

Biological Assessment of

American Cyanamid

Santa Rosa County

NPDES #FL0002593

Sampled August 1991

February 1992

Biology Section
Division of Technical Services

Department of Environmental Regulation
Results of Fifth Year Inspections

Discharger: American Cyanamid
County: Santa Rosa
NPDES Number: FL0002593
State Permit Expiration Date: 1 February 1992

Toxics Sampling Inspection (XSI)

Date Sampled: 26 August 1991

Results: The concentration of silver in the effluent sample was in violation of Class III standards. The concentrations of the remaining metals were within standards. Organic constituents in the effluent included aliphatic hydrocarbons (40 µg/L), benzyl butyl phthalate (4.3 µg/L), and di-n-butyl phthalate (8.2 µg/L). It is possible that these components of the effluent contributed to the observed toxicity.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 26 August 1991

Results: The effluent sample was toxic to the water flea, *Ceriodaphnia dubia*, producing an LC50 of 111.7%. This is a violation of 17-302.510(3)(p) FAC.

Impact Bioassessment Inspection (IBI)

Date Sampled: 26 August 1991

Results: Measurements of macroinvertebrate community health demonstrated that biota at the test sites were very degraded. Besides dramatic declines in taxa richness and diversity, adverse changes were evident in community composition, the relative abundances of epi-fauna, and trophic functioning. Violations of biological integrity criteria (17-302.560(5) FAC) occurred at both stations. Phytoplankton communities in Escambia Bay near the discharge were moderately degraded. The observed disturbances may be interpreted as imbalances of aquatic flora (17-302.560(19) FAC). Despite the apparent widespread biological stress in upper Escambia Bay and the many potential pollution sources, these present data clearly indicate that American Cyanamid is a contributor to the observed problems.

Water Quality Inspection (WQI)

Date Sampled: 26 August 1991

Results: Total and fecal coliforms in the American Cyanamid effluent were 8,000 organisms/100 ml and 2,900 org/100 ml, respectively These levels constitute violations of ambient standards. Ammonia (5.7 mg/L) and TKN (20 mg/L) measured in the effluent were elevated. An unionized ammonia concentration of 0.1 mg/L was calculated for the effluent, which may have contributed to the toxicity observed in the bioassay. The mean concentrations of nitrate-nitrite and TKN (measured as a transect near the outfall) were greater than 80% and 70%, respectively, of all other Florida estuaries. The remaining nutrient parameters found at this site were not unusually elevated.

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

American Cyanamid is a synthetic fiber manufacturing plant located in Milton, Santa Rosa County, Florida. The wastewater system consists of aerobic treatment basins and an oxidation/polishing pond. The effluent is discharged into upper Escambia Bay, and also to a spray irrigation site.

Effluent permit limits are as follows: BOD (125 lbs./day as a monthly average, 250 lbs./day maximum), TSS (250 lbs./day as a monthly average, 500 lbs./day maximum), cyanide (0.41 lbs./day as a monthly average, 0.75 lbs./day maximum), Total Nitrogen (450 lbs./day as a monthly average, 700 lbs./day maximum), Orthophosphate (15 lbs./day as a monthly average, 30 lbs./day maximum), temperature (35 °C maximum), and pH (6-9 S.U.).

A 125,600 m^2 mixing zone in Escambia Bay has been granted for cyanide and pH. A review of monthly operating report (MOR) data revealed no permit excursions for the past year. The facility was inspected in May, 1991, and received a satisfactory rating.

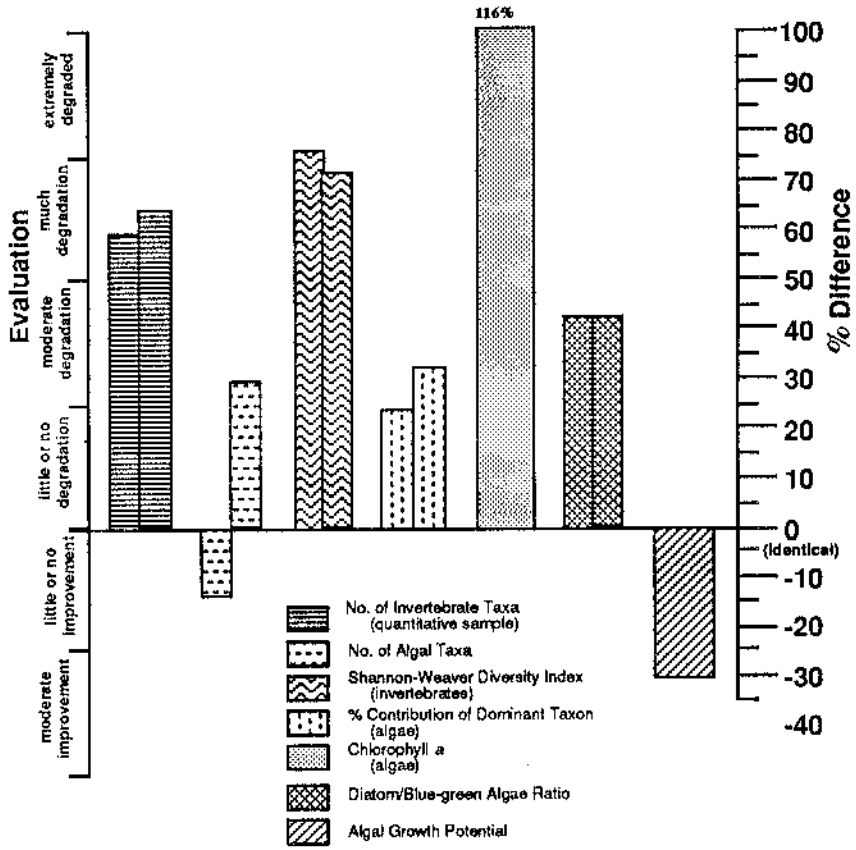
Methods

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 north of the discharge, test site 2 was south of the discharge) (see map 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 toxicity bioassay, using *Ceriodaphnia dubia* as the test organism, was performed on an effluent sample (Weber 1991). The effluent was analyzed for nutrients, metals, and organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on 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. Bacterial populations were analyzed for total and fecal coliforms following the methods of APHA (1989). Algal Growth Potential experiments, using *Selenastrum capricornutum* and *Dunaliella tertiolecta* as test organisms, followed Miller *et al.* (1978) and EPA (1974).

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	17	7	6
Shannon-Weaver Diversity	3.4	0.8	1.0
% Polychaeta	30.0	94.1	89.2
% Diptera	1.6	1.4	0
% Gastropoda	25.5	0	0
% Malacostraca	27.3	0	1.7
% Pelecypoda	9.5	1.5	3.5
% Nematoda	5.9	2.9	5.5
% Predators	32.8	3.7	10.6
% Collector-Gatherers	31.8	94.1	85.6
% Collector-Filterers	9.6	2.1	3.7
% Scrapers	25.8	0	0
Phytoplankton Algae			
Number of Taxa	7	8	5
% Contribution of Dominant Taxon	45.9	56.7	60.7
Chlorophyll a (mg/m2)	126	6	13
Diatom/Blue-green Abundance Ratio	0.28	0.16	0.16
% Blue-green	91.8	92.1	95.0
% Green	5.6	6.4	3.5
% Diatoms	2.6	1.5	1.5
Algal Growth Potential (mg dry wt/l)	6.0	4.2	



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

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, 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 (% 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, the diversity 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: Glenn Butts (DER Northwest District) and Lyn Burton, Russel Frydenborg, Kathleen Lurding, and Sandy McClure (Tallahassee Biology Laboratory).

Results and Discussion

Escambia Bay, the receiving waters for the American Cyanamid discharge, 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 the test sites (46 points). Dissolved oxygen was above 6.4 mg/L at all sites. The pH at the test sites (pH = 7.6) was higher than the reference (6.4).

The effluent sample was toxic to the water flea, *Ceriodaphnia dubia*, producing an LC_{50} of 111.7%. This is a violation of 17-302.510(3)(p) FAC.

Organic constituents in the effluent included aliphatic hydrocarbons (40 µg/L), benzyl butyl phthalate (4.3 µg/L), and di-n-butyl phthalate (8.2 µg/L). It is possible that these components of the effluent contributed to the observed toxicity. Additionally, 10 µg/L of methylene choride was detected in one of the three water chemistry samples (taken as a transect) near the discharge.

Metals detected in the effluent included aluminum (75 µg/L), copper (8 µg/L), chromium (15 µg/L), iron (1201 µg/L), and silver (0.2 µg/L). The concentrations of silver and iron in the sample were in violation of Class III standards. The concentrations of the remaining metals were within standards.

Ammonia (5.7 mg/L) and TKN (20 mg/L) measured in the effluent were elevated. Phosphorus (0.44 mg/L) and Nitrate-nitrite (1.2 mg/L) concentrations were not unusually high for an effluent. An unionized ammonia concentration of 0.1 mg/L was calculated for the effluent, which may have contributed to the toxicity observed in the bioassay.

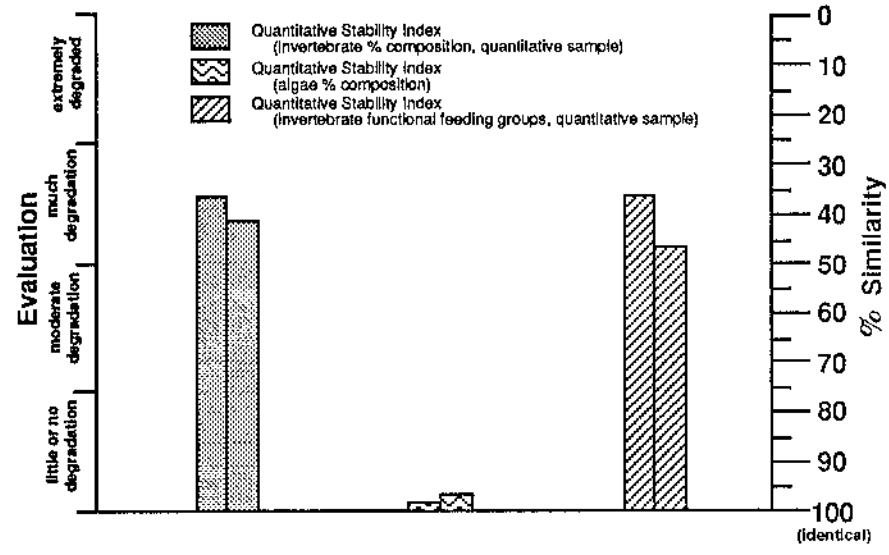
The concentrations of nitrate-nitrite (0.09 mg/L) and TKN (0.8 mg/L) at the stations near the American Cyanamid outfall were somewhat higher than those found in typical Florida estuaries (see Appendix). STORET data from 690 estuary stations, for the period of 1980 to 1989, have been compiled into a percentile distribution table (Joe Hand, personal communication). Data from this present investigation were evaluated against these values (see table in Appendix). The mean concentrations of nitrate-nitrite and TKN (measured as a transect near the outfall) were greater than 80% and 70%, respectively, of all other Florida estuaries. The remaining nutrient parameters found at this site were not unusually elevated.

Total and fecal coliforms in the American Cyanamid effluent were 8,000 organisms/100 ml and 2,900 org/100 ml, respectively These levels constitute violations of ambient standards.

Algal growth potential results (18.4 mg dry wt/L of *Selenastrum* in the American Cyanamid effluent, 6.0 mg dry wt/L of *Dunaliella* at the reference, 4.2 mg dry wt/L of *Dunaliella* at test site 1) indicate that only the discharge was slightly elevated. 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). Although the AGP results for ambient Escambia Bay waters (during this sampling) were below the "problem threshold", past studies indicate that the bay is periodically subject to eutrophication effects.

Measurements of macroinvertebrate community health demonstrated that biota at the American Cyanamid test sites were much degraded. 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.

Taxa richness and Shannon-Weaver diversity decreased quite dramatically at both test sites compared to the reference. The 76.4% decrease in diversity at test site 1, and the 70.6% decline in this metric at test site 2, constituted violations of biological integrity criteria (17-302.560(5) FAC) at both stations. Additionally, large differences existed between the reference and test sites involving adverse changes in community composition and the relative abundances of epi-fauna. There was a distinct decrease in predominantly sensitive groups (*e.g.*, Malacostraca) with a corresponding increase in pollution tolerant forms (polychaetes) between the reference and test sites. For example, while the capitellid polychaete, *Mediomastus ambiseta* made up only 1.6 % of the benthic population at the reference site, this pollution tolerant organism accounted for 87.4% and 84.6% of the total organisms found at test sites 1 and 2, respectively. Similarly, the percentage of pollution



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

sensitive epi-benthic fish food organisms (*e.g., Grandideriella bonnieroides*) decreased from 27.3% at the reference to 0% and 1.7% at test sites 1 and 2, respectively. These negative changes in community composition are summarized in the QSI (% composition) metric. The Quantitative Stability Index for functional feeding groups also indicated substantial trophic imbalances near the outfall.

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 and Ray (1986) found that the biota from all upper Escambia Bay stations (including the reference site in this present investigation) were 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 also the reference site in the present study (Butts and Ray 1986).

Phytoplankton communities in Escambia Bay near the discharge were moderately degraded. The percent contribution of the dominant taxon (the noxious blue-green alga, *Anabaena* sp.) increased by 23.5% at test site 1 and by 32.2% at test site 2, compared to the reference. Chlorophyll *a* was very high in the effluent (125 µg/L), and consequently, was 116% higher in Escambia Bay near the outfall. The diatom to blue-green algae ratio was 42.9% lower at both test sites, another indicator of the stressed conditions found there. Taxa richness declined by 28.6% at test site 2.

Conclusions

The American Cyanamid effluent sample was toxic to the water flea, *Ceriodaphnia dubia*, producing an LC_{50} of 111.7%. This is a violation of 17-302.510(3)(p) FAC.

Organic constituents in the effluent included aliphatic hydrocarbons (40 µg/L), benzyl butyl phthalate (4.3 µg/L), and di-n-butyl phthalate (8.2 µg/L). It is possible that these components of the effluent contributed to the observed toxicity. Additionally, 10 µg/L of methylene choride was detected in one of the test site samples.

The concentrations of silver and iron in the effluent sample were in violation of Class III standards. The concentrations of the remaining metals were within standards.

Total and fecal coliforms in the American Cyanamid effluent were 8,000 organisms/100 ml and 2,900 org/100 ml, respectively. These levels constitute violations of ambient standards.

Ammonia (5.7 mg/L) and TKN (20 mg/L) measured in the effluent were elevated. An unionized ammonia concentration of 0.1 mg/L was calculated for the effluent, which may have contributed to the toxicity observed in the bioassay. The mean concentrations of nitrate-nitrite and TKN (measured as a transect near the outfall) were greater than 80% and 70%, respectively, of all other Florida estuaries. The remaining nutrient parameters found at this site were not unusually elevated.

Algal growth potential of the discharge was elevated. Although the AGP results for ambient Escambia Bay waters (during this sampling) were below the "problem threshold", past studies indicate that the Bay is periodically subject to eutrophication effects.

Measurements of macroinvertebrate community health demonstrated that biota at the American Cyanamid test sites were very degraded. Besides dramatic declines in taxa richness and diversity, adverse changes were evident in community composition, the relative abundances of epi-fauna, and trophic functioning. Violations of biological integrity criteria (17-302.560(5) FAC) occurred at both stations. Phytoplankton communities in Escambia Bay near the discharge were moderately degraded. The observed disturbances may be interpreted as imbalances of aquatic flora (17-302.560(19) FAC). Despite the apparent widespread biological stress in upper Escambia Bay and the many potential pollution sources, these present data clearly indicate that American Cyanamid is a contributor to the observed problems.

Literature Cited

American Public Health Assoc., American Water Works Assoc., and Water Pollution Control Federation. 1989. Standard Methods for the Examination of Water and Wastewater, 17th ed. New York, N.Y. 1268 p.

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

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.

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.

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

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 American Cyanamid.

	Effluent	Reference Site	Test Sites 1 and 2
Organic Constituents (ug/L)			
Methylene Chloride			10 A
Benzyl butyl phthalate	4.3 T		
Di-n-butyl phthalate	8.2		
Aliphatics	40 J		
Metals (ug/L)			
Aluminum	75T		
Arsenic	20 U		
Cadmium	0.14 U		
Copper	8 T		
Chromium	15 T		
Iron	201		
Lead	15 U		
Mercury	0.2 U		
Nickel	5 U		
Silver	0.2		
Zinc	5 U		
Nutrients (mg/L)			Mean of 3 samples
Ortho-phosphorus	0.02 U	0.02 U	0.02 U
Total phosphorus	0.44	0.05	0.05 A
Ammonia	5.7	0.02	0.03 A
Nitrate+Nitrite	1.2	0.15	0.09 A
TKN	20	0.45	0.8 A
Other Parameters			
Habitat Assessment		72	46
D.O. (mg/L)		6.4	7.9
pH (SU's)		6.4	7.6
Conductivity (µmhos/cm)		17,700	16,200
Temperature (°C)		30.4	27.8
Chlororphyll a (ug/L)	125	6	13
B.O.D	6.4	0.8	1.7
Bioassay Invertebrate-Un-chlorinated	LC50=111.7%		

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

Typical Values for Selected Parameters in Florida Waters

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

Parameter	Percentile Distribution 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

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: AMERICAN TIMMIS	**Prepared by:** TRACIE Knabe / [illegible] **Date:**	
Location (attach detailed map): Milton, Florida	**County** SANTA ROSA	**District** Northwest
Federal Permit # FL 00 25 9 3 **and expiration date:** October 31, 1993	**State GMS # and State expiration date:**	**Facility Type:** Industrial Municipal Federal Agricultural Other (list):

Function of facility: Treatment of [illegible] waste from [illegible] synthetic fiber [illegible] manufacturing facility.

Description of treatment process:

[illegible] treatment [illegible] by oxidation of [illegible] wastes. [illegible] synthetic fiber manufacturing facility, wherein [illegible] wastes are [illegible] basins, [illegible] to an oxidation/polishing pond, [illegible] aeration chamber, with final discharge to Escambia Bay [illegible]

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

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

therefore, the best time to sample is: SUMMER

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

A mixing zone for [illegible] and pH is established [illegible] as follows: Commencing at a point 350 ft. from the end of the outfall pipe in a southwesterly direction for a distance of [illegible] thence turning 90° in a northwesterly direction for a distance of 1900 ft.; thence turning 90° in southeasterly direction [illegible]

List effluent limits:

Parameter	Limit (units)	
Sampling point:	Monthly	Maximum
BOD5	125 lbs/day	25 lbs/day
Total Suspended solids	250 lbs/day	500 lbs/day
Cyanide	0.4 lbs/day	.75 lbs/day
Total Nitrogen	450 lbs/day	900 lbs/day
Temperature		35°C (95°F)
pH		6.0 to 9.0 (SU)
Ortho-phosphate (as P)	15 lbs/day	30 lbs/day
PCB		49 ng/L

Describe special permit conditions and permit modifications:

October 5, 1988
Modification of [illegible] due to [illegible] Florida Administrative Code Rule 17-3.121(24) [illegible] was changed from 49 ng/L to .001 ng/L requirement.

November 2, 1988
Permittee request to stop monitoring PCB's because no detections [illegible]

January 18, 1990
Specific condition 32 deleted requiring a semi-annual groundwater monitoring schedule [illegible]

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

(Facility)

Description of permitted outfall(s):

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

No deficiencies noted

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

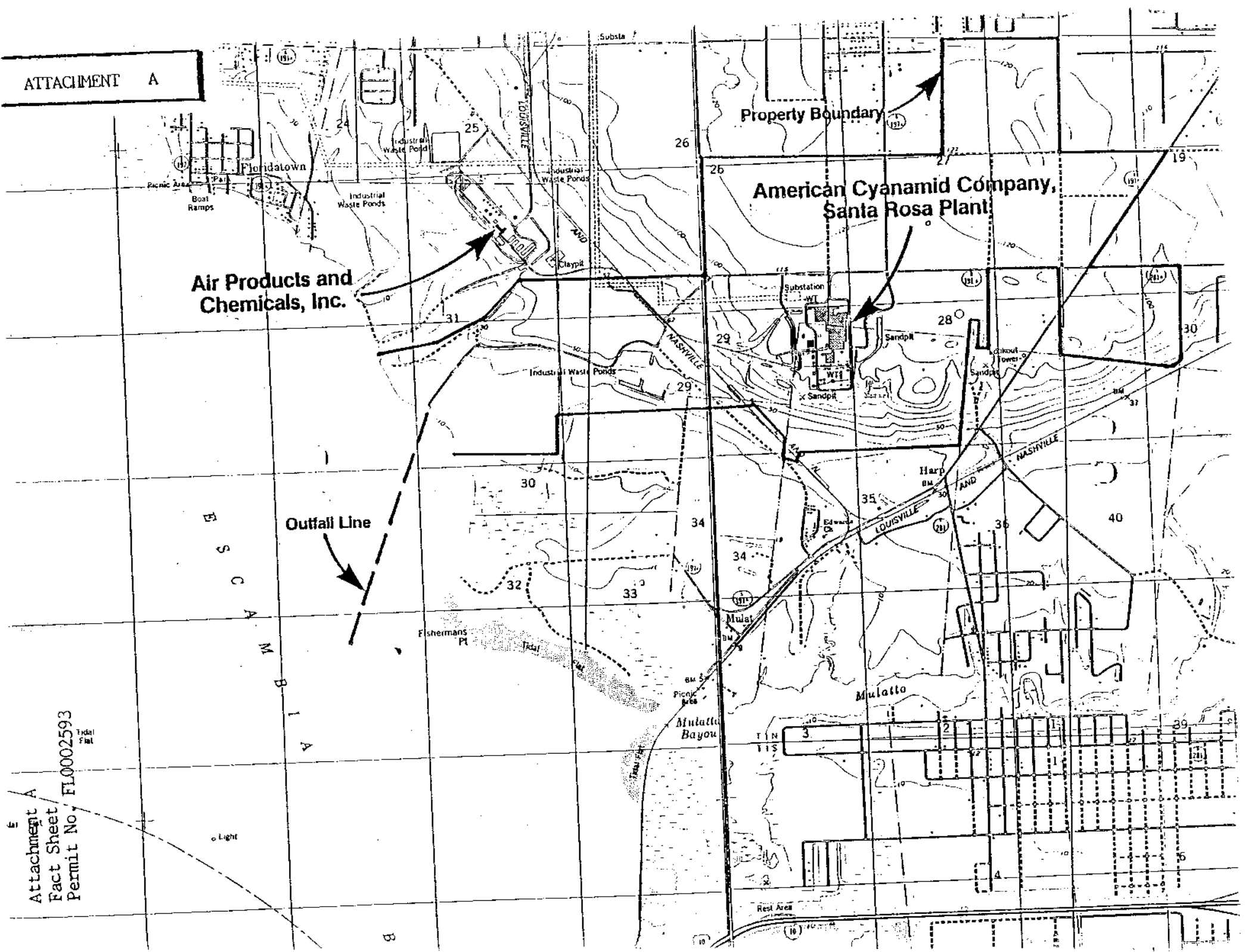
N/A

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

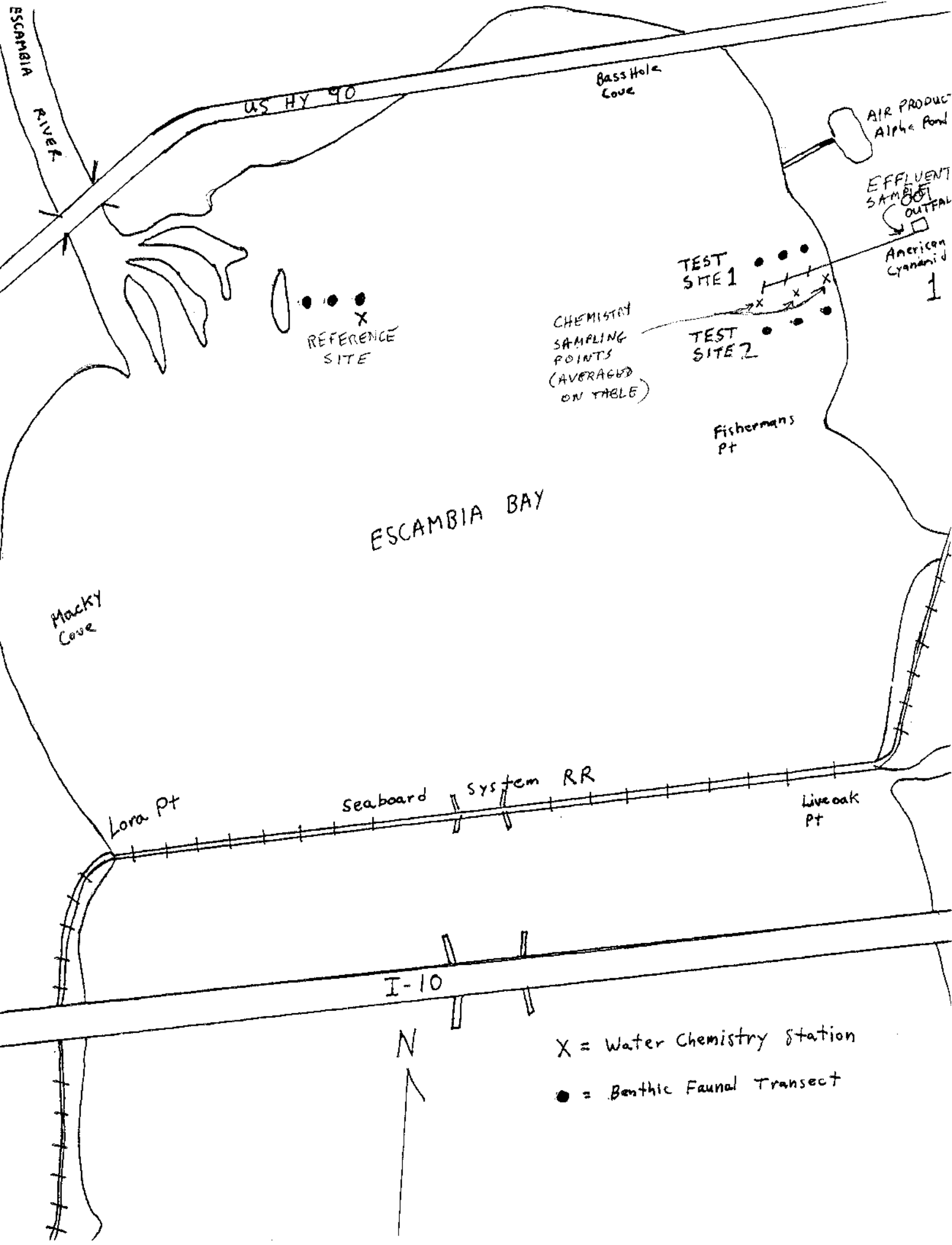
Poor water quality in upper Bay, poor benthic biomass and diversity at most sites North of RR trestle.

Additional information:

Biopsy from TRAC July 1991 showed no mortality for mysids or Fathead minnows. May 24, 1990 PAI rating of 5. Feb 27, 1991 inspection showed facility operating as permitted, one deficiency noted, phthalate ester discharge from Cyanalume light stick plant into waste stream without notifying the Department. Corrections have been made.



Attachment A
Fact Sheet
Permit No. FL0002593


ESCAMBIA RIVER
US HY 90
Bass Hole Cove
AIR PRODUCT
Alpha Pond
EFFLUENT
SAMPLE
001
OUTFALL
American Cyanamid
1
TEST SITE 1
TEST SITE 2
REFERENCE SITE
CHEMISTRY SAMPLING POINTS (AVERAGED ON TABLE)
Fishermans Pt
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
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: 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: 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): 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: [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):	Secchi Depth (m):	1.0
Top	30.44	6.43	pH (SU):	6.37
Mid-depth			Conductivity (µmho/cm):	17,700
Bottom	30.34	1.51	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:	ANALYST:	SIGNATURE:
07-23-91	G. BUTTS	Glenn Butts

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

TEST SITES 1 & 2

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: NW DIST	STORET STATION NUMBER:	DATE (M/D/Y): 08-27-91	RECEIVING BODY OF WATER: ESCAMBIA BAY

REMARKS: AM CYANAMID TEST SITE	LOCATION: SOUTH BOUNDARY OF CYANAMID DISCHARGE LINE	FIELD ID/NAME: ACT 1 & ACT 2

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 7	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 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 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 46

COMMENTS: HABITAT SAME ALONG N. & S. BOUNDARIES OF DISCHARGE LINE

ANALYSIS DATE: 08-27-91	ANALYST: G. BUTTS	SIGNATURE: Glenn Butts

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: NW DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 08-27-91	RECEIVING BODY OF WATER: ESCAMBIA BAY

REMARKS: Each site along Dolphins similar in depth and sed types	LOCATION: AT MIDDLE DOLPHIN IN CYANAMID DISCHARGE LINE	FIELD ID/NAME: FOR TEST SITES #3 1&2

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
10			30		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): Development at Fishermans Pt., Industrial run off

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

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

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☒ Other: ☐ 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:	10
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell	20	Coarse Organic Debris:	
Sand:	10	Mud/Muck (organic):	60

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	27.86	7.9	Secchi Depth (m):	1.1
Mid-depth			pH (SU):	7.6
Bottom	28.2	5.07	Conductivity (µmho/cm):	16200
			Other Parameters:	

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

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

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: Clear

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

ANALYSIS DATE: 08-2791	ANALYST: G.L. BUTTS	SIGNATURE: Glenn Butts

22125

DER Biology Section — Acute Bioassay Bench Sheet

POINT SOURCE

Sample Source: American Cyanamid Survey
Address/City: Pace, FL
County: Santa Rosa
Contact/District: Glenn Butts / NLV
NPDES Permit #: FL0002593 Outfall #: 001

Sample Collection: Date 8/26/91 Time 1000
Test Beginning: Date 8/27/91 Time 1400
Test Ending: Date 8/31/91 Time 1400
Test Organism: C. dubia
Life Stage/Age: <24 hours
** wrong date

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

Remarks:
* Decided to let test Run extra 24 hours just to see if mortality would increase
probit = 111.76

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7 9@9	8.9@21.5	21.5@24.2	1360@24.2 1386
24 hr	7@7 9@9	8.7@21.5	21.2@24.1	1370@24.2 1386
48 hr	7@7 9@9	8.9@21.5	21.2@23.8°C	1371@23.9°C 1378
72 hr	7@7 9@9	8.9@21.5	20.5°C 23.6°C	1362@23.6°C 1371

Conc.	Chamber #	Number Live 0	24	48/72h	pH 0	24	48/72h	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48/72h	Cond. (µmhos/cm) 0	24	48/72h
Control		5	5	5/5	8.1		8.2	20.9		21.5	9.3		9.2	171		202
Control		5	5	5/5			8.2						9.2			
Control		5	5	5/4			8.2						9.2			
Control		5	5	5/5			8.1						9.2			
25%		5	5	5/5	8.0		8.3	21.0		21.8	9.1		9.5	205		234
25%		5	5	5/5			8.3						9.5			
25%		5	5	5/5			8.3						9.5			
25%		5	5	5/5			8.3						9.5			
50%		5	5	5/5	7.9		8.3	21.3		21.9	8.8		9.7	239		253
50%		5	4	4/3			8.3						9.6			
50%		5	4	4/4			8.3						9.7			
50%		5	5	5/5			8.3						9.8			
75%		5	5	4/3	7.7		8.3	21.7		21.8	8.5		9.9	272		286
75%		5	4	4/4			8.3						9.9			
75%		5	4	4/3			8.3					mf ***	9.9			
75%		5	5	4/4			8.3				8.3	8.30 AM recorded	10.0	317 ***		368 ***
100%		5	5	5/4	7.5		7.6	21.9		21.6	8.3	mf ***	9.7	317		368
100%		5	4	3/3			7.6						9.7			
100%		5	4	4/4			7.6						9.7			
100%		5	5	3/2			7.6						9.7			
Measured/Loaded by:		mf	mf	mf/mf	MF		MF	MF		mf	MF		MF	MF		MF
Recorded by:		AP	AJ	mf/mf	AJ		MF	AJ		MF	AJ		MF	AJ		MF

*** recorded wrong place

Investigators' Signatures
Marshall Faircloth
Alison Jordan

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:	Blank 0.0				
Lab Tot. Resid. Cl2:			0.0	HACH	AJ
Alkalinity:	132	80	35	HACH	AJ
Hardness:	140	85	45	HACH	AJ
Total Ammonia:	0.0	0.0	7.2	HACH	AJ

Ammonia Meter Slope: _____ Ammonia Blank: 0.0 Salinity Sample: _____ ppt

****

American_Cyanamid
Ceriodaphnia_dubia_72_hrs
Chlorination type 1
Sample date = 8/26/91

****

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
100.00	20.	8.	40.	25.1722
75.00	20.	6.	30.	5.7659
50.00	20.	3.	15.	.1288
25.00	20.	0.	0.	.0001

THIS DATA SET DOES NOT MEET THE CRITERIA
ESTABLISHED BY THE COMMITTEE ON METHODS FOR
TOXICITY TESTS WITH AQUATIC ORGANISMS BECAUSE
NO PERCENT DEAD IS GREATER THAN 65 PERCENT.

NEITHER THE BINOMIAL TEST NOR THE MOVING AVERAGE
METHOD CAN GIVE ANY RESULTS FOR THIS DATA SET.
EITHER THE HIGHEST CONCENTRATION KILLED LESS THAN
50 PERCENT OR THE LOWEST KILLED MORE THAN 50.
IF THE PROBIT SLOPE IS NEGATIVE, ENTER DATA AGAIN
USING NUMBER ALIVE INSTEAD OF NUMBER DEAD.

-------- Results calculated using the PROBIT METHOD --------

SLOPE = 3.37553
95 PERCENT CONFIDENCE LIMITS = 1.23752 AND 5.51354

****
* LC50 = 111.76 *
****
95 PERCENT CONFIDENCE LIMITS = 86.2206 AND 262.251

LC1 = 22.8538
95 PERCENT CONFIDENCE LIMITS = 3.05208 AND 36.9420
****

Macroinvertebrate taxa list for American Cyanamid, collected in Escambia Bay, via 9 ponar grabs per site (3 grabs on 3 transects) on 28 August, 1991. The Reference Site was located near the mouth of the Escambia River, Test Sites 1 and 2 were north and south of American Cyanamid's discharge, respectively.

	Control Site	Test Site 1	Test Site 2
Diptera			
Undetermined Chironomidae sp.	8	8	0
Gastropoda			
Crepidula maculosa	4	0	0
Neritina reclivata	83	0	0
Pyramidella fusca	37	0	0
Malacostraca			
Cyathura sp.	8	0	0
Edotea montosa	4	0	0
Grandidierella bonnieroides	121	0	0
Mysidopsis bahia	0	0	8
Nemertea			
Carinoma tremaphoros	29	17	25
Pelecypoda			
Mulinia lateralis	29	0	0
Rangia cuneata	8	0	0
Tellina versicolor	8	8	17
Polychaeta			
Capitella capitata	8	4	0
Hobsonia florida	21	0	0
Laeonereis culveri	46	0	0
Lumbrinereis cf. *tenuis*	58	0	12
Mediomastus ambiseta	8	487	391
Polydora ligni	4	0	0
Sigambra tentaculata	0	4	8
Streblospio benedicti	0	29	0

Phytoplankton taxa list for American Cyanamid, Santa Rosa County, Florida, collected from Escambia Bay on 27 August 1991.

	Reference Site	Test Site 1	Test Site 2
Diatoms			
Cocconeis sp.	–	176	–
Cyclotella sp.	220	–	516
Navicula sp.	73	352	–
Unidentified pennate diatom	147	–	–
Chlorophyta			
Carteria sp.	73	–	–
Coelastrum sp.	–	176	–
Desmatractum sp.	–	1407	172
Tetraedron sp.	–	176	–
Unknown chlorophyte flagellate	879	528	1031
Cyanophyta			
Anabaena sp.	7767	20222	20966
Chroococcus sp.	7767	12661	11858

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

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 F L 0 0 0 2 5 9 3 11	12 9 1 0 8 2 6 17	18 X	19 S	20 2

Remarks

21 66

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

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 F L 0 0 0 2 5 9 3 11	12 9 1 0 8 2 6 17	18 B	19 S	20 2

Remarks

21 66