Bioassays of

Cargill Fertilizer, Inc.

Bartow, Polk County, Florida

NPDES #FL0001589

Sampled 12/11/95

March 1996

Biology Section

Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan #870346G

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Introduction

Cargill Fertilizer, Inc., Bartow Plant, Bartow, Polk County, Florida, NPDES #FL0001589, tests performed on 12 to 14 December, 1995.

This phosphate mining and processing facility is located on Highway 60, west of Bartow. The facility has a design flow of approximately 6 MGD and an average flow of 1.0 MGD. Non-contact cooling water and stormwater is discharged through outfall 001 into Skinned Sapling Creek, then to the Alafia River. The wastewater receives no treatment prior to discharge (facility summary provided by G. Brad Lamb, 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 on a sample of effluent from this facility. The test species used for these bioassays were the water flea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*. The tests results did not indicate toxicity (Table 1).

Total residual chlorine was not detected in the sample. Total ammonia and unionized ammonia concentrations were 1.66 mg/L and 0.02 mg/L, respectively. Further chemical analyses identified sulfate and fluoride in the sample (Table 2).

Conclusion

The sample of effluent collected from this facility on December 11, 1995, did not show toxicity.

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from Cargill Fertilizer, Inc., Bartow Plant, Bartow, Polk County, Florida, NPDES# FL0001589, performed on 12 to 14 December,1995.

Facility:	**Cargill Fertilizer, Inc., Bartow Plant**	**NPDES #**	**FL0001589**	Facility Type:	**Mining**
Location:	Highway 60, west of Bartow	Contact/District:	Brad Lamb/Southwest		
County:	Polk	Test type:	static acute screen		
Sample Collection Date:	12/11/95 Time: 1100	# tests:	2	Receiving Water:	Skinned Sapling Creek
Test Beginning Date:	12/12/95 Time: 1200	Chlorination Type:	Non-chlorinated		to the Alafia River
Test Ending Date:	12/14/95 Time: 1300				**Page 1 of 1**

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

Concentrations	Sample/Diluent Volume(mL)	SURVIVAL # Alive 0 hr	24 hr	48 hr	pH 0 hour	24 hour	48 hour	Temperature[A] 0 hour	24 hour	48 hour	Dissolved Oxygen 0 hour	24 hour	48 hour	Conductivity Uncorrected µmhos/cm 0 hour	48 hour
Control A	0/20	5	5	5	8.0	-	8.1	21.2	-	24.0	8.0	-	8.1	175	185
Control B	0/20	5	5	5	-	-	8.1	-	-	23.8	-	-	8.0	-	185
Control C	0/20	5	5	5	-	-	8.1	-	-	23.7	-	-	8.0	-	180
Control D	0/20	5	5	5	-	-	8.2	-	-	23.6	-	-	8.0	-	180
100% A	20/0	5	5	5	7.3	-	8.4	23.0	-	23.8	7.8	-	8.1	1195	1285
100% B	20/0	5	5	5	-	-	8.5	-	-	23.7	-	-	8.1	-	1305
100% C	20/0	5	5	5	-	-	8.4	-	-	23.7	-	-	8.1	-	1340
100% D	20/0	5	5	5	-	-	8.4	-	-	23.7	-	-	8.1	-	1335

[A] Temperature of test incubator was continously recorded on a strip chart recorde
Incubator temperature range for the test period was 24.4-25.4°C.

Organism: ***Cyprinella leedsi*** Age: 11 days

Concentrations	Sample/Diluent Volume(mL)	SURVIVAL # Alive 0 hr	24 hr	48 hr	pH 0 hour	24 hour	48 hour	Temperature[B] 0 hour	24 hour	48 hour	Dissolved Oxygen 0 hour	24 hour	48 hour	Conductivity Uncorrected µmhos/cm 0 hour	48 hour
Control A	0/500	5	5	5	7.8	8.1	8.3	22.9	21.4	23.5	7.9	8.2	8.2	240	250
Control B	0/500	5	5	5	7.8	8.1	8.2	22.9	21.3	23.4	7.9	8.2	8.1	240	250
Control C	0/500	5	5	5	7.8	8.1	8.3	22.9	21.2	23.3	7.9	8.3	8.1	240	250
Control D	0/500	5	5	5	7.8	8.1	8.3	22.9	21.4	23.3	7.9	8.4	8.1	240	250
100% A	500/0	5	5	5	7.3	7.9	8.2	23.8	21.5	23.4	7.9	8.4	8.2	1270	1275
100% B	500/0	5	5	5	7.3	7.9	8.2	23.9	21.4	23.4	7.7	8.4	8.3	1275	1285
100% C	500/0	5	5	5	7.3	7.9	8.2	23.9	21.4	23.3	7.8	8.5	8.3	1275	1280
100% D	500/0	5	5	5	7.3	7.9	8.2	23.9	21.5	23.3	7.8	8.5	8.3	1275	1285

[B] Temperature of test room was continously recorded on a strip chart recorder.
Room temperature range for the test period was 20.2-23.8°C.

Total Residual CL2	mg/L	Method
Field:	not measured	
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:	1.66	0.02

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	120	125
20% Dilute Mineral Water (cladocerans):	70	80
100% Sample:	90	280

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

Table 2. Results of chemical analyses on the effluent from Cargill Fertilizer, Inc., Bartow Plant, sampled on December 11, 1995.

Metals

Fluoride	4.8 mg/L[A]
Sulfate	530 mg/L

Base, Neutral, & Acid Extractable Organics

none detected

[A] Value reported is the mean of two or more determinations

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Cargill Fertilizer
County: Polk
Contact / District: Brad Lamb / Southwest
NPDES Permit #: FL0001589
LIMS Sample #: 124739 LIMS Job #: 95-Dec-12-11-01
sample log 12-15-95

Sample Collection: Date 12-11-95 Time 1100
Test Beginning: Date 12-12-95 Time 12.00
Test Ending: Date 12-14-95 Time 1300
Organism Batch #: *5457 Diluent Batch #: 49
Organism Age: <24 hours old

Test Organism: Ceriodaphnia dubia

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

Test Number: 1 of 2

Remarks:

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	19.8°C @ 19.9°C	8.9 @ 20.9 °C	97.3 @ 101.8 963 @ 1025 @ 21.6 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	21.2 @ 21.3	8.9 @ 21.1 °C	98.8 @ 101.8 971 @ 1025 @ 22.0 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.6 @ 22.7	8.4 @ 23.9 °C	9550 @ 10180 101.5 @ 102.2 990 @ 1025 @ 23.5 °C 9720 @ 10380

* batch mistake JN 12-13-95

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	24 h	48 h
Control	A	5	5	5	8.0		8.1	21.2	24.0		8.0		8.1	175		185
Control	B	5	5	5			8.1		23.6				8.0			185
Control	C	5	5	5			8.1		23.7				8.0			180
Control	D	5	5	5			8.2		23.6				8.0			180
100%	A	5	5	5	7.3		8.4	23.0	23.8		7.8		8.1	1195		1285
100%	B	5	5	5			8.5		23.7				8.1			1305
100%	C	5	5	5			8.4		23.7				8.1			1340
100%	D	5	5	5			8.4		23.7				8.1			1335
										JN 12-14 wrong column						
Measured/Loaded by:		MF	MF	MF	MF	A incorrect pH was entered at initial MF 12/13/95	JLS	MF		JLS	MF		JLS	MF		JLS
Recorded by:		JRS	MF	JRS	JRS		JN	JRS		JN	JRS		JN	JRS		JN

Investigators' Signatures

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Joseph Nott
Tina Mikulesky

reviewer

form updated 5/05/95

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			Not	Measured	
Lab Total Residual Cl2 (mg/L):	—	<0.03	<0.03	DR-100	JRS
Alkalinity (mg/L as $CaCO_3$):	—	70	90	HACH	JRS
Hardness (mg/L as $CaCO_3$):	—	80	280	HACH	JRS
Total ammonia (mg/L as N):	—	<0.017	1.66	Orion	JN

Ammonia Meter #98136 Ammonia Meter Slope: -56.5 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Cargill Fertilizer
County: Polk
Contact / District: Brad Lamb / South west
NPDES Permit #: FL0005789
LIMS Sample #: 124739 LIMS Job #: 95-Dec-12-11-01

Sample Collection: Date 12/11/95 Time 1100
Test Beginning: Date 12/12/95 Time 12:00
Test Ending: Date 12/14/95 Time 1300
Organism Batch #: 73 Diluent Batch #: well
Organism Age: 11 days old
Test Organism: Cyprinella leedsi

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

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	19.8 @ 19.9	8.9 @ 20.9 °C	473 @ 101.8 963 @ 1025 @ 21.6 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	21.2 @ 21.3	8.9 @ 21.1 °C	98.8 @ 101.8 971 @ 1025 @ 22.0 °C 9550 @ 10180
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.6 @ 22.7	8.4 @ 23.9 °C	101.5 @ 101.8 990 @ 1025 @ 23.5 °C 9720 @ 10180

Conc.	Chamber #	Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm)		
		0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
Control A	219	5	5	5	7.8	8.1	8.3	22.9	21.4	23.5	7.9	8.2	8.2	240	235	250
Control B	9	5	5	5	7.8	8.1	8.2	22.9	21.3	23.4	7.9	8.2	8.1	240	235	250
Control C	399	5	5	5	7.8	8.1	8.3	22.9	21.2	23.3	7.9	8.3	8.1	240	235	250
Control D	333	5	5	5	7.8	8.1	8.3	22.9	21.4	23.3	7.9	8.4	8.1	240	235	250
100% A	775	5	5	5	7.3	7.9	8.2	23.8	21.5	23.4	7.9	8.4	8.2	1270	1220	1275
100% B	118	5	5	5	7.3	7.9	8.2	23.9	21.4	23.4	7.7	8.4	8.3	1275	1225	1285
100% C	102	5	5	5	7.3	7.9	8.2	23.9	21.4	23.3	7.8	8.5	8.3	1275	1220	1280
100% D	41	5	5	5	7.3	7.9	8.2	23.9	21.5	23.3	7.8	8.5	8.3	1275	1235	1285
Measured/Loaded by:		MF	MF	MF	MF	MF	JLS	MF	MF	JLS	MF	MF	JLS	MF	MF	JW
Recorded by:		JKS	MF	MF	JKS	MF	JN	JKS	JN	JN	JKS	JN	JN	JKS	JN	JN

Investigators' Signatures

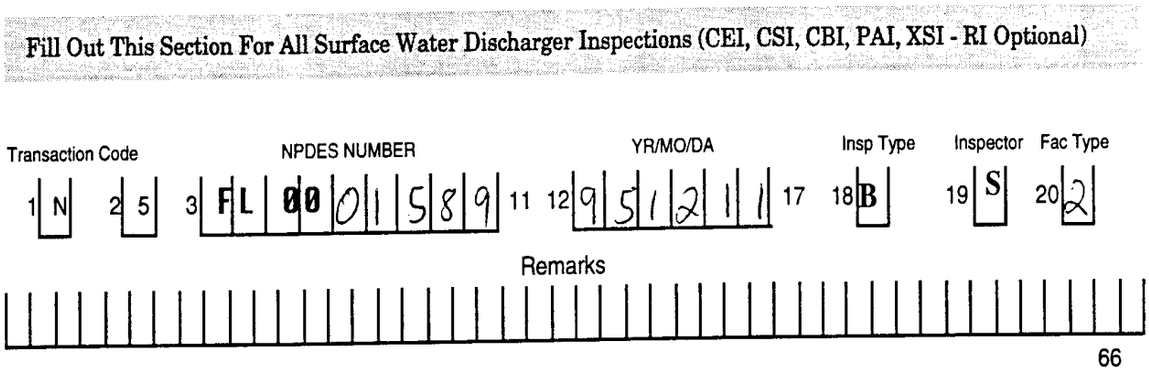
reviewer

form updated 5/05/95

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			NOT Measured		
Lab Total Residual Cl2 (mg/L):	<0.03	—	<0.03	DR-100	JKS
Alkalinity (mg/L as $CaCO_3$):	120	—	90	HACH	JKS
Hardness (mg/L as $CaCO_3$):	125	—	280	HACH	JKS
Total ammonia (mg/L as N):	<0.017	—	1.66	Orion	JN

Ammonia Meter #98136 Ammonia Meter Slope: -56.5 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

The Bioassay of the Cargill Fertilizer, Inc., Bartow Plant effluent sampled on December 11, 1995, NPDES #FL0001589.



The Priority Pollutants Analysis for the Bioassay of the Cargill Fertilizer, Inc., Bartow Plant effluent sampled on December 11, 1995, NPDES #FL0001589.

