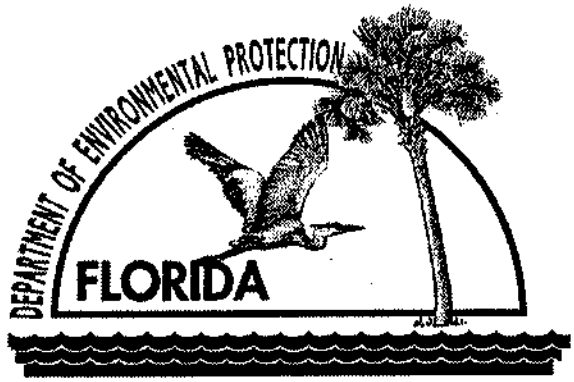
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Biological Assessment of

Stock Island Power Plant

Monroe County

NPDES #FL0002089

Sampled June 1997

December 1997

Biology Section
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection

Results of Fifth Year Inspections

Discharger: Stock Island Power Plant
County: Monroe
NPDES Number: FL0002089
State Permit Expiration Date: 31 December 1997

Toxics Sampling Inspection (XSI)

Date Sampled: 16 June 1997

Results: Copper (1.2 µg/L) was the only metal detected in the effluent. This copper concentration complies with the Class III marine water quality standard. No organic constituents were detected in the effluent.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 16 June 1997

Results: The effluent was not acutely toxic to the invertebrate, *Mysidopsis bahia,* or to the fish, *Menidia beryllina.*

Impact Bioassessment Inspection (IBI)

Date Sampled: 16 June 1997

Results: Measures of macroinvertebrate community health indicated the discharge was not adversely affecting the receiving water communities. Several benthic community parameters at test site 1 were either similar to, or better than, those found at the reference site. Pollution sensitive organisms were well represented throughout the study area, also suggesting that conditions near the outfall were healthy. As expected from the well flushed, oligotrophic waters of the Florida Straits, algal density was low and chlorophyll *a* was undetected. Overall, the facility did not appear to have an adverse effect on the receiving water algal communities.

Water Quality Inspection (WQI)

Date Sampled: 16 June 1997

Results: Total suspended solids (TSS) in the effluent (12 mg/L) complied with the facility's permit limits. Nutrient levels found at all receiving water sites were low compared to other Florida estuaries. Effluent nutrient concentrations were the same as, or lower than, receiving water levels. AGP levels at all receiving water stations were far below the marine "problem threshold" of 10 mg dry wt/L.

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 Utility Board of the City of Key West operates the Stock Island Power Plant for the purpose of generating electricity for the lower keys, Monroe County, Florida (see maps in Appendix). Cooling water for the facility is pumped from the underlying saline aquifer, which is high in hydrogen sulfide and low or devoid of dissolved oxygen. After serving its use for cooling, the wastewater is discharged into the Florida Straits through a canal, approximately 1,200 meters long, 10 meters wide, and 5 meters deep. The effluent receives aeration in the canal. This facility has a permitted flow of 37.7 MGD, with an average daily flow from April, 1996 through March, 1997 of 4.54 MGD. Flow on the day of sampling was 4.3 MGD.

Permit limits are as follows: flow (37.7 MGD as annual average daily flow), TSS (30 mg/L as a daily average, 100 mg/L as a daily maximum), pH (6.5 - 8.5 SU), dissolved oxygen (minimum of 4.0 mg/L as an average across the mixing zone, minimum of 1.5 mg/L at any time), oil and grease (15 mg/L as a daily average, 20 mg/L as a daily maximum), total copper (1.0 mg/L maximum), total iron (1.0 mg/L maximum), and acute toxicity (LC_{50} must be greater than 100%).

The Stock Island power plant has a mixing zone described by rule (62-302.700(9)(i)13.b., FAC) as being "a circle 150 feet in radius from the end of the power plant discharge canal." This provision serves as an one of areas excluded from being part of the "Special Waters" designation that applies to the remainder of the waters in the Florida Keys. While the rule is non-specific, the facility's permit says the mixing zone applies to (chronic) toxicity, dissolved oxygen, oil and grease, total (recoverable) copper, total (recoverable) iron. The parentheticals are not included in the permit.

The Department has granted Stock Island power plant a variance from having to meet acute and chronic toxicity limits within the discharge

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2	Test Site 3	Test Site 4
Macroinvertebrate Ponar					
Number of Taxa	68	65			
Shannon-Weaver Diversity	4.6	5.5			
% Polychaeta	43	38			
# Polychaeta	23	29			
% Tubificida	3	0			
% Gastropoda	9	14			
% Isopoda	7	5			
% Pelecypoda	3	8			
% Cumacea	2	0.8			
% Amphipoda	26	15			
% Tanaidacea	4	3			
% Polyplacophora	3	8			
% Other	0	8.2			
% Predator/Carnivores	36.4	15			
% Above-Surface Deposit Feeders	7.6	10.8			
% Below Surface Deposit Feeders	11	13			
% Scavengers	10	9			
% Suspension Feeders	6	15			
% Browser-grazer	10	9			
% Scrapers	1	9			
% Unknown	14.7	11.8			
% Other	3.3	7.4			
Phytoplankton Algae					
Number of Taxa	11	10	12	11	7
Shannon-Weaver Diversity	2.7	2.6	2.5	2.6	2.3
Chlorophyll a (µg/L)	1.0 U	1.1 U	1.0 U	1.1 U	1.1 U
Algal Density (#/mL)	1017	888	1287	896	462
% Dinophyceae	3.3	1.4	1.3	1.8	2.2
% Chlorophyceae	0.0	0.5	0.3	0.5	0.7
% Cryptophyceae	8.3	5.1	13.1	4.6	19
% Diatoms	88.4	93.1	85	92.7	78.1
Algal Growth Potential (mg dry wt/l)	0.2 I	0.4 I	0.2 I	0.1 I	0.1 AI

A - Value reported is the mean of two determinations

I - Value reported is less than the minimum quantitation limit, and greater than or equal to the minimum detection limit

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

canal. The variance also grants relief from having to meet the dissolved oxygen criteria for predominantly marine waters also within the discharge canal. The variance expires on December 31, 1997, but the Department has received a timely application for renewal of the variance.

Acute toxicity limits must be met at the end of the discharge canal and chronic limits must be met at the far (southern) edge of the mixing zone. There is a marker in the western seawall that shows the end of the discharge canal. According to Gus Rios, there is also a buoy at the end of the discharge canal with the location (via GPS) of Lat. 24° 33' 29.4" N and Long. 81° 44' 03" W which marks the outfall location. Other buoys mark required sampling points across the mixing zone.

Flow-through bioassays, conducted in August and September, 1994, and in July, 1995, indicated the effluent was acutely toxic. No other problems have been reported for this facility.

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 approximately 0.5 miles southeast of the outfall) and one test site on the southeast edge of the mixing zone (see maps in Appendix). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and three other study sites surrounding the mixing zone (see maps in Appendix). Acute screening toxicity bioassays, using *Mysidopsis bahia* and *Menidia beryllina* as test organisms, were performed on an effluent sample (Weber 1991). The effluent was analyzed for metals, and for organic constituents (base neutral and acid extractables). Additionally, nutrient analyses were performed on effluent, reference, and four test sites. Methods used for all chemical analyses are on file at the Tallahassee DEP Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at the reference site and test site 1. Of the four test sites, only site 1 was located in an area where natural substrate was present. The bottom was dredged out at test sites 2, 3, and 4, rendering them incomparable to the reference site for macroinvertebrate community analyses. Invertebrates were collected using three replicate petite Ponar grabs. Phytoplankton was sampled at reference and four test sites via subsurface grabs. Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). Algal Growth Potential tests, using *Dunaliella tertiolecta* as the test organism, followed EPA (1974). Sediment from the reference site and test site 1 was analyzed for grain size and percent organic matter (Ross 1990).

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.

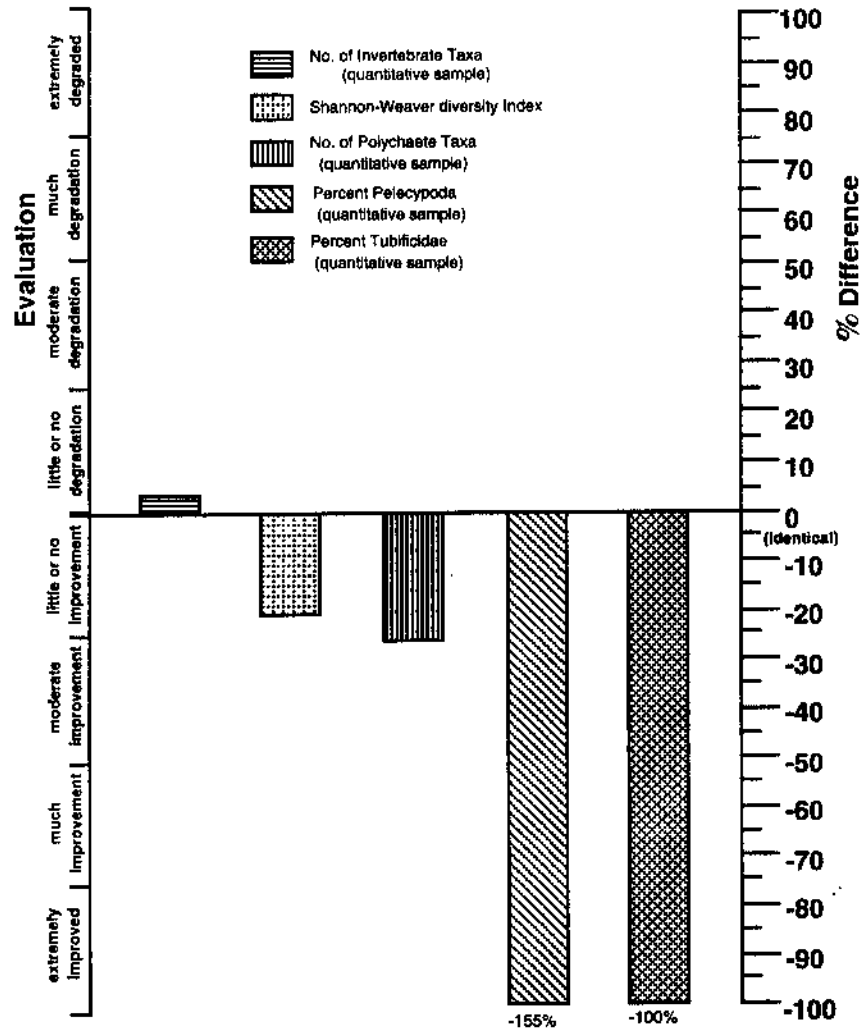
Habitat Assessment: For marine systems, overall habitat quality is also assigned to one of four categories: Optimal (75-100 points); Suboptimal (50-75 points); Marginal (25-49 points); and Poor (0-24 points) (see habitat assessment field sheets in Appendix).

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

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

Numbers of pollution sensitive taxa: Some organisms become rare or absent as the intensity or duration of disturbance increases. 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. 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: Substantial shifts in proportions of major groups of organisms, compared to reference conditions, may indicate degradation. In marine systems, an increase in the % tubificid oligochaetes, a decrease in the



Effect of discharge on the benthic macroinvertebrate community.

% pelecypods, and a decrease in the number of polychaete taxa are all considered indicators of disturbance (Engel *et al.* 1994).

Algal biomass: High algal biomass (algal density or chlorophyll *a*) implies nutrient stress. 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: Disturbance can shift the feeding strategies of invertebrates. In Florida for example, pollution may be responsible for reducing the numbers of filter-feeders (FDEP 1994) and shredders (EA Engineering 1994).

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: Gus Rios, (DEP South District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Joy Jackson, Kathleen Lurding, Elizabeth Miller, Urania Quintana, Lisa Tamburello, David Whiting, Vicki Whiting (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 waters adjacent to the Stock Island Power Plant discharge area are designated as Outstanding Florida Waters. Benthic macroinvertebrate, phytoplankton, and water quality data were collected on an outgoing tide from two sites: the reference site and test site 1. Phytoplankton and water quality were sampled at test sites 2, 3, and 4. The marine substrates present in the area include patch coral reefs, grass beds, coral/shell rubble, and well oxygenated sand. The habitat quality score at the reference site (with 85 points) was comparable to, but slightly higher than, that of test site 1 (with 71 points). Sample depths ranged from 2.0 meters to 2.4 meters.

The water at the five receiving water stations was very similar with respect to physical/chemical parameters. Surface dissolved oxygen levels ranged from 5.0 mg/L to 5.3 mg/L. Salinity varied from 38.9 ppt at the reference site to 39.2

ppt at the remaining sites. Surface layer temperatures at the receiving water sites were measured to be between 29° C and 31° C, while surface pH ranged between 8.0 SU and 8.2 SU.

The effluent was not acutely toxic to the invertebrate, *Mysidopsis bahia,* or to the fish, *Menidia beryllina*.

Copper (1.2 µg/L) was the only metal detected in the effluent. This copper concentration complies with the Class III marine water quality standards. No organic constituents were detected in the effluent.

Total suspended solids (TSS) in the effluent (12 mg/L) complied with the facility's permit limits.

Nutrient levels found at all receiving water sites were low compared to other Florida estuaries (see Table of Typical Water Quality Values in Appendix). Effluent nutrient concentrations were the same as, or lower than, receiving water levels.

Algal Growth Potential (AGP) results compared favorably with the nutrient results. AGP levels, ranging from 0.1 mg dry wt/L to 0.4 mg dry wt/L, were far below the marine "problem threshold" of 10 mg dry wt/L (Dr. Ron Raschke, USEPA, personal communication).

Measures of macroinvertebrate community health indicated the discharge was not adversely affecting the receiving water communities. The Figure on p. 3 indicates the degree of difference between the invertebrate populations of the reference and test site. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. Negative values mean the test site is better than the reference.

Several benthic community parameters at the test site were either similar to, or better than, those found at the reference site. A total of 68 macroinvertebrate taxa were found at the reference site, while 65 taxa were recovered from test site 1. Shannon-Weaver diversity was excellent at the reference site (4.6) and at test site 1 (5.5) alike. By way of comparison, both the test site taxa richness and Shannon-Weaver diversity values were better than those found in approximately 90% of other Florida estuaries. The number of polychaete taxa was slightly higher at test site 1 (with 29 taxa) than the reference site (with 23 taxa). Similarly, the % Pelecypoda was higher at test site 1 (with 8% pelecypods) than at the reference site (which had 3%).

Pollution sensitive organisms were well represented throughout the study area. For example, the polychaetes, *Fabricinuda trilobata* and *Prionospio heterobranchia,* and the amphipod, *Ampithoe longimana* were collected at the reference site. Similarly, taxa which require good water quality were found at test site 1. These included the polychaetes, *Syllis* sp. and *Lumbrineris* sp., the amphipods, *Ericthonius* sp., as well as the echinoderm, *Ophiomyxa* sp. The presence of such taxa suggests that conditions near the outfall were healthy.

As expected from the well flushed, oligotrophic waters of the Florida Straits, algal densities were low, ranging from 462 cells/mL at test site 4, to 1,287 cells/mL at test site 2 (see graphs in Appendix). Chlorophyll *a* was undetected at all sites. Phytoplankton taxa richness ranged from 12 taxa at test site 2 to 7 taxa at test site 4. Shannon-Weaver diversity ranged from 2.3 to 2.7. Diatoms were the most abundant algal group at all three sites, followed by cryptophytes.

Conclusions

The effluent was not acutely toxic to the invertebrate, *Mysidopsis bahia,* or to the fish, *Menidia beryllina*.

Copper (1.2 µg/L) was the only metal detected in the effluent. This copper concentration complies with the Class III marine water quality standards. No organic constituents were detected in the effluent.

Total suspended solids (TSS) in the effluent (12 mg/L) complied with the facility's permit limits.

Nutrient levels found at all receiving water sites were low compared to other Florida estuaries. Effluent nutrient concentrations were the same as, or lower than, receiving water levels.

AGP levels at all receiving water stations were far below the marine "problem threshold" of 10 mg dry wt/L.

Measures of macroinvertebrate community health indicated the discharge was not adversely affecting the receiving water communities. Several benthic community parameters at test site 1 were either similar to, or better than, those found at the reference site. Pollution sensitive organisms were well represented throughout the study area, also suggesting that conditions near the outfall were healthy.

As expected from the well flushed, oligotrophic waters of the Florida Straits, algal density was low and chlorophyll *a* was undetected. Overall, the facility did not appear to have an adverse effect on the receiving water algal communities.

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Chemistry Summary Table for Stock Island Power Plant.	Effluent	Ref Site	Test Site 1	Test Site 2	Test Site 3	Test Site 4
Organic Constituents (ug/L)						
	non detected					
Metals (ug/L)						
Aluminum	35 U					
Arsenic	40 U					
Cadmium	0.5 U					
Copper	1.2 I					
Chromium	10 U					
Iron	10 U					
Lead	1 U					
Mercury	0.1 U					
Nickel	6 U					
Selenium	50 U					
Silver	0.4 U					
Zinc	50 U					
Nutrients (mg/L)						
Ortho-phosphate	0.004 I	0.004 I	0.004 U	0.004 U	0.005 I	0.005 I
Total phosphorus	0.028 I	0.028 I	0.026 I	0.029 I	0.025 I	0.028 I
Ammonia	0.05 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Nitrate+Nitrite	0.02 U	0.012	0.01 I	0.009 I	0.008 I	0.007 I
TKN	0.38 J	0.43	0.45	0.47 A	0.37 I	0.46
General Phys-Chem Parameters						
Habitat Assessment	53	85	71	53	61	60
D.O. (mg/L) surface	4.5	5.1	5.3	5.0	5.0	5.0
pH (SU) surface	8.0	8.0	8.2	8.0	8.2	8.0
Salinity (ppt) surface	38.8	38.9	39.2	39.1	39.1	39.1
Specific Conductance (µmhos/cm) surface	58,000	58,200	58,700	58,200	58,200	58,200
Temperature (°C) surface	30	31	30	29	29	29
Total Suspended Solids (mg/L)	12 J	-	-	-	-	-
Algal Growth Potential (mg dry wt/L)	0.1 I	0.2 I	0.4 I	0.2 I	0.1 I	0.1 AI
Toxicity						
Bioassay Fish	non-toxic	-	-	-	-	-
Bioassay Invertebrate	non-toxic	-	-	-	-	-

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

I - Value reported is less than the minimum quantitation limit, and greater than or equal to the minimum detection limit

J - Estimated value

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

Typical Values for Selected Parameters in Florida Waters

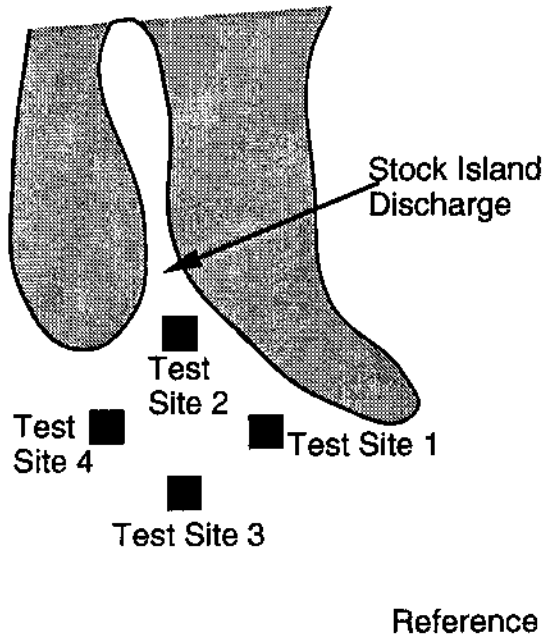
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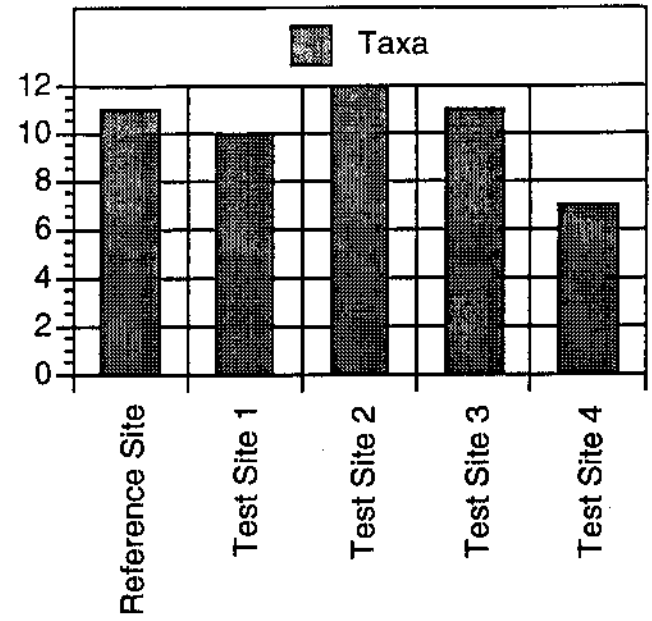
Percentile Distribution

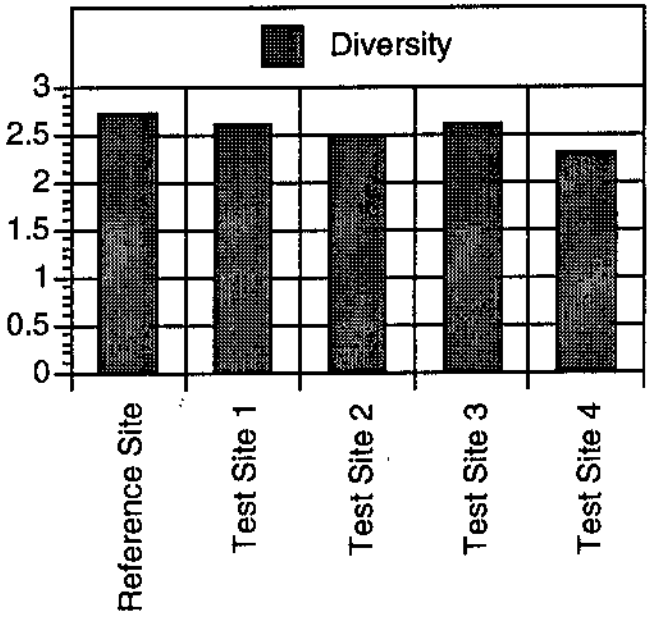
Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
STREAMS (1617 stations)											
Phytoplankton Chlorophyll *a*	0.22	0.52	0.94	1.60	3.02	4.63	6.72	9.87	14.68	27.35	48.70
Periphyton Chlorophyll *a*	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85
H-D Diversity	0.84	2.12	2.48	2.74	2.88	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

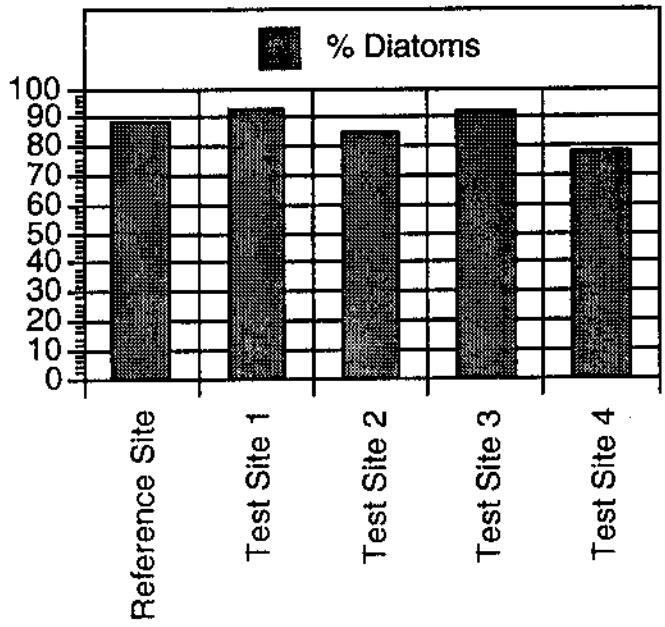
Units:
Phytoplankton Chlorophyll *a* (ug/L), Periphyton Chlorophyll *a* (mg/m^2), Nutrients (mg/L), Turbidity (NTU), Taxa richness and diversity values are for macroinvertebrates

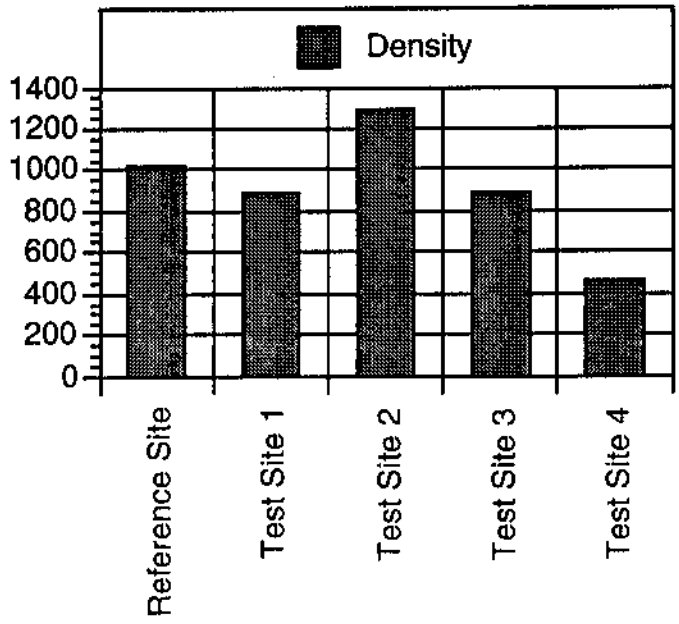
Phytoplankton community characteristics at reference and test sites.



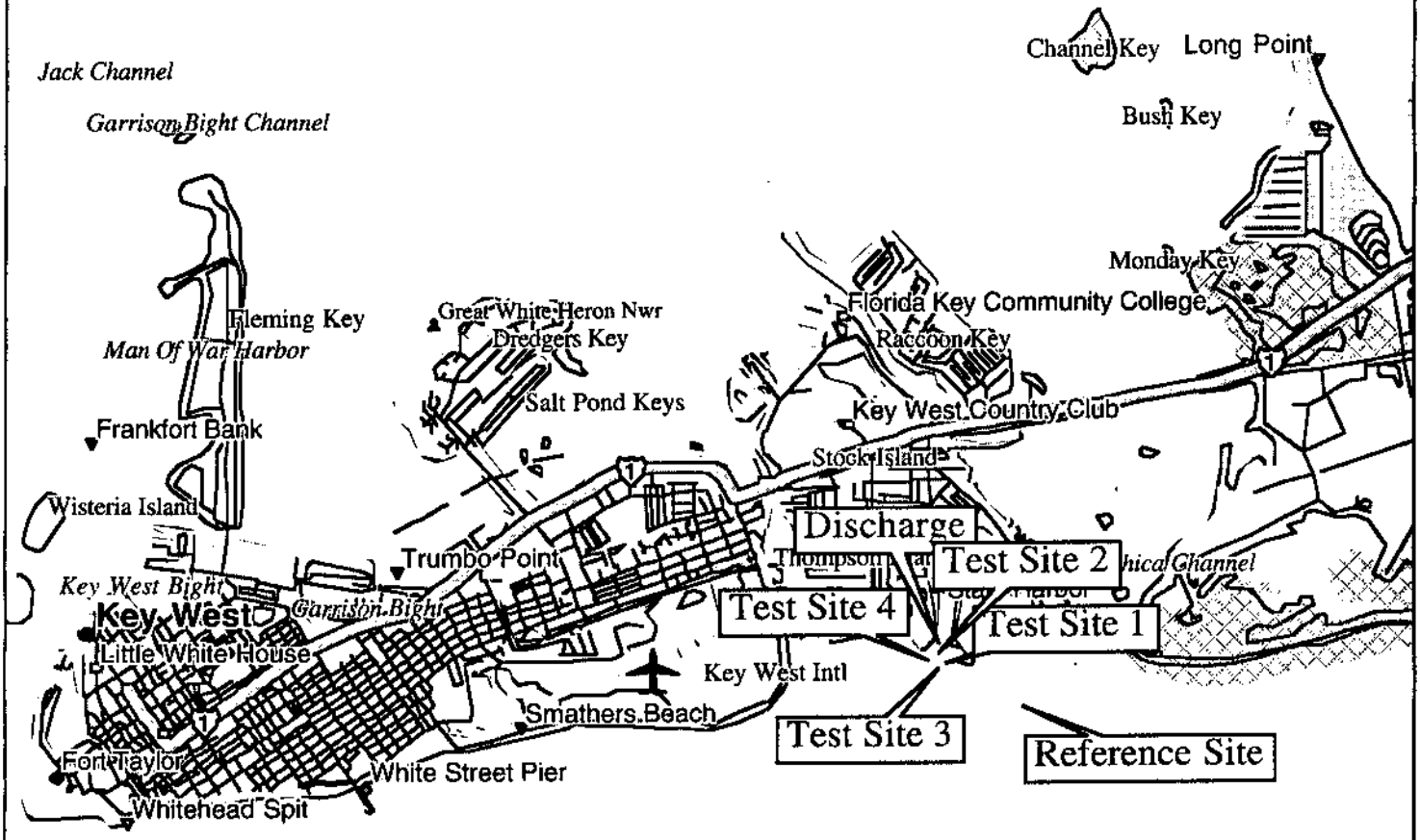








Stock Island Power Plant Stations

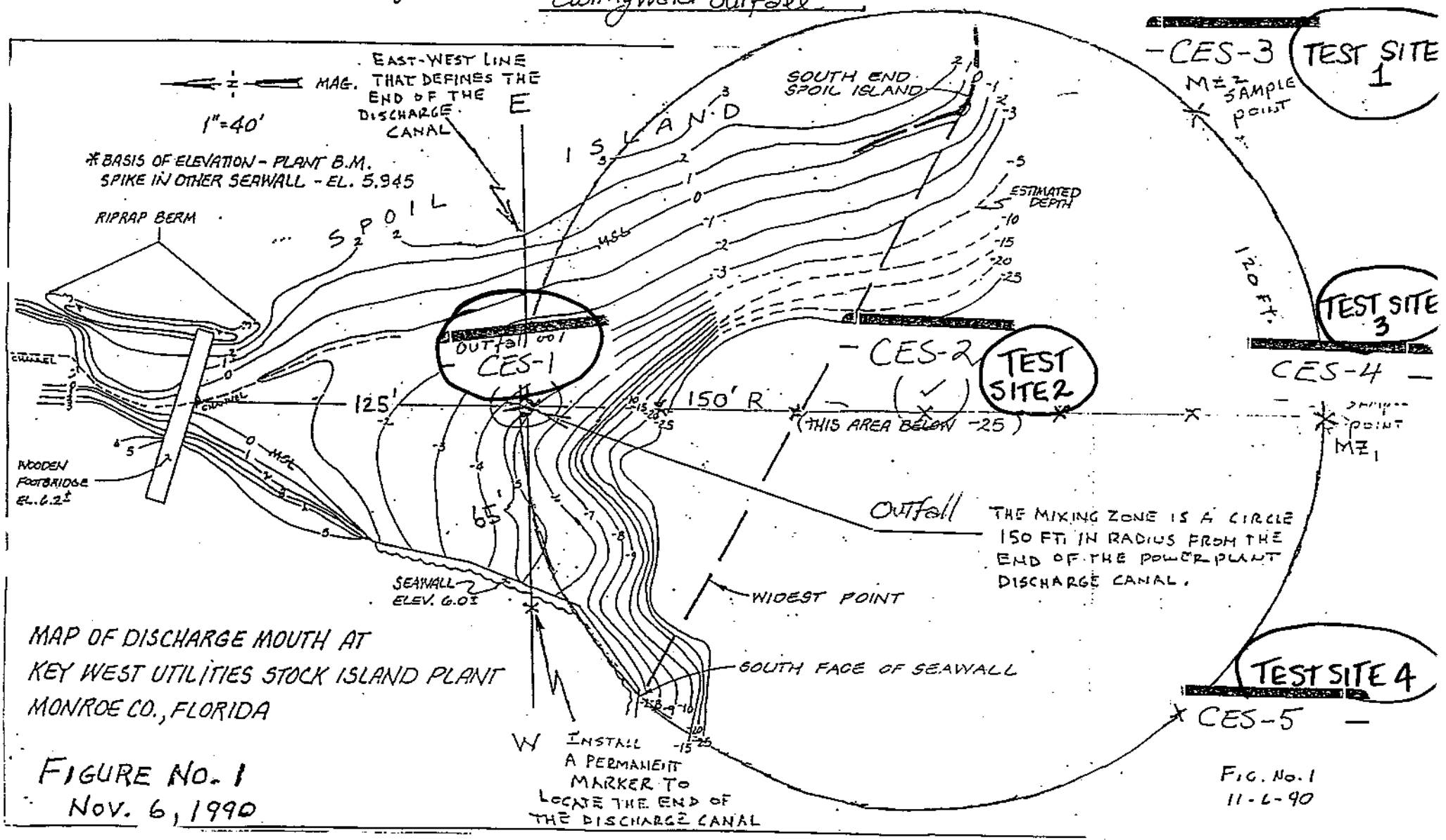


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Mag 13.00
Wed Aug 27 14:21 1997
Scale 1:62,500 (at center)
1 Miles
2 KM

- Secondary SR, Road, Hwy Ramp
- Major Connector
- State Route
- US Highway
- Utility
- Point of Interest
- County Seat
- Airfield
- Geographic Feature
- Park or Reservation
- Sched Service Airport
- Locale
- Population Center
- Land

Figure 1: STOCK Island Power Plant cooling water outfall

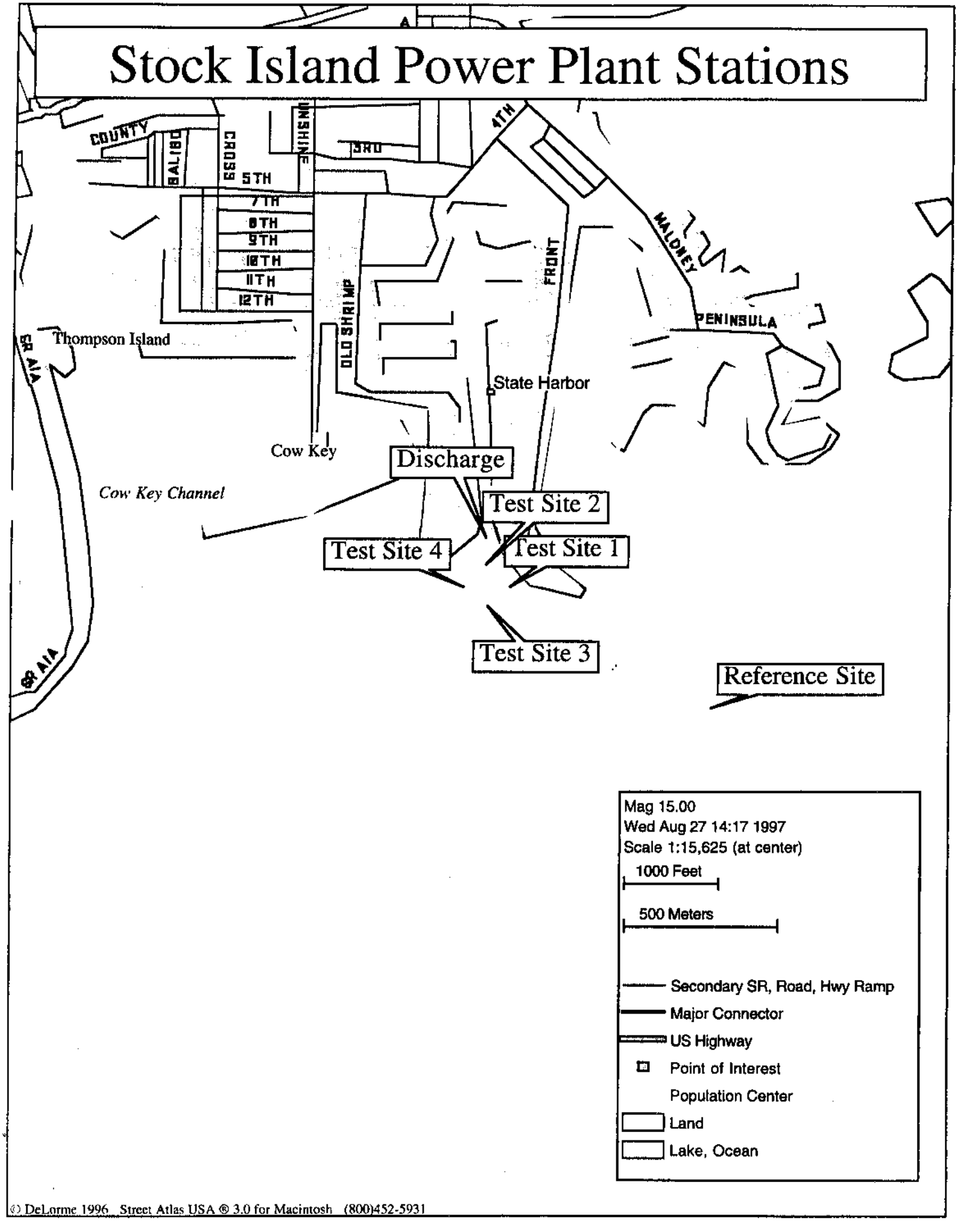


MAP OF DISCHARGE MOUTH AT
KEY WEST UTILITIES STOCK ISLAND PLANT
MONROE CO., FLORIDA

FIGURE NO. 1
Nov. 6, 1990

FIG. No. 1
11-6-90

Stock Island Power Plant Stations



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STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

FACILITY NAME: Utility Board of the City of Key West; Ralph Garcia Steam Plant aka Stock Island Power plant
DATE: June 16, 1997

LOCATION :	COUNTY	DISTRICT
Facility located on the Front Street Extension of Stock Island, Key West	Monroe	South District
Facility Outfall location: Latitude 24° 33' 29.4" N Longitude 81° 44' 03" W see maps (Figures 1 through 3)		Marathon Branch

FEDERAL PERMIT #FL0002089 AND EXPIRATION DATE:12/31/97
STATE GMS# 5244H02019
STATE EXPIRATION DATE: 12/31/97
Permit # 1044-181888
FACILITY TYPE: IW - Industrial
Municipal
OTHER (list):

FUNCTION OF FACILITY: - Electric Power Plant
- Serves the City of Key West and lower Florida Keys.

DESCRIPTION OF TREATMENT PROCESS: The facility discharges cooling water effluent (ground water source) to a discharge canal which is approximately 2,100 feet in length, 30-35 ft. wide, and about 5 ft. in depth. The discharge canal operates under a variance (DER file 91F004) with expiration date of December 31, 1997. The variance grants relief from the toxicity requirements of Rules 62-302.500 and 510, F.A.C., and the Class III marine DO standards pursuant to Rule 62-302.530, F.A.C., within the boundaries of the discharge canal. The variance does not include receiving waters within the mixing zone.

The only treatment provided is some aeration and mixing in the discharge canal. Since the source of the cooling water is ground water pumped from underlying salt water aquifer, the effluent contains high levels of naturally-occurring sulfides and low concentrations of dissolved oxygen (DO). The discharge canal provides for aerobic mixing and some reduction of Hydrogen Sulfide gas. The mixing zone provides further mixing and dilution before the effluent reaches Class III receiving waters.

There is also a settling pond for disposal of soot-bearing wastes with emergency overflow discharge to the cooling water discharge canal. No discharge from the settling pond emergency overflow has been reported or documented during recent years.

RECEIVING WATERS: Atlantic Ocean South of Stock Island CLASSIFICATION: Class III/OFW

DESIGN FLOW: Permitted flow: 37.7 MGD

ACTUAL MEAN FLOW: Annual ave. daily flow (April 96 - March 97) AADF= 4.54 MGD
Average daily flow reported on the date of the inspection was 4.3 MGD.)

DISCHARGE IS: Continuous x Intermittent Seasonal Rainfall dependent
OTHER (describe)

IF FACILITY HAS A MIXING ZONE, GIVE DETAILS (size, parameters affected, etc.): The mixing zone consists of a circle 150 feet in radius beginning at the end of the discharge canal (see Figure 1 - attached).

The mixing zone has been granted for the following parameters:
Dissolved Oxygen (DO), toxicity, oil and grease, total copper, and total iron.
This mixing zone is subject to the requirements specified in Rule 62-4.244 of the F.A.C.

LIST EFFLUENT LIMITS: State Permit

PARAMETER	Point of Discharge Mixing Zone (MZ) LIMITS
FLOW	37.7 MGD (AADF)
DO	4.0 mg/L average (across MZ) 1.5 mg/L min. at any time
Acute Toxicity	100% effluent concentration shall not cause LC50.
pH	6.5-8.5 Standard Unit (SU)
Total Suspended Solids	30.0 mg/L as daily ave. 100.0 mg/L as daily max.
Oil and Grease	15.0 mg/L as daily ave. 20.0 mg/L as daily max.
Total Copper	1.0 mg/L as daily ave. and max.
Total Iron	1.0 mg/L as daily ave. and max.

DESCRIBE SPECIAL PERMIT CONDITIONS (state permit) AND PERMIT MODIFICAITONS:

At the downstream end of the Mixing Zone (MZ) the Class III water limits shall be met, pursuant to Rule 62-302.530, F.A.C.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Stock Island Power Plant
(Facility)

Description of permitted outfall(s):

The outfall point is located at the end of the discharge canal at the North end, or upstream edge, of the mixing zone. Figure 1 (attached) shows the location of the outfall and provides a graphical representation of the mixing zone.

As shown in Figure 1, the mixing zone is a circle 300 feet in diameter. Receiving waters at the seaward (downstream) edge of the mixing zone are designated OFW and are subject to marine Class III standards.

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

Self-monitoring effluent toxicity reports revealed acute toxicity, in violation of permit requirements and Rule 62-302.500(1)(d), F.A.C., for the following dates:

1. August-September 1994
2. July 1995

These toxicity reports contained the results of flow-through toxicity assays required by Specific Condition 5 of the State permit and condition [6] of the NPDES permit.
The reported average daily flow (ADF) during these tests ranged between 15.30 MGD during the September 1994 tests and 33.67 to 35.41 MGD during the July 1995 tests.

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

I. PREVIOUS ENFORCEMENT ACTIONS:

On February 2, 1995, the Department proposed a Consent Order (OGC Case No. 94-3922-44-IW) to resolve the above referenced permit violations. The proposed Consent Order required submittal of a facility evaluation by a professional engineer and a schedule for corrective actions needed to achieve compliance with permit requirements.

On March 27, 1995 an informal conference was held at the Department's Marathon office to discuss the draft Consent Order and possible resolution to the toxicity violations. During the meeting facility representatives declined to enter into a Consent Order with the Department and instead proposed an alternative plan of corrective actions submitted by the facility's attorney on April 4, 1995. The proposed plan involved extending the quarterly flow-through toxicity studies beyond the period required by the permit in order to allow for a facility evaluation during periods of lower cooling water discharge flows that would result from the proposed operation of the steam plant in stand-by mode. It was also proposed to evaluate alternative treatment options during this period in order to provide appropriate corrective action in the event that the flow-through tests revealed acute toxicity during the stand-by operation of the steam plant. This plan was approved by the Department. The aforementioned studies did not reveal acute toxicity violations during 1996. The maximum steam plant stand-by flow was reported to be 7.8 MGD. On July 16, 1996 The facility's attorney submitted correspondence to the Department stating that this would be the maximum flow anticipated since the steam plant was in the process of inactivation. Therefore, except during emergencies, future discharge flows would be generated by cooling water from the diesel generators.

On February 7, 1997 an application for a minor revision of the State permit was submitted to the Department requesting reduction of the quarterly flow-through toxicity testing and the daily outfall monitoring requirements to annual and weekly frequencies, respectively.
The Department's South District office did not object to this request but recommended that any permit modification should include a reduction of the 37.7 MGD permitted capacity to the maximum standby flow of 7.8 MGD which was provided in the facility's attorney's letter of July 16, 1996.

Continued. . .

II. PREVIOUS WATER QUALITY STUDIES AND BIOASSESSMENTS:

Flow-through toxicity monitoring required by the permit as referenced in I above. Previous Department static/acute toxicity tests conducted in November 1979 and May 30 1989 did not reveal acute toxicity.

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

Additional information:

Gina Reis
June 19, 1997

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: 3065 / SUBMITTING AGENCY NAME: DEP MARTIN	STORET STATION NUMBER:	DATE (M/D/Y): 6/16/97	TIME: 1:00 pm	RECEIVING BODY OF WATER: ATLANTIC

REMARKS: [redacted] site Pitch reef Reference AMBient Background	LOCATION: STOCK Island Steam Plant 0.5mi. S.E. of outfall	FIELD ID/NAME: REFERENCE SITE CES-6-61697

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
			20	30	50	

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): None

NPS may include Boats from the Intracoastal and other adjacent navigation channels

Estimated Stream Width (range, m):	Estimated Stream Depth (range, m):	yes
High Water Mark (m above bed):	Velocity (range, m/s):	Impounded [ ] Channelized [ ]

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

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: [✓] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Anaerobic: [ ] Other: [ ]

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Rock or Shell Rubble	50	3	Poor	Woody Debris (Snags)			
Aquatic Vegetation	5	3		Leaf Packs/Roots			
Sand	5	3		Undercut Banks			
Other: Coral	40	3	Poor	Mud/Muck			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	30.8	5.1	Secchi Depth (m): 5 ft.	8.0
Mid-depth	30.8	5.3	pH (SU):	8.2
Bottom	30.7	5.3	Conductivity (µmho/cm): 55,200	58,200
			Other Parameters: Total depth 8.0 ft	

Stream Type (check box): Blackwater: [ ] Deep Aquifer Fed: [ ] Surficial Aquifer Fed: [ ] Alluvial: [ ] Other: [x] Marine Pitch reef

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 Wind SW 5-10 Knots Outgoing low tide

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

ANALYSIS DATE: 6/16/97	ANALYST:	SIGNATURE:

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

SUBMITTING AGENCY CODE: 1052 SUBMITTING AGENCY NAME: NEP NARRATION	STORET STATION NUMBER:	DATE (M/D/Y): 6/16/97	RECEIVING BODY OF WATER: ATLANTIC

REMARKS: Reference site 6 Ambient background	LOCATION: Stock Island Stream plant SE of Outfall	FIELD ID/NAME: CES-6-61697 REFERENCE SITE

Habitat Parameter score	Excellent	Good	Fair	Poor
Littoral Alterations 10	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 37	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 10	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 15	Combination of sand, gravel, and shell. **12-15 points**	Primarily sand, with small areas of mud. **8-11 points**	Mixture of sand and mud, or well-aerated mud only. **4-7 points**	Anaerobic mud. **0-3 points**

TOTAL SCORE 85

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: 3585 / SUBMITTING AGENCY NAME: DEP MARATHON	STORET STATION NUMBER:	DATE (M/D/Y): 6/16/97	TIME: 11:30	RECEIVING BODY OF WATER: ATLANTIC

REMARKS: Test site 1 off dredged channel. Natural Bottom	LOCATION: Stock Island Steam Plant South East Edge of Mixing Zone	FIELD ID/NAME: TEST SITE 1 CES-3-61697

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
			20	30	50	

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): Outfall from Stock Is. Power Plant Only obvious source. N.P.S. may include Nearby Marinas & Commercial fishing docks.

Estimated Stream Width (range, m): NA	Estimated Stream Depth (range, m):	yes
High Water Mark (m above bed):	Velocity (range, m/s):	Impounded ☐ Channelized ☐

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

SEDIMENT/SUBSTRATE

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

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

Sediment Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☐ Sand: ☑ Shell: ☑ Other: ☑ Coralrock

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Rock or Shell Rubble	50	3	Point	Woody Debris (Snags)			
Aquatic Vegetation	5	2	Point	Leaf Packs/Roots			
Sand	5	2	Point	Undercut Banks			
Other: Coral	40	3	Point	Mud/Muck			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):
Top	30	5.3 ✓
Mid-depth	30	5.3
Bottom	30	4.5

Secchi Depth (m): ~~ft~~ 6.5 ✓

pH (SU): 8.2

Conductivity (µmho/cm): 58,700

Other Parameters: Total depth 6.5

Stream Type (check box): Blackwater: ☐ Deep Aquifer Fed: ☐ Surficial Aquifer Fed: ☐ Alluvial: ☐ Other: ☑ marine patch reef

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 / wind SW 5-10 Knots outgoing tide

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

ANALYSIS DATE: 6/16/97	ANALYST:	SIGNATURE:

TEST SITE 1

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

SUBMITTING AGENCY CODE: 1052 SUBMITTING AGENCY NAME: FKNMS PROTECTION	STORET STATION NUMBER:	DATE (M/D/Y): 6/16/97	RECEIVING BODY OF WATER: ATLANTIC

REMARKS: Test Site #1 Natural Bottom	LOCATION: Stock Island Steam Plant SE Edge of MZ	FIELD ID/NAME: CES-3-61697 TEST SITE 1

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 (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 (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 (7)	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; flow restricted by manmade structures so that velocities are very high. 0-2 points
Sediment Type (14)	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 71

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Key West Stock Island PP
County: Monroe
Contact District: Gus Rios | Marathon SD
NPDES Permit #: FL0002089
LIMS Sample #: 181387 **LIMS Job #:** 97-JUN-20-06
sample log: 6/23/97 KE | DW

Sample Collection: Date 6/16/97 Time 10:14
Test Beginning: Date 6/17/97 Time 1500
Test Ending: Date 6/19/97 Time 1500
Organism Batch #: 23 **Diluent Batch #:** NSW
Organism Age: 12 days
Test Organism: Menidia beryllina

Test Type: (Screening) / Definitive
Static / Static Renewal / Flow-through
Temperature range: room 24.5-25.5°C
incubator 25.0-25.9°C
Test Number: 1 of 2
Remarks: D = dead, M = missing

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	25.3 @ 25.2	8.3 @ 24.6 °C	109.6 @ 103.6 1015 @ 1003 @ 25.5 °C 10210 @ 9944
24 hr	7.0 @ 7.0 9.0 @ 9.0	25.4 @ 25.4	8.3 @ 24.5 °C	108.8 @ 103.6 1008 @ 1003 @ 25.4 °C 10140 @ 9944
48 hr	7.0 @ 7.0 9.0 @ 9.0	25.3 @ 25.2	8.3 @ 24.6 °C	108.7 @ 103.6 1009 @ 1003 @ 25.3 °C 10150 @ 9944

Conc.	Chamber #	Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm)		
		0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
Ctl A	D1	5	5	5	8.0	8.1	8.0	25.7	25.5	25.4	6.1	5.9	5.9	49.7	53.2	54.5
Ctl B	D2	5	5	5	8.0	8.1	8.0	25.8	25.8	25.2	6.0	6.0	6.0	52.7	54.0	54.4
Ctl C	D3	5	5	5	8.0	8.1	8.0	25.7	24.8	25.0	6.0	5.9	6.0	53.0	52.5	53.6
Ctl D	D4	5	5	5	8.0	8.1	8.0	25.8	25.5	24.9	6.0	6.0	6.1	53.1	54.0	54.3
100% A	D5	5	5	5	8.1	8.1	8.0	25.9	25.4	25.4	6.0	5.8	6.0	54.1	54.0	55.2
100% B	D6	5	5	5	8.1	8.1	8.0	26.1	24.7	25.2	6.0	5.8	5.9	54.1	53.1	54.8
100% C	D7	5	5	5	8.1	8.1	8.0	26.1	25.1	25.4	6.0	5.9	5.9	54.1	53.7	55.6
100% D	D8	5	5	5	8.1	8.1	8.0	26.1	25.5	25.5	6.0	5.9	5.9	54.2	54.0	55.0
Measured/Loaded by:		DW	ND	ND	JS	KJ	ND	JS	KJ	ND	JS	KJ	ND	JS	KJ	ND
Recorded by:		KJ	ND	ND	KR	JS	JS	KR	JS	JS	KR	JS	JS	KR	JS	JS

Investigators' Signatures
Kellie Ralston
Julie Sharpe
Kris Johnson
Dale Knight
Marshall Faircloth
Al Wolfe

Water Quality Parameters (Salt Water / Well Water; 20% Min Water)	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):	NOT MEASURED		
Lab Total Residual Cl2 (mg/L):	<0.03	DRDO	JS
Alkalinity (mg/L as $CaCO_3$): 103	94	Hach	KJ
Hardness (mg/L as $CaCO_3$): —	—	Hach	KJ
Total ammonia (mg/L as N): <0.017	<0.017	Orion	MF

Parameter Entries verified by MF 8-11-97

Ammonia — Ammonia — Ammonia — Control Salinity: 35 ppt — Sample Salinity: 35 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Key West Stock Island PP
County: Monroe
Contact / District: Gus Rios / Marathon / SD
NPDES Permit #: FL0002089
LIMS Sample #: 18387 **LIMS Job #:** 97-JUN-2006
sample log: 6/23/97 KR/DW

Sample Collection: Date 6/16/97 Time 10:14
Test Beginning: Date 6/17/97 Time 1500
Test Ending: Date 6/19/97 Time 1500
Organism Batch #: 1164 **Diluent Batch #:** NSW
Organism Age: 4 days (6/14/97)
Test Organism: Americamysis bahia

Test Type: Screening / Definitive
(Static / Static Renewal / Flow-through)
Temperature range: room 24.5-25.5°C
incubator 25.1-25.9°C
Test Number: 2 of 2
Remarks: D = dead, M = missing

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	25.3 @ 25.2	8.3 @ 24.6 °C	101.6 @ 103.6 101.5 @ 100.3 @ 25.5 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	25.4 @ 25.4	8.3 @ 24.5 °C	103.0 @ 103.6 (10216 @ 9944) 100.8 @ 100.3 @ 25.4 °C (10140 @ 9944)
48 hr	7.0 @ 7.0 9.0 @ 9.0	25.3 @ 25.2	8.3 @ 24.6 °C	108.7 @ 105.6 100.9 @ 100.5 @ 25.3 °C (10150 @ 9944)

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm), Cond. (µmhos/cm)		
Conc.	Chamber #	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
Ctl A	E1	5	5	5	8.0	8.1	8.0	25.7	24.7	24.7	6.0	6.1	6.0	52.2	52.9	54.2
Ctl B	E2	5	5	5	8.0	8.1	8.0	25.7	24.8	24.7	6.1	6.1	6.1	53.0	52.8	53.4
Ctl C	E3	5	5	5	8.0	8.1	8.0	25.7	25.0	25.2	6.1	6.0	6.0	53.0	53.1	54.1
Ctl D	E4	5	5	5	8.0	8.1	8.0	25.7	26.6	24.9	6.0	6.0	5.9	53.1	55.3	54.4
100% A	E21	5	5	5	8.1	8.0	7.9	25.8	25.2	24.8	6.1	5.7	6.0	54.0	53.8	54.3
100% B	E22	5	5	5	8.1	8.1	8.0	26.0	24.8	24.8	6.0	5.8	5.8	54.0	53.4	54.1
100% C	E23	5	5	5	8.1	8.1	8.0	26.0	25.9	25.0	6.0	5.9	5.8	54.0	54.8	55.0
100% D	E24	5	5	5	8.1	8.0	7.9	26.1	25.2	25.3	6.0	5.8	5.8	54.0	53.7	55.1
Measured/Loaded by:		KR	JS	DD	JS	KJ	ND	JS	KJ	ND	JS	KJ	ND	JS	KJ	ND
Recorded by:		JS	JS	ND	KR	JS	JS	KR	JS	JS	KR	JS	JS	KR	JS	JS

Investigators' Signatures
Kellie Ralston
Sylvia Sharpe
Kim Johansen
Marshall Faircloth
Ashley Wolfe
reviewer

form updated 4/01/96

Water Quality Parameters (Salt Water / Well Water; 20% Min Water; Parameter entries verified by MF 6/20/97)

	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):	NOT MEASURED		
Lab Total Residual Cl2 (mg/L):	<0.03	DR100	JS
Alkalinity (mg/L as $CaCO_3$):	103	94	Hach	KJ
Hardness (mg/L as $CaCO_3$):	—	—	Hach	KJ
Total ammonia (mg/L as N):	<0.017	<0.017	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: 60.0 Ammonia Blank: <0.017
Control Salinity: 35 ppt
Sample Salinity: 35 ppt

Benthic macroinvertebrate taxa list for Stock Island Power Plant, collected via Ponar grab samples in the Atlantic Ocean, on 16 June, 1997. Densities, in number/m^2, represent the mean of three replicates.

	Reference Site	Test Site 1
Anthozoa		
Actiniaria	-	42
Platyhelminthes	14	-
Dugesia sp.	-	28
Nemertea	-	69
Tubulanus sp.	-	28
Polychaeta	-	28
Aphelochaeta sp.	-	97
Brania sp.	14	28
Brania pusilla	-	56
Capitella sp.	-	28
Caulleriella sp.	14	-
Chone sp.	42	97
Cirriformia sp.	-	42
Dentatisyllis sp.	14	28
Dorvillea sp.	-	14
Eunice sp.	42	-
Eunice rubra	42	-
Eunice tenuis	-	28
Eunice vittata	-	14
Exogone sp.	83	-
Fabricinuda sp.	-	28
Fabricinuda trilobata	69	-
Genetyllis sp.	-	14
Glycinde sp.	-	14
Haplosyllis sp.	1167	14
Jasmineira sp.	28	-
Laeonereis culveri	-	42
Lumbrineris sp.	56	28
Marphysa sp.	69	-
Mediomastus californiensis	-	14
Mooreonuphis sp.	-	14
Nematonereis sp.	-	42
Odontosyllis sp.	28	-
Platynereis sp.	-	42
Platynereis dumerilii	153	-
Prionospio sp.	14	28
Prionospio heterobranchia	28	-
Pseudeurythoe sp.	-	69
Pseudopolydora sp.	-	42
Pseudovermilia occidentalis	28	-
Schistomeringos sp.	-	14
Streblosoma verrilli	28	-

Syllis sp.	278	28
Tharyx sp.	-	14
Websterinereis tridentata	69	-
Capitellidae	42	-
Eunicidae	97	-
Lumbrineridae	-	14
Maldanidae	28	28
Nereidae	14	28
Opheliidae	28	-
Orbiniidae	-	28
Paraonidae	14	56
Polynoidae	14	-
Sabellidae	56	-
Spionidae	-	28
Syllidae	1264	69
Terebellidae	56	111
Oligochaeta	-	28
Tubificidae	236	-
Gastropoda		
Acteocina canaliculata	28	-
Balcis sp.	14	-
Caecum sp.	375	125
Caecum nitidum	28	42
Caecum pulchellum	250	153
Calliostoma sp.	14	-
Cerithiopsis sp.	-	14
Crepidula fornicata	14	-
Marginella sp.	14	14
Odostomia sp.	69	69
Oliva sp.	14	-
Turbonilla sp.	14	14
Dotoidae	-	42
Polyplacophora		
Acanthochitona pygmaea	42	-
Chaetopleura sp.	-	264
Pelecypoda	28	-
Anadara sp.	14	-
Arca zebra	42	-
Cerastoderma sp.	-	14
Chione sp.	-	28
Diplodonta punctata	-	28
Mactra fragilis	14	-
Mercenaria campechiensis	-	56
Musculus lateralis	69	28
Parastarte triquetra	-	28
Parvilucina multilineata	-	14
Tellina similis	-	14
Tellina sp.	-	56
Tellinidae	111	-

Scaphopoda		
Dentalium	-	14
Pycnogonida	14	-
Achelia scabra	14	28
Cumacea	14	-
Cyclaspis sp.	42	14
Cyclaspis varians	111	-
Cyclaspis unicornis	-	14
Tanaidacea		
Hargeria rapax	361	83
Isopoda		
Amakusanthura	14	-
Cirolana parva	14	-
Cyathura sp.	-	56
Cyathura polita	42	14
Dynamenella sp.	167	-
Edotea montosa	-	28
Erichsonella filiformis	14	-
Mesanthura bivittata	14	14
Rocinela signata	14	-
Stenetrium stebbingi	-	28
Uromunna sp.	111	-
Anthuridae	14	14
Janiridae	153	-
Sphaeromatidae	69	-
Amphipoda	83	14
Aeginella sp.	14	-
Ampithoe longimana	28	-
Chevalia aviculae	375	-
Cymadusa filosa	-	28
Elasmopus sp.	69	111
Ericthonius sp.	1139	69
Grandidierella bonnieroides	-	14
Hoplopheonoides obesa	14	-
Lembos retangulatus	56	-
Lembos sp.	181	42
Lembos unicornis	-	69
Leucothoe spinicarpa	14	-
Melita sp.	-	56
Amphilochidae	97	-
Aoridae	42	56
Caprellidae	28	-
Gammaridae	139	-
Isaeidae	-	56
Melitidae	56	-
Oedicerotidae	14	-
Decapoda	-	14
Crangonidae	14	-
Penaeidae	28	42

Sipuncula		
Sipuncula	14	-
Echinodermata		
Ophiomyxa sp.	28	-
Amphiuridae	14	-
Ophiuroidea	153	-

Phytoplankton taxa list and densities (#/mL) for Stock Island Power Plant, collected via subsurface grabs in the Atlantic Ocean, on 16 June, 1997.

	Reference Site	Test Site 1	Test Site 2	Test Site 3	Test Site 4
Cyanophyceae					
Dactylococcopsis sp.	-	-	-	4	-
Oscillatoria sp.	-	-	4	-	-
Bacillariophyceae					
Bacteriastrum sp.	8	-	4	-	-
Chaetoceros sp.	223	259	370	218	179
Cocconeis sp.	-	4	-	-	-
Cyclotella sp.	21	12	-	49	-
Cymbella sp.	-	-	12	-	-
Guinardia sp.	4	-	12	4	-
Navicula sp.	-	-	8	12	-
Nitzschia sp.	164	127	68	119	51
Nitzschia closterium	25	16	36	29	20
Rhizosolenia sp.	202	214	253	144	57
Skeletonema sp.	223	140	322	251	54
Thalassiothrix sp.	25	49	-	-	-
Pennales	4	4	8	4	-
Chlorophyceae					
Undetermined Chlorophyceae	-	4	4	4	3
Dinophyceae	25	8	16	-	10
Peridinium sp.	4	4	-	16	-
Prorocentrum sp.	4	-	-	-	-
Cryptophycea					
Chroomonas sp.	84	45	169	41	88

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

1	2	3	11	12	17	18	19	20
Transaction Code		NPDES NUMBER		YR/MO/DA		Insp Type	Inspector	Fac Type
N	5	FL0002089		970616		X	S	1

Remarks

21 66

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

1	2	3	11	12	17	18	19	20
Transaction Code		NPDES NUMBER		YR/MO/DA		Insp Type	Inspector	Fac Type
N	5	FL0002089		970616		B	S	1

Remarks

21 66