Florida

Department of Environmental Protection

Biological Assessment of

Indian River County Utilities Dept.

North Beach Reverse Osmosis Plant

Indian River County

NPDES #FL0039233

Sampled July 1993

February 1994

Biology Section

Division of Technical Services

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: Indian River County Utilities Dept. RO Plant
County: Indian River
NPDES Number: FL0039233
State Permit Expiration Date: 1 March 1998

Toxics Sampling Inspection (XSI)

Date Sampled: 20 July 1993

Results: No organic pollutants were detected in the effluent sample. Magnesium (248 mg/L), calcium (301 mg/L), and iron (19 µg/L) were found in the effluent. Preliminary studies concerning calcium toxicity in reverse osmosis reject water suggest that the concentration of calcium in this particular effluent may have contributed to the observed toxicity (Steve Wolfe, FDEP, personal communication).

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 20 July 1993

Results: The sample of final effluent was toxic to *Mysidopsis bahia*, with an LC_{50} of 100%. This toxicity is in violation of Rules 17-302.530(62) FAC, 17-302.500(1)(d) FAC, and 17-4.244(3)(a) FAC. The effluent sample was not toxic to the fish, *Menidia beryllina*.

Impact Bioassessment Inspection (IBI)

Date Sampled: 20 July 1993

Results: Although taxa richness was higher at the test sites than at the reference site, the Shannon-Weaver diversity index decreased by 67% and 55% at test sites 1 and 2, respectively. This is in violation of the biological integrity criterion (Rule 17-302.530(11) FAC). The reduced diversity values at the test site appeared to be directly related to the dominance of the amphipod, *Cerapus* sp., which accounted for 89% of the population at test site 1 and 81% of the total at test site 2. *Cerapus* sp., a tube-dwelling deposit-feeder, is considered moderately sensitive to organic enrichment and lowered dissolved oxygen. It should be noted that several other pollution-sensitive organisms, such as *Oxyurostylis smithi*, *Caecum pulchellum*, *Odostomia impressa*, *Sphenia antillensis*, and *Pista palmata*, were found at the test sites, suggesting that conditions there were not highly degraded. The discharge did not appear to have any discernible effect on phytoplankton communities. Most measures of algal community health were very similar between the reference and test sites. Chlorophyll *a* ranged from 12.0 µg/L at the reference site to 10.1 µg/L at test site 2, These levels are higher than those found in approximately 75% of other Florida estuaries, placing this portion of the Indian River in the mesotrophic category.

Water Quality Inspection (WQI)

Date Sampled: 20 July 1993

Results: Except for ammonia (1.2 mg/L) and TKN (1.6 mg/L), nutrients in the effluent were low or undetected. Nutrients were generally low at the receiving water stations, although total phosphorus was slightly above average for a Florida estuary at all three sites. Test and reference site AGP's were lower than the "problem threshold" of 10 mg dry wt/L.

Introduction

The Indian River County Utilities Department North Beach Reverse Osmosis Plant is located on Jungle Trail (old US A1A) in Wabasso Beach, Indian River County, Florida (see maps in Appendix). This facility was originally built to supply drinking water to a housing development, but has recently been purchased by the County, which intends to increase its capacity over the next six years. The effluent receives chlorination, aeration, and in-line hydrogen sulfide air stripping prior to discharge into the Indian River (Intracoastal Waterway) in an area designated as a Class II waterbody.

State permit limits for the effluent are as follows: flow (daily average of 0.71 MGD, daily maximum of 1.07 MGD), pH (6.5 to 8.5), hydrogen sulfide (less than 0.02 mg/L at discharge), total phosphorus (less than 0.2 mg/L), dissolved oxygen (minimum of 5.0), total nitrogen (daily average of 2.0 mg/L, daily maximum of 2.0 mg/L), chloride (less than 10% of background at any time), turbidity (no more than 29 NTU above natural background), total mercury (less than 0.025 µg/L as a daily average, less than 0.025 µg/L as a daily maximum). State permit limits at the edge of the 50 foot mixing zone are as follows: Radium$^{226/228}$ (less than 5.0 pCi/L as a daily average and less than 5.0 pCi/L as a daily maximum), and fluorides (less than 1.5 mg/L as a daily average and less than 1.5 mg/L as a daily maximum). Additionally, a series of bioassay tests are required every six months for the duration of the permit.

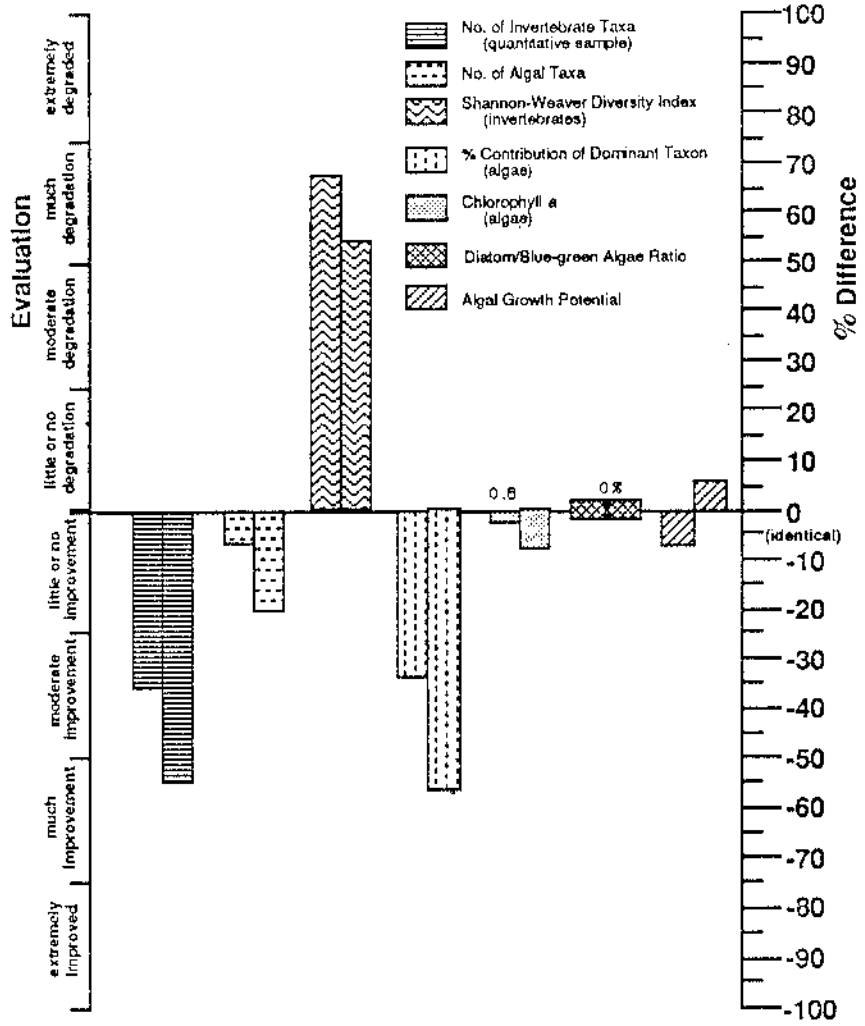
Prior to the past year, numerous violations of permit limits for dissolved oxygen and hydrogen sulfide were noted. During the past year, the facility has been in compliance with these parameters. However, in March, 1993, the effluent was toxic to *Mysidopsis bahia* (FDEP 1993).

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 2.5 miles south of the outfall near the Intracoastal Waterway at Channel Marker 110) and two test sites (150 feet north of the outfall at channel marker 87, and 150 feet south of the outfall). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. Acute screening toxicity bioassays, using *Menidia beryllina* and *Mysidopsis bahia* as test organisms, were performed on an effluent sample

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	24	32	37
Shannon-Weaver Diversity	3.3	1.1	1.5
% Amphipoda	1.9	88.5	81.4
% Polychaeta	66.3	2.2	6.2
% Nematoda	5.6	1.3	1.3
% Pelecypoda	11.2	2.9	4.6
% Gastropoda	4.9	1.7	1.0
% Cnidaria	5.6	0.17	0
% Other	4.4	2.9	5.5
% Deposit feeders (above surface)/ Collector-Gatherers	4.5	88.8	83.2
% Deposit feeders (below surface)	27.7	1.7	1.8
% Suspension feeders/ Collector-Filterers	14.6	5.0	7.5
% Plant piercers	37.0	0.7	4.6
% Scrapers	4.8	1.7	0.8
% Other	5.8	0.8	0.6
Phytoplankton Algae			
Number of Taxa	16	17	19
% Contribution of Dominant Taxon	48.4	32.0	20.3
Diatom/Blue-green Abundance Ratio	1.0	0.98	0.98
Chlorophyll a (µg/L)	12.0	11.9	10.1
% Diatoms	66.1	72.4	80.9
% Blue-green	0.0	1.4	1.3
% Green	28.5	20.7	13.8
% Dinoflagellates	3.6	1.8	0.9
% Other	1.8	3.7	3.1
Algal Growth Potential (mg dry wt/L)	6.7	6.4	7.1



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

(Weber 1991). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on effluent, reference, and test sites. Methods used for all chemical analyses are on file at the Tallahassee DEP Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at reference and test sites. Collection methods consisted of five Ponar dredges per station. Phytoplankton was sampled at both reference and test sites via subsurface grabs. Chlorophyll *a* was also determined for phytoplankton communities. Algal Growth Potential tests, using *Dunaliella tertiolecta* as the test organism, followed EPA (1974).

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health have been employed in this report. Many of these, such as the number of taxa, Shannon-Weaver Diversity Index, and chlorophyll *a* are well known. Others are briefly explained here. Excessive numerical dominance of a single type of organism (a high % contribution of dominant taxon) is usually associated with disturbance. A decreased diatom to blue-green algae ratio (calculated by dividing the number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta + Cyanophyta) is often indicative of nutrient enriched conditions. The determination of the Quantitative Stability Index (for taxonomic % composition) is a two step process. First, the relative proportions of major taxonomic groups are calculated for each site. Then, the lesser of the two percentages for each discrete taxonomic group is totaled. A QSI (for % composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (for functional feeding groups).

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, the diversity index, Florida Index and the diatom to blue-green algae ratio are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving the percent contribution of dominant taxon, chlorophyll *a*, and algal growth potential are measured as the test site minus reference site divided by the reference site.

The following personnel were involved in this investigation: Phil Kane, and Steven Kent (DEP Central District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Roberto Llansó, Kathleen Lurding, Elizabeth Miller, Urania Quintana, 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 Indian River is a well-flushed, high salinity lagoon in the vicinity of the study area. Vegetation at all three sampling locations consists predominantly of mangroves (*Avicennia germinans* and *Rhizophora mangale*) with sparse communities of emergent macrophytes (*Spartina* sp., *Juncus* sp., etc.). Habitat scores were high at all sites, with 88 points for the reference, and 86 points for each test site (Appendix). Dissolved oxygen was adequate at the three stations (5.9 mg/L to 6.1 mg/L) and temperature ranged from 31.3 to 31.5° C. The pH was similar at all three stations, ranging from 8.0 S.U.'s at the reference site to 7.9 S.U.'s at test site 2. Salinities were comparable at all three sites, ranging from 26.8 ppt to 26.3 ppt (see Chemistry Summary Table).

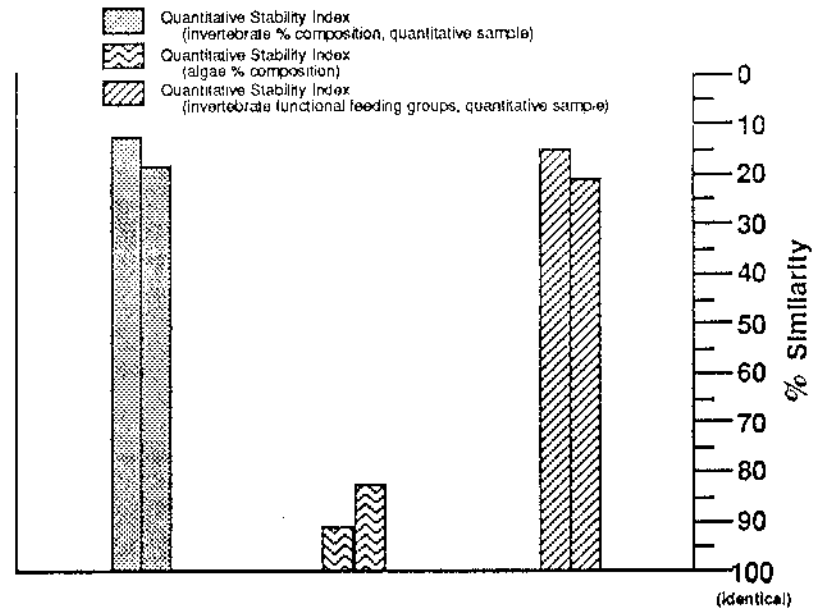
No organic pollutants were detected in the effluent sample. Magnesium (248 mg/L), calcium (301 mg/L), and iron (19 µg/L) were found in the effluent. Preliminary studies concerning calcium toxicity in reverse osmosis reject water suggest that the concentration of calcium in this particular effluent may have contributed to the observed toxicity (Steve Wolfe, FDEP, personal communication).

The sample of final effluent was toxic to *Mysidopsis bahia*, with an LC_{50} of 100%. This toxicity is in violation of Rules 17-302.530(62) FAC, 17-302.500(1)(d) FAC, and 17-4.244(3)(a) FAC. The effluent sample was not toxic to the fish, *Menidia beryllina*.

Except for ammonia (1.2 mg/L) and TKN (1.6 mg/L), nutrients in the effluent were low or undetected. Nutrients were generally low at the receiving water stations, although total phosphorus (ranging from 0.12 mg/L to 0.17 mg/L) was slightly above average for a Florida estuary at all three sites (see Table of Typical Water Quality Values in Appendix). Algal growth potential (AGP) results corresponded to the observed nutrient concentrations. Test site AGP's (6.4 mg dry wt/L and 7.2 mg dry wt/L at test sites 1 and 2, respectively) were lower than the "problem threshold" of 10 mg dry wt/L. The AGP at the reference site (6.74 mg dry wt/L) was comparable to that measured at the test sites.

While some measurements of benthic macroinvertebrate health suggested no degradation from the discharge, diversity was reduced at the test sites. The figure on p. 2 indicates the degree of difference between the reference and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. The figure on this page summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation. The average abundance of each individual taxon appears in the Appendix.

Taxa richness was higher at the test sites, increasing from 23 taxa at the reference site to 32 taxa at test site 1 and 37 species at test site 2. The taxa richness at the reference site was slightly above average for a Florida estuary, while the test site values ranked greater than approximately 70% of other Florida estuaries. Conversely, the Shannon-Weaver diversity index was 3.3 at the reference site, decreasing to 1.1 and 1.5 at test sites 1 and 2, respectively. This is in violation of the biological



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

integrity criterion (Rule 17-302.530(11) FAC). The reduced diversity values at the test site appeared to be directly related to the dominance of the amphipod, *Cerapus* sp., which accounted for 89% of the population at test site 1 and 81% of the total at test site 2. *Cerapus* sp., a tube-dwelling deposit-feeder, is considered moderately sensitive to organic enrichment and lowered dissolved oxygen (Farrell 1993). The overwhelming abundance of this organism at the test sites may be related to a few different factors. First, since the effluent was acutely toxic, it is possible that the tube-dwelling habit of *Cerapus* sp. enables it to avoid episodes of toxicity (although this scenario is not too probable, given the dilution potential of the receiving waters). On the other hand, the test sites may have been situated within a depositional area of the Indian River, where coarse particulate organic matter settles and provides a substantial food source for deposit-feeders. It should be noted that several other pollution-sensitive organisms, such as *Oxyurostylis smithi, Caecum pulchellum, Odostomia impressa, Sphenia antillensis,* and *Pista palmata*, were found at the test sites, suggesting that conditions there are not highly degraded. Polychaetes (66.3% of the total population) were abundant at the reference site (especially *Kimbergonuphis simoni)*, while polychaetes made up only 2.2% to 6.2% of the total populations at the test sites. As indicated earlier, both test sites were dominated by amphipods, while the reference site population consisted of only 1.9% amphipods. These differences between the reference and test site populations influenced the rather low similarities shown by the Quantitative Stability Indices for invertebrate composition and functional feeding groups.

The discharge did not appear to have any discernible effect on phytoplankton communities. Phytoplankton populations at all three study sites were similar with regard to taxa richness (16 to 19 taxa) and the diatom/blue-green algae ratio (0.98 to 1.0). *Nitzschia* spp. dominated all three sites (48.4% at the reference site, 32.0% and 20.3% at test sites 1 and 2, respectively). Diatoms were the most abundant algal group at all three receiving water sites, followed by chlorophytes, dinoflagellates, and cyanophytes. The Quantitative Stability Index for percent composition demonstrates the high degree of similarity among the three study sites. Chlorophyll *a* ranged from 12.0 µg/L at the test site to 10.1 µg/L at test site 2, These levels are higher than those found in approximately 75% of other Florida estuaries, placing this portion of the Indian River in the mesotrophic category (Appendix).

Conclusions

No organic pollutants were detected in the effluent sample. Magnesium (248 mg/L), calcium (301 mg/L), and iron (19 µg/L) were found in the effluent. Preliminary studies concerning calcium toxicity in reverse osmosis reject water suggest that the concentration of calcium in this particular effluent may have contributed to the observed toxicity (Steve Wolfe, FDEP, personal communication).

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Chemistry summary table for
Indian River Co. Utilities Dept.
North Beach RO Plant.

	Effluent	Control Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
None Detected				
Metals (ug/L)				
Aluminum	100 U			
Arsenic	20 U			
Antimony	15 U			
Cadmium	1 U			
Calcium (mg/L)	301			
Copper	5 U			
Chromium	10 U			
Iron	19 A			
Lead	15 U			
Magnesium (mg/L)	248			
Mercury	.1 U			
Nickel	5 U			
Selenium	30 U			
Silver	.1 U			
Zinc	5 U			
Nutrients (mg/L)				
Ortho-phosphate	0.027 T	0.080 A	0.095	0.095
Total phosphate	0.023 T	0.14 Q	0.17	0.12
Ammonia	1.2	0.020 U	0.020 U	0.031 T
Nitrate+Nitrite	0.020 U	0.020 U	0.020 U	0.020 U
TKN	1.6	0.60	0.82	0.65
Other Parameters				
Habitat Assessment		88	86	86
D.O. (mg/L)	8.0	5.9	6.0	6.1
pH (SU's)	6.6	8.0	8.0	7.9
Salinity (ppt)	10.5	26.8	26.6	26.3
Temperature (°C)	28.5	31.3	31.5	31.5
Algal Growth Potential (mg dry wt/L)	1.684	6.740	6.368	7.153
BOD5 (mg/L)	0.3 TJA	0.9 TJ	0.8 TJ	0.9 TJA
TSS (mg/L)	2 U	6	16	18
Bioassay Fish	Not toxic			
Bioassay Invertebrate	Toxic: LC50=100%			

A - Value reported is the mean of two or more determinations
J - Estimated value
K - Actual value is known to be less than value given
L - Actual value is known to be greater than value given
N - Presumptive evidence of presence of material
O- Sampled, but analysis lost or not performed
Q - Sample held beyond normal holding time
U - Material analyzed for but not detected; value reported is the minimum detection limit
T- Value reported is less than the practical quantitation limit

Typical Values for Selected Parameters in Florida Waters

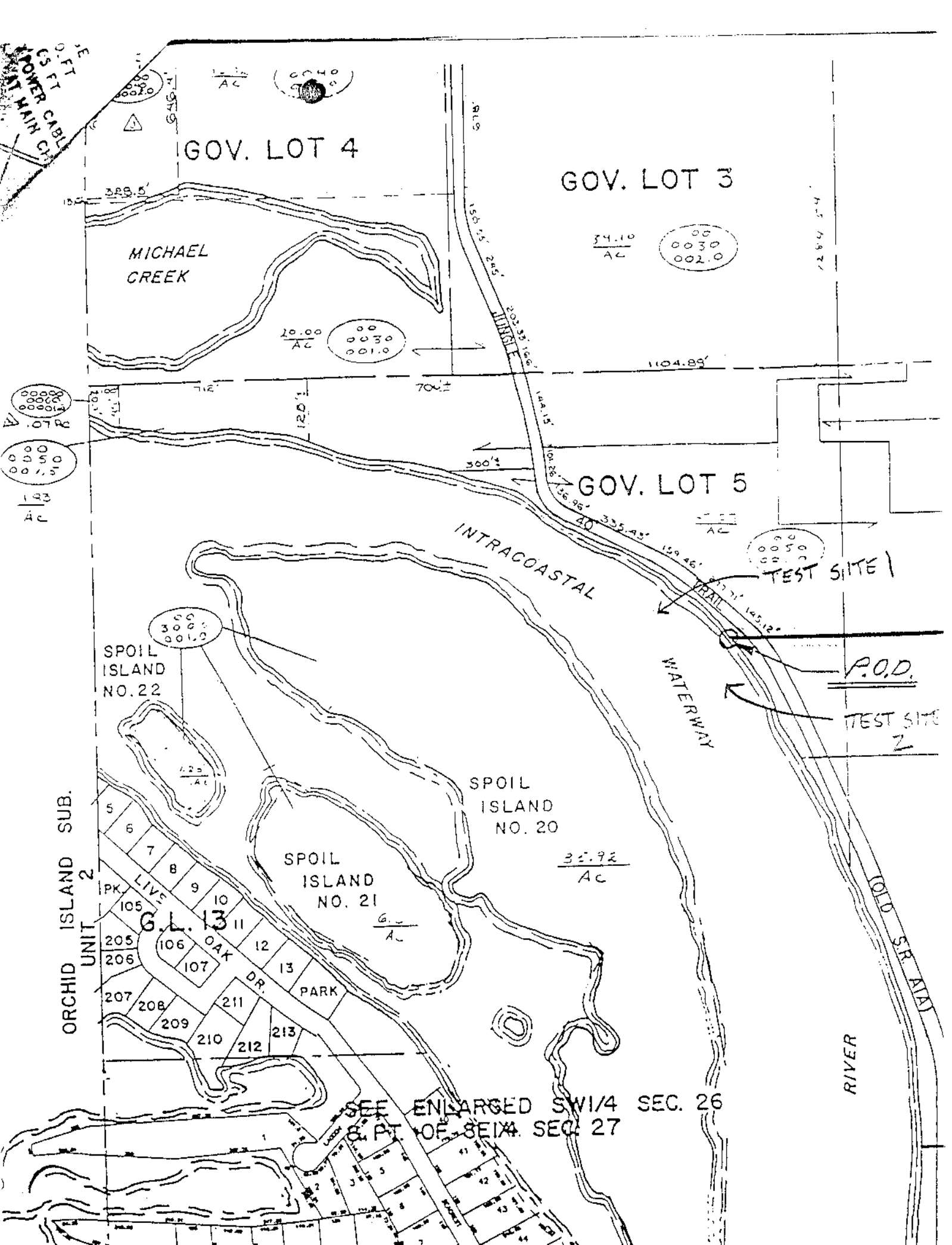
Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

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


Preachers Hole
Preachers Island
East Channel
WATERWAY
Light
South Point
Light
Piling
Michael I
Michael Cr
Wabasso Island
Wabasso Beach
Last 2 (C)
Wabasso Beach
TEST SITE 1
OUTFALL
SITE
TEST SITE 2
Pine Island Bay
Pine Island
Wabasso
Wabasso
Sand Pt
Pine Island
INTRACOASTAL WATERWAY
Pine Island
TO REFERENCE SITE
COAST LINE
FLORIDA
21
22
23
26
27
28
33
34
35
36
25


GOV. LOT 4
GOV. LOT 3
GOV. LOT 5
MICHAEL CREEK
JUNGLE
INTRACOASTAL WATERWAY
TEST SITE 1
TEST SITE 2
P.O.B.
SPOIL ISLAND NO. 22
SPOIL ISLAND NO. 20
SPOIL ISLAND NO. 21
ORCHID ISLAND SUB. UNIT 2
G.L. 13
OAK DR.
PARK
LIVE
OLD S.R. A1A
RIVER
SEE ENLARGED SW1/4 SEC. 26 & PT. OF SE1/4 SEC. 27

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: Indian River County Utilities Dep. North Beach R.O. plant		Date Summary Prepared: 7-17-93
Location (attach detailed map): SEE MAPS.	County: Indian River Co.	District: 30
Federal Permit # and expiration date: FL0039233 11/30/89	State GMS # and State expiration date: 3031C20001 3/1/98	Facility Type: 2 (Industrial) Municipal Federal Agricultural Other (list):

Function of facility: The plant has been operating since July 1986 and was designed, constructed and permitted by a developer to supply drinking water to his Development. the County recently purchased this plant, and will increase capacity over next 6 years.

Description of treatment process:
Effluent receives Chlorination and aeration prior to discharge to class II marine surface waters. (A Temporary IW permit to provide 1 year to install an In-line H_2S air stripping device was issued prior to this permit. This device was installed as of Jan 7, 1993.)

Receiving waters: Indian River Lagoon	Classification: I (II) III	
Design Flow: 1.07 MGD	Mean Flow: 0.71 MGD	Flow during survey:

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

therefore, the best time to sample is:

If facility has a mixing zone, give details (size, parameters affected, etc.):
Mixing zone is 50 feet downstream of Discharge for the following parameters: Radium (226 + 228) and Fluorides

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

Parameter	Limit (units)
SEE ATTACHED PAGES.	

Describe special permit conditions and permit modifications:
H_2S must be < 0.02 mg/L at point of Discharge.

1 Bio-Assay every 6 month for the Duration of the permit.

FRCUD / North Beach
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s): 001 (Discharge point "A")
Brine Discharge pipe to Indian River Lagoon.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: No Effluent violations noted within the last 1/2yr.

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

P.K. LEE

This facility has never nor is currently been under formal enforcement action by the Department. Last Bio-Assay was performed on 4/28/92 and showed no toxicity.

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set: prior to the last 12 months violations of D.O. and H_2S were routine. All effluent parameters are in compliance for last 12 reporting periods and no changes in data trends are noted.

Additional information:

Staff contributing to this review (signature):

	(Biologist)
Clayton A Smith	(Inspector)
Eugene Elliott	(Engineer)
	( )
	( )
	( )

PERMITTEE:
Indian River County Utilities Dept.

Attention: Terrance G. Pinto

GMS Number: 3031C20001
Permit Number: IO31-224156
Date of Issue:
Expiration Date: 3-1-98

SPECIFIC CONDITIONS:

1. Effluent (concentrate discharge) shall be sampled and analyzed for the following parameters at the point of discharge into the Indian River (Discharge Point A).

Parameter	Units	Daily Average	Daily Maximum	Sample Type	Frequency
Flow (ADF)*	MGD	0.71	1.07	Metered	Daily
pH	SU	6.5	8.5	Grab	Weekly
H_2S	mg/l	0.02	0.02	Grab	Weekly
Total Phosphorus as P	mg/l	0.2	0.2	Grab	Monthly
D.O.	mg/l	Not less than anytime	5.0	Grab	Weekly
Total Nitrogen as (N)	mg/l	2.0	2.0	Grab	Monthly
Chloride	mg/l	**	**	Grab	Monthly
Turbidity	NTU	***	***	Grab	Monthly
Total Chromium	mg/l	<0.05	<0.05	Grab	Quarterly
Mercury (Total)	ug/l	<0.025	<0.025	Grab	Quarterly
Temperature	°C	Report	Report	Insitu	Monthly

** No more than 10 % above normal background level.
*** Not more than 29 NTU above natural background level.

2. Reject water (raw concentrate) shall be sampled from a point before it enters the concentrate aeration system and analyzed for the following parameters:

Parameter	Units	Daily Average	Daily Maximum	Sample Type	Frequency
Dissolved Oxygen	mg/l	-	-	Grab	Monthly
Hydrogen Sulfide	mg/l	-	-	Grab	Monthly

3. The permittee shall sample and analyze the following parameters at the edge of the mixing zone 50 feet downstream of the Point of Discharge.

Parameter	Units	Daily Average	Daily Maximum	Sample Type	Frequency
Radium (226 & 228)	pCi/L	<5.0	<5.0	Grab	Quarterly
Fluorides	mg/l	<1.5	<1.50	Grab	Monthly

PERMITTEE:
Indian River County Utilities Dept.

Attention: Terrance G. Pinto

GMS Number: 3031C20001
Permit Number: IO31-224156
Date of Issue:
Expiration Date: 3-1-98

SPECIFIC CONDITIONS:

4. A representative background sampling point in the receiving waters shall be established at marker 110 of the Intercoastal Waterway (See Attachment No.1 for location). Samples shall be taken at the mid-point of depth at the sampling point. Quarterly analyses are required for the following parameters:

Parameter	Units	Daily Average	Daily Maximum	Sample Type	Frequency
Total Phosphorus	mg/l	-	-	Grab	Quarterly
D.O.	mg/l	-	-	Grab	Quarterly
Total Nitrogen	mg/l	-	-	Grab	Quarterly
Chloride	mg/l	-	-	Grab	Quarterly
Turbidity	NTU	-	-	Grab	Quarterly
pH	SU	-	-	Grab	Quarterly
Total Chromium	mg/l	-	-	Grab	Quarterly
Specific Conductance	umh/cm	-	-	Grab	Quarterly

5. All sampling required by Specific Conditions 1, 2, 3 and 4 above for a given reporting period shall be performed at all points on the same day (within 24 hours).

6. The sampling and analysis for the above specific conditions No.1 to 4, shall be in accordance with Chapter 17-4.246, F.A.C. and approved standard methods. Properly executed reports using attached "Industrial Waste Operating Report", forms A through D, shall be submitted to this office monthly, by the 15th day of the following month.

7. Pursuant to the provisions of Section 17-4.244 F.A.C. a zone of mixing for combined Radium and Fluoride extending to a 50 foot radius from the point of discharge (A) into the Intercoastal Waterway is granted by the department.

8. The aeration of concentrate shall reduce H2S concentration to less than 0.02 mg/l at the point of discharge (Point 'A'). Effluent discharged into the receiving body of water (RBW) at this concentration shall also meet (pass) the requirements of the whole effluent acute toxicity test as described in Specific Condition No. 9 below.

9. The permittee shall perform a series of bioassay tests, as described below, beginning no later than thirty (30) days after the date of issue of this permit, to evaluate whole effluent toxicity of the discharge. All test species, procedures, and quality assurance criteria used shall be in accordance with Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA/600/4-85/013, or the most current edition. A standard reference toxicant quality assurance test shall be

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 32 / SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 07/20/93	TIME 1:15p	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: REFERENCE	LOCATION: IRLND - N. BEACH R/C SOUTH JUNGLE TRAIL VERO BEACH, FLORIDA	FIELD ID/NAME: IRLND-N.B R/C

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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

Estimated System Width (range, m): 200	Estimated System Depth (range, m): 3.0		yes
High Water Mark (m above bed):	Velocity (range, m/s): Variable - +	Impounded	☐
		Channelized	☑

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Riffles			
Leaf Packs				Sand	50	7	
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble	50	7		Benthic leaf mats			
Undercut Banks/Roots				Other:			

* 6 TOTAL

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top								1.10
Mid-depth								
Bottom								

System Type : Stream: ☐ (Sand Bottomed, Sand Bot w/ Spring, Swamp & Bog, Calcareous, Alluvial, Misc.) Lake: ☐ Wetland: ☐ Estuary: ☑ Other: ☐ _____

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

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

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

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

Weather Conditions: Partly Cloudy 90° light, variable wind

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

SAMPLING TEAM: KANE, KENT	SIGNATURE: Phil Kane	DATE: 07/20/93

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

SUBMITTING AGENCY CODE: JC SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 07/20/93	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: REFERENCE	LOCATION: IRLNO - N. BEACH R/O SOUTH JUNGLE TRAIL VERO BEACH, FLORIDA	FIELD ID/NAME: IRLNO - N.B. R/O

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 50	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 1	>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 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 13	Combination of sand, gravel, and shell. 12-15 points	Primarily sand, with small areas of mud. 8-11 points	Mixture of sand and mud, or well-aerated mud only. 4-7 points	Anaerobic mud. 0-3 points

TOTAL SCORE 88

COMMENTS:

ANALYSIS DATE: 07/20/93	ANALYST: PHIL KANE	SIGNATURE: Phil Kane

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 36 / SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 07/20/93	TIME: 12:25P	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: "TEST A" (1)	LOCATION: IRL 10 - N. BEACH R/O SOUTH JUNGLE TRAIL VERO BEACH, FLORIDA	FIELD ID/NAME: IRL10-N.B. R/O

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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): Bridge overpass, Boat Docks

Estimated System Width (range, m): 150	Estimated System Depth (range, m): 0.3 m	yes
High Water Mark (m above bed): 0.2	Velocity (range, m/s): Varied Tidal	Impounded ☐ Channelized ☐

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

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☑ none

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Riffles			
Leaf Packs				Sand	50	*	
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble	50	*		Benthic leaf mats			
Undercut Banks/Roots				Other:			

WATER QUALITY

*5 TOTAL

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top								
Mid-depth								0.8
Bottom								

System Type : Stream: ☐ (Sand Bottomed, Sand Bot w/ Spring, Swamp & Bog, Calcareous, Alluvial, Misc.) Lake: ☐ Wetland: ☐ Estuary: ☑ Other: ☐

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

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

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

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

Weather Conditions: P-cloudy 90° light wind

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

SAMPLING TEAM: KANE, KENT	SIGNATURE: Phil Kane	DATE: 07/20/93

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

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 07/20/93	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: TEST A (1)	LOCATION: IRCUD-N. BEACH R/O SOUTH JUNGLE TRAIL JUPO. BEACH, FLORIDA	FIELD ID/NAME: IRCUD-N.B. R/O

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations: 6	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: 50	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: 1	>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: 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: 13	Combination of sand, gravel, and shell. 12-15 points	Primarily sand, with small areas of mud. 8-11 points	Mixture of sand and mud, or well-aerated mud only. 4-7 points	Anaerobic mud. 0-3 points

TOTAL SCORE 86

COMMENTS:

ANALYSIS DATE: 07/20/93	ANALYST: PHIL KANE	SIGNATURE: Phil Kane

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 07/20/93	TIME	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON
REMARKS: TEST B(2)	LOCATION: IRCUD-N. BEACH R/O South Jungle Trail Vero Beach, Florida			FIELD IDNAME: IRCUD-N.B. R/O

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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): Bridge overpass / Boat docks

Estimated System Width (range, m): 150	Estimated System Depth (range, m): 3m		yes
High Water Mark (m above bed): 0.20	Velocity (range, m/s): Variable, Tidal	Impounded ☐ / Channelized ☑	

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

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☑ none

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Riffles			
Leaf Packs				Sand	20	*	
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble	50	*		Benthic leaf mats			
Undercut Banks/Roots				Other:			

WATER QUALITY

* 5 TOTAL

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top								0.70
Mid-depth								
Bottom								

System Type : Stream: ☐ (Sand Bottomed, Swamp & Bog, Alluvial, Sand Bot w/ Spring, Calcareous, Misc.) Lake: ☐ Wetland: ☐ Estuary: ☑ Other: ☐

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

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

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

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

Weather Conditions: P-Cloudy 90° Wind variable light

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

SAMPLING TEAM:	SIGNATURE:	DATE:
KANE, KENT	Phil Kane	07/20/93

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

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDER CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 07/20/93	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: TEST B (2)	LOCATION: IRLLOD - N. BEACH R/O SOUTH JUNGLE TRAIL JERO BEACH, FLORIDA	FIELD ID/NAME: IRLLOD - N. B. R/O

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations: 6	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: 50	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: 1	>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: 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: 13	Combination of sand, gravel, and shell. 12-15 points	Primarily sand, with small areas of mud. 8-11 points	Mixture of sand and mud, or well-aerated mud only. 4-7 points	Anaerobic mud. 0-3 points

TOTAL SCORE 86

COMMENTS:

ANALYSIS DATE: 07/20/93	ANALYST: PHIL KANE	SIGNATURE: Phil Kane

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: North Beach R/O
Location:
County:
Contact/District: Phil Kane /
NPDES Permit #: FL0039233 Outfall #:
58779 93 JUL-21-18

Sample Collection: Date 7/20/93 Time 1400
Test Beginning: Date 7/21/93 Time 1445
Test Ending: Date 7/23/93 Time 1440
Organism Batch #: 101 Diluent Batch #: 343
Organism Age: 5 days
Test Organism: Mysidopsis Bahia

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

Test Number: 1 of 2

Remarks: tested mysids at adjusted sample salinity = 11-12 ppt
LC50 = 100% (no C.I.) TSK

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
0 hr	7.0 @ 7.0 9.0 @ 9.0	25.3 @ 25.4	8.3 @ 25.1	1020 @ 1,000 9850 @ 10,000
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.8 @ 24.9	8.3 @ 24.7	995 @ 1,000 9820 @ 10,000
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.4 @ 24.5	8.3 @ 24.5	1030 @ 1,000 9760 @ 10,000

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temperature (°C) 0	24	48	D.O. (mg/L) 0	24	48	Cond. (mmhos/cm) 0	24	48
Control A	1	5	4	4	8.1	8.1	8.0	24.6	24.1	23.8	8.5	8.1	9.4	19.22	19.20	19.19
Control B	49	5	5	5	8.1	8.1	8.0				8.5	8.1	9.4	20.30	20.30	20.40
25% A	11	5	5	5	7.7	7.9	8.0	24.7	24.1	23.9	8.7	8.0	8.9	20.40	20.30	20.3
25% B	29	5	5	5	7.7	7.9	8.0				8.7	8.0	9.0	18.90	18.87	18.91
50% A	103	5	5	5	7.2	7.8	7.9	24.9	24.1	24.0	8.5	8.0	8.8	19.10	18.99	19.00
50% B	87	5	5	5	7.2	7.8	7.9				8.6	7.9	8.8	18.68	18.64	18.68
75% A	360	5	5	5	7.0	7.7	7.9	24.9	24.1	24.1	8.6	8.0	8.9	19.71	19.55	19.54
75% B	891	5	5	5	7.0	7.7	7.9				8.7	8.0	8.9	19.28	19.98	19.22
100% A	39	5	4	2	6.9	7.6	7.9	25.0	24.1	24.1	8.6	7.9	8.8	19.25	19.16	19.21
100% B	86	5	5	3	6.9	7.7	7.9				8.7	7.9	8.9	18.63	18.41	18.48
													8.7			
													8.7			
Measured/Loaded by:		TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM
Recorded by:		TR	TM	TM	TR	EAM	EAM	TR	EAM	EAM	TR	EAM	EAM	TR	EAM	EAM

Investigators' Signatures

Tina M. Kuddin
Tobin C. Rader
Edward Mills

Reviewer

form updated 10/20/02

Water Quality Parameters (Salt Water)

	Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			not	measured	
Lab Total Residual Cl2:	<0.03	<0.03	<0.03	DR-100	TM
Alkalinity:	120	70	200	Hach	TR
Hardness:	—	80	—	Hach	TR
Total Ammonia:					

Cl_2 Blank: _____ Ammonia Meter Slope: _____ Ammonia Blank: _____ Sample Salinity: 11.3 ppt (ADJUSTED)

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: North Beach RD
Location:
County:
Contact/District: Phil Kane /
NPDES Permit #: FL0039233 Outfall #:
58779 93-JUL-21-18

Sample Collection: Date 7/20/93 Time 1400
Test Beginning: Date 7/21/93 Time 1145
Test Ending: Date 7/23/93 Time 1140
Organism Batch #: 12 Diluent Batch #: 33
Organism Age: 15 days
Test Organism: Mendia beryllina

Test Type: Screening | Definitive
Static | Static Renewal | Flow-through

Test Number: 2 of 2

Remarks: tested mendia at original salinity of sample ≅ 5.5ppt

Instrument Calibrations: pH Temperature °C D.O. mg/L Conductivity µmhos/cm

0 hr 7.0@7.0 25.3@25.4 8.3@25.1 1020@1,000 @24.9
9.0@9.0 9850@10,000

24 hr 7.0@7.0 24.8@24.9 8.3@24.7 995@1,000 @24.5
9.0@9.0 9920@10,000

48 hr 7.0@7.0 24.4@24.5 8.3@24.5 1030@1,000 @24.6
9.0@9.0 9760@10,000

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temperature (°C) 0	24	48	D.O. (mg/L) 0	24	48	~~Cond. (mmhos/cm)~~ Cond. (µmhos/cm) 0	24	48
Control A	18	5	5	5	7.9	8.0	8.1	24.6	24.1	24.1	8.3	8.4	9.2	9640	9620	9620
Control B	69	5	5	5	7.9	8.0	8.1				8.4	8.4	9.2	9640	9620	9660
100% A	858	5	5	5	6.8	7.5	7.9	24.8	24.2	24.1	8.5	8.2	9.0	9580	9510	9510
100% B	210	5	5	5	6.8	7.5	7.9				8.5	8.3	9.1	9600	9520	9600
Measured/Loaded by:		TR	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM
Recorded by:		TR	TM	TM	TR	EAM	EAM	TR	EAM	EAM	TR	EAM	EAM	TR	EAM	EAM

Investigators' Signatures

Tina Mikulski
Tobin G-Rader
Edward Miller

Reviewer

Salt Water

Water Quality Parameters	Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			not measured		
Lab Total Residual Cl2:	<0.03	<0.03	<0.03	DR400	TM
Alkalinity:	120	70	200	Hach	TR
Hardness:	—	80	—	Hach	TR
Total Ammonia:					

Ammonia Ammonia Sample
Cl_2 Blank: Meter Slope: Blank: Salinity: 5.5 ppt

Benthic macroinvertebrate taxa list for the Indian River County Utilities Department, North Beach R.O. plant, collected via Ponar grab samples in the Intracoastal Waterway, on 17 July, 1993. Densities are expressed as number/m^2.

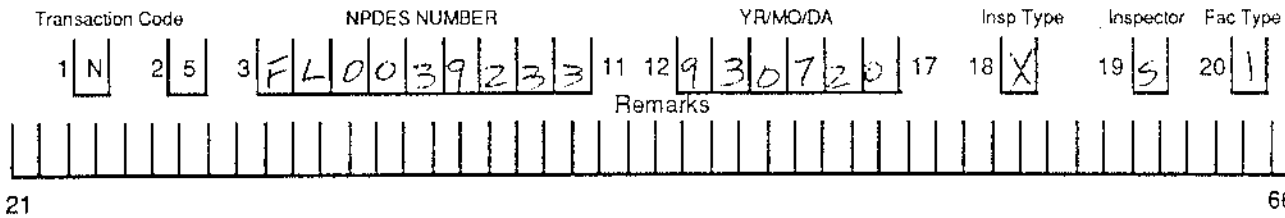
	Reference Site	Test A	Test B
Amphipoda			
Ampelisca sp.	12	75	75
Cerapus sp.	–	12887	9880
Corophium sp.	–	25	–
Grandidierella bonnieroides	50	137	75
Cnidaria			
Undetermined anthozoa	187	25	–
Cumacea			
Oxyurostylis smithi	25	274	275
Gastropoda			
Acteocina canaliculata	–	62	–
Acteon punctostriatus	12	–	12
Caecum pulchellum	50	125	50
Crepidula fornicata	–	–	12
Nassarius vibex	87	50	25
Undetermined Nudibranchia	–	–	12
Odostomia impressa	–	12	–
Turbonilla sp.	12	–	12
Isopoda			
Edotea montosa	37	62	50
Erichsonella sp.	–	25	–
Mysidacea			
Bowmaniella sp.	–	12	12
Undetermined Mysidacea	–	12	37
Nemertina			
Undetermined Nemertina sp.	187	187	162
Oligochaeta			
Undetermined marine Oligochaeta	–	12	–
Undetermined Tubificidae	–	–	25
Pelecypoda			
Amygdalum papyrium	162	125	299
Chione cancellata	175	–	–
Mercenaria campechiensis	–	12	–

Mulinia lateralis	25	262	200
Nucula crenulata	–	–	37
Sphenia antillensis	12	12	12
Tagelus sp.	–	12	12
Tellina versicolor	–	12	–
Phoronida			
Phoronis sp.	–	–	25
Platyhelminthes			
Stylochus ellipticus	–	–	25
Polychaeta			
Asychis elongatus	–	–	62
Capitella capitata	100	137	12
Capitella jonesi	–	–	12
Undetermined Capitellidae	12	12	–
Cirriformia sp.	–	–	12
Clymenella torquata	–	–	12
Diopatra cuprea	–	–	12
Glycinde solitaria	87	12	62
Gyptis brevipalpa	12	12	12
Kimbergonuphis simoni	1098	–	424
Undetermined Maldanidae	87	25	–
Mediomastus ambiseta	724	75	100
Undetermined Orbiniidae	–	–	12
Pista palmata	–	–	12
Paranaitis speciosa	–	–	12
Sabellidae juvenile unidentified	50	–	–
Sabella sp.	–	12	–
Undetermined Serpulidae	37	–	–
Streblospio benedicti	–	12	–
Undetermined Terebellidae	–	12	–
Sipuncula			
Phascolion strombi	87	25	200
Tanaidacea			
Hargaria rapax	–	75	37
Total	3327	14826	12317

Phytoplankton taxa list and densities (#/mL) for IRCUD, collected via subsurface grabs, on 20 July, 1993.

	Reference Site	Test A	Test B
Diatoms			
Amphora sp.	–	214	296
Chaetoceros sp.	376	786	1630
Cocconeis sp.	75	–	–
Coscinodiscus sp.	–	71	–
Gyrosigma sp.	–	–	74
Leptocylindrus sp.	1128	–	–
Melosira sp.	226	286	519
Navicula sp.	–	–	74
Nitzschia delicatissima	451	357	445
Nitzschia longissima	1128	1929	2075
Nitzschia seriata	301	–	222
Nitzschia spp.	3383	6000	4965
Rhizosolenia setigera	226	71	222
Skeletonema sp.	602	786	667
Thalassiosira sp.	301	643	2297
Unidentified pennate diatom	–	71	–
Chlorophyta			
Pyramimonas sp.	376	71	148
Unknown chlorophyte flagellate	3158	3143	2149
Cryptophyta			
Cryptomonas sp.	226	429	371
Cyanophyta			
Chroococcus sp.	–	214	148
Oscillatoria sp.	–	–	74
Euglenophyta			
Euglena sp.	–	143	148
Pyrrhophyta			
Gymnodinium sp.	226	–	–
Peridinium sp.	226	71	74
Dinoflagellate cyst	–	214	74
Total	12409	15499	16672

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)

