

Bioassays of

Cargill Fertilizer - Bartow Chemical Plant

Bartow, Polk County, Florida

NPDES #FL0001589

Sampled 2/21/94

June 1994

Biology Section
Division of Technical Services

Bioassays of

Cargill Fertilizer - Bartow Chemical Plant

Bartow, Polk County, Florida

NPDES #FL0001589

Biology Section
Bureau of Laboratories
June 1994

Introduction

Cargill Fertilizer-Bartow Chemical Plant, Bartow, Polk County, Florida, NPDES #FL0001589, tests performed on 22 to 24 February, 1994.

This facility, located on Highway 60 west of Bartow, is a fertilizer chemical plant which produces sulfuric acid, phosphoric acid, triple superphosphate, monoammonium phosphate, and diammonium phosphate. The average discharge from the plant is 1.18 MGD. Some of the process wastewater, which is gypsum transport water and scrubber water from the phosphate plants, is recycled to the plant. Excess process waste water is placed in ponds, double-limed, and discharged through outfall 002 into the IMC-Noralyn recirculation system. Non-contact cooling water and stormwater is discharged through outfalls 001 and 004. Discharge from outfall 001 is to Skinned Sapling Creek, then to the Alafia River. Outfall 004 discharges to a man-made ditch which enters Lake Joan. Only outfall 001 was active during the sampling period (description from facility summaries prepared by Lisa Carter and Paula Noblitt, FDEP Tampa).

The toxicity tests discussed in this report were performed in accordance with methods described by Weber, 1993, *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, 4th Edition, EPA/600/4-90/027F.

Results and Discussion

The FDEP Biology Section performed two 48-hour static acute screening toxicity bioassays with a sample of effluent from outfall 001 at this facility. The test species used for these bioassays were the water flea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*. The test results did not indicate toxicity.

Total residual chlorine of the sample was < 0.03 mg/L in the laboratory and < 0.1 mg/L in the field. Total and unionized ammonia concentrations were 0.92 mg/L and < 0.02 mg/L, respectively. Further chemical analyses were performed on the sample and several metals were present (Table 2). The fluoride concentration was 5.2 mg/L. Organics were not detected.

Conclusion

The sample of effluent collected from outfall 001 at this facility on 21 February, 1994, did not show toxicity.

Table 1. Concentration series and volumes used for the 48-hour static acute screening toxicity bioassays of the Cargill Fertilizer-Bartow Chemical Plant effluent performed on 22 to 24 February, 1994.

Ceriodaphnia dubia (water flea)

Concentration	Dilution Water	Sample	Total Volume
Control	20 mL	0 mL	20 mL
100 %	0 mL	20 mL	20 mL

Cyprinella leedsi (bannerfin shiner)

Concentration	Dilution Water	Sample	Total Volume
Control	500 mL	0 mL	500 mL
100 %	0 mL	500 mL	500 mL

Table 2. Results of chemical analyses on the effluent from Cargill Fertilizer-Bartow Chemical Plant, sampled on 21 February, 1994.

Fluoride	5.2	mg F/L [A]

Metals

Aluminum	140	µg/L [I]
Calcium	60.4	mg/L
Magnesium	22.5	mg/L
Zinc	7	µg/L [I]

Volatile Organic Compounds

None Detected

Base-Neutral & Acid Extractables

None Detected

A Value reported is the mean of two or more determinations.

I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

Table 3. Data recorded during the 48-hour static acute screening bioassays of a sample of effluent from the Cargill Fertilizer-Bartow Chemical Plant Outfall 001, Bartow, Polk County, Florida, NPDES# FL0001589, performed on 22 to 24 February, 1994.

Facility:	**Cargill Fertilizer-Bartow Chemical Plant**	**NPDES #**	**FL0001589**	Facility Type:	**Fertilizer Chemical Plant**
Location:	Outfall 001, Bartow	Contact/District:	P. Fricano/SW		
County:	Polk	Test type:	static acute screen		
Sample Collection Date:	**2/21/94** Time: 1125	# tests:	2	Receiving Water:	Skinned Sapling Creek to Alafia River
Test Beginning Date:	2/22/94 Time: 1130	Chlorination Type:	Non-chlorinated		
Test Ending Date:	2/24/94 Time: 1130			**Page 1 of 1**	

Total Residual Cl2	mg/L	Method
Field:	< 0.1	-
Lab:	< 0.03	DR-100

Ammonia	Total (mg/L)	Unionized (mg/L)
Control Water (fish):	0.017	0.00
20% Dilute Mineral Water (cladocerans):	<0.017	0.00
100% Sample:	0.92	<0.02

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	125	120
20% Dilute Mineral Water (cladocerans):	70	80
100% Sample:	85	255

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

Organism: ***Ceriodaphnia dubia*** Life stage: < 24 hours old

	SURVIVAL			pH			Temperature			Dissolved Oxygen			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	-	8.0	22.9	-	23.7	8.7	-	7.7	175	190
Control	5	5	5	-	-	8.0	-	-	23.7	-	-	7.7	-	190
Control	5	5	5	-	-	8.0	-	-	23.7	-	-	7.7	-	190
Control	5	5	5	-	-	8.0	-	-	23.7	-	-	7.7	-	195
100%	5	5	5	7.4	-	8.2	22.9	-	23.6	8.7	-	8.3	810	825
100%	5	5	5	-	-	8.2	-	-	23.6	-	-	8.3	-	845
100%	5	5	5	-	-	8.2	-	-	23.6	-	-	8.3	-	845
100%	5	5	5	-	-	8.2	-	-	23.6	-	-	8.3	-	845

Organism: ***Cyprinella leedsi*** Age: 10 days

	SURVIVAL			pH			Temperature			Dissolved Oxygen			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	7.8	8.2	8.0	21.6	23.6	23.2	9.5	8.0	7.7	235	245
Control	5	5	5	7.8	8.2	8.0	21.5	-	23.2	9.5	8.0	7.7	235	245
100%	5	5	5	7.4	7.7	7.6	23.2	23.6	23.0	8.5	7.2	7.6	865	860
100%	5	5	5	7.4	7.7	7.6	23.4	-	23.0	8.4	7.3	7.6	865	865

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Seminole Fertilizer - Bartow
Location: CARGILL INC -OWNER
County: Polk
Contact/District: P. Friano / SW
NPDES Permit #: FL0001589 Outfall #: 001
94-FEB-22-09 71389

Sample Collection: Date 2-21-94 Time 1125
Test Beginning: Date 2-22-94 Time 1130
Test Ending: Date 2-24-94 Time 11:30
Organism Batch #: 6 Diluent Batch #: 7
Organism Age: < 24 hrs
Test Organism: Ceriodaphnia dubia

Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Test Number: 1 of 2

Remarks: Critical sample Parameters
pH 7.3 After warming to
DO 10.5 Room temperature
Cond 800
Cl <0.03
Temp. 20.1

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0	23.0 @ 23.2	8.5 @ 23.3	975 @ 1,000 9875
	9.0 @ 9.0			9420 @ ~~10,000~~ @ 23.2 °C
24 hr	7.0 @ 7.0	23.0 @ 23.2	8.5 @ 23.7	975 @ 1,000 9875
	9.0 @ 9.0			9540 @ ~~10,000~~ @ 23.8 °C
48 hr	7.0 @ 7.0	22.2 @ 22.4	8.6 @ 22.7	975 @ 1,000 9875
	9.0 @ 9.0			9450 @ ~~10,000~~ @ — °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED ~~Cond. (mmhos/cm)~~ Cond. (µmhos/cm) 0 hr	UNCORRECTED Cond. (µmhos/cm) 24 h	UNCORRECTED Cond. (µmhos/cm) 48 h
Control	A	5	5	5	8.4		8.0	22.9		23.7	8.7		7.7	175		190
Control	B	5	5	5			8.0			23.7			7.7			190
Control	C	5	5	5			8.0			23.7			7.7			190
Control	D	5	5	5			8.0			23.7			7.7			195
100%	A	5	5	5	7.4		8.2	22.9		23.6	8.7		8.3	810		825
100%	B	5	5	5			8.2			23.6			8.3			845
100%	C	5	5	5			8.2			23.6			8.3			845
100%	D	5	5	5			8.2			23.6			8.3			845
Measured/Loaded by:		TR	TR	TR	MF		TR	MF		TR	MF		TR	MF		TR
Recorded by:		TR	TM	TR	TR		TR	TR		TR	TR		TR	TR		TR

Investigators' Signatures
Robin G. Rader
Marshall Faircloth
Tina Mikulsky

Reviewer

form updated 7/8/93

Water Quality Parameters	~~Salt Water~~ (Well Water)	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			<0.1	—	L. carter
Lab Total Residual Cl2:	<0.03	<0.03	<0.03	DR-100	TR
Alkalinity:	125	70	85	Hach	TR
Hardness:	120	80	255	Hach	TR
Total Ammonia:	<0.017	<0.017	0.92	Orion	mf

Ammonia Meter #98136 Meter Slope: -56.4 Ammonia pre-slope: mf 2/22/94 <0.017 Blank: <0.017 Ammonia Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Seminole Fertilizer - Bartow
Location: CARGILL INC - OWNER
County: Polk
Contact/District: P. Fricano / SW
NPDES Permit #: FL0001589 Outfall #: 001
94 FEB-22-09 71389

Sample Collection: Date 2-21-94 Time 1125
Test Beginning: Date 2-22-94 Time 1130
Test Ending: Date 2-24-94 Time 1130
Organism Batch #: 7 Diluent Batch #: Well
Organism Age: 10 days
Test Organism: Cyprinella leedsi

Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Test Number: 2 of 2

Remarks: Parameters after sample was warmed

pH 7.3
Temp 20.1°C
D.O. 10.5
Cond. 800 µ MHO's
Cl⁻ <0.03

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.0 @ 23.2	8.5 @ 23.3	975 @ 1,000 ~~9895~~ 9420 @ ~~10,000~~ @ 23.2 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.0 @ 23.2	8.5 @ 23.7	975 @ 1,000 9540 @ 10,000 @ 23.8 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.2 @ 22.4	8.6 @ 22.7	975 @ 1,000 ~~9895~~ 9450 @ ~~10,000~~ @ — °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED ~~Cond. (mmhos/cm)~~ Cond. (µmhos/cm) 0 hr	Cond. (µmhos/cm) 24 h	Cond. (µmhos/cm) 48 h
Control A	147	5	5	5	7.8	8.2	8.0	21.6	23.6	23.2	9.5	8.0	7.7	235	245	245
Control B	8	5	5	5	7.8	8.2	8.0	21.5		23.2	9.5	8.0	7.7	235	245	245
100% A	390	5	5	5	7.4	7.7	7.6	23.2	23.6	23.0	8.5	7.2	7.6	865	870	860
100% B	219	5	5	5	7.4	7.7	7.6	23.4		23.0	8.4	7.3	7.6	865	870	865
Measured/Loaded by:		TR	TR	TR	MF	TR	TR	MF	TR	TR	MF	TR	TR	MF	TR	TR
Recorded by:		TR	TR	TR	TR	TM	TR	TR	TM	TR	TR	TM	TR	TR	TM	TR

Investigators' Signatures
Robin C. Radel
Marshall Faircloth
Tim Mikulsky

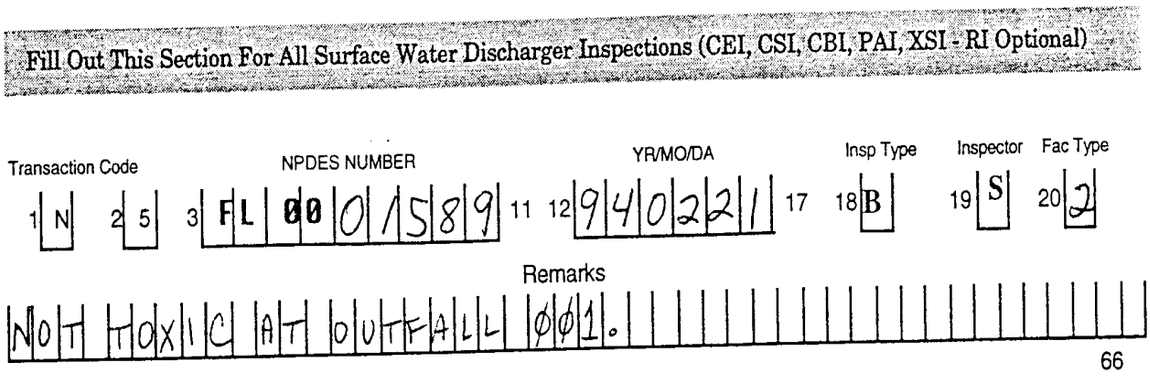
Reviewer

form updated 7/8/93

Water Quality Parameters	~~Salt Water~~ (Well Water)	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			<0.1	—	L. Carter
Lab Total Residual Cl2:	<0.03	<0.03	<0.03	DR-100	TR
Alkalinity:	125	70	85	Hach	TR
Hardness:	120	60	255	Hach	TR
Total Ammonia:	<0.017	<0.017	0.92	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: -56.4 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

The Bioassay of the Cargill Fertilizer-Bartow Chemical Plant effluent sampled on February 21, 1994, NPDES# FL0001589.



The Priority Pollutants Analysis for the Bioassay of the Cargill Fertilizer-Bartow Chemial Plant effluent sampled on February 21, 1994, NPDES# FL0001589.

