: Duval
Contact / District: Tim McKelvey / Northeast
NPDES Permit #: FL00
LIMS Sample #: 93568 LIMS Job #: 94-NOV-15-12

Sample Collection: Date 11/14/94 Time
Test Beginning: Date 11/15/94 Time 1500
Test Ending: Date 11-16-94 Time 1500
Organism Batch #: 44 Diluent Batch #: 44
Organism Age: <24 hrs.
Test Organism: Ceriodaphnia dubia

Test Type: Screening | Definitive
Static | Static Renewal | Flow-through
Test Number: 3 of 4
Remarks:
CO-

Test Terminated @ 24hrs.

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0	22.1 @ 22.2	8.5 @ 23.4 °C	110 @ 102.6
	9.0 @ 9.0			1021 @ 1047 @ 23.7 °C
24 hr	7.0 @ 7.0	23.0 @ 23.1	8.4 @ 24.0 °C	106 @ 102.6
	9.0 @ 9.0			1028 @ 1047 @ 24.0 °C
48 hr	7.0 @ 7.0	22.8 @ 22.9	8.6 @ 22.6 °C	107 @ 102.6
	9.0 @ 9.0			1069 @ 1047 @ 24.0 °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
Control	A	5	5	—	8.2	8.2		23.1	23.2		8.1	7.9		170	165	
Control	B	5	5	—		8.2			23.1			7.9			175	
Control	C	5	5	—		8.2			23.1			8.0			175	
Control	D	5	5	—		8.2			23.0			8.0			175	
100%	A	5	0	—	7.5	8.3		23.2	22.9		8.2	8.2		420	415	
100%	B	5	0	—		8.3			22.9			8.3			420	
100%	C	5	0	—		8.3			22.9			8.2			425	
100%	D	5	0	—		8.3			22.9			8.2			435	
Recorded by:		TM	TM		JKS	TR		JKS	TR		JKS	TR		JKS	TR	
Measured/Loaded by:		MF	TM		TM	TM		TM	TM		TM	TM		TM	TM	

Investigators' Signatures

Tina M. Kelvey
Jenny Spacapan
Marshall Faircloth
Robin Ce Rader
Reviewer

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):					
Lab Total Residual Cl2 (mg/L):	—	<0.03	0.5	DR-100	TM
Alkalinity (mg/L as $CaCO_3$):	—	75	75	HACH	JKS
Hardness (mg/L as $CaCO_3$):	—	85	140	HACH	JKS
Total ammonia (mg/L as N):	—	<0.017	<0.017	Orion	TM

Ammonia Meter #98136 Meter Slope: -57.7 Ammonia Blank: <0.017 Control Salinity: ( ) ppt Sample Salinity: ( ) ppt

form updated 10/05/94

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Villa Del Rio
County:
Contact / District:
NPDES Permit #: FL00
LIMS Sample #: 93568 LIMS Job #: 94-NOV-15-12

Sample Collection: Date 11/14/94 Time
Test Beginning: Date 11/15/94 Time 1500
Test Ending: Date 11/17/94 Time 1500
Organism Batch #: 46 Diluent Batch #: well
Organism Age: 11 days old
Test Organism: Cyprinella leedsi

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

Test Number: 4 of 4

Remarks:

Cl⁻

~~Test Terminated @ 24 hrs.~~ TM

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	22.1 @ 22.2	8.5 @ 23.4 °C	110 @ 102.6 1021 @ 1047 @ 23.7 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.0 @ 23.1	8.4 @ 24.0 °C	106 @ 102.6 1028 @ 1047 @ 24.0 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.8 @ 22.9	8.6 @ 22.6 °C	107 @ 102.6 1069 @ 1047 @ 24.0 °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
Control A	24	5	5	5	7.8	8.2		23.0	23.1		8.6	7.9		240	250	
Control B	317	5	5	5	7.8	8.2		22.6			8.5	7.9		240	245	
Control C	210	5	5	5	7.8	8.2		22.6			8.5	7.9		240	240	
Control D	3	5	5	5	7.8	8.2		22.6			8.6	8.0		240	245	
100% A	1960	5	03*	3	7.2	7.8		23.9	23.0		8.1	8.1		435	425	
100% B	3606	5	05	5	7.2	7.8		24.2			8.1	8.0		435	420	
100% C	142	5	04	4	7.0	7.8		24.2			8.2	8.0		435	420	
100% D	53	5	05	5	6.9	7.8		24.2			8.2	8.1		435	425	
*Put the C	Lab Id Numbers															
Lab on this C	leeds page			TM												
Recorded by:		TM	TM	MF	JAS	TM		TAS	TR		JAS	TR		JAS	TR	
Measured/Loaded by:		MF	TM	MF	TM	TR		TM	TM		TM	TM		TM	TM	

Investigators' Signatures

Tina Mikulski
Marshall Sandvik
Robin C. Radke

Reviewer

form updated 10/05/94

Water Quality Parameters	Salt Water: Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):					
Lab Total Residual Cl2 (mg/L):	<0.03	—	0.5	DR 820	TM
Alkalinity (mg/L as $CaCO_3$):	130	—	75	HACH	JAS
Hardness (mg/L as $CaCO_3$):	130	—	140	HACH	JAS
Total ammonia (mg/L as N):	<0.017	—	<0.017	0.1 cm	TM

Ammonia Meter #98136 Meter Slope: 57.7 Ammonia Blank: <0.017 Control Salinity: ( ) ppt Sample Salinity: ( ) ppt

Benthic macroinvertebrate taxa list for the Villa Del Rio Wastewater Treatment Facility, collected via Ekman grab samples in the Ortega River, on 14 November, 1994. Densities, in number/m^2, represent the mean of three replicates.

	Reference Site	Test Site 1	Test Site 2
Amphipoda			
Cerapus sp.	–	–	15
Corophium sp.	–	15	–
Gammarus sp.	–	104	15
Hyalella azteca	44	30	–
Undetermined Oedicerotidae	–	15	–
Decapoda			
Callinectes sapidus	–	15	–
Rhithropanopeus harrisii	–	15	–
Diptera			
Chaoborus sp.	44	–	–
Coelotanypus sp.	356	2785	4993
Polypedilum halterale grp.	30	–	–
Procladius sp.	370	30	30
Stictochironomus devinctus	59	–	–
Tanytarsus sp. M (Epler)	15	–	–
Tanytarsus sp. R (Epler)	–	–	15
Undetermined dipteran pupa	15	–	–
Gastropoda			
Littoridinops monroensis	459	148	89
Littoridinops sp.	–	904	–
Undetermined Hydrobiidae	311	–	–
Isopoda			
Cassidinidea ovalis	–	30	–
Cyathura polita	–	15	44
Cyathura sp.	104	–	–
Undetermined Flabellifera	15	–	–
Odonata			
Aphylla williamsoni	15	–	–
Oligochaeta			
Aulodrilus pigueti	44	–	15
Limnodrilus hoffmeisteri	89	–	–
Pelecypoda			
Mytilopsis leucophaeta	–	–	44
Rangia cuneata	15	237	326
Undetermined Mactridae	–	74	–
Undetermined Pelecypoda	15	237	252
Polychaeta			
Streblospio benedicti	15	–	–
Trichoptera			
Oecetis sp.	–	15	–
Total	2015	4667	5837

Phytoplankton taxa list and densities (#/mL) for the Villa Del Rio Wastewater Treatment Facility, collected via subsurface grabs in the Ortega River, on 14 November, 1994.

	Reference Site	Test Site 1	Test Site 2
Diatoms			
Bacillaria sp.	506	366	–
Biddulphia sp.	–	–	127
Cyclotella sp.	507	2016	1391
Cymatosira sp.	127	–	–
Diploneis sp.	–	168	–
Eunatogramma sp.	–	–	126
Gomphonema sp.	–	168	–
Gyrosigma sp.	–	336	–
Leptocylindrus sp.	–	–	253
Melosira sp.	–	1176	127
Navicula sp.	759	168	379
Nitzschia sp.	379	168	379
Nitzschia constricta	127	–	127
Nitzschia obtusa	127	–	–
Nitzschia obtusa v. *scalpelliformis*	–	–	127
Skeletonema sp.	127	–	–
Unidentified pennate diatom	–	168	127
Chlorophyta			
Chlorella sp.	–	336	–
Dunaliella sp.	253	1008	253
Scenedesmus sp.	–	–	127
Stichococcus sp.	127	–	–
Unknown chlorophyte flagellate	–	–	127
Unknown Chlorophyta	127	–	–
Chrysophyta			
Mallomonas sp.	–	168	–
Cryptophyta			
Chroomonas sp.	–	504	–
Cyanophyta			
Chroococcus sp.	–	–	127
Dactylococcopsis sp.	–	168	253
Merismopedia sp.	–	–	127
Oscillatoria sp.	759	–	127
Euglenophyta			
Euglena sp.	–	168	–
Eutreptia sp.	127	–	–
Total	4046	7057	4299

Fill Out This Section For All Surface Water Discharger Inspections (CEI, CSI, CBI, PAI, XSI - RI Optional)

1	2	3	11	12	17	18	19	20
Transaction Code		NPDES NUMBER		YR/MO/DA		Insp Type	Inspector	Fac Type
N	5	FL0030449		941114		B	S	1

Remarks

21 66

Fill Out This Section For All Surface Water Discharger Inspections (CEI, CSI, CBI, PAI, XSI - RI Optional)

1	2	3	11	12	17	18	19	20
Transaction Code		NPDES NUMBER		YR/MO/DA		Insp Type	Inspector	Fac Type
N	5	FL0030449		941114		X	S	1

Remarks

21 66