Florida
Department of Environmental Protection

Biological Assessment of

Lincoln Heights Subdivision
Sewage Treatment Plant

Seminole County

NPDES #FL0025917

Sampled May 1993

September 1993

Biology Section
Division of Technical Services

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: Lincoln Heights Subdivision STP
County: Seminole
NPDES Number: FL0025917
Federal Permit Expiration Date: 30 June 1994 (state = 1/5/96)

Toxics Sampling Inspection (XSI)

Date Sampled: 4 May 1993

Results: No organic pollutants were detected in the effluent at concentrations exceeding the practical quantitation limit. The following metals were measured in the discharge: aluminum (206 µg/L), copper (32 µg/L), iron (74 µg/L), and zinc (14 µg/L). At a $CaCO_3$ hardness of 121.5, the copper concentration is in violation of Class III standards, Rule 17-302.560(15) FAC.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 4 May 1993

Results: Effluent pH (10.1 SU's) was in violation of Class III standards, (Rule 17-302.560(32) FAC). In two sets of 48 hour bioassays, neither the unaltered nor the pH adjusted (to 8.1) effluent was acutely toxic to *Ceriodaphnia dubia* or *Notropis leedsi*.

Impact Bioassessment Inspection (IBI)

Date Sampled: 4 May 1993

Results: Benthic macroinvertebrate communities were of relatively poor quality throughout the study area in Smith Canal, but were somewhat more impaired below the discharge. Florida Index values were much lower than expected from an undisturbed Central Florida stream system in both dip net and artificial substrate samples. Although little change in taxa richness and diversity between the reference and test sites was noted in Hester-Dendy samples, a higher proportion of pollution tolerant taxa inhabited the downstream site. Phytoplankton populations were severely degraded below the outfall. Taxa richness suffered a 71% decrease, and the percent contribution of dominant taxon rose by 194%. An overwhelming majority (95%) of the phytoplankton community was made up of the green alga, *Scenedesmus* sp., a well-known indicator of eutrophic conditions and commonly found in sewage ponds. Chlorophyll *a* was extraordinarily elevated (108 µg/L) below the outfall. This 2416% increase in algal biomass below the outfall is further evidence the extremely degraded conditions in Smith Canal were caused by the discharge. The extremely negative alterations in the test site phytoplankton community are interpreted as a violations of Rule 17-302.560(29) FAC, nutrient induced imbalances in aquatic flora, and Rule 17-302.510(5)(q) FAC, dominance of nuisance species.

Water Quality Inspection (WQI)

Date Sampled: 4 May 1993

Results: At the upstream site, nutrients were slightly higher than the average for Florida stream systems. Below the point of discharge, ortho-phosphate and nitrate-nitrite were greater than 82% of other Florida streams, while total phosphorus exceeded 87%, and TKN was above 90%. These inputs to Smith Canal from the discharge contributed to violations in biological criteria. Reference site AGP was below the "problem threshold" of 5 mg dry wt/L, test site AGP was nearly eight times greater (39.4 mg dry wt/L). AGP of the effluent (23.4 mg dry wt/L) also indicated its contribution to enrichment problems.

Introduction

The Lincoln Heights subdivision is located 2 miles south of Lake Monroe and just west of Sanford in Seminole County, Florida (see maps in Appendix). This is a privately owned, 0.12 MGD extended aeration wastewater treatment facility. The aerated, disinfected effluent flows through three in-line polishing ponds. Following dechlorination, wastewater is discharged to Smith Canal, which ultimately flows into the St. Johns River.

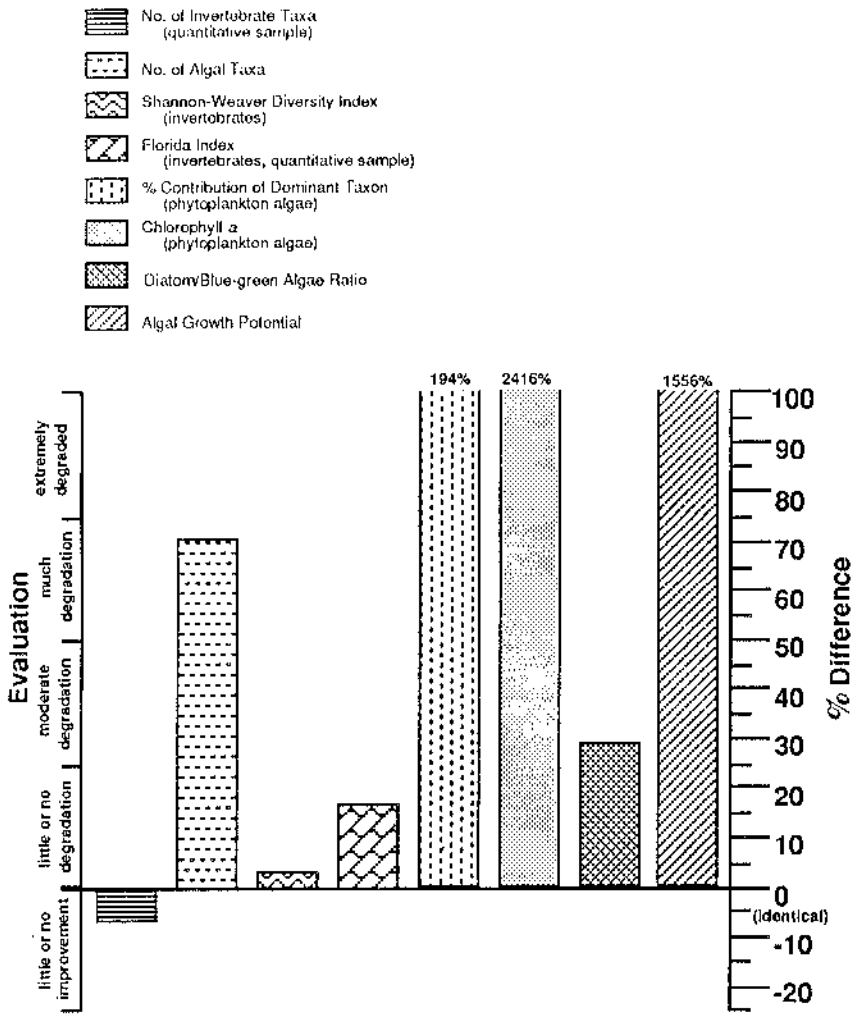
State and federal permit limits are as follows: BOD_5 and TSS (20 mg/L annual average), TKN (7.9 mg/L annual average), dissolved oxygen (≥ 6.0 mg/L), and total residual chlorine (≤ 0.01 mg/L). Since early 1992, violations of permit limits included five failures to meet the dissolved oxygen requirement, and on one occasion, the chlorine level was below the concentration needed for disinfection. In January, 1993, toxicity of the effluent was traced to applications of Diquat and copper sulfate to the polishing ponds for aquatic plant control. Overall, annual averages for TSS and fecal coliform have fallen, while those for BOD5 and TKN have increased, but the plant has remained in compliance (see facility summary in Appendix).

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	16	14
Florida Index	2	3
% Contribution of Dominant Taxon	21.9	70.3
% Oligochaeta	13.2	70.3
% Diptera	64.2	20.9
% Malacostraca	15.9	2.2
% Odonata	4.6	0
% Hirudinea	0	3.3
% Other	2.0	3.3
% Below Surface Deposit Feeders	13.3	71.1
% Above Surface Deposit Feeders	44.4	15.9
% Predator/Carnivores	14.7	3.7
% Shredders	19.9	2.6
% Scavengers	5.3	0.7
% Suspension Feeders	1.2	3.7
% Other	1.2	2.3
Macroinvertebrate Hester-Dendy		
Number of Taxa	29	31
Florida Index	6	5
Shannon-Weaver Diversity	3.27	3.15
% Diptera	73.8	91.6
% Malacostraca	12.2	4.5
% Oligochaeta	9.8	1.0
% Hirudinea	2.6	0.3
% Other	1.6	2.6
% Above Surface Deposit Feeders	47.3	65.7
% Shredders	17.8	14.9
% Predator/Carnivores	17.1	3.0
% Suspension Feeders	3.0	12.0
% Below Surface Deposit Feeders	10.0	1.0
% Scavengers	4.3	1.5
% Other	0.5	1.9
Phytoplankton Algae		
Number of Taxa	17	5
% Contribution of Dominant Taxon	32.1	94.4
Chlorophyll a (µg/L)	4.3	108.2
Diatom/Diatom + B-G Abundance Ratio	0.54	0.33
% Greens	39.3	98.0
% Diatoms	32.1	0.5
% Blue-greens	26.8	1.0
% Other	1.8	0.5
Algal Growth Potential (mg dry wt/l)	2.38	39.42



Effect of discharge on receiving stream
(measured as difference between control and test sites).

comparison of biological community health was made between a reference site (located in Smith Canal, 100 yards upstream of the outfall) and a test site (100 yards 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. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Notropis leedsi* as test organisms, were performed on an effluent sample (Weber 1991). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on effluent, reference, and test sites. Methods used for all chemical analyses are on file at the Tallahassee DEP Chemistry Laboratory.

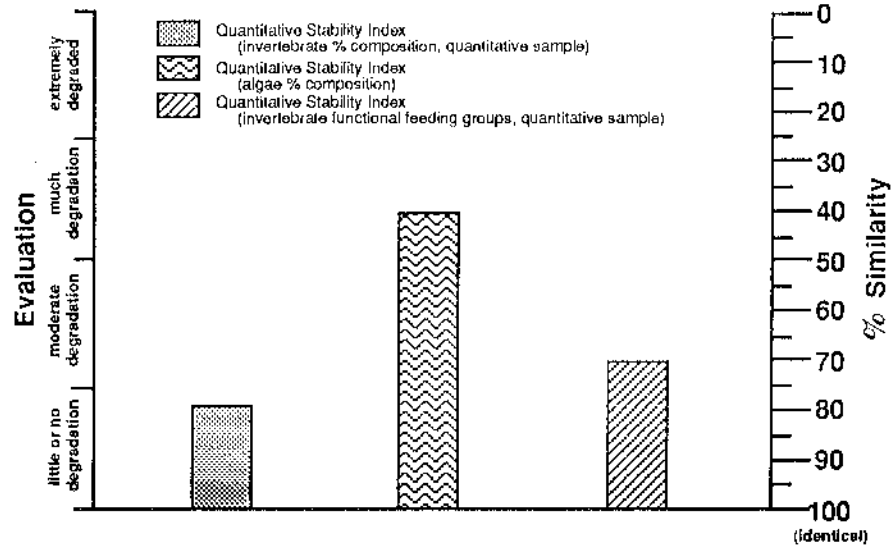
Benthic macroinvertebrate communities were evaluated at reference and test sites. Invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip net sweeps. Additional invertebrate collections were accomplished using Hester-Dendy multiplate samplers that were incubated for 28 days (Ross 1990). Phytoplankton was sampled at both reference and test sites via subsurface grabs. Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism, followed Miller *et al.* (1978).

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health have been employed in this report. Many of these, such as the number of taxa, Shannon-Weaver Diversity Index, and chlorophyll *a* are well known. Others are briefly explained here. 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 (*i.e.*, many clean-water organisms are present). Excessive numerical dominance of a single type of organism (a high % contribution of dominant taxon) is usually associated with disturbance. A decreased diatom to blue-green algae ratio (calculated by dividing the number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta + Cyanophyta) is often indicative of nutrient enriched conditions. The determination of the Quantitative Stability Index (for taxonomic % composition) is a two step process. First, the relative proportions of major taxonomic groups are calculated for each site. Then, the lesser of the two percentages for each discrete taxonomic group is totaled. A QSI (for % composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (for functional feeding groups).

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

The following personnel were involved in this investigation: Phil Kane and Steve Kent (DEP Central District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Kathleen Lurding, Kim Pearce, Urania Quintana, Landon Ross, and Greg Wynn (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 receiving stream
(measured as similarity between control and test sites).

Results and Discussion

Habitat quality in Smith Canal, the immediate receiving waters of the Lincoln Heights STP discharge, was relatively poor, with scores of 36 and 31 for reference and test sites, respectively. Smith Canal is a stagnant ditch (water velocity was very low) with aquatic macrophytes as the only in-stream habitat. The drainage basin consists predominately of residential (60%) and industrial (20%) land uses. Both sites had slightly alkaline water (pH = 7.3), but specific conductance was substantially higher below the discharge (373 µmho/cm) compared to the reference site (91 µmho/cm). Dissolved oxygen was 3.4 mg/L at the test site, a violation of Class III water quality standards (Rule 17-302.560 (21) FAC), but was 6.1 mg/L above the outfall (Appendix).

Of the organic pollutants tested for, only the herbicide atrazine (0.078 µg/L) was detected in the effluent, but this was below the practical quantitation limit. The following metals were measured in the discharge: aluminum (206 µg/L), copper (32 µg/L), iron (74 µg/L), and zinc (14 µg/L). At a $CaCO_3$ hardness of 121.5 (calculated from the calcium and magnesium values), the copper concentration is in violation of Class III standards, Rule 17-302.560(15) FAC.

Effluent pH at the beginning of the bioassay was 10.1 SU's. Because this pH is considered beyond the range tolerated by the test animals, a portion of the sample was adjusted to 8.05 SU's. Neither the unaltered nor the pH adjusted effluent was acutely toxic to *Ceriodaphnia dubia* or *Notropis leedsi* during the 48 hour bioassay (Appendix). Even though the final effluent was not toxic, the pH represents a violation of Class III water quality standards, Rule 17-302.560(32) FAC.

Nutrients were somewhat elevated in the effluent, including total phosphorus (0.56 mg/L), nitrate-nitrite (1.1 mg/L), and TKN (2.6 mg/L). The trip blank was contaminated with ammonia, and therefore, the determination of the relative contributions of ammonia from other sources is not possible. STORET data from 1617 Florida stream stations, for the period of 1980 to 1989, have been compiled into a percent distribution, found in the Appendix (Joe Hand, personal communication). Data from this present investigation were evaluated against this table. At the upstream site, nutrient concentrations were slightly higher than average (phosphorus-containing compounds and TKN were higher than 57 to 59% of typical Florida streams). Below the point of discharge, ortho-phosphate (0.35 mg/L) and nitrate-nitrite (0.39 mg/L) were greater than 82% of representative stream systems, total

phosphorus (0.63 mg/L) exceeded 87%, and TKN (2.0 mg/L) was above 90%.

Algal growth potential (AGP) corresponded with the high nutrient levels. A "problem threshold" of 5 mg dry wt/L is used to predict the detrimental consequences of nutrient enrichment, such as excessive macrophyte or algal growth, D.O. crashes, and fish kills (Raschke and Schultz 1987). While the reference site AGP was below this level (2.4 mg dry wt/L), the test site AGP increased by 1556%, to 39.4 mg dry wt/L. Algal growth potential of the effluent (23.4 mg dry wt/L) also indicated its contribution to eutrophication problems. It is postulated that the effluent AGP was less than the test site AGP due to the copper content of the effluent, which probably inhibited the test alga, *Selenastrum capricornutum*.

Benthic macroinvertebrate populations in Smith Canal collected with dip nets were generally of poor quality, with low taxa richness (lower than 82% to 86% of typical Florida streams), and very low Florida Index. Normally, an undisturbed stream in central Florida would be expected to yield a Florida Index score of 15, but the reference and test sites received only 2 and 3 points, respectively. Percent contribution of dominant taxon was 221% higher downstream of the discharge, due to the abundance of the pollution tolerant oligochaete, *Limnodrilus hoffmeisteri*. This elevation in percent contribution of dominant taxon is analogous to a reduction in diversity at the test site, probably related to the dissolved oxygen stress there.

Measures of macroinvertebrate community health calculated using Hester-Dendy samples indicated little difference between the reference and test sites. The figure on p. 2 indicates the degree of difference between the 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. The figure on p. 3 summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation, unless the test site is better than the reference site. The average abundance of each individual taxon appears in the Appendix.

Hester-Dendy taxa richness (29 and 31 at the reference and test site, respectively) and diversity (3.3 and 3.2 at the reference and test site, respectively) were not unusually depressed when compared to typical Florida streams. However, the majority of the taxa at both sites were organisms known to thrive in organically enriched conditions, *e.g., Glyptotendipes* sp., *Goeldichironomus holoprasinus*, and *Kiefferulus* sp. (Hudson *et al.* 1990). While these dipterans were present at both the reference and test sites, their abundance was notably higher at the test site. Florida Index values further demonstrate the lack of pollution sensitive taxa in Smith Canal, with scores of 6 and 5 at reference and test sites, respectively. It is interesting to note that taxa richness was higher in Hester-Dendy samples than in the dip net collections, which may be related to the introduction of suitable habitat via the artificial substrate samplers. Quantitative stability indices for percent composition and functional feeding groups indicate relatively slight differences associated with the outfall.

Phytoplankton populations were severely degraded below the outfall. Taxa richness decreased from 17 at the reference site to 5 at the test site, and the percent contribution of dominant taxon rose by 194% (see species list in Appendix). Approximately ninety-five percent of the phytoplankton community was made up of *Scenedesmus* sp., a green alga that is very common in sewage ponds and is a well-known indicator of eutrophy (Palmer 1977). Algal biomass as chlorophyll *a* corresponded with enormous increases in algal counts. The 108 µg/L measured at the test site (a 2416% increase over the reference site) is more than double the "greater than 95 percentile level" for typical Florida stream systems. This gross alteration in the phytoplankton community in Smith Canal is interpreted as a violation of nutrient induced imbalances in aquatic flora (Rule 17-302.560(29) FAC), and dominance of nuisance species (Rule 17-302.510(5)(q) FAC).

Conclusions

No organic pollutants were detected in the effluent at concentrations exceeding the practical quantitation limit. The following metals were found in the effluent: aluminum (206 µg/L), copper (32 µg/L), iron (74 µg/L), and zinc (14 µg/L). At a $CaCO_3$ hardness of 121.5, the copper concentration measured in the discharge was in violation of Class III standards, Rule 17-302.560(15) FAC.

Effluent pH at the beginning of the bioassay was 10.1 SU's, a violation of Class III standards (Rule 17-302.560(32) FAC). Because this pH is considered beyond the range tolerated by the test animals, a portion of the sample was adjusted to 8.05 SU's. Neither the unaltered nor the pH adjusted effluent was acutely toxic to

Ceriodaphnia dubia or *Notropis leedsi* during the 48 hour bioassay.

Nutrients were somewhat elevated in the effluent, including total phosphorus, nitrate-nitrite, and TKN. At the upstream site, nutrient concentrations were slightly higher than average Florida stream systems. Below the point of discharge, ortho-phosphate and nitrate-nitrite were greater than 82% of other Florida streams, while total phosphorus concentrations exceeded 87%, and TKN was above 90%. These nutrient inputs to Smith Canal contributed to violations in biological criteria, discussed below.

Algal growth potential (AGP) corresponded with the high nutrient levels. Reference site AGP (2.4 mg dry wt/L) was below the "problem threshold" of 5 mg dry wt/L level, while test site AGP increased by 1556%, to 39.4 mg dry wt/L. Algal growth potential of the effluent (23.4 mg dry wt/L) also indicated its contribution to enrichment problems. The effluent AGP was lower than the test site probably because of growth inhibition due to the copper present.

Benthic macroinvertebrate communities were of relatively poor quality throughout the study area in Smith Canal, but were somewhat more impaired below the discharge. Florida Index values were much lower than expected from an undisturbed Central Florida stream system in both dip net and artificial substrate samples. In dip net samples, the percent contribution of dominant taxon was substantially higher at the test site due to the large proportion of the sludge worm, *Limnodrilus hoffmeisteri*. Although little change in taxa richness and diversity between the reference and test sites was noted in Hester-Dendy samples, a higher proportion of pollution tolerant dipterans (*e.g., Glyptotendipes* sp., *Goeldichironomus holoprasinus*, and *Kiefferulus* sp.) inhabited the downstream site.

Phytoplankton populations were severely degraded below the outfall. Taxa richness suffered a 71% decrease, and the percent contribution of dominant taxon rose by 194%. An overwhelming majority (95%) of the phytoplankton community was made up of the green alga, *Scenedesmus* sp., a well-known indicator of eutrophic conditions and commonly found in sewage ponds. Chlorophyll *a* was extraordinarily elevated (108 µg/L) below the outfall, corresponding with increases in algal counts. This 2416% increase in algal biomass below the outfall is further evidence that the extremely degraded conditions in Smith Canal were caused by the discharge. The extremely negative alterations in the test site phytoplankton community are interpreted as a violations of Rule 17-302.560(29) FAC, nutrient induced imbalances in aquatic flora, and Rule 17-302.510(5)(q) FAC, dominance of nuisance species.

Literature Cited

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Miller, W. E., T. E. Maloney, and J. C. Greene. 1978. The *Selenastrum capricornutum* Printz algal assay bottle test. U. S. Environ. Prot. Agency, EPA-600/9-78-018. 126 p.

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Raschke, R. L. and D. A. Schultz. 1987. The use of the algal growth potential test for data assessment. J. Wat. Poll. Cont. Fed. 59(4): 222-227.

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Chemistry summary table for

Lincoln Heights STP	Effluent	Reference Site	Test Site
Organic Constituents (ug/L)			
Atrazine	0.078 T		
Metals (ug/L)			
Aluminum	206		
Antimony	15 U		
Arsenic	20 U		
Cadmium	0.22 T	Blank Contaminated	
Copper	32		
Chromium	10 U		
Iron	74		
Lead	15 U		
Mercury	0.1 U		
Nickel	5 U		
Selenium	30 U		
Silver	0.05 U		
Zinc	14		
Nutrients (mg/L)			
Ortho-phosphate	0.21	0.10	0.35
Total phosphorus	0.56	0.17	0.63
Ammonia (Blank Contaminated)	0.13	0.081	0.34
Nitrate+Nitrite	1.1	0.041 T	0.39
TKN	2.6	1.1	2.0
Other Parameters			
Habitat Assessment		36	31
D.O. (mg/L)		6.1	3.4
pH (SU's)	10.1	7.3	7.3
Conductivity (µmhos/cm)	425	91	373
Temperature (°C)		23.6	22.1
Hardness (mg CaCO3)	121.5		
Algal Growth Potential (mg dry wt/L)	23.4	2.4	39.4
Bioassay Fish-pH Unaltered	Not toxic		
Bioassay Invertebrate-pH Unaltered	Not toxic		
Bioassay Fish-pH Adjusted	Not toxic		
Bioassay Invertebrate-pH Adjusted	Not toxic		

T - Value reported is less than the practical quantitation limit

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

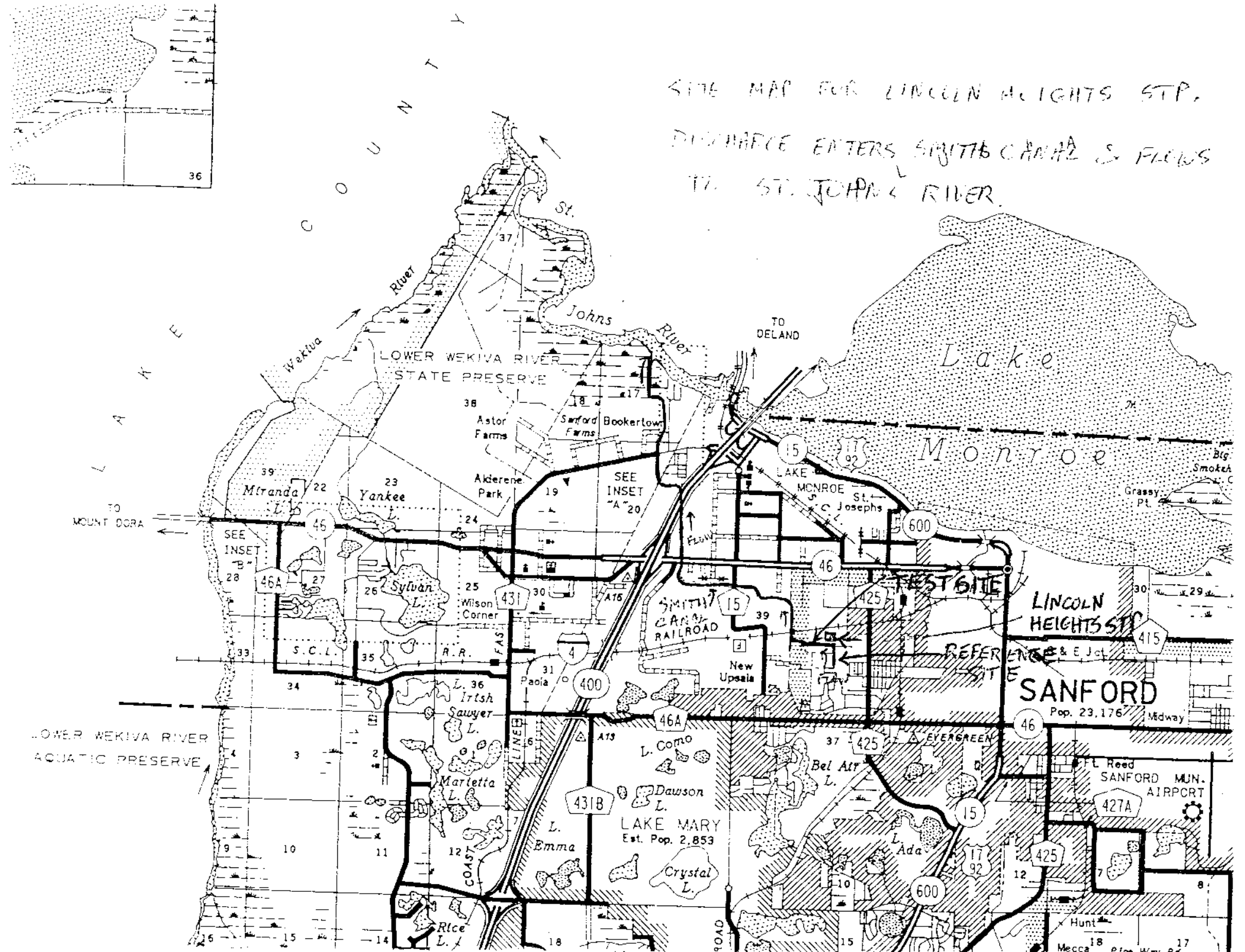
Typical Values for Selected Parameters in Florida Waters

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

Percentile Distribution

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
STREAMS (1617 stations)											
Phytoplankton Chlorophyll *a*	0.22	0.52	0.94	1.60	3.02	4.63	6.72	9.87	14.68	27.35	48.70
Periphyton Chlorophyll *a*	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85
H-D Diversity	0.84	2.12	2.48	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90
Qualitative Taxa Richness	9.00	12.00	17.00	20.00	22.00	24.50	26.00	28.00	31.00	37.00	53.00
H-D Taxa Richness	6.00	6.50	9.00	11.50	13.00	15.00	17.00	21.50	26.00	29.00	32.00
TKN	0.30	0.39	0.56	0.73	0.87	1.00	1.11	1.26	1.49	1.93	2.80
Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60
NO2-NO3	0.01	0.01	0.03	0.05	0.07	0.10	0.14	0.20	0.32	0.64	1.05
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	0.39	0.74	1.51
Ortho Phosphorus	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	0.27	0.59	1.37
Turbidity	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30
LAKES (477 stations)											
Phytoplankton Chlorophyll *a*	0.80	1.71	2.88	4.28	10.06	13.40	20.00	30.10	47.20	65.44	113.90
Dredge Diversity	0.71	0.97	1.43	1.74	1.98	2.12	2.21	2.59	2.85	3.15	3.17
Dredge Taxa Richness	3.00	5.00	6.50	7.00	9.00	10.00	11.00	13.00	15.00	17.00	21.00
TKN	0.36	0.49	0.67	0.83	1.08	1.26	1.40	1.51	1.68	2.11	3.46
NH3+NH4	0.01	0.02	0.02	0.03	0.04	0.06	0.08	0.12	0.15	0.21	0.28
NO2-NO3	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.05	0.10	0.14	0.23
Total Phosphorus	0.01	0.02	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.23	0.42
Ortho-Phosphorus	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.21	0.32
Turbidity	1.00	1.25	1.55	2.05	2.75	4.50	6.45	9.60	14.10	26.00	40.00
ESTUARIES (690 stations)											
Phytoplankton Chlorophyll *a*	2.14	3.28	4.49	5.13	6.00	6.93	7.94	9.60	12.40	17.60	22.20
Dredge Diversity	1.34	1.53	1.91	2.28	2.56	2.90	3.15	3.59	4.01	4.53	4.98
Dredge Taxa Richness	4.00	6.00	9.00	11.00	15.00	18.50	25.00	35.00	41.00	62.00	90.00
TKN	0.26	0.34	0.42	0.50	0.59	0.69	0.76	0.82	0.95	1.30	1.49
NH3+NH4	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.09	0.13	0.22	0.28
NO2-NO3	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.05	0.08	0.17	0.23
Total Phosphorus	0.01	0.02	0.06	0.07	0.10	0.11	0.14	0.17	0.23	0.43	0.59
Ortho-Phosphorus	0.01	0.02	0.03	0.04	0.04	0.05	0.07	0.09	0.12	0.21	0.44
Turbidity	3.50	4.00	4.50	5.05	5.40	5.60	6.30	6.80	8.00	11.40	11.75

Units:
Phytoplankton Chlorophyll *a* (ug/L), Periphyton Chlorophyll *a* (mg/m^2), Nutrients (mg/L), Turbidity (NTU), Taxa richness and diversity values are for macroinvertebrates


SITE MAP FOR LINCOLN HEIGHTS STP.
DISCHARGE ENTERS SMITH CANAL & FLOWS TO ST. JOHNS RIVER.
LAKE COUNTY
ORANGE COUNTY
LOWER WEKIVA RIVER STATE PRESERVE
LOWER WEKIVA RIVER AQUATIC PRESERVE
Wekiva River
St. Johns River
TO DELAND
TO MOUNT DORA
Lake Monroe
Astor Farms
Sanford Farms
Bookertown
Alderene Park
SEE INSET "A"
SEE INSET "B"
Miranda L.
Yankee L.
Sylvan L.
Wilson Corner
Paola
New Upsala
SMITH CANAL
RAILROAD
S.C.L. R.R.
FEAR
LINE
COAST
L. Irtsh
Sawyer L.
Marietta L.
L. Como
Dawson L.
LAKE MARY
Est. Pop. 2,853
L. Emma
Crystal L.
Rice L.
Bel Air L.
L. Ada
Grassy Pt.
Big Smoker
LAKE MONROE
St. Josephs
TEST SITE
REFERENCE SITE
LINCOLN HEIGHTS STP
SANFORD
Pop. 23,176
Midway
EVERGREEN
Ft. Reed
SANFORD MUN. AIRPORT
Hunt
Mecca
Pine Way
FLOW
SCL & E Jct.
15
46
46A
431
4
400
4318
425
427A
600
17 92
92
415

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: Lincoln Heights, S.T.P.		Date Summary Prepared: 4-1-93
Location (attach detailed map): Seminole County - South of Lake Monroe	County: Seminole	District: Central
Federal Permit # FL0025917 and expiration date: 6-30-94	State GMS # and 3059P01116 State expiration date: 0059-185633 1-5-96	Facility Type: Industrial Municipal Federal Agricultural (Other (list)) Private

Function of facility:
Domestic Wastewater Treatment Plant

Description of treatment process:
0.120 MGD Extended Aeration Wastewater Treatment Plant w/ mechanical aeration. The disinfected reclaimed water flows through 3 in-line polishing ponds and is dechlorinated w/ SO_2 prior to discharge into Smith Canal which leads to the St. Johns River.

Receiving waters: St. Johns River via Smith Canal	Classification: I II (III)

Design Flow: 0.120 MGD	Mean Flow: (3/92 - 2/93) 0.081 MGD	Flow during survey: As per 2/95: 0.076 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.):
N/A

List effluent limits (if necessary, attach relevant paperwork): State and Federal's

Parameter	Limit (units)
BOD5 & TSS	20.0 ppm Annual Avg.
TKN	7.9 ppm Annual Avg.
DO (Dissolved Oxygen)	6.0 ppm Minimum
TRC (Total Residual Chlorine)	0.01 ppm Maximum (after 8-1-91)
Total Residual Chlorine (Basic Disinfection/Dechlorination):	0.01 ppm Max.

Describe special permit conditions and permit modifications:
The current permit issued 1-14-91 required dechlorination by 8-1-91. An inspection on 8-22-91 confirmed installation and operation of the dechlorination equipment. (Permit No. DC59-193014)

Lincoln Heights STP
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s): Effluent is discharged into Smith Canal via a PVC pipe approximately 20' west of the last polishing pond.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year:
No plant upsets were reported or noted for the last 12 months. MOR violations: Dissolved Oxygen results reported were less than the permit requirement of 6.0 ppm on 4 occasions in July 1992 (2.8, 2.0, 4.0, 4.2). Chlorine residual results reported were less than the permit requirement of 0.5 ppm on 1 occasion in August 1992 (0.3) No other violations noted.
Also, the D.O. effluent requirement was not met on January 25, 1993 (4.4 mg/L).

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
Bioassay results are current and in compliance. THE STP HAS NO HISTORY OF TOXICITY PROBLEMS. HOWEVER, ON 01/05/93 A FAILED BIOASSAY AND SUBSEQUENT INVESTIGATION LED TO THE CAUSE OF TOXICITY BEING TREATMENT OF THE PONDS WITH DIQUAT AND COPPER SULPHATE BY A COMPANY CONTROLLING POND PLANT GROWTH.
There are no pending enforcement actions against this facility.

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set: Comparison of MOR data for 3/91 - 2/92 to 3/92 - 2/93 indicates little or no variation in annual averages for flow, pH or chlorine. Significant improvement was noted in TSS (reduced 32%) and fecal coliform (reduced 79%). The percentage of samples with no detectable fecal coliforms also increased as an annual average from 50% to 63%. Annual averages for BOD and TKN were within permit requirements, but increased by 62% and 133% respectively. Recent data indicates improvement and stabilization of the treatment process.

Additional information: N/A

Staff contributing to this review (signature):

Dr. Philip N. [illegible]	(Biologist)
Sue Graff	(Inspector)
Al Curtis	(Engineer)
	( )
	( )
	( )

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

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDER CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 05/04/93	RECEIVING BODY OF WATER: ST. JOHN'S RIVER

REMARKS:	LOCATION:	FIELD ID/NAME:
DOWNSTREAM	LINCOLN HEIGHTS STP HUGHEY AVE. SANFORD, FL.	LINCOLN STP

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 18	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity 12	Max. observed: >0.3 m/sec. but < 1 m/sec **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec **0-7 points**
Artificial Channel/ Flow Alteration 1	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability 6	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality 5	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments		TOTAL SCORE
0	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	31

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
05/04/93	Phil Kane	Philip N. Kane

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

SUBMITTING AGENCY CODE: 30 SUBMITTING AGENCY NAME: FDER CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 05/04/94	RECEIVING BODY OF WATER: ST JOHN'S RIVER

REMARKS:	LOCATION:	FIELD ID/NAME:
UPSTREAM	LINCOLN HEIGHTS STP HUGHEY AVE SANFORD, FL.	LINCOLN STP

Habitat Parameter score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 20	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity 1	Max. observed: >0.3 m/sec. but < 1 m/sec **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec **0-7 points**
Artificial Channel/ Flow Alteration 1	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability 8	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality 6	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments		TOTAL SCORE
0	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	36

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
05/04/93	Phil Kane	Philip N. Kane

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDER CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 05/04/93	TIME: 1110	RECEIVING BODY OF WATER: ST. JOHN'S RIVER

REMARKS:	LOCATION:	FIELD ID/NAME:
DOWNSTREAM	LINCOLN HEIGHTS STP, HUGHEY AVE. SANFORD, FL.	LINCOLN STP

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
10	10		60		20	

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

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

Point-Source Pollution (list location and describe): STP

Estimated System Width (range, m): 3.0	Estimated System Depth (range, m): 0.5	yes
High Water Mark (m above bed): 0.5	Velocity (range, m/s): 0.05m/s	Impounded ☐ Channelized ☑

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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Riffles			
Leaf Packs				Sand	~~20~~ PK	~~6~~ PK	
Aquatic Vegetation	60	12	NET	Mud/Muck/Silt	~~30-40~~	~~3~~	NET
Rock or Shell Rubble				Benthic leaf mats	PK		
Undercut Banks/Roots				Other:			

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
~~Top~~ PK			~~7.77~~ PK	~~7.34~~ PK	~~373~~ PK			0.25m/s
Mid-depth								
~~Bottom~~ TOP PK		22.1	7.31	3.37	373 Omicro S			

System Type : Stream: ☑ (Sand Bottomed, Sand Bot w/ Spring, Swamp & Bog, Calcareous, Alluvial, Misc.) 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: SUN / CLOUD

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

SAMPLING TEAM: KANE, KENT	SIGNATURE: Philip N Kane	DATE: 05/04/93

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDER CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 05/04/93	TIME: 1000	RECEIVING BODY OF WATER: ST. JOHN'S RIVER

REMARKS:	LOCATION: LINCOLN HEIGHTS STP, HUGHES AVE, SANFORD, FL.	FIELD ID/NAME: LINCOLN STP
UPSTREAM		

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
10	10		60		20	

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

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

Point-Source Pollution (list location and describe): STP

Estimated System Width (range, m): 2.0	Estimated System Depth (range, m): 0.25		yes
High Water Mark (m above bed): 0.5	Velocity (range, m/s): 0.05-A	Impounded ☐ / Channelized ☑	

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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	1%	35	NET	Riffles			
Leaf Packs	1%	35	NET	Sand	40%	5	NET
Aquatic Vegetation	50%	5	NET	Mud/Muck/Silt	8%	5	NET
Rock or Shell Rubble				Benthic leaf mats			
Undercut Banks/Roots				Other:			

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmhos/cm):			Secchi (m):
Top	.03	23.6	7.27	6.11	91.0			BOT.
Mid-depth								
Bottom								

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

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

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

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

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

Weather Conditions: SUN/CLOUD

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

SAMPLING TEAM:	SIGNATURE:	DATE:
KANE, KENT.	Philip N Kane	05/04/93

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Lincoln Heights - STP
Location:
County:
Contact/District:
NPDES Permit #: FL00 Outfall #:
93 MAY 05 19 54827

Sample Collection: Date 5/4/93 Time 0915
Test Beginning: Date 5/5/93 Time 1100
Test Ending: Date 5/7/93 Time 1200
Organism Batch #: 19 Diluent Batch #: 8
Organism Age: <24hrs
Test Organism: Ceriodaphnia dubia

Test Type: Screening | Definitive
Static | Static Renewal | Flow-through
Test Number: 1 of 24 KP 4/1/93
Remarks: sample unaltered

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.4 @ 23.5	8.4 @ 23.5	980 @ 1,000 9880 @ 10,000 @ 23.8
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.7 @ 23.8	8.4 @ 24.0	980 @ 1,000 9900 @ 10,000 @ 23.9
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.3 @ 24.4	8.3 @ 24.2	990 @ 1,000 9950 @ 10,000 @ 24.3

Conc.	Chamber #	Number Live			pH			Temperature (°C)			D.O. (mg/L)			Cond. (mmhos/cm) Cond. (µmhos/cm)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	A	5	5	5	8.0		8.1	23.9		23.7	7.9		8.4	155		165
Control	B	5	5	5			8.1						8.3			170
Control	C	5	5	5			8.1						8.3			170
Control	D	5	5	5			8.1						8.4			170
100%	A	5	5	5	10.1		9.1	24.5		23.9	9.7		9.9	425		420
100%	B	5	5	5			9.1						9.9			435
100%	C	5	5	5			9.1						10.2			440
100%	D	5	5	5			9.1						10.5			440
Measured/Loaded by:		TR	TR	TR	TM	T	TM	TM		TM	TM		TM	TM		TM
Recorded by:		TR	TR	TR	TR		TR	TR		TR	TR		TR	TR		TR

Investigators' Signatures

Tina Mikulski
Tobin C Rader
Kim Pearce

Reviewer

form updated 10/20/92

	Salt Water/ Well Water	Water Quality Parameters 20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:					
Lab Total Residual Cl2:	<0.03	<0.03	.04	DR400	TM
Alkalinity:	125	70	130	Hach	TR
Hardness:	125	80	110	Hach	TR
Total Ammonia:	<0.017	<0.017	<0.017	Orion	TM

Cl_2 Blank: _____ Ammonia Meter Slope: -55.2 Ammonia Blank: <0.017 Sample Salinity: _____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Lincoln Heights - STP
Location:
County:
Contact/District:
NPDES Permit #: FL00 Outfall #:
93 MAY 05 19 54827

Sample Collection: Date 5/4/93 Time 0915
Test Beginning: Date 5/5/93 Time 1100
Test Ending: Date 5/7/93 Time 1100
Organism Batch #: 19 Diluent Batch #: well
Organism Age: 10 days old
Test Organism: Notropis lerdsi

Test Type: Screening | Definitive
Static | Static Renewal | Flow-through
Test Number: 2 of 24 KP 4/1/93
Remarks: sample unaltered

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.4 @ 23.5	8.4 @ 23.5	980 @ 1,000 9880 @ 10,000 @ 23.8
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.7 @ 23.8	8.4 @ 24.0	980 @ 1,000 9900 @ 10,000 @ 23.9
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.3 @ 24.4	8.3 @ 24.2	990 @ 1,000 9950 @ 10,000 @ 24.3

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temperature (°C) 0	24	48	D.O. (mg/L) 0	24	48	Cond. (mmhos/cm) Cond. (µmhos/cm) 0	24	48
Control A	15	5	5	5	8.0	8.2	8.3	23.6	23.5	23.7	8.0	7.9	8.5	245	250	255
Control B	3	5	5	5	8.0	8.2	8.3				8.0	7.9	8.4	240	250	250
100% A	41	5	5	5	~~8.0~~	9.4	9.0	24.8	23.5	23.7	10.1	7.5	7.9	460	450	460
100% B	1103	5	5	5	10.1	9.4	9.0				10.1	7.5	7.9	460	450	460
					10.1 TR	recorded wrong										
Measured/Loaded by:		TM	TM	TR	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM
Recorded by:		TR	TM	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR

Investigators' Signatures
Tina Mikulski
Tobin G. Rader
Kim Pearce

Reviewer

form updated 10/20/92

	Salt Water/ Well Water	Water Quality Parameters 20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:					
Lab Total Residual Cl2:	<0.03	<0.03	0.04	DR-100	TM
Alkalinity:	125	70	130	Hach	TR
Hardness:	125	80	110	Hach	TR
Total Ammonia:	<0.017	<0.017	<0.017	Orion	TR

Cl_2 Blank: _____ Ammonia Meter Slope: -55.2 Ammonia Blank: <0.017 Sample Salinity: _____ ppt

Sample Source: Lincoln Heights STP
Location:
County:
Contact/District:
NPDES Permit #: FL00 Outfall #:

Sample Collection: Date 5/4/93 Time 0915
Test Beginning: Date 5/5/93 Time 1130
Test Ending: Date 5/7/93 Time 1130
Organism Batch #: 20 Diluent Batch #: 8
Organism Age: Ceriodaphnia Dubia
Test Organism: TR < 24 hrs

Test Type: (Screening) Definitive
(Static) Static Renewal | Flow-through
Test Number: ~~1~~ 3 of ~~2~~ 4 KP 6/1/93
Remarks: adjusted to pH 8.05

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.4 @ 23.5	8.4 @ 23.5	980 @ 1,000 @23.8 9880 @ 10,000
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.7 @ 23.8	8.4 @ 24.0	980 @ 1,000 9900 @ 10,000
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.3 @ 24.4	8.3 @ 24.2	990 @ 1,000 @24.3 9950 @ 10,000

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temperature (°C) 0	24	48	D.O. (mg/L) 0	24	48	Cond. (mmhos/cm) / Cond. (µmhos/cm) 0	24	48
Control	A	5	5	5	8.0		8.1	23.9		23.7	7.9		8.4	155		165
Control	B	5	5	5			8.1						8.3			170
Control	C	5	5	5			8.1						8.3			170
Control	D	5	5	5			8.1						8.4			170
100%	A	5	5	5	8.0		9.2	24.6		24.0	8.1		10.0	475		455
100%	B	5	5	5			9.2						10.0			470
100%	C	5	5	5			9.2						10.1			460
100%	D	5	5	5			9.2						10.2			480
Measured/Loaded by:		TR	TR	TR	TM		TM	TM		TM	TM		TM	TM		TM
Recorded by:		TR	TR	TR	TR		TR	TR		TR	TR		TR	TR		TR

Investigators' Signatures
Robin A. Rader
Tina Mikulski
Kim Pearce

Reviewer

form updated 10/20/92

Water Quality Parameters	Salt Water/ Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:					
Lab Total Residual Cl2:					
Alkalinity:	125	70	75	Hach	TR
Hardness:	125	80	110	Hach	TR
Total Ammonia:					

Cl_2 Blank: _____ Ammonia Meter Slope: _____ Ammonia Blank: _____ Sample Salinity: _____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Lincoln Heights STP
Location:
County:
Contact/District:
NPDES Permit #: FL00 Outfall #:

Sample Collection: Date 5/4/93 Time 0915
Test Beginning: Date 5/5/93 Time 1130
Test Ending: Date 5/7/93 Time 1130
Organism Batch #: 19 Diluent Batch #: well
Organism Age: 10 days
Test Organism: Notropis leedsi

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

Test Number: ~~24 61 X~~ 4 MP 4/1/93
Remarks: adjusted to pH 8.05

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.4 @ 23.5	8.4 @ 23.5	980 @ 1,000 9880 @ 10,000 @ 23.8
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.7 @ 23.8	8.4 @ 24.0	980 @ 1,000 9900 @ 10,000 @ 23.9
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.3 @ 24.4	8.3 @ 24.2	990 @ 1,000 9950 @ 10,000 @ 24.3

Conc.	Chamber #	Number Live			pH			Temperature (°C)			D.O. (mg/L)			Cond. (mmhos/cm) Cond. (µmhos/cm)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control A	16	5	5	5	8.0	8.2	8.3	23.6	23.5	23.7	8.0	7.9	8.5	245	250	255
Control B	4	5	5	5	8.0	8.2	8.3				8.0	7.9	8.4	240	250	250
100% A	263	5	5	5	8.1	7.9	7.9	24.6	23.5	23.8	8.5	7.4	8.1	495	495	500
100% B	147	5	5	5	8.1	7.9	7.9				8.3	7.4	8.0	500	490	495
Measured/Loaded by:		TM	TM	TR	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM
Recorded by:		TR	TM	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR

Investigators' Signatures
Robin C. Rader
Tracy Mikulski
Kim Pearce

Reviewer

	Salt Water/ Well Water	Water Quality Parameters: 20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:					
Lab Total Residual Cl2:					
Alkalinity:	125	70	75	Hach	TR
Hardness:	125	80	110	Hach	TR
Total Ammonia:					

Cl2 Blank: Ammonia Meter Slope: Ammonia Blank: Sample Salinity: ppt

Benthic macroinvertebrate taxa list for the Lincoln Heights Subdivision STP, collected via 20 discrete dip net sweeps in Smith Canal, on 5 May, 1993.

	Reference Site	Test Site
Coleoptera		
Peltodytes sp.	56	–
Diptera		
Chironomus sp.	812	56
Clinotanypus sp.	–	28
Cryptochironomus sp.	224	28
Endochironomus nigricans	28	28
Goeldichironomus holoprasinus	924	280
Kiefferulus sp.	84	56
Paratanytarsus sp. A Epler	84	–
Polypedilum illinoense	476	28
P. tritum	56	–
Undetermined dipteran pupa	28	28
Gastropoda		
Physella sp.	28	–
Hirudinea		
Batracobdella phalera	–	28
Helobdella stagnalis	–	28
H. triserialis	–	28
Malacostraca		
Amphipoda		
Hyalella azteca	672	56
Odonata		
Ischnura hastata	196	–
Oligochaeta		
Dero trifida	140	–
Limnodrilus hoffmeisteri	392	1792
Tubifex tubifex	28	–
Pelecypoda		
Sphaerium or *Musculium* sp.	–	84
Total	4228	2548

Benthic macroinvertebrate taxa list for the Lincoln Heights Subdivision STP, collected via Hester-Dendy artificial substrates in Smith Canal, on 4 May, 1993. Densities, in number/m^2, represent the mean of three replicates.

	Reference Site	Test Site
Acarina		
Limnesia sp.	–	1.0
Diptera		
Ablabesmyia mallochi	6.1	3.0
Asheum beckae	2.0	–
Chironomus sp.	5.1	61.6
Cricotopus bicinctus	1.0	–
Cryptochironomus sp.	7.1	3.0
Dicrotendipes modestus	1.0	–
D. neomodestus	1.0	–
D. simpsoni	3.0	35.4
Endochironomus nigricans	–	22.2
Glyptotendipes sp.	2.0	295.0
Goeldichironomus fluctuans	–	19.2
G. holoprasinus	15.2	212.1
G. natans ?	–	8.1
Guttipelopia guttipennis	–	3.0
Kiefferulus sp.	91.9	387.9
Parachironomus directus	–	5.1
Paratanytarsus sp. A Epler	18.2	41.4
Polypedilum illinoense	134.3	48.5
P. tritum	26.3	29.3
Procladius sp.	1.0	–
Tanytarsus sp. A Epler	1.0	–
Undetermined dipteran pupa	3.0	20.2
Ephemeroptera		
Caenis sp.	–	4.0
C. diminuta	–	2.0
Callibaetis floridanus	–	1.0
Gastropoda		
Hebetancyclus excentricus	–	22.2
Hirudinea		
Batracobdella phalera	1.0	3.0
Helobdella stagnalis	–	1.0
H. triserialis	1.0	–
Undetermined hirudinean	9.1	–
Malacostraca		
Amphipoda		
Hyalella azteca	51.5	58.6
Decapoda		
Procambarus fallax	1.0	–

Odonata		
Enallagma cardenium	–	1.0
Ischnura sp.	4.0	1.0
I. posita	1.0	–
Pachydiplax longipennis	2.0	–
Dero digitata	–	3.0
D. trifida	7.1	9.1
Ilyodrilus templetoni	4.0	–
Limnodrilus hoffmeisteri	28.3	1.0
Slavina appendiculata	3.0	–
Platyhelminthes		
Dugesia sp.	–	1.0
Trichoptera		
Oecetis sp.	–	1.0
Total	432.2	1304.9

Phytoplankton taxa list and densities (#/mL) for Lincoln Heights STP, collected via subsurface grabs in Smith Canal, on 4 May, 1993.

	Reference Site	Test Site
Diatoms		
Achnanthes sp.	76	–
A. exigua	255	–
Capartogramma crucicula	25	–
Cocconeis sp.	25	–
Navicula sp.	76	–
N. capitata	178	–
Nitzschia sp.	280	215
Chlorophyta		
Golenkinia sp.	–	1504
Oocystis sp.	25	–
Scenedesmus sp.	917	40,600
Tetraedron sp.	51	–
Unknown chlorophyte flagellate	127	–
Cryptophyta		
Cryptomonas sp.	–	215
Cyanophyta		
Anabaena sp.	25	–
Chroococcus sp.	509	–
Dactylococcopsis sp.	178	430
Merismopedia sp.	51	–
Euglenophyta		
Phacus sp.	25	–
Trachelomonas sp.	25	–
Total	2848	42,964

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

1 Transaction Code	2	3 NPDES NUMBER	11	12 YR/MO/DA	17	18 Insp Type	19 Inspector	20 Fac Type
N	5	FL0025917		930504		B	S	2

Remarks

21 66

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

1 Transaction Code	2	3 NPDES NUMBER	11	12 YR/MO/DA	17	18 Insp Type	19 Inspector	20 Fac Type
N	5	FL0025917		930504		X	S	2

Remarks

21 66