Appendix D

D-1 Acute Lethality and Sublethal Toxicity Reports

D-2 EEM MMER Report

D-3 2003 MMER Report

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Work Order : 204482
Sample Number : 7880

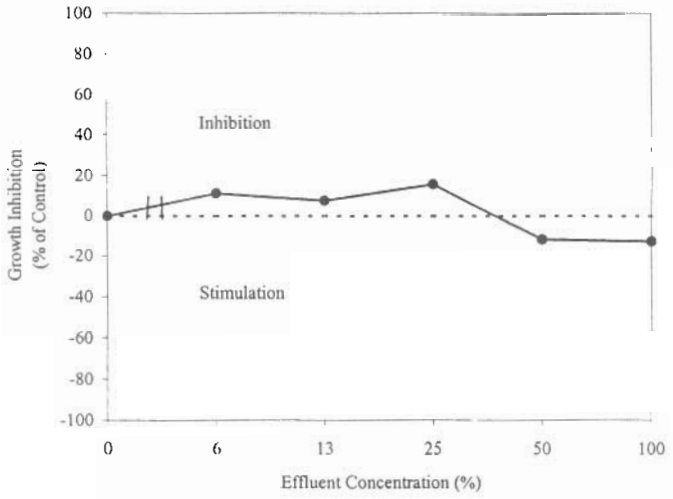
Sample Identification

Company :	Nanisivik Mine (a Division of CanZinco Ltd.)	Date Collected :	2003-08-09
Location :	Nanisivik NU	Time Collected :	11:00
Substance :	159-4 August 8, 2003	Date Received :	2003-08-13
Sampling Method :	grab	Time Received :	10:30
Sampled By :	M. Markle	Date Tested :	2003-08-13
Shipped By:	FirstAir/air & Purolator/RD	Lab Storage:	4±2 °C
Temp. on arrival :	8.0°C		
Sample Description:	Clear, colourless, odourless.		

Test Results

Effect	Value	95% Confidence Limits	Statistical Method
IC25 (Growth)	>100%	-	-
LC50 (Survival)	>100%	-	-

Fathead Minnow Growth Inhibition



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Work Order Number: 204482
Sample Number: 7880

Test Conditions

Test Organism	*Pimephales promelas*	Test Volume Per Replicate	: 500 mL
Source	: ESG stock	Test Vessel	: 1 L polypropylene beaker
Life Stage	: Larval (<24 h old)	Depth of test solution	: 7.5 cm
pH Adjustment	None	# Replicates	: 3
Sample Filtration	: None	# Organisms per Replicate	: 10
Hardness Adjustment	None	Renewal Method[d]	: Syphon
Test Aeration	None	Renewal Period	: 24 h intervals
Photoperiod (h) light/dark	16/8	Feeding Rate	: 1500-2250 nauplii
Control/Dilution Water[c]	: Undiluted well water	Feeding Frequency	: 3 times daily
Test Type	Static renewal	Test Duration	: 7 days

: Control/Dilution Water: Well water with trace NaCl (29.6 mg/L).

[d] Renewal Method: Three subsamples were used for testing. Subsample 1 was used for day 0,1 and 2 renewals, subsample 2 was used for day 3 and 4 renewals, and subsample 3 was used for day 5 and 6 renewals. Approximately 85 - 90% of test solution removed by syphon. New solution added to achieve desired test volume.

Test Protocol: Biological Test Method: Test of Growth and Survival using fathead minnows. Environment Canada, Conservation and Protection. Ottawa, Ontario. Report EPS 1/RM/22 (including November 1997 amendments).

Test Organisms: No organisms exhibiting unusual appearance, behaviour, or undergoing unusual treatment were used in the test. All test organisms were from the same culture.

Comments

Test conducted using three subsamples from a single sampling. The holding time was extended to four days as the sample was collected on 2003-08-09, but was not received until 2003-08-13. A power failure occurred on 2003-08-14 which resulted in the organisms being exposed to an extra 5 hours of darkness that day. There were no other unusual conditions or deviations from the test protocol. The results reported relate only to the sample tested.

Work Order Number: 204482
Sample Number: 7880

Reference Toxicant Data

Substance	:	Potassium Chloride
Test Date	:	2003-08-18
IC25 Survival (g/L)	:	1.07
Lower 95% Confidence Limit	:	0.96
Upper 95% Confidence Limit	:	1.21
Test Duration	:	7 days
Historical Mean IC25 (g/L)	:	1.07
Upper Warning Limit (+2SD)	:	1.28
Lower Warning Limit (-2 SD)	:	0.89
Statistical Method	:	Linear Interpolation (Toxstat 3.5)[b]
Fathead minnow Batch Number	:	Fm03-08
Test Conducted By	:	D.Holtze/E.Williams

Reference toxicant test was conducted under conditions identical to the test.

References

[a] Stephan, C. E. 1977. Methods for calculating an LC50. P. 65-84 In: P.L. Mayer and J. L. Hamelink (eds.), Aquatic Toxicology and Hazard Evaluation. Amer. Soc. Testing and Materials, Philadelphia PA. ASTM STP 634.

[b] West, Inc. and D. Gulley. 1996. Toxstat Release 3.5. Western Ecosystems Technology. Cheyenne, WY, U.S.A.

Date: 2003-09-10

Approved By: K. Holtze
Keith Holtze, Director, Laboratory Operations

Larval Fathead Minnow Survival

Work Order Number : 204482
Sample Number : 7880
Industry : Nanisivik Mine (a Division of CanZinco Ltd.)
Time Start : 15:25
Fathead Batch # : Fm03-08
Previous 7d Stock Mort. : 0.0%

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7 Completion Date		
Start Date	2003-08-13	2003-08-14	2003-08-15	2003-08-16	2003-08-17	2003-08-18	2003-08-19	2003-08-20		
Technician	DH(EW)	DH(EW)	TP	KO(LM)	KO(LM)	AM(EW)	TG	JG(EW)		
Conc (%)	Rep	Mortality							Mean Mortality (%)	Standard Deviation
0	A	0	0	0	0	0	0	0	6.7	1.15
	B	0	0	0	0	0	0	0		
	C	0	0	2	2	2	2	2		
6	A	0	0	0	0	0	0	0	6.7	1.15
	B	0	0	0	0	0	0	0		
	C	0	0	2	2	2	2	2		
13	A	0	0	0	0	0	0	0	6.7	1.15
	B	0	0	0	0	0	0	0		
	C	0	0	0	0	1	1	2		
25	A	0	0	0	0	0	0	0	3.3	0.58
	B	0	0	0	1	1	1	1		
	C	0	0	0	0	0	0	0		
50	A	0	0	0	0	0	0	0	0.0	0.00
	B	0	0	0	0	0	0	0		
	C	0	0	0	0	0	0	0		
100	A	0	0	0	0	1	1	1	3.3	0.58
	B	0	0	0	0	0	0	0		
	C	0	0	0	0	0	0	0		

Aberrant behaviour or swimming impairment noted during test: none

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Test Data Reviewed By: HC
Date: 2003-09-06

Larval Fathead Minnow Weights

Work Order Number : 204482
Sample Number : 7880

Concentration (%)	Replicate	# of Larvae Weighed	Mean Dry Wt. Of Larvae (mg)	Mean Dry Wt. (mg)	Standard Deviation
Control	A	10	0.778	0.757	0.049
	B	10	0.701		
	C	8	0.791		
6	A	10	0.682	0.671	0.064
	B	10	0.603		
	C	8	0.729		
13	A	10	0.626	0.699	0.073
	B	10	0.698		
	C	8	0.773		
25	A	10	0.614	0.637	0.077
	B	9	0.722		
	C	10	0.574		
50	A	10	0.811	0.846	0.031
	B	10	0.863		
	C	10	0.865		
100	A	9	0.921	0.854	0.067
	B	10	0.853		
	C	10	0.787		

Larval Fathead Minnow Survival and Growth
Water Chemistry Data

Work Order Number : 204482
Sample Number : 7880

Initial Parameters:	Temp. (°C)	D.O. (mg/L)	pH	Cond. (µs)	Hardness (mg/L as $CaCO_3$)
	25.0	9.9	7.6	2293	>1000

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Initial Temp. (°C):		25.0	25.0	24.0	25.0	25.0	25.5	25.0
Initial D.O. (mg/L):		9.9	9.3	9.8	9.5	9.8	9.1	9.3
% Sat. of 100% Effluent*		123	115	120	120	122	114	115
Preaeration (min)(≤100 bubbles/min):		20	20	20	20	20	20	20
		Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day 6**	**Day 7**
Technician	New	DH(EW)	DH(EW)	EW	LM	JG(LM)	EW	DH(EW)
	Old	AM(EW)	TP	LM	JG(LM)	EW	DH(EW)	JG(EW)
Control	**0%**							
Temp. (°C)	Initial:	25.0	25.0	25.0	25.0	24.5	24.0	24.5
	Final:	25.0	25.5	25.5	25.0	25.5	25.0	25.5
D.O. (% Sat.*)	Initial:	100	100	101	99	100	97	101
D.O. (mg/L)	Initial:	8.0	8.1	8.1	7.9	8.0	7.7	8.2
	Final:	7.5	7.1	7.2	7.3	7.0	7.4	6.7
pH	Initial:	8.3	8.4	8.4	8.5	8.3	8.3	8.4
	Final:	8.4	8.3	8.3	8.4	8.4	8.4	8.3
Conductivity	Initial:	535	491	575	513	545	508	545
Low	**6%**							
Temp. (°C)	Initial:	25.0	25.0	25.0	25.0	24.5	24.0	24.5
	Final:	25.0	25.5	25.5	25.0	25.5	25.0	25.5
D.O. (mg/L)	Initial:	8.1	8.1	8.1	7.9	8.0	7.8	8.2
	Final:	7.5	7.0	6.9	6.8	6.2	6.1	6.1
pH	Initial:	8.3	8.4	8.4	8.4	8.3	8.3	8.3
	Final:	8.3	8.2	8.2	8.3	8.1	8.1	8.1
Conductivity	Initial:	663	623	696	640	663	637	673
Middle	**25%**							
Temp. (°C)	Initial:	25.0	25.0	25.0	25.0	24.5	24.0	24.5
	Final:	25.0	25.5	25.5	25.0	25.5	25.0	25.5
D.O. (mg/L)	Initial:	8.2	8.3	8.3	7.9	8.1	7.9	8.3
	Final:	7.5	7.2	6.6	6.2	5.1	5.0	4.7
pH	Initial:	8.2	8.3	8.2	8.3	8.1	8.1	8.2
	Final:	8.2	8.0	8.0	7.9	7.7	7.6	7.6
Conductivity	Initial:	1038	1013	1064	1007	1015	1020	1021
High	**100%**							
Temp. (°C)	Initial:	25.0	25.0	25.0	25.0	24.5	24.0	24.5
	Final:	25.0	25.5	25.5	25.0	25.5	25.0	25.5
D.O. (mg/L)	Initial:	9.5	8.9	9.4	8.6	8.6	8.5	9.2
	Final:	7.6	6.8	6.2	6.1	5.5	5.7	4.8
pH	Initial:	7.8	7.8	7.6	7.7	7.8	7.6	7.6
	Final:	7.7	7.4	7.3	7.2	6.9	6.9	6.4
Conductivity	Initial:	2299	2300	2303	2291	2289	2307	2299

* % saturation adjusted for actual temperature and barometric pressure

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Ceriodaphnia dubia Test Report

Survival and Reproduction

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Work Order : 204482
Sample Number : 7880

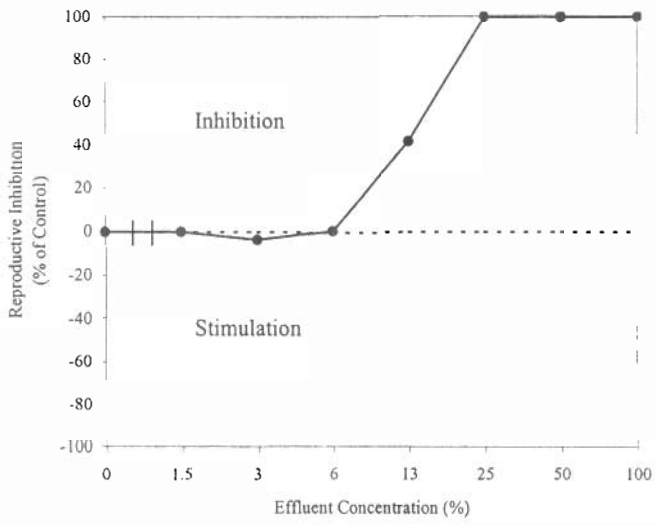
Sample Identification

Company :	Nanisivik Mine (a Division of CanZinco Ltd.)	Date Collected :	2003-08-09
Location :	Nanisivik NU	Time Collected :	11:00
Substance :	159-4 August 8, 2003	Date Received :	2003-08-13
Sampling Method :	grab	Time Received :	10:30
Sampled By :	M. Markle	Date Tested :	2003-08-13
Shipped By:	FirstAir/air & Purolator/RD	Lab Storage:	4±2 °C
Temp. on arrival :	22.0°C		
Sample Description:	Clear, colourless, odourless.		

Test Results

Effect	Value	95% Confidence Limits	Statistical Method
LC50 (Survival)	57.6%	40.5-94.6	Probit (Stephan) a
IC25 (Reproduction)	9.3%	7.4-11.5	Linear Interpolation (Toxstat 3.5) b

Ceriodaphnia dubia Reproductive Inhibition



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Certified by the Canadian Association of Environmental Analytical Laboratories (CAEAL)
Accredited by Standards Council of Canada (SCC)

Work Order Number: 204482
Sample Number: 7880

Test Conditions

Test Organism	: *Ceriodaphnia dubia*	Control/Dilution Water[c]	: Lake Erie and Well water
Source	: ESG stock	Test Type	: Static renewal
Life Stage	: Neonate (<24 h)	Test Volume Per Replicate	: 15 mL
Mean Young Produced (previous 7 days)	: ≥15.0	Test Vessel	: 15 mL polystyrene vial
# Young in Previous Brood	: ≥6.0	Depth of test solution	: 4.5 cm
pH Adjustment	: None	# Replicates	: 10
Sample Filtration	: None	# Organisms per Replicate	: 1
Hardness Adjustment	: None	Renewal Method[d]	: transfer
Test Aeration	: None	Renewal Period	: 24 h intervals
Photoperiod (h) light/dark	: 16/8	Feeding Rate	: 0.2 mL YCT and algae
		Feeding Frequency	: once daily

[c] Control/Dilution Water: Mixture consisting of 25% Lake Erie water and 75% well water. The well water was supplemented with 29.6 mg/L of NaCl.

[d] Renewal Method: Three subsamples were used for testing. Subsample 1 was used for day 0,1 and 2 renewals, subsample 2 was used for day 3 and 4 renewals, and subsample 3 was used for the day 5 and 6 renewals. Organisms were transferred to new solution daily using a wide bore pipet.

Test Protocol: Biological Test Method: Test of Reproduction and Survival using the Cladoceran *Ceriodaphnia dubia*. Environment Canada, Conservation and Protection. Ottawa, Ontario. Report EPS 1/RM/21 (including November 1997 amendements).

Test Organisms: No organisms exhibiting unusual appearance, behaviour, or undergoing unusual treatment were used in the test. No ephippia were present in cultures. All organisms were within 12 hours of the same age. Test neonates were obtained from single broods from culture organisms. All test organisms were from the same culture.

Comments

Test conducted using three subsamples from a single sampling. The holding time was extended to four days as the sample was collected on 2003-08-09, but was not received until 2003-08-13. A power failure occurred on 2003-08-14 which resulted in 5 hours of inconsistent lighting. There were no other unusual conditions or deviations from the test protocol. The results reported relate only to the sample tested.

Work Order Number: 204482
Sample Number: 7880

Reference Toxicant Data

Substance	:	Sodium Chloride
Test Date	:	2003-08-22
IC25 Reproduction (g/L)	:	0.96
Lower 95% Confidence Limit	:	0.36
Upper 95% Confidence Limit	:	1.44
Test Duration	:	7 days
Historical Mean IC25 (g/L)	:	1.11
Upper Warning Limit (+2SD)	:	1.81
Lower Warning Limit (-2 SD)	:	0.70
Statistical Method	:	Linear Interpolation (Toxstat 3.5)[b]
Ceriodaphnia Batch Number	:	Cd03-08
Test Conducted By	:	T.Gardiner

Reference toxicant test was conducted under conditions identical to the test.

References

[a] Stephan, C. E. 1977. Methods for calculating an LC50. P. 65-84 In: P.L. Mayer and J. L. Hamelink (eds.), Aquatic Toxicology and Hazard Evaluation. Amer. Soc. Testing and Materials, Philadelphia PA. ASTM STP 634.

[b] West, Inc. and D. Gulley. 1996. Toxstat Release 3.5. Western Ecosystems Technology. Cheyenne, WY, U.S.A.

Date: 2003-09-10

Approved By: K Holtze
Keith Holtze, Director, Laboratory Operations

Ceriodaphnia dubia Survival and Reproduction

Work Order Number : 204482
Sample Number : 7880
Industry : Nanisivik Mine (a Division of CanZinco Ltd.)
Time Start : 14:20 — *C. dubia* Batch Number : Cd03-08
Start Date : 2003-08-13 — Previous 7d culture mortality (%) : 11.7%
Completion Date : 2003-08-20

Concentration	Day	Replicate										%	Mean #	In'l
Control		1	2	3	4	5	6	7	8	9	10	Mortality	Young	JG(EW)
2003-08-14	1	0	0	0	0	0	0	0	0	0	0	0	0	LM
2003-08-15	2	0	0	0	0	0	0	0	0	0	0	0	0	LT
2003-08-16	3	0	0	0	6	6	1	0	0	0	0	0	1.3	JG(LM)
2003-08-17	4	6	7	0	0	0	5	4	7	5	6	0	4	JG(LM)
2003-08-18	5	13	13	5	13	12	10	9	8	12	13	0	10.8	EW/LM
2003-08-19	6	3	0	0	19	18	0	0	0	0	0	0	4	JG(EW)
2003-08-20	7	19	19	13	0	0	15	15	17	16	19	0	13.3	EW
Total neonates		41	39	18	38	36	31	28	32	33	38			

Mean # young: 33.4
Total adult mortality: 0

Concentration	Day	Replicate										%	Mean #
		1	2	3	4	5	6	7	8	9	10	Mortality	Young
1.5%	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0	0
	3	2	0	0	0	1	0	0	0	0	0	0	0.3
	4	2	6	0	4	5	4	6	5	6	7	0	4.5
	5	12	12	0	9	14	12	8	13	11	11	0	10.2
	6	21	0	4	0	19	0	0	0	0	0	0	4.4
	7	0	20	9	17	0	19	18	22	16	19	0	14
Total neonates		37	38	13	30	39	35	32	40	33	37		

Mean # young: 33.4
Total adult mortality: 0

Concentration	Day	Replicate										%	Mean #
		1	2	3	4	5	6	7	8	9	10	Mortality	Young
3%	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0	0
	3	1	0	0	3	5	0	0	0	0	0	0	0.9
	4	6	6	4	0	0	6	4	3	7	7	0	4.3
	5	17	14	3	12	12	12	11	7	10	13	0	11.1
	6	22	0	0	19	20	0	0	0	0	0	0	6.1
	7	0	20	16	0	0	21	14	14	19	18	0	12.2
Total neonates		46	40	23	34	37	39	29	24	36	38		

Mean # young: 34.6
Total adult mortality: 0

Concentration	Day	Replicate										%	Mean #
		1	2	3	4	5	6	7	8	9	10	Mortality	Young
6%	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0	0
	3	5	0	0	5	5	0	0	0	0	0	0	1.5
	4	0	6	4	0	0	6	5	5	6	7	0	3.9
	5	14	13	7	15	11	11	9	10	10	13	0	11.3
	6	19	21	0	11	17	0	0	0	0	0	0	6.8
	7	0	0	11	0	0	19	15	17	15	20	0	9.7
Total neonates		38	40	22	31	33	36	29	32	31	40		

Mean # young: 33.2
Total adult mortality: 0

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x = mortality
* = accidental death

Test Data Reviewed By: HK
Date: 2003-09-06

Concentration	Day	Replicate										%	Mean #
		1	2	3	4	5	6	7	8	9	10	Mortality	Young
13%	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0	0
	3	0	0	0	0	5	0	0	0	0	0	0	0.5
	4	3	2	0	0	0	0	3	5	0	2	0	1.5
	5	2	3	0	0	12	7	3	2	8	3	0	4
	6	0	0	0	0	19	0	0	0	0	0	0	1.9
	7	5	20	12	9 x	0	15	8	17	10	19	10	11.5
Total neonates		10	25	12	9 x	36	22	14	24	18	24		
												Mean # young:	19.4
												Total adult mortality:	1

Concentration	Day	Replicate										%	Mean #
		1	2	3	4	5	6	7	8	9	10	Mortality	Young
25%	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0	0	0	0	0
Total neonates		0	0	0	0	0	0	0	0	0	0		
												Mean # young:	0
												Total adult mortality:	0

Concentration	Day	Replicate										%	Mean #
		1	2	3	4	5	6	7	8	9	10	Mortality	Young
50%	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0 x	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	0	0	0	0	0	0	0 x	0	0	0	20	0
	5	0	0	0 x	0	0	0	0	0	0	0	30	0
	6	0	0	0	0	0	0	0	0	0	0	30	0
	7	0	0	0	0	0	0	0	0	0	0	30	0
Total neonates		0	0 x	0 x	0	0	0	0 x	0	0	0		
												Mean # young:	0
												Total adult mortality:	3

Concentration	Day	Replicate										%	Mean #
		1	2	3	4	5	6	7	8	9	10	Mortality	Young
100%	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0 x	0 x	0	0	0 x	0	0	0	0	0	30	0
	3	0	0	0	0	0	0	0	0	0	0	30	0
	4	0	0	0	0	0	0	0 x	0	0	0 x	50	0
	5	0	0	0 x	0 x	0	0 x	0	0	0 x	0	90	0
	6	0	0	0	0	0	0	0	0	0	0	90	0
	7	0	0	0	0	0	0	0	0	0	0	90	0
Total neonates		0 x	0 x	0 x	0 x	0 x	0 x	0 x	0	0 x	0 x		
												Mean # young:	0
												Total adult mortality:	9

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x = mortality
* = accidental death

Test Data Reviewed By: HL
Date: 2003-09-06

Concentration	Day	Replicate										% Mortality	Mean # Young
		1	2	3	4	5	6	7	8	9	10		
13%	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0	0
	3	0	0	0	0	5	0	0	0	0	0	0	0.5
	4	3	2	0	0	0	0	3	5	0	2	0	1.5
	5	2	3	0	0	12	7	3	2	8	3	0	4
	6	0	0	0	0	19	0	0	0	0	0	0	1.9
	7	5	20	12	9 x	0	15	8	17	10	19	10	11.5
Total neonates		10	25	12	9 x	36	22	14	24	18	24		
												Mean # young:	19.4
												Total adult mortality:	1

Concentration	Day	Replicate										% Mortality	Mean # Young
		1	2	3	4	5	6	7	8	9	10		
25%	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0	0	0	0	0
Total neonates		0	0	0	0	0	0	0	0	0	0		
												Mean # young:	0
												Total adult mortality:	0

Concentration	Day	Replicate										% Mortality	Mean # Young
		1	2	3	4	5	6	7	8	9	10		
50%	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0 x	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	0	0	0	0	0	0	0 x	0	0	0	20	0
	5	0	0	0 x	0	0	0	0	0	0	0	30	0
	6	0	0	0	0	0	0	0	0	0	0	30	0
	7	0	0	0	0	0	0	0	0	0	0	30	0
Total neonates		0	0 x	0 x	0	0	0	0 x	0	0	0		
												Mean # young:	0
												Total adult mortality:	3

Concentration	Day	Replicate										% Mortality	Mean # Young
		1	2	3	4	5	6	7	8	9	10		
100%	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0 x	0 x	0	0	0 x	0	0	0	0	0	30	0
	3	0	0	0	0	0	0	0	0	0	0	30	0
	4	0	0	0	0	0	0	0 x	0	0	0 x	50	0
	5	0	0	0 x	0 x	0	0 x	0	0	0 x	0	90	0
	6	0	0	0	0	0	0	0	0	0	0	90	0
	7	0	0	0	0	0	0	0	0	0	0	90	0
Total neonates		0 x	0 x	0 x	0 x	0 x	0 x	0 x	0	0 x	0 x		
												Mean # young:	0
												Total adult mortality:	9

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x = mortality
* = accidental death

Test Data Reviewed By: HC
Date: 2003-09-06

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Work Order : 204482
Sample Number : 7880

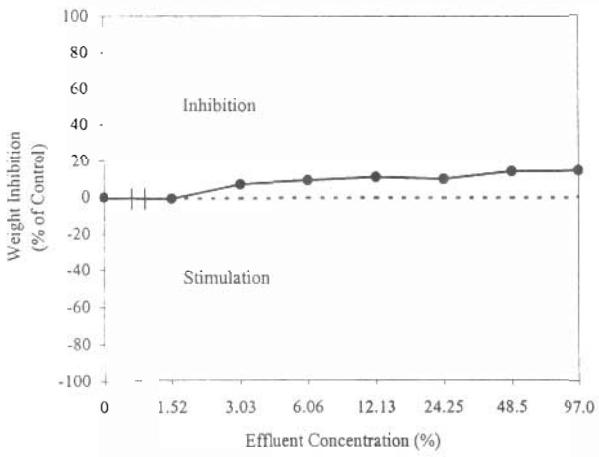
Sample Identification

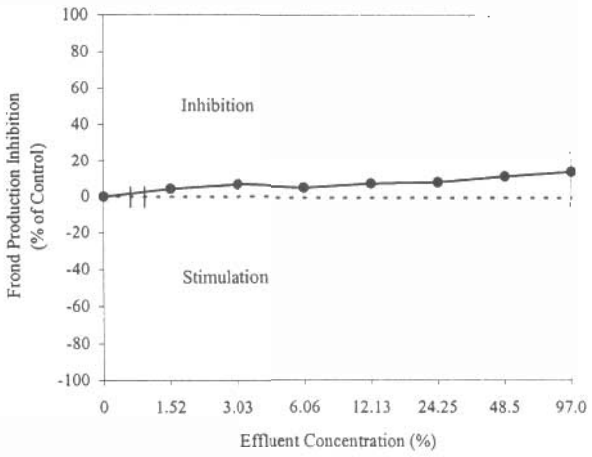
Company :	Nanisivik Mine (a Division of CanZinco Ltd.)	Date Collected :	2003-08-09
Location :	Nanisivik NU	Time Collected :	11:00
Substance :	159-4 August 8, 2003	Date Received :	2003-08-13
Sampling Method :	grab	Time Received :	10:30
Sampled By :	M. Markle	Date Tested :	2003-08-13
Shipped By:	FirstAir/air & Purolator/RD	Lab Storage:	4±2 °C
Temp. on arrival :	8.0°C		
Sample Description:	Clear, colourless, odourless.		

Test Results

Effect	Value	95% Confidence Limits	Statistical Method
IC25 (Weight)	>97.0%	-	-
IC25 (Frond Production)	>97.0%	-	-

Lemna minor Growth Inhibition





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Work Order Number: 204482
Sample Number: 7880

Test Conditions

Test Organism	: *Lemna minor* L., Strain 7730	Media Preparation Water [b]	: Millipore Super Q™
Organism Origin	: UTCC 492	Control/Dilution Water [c]	: Modified APHA
Source	: In-house culture	Test Type	: Static
Organism Age (days)	: 8	Test Volume Per Replicate	: 100 mL
Test Culture Frond # Increase	: >8	Test Vessel	: 250 mL Erlenmeyer flask
Initial Plant Inoculum	: 6 fronds (2 plants)	Depth of Test Solution	: 4.0 cm
Acclimation Time (h)	: 23:40	# Test Concentrations	: 6
Medium Sterilization	: No	# Control Replicates	: 3
Sample pH Adjustment	: None	# Test Replicates	: 3
Sample Hardness Adjustment	: None	Test Duration	: 7 days
Preaeration(≤100 bubbles/min)	: 20 min	Test Temperature	: 25 ± 2°C
Sample Filtration (µm)	: 1 (Whatman GF/C)	Lighting	: 24 hrs. 4200 – 4800 lux

[b] Media Preparation Water: Water used to prepare the liquid growth medium (Modified APHA). Obtained from the University of Guelph. No chemicals added.

[c] Control/Dilution Water: Millipore Super Q™ enriched with 10 mL/L nutrient stock solutions A, B, and C as described in EPS 1/RM/37.

Test Protocol: Environment Canada. 1999. Biological Test Method: Test for Measuring the Inhibition of Growth using the Freshwater Macrophyte, Lemna minor. Method Development and Application Section. Environmental Technology Centre. Environment Canada. Ottawa, ON. EPS 1/RM/37.

Test Organisms: No unusual appearance or treatment of culture prior to testing. Test culture was axenic.

Comments

Test sample was enriched with 10 mL/L nutrient stock solutions A, B, and C as described in EPS 1/RM/37.
Test dilutions were prepared and then allowed to acclimate for one hour before plants were added.

Control plants showed the required minimum growth of >8 times.

The holding time was extended to four days as the sample was collected on 2003-08-09, but was not received until 2003-08-13. A power failure occurred on 2003-08-14 which resulted in insufficient or variable lighting for 17 hours. There were no other unusual conditions or deviations from the test protocol. The results reported relate only to the sample tested.

Work Order Number: 204482
Sample Number: 7880

Reference Toxicant Data

Substance	: Potassium Chloride
Test Date	: 2003-08-22
IC25 Frond Production (g/L)	: 2.64
Lower 95% Confidence Limit	: 0.43
Upper 95% Confidence Limit	: 3.43
Test Duration	: 7 days
Historical Mean IC25 (g/L)	: 2.25
Upper Warning Limit (+2SD)	: 3.58
Lower Warning Limit (-2 SD)	: 1.43
Statistical Method	: Linear Interpolation (Toxstat 3.5)[a]
Lemna minor Batch Number	: Lm03-08
Test Conducted By	: T.Patey/H.Roshon/K.Olaveson

Reference toxicant test was conducted under conditions identical to the test.
The first 5 reference toxicant tests were conducted using strain #8434, afterwhich they were conducted using strain #7730.

References

[a] West, Inc. and D. Gulley. 1996. Toxstat Release 3.5. Western Ecosystems Technology. Cheyenne, WY, U.S.A.

Date: 2003-09-10

Approved By: K Holtze
Keith Holtze, Director, Laboratory Operations

7 Day *Lemna minor* Growth Inhibition Test

Work Order Number: 204482
Sample Number: 7880

Lemna Batch #: Lm03-08
Culture Age (days): 8
Culture Health Increase Factor (in APHA media): 11.2

Light Intensity: 4200-4800 lux
Sample Pre-aeration Time (min 20
Sample Filtration (µm): 1

Acclimation of plants to APHA medium: Date: 2003-08-12 Time: 15:50
Start Date: 2003-08-13 Time: 15:30 Technician: T. Patey
Completion Date: 2003-08-20

Initial sample temperature: 25.0

Initial sample pH: 7.6

Daily Temperature			
Day	Date	Temp (°C)	Initials
0	2003-08-13	25.5	TP
1	2003-08-14	25.5	TP
2	2003-08-15	24.5	TP
3	2003-08-16	25.5	KO
4	2003-08-17	26.0	KO
5	2003-08-18	25.5	TP
6	2003-08-19	25.5	TP
7	2003-08-20	25.5	TP

pH		
Conc. (%)	Day 0	Day 7
Control	8.2	8.3
1.52	8.3	8.4
3.03	8.3	8.4
6.06	8.2	8.4
12.13	8.2	8.3
24.25	8.2	8.1
48.5	8.1	7.5
97.0	8.0	5.7

Frond Counts at Day 7

Technician: K. Olaveson/ T. Patey/ H. Roshon

Conc. (%)	Rep A				Rep B				Rep C			
	Plant		Frond		Plant		Frond		Plant		Frond	
	# Live	# Dead	# Live	# Dead	# Live	# Dead	# Live	# Dead	# Live	# Dead	# Live	# Dead
Control	20	0	113	0	19	0	114	0	16	0	87	0
1.52	21	0	99	0	19	0	105	0	15	0	97	0
3.03	22	0	102	0	21	0	98	0	18	0	94	0
6.06	19	0	93	0	20	0	94	0	20	0	111	0
12.13	18	0	95	0	22	0	118	0	13	0	78	0
24.25	16	0	109	0	14	0	93	0	8	0	86	1
48.5	7	0	91	0	3	0	81	0	7	0	108	0
97.0	5	0	73	1	6	0	88	0	10	0	110	0

Summary (includes initial plant and frond numbers)

Conc. (%)	Average				Standard Deviation				Observations
	Plant		Frond		Plant		Frond		Frond/root appearance
	# Live	# Dead	# Live	# Dead	# Live	# Dead	# Live	# Dead	
Control	18.3	0.0	104.7	0.0	2.1	0.0	15.3	0.0	fronds healthy, appearance normal
1.52	18.3	0.0	100.3	0.0	3.1	0.0	4.2	0.0	
3.03	20.3	0.0	98.0	0.0	2.1	0.0	4.0	0.0	
6.06	19.7	0.0	99.3	0.0	0.6	0.0	10.1	0.0	
12.13	17.7	0.0	97.0	0.0	4.5	0.0	20.1	0.0	
24.25	12.7	0.0	96.0	0.3	4.2	0.0	11.8	0.6	
48.5	5.7	0.0	93.3	0.0	2.3	0.0	13.7	0.0	
97.0	7.0	0.0	90.3	0.3	2.6	0.0	18.6	0.6	

Notes: Large colonies in the 48.5% and 97.0% concentrations. Settled debris in the 97.0% concentration.

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Test Data Reviewed By: HL
Date: 2003-09-03

7 Day *Lemna minor* Growth Inhibition Test

Work Order Number: 204482
Sample Number: 7880

Increase in Frond Numbers

Conc. (%)	Rep A	Rep B	Rep C	Average	Standard Deviation	%CV	% Inhibition
Control	107	108	81	98.7	15.3	15.5	0.0
1.52	93	99	91	94.3	4.2	4.4	4.4
3.03	96	92	88	92.0	4.0	4.3	6.8
6.06	87	88	105	93.3	10.1	10.8	5.4
12.13	89	112	72	91.0	20.1	22.1	7.8
24.25	103	87	81	90.3	11.4	12.6	8.4
48.5	85	75	102	87.3	13.7	15.6	11.5
97.0	68	82	104	84.7	18.1	21.4	14.2

Increase in control frond count: 17.4 fold

Lemna minor Weights

Concentration	Replicate	Total Replicate Biomass (mg)	Mean Treatment Biomass (mg)	Standard Deviation	%CV	% Inhibition
Control	A	10.10	9.14	1.45	15.9	0.0
	B	9.86				
	C	7.47				
1.52	A	9.57	9.17	0.49	5.4	-0.3
	B	9.31				
	C	8.62				
3.03	A	9.10	8.45	0.74	8.8	7.5
	B	8.62				
	C	7.64				
6.06	A	8.29	8.28	0.14	1.6	9.4
	B	8.41				
	C	8.14				
12.13	A	8.13	8.12	1.59	19.6	11.2
	B	9.71				
	C	6.53				
24.25	A	9.58	8.22	1.23	15.0	10.1
	B	7.90				
	C	7.18				
48.5	A	8.02	7.84	0.54	6.9	14.3
	B	7.23				
	C	8.26				
97.0	A	6.71	7.80	1.05	13.4	14.7
	B	7.88				
	C	8.80				

Test Data Reviewed By: ttl
Date: 2003-09-03

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Work Order : 204482
Sample Number : 7880

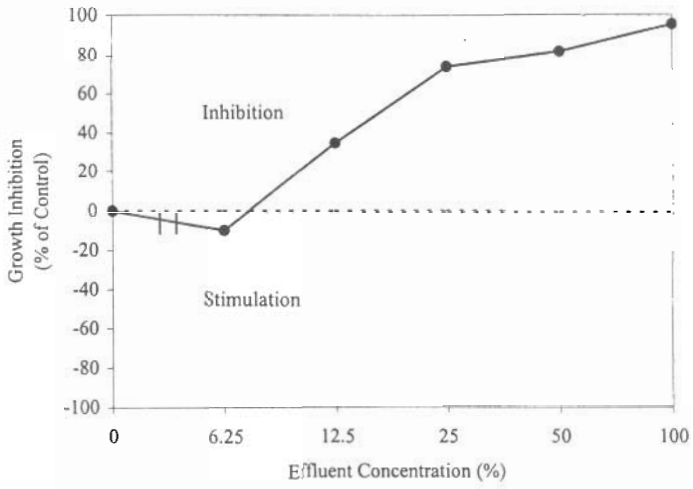
Sample Identification

Company :	Nanisivik Mine (a Division of CanZinco Ltd.)	Date Collected :	2003-08-09
Location :	Nanisivik NU	Time Collected :	11:00
Substance :	159-4 August 8, 2003	Date Received :	2003-08-13
Sampling Method :	grab	Time Received :	10:30
Sampled By :	M. Markle	Date Tested :	2003-08-13
Shipped By:	FirstAir/air & Purolator/RD	Lab Storage:	4±2 °C
Temp. on arrival :	8.0°C		
Sample Description:	Clear, colourless, odourless.		

Test Results*

Effect	Value	95% Confidence Limits	Statistical Method
IC25 (Growth)	10.4%	9.4-10.8	Linear Interpolation (Toxstat 3.5) a

Selenastrum capricornutum Growth Inhibition



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*Note: The test results have not been adjusted for the 0.9091 dilution factor (see 'Concentrations' section on page 2).

Work Order Number: 204482
Sample Number: 7880

Test Conditions

Test Organism	: *Selenastrum capricornutum*	Control/Dilution Water[c]	: Millipore Milli Q™
Batch Number	: Sel03-08	Test Type	: Static
Organism Origin	: UTCC37	Test Volume Per Replicate	: 220 µL
Source	: In-house culture	Test Vessel	: U-shaped polystyrene microplate
Organism Age (days)	: 5 (in exponential growth)	# Test Concentrations[d]	: 10 + control
Initial Algal Inoculum	: 9448 cells/mL	# Control Replicates	: 10
pH Adjustment	: None	# Test Replicates	: 3
Sample Filtration[b]	: 0.45 µm	Test Duration	: 72 hours
Hardness Adjustment	: None	Lighting	: 24 hrs. 4000±10% lux
Sample Aeration	: None		

[b] Sample Filtration: 5-10 ml sub-sample was filtered through a preconditioned 0.45 µm filter prior to dilution.

[c] Control/Dilution Water: No chemicals added.

[d] Number of Concentrations: A total of ten concentrations were prepared and inoculated with algae. A minimum of five concentrations were enumerated at test completion.

Concentrations: Concentrations are prepared by making up a series of dilutions such as: 0.195, 0.39, 0.78, 1.56, 3.13, 6.25, 12.5, 25, 50, and 100%. The actual concentrations are slightly diluted by the addition of 10 µL of enrichment medium and 10 µL of algal inoculum. Therefore, the concentrations for the above series are actually 0.18, 0.35, 0.71, 1.42, 2.85, 5.68, 11.36, 22.73, 45.45, and 90.91% (a multiplication factor of 0.9091%). This multiplication factor has not been applied to the results.

Test Organisms: No unusual appearance or treatment of culture prior to testing.

Test Protocol: Biological Test Method. Growth Inhibition Test Using the Freshwater Alga *Selenastrum capricornutum*. Environment Canada, Conservation and Protection. Ottawa, Ontario. Report EPS1/RM/25 (including November 1997 amendments).