

Biological Assessment of

City of Oldsmar Wastewater Treatment Plant

Pinellas County

NPDES #FL0027651

Sampled December 1998

June 1999

Biology Section
Division of Administrative and Technical Services
Bureau of Laboratories

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection

Results of Fifth Year Inspections

Discharger:	City of Oldsmar WWTP
County:	Pinellas
NPDES Number:	FL0027651
Permit Expiration Date:	9/30/99

Toxics Sampling Inspection (XSI)

Date Sampled: 14 December 1998

Results: Copper (3.4 µg/L) was detected in the effluent sample at a level that exceeded Class III marine water quality standards, Rule 62-302.530(24) FAC. Aluminum, cadmium, iron, lead, silver, and zinc were detected in the effluent sample at levels that complied with Class III marine water quality standards. Atrazine was detected in the effluent sample at a level below the practical quantitation limit.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 14 December 1998

Results: The effluent was not toxic to the invertebrate, *Ceriodaphnia dubia,* or to the fish, *Cyprinella leedsi,* during the 48-hour bioassay.

Impact Bioassessment Inspection (IBI)

Date Sampled: 14 December 1998

Results: Macroinvertebrate taxa richness was 18% higher at the two test sites compared to the control site. Shannon-Weaver diversity decreased by 41% at test site 1 compared to the control site, which does not meet the biological integrity criterion (Rule 62-302.530(11) FAC). All three sites were dominated by pollution-tolerant organisms, and had similar numbers of polychaete taxa. In general, the macroinvertebrate communities were poor at all three study sites.

Water Quality Inspection (WQI)

Date Sampled: 14 December 1998

Results: Ortho-phosphate, total phosphorus and TKN levels at all three study sites were 85% higher than those normally found in Florida's estuaries. The Algal Growth Potential (AGP) exceeded the 10 mg dry wt/L "problem threshold" at test site 1. The effluent AGP was 11.4 mg dry wt/L. Chlorophyll *a* was elevated at the control site and test site 2. Overall, algal densities were fairly typical for a marine system, with the control site having the highest densities.

This biological assessment was prepared by DEP staff to provide information to be used in reviewing an NPDES permit renewal application for the subject facility. This assessment will be used in conjunction with other information concerning the facility and its receiving water body to determine appropriate final permit conditions.

Introduction

The City of Oldsmar Wastewater Treatment Plant is located in Pinellas County, Florida (see maps in the Appendix). This domestic waste water facility provides advanced treatment by activated sludge process. The facility's discharge is located a half mile south of the plant where it enters a herbaceous wetland/pond area via a concrete box and weir. The effluent then flows into a tidal creek which eventually flows into Mobbly Bay. The design flow of the wastewater system is 2.5 MGD. The actual mean flow during this survey was 1.8 MGD.

State permit limits for the City of Oldsmar Wastewater Treatment Plant are listed in Table 1. According to the facility's monthly operating reports, the plant has been in exceedance of the state surface water quality standards for copper and is presently under negotiations with the Southwest District's Domestic Wastewater Compliance/ Enforcement in regards to these levels (see Facility Summary in the Appendix).

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a control site (located on the southwest side of a peninsula within a wetlands/pond area which eventually flows into Mobbly Bay) and two test sites bracketing the discharge (which flows into the northeast section of the pond) (see map in the Appendix). A habitat assessment was performed *in situ* to establish comparability between sites, and supplemental physical/chemical data were also collected on the effluent and study sites during an outgoing tide on December 14, 1998. The effluent was analyzed for nutrients, metals, and for organic constituents (base neutral and acid extractables, and pesticide extractables). Methods used for all chemical analyses are on file at the DEP Central Chemistry Laboratory in Tallahassee.

Acute screening toxicity bioassays, using the invertebrate, *Ceriodaphnia dubia,* and the fish, *Cyprinella leedsi*, as test organisms, were performed on an effluent sample. Sediments from control and test sites were analyzed for grain size and percent organic matter.

Phytoplankton were sampled at both control and test sites via subsurface grabs. Chlorophyll *a* was also determined for phytoplankton communities. Algal Growth Potential (AGP) tests were performed using *Selenastrum capricornutum* as the test organism for the freshwater effluent and *Dunaliella tertiolecta* for the marine receiving-water sites.

Benthic macroinvertebrate communities were evaluated at control and test sites using three replicate petite Ponar grabs. Several different measures of macroinvertebrate and algal community health have been employed to determine the effects of the discharge. These measurements include: taxa richness, Shannon-Weaver Diversity Index, community composition, functional feeding groups, and algal biomass. For discussion of each of these measures see the *Explanation of Measurements of Community Health* in the Appendix. All field and laboratory biological methods followed Biology Section Standard Operating Procedures (SOP's). The SOP's can be viewed on our web site at <www.dep.state.fl.us/labs/sops.htm>.

The following personnel were involved in this investigation: Andrea Grainger and Charles Kovach (DEP Southwest District), and Julie Baughman, Ken Espy, Marshall Faircloth, Russel Frydenborg, Joy Jackson, Michael Heyn, Elizabeth Miller, Urania Quintana, Johnny Richardson, Lisa Tamburello, Amy Weaver, Steve Wolfe, David Whiting, and Vicki Whiting (DEP Central Biology Laboratory in Tallahassee). The report was reviewed by the Point Source Studies Review Committee, consisting of Wayne Magley, Chuck Ziegmont, and Michael Tanski, as well as District representatives.

Results

Shorelines were mostly natural at all three study sites (see Habitat Assessment Field Data Sheets in Appendix). Three community types were observed at the control site; mangroves, mussel beds, and natural beach. Only two community types were observed at the test sites; mangroves and natural beach. The substrate at the study sites consisted mainly of sand with some areas of mud. Sediment particle sizes between 0.125–0.5 mm in diameter made up 84% of the control site, 85% of test site 1 and 86% of test site 2. Habitat scores were in the "good" category at all three study sites, ranging from 63 points at the two test sites to 76 points at the control site (Habitat Assessment Sheets in Appendix). The remaining results are in Tables 1 and 2.

Table 1. Effluent limits and summary of chemistry data.

City of Oldsmar WWTP	Effluent Limits	Effluent Samples	Control Site	Test Site 1	Test Site 2
Organic Constituents (µg/L)					
Atrazine	-	0.3 I	-	-	-
Metals (µg/L)					
Aluminum	≤ 1500 **	55	-	-	-
Arsenic	≤ 50 **	20 U	-	-	-
Cadmium	≤ 9.3 **	0.05 I	-	-	-
Chromium	≤ 50 **	10 U	-	-	-
Copper	≤ 2.9 **	3.4	-	-	-
Iron	≤ 300 **	37 I	-	-	-
Lead	≤ 5.6 **	0.26 I	-	-	-
Mercury	≤ 0.025 **	0.1 U	-	-	-
Nickel	≤ 8.3 **	6 U	-	-	-
Selenium	≤ 71 **	40 U	-	-	-
Silver	≤ 2.3 **	0.04	-	-	-
Zinc	≤ 86 **	35	-	-	-
Nutrients (mg/L)					
Ortho-phosphate	-	0.16 J	0.14	0.16 A	0.16
Total phosphorus	-	0.24	0.28	0.4	0.3
Ammonia	-	0.03	0.03	0.047	0.035
Nitrate+Nitrite	-	0.14	0.004	0.006 I	0.004
TKN	-	1.0	1.1	1.2	1.1
Organic Nitrogen	-	0.97	1.07	1.15	1.07
Total Nitrogen	3* a	1.14	1.10	1.20	1.10
General Phys-Chem Parameters					
Habitat Assessment	-	-	76	63	63
D.O. (mg/L)	-	-	6.7	5.6	5.3
pH (SU)	(6.0-8.5) **	-	7.2	7.3	7.3
Conductivity (µmhos/cm)	-	825	23,480	19,440	23,479
Salinity (ppt)	-		15.5	12.7	15.6
Temperature (°C)	-	-	21.3	21.9	22.0
B.O.D. 5 day (mg/L)	-	-	3	2	3
C.B.O.D., 5 day (mg/L)	5* a	2 U	-	-	-
Flow (MGD)	2.5 *	1.8	-	-	-
T.S.S. (mg/L)	5* a	1 U	20	18	17
Turbidity (mg/L)	-	0.4	9.8	7.5	8.4
AGP (mg dry wt/L)	-	11.4	4.5	11.9	8.1
Toxicity (48-hour static, screening bioassay)					
Bioassay - Fish	-	Not Toxic	-	-	-
Bioassay - Invertebrate	-	Not Toxic	-	-	-
Microbiology (# counts/100ml)					
Fecal Coliforms	25*	3 J	77	480	280
Total Coliforms	-	1340	1600 L	1600 L	1600 L

* Permit Limit

** Class III water quality standard

a - Annual average

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

I - Value reported is less than the minimum quantitation limit, and ≥ the minimum detection limit

J - Estimated value

L - Actual value is known to be greater than value given.

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

Discussion

Copper (3.4 µg/L) was detected at a level that exceeded Class III marine water quality standards, Rule 62-302.530(24) FAC. Aluminum, cadmium, iron, lead, silver and zinc were detected in the effluent sample at levels that complied with Class III marine water quality standards (Table 1). Atrazine was detected in the effluent sample at a level below the practical quantitation limit.

The effluent sample was not toxic to the fish, *Cyprinella leedsi,* or to the invertebrate, *Ceriodaphnia dubia,* during the 48-hour bioassay (Appendix).

All the effluent nutrients complied with the facility's permit limits (Table 1). Ortho-phosphate and total phosphorus levels at all three study sites were 85% higher than those normally found in Florida's estuaries (see *Typical Values for Selected Parameters in Florida Waters* in the Appendix). TKN levels were similar among all three study areas and also exceeded levels normally found in 85% of Florida's estuaries.

AGP, which measures bioavailable nutrients via algal response, was below the 10 mg dry wt/L "problem threshold" (Ron Raschke, U.S. EPA, pers. comm.) at the control site and test site 2, but slightly exceeded this level at test site 1 (Table 1).

The increased nutrients at the study sites did not appear to have altered the phytoplankton communities (Figure 1). Although algal densities were low for a marine system at all three study sites, they were roughly twice as high at the control site compared to the test sites. Chlorophyll *a* was 40% higher at the control site compared to test site 2 and was undetected at test site 1 (Table 2).

Most of the macroinvertebrate community health parameters were similar among the three study areas with one notable exception (Figure 2). The diversity was considerably lower at test site 1 (1.71) com-

Table 2. Community structure of control and test sites.

City of Oldsmar WWTP	Control Site	Test Site 1	Test Site 2
Macroinvertebrate Quantitative			
Number of Taxa	14	17	17
Shannon-Weaver diversity	2.9	1.7	2.5
No. Polychaete Taxa	7	7	6
Community Composition			
% Amphipoda	3.0	1.0	1.0
% Decapoda	1.0	0.0	1.0
% Nemertea	2.0	1.0	2.0
% Pelecypoda	0.0	2.0	3.0
% Polychaeta	69.0	80.0	69.0
% Oligochaeta	25.0	17.0	24.0
Functional Feeding Groups			
% Browsers-grazers	2.0	0.0	1.0
% Burrowing Deposit Feeders	49.0	25.0	43.0
% Predators/Carnivores	15.0	35.0	22.0
% Scavengers	2.0	0.0	1.0
% Surface Deposit Feeders	21.0	36.0	26.0
% Suspension Feeders	9.0	4.0	8.0
% Unknown	2.0	0.0	0.0
Phytoplankton Algae			
Number of Taxa	6	6	8
Shannon-Weaver diversity	1	1	1
Chlorophyll *a* (µg/L)	23.8 A	1.0 U	14.3
Algal Density (#/mL)	16,952	7,473	9,386
% Blue-green	0	0	1
% Cryptophytes	4	4	1
% Diatoms	96	96	96
% Dinoflagellates	0	0	2
AGP (mg dry wt/L)	4.5	11.9	8.1

A- Value reported is the mean of two or more determinations
U - Material analyzed for but not detected; value is the minimum detection limit

pared to the control site (2.86) or test site 2 (2.53). This 41% reduction at test site 1 fails to comply with the Class III marine water quality biological integrity criterion (Rule 62-302.530(11) FAC). The pollution-tolerant polychaete, *Laeonereis culveri*, was the dominant taxon at the test sites where it made up 67% and 39% of test sites 1 and 2, respectively (Macroinvertebrate Taxa Lists in the Appendix). The control site was dominated by pollution-tolerant tubificid worms (25% contribution). The increase in contribution of the dominant taxon from 25% at the control site to 67% at test site 1, resulted in the lower diversity at test site 1. Pelecypods, normally indicators of "good water quality" were absent from the control site, and made up only 2% and 3% of test sites 1 and 2, respectively. In general, the macroinvertebrate community health was poor at all three study sites, and with the exception of the decrease in diversity at test site 1, the community characteristics were similar among the three study sites.

Literature Cited

EA Engineering, Science, and Technology and Tetra Tech, Inc. 1994. Bioassessment for the nonpoint source program (draft). Prepared for the Fla. Dept. Environ. Protection. Unpaginated.

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. 1993. 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.

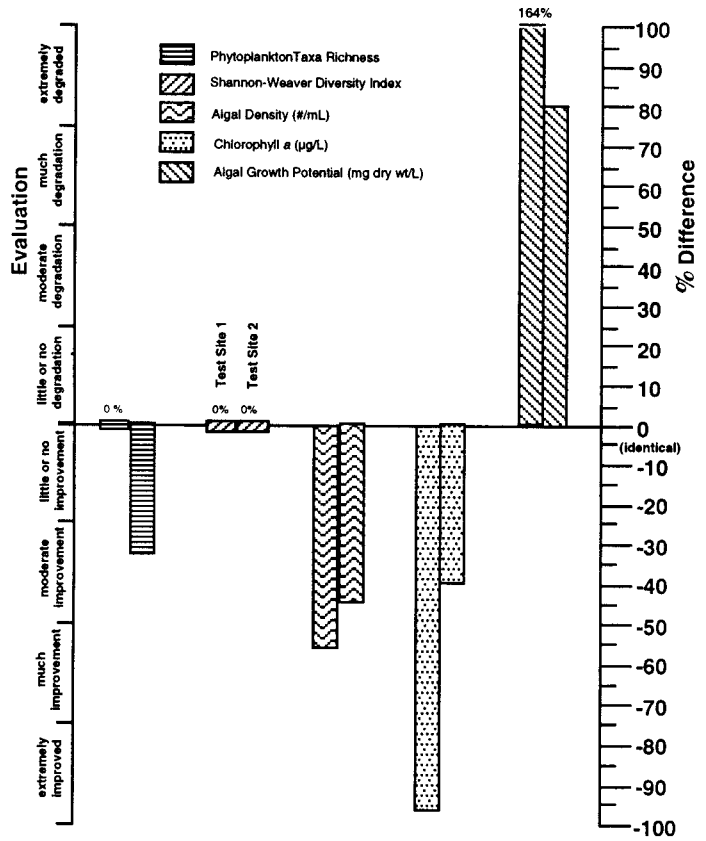


Figure 1. Effect of discharge on the phytoplankton community.

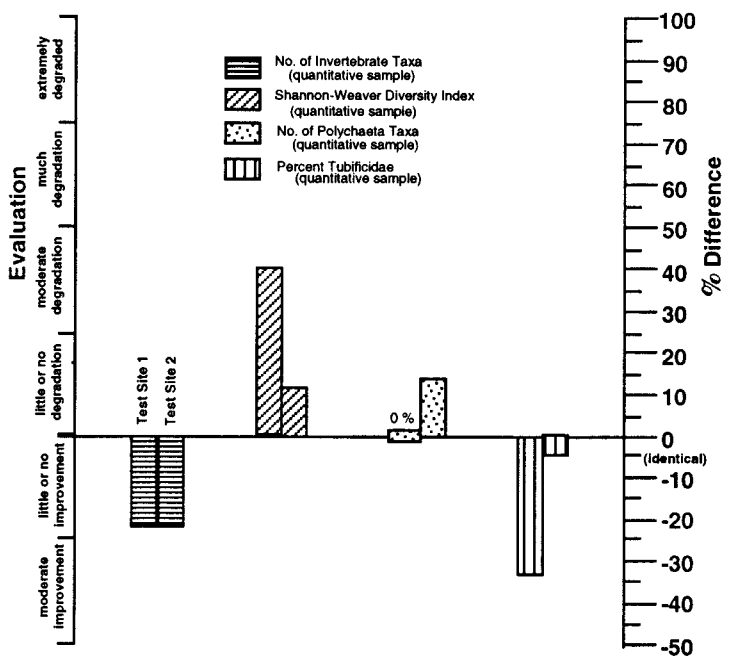


Figure 2. Effect of discharge on the macroinvertebrate community.

Explanation of Measurements of Community Health

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

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

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

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

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

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

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

Typical Values for Selected Parameters in Florida Waters

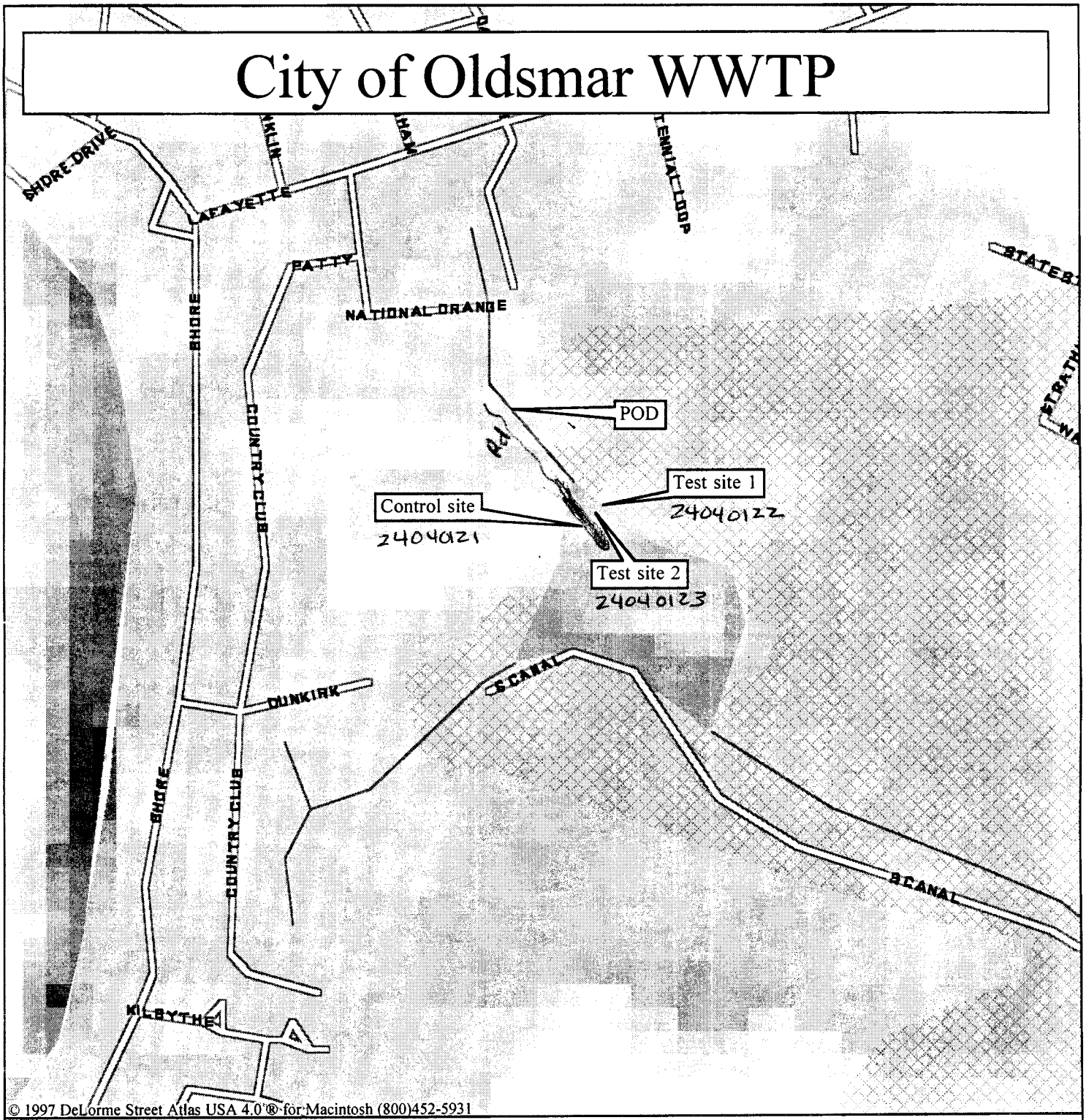
Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

Percentile Distribution

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

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

City of Oldsmar WWTP



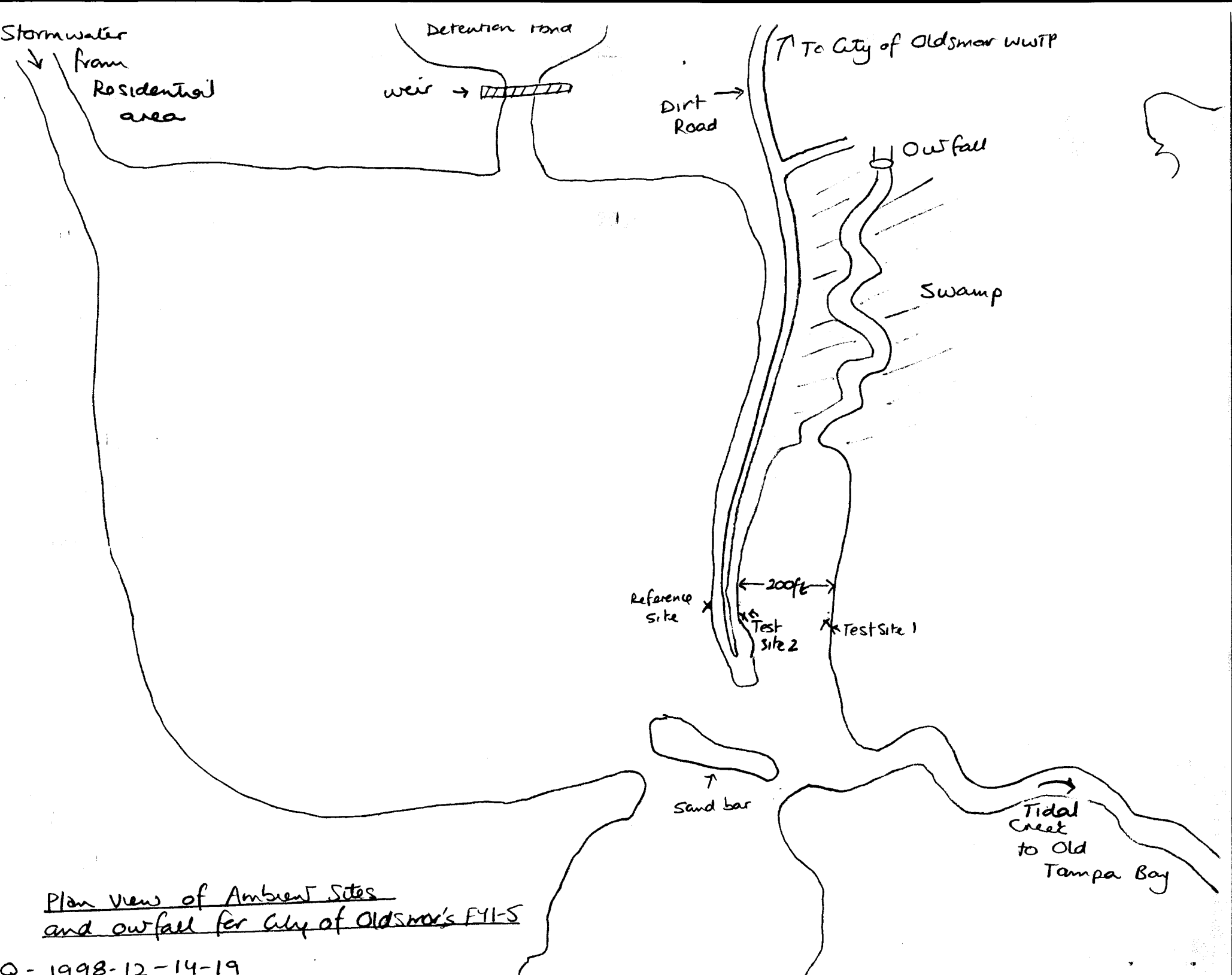
© 1997 DeLorme Street Atlas USA 4.0® for Macintosh (800)452-5931

Mag 16.00
Thu Jan 14 13:18 1999
Scale 1:7,812 (at center)

500 Feet

200 Meters

- Local Road
- Water
- Population Center
- Wetland
- River/Canal



Plan View of Ambient Sites
and outfall for City of Oldsmar's FY1-5

O - 1998-12-14-19

Facility Summary Sheet for City of Oldsmar WWTP's FYI-5 Conducted in December 1998

Facility Name: City of Oldsmar WWTP Date Summary Prepared: 12/28/98

Location: send map County: Pinellas District: SW District

Function of Facility: Domestic wastewater treatment plant.

Description of Treatment Process: A Type I wastewater treatment plant that provides advanced treatment by the activated sludge process.

Receiving Waters: Old Tampa Bay Water Classification: Class III Marine

Design Flow: 2.5 mgd Mean Flow: 1.8 mgd

The Discharge is Continuous

List Effluent Limits:

Parameter	Min	Max	Type Sample	Frequency
TSS (mg/L)	0	5 annual avg.	fpc*	weekly
CBOD5 (mg/L)	0	5 annual avg.	fpc	weekly
Fecal Coliform (#/100 ml)	**ND	25	grab	weekly
Total nitrogen (mg/L)	0	3 annual avg.	fpc	weekly
TRC (mg/L)	0	0.01	grab	continuous
Flow (mgd) continuous	0.000	2.25	record flow rate	
pH (SU)	6.00	8.50	grab	daily, 5/week

* flow proportioned composite sample
** Non-detectable in at least seventy-five percent of the samples collected during the monthly reporting period.

Description of permitted outfall: The outfall is located approximately half a mile south of the WWTP and is a concrete box with a weir. From the weir the effluent discharges into a freshwater herbaceous wetland that flows into an estuarine forested wetland system (Brazilian peppers and white mangroves) located approximately 300 feet from the outfall. The effluent meanders in a tidal creek within the forest for a quarter of a mile and then flows into Mobbly Bay tidal pool system.

List permit violations and plant upsets that occurred within past 3 years: This facility been in exceedance of the state surface water quality standard for copper. Presently, Domestic Wastewater Compliance/Enforcement is in negotiations with the facility in regard to its effluent copper levels.

Describe previous impact bioassessments, WQBELs, and previous and current enforcement actions: In July 11 to 13, 1995, the Department conducted a FYI-3 at this facility. The results indicated that the effluent copper levels was 0.1 µg/L above its surface water quality standard for a class marine waterbody. The 48-hour acute screen toxicity test did not indicate toxicity.

Staff contributing to this review:
Andrea Grainger (Biologist)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION RQ-1998-12-14-19

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
	24040121	12/14/98	1140	Old Tampa Bay

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Tide going out	Pinellas	City of Oldsmar Control site	Reference Site 24908 → 24910

RIPARIAN ZONE/INSTREAM FEATURES

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

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

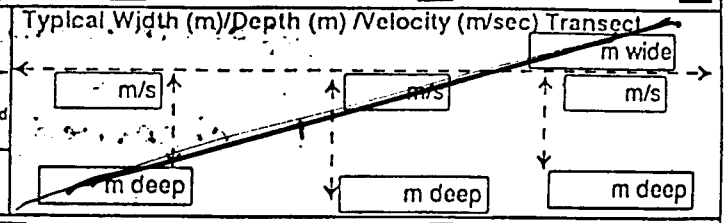
Local Watershed Erosion (check box): None ☐ Slight ☐ Moderate ☑ Heavy ☐

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

Width of riparian vegetation (m) on least buffered side: 2

List & map dominant vegetation on back

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



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

Artificially Impounded ☐ yes more sinuous

High Water Mark: 0.6 (m above present water level) + 0.3 (present depth in m) = 0.9 (m above bed)

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

SEDIMENT/SUBSTRATE

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

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

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

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

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	~~Cond.~~ (µmho/cm) or Salinity (ppt):			Secchi (m):
Top								
Mid-depth	0.2	21.33	7.20	6.68	15.50‰			VOB
Bottom								

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

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

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

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

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

Weather Conditions/Notes:
Cold, windy, overcast. Tide going out at rapid pace. The mangroves had thick beds of mussel growing around them.

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Andrea Grainger	Andrea Grainger	12/16/98

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION RQ-1998-12-14-1C
MARINE BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		11/14/98	Old Tampa Bay

REMARKS:	LOCATION:	FIELD ID/NAME:
Tide's out	City of Oldsmar	Reference Site 24908 → 24910

Habitat Parameter / Score	Excellent	Good	Fair	Poor
Littoral Alterations: 10	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed: 27 38	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 tidal creek mangroves mussel beds natural beach	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation: 3	>0.75 m. 4-5 points	0.5 - 0.75 m. (3) points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations: 3	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action: 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: 12	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: 76

COMMENTS: Please note that only reference site had thick beds of mussels growing around mangroves. This was not the case at te

ANALYSIS DATE:	ANALYST:	SIGNATURE:
12/16/98	Grainger	Candrea Grainger

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION RQ-1998-12-14-19

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
	2404122	12/14/98	1000	Old Tampa Bay

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Tide going out	Pinellas	City of Oldsmar	Test Site 1 24902 to 24904

RIPARIAN ZONE/INSTREAM FEATURES

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

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

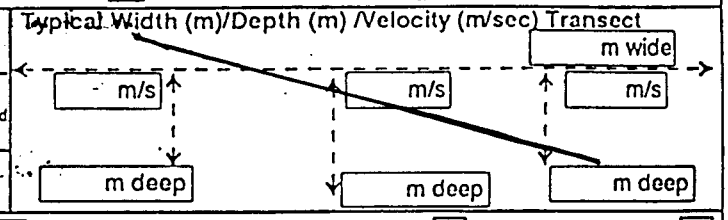
Local Watershed Erosion (check box): None ☐ Slight ☐ Moderate ☑ Heavy ☐

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

Width of riparian vegetation (m) on least buffered side: 2

List & map dominant vegetation on back

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



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

Artificially Impounded ☐ yes more sinuous

High Water Mark: 0.6 (m above present water level) + 0.3 (present depth in m) = 0.9 (m above bed)

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

SEDIMENT/SUBSTRATE

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

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

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

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

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top								
Mid-depth	0.2	21.91	7.25	5.64	12.7			VOS
Bottom								

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

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

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

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

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

Weather Conditions/Notes:
windy, cold, overcast. Tide going out.

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Granger	Chauncea Frampton	12/16/98

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		12/14/98	Old Tampa Bay

REMARKS:	LOCATION:	FIELD ID/NAME:
Tide going out	City of Oldsmar	24902 -> 24904 Test Site 1

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations **10**	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed **26**	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points mangroves Tidal Creek	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation **3**	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations **3**	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action **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, o 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 **63**

COMMENTS: No mussel beds under and around mangroves.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
12/16/98	Grainger	Candace Grainger

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION RQ-1998-12-14-19

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
	24040123	12/14/98	1045	Old Tampa Bay

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Tide going out	Pinellas	City of Oldsmar	24905→24907 Test Site 2

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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

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

Width of riparian vegetation (m) on least buffered side: 2

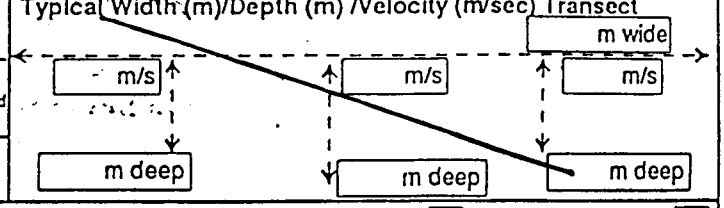
List & map dominant vegetation on back

Artificially Channelized ☑ no ☐ recent severe ☐ some recovery ☐ mostly recovered

Artificially Impounded ☐ yes ☐ more sinuous

High Water Mark: 0.6 (m above present water level) + 0.3 (present depth in m) = 0.9 (m above bed)

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



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

SEDIMENT/SUBSTRATE

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

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

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

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

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	~~Cond.~~ (µmho/cm) or Salinity (ppt):			Secchi (m):
Top								
Mid-depth	0-2	22.84	7.31	5.33	15.56			VOB
Bottom								

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

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

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

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

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

Weather Conditions/Notes:
Cold, windy, overcast. Tide going out.
No mussel beds in and around the mangroves

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Grainger	Candrea Granger	12/16/98

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		12/14/98	Old Tampa City

REMARKS:	LOCATION:	FIELD ID/NAME:
Tide going out	City of Oldsmar	24905→24908 Test Site 2

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations **10**	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed **26**	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points mangroves tidal creek	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation **2**	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations **3**	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land 0-2 points
Flow and Wave Action **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; 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 **63**

COMMENTS: No mussel beds growing on and around mangroves

ANALYSIS DATE:	ANALYST:	SIGNATURE:
12/16/98	Grainger	Cindrea Grainger

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Oldsmar
County: Pinellas
Contact / District: Andrea Grainger / SWD
NPDES Permit #: FL0027651
LIMS Sample #: 361004 LIMS Job #: TLH-1998-12-15-14
sample log — DW
Test Type: Screening | Definitive
Static | Static Renewal | Flow-through
Test Number: 1 of 2

Sample Collection: Date 12/14/98 Time 13:00
Test Beginning: Date 12/15/98 Time 15:40
Test Ending: Date 12/17/98 Time 1540
Organism Batch #: 94 Diluent Batch #: 1
Organism Age: <24hours SRT toxicant batch #: NA
Test organism: Ceriodaphnia dubia

Remarks:

Temperature Ranges
Incubator #2 25.5-27.0°C
Room 23.5-25.0°C

Conc.	Chamber #	Number Live 0 hr	24 h	48 h	pH 0 hr	24 h	48 h	Temperature (°C) 0 hr	24 h	48 h	D.O. (mg/L) 0 hr	24 h	48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Ctl	A	5	5	5	8.0		7.8	24.3		25.0	7.7		7.7	280		310
Ctl	B	5	5	5			8.0			25.0			7.7			325
Ctl	C	5	5	5			8.1			24.9			7.7			320
Ctl	D	5	4[1D]	3[1D]			8.1			24.6			7.8			330
100%	A	5	5	5	7.9		8.5	24.5		24.7	7.7		7.8	800		860
100%	B	5	5	5			8.5			25.1			7.8			895
100%	C	5	5	5			8.5			25.0			7.7			885
100%	D	5	4[1D]	4			8.5			24.4			7.7			900
measured by:		DW	FW		CH		DAW	CH		DAW	CH		DAW	CH		DAW
recorded by:		FW	FW		DAW		CH	DAW		CH	DW		CH	DAW		CH

Investigators' Signatures

Salt Water / Well Water

Water Quality Parameters	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):		NOT measured			mf
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	DR-100	CH	mf
Alkalinity (mg/L as $CaCO_3$):	71	175	Hach	CH	mf
Hardness (mg/L as $CaCO_3$):	89	200	Hach	CH	mf
Total ammonia (mg/L as N):	<0.017	<0.017	orion	FW	mf
Salinity:	0	0	YCT	CH	mf

reviewer

form updated 5/22/98

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Oldsmar
County: Pinellas
Contact / District: Andria Grainger / SWD
NPDES Permit #: FL0027651
LIMS Sample #: 361004 LIMS Job #: TLH-1998-12-15-14
sample log DW

Sample Collection: Date 12/14/98 Time 13:00
Test Beginning: Date 12/15/98 Time 14:50
Test Ending: Date 12/17/98 Time 1500
Organism Batch #: 96 Diluent Batch #: well H2O
Organism Age: 11 days SRT toxicant batch #: NA
Test organism: Cyprinella (redfish)

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

Temperature Range Incubator #3 24.0-26.0°C Room 23.5-25.0°C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) 0 hr	UNCORRECTED Cond. (mmhos/cm) 24 h	UNCORRECTED Cond. (mmhos/cm) 48 h
Ctl A	D1	5	5	5	7.9	8.4	8.4	23.7	23.5	24.3	7.4	7.5	7.7	230	230	255
Ctl B	D2	5	5	5	7.9	8.4	8.4	23.9	23.4	24.4	7.6	7.6	7.9	240	240	255
Ctl C	D3	5	5	5	8.0	8.4	8.4	24.0	23.3	24.3	7.5	7.7	7.8	245	245	255
Ctl D	D4	5	5	5	8.0	8.4	8.4	24.6	23.4	24.2	7.6	7.9	7.9	250	245	255
100% A	D5	5	5	5	7.7	8.3	8.4	24.0	23.0	24.0	7.4	7.7	7.8	800	750	840
100% B	D6	5	5	5	7.7	8.3	8.4	23.9	22.7	24.1	7.4	7.6	7.8	840	820	900
100% C	D7	5	5	5	7.7	8.3	8.4	23.9	22.8	24.1	7.4	7.7	7.8	860	830	895
100% D	D8	5	5	5	7.7	8.2	8.4	24.3	23.2	24.3	7.5	7.6	8.1	870	830	890
measured by:		DW	CH	CH	CH	CH	DAW	CH	CH	DAW	CH	CH	DAW	CH	CH	DAW
recorded by:		DW	CH	CH	DW	FW	CH	DW	FW	CH	DAW	FW	CH	DW	FW	CH

Investigators' Signatures

Carolyn Head
David A. Webb (DAW)
Tran Nguyen
Dan Wilk (DW)
Marshall Faircloth

Salt Water / Well Water	20% Min Water	Water Quality Parameters: Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):		Not Measured			MF
Lab Total Residual Cl2 (mg/L): <0.03		~~DR*10~~ <0.03	DR-100	CH	MF
Alkalinity (mg/L as $CaCO_3$): 125		175	Hach	CH	MF
Hardness (mg/L as $CaCO_3$): 125		200	Hach	CH	MF
Total ammonia (mg/L as N): <0.017		<0.017	Orion	FW	MF
Salinity: 0	-	0	YCT	CH	MF

* Method in Sample Space MF 12-17-98

reviewer form updated 5/22/98

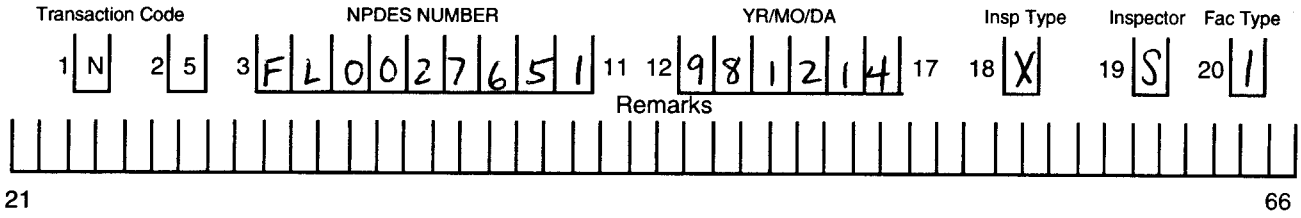
Phytoplankton taxa list and densities (#/mL) for City of Oldsmar WWTP, collected via subsurface grabs in a wetland/pond area on 14 December, 1998.

	Control Site	Test Site 1	Test Site 2
Bacillariophyceae			
Amphora sp.	–	49	–
Asterionella sp.	235	–	–
Chaetoceros sp.	1060	293	544
Cylindrotheca sp.	118	–	68
Navicula sp.	–	49	–
Nitzschia sp.	118	49	68
Pennales sp.	353	488	272
Rhizosolenia sp.	–	–	136
Skeletonema sp.	14363	6252	7958
Cryptophyceae			
Chroomonas sp.	706	293	68
Cyanophyceae			
Oscillatoria sp.	–	–	68
Dinophyceae			
Ceratium sp.	–	–	68
Undetermined Dinophyceae	–	–	136

Benthic macroinvertebrate taxa list for City of Oldsmar WWTP collected via Ponar grab samples in a wetland/pond area, on 14 December, 1998. Densities, in number/m^2, represent the mean of three replicates.

	Control Site	Test Site 1	Test Site 2
Amphipoda			
Corophium sp.	14	14	–
Gammarus mucronatus	14	14	–
Gammarus sp.	–	14	–
Grandidierella bonnieroides	83	14	28
Chironomidae			
Chironomus sp.	–	14	14
Dicrotendipes modestus	–	–	14
Dicrotendipes neomodestus	–	–	14
Polypedilum scalaenum grp.	–	14	–
Decapoda			
Palaemonetes pugio	–	–	14
Palaemonetes sp.	28	–	14
Undetermined Decapoda	28	–	28
Gastropoda			
Epitonium rupicola	–	–	14
Undetermined Gastropoda	–	14	–
Isopoda			
Edotea montosa	14	–	–
Mysidaecea			
Taphromysis sp.	–	14	–
Nemaetea			
Undetermined Nemertea	69	42	83
Oligochaeta			
Tubificidae	1028	1306	1361
Pelecypoda			
Amygdalum papyrium	–	–	14
Parastarte triquetra	–	–	42
Tellina sp.	–	153	125
Tellina versicolor	–	–	14
Polychaeta			
Ampharetidae	–	–	28
Capitellidae	806	569	944
Eteone heteropoda	69	97	28
Eteone sp.	–	–	14
Hobsonia florida	–	42	42
Laeonereis culveri	958	5236	2222
Leitoscoloplos fragilis	181	42	56
Orbiniidae	14	–	125
Pectinaria gouldi	–	28	–
Polydora sp.	500	–	–
Spionidae	–	14	–
Stenoninereis martini	83	–	–
Streblospio benedicti	250	222	528

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



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

