

Biological Assessment of

Monsanto Chemical Company

Escambia County, Florida

NPDES #FL0002488

Sampled 17 September, 25 October, and 5 November, 1990

February, 1991

Biology Section
Division of Administrative and Technical Services

Introduction

Monsanto is a chemical manufacturing facility producing synthetic organic fibers, agricultural chemicals, industrial organic chemicals, plastics, and synthetic resins. There are two permitted surface water outfalls, including the south outfall (001) and the north outfall (002) (see map in Appendix). Each discharges into the Escambia River, Escambia County, Pensacola, Florida. These effluents consist of once-through cooling water and stormwater (001) and some process water at 002. The flow designs are 25 MGD and 1 MGD, respectively.

A mixing zone for zinc, residual chlorine, copper, nickel, and pH is granted for each outfall 300 feet downstream in the Escambia River. Concentrated process wastewater is deep well injected to 1500 feet through three 6 inch diameter wells. Flow can vary from 200 gallons per minute to over 1200 gallons per minute.

The Escambia River is the fifth largest river in Florida. Its basin covers 4,233 square miles, of which 415 square miles are in Florida. Usually the low flow period occurs in October and peak flow occurs in March. The 7Q10 is 777 cfs (Hughes 1981).

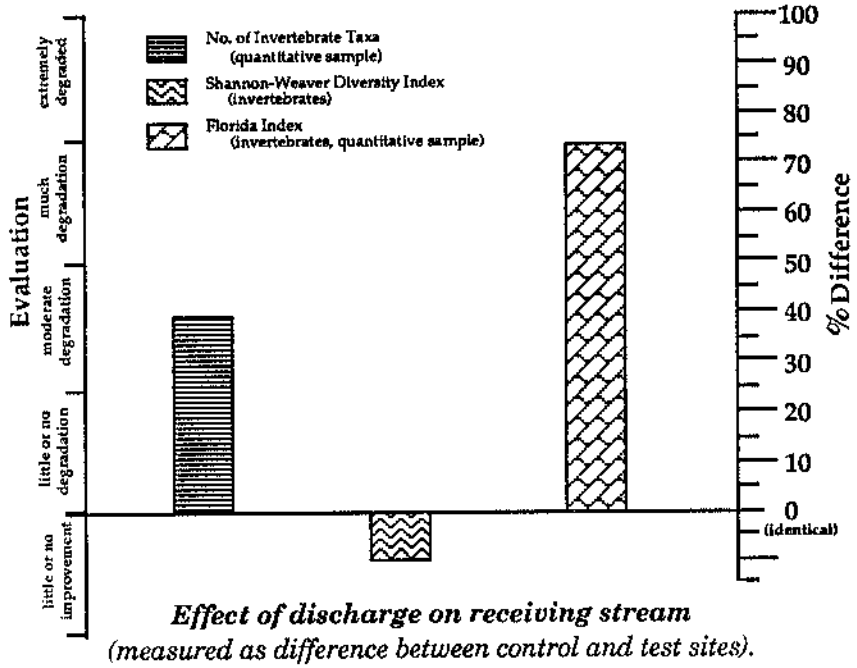
No major violations were found for either outfall from August, 1989, to August, 1990. The facility received a 5 rating on the October 24, 1989, PAI inspection. On June 12, 1990, a moderate fish kill occurred in the Escambia River, presumably due to an ammonia spill at the company's loading docks. The Department issued a warning notice on June 20, 1990 and Monsanto took appropriate action to prevent future barge spills. On September 18, 1990, a Consent Order and $3,750 fine were issued to Monsanto. A maleic anhydride spill occurred on July 10, 1990. The material, approximately 37,000 pounds, was accidentally injected into the underground injection wells. A warning notice was issued. However, this case remains open to date.

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 control

Major characteristics of community structure of control and test sites.

	Control Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	27	6
Florida Index	9	2
% Contribution of Dominant Taxon	50.3	25
% Oligochaeta	7.6	12.5
% Diptera	78.6	12.5
% Ephemeroptera	3.5	0
% Pelecypoda	4.1	25
% Malacostraca	1.4	31.3
% Gastropoda	0.7	12.5
% Other	4.1	6.2
% Predators	6.6	4.2
% Collector-Gatherers	74.7	54.2
% Collector-Filterers	12.8	25
% Scrapers	3.5	12.5
% Shredders	2.4	4.2
Macroinvertebrate Hester-Dendy		
Number of Taxa	28	17
Florida Index	15	4
Shannon-Weaver Diversity	3.0	3.3
% Polychaeta	0	17.0
% Diptera	53.9	22.3
% Ephemeroptera	2.8	0
% Trichoptera	40.1	0
% Pelecypoda	0	27.7
% Malacostraca	0.9	19.2
% Other	2.4	14
% Predators	4.8	23.4
% Collector-Gatherers	38.7	42.9
% Collector-Filterers	42.5	30.4
% Scrapers	5.4	1.9
% Shredders	8.3	1.1
% Parasites	0.3	0.4
Algal Growth Potential (mg dry wt/l)	Outfall 001 = 30.8	Outfall 002 = 17.9



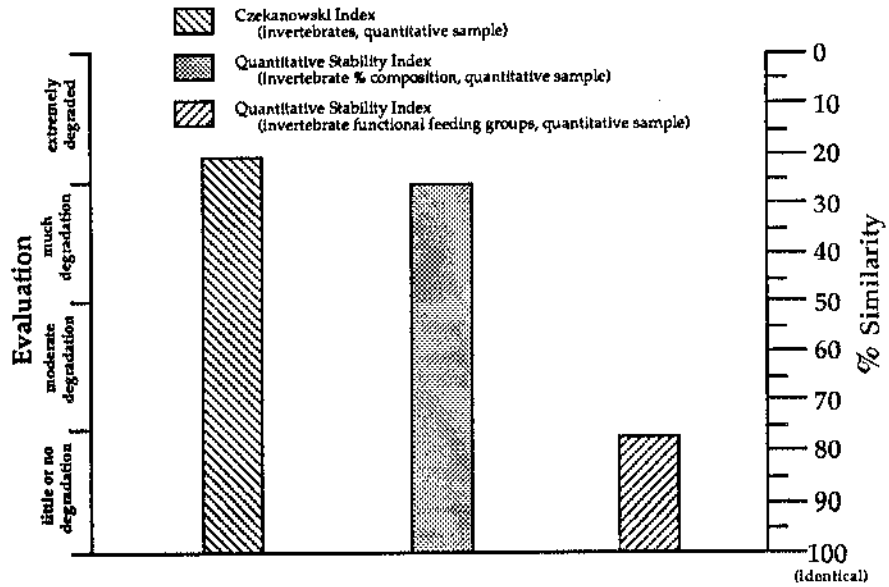
Effect of discharge on receiving stream
(measured as difference between control and test sites).

site (located upstream in the Escambia river) and a test site (the area in the Escambia River down gradient of the outfall 001 discharge). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Notropis leedsi* as test organisms, were performed on an effluent sample (Peltier and Weber 1985, FDER 1985). The effluent was analyzed for organic constituents (base neutrals, acid extractables, and pesticide extractables) and metals. 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 a timed (one hour per site) multi-substrate (*e.g.*, snags, vegetation, sediment) semi-quantitative effort. Additional invertebrate collections were accomplished using Hester-Dendy multiplate samplers which were incubated for 28 days (Ross 1990). Bacterial populations were analyzed for total and fecal coliforms following the methods of APHA (1989). 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, Shannon-Weaver Diversity Index, and chlorophyll *a* are well known. Others are briefly explained here. The Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index score is considered healthy (*i.e.*, many clean-water organisms are present). Excessive numerical dominance of a single type of organism (a high % contribution of dominant taxon) is usually associated with disturbance. Czekanowski's Similarity Index is a multivariate ordination procedure which compares organism abundance and taxonomic structure between sites. The determination of the Quantitative Similarity Index (for taxonomic % composition) is a two



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

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, the diversity index, and the Florida Index are measured as the control site minus test site divided by the control 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

Habitat quality at the test site (Habitat Score = 51) was comparable to the control site (Habitat Score = 57) (Appendix). Both sites are part of a large alluvial river system. Drought conditions prevailed during this study and consequently, water velocity was low (< .05 m/sec) at both locations. Although some important physical/chemical parameters (i.e., pH and D.O.) were similar (and normal) at the two sampling sites, conductivity was higher at the downstream area (control site = 105 µmhos/cm^2; test site = 574 µmhos/cm^2) (Appendix). The test site was approximately five miles from the Escambia Bay. The control site was about another mile farther upstream. When evaluating these data, the proximity of these sites to the estuary should be considered.

Effluents from the 001 and 002 outfalls were not toxic to the cladoceran, *Ceriodaphnia dubia,* or to the fish, *Notropis leedsi.* All effluent organic constituents determined from grab samples of both outfalls were below detection limits (Appendix). Zinc was detected at 10 µg/l from outfall 001 and at 58 µg/l from outfall 002. EPA ambient Water Quality Criteria states that zinc may be chronically toxic to freshwater biota as low as 26 to 51 µg/l. No other metals were found above practical quantitation limits (Appendix).

Only slightly elevated levels of total phosphorus were found in outfall 001 (0.15 mg/l) and at outfall 002 (0.13 mg/l). The Algal Growth Potential measured from the two discharge points was moderately high, at 30.8 mg algal dry wt/1 and 17.9 mg algal dry wt/l, respectively. AGP values above 5.0 mg algal dry wt/l in receiving waters are considered undesirable (Raschke and Schultz 1987). Total phosphorus at the test site (0.6 mg/l) was twice that found at the control site (0.3 mg/l). Ammonia was present at the 002 outfall (0.13 mg/l). The AGP and nutrient results suggest that Monsanto may be contributing somewhat to the nutrient load entering the lower Escambia River/Escambia Bay System.

Total and fecal coliform levels were low at the control (TC = 70 organisms/100 ml, FC = 20 organisms/100 ml) and test sites (TC = 80 organisms/100 ml, FC = 45 organisms/100 ml). Total coliform standards were exceeded at the 002 outfall, where 3700 organisms/100 ml were detected.

Quantitative measures of benthic macroinvertebrate community health indicated that the test site was stressed compared to the control (see Table on page 1 and Figures on page 2). The upper left figure indicates the degree of difference between the control 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 control. The lower right figure summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

Taxa richness and the Florida Index decreased by 39% and 73%, respectively, between the control and test sites. Czekanowski's Index and the Quantitative Stability Index for percent composition further emphasized the large differences between sampling locations. An examination of the taxa inhabiting the two areas reveals that some organisms more typical of estuarine situations (*e.g.,* the crabs, *Callinectes sapidus* and *Rithropanopeus harrissii,* the polychaete, *Laeoneris culveri,* and an undetermined mytillid clam) were found at the test site but not at the control. This suggests that invertebrate colonization at the test site was influenced by its proximity to the estuary, despite the low conductivity found there. Therefore, it is difficult to attribute the observed differences in macroinvertebrate communities solely to the Monsanto discharge. Additional studies using a control site just upstream of the 001 outfall may help clarify the estuarine influence on the macroinvertebrates inhabiting this reach of the river, so that effects of Monsanto's largest discharge may be better understood. Similarly, a test site could be situated downstream of the 002 outfall. The data generated at this test area could then be compared to that of the control site utilized in this study (at Upper Bluffs), to further characterize the effects of the 002 outfall.

Conclusions

Macroinvertebrate populations downstream of the Monsanto 001 outfall were very stressed compared to a control site located about a mile upstream at Upper Bluffs. Although conductivity was relatively low, the proximity of the test site to estuarine conditions may have been partially responsible for these observed changes in community structure. Further biological surveys appear warranted.

Results of priority pollutant chemical analyses indicated that no toxic substances, except for small amounts of zinc, were present at the 001 and 002 outfalls. Water sampled from these outfalls was not acutely toxic to either the fish or the invertebrate tested. Results of total phosphorus analyses and AGP tests suggested that Monsanto may be contributing slightly to the nutrient load in the Lower Escambia River/Escambia Bay system. Data were insufficient to attribute imbalances in biota to these nutrient inputs.

Total coliforms measured at the 002 outfall exceeded Class III standards.

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.

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.

Hughes, G. H. 1981. Low-Flow Frequency Data for Selected Stream-Gaging Stations in Florida. U. S. Geological Survey Open File Report 81-69.

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.

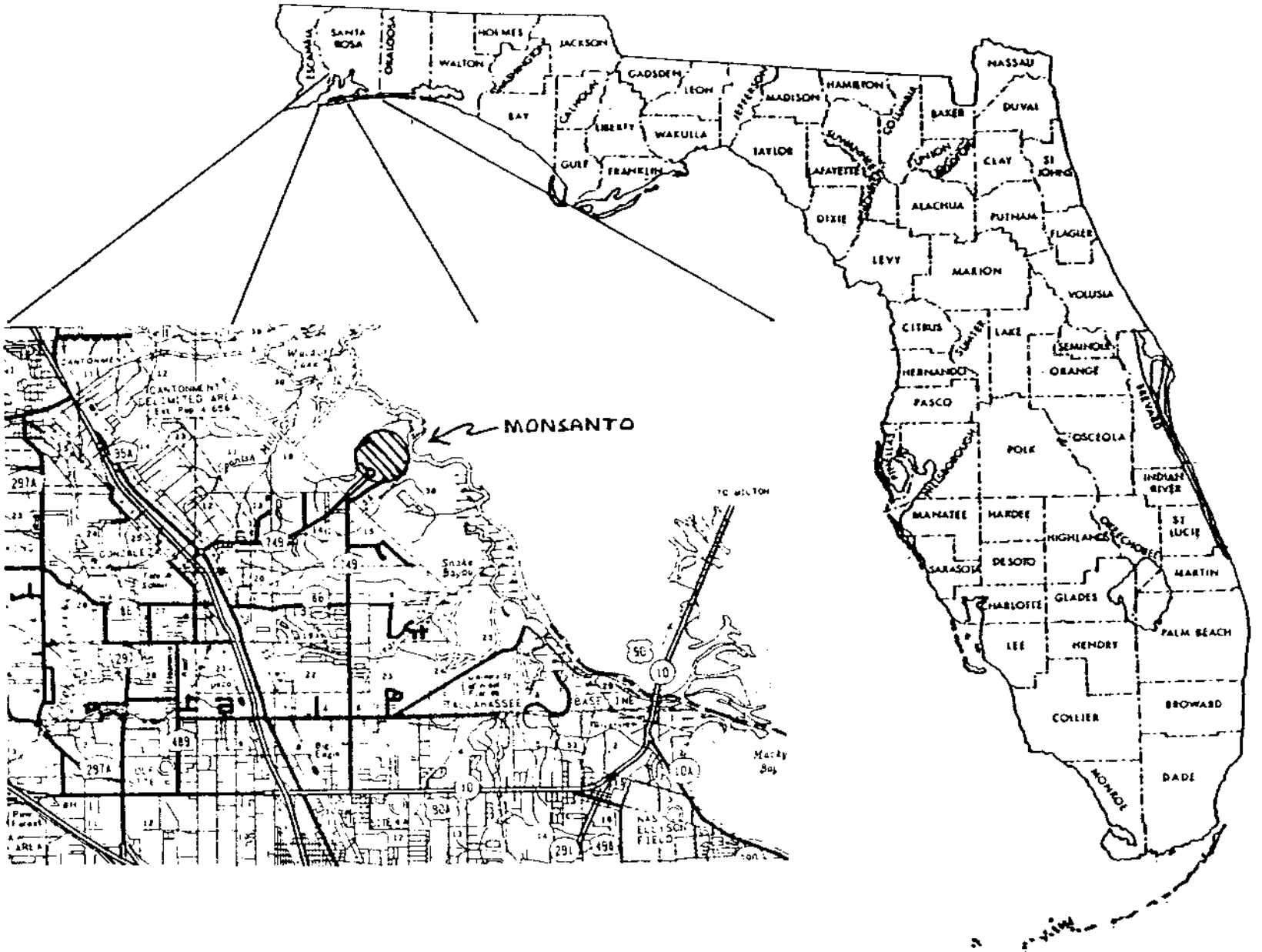

MONSANTO
SANTA ROSA
OKALOOSA
WALTON
HOLMES
JACKSON
BAY
CALHOUN
GADSDEN
LEON
LIBERTY
WAKULLA
JEFFERSON
MADISON
HAMILTON
GULF
FRANKLIN
TAYLOR
LAFAYETTE
COLUMBIA
BAKER
NASSAU
DUVAL
UNION
CLAY
ST JOHNS
ALACHUA
PUTNAM
FLAGLER
DIXIE
LEVY
MARION
VOLUSIA
CITRUS
SUMTER
LAKE
SEMINOLE
ORANGE
HERNANDO
PASCO
POLK
OSCEOLA
BREVARD
INDIAN RIVER
MANATEE
HARDEE
HIGHLANDS
ST LUCIE
SARASOTA
DESOTO
MARTIN
CHARLOTTE
GLADES
PALM BEACH
LEE
HENDRY
COLLIER
BROWARD
DADE
MONROE
TALLAHASSEE
BASE LINE

Figure 1

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

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: NW FDER	STORET STATION NUMBER: 33.02.0009	DATE (M/D/Y): 09-17-90	RECEIVING BODY OF WATER: ESCAMBIA RIVER

REMARKS:	LOCATION: UPPER BLUFFS	FIELD ID/NAME: MONSANTO SURVEY

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 21	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity 5	Max. observed; >0.3 m/sec. **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec **0-7 points**
Artificial Channel/ Flow Alteration 12	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability 5	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality 9	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments 5	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	**TOTAL SCORE** 57

COMMENTS: LOW FLOW CONDITIONS, NO OBSERVABLE FLOW

ANALYSIS DATE: 09-17-90	ANALYST: DUTTO / DONELAN	SIGNATURE: Glenn L. Dutto

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: 8015 / SUBMITTING AGENCY NAME: NW FDER	STORET STATION NUMBER: 37.02.0009	DATE (M/D/Y): 09-17-90	RECEIVING BODY OF WATER: ESCAMBIA RIVER

REMARKS:	LOCATION: UPPER BLUFFS	FIELD ID/NAME: MONSANTO SURVEY

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
80	5	15				

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):

BECH'S LAKE ROAD, BOATING, PAPER MILL AT BREWTON, AL.

Estimated Stream Width (range, m): 75 yds	Estimated Stream Depth (range, m): 1 ft	yes
High Water Mark (m above bed): 2 ft	Velocity (range, m/s): <.05	Impounded ☐ Channelized ☒

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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	50
Consolidated Clay:	10	Clay/Silt (inorganic):	5
Gravel/Shell	5	Coarse Organic Debris:	10
Sand:	15	Mud/Muck (organic):	5

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	Secchi Depth (m):	0.8
Top	26.6	6.0	pH (SU):	6.2
Mid-depth			Conductivity (µmho/cm):	105
Bottom			Other Parameters:	

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

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: ☒ brown

Weather Conditions: Clear

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

ANALYSIS DATE: 09-17-90	ANALYST: CUTTS / DOWLAN	SIGNATURE: Glenn Butts

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
	33.02.0012	09-17-90	ESCAMBIA RIVER

REMARKS:	LOCATION:	FIELD ID/NAME:
	BELOW MILLSAP'S	

Habitat Parameter (score)	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover (16)	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity (5)	Max. observed; >0.3 m/sec. **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec **0-7 points**
Artificial Channel/ Flow Alteration (7)	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability (9)	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality (9)	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments (5)		TOTAL SCORE (57)
	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
09-17-90	G. Byrds	

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: NW FDER	STORET STATION NUMBER: 33.02.0012	DATE (M/D/Y): 09-17-90	RECEIVING BODY OF WATER: ESCAMBIA RIVER

REMARKS:	LOCATION: BELOW MONSANTO	FIELD ID/NAME: MONSANTO SURVEY

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
70	10	15			5	

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):
BANK EROSION

Estimated Stream Width (range, m): 50 YDS	Estimated Stream Depth (range, m): 12 ft	yes
High Water Mark (m above bed): 3 ft	Velocity (range, m/s): 2.05	Impounded ☐ Channelized ☐

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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	60
Consolidated Clay:	5	Clay/Silt (inorganic):	
Gravel/Shell	10	Coarse Organic Debris:	5
Sand:	20	Mud/Muck (organic):	

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top			Secchi Depth (m):	
Mid-depth	28.1	6.3	pH (SU):	6.6
Bottom			Conductivity (µmho/cm):	574
			Other Parameters:	

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

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: ☒ brown

Weather Conditions:
clear

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

ANALYSIS DATE: 09-17-90	ANALYST: Butts / Donelan	SIGNATURE: Glenn Butts

Sample Number: 90-SEP-18-01-02 Test status: Authorized by Tim Fitzpatrick
Analysis Id: W-ICP-23 Analysis Description: ICP multielement analysis for water samples

Storet Number	Analyte	Result	Units
01106	Aluminum	NR	ug/L
01002	Arsenic	20 U	ug/L
01097	Antimony	NR	ug/L
01007	Barium	NR	ug/L
01012	Beryllium	NR	ug/L
01027	Cadmium	NR	ug/L
00916	Calcium	NR	mg/L
01034	Chromium	10 U	ug/L
01037	Cobalt	NR	ug/L
01042	Copper	5 U	ug/L
01045	Iron	NR	ug/L
01051	Lead	NR	ug/L
00927	Magnesium	NR	mg/L
01055	Manganese	NR	ug/L
01067	Nickel	5 U	ug/L
00937	Potassium	NR	mg/L
01147	Selenium	NR	ug/L
01077	Silver	NR	ug/L
00929	Sodium	NR	mg/L
01082	Strontium	NR	ug/L
01059	Thallium	NR	ug/L
01087	Vanadium	NR	ug/L
01092	Zinc	7 T	ug/L

OUTFALL #001

Sample Number: 90-SEP-18-01-03 Sample Status: Authorized by Tim Fitzpatrick
Sample Location: Monsanto Outfall into Escambia River Matrix: Fresh Surf Water
Field ID: #2 Storet Station Number:
Date/Time Collected: 17-SEP-1990 11:05:11.62
Comments:

Sample Number: 90-SEP-18-01-03 Test status: Authorized by Jack Merritt
Analysis Id: HG-H-W Analysis Description: Mercury by cold vapor using hydride sys.-water

Storet Number	Analyte	Result	Units
71900	Mercury	.2 U	ug/L

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 practice quantiation limit
U - Material was analyzed for but not detected; The value reported is the mimimum detection limit
N/A - Not applicable NR - Not requested

Sample Number: 90-SEP-18-01-03 Test status: Authorized by Jack Merritt
Analysis Id: PB-G-W Analysis Description: Lead by furnace AA in water

Storet Number	Analyte	Result	Units
01051	Lead	2 U	ug/L

Sample Number: 90-SEP-18-01-03 Test status: Authorized by Jack Merritt
Analysis Id: CD-G-W Analysis Description: Cadmium by graphite furnace for water saple

Storet Number	Analyte	Result	Units
01027	Cadmium	0.2 U	ug/L

Sample Number: 90-SEP-18-01-03 Test status: Authorized by Tim Fitzpatrick
Analysis Id: W-ICP-23 Analysis Description: ICP multielement analysis for water samples

Storet Number	Analyte	Result	Units
01106	Aluminum	NR	ug/L
01002	Arsenic	20 U	ug/L
01097	Antimony	NR	ug/L
01007	Barium	NR	ug/L
01012	Beryllium	NR	ug/L
01027	Cadmium	NR	ug/L
00916	Calcium	NR	mg/L
01034	Chromium	10 U	ug/L
01037	Cobalt	NR	ug/L
01042	Copper	8 T	ug/L
01045	Iron	NR	ug/L
01051	Lead	NR	ug/L
00927	Magnesium	NR	mg/L
01055	Manganese	NR	ug/L
01067	Nickel	5 U	ug/L
00937	Potassium	NR	mg/L
01147	Selenium	NR	ug/L
01077	Silver	NR	ug/L
00929	Sodium	NR	mg/L
01082	Strontium	NR	ug/L
01059	Thallium	NR	ug/L
01087	Vanadium	NR	ug/L
01092	Zinc	10	ug/L

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T - Value reported is less than the practice quantiation limit
U - Material was analyzed for but not detected; The value reported is the mimimum detection limit
N/A - Not applicable NR - Not requested

Cont. from previous page for Sample Number: 90-SEP-18-01-04 Analysis_id: W-ICP-23

00927	Magnesium	NR	mg/L
01055	Manganese	NR	ug/L
01067	Nickel	5 U	ug/L
00937	Potassium	NR	mg/L
01147	Selenium	NR	ug/L
01077	Silver	NR	ug/L
00929	Sodium	NR	mg/L
01082	Strontium	NR	ug/L
01059	Thallium	NR	ug/L
01087	Vanadium	NR	ug/L
01092	Zinc	12	ug/L

OUTFALL #002

Sample Number: 90-SEP-18-01-05 Sample Status: Authorized by Tim Fitzpatrick
Sample Location: Monsanto North Ditch into Escambia River Matrix: Fresh Surf Water
Field ID: #4 Storet Station Number:
Date/Time Collected: 17-SEP-1990 10:24:11.62
Comments:

Sample Number: 90-SEP-18-01-05 Test status: Authorized by Jack Merritt
Analysis Id: HG-H-W Analysis Description: Mercury by cold vapor using hydride sys.-water

Storet Number	Analyte	Result	Units
71900	Mercury	.2 U	ug/L

Sample Number: 90-SEP-18-01-05 Test status: Authorized by Jack Merritt
Analysis Id: PB-G-W Analysis Description: Lead by furnace AA in water

Storet Number	Analyte	Result	Units
01051	Lead	2 U	ug/L

Sample Number: 90-SEP-18-01-05 Test status: Authorized by Jack Merritt
Analysis Id: CD-G-W Analysis Description: Cadmium by graphite furnace for water saple

Storet Number	Analyte	Result	Units
01027	Cadmium	0.2 K	ug/L

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 practice quantiation limit
U - Material was analyzed for but not detected; The value reported is the mimimum detection limit
N/A - Not applicable NR - Not requested

Sample Number: 90-SEP-18-01-05 Test status: Authorized by Tim Fitzpatrick
Analysis Id: W-ICP-23 Analysis Description: ICP multielement analysis for water samples

Storet Number	Analyte	Result	Units
01106	Aluminum	NR	ug/L
01002	Arsenic	20 U	ug/L
01097	Antimony	NR	ug/L
01007	Barium	NR	ug/L
01012	Beryllium	NR	ug/L
01027	Cadmium	NR	ug/L
00916	Calcium	NR	mg/L
01034	Chromium	10 U	ug/L
01037	Cobalt	NR	ug/L
01042	Copper	10 T	ug/L
01045	Iron	NR	ug/L
01051	Lead	NR	ug/L
00927	Magnesium	NR	mg/L
01055	Manganese	NR	ug/L
01067	Nickel	5 U	ug/L
00937	Potassium	NR	mg/L
01147	Selenium	NR	ug/L
01077	Silver	NR	ug/L
00929	Sodium	NR	mg/L
01082	Strontium	NR	ug/L
01059	Thallium	NR	ug/L
01087	Vanadium	NR	ug/L
01092	Zinc	58	ug/L

End of Report

A - Value reported is the mean of two or more determinations
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J - Estimated value
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L - Actual value is known to be greater than value given
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U - Material was analyzed for but not detected; The value reported is the mimimum detection limit
N/A - Not applicable NR - Not requested

OUTFALL #001

Sample Number: 90-SEP-18-03-01 Sample Status: Authorized by Liang T. Lin
Sample Location: Monsanto Outfall into Escambia River Matrix: Fresh Surf Water
Field ID: #2 Storet Station Number:
Date/Time Collected: 17-SEP-1990 11:05:05.14
Comments:

Sample Number: 90-SEP-18-03-01 Test status: Authorized by Laura Harrison
Analysis Id: W-BNA Analysis Description: base-neutral-acid water analysis

Storet Number	Analyte	Result	Units
34205	Acenaphthene	10 U	ug/L
34200	Acenaphthylene	10 U	ug/L
39330	Aldrin	10 U	ug/L
34220	Anthracene	10 U	ug/L
34526	Benzo(a)anthracene	10 U	ug/L
34230	Benzo(b)fluoranthene	10 U	ug/L
34242	Benzo(k)fluoranthene	10 U	ug/L
34247	Benzo(a)pyrene	10 U	ug/L
34521	Benzo(g,h,i)perylene	15 U	ug/L
34292	Benzyl butyl phthalate	10 U	ug/L
	a-BHC	10 U	ug/L
39337	b-BHC	10 U	ug/L
39340	d-BHC	10 U	ug/L
	g-BHC	10 U	ug/L
39120	Benzidine	10 U	ug/L
34273	Bis(2-chloroethyl)ether	10 U	ug/L
34278	Bis(2-chloroethoxy)methane	15 U	ug/L
34283	Bis(2-chloroisopropyl)ether	15 U	ug/L
39100	Bis(2-ethylhexyl)phthalate	10 U	ug/L
34636	4-Bromophenyl phenyl ether	10 U	ug/L
34581	2-Chloronaphthalene	10 U	ug/L
34641	4-Chlorophenyl phenyl ether	10 U	ug/L
34320	Chrysene	10 U	ug/L
39310	4,4'-DDD	10 U	ug/L
39320	4,4'-DDE	10 U	ug/L
39300	4,4'-DDT	10 U	ug/L
34556	Dibenzo(a,h)anthracene	15 U	ug/L
39110	Di-n-butyl phthalate	10 U	ug/L
34536	1,2-Dichlorobenzene	10 U	ug/L
34566	1,3-Dichlorobenzene	10 U	ug/L
34571	1,4-Dichlorobenzene	10 U	ug/L
34631	3,3'-Dichlorobenzidine	10 U	ug/L
39380	Dieldrin	10 U	ug/L
34336	Diethylphthalate	10 U	ug/L
34341	Dimethylphthalate	10 U	ug/L
34611	2,4-Dinitrotoluene	10 U	ug/L
34626	2,6-Dinitrotoluene	10 U	ug/L
34596	Di-n-octyl phthalate	10 U	ug/L
34361	Endosulfan-I	10 U	ug/L

Continued

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 practice quantiation limit
U - Material was analyzed for but not detected; The value reported is the minimum detection limit
N/A - Not applicable NR - Not requested

Cont. from previous page for Sample Number: 90-SEP-18-03-01 Analysis_id: W-BNA

34356	Endosulfan-II	10 U	ug/L
34351	Endosulfan-sulfate	10 U	ug/L
39390	Endrin	10 U	ug/L
34366	Endrin-aldehyde	10 U	ug/L
34376	Fluoranthene	10 U	ug/L
34381	Fluorene	10 U	ug/L
39410	Heptachlor	10 U	ug/L
39420	Heptachlor-epoxide	10 U	ug/L
39700	Hexachlorobenzene	15 U	ug/L
34391	Hexachlorobutadiene	10 U	ug/L
34396	Hexachloroethane	60 U	ug/L
34386	Hexachlorocyclypentadiene	10 U	ug/L
34403	Indeno(1,2,3-cd)pyrene	10 U	ug/L
34408	Isophorone	10 U	ug/L
34696	Naphthalene	10 U	ug/L
34447	Nitrobenzene	10 U	ug/L
34438	N-Nitrosodimethylamine	50 U	ug/L
34428	N-Nitrosodi-n-propylamine	10 U	ug/L
34433	N-Nitrosodiphenylamine	15 U	ug/L
34671	PCB-1016	10 U	ug/L
39488	PCB-1221	10 U	ug/L
39492	PCB-1232	10 U	ug/L
39496	PCB-1242	10 U	ug/L
39500	PCB-1248	10 U	ug/L
39504	PCB-1254	10 U	ug/L
39508	PCB-1260	10 U	ug/L
	PCB-1262	10 U	ug/L
34461	Phenanthrene	10 U	ug/L
34469	Pyrene	10 U	ug/L
39400	Toxaphene	10 U	ug/L
34551	1,2,4-Trichlorobenzene	10 U	ug/L
34462	4-Chloro-3-methyl phenol	15 U	ug/L
34586	2-Chlorophenol	15 U	ug/L
34601	2,4-Dichlorophenol	15 U	ug/L
34606	2,4-Dimethylphenol	15 U	ug/L
34616	2,4-Dinitrophenol	30 U	ug/L
34657	2-Methyl-4,6-dinitrophenol	30 U	ug/L
34591	2-Nitrophenol	15 U	ug/L
34646	4-Nitrophenol	50 U	ug/L
39032	Pentachlorophenol	15 U	ug/L
34694	Phenol	15 U	ug/L
34621	2,4,6-Trichlorophenol	15 U	ug/L

Comments (1):
(2):
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(6):

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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
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T - Value reported is less than the practice quantiation limit
U - Material was analyzed for but not detected; The value reported is the minimum detection limit
N/A - Not applicable NR - Not requested

Sample Number: 90-SEP-18-03-02 Sample Status: Authorized by Liang T. Lin
Sample Location: Monsanto North Ditch into Escambia River Matrix: Fresh Surf Water
Field ID: #4 Storet Station Number:
Date/Time Collected: 17-SEP-1990 10:24:05.14
Comments:

Sample Number: 90-SEP-18-03-02 Test status: Authorized by Laura Harrison
Analysis Id: W-BNA Analysis Description: base-neutral-acid water analysis

Storet Number	Analyte	Result	Units
34205	Acenaphthene	10 U	ug/L
34200	Acenaphthylene	10 U	ug/L
39330	Aldrin	10 U	ug/L
34220	Anthracene	10 U	ug/L
34526	Benzo(a)anthracene	10 U	ug/L
34230	Benzo(b)fluoranthene	10 U	ug/L
34242	Benzo(k)fluoranthene	10 U	ug/L
34247	Benzo(a)pyrene	10 U	ug/L
34521	Benzo(g,h,i)perylene	15 U	ug/L
34292	Benzyl butyl phthalate	10 U	ug/L
	a-BHC	10 U	ug/L
39337	b-BHC	10 U	ug/L
39340	d-BHC	10 U	ug/L
	g-BHC	10 U	ug/L
39120	Benzidine	10 U	ug/L
34273	Bis(2-chloroethyl)ether	10 U	ug/L
34278	Bis(2-chloroethoxy)methane	15 U	ug/L
34283	Bis(2-chloroisopropyl)ether	15 U	ug/L
39100	Bis(2-ethylhexyl)phthalate	10 U	ug/L
34636	4-Bromophenyl phenyl ether	10 U	ug/L
34581	2-Chloronaphthalene	10 U	ug/L
34641	4-Chlorophenyl phenyl ether	10 U	ug/L
34320	Chrysene	10 U	ug/L
39310	4,4'-DDD	10 U	ug/L
39320	4,4'-DDE	10 U	ug/L
39300	4,4'-DDT	10 U	ug/L
34556	Dibenzo(a,h)anthracene	15 U	ug/L
39110	Di-n-butyl phthalate	10 U	ug/L
34536	1,2-Dichlorobenzene	10 U	ug/L
34566	1,3-Dichlorobenzene	10 U	ug/L
34571	1,4-Dichlorobenzene	10 U	ug/L
34631	3,3'-Dichlorobenzidine	10 U	ug/L
39380	Dieldrin	10 U	ug/L
34336	Diethylphthalate	10 U	ug/L
34341	Dimethylphthalate	10 U	ug/L
34611	2,4-Dinitrotoluene	10 U	ug/L
34626	2,6-Dinitrotoluene	10 U	ug/L
34596	Di-n-octyl phthalate	10 U	ug/L
34361	Endosulfan-I	10 U	ug/L

Continued

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N/A - Not applicable NR - Not requested

Cont. from previous page for Sample Number: 90-SEP-18-03-02 Analysis_id: W-ENA

34356	Endosulfan-II	10 U	ug/L
34351	Endosulfan-sulfate	10 U	ug/L
39390	Endrin	10 U	ug/L
34366	Endrin-aldehyde	10 U	ug/L
34376	Fluoranthene	10 U	ug/L
34381	Fluorene	10 U	ug/L
39410	Heptachlor	10 U	ug/L
39420	Heptachlor-epoxide	10 U	ug/L
39700	Hexachlorobenzene	15 U	ug/L
34391	Hexachlorobutadiene	10 U	ug/L
34396	Hexachloroethane	60 U	ug/L
34386	Hexachlorocyclypentadiene	10 U	ug/L
34403	Indeno(1,2,3-cd)pyrene	10 U	ug/L
34408	Isophorone	10 U	ug/L
34696	Naphthalene	10 K	ug/L
34447	Nitrobenzene	10 U	ug/L
34438	N-Nitrosodimethylamine	50 U	ug/L
34428	N-Nitrosodi-n-propylamine	10 U	ug/L
34433	N-Nitrosodiphenylamine	15 U	ug/L
34671	PCB-1016	10 U	ug/L
39488	PCB-1221	10 U	ug/L
39492	PCB-1232	10 U	ug/L
39496	PCB-1242	10 U	ug/L
39500	PCB-1248	10 U	ug/L
39504	PCB-1254	10 U	ug/L
39508	PCB-1260	10 U	ug/L
	PCB-1262	10 U	ug/L
34461	Phenanthrene	10 U	ug/L
34469	Pyrene	10 U	ug/L
39400	Toxaphene	10 U	ug/L
34551	1,2,4-Trichlorobenzene	10 U	ug/L
34462	4-Chloro-3-methyl phenol	15 U	ug/L
34586	2-Chlorophenol	15 U	ug/L
34601	2,4-Dichlorophenol	15 U	ug/L
34606	2,4-Dimethylphenol	15 U	ug/L
34616	2,4-Dinitrophenol	30 U	ug/L
34657	2-Methyl-4,6-dinitrophenol	30 U	ug/L
34591	2-Nitrophenol	15 U	ug/L
34646	4-Nitrophenol	50 U	ug/L
39032	Pentachlorophenol	15 U	ug/L
34694	Phenol	15 U	ug/L
34621	2,4,6-Trichlorophenol	15 U	ug/L

Comments (1):
(2):
(3):
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(5):
(6):

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DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Monsanto River outfall
Address/City: Pensacola
County: Escambia
Contact/District:
NPDES Permit #: _____ **Outfall #:** 001

Sample Collection: Date 9.17.90 Time 1090
Test Beginning: Date 9.18.90 Time 8:30
Test Ending: Date 9.20.90 Time 830
Test Organism: Ceriodaphnia dubia
Life Stage/Age: neonate

Test Number: 1 of 2 **Test Type:** Screening | Definitive
Static | Static Renewal | Flow-through

Remarks: dummy vials used for parameters

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7@7 9@9	8.5@22°	1307@23.5	-
24 hr	7@7 9@9	8.8@22.0	1350@23.3	-
48 hr	7@7 9@9	8.8@22.0	1350@23.3	22.0@23.3

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		5	5	5	7.1	8.8	8.7	8.0	8.1	8.4	22.1	21.0	21.5	338		360
"		5	5	5		8.8										
"		5	5	5												
"		5	5	5												
100%		5	5	5	7.7	8.7	8.7	7.2	7.5	7.9	21.4	21.5	21.6	337		381
"		5	5	5												
"		5	5	5												
"		5	5	5												
Measured/Loaded by:		AWM	SMC	MF	AWM	SMC	SMC	AWM	SMC	SMC	AWM	SMC	SMC	AWM		SMC
Recorded by:		SMC	SMC	MF	KML	LB	SMC	KML	LB	SMC	KML	LB	SMC	KML		SMC

Investigators' Signatures

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:			0	HACH	AWM
Alkalinity:	118	119	17	HACH	SMC RJH
Hardness:	121	136	56	HACH	SMC RJH
Total Ammonia:					

Ammonia meter slope: _____

DER Biology Section — Acute L... ...ench Sheet

Sample Source: Monsanto R. outfall — **Sample Collection:** Date 9.17.90 Time 1050
Address/City: _____ **Test Beginning:** Date 9.19.90 Time 830
County: _____ **Test Ending:** Date 9.20.90 Time 830
Contact/District: _____ **Test Organism:** N. leedsi
NPDES Permit #: _____ **Outfall #:** 001 **Life Stage/Age:** 24-5 days

Test Number: 2 of 2 **Test Type:** Screening | Definitive
Static | Static Renewal | Flow-through

Remarks:

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr				
24 hr				
48 hr				

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	19	5	5	5	7.7	8.3	8.3	7.3	7.8	8.0	21.8	21.0	21.2	237		238
"	214	5	5	5	7.6	8.3	8.1	7.4	7.8	8.0				236		239
100%	174	5	5	5	7.9	8.0	8.0	7.2	7.3	7.3	21.9	21.0	21.2	390		390
"	14	5	5	5	7.9	8.2	8.3	7.2	7.3	7.3				388		391
Measured/Loaded by:		RJH	SMC	SMC	SMC	SMC	SMC	SMC	SMC	SMC	SMC	SMC	SMC	SMC		SMC
Recorded by:		SMC	SMC	SMC	RJH	LB	LB	RJH	LB	LB	RJH	LB	LB	RJH		LB

Investigators' Signatures

Sandy McClure
Robert
Allen W. Ming
Tom Burton

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:			0	HACH	AWM
Alkalinity:					
Hardness:					
Total Ammonia:					

Sample Source: Monsanto North Ditch
Address/City:
County:
Contact/District:
NPDES Permit #: Outfall #: 002

Sample Collection: Date 9-17-90 Time 1015
Test Beginning: Date 9-18-90 Time 830
Test Ending: Date 9-20-90 Time 830
Test Organism: Ceriodaphnia dubia
Life Stage/Age: neonate

Test Number: 1 of 2 Test Type: Screening | Definitive
Static | Static Renewal | Flow-through

Remarks: dummy vials used for parameters

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7e7 9e9	8.8 @ 22.0	1307 @ 23.5	—
24 hr	7e7 9e9	8.8 @ 22.0	1350 @ 23.3	—
48 hr	7e7 9e9	8.8 @ 22.0	1350 @ 23.3	22.0 @ 23.3

		Number Live			DO (mg/l)			pH			Temp. (°C)			Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control		5	5	5	7.9	8.7	8.5	8.0	8.1	8.3	22.0	21.2	22.0	325		324
"		5	5	5												
"		5	4	4												
"		5	5	5												
100%		5	5	5	7.2	8.7	8.6	SMC ↑	SMC ↑	SMC ↑	SMC ↑	21.2	22.0	SMC ↑		121
"		5	5	5				6.1	7.0	7.7	21.6			83		
"		5	SMC 6	6												
"		5	6	6												
Measured/Loaded by:		AWM	LB	MF	AWM	SMC	SMC	AWM	SMC	SMC	AWM	SMC	SMC	AWM		SMC
Recorded by:		SMC	LB	MF	KML	LB	SMC	KML	LB	SMC	KML	LB	SMC	KML		SMC

Investigators' Signatures

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:			0	HACH	AWM
Alkalinity:	118	119	25	HACH	SMC RJH
Hardness:	121	136	34	HACH	SMC RJH
Total Ammonia:					

Ammonia meter slope:

DER Biology Section — Bioassay Bench Sheet

Sample Source: Monsanto North D.
Address/City:
County:
Contact/District:
NPDES Permit #: **Outfall #:** 002

Sample Collection: Date 9-17-90 Time 1050
Test Beginning: Date 9-18-90 Time 830
Test Ending: Date 9-20-90 Time 830
Test Organism: N. leedsi
Life Stage/Age: 25 days

Test Number: 2 of 2 **Test Type:** Screening | Definitive
Static | Static Renewal | Flow-through

Remarks:

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr				
24 hr				
48 hr				

		Number Live			DO (mg/l)			pH			Temp. (°C)			Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	(same as 001)															
"																
100%	39	5	5	5	6.6	8.1	8.0	5.7	6.3	6.7	22.0	21.0	21.2	92		94
"	10	5	5	5	6.5	7.8	7.9	5.7	6.4	6.7				92		98
Measured/Loaded by:		RJH	SMC	SMC	SMC	SMC	SMC	SMC	SMC	SMC	SMC	SMC	SMC	SMC		SMC
Recorded by:		SMC	SMC	SMC	RJH	LB	LB	RJH	LB	LB	RJH	LB	LB	RJH		LB

Investigators' Signatures

Sandy McClure
Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:			0	HACH	AWM
Alkalinity:					
Hardness:					
Total Ammonia:					

Ammonia meter slope:

Macroinvertebrate taxa list for Monsanto Chemical Company, Escambia County, Florida, collected via Hester-Dendy samplers above and below the discharge on October 25,1990 and November 5, 1990, respectively.

	Control Site	Test Site
Decapoda		
Callinectes sapidus	–	+
Rhithropanopeus harrisii	–	+
Diptera		
Ablabesmyia idei	–	+
Ablabesmyia parajanta grp.	+	+
Cladotanytarsus sp.	+	–
Cricotopus/Orthocladius grp. sp.	+	+
Dicrotendipes modestus	+	+
Dicrotendipes neomodestus	+	–
Nanocladius alternatherae	+	–
Nanocladius distinctus	+	+
Nilothauma bicornus	+	–
Parachironomus sp.	–	+
Polypedilum convictum grp.	+	–
Undetermined dipteran pupae	+	+
Simulium sp.	+	–
Tanytarsus sp.	+	–
Tribelos fuscicorne	+	+
Ephemeroptera		
Baetis intercalaris	+	–
Caenis diminuta	+	–
Stenonema mexicanum integrum	+	–
Hirudinea		
Helobdella elongata	+	–
Malacostraca		
Gammarus sp.	+	+
Grandidierella bonnieroides	–	+
Hyalella azteca	+	+
Palaemonetes paludosus	–	+
Odonata		
Ischnura sp.	–	+
Neurocordulia molesta	+	–
Oligochaeta		
Nais elinguis	+	–
Slavina appendiculata	+	–
Pelecypoda		
Undetermined mytillid sp.	–	+
Polychaeta		
Laeonereis culveri	–	+
Trichoptera		
Cyrnellus fraternus	+	–
Hydropsyche sp.	+	–
Hydroptila sp.	+	–
Macronema carolina	+	–
Oecetis cinerascens	+	–
Oecetis sp.	+	–
Total	**28**	**17**

Macroinvertebrate taxa list for Monsanto Chemical Company, Escambia County, Florida, collected via timed qualitative methods (dip net, etc.) above and below the discharge on September 17,1990.

	Control Site	Test Site
Coleoptera		
Berosus sp.	+	–
Macronychus glabratus	+	–
Decopoda		
Rhithropanopeus harrisii	–	+
Diptera		
Ablabesmyia parajanta	+	–
Chironomini Genus B Johannsen	+	–
Cricotopus/Orthocladius grp. sp.	+	–
Cryptotendipes sp.	+	–
Dicrotendipes modestus	+	–
Dicrotendipes nervosus	+	–
Palpomyia grp. sp.	+	–
Polypedilum halterale grp.	+	+
Polypedilum illinoense	+	–
Pseudochironomus fulviventris	+	–
Pseudochironomus sp.	+	–
Stictochironomus devinctus	+	–
Tanytarsus sp.	+	–
Ephemeroptera		
Baetis ephipppatus	+	–
Centroptilum viridocularis	+	–
Gastropoda		
Undetermined hydrobiid	+	–
Physella heterostropha pomila	–	+
Malacostraca		
Grandidierella bonnieroides	–	+
Hyalella azteca	+	–
Palaemonetes paludosus	+	+
Odonata		
Enallagma sp.	+	–
Oligochaeta		
Eclipidrilus palustris	+	–
Limnodrilus hoffmeisteri	+	–
Undetermined lumbriculid sp.	+	–
Undetermined tubificid w/o capilliform setae	–	+
Pelecypoda		
Corbicula manilensis	+	–
Undetermined mytillid sp.	–	+
Trichoptera		
Cheumatopsyche sp.	+	–
Oecetis sp.	+	–
Total	**27**	**7**

Department of Environmental Regulation

Results of Fifth Year Inspections

Discharger:	**Monsanto Company**
County:	**Escambia**
NPDES Number:	**FL00902488**
State Permit Expiration Date:	**April 1, 1991**

Toxics Sampling Inspection (XSI)	
Date Sampled:	September 17,1991
Results:	No priority organic pollutants detected. 58 ug/l of zinc was found at the 002 outfall. This level may be chronically toxic.

Compliance Biomonitoring Inspection (CBI)	
Date Sampled:	September 17,1990
Results:	Neither Outfall 001 nor 002 was acutely toxic to *C. Dubia* or *N. leedsi.*

Impact Bioassessment Inspection (IBI)	
Date Sampled:	September 17, October 25, and November 5,1990
Results:	Macroinvertebrate community downstream of Monsanto appeared stressed compared to upstream site. This may have been partially due to the proximity of the downstream station to estuarine conditions. Further testing appears warrented.

Water Quality Inspection (WQI)	
Date Sampled:	
Results:	

These fifth year inspections provide the necessary information to evaluate the facility's impact on its receiving waters and to provide specific recommendations for renewal.