Bioassays of

Cargill Fertilizer - Hookers Prairie Mine

Bradley Junction, Polk County, Florida

NPDES #FL0033294

Sampled 12/12/94

March 1995

Biology Section

Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan #870346G

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Biology Section
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Introduction

Cargill Fertilizer - Hookers Prairie Mine, Bradley Junction, Polk County, Florida, NPDES #FL0033294, tests performed on 13 to 15 December, 1994.

This phosphate-rock mining and beneficiation complex is located on Old Highway 37 east of Bradley Junction. Process generated wastewater, mine dewatering discharges, and stormwater runoff are discharged from outfall 003 to a grass-lined drainage ditch to Whidden Creek which enters the Peace River (facility summary from FDEP Tallahassee NPDES files).

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 bioassays with a sample of effluent from this facility. The test species used for these bioassays were the waterflea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*. The test results did not indicate toxicity (Table 1).

Total residual chlorine of the sample was 0.04 mg/L in the laboratory. Total residual chlorine was not measured in the field. Total ammonia was not detected in the sample. Further chemical analyses were performed on the sample and several metals were identified (Table 2). Organics were not detected.

Conclusion

The sample of effluent collected from this facility on 12 December, 1994, did not show toxicity.

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Cargill Fertilizer-Hookers Prairie Mine, Bradley Junction, Polk County, Florida, NPDES# FL0033294, performed on 13 to 15 December, 1994.

Facility:	**Cargill Fertilizer-Hookers Prairie Mine**			**NPDES #**	**FL0033294**	Facility Type:	**Phosphate Mine**
Location:	Old Highway 37, Bradley Junction			Contact/District:	L. Carter/SW		
County:	Polk			Test type:	static acute screen		
Sample Collection Date:	**12/12/94**	Time:	1045	# tests:	2	Receiving Water:	Whidden Creek to
Test Beginning Date:	12/13/94	Time:	1600	Chlorination Type:	**not chlorinated**		Peace River
Test Ending Date:	12/15/94	Time:	1600				**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* 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	8.1	-	8.2	21.7	-	23.8	8.4	-	8.0	160	195
Control B	0/20	5	5	5	-	-	8.2	-	-	23.9	-	-	8.1	-	190
Control C	0/20	5	5	5	-	-	8.3	-	-	23.9	-	-	8.0	-	190
Control D	0/20	5	5	5	-	-	8.3	-	-	23.7	-	-	8.0	-	180
100% A	20/0	5	4	5	7.9	-	8.5	21.6	-	23.8	7.7	-	8.2	325	380
100% B	20/0	5	5	5	-	-	8.5	-	-	23.9	-	-	8.2	-	380
100% C	20/0	5	5	5	-	-	8.5	-	-	23.8	-	-	8.3	-	370
100% D	20/0	5	5	5	-	-	8.5	-	-	23.5	-	-	8.4	-	365

*Temperature of test incubator was continously recorded on a strip chart recorder.
Temperature range for the test period was 23.3-24.4°C.

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

Concentrations	Sample/Diluent Volume(mL)	SURVIVAL # Alive 0 hr	24 hr	48 hr	pH 0 hour	24 hour	48 hour	Temperature** 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	8.2	8.3	21.8	22.3	22.2	8.4	8.3	8.2	235	240
Control B	0/500	5	5	5	7.8	8.2	8.3	-	-	22.1	8.4	8.3	8.3	235	235
Control C	0/500	5	5	5	7.8	8.2	8.3	-	-	22.1	8.4	8.3	8.3	235	235
Control D	0/500	5	5	5	7.8	8.2	8.3	-	-	22.2	8.4	8.3	8.4	235	235
100% A	500/0	5	5	5	7.8	8.1	8.2	22.9	22.3	22.2	7.3	8.2	8.5	355	350
100% B	500/0	5	5	5	7.8	8.1	8.2	-	-	22.1	7.3	8.2	8.4	355	350
100% C	500/0	5	5	5	7.8	8.1	8.2	-	-	22.1	7.3	8.1	8.4	355	350
100% D	500/0	5	5	5	7.8	8.1	8.2	-	-	22.2	7.3	8.1	8.5	355	350

**Temperature of test room was continously recorded on a strip chart recorder.
Temperature range for the test period was 22-24°C.

Total Residual CL2	mg/L	Method
Field:	-	-
Lab:	0.04	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:	<0.017	0.00

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	120	125
20% Dilute Mineral Water (cladocerans):	75	80
100% Sample:	95	150

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

Table 2. Results of chemical analyses on the effluent from the Cargill Fertilizer-Hookers Prairie Mine sampled on December 12, 1994.

Metals

Aluminum	280	µg/L
Calcium	34.1	mg/L [A]
Iron	105	µg/L [A]
Magnesium	14.0	mg/L [A]

Base-Neutral & Acid Extractables

none detected

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

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Cargill Fertilizer Hooker Prairie Mine outfall 003
County: POLK
Contact & District: Lisa Carter / SW
NPDES Permit #: FL00
LIMS Sample #: 95478 LIMS Job #: 94-DEC-13-12

Sample Collection: Date 12/12/94 Time 1015 - 1055
Test Beginning: Date 12/13/94 Time 1100 1600
Test Ending: Date 12/15/94 Time 1120 1600
Organism Batch #: 50 Diluent Batch #: Well
Organism Age: 10 days
Test Organism: Cyprinella leedsi

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 7.0 @ 9.0	20.5 @ 21.0	8.6 @ 22.3 °C	105.5 @ 102.6 9911 @ 1000 @ 22.7 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	20.9 @ 21.0	8.6 @ 22.6 °C	108.1 @ 102.6 955 @ 1000 @ 23.1 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	21.7 @ 21.8	8.5 @ 22.9 °C	107.5 @ 102.6 969/1000 9630 @ 10000 @ 23.4 °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	24 h	48 h
CTL A	136	5	5	5	7.8	8.2	8.3	21.8	22.3	22.2	8.4	8.3	8.2	235	235	240
CTL B	76	5	5	5	7.8	8.2	8.3			22.1	8.4	8.3	8.3	235	235	235
CTL C	326	5	5	5	7.8	8.2	8.3			22.1	8.4	8.3	8.3	235	235	235
CTL D	505	5	5	5	7.8	8.2	8.3			22.2	8.4	8.3	8.4	235	235	235
100% A	775	5	5	5	7.8	8.1	8.2	22.9	22.3	22.2	7.3	8.2	8.5	355	350	350
100% B	102	5	5	5	7.8	8.1	8.2			22.1	7.3	8.2	8.4	355	350	350
100% C	45	5	5	5	7.8	8.1	8.2			22.1	7.3	8.1	8.4	355	350	350
100% D	308	5	5	5	7.8	8.1	8.2			22.2	7.3	8.1	8.5	355	350	350
Recorded by:		DW	DW	TM	DW	DW	TM	DW	DW	TM	DW	DW	TM	DW	DW	TM
Measured/Loaded by:		DW	TM	TM	TM	TM	MF	TM	TM	MF	TM	TM	MF	TM	TM	MF

Investigators' Signatures

Water Quality Parameters

	Salt Water: Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			—	—	—
Lab Total Residual Cl2 (mg/L):	<0.03	—	0.04	DR-100	TM
Alkalinity (mg/L as $CaCO_3$):	120	—	95	HACH	JBS
Hardness (mg/L as $CaCO_3$):	125	—	150	HACH	JBS
Total ammonia (mg/L as N)	<0.017	—	<0.017	Orion	TM

Reviewer

Ammonia Meter #98136 Ammonia Meter Slope: 98.6 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

form updated 10/05/94

FDEP Biology Section — Acute Bioassay Bench Sheet

outfall 003

Sample Source: Cargill Fertilizer, Hookers Prairie mine
County: Polk
Contact / District: Lisa Carter / SW
NPDES Permit #: FL00
LIMS Sample #: 95478 LIMS Job #: 94-0EC-13-12

Sample Collection: Date 12/12/94 Time 10:45 - 10:55
Test Beginning: Date 12/13/94 Time 1500 - 1600
Test Ending: Date 12/15/94 Time 1600
Organism Batch #: 47 Diluent Batch #: 48
Organism Age: < 24 hours
Test Organism: Ceriodaphnia dubia

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	DW 90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	20.9 @ 21.0	8.6 ~~22.5~~ @ 22.3 °C	108.5 @ 102.6 941 @ 1000 @ 22.7 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	20.9 @ 21.0	8.6 @ 22.6 °C	103.9 @ 102.6 955 @ 1000 @ 23.1 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	21.7 @ 21.8	8.5 @ 22.9 °C	107.5 @ 102.6 969/1000 9630 @ 1000 @ 23.4 °C

A wrote # in wrong column TM 12/15/94

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
Ctl A	A	5	5	5	8.1	~~8.2~~	8.2	21.7		23.8	8.4		8.0	160		195
Ctl B	B	5	5	5			8.2			23.9			8.1			190
Ctl C	C	5	5	5			8.3			23.9			8.0			190
Ctl D	D	5	5	5			8.3			23.7			8.0			180
100% A	A	5	5	5	7.9		8.5	21.6		23.8	7.7		8.2	325		380
100% B	B	5	5	5			8.5			23.9			8.2			380
100% C	C	5	5	5			8.5			23.8			8.3			370
100% D	D	5	5	5			8.5			23.5			8.4			365
Recorded by:		DW	DW	TM	DW		TM	DW		TM	DW		TM	DW		TM
Measured/Loaded by:		DW	TM	MF	TM		MF	TM		MF	TM		MF	TM		MF

Investigators' Signatures

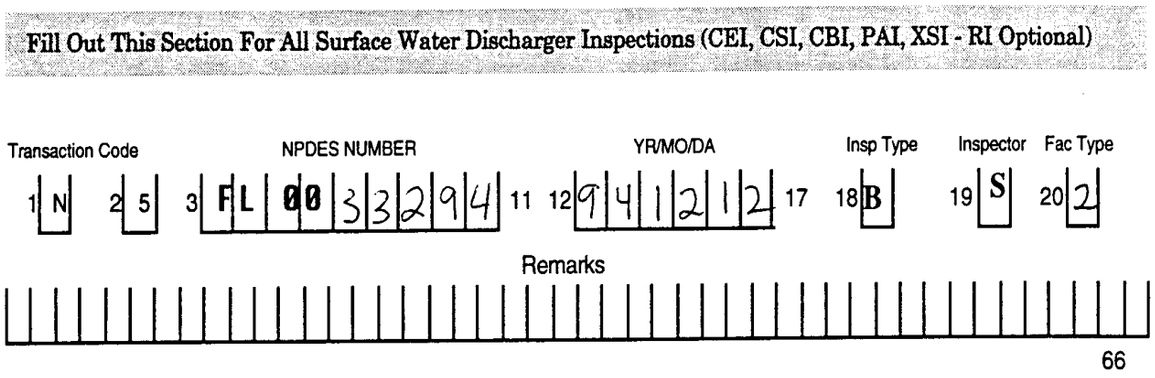
Reviewed

form updated 10/05/94

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			—	—	—
Lab Total Residual Cl2 (mg/L):		<0.03	0.04	DR-100	TM
Alkalinity (mg/L as $CaCO_3$):	—	75	95	HACH	JAS
Hardness (mg/L as $CaCO_3$):	—	80	150	HACH	JAS
Total ammonia (mg/L as N):	—	<0.017	0.017	Orion	TM

Ammonia Meter #98136 Ammonia Meter Slope: -58.6 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

The Bioassay of the Cargill Fertilizer-Hookers Prairie Mine effluent sampled on December 12, 1994, NPDES #FL0033294.



The Priority Pollutants Analysis for the Bioassay of the Cargill Fertilizer-Hookers Prairie Mine effluent sampled on December 12, 1994, NPDES #FL0033294.

