

Biological Assessment of

Anheuser - Busch Old Sod Farm

Duval County

NPDES #FL0041530

Sampled September 1994

February 1995

Biology Section
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: Anheuser - Busch Old Sod Farm
County Duval
NPDES Number: FL0041530
State Permit Expiration Date: 1 June 1995

Toxics Sampling Inspection (XSI)

Date Sampled: 13 September 1994

Results: No organic constituents were found in the sample above detection limits. The effluent sample contained non-problem levels of aluminum (577 µg/L), iron (332 µg/L), nickel (6 µg/L), and copper (7 µg/L).

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 13 September 1994

Results: The sample did not show toxicity to the invertebrate *Ceriodaphnia dubia*, or to the fish, *Cyprinella leedsi*.

Impact Bioassessment Inspection (IBI)

Date Sampled: 13 September 1994

Results: Macroinvertebrate taxa richness and Shannon-Weaver diversity were substantially reduced between the reference and test sites. The diversity decreases represent violations of Rule 62-302.530(11) FAC. Although present at the reference site, many pollution sensitive groups, such as gastropods, isopods, and pelecypods were conspicuously absent at the test sites. The fact that effluent levels of BOD (20 mg/L), TSS (68 mg/L), and turbidity (30.6 NTU) were fairly high suggests that the biota may potentially be responding to long term effects of organic/particulate loading from the sod farm, even though receiving water levels of these parameters were not particularly elevated on the day of sampling. With the exception of biomass, most phytoplankton community parameters were similar between the reference and test sites. Compared with the reference site, algal density increased by 830% at test site 1 and by 1156% at test site 2. Similarly, chlorophyll *a* increased by 102% at test site 1 and 64% at test site 2. The chlorophyll *a* at all sites exceeded that found in 95% of other Florida estuaries. The higher values found at the test sites, along with visual observations (green effluent and water), suggest an aggravation of the problem due to the sod farm discharge, although nutrient levels were not much higher than the reference site at the time of sampling.

Water Quality Inspection (WQI)

Date Sampled: 13 September 1994

Results: Moderate nutrient enrichment was evident throughout the study area. While the Anheuser-Busch effluent was relatively high in some nutrients (*e.g.*, total phosphorus was 0.51 mg/L and TKN was 7.5 mg/L), it did not appear to be causing additional enrichment of the receiving waters at the time of inspection. Algal Growth Potential was above the "problem threshold" of 10 mg dry wt/L for marine waters at all stations, with 13.3 mg dry wt/L at the reference site, 11.4 mg dry wt/L at test site 1, and 12.7 mg dry wt/L at test site 2. Total coliform bacteria counts were above Class III standards in the effluent and at all three study sites (Rule 62-302.530(7) FAC). Fecal coliforms were above Class III standards at the reference site only (Rule 62-302.530(6) FAC).

Introduction

The Anheuser-Busch Old Sod Farm is located in Duval County near the intersection of Interstate 95 and Interstate 295 (see maps in Appendix). The farm was established to treat 1.36 MGD of residual brewery liquor via biological uptake/assimilation by growing sod and hay crops. The brewery effluent is sprayed directly onto 350 acres of turf. A portion of the liquor may be pretreated by anaerobic digestion prior to land application. Two borrow pits (designated North and South) are designed to collect leachate and stormwater run-off from the sod farm. Runoff collects in the North borrow pit, which flows to the South borrow pit, and is discharged through four possible outfalls. Discharge from Outfall 001 is continuous, while discharge through the other outfalls is dependent upon rainfall. Effluent from outfall 001 enters the Class III Cedar River, thence to the Broward River, which empties into the St. Johns River. Outfalls 002, 003, and 004 discharge directly to the Broward River.

Temporary Operating Permit limits are as follows: BOD (annual average of 20 mg/L), TSS (annual average of 50 mg/L), pH (6.0 to 10.0 S.U.'s), unionized ammonia (2.15 mg/L maximum), TKN (annual average of 10 mg/L), and flow (1.36 MGD).

The facility is currently under a Consent Order to come into compliance with water quality standards for unionized ammonia, pH, DO, and TSS. Historical data indicate that the concentrations of unionized ammonia and dissolved oxygen from outfall 001 have both been reduced. Concentrations of TSS and pH have remained approximately constant. There have been no plant upsets or permit violations reported since issuance of the Temporary Operating Permit in December, 1993.

No previous impact bioassessments have been conducted by the Department.

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located in the Broward River at Harts Road in Duval County) and at two test sites (in Little Cedar Creek, about 100 m upstream and downstream of outfall

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	17	6	5
Shannon-Weaver Diversity	2.43	1.82	1.56
% Polychaeta	.4	22.6	34.5
% Diptera	57.7	19.4	60.3
% Oligochaeta	32.6	54.8	5.2
% Isopoda	7.8	0	0
% Other	1.6	3.2	0
# Polychaete Taxa	1	1	1
% Pelecypoda	.2	0	0
% Tubificidae	32.4	2.7	.5
% Predator/Carnivores	6.8	17.1	36.7
% Above-Surface Deposit Feeders	57.1	23.5	38.4
% Below Surface Deposit Feeders	33.4	54.8	5.2
% Shredders	2.3	4.5	19.7
% Suspension Feeders	.14	0	0
% Scrapers	.3	0	0
Phytoplankton Algae			
Number of Taxa	24	24	23
Shannon-Weaver Diversity	3.8	3.9	3.6
Chlorophyll a (µg/L)	25.3	51.2	41.5
Algal Density (#/mL)	65,587	610,063	823,713
% Blue-green	7.5	28.3	49.7
% Green	9.0	9.7	3.8
% Other	3	14.8	4.6
% Diatoms	80.5	47.3	41.9
Algal Growth Potential (mg dry wt/l)	13.3	11.4	12.7

001) (see map in Appendix). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were collected on the effluent, and on the study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Cyprinella leedsi* as test organisms, were performed on the 001 discharge sample (Weber 1991). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on effluent, reference, and test sites. Methods used for all chemical analyses are on file at the Tallahassee DEP Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at reference and test sites. Invertebrates were collected using an Ekman dredge (3 replicates per site). Field observations indicated that the Ekman dredge was appropriate for the sediment type. Phytoplankton communities were sampled for identification, enumeration, and chlorophyll *a* determination via whole water grabs. Algal Growth Potential tests, using *Selenastrum capricornutum* for the freshwater effluent, and *Dunaliella tertiolecta* for saline receiving waters, followed Miller *et al.* (1978) and EPA (1974).

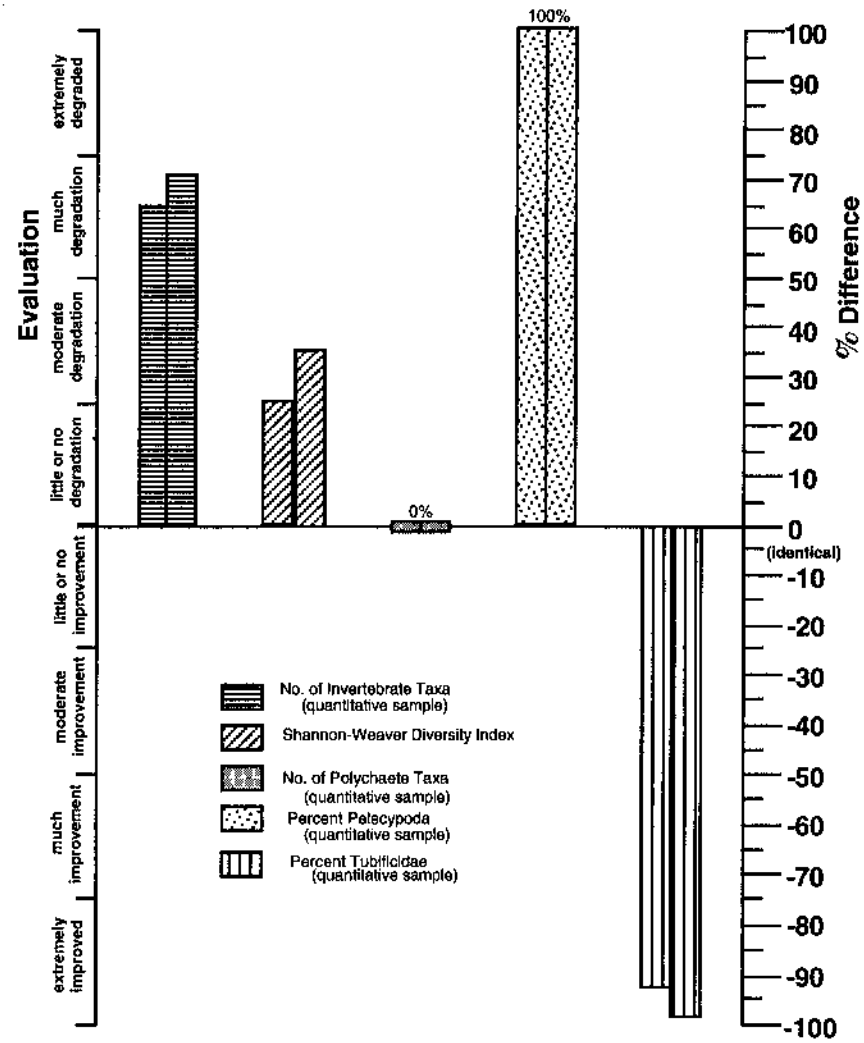
Explanation of Measurements of Community Health

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

Taxa richness: It is generally accepted that taxa richness is among the most robust measures of benthic community health. Anthropogenic stress has a tendency to reduce the number of different types of invertebrates present in a system. Algal taxa richness may increase with moderate nutrient enrichment, compared to an oligotrophic natural background, but become reduced with extreme nutrient enrichment or toxicity.

Shannon-Weaver diversity: This index is specified in the Florida Administrative Code as a measure of biological integrity. Low diversity scores are undesirable, in that they represent conditions where only a few organisms are abundant, to exclusion of other taxa. Such scores may be associated with organic/nutrient enrichment and decreased dissolved oxygen. Excessive numerical dominance of a single type of organism (a high % contribution of the dominant taxon) is also associated with disturbance.

Numbers of pollution sensitive taxa: Unpolluted sites have characteristic numbers and types of taxa which are sensitive to anthro-



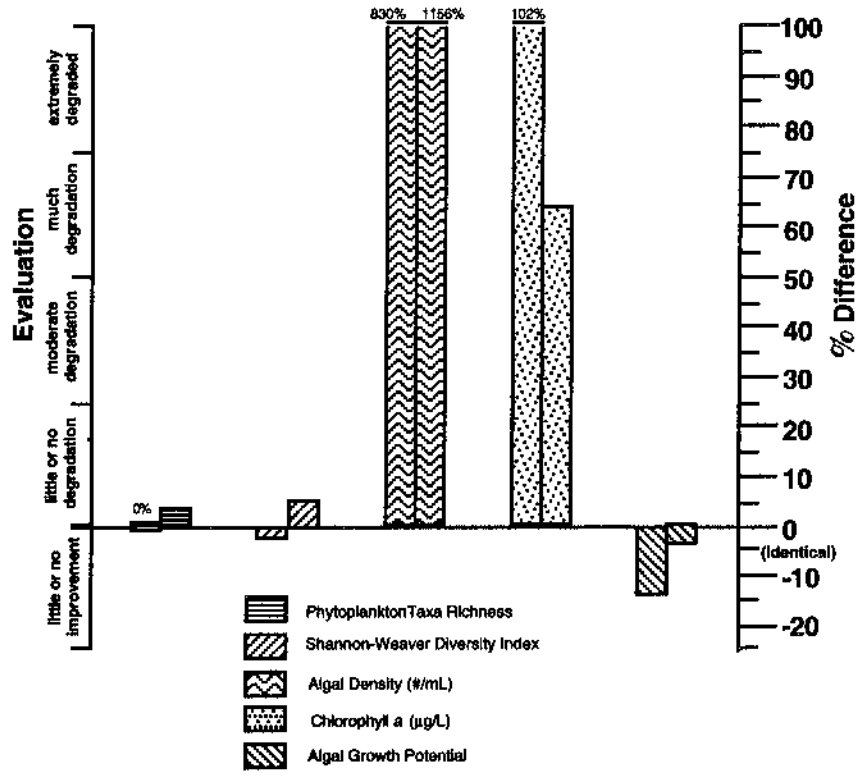
Effect of discharge on the benthic macroinvertebrate community.

pogenic stress. These organisms become rare or absent as the intensity or duration of the disturbance increases. For example, the Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index score is considered healthy (*e.g.*, around 20 or more in the Panhandle, around 15 or more in the Peninsula). Species sensitivity data from other sources, such as Hulbert (1990), Hudson *et al.* 1990), Lenat (1993), Farrell (1992), Chang *et al.* 1992), and Whitmore (1989), are used as appropriate.

Community structure: A system is generally considered degraded if a substantial shift in the proportions of the major taxonomic groups (*e.g.*, mayflies, riffle beetles, etc.) is observed when compared to a reference site. 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.

Algal biomass: The density of algal cells and the chlorophyll *a* concentration are used as estimators of biomass. A system has traditionally been considered nutrient stressed when biomass exceeds problem threshold levels, often resulting in visible algal blooms, nuisance scums, and low dissolved oxygen from the decomposition of the decaying algal tissue. 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 in flowing streams.

Trophic composition/feeding guilds: Undisturbed aquatic systems possess characteristic proportions of organisms using various functional feeding strategies, and human disturbance shifts these established feeding strategies. For example, pollution is known to reduce the numbers of filter-feeders and shredders.



Effect of discharge on the algal community.

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, the diversity index, the number of polychaete taxa, and the % pelecypods are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving the % tubificids, algal density, 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: Lee Banks, Mike Hollingsworth, and Tim McKelvey (DEP Northeast District) and Marshall Faircloth, Russel Frydenborg, Kathleen Lurding, Tina Mikulski, Ed Miller, Liz Miller, Landon Ross, Jack Taylor, David Whiting, Vicki Whiting, Greg Wynn, and David Young (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 sites studied during this investigation were heavily vegetated, tannic, tidally influenced systems. Although the surrounding

land was predominantly forested, potential non-point sources of pollution affecting the area include run-off from agriculture, residential lands, and highways. Aquatic macrophytes, including *Typha* sp., *Mariscus* sp., *Spartina* sp., *Juncus* sp., and *Pontederia* sp. were abundant at all sites.

Habitat quality was slightly higher at the reference site (with 78 points), than the test sites (with 69 points each). The study sites were similar with regard to many physical/chemical parameters. The morphology of each site was relatively unaltered, with a healthy littoral community, as well as an extensive riparian zone. The channel width at all three sites was between 6 and 8 meters. Available substrates at all stations consisted predominantly of sand, with some mud and detritus. Other measurements which were similar at all sites included salinity (between 6 and 7 ppt), temperature (between 27 and 28° C), pH (6.8 to 6.9 S.U.'s), dissolved oxygen (between 5.8 and 6.0 mg/L), TSS (between 10 and 11 mg/L). Water clarity was similar at each site, with Secchi depth measurements of between 0.6 m and 0.8 m. Conductivity was slightly lower at the reference site (10,540 µmhos/cm) than at test sites 1 and 2 (with 13,800 and 14,000 µmhos/cm, respectively). BOD decreased from the reference site (5.2 mg/L) to the test sites (2 mg/L each). Each site was open, with no canopy. No evidence of sediment oils or odors was present, however a slight surface oil sheen was noted at the reference site.

The final effluent sample did not show toxicity to the fish, *Cyprinella leedsi*, or to the water flea, *Ceriodaphnia dubia* (Appendix). No organic constituents were found in the sample above detection limits. The effluent sample contained aluminum (577 µg/L), and iron (332 µg/L) at levels above the practical quantitation limit, and nickel (6 µg/L), and copper (7 µg/L) were found below this level. None of these metal concentrations represent a violation of standards for Class III marine waters.

Moderate nutrient enrichment was evident throughout the study area. While the Anheuser-Busch effluent was relatively high in some nutrients (*e.g.*, total phosphorus was 0.51 mg/L and TKN was 7.5 mg/L), it did not appear to be causing additional enrichment of the receiving waters at the time of inspection (see Chemistry Summary Table). However, the effluent was observed to have a "pea-soup green" color (see Bioassay Bench Sheet in Appendix). This indicates that phytoplankton was being exported to the receiving waters at the time of this study. Because this algae is filtered from the sample before nutrient analyses are performed, the bioavailable nutrient concentrations in the effluent and test sites would be considerably underestimated. Many nutrient concentrations at the reference site were similar to the values found at both test sites, and some of these were higher than average for a Florida estuary (see Table of Typical Water Quality Values in Appendix). For example, ortho-phosphate and nitrate-nitrite values at all three sites were higher than those found in approximately 70% of other Florida estuaries. Ammonia concentrations were slightly higher at the test sites, but not elevated enough to indicate a problem.

Algal Growth Potential (AGP) of the freshwater effluent was 63.9 mg dry wt/L, corresponding to the moderately high nutrients. Algal Growth Potential was slightly above the "problem threshold" of 10 mg dry wt/L for marine waters at all stations, with 13.3 mg dry wt/L at the reference site, 11.4 mg dry wt/L at test site 1, and 12.7 mg dry wt/L at test site 2 (Ron Raschke, US EPA, personal communication).

The BOD of the final effluent was equal to the annual average permit limit (20 mg/L), and was higher at the reference site (5.2 mg/L) than at the test sites (2.0 mg/L each).

Total coliform bacteria counts were above Class III standards in the effluent sample (9000 organisms/100 mL) and at all three study sites, a violation of (Rule 62-302.530(7) FAC). Total coliforms increased from 3000 organisms/100 mL at the reference site, to 5000 organisms/100 mL at the test site 1, and to 9000 organisms/100 mL at test site 2. Fecal coliforms were above Class III standards at the reference site (1300 organisms/100 mL) (Rule 62-302.530(6) FAC). Fecal coliforms in the effluent and at both test sites were within Class III standards.

Measures of macroinvertebrate health indicated that the discharge was adversely affecting the community. The figure on p. 2 indicates the degree of difference between the invertebrate populations of 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 control.

Taxa richness at the reference site (with 17 taxa) was considerably better than that found at test site 1 (6 taxa) or test site 2 (with 5 taxa). These reductions in taxa richness

(65% and 71% at test sites 1 and 2, respectively), are cause for concern, as these values are lower than those found in 90% of other Florida estuaries. Compared with the reference site, Shannon-Weaver diversity decreased by 25.1% at test site 1 and by 36% at test site 2. These decreases represent violations of the Biological Integrity Criterion, Rule 62-302.530(11) FAC.

The reference site community consisted primarily of oligochaetes (58%), dipterans (33%), and isopods (8%), as well as a mixture of amphipods, gastropods, pelecypods, and polychaetes. A community shift was noted at the test sites, in that many pollution sensitive groups, such as gastropods, isopods, and pelecypods were conspicuously absent there. The fact that effluent levels of BOD (20 mg/L), TSS (68 mg/L), and turbidity (30.6 NTU) were fairly high, suggest that the biota may potentially be responding to long term effects of organic/particulate loading from the sod farm, even though receiving water levels of these parameters were not particularly elevated on the day of sampling.

The figure on p. 3 represents changes in the phytoplankton algal community. As was noted with the macroinvertebrates, larger differences (that is, higher percentages) correspond with greater degrees of degradation. Taxa richness was similar throughout the study area, with 24 taxa at the reference and test site 1, and 23 taxa at test site 2. Diversity was also similar, with 3.8 at the reference site, 3.9 at test site 1, and 3.6 at test site 2. The reference site community consisted of 80.5% diatoms, 9% chlorophytes, and 7.5% cyanophytes, along with a mixture of chrysophytes, cryptophytes, and pyrrhophytes. Test site 1 was also composed of diatoms (47.3%), cyanophytes (28.3%), and chlorophytes (9.7%), as well as cryptophytes, euglenophytes, and pyrrhophytes. Test site 2 was co-dominated by cyanophytes (49.7%) and diatoms (41.9%), with some chlorophytes (3.8%), and euglenophytes, cryptophytes, and pyrrhophytes.

Biomass was substantially higher at the test sites. Compared with the reference site, algal density increased by 830% at test site 1 and by 1156% at test site 2. Similarly, chlorophyll *a* was higher at test site 1 (with 51.2 µg/L, an increase of 102%) and test site 2 (with 41.5 µg/L, an increase of 64%), compared with the reference site (which had 25.3 µg/L of chlorophyll *a*). The chlorophyll *a* at all sites exceeded that found in 95% of other Florida estuaries. The higher values found at the test sites, along with visual observations, suggests an aggravation of the problem due to the sod farm discharge, although nutrient concentrations were not much higher than those of the reference site at the time of sampling. This is consistent with the export of phytoplankton from the facility's holding pond to the receiving waters.

Conclusions

The final effluent sample did not show toxicity to the fish, *Cyprinella leedsi*, or to the water flea, *Ceriodaphnia dubia*.

No organic constituents were found in the sample above detection limits. The effluent sample contained non-problem levels of aluminum (577 µg/L), iron (332 µg/L), nickel (6 µg/L), and copper (7 µg/L).

Moderate nutrient enrichment was evident throughout the study area. While the Anheuser-Busch effluent was relatively high in some nutrients (*e.g.*, total phosphorus was 0.51 mg/L and TKN was 7.5 mg/L), it did not appear to be causing additional enrichment of the receiving waters at the time of inspection. Many nutrient concentrations at the reference site were similar to the values found at both test sites, and some of these were higher than average for a Florida estuary. For example, ortho-phosphate and nitrate-nitrite values at all three sites were higher than those found in approximately 70% of other Florida estuaries.

Algal Growth Potential was above the "problem threshold" of 10 mg dry wt/L for marine waters at all stations, with 13.3 mg dry wt/L at the reference site, 11.4 mg dry wt/L at test site 1, and 12.7 mg dry wt/L at test site 2.

Total coliform bacteria counts exceeded Class III standards in the effluent and at all three study sites (Rule 62-302.530(7) FAC). Fecal coliforms were above Class III standards at the reference site only (Rule 62-302.530(6) FAC).

Macroinvertebrate taxa richness and Shannon-Weaver diversity were substantially reduced between the reference and test sites. The diversity decreases represent violations of Rule 62-302.530(11) FAC. Although present at the reference site, many pollution sensitive groups, such as gastropods, isopods, and pelecypods were conspicuously absent at the test sites. The fact that effluent levels of BOD (20 mg/L), TSS (68 mg/L), and turbidi-

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Chemistry summary table for Anheuser - Busch Old Sod Farm

	Effluent	Reference Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
None Detected				
Metals (ug/L)				
Aluminum	577 A			
Arsenic	10 U			
Cadmium	0.08 U			
Copper	7 I			
Chromium	10 U			
Iron	332 A			
Lead	10 U			
Mercury	0.1 U			
Nickel	6 I			
Selenium	30 U			
Silver	0.05 U			
Zinc	4 U			
Nutrients (mg/L)				
Ortho-phosphate	0.03 Q	0.10	0.09 A	0.09
Total phosphate	0.51	0.18	0.19 J	0.18 J
Ammonia	0.05 A	0.02 A	0.03 I	0.04 A
Nitrate+Nitrite	0.02 U	0.06	0.05	0.05
TKN	7.5	1.0 A	1.0	0.96
Other Parameters				
Habitat Assessment		78	69	69
D.O. (mg/L)	7.5	5.8	6.0	5.8
pH (SU's)	9.5	6.8	6.9	6.9
Conductivity (µmhos/cm)	927	10,540	13,800	14,000
Temperature (°C)	28	27	28	28
Salinity (ppt)		6	7	7
Turbidity (mg/L)	30.6	19.6	48.7	20.5
TSS (mg/L)	68	11	10	10
BOD (mg/L)	20	5.2	2	2
Hardness (mg/L) CaCO3	142.3			
Bioassay Fish-Chlorinated	Not toxic			
Bioassay Invertebrate-Chlorinated	Not toxic			
Bioassay Fish-Dechlorinated	Not toxic			
Bioassay Invertebrate-Dechlorinated	Not toxic			
Algal Growth Potential (mg dry wt/L)	63.9	13.3	11.4	12.7
Fecal coliform (org/100 ml)	500	1300	700	20
Total coliform (org/100 ml)	9000	3000	5000	9000

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

I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

J - Estimated value

Q - Sample held beyond normal holding time

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

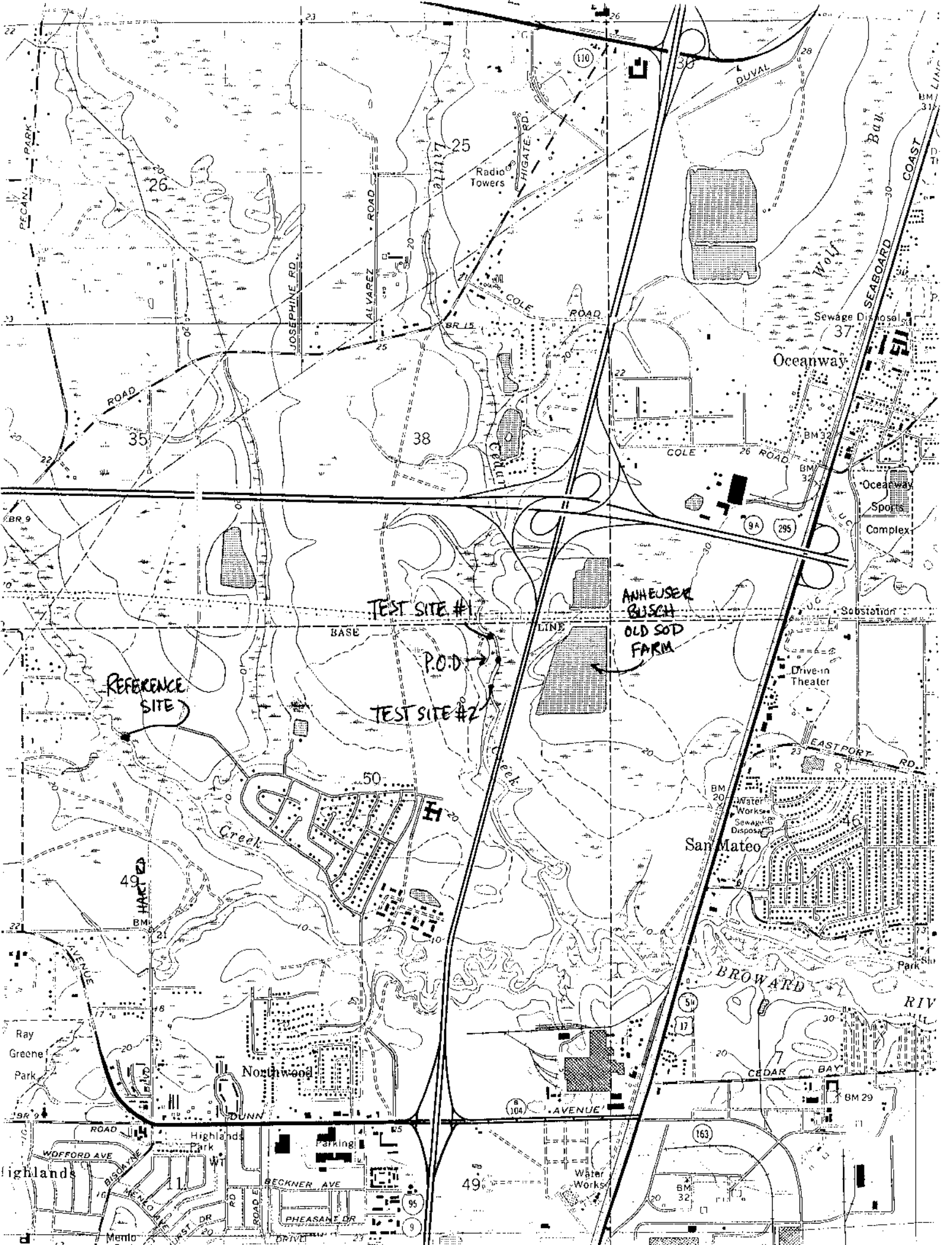
Typical Values for Selected Parameters in Florida Waters

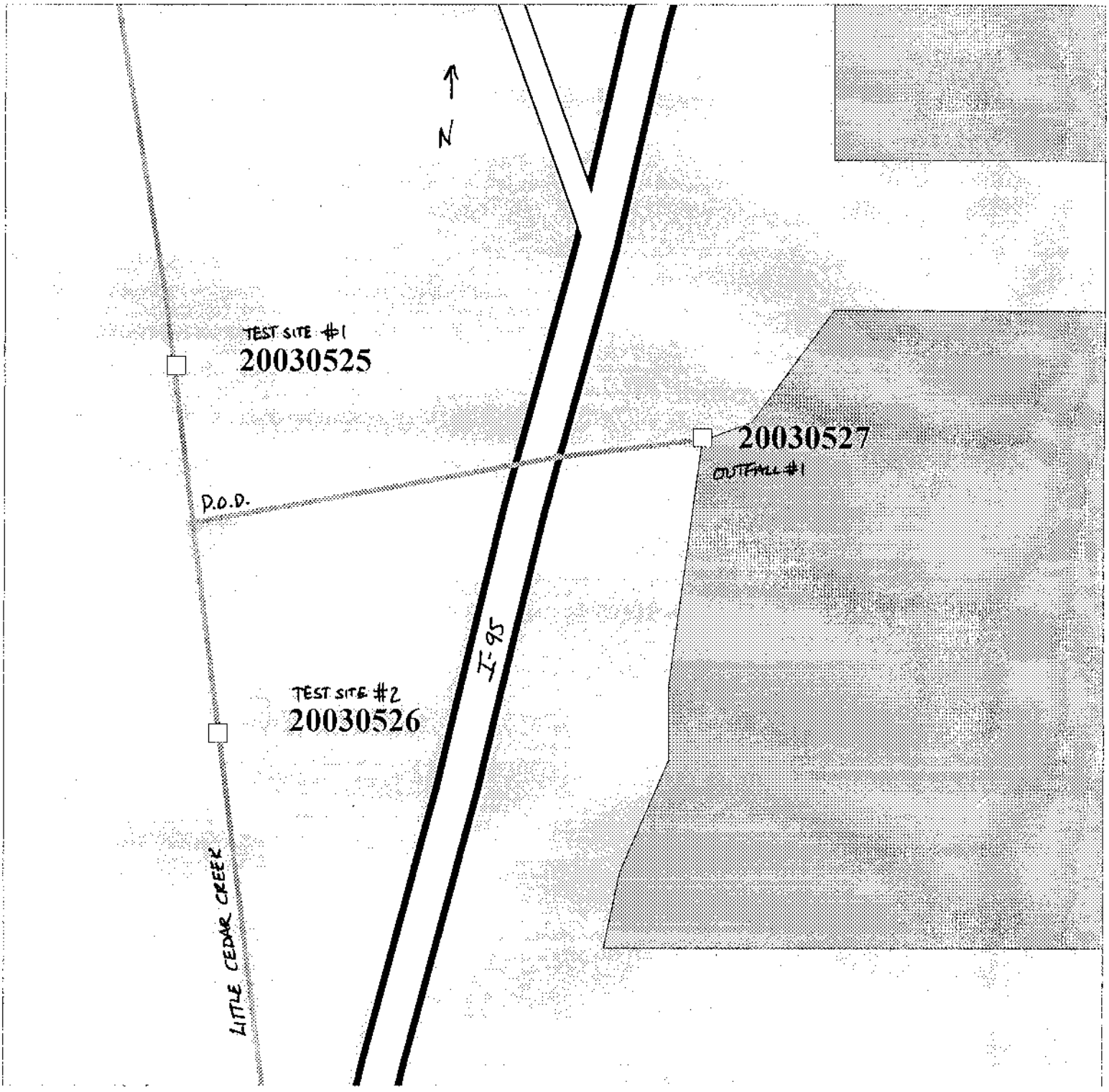
Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

Percentile Distribution

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

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


TEST SITE #1
BASE LINE
P.O.D
TEST SITE #2
REFERENCE SITE
ANHEUSER BUSCH OLD SOD FARM
Radio Towers
Oceanway
Sewage Disposal
Oceanway Sports Complex
Drive-in Theater
San Mateo
Water Works
Sewage Disposal
Northwood
Highlands
Ray Greene Park
Highlands Park
Parking
Water Works
Memo
Cedar Creek
Creek
DUVAL
COLE ROAD
EASTPORT RD.
BROWARD
CEDAR BAY
AVENUE
ROAD
DRIVE
PHEASANT DR
BECKNER AVE
WOFFORD AVE
BISCAYNE
ALVAREZ ROAD
JOSEPHINE RD
HIGATE RD
PECAN PARK
SEABOARD COAST LINE
BM 29
BM 32
BM 31


N
TEST SITE #1
20030525
20030527
OUTFALL #1
P.O.D.
I-95
TEST SITE #2
20030526
LITTLE CEDAR CREEK

FACILITY SUMMARY

Facility Name: Anheuser-Busch, Inc.

County: Duval (16)

Site Name: Old Sod Farm (Main Street) Land Application System

State GMS ID: 3116P00248

State Permit No. IT16-223113 Issued 12/06/93 Expires 6/1/95

Federal Permit No. FL0041530

Receiving Waters: North Prong of Cedar Creek and Broward River to St. Johns's River.

Classification: Class III Marine Waters

Design Flow: 1.36 MGD Brewery Residual Liquor

Acutal Mean Flow: 0.684 MGD Brewery Residual Liquor from June 93 to June 94

Discharge is continuous from outfall 001, Rainfall dependent at outfalls 002, 003 & 004

Description of Treatment Processes:

The Land Application System at the Old Sod Farms receives untreated and/or pretreated brewery liquor (a nitrogen containing residual), as a nutrient enrichment to grow turf and hay crops by spraying the liquor through center pivots for growing turf on a 350-acre land application segment. A portion of the liquor may be pretreated by anaerobic digestion prior to land application. The Old Sod Farm has a portion of the land application site underdrained to intercept (1) ground water, (2) stormwater infiltration, and (3) deep percolation of now treated brewery liquor effluent. Underdrain waters from pivot 1 and 2 flow into the North Borrow Pit which flows into the South Borrow Pit. Underdrain waters from pivots 3, 4 & 5 flow to the South Borrow Pit. The South Borrow Pit discharges from outfall No. 1 to the Cedar River thence to the Broward River. Stormwater runoff from pivots 1, 2, and part of 3 flow to the North and South Borrow Pits. Stormwater from pivot 5 to outfall 2, from part of pivot 4 to outfall 3 and part of pivots 3 & 4 to outfall 4. Outfalls 2, 3 & 4 flow to the Broward River.

Effluent Limits (See Attached):

Description of Permitted Outfall(s):

001 Treated brewery residual liquor collected in underdrains from Pivots 1 & 2 that flow into the North Borrow Pit and underdrains from Pivots 3, 4 and 5. Stormwater runoff from Pivots 1, 2, and part of 3. The North Borrow Pit flows into the South Borrow Pit. The outfall is located at the western bank of the South Borrow Pit. The outfall flows into the north prong of Little Cedar Creek.

002 Stormwater Runoff from Pivot 5

003 Stormwater Runoff from Part of Pivot 4

004 Stormwater Runoff from Parts of Pivot 3 & 4

Permit violations and plant upsets that have occurred since December 1993:

No plant upsets have been reported to the Department since issuance of the TOP.

Effluent parameters for outfall 1 have been in compliance since issuance of the TOP. No flow measurements have been made due to construction of the new flume. No anomalies were found at outfalls 2, 3, or 4 or with sampling of Brewery Residual Liquor as required in the TOP.

Current Enforcement Actions Undertaken:

The facility is currently under Consent Order to come into compliance with water quality standards for unionized ammonia, pH, DO and TSS at the Old Sod Farm. The TOP issued for the facility is in conjunction with the Consent Order.

No previous impact bioassessments have been conducted by the Department.

Trends in Data:

Trends in Data:

Past histroy of the site indicates that unionized ammonia from outfall 1 has improved marginally from roughly 0.5-0.4 mg/l to 0.2-0.1 mg/l. Dissolved oxygen has decreased from roughly 8.0-9.0 to 6.0-7.0 mg/l indicative of control of algae blooms in the South Borrow pit. TSS and pH has remained approximately constant.

INDUSTRIAL WASTEWATER MONTHLY OPERATION REPORT

CHECK IF NO FLOW MONTH _____

SAMPLE LOCATION: Outfall 001

TEST SITE ID: 3116X10633 DATE SAMPLED _____

LAB ID/NAME: _____

COMMENTS: _____

PARAMETER NAME	STORET NO.	RESULT	LIMITS #	UNITS	SAMPLE FREQUENCY	METHOD
D.O. MINIMUM		___.___	>1.0	mg/L		Grab
D.O. AVERAGE		___.___	*	mg/L		Grab
AMMONIA AS N (UNIONIZED) AVG.		___.___	*	mg/L		
Ammonia As N (Unionized) Max.		___.___	2.15	mg/L		
pH MINIMUM		___.___	6.0	S.U.		
pH MAXIMUM		___.___	10.0	S.U.		
pH AVERAGE		___.___	*	S.U.		
BOD5 AVERAGE		___.___	20.0	mg/L		
TSS AVERAGE		___.___	50.0	mg/L		
TKN AVERAGE		___.___	10.0	mg/L		
TOC AVERAGE		___.___	*	mg/L		
TOTAL NITROGEN AS N AVERAGE		___.___	**	mg/L		
NITRATE AVERAGE		___.___	*	mgL		
FLOW AVERAGE		___.___	*	MGD		
ACUTE TOXICITY		___.___	**	%		
COPPER		___.___		MG/L		
SILVER		___.___		MG/L		

* Report as per Permit Requirements

** Complex - See Permit

Effluent Limitations in effect until March 1, 1995

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 803T SUBMITTING AGENCY NAME: DEP Jax	STORET STATION NUMBER: ~~20030446~~ 20030528	DATE (M/D/Y): 09/13/94	TIME 1740	RECEIVING BODY OF WATER:

REMARKS: incoming tide near high Reference Site for Anheuser-Busch Old Salt Farm 5th Year Inspection	LOCATION: 3/4 mi. West Broward River at ~~Horse~~ Harts Rd	FIELD ID/NAME:

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Surrounding Land-Use (specify relative percent in each category): Natural in immed. area, Res. near by

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
80				20			

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

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

Width of riparian vegetation (m) on least buffered side: 718

List & map dominant vegetation on back

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect (draw cross-section & provide at least 3 velocity & depth values)

see attached reference site drawing

Artificially Channelized ~~☐~~ ☐ ☐ ☐ ☐ (~~no~~ recent, severe / some recovery / mostly recovered, more sinuous)

Artificially Impounded ☐ yes

High Water Mark (m above bed): tidal

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)				Riffles			
Leaf Packs or Mats				Sand	90	3 (3)	Ekman
Aquatic Vegetation				Mud/Muck/Silt	5		
Rock or Shell Rubble				Other: Detritus	5		
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):	Sal (ppt)	Turb	Secchi (m):
Top	0.1							
Mid-depth	3.5	26.9	6.78	5.83	10,540	6	19.6	0.67
Bottom	7.0							

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: ☐ slight Sheen: ☑ Globs: ☐ Slick: ☐

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

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

Weather Conditions/Notes:

PC + a's

tide incoming; near high

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Hollingsworth / McKelvey	Mike Hollingsworth	09/22/94

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

SUBMITTING AGENCY CODE: 5031 / SUBMITTING AGENCY NAME: DEP Jax	STORET STATION NUMBER: 70030 ~~527~~ 528	DATE (M/D/Y): 09/13/94	RECEIVING BODY OF WATER:

REMARKS: Reference Site for Anheuser-Busch Old Seal Farm 5th Year Inspection	LOCATION: W of Broward River ~~at~~ Harts Rd.	FIELD ID/NAME:

Habitat Parameter / SCORE	Excellent	Good	Fair	Poor
Littoral Alterations — 9	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 — 40	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 — 6	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 — 10	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 — 78

COMMENTS: Mixed flora, absent in midstream - abundant in littoral. Mariscus, Typha, Pontederia, Spartina, Juncus. NS: Ekman grab, 3 reps with 3 drops/rep.

ANALYSIS DATE: 09/12/94	ANALYST: Hollingsworth	SIGNATURE: Mike Hollingsworth

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: DEP Jax	STORET STATION NUMBER: 20030525	DATE (M/D/Y): 09/12/94	TIME: 1645	RECEIVING BODY OF WATER:

REMARKS: Test Site #1 Anheuser-Busch Old Sod Farm 5th Year	LOCATION: Little Cedar Creek North of ABSF POR #1	FIELD ID/NAME:

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Surrounding Land-Use (specify relative percent in each category): Salt marsh / res. upstream

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
~~70~~			70	20			

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

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

Width of riparian vegetation (m) on least buffered side: > 18

List & map dominant vegetation on back

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect (draw cross-section & provide at least 3 velocity & depth values)

see attached test sites drawing

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

Artificially Impounded ☑ yes

High Water Mark (m above bed): tidal

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)				Riffles			
Leaf Packs or Mats				Sand	80	3(3)	Ponar
Aquatic Vegetation				Mud/Muck/Silt	~~5~~ 10		
Rock or Shell Rubble				Other: Detritus	~~5~~ 10		
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):	Sal (ppt)	Turb	Secchi (m):
Top	0.7							
Mid-depth	0.8	27.72	6.91	6.0	13,800	7	48.7	0.8
Bottom	1.5							

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:
M. Cloudy / Warm Breezy E 15-20
Tide Outgoing; near high

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Hollingsworth / McKelvey	Mike Holly	09/12/94

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: DEP Jax	STORET STATION NUMBER: 70030525	DATE (M/D/Y): 09/12/94	RECEIVING BODY OF WATER:

REMARKS: Test Site #1 Anheuser Busch Old Sod Farm 5th Year Inspection	LOCATION: Little Cedar Creek North of ABSF POND #1	FIELD ID/NAME:

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations — 9	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 — 36	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 — 25	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 — 6	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 69

COMMENTS: mixed flora - spartina, Juncus, ~~Salicornia~~ Pontederia, Typha, Marsicus. Abundant in littoral zone
NS: Ekman grab; 3 reps with 3 drops/rep

ANALYSIS DATE:	ANALYST:	SIGNATURE:
09/12/94	Hollingsworth	Mark Holl

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: DEP Jax	STORET STATION NUMBER: 20030526	DATE (M/D/Y): 06/12/14	TIME: 1755	RECEIVING BODY OF WATER:

REMARKS: Test Site #2 Anheuser-Busch Old Sod Farm 5th Year Inspection	LOCATION: Little Cedar Creek South of ABSF Pod #1	FIELD ID/NAME:

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Surrounding Land-Use (specify relative percent in each category): Salt marsh / Residential upstream

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
70			10	20			

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

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

Width of riparian vegetation (m) on least buffered side: >18 — *List & map dominant vegetation on back*

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect (draw cross-section & provide at least 3 velocity & depth values)

see attached test sites drawing

Artificially Channelized ☑ no ☐ ☐ ☐ (recent, severe / some recovery / mostly recovered, more sinuous)

Artificially Impounded ☐ yes

High Water Mark (m above bed): tidal

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)				Riffles			
Leaf Packs or Mats				Sand	90%		
Aquatic Vegetation				Mud/Muck/Silt	10%		
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):	Sal (ppt)	Turb	Secchi (m):
Top	0.1							
Mid-depth	0.6	27.73	6.88	5.84	14,000	7	20.5	0.7
Bottom	1.1							

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:

M. Cloudy Warm Breezy E 15-20

Tide outgoing; near high

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Hollingsworth / McTelvey	Mike Holy	06/12/14

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

SUBMITTING AGENCY CODE: 3031 / SUBMITTING AGENCY NAME: DEP Jax	STORET STATION NUMBER: 20030526	DATE (M/D/Y): 09/12/94	RECEIVING BODY OF WATER:

REMARKS: Test Site #2 Anheuser-Busch old Salt Farm 5th Year Inspection	LOCATION: Little Cedar Creek South of ABSF POO #1	FIELD ID/NAME:

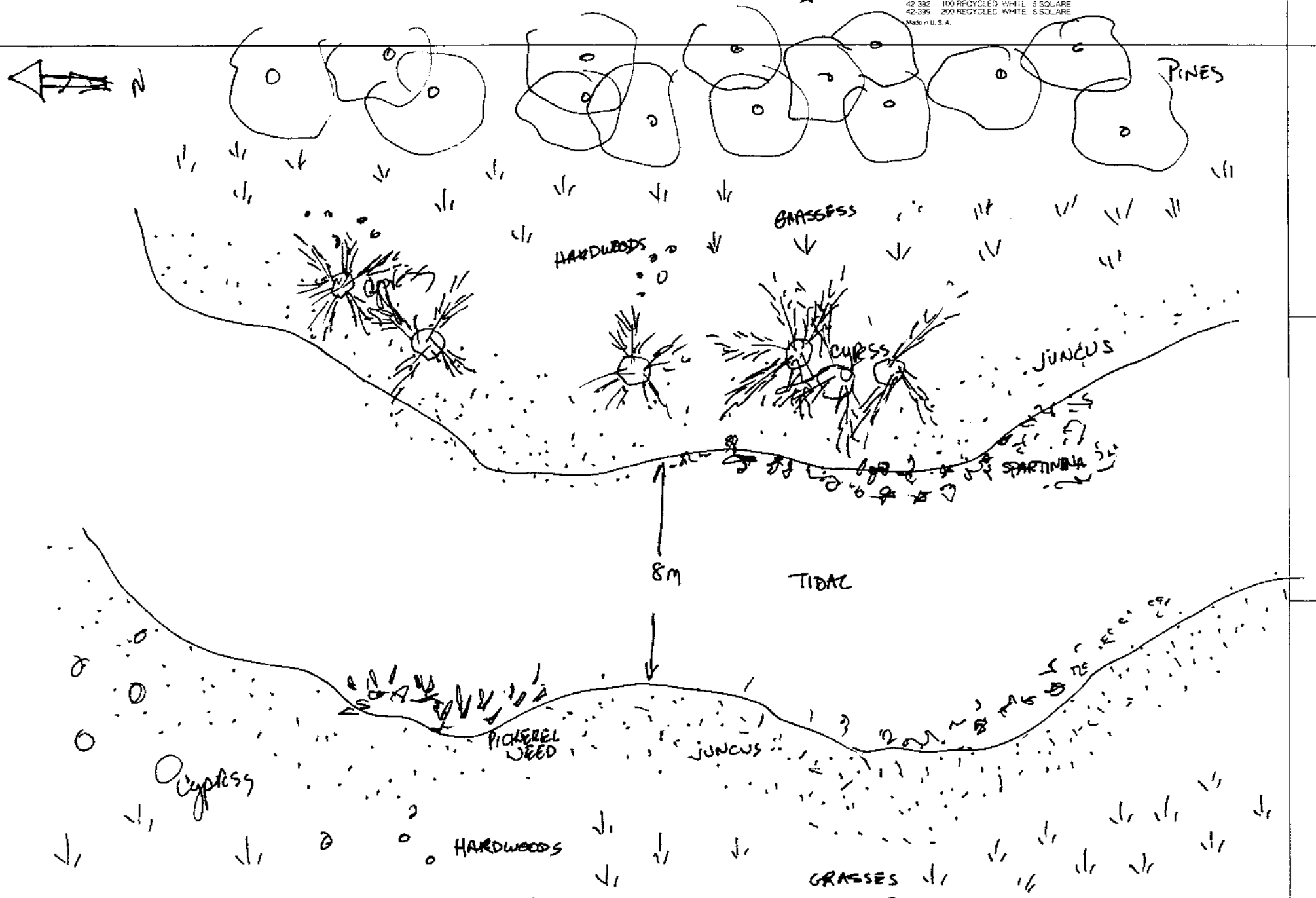
Habitat Parameter / SCORE	Excellent	Good	Fair	Poor
Littoral Alterations — 9	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed — 30	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 — 35	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 — 10	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 69

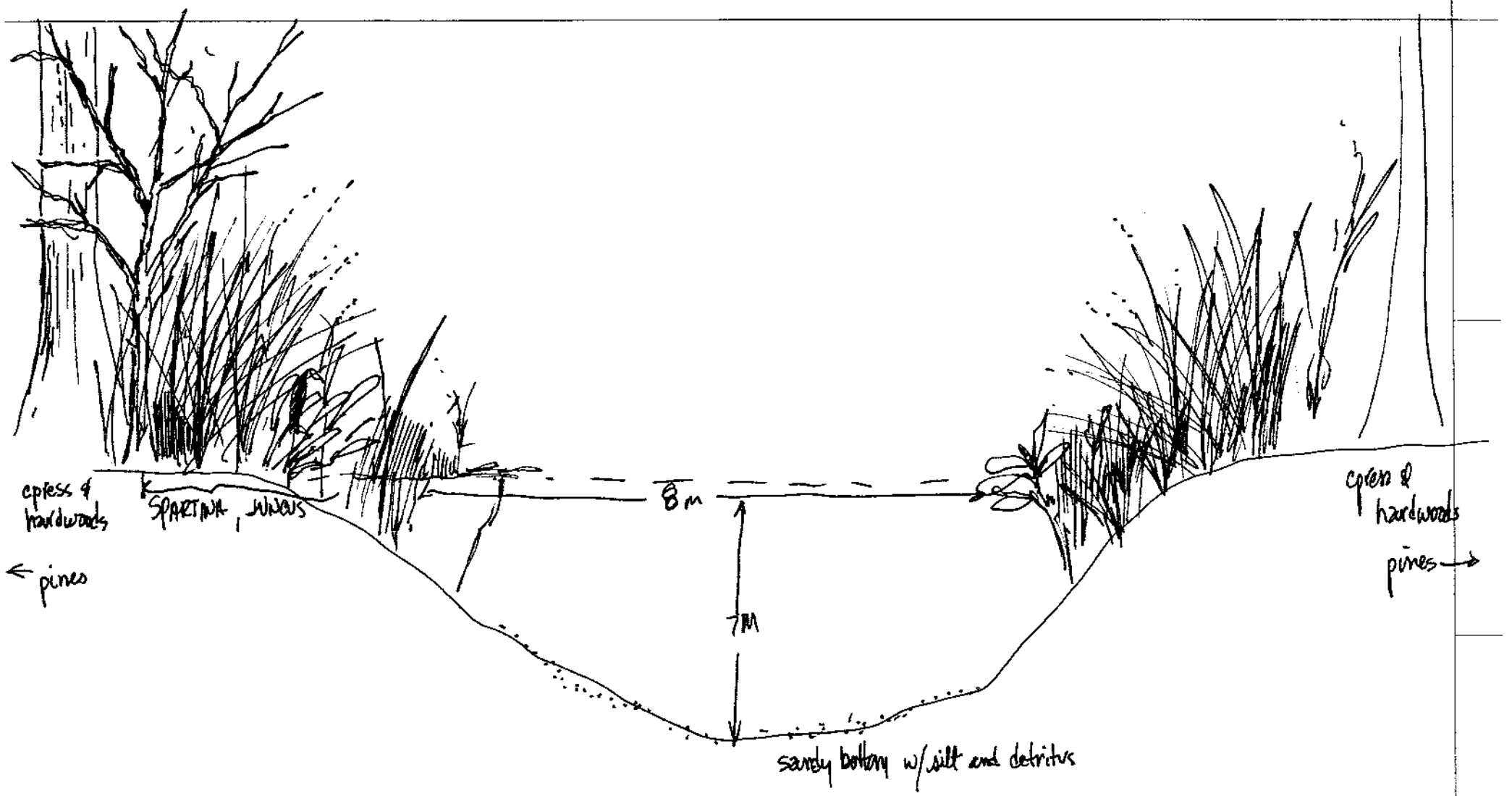
COMMENTS: Mixed flora — ~~ambient~~ ~~in stream~~, abundant in littoral zone; Spartina, Juncus Pontederia, Typha, Manisens. NS: Ekman grab; 3 reps with 3 drops/rep. > 3 mg/l effluent input

ANALYSIS DATE:	ANALYST:	SIGNATURE:
09/12/94	Hollingsworth	Mike Holl

National Brand
42-752 50 SHEETS FILLER 5 SQUARE
42-381 50 SHEETS EYE EASE 5 SQUARE
42-382 100 SHEETS EYE EASE 5 SQUARE
42-388 200 SHEETS EYE EASE 5 SQUARE
42-392 100 RECYCLED WHITE 5 SQUARE
42-399 200 RECYCLED WHITE 5 SQUARE
Made in U.S.A.



REFERENCE SITE; BROWARD RIVER ABOVE HART ROAD BRIDGE
ANHEUSER BUSCH OLD SOD FARM 5TH YEAR

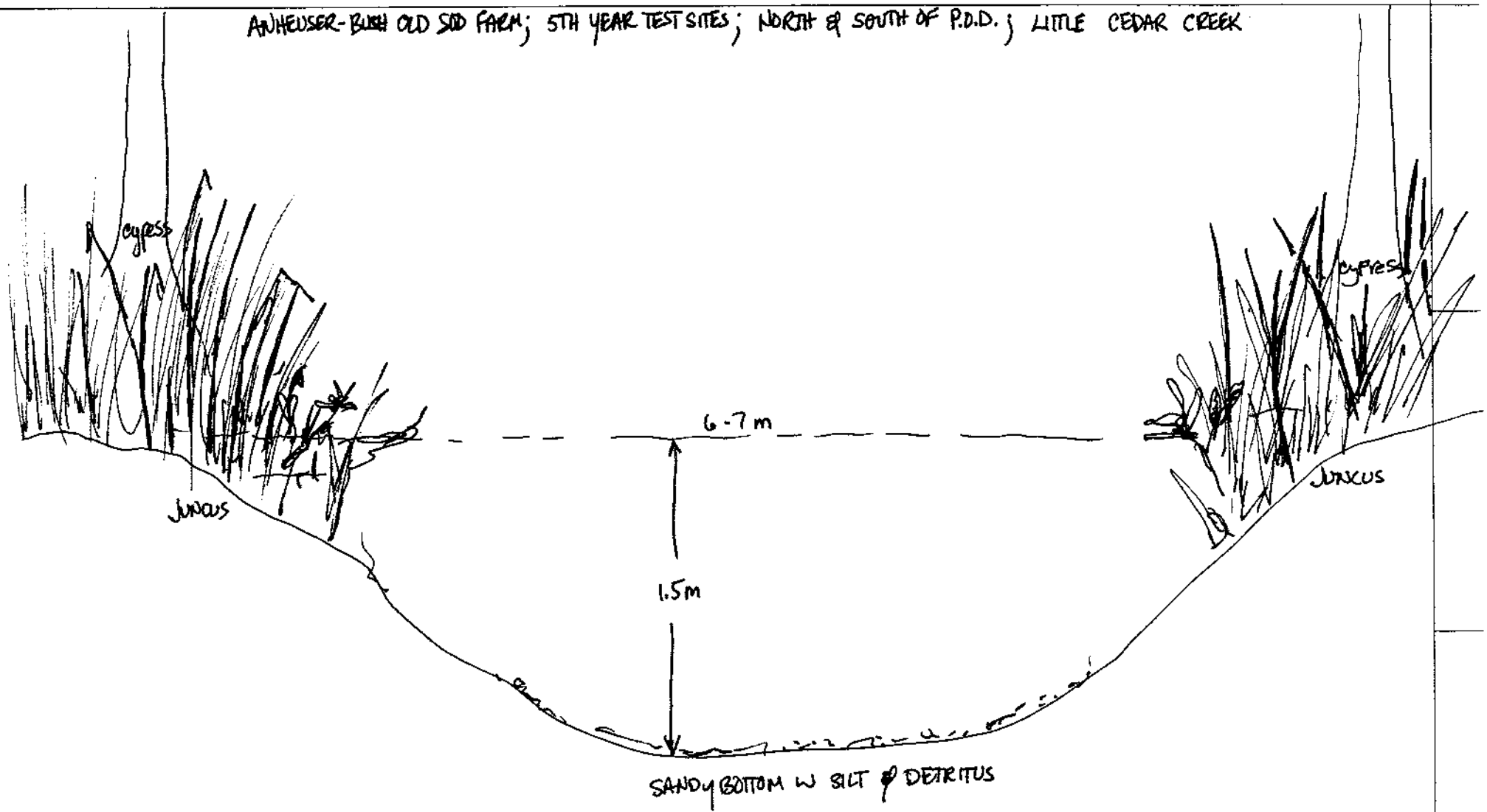


REFERENCE SITE: BROWARD RIVER ABOVE HART ROAD BRIDGE
ANHEUSER BUSCH OLD SOD FARM 5th YEAR

TEST SITES #'s 1 & 2; SHEET #'s 20030525 & 20030526

National "Brand
13-792 500 SHEETS SMALL FIT 5 SQUARE
42-381 500 SHEETS EYE EASE 5 SQUARE
42-382 100 SHEETS EYE EASE 5 SQUARE
42-389 200 SHEETS EYE EASE 5 SQUARE
42-392 100 RECYCLED WHITE 5 SQUARE
42-399 200 RECYCLED WHITE 5 SQUARE
Made in U.S.A.

ANHEUSER-BUSH OLD SOD FARM; 5TH YEAR TEST SITES; NORTH & SOUTH OF P.O.D.; LITTLE CEDAR CREEK



TEST SITES #'s 1 & 2; STORET #'s 20030525 & 20030526

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Anheuser Busch Sod Farm POD#1
County:
Contact / District: Tim McKelvey / NE
NPDES Permit #: FL00
LIMS Sample #: 89106 **LIMS Job #:** 94-Sep-13-19

Sample Collection: Date 9/12/94 Time 0800
Test Beginning: Date 9/13/94 Time 1600
Test Ending: Date 9/15/94 Time 1600
Organism Batch #: 3-7 **Diluent Batch #:** well
Organism Age: 11 days old
Test Organism: Cyprinella leedsi

Test Type: Screening / Definitive
Static / Static Renewal / Flow-through
Test Number: 1 of 4

Remarks:
Treated
Sample pen soap green with algae. DR-100 indicated chlorine. Sample would not dechlorinate with Calculated aliquot of Sodium thiosulfate (0.25N) 0.3 mLs/~~mL~~ plus 1 mL extra added in 0.2 mL aliquots.

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0	23.4 @ 23.5	8.5 @ 23.2 °C	1025 @ 1017
	9.0 @ 9.0			9720 @ 10000 @ 24.1 °C
24 hr	7.0 @ 7.0	23.4 @ 23.5	8.3 @ 24.4 °C	1032 @ 1047
	9.0 @ 9.0			9770 @ 10000 @ 24.1 °C
48 hr	7.0 @ 7.0	23.0 @ 23.1	8.3 @ 24.4 °C	1032 @ 1011
	9.0 @ 9.0			1039 @ 1047 @ 24.5 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 hr	Number Live 48 hr	pH 0 hr	pH 24 hr	pH 48 hr	Temperature (°C) 0 hr	Temperature (°C) 24 hr	Temperature (°C) 48 hr	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 hr	D.O. (mg/L) 48 hr	UNCORRECTED Cond. (mmhos/cm) (Cond. (µmhos/cm)) 0 hr	24 hr	48 hr
Ctl A	11	5	5	5	8.1	8.3	8.4	23.5	23.2	23.2	7.9	8.4	8.0	245	245	245
Ctl B	2	5	5	5	8.1	8.3	8.4			23.1	7.9	8.4	8.1	245	245	245
100% A	263	5	5	5	9.7	9.3	9.2	24.1	23.3	23.1	8.1	8.6	10.3	875	870	875
100% B	65	5	5	5	9.7	9.3	9.2			23.1	8.1	8.7	10.4	875	870	875
Measured/Loaded by:		DW	TR	MF	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM
Recorded by:		TR	TR	MF	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR

Investigators' Signatures

Tina McKelvey
Robin C. Rodgers
Reviewer

Water Quality Parameters	Salt Water: Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			—	—	—
Lab Total Residual Cl2:	<0.03		1.2	DR-100	TM
Alkalinity:	125		190	Hach	TR
Hardness:	120		155	Hach	TR
Total Ammonia:	<0.017		<0.017	orion	TM

Ammonia Meter #98136 Ammonia Meter Slope: -65.5 Ammonia Blank: <0.017 Control Salinity: ( ) ppt Sample Salinity: ( ) ppt

form updated 4/27/94

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Anheuser Busch Sod Farm POD #1
County:
Contact / District: Tim McKelvey / NE
NPDES Permit #: FL00
LIMS Sample #: 89106 **LIMS Job #:** 94-Sep-13-19

Sample Collection: Date 9-12-94 Time 0800
Test Beginning: Date 9-13-94 Time 1600
Test Ending: Date 9-15-94 Time 1600
Organism Batch #: 34 **Diluent Batch #:** 35
Organism Age: <24 hrs
Test Organism: Ceriodaphnia dubia

Test Type: ~~Screening~~ / Definitive
~~Static~~ / Static Renewal / Flow-through
Test Number: 2 of 4

Remarks:

Treated
Sample pea-soup green with algae. DR-100 indicated chlorine. Sample would not dechlorinate with 1.3 mls of sodium thiosulfate (0.25N). Calculated 0.3mls + 1mL added in 0.2mL aliquots

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0	23.4 @ 23.5	8.5 @ 23.2 °C	1025 @ 1047
	9.0 @ 9.0			9770 @ 10000 @ 24.0 °C
24 hr	7.0 @ 7.0	23.4 @ 23.5	8.3 @ 24.4 °C	1037 @ 1047
	9.0 @ 9.0			9770 @ 10000 @ 24.1 °C
48 hr	7.0 @ 7.0	23.0 @ 23.1	8.3 @ 24.4 °C	1032 @ 1041
	9.0 @ 9.0			1039 @ 1047 @ 24.5 °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) Cond. (µmhos/cm) 0 hr	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 24 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 48 h
Control	A	5	5	4	8.3		8.3	23.6		23.0	7.8		8.5	165		190
Control	B	5	5	5			8.3			23.0			8.5			175
Control	C	5	5	5			8.3			23.0			8.4			175
Control	D	5	5	5			8.3			22.4			8.4			190
100%	A	5	5	5	9.7		9.2	23.6		23.0	7.9		9.1	830		890
100%	B	5	5	5			9.2			23.0			9.2			900
100%	C	5	5	5			9.2			23.0			9.3			900
100%	D	5	5	5			9.2			22.8			9.3			920
Measured/Loaded by:		TM	TM	TM	TM		TM	TM		TM	TM		TM	TM		TM
Recorded by:		TR	TM	TM	TR		TR	TR		TR	TR		TR	TR		TR

Investigators' Signatures

Tina McKelvey
Robin C. Rader
Marshall Faulkner
Reviewer

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			—	—	—
Lab Total Residual Cl2:		<0.03	1.2	DR-100	TM
Alkalinity:		75	190	Hach	TR
Hardness:		85	155	Hach	TR
Total Ammonia:		<0.017	<0.017	Orion	TM

Ammonia Meter #98136 Ammonia Meter Slope: -65.5 Ammonia Blank: <0.017 Control Salinity: ( ) ppt Sample Salinity: ( ) ppt

form updated 4/27/94

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Anheuser Busch Sod farm
County:
Contact / District: Tim McKelvey / NE
NPDES Permit #: FL00
LIMS Sample #: 89106 **LIMS Job #:** 94-Sep-13-19

Sample Collection: Date 9-12-94 Time 0800
Test Beginning: Date 9-13-94 Time 1400
Test Ending: Date 9-15-94 Time 1600
Organism Batch #: 37 **Diluent Batch #:** WC11
Organism Age: 11 days old
Test Organism: Cyprinodon leedsi

Test Type: (Screening) | Definitive
Static | Static Renewal | Flow-through
Test Number: 3 of 4

Remarks: Sample pea-soup green with algae
Untreated
DR-100 indicated presence of chlorine but sample would not dechlorinate/ with calculated amount of Sodium thiosulfate (0.025N) 0.3mls #1 mlestra in 0.2ml aliquots in treated test

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0	23.4 @ 23.5	8.5 @ 23.2 °C	1025 @ 1047
	9.0 @ 9.0			9720 @ 10000 @ 24.0 °C
24 hr	7.0 @ 7.0	23.4 @ 23.5	8.3 @ 24.4 °C	1037 @ 1047
	9.0 @ 9.0			9770 @ 10000 @ 24.1 °C
48 hr	7.0 @ 7.0	23.0 @ 23.1	8.3 @ 24.4 °C	103.2 @ 101.1
	9.0 @ 9.0			1039 @ 1047 @ 24.5 °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) Cond. (µmhos/cm) 0 hr	24 h	48 h
Ctl A	4	5	5	5	8.0	8.3	8.4	26.0	22.8	23.0	7.6	8.3	8.2	260	240	245
Ctl B	891	5	5	5	8.0	8.3	8.4			23.0	7.7	8.4	8.2	250	245	245
100% A	77	5	5	5	9.7	9.4	9.2	24.2	22.9	23.1	7.4	8.8	10.3	870	850	870
100% B	348	5	5	5	9.7	9.4	9.2			23.2	7.3	9.4	10.3	870	860	870
Measured/Loaded by:		DW	TR	NF	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM
Recorded by:		TR	TR	NF	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR

Investigators' Signatures
Helen C. Raden
Tina McKelvey
Marshall Faircloth
Reviewer

Water Quality Parameters	Salt Water: Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			—	—	—
Lab Total Residual Cl2:	<0.03		1.2*	DR-100	TM
Alkalinity:	125		190	Hach	TR
Hardness:	120		195	Hach	TR
Total Ammonia:	<0.017		<0.017	Orion	TM

Ammonia Meter #98136 Ammonia Meter Slope: -65.5 Ammonia Blank: <0.017 Control Salinity: ( ) ppt Sample Salinity: ( ) ppt

form updated 4/27/94

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Anheuser Busch Sod Farm
County:
Contact / District: Tim McKelvey / NE
NPDES Permit #: FL00
LIMS Sample #: 89106 **LIMS Job #:** 94-Sep-13-19

Sample Collection: Date 9-12-94 Time 0800
Test Beginning: Date 9-13-94 Time 1600
Test Ending: Date 9-15-94 Time 1600
Organism Batch #: 34 **Diluent Batch #:** 35
Organism Age: <24hrs
Test Organism: Ceriodaphnia dubia

Test Type: (Screening) / Definitive
Static / Static Renewal / Flow-through
Test Number: 4 of 4

Remarks:
Untreated
DR-100 indicated chlorine but sample would not dechlorinate with calculated amount of Sodium thiosulfate (0.025N) 0.3mL + 1mL extra in 0.2 mL aliquots in treated test %

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.4 @ 23.5	8.5 @ 23.2 °C	1025 @ 1047 9720 @ 10000 @ 24.0 °C
24 hr	7.0 @ 7.0 9.2 @ 9.0	23.4 @ 23.5	8.3 @ 24.4 °C	1037 @ 1047 9720 @ 10000 @ 24.1 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	23.0 @ 23.1	8.3 @ 24.4 °C	1032 @ 1011 1039 @ 1047 @ 24.5 °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) Cond. (µmhos/cm) 0 hr	24 h	48 h
Control	A	5	5	5	8.4		7.6	23.6		23.3	7.8		8.2	165		175
Control	B	5	5	5			8.1			23.2			8.3			175
Control	C	5	5	5			8.3			23.2			8.4			175
Control	D	5	5	5			8.3			23.2			8.4			180
100%	A	5	5	5	5.7		9.2	23.6		23.1	7.3		8.8	810		835
100%	B	5	5	5			9.2			23.1			8.9			835
100%	C	5	4	4			9.3			23.1			9.8			835
100%	D	5	5	5			9.4			23.1			9.8			840
Measured/Loaded by:		TM	TM	TM	TM		TM	TM		TM	TM		TM	TM		TM
Recorded by:		TR	TM	TR	TR		TR	TR		TR	TR		TR	TR		TR

Investigators' Signatures
Robin C Rader
Tim McKelvey
Marshall Faircloth

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:					
Lab Total Residual Cl2:		<0.03	1.2*	DR-100	TM
Alkalinity:		75	190	Hach	TR
Hardness:		85	155	Hach	TR
Total Ammonia:		<0.017	<0.017	Orion	TM

Ammonia Meter #98136 Ammonia Meter Slope: -65.5 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

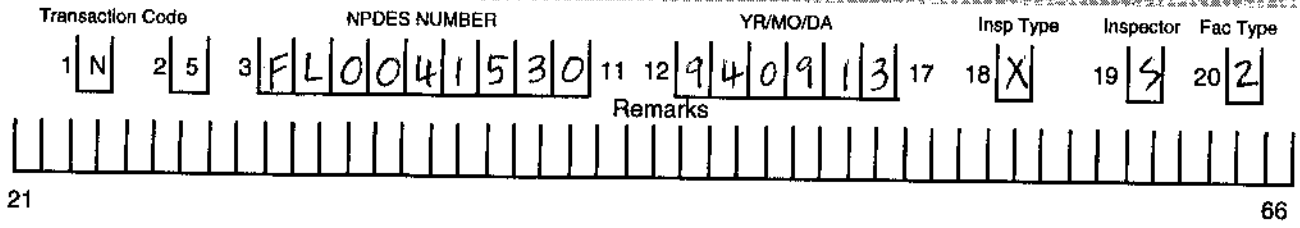
Benthic macroinvertebrate taxa list for Anheuser - Busch Old Sod Farm, collected via Ekman dredge in the Broward River, on 13 August, 1994. Densities, in number/m^2, represent the mean of three replicates.

	Reference Site	Test Site 1	Test Site 2
Amphipoda			
Gammarus sp.	133	15	–
Diptera			
Cladotanytarsus sp.	5185	–	–
Conchapelopia sp.	30	–	–
Goeldichironomus carus	–	15	15
Polypedilum halterale grp.	681	59	459
Polypedilum illinoense	15	–	–
Polypedilum scalaenum grp.	30	–	44
Tanypus neopunctipennis	–	15	–
Undetermined dipteran pupae	281	–	–
Gastropoda			
Amnicola rhombostoma	30	–	–
Isopoda			
Ancinnus depressus	30	–	–
Cyathura polita	800	–	–
Oligochaeta			
Aulodrilus pigueti	1007	–	–
Branchiura sowerbyi	30	–	–
Limnodrilus hoffmeisteri	2119	252	44
Pristina synclites	15	–	–
Undetermined tubificid w/o capilliform setae	341	–	–
Pelecypoda			
Tellina sp.	15	–	–
Polycheata			
Undetermined Nereidae	44	104	296

Phytoplankton taxa list and densities (#/mL) for Anheuser - Busch Old Sod Farm, collected via subsurface grabs in the Broward River, on 13 September, 1994.

	Reference Site	Test site A	Test site B
Bacillariophyta			
Achnanthes sp.	–	–	15,445
Corethron sp.	–	5148	5148
Coscinodiscus sp.	1479	5148	20,593
Cyclotella sp.	1973	38,612	54,056
Cylindrotheca spe.	11,835	97,816	84,946
Cymbella sp.	–	2574	–
Gyrosigma sp.	986	5148	2574
Leptocylindrus sp.	6411	15,445	15,445
Melosira sp.	–	33,463	–
Navicula sp.	6904	23,167	18,019
Nitzschia sp.	4438	5148	33,463
Nitzschia constricta	493	–	–
Nitzschia longissima	986	–	–
Pinnularia sp.	493	–	–
Rhizosolenia sp.	1479	7722	25,741
Skeletonema sp.	11,835	18,019	51,482
Thalassiosira sp.	3452	30,889	18,019
Chlorophyta			
Ankistrodesmus sp.	986	–	–
Chlamydomonas sp.	1479	–	–
Chlorella sp.	2959	38,612	12,871
Cosmarium sp.	–	–	2574
Gloeocystis sp.	–	5148	–
Scenedesmus sp.	–	15,445	15,445
Unknown chlorophyte flagellate	493	–	–
Chrysophyta			
Mallomonas sp.	493	–	–
Cryptophyta			
Chroomonas sp.	–	25,741	15,445
Cryptomonas sp.	986	20,593	10,296
Cyanophyta			
Aphanocapsa sp.	986	–	–
Chroococcus sp.	–	84,946	175,039
Dactylococcopsis sp.	1479	46,334	175,039
Johannesbaptista sp.	–	2574	–
Lyngbya sp.	493	–	–
Merismopedia sp.	1973	38,612	54,056
Microcystis sp.	–	–	5148
Euglenophyta			
Phacus sp.	–	2574	–
Trachelomonas sp.	–	2574	2574
Pyrrhophyta			
Dinoflagellate cyst	–	38,612	–
Peridinium sp.	493	–	10,296

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)

