

Biological Assessment of

Air Products and Chemicals, Inc.

Santa Rosa County

NPDES #FL0002313

Sampled July 1991

February 1992

Biology Section
Division of Technical Services

Department of Environmental Regulation
Results of Fifth Year Inspections

Discharger: Air Products and Chemicals, Inc.
County: Santa Rosa
NPDES Number: FL0002313
State Permit Expiration Date: 1 March 1992

Toxics Sampling Inspection (XSI)

Date Sampled: 23 July 1991

Results: Organic constituents in the effluent included aliphatic hydrocarbons which were predominantly oxygenated (150 µg/L). Additionally, 2.4 mg/L of chlorine produced oxidents (possibly chloramines) were detected in the facility's discharge. It is possible that these components of the effluent contributed to the observed toxicity. Silver was present in the effluent, but at a concentration of less than 0.2 µg/L. Due to the detection limit, it could not be determined if the concentration of silver in the sample was in violation of Class III standards. The concentrations of the remaining metals were within standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 23 July 1991

Results: The Air Products and Chemicals, Inc. effluent sample was acutely toxic to the water flea, *Ceriodaphnia dubia*, producing an LC50 of 86%. This is a violation of 17-4.244(3)(a) FAC.

Impact Bioassessment Inspection (IBI)

Date Sampled: 23 July 1991

Results: The primary differences between macroinvertebrate communities at the control and test sites involved undesirable changes in community composition and the relative abundances of epi-fauna. Butts (1986) found that the biota from all upper Escambia Bay stations were highly stressed when compared to similar yet non-anthropogenically affected estuaries. Due to the apparent widespread biological stress in upper Escambia Bay and the many potential pollution sources, we may conclude only that APCI is a contributor to the observed problems.

Water Quality Inspection (WQI)

Date Sampled: 23 July 1991

Results: Ammonia (32 mg/L) and TKN (48.5 mg/L) measured in the effluent were particularly elevated. An unionized ammonia concentration of 0.6 mg/L was calculated for the effluent, which also could have contributed to the acute toxicity observed in the bioassay. The concentrations of ammonia and TKN measured at Test Site 1 were greater than 95% of all other Florida estuaries. Nitrate+nitrite values at Test Site 1 were higher than 80% of other estuary measurements. Algal growth potential results indicate that the waters near the APCI outfall, as well as the control, may be subject to eutrophication effects.

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

Air Products and Chemicals, Inc. (APCI) is a chemical manufacturing plant located in Pace, Florida (see map in Appendix). APCI produces nitrogen fertilizer, amines, methanol, ammonia, and nitric acid. Until recently, APCI also made polyvinyl chloride, but the PVC facility was purchased by Pacific Western Resins, Inc. in 1990.

The wastewater system consists of neutralization, equalization, anaerobic treatment, and extended aeration in a 75 acre pond network. Final discharge is through a 1000 foot ditch into upper Escambia Bay.

Effluent permit limits are as follows: COD (1390 lbs./day as a daily average, 2530 lbs./day maximum), TSS (400 lbs./day as a daily average, 800 lbs./day maximum), Total Nitrogen (from December through April: 750 lbs./day as a daily average, 1400 lbs./day maximum; from May through November: 425 lbs./day as a daily average, 1400 lbs./day maximum), Total Phosphorus (32 lbs./day as a daily average, 64 lbs./day maximum), and PCB (0.001 µg/L maximum).

A semi-circular mixing zone, extending radially about the point of discharge for 282 meters in Escambia Bay, has been granted for the following parameters: cyanide (0.1 mg/L), chromium (0.2 mg/L), copper (0.03 mg/L) silver (0.005 mg/L), phenol (0.02 mg/L), mercury (0.004 mg/L), pH (6.0 to 9.0), and toxicity.

A review of Monthly Operating Report (MOR) data revealed no permit excursions for the past year. The facility was inspected in June, 1991, and received a satisfactory rating. However, the effluent has been acutely toxic to *Ceriodaphnia dubia* and *Mysidopsis bahia* in numerous toxicity tests, with ammonia often cited as a contributor to the observed toxicity.

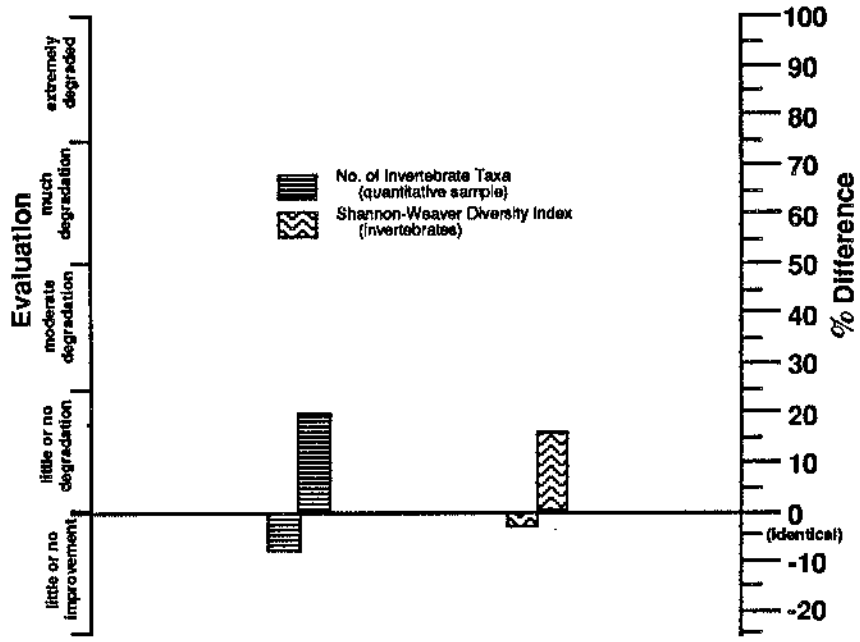
Dinitrotoluene was manufactured at APCI from 1966 to 1973. Infiltration of dinitrotoluene from treatment ponds has contaminated local groundwater, and is currently being remediated. Dinitrotoluene has also been detected in small amounts in the surface waters of Dridgler's Creek and Escambia Bay.

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located in Escambia Bay near the mouth of the Escambia River) and two test sites (Test Site 1 was west of the discharge, Test Site 2 was near Fisherman's Point) (see map in Appendix). A habitat assessment

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	12	13	10
Shannon-Weaver Diversity	3.0	3.1	2.5
% Polchaeta	29.8	58.0	78.5
% Malacostraca	34.9	4.8	10.6
% Gastropoda	19.6	24.1	0
% Pelecypoda	12.8	1.2	4.2
% Nemertea	2.5	9.6	4.2
% Other	0.7	2.3	2.5
% Epi-fauna	35	4.8	10.7
% Predators	21.4	25.3	23.5
% Collector-Gatherers	46.8	48.5	71.4
% Collector-Filterers	12.3	1.5	5.1
% Scrapers	19.5	24.7	0
Phytoplankton Algae	**Effluent Alpha Pond**		
Number of Taxa	7	No data	
% Contribution of Dominant Taxon	53.1		
Diatom/Blue-green Abundance Ratio	0		
% Blue-green	3.7		
% Green	95.9		
% Euglenophyta	0.4		
Algal Growth Potential (mg dry wt/l)	43.7		



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.)

was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. An acute toxicity bioassay, using *Ceriodaphnia dubia* as the test organism, was performed on an effluent sample (Peltier and Weber 1985, FDER 1885). The effluent was analyzed for nutrients, metals, and 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. Collection methods consisted of 9 ponar dredges (3 replicates at 3 discrete locations, sampled as a transect) per site. Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism, followed Miller *et al.* (1978).

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 Shannon-Weaver Diversity Index, are well known. Others are briefly explained here. 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 control and test sites involving the number of taxa and the diversity index are measured as the reference site minus test site divided by the reference site.

The following personnel were involved in this investigation: Glenn Butts (DER Northwest District) and Lyn Burton, Russel Frydenborg, Kathleen Lurding, and Sandy McClure (Tallahassee Biology Laboratory).

Results and Discussion

The receiving waters for the Air Products and Chemicals (APCI) discharge, Escambia Bay, is a marine, tidal estuary with vegetated shores of *Spartina* and *Juncus* (Appendix). Habitat quality was better at the reference site (with 72 points) than at Test Site 1 (47 points) or Test Site 2 (52 points). Dissolved oxygen was above 6.4 mg/L at all 3 sites. The pH at Test Site 2 (pH = 7.4) was about a unit higher than the control (6.4) or Test Site 1 (6.3).

The effluent sample was acutely toxic to the water flea, *Ceriodaphnia dubia*, producing an LC50 of 86%. This is a violation of 17-4.244(3)(a) FAC.

Organic constituents in the effluent included aliphatic hydrocarbons which were predominantly oxygenated (150 µg/L). The effluent also consistently contains compounds

which can be measured with the iodometric test for chlorine (sometimes referred to as chlorine produced oxidents or CPO's) (David Staples, FDER, personal communication). During the present study, 2.4 mg/L of CPO's were detected in the facility's discharge, but no free chlorine could be measured using the DPD test. Because chloramines may interfere with the iodometric test and because there was a high amount of ammonia present in the effluent, this suggests that the compounds being measured with the iodometric test may be chloramines (Tim Fitzpatrick, FDER, personal communication). It is possible that these components of the effluent contributed to the observed toxicity.

Metals detected in the effluent included aluminum (81 µg/L), chromium (88 µg/L), iron (178 µg/L), silver (present but less than 0.2 µg/L), and zinc (15 µg/L). Due to the detection limit, it could not be determined if the concentration of silver in the sample was in violation of Class III standards. The concentrations of the remaining metals were within standards.

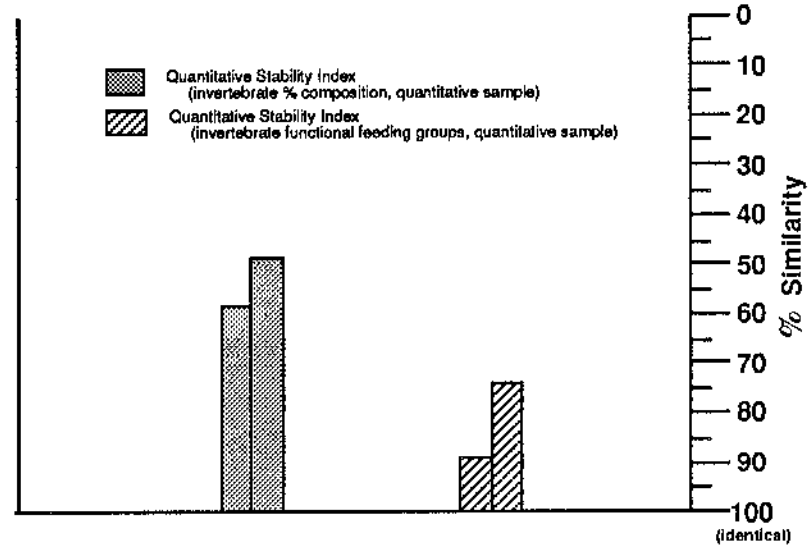
Ammonia (32 mg/L) and TKN (48.5 mg/L) measured in the effluent were particularly elevated. Phosphorus (2.2 mg/L) and nitrate-nitrite (1.7 mg/L) were somewhat elevated. An unionized ammonia concentration of 0.6 mg/L was calculated for the effluent, which also could have contributed to the acute toxicity observed in the bioassay.

The concentrations of ammonia and TKN at the stations near the APCI outfall (Test Site 1) were much higher than those found in typical Florida estuaries (see Appendix). STORET data from 690 estuary stations, for the period of 1980 to 1989, have been compiled into a percentile distribution (Joe Hand, personal communication). Data from this present investigation were evaluated against these (see table in Appendix). The concentrations of ammonia and TKN measured at Test Site 1 were greater than 95% of all other Florida estuaries. Nitrate+nitrite values at Test Site 1 were higher than 80% of other estuary measurements. In contrast, total phosphorus detected at this test site was not unusually elevated.

Algal growth potential results (43.7 mg dry wt/L in the APCI effluent, 12.6 mg dry wt/L at the control, 15.6 mg dry wt/L at Test Site 1) indicate that the waters near the APCI outfall, as well as the control, may be subject to eutrophication effects. In ambient estuarine waters, *Dunaliella* is the preferred test organism for AGP studies. *Dunaliella* AGP results above 10 mg dry wt/L, indicate that the negative consequences associated with nutrient enrichment (D.O. depletion, algal blooms, fish kills) will be manifest (Ron Raschke, U.S. EPA, personal communication). These results indicate that the APCI effluent is contributing harmful amounts of nutrients to to a system which is already nutrient enriched.

Some measurements of macroinvertebrate community health suggested that biota at the test sites were, in some respects, not too much different than the control. The upper left figure indicates the degree of difference between the reference and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. The lower right figure summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

While taxa richness and Shannon-Weaver diversity were very similar at the control and at Test Site 1, these values showed some decreases at Test Site 2. The primary differences between the control and test sites involved undesirable changes in community composition and the relative abundances of epi-fauna. There was a distinct decrease in predominantly sensitive groups (e.g., Mala-



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.)

costraca) with a corresponding increase in pollution tolerant forms (polychaetes) between the control and test sites. For example, while the capitellid polychaete, *Mediomastus ambiseta* made up 9.4 % of the benthic population at the control site, this pollution tolerant organism accounted for 26.5% and 42.3% of the total organisms found at Test Sites 1 and 2, respectively. Similarly, the percentage of pollution sensitive epibenthic organisms (*e.g.*, *Lembos* sp.) decreased from 35% at the control to 4.8% and 10.7% at Test Sites 1 and 2, respectively.

When evaluating these data, it is important to consider past studies in Escambia Bay and other panhandle estuaries. Beginning in the late 1950's, Escambia Bay has had a history of water quality problems, including declines in fisheries, macroinvertebrate perturbations, and massive fish kills (FDER 1988). Butts (1986) found that the biota from all upper Escambia Bay stations (including the control site in this present investigation) were highly stressed when compared to similar yet non-anthropogenically affected estuaries such as nearby Horse Shoe Bayou. For example, taxa richness (40 taxa) and diversity (4.6) values in Horse Shoe Bayou were considerably higher than the taxa (12) and diversity (2.7) noted for the Escambia Bay background site, which was the control site in the present study (Butts 1986). Due to the apparent widespread biological stress in upper Escambia Bay and the many potential pollution sources, we may conclude only that APCI is a contributor to the observed problems.

Phytoplankton communities in the APCI final (alpha) effluent pond were characteristic of eutrophic water bodies. These algal cells are transferred to the Bay as part of the effluent, where they contribute to the algal biomass of an already nutrient stressed system.

Due to the complexity of and apparent widespread stress found in this estuary system, further and more intensive biological study seems appropriate to better characterize the extent of the influence of APCI's discharge.

Conclusions

The Air Products and Chemicals, Inc. effluent sample was acutely toxic to the water flea, *Ceriodaphnia dubia*, producing an LC50 of 86%. This is a violation of 17-4.244(3)(a) FAC.

Organic constituents in the effluent included aliphatic hydrocarbons which were predominantly oxygenated (150 µg/L). Additionally, 2.4 mg/L of chlorine produced oxidents (possibly chloramines) were detected in the facility's discharge It is possible that these components of the effluent contributed to the observed toxicity.

Silver was present in the effluent but at a concentration of less than 0.2 µg/L. Due to the detection limit, it could not be determined if the concentration of silver in the sample was in violation of Class III standards. The concentrations of the remaining metals were within standards.

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Algal growth potential results (43.7 mg/dry wt/L in the APCI effluent, 12.6 mg/dry wt/L at the control, 15.6 mg/dry wt/L at Test Site 1) indicate that the waters near the APCI outfall, as well as the control, may be subject to eutrophication effects.

The primary differences between macroinvertebrate communities at the control and test sites involved undesirable changes in community composition and the relative abundances of epi-fauna. Butts (1986) found that the biota from all upper Escambia Bay stations (including the control site in this present investigation) were highly stressed when compared to similar yet non-anthropogenically affected estuaries. Due to the apparent widespread biological stress in upper Escambia Bay and the many potential pollution sources, we may conclude only that APCI is a contributor to the observed problems.

Literature Cited

Butts, G. and D. Ray. 1986. An investigation of upper Escambia Bay during drought conditions: July-August 1986. Fla. Dept. Environmental Regulation, Northwest District. 11 pp.

Florida Department of Environmental Regulation. 1985. Quality assurance manual for performing acute toxicity tests. 2nd edition. Fla. Dept. Environmental Regulation, Biology Section, Tallahassee. 53 pp.

Florida Department of Environmental Regulation. 1988. Biological and physicochemical assessment of Escambia Bay: 1987-1988. Fla. Dept. Environmental Regulation, Northwest District, Biology Section 41 pp.

Miller, W. E., T. E. Maloney, and J. C. Greene. 1978. The *Selenastrum capricornutum* Printz algal assay bottle test. U. S. Environ. Prot. Agency, EPA-600/9-78-018. 126 p.

Peltier, W. H. and C. I. Weber. 1985. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. 3rd edition. EPA/600/4-85/013. U. S. EPA, Cincinnati, Ohio. 216 pp.

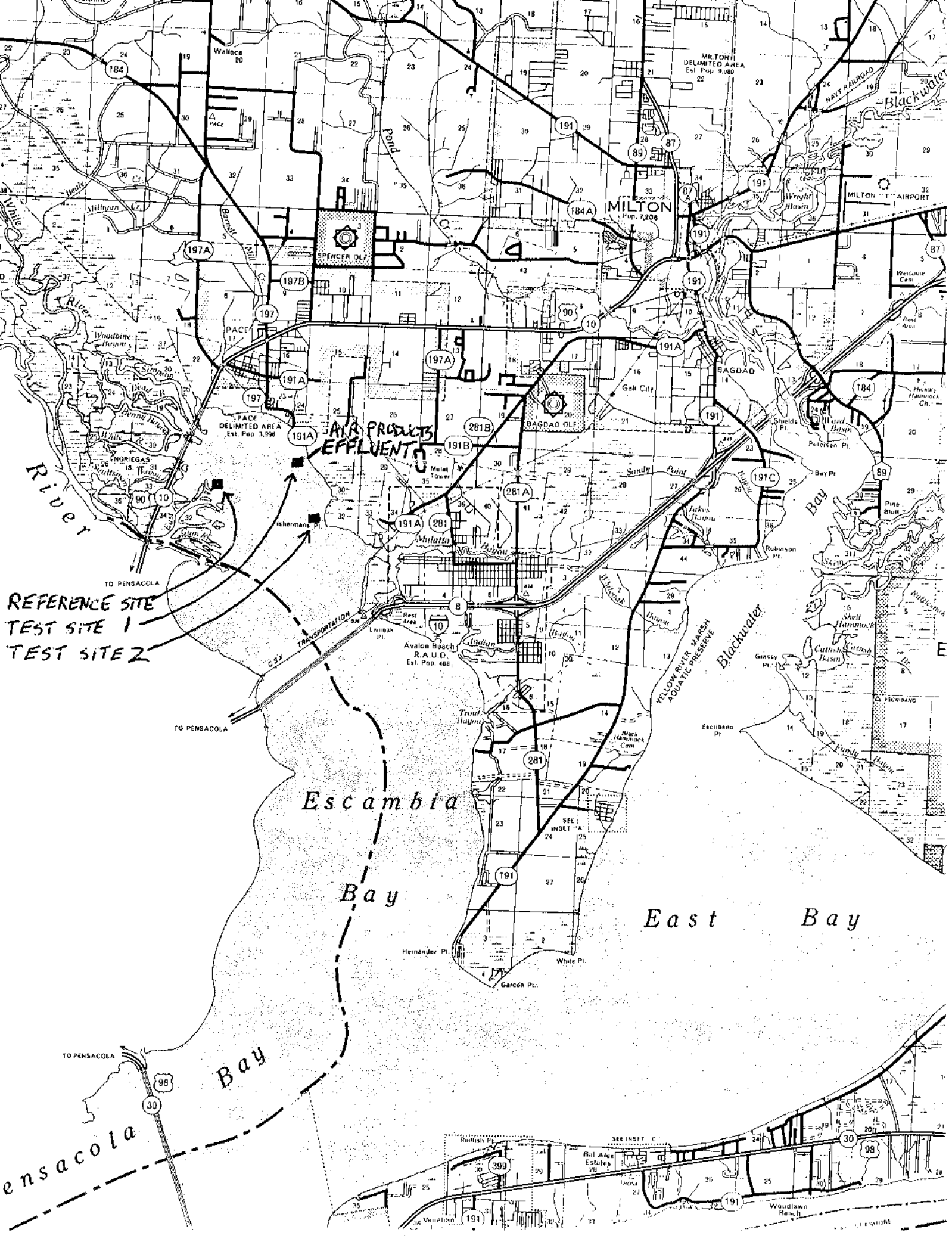
Raschke, R. L. and D. A. Schultz. 1987. The use of the algal growth potential test for data assessment. J. Wat. Poll. Cont. Fed. 59(4): 222-227.

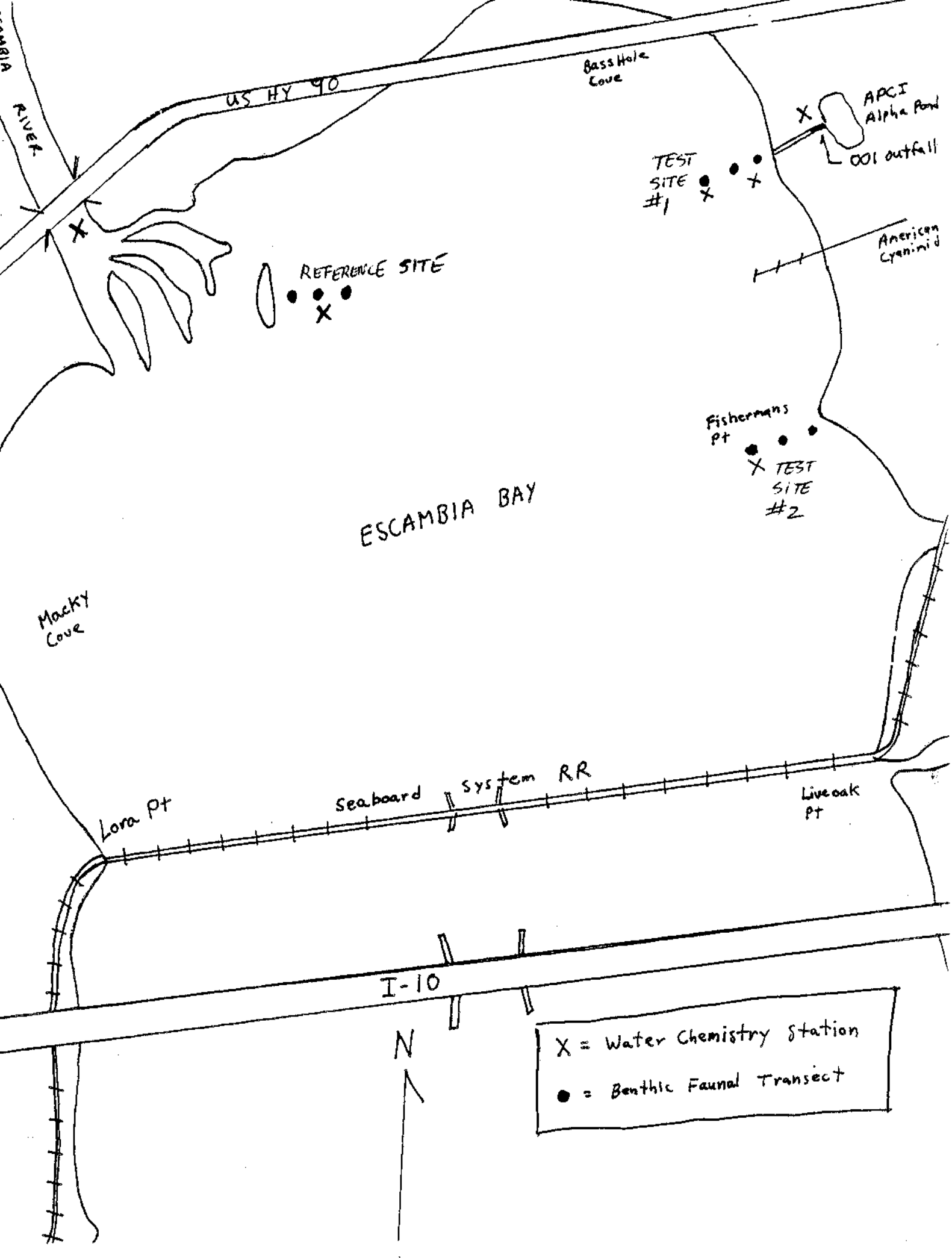
Ross, L. T. 1990. Methods for aquatic biology. Fla. Dept. Environ. Reg. Tech. Ser. 10(1): 1-47.

Chemistry summary table for Air Products.

	Effluent	Control Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
Aliphatic Compounds (predominantly oxygenated)	150 J			
Metals (ug/L)				
Aluminum	81	116		
Arsenic	20 U	U		
Cadmium	0.2 U	U		
Copper	5 U	U		
Chromium	88 J	U		
Iron	178	844		
Lead	15 U	U		
Mercury	0.2 U	U		
Nickel	6 U	U		
Silver	0.2 K	U		
Zinc	15	U		
Nutrients (mg/L)			Includes 2 separate grabs	
Total phosphorus	2.2	0.09	0.13	0.09
Ammonia	32 A	0.16 A	1.03 A	0.04
Nitrate+Nitrite	1.7 A	0.06 T	0.15 A	0.06
TKN	48.5	1.5	2.2 A	2.4
Other Parameters				
Habitat Assessment		72	47	52
D.O. (mg/L)	7.4	6.4	6.3	7.4
pH (SU's)	7.5	6.4	6.7	6.4
Conductivity (µmhos/cm)	1166	17,700	13,950	21,700
Temperature (°C)		30.4	30.3	28.9
Bioassay Invertebrate- C. dubia	LC50 = 86%			

A - Value reported is the mean of two or more determinations
E - Scientific notation
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 - Not analyzed for this compound
T - Value reported is less than the practical quantitation limit
U - Material analyzed for but not detected; value reported is the minimum detection limit
Q - Evidence that analyte is present in sample is equivocal
NA - Not applicable
NR - Not requested


MILTON
Pop. 7,206
MILTON DELIMITED AREA
Est. Pop. 9,080
MILTON AIRPORT
PACE
PACE DELIMITED AREA
Est. Pop. 3,990
BAGDAD
BAGDAD OLF
SPENCER OLF
Gulf City
Avalon Beach
R.A.U.D.
Est. Pop. 468
NORIEGAS
Bay Pt
Pine Bluff
Sandy Point
Robinson Pt.
Escribano Pt
Gassy Pt.
Hernandez Pt.
White Pt.
Garcon Pt.
Rail Alex Estates
Woodlawn Beach
Blackwater
Blackwater Bay
East Bay
Escambia
Bay
Pensacola
Bay
River
Pond
Wallace
Woodbine
Simmons
Dead R.
Berry Bayou
White
Southern
Is.
Bayou
East
Gum Pt.
Fisherman Pt.
Mulat Tower
Mulatto
Bayou
Indian
Bayou
Trout
Bayou
Livingston
Pt.
Shell Hammock
Cattish
Basin
Fundy
Bayou
Shields Pt.
Petersen Pt.
Hickory Hammock Ch.
Welcome Cem.
Rest Area
Wright Basin
Hurd Basin
Bayou
Point
Jakes
Bayou
Black Hammock Cem.
Redfish Pt.
SEE INSET "A"
SEE INSET "C"
YELLOW RIVER MARSH AQUATIC PRESERVE
NAVY RAILROAD
CSX TRANSPORTATION
TO PENSACOLA
TO PENSACOLA
AIR PRODUCTS EFFLUENT
REFERENCE SITE
TEST SITE 1
TEST SITE 2


ESCAMBIA RIVER
US HY 90
Bass Hole Cove
APCI Alpha Pond
001 outfall
TEST SITE #1
American Cyanimid
REFERENCE SITE
Fishermans Pt
TEST SITE #2
ESCAMBIA BAY
Macky Cove
Lora Pt
Seaboard System RR
Liveoak Pt
I-10
N
X = Water Chemistry Station
● = Benthic Faunal Transect

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: Air Products & Chemicals, Inc.	**Prepared by:** TRACIA RHODES / GLENN BUTTS **Date:** 07-08-91	
Location (attach detailed map): U.S. Highway 90 East Pace, FL	**County** SANTA ROSA	**District** NorthWest
Federal Permit # and expiration date:	**State GMS # and** 1057 P06140 **State expiration date:** March 1, 1992	**Facility Type:** (Industrial) Municipal Federal Agricultural **Other (list):**

Function of facility: Treatment of Industrial Waste from a chemical manufacturing plant. (See facility file for more details)

Description of treatment process:

Wastewater treatment consisting of neutralization, equalization, anaerobic treatment, extended aeration treatment in a 75 acre bipond complex (four oxidation ponds) discharging to Escambia Bay.

Receiving waters: Escambia Bay	**Classification:** Class III
Design Flow: 1.5 MGD	**Actual Mean Flow:**

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

therefore, the best time to sample is: Summer

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

The mixing zone for ptl, chromium, copper, silver, cyanide, phenol, and mercury shall be a semicircular area with a radius of 282 meters originating at the point of discharge (POD) of the effluent water quality standards for Class III water shall not be exceeded outside the mixing zone.

Parameter	Concentration
Cyanide	.1 mg/l
Chromium	.2 mg/l
Copper	.03 mg/l
Silver	.005 mg/l
Phenol	.02 mg/l
mercury	.004 mg/l
pH	6.0 - 9.0 (S.U.)

List effluent limits:

Parameter	Limit (units)	
Sample point:	Monthly Ave.	Maximum
COD	1390 lbs/day	2530 lbs/day
TSS	400 lbs/day	800 lbs/day
TOT N (Dec-Apr.)	750 lbs/day	1400 lbs/day
(May - Nov.)	425 lbs/day	1400 lbs/day
Total Phosphorus	32 lbs/day	64 lbs/day
PCB	— —	.001 mg/l

Describe special permit conditions and permit modifications:

October 5, 1988
Modification of PCB limit due to exceedence of Florida Administrative Code Rule 17-3.121 (24). It was changed from 49 mg/l to .001 micrograms/liter.

February 2, 1989
Granted request to stop monitoring PCBs because no detection or basis to believe present in wastestream

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

(Facility)

Description of permitted outfall(s): OUTFALL 001 FROM FINAL BIO POND (ALPHA) THRU A PARSHALL FLUME, CONCRETE CASCADE INTO A 1000 FOOT DITCH TO ESCAMBIA BAY.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: NO PERMIT EXCURSIONS FROM MOR DATA. DINITROTOLUENE (DNT) WAS FOUND IN THE GROUNDWATER AND SURFACE WATERS OF DRIDGERS CREEK, [redacted] CONTAMINATION ASSESSMENT UNDER WAY. APCI SUBMITTED A CONTAMINATION ASSESSMENT REPORT AND FEASIBILITY STUDY REPORT FOR PROPOSED CLEAN UP BY AUG 23, 1991.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
SEE ATTACHED PAPER BUTTS 1986

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:
No obvious trends seen

Additional information: EFFLUENT WAS FOUND TO BE TOXIC FEB 1984, JAN 1985, JAN 1986, [redacted], JAN 1987, MARCH 1988, FEB 1990, SEPT 1990, APRIL 1991

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

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: NW DIST	STORET STATION NUMBER: 33.02.0A13	DATE (M/D/Y): 07-23-91	RECEIVING BODY OF WATER: ESCAMBIA BAY

REMARKS:	LOCATION:	FIELD ID/NAME:
REFERENCE SITE	AT ISLAND NEAR MOUTH OF ESCAMBIA RIVER REFERENCE SITE	#.5

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 9	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 38	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, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 6	Combination of sand, gravel, and shell. **12-15 points**	Primarily sand, with small areas of mud. **8-11 points**	Mixture of sand and mud, or well-aerated mud only. **4-7 points**	Anaerobic mud. **0-3 points**

TOTAL SCORE 72

COMMENTS: EXTENSIVE VALISNERIA BEDS IN AREA, TYPICAL SALT MARSH EMERGENT VEGETATION DOMINATED BY CLADIUM

ANALYSIS DATE:	ANALYST:	SIGNATURE:
07-23-91	G BUTTS	Glenn Butts

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: 2010 / SUBMITTING AGENCY NAME: NW DIST	STORET STATION NUMBER: 33.02.0A13	DATE (M/D/Y): 07-23-91	RECEIVING BODY OF WATER: ESCAMBIA BAY

REMARKS:	LOCATION: AT ISLAND NEAR MOUTH OF ESCAMBIA RIVER REFERENCE SITE	FIELD ID/NAME: # 5
REFERENCE SITE		

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
						100

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

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

Point-Source Pollution (list location and describe): AMBIENT UPPER BAY LOCATION. THIS AREA IS A SALT MARSH WITH CLADIUM, JUNCUS + SUBMERGED Valisneria americana

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

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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	20
Consolidated Clay:		Clay/Silt (inorganic):	10
Gravel/Shell		Coarse Organic Debris:	15
Sand:	15	Mud/Muck (organic):	40

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	30.44	6.93	Secchi Depth (m):	1.0
Mid-depth			pH (SU):	6.37
Bottom	30.34	1.51	Conductivity (µmho/cm):	17,700
			Other Parameters:	

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

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

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

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

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

Weather Conditions: SUNNY

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

ANALYSIS DATE: 07-23-91	ANALYST: G. BUTTS	SIGNATURE: Glenn Butts

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

SUBMITTING AGENCY CODE: 4010 / SUBMITTING AGENCY NAME: NW DIST	STORET STATION NUMBER: 33.02.0A14	DATE (M/D/Y): 07-23-91	RECEIVING BODY OF WATER: ESCAMBIA BAY

REMARKS:	LOCATION:	FIELD ID/NAME:
TEST SITE	AT AIR PRODUCTS DISCHARGE TEST SITE #1	# 2

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 9	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 20	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 4	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 7	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 4	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 47

COMMENTS: NO GRASS BEDS, MOSTLY UNALTERED, UNDEVELOPED SHORELINE, SPARTINA & JUNCUS PRESENT, HIGH ALGAL PRODUCTION

ANALYSIS DATE:	ANALYST:	SIGNATURE:
07-23-91	G. BUTTS	Glenn Butts

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: ~~NW DIST~~	STORET STATION NUMBER: 33.02.0A14	DATE (M/D/Y): 07-23-91	RECEIVING BODY OF WATER: ESCAMBIA BAY
REMARKS: TEST SITE	LOCATION: AT AIR PRODUCTS DISCHARGE TEST SITE #1		FIELD ID/NAME: # 2

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
50					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): APCI DISCHARGE, HIGH CHLA, ALGAL PRODUCTION, DISCHARGE CONTAINS N-NH_3 + CPO

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

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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	5
Consolidated Clay:		Clay/Silt (inorganic):	20
Gravel/Shell	5	Coarse Organic Debris:	
Sand:	20	Mud/Muck (organic):	50

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	30.34	6.33	Secchi Depth (m):	0.7
Mid-depth			pH (SU):	6.86
Bottom	30.28	4.52	Conductivity (µmho/cm):	13,950
			Other Parameters:	

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

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

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

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

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

Weather Conditions: SUNNY

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
07-23-91	G. BUTTS	Glenn Butts

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

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: NW DIST	STORET STATION NUMBER: 33.02.0001	DATE (M/DY): 07-23-91	RECEIVING BODY OF WATER: ESCAMBIA BAY

REMARKS: PROBABLY A DEPOSITION AREA FOR APCI + AMERICAN CYANIMID	LOCATION: AT FISHERMANS POINT TEST SITE #2	FIELD ID/NAME: # 10

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 20	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 3	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 6	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 8	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 52

COMMENTS: NO GRASS BEDS, RESIDENTIAL DEVELOPMENT CONTINUING OVER PAST 2-4 YEARS, NO SEA WALLS YET, SPARSE SPARTINA & JUNCUS. OVERALL HABITAT POOR

ANALYSIS DATE:	ANALYST:	SIGNATURE:
07-23-91	G. BUTTS	Glenn Butts

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: KOIO SUBMITTING AGENCY NAME: NW DIST	STORET STATION NUMBER: 33.02.00C1	DATE (M/D/Y): 07-23-91	RECEIVING BODY OF WATER: ESCAMBIA BAY

REMARKS: LOWEST PRODUCTIVITY OF BENTHIC INVERTEBRATES COLLECTED IN THIS STUDY	LOCATION: AT FISHERMANS POINT TEST SITE #2	FIELD ID/NAME: # 10

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
40			60			

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): APCI & AMERICAN CYANAMID ; POSSIBLY A DEPOSITION AREA FOR BOTH DISCHARGE SOURCES

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

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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	30
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell	40	Coarse Organic Debris:	
Sand:	15	Mud/Muck (organic):	15

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	28.93	7.43	Secchi Depth (m):	0.9
Mid-depth			pH (SU):	6.41
Bottom	29.69	1.16	Conductivity (µmho/cm):	21,700
			Other Parameters:	

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

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

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

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

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

Weather Conditions: SUNNY

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

ANALYSIS DATE: 07-23-91	ANALYST: G. BUTTS	SIGNATURE: Glenn Butts

LIMS # 20838

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Air Products
Address/City:
County: Santa Rosa
Contact/District: Glenn Butts / NW
NPDES Permit #: FL0002313 **Outfall #:** 001

Sample Collection: Date 7/22/91 Time 0945
Test Beginning: Date 7/23/91 Time 1130
Test Ending: Date 7/27/91 Time 1130
Test Organism: Cadubia
Life Stage/Age: <24 hours

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

Remarks: SAMPLE ID: 20838 JOB# 91-JUL-23-09

POURED SAMPLE + CONTROL WATER THROUGH FLOSS TO REMOVE AQUATIC ORGANISMS VISIBLE IN SAMPLE.

7/23/91 1145 KWP HAD TO RECALIB METER AT TIME 0. TOOK NEW READINGS

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7@7.9@9	9.2@25	@1351	19.1@22.3
24 hr	7@7.9@9	9.2@20	@1334	19.2@21.9
48 hr	7@7.9@9	9.2@25	1326@22.9 1350	20.0@22.5

Conc.	Chamber #	Number Live 0	24	48	DO (mg/l) 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	Cond. (µmhos/cm) 0	24	48
Control	A	5	5	5	9.5		8.5	8.1		8.2	19.8	20.5	20.5	192		222
Control	B	5	5	5	9.0		8.5			8.2						
Control	C	5	5	5			8.6			8.2						
Control	D	5	5	5			8.7			8.2						
50%	A	5	5	5	8.9		8.8	7.7		8.3	19.4		20.5	654		683
50%	B	5	4	5	8.3		8.7			8.3						
50%	C	5	5	4			8.9			8.3						
50%	D	5	5	5			9.0			8.3						
70%	A	5	5	5	8.4		9.6	7.6		8.2	19.5		20.2	868		872
70%	B	5	5	5	8.0		9.6			8.2						
70%	C	5	5	5			9.7			8.2						
70%	D	5	5	5			9.6			8.2						
85%	A	5	4	4	8.3		9.6	7.6		8.2	19.5		20.0	1026		1030
85%	B	5	3	4	7.6		9.6			8.2						
85%	C	5	1	0			9.7			8.2						
85%	D	5	2	0			9.7			8.1 KP						
100%	A	5	3	1	7.8		9.7	7.5		8.1	19.5		19.9	1166		1178
100%	B	5	0	0	7.4		9.7			8.1						
100%	C	5	2	0			9.7			8.1						
100%	D	5	1	1			9.7			8.0						
			counted out of order KP 7/25/91 1040													
Measured/Loaded by:		MF	MF	KP	AJ		AJ	AJ		AJ	AJ		AJ	AJ		AJ
Recorded by:		KP	KP	AJ	KP		KP	KP		KP	KP		KP	KP		KP

Investigators' Signatures

Kim Pearce
Alana Ford
Randall Fandel

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
~~Field Tot. Resid. Cl2:~~	CAR BLANK		0.0	Hach	KWP
Lab Tot. Resid. Cl2:			0.0	Hach	KWP
Alkalinity:		70	95	Hach	AF
Hardness:		90	85	Hach	KP
Total Ammonia:		0.0	33.6	Hach	MF

Ammonia meter slope:

****

Air_Products
Ceriodaphnia_dubia
Chlorination type 1
Sample date = 7/22/91

****

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
100.00	20.	16.	80.	.5909
85.00	20.	12.	60.	25.1722
70.00	20.	0.	0.	.0001
50.00	20.	1.	5.	.0020

-------- Results calculated using the BINOMIAL METHOD --------

THE BINOMIAL TEST SHOWS THAT 70.00 AND 100.00 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS 99.41 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 82.97

-------- Results calculated using the MOVING AVERAGE METHOD --------

****
* LC50 = 85.71 * 95% CI = 81.59, 90.36
****

NO CONVERGENCE IN 25 ITERATIONS. THE PROBIT METHOD
PROBABLY CANNOT BE USED WITH THIS SET OF DATA.

****

Typical Values for Selected Parameters in Florida Waters

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

Percentile Distribution

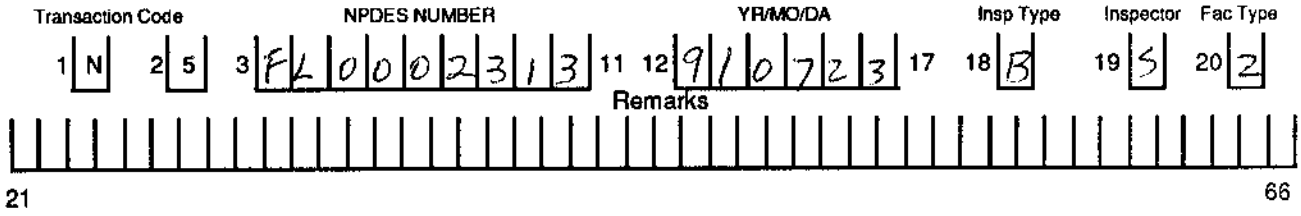
Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
STREAMS (1617 stations)											
Phytoplankton Chlorophyll *a*	0.22	0.52	0.94	1.60	3.02	4.63	6.72	9.87	14.68	27.35	48.70
Periphyton Chlorophyll *a*	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85
H-D Diversity	0.84	2.12	2.48	2.74	2.88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

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

Macroinvertebrate taxa list for Air Products, collected in Escambia Bay, via 9 ponar grabs per site (3 grabs on 3 transects) on 24 July, 1991. The Reference Site was located near the mouth of the Escambia River, Test Site 1 was west of the Air Product's discharge, and Test Site 2 was near Fisherman's Point.

	Reference Site	Test Site 1	Test Site 2
Diptera			
Undetermined Chironomidae sp.	0	8	0
Gastropoda			
Neritina reclivata	62	21	0
Pyramidella fusca	33	62	0
Malacostraca			
Grandidierella bonnieroides	158	4	8
Lembos sp.	4	0	0
Mysidopsis bahia	8	12	8
Synchelidium sp.	0	0	4
Carinoma tremaphoros	12	33	8
Oligochaeta			
Undetermined Oligochaete sp.	0	0	4
Pelecypoda			
Mulinia lateralis	58	0	8
Rangia cuneata	4	0	0
Tellina versicolor	0	4	0
Polychaeta			
Capitella capitata	0	8	4
Hobsonia florida	50	4	0
Laeonereis culveri	8	29	0
Lumbrinereis cf. *tenuis*	42	46	42
Mediomastus ambiseta	46	91	83
Streblospio benedicti	0	21	25

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



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