Florida
Department of Environmental Protection

Biological Assessment of

City of Naples Wastewater Treatment Plant

Collier County

NPDES #FL0026271

Sampled February 1993

September 1993

Biology Section
Division of Technical Services

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: Naples Wastewater Treatment Plant
County: Collier
NPDES Number: FL0026271
State Permit Expiration Date: 18 November 1993

Toxics Sampling Inspection (XSI)

Date Sampled: 8 February 1993

Results: No organic pollutants were detected in amounts exceeding the practical quantitation limit (PQL). The following metals were detected in the effluent: aluminum (85 µg/L), iron (48 µg/L), and zinc (18 µg/L). Silver was found at a concentration below the PQL (0.17 µg/L). For regulatory purposes, the silver concentration is set at the method detection limit of 0.05 µg/L, which, in this case, is equal to the Class III standard for marine waters.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 8 February 1993

Results: Not acutely toxic to the water flea, *Ceriodaphnia dubia*, or to the bannerfin shiner, *Notropis leedsi*. No mortality occurred during the 48 hour bioassay.

Impact Bioassessment Inspection (IBI)

Date Sampled: 8 February 1993

Results: The benthic macroinvertebrate communities were representative of a normal Florida estuary, dominated by polychaetes and epibenthic crustaceans. No degradation that could be attributed to the plant discharge was apparent. Taxa richness was relatively good, and was somewhat better at the test sites than at the reference station. Shannon-Weaver diversities were fairly average, and only very slightly decreased in the area of the outfall. Many taxa considered sensitive to contaminant stress were represented at the test sites, further suggesting the lack of anthropogenic effects. Phytoplankton populations were relatively sparse at all stations, although density was higher at the test sites. Taxa richness was similar and uniformly low at all sites, but the percent contribution of dominant taxon was higher at the test sites compared to the reference. Differences in species composition may have been related to the variations in salinity regimes between sites, or possibly, due to the bioavailable nutrient inputs from the WWTP.

Water Quality Inspection (WQI)

Date Sampled: 8 February 1993

Results: Ortho-phosphate (0.77 mg/L) and NO_2NO_3 (9.7 mg/L) were high in the effluent. It is likely that the discharge contributed to test site concentrations of nitrate-nitrite and ortho-phosphate which were higher than 95% and 77% of all other Florida estuaries, respectively. All other nutrient compounds in receiving waters were either undetected or at concentrations that do not usually indicate problems. The effluent AGP was extraordinarily high. Consequently, both test sites had AGP's above the marine "problem threshold" of 10 mg dry wt/L. This is evidence that problems associated with nutrient enrichment, such as algae blooms or low dissolved oxygen, may occur in the Gordon River or Naples Bay.

Introduction

The City of Naples Wastewater Treatment Plant is located near the Naples Airport in Collier County, Florida (see maps in Appendix). This 8.5 MGD design capacity facility treats domestic wastes using an activated sludge process (see facility summary in Appendix for details). Sludge is subsequently transported to Hendry County for land application. Treated effluent is chlorinated for disinfection, and then dechlorinated prior to surface water discharge. A significant portion of the effluent is used to irrigate surrounding golf courses, depending on weather conditions. Treated wastewater that cannot be reused enters a polishing pond, and the overflow is routed to the Gordon River (outfall #002), which flows into the Bay of Naples. In 1992, the proportion of effluent used for irrigation averaged 52%. The remaining 48% of the wastewater was discharged into the Gordon River.

Federal permit limits for surface water discharge are as follows: BOD_5 and TSS (10 mg/L monthly average, 15 mg/L weekly average), total phosphorus (1.0 mg/L monthly average, 1.5 mg/L weekly average), TKN (5.0 mg/L monthly average, 7.5 mg/L weekly average), dissolved oxygen (≥ 5.0 mg/L), pH (6.5 to 8.5 SU's), and a maximum residual chlorine of 0.01 mg/L.

During the year 1992, only a few permit violations occurred. Residual chlorine limits were not met in January, due to an equipment problem, and the average for total phosphorus was exceeded (1.59 mg/L) during the week of November 15-21.

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 in the Gordon River, approximately 1 mile upstream of the discharge) 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 *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

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	21	30	33
Shannon-Weaver Diversity	3.25	3.07	2.78
% Polychaeta	75.2	64.0	71.1
% Malacostraca	22.4	33.7	24.4
% Pelecypoda	1.4	2.1	2.1
% Other	1.0	0.2	2.4
% Above Surface Deposit Feeders	47.7	55.9	69.5
% Below Surface Deposit Feeders	38.6	33.4	19.5
% Suspension Feeders	7.5	5.2	8.3
% Scavengers	2.5	2.6	0.2
% Predator/Carnivores	2.4	2.0	0.8
% Other	1.3	0.9	1.7
Phytoplankton Algae			
Number of Taxa	11	13	11
% Contribution of Dominant Taxon	23.8	51.9	38.2
Chlorophyll a (µg/L)	below PQL	below PQL	7.34
Diatom/Blue-green Abundance Ratio	1.0	1.0	0.91
% Diatoms	54.8	66.3	36.0
% Green	7.1	18.3	41.6
% Chrysophytes	33.3	1.0	0
% Dinoflagellates	4.8	12.5	18.0
Blue-greens	0	0	3.4
% Cryptophytes	0	1.9	1.1
Algal Growth Potential (mg dry wt/l)	7.1	48.3	19.6

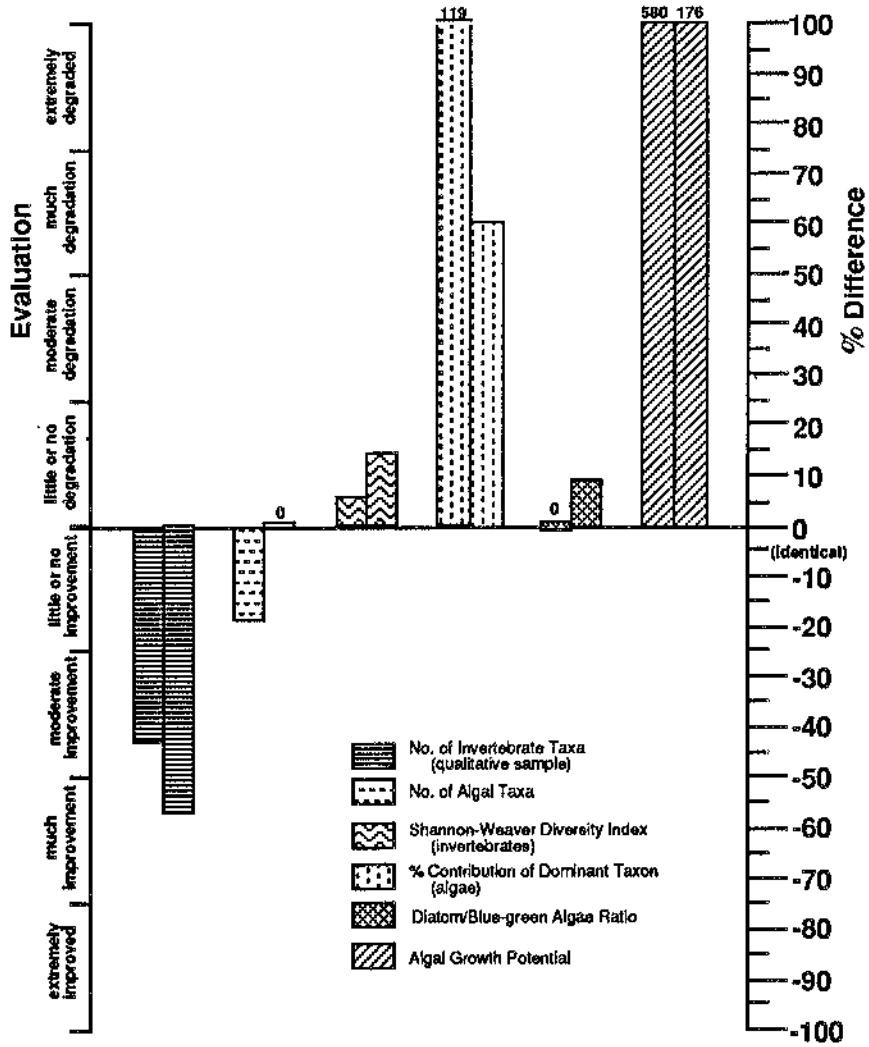
and test sites. Collection methods consisted of three Ponar dredges per station. Phytoplankton was collected via subsurface grabs (Ross 1990). Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). Algal Growth Potential tests, using *Selenastrum capricornutum* for the freshwater effluent and *Dunaliella tertiolecta* as the test organism for the estuarine receiving water stations, followed Miller *et al.* (1978) and EPA (1974).

Explanation of Measurements of Community Health

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

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, the diversity index, and the diatom to blue-green algae ratio are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving the percent contribution of dominant taxon, 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: Roxanne Gause and Ford Walton (DEP South District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Roberto Llansó, Kathleen Lurding, Elizabeth Miller, 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.

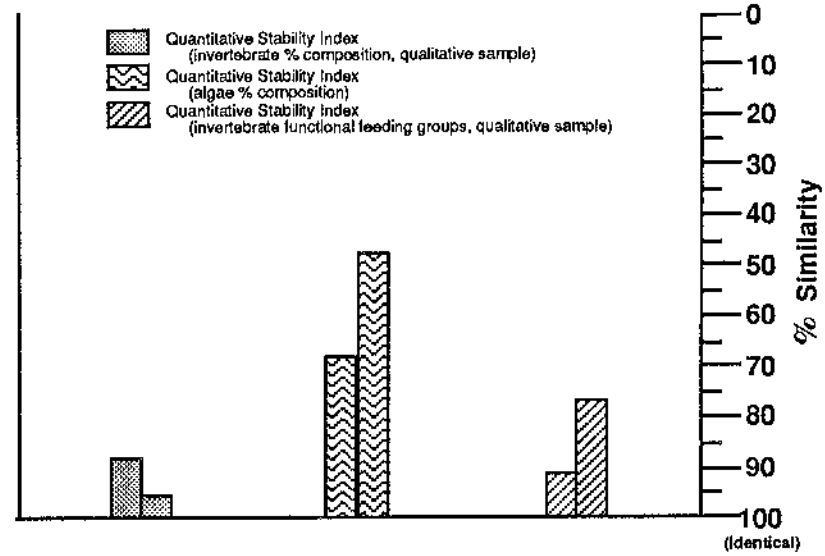


Effect of discharge on receiving water
(measured as difference between control and test sites).
(Left bar represents comparison between control site and test site 1; right bar represents comparison between control site and test site 2.)

Results and Discussion

The area surrounding the reference site was somewhat less developed than that of the test sites, as demonstrated by the higher score for community types present and the relative proportions of predominant land uses. Substrate at the reference site and test site 1 consisted primarily of sand, while a large proportion of mud was present at test site 2. The three stations were similar in terms of shoreline characteristics, input from manmade drainage canals, and wave action. All sites were near neutral in pH (range 6.9 to 7.4 SU's) and amply oxygenated (6.9 to 7.1 mg/L). Specific conductance was quite variable at the study areas: a distinct layer of fresh water covered the more saline bottom layers at the reference site (see physical/chemical characterization sheet in Appendix). Bottom conductivity ranged from 34,900 µmhos/cm (approximately 25 ppt salinity) at the reference site to 44,500 µmhos/cm (approximately 32 ppt) at test site 2.

No organic priority pollutants were detected in amounts exceeding the practical quantitation limit (PQL), although the herbicide atrazine was found at 0.16 µg/L, which is below the PQL. The following metals were detected in the effluent: aluminum (85 µg/L), iron (48 µg/L), and zinc (18 µg/L). Other metals present at levels below the PQL were cadmium (0.18 µg/L) and silver (0.17 µg/L). This concentration of silver may be cause for concern, as the Class III standard for marine waters is 0.05 µg/L. Since the method detection limit for silver is also 0.05 µg/L, it is assumed that the true concentration is at least equal to the standard.



Effect of discharge on receiving water
(measured as similarity between control and test sites).
(Left bar represents comparison between control site and test site 1; right bar represents comparison between control site and test site 2.)

The effluent sample was not acutely toxic to the water flea, *Ceriodaphnia dubia*, or to the bannerfin shiner, *Notropis leedsi*. No mortality occurred during the 48 hour bioassays (Appendix).

Nutrients were elevated in the effluent, particularly the bioavailable forms such as ortho-phosphate (0.77 mg/L) and nitrate-nitrite (9.7 mg/L). It is likely that the discharge contributed to nitrate-nitrite concentrations at the test sites (1.4 and 0.48 mg/L at test sites 1 and 2, respectively) which were higher than 95% of all other Florida estuary systems (see Table of Typical Water Quality Values in Appendix). Nitrate-nitrite was also higher than expected at the reference site (0.078 mg/L), exceeding concentrations found in 79% of other Florida estuaries. The discharge also appeared to influence the ortho-phosphate concentrations at test site 1, which was in the 77th percentile, at 0.13 mg/L. All other nutrient compounds in receiving waters were either undetected or at concentrations that do not usually indicate problems (see Chemistry Summary Table).

Algal growth potential results (AGP) corresponded to nutrient concentrations. Although AGP samples were held past the normal holding time, results are still useful to indicate trends. The effluent AGP was an extraordinary 128.7 mg dry wt/L, a direct result of the high levels of bioavailable nitrogen and phosphorus present in it. Both test sites (48.3 mg dry wt/L and 19.6 mg dry wt/L at test sites 1 and 2, respectively) had AGP's above the marine "problem threshold" of 10 mg dry wt/L (Dr. Ron Raschke, USEPA, personal communication). This is evidence that problems associated with nutrient enrichment, such as algae blooms or low dissolved oxygen, may occur in the Gordon River or Naples Bay. The reference site yielded an AGP of 7.1 mg dry wt/L, which is below the "problem threshold". The high AGP measurements at the test sites coincided with the elevated concentra-

tions of ortho-phosphate (test site 1) and nitrate-nitrite (both test sites).

Measures of benthic macroinvertebrate community health indicated no negative effects associated with the discharge. 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 sites are better than the reference site. The average abundance of each individual taxon appears in the Appendix.

Taxa richness was better at the test sites than it was at the reference site. The number of taxa found near the WWTP outfall was greater than 65% (test site 1) and 68% (test site 2) of other Florida estuarine systems. Shannon-Weaver diversity was fairly typical of most Florida estuaries, ranging from 3.3 at the reference site to 2.8 at test site 2. The 15% decrease in diversity at test site 2 (relative to the reference site) was related to the dominance of the polychaete, *Streblospio benedicti*, which was present in fairly high numbers at the reference site as well.

All three stations were similar with respect to the numbers of pollution sensitive epi-benthic crustaceans present, ranging from 22% (at the reference site) to 34% (at test site 1) of the total community. Taxa considered sensitive to contaminant stress, such as *Ampelisca* sp., *Cerapus* sp., *Corophium* sp., *Mysidopsis almyra*, Cirratulidae spp., *Schistomeringos rudolphi*, and *Sabella microphthalma*, were represented at one or both test sites (Chang *et al.* 1992, Dr. Doug Farrell, FDEP, pers. com.), further suggesting the lack of anthropogenic effects. The relatively minor differences in macroinvertebrate assemblages observed between the reference and test sites shown by the Quantitative Stability Indices (88%-96% similarity) were probably related to observed variations in substrate or salinity regime.

Phytoplankton populations were relatively sparse at all stations, although density was at least doubled at each test site compared to the reference (see taxa list in Appendix). Species richness was similar and uniformly low at all sites. The percent contribution of dominant taxon was higher at the test sites compared to the reference, usually indicative of degradation. Some notable differences in species composition were apparent. At both study sites, the diatom, *Skeletonema costatum*, the dinoflagellate, *Prorocentrum minimum*, along with small chlorophyte flagellates, made up the majority of algae collected. These taxa or groups were either not found or were poorly represented at the reference site. The Quantitative stability index for phytoplankton percent composition further illustrates these differences among stations. Chlorophyll *a* was below the practical quantitation limit at the reference site and at test site 1 (see typical values in Appendix). The 7.3 µg/L of chlorophyll *a* measured at test site 2 was average for an estuary system.

Conclusions

The effluent sample was not acutely toxic to the water flea, *Ceriodaphnia dubia*, or to the bannerfin shiner, *Notropis leedsi*. No mortality occurred during the 48 hour bioassay.

No organic pollutants were detected in amounts exceeding the practical quantitation limit. The following metals were detected in the effluent: aluminum (85 µg/L), iron (48 µg/L), and zinc (18 µg/L). Silver was found at a concentration of 0.17 µg/L, which is below the practical quantitation limit. For regulatory purposes, the concentration of silver is set at the method detection limit (0.05 µg/L), which, in this case, is equal to the Class III standard for marine waters.

Nutrients were high in the effluent, particularly the bioavailable forms such as ortho-phosphate (0.77 mg/L) and nitrate-nitrite (9.7 mg/L). It is likely that the discharge contributed to nitrate-nitrite concentrations at the test sites which were higher than 95% of all other Florida estuary systems. Nitrate-nitrite was also higher than expected at the reference site. The discharge also appeared to influence the ortho-phosphate concentrations at test site 1, which was in the 77th percentile. All other nutrient compounds in receiving waters were either undetected or at concentrations that do not usually indicate problems.

The effluent AGP was extraordinarily high. Consequently, both test sites (48.3 mg dry wt/L and 19.6 mg dry wt/L at test sites 1 and 2, respectively) had AGP's above the marine "problem threshold" of 10 mg dry wt/L. This is evidence that problems associated with nutrient enrichment, such as algae blooms or low dissolved oxygen, may occur in the Gordon River or Naples Bay. The reference site yielded an AGP of 7.1 mg dry wt/L, which is below the "problem threshold". The high AGP measurements at the test sites coincided with the

elevated concentrations of orthophosphate (test site 1) and nitrate-nitrite (both test sites).

The benthic macroinvertebrate communities were representative of a normal Florida estuary, dominated by polychaetes and epi-benthic crustaceans. No degradation that could be attributed to the plant discharge was apparent. Taxa richness was relatively good, and was somewhat better at the test sites than at the reference station. Shannon-Weaver diversities were fairly average, and only very slightly decreased in the area of the outfall. Many taxa considered sensitive to contaminant stress were represented at the test sites, further suggesting the lack of anthropogenic effects.

Phytoplankton populations were relatively sparse at all stations, although density was higher at the test sites. Chlorophyll *a* concentrations were normal at test site 2, and very low at the reference site and at test site 1. Species richness was similar and uniformly low at all sites, but the percent composition of dominant taxon was considerably higher at the test sites. Differences in species composition may have been related to the variations in salinity regimes between sites, or possibly, due to the bioavailable nutrient inputs from the WWTP.

Literature Cited

Chang, S., F.W. Steimle, R.N. Reid, S.A. Fromm, V.S. Zdanowicz, and R.A. Pikanowski. 1992. Association of benthic macrofauna with habitat types and quality in the New York Bight. Mar. Ecol. Prog. Ser. 89: 237-251.

Environmental Protection Agency. 1974. Marine algal assay procedure: Bottle test. Nat'l Environ. Res. Center, Office of Res. and Dev., U.S. EPA, Corvallis, Oregon. 43 p.

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.

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

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

Chemistry summary table for

Naples WWTP	Effluent	Reference Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
Atrazine	0.16 T			
Metals (ug/L)				
Aluminum	85			
Antimony	15 U			
Arsenic	20 U			
Cadmium	0.18 T			
Copper	5 U			
Chromium	10 U			
Iron	48			
Lead	15 U			
Mercury	0.1 U			
Nickel	5 U			
Selenium	30 U			
Silver	0.17 T			
Zinc	18			
Nutrients (mg/L)				
Ortho-phosphate	0.77	0.020 U	0.11	0.038 T
Total phosphorus	0.72	0.029 T	0.13 A	0.058
Ammonia	0.054	0.038 T	0.047	0.052
Nitrate+Nitrite	9.7	0.078	1.4	0.48
TKN	0.78	0.64	0.62	0.57 A
Other Parameters				
Habitat Assessment		51	42	39
D. O. (mg/L)		6.9	6.9	7.1
pH (SU's)		7.4	7.3	6.9
Specific Conductance-Surface (µmhos/cm)		5020	19,700	18,100
Specific Conductance-Mid depth (µmhos/cm)		26,600	25,700	38,100
Temperature (°C)		22.3	21.2	20.7
Algal Growth Potential (mg dry wt/L)	128.7 Q	7.1 Q	48.3 Q	19.6 Q
BOD5 (mg/L)				
TSS (mg/L)				
Bioassay Fish	Not toxic			
Bioassay Invertebrate	Not toxic			

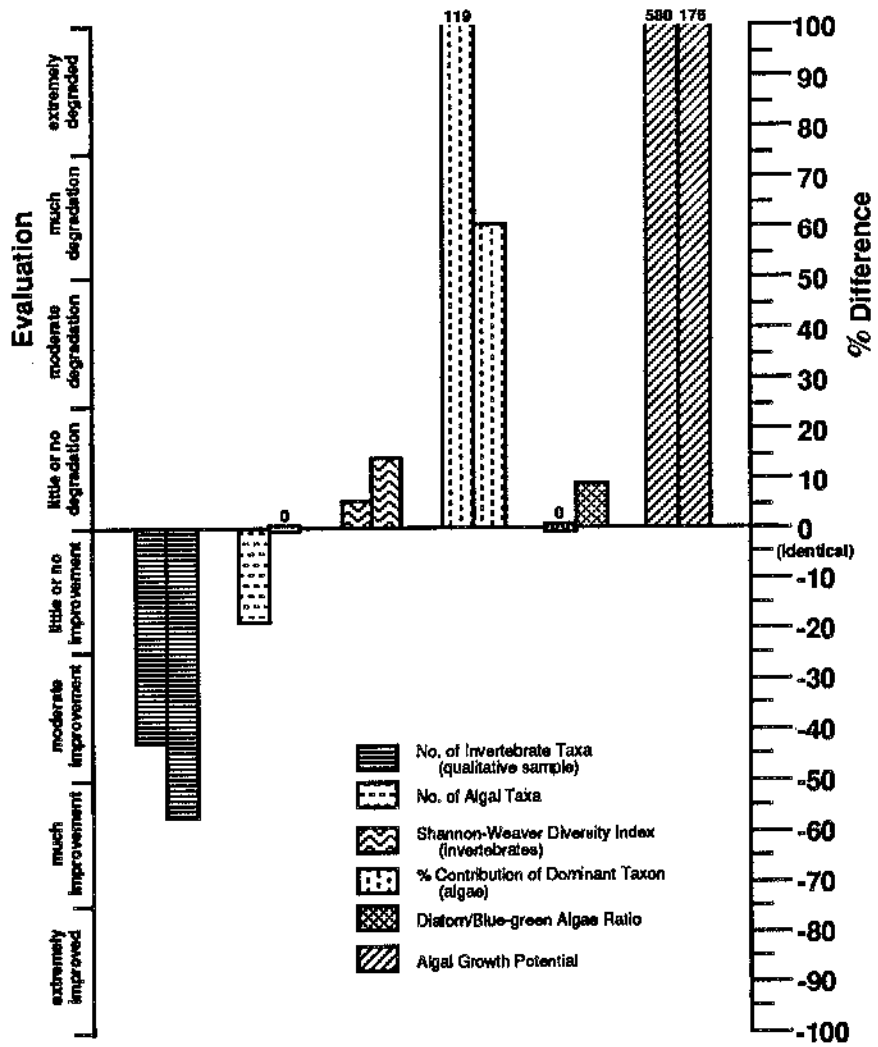
A - Value reported is the mean of two or more determinations

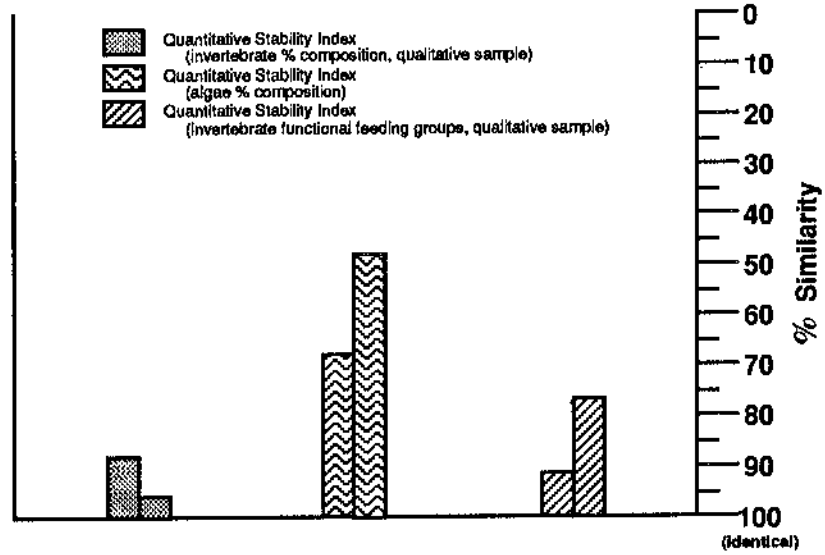
Q - Sample held beyond normal holding time

T - Value reported is less than the practical quantitation limit

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

	Refer-ence Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	21	30	33
Shannon-Weaver Diversity	3.25	3.07	2.78
% Polychaeta	75.2	64.0	71.1
% Malacostraca	22.4	33.7	24.4
% Pelecypoda	1.4	2.1	2.1
% Other	1.0	0.2	2.4
% Above Surface Deposit Feeders	47.7	55.9	69.5
% Below Surface Deposit Feeders	38.6	33.4	19.5
% Suspension Feeders	7.5	5.2	8.3
% Scavengers	2.5	2.6	0.2
% Predator/Carnivores	2.4	2.0	0.8
% Other	1.3	0.9	1.7
Phytoplankton Algae			
Number of Taxa	11	13	11
% Contribution of Dominant Taxon	23.8	51.9	38.2
Chlorophyll a (µg/L)	below PQL	below PQL	7.34
Diatom/Blue-green Abundance Ratio	1.0	1.0	0.91
% Diatoms	54.8	66.3	36.0
% Green	7.1	18.3	41.6
% Chrysophytes	33.3	1.0	0
% Dinoflagellates	4.8	12.5	18.0
Blue-greens	0	0	3.4
% Cryptophytes	0	1.9	1.1
Algal Growth Potential (mg dry wt/l)	7.1	48.3	19.6


Evaluation
extremely degraded
much degradation
moderate degradation
little or no degradation
little or no improvement
moderate improvement
much improvement
extremely improved
119
580
175
0
0
100
90
80
70
60
50
40
30
20
10
0
(identical)
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
% Difference
No. of Invertebrate Taxa (qualitative sample)
No. of Algal Taxa
Shannon-Weaver Diversity Index (invertebrates)
% Contribution of Dominant Taxon (algae)
Diatom/Blue-green Algae Ratio
Algal Growth Potential


Quantitative Stability Index
(invertebrate % composition, qualitative sample)
Quantitative Stability Index
(algae % composition)
Quantitative Stability Index
(invertebrate functional feeding groups, qualitative sample)
0
10
20
30
40
50
60
70
80
90
100
(identical)
% Similarity

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: [illegible]	Date Summary Prepared: [illegible]	
Location (attach detailed map): [illegible] Avenue North Naples, Florida	County: Collier	District: South
Federal Permit # and expiration date: NPDES = FL0026271	State GMS # and State expiration date: 5211M01188 Permit # DO11-156642 Exp. 11/18/93	Facility Type: Industrial Municipal Federal Agricultural Other (list):

Function of facility: [illegible] / Garden Street

Description of treatment process: [illegible] activated sludge, disinfection [illegible] filtration chlorination — declorination [illegible] anaerobic digestion + belt press [illegible] land application - in Hendry County. [illegible] goes to golf course irrigation - declorinated effluent

Receiving waters: Gordon River - Bay of Naples	Classification: I II III	
Design Flow: 8.5 MGD	Mean Flow:	Flow during survey:

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

therefore, the best time to sample is:

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

no mixing zone

List effluent limits (if necessary, attach relevant paperwork):

Parameter	Limit (units) monthly AV	Limit (units) weekly AV
EPA		
BOD5	10 mg/l	15 mg/l
TSS	10 mg/l	15 mg/l
Total P	1.0 mg/l	1.5 mg/l
TKN	5.0 mg/l	7.5 mg/l
DO	5.0 or > mg/l	
PH	6.5 - 8.5	
residual Cl	0.01 mg/l	
State		
BOD + TSS	10 annual, 12.5 monthly, 15 weekly, 20 max grab	
Total: 5 mg/l TSS		

Describe special permit conditions and permit modifications:

modification of NPDES permit # FL0026271: monitoring identified to be discharged at outfall 002, define what weather conditions, change the limitations, language to include both saltwater and fresh water species and correct typo [illegible] limitations for TKN. [illegible] acceptable.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

(Facility)

Description of permitted outfall(s):

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

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

DER case 84-0523 became null and void [illegible]
on operating permit No.: DO11-151262.
Administrative Order 89-055 issued May [illegible] 19[illegible]

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

1992	% reuse	% [illegible]
Nov	30	[illegible]
Dec	36	4

reuse [illegible]: 31.7% = 32%

[illegible]: 29.6% = 48%

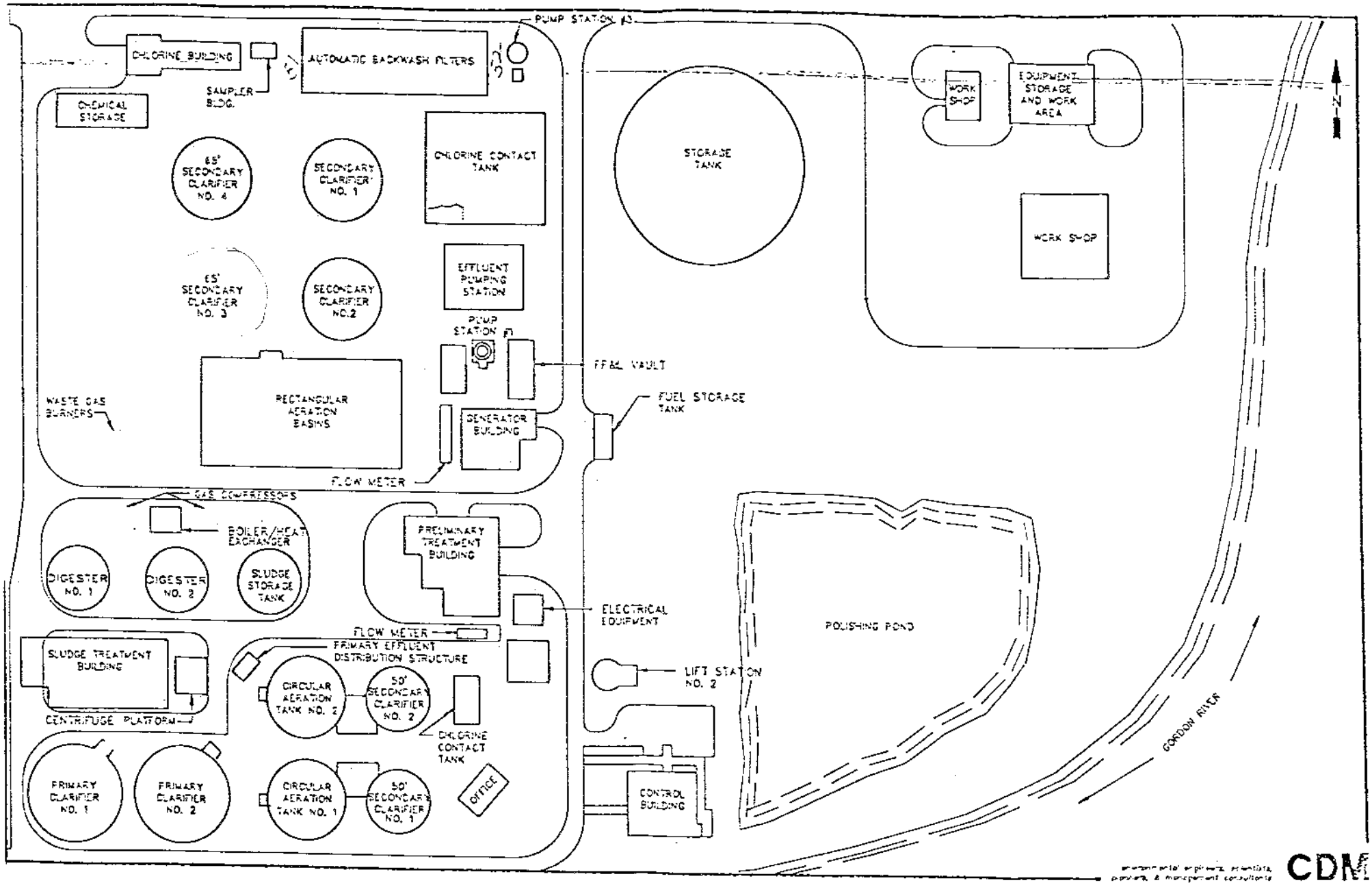
1992	% river	% reuse
Jan	49	51
Feb	60	40
March	46	54
April	36	64
May	29	71
June	62	38
July	68	32
Aug	66	34
Sept	69	31
Oct	40	60

Additional information:

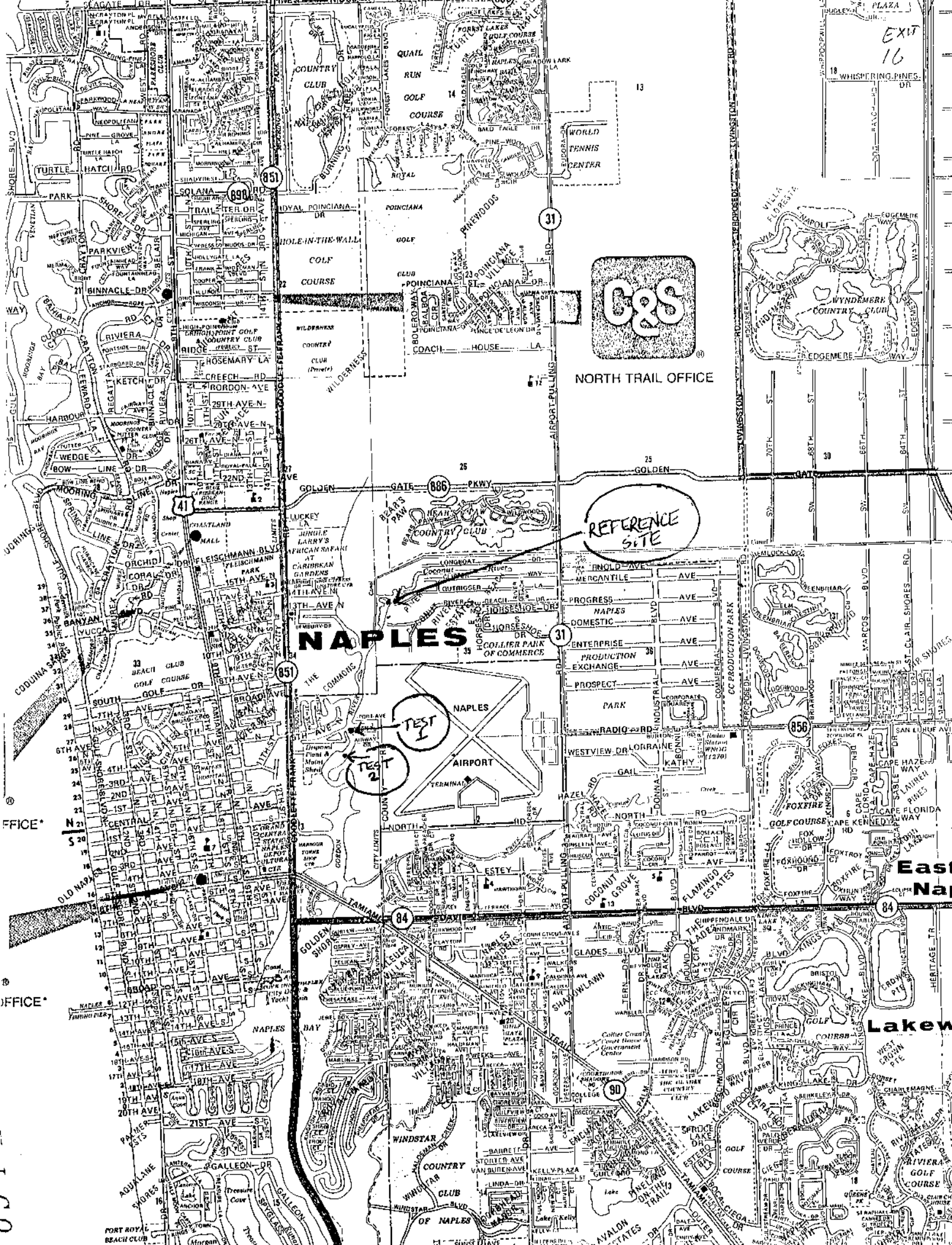
Daily TSS grab samples required by Order in addition to 24hr composite Sample. Discharge to Cocoa River set as only during wet weather conditions in FPA permit No. FL0002071. Discharge to forest creek annual daily. Last 12 months Jan 92 – Dec 92 reuse 12mo AV 51% Surf H2O 12mo AV 49%

Staff contributing to this review (signature):

	(Biologist)
PATTY BARON	(Inspector)
ROXANNE GAUSE	(Engineer)
	( )
	( )
	( )



City of Naples WWTF – Overview Site Plan


C&S
NORTH TRAIL OFFICE
REFERENCE SITE
NAPLES
TEST 1
TEST 2
AIRPORT
EXIT 16
GOLDEN GATE PKWY
TAMIAMI TRAIL
COLLIER PARK OF COMMERCE
NAPLES BAY
GULF
COUNTRY CLUB
GOLF COURSE
PARK SHORE
PORT ROYAL BEACH CLUB
WINDSTAR COUNTRY CLUB OF NAPLES
WYNDEMERE COUNTRY CLUB
FLEISCHMANN PARK
BEACH CLUB GOLF COURSE
COASTLAND MALL
THE COMMONS
WORLD TENNIS CENTER
POINCIANA GOLF CLUB
HOLE-IN-THE-WALL GOLF COURSE
QUAIL RUN GOLF COURSE
FOREST LAKES GOLF COURSE
BEAR'S PAW COUNTRY CLUB
JUNGLE LARRY'S AFRICAN SAFARI AT CARIBBEAN GARDENS
CRICKET CLUB & COUNTRY CLUB
WILDERNESS COUNTRY CLUB (Private)
COLLIER COUNTY COURT HOUSE & GOVERNMENT CENTER
GOLDEN GATE
PARK SHORE
PARKVIEW
RIVIERA POINTE
BINNACLE
HARBOUR
MOORING LINE
BOW LINE
REGATTA
KETCH
CUDDY
CRAYTON
LEEWARD
BAHIA PT
SOLANA
TURTLE HATCH
TURTLE
SHADYREST
TRAILWAY
POINCIANA VILLAGE
POINCIANA
ROYAL POINCIANA
PINEWOODS
BOLERO-WAY
RALBOA
COACH HOUSE
ROSEMARY
CREECH
GORDON
29TH AVE N
26TH AVE N
22ND
ORCHID
CORAL
BANYAN
YUCCA
LUCKEY
LONGBOAT
OUTRIGGER
HORSESHOE
ARNOLD
MERCANTILE
PROGRESS
DOMESTIC
ENTERPRISE
PRODUCTION
EXCHANGE
PROSPECT
PARK
RADIO
WESTVIEW
LORRAINE
KATHY
GAIL
HAZEL
DONNA
NORTH
ESTEY
GOLDEN SHORES
GLADES
SHAWNLAWN
CRISPENDALE
LANDMARK
KINGS LAKE
BRISTOL
CROWN PTE
HERITAGE TR
FOXFIRE
FOX HOLLOW
FOXHOUND
CAPE HAZE
CAPE FLORIDA
CAPE KENNEDY
SABLE
LAURER PINES
SAN LUIS
COCONUT GROVE
FLAMINGO ESTATES
WINDSTAR
GALLEON
AQUALANE SHORES
PALMER ESTS
SPYGLASS
AVALON ESTATES
ROCA CIEGA
SPRUCE
LAKEWOOD
ESTERO BAY
RIVIERA GOLF COURSE
PINELAND ON THE TRAIL
KELLY PLAZA
VAN BUREN
BARRETT
STOLTZ
HALDEMAN
MARLIN
PELICAN
OSPREY
CLAYTON
KIRKWOOD
CONNECTICUT
WALKERS
CALOOSA
MANGROVE
HALDEMAN
WEEKS
RIVIERA
BAYVIEW
GOLDEN GATE
HEMLOCK
GREENBRIAR
ELM
ELDERBERRY
MARCOS
ST CLAIR SHORES
BAREBELLA
DOGWOOD
CC PRODUCTION PARK
COMMERCIAL
INDUSTRIAL
CORPORATE
BINNEY
BONITA
PROPOSED
LIVINGSTON
AIRPORT-PULLING
CITY LIMITS
COUNTY
OLD NAPLES
FERRY
NAPLES PIER
BROADWAY
CENTRAL
SOUTH
NAPLES DEPOT CULTURAL
HISTORICAL
ORIANA
CONTRA
STATION
NAPLES
DEPOT
CULTURA
Dragonfly Plant & Maint. Shed
Radio Station WNOG (1270)
Lake Kelly
Lake
Creek
Treasure Cove
Lantern
Anchor
Marlin
Pelican
Osprey
Clayton
Kirkwood
Connecticut
Walkers
Calooosa
Mangrove
Haldeman
Weeks
Riviera
Bayview
Golden Gate
Hemlock
Greenbriar
Elm
Elderberry
Marcos
St Clair Shores
Barebella
Dogwood
CC Production Park
Commercial
Industrial
Corporate
Binney
Bonita
Proposed
Livingston
Airport-Pulling
City Limits
County
Old Naples
Ferry
Naples Pier
Broadway
Central
South
Naples Depot Cultural
Historical
Oriana
Contra
Station
Naples
Depot
Cultura
Dragonfly Plant & Maint. Shed
Radio Station WNOG (1270)
Lake Kelly
Lake
Creek
Treasure Cove
Lantern
Anchor
Marlin
Pelican
Osprey
Clayton
Kirkwood
Connecticut
Walkers
Calooosa
Mangrove
Haldeman
Weeks
Riviera
Bayview
Golden Gate
Hemlock
Greenbriar
Elm
Elderberry
Marcos
St Clair Shores
Barebella
Dogwood
CC Production Park
Commercial
Industrial
Corporate
Binney
Bonita
Proposed
Livingston
Airport-Pulling
City Limits
County
Old Naples
Ferry
Naples Pier
Broadway
Central
South
Naples Depot Cultural
Historical
Oriana
Contra
Station
Naples
Depot
Cultura

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

SUBMITTING AGENCY CODE: 8052 SUBMITTING AGENCY NAME: SO. ENV. WTR	STORET STATION NUMBER: 28-03-0048	DATE (M/D/Y): 2-8-93	RECEIVING BODY OF WATER: GORDON RIVER

REMARKS: BEST CONDITIONS AVAILABLE WITHIN GOLDEN GATE CANAL INFLUENCE	LOCATION: NAPLES WWTP (GORDON RIVER) CONTROL (REFERENCE)	FIELD ID/NAME: DW020393-4

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 20	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 1	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 10	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 11	Combination of sand, gravel, and shell. **12-15 points**	Primarily sand, with small areas of mud. **8-11 points**	Mixture of sand and mud, or well-aerated mud only. **4-7 points**	Anaerobic mud. **0-3 points**

TOTAL SCORE 51

COMMENTS: AREA SOMEWHAT LESS DEVELOPED THAN AFFECTED, UPSTREAM; DISTINCT FLOW FROM CANAL @ SAMPLE SITE

ANALYSIS DATE:	ANALYST:	SIGNATURE:
2-8-93	A.S. WALTON	Albert S Walton

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

SUBMITTING AGENCY CODE: 8252 / SUBMITTING AGENCY NAME: SO-FMY-WTP	STORET STATION NUMBER: 18-03-0030	DATE (M/D/Y): 2-9-93	RECEIVING BODY OF WATER: GORDON RIVER

REMARKS:	LOCATION: NAPLES WWTP AFFECTED UP STREAM	FIELD ID/NAME: DW 020893-2

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 4	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 15	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 1	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 10	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 9	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 42

COMMENTS: SEDIMENTS FINE + COARSE QUARTZ-LIKE SAND WITH LIGHT LAYER OF LEAVES OR WOOD

ANALYSIS DATE:	ANALYST:	SIGNATURE:
2-8-93	A.S. WALTON	Albert S Walton Jr

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

SUBMITTING AGENCY CODE: 52 SUBMITTING AGENCY NAME:	STORET STATION NUMBER: 28030031	DATE (M/D/Y): 2-8-93	RECEIVING BODY OF WATER: GORDON RIVER

REMARKS:	LOCATION: NAPLES WWTP DOWNSTR AFF	FIELD ID/NAME: DGV 020893-3

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 15	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 1	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 10	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 4	Combination of sand, gravel, and shell. **12-15 points**	Primarily sand, with small areas of mud. **8-11 points**	Mixture of sand and mud, or well-aerated mud only. **4-7 points**	Anaerobic mud. **0-3 points**

TOTAL SCORE 39

COMMENTS: SEDIMENT WAS VERY SOFT, WITH LOTS OF DECAYING UPLAND VEGETATION REMAINS

ANALYSIS DATE:	ANALYST:	SIGNATURE:
2-8-93	A.S. WALTON	Albert S Walton, J

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 80 52 / SUBMITTING AGENCY NAME: SO. Fmy - WTF	STORET STATION NUMBER: 28-03-0048	DATE (M/D/Y): 2-8-93	TIME: 1400	RECEIVING BODY OF WATER: GORDON R.

REMARKS: NOTE LAYER OF FRESH WATER OVER SALTIER BOTTOM LAYERS.	LOCATION: NAPLES MWTP CONTROL (REFERENCE)	FIELD ID/NAME: DW 020893-4

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
5			95			

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): NAPLES MWTP

Estimated System Width (range, m): 25-50	Estimated System Depth (range, m): 0.5-2	Impounded ? ☐ yes
High Water Mark (m above bed):	Velocity (range, m/s): 0-0.5	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	95		
Aquatic Vegetation	5 MANGROVE			Mud/Muck/Silt			
Rock or Shell Rubble				Benthic leaf mats			
Undercut Banks/Roots				Other:			

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top		22.3	7.4	6.4	5020			1.4
Mid-depth	3ft	20.9	7.3	6.1	26 600			
Bottom	6ft	20.7	7.3	6.7	34,900			

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: COOL BREEZY

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

SAMPLING TEAM: WALTON / GAUSE	SIGNATURE: Albert S Walton Jr	DATE: 2-8-93

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 8052 / SUBMITTING AGENCY NAME: SW - FMY-WDF	STORET STATION NUMBER: 2803-0030	DATE (M/D/Y): 2-8-93	TIME: 1305	RECEIVING BODY OF WATER: GORDON RIVER
REMARKS:	LOCATION: NAPLES WWTP (GORDON RIVER) UPSTREAM AFFECTED			FIELD ID/NAME: DW 020893-2

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
			90	5	5	

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): NAPLES WWTP

Estimated System Width (range, m): 50-100 m	Estimated System Depth (range, m): 0.5-2	yes
High Water Mark (m above bed): 0.5	Velocity (range, m/s): 0-0.2	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	95		
Aquatic Vegetation	5 Mid/C Row			Mud/Muck/Silt			
Rock or Shell Rubble				Benthic leaf mats			
Undercut Banks/Roots				Other:			

WATER QUALITY

	Depth (ft):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top	0.5 ft	21.2	7.3	6.9	49 700			1.3
Mid-depth	2 ft	20.9	7.4	6.5	25 700			
Bottom	4 ft	20.5	7.5	7.2	43 000			

System Type : Stream: ☐ (Sand Bottomed ☐ Swamp & Bog ☐ Alluvial ☐ Sand Bot w/ Spring ☐ Calcareous ☐ 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: COOL WINDY

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

SAMPLING TEAM: WALTON / GAUSE	SIGNATURE: Albert S Walton Jr	DATE: 2-8-93

ATTACHMENT 2

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 3)

SUBMITTING AGENCY CODE: 52 / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
	28-03-0031	2-8-93	1155	GORDON RIVER

REMARKS:	LOCATION:	FIELD ID/NAME:
NOTE HALOCLINE	NAPLES WWTP DOWNSTREAM AFFECTED	DW020893-3

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
5			75	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):

NAPLES WWTP

Estimated System Width (range, m): 150-60	Estimated System Depth (range, m): 0.5-2		yes	
High Water Mark (m above bank): 0.25	Velocity (range, m/s): 0-0.2		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: ☑ VEGETATION DECAYED

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Riffles			
Leaf Packs				Sand			
Aquatic Vegetation	5	MANGROVE		Mud/Muck / silt	95		
Rocky outcrops				Leaf mats			
Undercut banks /root systems				Other:			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	pH (SU):	Cond. (µmho/cm):				Secchi (m):
Top	20.7	7.1	6.9	18100	SURF			1.4
Mid-depth	20.4	7.1	7.3	38 100	5'			
Bottom	20.4	7.03	7.4	44 500	8'			

~~Stream Type:~~ (sand bottom) swamp & bog calcareous sand w/spring inf alluvial misc. ESTUARY Stream Size:

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

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

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

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

Weather Conditions: COOL WINDY

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
2-8-93	WALTON	A.S. Walton

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Naples WWTP
Location: Naples
County: Collier
Contact/District: R. McGregor / South
NPDES Permit #: FL00 Outfall #:
93 Feb 0927 49420

Sample Collection: Date 2/8/93 Time 1140
Test Beginning: Date 2/9/93 Time 1500
Test Ending: Date 2/11/93 Time 1400
Organism Batch #: 6 Diluent Batch #: 2
Organism Age: < 24 hours
Test Organism: Ceriodaphnia dubia

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

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
0 hr	7.0 @ 7.0 10.06 @ 10.0	21.9 @ 22.0	8.4 @ 24.0	980 @ 1,000 9770 @ 10,000 @ 24°C
24 hr	7.0 @ 7.0 10.02 @ 10.0	22.1 @ 22.3	8.7 @ 24.0	975 @ 1,000 9730 @ 10,000 @ 23.6°C
48 hr	7.0 @ 7.0 10.0 @ 10.0	23.3 @ 23.4	8.5 @ 23.4	960 @ 1,000 9660 @ 10,000 @ 23.3°C

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	8.2		8.3	22.3		23.0	8.4		8.4	160		190
Control	B	5	5	5			8.3						8.3			190
Control	C	5	5	5			8.3						8.4			185
Control	D	5	5	5			8.3						8.4			175
100%	A	5	5	5	7.4		8.2	22.2		23.0	8.3		8.4	1360		1375
100%	B	5	5	5			8.2						8.4			1505
100%	C	5	5	5			8.2						8.4			1535
100%	D	5	5	5			8.2						8.4			1435
Measured/Loaded by:		MF	MF	TR	MF		TM	MF		TM	MF		TM	MF		TM
Recorded by:		MF	MF	TR	TR		TR	TR		TR	TR		TR	TR		TR

Investigators' Signatures

Marshall Faircloth
Tobin Rader

Reviewer

	Salt Water/ (Well Water) / 20% Mln Water	Sample	Method	Measured by
Field Total Residual Cl2:		0.0	—	RM
Lab Total Residual Cl2:	.02 / .02	.02	DR100	TR
Alkalinity:	125 / 75	75	Hach	TR
Hardness:	120 / 70	230	Hach	TR
Total Ammonia:	<0.017 / <0.017	0.641	Orion	MF

Cl2 Blank: _____ Ammonia Meter Slope: -55.0 Ammonia Blank: <0.017 Sample Salinity: _____ ppt

form updated 10/20/92

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Naples WWTP
Location: Naples
County: Collier
Contact/District: R. McGregor / SO
NPDES Permit #: FL00 Outfall #:

Sample Collection: Date 2/8/93 Time 1140
Test Beginning: Date 2/9/93 Time 1515
Test Ending: Date 2/11/93 Time 1400
Organism Batch #: 4 Diluent Batch #: WELL
Organism Age: 12 days
Test Organism: Nitrocoleds

93 Feb 09 27 49420

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

Test Number: 2 of 2

Remarks:

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
0 hr	7.0 @ 7.0 10.06 @ 10.0	21.9 @ 22.0	8.4 @ 24.0	980 @ 1,000 @24°C 9770 @ 10,000
24 hr	7.0 @ 7.0 10.02 @ 10.0	22.1 @ 22.3	8.7 @ 24.0	975 @ 1,000 @23°C 9730 @ 10,000
48 hr	7.0 @ 7.0 10.0 @ 10.0	23.3 @ 23.4	8.5 @ 23.4	960 @ 1,000 @23°C 9660 @ 10,000

Conc.	Chamber #	Number Live 0	Number Live 24	Number Live 48	pH 0	pH 24	pH 48	Temperature (°C) 0	Temperature (°C) 24	Temperature (°C) 48	D.O. (mg/L) 0	D.O. (mg/L) 24	D.O. (mg/L) 48	~~Cond. (mmhos/cm)~~ Cond. (µmhos/cm) 0	Cond. (µmhos/cm) 24	Cond. (µmhos/cm) 48
Control	15	5	5	5	7.8	8.2	8.3	23.0	22.3	22.5	8.0	7.7	8.4	240	240	240
Control	69	5	5	5	7.8	8.2	8.3				8.0	7.7	8.4	240	240	240
100%	682	5	5	5	7.1	7.7	7.9	23.2	22.2	22.5	8.1	7.7	8.3	1485	1450	1465
100%	1	5	5	5	7.1	7.7	7.9				8.1	7.7	8.3	1485	1450	1465
Measured/Loaded by:		TM	TR	TM	MF	MF	TM	MF	MF	TM	MF	MF	TM	MF	MF	TM
Recorded by:		MF	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR

Investigators' Signatures

Marshall Faircloth
Tobin Rader

Reviewer

Water Quality Parameters	Salt Water/ Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			0.0	—	RM
Lab Total Residual Cl2:	.02	.02	.02	DR100	TR
Alkalinity:	125	75	75	Hach	TR
Hardness:	120	70	230	Hach	TR
Total Ammonia:	<0.017	<0.017	0.641	Orion	MF

Cl_2 Blank: 0.0 Ammonia Meter Slope: -55.0 Ammonia Blank: <0.017 Sample Salinity: _____ ppt

form updated 10/20/92

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

Benthic macroinvertebrate taxa list for City of Naples WWTP, collected via Ponar grab samples in the Gordon River, on 8 February, 1993. Densities, in number/m^2, represent the mean of three replicates.

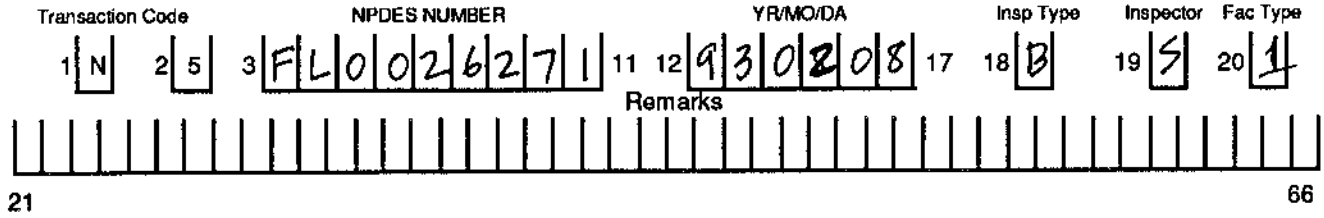
	Reference Site	Test Site 1	Test Site 2
Gastropoda			
Acteocina canaliculata	–	–	12.5
Acteon punctostriatus	25.0	–	–
Undetermined Vitrinellidae	–	–	12.5
Undetermined gastropod	–	–	25.0
Malacostraca			
Amphipoda			
Ampelisca sp.	–	25.0	62.4
Cerapus sp.	399.2	2407.7	1122.8
Corophium sp.	37.4	12.5	37.4
Grandidierella bonnieroides	212.1	99.8	12.5
Cumacea			
Almyracuma cf *proximoculi*	–	25.0	–
Cyclaspis varians	37.4	162.2	149.7
Oxyurostylis smithi	25.0	25.0	–
Isopoda			
Cyathura polita	–	25.0	–
Edotea montosa	49.9	149.7	37.4
Xenanthura brevitelson	–	25.0	–
Mysidacea			
Mysidopsis almyra	37.4	12.5	–
Taphromysis bowmani ?	12.5	–	–
Nemertina			
Undetermined nemertina	12.5	12.5	37.4
Oligochaeta			
Undetermined oligochaete	–	–	37.4
Pelecypoda			
Amygdalum papyria	–	25.0	–
Anadara sp.	–	–	12.5
Corbula swiftiana	–	–	12.5
Lyonsia hyalina	–	12.5	–
Mercenaria sp. ?	–	25.0	–
Tagelus cf *plebeius*	37.4	37.4	–
Undetermined Dreissenidae	–	25.0	12.5
Undetermined Mactridae	12.5	–	25.0
Undetermined pelecypod spp.	–	75.0	62.4
Platyhelminthes			
Undetermined turbellaria	–	–	12.5

Polychaeta			
Capitella capitata	548.9	1384.7	698.6
Cossura sp.	–	–	49.9
Eteone heteropoda	–	12.5	–
Glycinde solitaria	–	–	12.5
Heteromastus filiformis	286.9	748.5	49.9
Hobsonia florida	25.0	149.7	49.9
Laeonereis culveri	224.6	486.5	–
Mediomastus sp.	–	25.0	–
Paraprionospio pinnata	–	–	25.0
Podarkeopsis levifuscina	–	–	12.5
Polydora sp.	–	–	25.0
Sabella microphthalma	–	37.4	87.3
Schistomeringos rudolphi	–	–	12.5
Scolelepis texana	25.0	–	–
Streblospio benedicti	960.6	2008.5	2694.6
Undetermined Ampharetidae	12.5	–	–
Undetermined Capitellidae	561.4	761.0	274.5
Undetermined Cirratulidae	–	–	62.4
Undetermined Orbinidae	–	25.0	–
Undetermined Sabellidae	74.9	–	87.3
Total	3618.1	8820.6	5826.4

Phytoplankton taxa list and densities (#/mL) for Naples WWTP, collected via subsurface grabs in the Gordon River, on 8 February, 1993.

	Reference Site	Test Site 1	Test Site 2
Diatoms			
Diploneis sp.	–	50	–
Melosira sp.	50	100	–
Nitzschia sp.	50	–	25
N. closterium	–	25	25
N. longissima	–	–	25
Rhizosolenia sp.	174	125	–
Skeletonema costatum	249	1345	712
Synedra sp.	50	25	–
Unidentified centric diatom	–	50	–
Chlorophyta			
Ankistrodesmus sp.	50	–	–
Pyramimonas sp.	–	25	74
Scenedesmus sp.	25	–	–
Unknown chlorophyte flagellate	–	448	835
Chrysophyta			
Dinobryon sp.	149	25	–
Mallomonas sp.	100	–	–
M. akrokomos	100	–	–
Cryptophyta			
Cryptomonas sp.	–	50	25
Cyanophyta			
Chroococcus sp.	–	–	49
Oscillatoria sp.	–	–	25
Pyrrhophyta			
Peridinium sp.	–	25	25
Prorocentrum minimum	50	299	368
Total Density	1047	2592	2188

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



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