Florida

Department of Environmental Protection

Biological Assessment of

Ft. Myers Central Wastewater Treatment Plant

Lee County

NPDES #FL0021261

Sampled December 1992

August 1993

Biology Section
Division of Technical Services

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: Ft. Myers Central WWTP
County: Lee
NPDES Number: FL0021261
State Permit Expiration Date: 28 September 1993

Toxics Sampling Inspection (XSI)

Date Sampled: 7 December 1992

Results: The following pesticides were found in the effluent at levels below practical quantitation limits: atrazine (0.11 µg/L), hexazione (0.16 µg/L), and simazine (0.073 µg/L). Although there are no water quality standards for these pesticides, the levels of atrazine and simazine present were far below toxic concentrations. Toxicity information was unavailable for hexazione. Non-problem amounts of aluminum (281 µg/L), iron (79 µg/L), and zinc (42 µg/L) were also found in the discharge.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 7 December 1992

Results: The sample of effluent was not acutely toxic to the invertebrate, *Ceriodaphnia dubia*, or to the fish, *Notropis leedsi*. No mortality occurred during either of the 48 hour screening bioassays.

Impact Bioassessment Inspection (IBI)

Date Sampled: 7 December 1992

Results: The Ft. Myers Central WWTP appeared to have no detrimental effects on receiving water benthic macroinvertebrate communities. However, the health of the benthic populations in this area of the Caloosahatchee River, as demonstrated by the low diversities, the average taxa richness, and the predominance of pollution tolerant taxa, could be described only as fair to mediocre. A few moderately sensitive organisms were recovered, suggesting that the area is not entirely degraded. Phytoplankton communities were characterized by low taxa richness, and domination by small chlorophyte flagellates and diatoms. Although chlorophyll *a* was somewhat elevated at the reference site, the algal populations appeared fairly normal. No degradation which could be associated with the plant discharge was found.

Water Quality Inspection (WQI)

Date Sampled: 7 December 1992

Results: Nutrients were relatively low in the effluent. Of the bioavailable nutrient forms, only nitrate-nitrite was slightly elevated at the study sites. Total Kjeldahl Nitrogen was greater than 93-95% of typical Florida estuary systems at both reference and test sites, but no enrichment effects were apparent. Algal growth potential in the receiving waters was below the "problem threshold" for marine test species.

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

Introduction

The Ft. Myers Central Wastewater Treatment Plant is located on Raleigh St. in Ft. Myers, Lee County, Florida. Treatment consists of an odor control system (chemical scrubbing and carbon adsorption), followed by a biological system that is an advanced modification of the activated sludge process. Sludge is removed by settling, and the clarified effluent is chlorinated and then dechlorinated prior to discharge into the Caloosahatchee River. Although the facility's design flow is 11 MGD, flow during the survey was 5.8 MGD (see facility summary in Appendix).

Effluent limits are as follows: BOD and TSS (annual average of 20 mg/L), fecal coliform (800 organisms/100 mL in a single grab, monthly average of 200 organisms/100 mL), total nitrogen (3.0 mg/L at 11 MGD, 300 lbs/day), total phosphorus (0.5 mg/L at 11 MGD, 50 lbs/day), and total chlorine residual (0.5 mg/L for disinfection, maximum of 0.01 mg/L after dechlorination).

During the past year, the plant has had some problems with influent monitoring equipment and improper residuals management (see Appendix). A consent order was executed in March, 1993, to address these problems, as well as failure to notify the department when the equipment malfunctions occurred. The FDER Biology Section performed acute toxicity bioassays on this facility in December, 1985 At that time, the effluent was not toxic to *Daphnia pulex, Notropis leedsi,* or *Mysidopsis bahia.*

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 on the western shore of the Caloosahatchee River, opposite the outfall area) 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 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

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	22	27	23
Shannon-Weaver Diversity	1.95	2.51	2.26
% Malacostraca	54.6	49.2	61.4
% Polychaeta	34.9	33.3	5.3
% Pelecypoda	8.0	14.5	31.7
% Other	2.5	3.0	1.7
% Above surface collector-gatherer	84.5	77.3	61.9
% Collector-filterer/suspension feeder	11.9	18.0	34.8
% Predator/carnivore	2.5	2.6	1.3
% Other	1.1	2.1	2.0
Phytoplankton Algae			
Number of Taxa	10	8	7
% Contribution of Dominant Taxon	34.3	38.7	36.7
Chlorophyll a (µg/L)	9.6	8.3	4.8
Diatom/Blue-green Abundance Ratio	0.94	0.93	1.00
% Diatoms	48.6	41.9	60.0
% Greens	34.3	38.7	36.7
% Dinoflagellates	14.3	12.9	3.3
% Blue-greens	2.9	3.2	0
% Euglenophytes	0	3.2	0
Algal Growth Potential (mg dry wt/l)	5.2	6.9	2.7

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, 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: Ron McGregor and Ford Walton (DEP South District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Roberto Llansó, Kathleen Lurding, Elizabeth Miller, Kim Pearce, Urania Quintana, 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.

Results and Discussion

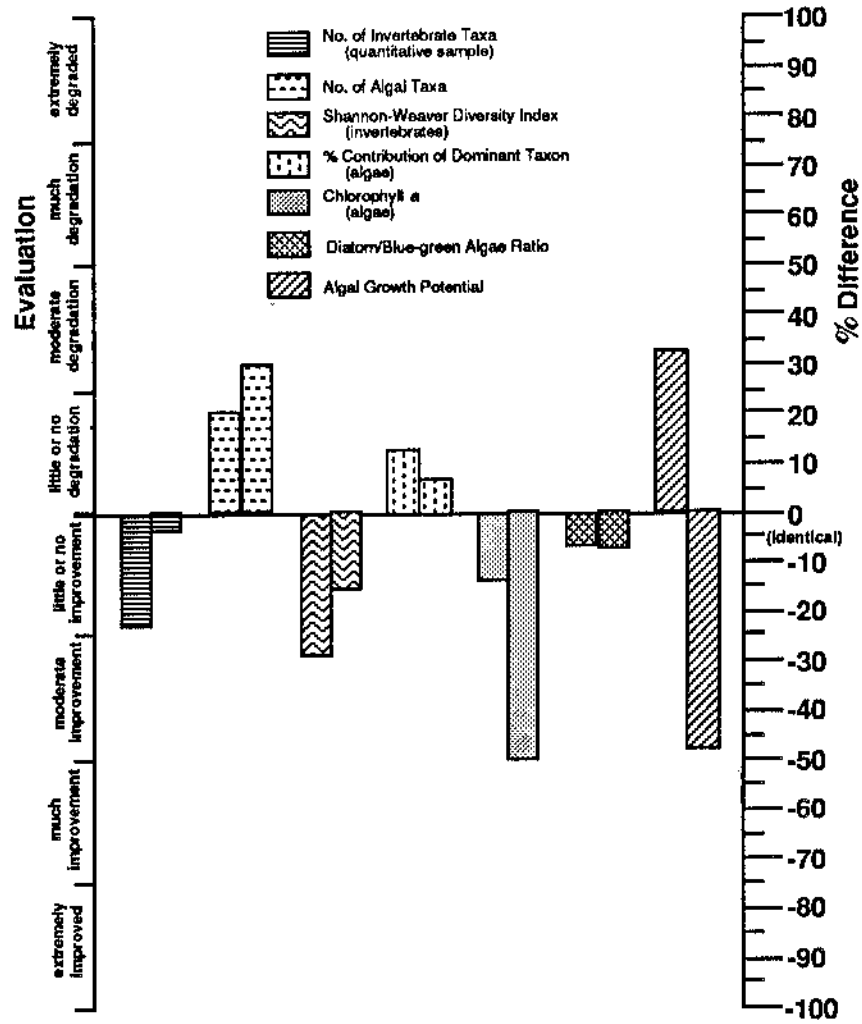
The study area was located in the Caloosahatchee River in a predominantly residential section of Ft. Myers (see maps in Appendix). The reference site and both test sites received habitat scores of 40. These low scores were largely due to the lack of community types present (*e.g.*, no mangrove swamps, oyster bars, or grassbeds), the extent of stormwater runoff from impervious surfaces in the watershed, and the relatively poor sediment type. Additionally, the shoreline consisted mainly of riprap and vertical seawalls. Conversely, tidal fluctuation, as well as wave action, scored in the excellent range for all stations. The sites were well oxygenated at the time of sampling, with the dissolved oxygen ranging from 8.3 to 9.1 mg/L. Water was neutral in pH (test site 1 = 7.0), or slightly alkaline (7.7 and 7.3 standard units at the reference site and test site 2, respectively), and conductivities ranged from 19,000 to 21,000 µmhos/cm (Appendix).

The following pesticides were found in the effluent at levels below the practical quantitation limit: atrazine (0.11 µg/L), hexazione (0.16 µg/L), and simazine (0.073 µg/L). Although there are no water quality standards for these pesticides, the levels of atrazine and simazine present were far below acutely toxic concentrations (AQUIRE 1993). Toxicity information was unavailable for hexazione. Non-problem amounts of aluminum (281 µg/L), iron (79 µg/L), and zinc (42 µg/L) were also found in the discharge.

The sample of effluent was not acutely toxic to the invertebrate, *Ceriodaphnia dubia*, or to the fish, *Notropis leedsi*. No mortality occurred during either of the 48 hour screening bioassays (Appendix).

Nutrients were relatively low in the effluent. At the study sites, orthophosphate, total phosphorus, and ammonia concentrations were low to average, as compared to 690 estuary stations in Florida (see table of typical values in Appendix). Nitrate-nitrite levels were somewhat elevated (higher than 70% of typical Florida estuaries) and TKN levels exceeded 93-95% at the reference and test sites.

Algal growth potential (AGP) of the freshwater effluent was 9.5 mg dry wt/L, using *Selenastrum capricornutum*. Algal assays performed on the marine receiving waters with *Dunaliella tertiolecta* produced AGP's of 5.2 mg dry wt/L, 6.9 mg dry wt/L, and 2.7 mg dry wt/L for the reference site, test site 1, and test site 2, re-



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.)

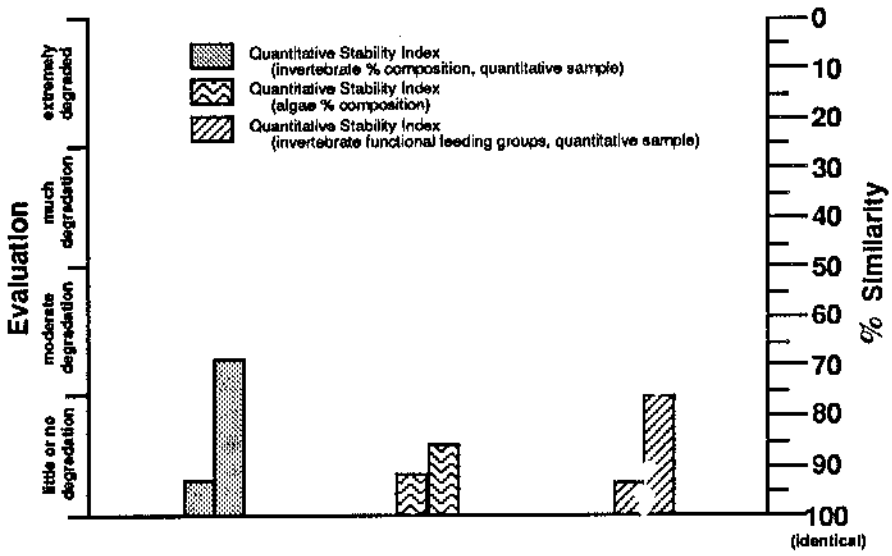
spectively. Although the percent difference illustrated on the figure on this page appears to indicate improvement in conditions at test site 2, it should be noted that the absolute values were all below 10 mg dry wt/L, the level at which enrichment problems would be expected in marine or estuarine systems (Dr. Ron Raschke, USEPA, pers. comm.).

The Ft. Myers Central WWTP appeared to have no detrimental effects on receiving water benthic macroinvertebrate communities. However, the health of the benthic populations in this area of the Caloosahatchee River could be described only as fair to mediocre. The figure on this page 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 reference. The figure on p. 4 summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation. In this case, however, the test sites are different from the reference site due to slight improvements. The relative abundance of each individual taxon appears in the Appendix.

Taxa richness, 22 at the reference site, 23 at test site 2, and 27 at test site 1, was fairly average for a Florida estuary system (from the 55th to 62nd percentile compared to other Florida estuaries). Shannon-Weaver diversity, ranging from 2.0 at the reference site to 2.5 at test site 1, was below average, (in the 21st to 39th percentile compared to other estuaries). Because these measurements were higher at the test sites than at the reference site, it appeared that the WWTP did not make conditions worse than the anthropogenically affected background.

All three sites were dominated by amphipods, particularly the cosmopolitan *Grandidierella bonnieroides*. Polychaetes comprised a significant portion of the macroinvertebrate population at the reference site and test site 1 (most were the tolerant form, *Streblospio benedicti*), but this group was displaced by pelecypods at test site 2. Although most of the organisms sampled were tolerant of polluted conditions, a few taxa found, such as *Cyclaspis varians*, *Bowmaniella* sp., and *Mysidopsis almyra*, require moderately clean water (Dr. Doug Farrell, DEP Southwest District, pers. comm.). Quantitative stability indices for percent composition and functional feeding groups show no major differences between sites. There was a moderate variation in community structure between test site 2 and the reference site, predominately due to the increased abundance of pelecypods (with a decrease in polychaetes) at test site 2.

Phytoplankton communities were similar at all three study sites, dominated by small chlorophyte flagellates, and the diatoms, *Skeletonema* sp. and *Chaetoceros* sp. Species richness was low at all stations even though a few more taxa were identified from the reference site (see species list in Appendix). Chlorophyll *a* was highest at the reference site (9.6 µg/L). This value is greater than 70% of other Florida estuaries. Test site 2 had the lowest chlorophyll *a* (4.8 µg/L). The quantitative stability index for percent composition further demonstrated that phytoplankton populations at the three study areas were analogous. With the exception of the moderately elevated chlorophyll *a* at the reference site, the phytoplankton communities appeared relatively normal.



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.)

Conclusions

The sample of effluent was not acutely toxic to the invertebrate, *Ceriodaphnia dubia*, or to the fish, *Notropis leedsi*. No mortality occurred during either of the 48 hour screening bioassays.

The following pesticides were found in the effluent at levels below the practical quantitation limit: atrazine (0.11 µg/L), hexazione (0.16 µg/L), and simazine (0.073 µg/L). Although there are no water quality standards for these pesticides, the levels of atrazine and simazine present were far below toxic concentrations (AQUIRE 1993). Toxicity information was unavailable for hexazione. Non-problem amounts of aluminum (281 µg/L), iron (79 µg/L), and zinc (42 µg/L) were also found in the discharge.

Nutrients were relatively low in the effluent. Of the bioavailable nutrient forms (ammonia, ortho-phosphate, and nitrate-nitrite), only nitrate-nitrite was slightly elevated at the study sites. Total Kjeldahl Nitrogen was greater than 93-95% of typical Florida estuary systems at both reference and test sites, but no enrichment effects were apparent. Algal growth potential of the receiving waters was below the "problem threshold" for marine test species.

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Phytoplankton communities were characterized by low taxa richness, and domination by small chlorophyte flagellates and diatoms. Although chlorophyll *a* was somewhat elevated at the reference site, the algal populations appeared fairly normal. No degradation which could be associated with the plant discharge was found.

Literature Cited

Aquatic Toxicity Information Retrieval Data Base (AQUIRE). 1993. U.S. EPA Environmental Research Laboratory, Duluth, Mn.

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.

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

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

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

Chemistry summary table for

Ft. Myers Central WWTP	Effluent	Reference Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
Atrazine	0.11 T			
Hexazinone	0.16 T			
Simazine	0.073 T			
Metals (ug/L)				
Aluminum	281			
Antimony	15 U			
Arsenic	20 U			
Cadmium	0.08 U			
Copper	5 U			
Chromium	10 U			
Iron	79			
Lead	15 U			
Mercury	0.1 U			
Nickel	5 U			
Selenium	30 U			
Silver	0.05 U			
Zinc	42			
Nutrients (mg/L)				
Ortho-phosphate	0.040 T	0.065	0.072 A	0.063
Total phosphorus	0.18	0.13	0.12	0.13
Ammonia	0.042	0.030 K	0.030 K	0.030 K
Nitrate+Nitrite	0.10	0.050 K	0.050 K	0.050 K
TKN	1.5	1.4	1.4	1.5
Other Parameters				
Habitat Assessment		40	40	40
D. O. (mg/L)	8.5	8.7	8.3	9.1
pH (SU's)	7.0	7.7	7.0	7.3
Specific Conductance (µmhos/cm)	900	19,000	21,000	19,000
Temperature (°C)	26.8	21.5	25.0	21.0
Algal Growth Potential (mg dry wt/L)	9.5	5.2	6.9	2.7
Bioassay Fish	Not Toxic			
Bioassay Invertebrate	Not Toxic			

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

K - Actual value is known to be less than value given

T - Value reported is less than the practical quantitation limit

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

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

RECEIVED
MAY 17 1993
WASTEWATER FACILITIES
REGULATION SECTION

Facility Name: FORT MYERS CENTRAL PLANT	**Date Summary Prepared:**	
Location (attach detailed map): 1501 KRAUSE STREET FT MYERS	**County** LEE	**District**
Federal Permit # 0021261 **and expiration date:** 06.30.94	**State GMS # and** S336M021701 **State expiration date:** 09 25 93 0036-154 756	**Facility Type:** Industrial **Municipal** Federal Agricultural **Other (list):**

Function of facility: TREATMENT (ACHIEVED BY THE CARBONACEOUS BIOLOGICAL DEGRADATION OF DOMESTIC WASTEWATER WITH TREATED EFFLUENT (DECHLORINATED WATER) DISCHARGED IN TO THE CALOOSAHATCHEE RIVER.

Description of treatment process: RAW SEWAGE IS CONVEYED FROM VARIOUS AREAS OF THE CITY TO THE PLANT PUMP STATION, WHERE AN AUTOMATIC SCREENING DEVICE REMOVES LARGE SOLIDS. FROM THE HEADWORKS, THE WASTEWATER IS DIVERTED INTO AERATION BASINS WHERE BIOLOGICAL PROCESSES ALONG WITH CHEMICAL ADDITION REMOVES HIGH LEVELS OF BOD, SUSPENDED SOLIDS AND NITROGEN & PHOSPHORUS. AFTER LEAVING THE AERATION BASINS CLARIFIED - SLUDGE REMOVED BY SETTLING, AND THE CLEAR SUPERNATANT EFFLUENT IS THEN CHLORINATED TO KILL/REDUCE BACTERIA CONTENT FOLLOWED BY DECHLORINATION WITH SO2 PRIOR TO DISCHARGE TO THE RIVER.

Receiving waters: CALOOSAHATCHEE RIVER	**Classification:** I II III	
Design Flow: 11.0 MGD	**Mean Flow:** 5.0 MGD	**Flow during survey:** 5.50 MGD

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

therefore, the best time to sample is: DURING PERIODS OF GREATEST EFFLUENT FLOWS CONSISTING OF FINAL EFFLUENT

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

FACILITY DOES NOT HAVE A MIXING ZONE

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

Parameter	Limit (units)
TOTAL CHLORINE RESIDUAL PRIOR TO DECHLORINATION	0.5 mg/L FOR AT LEAST 15 MINS.
TOTAL CHLORINE RESIDUAL AFTER DECHLORINATION	NMT 0.01 mg/L AT ALL TIMES
BOD 5 DAY	ANNUAL AVG. 20 mg/L
FECAL COLIFORM	MONTHLY AVG. 200 COLONIES/100 ml (SAMPLE SHALL NOT EXCEED 800 COLONIES/100 ml)
TOTAL NITROGEN	3.0 mg/L AT 11 MGD 330 lbs/day
TOTAL PHOSPHORUS	0.5 mg/L AT 11 MGD 55 lbs/day

Describe special permit conditions and permit modifications:

Permit # ...00 File Folder Type

Permittee

INITIAL & ROUTE	MT				

District co

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:

DEC. 1992 - INOPERATIVE EFFLUENT MONITORING EQUIPMENT, AND FAILURE TO NOTIFY DEP OF MALFUNCTION.

ALL OF 1992 - INNEQUATE/INACCURATE RECORDKEEPING

OCTOBER-NOVEMBER 1993 - TO ACCESS EFFLUENT DEC. 1993 CONSENT NO. 93-0012

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

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

Additional information:

Staff contributing to this review (signature):

(Biologist)

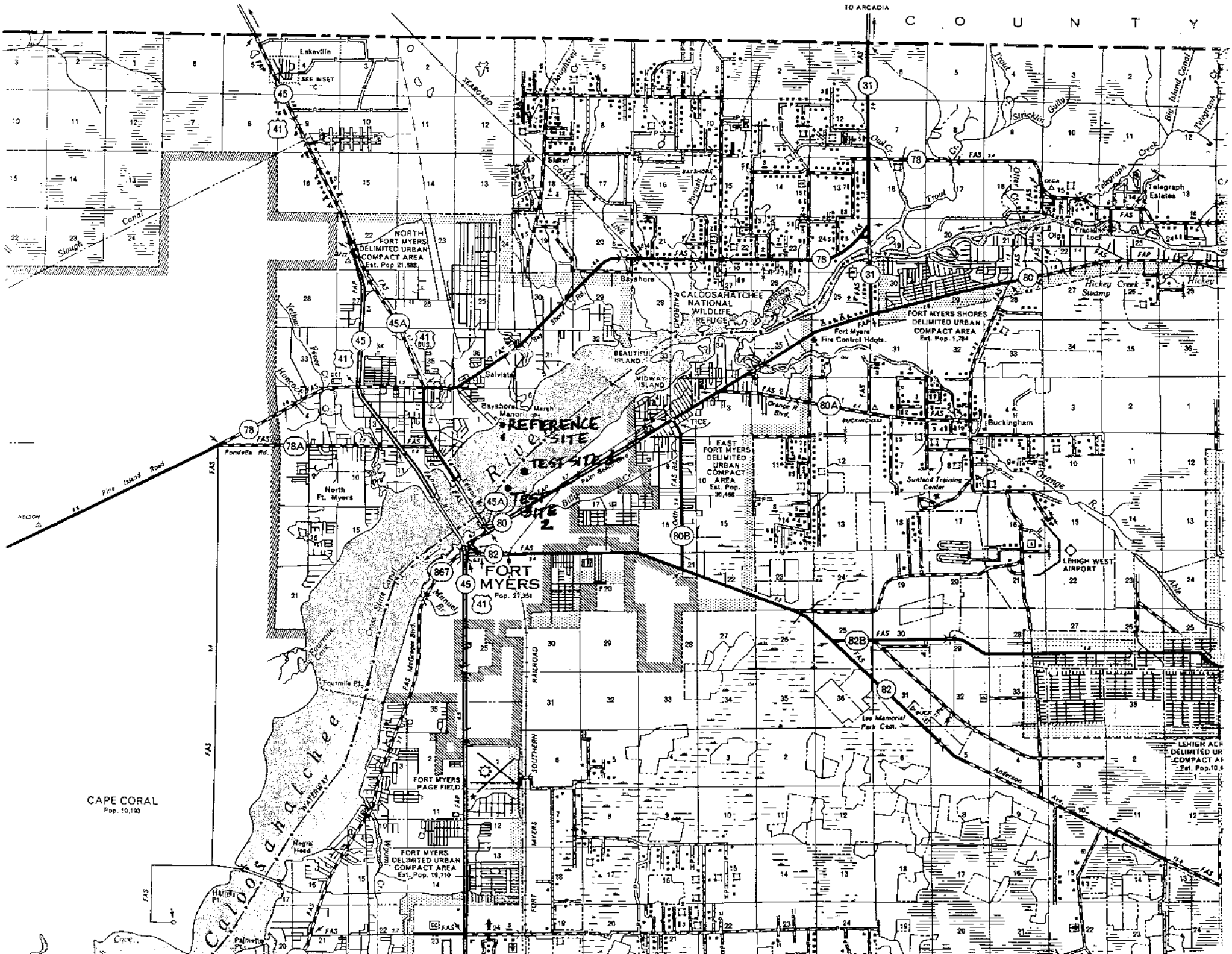
WINSTON C. ANDERSON (Inspector)

(Engineer)

( )

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TO ARCADIA
C O U N T Y
Lakeville
SEE INSET C
NORTH FORT MYERS DELIMITED URBAN COMPACT AREA Est. Pop 21,666
CALOOSAHATCHEE NATIONAL WILDLIFE REFUGE
FORT MYERS SHORES DELIMITED URBAN COMPACT AREA Est. Pop. 1,784
EAST FORT MYERS DELIMITED URBAN COMPACT AREA Est. Pop. 36,466
REFERENCE SITE
TEST SITE
TEST SITE 2
FORT MYERS Pop. 27,351
FORT MYERS DELIMITED URBAN COMPACT AREA Est. Pop. 19,710
FORT MYERS PAGE FIELD
LEHIGH WEST AIRPORT
CAPE CORAL Pop. 10,193
Caloosahatchee
Pine Island Road
Slough Canal
Seaboard
Daughtrey Cr.
Slater Cr.
Durrah
Little
Bayshore
Trout
Old Cr.
Stricklin Gully
Big Mound Canal
Telegraph Creek
Telegraph Estates
Olga
Franklin Lock
Hickey Creek Swamp
Hickey
Yellow Fever Cr.
Homeco Cr.
Shell Point
Salvista
Beautiful Island
Midway Island
Bayshore Manor
Marsh Pt.
Billy Palm Branch
Orange R. Blvd.
Buckingham
Sunland Training Center
Orange R.
Pondella Rd.
North Ft. Myers
Nelson
Cross State Canal
Fourmile Cr.
Fourmile Pt.
McGregor Blvd
Manuel Dr.
Railroad
Southern
Fort Myers
Lee Memorial Park Cem.
Anderson Ave.
Abla
Myers Cr.
Myers Head
Harney Pt.
Palmetto
Creek
Waterway
45
41
31
78
80
82
867
45A
78A
80A
80B
82B

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

SUBMITTING AGENCY CODE: 52 SUBMITTING AGENCY NAME: DER SOUTHEAST	STORET STATION NUMBER:	DATE (M/D/Y): 12-7-92	RECEIVING BODY OF WATER: CALOOSAHATCHEE R.

REMARKS:	LOCATION: FT. MYERS CENTRAL WWTP - CONTROL (OTHER SIDE OF RIVER)	FIELD ID/NAME: DW-120792-5

Habitat Parameter score	Excellent	Good	Fair	Poor
Littoral Alterations 5	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 12	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 4	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 5	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	— —	— —	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 15	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 40

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
12-7-92	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: DER SOUTH DIST	STORET STATION NUMBER:	DATE (M/D/Y): 12-7-92	RECEIVING BODY OF WATER: CALOOSAHATCHEE RIVER

REMARKS: INCOMING TIDE CAUSED EFFLUENT TO FLOW ~~UPSTREAM~~ OVER THIS STATION	LOCATION: FT MYERS CENTRAL WWTP— AFFECTED UPSTREAM (CALOOSAHATCHEE RIVER)	FIELD ID/NAME: DW-120792-3

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 5	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 12	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 4	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 5	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 5	Combination of sand, gravel, and shell. **12-15 points**	Primarily sand, with small areas of mud. **8-11 points**	Mixture of sand and mud, or well-aerated mud only. **4-7 points**	Anaerobic mud. **0-3 points**

TOTAL SCORE 38 40

COMMENTS: FLECKS OF SUSPENDED MATTER FROM OUTFALL IN WATER AT SITE, LOTS OF GULLS

ANALYSIS DATE:	ANALYST:	SIGNATURE:
12-7-92	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: DER SOUTH DIST	STORET STATION NUMBER:	DATE (M/D/Y): 12-07-92	RECEIVING BODY OF WATER: CALOOSAHATCHEE RIVER

REMARKS: INCOMING TIDE CAUSED EFFLUENT TO FLOW AWAY FROM THIS SITE WHEN SAMPLES TAKEN	LOCATION: FT. MYERS CENTRAL WWTP AFFECTED - DOWNSTREAM	FIELD ID/NAME: DW-120792-4

Habitat Parameter score	Excellent	Good	Fair	Poor
Littoral Alterations 5	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 12	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 4	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 5	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 15 after	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 40

COMMENTS: NO BIRDS OVER SITE

ANALYSIS DATE: 12-7-92	ANALYST: A.S. WALTON	SIGNATURE: Albert S Walton Jr

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 52 / SUBMITTING AGENCY NAME: DER SOUTH DIST	STORET STATION NUMBER:	DATE (M/D/Y): 12-7-92	TIME: 1420	RECEIVING BODY OF WATER: CALOOSAHATCHEE RIVER

REMARKS:	LOCATION: FT. MYERS CONTRAL WWTP CONTROL (ACROSS RIVER FROM OUTFALL)	FIELD ID/NAME: DW-120792-5

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
			75	20	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): FT. MYERS CONTRAL A WWTP OUTFALL ACROSS RIVER FROM SITE

Estimated System Width (range, m): 200	Estimated System Depth (range, m): 0-3	yes
High Water Mark (m above bed): 1	Velocity (range, m/s): 0-.25	Impounded ☐ Channelized ☐

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

SEDIMENT/SUBSTRATE (MAYBE SLIGHTLY ANAEROBIC)

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			
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble				Benthic leaf mats			
Undercut Banks/Roots				Other: FINE BLACK MUD W/ SHELL FRAGMENTS MIXED	100	3	PONAR

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top	0.25	21.5	7.7	4.87	19 000			1.2
Mid-depth				n/a				
Bottom	2							

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: CLEAR, COOL

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

SAMPLING TEAM:	SIGNATURE:	DATE:
WALTON, McGREGOR	Albert S Walton, Jr	12-7-92

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 52 / SUBMITTING AGENCY NAME: DER SOUTH	STORET STATION NUMBER:	DATE (M/D/Y): 12-7-92	TIME 1310	RECEIVING BODY OF WATER: CALOOSAHATCHEE RIVER

REMARKS:	LOCATION: FT. MYERS CENTRAL WWTP AFFECTED UPSTRM	FIELD ID/NAME: DW-120792-3

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
			100 75	20	5	

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

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

Point-Source Pollution (list location and describe): FT MYERS CENTRAL AWWTP OUTFALL ~50 M. "DOWNSTREAM" FROM SITE, BUT INCOMING TIDE WAS CARRYING EFFLUENT OVER SITE AT TIME OF SAMPLING

Estimated System Width (range, m): 2000	Estimated System Depth (range, m): 0-3 M	yes
High Water Mark (m above bed): 1	Velocity (range, m/s): 0-.25	Impounded [ ] Channelized [ ]

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

SEDIMENT/SUBSTRATE

SLIGHTLY ANAEROBIC

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			
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble				Benthic leaf mats			
Undercut Banks/Roots				Other: MUD W/ SHELL FRAGMENTS	100	3	PAN

MUD W/ SHELL FRAGMENTS

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top	0.5	25	7.0	8.3	21 000			1.2
Mid-depth								
Bottom	2.0							

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: CLEAR. COOL

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

SAMPLING TEAM: WALTON / MCGREGOR	SIGNATURE: Albert S Walton Jr	DATE: 12-7-92

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 52 / SUBMITTING AGENCY NAME: DER SOUTH EAST	STORET STATION NUMBER:	DATE (M/D/Y): 12-7-92	TIME: 1345	RECEIVING BODY OF WATER: CALOOSAHATCHEE
REMARKS:	LOCATION: FT. MYERS CENTRAL WWTP — AFFECTED DOWNSTREAM			FIELD ID/NAME: DW-120792-4

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
			75-80	20	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): FT. MYERS CENTRAL AWWTP OUTFALL ~ 50 m "UPSTREAM" OF SITE

Estimated System Width (range, m): 200	Estimated System Depth (range, m): 6-3		yes
High Water Mark (m above bed): 1	Velocity (range, m/s): 0-.25	Impounded ☐	
		Channelized ☐	

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

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☑ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic ☑ (MAYBE SLIGHTLY 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			
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble				Benthic leaf mats			
Undercut Banks/Roots				Other: MUDDY SHELL BOTTOM	100	3	PONAR

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top	0.25	21	7.3	7.1	19000			1.2
Mid-depth				AVG				
Bottom	2							

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: CLEAR, COOL

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

SAMPLING TEAM:	SIGNATURE:	DATE:
WALTON / McGREGOR	albert S Walton Jr	12-7-92

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: FT MYERS CENTRAL WWTP
Address/City:
County: LEE
Contact/District: ALBERT WALTON S
NPDES Permit #: FL00 21261 Outfall #:

Sample Collection: Date 12-7-92 Time 1107
Test Beginning: Date 12-8-92 Time 1400
Test Ending: Date 12-10-92 Time 1400
Test Organism: C. DUBIA
Life Stage/Age: < 24 HRS

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

92-DEC-08-27 460458
verified 12/11/92 KP

Remarks:

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7.07, 10.10	8.6@22.4°C	21.4@21.5°C	950 9550 @ 22.5°C
24 hr	7.07, 10.10	8.5@23.2°C	22.3°@22.2	970 9630 @ 23.7
48 hr				

		Number Live			pH			Temp. (°C)			DO (mg/L)			Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
control	A	5	5	5	8.3		8.3	22.2		24.4	9.1		7.3	148		170
control	B	5	5	5			8.3						7.4			165
control	C	5	5	5			8.3						7.4			170
control	D	5	5	5			8.3						7.4			165
100%	A	5	5	5	7.2		8.5	22.0		24.3	8.4		7.5	833		890
100%	B	5	5	5			8.5						7.5			935
100%	C	5	5	5			8.5						7.5			940
100%	D	5	5	5			8.5						7.5			940
Measured/Loaded by:		MF	MF	TM	MF		TM	MF		TM	MF		TM	MF		TM
Recorded by:		MF	TR	TR	KP		TR	KP		TR	KP		TR	KP		JR

Investigators' Signatures

Kim Pearce
Marshall Faudet
John Rader

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			0		RMe
Lab Tot. Resid. Cl2:			<0.02	DR100	KWP
Alkalinity:	125	72	118	Hach	MF
Hardness:	122	84	200	Hach	MF
Total Ammonia:	0.0	0.0	0.0	ammon	MF

Ammonia Meter Slope: −55.6
Ammonia Blank: 0.0
Salinity Sample: _____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: FT MYERS CENTRAL WWTP
Address/City:
County: LEE
Contact/District: ALBERT WALTON S
NPDES Permit #: FL00 21261 Outfall #:

Sample Collection: Date 12-7-92 Time 1107
Test Beginning: Date 12-8-92 Time 1400
Test Ending: Date 12-10-92 Time 1400
Test Organism: N. LEEDSI
Life Stage/Age: 11 DAYS

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

92-DEC-08-27 46048
verified 12/11/92 KP

Remarks:

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7, 10@10	8.6@22.4	21.4@21.5	950 9550 @22.5°C
24 hr	7@7, 10@10	8.5@23.2°C	22.3@22.3°	970 9630 @23.7
48 hr				

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48	Cond. (µmhos/cm) 0	24	48
control	413	5	5	5	7.7	8.2	8.3	21.3	22.1	22.5	8.5	8.4	7.9	235	235	255
control	85	5	5	5	7.7	8.2	8.3				8.5	8.4	7.8	235	235	260
100%	39	5	5	5	7.1	7.7	8.0	21.6	22.1	22.5	8.5	8.4	7.6	880	885	910
100%	48	5	5	5	7.1	7.7	8.0				8.5	8.4	7.6	880	885	910
Measured/Loaded by:		MF	TR	TM	MF	MF	TM	MF	MF	TM	MF	MF	TM	MF	MF	TM
Recorded by:		KP	TR	TR	KP	TR	TR	KP	TR	TR	KP	TR	TR	KP	TR	TR

Investigators' Signatures

Kim Pearce
Marshall Faircloth
Tobin Rader

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			0		RMc
Lab Tot. Resid. Cl2:			<0.02	DR100	KWP
Alkalinity:	125	72	118	Hach	MF
Hardness:	122	84	200	Hach	MF
Total Ammonia:	0.0	0.0	0.0	Orion	MF

Ammonia Meter Slope: -55.6
Ammonia Blank: 0.0
Salinity Sample: _____ ppt

Typical Values for Selected Parameters in Florida Waters

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

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

Phytoplankton taxa list and densities (#/mL) for Ft. Myers Central STP, collected via subsurface grabs in the Caloosahatchee River, on 7 December, 1992.

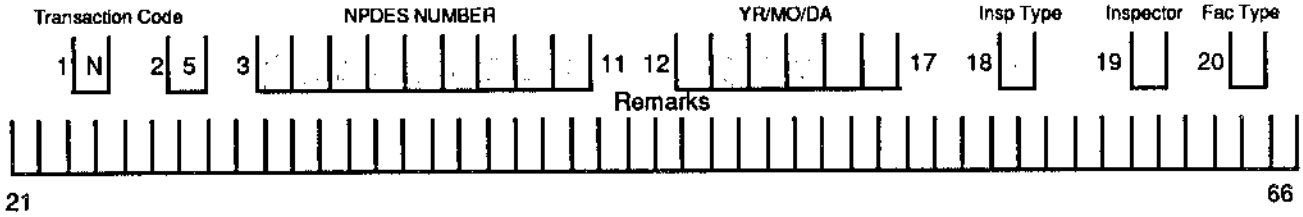
	Reference Site	Test Site 1	Test Site 2
Diatoms			
Chaetoceros sp.	109	134	165
Cymatosira sp.	28	27	–
Corethron sp.	28	–	–
Cyclotella sp.	28	–	28
Delphineis sp.	–	–	28
Diploneis sp.	–	–	110
Leptocylindrus sp.	–	27	–
Navicula sp.	28	–	28
Skeletonema sp.	247	161	137
Chlorophyta			
Unknown chlorophyte flagellate	330	322	302
Cyanophyta			
Chroococcus sp.	28	–	–
Lyngbya sp.	–	27	–
Euglenophyta			
Euglena sp.	–	27	–
Pyrrhophyta			
Dinoflagellate cyst	28	54	–
Peridinium sp.	28	54	28
Prorocentrum micans	82	–	–

Benthic macroinvertebrate taxa list for Ft. Myers Central, collected via Ponar grab samples in the Caloosahatchee River, on 7 December, 1992. Densities, in number/m^2, represent the mean of three replicates.

	Reference Site	Test Site 1	Test Site 2
Diptera			
Coelotanypus concinnus	62.4	99.8	–
Polypedilum scalaenum grp.	–	74.9	62.4
Gastropoda			
Acteocina canaliculata	12.5	–	–
Acteon punctostriatus	12.5	25.0	12.5
Odostomia sp.	–	–	49.9
Undetermined gastropod	–	12.5	–
Malacostraca			
Amphipoda			
Grandidierella bonnieroides	6137.7	6786.4	13261.0
Cumacea			
Cyclaspis varians	461.6	499.0	723.6
Decapoda			
Rhithropanopeus harrisii	25.0	37.4	12.5
Isopoda			
Cyathura polita	25.0	149.7	286.9
Edotea montosa	37.4	112.3	224.6
Mysidacea			
Bowmaniella sp.	–	–	12.5
Mysidopsis sp.	–	25.0	–
M. almyra	12.5	12.5	–
Nemertina			
Undetermined nemertean	199.6	187.1	112.3
Undetermined nemertean sp. 2	–	37.4	–
Odonata			
Erythemis simplicicollis	12.5	–	–
Pelecypoda			
Amygdalum papyria	187.1	586.3	2033.4
Macoma sp.	25.0	–	–
Undetermined Dreissenidae	112.3	586.3	3493.0
Undetermined Mactridae	436.6	935.6	1297.4
Undetermined pelecypod sp. 1	–	24.95	262.0
Undetermined pelecypod sp. 2	25.0	24.95	87.3
Undetermined Pelecypoda	199.6	87.3	324.4
Turbellaria			
Stylochus ellipticus	12.5	–	–
Undetermined turbellarian	–	25.0	149.7
Polychaeta			
Etecone heteropoda	49.9	37.4	12.5

Hobsonia florida	137.2	860.8	399.2
Mediomastus sp.	–	–	12.5
Nematonereis hebes	–	–	12.5
Nereis sp.	–	12.5	49.9
N. succinea	37.4	–	–
Polydora ligni	–	37.4	12.5
Streblospio benedicti	4054.4	4179.1	761.0
Undetermined Capitellidae	–	12.5	–
Undetermined polychaete sp.	–	12.5	–
Total density	12275.7	15481.6	23665.5

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



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