

Biological Assessment of

Pensacola Main Street Sewage Treatment Plant

Escambia County

NPDES #FL0021440

Sampled September 1991

March 1992

Biology Section
Division of Technical Services

Department of Environmental Regulation

Results of Fifth Year Inspections

Discharger: Pensacola Main Street STP
County: Escambia
NPDES Number: FL0021440
State Permit Expiration Date:

Toxics Sampling Inspection (XSI)

Date Sampled: 23 September 1991

Results: Organics analyses detected bis (2-ethylhexyl) phthalate (12 µg/L) and unidentified aliphatic compounds at 27 µg/L. It is possible that these organic constituents, or others not analyzed for, contributed to the observed toxicity. Metals found in the effluent included aluminum (73 µg/L), iron (118 µg/L), and zinc (12 µg/L). These values are within Class III standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 23 September 1991

Results: Toxic to *Ceriodaphnia dubia*, with a 48 hour LC_{50} of 37%.

Impact Bioassessment Inspection (IBI)

Date Sampled: 23 September 1991

Results: No apparent detrimental effects on benthic macroinvertebrate or phytoplankton communities could be attributed to this discharge at this time. Microbiological analyses indicated low levels of total coliform bacteria in the effluent. Fecal coliforms were not detected in the effluent or any study sites.

Water Quality Inspection (WQI)

Date Sampled: 23 September 1991

Results: Nutrients were elevated in the effluent, but only NO_2NO_3 concentrations were of concern at the test sites. Nitrate-nitrite levels at the two test sites were higher than 83-85% of typical Florida estuaries, but undetected at the reference station. Algal growth potential test results corresponded with nutrient concentrations. AGP at test site 1 was substantially higher than that of the reference site, but was not so high as to indicate severe enrichment.

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 City of Pensacola Main Street Sewage Treatment Plant is located on West Government Street in Pensacola, Escambia County, Florida (see map in Appendix). This facility has a design flow capacity of 20 MGD, and provides advanced treatment for domestic and industrial wastewater. Treatment consists of a mechanical bar screen, aerated grit chamber, equalization basin, primary clarifier, nitrification bioreactor and clarifier, effluent filters, and chlorination. Effluent is discharged to Pensacola Bay through a 6,109 ft pipe at a depth of 26 ft.

Wastewater from this facility has been tested for toxicity by FDER on several occasions (1980, 1985, and 1986). Acute toxicity to freshwater and marine organisms resulted each time, with LC_{50}'s ranging from 11.0% to 60.2%. This toxicity has been attributed to a number of compounds detected in the effluent on the different sample dates, including pentachlorophenol, diazinon, dimethyl phthalate, arsenic, silver, cadmium, zinc, and unidentified organics. A variety of industrial contributors to the Main Street STP (a chemical company, four hospitals, a paperboard manufacturer, a plastics plant, a wood preserving facility, and an electric company) are possible sources for many potentially harmful by-products.

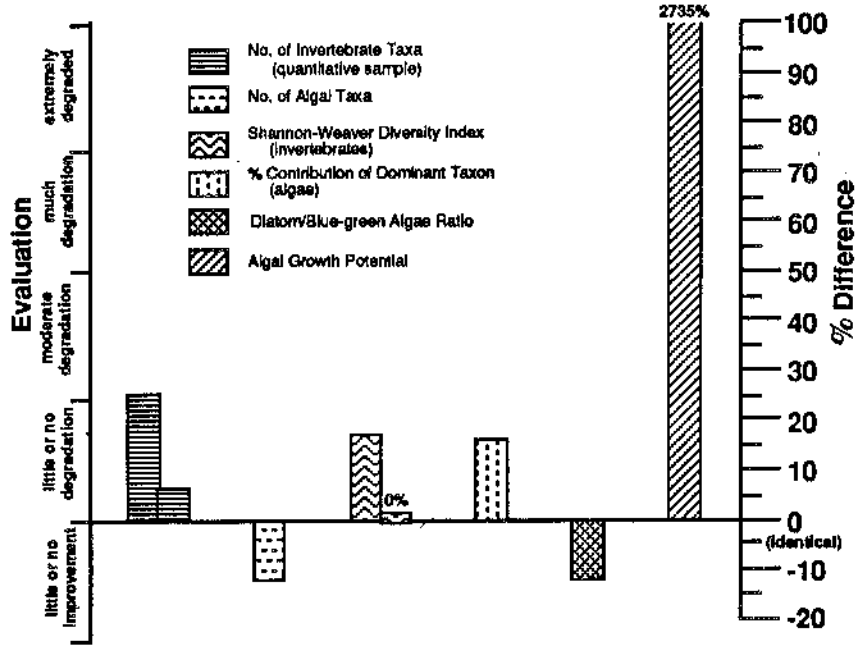
Pensacola Main St. has been implicated in past studies as a contributor to water quality degradation in the bay, in terms of nutrient enrichment and benthic macroinvertebrate community stability. In a report that combines chemical and biological data from 1986 to 1990, the FDER Northwest District Office found that total nitrogen was elevated in the vicinity of the Main Street outfall (Butts *et al.* 1990). Also, the benthic population was characterized by low numbers of taxa, depressed biomass levels, and shifts in community structure. Violations of the biological integrity criterion occurred near the Pensacola Main Street outfall, when compared to a reference station of similar depth and salinity (Butts *et al.* 1990).

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 off Fair Point in Pensacola Bay) and two test sites (test site 1, 50 meters south of the discharge boil, and test site 2, which was 50meters inshore) (see map in Appendix). A habitat assessment was performed *in situ* at the reference and test site 1 to establish

Major characteristics of community structure of control and test sites.

	Ref. Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	16	12	15
Shannon-Weaver Diversity	3.59	2.98	3.59
% Polychaeta	51.1	57.9	29.8
% Pelecypoda	10.6	23.7	29.8
% Decapoda	17.0	13.2	19.3
% Nemertea	12.8	5.3	5.3
% Echinodermata	8.5	0	14.0
% Cnidaria	0	0	1.8
% Collector-Gatherers	45.9	59.1	21.9
% Collector-Filterers	18.0	23.7	41.2
% Predators	23.5	11.9	31.7
% Parasites	12.7	5.3	5.2
Phytoplankton Algae			
Number of Taxa	8	9	
% Contribution of Dominant Taxon	66.7	77.1	
Chlorophyll a (µg/L)	Undetected at 4		
Diatom/Blue-green Abundance Ratio	0.82	0.92	
% Blue-green	16.7	8.3	
% Green	5.5	0	
% Diatoms	75.0	91.7	
% Other	2.8	0	
Algal Growth Potential (mg dry wt/l)	0.265	7.514	



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

comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. A static definitive toxicity bioassay, using *Ceriodaphnia dubia* as the test organism, was 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). Test site 1 and the reference site were also analyzed for metals. Additionally, nutrient analyses were performed on effluent, reference, and test sites. Methods used for all chemical analyses are on file at the Tallahassee DER Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at reference and test sites. Collection methods consisted of three petite ponar dredges per station (Ross 1990). Phytoplankton was sampled at the reference site and test site 1 via sub-surface grabs. Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). Bacterial populations were analyzed for total and fecal coliforms following the methods of APHA (1989). Algal Growth Potential tests, using *Selenastrum capricornutum* for the effluent and *Dunaliella tertiolecta* as the test organism for the reference and test site 1, 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. 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 (% composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (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: Glenn Butts (DER Northwest District) and Lyn Burton, Russel Frydenborg, Kathleen Lurding, and Sandy McClure (Tallahassee Biology Laboratory).

Results and Discussion

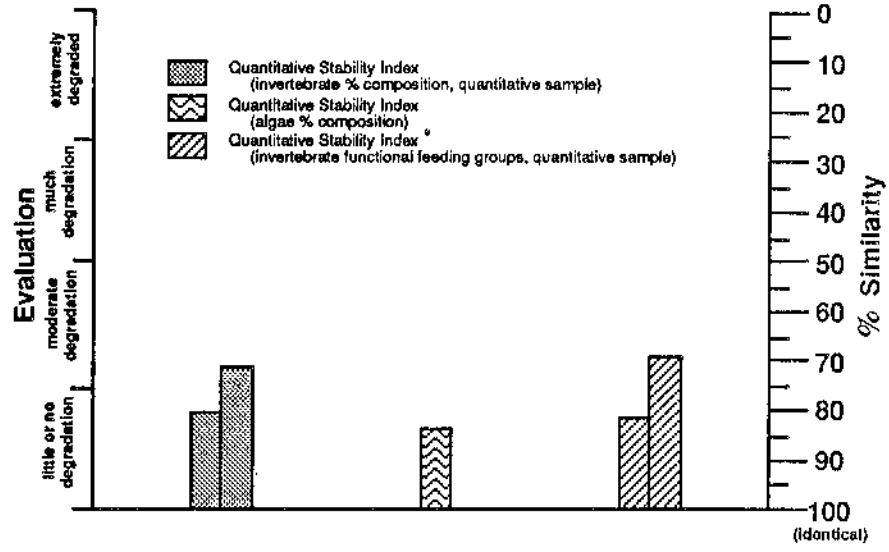
Habitat quality at the reference site was 30% higher than that of test site 1, with scores of 56 and 39 for the reference and test site 1, respectively. Shorelines at the reference site were mostly natural, while those at test site 1 consisted mostly of riprap. The test site area was also subject to considerable stormwater runoff from urban Pensacola, and flow and wave action were often high due to restriction by man-made structures. Neither site received a high score for community types present (Appendix). Both sites were moderately alkaline (pH was 7.9 at the reference and 7.8 at test site 1) and highly saline (conductivities were 46700 µmhos/cm at the reference site and 46400 µmhos/cm at test site 1). Both were adequately oxygenated and similar in clarity and sediment composition. The major difference between the two areas was the surrounding land use, with 100% residential at the reference site and 100% commercial at the test site (Appendix).

The sample of effluent was acutely toxic to *Ceriodaphnia dubia*, with an LC_{50} of 37 % (Appendix). Analysis for organic constituents revealed the presence of bis (2-ethylhexyl) phthalate at 12 µg/L and unidentified aliphatic compounds at 27 µg/L. These constituents, or others not analyzed for, may have contributed to the observed toxicity. The metals scan detected aluminum (73 µg/L), iron (118 µg/L), and zinc (12 µg/L). None of these were in violation of Class III metals standards for marine waters. Aluminum and iron were also detected in samples from the reference site and test site 1, but at lower levels than those measured in the effluent (see chemistry summary table).

Effluent nutrients were somewhat elevated, particularly NO_2NO_3 (3.1 mg/L) and TKN (1.3 mg/L). Total and orthophosphorus were 0.64 mg/L and 0.44 mg/L, respectively. These nutrient levels, particularly the bioavailable forms (NO_2NO_3 and OPO_4) were also reflected in the high algal growth potential measured in the effluent (34.26 mg dry wt/L). At the two test sites, NO_2NO_3 concentrations were elevated enough to be of some concern. The 0.11 and 0.13 mg/L measured at test sites 1 and 2, respectively, were higher than 83-85% of typical Florida estuaries, according to STORET data from 690 estuary stations sampled from 1980 to 1989 (Joe Hand, personal communication, Appendix). At the reference site, all nutrient compounds were undetected except for TKN (0.42 mg/L). Algal growth potential levels corresponded to the nutrient concentrations at the study sites. At the reference site, AGP was a low 0.27 mg dry wt/L, while waters from test site 1 yielded 7.51 mg dry wt/L. This level is similar to the 7.3 mg dry wt/L measured by FDER in 1979, at a station near test site 1 in the present study. While the test site AGP is a great deal higher than that of the reference station (see top left figure), this level is below the "problem threshold" of 10 mg dry wt/L used to indicate cultural eutrophication and its consequences (Ron Raschke, US EPA, personal communication).

Coliform bacteria counts were very low in the effluent sample and at the Pensacola Bay study sites. Total coliforms were 200 org/100 ml in the effluent, 10 org/100 ml at test site 2, and undetected at the reference site and test site 1. Fecal coliforms were undetected in the effluent and study sites.

Quantitative measures of benthic macroinvertebrate community health indicated little or no



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

degradation associated with the discharge (see table and figures). The figure on p. 2 indicates the degree of difference between the reference and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. Negative values mean that the test site is better than the reference. The figure on p. 3 summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

Taxa richness was highest at the reference site (with 16), and only slightly decreased at test site 1 (with 12 taxa) and test site 2 (with 15 taxa) (see taxa list in Appendix). The number of taxa recovered from all three sites (including the reference) was lower than in past samplings (Butts *et al.* 1990). The reference site and test site 1 were strongly dominated by polychaetes, particularly *Cossura delta*, an often common constituent of deeper, high salinity waters. Test site 2 was equally dominated by polychaetes and pelecypods, the most numerous being *Lumbrineris* sp. and *Nuculana concentrica*, respectively. None of these organisms, or any other collected during this study, are recognized indicators of organic pollution, although polychaetes are generally considered pollution resistant. However, the fair representation of decapods (from 13.2% at test site 1 to 19.3% at test site 2) suggests that the sites were not greatly stressed.

Shannon-Weaver diversity was acceptable at all sites. Only a 17% difference occurred between the reference site and test site 1, and diversity at test site 2 was equal to that of the reference. The qualitative stability indices for percent composition and functional feeding groups also demonstrated the similarity between these three study sites.

Phytoplankton communities, collected at the reference site and test site 1, were depauperate. The number of taxa recovered was 8 and 9 at reference and test site, respectively, and consisted mostly of diatoms (see taxa list in Appendix). The commonly encountered centric diatom, *Cyclotella* sp., dominated at both sites. Chlorophyll *a* corresponded with the low algal densities, and was undetected (4 µg/L detection limit).

Conclusions

The sample of effluent collected from the Pensacola Main Street STP was acutely toxic to the cladoceran, *Ceriodaphnia dubia*, with a 48 hour LC_{50} of 37%. Chemical analysis of the discharge revealed the presence of bis (2-ethylhexyl) phthalate (12 µg/L), unidentified aliphatic compounds (27 µg/L), aluminum (73 µg/L), iron (118 µg/L), and zinc (12 µg/L). Although none of these concentrations violated ambient standards, the organic constituents may have partially contributed to the observed toxicity.

Nutrients were somewhat elevated in the effluent, but most nutrient compounds (except nitrate-nitrite) were fairly low at the Pensacola Bay study sites. Concentrations of nitrate-nitrite measured at the two test sites were higher than 83-85% of other Florida estuaries. This increased level of bioavailable nitrogen influenced the algal growth potential, which was substantially higher at test site 1 when compared to the reference station. Although this increased AGP is probably a response to NO_2NO_3 enrichment from the STP, the 7.5 mg dry wt/L measured at the test site was not high enough to indicate a serious problem. The test site AGP measured during this study was similar to that determined in the same area in 1979, suggesting that nutrient enrichment of Pensacola Bay is not accelerating.

Benthic macroinvertebrate communities at reference and test sites were sparse and dominated by polychaetes and pelecypods. Little or no degradation could be linked to the influence of the Main Street outfall. Likewise, taxa richness in the phytoplankton community was low throughout the study area, but no substantial differences between the reference and test site were observed.

Literature Cited

American Public Health Assoc., American Water Works Assoc., and Water Pollution Control Federation. 1989. Standard Methods for the Examination of Water and Wastewater, 17th ed. New York, N.Y. 1268 p.

Butts, G.L., D.H. Ray, and L.W. Donelan. 1990. A benthic macroinvertebrate and water chemistry assessment of the ECUA Main Street discharge into Pensacola Bay. Fla. Dept. Environ. Reg. Northwest District. 19 p.

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

Pensacola Main St. STP	Effluent	Reference Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
Bis (2-ethylhexyl) phthalate	12			
Tentative id and Est. Conc.:				
Aliphatic compounds	27			
Metals (ug/L)				
Aluminum	73	29 T	53	
Antimony	15 U	15 U	15 U	
Arsenic	20 U	20 U	20 U	
Cadmium	0.08 U	0.4 U	0.35 U	
Copper	5 U	100 U	100 U	
Chromium	10 U	15 U	15 U	
Iron	118	15 J	38 J	
Lead	1 T	5 U	5 U	
Mercury	0.2 U	0.2 U	0.2 U	
Nickel	5 U	7 U	7 U	
Selenium	2 U	2 U	2 U	
Silver	0.07 U	0.14 U	0.2 U	
Zinc	12	10 U	10 U	
Nutrients (mg/L)				
Ortho-phosphorus	0.44 A	0.02 U	0.02 U	0.02 U
Total phosphorus	0.64	0.05 U	0.05 U	0.05 U
Ammonia	0.24 A	0.020 U	0.034 T	0.035 T
Nitrate+Nitrite	3.1 A	0.05 U	0.11 A	0.13 A
TKN	1.3	0.42	0.45	0.45
Other Parameters				
Habitat Assessment		56	39	
D.O. (mg/L)	6.5	8.1	7.6	7.6
pH (SU's)	7.4	7.9	7.8	7.8
Conductivity (µmhos/cm)		46700	46400	35200
Temperature (°C)	30.6	26.8	27.5	27.1
Bioassay Invertebrate-Dechlorinated	LC50 = 37.0			
Fecal coliform (org/100 ml)	10 U	10 U	10 U	10 U
Total coliform (org/100 ml)	200	10 U	10 U	10
AGP (mg dry wt/L)	34.26	0.27	7.51	

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

J - Estimated value

T - Value reported is less than the practical quantitation limit

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

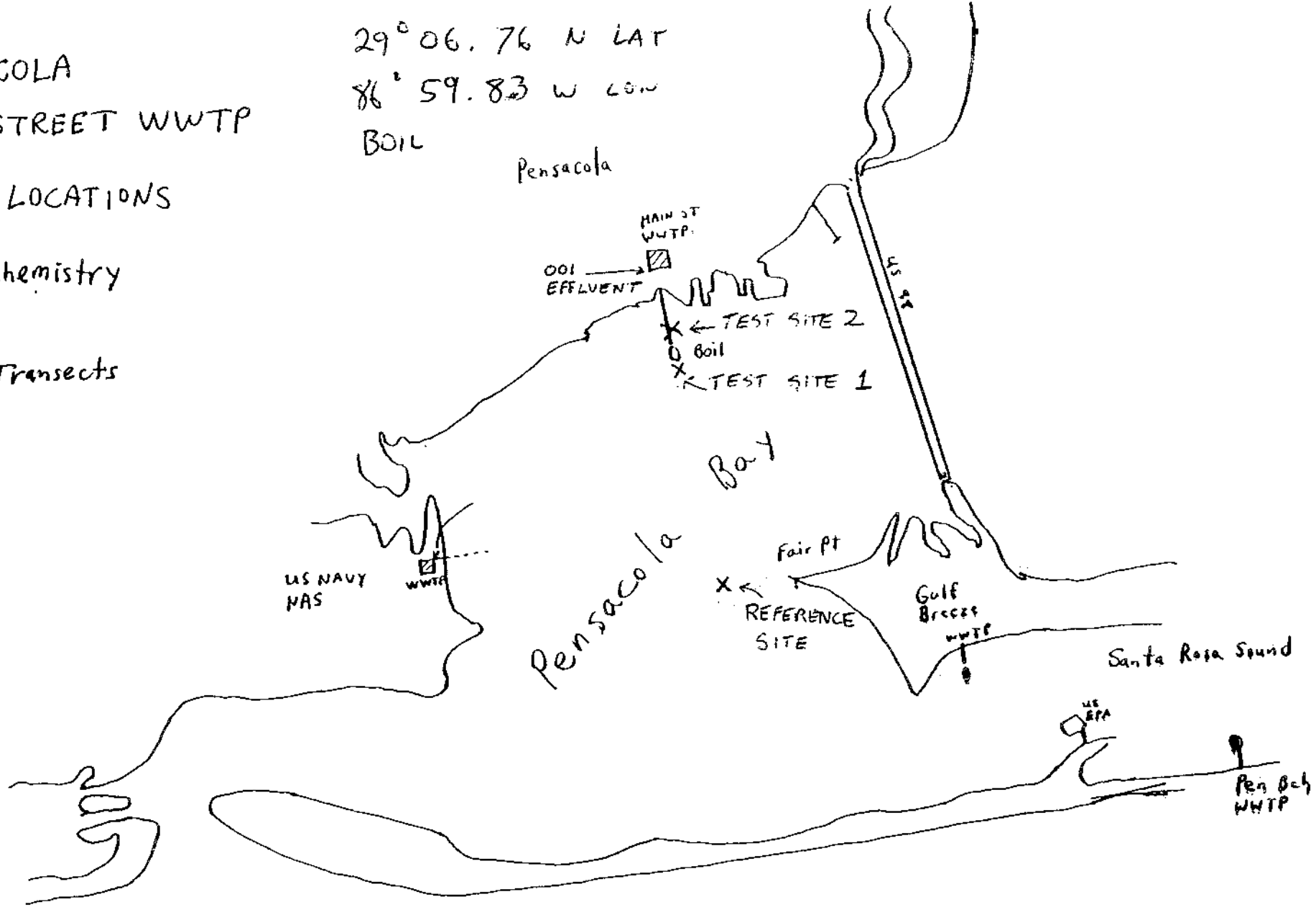
PENSACOLA
MAIN STREET WWTP

SAMPLE LOCATIONS

Water Chemistry

Biology Transects

29° 06. 76 N LAT
87° 59. 83 W LON
BOIL



STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: MAIN STREET WWTP	**Prepared by:** Tracie Rhodes & Glenn Butts **Date:** 10-1-91	
Location (attach detailed map): Pensacola, FL	**County** ESCAMBIA	**District** Northwest
Federal Permit # FL0021440	**State GMS #** 1017MD1012	**Facility Type:** Industrial (Municipal) Federal Agricultural Other (list):

Function of facility: A 20.0 MGD AWT (Advanced wastewater treatment) plant with reuse and water discharge to Pensacola Bay.

Description of treatment process:
Extended air facility operation which uses pure oxygen in the treatment process.

Receiving waters: Pensacola BAY	**Classification:** Class III
Design Flow: 20.0 MGD	**Actual Mean Flow:** 15.0 MGD

Discharge is: (Continuous) Intermittant Seasonal Rainfall dependant
Other (describe)

therefore, the best time to sample is:

If facility has a mixing zone, give details (size, parameters affected, etc.):
NO

List effluent limits, special permit conditions, and permit modifications:

Parameter	Limit (units)
Flow	20.0 MGD (max annual avg.)
pH	6.0 (min) 8.5 (max)
Chlorine Residual	.01 mg/l (max)
BOD_5	8.0 mg/l (max annual average)
Total Nonfilt. Residue (SS)	8.0 mg/l (max annual ave.)
Total (N)	1,000 #/day (max ann. ave.)
Total (P)	168 #/day (max ann. ave.)
Phenols	.05 mg/l (max)
Fecal Coliform	200/100 ml (max)
Bioassay	

Sept. 15, 1988
Approved chlorine minimization plan and modified DO17-135661 so that chlorine residual requirement would be 2 times per day instead of hourly and fecal coliform 2 times per day instead of daily.

August 30, 1991
Approved once daily testing of chlorine residual and fecal coliforms.

August 26, 1991
Approved use of conventional gaseous chlorine and sulfur dioxide system instead of sulfamic acid

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s): OUTFALL BOIN AT 29°06.76 N LAT 86°59.83 W LON IN 26 ft depth

List permit violations (from MOR data or other source) and plant upsets that occurred within past year:
Permit violations for total nitrogen in Feb + March of this year. Some problems with dechlorination unit resulting in a few high chlorine readings. High BOD and TSS explained due to heavy rainfall in Jan 1991.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
Report included by Butler 1990. Violation of 17-3.121(7) found in Jan. 1990.

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

Additional information:

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

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: NW DISTRICT	STORET STATION NUMBER: 33.02.0008	DATE (M/D/Y): 09-24-91	RECEIVING BODY OF WATER: PENSACOLA BAY

REMARKS: SAMPLE TAKEN IN 26 Ft DEPTH	LOCATION: BACKGROUND AT FAIR POINT	FIELD ID/NAME: REFERENCE SITE

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations — 8	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 — 8	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action — 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type — 13	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 56

COMMENTS: MOSTLY NATURAL SHORELINE, NO GRASS BEDS

ANALYSIS DATE: 09-24-91	ANALYST: Glenn Butts	SIGNATURE: Glenn Butts

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: NW DISTRICT	STORET STATION NUMBER: 33.02.00 08	DATE (M/D/Y): 09-24-91	RECEIVING BODY OF WATER: PENSACOLA BAY
REMARKS:	LOCATION: BACKGROUND AT FAIR POINT	FIELD ID/NAME: REFERENCE SITE	

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
			100			

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

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

Point Source Pollution (list location and describe): PERHAPS GULF BREEZE WWTP

Estimated Stream Width (range, m):		Estimated Stream Depth (range, m):	
High Water Mark (m above bed):		Velocity (range, m/s):	

yes
Impounded [ ]
Channelized [ ]

Canopy Cover % (check box): Open: [X] Lightly Shaded: [ ] Moderately Shaded: [ ] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: [X] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Anaerobic: [ ] Other: [ ] Slight H2S

Sediment Oils: Absent: [X] Slight: [ ] Moderate: [ ] Profuse: [ ]

Sediment Deposits: Sludge: [ ] Paper Fiber: [ ] Mud: [X] Sand: [X] Shell: [X] Other: [ ]

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	10
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell	30	Coarse Organic Debris:	30
Sand:	20	Mud/Muck (organic):	10

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	26.8	8.1	Secchi Depth (m):	2.6
Mid-depth			pH (SU):	7.9
Bottom	27.0	5.0	Conductivity (µmho/cm):	46,700
			Other Parameters:	

Stream Type (check box): Blackwater: [ ] Deep Aquifer Fed: [ ] Surficial Aquifer Fed: [ ] Alluvial: [ ] Other: [X] BAY

Water Odors (check box): Normal: [X] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Other: [ ]

Water Surface Oils (check box): Slick: [ ] Sheen: [ ] Globs: [ ] None: [X]

Clarity (check box): Clear: [X] Slightly turbid: [ ] Turbid: [ ] Opaque: [ ]

Color (check box): Tannic: [ ] Green (algae): [ ] Clear: [X] Other: [ ]

Weather Conditions: SUNNY

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
09-24-91	G. BUTTS	Glenn Butts

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

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: NW DISTRICT	STORET STATION NUMBER: 33.02.0312	DATE (M/D/Y): 09-24-91	RECEIVING BODY OF WATER: PENSACOLA BAY

REMARKS: SAMPLE TAKEN IN 26 ft DEPTH	LOCATION: 50ft SOUTH OF MAIN STREET BOIL	FIELD ID/NAME: TEST SITE 1

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 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 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 5	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 39

COMMENTS: SHORELINE ALTERED BY URBAN PENSACOLA, PORT AUTHORITY, COMMERCIAL FISHING FLEETS. HABITAT ASSESSMENT SAME FOR # 4 LOCATION

ANALYSIS DATE: 09-24-91	ANALYST: Glenn Butts	SIGNATURE: Glenn Butts

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: NW DISTRICT	STORET STATION NUMBER: 33.02.0312	DATE (M/D/Y): 09-24-91	RECEIVING BODY OF WATER: PENSACOLA BAY
REMARKS: SCHOOLS OF SPANISH MACKERAL CIRCLING BOIL	LOCATION: 50 ft SOUTH OF MAIN STREET BOIL		FIELD ID/NAME: TEST SITE 1

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
				100		

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):

MAIN STREET WWTP

Estimated Stream Width (range, m):		Estimated Stream Depth (range, m):	
High Water Mark (m above bed):		Velocity (range, m/s):	

yes: Impounded ☐ Channelized ☐

Canopy Cover % (check box): Open: ☒ Lightly Shaded: ☐ Moderately Shaded: ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☒ H_2S

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

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

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	10
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell	30	Coarse Organic Debris:	30
Sand	10	Mud/Muck (organic):	20

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
			Secchi Depth (m):	2.4
Top	27.5	7.6	pH (SU):	7.8
Mid-depth			Conductivity (µmho/cm):	46400
Bottom	28.3	4.4	Other Parameters:	

Stream Type (check box): Blackwater: ☐ Deep Aquifer Fed: ☐ Surficial Aquifer Fed: ☐ Alluvial: ☐ Other: ☐ BAY

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: SUNNY

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
09-24-91	G. BUTTS	Glenn Butts

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: PENSACOLA MAIN ST WWTP
Address/City:
County: ESCAMBIA
Contact/District: GLEN BUTTS - NW
NPDES Permit #: FL0021440 Outfall #: 001

Sample Collection: Date 9/23/91 Time 0825
Test Beginning: Date 9-24-91 Time 1300
Test Ending: Date Time
Test Organism: CERIODAPHNIA DUBIA
Life Stage/Age: <24 HRS

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

Remarks: * 9/24/91 wrote D.O. in wrong space AJ

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7.9@9	8.9@21.5°C	20.9@23.9°C	1368@24°C@1381
24 hr	7@7.9@9	8.2@21.5°C	20.2@23.2°C	1316@23.6°C@1369
48 hr	7@7.9@9	8.8@22	20.5°@23.5°C	1366@23.8°C 1375

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	A	5	5	5	8.2		8.2	20.9		20.3	8.2		8.7	170		207
control	B	5	5	5			8.2						8.7			
control	C	5	5	5			8.2						8.7			
control	D	5	5	5			8.2						8.7			
25%	A	5	5	5	7.9		8.4	20.4		20.3	8.5		8.7	301		327
25%	B	5	5	5			8.4						8.7			
25%	C	5	5	5			8.4						8.7			
25%	D	5	5	5			8.4						8.7			
50%	A	5	5	0	7.8		8.6	20.2		20.7	8.3		8.6	435		448
50%	B	5	5	0			8.6						8.6			
50%	C	5	5	0			8.6						8.6			
50%	D	5	5	1			8.6				8.2*		8.6			
75%	A	5	0		7.8	8.5		20.1	21.0		8.2	8.3		560	550	
75%	B	5	0			8.5						8.3				
75%	C	5	0			8.5						8.3				
75%	D	5	0			8.6						8.4				
100%	A	5	0		7.7	8.6		20.1	20.5		8.0	8.3		686	673	
100%	B	5	0			8.6						8.3				
100%	C	5	0			8.6						8.4				
100%	D	5	0			8.6						8.4				
Measured/Loaded by:		MA	KP	.	TM	KP	MF	TM	KP	MF	TM	KP	MF	TM	KP	MF
Recorded by:		MA	GD	TM	AJ	GD	TM	AJ	GD	TM	DA	GD	TM	AJ	GD	TM

Investigators' Signatures

Kim Pearce
Allison Jordan
Thomas Macon
Marshall Faircloth
Anthony Hodges
Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:	[illegible]		0.1	Hach	GB
Lab Tot. Resid. Cl2:	0.0	0.0	0.0	Hach	MF
Alkalinity:	126	TM ~~126~~ 73	236	Hach	TM
Hardness:	130	70	254	Hach	TM
Total Ammonia:	0	0	.84	Hach	TM

Ammonia Meter Slope: _____ Ammonia Blank: 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)

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

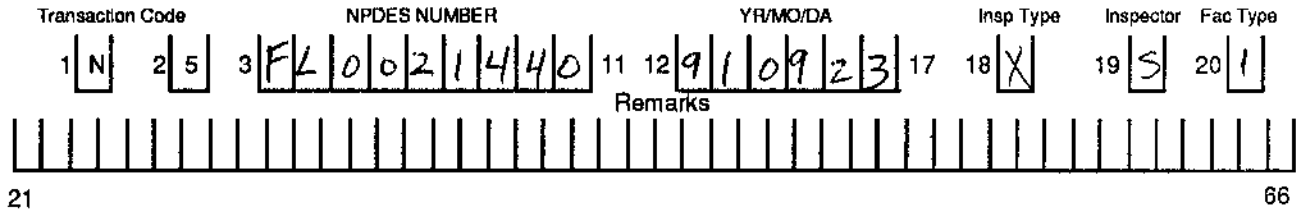
Macroinvertebrate taxa list for Pensacola Main Street STP, collected via 3 ponar dredges per site in Pensacola Bay on 26 September 1991.

	Reference Site	Test Site 1	Test Site 2
Cnidaria			
Undetermined sea anemone	–	–	12
Decapoda			
Acetes americanus carolinae	12	12	–
Alpheus sp.	25	25	37
Leptochelia serratorbita	–	–	12
Lucifer faxoni	25	25	50
Periclimenes sp.	37	–	–
Processa sp.	–	–	37
Echinodermata			
Amphioplus sp.	50	–	100
Nemertea			
Cerebratulus lactens	37	25	37
Undetermined nemertean	37	–	–
Pelecypoda			
Corbula contracta	12	–	37
Laevicardium sybariticum	12	–	–
Macoma sp.	37	37	62
Nuculana concentrica	–	75	112
Polychaeta			
Aricidea sp.	–	12	–
Armandia agilis	12	37	25
Asychis elongatus	25	–	–
Cossura delta	150	175	25
Lepidametria sp.	–	–	12
Lumbrinereis sp.	62	25	100
Paleanotus sp.	–	–	37
Sigambra tentaculata	–	12	–
Spiophanes missionensis	12	–	–
Sthenelais sp. A	37	12	–
Undetermined nereid	–	–	12

Phytoplankton taxa list for Pensacola Main Street STP, collected via surface grabs in a Pensacola Bay on 24 September 1991.

	Reference Site	Test Site 1
Diatoms		
Amphora sp.	–	72
Cocconeis sp.	70	216
Coscinodiscus sp.	–	72
Cyclotella sp.	1688	2663
Denticula sp.	–	72
Nitzschia sp.	70	–
Nitzschia sp.1	–	72
Nitzschia sp.2	70	–
Chlorophyta		
Unknown chlorophyte flagellate	141	–
Cryptophyta		
Cryptomonas sp.	70	–
Cyanophyta		
Chroococcus sp.	281	72
Gloeocapsa sp.	141	144
Lyngbya sp.	–	72

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)

