Bioassays of

American Cyanamid

Outfall #001

Milton, Santa Rosa County, Florida

NPDES #FL0002593

Biology Section
Bureau of Laboratories
September 28, 1989

Introduction

American Cyanamid, Fibers Division, Milton, Santa Rosa County, Florida, NPDES #FL0002593, outfall #001 on 14 to 16 March, 1989.

This facility is located near Milton in Santa Rosa County, Florida. According the NPDES file, the facility produces acrylic fiber. Concentrated process water is disposed of in a deep well constructed in 1976 (J. May, Northwest District, personal communication), while remaining process water is discharged through outfall #001 to Escambia Bay.

The toxicity tests discussed in this report were performed in accordance with methods described by Peltier and Weber, 1985, *Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms*, 3rd Edition and by the FDER Biology Section, 1989, *Quality Assurance Manual for Performing Acute Toxicity Tests*, 2nd Edition.

Results and Discussion

The sample of discharge taken from outfall #001 of the American Cyanamid facility was not toxic to the bioassay organisms, *Ceriodaphnia dubia*, *Daphnia pulex*, and *Notropis leedsi*. The sample did adversely affect the Microtox® organism, *Photobacterium phosphoreum*, producing an EC_{50} of 103.5%.

Chemical analyses were performed on the sample. Trace amounts of naturally occurring organic compounds, trace amounts of organic acids and esters, and two unidentified components sensitive to electron capture detection, were detected by the organics analyses. The metals, chromium (20.0 µg/l^K), copper (25.0 µg/l^K), lead (60 µg/l), and silver (0.45 µg/l), were also detected in the sample. The total ammonia and the unionized ammonia concentrations were 5.01 mg/l and 0.63 mg/l, respectively. The sample was not chlorinated. The initial unionized ammonia concentration was sufficient to have caused mortality in the *N. leedsi* tests; however, the sample pH apparently decreased rapidly enough to limit the exposure of the *N. leedsi* to toxic concentrations (~ 0.20 mg/l) of the unionized ammonia. At twenty-four hours the unionized ammonia was 0.11 mg/l.

Conclusion

In conclusion, the sample of discharge from the American Cyanamid facility was not toxic on 13 February, 1989.

K = actual value is at least half of, but less than, given value

Table 1. Concentration Series and Volumes Used for These Static Bioassays.

Ceriodaphnia dubia (water flea)

Concentration	Dilution Water	Sample	Total Volume
Control	15.0 ml	0.0 ml	15 ml
10.0%	13.5 ml	1.5 ml	15 ml
30.0%	10.5 ml	4.5 ml	15 ml
50.0%	7.5 ml	7.5 ml	15 ml
70.0%	4.5 ml	10.5 ml	15 ml
85.0%	2.25 ml	12.75 ml	15 ml
100.0%	0.0 ml	15.0 ml	15 ml

Daphnia pulex (water flea)

Concentration	Dilution Water	Sample	Total Volume
Control	15.0 ml	0.0ml	15 ml
100.0%	0.0 ml	15.0 ml	15 ml

Notropis leedsi (bannerfin shiner)

Concentration	Dilution Water	Sample	Total Volume
Control	500 ml	0 ml	500 ml
10.0%	450 ml	50 ml	500 ml
30.0%	350 ml	150 ml	500 ml
50.0%	250 ml	250 ml	500 ml
70.0%	150 ml	350 ml	500 ml
85.0%	75 ml	425 ml	500 ml
100.0%	0 ml	500 ml	500 ml

Table 2. Data recorded during the 48-hour static definitive bioassays of a sample of discharge from the American Cyanamid facility, Milton, Santa Rosa County, Florida, NPDES #FL0002593, on 14 to 19 February, 1989.

Facility:	**American Cyanamid**		NPDES #	**FL0002593**	Facility Type: **Chemical Processing**
Location:	1801 Cyanamid Road, Milton, Florida		Contact/District:	J. Williams / NW	
County:	Santa Rosa		Test type:	static definitive	
Sample Collection Date:	**3/13/89**	Time: 1430	# tests:	3	Receiving Water: Escambia Bay
Test Beginning Date:	3/14/89	Time: 1100	Chlorination Type:	**nonchlorinated**	
Test Ending Date:	3/16/89	Time: 1115			**Page 1 of 2**

Organism: ***Ceriodaphnia dubia*** Life stage: neonate
LC50: - Binomial: - Moving Average: - Probit: -

	SURVIVAL			Dissolved Oxygen			pH			Temperature			Conductivity	
Concentrations	# at 0 hr	Live at 24 hr	Live at 48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control	5	5	4	8.5	-	8.3	8.2	-	8.4	21.3	-	22.4	-	-
Control	5	5	5	8.5	-	8.3	8.2	-	8.4	-	-	-	-	-
Control	5	5	5	8.5	-	8.3	8.2	-	8.4	-	-	-	-	-
Control	5	5	5	8.5	-	8.3	8.2	-	8.4	-	-	-	240	315
10%	5	5	5	8.5	-	8.4	8.2	-	8.3	21.2	-	22.3	-	-
10%	5	5	4	8.5	-	8.4	8.2	-	8.3	-	-	-	-	-
10%	5	5	5	8.5	-	8.3	8.2	-	8.3	-	-	-	-	-
10%	5	5	5	8.5	-	8.3	8.2	-	8.3	-	-	-	240	300
30%	5	5	4	8.4	-	8.1	8.3	-	8.2	21.5	-	22.3	-	-
30%	5	5	5	8.4	-	8.1	8.3	-	8.2	-	-	-	-	-
30%	5	5	5	8.4	-	8.1	8.3	-	8.2	-	-	-	-	-
30%	5	5	4	8.4	-	8.1	8.3	-	8.2	-	-	-	225	280
50%	5	5	5	8.5	-	8.0	8.3	-	8.1	21.5	-	22.3	-	-
50%	5	5	5	8.5	-	8.0	8.3	-	8.1	-	-	-	-	-
50%	5	5	5	8.5	-	8.0	8.3	-	8.1	-	-	-	-	-
50%	5	5	5	8.5	-	8.0	8.3	-	8.1	-	-	-	210	260
70%	5	5	5	8.6	-	8.0	8.3	-	8.0	21.6	-	22.5	-	-
70%	5	5	5	8.6	-	8.0	8.3	-	8.0	-	-	-	-	-
70%	5	5	5	8.6	-	8.0	8.3	-	8.0	-	-	-	-	-
70%	5	5	5	8.6	-	8.0	8.3	-	8.0	-	-	-	200	245
85%	5	5	5	8.7	-	8.0	8.3	-	7.9	22.0	-	22.5	-	-
85%	5	5	5	8.7	-	7.9	8.3	-	7.9	-	-	-	-	-
85%	5	5	5	8.7	-	7.9	8.3	-	7.9	-	-	-	-	-
85%	5	5	5	8.7	-	8.1	8.3	-	7.9	-	-	-	200	235
100%	5	5	5	8.9	-	7.9	8.4	-	7.6	22.0	-	22.7	-	-
100%	5	5	5	8.9	-	7.9	8.4	-	7.6	-	-	-	-	-
100%	5	5	5	8.9	-	7.9	8.4	-	7.6	-	-	-	-	-
100%	5	5	5	8.9	-	7.9	8.4	-	7.6	-	-	-	190	235

Total Residual Cl2	mg/l	Method
Field:	0.0	DR-100
Lab:	0.0	Hach
Lab:	-	-

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.24	0.02
100% Sample:	5.01	0.63

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	120	111
Cond. Control Water (daphnids):	130	123
100% Sample:	20	0

Salinity (ppt)	
Control Water:	0
100% Sample:	0

Table 2. Continued.

Facility:	**American Cyanamid**		**NPDES #**	**FL0002593**	Facility Type: **Chemical Processing**
Location:	1801 Cyanamid Road, Milton, Florida		Contact/District:	J. Williams / NW	
County:	Santa Rosa		Test type:	static definitive	
Sample Collection Date:	**3/13/89**	Time: 1430	# tests:	3	Receiving Water: Escambia Bay
Test Beginning Date:	3/14/89	Time: 1100	Chlorination Type:	**nonchlorinated**	
Test Ending Date:	3/16/89	Time: 1115			**Page 2 of 2**

Total Residual Cl2	mg/l	Method
Field:	0.0	DR-100
Lab:	0.0	Hach
Lab:	-	-

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.24	0.02
100% Sample:	5.01	0.63

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	120	111
Cond. Control Water (daphnids):	130	123
100% Sample:	20	0

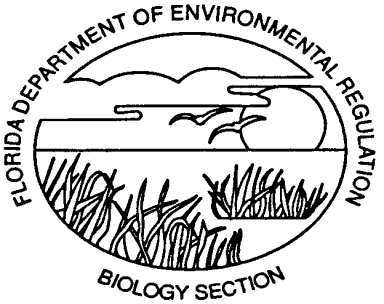
Salinity (ppt)	
Control Water:	0
100% Sample:	0

Organism: ***Daphnia pulex*** Life stage: neonate
LC50: - Binomial: - Moving Average: - Probit: -

	SURVIVAL			Dissolved Oxygen			pH			Temperature			Conductivity	
Concentrations	# at 0 hr	Live at 24 hr	Live at 48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control	5	5	5	8.4	-	7.9	8.1	-	8.3	22.0	-	22.7	-	-
Control	5	5	5	8.4	-	7.9	8.1	-	8.3	-	-	-	-	-
Control	5	5	5	8.4	-	7.9	8.1	-	8.3	-	-	-	-	-
Control	5	5	5	8.4	-	7.9	8.1	-	8.3	-	-	-	225	310
100.0%	5	5	5	8.8	-	8.0	8.4	-	7.7	22.0	-	22.7	-	-
100.0%	5	5	5	8.8	-	8.0	8.4	-	7.7	-	-	-	-	-
100.0%	5	5	5	8.8	-	8.0	8.4	-	7.7	-	-	-	-	-
100.0%	5	5	5	8.8	-	8.0	8.3	-	7.7	-	-	-	175	235

Organism: ***Notropis leedsi*** Age: 17 days
LC50: - Binomial: - Moving Average: - Probit: -

	SURVIVAL			Dissolved Oxygen			pH			Temperature			Conductivity	
Concentrations	# at 0 hr	Live at 24 hr	Live at 48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control	5	5	5	8.4	7.7	7.8	7.7	7.9	8.1	22.5	22.2	22.3	-	-
Control	5	5	5	8.4	7.7	7.8	7.7	7.9	8.1	-	-	-	235	240
10%	5	5	5	8.5	7.7	7.9	7.8	7.9	8.1	22.5	22.0	22.1	-	-
10%	5	5	5	8.5	7.8	7.9	7.8	7.9	8.1	-	-	-	230	230
30%	5	5	5	8.7	7.9	7.9	7.9	7.9	8.1	22.2	21.9	22.1	-	-
30%	5	5	5	8.7	7.9	7.9	7.9	7.9	8.1	-	-	-	220	225
50%	5	5	5	9.0	8.0	7.9	8.1	7.8	8.0	22.0	21.8	22.0	-	-
50%	5	5	5	9.0	8.0	7.9	8.1	7.9	8.0	-	-	-	210	215
70%	5	5	5	9.2	8.0	7.9	8.2	7.8	7.8	21.7	21.8	22.0	-	-
70%	5	5	5	9.2	8.0	7.9	8.2	7.8	7.8	-	-	-	205	210
85%	5	5	5	9.4	8.0	7.9	8.4	7.7	7.7	21.5	21.8	22.0	-	-
85%	5	5	5	9.4	8.0	7.9	8.4	7.7	7.7	-	-	-	200	210
100%	5	5	5	9.7	8.0	7.8	8.4	7.6	7.5	-21.5	22.1	22.0	-	-
100%	5	5	5	9.7	8.0	7.8	8.4	7.6	7.5	-	-	-	195	210



Bioassays of

American Cyanamid

Outfall #001

Milton, Santa Rosa County, Florida

NPDES #FL0002593

Sampled 3/13/89

September 28, 1989

Biology Section
Division of Administrative and Technical Services

Table 3. Microtox test results, American Cyanamid, Santa Rosa County, NPDES #FL0002593, on 14 March, 1989.

Microtox Test — Culture Lot # M-603

% Sample	Final Reclaimed Water nonchlorinated 5-min	15-min
0	97	49
0	86	43
0	87	44
12.38	85	44
12.38	86	45
12.38	85	43
24.75	79	39
24.75	80	41
24.75	81	40
49.5	67	32
49.5	73	36
49.5	73	36
99	52	25
99	52	24
99	53	25

EC_{50} Nonchlorinated (15 minute, 15 °C) = 103.5% sample

EC_{50} (15 minute, 15 °C) is calculated using the Data Reduction Computer Program developed by Microbics Corporation for the Sharp Model EL-5100 calculator. *Microbics Systems Operating Manual, 1982.*

Table 4. Results of chemical analyses on the sample of discharge from American Cyanamid, Santa Rosa County, Florida NPDES #FL0002593.

Organics

Acid Extractables	Trace amounts of naturally occurring organic compounds
Base Neutral Extractables	Trace amounts of organic acids and esters
Pesticide Extractables	Two unidentified components sensitive to ECD

Metals

Chromium	20.0 µg/l [k]
Copper	25.0 µg/l [k]
Lead	6.0 µg/l
Silver	0.45 µg/l

[k] actual value is at least half of, but less than, given value.

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: American Cyanamid
Address/City: 1801 Cyanamid Rd Milton Fl 32570
County: ~~NFL000 2593~~ Santa Rosa
Contact/District: J. Williams / NW
NPDES Permit #: FL0002593 Outfall #: 001

Sample Collection: Date 3/13/89 Time 1430
Test Beginning: Date 3/14/89 Time 1100
Test Ending: Date 3/16/89 Time 1115
Test Organism: C. Dubia
Life Stage/Age: neonate

Test Number: 1 of 3 Test Type: Screening | (Definitive)
(Static) | Static Renewal | Flow-through

Remarks:

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7.0 7.9	8.7 @ 23°C	1352 @ 24°C 1405	23.5 @ 23.4
24 hr	7.0 7.9	8.5 @ 24°C		22.2 @ 22.1
48 hr	7.0 7.9	8.7 @ 23°C	1372 @ 24°C 1350	22.0 @ 22.0

Conc.	Chamber #	Number Live 0	24	48	DO (mg/l) 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	Cond. (umhos/cm) 0	24	48
Control	1	5	5	4	8.5		8.3	8.2		8.4	21.3		22.4			
"	2	5	5	5	8.5		8.3	8.2		8.4						
"	3	5	5	5	8.5		8.3	8.2		8.4						
"	4	5	5	5	8.5		8.3	8.2		8.4			~~22.3~~	240		315
10%	5	5	5	5	8.5		8.4	8.2		8.3	21.2		22.3			
"	6	5	5	4	8.5		8.4	8.2		8.3						
"	7	5	5	5	8.5		8.3	8.2		8.3						
"	8	5	5	5	8.5		8.3	8.2		8.3				240		300
30%	9	5	5	4	8.4		8.1	8.3		8.2	21.5		22.3			
"	10	5	5	5	8.4		8.1	8.3		8.2						
"	11	5	5	5	8.4		8.1	8.3		8.2						
"	12	5	5	4	8.4		8.1	8.3		8.2				225		280
50%	13	5	5	5	8.5		8.0	8.3		8.1	21.5		22.3			
"	14	5	5	5	8.5		8.0	8.3		8.1						
"	15	5	5	5	8.5		8.0	8.3		8.1						
"	16	5	5	5	8.5		8.0	8.3		8.1				210		260
70%	17	5	5	5	8.6		8.0	8.3		8.0	21.6		22.5			
"	18	5	5	5	8.6		8.0	8.3		8.0						
"	19	5	5	5	8.6		8.0	8.3		8.0						
"	20	5	5	5	8.6		8.0	8.3		8.0			~~22.5~~	200		245
85%	21	5	5	5	8.7		8.0	8.3		7.9	22.0		22.5			
"	22	5	5	5	8.7		7.4	8.3		7.9						
"	23	5	5	5	8.7		7.9	8.3		7.9						
"	24	5	5	5	8.7		8.1	8.3		7.9				200		235
100%	25	5	5	5	8.4		7.9	8.4		7.6	22.0		22.7			
"	26	5	5	5	8.4		7.9	8.4		7.6						
"	27	5	5	5	8.4		7.9	8.4		7.6						
"	28	5	5	5	8.4		7.9	8.4		7.6				190		235
Measured by:		JMF	ME	MF	JMF		SHW	JMF		SHW	JMF		SHW	JMF		SHW
Recorded by:		KML	MF	MF	KML		MF	KML		MF	KML		MF	KML		MF

Investigators' Signatures

M. Smith
Kilgording
Steven H Lowe

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:	—	—	0	DR-100	J.C.
Lab Tot. Resid. Cl2:	—	—	0	Hach	M.E.
Alkalinity:	120	130	20	HACH	SHW
Hardness:	111	123	0	HACH	SHW
Total Ammonia:	0.0	0.239	5.01	ORION	SHW

slope = −56.3

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: American Cyanamid
Address/City: 1801 Cyanamid Rd Milton Fl
County: Santa Rosa
Contact/District: J. Williams / NW
NPDES Permit #: FL0002593 Outfall #: 001

Sample Collection: Date 3/13/89 Time 1430
Test Beginning: Date 3/14/89 Time 1100
Test Ending: Date 3/16/89 Time 1115
Test Organism: D. pulex
Life Stage/Age: Neonate

Test Number: 2 of 3 Test Type: Screening | Definitive BF
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	29	5	5	5	8.4		7.9	8.1		8.3	22.0		22.7			
"	30	5	5	5	8.4		7.9	8.1		8.3						
"	31	5	5	5	8.4		7.9	8.1		8.3						
"	32	5	5	5	8.4		7.9	8.1		8.3				225		310
100%	33	5	5	5	8.8		8.0	8.4		7.7	22.0		22.7			
"	34	5	5	5	8.8		8.0	8.4		7.7						
"	35	5	5	5	8.8		8.0	8.4		7.7						
"	36	5	5	5	8.8		8.0	8.3		7.7				175		235
Measured by:		KMH	MF	MF	JMF		SHW	JMF		SHW	JMF		SHW	JMF		SHW
Recorded by:		KML	MF	MF	KML		MF	KML		MF	KML		MF	KML		MF

Investigators' Signatures

M Fiedler
K M Harding
Steven H Wolfe

Reviewer

Water-quality Parameters

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

DER Biology Section --- Acute-bioassay Bench Sheet

Sample Source: American Cyanamid
Address/City: 1801 Cyanamid Rd. Milton Fl 32570
County: Santa Rosa
Contact/District: J. Williams / NW
NPDES Permit #: FL0002593 Outfall #: 001

Sample Collection: Date 3/13/89 Time 1430
Test Beginning: Date 3/14/89 Time 1100
Test Ending: Date 3/16/89 Time 1115
Test Organism: M. bahia
Life Stage/Age: 17 days

Test Number: 3 of 3
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	18	5	5	5	8.4	7.7	7.8	7.7	7.9	8.1	22.5	22.2	22.3			
"	27	5	5	5	8.4	7.7	7.8	7.7	7.9	8.1				235		240
10%	16	5	5	5	8.5	7.7	7.9	7.8	7.9	8.1	22.5	22.0	22.1			
"	43	5	5	5	8.5	7.8	7.9	7.8	7.9	8.1				230		230
30%	164	5	5	5	8.7	7.9	7.9	7.9	7.9	8.1	22.2	21.9	22.1			
"	5	5	5	5	8.7	7.9	7.9	7.9	7.9	8.1				220		225
50%	183	5	5	5	9.0	8.0	7.9	8.1	7.8	8.0	22.0	21.8	22.0			
"	49	5	5	5	9.0	8.0	7.9	8.1	7.9	8.0				210		215
70%	38	5	5	5	9.2	8.0	7.9	8.2	7.8	7.8	21.7	21.8	22.0			
"	70	5	5	5	9.2	8.0	7.9	8.2	7.8	7.8				205		210
85%	58	5	5	5	9.4	8.0	7.9	8.4	7.7	7.7	21.5	21.8	22.0			
"	2	5	5	5	9.4	8.0	7.9	8.4	7.7	7.7				200		210
100%	71	5	5	5	9.7	8.0	7.8	8.4	7.6	7.5	21.5	22.1	22.0			
"	37	5	5	5	9.7	8.0	7.8	8.4	7.6	7.5				195		210
Measured by:		KML	MF	MF	JMF	MF	SHW	JMF	MF	SHW	JMF	MF	SHW	JMF		SHW
Recorded by:		MF	MF	MF	KML	MF	MF	KML	MF	MF	KML	MF	MF	KML		MF

Investigators' Signatures

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:					
Alkalinity:	120		20	HACH	SHW
Hardness:	111		0	HACH	SHW
Total Ammonia:					

MICROTOX™ Data Reduction Sheet

SOURCE: American Cyanamid

GRAPH CALC EC 50 (15 MIN, 15 °C) = 103.5 %SAMPLE mL/L

SAMPLE DATA

SAMPLE TYPE (EFFLUENT, LEACHATE, ETC): effluent

DATE ASSAYED: 3-14-89 TIME: 9:15 AM

VISUAL COLOR: none CORRECTION REQUIRED: YES (NO)

VISUAL TURBIDITY: none SEPARATION REQUIRED: YES (NO)

INITIAL pH: pH ADJUSTED TO: WITH:

OSMOTICALLY ADJUSTED WITH: MOAS (DRY NaCl) OTHER:

PRIMARY DILUTION OF SAMPLE:

OPERATOR: Leslie A Williams REAGENT VIAL LOT NO. 603

REMARKS:

MICROTOX™ 100% TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	T5	T15	NOTES
A1	0	97	49			
B1		86	43			
C1		87	44			
A2	12.38	85	44	.05	.03	
B2		86	45			
C2		85	43			
A3	24.75	79	39	.13	.13	
B3		80	41			
C3		81	40			
A4	49.5	67	32	.27	.31	
B4		73	36			
C4		73	36			
A5	99	52	25	.72	.84	
B5		52	24			
C5		53	25			
EC_{50} (MIN, °C)				131.16	103.5	

REVIEWED BY:

DATE: