DEPARTMENT OF ENVIRONMENTAL PROTECTION

FLORIDA

Bioassays of

Crystals International, Inc.

Plant City, Hillsborough County, Florida

NPDES #FL0037389

Sampled 1/17/95

March 1995

Biology Section

Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan #870346G

Bioassays of

Crystals International, Inc.

Plant City, Hillsborough County, Florida

NPDES #FL0037389

Biology Section
Bureau of Laboratories
March 1995

Introduction

Crystals International, Inc., Plant City, Hillsborough County, Florida, NPDES #FL0037389, tests performed on 18 to 20 January, 1995.

This citrus crystallization plant is located at 1111 West Haines Street in Plant City. Fruit crystals are manufactured by a freeze-drying dehydrator process which utilizes barometric condenser-induced vacuum. Wastewater generated from the freeze drying process is collected in floor drains and routed to the city sewer system. Barometric condenser cooling water is discharged, along with stormwater runoff, through outfall 001 into Westside Canal which flows into Pemberton Creek (facility summary provided by Lisa Carter, FDEP Tampa, with some information from NPDES files, FDEP Tallahassee).

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 bioassay results indicated some toxicity in the sample as the 100% sample test produced 30% mortality in the *Ceriodaphnia dubia* test organisms and 15% mortality in the *Cyprinella leedsi* test organisms (Table 1). Test results suggest an LC_{50} greater than 100% sample in each test.

Total residual chlorine and total ammonia were not detected in the sample. Further chemical analyses were performed on the sample and several metals and herbicides were identified (Table 2). The metals and herbicides do not appear to be present in concentrations known to be toxic to the test species.

Conclusion

The sample of effluent collected from this facility on January 17, 1995, showed some toxicity to both the *Ceriodaphnia dubia* and the *Cyprinella leedsi* test species. The cause of toxicity was not determined.

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Crystals International, Inc., citrus processing plant, Plant City, Hillsborough County, Florida, NPDES# FL0037389, performed on 18 to 20 January, 1995.

Facility:	**Crystals International, Inc.**		**NPDES #**	**FL0037389**	Facility Type: **Citrus Processing Plant**
Location:	Plant City		Contact/District:	L. Carter/SW	
County:	Hillsborough		Test type:	static acute screen	
Sample Collection Date:	**1/17/95**	Time: 1050	# tests:	2	Receiving Water: Westside Canal to Pemberton Creek
Test Beginning Date:	1/18/95	Time: 1600	Chlorination Type:	**not chlorinated**	
Test Ending Date:	1/20/95	Time: 1600			**Page 1 of 1**

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

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature*			Dissolved Oxygen			Conductivity uncorrected µmhos/cm	
Concentrations	Volume(mL)	0 hr	24 hr	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 A	0/20	5	5	5	8.1	-	8.2	21.9	-	22.3	8.2	-	7.8	160	180
Control B	0/20	5	5	5	-	-	8.2	-	-	22.3	-	-	7.9	-	165
Control C	0/20	5	5	5	-	-	8.2	-	-	22.2	-	-	7.9	-	165
Control D	0/20	5	5	5	-	-	8.2	-	-	22.1	-	-	8.0	-	170
100% A	20/0	5	5	3	8.0	-	8.6	22.2	-	22.2	7.6	-	8.0	345	340
100% B	20/0	5	5	4	-	-	8.7	-	-	22.2	-	-	8.0	-	350
100% C	20/0	5	5	3	-	-	8.7	-	-	22.1	-	-	8.0	-	350
100% D	20/0	5	5	4	-	-	8.7	-	-	22.1	-	-	8.0	-	355

*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: 12 days

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature**			Dissolved Oxygen			Conductivity uncorrected µmhos/cm	
Concentrations	Volume(mL)	0 hr	24 hr	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 A	0/500	5	5	5	7.8	8.2	8.3	21.5	24.8	24.6	8.2	7.8	7.5	235	270
Control B	0/500	5	5	5	7.8	8.2	8.3	-	-	25.9	8.3	7.8	7.5	235	265
Control C	0/500	5	5	5	7.8	8.2	8.3	-	-	25.6	8.4	7.8	7.5	235	260
Control D	0/500	5	4	4	7.8	8.2	8.3	-	-	25.5	8.4	7.8	7.5	235	260
100% A	500/0	5	5	5	7.8	8.3	8.4	22.8	24.5	25.0	7.0	7.6	7.5	365	380
100% B	500/0	5	5	5	7.8	8.4	8.4	-	-	25.3	7.1	7.4	7.5	370	390
100% C	500/0	5	4	4	7.8	8.4	8.4	-	-	25.3	7.1	7.4	7.5	370	385
100% D	500/0	5	4	3	7.8	8.3	8.4	-	-	25.4	7.2	7.4	7.5	370	385

**Temperature of test room was continously recorded on a strip chart recorder.
Temperature range for the test period was 21-24.5°C.

Total Residual CL2	mg/L	Method
Field:	0.00	-
Lab:	< 0.03	DR-100

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

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	120	125
20% Dilute Mineral Water (cladocerans):	70	80
100% Sample:	165	175

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

Table 2. Results of chemical analyses on the effluent from the Crystals International, Inc., Citrus Processing Plant sampled on January 17, 1995.

Metals

Calcium	55.1	mg/L [A]
Iron	63	µg/L [A]
Magnesium	10.0	mg/L [A]

Herbicides

Atrazine	0.10	µg/L [T]
Hexazinone	0.20	µg/L [T]

Base-Neutral & Acid Extractables

none detected

[A] Value reported is the mean of two or more determinations.
[T] Value reported is less than the criterion of detection.

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Crystals International
County: Hillsborough
Contact / District: L Carter / SW TAM
NPDES Permit #: FL0037389
LIMS Sample #: 97580 LIMS Job #: 95-JAN-18-07
sms 1/30/95

Sample Collection: Date 1/17/95 Time 10:40 AM
Test Beginning: Date 1/18/95 Time 1600
Test Ending: Date 1/20/95 Time 1600
Organism Batch #: 3 Diluent Batch #: 3
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	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	21.7 @ 21.7	8.6 @ 22.9 °C	103.4 @ 104.1 955 @ 1000 @ 22.6 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	22.6 @ 22.7	8.6 @ 22.4 °C	103.7 @ 104.1 970 @ 1000 @ 23.7 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	21.1 @ 21.1	8.8 @ 21.2 °C	106 @ 98.6 942 @ 1000 @ 22.3 °C

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm)		
Conc.	Chamber #	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
Ctl	A	5	5	5	8.1		8.2	21.9		22.3	8.2		7.8	160		180
Ctl	B	5	5	5			8.2			22.3			7.9			165
Ctl	C	5	5	5			8.2			22.2			7.9			165
Ctl	D	5	5	5			8.2			22.1			8.0			170
100%	A	5	5	3	8.0		8.6	22.2		22.2	7.6		8.0	345		340
100%	B	5	5	4			8.7			22.2			8.0			350
100%	C	5	5	3			8.7			22.1			8.0			350
100%	D	5	5	4			8.7			22.1			8.0			355
Recorded by:		TM	TM	TM	JN		TR	JN		TR	JN		TR	JN		TR
Measured/Loaded by:		TM	TM	TM	DW		JN	DW		JN	DW		JN	DW		JN

Investigators' Signatures

Joseph W. North

Tim Mikulsky

Tobin G. Rader

Reviewer

Water Quality Parameters	Salt Water Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			0.0	—	L. Carter
Lab Total Residual Cl2 (mg/L):	—	<0.03	<0.03	DR-LCD	TM
Alkalinity (mg/L as $CaCO_3$):	—	70	165	HACH	JRS
Hardness (mg/L as $CaCO_3$):	—	80	175	HACH	JRS
Total ammonia (mg/L as N):	—	<0.017	<0.017	Orion	TM

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

form updated 10/05/94

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Crystals International
County: Hillsborough
Contact / District: L Carter / SW TAM
NPDES Permit #: FL0037389
LIMS Sample #: 97580 LIMS Job #: 95-JAN-18-07
LIMS 1/30/95

Sample Collection: Date 1/17/95 Time 10:40 Am
Test Beginning: Date 1/18/95 Time 1600
Test Ending: Date 1/20/95 Time 1600
Organism Batch #: 1 Diluent Batch #: well
Organism Age: 12 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 9.0 @ 9.0	21.7 @ 21.7	8.6 @ 22.9 °C	1034 @ 1041 955 @ 1000 @ 22.6 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	22.6 @ 22.7	8.6 @ 22.4 °C	1037 @ 1041 970 @ 1000 @ 23.7 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	21.1 @ 21.1	8.8 @ 21.2 °C	106 @ 98.6 9420 @ 1000 @ 22.3 °C

* incorrect unit selected. TM 1/18/95
FE JAS 1/26/95

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) 0 hr	UNCORRECTED Cond. (mmhos/cm) 24 h	UNCORRECTED Cond. (mmhos/cm) 48 h
Ctl A	198	5	5	5	7.8	8.2	8.3	21.5	24.8	24.6	8.2	7.8	7.5	235	270	270
Ctl B	1265	5	5	5	7.8	8.2	8.3			25.9	8.3	7.8	7.5	235	260	265
Ctl C	328	5	5	5	7.8	8.2	8.3			25.6	8.4	7.8	7.5	235	260	260
Ctl D	503	5	4	4	7.8	8.2	8.3			25.5	8.4	7.8	7.5	235	260	260
100% A	29	5	5	5	7.8	8.3	8.4	22.8	24.5	25.0	7.0	7.6	7.5	365	375	380
100% B	219	5	5	5	7.8	8.4	8.4			25.7	7.1	7.4	7.5	370	390	390
100% C	305	5	4	4	7.8	8.4	8.4			25.3	7.1	7.4	7.5	370	390	385
100% D	287	5	4	3	7.8	8.3	8.4			25.4	7.2	7.4	7.5	370	380	385
Recorded by:		TM	TM	TM	JN	JH	JN	JN	JN	JR	JN	JH	TR	JN	JN	TR
Measured/Loaded by:		TM	TM	TM	DW	TR	TR	DW	TR	JN	DW	TR	JN	DW	TR	JN

Investigators' Signatures

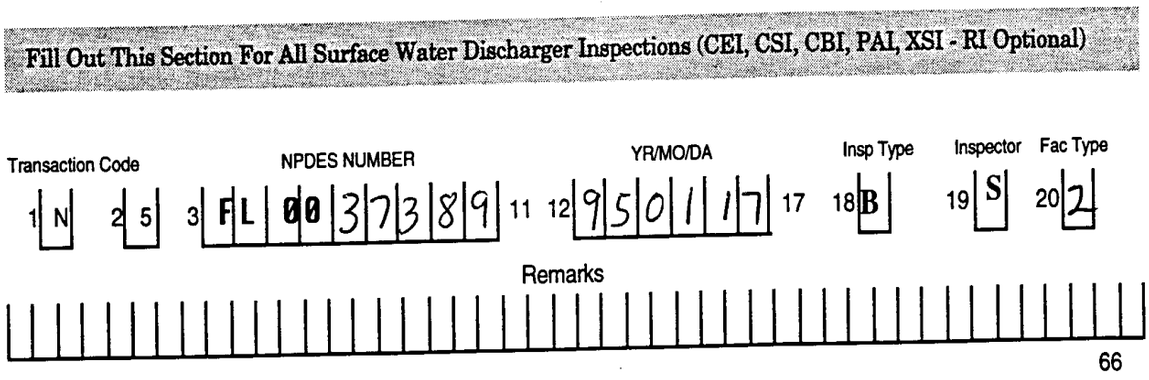
Joseph B Smith
Jennifer Sparagani
Tina Mulsby
Tobin C Rader
Reviewer

form updated 10/05/94

	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			0.0	—	L Carter
Lab Total Residual Cl2 (mg/L):	<0.03	—	<0.03	DR-100	TM
Alkalinity (mg/L as $CaCO_3$):	120	—	165	HACH	JAS
Hardness (mg/L as $CaCO_3$):	125	—	175	HACH	JAS
Total ammonia (mg/L as N):	<0.017	—	<0.017	Orion	TM

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

The Bioassay of the Crystals International, Inc., effluent sampled on January 17, 1995, NPDES #FL0037389.



The Priority Pollutants Analysis for the Bioassay of the Crystals International, Inc., effluent sampled on January 17, 1995, NPDES #FL0037389.

