

Biological Assessment of

Charlotte Harbor Water Association

Charlotte County

NPDES #FL0035378

Sampled November 1992

March 1993

Biology Section
Division of Technical Services

Department of Environmental Regulation
Results of Fifth Year Inspections

Discharger: Charlotte Harbor Water Association
County: Charlotte
NPDES Number: FL0035378
State Permit Expiration Date: 16 August 1993

Toxics Sampling Inspection (XSI)

Date Sampled: 9 November 1992

Results: No organic constituents were detected in the effluent sample. None of the metals in the Charlotte Harbor R.O. discharge exceeded Class III standards for marine waters.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 9 November 1992

Results: The effluent was acutely toxic to the test organism, *Mysidopsis bahia,* producing a 48 hour LC_{50} of 86.6% (Appendix). This is a violation of Rules 17-302.510(5)(p) FAC, 17-302.500(1)(d) FAC, and 17-4.244(3)(a) FAC.

Impact Bioassessment Inspection (IBI)

Date Sampled: 9 November 1992

Results: Qualitative measures of benthic macroinvertebrate community health indicated that neither site was particularly hospitable, but that conditions were moderately worse at the test site. Some of these observed biological changes may have been related to the differences in specific conductance or chlorides (caused by the R.O. effluent) at the two stations. Phytoplankton communities were disturbed at both the reference site and the test site, due to the greatly elevated nutrient levels at both locations. Chlorophyll *a* at both sites was considerably higher than 95% of all other Florida estuaries. Phytoplankton taxa often associated with algal bloom conditions were common at both sites, providing evidence that nutrient induced imbalances (Rule 17-302.560(29) FAC) were occurring at the two locations. To be maximize environmental success, nutrient reductions in the Charlotte Harbor R.O. effluent must also be accompanied by nonpoint source nutrient controls in the area.

Water Quality Inspection (WQI)

Date Sampled: 9 November 1992

Results: Depending on the exact ionic composition of the effluent, the chloride concentration calculated for the test site probably represents a violation of the standard prohibiting a 10% or more increase in chlorides (Rule 17-302.510(5)(c) FAC). Follow-up sampling for chlorides is warranted. Concentrations of total phosphorus, ortho-phosphate, and nitrate-nitrite at the reference site and test site were generally much higher than 95% of other Florida estuaries. Nutrients in the R.O. discharge contributed to the imbalanced algal community found in San Marino canal. However, given the very high levels of nutrients in the adjacent dead-end Dover Street canal, it appears that sources other than the discharge are responsible for the imbalanced algal populations found elsewhere in the area. Algal growth potential at both sites exceeded the estuarine "problem threshold" of 10 mg dry wt/L which indicates that eutrophication problems such as excessive algal growth and D.O. sags are likely.

Introduction

The Charlotte Harbor Water Association is located off Broadpoint Drive in Harbor Heights, Charlotte County, Florida (see maps in Appendix). Reject water from this reverse osmosis facility is aerated and then discharged to the San Marino Canal, a man-made waterway which connects to the Class III waters of the Peace River. The facility has a design capacity of 0.08 MGD, but has been discharging 0.11 MGD (see Facility Summary in Appendix). Permit limits include gross alpha radiation (15 picocuries/L), radium (5 picocuries/L), pH (6.1 to 8.1), dissolved oxygen (4.0 mg/L minimum, 5.0 mg/L average), chlorine residual (0.01 mg/L maximum), and hydrogen sulfide (0.1 mg/L). A 25 foot mixing zone for gross alpha radiation and radium has been granted to the Charlotte Harbor reverse osmosis (R.O.) plant. Although the facility has not submitted portions of the required monitoring data, Monthly Operating Report data indicate improvements in effluent quality since 1990 (including increases in dissolved oxygen and decreases in hydrogen sulfide), when an aerator was installed.

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 at the northeastern end of the Dover Drive canal) and a test site (located just downstream of the discharge in San Marino canal) (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 study sites. An acute definitive toxicity bioassay, using *Mysidopsis bahia* as the test organism, was performed on an effluent sample (Weber 1991). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on effluent, reference and test sites. Methods used for all chemical analyses are on file at the Tallahassee DER Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at reference and test sites. Invertebrates were collected from multiple substrates (*e.g.*, seawalls, leaf mats, mud) using 20 discrete dip net sweeps, in conjunction with a metal scraper. Phytoplankton was sampled at both reference and test sites via sub-surface grab samples. Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). Algal Growth Potential tests, using *Dunaliella tertiolecta*, followed EPA (1974).

Major characteristics of community structure of control and test sites.

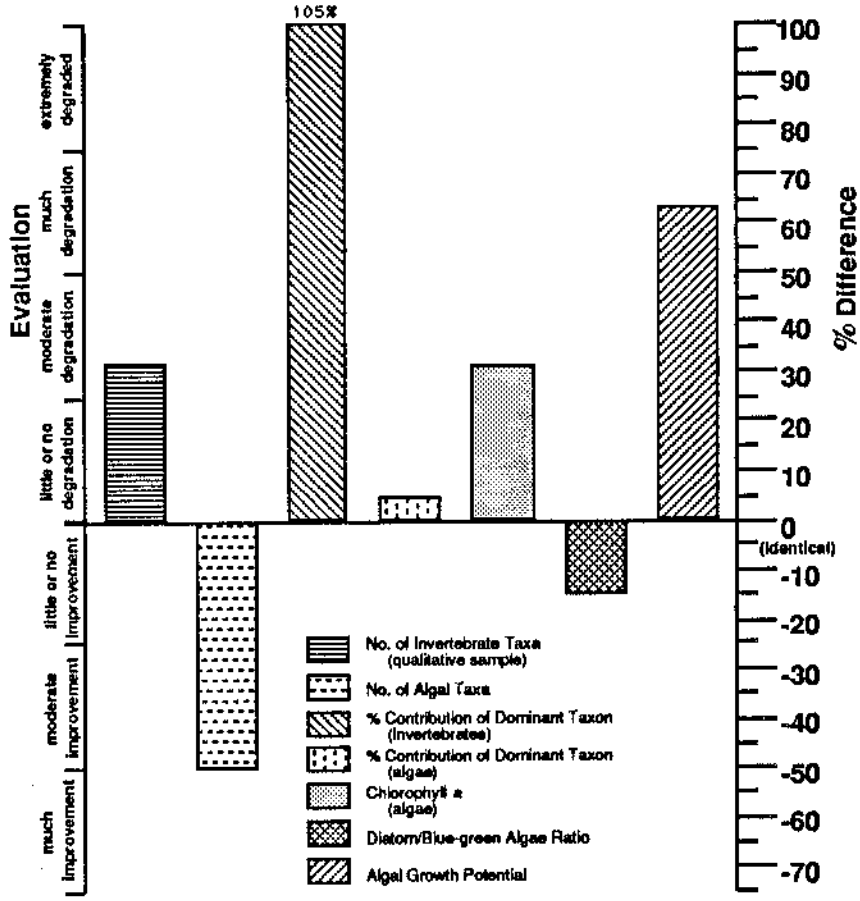
	Control Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	19	13
% Contribution of Dominant Taxon	34.0	69.6
% Malacostraca	23.2	7.5
% Diptera	22.4	15.0
% Polychaeta	12.0	1.3
% Gastropoda	8.3	1.3
% Pelecypoda	0	5.3
% Thoracica	34.0	69.9
% Predators	7.7	1.6
% Collector-Gatherers	33.3	16.8
% Collector-Filterers	42.6	78.6
% Scrapers	10.4	1.3
% Shredders	6.0	1.6
Phytoplankton Algae		
Number of Taxa	12	18
% Contribution of Dominant Taxon	31.7	33.3
Chlorophyll a (µg/L)	41.7	54.5
Diatom/Diatom + B-G Abundance Ratio	0.78	0.90
% Blue-green	20.0	7.9
% Green	0	13.6
% Diatoms	70.0	73.4
% Euglenophytes	3.3	2.3
% Pyrrophytes	6.7	2.8
Algal Growth Potential (mg dry wt/L)	16.6	27.0

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health have been employed. Many of these, such as the number of taxa 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 bluegreen algae ratio (calculated by dividing the number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta + Cyanophyta) is often indicative of nutrient enriched conditions. The determination of the Quantitative Stability Index (for taxonomic % composition) is a two step process. First, the relative proportions of major taxonomic groups are calculated for each site. Then, the lesser of the two percentages for each discrete taxonomic group is totaled. A QSI (% composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (functional feeding groups).

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa and the diatom to bluegreen 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: Ford Walton (DER Punta Gorda office) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Roberto Llanso, Kathleen Lurding, Kim Pearce, Urania Quintana, Landon Ross, and Greg Wynn (Tallahassee Biology Laboratory).



Effect of discharge on receiving stream
(measured as difference between control and test sites).

Results and Discussion

Both the reference site and the test site were located in artificially channelized canals. Habitat quality was poor at the sampling stations (habitat scores were 44 and 38 for reference and test sites, respectively, Appendix). The shoreline of both sites consisted mostly of seawalls, surrounded entirely by residential land uses. Neither site was well flushed (velocity was zero). Consequently, the bottom substrate was composed primarily of sand, mud, muck, silt, and decaying leaves. One major difference between the reference site and the test site involved shoreline vegetation. While some mangroves and swamp lilies were present in the littoral zone at the reference site, the only vegetation at the test site was the exotic Brazilian pepper tree. These trees were not present in the water, however, the branches did extend from the uplands to hang over the water. Dis-

solved oxygen (on the bottom) was above 5.7 mg/L at both sampling sites. The bottom pH at both sites was the same (6.8).

The bottom conductivity was virtually doubled at the test station (6350 µmhos/cm and 12,850 µmhos/cm at reference and test sites, respectively). This was associated with the elevated conductivity of the discharge, which was 18,100 µmhos/cm. Specific conductance may be converted into a chloride concentration (as per Tiphane and St.-Pierre 1962), yielding values of 2000 mg/L at the reference site and 4300 mg/L at the test site. Depending on the exact ionic composition of the effluent, the chloride concentration calculated for the test site probably represents a violation of the standard prohibiting a 10% or more increase in chlorides (Rule 17-302.510(5)(c) FAC). Follow-up sampling for chloride concentrations is warranted.

The effluent was acutely toxic to the test organism, *Mysidopsis bahia*, producing a 48 hour LC_{50} of 86.6% (Appendix). This is a violation of Rules 17-302.510(5)(p) FAC, 17-302.500(1)(d) FAC, and 17-4.244(3)(a) FAC.

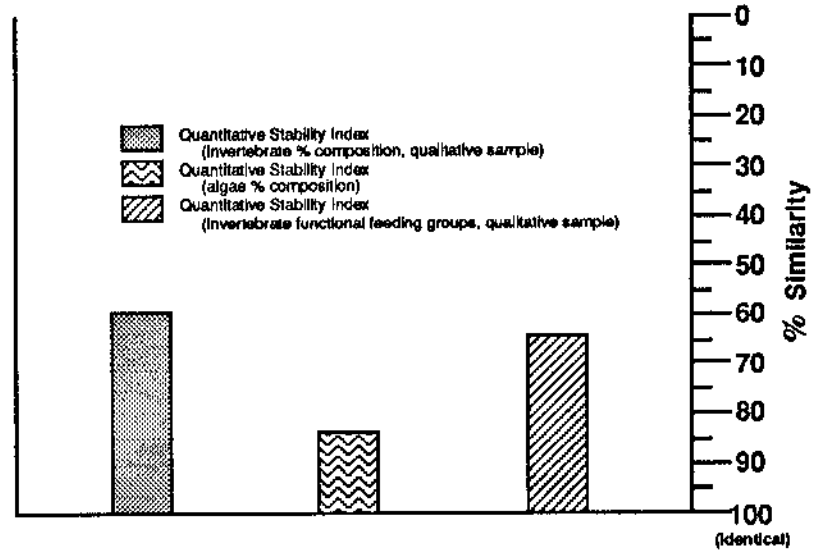
No organic constituents were detected in the effluent sample. Iron (14 µg/L), copper (5 µg/L), and silver (0.06 µg/L) were measured in the effluent at concentrations above detection limits. Since the silver and copper values were below their practical quantitation limits, the value which represents a violation was set at the minimum detection limit (0.05 µg/L for silver and 5 µg/L for copper). None of the metals in the Charlotte Harbor R.O. discharge exceeded Class III standards for marine waters.

Concentrations of total phosphorus, ortho-phosphate, and nitrate-nitrite at the reference site and test site were all higher (and generally much higher) than 95% of other Florida estuaries (see Chemistry Summary Table and Table of Typical Water Quality Values in Appendix). Ammonia concentrations exceeded 92% and 89% of other estuaries at the test site and reference site, respectively. This suggests that the area is subject to considerable inputs of nutrients (*e.g.*, from residential stormwater runoff), in addition to the nutrient enrichment caused by R.O. discharge. Nutrients in the R.O. discharge exacerbated the enrichment problem in San Marino canal and contributed to the imbalanced algal community found there. However, given the very high levels of nutrients in the adjacent dead-end Dover Street canal, it appears that sources other than the R.O. discharge are responsible for the imbalanced algal populations found elsewhere in the area.

Algal growth potential (AGP) also demonstrated the significant nutrient enrichment present in these canals. Reference site AGP was 16.7 mg dry wt/L, while the AGP of the test site was 27.0 mg dry wt/L. According to Ron Raschke (EPA, personal communication), estuarine AGP levels above 10 mg dry wt/L are often associated with eutrophication problems such as excessive algal growth and dissolved oxygen sags. Effluent AGP was also elevated (39.8 mg dry wt/L).

Qualitative measures of benthic macroinvertebrate community health indicated that neither site was particularly hospitable, but that conditions were moderately worse at the test site. The figure on p. 2 indicates the degree of difference between the reference and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. Negative values mean that the test site is better than the reference. The figure on this page summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

Species richness was decreased by 32% at the test site (compared to the reference site), which suggests a moderate perturbation. The fauna at both stations consisted mostly of



Effect of discharge on receiving stream
(measured as similarity between control and test sites).

barnacles (*Balanus* sp.), fairly pollution tolerant chironomids (*e.g.*, *Chironomus* sp., *Goeldichironomus* spp.), and polychaetes (see taxa list in Appendix). The abundance of malacostracans (*e.g.*, *Grandidierella bonnieroides*, *Corophium* sp.) was 67% higher at the reference site, suggesting that motile, somewhat sensitive organisms were less favored by conditions encountered in the vicinity of the discharge. The % contribution of the dominant taxon (*Balanus* sp.) was 105% higher at the test site. While an elevated % contribution of the dominant taxon is usually associated with disturbance, the presence of barnacles in the samples may have been influenced by how well they were attached to substrates at the stations. Perhaps the barnacles were more easily removed with the metal scraper and dip net at the test site than they were at the control area. Quantitative Stability Indices for percent composition and functional feeding groups illustrated moderate differences between the sites.

Phytoplankton communities appeared disturbed at both sampling locations, predominantly due to the greatly elevated chlorophyll *a* present. Although taxa richness was higher (by 50%) at the test site, other algal measurements (except for biomass) were fairly similar at the two stations. Both sites were composed of several taxa tolerant of nutrient enrichment (*e.g.*, *Cyclotella* sp., *Scenedesmus* sp., *Chroococcus* sp., and *Lyngbya* sp.). Chlorophyll *a* was increased by 30.7% at the test site over the reference site. This appeared to be related to the somewhat higher nutrient and AGP regime at the test site, which, in turn, was due to the influence of the high nutrient effluent, and probably from nonpoint sources as well. It should be noted that the chlorophyll *a* at the reference site was already considerably higher than 95% of all other Florida estuaries. This is evidence that nutrient induced imbalances (Rule 17-302.560(29) FAC) were occurring at both locations.

Conclusions

The effluent was acutely toxic to the test organism, *Mysidopsis bahia*, producing a 48 hour LC_{50} of 86.6% (Appendix). This is a violation of Rules 17-302.510(5)(p) FAC, 17-302.500(1)(d) FAC, and 17-4.244(3)(a) FAC.

No organic constituents were detected in the effluent sample. None of the metals in the Charlotte Harbor R.O. discharge exceeded Class III standards for marine waters.

Effluent and receiving water chloride concentrations were calculated from specific conductance values. Depending on the exact ionic composition of the effluent, the value calculated for the test site probably represents a violation of the standard prohibiting a 10% or more increase in chlorides (Rule 17-302.510(5)(c) FAC). Follow-up sampling for chloride concentrations is warranted.

Concentrations of total phosphorus, ortho-phosphate, and nitrate-nitrite at the reference site and test site were all higher (and generally much higher) than 95% of other Florida estuaries. Ammonia concentrations exceeded 92% and 89% of other estuaries at the test site and reference site, respectively. This suggests that the area is subject to considerable inputs of nutrients (*e.g.*, from residential stormwater runoff), in addition to the nutrient enrichment caused by R.O. discharge. Nutrients in the R.O. discharge exacerbated the enrichment problem in San Marino canal and contributed to the imbalanced algal community found there. However, given the very high levels of nutrients in the adjacent dead-end Dover Street canal, it appears that sources other than the discharge are responsible for the imbalanced algal populations found elsewhere in the area.

Algal growth potential (AGP) also demonstrated the significant nutrient enrichment present in these canals. Water from both sites exceeded the estuarine "problem threshold" of 10 mg dry wt/L which indicates that eutrophication problems such as excessive algal growth and D.O. sags are likely. Effluent AGP was also elevated (39.8 mg dry wt/L).

Qualitative measures of benthic macroinvertebrate community health indicated that neither site was particularly hospitable, but that conditions were moderately worse at the test site. Species richness and the abundance of somewhat sensitive malacostracans were decreased at the test site, compared to the control. Some of these observed biological changes may have been related to the differences in specific conductance (caused by the R.O. effluent) at the two stations. While the % contribution of the dominant taxon (*Balanus* sp.) was much higher at the test site, it was possible that the presence of barnacles in the samples may have been influenced by how well they were attached to substrates at the stations, not exclusively due to the discharge.

Phytoplankton communities were disturbed at both the reference site and the test site, due to the great-

ly elevated nutrient levels at both locations. Chlorophyll *a* at both sites was considerably higher than 95% of all other Florida estuaries. Both sites were composed of taxa associated with nutrient enrichment. This is evidence that nutrient induced imbalances (Rule 17-302.560(29) FAC) were occurring at the two locations. To maximize environmental success, nutrient reductions in the Charlotte Harbor R.O. effluent should also be accompanied by nonpoint source nutrient controls in the area.

Literature Cited

Environmental Protection Agency. 1974. Marine algal assay procedure: Bottle test. Nat'l Environ. Res. Center, Office of Res. and Dev., U.S. EPA, Corvallis, Oregon. 43 p.

Ross, L. T. 1990. Methods for aquatic biology. Fla. Dept. Environ. Reg. Tech. Ser. 10(1): 1-47.

Tiphane, M. and J. St.-Pierre. 1962. Tables de determination de la salinite de l'eau de mer par conductivite electrique. University of Montreal. Montreal, Canada. 20 p.

Weber, C. I. 1991. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. 4th edition. EPA/600/4-90/027. U. S. EPA, Cincinnati, Ohio. 216 pp.

Chemistry summary table for

Charlotte Harbor Water Assoc.	Effluent	Reference Site	Test Site
Organic Constituents (ug/L)			
None Detected	U		
Metals (ug/L)			
Aluminum	50 U		
Antimony	15 U		
Arsenic	20 U		
Cadmium	0.4 U		
Copper	5 T		
Chromium	10 U		
Iron	14		
Lead	15 U		
Mercury	0.1 U		
Nickel	5 U		
Selenium	30 U		
Silver	0.06T		
Zinc	5 U		
Nutrients (mg/L)			
Ortho-phosphate	0.97	0.46	0.73
Total phosphorus	3.4	0.65	1.6
Ammonia	0.57	0.21	0.25
Nitrate+Nitrite	0.35	0.25	0.32
TKN	0.98	1.2	1.1
Other Parameters			
Habitat Assessment		44	38
D.O. (mg/L) -Bottom		5.7	6.0
pH (SU's) -Bottom	8.3	6.8	6.8
Conductivity (µmhos/cm) -Bottom	18,100	12,850	6350
Temperature (°C) -Bottom		23.2	23.6
Algal Growth Potential (mg dry wt/L)	39.8	16.7	27.0
Bioassay - Invertebrate	LC50 = 86.6%		

T - Value reported is less than the practical quantitation limit

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

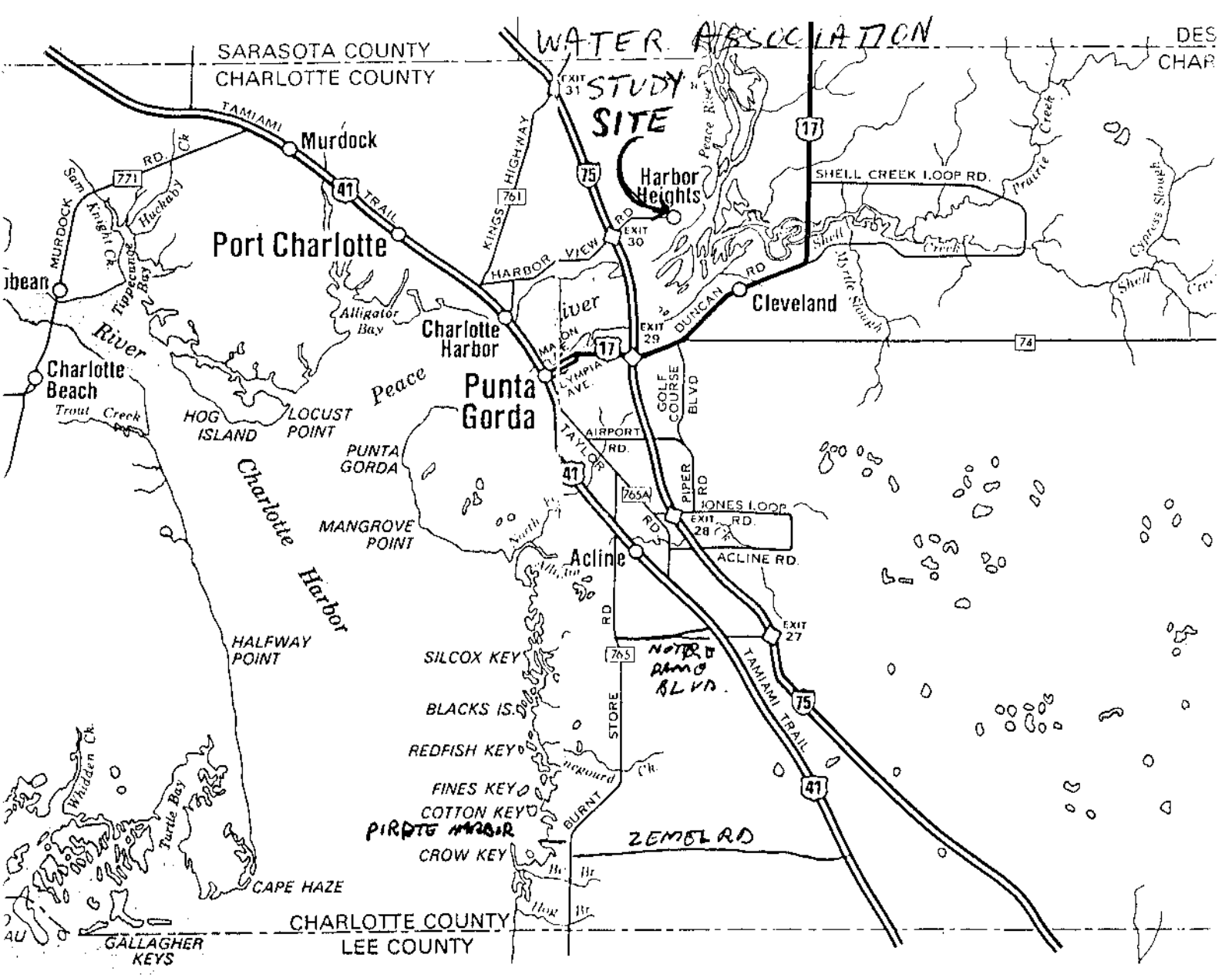
Typical Values for Selected Parameters in Florida Waters

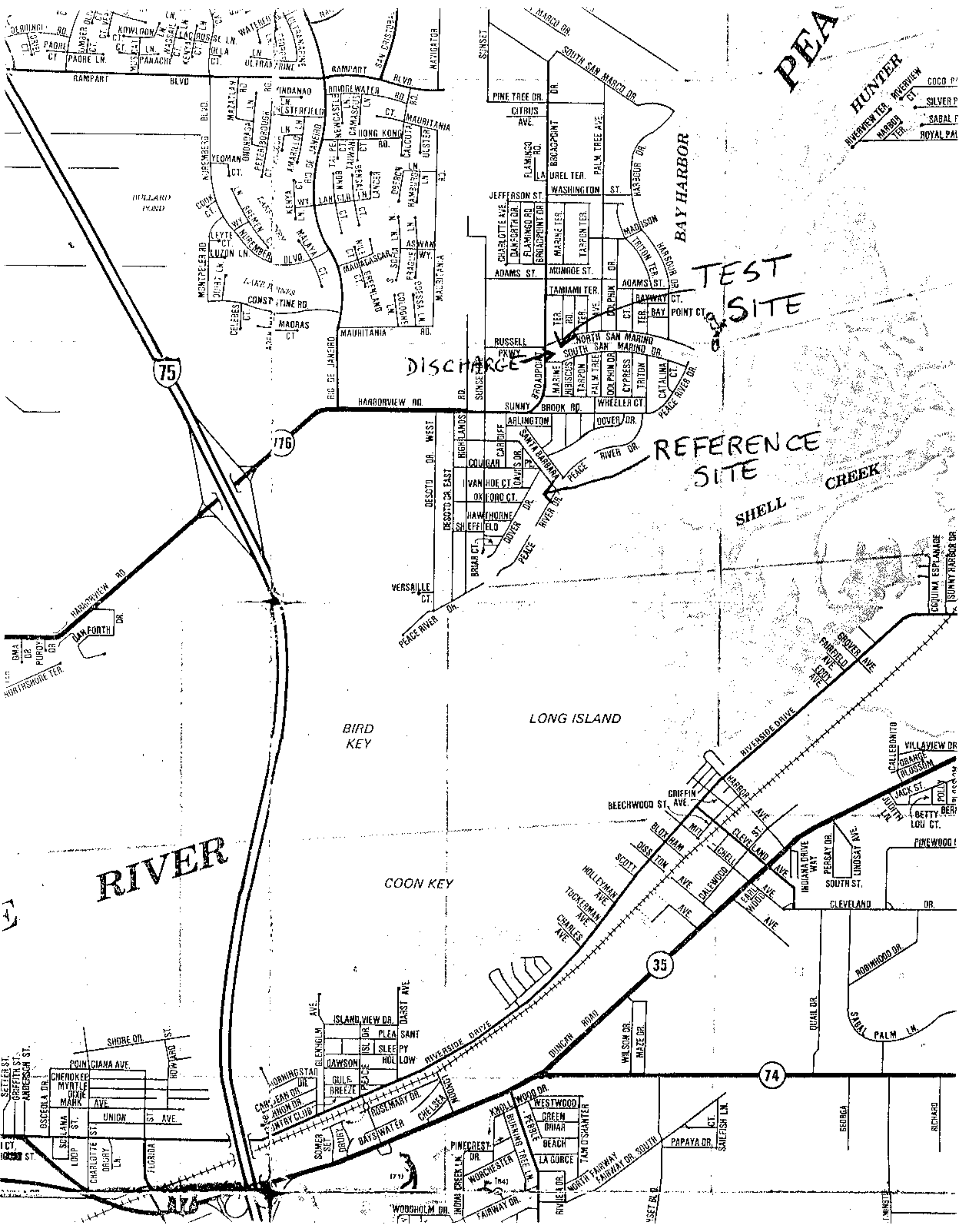
Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

Percentile Distribution

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

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


WATER ASSOCIATION
STUDY SITE
SARASOTA COUNTY
CHARLOTTE COUNTY
CHARLOTTE COUNTY
LEE COUNTY
Murdock
Port Charlotte
Harbor Heights
Cleveland
Charlotte Harbor
Punta Gorda
Charlotte Beach
Acline
TAMIAMI TRAIL
KINGS HIGHWAY
HARBOR VIEW RD.
DUNCAN RD.
SHELL CREEK LOOP RD.
AIRPORT RD.
GOLF COURSE BLVD
PIPER RD
JONES LOOP RD.
ACLINE RD.
TAYLOR RD
STORE RD
BURNT
Peace River
Charlotte Harbor
Alligator Bay
Tippecanoe Bay
Trout Creek
HOG ISLAND
LOCUST POINT
PUNTA GORDA
MANGROVE POINT
HALFWAY POINT
SILCOX KEY
BLACKS IS.
REDFISH KEY
FINES KEY
COTTON KEY
CROW KEY
PIRATE HARBOR
ZEMBLAD
CAPE HAZE
GALLAGHER KEYS
Whidden Ck.
Turtle Bay
Myrtle Slough
Shell Creek
Prairie Creek
Cypress Slough
Sam Knight Ck.
Huckaby
MURDOCK
EXIT 31
EXIT 30
EXIT 29
EXIT 28
EXIT 27
41
75
17
74
771
761
765
765A



TEST SITE
DISCHARGE
REFERENCE SITE
BAY HARBOR
SHELL CREEK
HUNTER
LONG ISLAND
BIRD KEY
COON KEY
RIVER
PEA
75
776
35
74
HARBORVIEW RD.
RIVERSIDE DRIVE
DUNCAN ROAD
PEACE RIVER DR.
NORTH SAN MARINO
SOUTH SAN MARINO DR.
SUNNYBROOK RD.
RAMPART BLVD
DESOTO DR. WEST
DESOTO DR. EAST
CLEVELAND DR.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: Charlotte Harbor Water Assn.		Date Summary Prepared : 9-10-92
Location (attach detailed map): Broadpoint Drive, Harbor Heights	County: Charlotte	District: South
Federal Permit # and expiration date: FL0035378 Feb 95?	State GMS # and State expiration date: I008-139101 Aug 16, '93	Facility Type: Industrial Municipal Federal Agricultural Other (list):

Function of facility:

R. O. drinking water plant

Description of treatment process:

Reverse Osmosis - ~~possibly~~ aeration of reject water

Receiving waters: San Marino Canal to Peace River	Classification: I II (III) of receiving water?	
Design Flow: 80,000 g/day	Mean Flow: 110,000g/day	Flow during survey:

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

therefore, the best time to sample is: Any time

If facility has a mixing zone, give details (size, parameters affected, etc.):

25 foot mixing zone for gross alpha and radium

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

Parameter	Limit (units)
gross alpha	15 picocur/l
pH	6.1 - 8.1
DO	4.0 (avg 5.0)
Chlorine Resid.	0.01
H_2S	0.1 (0.4 preferred)
Radium	5 picocur/l

Describe special permit conditions and permit modifications:

None

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Charlotte Harbor Water Assoc.
(Facility)

Description of permitted outfall(s):

Dead end of residential canal (see, map).

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

Some reporting data missing.

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

None.

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

No DER results, MOR indicates increased DO, decreased H_2S in 1990 ~~(possibly~~ (aerator installed).

Additional information:

Staff contributing to this review (signature):

Albert S. Walton, Jr. (Biologist)

Gary A. Millington (Inspector)

(Engineer)

( )

( )

( )

ATTACHMENT 2

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 3)

SUBMITTING AGENCY CODE: 52 / SUBMITTING AGENCY NAME: DCR, SOUTH DIST	STORET STATION NUMBER: —	DATE (M/D/Y): 11-09-92	TIME: 1300	RECEIVING BODY OF WATER: PEACE RIVER

REMARKS: VEGETATION - TYPHA, SWAMP LILY, MANGROVE	LOCATION: CHAR, HARK WATER ASSN DOVER DR. CANAL CONTROL	FIELD ID/NAME: IW-110992-3

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
			100			

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

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

Point-Source Pollution (list location and describe):

Estimated System Width (range, m): 20	Estimated System Depth (range, m): 0-1.5	yes
High Water Mark (m above bank) 0.75	Velocity (range, m/s): 0	Impounded [ ] Channelized [✓]

Canopy Cover % : Open : [✓] Lightly Shaded (11-45%): [ ] Moderately Shaded (46-80%): [ ] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

ON SURFACE @ EDGE OF CANAL — BELOW SURFACE IN CENTER

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	25	6	NET
Aquatic Vegetation	5			Mud/Muck / silt	60	6	NET
Rocky outcrops				Leaf mats			
Undercut banks /root systems	5			Other: SEAWALL	5	8	NET

SCRAPE

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	pH (SU):	Cond. (µmho/cm):				Secchi (m):
Top	23.2	7.5	7.0	10440				.75
Mid-depth	23.1	6.4	6.8	12450				
Bottom	23.2	5.7	6.8	12650				

Stream Type: sand bottom / sand w/spring inf / swamp & bog / alluvial / calcareous / (misc.) CANAL Stream Size:

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: OVERCAST, LOW TIDE

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

ANALYSIS DATE: 11-09-92	ANALYST: A.S. WALTON	SIGNATURE: Albert S Walton Jr

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

SUBMITTING AGENCY CODE: SL SUBMITTING AGENCY NAME: SOUTH DIST	STORET STATION NUMBER:	DATE (M/D/Y): 11-09-92	RECEIVING BODY OF WATER: PEACE RIVER

REMARKS:	LOCATION: CHAR. HARB. WATER ASSN DOVER DRIVE CANAL — CONTROL	FIELD ID/NAME: 1W-110992-3

Habitat Parameter score	Excellent	Good	Fair	Poor
Littoral Alterations 2	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed 15	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation 4	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations 8	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action 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 5	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 44

COMMENTS: MANGROVES, TYPHA, SWAMP LILIES @ EDGE, BOTTOM — MUD, SAND, LEAF MATERIAL (GRASS, MANGROVE ORANGE)

ANALYSIS DATE:	ANALYST:	SIGNATURE:
11-09-92	A.S. WALTON	Albert S Walton, Jr

ATTACHMENT 2

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 3)

SUBMITTING AGENCY CODE: 52 / SUBMITTING AGENCY NAME: SOUTH DIST	STORET STATION NUMBER:	DATE (M/D/Y): 11-09-92	TIME: 1045	RECEIVING BODY OF WATER: PEACE R

REMARKS:	LOCATION: CHAR. HARBOR WATER ASSN SAN MARINO CANAL (AFFECTED)	FIELD ID/NAME: IW-110992-2

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
			100			

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

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

Point-Source Pollution (list location and describe): CHARLOTTE HARBOR WATER ASSN — R.O. PLANT DISCHARGE

Estimated System Width (range, m): 20 M	Estimated System Depth (range, m): 0-1.5	Impounded: yes [ ]
High Water Mark (m above bank): 0.75	Velocity (range, m/s): 0	Channelized [✓]

Canopy Cover % : Open : [✓] Lightly Shaded (11-45%): [ ] Moderately Shaded (46-80%): [ ] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: [✓] (SHALLOW WATER) Sewage: [ ] Petroleum: [ ] Chemical: [ ] Anaerobic: [✓] (BELOW SURFACE, DEEPER WATER) 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	30	6	NET
Aquatic Vegetation	*			Mud/Muck / silt	65	6	NET
Rocky outcrops				Leaf mats			
Undercut banks /root systems				Other: SEAWALL	5	3	SCRAPE NET

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	pH (SU):	Cond. (µmho/cm):				Secchi (m):
Top	23.6	6.3	6.8	6350				.75
Mid-depth	23.7	6.0	6.7	6400				
Bottom	23.6	6.0	6.8	6350				

Stream Type: sand bottom / sand w/spring inf / swamp & bog / alluvial / calcareous / misc, CANAL Stream Size:

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

Water Surface Oils (check box): Slick: [✓] (SMALL @ DISCHARGE) Sheen: [ ] Globs: [ ] None: [ ]

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

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

Weather Conditions: OVERCAST, LOW TIDE

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

ANALYSIS DATE: 11-9-92	ANALYST: A.S. WALTON	SIGNATURE: Albert S Walton, Jr

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

SUBMITTING AGENCY CODE: 52 SUBMITTING AGENCY NAME: SCCPR DAN	STORET STATION NUMBER: —	DATE (M/D/Y): 11-9-92	RECEIVING BODY OF WATER: PEACE RIVER

REMARKS:	LOCATION: CHAR. HARBOR WATER ASSN SAN MARINO CANAL AFFECTED	FIELD ID/NAME: IW-110992-2

Habitat Parameter score	Excellent	Good	Fair	Poor
Littoral Alterations 1	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 10	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation 4	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations 6	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action 10	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. 9-10 points	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. 0-2 points
Sediment Type 7	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 38

COMMENTS: SEE FRESH WATER HABITAT ASSES. MAJOR DIFFERENCE FROM CONTROL IS THAT VEGETATION IN CANAL, ALONG SIDE MORE, NOT JUST HANGING OVER SEAWALL AS HERE

ANALYSIS DATE:	ANALYST:	SIGNATURE:
11-9-92	A.S. WALTON	Albert S. Walton, Jr

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Charlotte Harbor
Address/City:
County: Charlotte
Contact/District: Albert Walton / South
NPDES Permit #: FL00 35378 Outfall #:

Sample Collection: Date 11/09/92 Time 1005
Test Beginning: Date 11/10/92 Time 1330
Test Ending: Date 11/12/92 Time 1330
Test Organism: Mysidopsis bahia
Life Stage/Age: 4 days

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

44803 92 NOV 10 14

Remarks:
Sample Salinity 4.4‰ adjusted to 10‰

LC50 - 86.60% (79.48 94.36)

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7.9.9	8.5@24°C	22.8@22.6°C	955 9500@23.2
24 hr	7.9.9	8.6@23.5°C	22.6@22.5°C	9670 9900@23.6°C
48 hr	7.9.9	8.5@24°C	23.5@23.5°C	960 9720@23.3 only

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48	Cond. (umhos/cm) 0	24	48
Control	183	5	5	5	8.2	8.2	7.6	23.2	22.8	23.2	8.4	7.6	6.0	17.9	17.9	18.2
Control	26	5	5	5	8.3	8.2	7.6				8.4	7.6	5.4	18.1	18.1	18.4
25%	25	5	5	5	8.3	8.2	7.7	23.5	22.8	23.1	8.5	7.7	5.5	18.1	18.0	18.3
25%	63	5	5	5	8.3	8.2	7.8				8.5	7.8	5.5	18.1	17.9	18.2
50%	16	5	5	5	8.3	8.2	7.9	23.5	22.8	23.1	8.5	7.7	5.5	18.1	18.0	18.3
50%	153	5	5	5	8.3	8.2	7.9				8.5	7.7	5.1	18.1	17.9	18.2
75%	13	5	5	5	8.3	8.3	7.9	23.9	22.7	23.1	8.5	7.7	5.1	18.1	17.9	18.2
75%	28	5	5	3	8.3	8.3	7.9				8.5	7.7	5.0	18.1	17.9	18.2
100%	190	5	3	1	8.3	8.3	7.9	23.9	22.8	23.2	8.5	7.7	5.0	18.1	17.8	18.2
100%	68	5	4	1	8.3	8.3	8.2				8.5	7.7	6.1	18.1	17.8	18.2
Measured/Loaded by:		MF	MF	MF	TR	MF	TM	TR	MF	TM	TR	MF	TM	TR	MF	TM
Recorded by:		TM	MF	MF	TM	MF	TR	TM	MF	TR	TM	MF	TR	TM	MF	TR

Investigators' Signatures
J.M. Faulkner
Tobin A. Rader
Tina Mikulski

Reviewer

Water-quality Parameters

	ASW Well Water	20‰ Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:			20.06	DR 100	TM
Alkalinity:	137	65	187	Hach	TR
Hardness:	113	75		Hach	TR
Total Ammonia:	0.0	0.0	0.0	Hach	TM

Ammonia Ammonia Salinity 4.4

TRIMMED SPEARMAN-KARBER METHOD. MONTANA STATE UNIV

FOR REFERENCE, CITE:
HAMILTON, M.A., R.C. RUSSO, AND R.V. THURSTON, 1977.
TRIMMED SPEARMAN-KARBER METHOD FOR ESTIMATING MEDIAN
LETHAL CONCENTRATIONS IN TOXICITY BIOASSAYS.
ENVIRON. SCI. TECHNOL. 11(7): 714-719;
CORRECTION 12(4):417 (1978).

DATE: 11/10/92 TEST NUMBER: 1
DURATION: 48 HR

CHEMICAL: CHARLOTTE HARBOR R/O EFFLUENT

SPECIES: M. BAHIA: sample salinity 4 ppt, adjusted to 10 ppt for test

RAW DATA:

CONCENTRATION(%)	25.00	50.00	75.00	100.00
NUMBER EXPOSED:	10	10	10	10
MORTALITIES:	0	0	2	8
SPEARMAN-KARBER TRIM:		20.00%		

SPEARMAN-KARBER ESTIMATES: LC50: 86.60
95% LOWER CONFIDENCE: 79.48
95% UPPER CONFIDENCE: 94.36

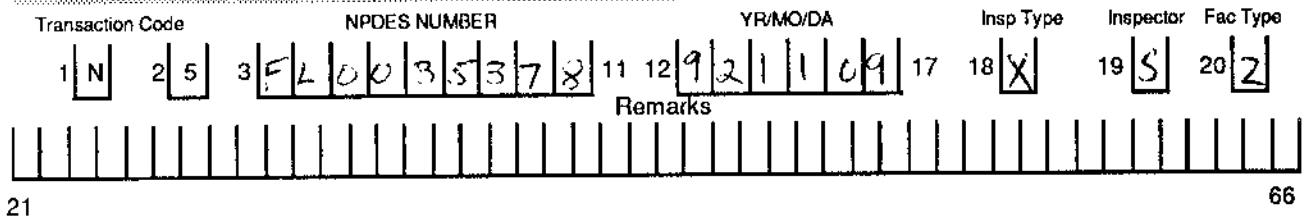
Taxa list for Charlotte Harbor, collected via 20 discrete dip net sweeps at a reference site (Dover Dr. canal) and below the discharge (San Marino Dr. canal) on 9 November 1992.

	Reference Site	Test Site
Diptera		
Asheum beckae	–	5
Chironomus sp.	28	6
Dicrotendipes lobus	1	8
Dicrotendipes modestus	1	–
Goeldichironomus amazonicus	–	8
Goeldichironomus carus	5	4
Palpomyia grp.sp.	1	–
Polypedilum halterale grp.	1	2
Undetermined dipteran pupae	3	1
Tanytarsus sp. G Epler	12	–
Tanytarsus sp.K Epler	1	–
Tanytarsus sp.R Epler	1	–
Gastropoda		
Neritina reclivata	20	–
Pyrogophorus platyrachis	–	3
Malacostraca		
Cirolana sp.	1	–
Corophium sp.	19	–
Edotea montosa	5	–
Grandidierella bonnieroides	31	–
Mysidopsis almyra	–	2
Tanais cavolini	–	15
Pelecypoda		
Mytilopsis leucophaeta	–	12
Polychaeta		
Hobsonia florida	11	–
Nereis sp.	–	3
Nereis succinea	6	–
Polydora ligni	12	–
Thoracica		
Balanus sp.	82	158

Phytoplankton taxa list and densities for Charlotte Harbor Water Association Reverse Osmosis Plant, collected via subsurface grabs in Dover Dr. Canal (reference site) and San Marino Dr. Canal (test site) on 9 November, 1992.

	Reference Site	Test Site
Diatoms		
Amphora sp.	–	52
Chaetoceros sp.	51	105
Cocconeis sp.	–	52
Coscinodiscus sp.	25	–
Cyclotella sp.	152	918
Diploneis sp.	–	26
Melosira sp.	–	131
Navicula sp.	125	–
Nitzschia sp.	51	394
Skeletonema sp.	253	184
Skeketonema sp.?	480	1548
Surirella sp.	25	–
Chlorophyta		
Ankistrodesmus sp.	–	26
Chlamydomonas sp.	–	52
Oocystis sp.	–	210
Scenedesmus sp.	–	131
Unknown chlorophyte flagellate	–	210
Cyanophyta		
Chroococcus sp.	101	341
Lyngbya sp.	202	26
Euglenophyta		
Euglena sp.	51	105
Pyrrhophyta		
Peridinium sp.	101	131

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)

