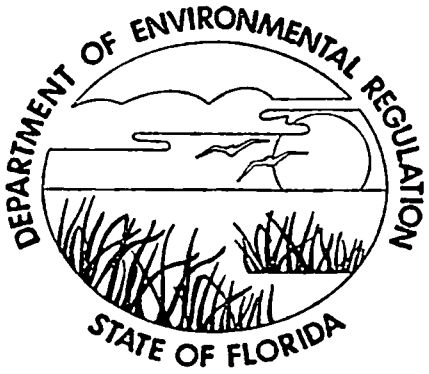


BIOASSAYS OF MONSANTO COMPANY, ESCAMBIA COUNTY
INCLUDING 96 HOUR FLOW THROUGH, 96 HOUR STATIC RENEWAL
48 HOUR STATICS AND STANDARD REFERENCE TOXICANT ASSAYS
SOUTH OUTFALL #001, NPDES #FL0002488

SEPTEMBER 19, 1986

Biology Section
Division of Environmental Programs

BIOASSAYS OF MONSANTO COMPANY, ESCAMBIA COUNTY INCLUDING 96 HOUR FLOW THROUGH, 96 HOUR STATIC RENEWAL 48 HOUR STATICS AND STANDARD REFERENCE TOXICANT ASSAYS SOUTH OUTFALL #001, NPDES #FL0002488

Biology Section
Bureau of Laboratories and
Special Programs
September 19, 1986

EXECUTIVE SUMMARY

Monsanto Company, Flow-Through and Statics, on 13 to 17 July, 1986.

On-site flow-through and static acute toxicity bioassays were performed on the south outfall (#001) of Monsanto Company, a manufacturer of nylon fibers and chemical intermediate products. The flow-through test, using Notropis leedsi, indicated that the discharge was not acutely toxic. Only a few random deaths were noted. The static renewal test, also using N. leedsi, similarly resulted in only random deaths through 72 hours of the test period. By hour 96 however, most of the fish had died in the 100% effluent concentration, resulting in an LC_{50} of 79.6%. This mortality, however, may have resulted from large fluctuations in temperature, pH, and dissolved oxygen during the test, which probably stressed the organisms. This mortality (and LC_{50}), therefore, is suspect and should not be considered as a violation of the FAC toxicity standards. Concurrent 48 hour static test, using Ceriodaphnia dubia and Daphnia pulex, produced LC_{50}'s of 238.0% and 881.7%, respectively. These LC_{50}'s however, are in compliance with the FAC toxicity standards due to the presence of Monsanto's mixing zone. Results of standard reference toxicant bioassays, performed on-site during the flow-through test, indicated that all test organisms were viable and within expected sensitivity ranges using sodium lauryl sulfate as the toxicant.

No ammonia was detected in the south outfall effluent during the test period. Additionally, the highest chlorine residual measured (0.10 mg/l) was apparently insufficient to have caused acute toxicity, but may have contributed to the slight toxicity noted in the water flea bioassays. The results of metal analyses indicated the presence of a small amount of zinc (10 ug/l), which was insufficient to have caused any toxicity.

The results of concurrent flow-through and static bioassays, performed by Dr. Don Grothe of Monsanto Company, indicated no acute toxicity (Dr. Donald Grothe, personal communication).

Based on these results, we recommend no further action be taken other than continued routine inspection and biomonitoring of the Monsanto discharges.

INTRODUCTION

Monsanto Textiles Company is located at the intersection of State Roads 292 and 297, near Gonzalez in Escambia County, Florida (Figure 1). This facility operates continuously producing nylon fibers and intermediate products. Process wastewater is generated by the production of adipic acid and nylon fibers. This wastewater is concentrated and disposed of through deep-well injection. Additional sources of wastewater are cooling water and stormwater. Cooling water, obtained directly from the Escambia River, is supplemented with the anti-fouling agents chromium and chlorine for use in the plant. The chromium additive, however, is currently being replaced with a less harmful phosphate based agent. This water is discharged through Outfall #001 (South) to the Escambia River. Prior to discharge, an oil skimmer collects floating oil, grease, and other debris. Stormwater is collected from the plant and surrounding properties and is discharge through Outfall #002 (North) to the Escambia River. A schematic of wastewater sources and flow is outlined in Figure 2.

On 13 February, 1980, the Biology Section performed two 48 hour static bioassays on a 24 hour composite sample of effluent from Outfall #001. The results of those tests indicated that the sample was not acutely toxic Pimephales promelas. However, the sample was toxic to Daphnia pulex, resulting in a 48 hour LC_{50} of 55%.

At the request of DER's Northwest District, additional bioassays were performed to further evaluate the toxicity of effluents from this facility. Six 48 hour static acute toxicity bioassays were performed from 27 to 29 March, 1985, on samples collected from both Outfall #001 and #002. The Outfall #001 tests resulted in acute toxicity to Daphnia pulex and to Notropis leedsi (48 hour LC_{50}'s = 77.8% and 59.1%, respectively). No mortality occurred in the Mysidopsis bahia test. No apparent cause for this toxicity was evident, since residual chlorine was not detected in the sample (FDER 1985a). Chemical anlayses, contracted and submitted by Monsanto, indicated the presence of chromium, copper, and zinc, which may have contributed to the toxicity. No toxicity was evident in the Outfall #002 (North) sample. Due to the concern over the outcome of the DER tests, Monsanto contracted a private laboratory to perform additional bioassays on the Outfall #001 (South) effluent. Results indicated no acute toxicity to the test organisms, Pimephales promelas and Daphnia pulex. These tests, however were performed during November 1985 (Dr. Peter Shuba, personal communication).

Due to the difference in test results, the Northwest District requested that a definitive onsite flow-through bioassay be performed on the Outfall #001 effluent. This 96 hour flow-through, together with a 96 hour static renewal and 48 hour static bioassays, were performed from 13 to 17 July, 1986. Test organisms were the previously used Notropis leedsi and Daphnia pulex, and the waterflea, Ceriodaphnia dubia. Standard Reference Toxicant bioassays using these test organisms were also

performed onsite during the flow-through test. The results of these tests are presented in this report. Those involved in performing the tests and in preparation of this report were: C. W. Dye, R. B. Frydenborg, M. L. Roll, and P. G. Weiland.

Additionally, to duplicate the DER flow-through and static bioassay, Monsanto Company performed concurrent and identical tests using their own mobile bioassay trailer. A copy of the Monsanto test results is attached to this report as an appendix. We wish to thank Monsanto representatives, specifically Ms. Laura Brown and Dr. Don Grothe, for their valuable assistance and cooperation during the test and during a previous onsite inspection.

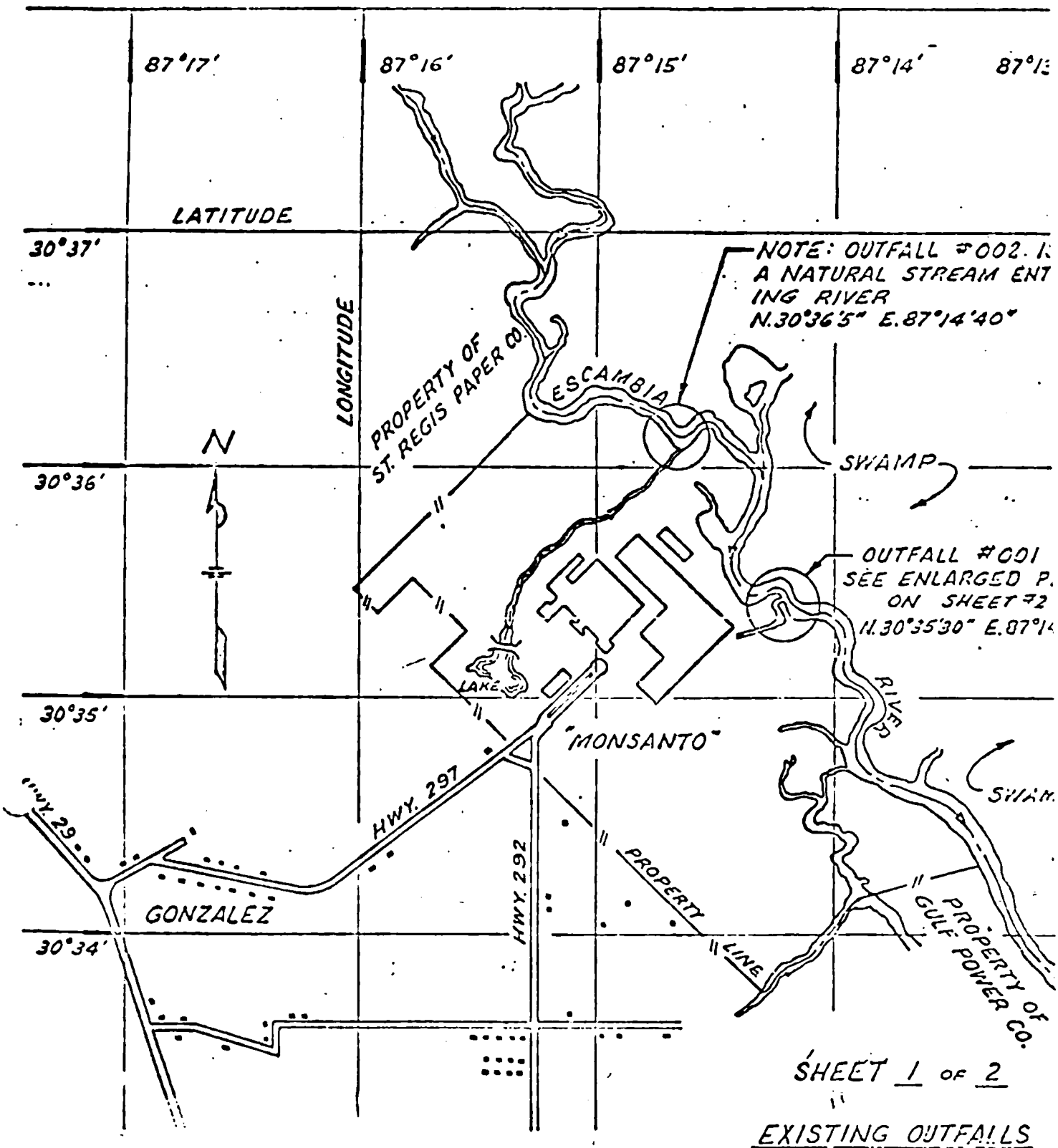

87°17'
87°16'
87°15'
87°14'
LATITUDE
30°37'
LONGITUDE
NOTE: OUTFALL #002. I
A NATURAL STREAM ENT
ING RIVER
N.30°36'5" E.87°14'40"
PROPERTY OF
ST. REGIS PAPER CO.
ESCAMBIA
N
30°36'
SWAMP
OUTFALL #001
SEE ENLARGED P.
ON SHEET #2
N.30°35'30" E.87°1
LAKE
RIVER
30°35'
"MONSANTO"
SWAM
HWY. 29
HWY. 297
HWY. 292
PROPERTY
LINE
PROPERTY OF
GULF POWER CO.
GONZALEZ
30°34'
SHEET 1 OF 2
EXISTING OUTFALLS
In ESCAMBIA RIVER
at MONSANTO COMPANY
County of ESCAMBIA
State of FLORIDA
Date 5-28-71
LOCATION MAP
SCALE IN MILES
1 3/4 1/2 1/4 0 1 2

FIGURE 1.

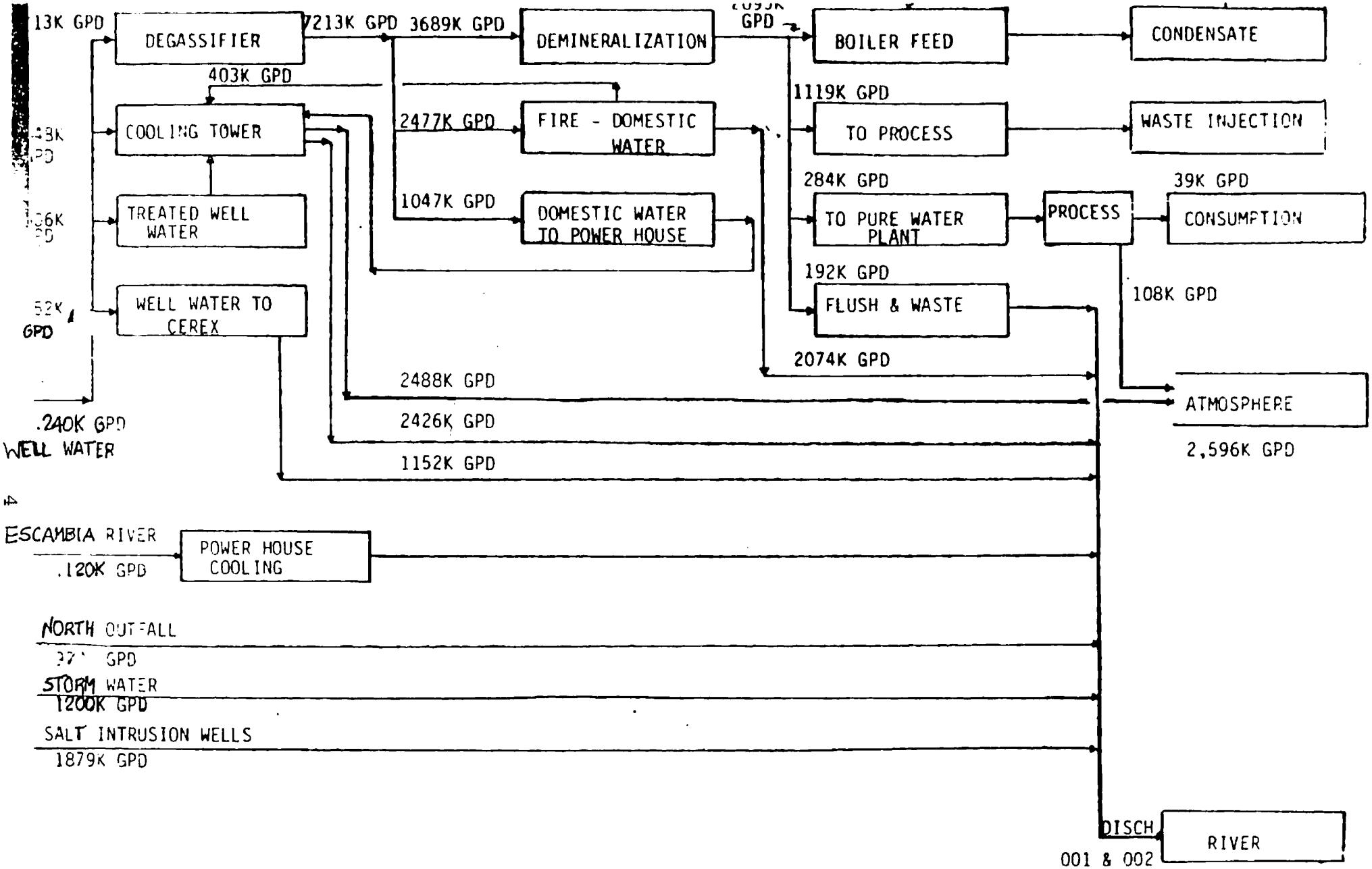


FIGURE 2

SCHEMATIC OF WATER FLOW
MONSANTO TEXTILES COMPANY
GONZALEZ, ESCAMBIA, FLORIDA
JULY 12, 1978

METHODS AND MATERIALS

Test methods used to conduct these flow-through and static bioassays are extensively described by Peltier and Weber (1985) and the FDER Biology Section (1985a). The organism selected for this study include species recommended by Peltier and Weber (1985), the U.S. EPA (1978), and the FDER Biology Section (1985b). Additionally, the Biology Section maintains cultures of several species of organisms indigenous to the State of Florida. One of these indigenous species was also selected for testing. Life histories of these test organisms and maintenance procedures used to culture them are detailed below.

History and Maintenance of Bioassay Organisms

Daphnia pulex (water flea) - A breeding culture of Daphnia pulex was obtained from the EPA laboratory in Athens, Georgia, in March, 1979. This culture has been maintained since its arrival in 2 1/2 gallon all-glass aquaria, filled with unchlorinated DER well water, under a 16:8 hour light-dark cycle. Organisms are fed a liquified blend of Purina Trout Chow® and Cerophyl® twice daily, once daily on weekends, and are kept at a constant temperature of 22° ± 2°C. The aquaria are cleaned weekly by siphoning off half the water along with the detritus and excess organisms, and then refilling with fresh aerated well water. Additional measures are taken and/or new cultures started in the event of abnormal circumstances such as: declining populations, ephippia formation, or excessive fungal or bacterial growth.

The D. pulex used in the Monsanto tests were obtained by siphoning individuals from each of our culturing aquaria into a eight liter glass aquarium, containing water obtained from the Escambia River during a preliminary site visit. The Escambia River water was used as diluent for the onsite tests and, therefore, the organisms were pre-acclimated to this dilution water. The aquarium was transported to the site by state vehicle and immediately transferred to the mobile bioassay lab, and therefore, did not undergo any significant temperature change or disturbance. The D. pulex were fed prior to transport, and daily thereafter, and there was no observed mortality of these organisms prior to the test.

Ceriodaphnia dubia (water flea) - A breeding culture of Ceriodaphnia dubia was obtained from the EPA laboratory in Athens, Georgia, in June, 1985. The culture is maintained in 2-1/2 gallon all-glass aquaria, filled with unchlorinated DER well water, under a 16:8 hour light-dark cycle. Organisms are fed a liquified blend of Purina Trout Chow®, Cerophyl® and Fleischmann's® yeast twice daily, once daily on weekends, and are kept at a constant temperature of 26° ± 2°C. The aquaria are cleaned weekly by siphoning off half the water along with the detritus and excess organisms, and then refilling with fresh aerated well water. Additional measures are taken and/or new cultures started in the event of abnormal circumstances such as: declining populations, ephippia formation, or excessive fungal or bacterial growth. The C. dubia used in the Monsanto tests were treated the same as were the Daphnia, except they were transported to the test site in an one gallon jar.

Notropis leedsi (bannerfin shiner) - Approximately 40 adult bannerfin shiners were obtained from an indigenous population in the upper Suwannee River during October, 1981. The breeding stock is maintained in 30 and 125 gallon all-glass aquaria equipped with a flow-through water exchange system. Water for this system is unchlorinated and is pumped from the DER deep well. The bannerfin shiners are reared at 22° ± 2°C under a 16:8 hour light-dark cycle and are fed Tetra-Min® and frozen Artemia (brine shrimp) twice daily, and once daily on weekends. Breeding and egg hatching are encouraged at 25°C. The eggs are laid between stacked red ceramic tiles separated by a 3mm bead of silicone. Most of the eggs adhere to the tiles and are easily removed to heated, aerated hatching tanks. The narrow space between the tiles eliminates egg predation by adult fish. New hatching tanks are started regularly to segregate fry into even age groups. Newly hatched fry are fed a liquefied blend of Purina Trout Chow® and Cerophyl® twice daily. After one week, feeding is augmented with newly hatched Artemia nauplii and finely crushed Tetra Min®.

The N. leedsi used in the Monsanto test began hatching in the Tallahassee lab on approximately June 20, 1986, in 2-1/2 gallon all-glass aquaria. Water was replaced in these aquaria over a period of days with Escambia River water (to be used as diluent in the on-site tests). Therefore, the fish were pre-acclimated to this dilution water. The fish were fed daily with live, freshly hatched Artemia and were acclimated to 20°C in the mobile lab prior to the test. The fish did not under go any significant tempeature change or disturbance, nor was there any mortality observed prior to the test. The fish were approximately 20 days old at the start of the test.

To ensure the uniform sensitivity of these test organisms to toxic substances, the Biology Section conducts monthly standard reference toxicant bioassays using sodium lauryl sulfate as the reference toxicant. Additionally, on-site reference toxicant tests were performed in the mobile bioassay lab using Notropis leedsi, Daphnia pulex, and Ceriodaphnia dubia, to evaluate the sensitivity of these organisms after their transportation to the site and under the conditions in the mobile lab. The results of these tests would indicate whether the sensitivities of the organisms used in the tests had changed significantly from that experienced in the Tallahassee lab or had deviated from the recommended EPA and DER sensitivity ranges.

Test Methods

Dilution Water

Water used to acclimate the organisms prior to the test, and as dilution water in the flow-through and static tests, was obtained from the Escambia River upstream of the Outfall #002 discharge. This water was characterized by a pH of 6.5 to 6.9 standard units and a conductivity of 100 to 160. Approximately 250 gallons of this dilution water was conveyed daily to a 300 gallon Nalgene® tank at the test site.

Pre-test Conditions and Preparations

DER's mobile bioassay laboratory was constructed following EPA design specifications (Peltier and Weber, 1985) and is equipped with two solenoid valve operated, flow-through, proportional dilutor systems (Figure 3). The mobile lab also has suitable working area for performing static tests concurrently with the flow-through tests. The mobile laboratory was transported by commerical mover from Tallahassee to Monsanto on July 11, 1986. The trailer was positioned adjacent to Monsanto's Outfall #002. Electric power for the mobile lab was supplied by Monsanto.

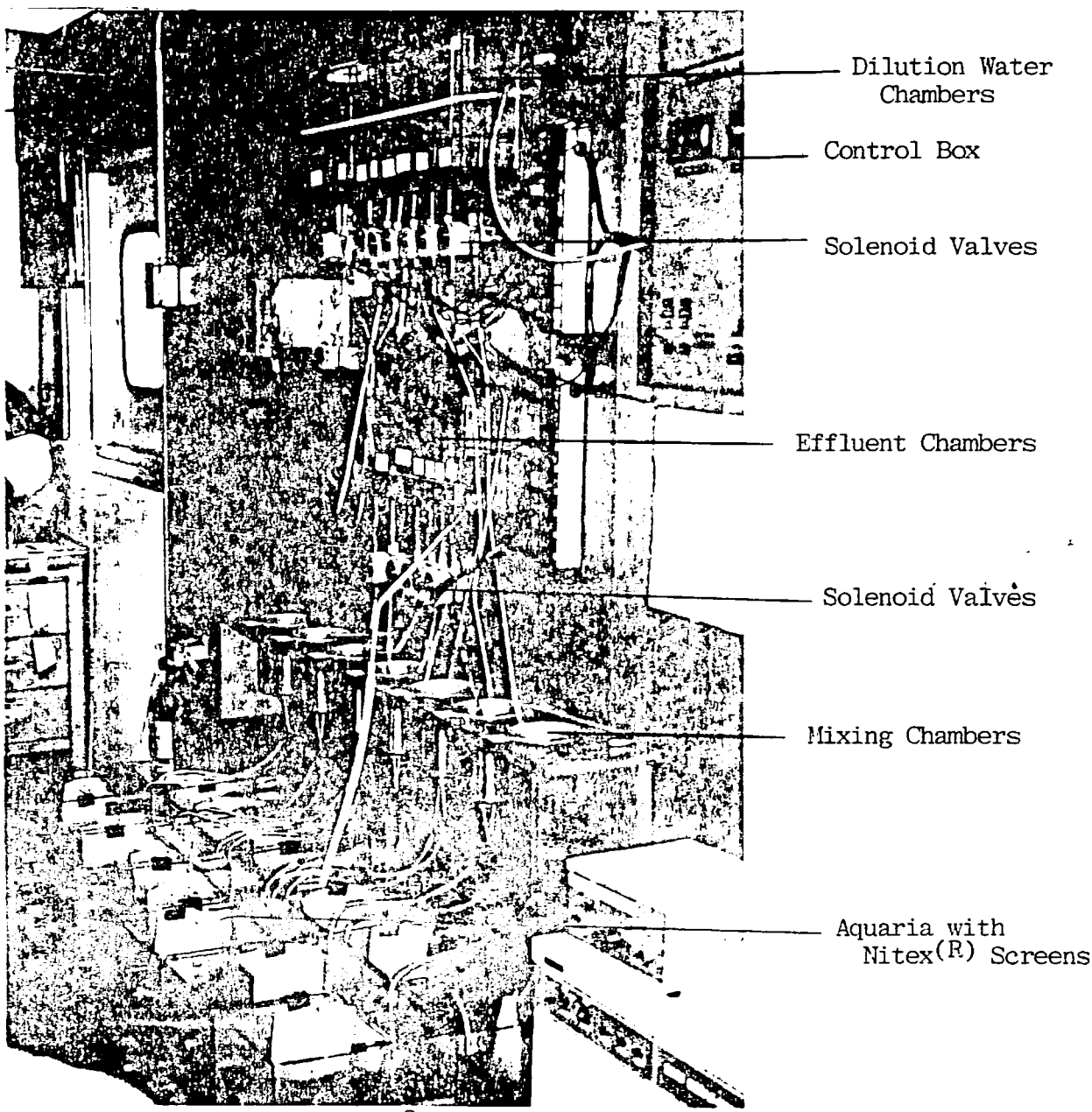
An effluent sampling pump was suspended into the wastewater stream and was positioned approximately 0.3 meters beneath the surface (at least 0.3 meters off the bottom of the ditch). Effluent was conveyed directly and continously to the mobile bioassay lab via a 100' length of braided reinforced Tygon® hose. Dilution water was transferred to a 350 gallon Nalgene® tank postioned near the mobile lab. A similar sampling pump was submerged in this tank and dilution water was conveyed diretly and continously to the mobile lab via a 10' length of identical Tygon® hose. Upon entering the mobile lab, both effluent and dilution water sampling lines passed through a cooled water bath adjusted to approximately 18°C. This water bath maintained the temperature of the effluent and dilution water at 24° $\pm$ 2°C. This temperature is somewhat higher than the recommended test temperature, a result of the unusually warm effluent and dilution water during this time of year.

Calibration of the proportional dilutor was performed in Tallahassee prior to transport to Monsanto. Additionally, calibration was verified again just prior to the beginning of the test and at the end of the 96 hour test. The concentrations and volumes produced by the flow-through dilutor system are presented in Table 1. Flow rates were adjusted to operate the dilutor at approximately 10.5 cycles per hour, which provided for approximately 15 complete volume changes in the 8 liter flow-through aquaria every 24 hours. The dilutor system was operated for approximately 21 hours before the introduction of the test organisms at the beginning of the test at 0900 hours on Sunday, July 13, 1986. The test was concluded at 0900 hours on Thurdsay, July 17, 1986.

Flow-Through Methods and Parameters

Two replicates of six concentrations and a control were used for the *N. leedsi* flow-through test. To facilitate counting, the organisms were pipetted from culture dishes into retention chambers, which consisted of glass petri dishes to which cylinders of Nitex® screen (243 micron mesh size) were attached by silicone cement. These Nitex® retention chambers allowed much easier counting of test organisms when lifted from the test aquaria, while not retarding water flow in the aquaria. Five organisms were loaded per retention chamber per aquarium, resulting in 10 test organisms per test concentration.

Figure 3. Inside of DER's Mobile Bioassay Lab Showing Solenoid Valve Operated Flow-Through Dilutor System and Aquaria.



The number of live organisms, dissolved oxygen, pH, temperature and conductivity were recorded at 0, 24, 48, 72, and 96 hours for each aquarium. Ammonia concentrations, including total and unionized fractions (expressed in mg/l as N and NH_3, respectively), in the 100% test concentration, were also recorded daily. Total alkalinity and total hardness were also measured daily in the control and 100% concentration. These values appear in Table 2. The Notropis leedsi were fed Artemia nauplii prior to transport and several times throughout the 96 hour test.

96 Hour Static Renewal Bioassay

Concurrently with the flow-through test, a 96 hour static renewal bioassay was performed on-site, in the mobile bioassay lab. This test consisted of collecting daily, approximately two gallons of wastewater directly from the wastewater stream. This sample was then de-chlorinated to remove any trace of residual chlorine, by adding an appropriate amount of sodium thiosulfate. The de-chlorinated sample was then split with Monsanto for use in their duplicate test. Five test concentrations of the effluent were prepared with this sample and Escambia River diluent, consisting of from 10% through 100% (Table 1). A control was used for this test, consisting of Escambia River water with a similar concentration of sodium thiosulfate added. These procedures were performed daily at each renewal. Five N. leedsi were pipetted into Nitex® retention chambers, (identical but smaller than the ones used in the flow-through aquaria) in each jar. Two replicates were used for each concentration, resulting in 10 test organisms per test concentration. At each 24 hour interval, the Nitex® chambers were removed and the contents of the jars discarded. Each jar was then immediately filled (500 ml) with the same test concentration as previously described. The fish, still in their Nitex® chambers, were then re-introducted into their appropriate jars. The same physical-chemical parameters as above were recorded from 0 through 96 hours. These values are reported in Table 3.

These parameters were recorded at the beginning of each daily renewal period, until hour 96 when the final parameters were recorded at the end of the test. Surprisingly, the 96 hour recordings of dissolved oxygen, pH, and temperature were significantly different from the previous 72 hours of recordings. The difference in temperature was due to the fact that a fresh (warm) sample was collected each day from the outfall and the temperature then decreased in the cool trailer until the next renewal period. The differences in dissolved oxygen and pH are not so easily explained. It is not known if these two parameters also decreased daily in the trailer prior to the next renewal period, or if the 96 hour values were actually due to a change in the wastewater when the sample was collected for the final renewal period. It is not expected that the pH would decrease to the value measured (4.9, Table 3) due solely to natural conditions. Nevertheless, mortality data obtained from this test is suspect due to the known fluctuation in temperature. The fish used in this test were also fed Artemia nauplii.

Daphnia pulex and Ceriodaphnia dubia Freshwater Static Tests

During the first two days of the flow-through test, a D. pulex and a C. dubia 48 hour static bioassays were performed, using test concentrations (effluent and dilution water) obtained directly from the flow-through aquaria. The D. pulex test was repeated during the last two days of the flow-through test.

Two replicates, of each of the flow-through concentrations and the control, were used to test with the water fleas, Ceriodaphnia dubia and Daphnia pulex. Flint glass jars of 250 ml capacity were used as test chambers, and 200 ml of the appropriate test concentration was placed in each chamber. Ceriodaphnia were siphoned into a large culture dish and neonates were transferred by glass pipette, and loaded 10 per chamber, resulting in 20 per test concentration. Daphnia were siphoned into a large culture dish to isolate the proper size and age organisms (neonates). To accomplish this, the water fleas were siphoned through a stainless steel screen. The trapped adults were then discarded. These neonates were then transferred by glass pipette, examined for injury, and were loaded 10 per chamber, resulting in 20 per test concentration. Water fleas were not fed during these tests. Test data are reported in Tables 4, 5, and 6.

48 Hour Standard Reference Toxicant Bioassays

During the first two days of the flow-through bioassay (13 to 15 July, 1986) three Standard Reference Toxicant bioassays were performed on-site, in the bioassay trailer. Sodium lauryl sulfate was used as the reference toxicant, in a stock concentration of 100 ppm. This stock concentration was diluted in Tallahassee well water to obtain a concentration series (Table 1) of from 3 to 10 ppm. Two replicates of each concentration was used, each containing either 10 water fleas or 5 fish.

These tests would indicate if the sensitivities of the organisms used in these tests were significantly different from sensitivities obtained in previous tests in the Tallahassee laboratory. Dissolved oxygen, pH, temperature, and the number of live organisms were recorded for each test chamber at 0 hours, 24 hours, and 48 hours. The conductivity of each test concentration was recorded at the beginning and end of the test. All data recorded during these tests are presented in Tables 7, 8, and 9. The organisms were not fed during the tests.

Table 1. Diluent and Effluent Volumes, and Final Concentrations used in Flow-Through Bioassay of Monsanto Company (13 to 17 July, 1986).

1. Flow-Through Bioassay (13 to 17 July, 1986), Notropis leedsi

Diluent[a]		Effluent[a]		Total Volume[a]		Final Concentration[a]	
0 Hours	96 Hours	0 Hours	96 Hours	0 Hours	96 Hours	0 Hours	96 Hours
956 ml	980 ml	0 ml	0 ml	956 ml	980 ml	0%	0%
928 ml	929 ml	55 ml	55 ml	983 ml	984 ml	5.6%	5.6%
923 ml	932 ml	99 ml	96 ml	1022 ml	1028 ml	9.6%	9.3%
727 ml	750 ml	150 ml	147 ml	877 ml	897 ml	17.1%	16.4%
640 ml	645 ml	309 ml	308 ml	949 ml	953 ml	32.5%	32.3%
360 ml	367 ml	460 ml	450 ml	820 ml	817 ml	56.0%	55.0%
0 ml	0 ml	945 ml	993 ml	945 ml	993 ml	100.0%	100.0%

2. Static (C. dubia and D. pulex) and Static Renewal (N. leedsi) tests (13 to 17 July, 1986)

Ceriodaphnia dubia (water flea)

Daphnia pulex (water flea)

Concentration	Dilution Water	Effluent	Total Volume
Control	200.0 ml	--------	200 ml
5.6%	188.8 ml	11.2 ml	200 ml
10.0%	180.0 ml	20.0 ml	200 ml
18.0%	164.0 ml	36.0 ml	200 ml
32.0%	136.0 ml	64.0 ml	200 ml
56.0%	88.0 ml	112.0 ml	200 ml
100.0%	--------	200.0 ml	200 ml

Notropis leedsi (bannerfin shiner)

Concentration	Dilution Water	Effluent	Total Volume
Control	500 ml	--------	500 ml
10.0%	450 ml	50 ml	500 ml
18.0%	410 ml	90 ml	500 ml
32.0%	340 ml	160 ml	500 ml
56.0%	220 ml	280 ml	500 ml
100.0%	------	500 ml	500 ml

3. Notropis leedsi Standard Reference Toxicant Test (13 to 17 July, 1986)

Concentration	Dilution Water	Toxicant	Total Volume
Control	500 ml	-----	500 ml
3.0 ppm	485 ml	15 ml	500 ml
7.0 ppm	465 ml	35 ml	500 ml
10.0 ppm	450 ml	50 ml	500 ml

Daphnia pulex and Ceriodaphnia dubia Standard Reference Toxicant Test (13 to 17 July, 1986)

Concentration	Dilution Water	Toxicant	Total Volume
Control	200 ml	-----	200 ml
3.0 ppm	194 ml	6 ml	200 ml
7.0 ppm	186 ml	14 ml	200 ml
10.0 ppm	180 ml	20 ml	200 ml

[a] All values are the average of two or more replicates. Final concentrations are to nearest 0.1%.

Table 2. Data recorded during 96 hour, Notropis leedsi, flow-through bioassay of Monsanto Company, Escambia County, NPDES #FL0002488, South Outfall #001, on 13 to 17 July, 1986.

Conc. or %	Test Container Number	Number of Live Organisms					Dissolved Oxygen (mg/l)					pH					Total Alkalinity (mg/l as $CaCO_3$)					Total Hardness (mg/l as $CaCO_3$)					Temperature				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Control	A	5	5	5	5	5	7.5	7.4	8.2	8.8	7.9	6.8	6.9	6.6	6.6	6.5	29	32	39	29	27	28	27	25	27	28	21.9	23.8	23.0	24.5	23.9
Control	B	5	5	5	5	5	7.2	7.4	8.3	8.7	7.9	6.9	6.9	6.6	6.6	6.6											23.0	24.5	23.4	25.0	24.4
5.6%	A	5	5	5	5	5	7.4	7.3	8.2	8.7	7.9	6.8	6.8	6.8	6.9	6.7											22.2	24.5	23.4	25.1	24.3
5.6%	B	5	5	5	5	5	7.4	7.3	8.2	8.6	8.0	6.9	6.7	6.8	6.9	6.7											22.6	24.5	23.5	25.0	24.5
9.5%	A	5	5	5	5	5	7.6	7.5	8.2	8.7	7.8	6.9	6.7	6.9	7.0	6.8											21.9	23.8	23.1	24.2	23.7
9.5%	B	5	5	5	5	5	7.4	7.3	8.3	8.7	7.9	7.0	6.8	6.9	6.9	6.8											23.0	24.9	24.0	25.0	24.7
16.8%	A	5	5	5	5	5	7.4	7.3	8.1	8.7	7.7	7.0	6.9	7.0	7.0	6.9											22.1	24.1	23.5	24.5	24.0
16.8%	B	5	5	5	5	5	7.3	7.3	8.2	8.7	7.7	7.0	6.9	7.0	7.0	6.9											23.5	25.2	24.1	25.5	24.8
32.4%	A	5	4	4	4	4	7.2	7.2	8.0	8.5	7.6	7.1	6.9	7.0	7.0	6.9											22.5	24.8	24.0	25.2	24.5
32.4%	B	5	5	5	5	5	7.3	7.1	8.0	8.5	7.6	7.1	6.9	7.0	7.0	6.9											23.2	25.4	24.3	25.7	25.0
55.5%	A	5	5	4[a]	4	4	7.4	7.1	7.8	8.3	7.3	7.1	7.0	7.0	7.0	7.0											22.4	25.0	24.5	25.2	24.9
55.5%	B	5	5	5	5	5	7.3	7.0	7.9	8.4	7.3	7.1	7.0	7.0	7.0	7.0											23.2	25.6	24.9	26.0	25.2
100.0%	A	5	5	5	5	5	7.2	6.8	7.5	8.2	7.1	7.1	7.0	7.0	7.0	7.0	37	32	30	32	29	110	100	100	72	52	23.0	26.1	25.8	26.5	26.0
100.0%	B	5	5	5	5	5	7.2	6.8	7.6	8.2	7.1	7.1	7.0	7.0	7.0	7.0											23.5	26.2	25.8	26.5	26.0

[a] Value not found.

Total Residual Chlorine: 0 Hours, 0.06mg/l; 24 Hours, 0.06mg/l; 48 Hours, 0.10mg/l; 72 Hours, 0.08mg/l

Table 2. Continued.

Conc. %	Test Container Number	Conductivity (umhos)					Total Ammonia (mg/l as N)					Unionized Ammonia (mg/l as NH_3)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Control	A	100	120	110	120	115										
Control	B	110	160	110	115	110										
5.6%	A	145	175	155	140	130										
5.6%	B	160	180	165	140	130										
9.5%	A	185	200	195	155	145										
9.5%	B	185	195	195	155	145										
10.8%	A	255	270	260	190	170										
10.8%	B	245	250	255	190	170										
32.4%	A	365	365	380	250	220										
32.4%	B	385	400	415	270	235										
55.5%	A	650	700	700	370	310										
55.5%	B	650	650	650	370	310										
100.0%	A	1000	1000	1100	610	485	0	0	0	0	0	0	0	0	0	0
100.0%	B	1100	1050	1100	650	475										

Table 3. Data recorded during 96 hour, Notropis leedsi, static renewal bioassay of Monsanto Company, Escambia County, NPDES #FL0002488, South Outfall #001, on 13 to 17 July, 1986.

Conc. or %	Test Container Number	Number of Live Organisms					Dissolved Oxygen (mg/l)					pH					Total Alkalinity (mg/l as $CaCO_3$)					Ammonia (mg^3/l)					Temperature				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Control		5	5	5	5	5	7.4	6.8	8.2	7.3	3.1	6.8	7.3	6.6	6.9	6.6	120	230	129			0	0	0	0	0	26.2	26.5	25.4	25.4	18.7
Control		5	5	5	4	4	7.5	6.9	8.2	7.3	3.0	6.8	7.3	6.6	6.9	6.6	120	260	120	132	255						26.2	26.5	25.4	25.5	18.6
10.0%		5	5	5	5	4	7.4	7.0	8.3	7.1	2.8	7.0	7.2	6.8	7.0	6.0	145	312	392								26.7	26.6	25.5	26.0	18.3
10.0%		5	5	5	5	4	7.4	6.9	8.3	7.3	2.1	7.0	7.2	6.9	7.0	6.0	130	322	390	333	380						26.7	26.8	25.7	26.1	18.3
18.0%		5	5	5	5	5	7.4	7.0	8.1	7.1	1.6	7.1	7.2	7.0	7.0	5.6	125	470	680								27.0	27.1	25.9	26.5	18.3
18.0%		5	4	4	4	4	7.4	7.0	8.1	7.3	2.1	7.1	7.2	7.0	7.0	5.5	120	470	690	600	600						27.0	27.1	25.9	26.5	18.3
32.0%		5	5	5	5	5	7.4	7.0	7.9	7.4	1.8	7.4	7.3	7.0	7.1	5.0	750	800	1020								27.0	26.9	25.8	26.6	18.3
32.0%		5	5	5	3	3	7.4	7.0	7.9	7.5	1.7	7.3	7.2	7.0	7.1	5.0	750	800	1050	900	850						27.0	26.9	26.2	26.8	18.5
56.0%		5	5	5	5	5	7.3	6.9	7.9	6.9	2.3	7.3	7.3	7.0	7.1	5.1	1200	1260	1610								27.0	26.6	25.7	26.9	18.5
56.0%		5	5	5	5	5	7.3	6.9	7.9	6.9	2.2	7.3	7.3	7.1	7.1	5.0	1200	1270 1650	1410 1350								27.0	26.5	26.1	26.9	18.5
100.0%		5	5	5	5	0[a]	7.2	6.9	6.9	6.9	3.4	7.4	7.3	7.1	7.1	4.9	1950	2000	2610			0	0	0	0	0	27.5	26.0	25.8	26.9	18.5
100.0%		5	5	5	5	1[a]	7.3	6.9	6.9	6.9	3.3	7.4	7.3	7.1	7.1	4.9	1950	2050 2700	2320 2050								27.7	26.0	25.9	26.9	18.5

Sodium thiosulfate used to de-chlorinate wastewater. Sodium thiosulfate also added to the controls.

[a] This mortality is considered invalid due to stress caused by low DO and temperature fluctuations.

Table 4. Data recorded during 48 hour, Daphnia pulex, static acute toxicity bioassay of Monsanto Company, Escambia County, NPDES #FL0002488, South Outfall #001, on 13 to 15 July, 1986.

Concentration or %	Number of Live Organisms			Dissolved Oxygen (mg/l)			pH			Temperature (°C)			Conductivity (umhos)		
	0	24	48	0	24	48	0	24	48	0	24	48	0	48	
Control	10	10	10	7.5	8.5	9.6	6.8	6.6	6.7	21.9	19.6	17.7	100	125	Control Water
Control	10	10	10	7.2	8.4	9.6	6.9	6.6	6.7	23.0	19.7	17.6	110		NH_3(as NH_3)(mg/l) 0; Total Alkalinity 29 (mg/l $CaCO_3$)
5.6%	12[a]	12	12	7.4	8.5	9.6	6.8	6.6	6.8	22.2	19.2	17.1	145	145	
5.6%	10	10	10	7.4	8.5	9.6	6.9	6.6	6.8	22.6	19.2	17.1	160		Total ammonia (as N)(mg/l) 0; Total Hardness 28 (mg/l $CaCO_3$)
10.0%	10	10	10	7.6	8.5	9.6	6.9	6.7	6.8	21.9	19.0	16.9	185	190	
10.0%	11[a]	11	11	7.4	8.4	9.6	7.0	6.7	6.9	23.0	18.9	17.0	185		
18.0%	10	10	10	7.4	8.4	9.7	7.0	6.8	6.9	22.1	18.9	17.0	255	240	
18.0%	11[a]	11	11	7.3	8.1	9.7	7.0	6.9	6.9	23.5	19.0	17.0	245		
32.0%	10	10	10	7.3	8.2	9.7	7.1	6.8	7.0	22.5	19.3	17.0	365	330	
32.0%	10	10	10	7.3	8.1	9.7	7.1	6.8	7.0	23.2	19.3	17.0	385		100% Effluent
56.0%	10	10	9	7.4	8.0	9.7	7.1	6.8	7.0	22.4	19.4	17.0	650	490	NH_3(as NH_3)(mg/l) 0; Total Alkalinity 37 (mg/l $CaCO_3$)
56.0%	11[a]	11	11	7.3	8.0	9.7	7.1	6.9	7.0	23.2	19.4	17.0	650		
100.0%	10	10	10	7.2	8.0	9.7	7.1	6.9	7.0	23.2	20.1	17.1	1000	900	
100.0%	10	10	10	7.2	8.0	9.7	7.1	6.9	7.0	23.5	19.3	17.2	1100		Total ammonia (as N)(mg/l) 0; Total Hardness 110 (mg/l $CaCO_3$)

[a] Extra organisms loaded by mistake, allowed to remain.

Table 5. Data recorded during 48 hour, Ceriodaphnia dubia, static acute toxicity bioassay of Monsanto Company, Escambia County, NPDES #FL0002488, on 13 to 15 July, 1986.

Concentration or %	Number of Live Organisms			Dissolved Oxygen (mg/l)			pH			Temperature (°C)			Conductivity (umhos)	
	0	24	48	0	24	48	0	24	48	0	24	48	0	48
Control	10	10	10	7.5	7.8	9.7	6.8	7.1	6.9	21.9	22.0	17.2	100	125
Control	10	10	10	7.2	7.8	9.7	6.9	7.1	6.9	23.0	22.0	17.2	110	
5.6%	10	10	10	7.4	7.8	9.6	6.8	7.1	7.0	22.2	21.9	17.4	145	160
5.6%	10	9	9	7.4	7.8	9.6	6.9	7.1	7.0	22.6	21.6	17.4	160	
10.0%	10	10	10	7.6	7.9	9.6	6.9	7.1	7.0	21.9	21.5	17.3	185	210
10.0%	10	10	10	7.4	7.9	9.6	7.0	7.1	7.0	23.0	21.0	17.3	185	
18.0%	10	10	10	7.4	8.0	9.7	7.0	7.1	7.0	22.1	21.0	17.0	255	260
18.0%	10	10	10	7.3	8.0	9.7	7.0	7.1	7.0	23.5	21.0	17.0	245	
32.0%	10	10	9	7.2	8.2	9.5	7.1	7.1	7.0	22.5	20.8	17.0	365	380
32.0%	10	10	10	7.3	8.2	9.6	7.1	7.1	7.1	23.2	20.5	17.0	385	
56.0%	10	10	8	7.4	8.2	9.5	7.1	7.0	7.1	22.4	20.3	17.2	650	650
56.0%	10	10	9	7.3	8.2	9.5	7.1	7.0	7.1	23.2	20.0	17.4	650	
100.0%	10	8	7	7.2	8.3	9.5	7.1	7.1	7.1	23.2	20.0	17.4	1000	1000
100.0%	10	9	6	7.2	8.3	9.6	7.1	7.1	7.1	23.5	19.8	17.4	1100	

Control Water

NH_3(as NH_3)(mg/l): 0

Total ammonia (as N)(mg/l): 0

Total Alkalinity (mg/l $CaCO_3$): 29

Total Hardness (mg/l $CaCO_3$): 28

100% Effluent

NH_3(as NH_3)(mg/l): 0

Total ammonia (as N)(mg/l): 0

Total Alkalinity (mg/l $CaCO_3$): 37

Total Hardness (mg/l $CaCO_3$): 110

Table 6. Data recorded during 48 hour, Daphnia pulex, static acute toxicity bioassay of Monsanto Company, Escambia County, NPDES #FL0002488, on 15 to 17 July, 1986.

Concentration or %	Number of Live Organisms			Dissolved Oxygen (mg/l)			pH			Temperature (°C)			Conductivity (umhos)		
	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	10	10	10	8.2	9.1	8.5	6.6	6.8	6.7	23.0	19.5	18.5	110	110	110
Control	10	10	10	8.3	9.1	8.7	6.6	6.9	6.7	23.4	19.4	18.7	110		
5.6%	10	10	10	8.2	9.1	8.6	6.8	6.9	6.8	23.4	18.8	18.4	155	155	162
5.6%	10	10	10	8.2	9.1	8.4	6.8	6.9	6.8	23.5	18.4	18.1	165		
10.0%	10	10	9	8.2	9.1	8.6	6.9	6.9	6.8	23.1	18.7	18.0	195	180	189
10.0%	10	10	10	8.3	9.1	8.6	6.9	6.9	6.8	24.0	18.6	18.0	195		
18.0%	10	10	10	8.1	9.2	8.7	7.0	6.9	6.8	23.5	18.7	18.0	260	240	241
18.0%	10	10	10	8.2	9.2	8.7	7.0	6.9	6.8	24.1	18.6	18.0	255		
32.0%	10	10	8	8.0	9.2	8.8	7.0	7.0	6.9	24.0	18.8	18.0	380	380	385
32.0%	10	10	8	8.0	9.2	8.8	7.0	7.0	6.9	24.3	18.5	18.1	415		
56.0%	10	10	8	7.8	9.2	8.8	7.0	7.0	6.9	24.5	18.8	17.8	700	600	650
56.0%	10	10	10	7.9	9.2	8.8	7.0	7.0	7.0	24.9	18.5	17.8	650		
100.0%	10	10	8	7.5	9.2	8.8	7.0	7.0	7.0	25.8	18.4	17.9	1100	1000	1100
100.0%	10	10	9	7.6	9.0	8.9	7.0	7.0	7.0	25.8	19.1	18.0	1100		

Control Water

NH_3(as NH_3)(mg/l) 0

Total ammonia (as N)(mg/l) 0

Total Alkalinity (mg/l $CaCO_3$) 39

Total Hardness (mg/l $CaCO_3$) 25

100% Effluent

NH_3(as NH_3)(mg/l) 0

Total ammonia (as N)(mg/l) 0

Total Alkalinity (mg/l $CaCO_3$) 30

Total Hardness (mg/l $CaCO_3$) 100

Table 7. Data recorded during 48 hour, Ceriodaphnia dubia, static acute toxicity bioassay of sodium lauryl sulfate (SRT). on 13 to 15 July, 1986.

Concentration or %	Number of Live Organisms			Dissolved Oxygen (mg/l)			pH			Temperature (°C)			Conductivity (umhos)	
	0	24	48	0	24	48	0	24	48	0	24	48	0	48
Control	10	10	10	6.7	8.1	9.7	7.3	7.5	7.9	23.5	20.0	16.3	215	210
Control	10	10	10	6.9	8.1	9.7	7.3	7.6	7.9	23.5	19.8	16.3	215	210
3.0 ppm	10	7	6	7.3	8.0	9.7	7.3	7.7	7.9	24.0	19.8	17.0	215	210
3.0 ppm	10	9	8	7.4	8.0	9.7	7.4	7.7	7.9	24.0	19.7	17.0	215	210
7.0 ppm	10	5	1	7.3	7.9	9.7	7.4	7.7	7.9	23.5	19.6	17.2	215	210
7.0 ppm	10	2	0	7.4	7.9	9.7	7.4	7.7	7.9	23.5	19.6	17.2	215	210
10.0 ppm	10	0	0	7.3	8.0	a	7.5	7.7	a	23.5	20.0	a	215	a
10.0 ppm	10	0	0	7.3	8.0	-	7.6	7.8	-	23.5	20.0	-	215	-

Control Water

NH_3(as NH_3)(mg/l) _____ Total Alkalinity _____ (mg/l $CaCO_3$)

Total ammonia (as N)(mg/l) _____ Total Hardness _____ (mg/l $CaCO_3$)

100% Effluent

NH_3(as NH_3)(mg/l) _____ Total Alkalinity _____ (mg/l $CaCO_3$)

Total ammonia (as N)(mg/l) _____ Total Hardness _____ (mg/l $CaCO_3$)

[a] Parameters not taken since all organisms were dead at 24 hours.

Table 8. Data recorded during 48 hour, Daphnia pulex, static acute toxicity bioassays of sodium lauryl sulfate (SRT), on 13 to 15 on 13 to 15 July, 1986.

Concentration or %	Number of Live Organisms			Dissolved Oxygen (mg/l)			pH			Temperature (°C)			Conductivity (umhos)	
	0	24	48	0	24	48	0	24	48	0	24	48	0	48
Control	10	9	9	6.7	8.2	9.4	7.3	7.7	7.7	23.0	19.6	17.0	215	210
Control	10	10	10	6.9	8.2	9.4	7.3	7.7	7.7	22.9	19.6	17.0		
3.0 ppm	10	10	10	7.3	7.6	9.4	7.3	7.7	7.7	22.9	19.6	17.2	215	210
3.0 ppm	10	10	10	7.4	7.8	9.4	7.4	7.7	7.8	22.9	19.7	17.2		
7.0 ppm	10	5	3	7.3	7.6	9.4	7.4	7.6	7.7	22.7	19.6	17.0	215	215
7.0 ppm	10	8	2	7.4	7.6	9.4	7.4	7.6	7.7	22.7	19.6	17.0		
10.0 ppm	10	2	0	7.3	7.7	9.1	7.5	7.7	7.7	22.9	20.2	17.2	215	210
10.0 ppm	10	5	0	7.3	7.7	9.0	7.6	7.7	7.7	22.9	20.2	17.2		

Control Water

NH_3(as NH_3)(mg/l) _____ Total Alkalinity _____ (mg/l $CaCO_3$)

Total ammonia (as N)(mg/l) _____ Total Hardness _____ (mg/l $CaCO_3$)

100% Effluent

NH_3(as NH_3)(mg/l) _____ Total Alkalinity _____ (mg/l $CaCO_3$)

Total ammonia (as N)(mg/l) _____ Total Hardness _____ (mg/l $CaCO_3$)

Table 9. Data recorded during 48 hour, Notropis leedsi, static acute toxicity bioassay of sodium lauryl sulfate (SRT) on 13 to 15 July, 1986.

Concentration or %	Number of Live Organisms			Dissolved Oxygen (mg/l)			pH			Temperature (°C)			Conductivity (umhos)		
	0	24	48	0	24	48	0	24	48	0	24	48	0	48	
Control	5	5	5	6.7	8.0	7.2	7.3	7.7	7.4	22.5	19.4	17.0	215	390	Control Water
Control	5	5	5	6.9	8.0	7.3	7.3	7.7	7.4	22.5	19.4	17.0			NH_3(as NH_3)(mg/l) _____ Total Alkalinity (mg/l $CaOO_3$)
3.0 ppm	5	4	4	7.3	8.0	7.0	7.3	7.7	7.5	23.0	19.6	17.0	215	400	
3.0 ppm	5	4	4	7.4	7.9	7.2	7.4	7.7	7.5	23.0	19.6	17.0			
7.0 ppm	5	5	4	7.3	6.8	6.8	7.4	7.6	7.5	23.2	19.6	16.8	215	410	Total ammonia (as N)(mg/l) _____ Total Hardness (mg/l $CaOO_3$)
7.0 ppm	5	5	5	7.4	6.8	6.8	7.4	7.6	7.5	23.2	19.6	16.8			
10.0 ppm	5	0	0	7.3	5.8	a	7.5	7.5	a	23.2	19.0	a	215	-a	
10.0 ppm	5	0	0	7.3	5.8	-	7.6	7.5	-	23.2	18.0	-		-	
															100% Effluent
															NH_3(as NH_3)(mg/l) _____ Total Alkalinity (mg/l $CaOO_3$)
															Total ammonia (as N)(mg/l) _____ Total Hardness (mg/l $CaOO_3$)

[a] Parameters not taken since all organisms were dead at 24 hours.

Table 10. LC_{50} Data for 96 Hour Flow-Through and Static Renewal Bioassays of Monsanto Company, NPDES #FL0002488, on 13 to 17 July, 1986.

Organism	Method of Data Analysis	24 to 72 Hour LC_{50} and 95% Confidence Intervals	96 Hour LC_{50} and 95% Confidence Intervals
Flow-Through			
Notropis leedsi	Binomial Moving Average Probit	Random Mortality	Random Mortality
Static Renewal			
Notropis leedsi	Binomial Moving Average Probit	Random Mortality	79.6% (0 and 100), b [a] 81.2% (0[a] and ∞), b

[a] Due to an insufficient number of dead organisms, or to the irregular distribution of mortality, an LC_{50} value cannot be calculated using this method of statistical analysis.

[b] Although this LC_{50} was calculated, the mortality causing the LC_{50} was suspect due to large fluctuations of temperature during the test which probably stressed the test organisms. Therefore, the LC_{50} may be considered invalid and will not be reported as a violation of FAC toxicity standards.

Table 11. LC_{50} Data for 48 Hour Static Bioassays of Monsanto Company, NPDES #FL0002488, on 13 to 17 July, 1986.

Organism	Method of Data Analysis	24 Hour LC_{50} and 95% Confidence Intervals	96 Hour LC_{50} and 95% Confidence Intervals
13-15 July			
Daphnia pulex	Binomial		
	Moving Average	No Mortality	Random Mortality
	Probit		
13-15 July			
Ceriodaphnia dubia	Binomial	a	a
	Moving Average	a	a
	Probit	a	238.0% (110.5 and 5405.1)
15-17 July			
Daphnia pulex	Binomial		a
	Moving Average	No Mortality	a
	Probit		881.7% (172.5 and ∞)

[a] Due to an insufficient number of dead organisms, or to the irregular distribution of mortality, an LC_{50} value cannot be calculated using this method of statistical analysis.

Table 12. LC_{50} Data for Standard Reference Toxicant Performed during Monsanto Flow-Through Test, on 13 to 15 July, 1986.

Organism	Method of Data Analysis	24 Hour LC_{50} and 95% Confidence Intervals	96 Hour LC_{50} and 95% Confidence Intervals
Notropis leedsi	Binomial	8.4 ppm (0 and 10)	8.1 ppm (0 and 10)
	Moving Average	a	7.2 ppm (5.7 and 10.1), b
	Probit	a	6.8 ppm (0 and ∞), c
Daphnia pulex	Binomial	8.4 ppm (3 and ∞)	5.6 ppm (0 and 7)
	Moving Average	8.4 ppm (6.9 and 11.2)	a
	Probit	8.4 pm (7.0 and 10.5)	a
Ceriodaphnia dubia	Binomial	5.3 ppm (3 and 10)	3.8 ppm (0 and 7)
	Moving Average	5.1 ppm (4.1 and 6.0)	3.8 ppm (2.9 and 4.5)
	Probit	4.8 ppm (3.8 and 5.9)	3.7 ppm (2.9 and 4.4), b

[a] Due to an insufficient number of dead organisms, or to the irregular distribution of mortality, an LC_{50} value cannot be calculated using this method of statistical analysis.

[b] This LC_{50} is chosen since it is the most statistically conservative value of the data set.

Table 13. Results of Metal Analyses Performed on Monsanto's Outfall #001 (South) discharge, NPDES #FL0002488, collected on 17 July, 1986.

Metals	
Antimony	N.D.
Arsenic	N.D.
Beryllium	N.D.
Cadmium	< 1 ug/l
Chromium	N.D.
Copper	N.D.
Lead	N.D.
Mercury	N.D.
Nickel	N.D.
Selenium	N.D.
Silver	N.D.
Thallium	N.D.
Zinc	10 ug/l

N.D. = None Detected

RESULTS AND DISCUSSION

Monsanto Company's wastewater discharge from Outfall #001 (South) to the Escambia River was apparently not acutely toxic to various freshwater test organisms during on-site flow-through and static toxicity testing. The 96 hour flow-through bioassay, using Notropis leedsi, resulted in only a few random deaths of organisms (Table 2). The 96 hour static renewal bioassay, also using N. leedsi, resulted in notable mortality in the 100% concentration by 96 hours (Table 3). This mortality, however, is suspect due to fluctuations in temperature during the renewal test, and to low dissolved oxygen recorded at the time that the mortality was noted. The pH had also decrease significantly at this time. Therefore, the LC_{50} calculated for this test will not be reported as a violation of the FAC acute toxicity standards (Table 10). Although the differences in temperature and dissolved oxygen may be explained due to natural conditions, the reason for the significant decrease in pH is not so readily evident. This may suggest that the wastewater collected for the last renewal period was different from previously discharged wastewater, and should be investgated further. The results of three 48 hour static tests, using Daphnia pulex and Ceriodaphnia dubia, produced 48 hour LC_{50}'s of 881.7% and 238.0%, respectively (Table 11). These LC_{50}'s however, are in compliance with the FAC acute toxicity standards, due to the presence of Monsanto's designated mixing zone.

The cause of the slight toxicity noted above is not entirely evident. No ammonia was detected in the wastewater. The total residule chlorine (maximum measured = 0.01 mg/l) may have contributed to the toxicity, but was not responsible for all of it. The results of metal analyses (Table 13) indicated a small amount of zinc (10 ug/l) present in Monsanto's wastewater, which was insufficient to have contributed to the toxicity.

The results of on-site Standard Reference Toxicant biaossays, using sodium lauryl sulfate, indicated that the sensitivities of the three test organisms used for the Monsanto study were within both the EPA and DER recommended ranges (Table 12).

The results of concurrent flow-through and static bioassays, performed by Dr. Don Grothe of Monsanto Company, indicated no acute toxicity. Monsanto's raw data from these tests are presented in Appendix A of this report.

Recommendation

Based on these results, we recommend no further action be taken other than continued routine inspection and biomonitoring of the Monsanto discharges.

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APPENDIX A

MONSANTO COMPANY'S RAW DATA FOR BIOASSAYS OF

13 to 17 JULY, 1986

CONTINUOUS FLOW — ~~STATIC~~ BIOASSSAY DATA SHEET

N. TROPIS HATCHED ON JUNE 20, 1986 BY FDER

Company MONSANTO

Address PENSACOLA, FLA

Contact JOHN WILEY

Effluent Serial Number SOUTHOUTFALL

NPDES Permit Number _____

Beginning: Date 7/13/86 Time _____

Ending: Date 7/17/86 Time _____

Test Organism NITROPIS BOSCII (< 30 days old)

Test Temperature Range _____

Conc. or %	Test Container Number	Number of Dead Organisms (10/Rep) 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	pH 0	24	48	72	96	Total Alkalinity (mg/L as $CaCO_3$) 0	96
C	1		0	0	0	0	6.7	7.4	7.3	7.4	7.2	6.8	6.7	6.7 7.4	7.0 6.7	6.9 DNR		
	2		0	0	0	0									6.9	6.8		
~~5.6~~	1		~~0~~	~~0~~	~~0~~	–	6.4	7.4	8.9	7.0	6.3	6.8	6.7	6.7 7.4	~~6.8~~ 7.0	DNR		
	2		~~0~~	~~0~~	~~0~~	–	The 5.6% and 10% Rep 2, 1st test exhibited erratic concentrations were not evaluated because not enough test											
10	1		~~0~~	~~0~~	~~0~~	–	organisms were available for tests.											
	2*		0	0	0													
18	1		0	0	0	0												
	2		0	0	0	1												
32	1		0	0	0	0												
	2		0	0	0	0												
56	1		0	0	0	0	6.6	7.3	7.3	7.7	6.1	6.8	6.7	6.7 7.3	6.8	6.8		
	2		0	0	0	0												
100	1		0	0	0	0	6.0	7.2	7.0	7.7	7.0	6.8	6.7	6.7	6.7	6.8		
	2		0	0	0	0												

TEST SOLUTION VOLUME: 10 LITERS. TEST ORGANISM SIZE: _____ AVE. WT. _____ AVE. LENGTH.

SAMPLE: ~~—~~ GRAB. COLLECTED ON / / AT ~~—~~ AM/PM.

~~—~~ COMPOSITE. COLLECTED ~~—~~ mL EVERY ~~—~~ MIN. OVER A ~~—~~ HR. PERIOD

BEGINNING ON / / AT _____ AM/PM USING A _____ MODEL ~~—~~ COMPOSITE SAMPLER.

Donald R. Hunter

STATIC BIOASSAY DATA SHEET (CONTINUED)

Company Monsanto

Address Pensacola, Fla

Contact John Wiley

Effluent Serial Number Southwest Fall

NPDES Permit Number

Beginning: Date 7/13/86 Time

Ending: Date 7/17/86 Time

Test Organism Notropis leedsi (< 30 days old)

Test Temperature Range

Conc. of %	Test Container Number	Total Hardness (mg/L as $CaCO_3$) 0	96	Conductivity µ mhos/cm 0	24	48	72	96	Temperature °C 0	24	48	72	96	Total Ammonia mg/L 0	24
C	1			130	125	125	110	105	26	24	23	23	22		
	2														
5.6	1			160	155	120	150	140	26	24	23	23	22		
	2														
10	1														
	2														
18	1														
	2														
32	1														
	2														
56	1			440	440	250	330	355	26	24	23	23	22		
	2														
100	1			800	800	1100	590	440	26	24	23	23	22		
	2														

AERATION: ✓ NONE, _____ SLOW, _____ MODERATE, _____ RAPID (SINGLE BUBBLES).

AERATION BEGAN — HOURS INTO TEST AND CONTINUED FOR _____ HOURS IN TEST CONCENTRATION _____.

CONDITION OF SURVIVING ORGANISMS AT END OF TEST: All organisms appeared to be normal

* Only 5 organisms were placed in the 10% Rep 2 test conc. due to the scarcity of test organisms available for testing.

OTHER COMMENTS: Organisms were fed brine shrimp nauplii daily throughout the

Continuous flow

~~STATIC~~ BIOASSSAY DATA SHEET

Company Monsanto

Address Pensacola, Fla

Contact John Wiley

Effluent Serial Number Southerstoll

NPDES Permit Number _____

Beginning: Date 2/13/86 Time am

Ending: Date 2/17/86 Time am

Test Organism Pimephales promelas

Test Temperature Range _____

Conc. or %	Test Container Number	Number of Dead Organisms (10/Rep) 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	pH 0	24	48	72	96	Total Alkalinity (mg/L as $CaCO_3$) 0	96
C	1		0	0	0	0	—	—	—	—	—	—	—	—	—	—		
	2		0	0	0	0												
5.6	1		0	0	0	0												
	2		0	0	0	0												
10	1		0	0	0	0												
	2		0	0	0	0												
18	1		0	0	0	0												
	2		0	0	0	0												
32	1		0	0	0	0												
	2		0	0	0	0												
56	1		0	0	0	0												
	2		0	0	0	0												
100	1		0	0	0	0												
	2		0	0	0	0												

TEST SOLUTION VOLUME: 10 LITERS. TEST ORGANISM SIZE: _____ AVE. WT. 1" AVE. LENGTH.

SAMPLE: — GRAB. COLLECTED ON / / AT — AM/PM.

— COMPOSITE. COLLECTED — mL EVERY _____ MIN. OVER A _____ HR. PERIOD

BEGINNING ON / / AT _____ AM/PM USING A _____ MODEL _____ COMPOSITE SAMPLER.

NOTE: See Biomonitoring Flow-thru Data sheet for physical/chemical measurements during test period.

Donald K Yurtz

STATIC BIOASSSAY DATA SHEET

Company Monsanto

Address Pensacola, FLA

Contact John Wiley

Effluent Serial Number Southwall

NPDES Permit Number

Beginning: Date 7/13/86 Time

Ending: Date 7/15/86 Time

Test Organism Ceriodaphnia (< 24 hrs old)

Test Temperature Range

Conc. or %	Test Container Number	1 organism/Rep Number of Dead Organisms 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	Temp °C ~~pH~~ 0	24	48	72	96	Total Alkalinity (mg/L as $CaCO_3$) 0	96
C	1		0	0														
	2		0	0														
	3		0	0									22°	21	22	22		
	4		0	0														
	5		0	0														
	6		0	0														
	7		0	0														
	8		0	0														
	9		0	0														
	10		0	0														
5.6	1		0	0														
	2		0	0														
	3		0	0														
	4		0	0														
	5		0	0														
	6		0	0														
	7		0	0														
	8		0	0														
	9		0	0														
	10		0	0														
10	1		0	0														
	2		0	0														
	3		0	0														
	4		0	0														
	5		0	0														
	6		0	0														
	7		0	0														
	8		0	0														

TEST SOLUTION VOLUME: 0.015 LITERS. TEST ORGANISM SIZE: _____ AVE. WT. _____ AVE. LENGTH.

SAMPLE: ✓ GRAB. COLLECTED ON 7/13/86 AT _____ AM/(PM) from continuous flow dilution system control

— COMPOSITE. COLLECTED — mL EVERY — MIN. OVER A — HR. PERIOD

BEGINNING ON / / AT — AM/PM USING A — MODEL — COMPOSITE SAMPLER.

Note: See bioassay feeding flow thru data sheet for physical/chemical measurements

Donald R. Mattie

STATIC BIOASSSAY DATA SHEET

Company Monsanto

Address Pensacola, FL

Contact John Wiley

Effluent Serial Number SOUTHOUTFALL

NPDES Permit Number

Beginning: Date 7/13/86 Time

Ending: Date 7/15/86 Time

Test Organism Ceriodaphnia (< 24 hrs old)

Test Temperature Range

Conc. or %	Test Container Number	Number of Dead Organisms					Dissolved Oxygen (mg/L)					Temp °C / pH					Total Alkalinity (mg/L as $CaCO_3$)	
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
10	9		0	0														
	10		0	0														
18	1		0	0														
	2		0	0														
	3		0	0														
	4		0	0														
	5		0	0														
	6		0	0														
	7		0	0														
	8		0	0														
	9		0	0														
	10		0	0														
32	1		0	0														
	2		0	0														
	3		0	0														
	4		0	0														
	5		0	0														
	6		0	0														
	7		0	0														
	8		0	0														
	9		0	0														
	10		0	0														
56	1		0	0														
	2		0	0														
	3		0	0														
	4		0	0														
	5		0	0														
	6		0	0														

TEST SOLUTION VOLUME: 0.015 LITERS. TEST ORGANISM SIZE: _____ AVE. WT. _____ AVE. LENGTH.

SAMPLE: Y GRAB. COLLECTED ON 7/13/86 AT _____ AM/PM from continuous flow dilution system concentrations

_____ COMPOSITE. COLLECTED _____ mL EVERY _____ MIN. OVER A _____ HR. PERIOD

BEGINNING ON / / AT _____ AM/PM USING A _____ MODEL _____ COMPOSITE SAMPLER.

Donald R. Shotts

STATIC BIOASSSAY DATA SHEET

Company Monsanto

Address Pensacola, Fla

Contact John Wiley

Effluent Serial Number South outfall

NPDES Permit Number

Beginning: Date 2/13/86 Time

Ending: Date 2/15/86 Time

Test Organism Ceriodaphnia (<24 hrs old)

Test Temperature Range

Conc. or %	Test Container Number	Number of Dead Organisms					Dissolved Oxygen (mg/L)					Temp °C / pH					Total Alkalinity (mg/L as $CaCO_3$)	
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
56	7		0	0														
	8		0	0														
	9		0	0														
	10		0	0														
100	1		0	0									22	21	22	22		
	2		0	0														
	4		0	0														
	5		0	0														
	6		0	0														
	7		0	0														
	8		0	0														
	9		0	0														
	10		0	0														

TEST SOLUTION VOLUME: 0.08 LITERS. TEST ORGANISM SIZE: _____ AVE. WT. _____ AVE. LENGTH.

SAMPLE: ✓ GRAB. COLLECTED ON 2/13/86 AT _____ AM/PM. From continuous flow dilution system concentrate

_____ COMPOSITE. COLLECTED _____ mL EVERY _____ MIN. OVER A _____ HR. PERIOD

BEGINNING ON _____ AT _____ AM/PM USING A _____ MODEL _____ COMPOSITE SAMPLER.

Donald L. Hoffa

STATIC BIOASSSAY DATA SHEET

Company Monsanto

Address Pensacola, Fla.

Contact John Wiley

Effluent Serial Number Southern Mill

NPDES Permit Number

Beginning: Date 7/13/86 Time

Ending: Date 7/15/86 Time

Test Organism Daphnia magna (< 24 hrs old)

Test Temperature Range

Conc. or %	Test Container Number	Number of Dead Organisms (10/rep) 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	pH 0	24	48	72	96	Total Alkalinity (mg/L as $CaCO_3$) 0	96
C	1		0	0														
	2		0	0														
10	1		0	0														
	2		0	0														
18	1		0	0														
	2		0	0														
32	1		0	0														
	2		0	0														
56	1		0	0														
	2		0	0														
100	1		0	0														
	2		0	0														

TEST SOLUTION VOLUME: 0.200 LITERS. TEST ORGANISM SIZE: _____ AVE. WT. _____ AVE. LENGTH.

SAMPLE: ✓ GRAB. COLLECTED ON 7/13/86 AT _____ AM/PM. from continuous flow dilute system concentrat

_____ COMPOSITE. COLLECTED — mL EVERY — MIN. OVER A — HR. PERIOD

BEGINNING ON / / AT — AM/PM USING A — MODEL — COMPOSITE SAMPLER.

Note: See Monsanto Pensacola flow thru data sheet for physical / chemical measurements

Donald K. Hunter

STATIC BIOASSSAY DATA SHEET

DNH

Company Monsanto

Address Pensacola, Fla

Contact John Wiley

Effluent Serial Number Southwestfall

NPDES Permit Number

Beginning: Date 7/12/86 13 Time

Ending: Date 7/19/86 Time

Test Organism Daphnia pulex (< 24 hrs old)

Test Temperature Range

Conc. or %	Test Container Number	Number of Dead Organisms (10/Rep.) 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	pH 0	24	48	72	96	Total Alkalinity (mg/L as $CaCO_3$) 0	96
C	1		0	floating 0														
	2		0	floating 0														
5.6	1		0	floating 0														
	2		0	0														
10	1		0	0														
	2		0	0														
18	1		0	0														
	2		0	0														
32	1		0	0														
	2		0	0														
56	1		0	0														
	2		0	0														
100	1		0	0														
	2		0	0														

TEST SOLUTION VOLUME: 200 ~~LITERS~~ mL. TEST ORGANISM SIZE: _____ AVE. WT. _____ AVE. LENGTH.

SAMPLE: √ GRAB. COLLECTED ON 7/13/86 AT _____ AM/PM. from continuous flow dilution system

_____ COMPOSITE. COLLECTED _____ mL EVERY _____ MIN. OVER A _____ HR. PERIOD

BEGINNING ON / / AT _____ AM/PM USING A _____ MODEL _____ COMPOSITE SAMPLER.

Note: See notebook (Flow thru data sheet for physical/chemical measurements at Southwestfall during test period.

Donald R. Mathe

STATIC BIOASSAY DATA SHEET (CONTINUED)

Company Monsanto

Address Pensacola, FL

Contact John Wiley

Effluent Serial Number South outfall

NPDES Permit Number _____

Beginning: Date 7/13/86 Time _____

Ending: Date 7/15/86 Time _____

Test Organism Daphnia pulex

Test Temperature Range _____

Conc. of %	Test Container Number	Total Hardness (mg/L as $CaCO_3$)		Conductivity µ mhos/cm					Temperature °C					Total Ammonia mg/L	
		0	96	0	24	48	72	96	0	24	48	72	96	0	24
C	1									20°					
	2														
5.6	1														
	2														
10	1														
	2														
18	1														
	2														
32	1														
	2														
56	1														
	2														
100	1									20°					
	2														

AERATION: _____ NONE, _____ SLOW, _____ MODERATE, _____ RAPID (SINGLE BUBBLES).

AERATION BEGAN _____ HOURS INTO TEST AND CONTINUED FOR _____ HOURS IN TEST CONCENTRATION _____.

CONDITION OF SURVIVING ORGANISMS AT END OF TEST: No mortalities were observed in any of the test concentrations, however many of the organisms were floating in all but the 100 % test concentration. Presence of floating possibly due to temperature shock during transferring process on initial day.

OTHER COMMENTS: _____

STATIC RENEWAL

~~STATIC~~ BIOASSSAY DATA SHEET

Sodium Thiosulfate added to remove any chlorine potentially present in effluent

Company Monsanto

Address Pensacola, Fla.

Contact John Wiley

Effluent Serial Number Southwestern + Sodium thiosulfate

NPDES Permit Number

Beginning: Date 2/13/86 Time

Ending: Date 2/17/86 Time

Test Organism Nitrocis Leedsii (< 30 days old)

Test Temperature Range

Conc. or %	Test Container Number	Number of Dead Organisms (5 organisms per rep) 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	pH 0	24	48	72	96	Total Alkalinity (mg/L as $CaCO_3$) 0	96
C	1		1	1	1	1	—	—	—	—	6.2	—	—	—	—	—		
	2		0	0	0	0	—	—	—	—		—	—	—	—	—		
5.6	1																	
	2																	
10	1	TEST CONCENTRATIONS WERE NOT EVALUATED BECAUSE																
	2	NOT ENOUGH TEST ORGANISMS WERE AVAILABLE FOR TEST																
18	1																	
	2																	
32	1																	
	2																	
56	1	0	0	0	0		—	—	—	—	—							
	2	0	0	0	0		—	—	—	—	—	—	—	—	—	—		
100	1	0	0	0	0		—	—	—	—	3.4	—	—	—	—	5.5		
	2	0	0	0	0													

Organisms fed brine shrimp Nauplii daily throughout test period

TEST SOLUTION VOLUME: 0.900 LITERS. TEST ORGANISM SIZE: fry AVE. WT. fry AVE. LENGTH.

SAMPLE: ✓ GRAB. COLLECTED ON / / AT (AM)/PM. every 24hrs during test period

COMPOSITE. COLLECTED mL EVERY MIN. OVER A HR. PERIOD

BEGINNING ON / / AT AM/PM USING A MODEL COMPOSITE SAMPLER.

Note: Number of mortalities equals total mortalities during monitoring period.

Donald R. Hutto

STATIC ~~DRM~~

~~STATIC~~ BIOASSSAY DATA SHEET

Sodium Thiosulfate added to remove chlorine

Company Monsanto

Address Pensacola, Fla

Beginning: Date 7/13/86 Time ____

Contact John Wiley

Ending: Date 7/15/86 Time ____

Effluent Serial Number Southeastfall + Sodium Thiosulfate Test Organism Daphnia pulex (< 24 hrs old)

NPDES Permit Number ____

Test Temperature Range ____

Conc. or %	Test Container Number	Number of Dead Organisms (10/rep) 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	pH 0	24	48	72	96	Total Alkalinity (mg/L as $CaCO_3$) 0	96
C	1		0	0			—	—	—			—	—	—				
	2		0	0			—	—	—			—	—	—				
100	1		0	0			—	—	—			—	—	—				
	2		0	0														

TEST SOLUTION VOLUME: 0.200 LITERS. TEST ORGANISM SIZE: ~ AVE. WT. ~ AVE. LENGTH.

SAMPLE: ✓ GRAB. COLLECTED ON 7/13/86 AT ~ (AM)/PM.

~ COMPOSITE. COLLECTED ~ mL EVERY ~ MIN. OVER A ~ HR. PERIOD

BEGINNING ON / / AT ____ AM/PM USING A ____ MODEL ____ COMPOSITE SAMPLER.

Donald R. Mattie

STATIC RENEWAL

~~STATIC~~ BIOASSAY DATA SHEET (CONTINUED)

Company Monsanto Co

Address Pensacola, Fla

Contact John Wiley

Effluent Serial Number Static outfall

NPDES Permit Number

Beginning: Date 7/13/86 Time

Ending: Date 7/15/86 Time

Test Organism Daphnia pulex

Test Temperature Range

Conc. of %	Test Container Number	Total Hardness (mg/L as $CaCO_3$)		Conductivity µ mhos/cm					Temperature °C					Total Ammonia mg/L	
		0	96	0	24	48	72	96	0	24	48	72	96	0	24
C	1														
	2														
100	1														
	2														

AERATION: _____ NONE, _____ SLOW, _____ MODERATE, _____ RAPID (SINGLE BUBBLES).

AERATION BEGAN _____ HOURS INTO TEST AND CONTINUED FOR _____ HOURS IN TEST CONCENTRATION _____.

CONDITION OF SURVIVING ORGANISMS AT END OF TEST: Problems were encountered with same Daphnia floating on surface; however no mortalities were observed. Presence of floaters was likely due to temperature shock during transfer of the organisms to the test vessels.

OTHER COMMENTS: See Continuous Flow Mysidopsis feeding data sheet for July 13-17, 1986

Reference Toxicant

STATIC BIOASSSAY DATA SHEET

Company Monsanto

Address Pensacola, Fla

Contact John Wiley

Effluent Serial Number Sodium Dodecyl Sulfate

NPDES Permit Number

Beginning: Date 2/13/86 Time

Ending: Date 2/15/86 Time

Test Organism Daphnia magna (< 24 hrs old)

Test Temperature Range

Conc. or %	Test Container Number	Number of Dead Organisms (10/Rep.) 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	pH 0	24	48	72	96	Total Alkalinity (mg/L as $CaCO_3$) 0	96
C	1	0 →		0 Floating														
	2	0 →		2 floating														
300ppm	1	0 →		1 floating														
	2	0 →		0 floating														
700ppm	1	0 →		0														
	2	0 →		2														
1000ppm	1	0 →		1														
	2	1 →		2														

TEST SOLUTION VOLUME: 0.200 LITERS. TEST ORGANISM SIZE: — AVE. WT. — AVE. LENGTH.

SAMPLE: — GRAB. COLLECTED ON / / AT — AM/PM.

— COMPOSITE. COLLECTED — mL EVERY — MIN. OVER A — HR. PERIOD

BEGINNING ON / / AT — AM/PM USING A — MODEL — COMPOSITE SAMPLER.

Donald A. Yoltz

Reference Toxicant

STATIC BIOASSAY DATA SHEET (CONTINUED)

Company Monsanto

Address Pensacola, Fla

Contact John Wiley

Effluent Serial Number Sodium Dodecyl Sulfate

NPDES Permit Number

Beginning: Date 7/13/86 Time

Ending: Date 7/15/86 Time —

Test Organism Daphnia magna

Test Temperature Range

Conc. of %	Test Container Number	Total Hardness (mg/L as $CaCO_3$)		Conductivity µ mhos/cm					Temperature °C					Total Ammonia mg/L	
		0	96	0	24	48	72	96	0	24	48	72	96	0	24
C	1			—	—	—				19					
	2			—	—	—									
3ppm	1			—	—	—				19					
	2			—	—	—									
7ppm	1			—	—	—				19					
	2			—	—	—									
10ppm	1			—	—	—				19					
	2														

AERATION: ✓ NONE, _____ SLOW, _____ MODERATE, _____ RAPID (SINGLE BUBBLES).

AERATION BEGAN — HOURS INTO TEST AND CONTINUED FOR _____ HOURS IN TEST CONCENTRATION _____.

CONDITION OF SURVIVING ORGANISMS AT END OF TEST: ~~Dn~~ Most of the test organisms in the control & 3ppm test concentrations were alive but were floating on the surface of the water. Presence of floating possibly due to temperature shock or changes inside mobile lab.

OTHER COMMENTS:

Sodium Dodecyl Sulfate

STATIC BIOASSSAY DATA SHEET

Company Monsanto

Address Pensacola, Fla

Contact John Wiley

Effluent Serial Number Reference Toxicant

NPDES Permit Number —

Beginning: Date 7/13/86 Time —

Ending: Date 7/15/86 Time —

Test Organism Daphnia pulex (< 24 hrs old)

Test Temperature Range —

Conc. or %	Test Container Number	Number of Dead Organisms 10/Rep 24 ~~0~~	~~24~~ 48 Dead	~~48~~	~~72~~	~~96~~	Dissolved Oxygen (mg/L) 0	24	48	72	96	pH 0	24	48	72	96	Total Alkalinity (mg/L as $CaCO_3$) 0	96
C	1	0	Floating 10															
	2	0	~~10~~ floating															
3ppm	1	0	floating 10															
	2	0	floating 10															
7ppm	1	3	10															
	2	3	10															
10ppm	1	10	10															
	2	10	10															

TEST SOLUTION VOLUME: 0.200 LITERS. TEST ORGANISM SIZE: — AVE. WT. — AVE. LENGTH.

SAMPLE: — GRAB. COLLECTED ON —/—/— AT — AM/PM.

— COMPOSITE. COLLECTED — mL EVERY — MIN. OVER A — HR. PERIOD

BEGINNING ON —/—/— AT — AM/PM USING A — MODEL — COMPOSITE SAMPLER.

All of the organisms in the control and 3 ppm were dead and floating on the surface of the water

Donald R. Hurtle

Reference Toxicant

STATIC BIOASSSAY DATA SHEET

Company Monsanto

Address Pensacola, Fla

Contact John Wiley

Effluent Serial Number Sodium dodecyl sulfate

NPDES Permit Number —

Beginning: Date 7/13/86 Time —

Ending: Date 7/15/86 Time —

Test Organism Ceriodaphnia (<24 hr old)

Test Temperature Range

Conc. or %	Test Container Number	1/Rep Number of Dead Organisms 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	pH 0	24	48	72	96	Total Alkalinity (mg/L as $CaCO_3$) 0	96
C	1	0	→	0														
	2	0		0														
	3	0		0														
	4	0	→	0														
	5	0	→	0														
3 ppm	1	0		0														
	2	0	→	0														
	3	0		0														
	4	0	→	0														
	5	0	→	0														
7 ppm	1	0		1														
	2	0	→	1														
	3	0		1														
	4	0	→	1														
	5	0	→	1														
10 ppm	1	0		1														
	2	0	→	1														
	3	0		1														
	4	0	→	1														
	5	0	→	1														
		10	→	*														
				DNB														

TEST SOLUTION VOLUME: 0.015 LITERS. TEST ORGANISM SIZE: _____ AVE. WT. _____ AVE. LENGTH.

SAMPLE: — GRAB. COLLECTED ON / / AT — AM/PM.

— COMPOSITE. COLLECTED — mL EVERY — MIN. OVER A — HR. PERIOD

BEGINNING ON / / AT _____ AM/PM USING A — MODEL — COMPOSITE SAMPLER.

* 10 organisms exposed per conc (1 per rep)

Donald R. Mount

STATIC BIOASSSAY DATA SHEET

Company Monsanto

Address Pensacola, Fla

Contact John Wiley

Effluent Serial Number Sw T2eff Full

NPDES Permit Number

Beginning: Date 2/14/86 Time

Ending: Date 2/16/86 Time

Test Organism D. pulex (< 24 hrs old)

Test Temperature Range

Conc. or %	Test Container Number	Number of Dead Organisms (10 organisms / rep) 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	pH 0	24	48	72	96	Total Alkalinity (mg/L as $CaCO_3$) 0	96
Below 100% Dechlorinated with Na Thiosulfate	1		0	0			–	–	–	–		–	–	–				
	2		0	0			–					–	–	–				
Above 100% Dechlorinated with Na Thiosulfate	1		0	0			–	–	–			–	–	–				
	2		0	0			–	–	–			–	–	–				
C	1		0	0			–	–	–			–	–	–				
	2		0	0			–	–	–			–	–	–				

TEST SOLUTION VOLUME: 0.200 LITERS. TEST ORGANISM SIZE: _____ AVE. WT. _____ AVE. LENGTH.

SAMPLE: Y GRAB. COLLECTED ON 2/14/86 AT 1:30 AM/PM.

_____ COMPOSITE. COLLECTED _____ mL EVERY _____ MIN. OVER A _____ HR. PERIOD

BEGINNING ON / / AT _____ AM/PM USING A _____ MODEL _____ COMPOSITE SAMPLER.

NOTE: See Analysis Request Form for data sheet for physical/chemical

Donald R. Thorbe

Sodium Thiosulfate Control

STATIC BIOASSSAY DATA SHEET

Company Monsanto

Address Pensacola, FL

Contact John Wiley

Effluent Serial Number Escambia River water + Sodium Thiosulfate

NPDES Permit Number

Beginning: Date 7/14/86 Time

Ending: Date 7/15/86 Time

Test Organism Daphnia pulex (<24 hrs old)

Test Temperature Range

Conc. or \	Test Container Number	Number of Dead Organisms (10)					Dissolved Oxygen (mg/L)					pH					Total Alkalinity (mg/L as $CaCO_3$)	
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
Sodium Thiosulfate control	1	–	10*															
	2	–	10*															

TEST SOLUTION VOLUME: 0.200 LITERS. TEST ORGANISM SIZE: _____ AVE. WT. _____ AVE. LENGTH.

SAMPLE: _____ GRAB. COLLECTED ON / / AT _____ AM/PM.

_____ COMPOSITE. COLLECTED _____ mL EVERY _____ MIN. OVER A _____ HR. PERIOD

BEGINNING ON / / AT _____ AM/PM USING A _____ MODEL _____ COMPOSITE SAMPLER.

*All daphnids were floating indicating potential temperature shock during transfer of daphnids

Donald L. Hunter

STATIC BIOASSSAY DATA SHEET

Company Monsanto

Address Pensacola Fla

Contact John Wiley

Effluent Serial Number South outfall

NPDES Permit Number _____

Beginning: Date July 15, 1986 Time _____

Ending: Date July 17, 1986 Time _____

Test Organism Daphnia pulex (< 24hrs old)

Test Temperature Range _____

Conc. or %	Test Container Number	Number of Dead Organisms					Dissolved Oxygen (mg/L)					pH					Total Alkalinity (mg/L as $CaCO_3$)	
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
C	1	DRY	~~Heater~~ 0	0														
	2	DRY	~~Heater~~ 0	0														
32	1		0	0														
	2		0	0														
56	1		0	0														
	2		0	0														
100	1	~~DRY~~ 0	0	0														
	2	0	0	0														

TEST SOLUTION VOLUME: 0.200 LITERS. TEST ORGANISM SIZE: _____ AVE. WT. _____ AVE. LENGTH.

SAMPLE: Y GRAB. COLLECTED ON 7/15/86 AT _____ AM/PM. from continuous flow dilution system

_____ COMPOSITE. COLLECTED _____ mL EVERY _____ MIN. OVER A _____ HR. PERIOD

BEGINNING ON / / AT _____ AM/PM USING A _____ MODEL _____ COMPOSITE SAMPLER.

NOTE: See Bioassay Results flow thru data sheet for physical/chemical

Donald R. Grotta

STATIC BIOASSAY DATA SHEET (CONTINUED)

Company Monsanto

Address Pensacola, Fla

Contact John Wiley

Effluent Serial Number Southport Mill

NPDES Permit Number _____

Beginning: Date July 15, 1986 Time _____

Ending: Date July 17, 1986 Time _____

Test Organism Daphnia pulex

Test Temperature Range _____

Conc. of %	Test Container Number	Total Hardness (mg/L as $CaCO_3$)		Conductivity µ mhos/cm					Temperature °C					Total Ammonia mg/L	
		0	96	0	24	48	72	96	0	24	48	72	96	0	24
C	1														
	2														
32	1														
	2														
56	1														
	2														
100	1														
	2														

AERATION: _____ NONE, _____ SLOW, _____ MODERATE, _____ RAPID (SINGLE BUBBLES).

AERATION BEGAN _____ HOURS INTO TEST AND CONTINUED FOR _____ HOURS IN TEST CONCENTRATION _____.

CONDITION OF SURVIVING ORGANISMS AT END OF TEST: Problems with encountered with Daphnia floating on the surface in the control, 32% & 56% test conc. No floaters were observed in 100% effluent. Presence of floaters possibly due to temp shock during transfer of daphnids on temp. changes inside mobile lab

OTHER COMMENTS: _____

Donald R. Stratt

STATIC BIOASSSAY DATA SHEET

Company Monsanto

Address Pensacola, Fla

Contact John Wiley

Effluent Serial Number Sewhoutfall

NPDES Permit Number _____

Beginning: Date 7/15/86 Time _____

Ending: Date 7/17/86 Time _____

Test Organism Daphnia pulex (< 24 hrs old)

Test Temperature Range _____

Conc. or %	Test Container Number	Number of Dead Organisms (10/Rep) 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	pH 0	24	48	72	96	Total Alkalinity (mg/L as $CaCO_3$) 0	96
Before Declorinating with Thiosulfate 100%	1		0	0			–	–	–			–	–	–				
	2		0	0			–	–	–			–	–	–				
			0	0			–	–	–			–	–	–				
After declorinating with Sodium Thiosulfate 100%	1		0	0			–	–	–			–	–	–				
	2																	
C	1		0	0			–	–	–			–	–	–				
	2		0	0			–	–	–			–	–	–				

TEST SOLUTION VOLUME: 0.200 LITERS. TEST ORGANISM SIZE: _____ AVE. WT. _____ AVE. LENGTH.

SAMPLE: V GRAB. COLLECTED ON 7/15/86 AT _____ (AM)/PM.

_____ COMPOSITE. COLLECTED _____ mL EVERY _____ MIN. OVER A _____ HR. PERIOD

BEGINNING ON / / AT _____ AM/PM USING A _____ MODEL _____ COMPOSITE SAMPLER.

Note: See Mortality Records from this data sheet for physical/chemical

Donald R. Hoste

Sodium Thiosulfate added to remove Chlorine

STATIC BIOASSSAY DATA SHEET

Company Monsanto

Address Pensacola, FL

Contact John Wiley

Effluent Serial Number Southcentral + Sodium Thiosulfate

NPDES Permit Number _____

Beginning: Date 7/16/86 Time _____

Ending: Date 7/17/86 Time _____

Test Organism D. pulex (<24 hrs old)

Test Temperature Range _____

Conc. or %	Test Container Number	Number of Dead Organisms					Dissolved Oxygen (mg/L)					pH					Total Alkalinity (mg/L as $CaCO_3$)	
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
100%	1	0	0									5.8						
	2	0	0															

TEST SOLUTION VOLUME: _____ LITERS. TEST ORGANISM SIZE: _____ AVE. WT. _____ AVE. LENGTH.

SAMPLE: Y GRAB. COLLECTED ON 7/16/86 AT _____ (AM)/PM.

_____ COMPOSITE. COLLECTED _____ mL EVERY _____ MIN. OVER A _____ HR. PERIOD

BEGINNING ON / / AT _____ AM/PM USING A _____ MODEL _____ COMPOSITE SAMPLER.

Donald R. Hobbs

STATIC BIOASSAY DATA SHEET (CONTINUED)

Company Monsanto

Address Pensacola

Contact John Haley

Effluent Serial Number Southwestern

NPDES Permit Number

Beginning: Date 2/16/86 Time

Ending: Date 2/17/86 Time

Test Organism D. pulex (< 24hrs old)

Test Temperature Range

Conc. of %	Test Container Number	Total Hardness (mg/L as $CaCO_3$)		Conductivity µ mhos/cm					Temperature °C					Total Ammonia mg/L	
		0	96	0	24	48	72	96	0	24	48	72	96	0	24
100	1				2400					21					
	2														

AERATION: ✓ NONE, _____ SLOW, _____ MODERATE, _____ RAPID (SINGLE BUBBLES).

AERATION BEGAN _____ HOURS INTO TEST AND CONTINUED FOR _____ HOURS IN TEST CONCENTRATION _____.

CONDITION OF SURVIVING ORGANISMS AT END OF TEST: _____

OTHER COMMENTS: See NOTEBOOK Record for raw data sheet for physical/chemical measurements during