

TRE Environmental Strategies, LLC
100 Racquette Drive, Unit A Fort Collins, CO 80524
T 970.416.0916 F 970.490.2963

June 30, 2016

Ms. Stacy Staley
Sumitomo Metal Mining Pogo, LLC
Pogo Mine Joint Venture
P.O. Box 145
Delta Junction, Alaska 99737

RE: Results of WET tests – June 2016

Dear Ms. Staley,

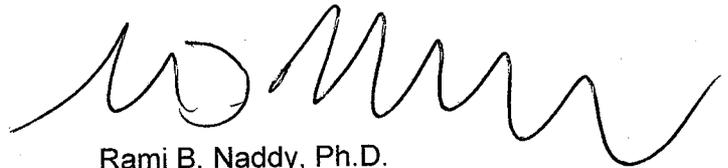
Attached are copies of the reports for the *Ceriodaphnia dubia* (water flea) and *Pimephales promelas* (fathead minnow) toxicity tests conducted in June 2016 with effluent from your facility.

TRE Environmental Strategies, LLC greatly appreciates this opportunity to provide our services to Sumitomo Metal Mining Pogo. Please do not hesitate to call if you have any questions.

Sincerely,



Whitney Naddy
Report Author
naddywm.tre@gmail.com



Rami B. Naddy, Ph.D.
Manager / Environmental Toxicologist
naddyrb.tre@gmail.com

Attachments:

14001-412-023
14001-412-024

**Report of Short-Term Chronic Toxicity Testing using the Water Flea
(Ceriodaphnia dubia)**

**Project ID: 14001-412-023
June 2016**

Sponsor and Laboratory Information

Sponsor	Sumitomo Metal Mining Pogo LLC Pogo Mine Joint Venture P.O. Box 145 Delta Junction, AK 99737
Project Officer	Stacy Staley (907) 895-2761
Testing Facility	TRE Environmental Strategies, LLC 100 Racquette Dr., Unit A Fort Collins, CO 80524 Fax: (970) 490-2963 State of Florida NELAP Laboratory ID: E87972
Study Director	Rami B. Naddy, Ph.D. (970) 416-0916 email: naddyrb.tre@gmail.com
Report Author	Whitney Naddy (970) 416-0916 email: naddywm.tre@gmail.com

Test Information

Test	Short-Term Chronic under Static-Renewal Conditions
Basis	USEPA (2002), method 1002.0
Test Dates and Time	June 14, 2016 @ 1530 to June 21, 2016 @ 1615
Test Length	7 days
Species	<i>Ceriodaphnia dubia</i>
Test Material	Effluent
Outfall	Outfall 001
Permit Number	AK-005334-1
Receiving Stream	N/A
Dilution Water	Moderately hard reconstituted water
Concurrent Control Water	None
Test Concentrations	0 (control), 12.5, 25, 50, 75, and 100% effluent
Permit Compliance	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

- Results described in this report apply only to the samples submitted to the laboratory and analyzed, as listed in the report
- Test results comply with NELAC standards. Reports are intended to be considered in their entirety; TRE is not responsible for consequences arising from use of a partial report
- This report contains 5 pages plus 2 appendices

Effluent Collection and Receipt

Sample No.	Field No.	Collection Date & Time	TRE No.	Date of Receipt	Temp. at Arrival (°C)
1	N/A	06/13/16 @ 1040 to 06/13/16 @ 1045	29713	06/14/16	2.4
2	N/A	06/15/16 @ 0945 to 06/15/16 @ 0950	29726	06/16/16	1.7
3	N/A	06/17/16 @ 0845 to 06/17/16 @ 0850	29734	06/18/16	5.0

Note: See Appendix A for chain of custody records

Effluent Characterization

Sample No.	pH	Hard. (mg/L) ^a	Alk. (mg/L) ^a	Spec. Cond. (µS/cm)	TRC (mg/L) ^b	NH ₃ -N (mg/L)
1	7.5	68	40	278	<0.02	1.6
2	7.5	70	37	272	<0.02	1.7
3	7.6	74	47	312	<0.02	2.1

^a As CaCO₃

^b Total residual chlorine

Initial Dilution/Control Water Characterization

Batch No.	pH	Hard. (mg/L) ^a	Alk. (mg/L) ^a	Spec. Cond. (µS/cm)	TRC (mg/L) ^b	NH ₃ -N (mg/L)
12281	8.1	94	57	312	<0.02	<1.0

^a As CaCO₃

^b Total residual chlorine

Test Conditions

Type	Static-Renewal Short-term Chronic		
Test Endpoints	Survival and Reproduction		
Test Chambers	30-ml plastic cups		
Test Solution Volume	15 ml		
Replicates per Treatment	10		
Organisms per Replicate	1		
Test Temperature	25 ± 1°C (≤ 3°C differential)		
Lighting	Fluorescent, 16 hours light:8 hours dark		
Chamber Placement	Random block according to computer-generated chart		
Aeration?	X	No	Yes
Test Solution Renewal	Daily		

Test Organism

Species	<i>Ceriodaphnia dubia</i>
Age	<24 hours (all within 8 hours of the same age)
Source	TRE in-house culture, batch 061316
Acclimation	Test temperature
Feeding	0.2 ml YTC/Algae mixed per test chamber daily during the test
Reference Toxicant Testing	Initiated June 3, 2016 using sodium chloride (NaCl)

TEST RESULTS

Biological Data

Treatment (% Effluent)	Percent Survival of <i>Ceriodaphnia dubia</i>							Mean Young per Female ^a	Significant Reduction Relative to Control?	
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7		Surv.	Repr.
0 (Control)	100	100	100	100	100	100	100	29.5	N/A	N/A
12.5	100	100	100	100	100	100	100	31.1	No	No
25	100	100	100	100	100	100	100	30.5	No	No
50	100	100	100	100	100	100	100	31.4	No	No
75	100	100	100	100	100	100	100	29.0	No	No
100	100	100	100	100	100	100	100	29.9	No	No
Percent Minimum Significant Difference (Reproduction)								14.0	Acceptable	

^a Mean young per original female. If any 4th broods or higher were produced, they were excluded from calculation of mean young per female and statistical analysis of reproduction.

Note: See Appendix B for copies of laboratory data sheets

Data Analysis and Test Endpoints

Biological Endpoint	Statistical Endpoint	Value
Survival	NOEC	100% Effluent
	LOEC	>100% Effluent
	IC ₂₅	>100% Effluent
Reproduction	NOEC	100% Effluent
	LOEC	>100% Effluent
	ChV	>100% Effluent
	IC ₂₅	>100% Effluent
	TU _c (100/IC ₂₅)	<1.0

NOEC = No Observed Effect Concentration

LOEC = Lowest Observed Effect Concentration

ChV = Chronic Value

IC₂₅ = 25% Inhibition Concentration

TU_c = Chronic Toxic Units

Note: Analyses completed using, where appropriate, CETIS version 1.8.7 (2014).

Physical and Chemical Data

Treatment (% Effluent)	pH		Dissolved Oxygen (mg/L)		Conductivity (μS/cm)		Temperature (°C)	
	Low	High	Low	High	Low	High	Low	High
0 (Control)	8.0	8.3	6.3	6.9	289	313	24	25
100	7.4	8.0	6.4	6.8	272	333	24	25
All Treatments	7.4	8.3	≥6.3		NA		24 ^a	25 ^a
							25 ^b	27 ^b

^a Temperature in test solutions

^b Continuous wet temperature in the environmental chamber

Reference Toxicant Test Results for *C. dubia*

IC ₂₅	TRE Historical 95% Control Limits	
	Low	High
409	197	688

Note: Values are expressed as mg/L of chloride.

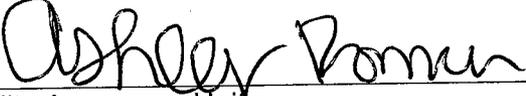
References

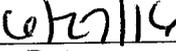
CETIS. 2014. Comprehensive Environmental Toxicity Information System. User Guide (version 1.8.7). Tidepool Scientific, LLC. McKinleyville, CA.

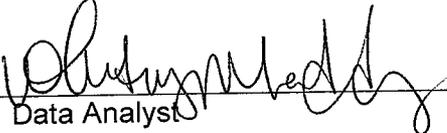
USEPA. 2002. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Fourth Edition. EPA-821-R-02-013.

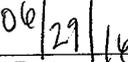
Statement of Quality Assurance

The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol (if applicable) and standard operating procedures, and that the resulting data and report meet the requirements of the NELAC standards. This report is an accurate reflection of the raw data.


Quality Assurance Unit


Date


Data Analyst


Date

APPENDIX A
Chain of Custody Records

APPENDIX B

Test Data

TOXICITY DATA PACKAGE COVER SHEET

Test Type: Chronic
Test Substance: Effluent-(Outfall 001)
Dilution Water Type: Mod Hard
Concurrent Control Water Type: NA
Date and Time Test Began: 6/14/16 @ 1530
Protocol Number: USEPA 2002, Method 1002.0

Project Number: 14001-412-023
Species: Ceriodaphnia dubia
Organism Lot or Batch Number: 0013110
Age: <24hr (<24 hr) Supplier: TRE
Date and Time Test Ended: 6/16 @ 1615
Investigator(s): MW/A-113 / MDM/RR/BJN / MH

Background Information

Type of Test: Static-Renewal
Test Temperature: 25 ± 1 °C
Test Solution Vol.: 15 ml
Length of Test: 3 broods
Photoperiod: 16 h light : 8 h dark
Type of Food and Quantity per Chamber: 0.2 ml YTC/ALG

pH control?: Yes No
If yes, give % CO₂: N/A

Env. Chmbr/Bath #: 25 Test Chmbrs: 30-ml cups

Number of Replicates per Treatment: 10

Number of Organisms per Replicate: 1

Light Intensity: 50 to 100 ft.-c.

Feeding Frequency: 1 x Daily

Test Substance Characterization Parameters and Frequency:

Hardness: Sx Receipt Alkalinity: Sx Receipt NH₃: Sx Receipt TRC: Sx Receipt
pH: Daily Conductivity: Daily and Test Termination*

Test Concentrations (Volume:Volume): 0 (MH), 12.5, 25, 50, 75, and 100% effluent

Agency Summary Sheet(s): _____

Reference Toxicant Data: Test Dates: 06/02/16 to 06/09/16 IC₂₅: 409
Hist. 95% Control Limits: 197 to 688 Method for Determining Ref. Tox. Value: Lin Interp

Special Procedures and Considerations:

*Conductivity measured in dilution water and 100% effluent at test termination

D.O. maintained ≥ 4.0 mg/L

Study Director Initials: NAN Date: 6/14/16

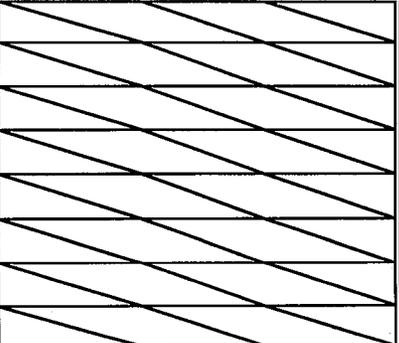
TEST SUBSTANCE USAGE LOG

Project Number: 14001-412-023

QA: DM 6/28/16

	Sample 1	Sample 2	Sample 3	
Test Substance Number	29715	29726	29734	
Test Substance Collection Date and Time	From: 6/13/16	From: 6/15/16	From: 6/17/16	
	@ 1040	@ 0945	@ 0845	
	To: 6/13/16	To: 6/15/16	To: 6/17/16	
	@ 1045	@ 0950	@ 0850	
Sample Type (Grab or Comp)	Grab	Grab	Grab	
Date Test Substance Received	6/14/16	6/16/16	6/18/16	
Dilution Water Number				
<u>RW#</u> or TRE#, circle one	12281	12281/12292*	12292/12299*	
Concurrent Control Water RW#	NA	NA	NA	
Date(s) Used	6/14/16	6/16/16	6/18/16	
	6/15/16	6/17/16*	6/19/16	
			6/20/16*	

Preparation of Test Solutions

Test Substance % Conc.	Test Substance Volume (ml)	Dilution Water Volume (ml)	Total Volume (ml)	Test Substance Volume (ml)	Dilution Water Volume (ml)	Total Volume (ml)	Test Substance Volume (ml)	Dilution Water Volume (ml)	Total Volume (ml)
0 (MH)	0	1200	1200	0	200	200			
12.5%	150	1050	1200	25	175	200			
25%	300	900	1200	50	150	200			
50%	600	600	1200	100	100	200			
75%	900	300	1200	150	50	200			
100%	1200	0	1200	200	0	200			
Total	3150	4050	7200	525	675	1200			
Initials / Date				MW 6/14/16 Mixed CC					
Initials / Date				MW 6/15/16 " "					
Initials / Date				RR 6/16/16 " "					
Initials / Date				MW 6/17/16 " "					
Initials / Date				KZ 6/18/16 " "					
Initials / Date				MH 6/19/16 " "					
Initials / Date				DM 6/20/16 " "					
Initials / Date									

CERIODAPHNIA DUBIA
CHRONIC BIOLOGICAL DATA

DA WZN 6/22/16

Project Number: 14001-412-023

Number of Neonates Produced and Survival of Original Organisms														
Conc.	Day	A	B	C	D	E	F	G	H	I	J	Total	Mean	Remarks
0 (MH)	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			100%
	3	0	0	5/1	0	0	0	0	0	0	0	5		
	4	6/1	2/1	0	5/1	6/1	6/1	2/1	4/1	5/1	3/1	43		
	5	0	12/2	12/2	15/2	10/2	12/2	0	8/2	12/2	8/2	89		
	6	14/2	0	15/3	5/3	17/3	15/3	0	0	14/3	0	80		small neos
	7	14/3	16/3	0	8/3	0	0	16/3	17/3	17/3	16/3	82		
	8								29					
Total		34	30	32	33	33	33	13	31	31	27	295	29.5	
12.5%	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			100%
	3	0	0	0	0	0	0	0	0	0	0			
	4	5/1	5/1	4/1	4/1	4/1	5/1	4/1	5/1	6/1	6/1	48		
	5	10/2	10/2	13/2	12/2	9/2	12/2	11/2	11/2	14/2	11/2	119		
	6	0	12/3	18/3	14/3	19/3	15/3	0	0	10/3	0	85		kind neos
	7	17/3	0	0	0	0	0	17/3	10/3	0	15/3	59		kind neos NC
	8													
Total		32	33	35	30	23	32	32	20	30	32	311	31.1	
25%	1	0	0	0	0	0	0	0	0	0	0			100%
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	5/1	0	0	0	0	0	1/1	6		small neos
	4	5/1	5/1	2/1	0	3/1	2/1	6/1	5/1	5/1	5/1	43		big neos
	5	12/2	8/2	8/2	9/2	9/2	8/2	11/2	10/2	11/2	13/2	99		
	6	0	0	17/3	18/3	9/3	0	7/3	0	14/3	0	65		small neos
	7	15/3	16/3	0	0	5/3	15/3	7/3	16/3	0	18/3	92		large neos
	8													
Total		32	29	27	32	20	30	31	31	30	37	305	30.5	
Day:	1	2	3	4	5	6	7	8	Key to symbols:					
Date:	6/15/16	6/16/16	6/17/16	6/18/16	6/19/16	6/20/16	6/21/16	6/22/16	X = Original organism died.					
Time:	1550	1525	1550	1435	1230	1550	1615		M = Male					
Initials:	MB	RR	MM	WZ	MT	DM	AB		NC = not counted					

DMH 6/22/16 6

DMH 6/22/16 E

CERIODAPHNIA DUBIA
CHRONIC BIOLOGICAL DATA

RA NZN 6/22/16

Project Number: 14001-412-023

Number of Neonates Produced and Survival of Original Organisms

Conc.	Day	A	B	C	D	E	F	G	H	I	J	Total	Mean	Remarks
50%	1	0	0	0	0	0	0	0	0	0	0			
	2	6	0	0	0	0	0	0	0	0	0			100%
	3	0	0	0	4/1	0	0	0	0	0	0	4		(3)
	4	2/1	6/1	4/1	D	3/1	4/1	4/1	3/1	5/1	4/1	42		35
	5	14/2	12/2	12/2	12/2	11/2	10/2	14/2	11/2	11/2	10/2	117		
	6	0	17/3	16/3	17/3	14/3	18/3	0	14/3	12/3	0	108		(1) 1/2 + 1/3
	7	17/3	0	0	0	0	0	16/3	0	0	17/3	50		
	8											31		31.4
Total		33	35	32	33	28	32	34	28	28	31	321		32.1
75%	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			100%
	3	0	0	0	0	0	0	0	0	0	0			
	4	5/1	4/1	4/1	4/1	2/1	3/1	6/1	3/1	2/1	4/1	37		
	5	8/2	12/2	13/2	12/2	10/2	10/2	9/2	8/2	9/2	11/2	94		
	6	12/2	0	12/3	19/3	12/3	0	0	11/3	0	16/3	78		*iridoneas Δ large neos
	7	18/3	16/3	0	0	0	18/3	11/3	2/3	16/3	0	81		
	8													
Total		35	32	29	31	24	31	26	24	27	31	290		29.0
100%	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			100%
	3	0	0	2/1	2/1	0	0	0	0	0	0	4		* under neos nc
	4	3/1	3/1	6	0	4/1	2/1	7/1	5/1	4/1	6/1	34		
	5	0	12/2	13/2	12/2	19/2	10/2	8/2	8/2	7/2	9/2	89		
	6	13/3	14/3	17/3	17/3	0	17/3	0	10/3	0	0	84		Δ small neos Δ large neos
	7	16/3	0	0	0	18/3	0	18/3	1/3	18/3	17/3	88		
	8													
Total		32	29	32	31	32	29	33	20	29	32	299		29.9
Day:	1	2	3	4	5	6	7	8	Key to symbols:					
Date:	6/15/16	6/16/16	6/17/16	6/18/16	6/19/16	6/20/16	6/21/16	6/22/16	X = Original organism died.					
Time:	1550	1525	1550	1435	1630	1550	1615		M = Male					
Initials:	MM	RR	MM	MS	MT	SM	AB		nc = not counted					

(1) MT 6/15/16 E (3) NZN 6/22/16 E
 (2) MM 6/16/16 E

CHRONIC CHEMICAL DATA (INITIAL)

QA Form 0128/16

Project Number: 14001-412-023

Test Species: *Ceriodaphnia dubia*

%	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Meter #	Remarks
Conc.: 0 (MH)									All Conc.	
pH	8.1	8.1	8.2	8.2	8.3	8.2	8.2		FM24	
D.O. (mg/L)	6.8	6.7	6.7	6.6	6.3	6.9	6.6		5	
Temp. (°C)	25	25	25	25	25	25	25		L-10	
Cond. (µS/cm)	312	305	301	301	313	298	289		15	
Hard. (mg/L)	94		90		94				Titr.	
Alk. (mg/L)	58		58		60				Titr.	
TRC (mg/L) (9.1/16)	20.02				20.02				#22	
NH ₃ (mg/L) (0.1/16)	21.0				21.0				HA#	
Conc.: 12.5%										
pH	8.0	8.0	8.1	8.1	8.2	8.1	8.1			
D.O. (mg/L)	6.8	6.6	6.7	6.6	6.4	6.8	6.6			
Temp. (°C)	*	*	*	*	*	*	*			
Cond. (µS/cm)	302	302	294	298	294	308	293			
Hard. (mg/L)										
Alk. (mg/L)										
TRC (mg/L)										
NH ₃ (mg/L)										
Conc.: 25%										
pH	7.9	8.0	8.0	8.0	8.1	8.0	8.0			
D.O. (mg/L)	6.8	6.7	6.7	6.6	6.5	6.8	6.6			
Temp. (°C)	*	*	*	*	*	*	*			
Cond. (µS/cm)	302	299	293	295	312	310	298			
Hard. (mg/L)										
Alk. (mg/L)										
TRC (mg/L)										
NH ₃ (mg/L)										
Conc.: 50%										
pH	7.8	7.8	7.8	7.9	7.9	7.8	7.8			
D.O. (mg/L)	6.8	6.7	6.7	6.6	6.5	6.8	6.6			
Temp. (°C)	*	*	*	*	*	*	*			
Cond. (µS/cm)	293	291	286	289	308	313	298			
Date:	6/10/16	6/15/16	6/16/16	6/17/16	6/18/16	6/19/16	6/20/16			
Time:	1510	1530	1510	1515	1405	1215	1530			
Initials:	MW	MW	RP	MW	MW	MH	MW			

Note: Hardness, alkalinity, TRC, and NH₃ data appearing on this page have been transcribed from the wet chemistry log QA Form No. 084.

*Dilution/control water and effluent were brought to 25°C prior to making the dilution series. The temperature of resulting effluent dilution is assumed to also be 25°C.

QA Form for: 6/20/16 E

CHRONIC CHEMICAL DATA (INITIAL)

QA: *mm 6/28/16*

Project Number: 14001-412-023

Test Species: *Ceriodaphnia dubia*

%	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Meter #	Remarks
Conc.: 75%									All Conc.	
pH	7.7	7.7	7.7	7.7	7.7	7.7	7.6		FM24	
D.O. (mg/L)	6.8	6.7	6.7	6.7	6.4	6.8	6.6			
Temp. (°C)	*	*	*	*	*	*	*			
Cond. (µS/cm)	294	293	284	279	282	312	316	301		
Conc.:										
pH										
D.O. (mg/L)										
Temp. (°C)										
Cond. (µS/cm)										
Conc.:										
pH										
D.O. (mg/L)										
Temp. (°C)										
Cond. (µS/cm)										
Conc.:										
pH										
D.O. (mg/L)										
Temp. (°C)										
Cond. (µS/cm)										
Conc.: 100%										
pH	7.5	7.6	7.5	7.5	7.6	7.5	7.4			
D.O. (mg/L)	6.8	6.7	6.7	6.7	6.6	6.7	6.7			
Temp. (°C)	25	25	25	25	25	25	25			
Cond. (µS/cm)	278	276	272	275	312	317	306			
Hard. (mg/L)	68		70		74					
Alk. (mg/L)	40		37		47					
TRC (mg/L)	20.02		20.02		20.02					
NH ₃ (mg/L)	1.65		1.73		2.08					
Date:	6/14/16	6/15/16	6/16/16	6/17/16	6/18/16	6/19/16	6/20/16			
Time:	1510	1530	1510	1515	1405	1215	1530			
Initials:	MM	MM	RR	MM	MM	MM	MM			

Note: Hardness, alkalinity, TRC, and NH₃ data appearing on this page have been transcribed from the wet chemistry log QA Form No. 084.

*Dilution/control water and effluent were brought to 25°C prior to making the dilution series. The temperature of resulting effluent dilution is assumed to also be 25°C.

Draw 6/14/16, Wp

CHRONIC CHEMICAL DATA (FINAL)

QA: bmm 6/28/16

Project Number:	14001-412-023
Test Species:	<i>Ceriodaphnia dubia</i>

%	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Meter #	Remarks
Conc.: 0 (MH)								302	All Conc.	* conductivity (15)
pH	8.2	8.1	8.1	8.3	8.3	8.1	8.0		FM24	
D.O. (mg/L)	6.7	6.7	6.6	6.5	6.8	6.6	6.6		5	
Temp (°C)	25	24	24	24	24	24	24		L-10	
Conc.: 12.5%										
pH	8.1	8.1	8.0	8.3	8.2	8.1	7.9			
D.O. (mg/L)	6.7	6.7	6.5	6.6	6.8	6.6	6.5			
Temp (°C)	24	24	24	24	24	24	24			
Conc.: 25%										
pH	8.1	8.0	8.0	8.2	8.2	8.1	7.9			
D.O. (mg/L)	6.7	6.7	6.6	6.7	6.9	6.5	6.4			
Temp (°C)	25	24	24	24	24	24	24			
Conc.: 50%										
pH	8.0	8.0	7.9	8.1	8.1	8.0	7.7			
D.O. (mg/L)	6.6	6.7	6.5	6.5	6.9	6.5	6.4			
Temp (°C)	25	24	25	24	24	24	24			
Conc.: 75%										
pH	8.0	7.9	7.9	8.0	8.0	7.9	7.8			
D.O. (mg/L)	6.7	6.7	6.6	6.5	6.9	6.5	6.3			
Temp (°C)	25	24	25	24	24	24	24			
Conc.: 100%								333		* conductivity
pH	7.9	7.9	7.9	8.0	7.9	7.8	7.7			
D.O. (mg/L)	6.7	6.8	6.6	6.5	6.8	6.4	6.4			
Temp (°C)	24	24	24	24	24	24	24			
Conc.:										
pH										
D.O. (mg/L)										
Temp (°C)										
Date:	6/15/16	6/16/16	6/17/16	6/18/16	6/19/16	6/20/16	6/21/16			
Time:	1540	1520	1530	1445	1445	1600	1600			
Initials:	MM	RR	MM	KS	MM	MM	MS			

DAILY TOXICITY TEST LOG

QA: Ann 6/28/16

Project Number:	14001-412-023
Test Species:	<i>Ceriodaphnia dubia</i>

General Comments	Neonates obtained from <u>0106310 Purina B</u> cerio monoculture board (<u>GREEN</u> marked cups) Random Chart: <u>40</u> Min/Max Therm. #: <u>M-14</u>	Feeding 0.2 ml YTC/ALG Daily	Initials/Date
Test Day 0	Test Solution Mixed at: <u>1505</u> Test Organisms Added at: <u>1530</u>	Fed @ <u>1515</u>	<u>mw/Ann</u> <u>6/14/16</u>
Test Day 1	Real Time Temp= <u>25</u> °C Range = <u>25-26</u> °C	Fed @ <u>1535</u>	<u>KRM/Ann</u> <u>6/15/16</u>
Test Day 2	Real Time Temp= <u>25</u> °C Range = <u>25-26</u> °C	Fed @ <u>1515</u>	<u>RR</u> <u>6/16/16</u>
Test Day 3	Real Time Temp= <u>25</u> °C Range = <u>25-26</u> °C	Fed @ <u>1520</u>	<u>KRM/Ann</u> <u>6/17/16</u>
Test Day 4	Real Time Temp= <u>26</u> °C Range = <u>25-27</u> °C	Fed @ <u>1410</u>	<u>WZN</u> <u>6/18/16</u>
Test Day 5	Real Time Temp= <u>26</u> °C Range = <u>25-27</u> °C	Fed @ <u>1225</u>	<u>MB</u> <u>6/19/16</u>
Test Day 6	Real Time Temp= <u>25</u> °C Range = <u>25-26</u> °C	Fed @ <u>1535</u>	<u>Ann</u> <u>6/20/16</u>
Test Day 7	Real Time Temp= <u>26</u> °C Range = <u>25-27</u> °C	Fed @ <u>None</u>	<u>AS</u> <u>6/21/16</u>
Test Day 8	Real Time Temp= °C Range = °C	NONE	

CETIS Analytical Report

Report Date: 22 Jun-16 11:20 (p 1 of 2)
 Test Code: 412-023 | 07-0974-2097

Ceriodaphnia 7-d Survival and Reproduction Test

TRE Environmental Strategies

Analysis ID: 13-8248-0983	Endpoint: 7d Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 22 Jun-16 11:20	Analysis: Nonparametric-Control vs Treatments	Official Results: Yes
Batch ID: 16-0492-6685	Test Type: Reproduction-Survival (6-8d)	Analyst: Lab Tech
Start Date: 14 Jun-16 15:30	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 21 Jun-16 16:15	Species: Ceriodaphnia dubia	Brine: Not Applicable
Duration: 7d 1h	Source: In-House Culture	Age: <24
Sample ID: 11-7369-3939	Code: 45F525F3	Client: Sumitomo Mining (Pogo)
Sample Date: 13 Jun-16 10:45	Material: Ambient Sample	Project: WET Annual Compliance Test
Receive Date: 14 Jun-16 14:20	Source: Discharge Monitoring Report	
Sample Age: 29h (2.4 °C)	Station: Outfall 001	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	14.0%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water	12.5	110	75	3	18	0.9223	Asymp	Non-Significant Effect
	25	97	75	5	18	0.5980	Asymp	Non-Significant Effect
	50	111	75	4	18	0.9347	Asymp	Non-Significant Effect
	75	91	75	4	18	0.3875	Asymp	Non-Significant Effect
	100	97.5	75	4	18	0.6152	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	43.53333	8.706667	5	0.5372	0.7472	Non-Significant Effect
Error	875.2	16.20741	54			
Total	918.7333		59			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	8.282	15.1	0.1414	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8798	0.946	<0.0001	Non-normal Distribution

7d Reproduction Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	10	29.5	25.07	33.93	31.5	13	34	1.956	21.0%	0.0%
12.5		10	31.1	28.29	33.91	32	23	36	1.242	12.6%	-5.42%
25		10	30.5	28.33	32.67	30.5	26	37	0.9574	9.93%	-3.39%
50		10	31.4	29.55	33.25	32	28	35	0.8192	8.25%	-6.44%
75		10	29	26.39	31.61	30	24	35	1.155	12.6%	1.69%
100		10	29.9	27.19	32.61	31.5	20	33	1.197	12.7%	-1.36%

7d Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	34	30	32	33	33	33	13	29	31	27
12.5		32	33	35	30	23	32	32	26	36	32
25		32	29	27	32	26	30	31	31	30	37
50		33	35	32	33	28	32	34	28	28	31
75		35	32	29	31	24	31	26	24	27	31
100		32	29	32	31	32	29	33	20	29	32

CETIS Analytical Report

Report Date:
Test Code:

22 Jun-16 11:20 (p 2 of 2)
412-023 | 07-0974-2097

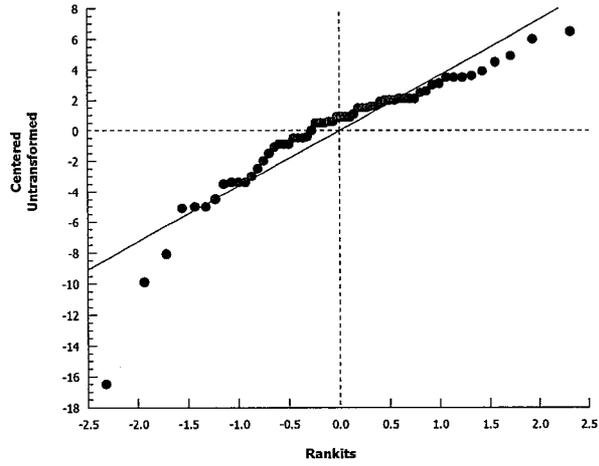
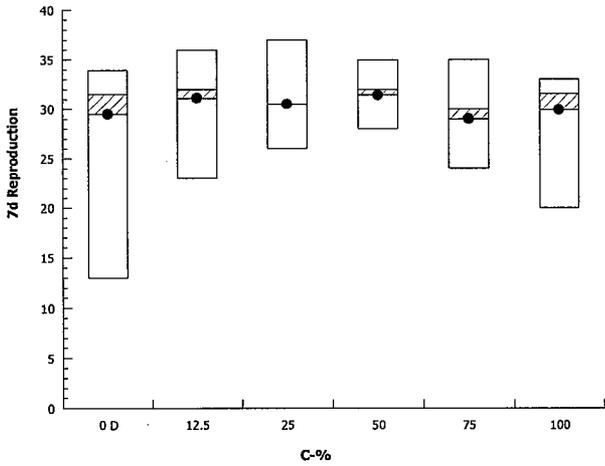
Ceriodaphnia 7-d Survival and Reproduction Test

TRE Environmental Strategies

Analysis ID: 13-8248-0983 Endpoint: 7d Reproduction
Analyzed: 22 Jun-16 11:20 Analysis: Nonparametric-Control vs Treatments

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



**Report of Short-Term Chronic Toxicity Testing using the Fathead Minnow
(Pimephales promelas)**

**Project ID: 14001-412-024
June 2016**

Sponsor and Laboratory Information

Sponsor	Sumitomo Metal Mining Pogo LLC Pogo Mine Joint Venture P.O. Box 145 Delta Junction, AK 99737
Project Officer	Stacy Staley (907) 895-2761
Testing Facility	TRE Environmental Strategies, LLC Fort Collins Environmental Toxicology Laboratory 100 Racquette Drive, Unit A Fort Collins, CO 80524 Fax: (970) 490-2963 State of Florida NELAP Laboratory ID: E87972
Study Director	Rami B. Naddy, Ph.D. (970) 416-0916 email: naddyrb.tre@gmail.com
Report Author	Whitney Naddy (970) 416-0916 email: naddywm.tre@gmail.com

Test Information

Test	Short-Term Chronic under Static-Renewal Conditions
Basis	USEPA (2002), method 1000.0
Test Dates and Time	June 14, 2016 @ 1535 to June 21, 2016 @ 1500
Test Length	7 days
Species	<i>Pimephales promelas</i>
Test Material	Effluent
Outfall	Outfall 001
Permit Number	AK-005334-1
Receiving Stream	N/A
Dilution Water	Moderately hard reconstituted water
Concurrent Control Water	None
Test Concentrations	0 (control), 12.5, 25, 50, 75, and 100% effluent
Permit Compliance	<u> X </u> Pass <u> </u> Fail

- Results described in this report apply only to the samples submitted to the laboratory and analyzed, as listed in the report
- Test results comply with NELAC standards. Reports are intended to be considered in their entirety; TRE is not responsible for consequences arising from use of a partial report
- This report contains 5 pages plus 2 appendices

Effluent Collection and Receipt

Sample No.	Field No.	Collection Date & Time	TRE No.	Date of Receipt	Temp. at Arrival (°C)
1	N/A	06/13/16 @ 1040 to 06/13/16 @ 1045	29713	06/14/16	2.4
2	N/A	06/15/16 @ 0945 to 06/15/16 @ 0950	29726	06/16/16	1.7
3	N/A	06/17/16 @ 0845 to 06/17/16 @ 0850	29734	06/18/16	5.0

Note: See Appendix A for chain of custody records

Effluent Characterization

Sample No.	pH	Hard. (mg/L) ^a	Alk. (mg/L) ^a	Spec. Cond. (µS/cm)	TRC (mg/L) ^b	NH ₃ -N (mg/L)
1	7.5	68	40	276	<0.02	1.6
2	7.5	70	37	278	<0.02	1.7
3	7.3	74	47	308	<0.02	2.1

^a As CaCO₃

^b Total residual chlorine

Initial Dilution/Control Water Characterization

Batch No.	pH	Hard. (mg/L) ^a	Alk. (mg/L) ^a	Spec. Cond. (µS/cm)	TRC (mg/L) ^b	NH ₃ -N (mg/L)
12277	8.6	88	58	311	<0.02	<1.0

^a As CaCO₃

^b Total residual chlorine

Test Conditions

Type	Static-Renewal Short-term Chronic		
Test Endpoints	Survival and Growth		
Test Chambers	500-ml plastic cups		
Test Solution Volume	250 ml		
Replicates per Treatment	4		
Organisms per Replicate	10		
Test Temperature	25 ± 1°C (≤ 3°C differential)		
Lighting	Fluorescent, 16 hours light:8 hours dark		
Chamber Placement	Random according to computer-generated chart		
Aeration?	X	No	Yes
Test Solution Renewal	Daily		

Test Organism

Species	<i>Pimephales promelas</i>
Age	<24 hours
Source	TRE in-house culture, batch 061416
Acclimation	Test temperature
Feeding	0.10 ml concentrated suspension of brine shrimp (<i>Artemia</i> sp.) nauplii per test chamber three times daily during the test.
Reference Toxicant Testing	Initiated June 1, 2016 using sodium chloride (NaCl)

TEST RESULTS

Biological Data

Treatment (% Effluent)	Percent Survival of <i>Pimephales promelas</i>								Significant Reduction Relative to Control?	
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Mean Dry Weight (mg) ^a	Surv.	Growth
0 (Control)	100	97.5	97.5	97.5	97.5	97.5	97.5	0.398	N/A	N/A
12.5	100	100	100	100	100	100	100	0.384	No	No
25	100	100	100	100	100	100	100	0.437	No	No
50	100	100	100	100	100	100	100	0.379	No	No
75	100	100	100	100	100	100	100	0.423	No	No
100	100	100	100	97.5	97.5	97.5	97.5	0.412	No	No
Percent Minimum Significant Difference (Growth)								17.0	Acceptable	

^a Mean dry weight calculated based on the original number of organisms per replicate
 Note: See Appendix B for copies of laboratory data sheets

Data Analysis and Test Endpoints

Biological Endpoint	Statistical Endpoint	Value
Survival	NOEC	100% Effluent
	LOEC	>100% Effluent
	IC ₂₅	>100% Effluent
Chronic (Growth)	NOEC	100% Effluent
	LOEC	>100% Effluent
	ChV	>100% Effluent
	IC ₂₅	>100% Effluent
	TU _c (100/IC ₂₅)	<1.0

NOEC = No Observed Effect Concentration
 LOEC = Lowest Observed Effect Concentration
 ChV = Chronic Value
 IC₂₅ = 25% Inhibition Concentration
 TU_c = Chronic Toxic Units
 Note: Analyses completed using, where appropriate, CETIS version 1.8.7 (2014).

Physical and Chemical Data

Treatment (% Effluent)	pH		Dissolved Oxygen (mg/L)		Conductivity (µS/cm)		Temperature (°C)	
	Low	High	Low	High	Low	High	Low	High
0 (Control)	7.5	8.6	4.4	6.9	302	318	24	25
100	7.2	7.5	4.2	7.0	276	316	24	25
All Treatments	7.2	8.6	≥4.0		NA		24 ^a	25 ^a
							25 ^b	27 ^b

^a Temperature in test solutions
^b Continuous wet temperature in the environmental chamber

Reference Toxicant Test Results for *Pimephales promelas*

IC ₂₅	TRE Historical 95% Control Limits	
	Low	High
1,054	882	1,531

Note: Values are expressed as mg/L of chloride.

References

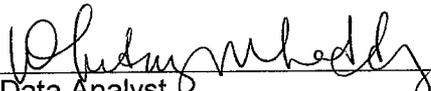
CETIS. 2014. Comprehensive Environmental Toxicity Information System. User Guide (version 1.8.7). Tidepool Scientific, LLC. McKinleyville, CA

USEPA. 2002. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Fourth Edition. EPA-821-R-02-013.

Statement of Quality Assurance

The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol (if applicable) and standard operating procedures, and that the resulting data and report meet the requirements of the NELAC standards. This report is an accurate reflection of the raw data.


Quality Assurance Unit _____ Date 6/27/16


Data Analyst _____ Date 8/29/16

APPENDIX A
Chain of Custody Records

APPENDIX B

Test Data

TOXICITY DATA PACKAGE COVER SHEET

QA: DMC/23/16

Test Type: Chronic Project Number: 14001-412-024
Test Substance: Effluent-(Outfall 001) Species: Pimephales promelas
Dilution Water Type: Mod Hard Organism Lot or Batch Number: 061416
Concurrent Control Water Type: NA Age: 224 hrs (< 24 hr) Supplier: TRE
Date and Time Test Began: 6/14/16 @ 1535 Date and Time Test Ended: 6/21/16 @ 1500
Protocol Number: USEPA 2002, Method 1000.0 Investigator(s): RA/07/MH/mon/RJ

Background Information

Type of Test: Static-Renewal pH control?: Yes No
If yes, give % CO₂: N/A
Test Temperature: 25 ± 1 °C Env. Chmbr/Bath #: 25 Test Chmbrs: 500-ml cups/beakers
Test Solution Vol.: 250 ml Number of Replicates per Treatment: 4
Length of Test: 7 days Number of Organisms per Replicate: 10
Photoperiod: 16 h light : 8 h dark Light Intensity: 50 to 100 ft.-c.
Type of Food and Quantity per Chamber: 0.1 ml B.S. Feeding Frequency: 3 x Daily
Test Substance Characterization Parameters and Frequency:
Hardness: Sx Receipt Alkalinity: Sx Receipt NH₃: Sx Receipt TRC: Sx Receipt
pH: Daily Conductivity: Daily
Test Concentrations (Volume:Volume): 0 (MH), 12.5, 25, 50, 75, and 100%
Agency Summary Sheet(s)?: None

Reference Toxicant Data: Test Dates: 06/01/16 to 06/08/16 IC₂₅: 1.054
Hist. 95% Control Limits: 882 to 1531 Method for Determining Ref. Tox. Value: her laptop

Special Procedures and Considerations:
D.O. maintained ≥ 4.0 mg/L
*Conductivity measured in dilution water and 100% effluent at test termination
If survival in any test chamber falls below 50%, reduce feeding in that chamber to 0.05 ml of brine shrimp
Study Director Initials: NW Date: 6/14/16

FATHEAD MINNOW (*PIMEPHALES PROMELAS*)
 CHRONIC BIOLOGICAL DATA

QA: Ann 9/29/16

Project Number: 14001-412-024

%Conc.	Test Replicate	Number of Surviving Organisms								Remarks
		Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
0 (MH)	A	10	10	10	10	10	10	10	10	100% 97.5%
	B	10	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	10	
	D	10	10	9	9	9	9	9	9	
12.5%	A	10	10	10	10	10	10	10	10	100%
	B	10	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	10	
	D	10	10	10	10	10	10	10	10	
25%	A	10	10	10	10	10	10	10	10	100%
	B	10	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	10	
	D	10	10	10	10	10	10	10	10	
50%	A	10	10	10	10	10	10	10	10	100%
	B	10	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	10	
	D	10	10	10	10	10	10	10	10	
75%	A	10	10	10	10	10	10	10	10	100%
	B	10	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	10	
	D	10	10	10	10	10	10	10	10	
100%	A	10	10	10	10	9	9	9	9	97.5%
	B	10	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	10	
	D	10	10	10	10	10	10	10	10	
	A									
	B									
	C									
	D									
Date:	6/14/16	6/15/16	6/16/16	6/17/16	6/18/16	6/19/16	6/20/16	6/21/16		
Time:	1335	1045	1545	1120	1410	1340	1345	1500		
Initials:	RR	MH	MH	MH	RR	MH	MH	RR		

CHRONIC CHEMICAL DATA (INITIAL)

QA Form 02/14

Project Number: 14001-412-024

Test Species: *Pimephales promelas*

%	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Meter #	Remarks
Conc.: 0 (MH)									All Conc.	
pH	8.6	8.6	8.2	8.2	8.3	8.3	8.3		FM24	
D.O. (mg/L)	6.9	6.8	6.7	6.7	6.6	6.6	6.6		5	
Temp. (°C)	25	25	25	25	25	25	25		L29	
Cond. (µS/cm)	311	302	308	312	318	305	306		15	
Hard. (mg/L)	88		88		88				Tit.	
Alk. (mg/L)	58		59		60				Tit.	
TRC (mg/L) (6/11/16)	20.02		20.02						22	
NH ₃ (mg/L) (6/11/16)	<1.0		<1.0						HA#1	
Conc.: 12.5%										
pH	8.5	8.5	8.1	8.1	8.1	8.2	8.2			
D.O. (mg/L)	6.9	6.8	6.7	6.7	6.6	6.6	6.6			
Temp. (°C)	*	*	*	*	*	*	*			
Cond. (µS/cm)	306	304	312	308	315	317	316			
Hard. (mg/L)										
Alk. (mg/L)										
TRC (mg/L)										
NH ₃ (mg/L)										
Conc.: 25%										
pH	8.3	8.3	8.0	8.0	8.0	8.0	8.0			
D.O. (mg/L)	6.9	6.7	6.7	6.7	6.6	6.6	6.6			
Temp. (°C)	*	*	*	*	*	*	*			
Cond. (µS/cm)	302	306	307	304	314	319	316			
Conc.: 50%										
pH	8.0	8.0	7.9	7.8	7.8	7.8	7.8			
D.O. (mg/L)	6.9	6.7	6.7	6.7	6.6	6.7	6.6			
Temp. (°C)	*	*	*	*	*	*	*			
Cond. (µS/cm)	294	298	297	294	313	318	315			
Date:	6/14/16	6/15/16	6/16/16	6/17/16	6/18/16	6/19/16	6/20/16			
Time:	1510	1035	1530	1050	1345	1320	1335			
Initials:	RR	MH	MH	MH	RR	MH	MH			

Note: Hardness, alkalinity, TRC, and NH₃ data appearing on this page have been transcribed from the wet chemistry log QA Form No. 084.

*Dilution/control water and effluent were brought to 25°C prior to making the dilution series. The temperature of resulting effluent dilution is assumed to also be 25°C.

DRR 6/14/16; E

CHRONIC CHEMICAL DATA (INITIAL)

QA Form 02/29/16

Project Number: 14001-412-024

Test Species: *Pimephales promelas*

%		Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Meter #	Remarks
Conc.:	75%									All Conc.	
pH		7.7	7.7	7.7	7.6	7.5	7.6	7.6			
D.O. (mg/L)		6.9	6.7	6.7	6.7	6.6	6.7	6.6			
Temp. (°C)		*	*	*	*	*	*	*			
Cond. (µS/cm)		285	288	288	285	310	317	315			
Conc.:											
pH											
D.O. (mg/L)											
Temp. (°C)											
Cond. (µS/cm)											
Conc.:											
pH											
D.O. (mg/L)											
Temp. (°C)											
Cond. (µS/cm)											
Conc.:											
pH											
D.O. (mg/L)											
Temp. (°C)											
Cond. (µS/cm)											
Conc.:	100%										
pH		7.5	7.5	7.5	7.4	7.3	7.3	7.4			
D.O. (mg/L)		7.0	6.8	6.7	6.7	6.7	6.8	6.6			
Temp. (°C)		25	25	25	25	25	25	25			
Cond. (µS/cm)		276	280	279	276	308	316	311			
Hard. (mg/L)		68		70		74					
Alk. (mg/L)		40		37		47					
TRC (mg/L)		0.02		0.02		0.02					
NH ₃ (mg/L)		1.05		1.73		2.08					
Date:		10/14/16	10/15/16	10/16/16	10/17/16	10/18/16	10/19/16	10/20/16			
Time:		1510	1035	1530	1050	1345	1320	1335			
Initials:		RF	mt	mt	mt	RF	mt	mt			

Note: Hardness, alkalinity, TRC, and NH₃ data appearing on this page have been transcribed from the wet chemistry log QA Form No. 084.
 *Dilution/control water and effluent were brought to 25°C prior to making the dilution series. The temperature of resulting effluent dilution is assumed to also be 25°C.

CHRONIC CHEMICAL DATA (FINAL)

OK *mm/20/16*

Project Number:	14001-412-024
Test Species:	<i>Pimephales promelas</i>

%	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Meter #	Remarks
Conc.:	0 (MH)							3/6	All Conc.	* conductivity
pH	7.6	7.0	7.5	7.6	7.7	7.7	7.9		EM24	
D.O. (mg/L)	5.3	4.4	4.9	5.3	5.7	5.5	6.3		5	
Temp (°C)	24	24	24	24	24	24	25		L-16	
Conc.:	12.5%									
pH	7.0	7.5	7.4	7.5	7.4	7.5	7.6			
D.O. (mg/L)	5.5	4.3	4.4	4.7	4.6	4.9	5.5			
Temp (°C)	24	25	25	24	24	24	25			
Conc.:	25%									
pH	7.5	7.5	7.4	7.5	7.5	7.5	7.6			
D.O. (mg/L)	5.5	4.0	4.7	4.9	4.9	4.9	5.6			
Temp (°C)	24	25	24	24	24	24	25			
Conc.:	50%									
pH	7.5	7.4	7.3	7.5	7.3	7.5	7.4			
D.O. (mg/L)	5.6	4.0	4.5	4.9	4.1	4.8	5.2			
Temp (°C)	24	25	25	24	24	24	25			
Conc.:	75%									
pH	7.4	7.4	7.3	7.4	7.3	7.4	7.4			
D.O. (mg/L)	5.7	4.1	4.4	4.8	4.1	4.6	5.3			
Temp (°C)	24	25	25	24	24	24	25			
Conc.:	100%							3/6		* conductivity
pH	7.4	7.3	7.2	7.4	7.3	7.2	7.2			
D.O. (mg/L)	5.9	4.2	4.6	5.2	4.4	4.5	5.0			
Temp (°C)	24	25	24	24	24	24	25			
Conc.:										
pH										
D.O. (mg/L)										
Temp (°C)										
Date:	6/15/16	6/16/16	6/17/16	6/18/16	6/19/16	6/20/16	6/21/16			
Time:	1635	1530	1050	1345	1326	1335	1445			
Initials:	mm	mm	mm	kr	mm	mm	mm			

DAILY TOXICITY TEST LOG

QAD 20160211

Project Number:	14001-412-024
Test Species:	<i>Pimephales promelas</i>

General Comments	Feeding 0.1 ml B.S. 3 x Daily	Initials/Date
Random Chart: <i>Kappa</i> Min/Max Therm. #: <i>M-14</i>		
Test Day 0 Test Solution Mixed at: <i>1505</i> Test Organisms Added at: <i>1535</i>	Fed @ <i>1700</i>	<i>RR</i> <i>6/14/16</i>
Test Day 1 Real Time Temp= <i>25</i> °C Range = <i>25-26</i> °C	Fed @ <i>0830</i> <i>1215</i> <i>1705</i> <i>MM</i>	<i>MH</i> <i>6/15/16</i>
Test Day 2 Real Time Temp= <i>25</i> °C Range = <i>25-26</i> °C	Fed @ <i>0830</i> <i>1200</i> <i>1705</i> <i>MH</i>	<i>MH</i> <i>6/16/16</i>
Test Day 3 Real Time Temp= <i>25</i> °C Range = <i>25-26</i> °C	Fed @ <i>0830</i> <i>1200</i> <i>1635</i> <i>MM</i>	<i>MM</i> <i>6/17/16</i>
Test Day 4 Real Time Temp= <i>26</i> °C Range = <i>25-27</i> °C	Fed @ <i>0830</i> <i>1200</i> <i>1715</i> <i>M</i>	<i>RR</i> <i>6/18/16</i>
Test Day 5 Real Time Temp= <i>26</i> °C Range = <i>25-27</i> °C	Fed @ <i>0820</i> <i>MH</i> <i>1205</i> <i>MM</i> <i>1700</i> <i>MH</i>	<i>MH</i> <i>6/19/16</i>
Test Day 6 Real Time Temp= <i>25</i> °C Range = <i>25-26</i> °C	Fed @ <i>0820</i> <i>1200</i> <i>1700</i> <i>MH</i>	<i>MH</i> <i>6/20/16</i>
Test Day 7 Real Time Temp= <i>26</i> °C Range = <i>25-27</i> °C	<u>NONE</u>	<i>FJ</i> <i>6/21/16</i>
Test Day 8		

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

QA: *Amesville*

Boat No.	Treatment (%)	Rep.	Length Units:	Weight Type (Circle):			Wet	Blot Dry	Adjusted Net Weight (g) ¹	No. of Orig. Organisms	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Organisms	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)	Lot or Batch Number:
				Tare Weight (g)	Gross Weight (g)	Net Weight (g)										
	0 (mH)	A		0.9250	0.9257	0.00362							10			061416
		B		0.92671	0.93052	0.00381							10			
		C		0.92844	0.93304	0.00460							10			
		D		0.93137	0.93521	0.00384							9			
	12.5	A		0.92843	0.93225	0.00382							10			
		B		0.93176	0.93582	0.00406							10			
		C		0.92678	0.92980	0.00342							10			
		D		0.92884	0.93286	0.00402							10			
	25	A		0.92594	0.93116	0.00522							10			
		B		0.92800	0.93213	0.00413							10			
		C		0.92969	0.93376	0.00467							10			
		D		0.93168	0.93569	0.00401							10			
				0.93271	0.93270	0.00001										
Blank																
Range																
Mean																
Test Solution Volume:															Loading Rate:	

Comments:
 Analytical Balance ID: *SAR-TLL*
 Dried in Oven # *2* from Date: *6/22/16* Time: *16:50*
 to Date: *6/22/16* Time: *12:00*

Test Substance: *Effluent*
 Analyst Tare: *PM* Analyst Gross: *MM*
 Date/Time of Tare Wt.: *6/21/16* *10:19*
 Date/Time of Gross Wt.: *6/22/16* *15:10*

Project Number: *14061-412-024*
 Species: *P. promelas*

¹ Add in weight loss of blank boat, if appropriate.
Dry canule E

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

OK *mm 6/22/16*

Boat No.	Treatment (%)	Rep.	Length Units:	Weight Type (Circle):			Wet	Blot Dry	Dry (>100°C)	No. of Orig. Organisms	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Organisms	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)	Lot or Batch Number:
				Tare Weight (g)	Gross Weight (g)	Net Weight (g)										
	50	A		0.92989	0.93349	0.00360			10			10			0601416	
		B		0.92999	0.93339	0.00341			10			10				
		C		0.92879	0.93249	0.00370			10			10				
		D		0.92814	0.93254	0.00440			10			10				
	75	A		0.92479	0.92915	0.00436			10			10				
		B		0.92852	0.93260	0.00408			10			10				
		C		0.92999	0.93341	0.00391			10			10				
		D		0.92730	0.93584	0.00454			9			9				
	100	A		0.92586	0.93000	0.00414			10			10				
		B		0.92761	0.93121	0.00470			10			10				
		C		0.92415	0.92852	0.00437			10			10				
		D		0.92554	0.92928	0.00374			10			10				
	Blank															
	Range															
	Mean															
Test Solution Volume:														Loading Rate:		

Project Number: 14001-412-024
 Species: P. promelas
 Date/Time of Tare Wt.: 6/21/16 1015
 Test Substance: Effluent
 Analyst Tare: *Rob Mt* Analyst Gross: *WTM*
 Date/Time of Gross Wt.: *6/22/16 1310*

Comments:
 Analytical Balance ID: SARTAL
 Dried in Oven # 2 from Date: 6/21/16 Time: 1600
 to Date: 6/22/16 Time: 1200

¹ Add in weight loss of blank boat, if appropriate.
OPG 6/21/16

6/23/16
 OAI: DMU 4/27/16

Project Number: 14001-412-024 Species: Fathead minnow

Summary Statistics for Survival Data

Treatment	N	Min	Max	Mean	SD	C.V.
MH	4	0.9	1.0	0.9750	0.0500	5.128%
12.5%	4	1.0	1.0	1.0000	0.0000	0.000%
25%	4	1.0	1.0	1.0000	0.0000	0.000%
50%	4	1.0	1.0	1.0000	0.0000	0.000%
75%	4	1.0	1.0	1.0000	0.0000	0.000%
100%	4	0.9	1.0	0.9750	0.0500	5.128%

Summary Statistics for Growth Data (dry wt per original)

Treatment	N	Min	Max	Mean	SD	C.V.
MH	4	0.363	0.461	0.3978	0.0433	10.881%
12.5%	4	0.343	0.407	0.3840	0.0293	7.625%
25%	4	0.402	0.523	0.4368	0.0577	13.213%
50%	4	0.342	0.441	0.3788	0.0432	11.408%
75%	4	0.392	0.455	0.4233	0.0281	6.650%
100%	4	0.375	0.438	0.4123	0.0267	6.471%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
MH	4	0.363	0.461	0.4084	0.0443	10.858%
12.5%	4	0.343	0.407	0.3840	0.0293	7.625%
25%	4	0.402	0.523	0.4368	0.0577	13.213%
50%	4	0.342	0.441	0.3788	0.0432	11.408%
75%	4	0.392	0.455	0.4233	0.0281	6.650%
100%	4	0.375	0.461	0.4238	0.0364	8.598%

CETIS Analytical Report

Report Date: 24 Jun-16 10:12 (p 1 of 2)
 Test Code: 412-024 | 15-0987-0284

Page 12 of 13

Fathead Minnow 7-d Larval Survival and Growth Test

TRE Environmental Strategies

Analysis ID: 05-5258-6235	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 24 Jun-16 10:12	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 18-8225-7385	Test Type: Growth-Survival (7d)	Analyst: Lab Tech
Start Date: 14 Jun-16 15:35	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 21 Jun-16 15:00	Species: Pimephales promelas	Brine: Not Applicable
Duration: 6d 23h	Source: In-House Culture	Age: <24
Sample ID: 21-4366-0594	Code: 7FC5AA32	Client: Sumitomo Mining (Pogo)
Sample Date: 13 Jun-16 10:45	Material: Ambient Sample	Project: WET Annual Compliance Test
Receive Date: 14 Jun-16 14:20	Source: Discharge Monitoring Report	
Sample Age: 29h (2.4 °C)	Station: Outfall 001	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	17.0%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		12.5	0.4905	2.41	0.067	6	0.6517	CDF	Non-Significant Effect
		25	-1.391	2.41	0.067	6	0.9943	CDF	Non-Significant Effect
		50	0.6777	2.41	0.067	6	0.5682	CDF	Non-Significant Effect
		75	-0.9096	2.41	0.067	6	0.9780	CDF	Non-Significant Effect
		100	-0.5172	2.41	0.067	6	0.9420	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.3978	0.25 - NL	Yes	Passes Acceptability Criteria
PMSD	0.1697	0.12 - 0.3	Yes	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01030021	0.002060042	5	1.311	0.3035	Non-Significant Effect
Error	0.02829375	0.001571875	18			
Total	0.03859396		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	2.618	15.1	0.7586	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9061	0.884	0.0290	Normal Distribution

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	4	0.3978	0.3289	0.4666	0.3835	0.363	0.461	0.02164	10.9%	0.0%
12.5		4	0.384	0.3374	0.4306	0.393	0.343	0.407	0.01464	7.63%	3.46%
25		4	0.4367	0.3449	0.5286	0.411	0.402	0.523	0.02885	13.2%	-9.81%
50		4	0.3787	0.31	0.4475	0.366	0.342	0.441	0.0216	11.4%	4.78%
75		4	0.4233	0.3785	0.468	0.423	0.392	0.455	0.01407	6.65%	-6.41%
100		4	0.4123	0.3698	0.4547	0.418	0.375	0.438	0.01334	6.47%	-3.65%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	0.363	0.382	0.461	0.385
12.5		0.383	0.407	0.343	0.403
25		0.523	0.414	0.408	0.402
50		0.361	0.342	0.371	0.441
75		0.437	0.409	0.392	0.455
100		0.415	0.421	0.438	0.375

CETIS Analytical Report

Report Date:

24 Jun-16 10:12 (p 2 of 2)

Test Code:

412-024 | 15-0987-0284

Fathead Minnow 7-d Larval Survival and Growth Test

TRE Environmental Strategies

Analysis ID: 05-5258-6235

Endpoint: Mean Dry Biomass-mg

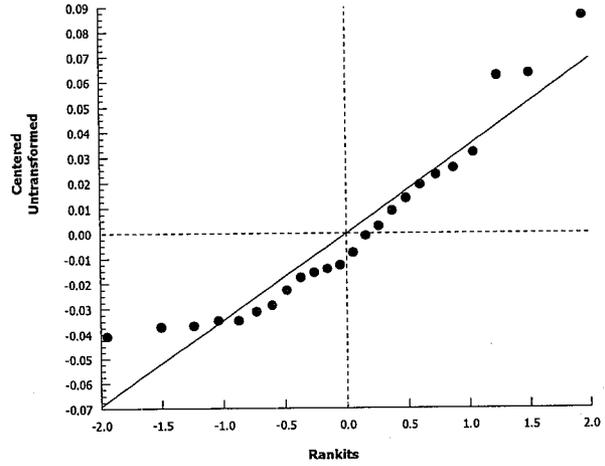
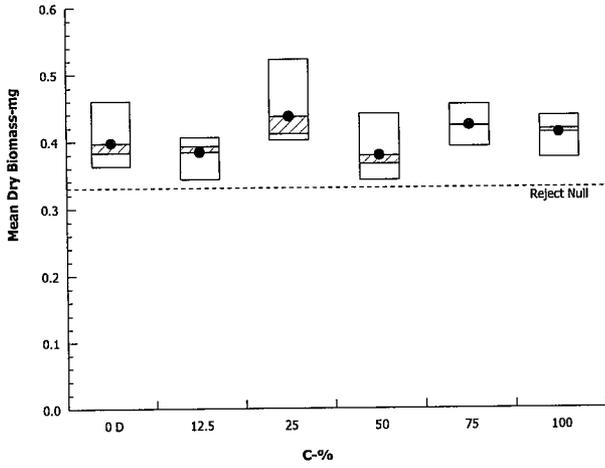
CETIS Version: CETISv1.8.7

Analyzed: 24 Jun-16 10:12

Analysis: Parametric-Control vs Treatments

Official Results: Yes

Graphics



**BIOASSAY REPORT
CHRONIC AND ACUTE
BIOASSAYS CONDUCTED
June 14 through 21, 2016**

Prepared for

SUMITOMO METAL MINING-POGO MINE
DELTA JUNCTION, ALASKA

Prepared by



Applied Sciences Laboratory (ASL)

1100 NE Circle Boulevard, Suite 300
Corvallis, Oregon 97330
541-768-3160

NELAC #OR100022

State of Washington Department of Ecology (WDOE), Lab ID C1233

Report Date: July 17, 2016
Lab I.D. No. B3564

CONTENTS

Section	Page
INTRODUCTION	1
OVERVIEW OF REGULATORY GUIDANCE	1
SUMMARY OF TEST RESULTS	2
ACRONYM DEFINITIONS	2
METHODS AND MATERIALS	3
TEST METHODS	3
DEVIATIONS FROM PROTOCOLS	3
TEST DESIGN	3
DILUTION WATER	4
SAMPLE COLLECTION AND STORAGE	4
SAMPLE PREPARATION	4
DATA ANALYSIS	5
RESULTS AND DISCUSSION	6
CHRONIC RESULTS	6
REFERENCE TOXICANT TESTS	8
APPENDIX A. RAW DATA SHEETS	
APPENDIX B. REFERENCE TOXICANT DATA SHEETS	
APPENDIX C. CHAIN OF CUSTODY	

INTRODUCTION

CH2M Applied Sciences Laboratory (ASL) conducted chronic bioassay testing from June 14 through 21, 2016, on samples provided by Sumitomo Metal Mining – Pogo Mine, Delta Junction, Alaska. The tests were conducted using the water flea (*Ceriodaphnia dubia*) and the fathead minnow (*Pimephales promelas*).

OVERVIEW OF REGULATORY GUIDANCE

The following provides an overview and excerpts of applicable permit specifics, regulatory guidance, and other relevant information. This is intended only as a helpful guide, from a laboratory perspective, for understanding test outcomes. The final responsibility for interpretation of results remains with the client and/or regulatory agency.

The following guidance is taken from CH2M’s reading of the NPDES permit for Sumitomo - Pogo (permit #AK0053341, effective May 1, 2011, expires April 30, 2016).

Note: At the time of testing, no updated permit has been obtained by CH2M ASL.

Whole Effluent Toxicity Testing (WET) Requirements:

“1.4.1 Toxicity testing must be conducted on grab sample of effluent.”

“1.4.2 Chronic Test Species and Methods”

- “1.4.2.2 The permittee must conduct short-term tests with the water flea, *Ceriodaphnia dubia* (survival and reproduction test), and the fathead minnow, *Pimephales promelas* (larval survival and growth test) ...”
- “1.4.2.3 The presence of chronic toxicity must be determined as specified in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Fourth Edition, EPA/821-R-02-013, October 2002.”
- “1.4.2.4 Results must be reported in TU_c (chronic toxic units), where TU_c = 100/IC₂₅.”

“1.4.3 Toxicity Triggers. Since data does not exist to support the development of a WET limit at this time, a target level for chronic toxicity of 2 TU_c shall apply ...”

1.4.4 Quality Assurance

- 1.4.4.3.1 If organisms are not cultured in-house, concurrent testing with reference toxicants must be conducted. If organisms are cultured in-house, monthly reference toxicant testing is sufficient. Reference toxicant tests must be conducted using the same test conditions as the effluent toxicity tests.
- 1.4.4.3.2 If either of the reference toxicant tests or the effluent tests do not meet all test acceptability criteria as specified in the test methods manual, the permittee must re-sample and re-test within 14 days of receipt of the test results.

SUMMARY OF TEST RESULTS

Exhibit 1 provides a summary of the final test results.

EXHIBIT 1

Summary of Chronic Test Results

Species	NOEC (%)	LOEC (%)	IC ₂₅ (%)	TUc (100/IC ₂₅)	Was chronic toxicity demonstrated (a TUc value > 2.0)?
<i>C. dubia</i>	100	> 100	> 100	> 100	No
<i>P. promelas</i>	100	> 100	> 100	> 100	No

Note: acronyms are as defined below.

From the NPDES permit - *Chronic Toxicity Trigger*: “Toxicity Triggers. Since data does not exist to support the development of a WET limit at this time, a target level for chronic toxicity of 2 TUc shall apply ...”

More detailed information is provided in the Chronic Results and Data Interpretation sections.

ACRONYM DEFINITIONS (from EPA guidance):

NOEC = No Observed Effect Concentration: The highest test concentration that causes no observable adverse effects on the test organisms (i.e. no statistically significant reduction from the control).

LOEC = Low Observed Effect Concentration: The lowest test concentration that does cause an observable adverse effect on the test organisms (i.e. is statistically significant reduction from the control).

IC₂₅ = Inhibition Concentration (25%): A point estimate of the test concentration that would cause a 25 percent reduction of a non-quantal biological measurement (i.e. growth, reproduction, etc.) for the test population.

TUc = Toxic Units (Chronic): Calculated as 100% sample divided by the chronic IC₂₅ value.

METHODS AND MATERIALS

TEST METHODS

The chronic test methods were performed according to: *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Fourth Edition, (EPA 2002), EPA-821-R-02-013.

DEVIATIONS FROM PROTOCOLS

Deviations from required procedures in the test methods:

None noted.

Deviations from recommended procedures in the test methods:

None noted.

TEST DESIGN

The following summarizes the conditions used for both overall testing and the specifics for each test (observations and notations can be found on the datasheets in Appendix A):

Overall Test Design:

Chronic tests: 12.5, 25, 50, 75, and 100 percent sample + dilution water for the control.

Test Organism Conditions:

All organisms tested were fed and maintained during culturing, acclimation, and testing as prescribed by the EPA (2002).

The test organisms appeared vigorous and in good condition prior to testing.

C. dubia chronic test:

Source: CH2M's in-house cultures

Age: Less than 24 hours old and within an 8-hour age range, with blocking by known parentage

Design: Ten test vessels per concentration, one organism per vessel

Test Solution Renewal: Daily

Monitoring:

- Daily: Survival and neonate production (with brood determination)
- Daily: DO and pH in pre and post-renewal solutions, all concentrations
- Daily: Temperature in pre-renewal solutions, all concentrations
- With each new sample: Conductivity in post-renewal solutions, control and highest sample concentration

Termination: When 60%+ of surviving control organisms produce a 3rd brood.

Endpoints: Survival (at termination) and Reproduction (through first 3 broods)

P. promelas chronic test:

Source: Aquatox Inc., Hot Springs, Arkansas

Age: Less than 48 hours old and within an 24 hour age range

Design: Four test vessels per concentration, ten organisms per vessel

Test Solution Renewal: Daily

Monitoring:

- Daily: Survival
- Daily: DO and pH in pre and post-renewal solutions, all concentrations
- Daily: Temperature in pre-renewal solutions, all concentrations
- With each new sample: Conductivity in post-renewal solutions, control and highest sample concentration

Termination: 7 days after test initiation.

Endpoints: Survival and Growth (average dry weight per organism added @ initiation)

DILUTION WATER

The dilution water used was the standard culture water used by CH2M-ASL:

Reconstituted, moderately hard water (as per EPA protocol) with a total hardness of 80 to 100 mg/L as CaCO₃ and an alkalinity of 60 to 70 mg/L as CaCO₃.

SAMPLE COLLECTION AND STORAGE

Samples were collected by Sumitomo-Pogo personnel. The samples were accepted as scheduled by CH2M's Applied Sciences Laboratory. Chain of Custody and Sample Receipt Records are provided in Appendix C.

All samples were received within the EPA recommended 0 to 6 °C range.

All samples were initially used for test initiation or test solution renewal within the EPA recommended maximum holding time of 36 hours of sample collection.

All subsequent uses of a sample occurred within the EPA recommended maximum holding time of 72 hours past the time of initial use of that sample.

Following receipt, the samples were stored in the dark at 0 to 6 °C until test solutions were prepared and tested.

SAMPLE PREPARATION

Samples used during these tests were:

Temperature adjusted prior to test initiation and each daily renewal.

Filtered through a 60 μm net upon arrival.

DATA ANALYSIS

The statistical analyses performed for the chronic tests were those outlined in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, USEPA Office of Water, Fourth Edition (EPA 2002), EPA-821-R-02-013, using CETIS.

The specific statistical analysis and CETIS version used for each endpoint evaluation is listed with the statistical outputs included with each test in Appendix A.

If any additional analysis methods were also used, an explanation of the rationale and reference to the source method is included with the presentation of those results below.

RESULTS AND DISCUSSION

The raw data sheets for all tests are presented in Appendix A.

CHRONIC BIOASSAYS

Table 1 summarizes the survival and reproduction data for the *C. dubia* chronic test.

Table 1 Summary of Chronic Results <i>C. dubia</i>		
Sample Concentration (%)	Percent Survival	Mean Number of Young Per Adult
Control	100	33.2
12.5	100	36.8
25	100	39.2
50	100	36.9
75	100	37.5
100	100	37.8

Statistical analysis in accordance with the EPA protocol results in:

NOEC = 100 %
LOEC > 100 %
IC₂₅ > 100 %
TUc < 1

From the NPDES permit - *Chronic Toxicity Trigger*: “Toxicity Triggers. Since data does not exist to support the development of a WET limit at this time, a target level for chronic toxicity of 2 TUc shall apply ...”

The TUc (calculated as $= 100/IC_{25}$) did not exceed 2.0.

The dissolved oxygen levels in the chronic tests remained above 4.0 mg/L. Test temperatures remained at 25±1 C.

The *C. dubia* test meets Test Acceptability Criteria (TAC) for a minimum 80 percent control survival and a minimum 15 young produced per surviving control adult. Unless referenced above, the tests proceeded without any noted deviations or interruptions that could have affected test results. The testing should be considered “valid”.

Table 4 summarizes the survival and growth data for the *P. promelas* chronic test.

Table 4 Summary of Chronic Results <i>P. promelas</i>		
Sample Concentration (%)	Percent Survival	Mean Dry Weight Per Organism Added (mg)
Control	100	0.932
12.5	95.0	0.954
25	95.0	0.912
50	92.5	0.873
75	95.0	1.011
100	100	1.067

Statistical analysis in accordance with the EPA protocol results in:

NOEC = 100 %
 LOEC > 100 %
 IC₂₅ > 100 %
 TUc < 1

From the NPDES permit - *Chronic Toxicity Trigger*: “Toxicity Triggers. Since data does not exist to support the development of a WET limit at this time, a target level for chronic toxicity of 2 TUc shall apply ...”

The TUc (calculated as = 100/IC₂₅) did not exceed 2.0.

The dissolved oxygen levels in the chronic tests remained above 4.0 mg/L. Test temperatures remained at 25±1 C.

The *P. promelas* test meets Test Acceptability Criteria (TAC) for a minimum 80 percent control survival and a minimum weight of 0.250 mg per surviving control organism. Unless referenced above, the tests proceeded without any noted deviations or interruptions that could have affected test results. The testing should be considered “valid”.

REFERENCE TOXICANT TESTS

Reference toxicant (reftox) testing is performed to document both initial and ongoing laboratory performance of the test method(s). While the health of the test organisms is primarily evaluated by the performance of the laboratory control, reftox test results also may be used to assess the health and sensitivity of the test organisms. Reftox test results within their respective cumulative summary (Cusum) chart limits are indicative of consistent laboratory performance and normal test organism sensitivity.

As required by the NPDES permit, since the *P. promelas* were not cultured in-house, reference toxicant testing on these organisms was performed concurrently.

The results of the reftox tests indicate that the test organisms were within their respective cusum chart limits based on EPA guidelines. This demonstrates ongoing laboratory proficiency of the test methods and suggests normal test organism sensitivity in the associated client testing.

The *C. dubia* and *P. promelas* reftox tests were conducted using sodium chloride. The data sheets for the reference toxicant tests are provided in Appendix B.

Table 3 summarizes the reference toxicant test results and Cusum chart limits.

Species	IC₂₅	Cusum Chart Limits
<i>C. dubia</i> (survival)	1.55	0.65 to 2.21
<i>C. dubia</i> (reproduction)	0.72	0.20 to 1.18
<i>P. promelas</i> (survival)	2.3	1.1 to 3.9
<i>P. promelas</i> (growth)	2.4	0.9 to 3.2

APPENDIX A
RAW DATA SHEETS

Client Sumitomo Metal Mining - Pogo

Sample Designation (SDG): B 3564

Test Species Information	Cd # <u>3192</u> <i>Ceriodaphnia dubia</i> Chronic	FHM # <u>1875</u> <i>Pimephales promelas</i> Chronic			
Organism Age at Initiation	<24 hrs, all within an 8 hr window	<48 hrs, all within a 24 hour window			
Test Container Size	30 ml	800 ml			
Test Volume	15 ml	500 ml			
Feeding: Type and Amount	0.10 ml Algae and 0.10 ml YCT daily	0.15 ml <i>Artemia</i> , 2 x Daily			
Aeration: In Test Chambers via Slow Bubble :	<input checked="" type="checkbox"/> None <input type="checkbox"/> Prior to use	<input checked="" type="checkbox"/> None <input type="checkbox"/> Prior to use <input type="checkbox"/> @ _____ hrs			
Acclimation Period	<24 hrs	<24 hrs			
Organism Source	In-House	<u>Aquatox</u>			
Size	-	-			
Loading Rate	-	-			

Dissolved Oxygen aeration justifications (in test chambers):

Test(s): All _____
Date:

Comments:

Test Solution Preparation and Dilution Record

Client: Sumitomo Metal Mining - Pogo

Note: Indicates task not done, Indicates task was done. Temp adj. = Temperature adjusted to ambient or test temp
 Ditto marks (' ') indicate that the same SDG, batch of dilution water, or food as the previous day's entry was used.

Ceriodaphnia dubia - Chronic

Test Concentration (%)	Sample Volume (mls)	Final Volume (mls)
Control	0.00 →	200
12.5	25.0 →	200
25	50.0 →	200
50	100 →	200
75	150 →	200
100	200 →	200

Total Sample volume needed per day = 525 mls

Test Day	Sample ID Used	Daily Sample Preparation (prior to dilution)	Dilution Water Used	YCT ID Used	Algae ID Used	Date	Time	Initials
0 (Initiation)	B 3564-01	<input type="checkbox"/> Temp adj, <input type="checkbox"/> Aerated	ID# 4365	# 1097	# 1095	6/14/2016	12:55	ML
1	B - 01	<input type="checkbox"/> Temp adj, <input type="checkbox"/> Aerated	ID# 4365	# 1097	# 1095	6/15/16	07:15	DW
2	B - 02	<input type="checkbox"/> Temp adj, <input type="checkbox"/> Aerated	ID# 4365	# 1092	# 1095	6/16/16	14:40	SE
3	B - 02	<input type="checkbox"/> Temp adj, <input type="checkbox"/> Aerated	ID# 4365	# 1092	# 1095	6/17/16	07:15	DW
4	B - 03	<input type="checkbox"/> Temp adj, <input type="checkbox"/> Aerated	ID# 4365	# 1090	# 1095	6/18/16	09:15	SE
5	B - 03	<input type="checkbox"/> Temp adj, <input type="checkbox"/> Aerated	ID# 4369	# 1090	# 1095	6/19/16	09:35	SE
6	B - 03	<input type="checkbox"/> Temp adj, <input type="checkbox"/> Aerated	ID# 4369	# 1090	# 1095	6/20/16	07:30	NW
7	B -	<input type="checkbox"/> Temp adj, <input type="checkbox"/> Aerated	ID#	#	#	1/1"	:	

Fathead minnow - Chronic

Test Concentration (%)	Sample Volume (mls)	Final Volume (mls)
Control	0.00 →	2000
12.5	250 →	2000
25	500 →	2000
50	1,000 →	2000
75	1,500 →	2000
100	2,000 →	2000

Total Sample volume needed per day = 5250 mls

Test Day	Sample ID Used	Daily Sample Preparation (prior to dilution)	Dilution Water Used	Date	Time	Initials
0 (Initiation)	B 3564-01	<input type="checkbox"/> Temp adj, <input type="checkbox"/> Aerated	ID# 4365	6/14/2016	13:00	ML
1	B - 01	<input type="checkbox"/> Temp adj, <input type="checkbox"/> Aerated	ID# 4365	6/15/16	07:15	DW
2	B - 02	<input type="checkbox"/> Temp adj, <input type="checkbox"/> Aerated	ID# 4365	6/16/16	14:40	SE
3	B - 02	<input type="checkbox"/> Temp adj, <input type="checkbox"/> Aerated	ID# 4365	6/17/16	07:20	DW
4	B - 03	<input type="checkbox"/> Temp adj, <input type="checkbox"/> Aerated	ID# 4365	6/18/16	09:15	SE
5	B - 03	<input type="checkbox"/> Temp adj, <input type="checkbox"/> Aerated	ID# 4369	6/19/16	09:35	SE
6	B - 03	<input type="checkbox"/> Temp adj, <input type="checkbox"/> Aerated	ID# 4369	6/20/16	07:35	DW



Ceriodaphnia dubia
Survival and Reproduction
Test Data Summary

Client Sumitomo Metal Mining - Pogo Test Start Date 6-14-2016
 Sample Description Outfall 001 Initial Sample ID# B 3564
 Data summarized by MC

Percent or Concentration	Total Live Young Produced in First 3 Broods per Replicate ²⁰¹⁶⁻⁰⁶⁻²³⁻¹⁶										# Alive Adults	Total Live Young
	A	B	C	D	E	F	G	H	I	J		
Control	34	31	31	37	35	36	31	31	37 29	37	10	332
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		
12.5 %	37	39	36	38	33	40	36	30	37	42	10	368
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		
25 %	39	46	38	39	39	33	39	43	32	44	10	392
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		
50 %	39	42	36	35	37	34	35	41	34	42	10	369
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		
75 %	43	40	37	32	36	34	33	39	37	44	10	375
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		
100 %	40	37	34	43	32	36	38	42	38	38	10	378
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		

Test Organism Mortality (Adult dead) = AD? ✓

of Alive Adults = Number of test organism alive at termination

Test Organism identified as Male = AD? M

Total Live Young = Total neonates produced in first 3 broods

Test Organism Injured during test = AD? I

Footnote: As per EPA-600-4-91-002 and EPA-821-R-02-013, *Ceriodaphnia dubia* test should be terminated when 60% of the surviving control organisms have produced their third brood, or at the end of eight days, whichever occurs first.

Also as per EPA-821-R-02-013 (13.10.9.1), "In this three-brood test, offspring from fourth or higher broods should not be counted and should not be included in the total number of neonates produced during the test."

CERIODAPHNIA CHRONIC SURVIVAL AND REPRODUCTION DATA

Neo's obtained from
Culture Board ID:
Slot #:

A	B	C	D	E	F	G	H	I	J
B	B	B	B	B	B	B	B	B	B
23	38	44	14	33	34	49	53	43	58

Incubator Used: # 6
Random Template
Used: 6 conc # 18

Client: Sumitomo Metal Mining - Pogo

Test Initiation: Date: 6/14/2016 Time: 14:00

Sample Description: Outfall 001

Initial Sample ID # B3564-01 → 03

Termination: Date: 6/21/2016 Time: 10:25

Technician Day 0 MC Day 1 DW Day 2 DW Day 3 DW Day 4 Bm Day 5 Bm Day 6 DW Day 7 _____ Day 8 _____

Time Day 0 1400 Day 1 0930 Day 2 1505 Day 3 0930 Day 4 1140 Day 5 1100 Day 6 1025 Day 7 _____ Day 8 _____

Cerio ID: Cd3192

Percent	Day	Daily Number of Live Young for each Replicate										No. Live Adults	Daily Total Live Young
		A	B	C	D	E	F	G	H	I	J		
Control	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	6	6	7	8	6	7	6	4	6	5	10	61
	5	12	10	10	14	13	12	10	11	12	0	10	104
	6	0	0	0	0	0	0	0	0	0	14	10	14
	7	16	15	14	15	16	17	15	16	11	18	10	153
	8												
12.5 %	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	6	7	8	7	5	7	4	6	4	6	10	60
	5	10	14	13	13	11	11	0	9	11	0	10	92
	6	0	0	0	0	0	0	14	15	0	12	10	41
	7	21	18	15	18	17	22	18	0	22	24	10	175
	8												
25 %	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	7	8	8	6	5	7	6	9	3	8	10	67
	5	11	13	13	12	13	12	12	0	12	13	10	111
	6	0	0	17	0	0	14	0	14	0	0	10	45
	7	21	25	0	21	21	0	21	20	17	23	10	169
	8												
50 %	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	8	7	2	6	7	8	7	6	5	6	10	62
	5	12	12	0	14	12	11	12	12	11	15	10	111
	6	0	0	11	13	0	15	16	0	0	0	10	55
	7	19	23	17	2/0	18	0	0	23	18	21	10	141
	8												
75 %	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	7	8	6	6	6	5	5	6	8	7	10	64
	5	13	14	12	11	13	13	11	14	0	14	10	115
	6	0	0	16	15	17	14	0	0	10	0	10	72
	7	23	18	3/0	0	0	2/0	17	19	19	23	10	124
	8												
100 %	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	7	7	8	9	6	7	7	7	6	3	10	67
	5	11	14	11	15	12	11	12	12	13	0	10	111
	6	0	16	12	0	14	0	0	0	0	13	10	55
	7	22	0	3/0	19	0	18	19	23	19	22	10	145
	8												

"AD" = Adult Dead, "AY" = Aborted young, "M" = male organism, "F" = Female, "R" = Adult releasing young, "/" = split brood (carry-over brood / current day brood),
"Inj" = Adult Injured during test solution renewal, replicate removed from analysis. "AM" = Adult missing, remove from analysis. A circled neonate count = 4th brood

Footnote: As per EPA, C. dubia tests should be terminated when 60% of the surviving control organisms have produced their third brood, or at eight days, whichever occurs first.



CERIODAPHNIA WATER QUALITY DATA

Client: Sumitomo Metal Mining - Pogo
 Initiated Date: 6/14/2016 Time 14:00
 Initial Sample ID #: B3564-61
 Adults Isolated Date: 6/14/2016 Time 07:05
 Sample Description: Outfall 001
 Tech: Day 0 MC Day 1 DWS Day 2 DWS Day 3 DWS Day 4 SW Day 5 SW Day 6 DW Day 7 DW Day 8 DW
 Time: Day 0 14:10 Day 1 09:30 Day 2 15:05 Day 3 09:30 Day 4 12:55 Day 5 12:20 Day 6 10:25 Day 7 10:10 Day 8
 Therm. Day 0 # 177 Day 1 # 177 Day 2 # 177 Day 3 # 177 Day 4 # 177 Day 5 # 177 Day 6 # 177 Day 7 # 177 Day 8 #

%	Dissolved Oxygen (mg/l)								pH								Temperature (°C) / Conductivity (µS) (1 st use of each sample only)										
	0	1	2	3	4	5	6	7	8	0	1	2	3	4	5	6	7	8	0	1	2	3	4	5	6	7	8
Control	7.8	7.9	7.7	8.1	8.0	8.0	7.5	7.9		7.5	7.9	7.5	7.5	7.6	7.7	8.0	7.5		25.3	25.6	25.1	25.0	25.3	25.2	25.0	24.8	24.9
12.5 %	7.9	7.8	8.2	8.0	7.7	7.2	-			7.5	7.8	7.8	7.6	7.6	7.5	8.0	-		31.2	31.4	31.4	31.4	31.6	31.4	31.6	31.4	31.6
25 %	8.1	7.9	7.5	8.1	7.8	7.9	8.0			7.4	7.8	7.5	7.5	7.6	7.5	7.8	-		25.4	24.8	25.0	24.6	25.3	24.9	25.0	24.9	25.0
50 %	8.1	7.9	8.3	8.2	8.2	7.8	-			7.2	7.6	7.6	7.5	7.4	7.3	7.6	-		25.5	25.3	24.8	24.9	25.6	25.4	25.4	24.8	24.8
75 %	8.3	7.9	7.4	8.1	7.9	7.5	8.0			7.0	7.5	7.3	7.3	7.2	7.1	7.4	-		25.4	25.5	25.0	25.3	24.0	25.7	25.0	25.7	25.1
100 %	8.4	8.0	7.7	8.1	8.0	7.9	8.0			7.0	7.5	7.4	7.6	7.4	7.3	7.1	-		25.5	25.7	24.8	25.5	25.2	25.5	25.5	25.5	25.3
		8.1	7.9	8.2	7.9	7.7	-			7.0	7.1	7.8	7.0	7.1	6.9	7.2	-		26.1	30.1	30.1	29.4	29.4	29.4	29.4	29.4	29.4

COMMENTS: Temperatures taken just prior to test solution renewals. DO, pH, and Conductivity taken following organism transfer.

23.8

= Temp out of recom. range

Note: All Day 0 data represents conditions at initiation. All other days: numerator represents pre-renewal conditions, denominator represents post-renewal conditions.

Sumitomo Pogo.xlsx:Dec Control ID: ASL690-0911

CETIS Summary Report

Report Date: 29 Jun-16 13:04 (p 1 of 2)
 Test Code: B356401cdc | 10-2618-5733

Ceriodaphnia 7-d Survival and Reproduction Test

CH2M HILL - ASL

Batch ID: 13-0528-6429	Test Type: Reproduction-Survival (7d)	Analyst:
Start Date: 14 Jun-16 14:00	Protocol: EPA/821/R-02-013 (2002)	Diluent:
Ending Date: 21 Jun-16 10:25	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 20h	Source: In-House Culture	Age: <24h

Sample ID: 13-2729-6357	Code: B3564-01	Client:
Sample Date: 13 Jun-16 10:30	Material: Unknown	Project:
Receive Date: 14 Jun-16 12:25	Source: Sumitomo Mining - Pogo (AK0053341)	
Sample Age: 28h (0.5 °C)	Station:	

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
00-3765-8335	7d Survival Rate	100	>100	N/A	N/A	1	Fisher Exact/Bonferroni-Holm Test
00-9784-0941	Reproduction	100	>100	N/A	11.5%	1	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
18-0879-9287	Reproduction	IC25	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
00-3765-8335	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
00-9784-0941	Reproduction	Control Resp	33.2	15 - NL	Yes	Passes Acceptability Criteria
18-0879-9287	Reproduction	Control Resp	33.2	15 - NL	Yes	Passes Acceptability Criteria
00-9784-0941	Reproduction	PMSD	0.1151	0.13 - 0.47	Yes	Below Acceptability Criteria

7d Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	10	1	1	1	1	1	0	0	0.0%	0.0%
12.5		10	1	1	1	1	1	0	0	0.0%	0.0%
25		10	1	1	1	1	1	0	0	0.0%	0.0%
50		10	1	1	1	1	1	0	0	0.0%	0.0%
75		10	1	1	1	1	1	0	0	0.0%	0.0%
100		10	1	1	1	1	1	0	0	0.0%	0.0%

Reproduction Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	10	33.2	32.1	34.3	29	37	0.9286	2.936	8.84%	0.0%
12.5		10	36.8	35.52	38.08	30	42	1.083	3.425	9.31%	-10.84%
25		10	39.2	37.55	40.85	32	46	1.397	4.417	11.27%	-18.07%
50		10	36.9	35.4	38.4	30	42	1.269	4.012	10.87%	-11.14%
75		10	37.5	35.99	39.01	32	44	1.276	4.035	10.76%	-12.95%
100		10	37.8	36.55	39.05	32	43	1.062	3.36	8.89%	-13.86%

CETIS Summary Report

Report Date: 29 Jun-16 13:04 (p 2 of 2)
 Test Code: B356401cdc | 10-2618-5733

Ceriodaphnia 7-d Survival and Reproduction Test

CH2M HILL - ASL

7d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
75		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

Reproduction Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	34	31	31	37	35	36	31	31	29	37
12.5		37	39	36	38	33	40	36	30	37	42
25		39	46	38	39	39	33	39	43	32	44
50		39	42	30	35	37	34	35	41	34	42
75		43	40	37	32	36	34	33	39	37	44
100		40	37	34	43	32	36	38	42	38	38

CETIS Analytical Report

Report Date: 29 Jun-16 13:04 (p 1 of 1)
 Test Code: B356401cdc | 10-2618-5733

Ceriodaphnia 7-d Survival and Reproduction Test CH2M HILL - ASL

Analysis ID: 00-3765-8335 Endpoint: 7d Survival Rate CETIS Version: CETISv1.8.1
 Analyzed: 29 Jun-16 13:04 Analysis: STP 2x2 Contingency Tables Official Results: Yes

Batch ID: 13-0528-6429 Test Type: Reproduction-Survival (7d) Analyst:
 Start Date: 14 Jun-16 14:00 Protocol: EPA/821/R-02-013 (2002) Diluent:
 Ending Date: 21 Jun-16 10:25 Species: Ceriodaphnia dubia Brine:
 Duration: 6d 20h Source: In-House Culture Age: <24h

Sample ID: 13-2729-6357 Code: B3564-01 Client:
 Sample Date: 13 Jun-16 10:30 Material: Unknown Project:
 Receive Date: 14 Jun-16 12:25 Source: Sumitomo Mining - Pogo (AK0053341)
 Sample Age: 28h (0.5 °C) Station:

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU
Untransformed		C > T	Not Run	100	>100	N/A	1

Fisher Exact/Bonferroni-Holm Test

Control	vs	Conc-%	Test Stat	P-Value	Decision(0.05)
Dilution Water		12.5	1	1.0000	Non-Significant Effect
		25	1	1.0000	Non-Significant Effect
		50	1	1.0000	Non-Significant Effect
		75	1	1.0000	Non-Significant Effect
		100	1	1.0000	Non-Significant Effect

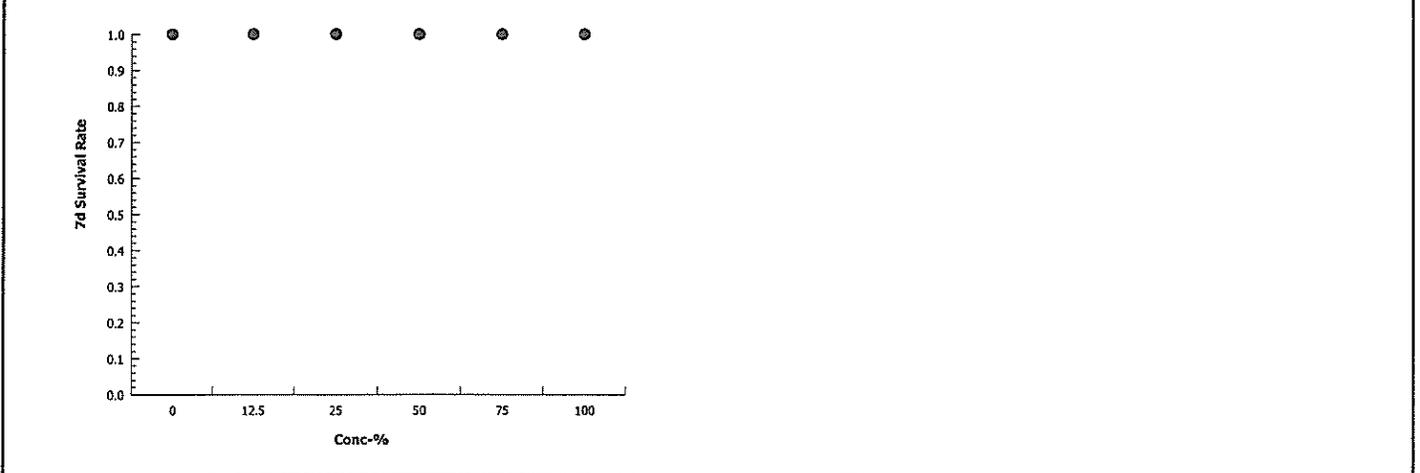
Data Summary

Conc-%	Control Type	No-Resp	Resp	Total
0	Dilution Water	10	0	10
12.5		10	0	10
25		10	0	10
50		10	0	10
75		10	0	10
100		10	0	10

7d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
75		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

Graphics



CETIS Analytical Report

Report Date: 29 Jun-16 13:04 (p 1 of 2)
 Test Code: B356401cdc | 10-2618-5733

Ceriodaphnia 7-d Survival and Reproduction Test **CH2M HILL - ASL**

Analysis ID: 00-9784-0941	Endpoint: Reproduction	CETIS Version: CETISv1.8.1
Analyzed: 29 Jun-16 13:04	Analysis: Parametric-Control vs Treatments	Official Results: Yes

Batch ID: 13-0528-6429	Test Type: Reproduction-Survival (7d)	Analyst:
Start Date: 14 Jun-16 14:00	Protocol: EPA/821/R-02-013 (2002)	Diluent:
Ending Date: 21 Jun-16 10:25	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 20h	Source: In-House Culture	Age: <24h

Sample ID: 13-2729-6357	Code: B3564-01	Client:
Sample Date: 13 Jun-16 10:30	Material: Unknown	Project:
Receive Date: 14 Jun-16 12:25	Source: Sumitomo Mining - Pogo (AK0053341)	
Sample Age: 28h (0.5 °C)	Station:	

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	0	C > T	Not Run	100	>100	N/A	1	11.5%

Dunnnett Multiple Comparison Test

Control	vs Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Dilution Water	12.5	-2.157	2.289	18	3.82	0.9997	Non-Significant Effect
	25	-3.596	2.289	18	3.82	1.0000	Non-Significant Effect
	50	-2.217	2.289	18	3.82	0.9998	Non-Significant Effect
	75	-2.577	2.289	18	3.82	0.9999	Non-Significant Effect
	100	-2.757	2.289	18	3.82	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	0	2.017	3.2	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	201.6	40.32	5	2.896	0.0218	Significant Effect
Error	751.8	13.92222	54			
Total	953.4	54.24222	59			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.904	15.09	0.8622	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9771	0.9459	0.3181	Normal Distribution

Reproduction Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	10	33.2	32.08	34.32	29	37	0.9286	2.936	8.84%	0.0%
12.5		10	36.8	35.5	38.1	30	42	1.083	3.425	9.31%	-10.84%
25		10	39.2	37.52	40.88	32	46	1.397	4.417	11.27%	-18.07%
50		10	36.9	35.37	38.43	30	42	1.269	4.012	10.87%	-11.14%
75		10	37.5	35.97	39.03	32	44	1.276	4.035	10.76%	-12.95%
100		10	37.8	36.52	39.08	32	43	1.062	3.36	8.89%	-13.86%

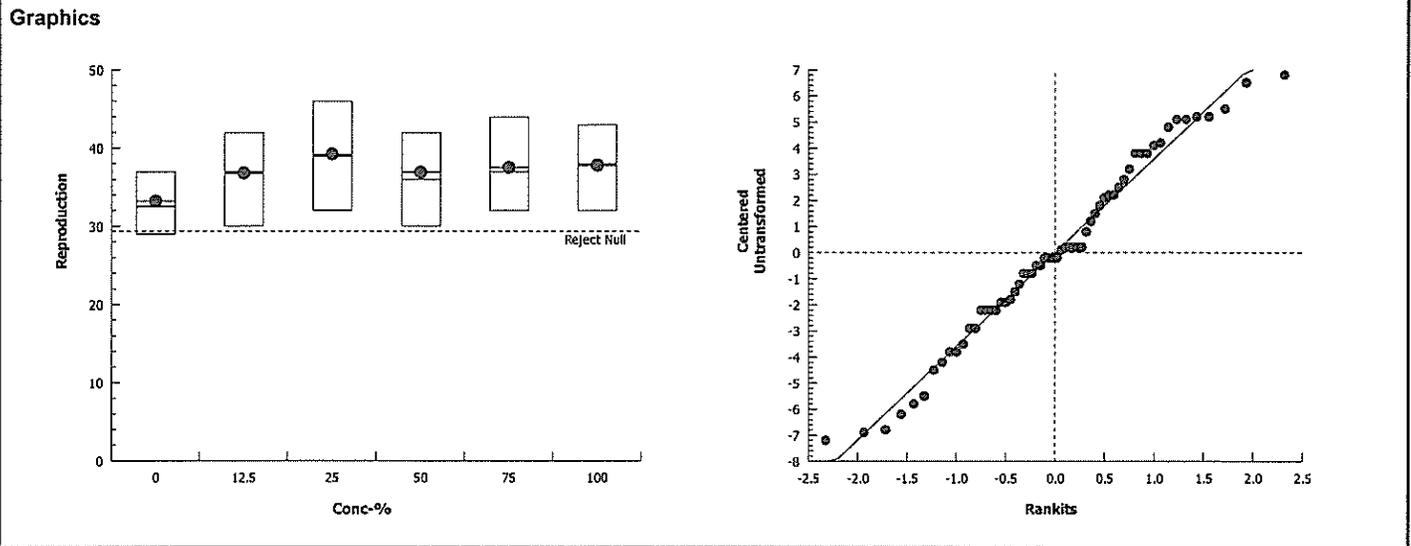
CETIS Analytical Report

Report Date: 29 Jun-16 13:04 (p 2 of 2)
 Test Code: B356401cdc | 10-2618-5733

Ceriodaphnia 7-d Survival and Reproduction Test **CH2M HILL - ASL**

Analysis ID: 00-9784-0941 Endpoint: Reproduction CETIS Version: CETISv1.8.1
 Analyzed: 29 Jun-16 13:04 Analysis: Parametric-Control vs Treatments Official Results: Yes

Reproduction Detail											
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	34	31	31	37	35	36	31	31	29	37
12.5		37	39	36	38	33	40	36	30	37	42
25		39	46	38	39	39	33	39	43	32	44
50		39	42	30	35	37	34	35	41	34	42
75		43	40	37	32	36	34	33	39	37	44
100		40	37	34	43	32	36	38	42	38	38



CETIS Analytical Report

Report Date: 29 Jun-16 13:04 (p 1 of 2)
 Test Code: B356401cdc | 10-2618-5733

Ceriodaphnia 7-d Survival and Reproduction Test **CH2M HILL - ASL**

Analysis ID: 18-0879-9287 Endpoint: Reproduction CETIS Version: CETISv1.8.1
 Analyzed: 29 Jun-16 13:04 Analysis: Linear Interpolation (ICPIN) Official Results: Yes

Batch ID: 13-0528-6429 Test Type: Reproduction-Survival (7d) Analyst:
 Start Date: 14 Jun-16 14:00 Protocol: EPA/821/R-02-013 (2002) Diluent:
 Ending Date: 21 Jun-16 10:25 Species: Ceriodaphnia dubia Brine:
 Duration: 6d 20h Source: In-House Culture Age: <24h

Sample ID: 13-2729-6357 Code: B3564-01 Client:
 Sample Date: 13 Jun-16 10:30 Material: Unknown Project:
 Receive Date: 14 Jun-16 12:25 Source: Sumitomo Mining - Pogo (AK0053341)
 Sample Age: 28h (0.5 °C) Station:

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1.574E+09	200	Yes	Two-Point Interpolation

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.017	3.2	1.0000	No Outliers Detected

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC25	>100	N/A	N/A	<1	N/A	N/A

Reproduction Summary **Calculated Variate**

Conc-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	10	33.2	29	37	0.9286	2.936	8.84%	0.0%
12.5		10	36.8	30	42	1.083	3.425	9.31%	-10.84%
25		10	39.2	32	46	1.397	4.417	11.27%	-18.07%
50		10	36.9	30	42	1.269	4.012	10.87%	-11.14%
75		10	37.5	32	44	1.276	4.035	10.76%	-12.95%
100		10	37.8	32	43	1.062	3.36	8.89%	-13.86%

Reproduction Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	34	31	31	37	35	36	31	31	29	37
12.5		37	39	36	38	33	40	36	30	37	42
25		39	46	38	39	39	33	39	43	32	44
50		39	42	30	35	37	34	35	41	34	42
75		43	40	37	32	36	34	33	39	37	44
100		40	37	34	43	32	36	38	42	38	38

CETIS Analytical Report

Report Date: 29 Jun-16 13:04 (p 2 of 2)
Test Code: B356401cdc | 10-2618-5733

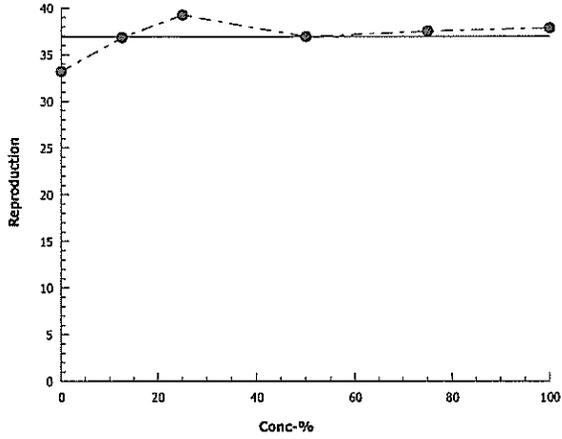
Ceriodaphnia 7-d Survival and Reproduction Test

CH2M HILL - ASL

Analysis ID: 18-0879-9287 Endpoint: Reproduction
Analyzed: 29 Jun-16 13:04 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.1
Official Results: Yes

Graphics



Random Template Used: 6 conc. x 4 reps. # 10 Waterbath/incubator Used: 40 Date Initiated 6/14/2016 Time 14:25
 Initial sample ID B 3564 -01 # 7 Date Terminated 6/21/2016 Time 14:15

Client Sumitomo Metal Mining - Pogo Sample Description Outfall 001

Tech: Day 0 9 Day 1 MC Day 2 9 Day 3 9 Day 4 9/15 Day 5 9 Day 6 9 Day 7 9
 Time Day 0 1425 Day 1 1630 Day 2 1540 Day 3 1250 Day 4 1430 Day 5 1550 Day 6 1510 Day 7 1415

Conc. or Percent	Day	Number of Live Organisms				Dissolved O ₂ (mg/l)		pH		Temp. (°C)	Therm. ID #	Conductivity (µS)
		A	B	C	D	Pre	Post	Pre	Post	Pre		Post (1 st use)
Control	0	10	10	10	10		8.0		7.7	Post: 25.1	184	311
	1	10	10	10	10	7.6	7.9	7.6	7.8	24.7	184	
	2	10	10	10	10	7.1	8.0	6.9	7.7	24.8	214	310
	3	10	10	10	10	7.2	8.0	7.0	7.6	25.1	214	
	4	10	10	10	10	6.8	7.8	6.9	7.5	25.0	214	308
	5	10	10	10	10	6.2	7.9	7.2	7.9	24.9	202	
	6	10	10	10	10	5.9	7.3	7.2	7.3	25.0	184	
12.5 %	0	10	10	10	10		8.2		7.6	Post: 25.1		
	1	10	10	10	10	7.5	8.1	7.6	7.8	24.7		
	2	10	10	9	10	6.5	8.0	6.9	7.7	24.8		
	3	10	10	9	10	6.9	8.0	7.0	7.5	25.1		
	4	10	10	9	10	6.3	7.9	6.9	7.4	24.9		
	5	10	10	9	10	6.2	9.0	7.1	7.3	24.9		
	6	10	10	9	10	6.0	7.3	7.2	7.3	25.0		
25 %	0	10	10	10	10		8.2		7.4	Post: 25.3		
	1	10	10	10	10	7.5	8.2	7.6	7.6	24.7		
	2	10	10	10	10	5.8	8.1	6.9	7.5	24.7		
	3	10	10	10	10	6.7	8.0	6.9	7.4	25.0		
	4	10	10	9	10	6.1	8.0	6.9	7.2	25.0		
	5	10	10	8	10	6.2	9.1	7.1	7.6	24.9		
	6	10	10	8	10	5.9	7.4	7.1	7.7	25.0		
50 %	0	10	10	10	10		8.2		7.1	Post: 25.0		
	1	10	10	10	10	7.5	8.3	7.5	7.4	24.8		
	2	10	10	10	10	5.9	8.3	6.8	7.3	24.7		
	3	9	10	10	9	6.7	8.2	6.9	7.1	25.0		
	4	9	10	10	9	6.4	8.2	7.0	7.0	25.0		
	5	9	10	10	8	6.3	9.2	7.1	7.3	24.9		
	6	9	10	10	8	5.9	7.6	7.0	7.4	25.0		
75 %	0	10	10	10	10		8.1		6.9	Post: 25.1		
	1	10	10	10	10	7.5	8.3	7.4	7.2	24.4		
	2	10	9	9	10	5.9	8.3	6.8	7.0	24.8		
	3	10	9	9	10	6.8	8.2	6.8	6.9	25.0		
	4	10	9	9	10	6.5	8.2	6.9	6.7	25.0		
	5	10	9	9	10	6.3	9.2	7.0	7.0	24.3		
	6	10	9	9	10	6.0	7.3	7.0	7.1	25.0		
100 %	0	10	10	10	10		8.2		6.8	Post: 25.3		255
	1	10	10	10	10	7.5	8.3	7.3	6.9	24.7		
	2	10	10	10	10	6.0	8.3	6.7	6.8	24.9		245
	3	10	10	10	10	6.8	8.3	6.8	6.7	25.0		
	4	10	10	10	10	6.9	8.2	7.0	6.5	24.9		291
	5	10	10	10	10	6.0	9.2	6.8	6.8	24.9		
	6	10	10	10	10	5.7	8.1	6.8	6.9	25.0		
7	10	10	10	10	7.0		6.9		25.0			

✓ Indicates one organism inadvertently poured off during solution renewal, replaced into container. Pre = Pre-renewal solutions. Post = Post-renewal solutions.
 "M" = organism missing, start count reduced. "Inj" = organism injured, remove from stats. Day 0 Temperatures = Post-renewals
 "F" = fungus noted on dead organisms. Therm ID# = Thermometer ID used for all measurements that day.
 Aeration in test chambers begun @ _____ (Note observations on Test Organism Info sheet) 23.8 = Temp. out of recommended range

FATHEAD MINNOW 7-DAY GROWTH DATA

Client Sumitomo Metal Mining - Pogo Tins Labeled As: POGO (6/14)
 Lab ID: B3564 Start Date: 6/14/2016
 Sample Description: _____

Technician:	<u>DW</u>	<u>KJ</u>
Date:	<u>6/22/2016</u>	<u>6/8/2016</u>
Balance Serial #:	<u>B328543647</u>	<u>B328543647</u>

Percent	Replicate	Total Weight (mg)	Tare Weight (mg)	No. of Fish
Control	A	1159.68	1150.09	10
	B	1144.86	1135.07	10
	C	1155.69	1144.68	10
	D	1147.52	1140.62	10
12.5 %	A	1158.76	1147.16	10
	B	1151.21	1140.62	10
	C	1190.42	1182.68	9
	D	1143.84	1135.62	9
25 %	A	1168.84	1159.27	10
	B	1159.59	1149.95	10
	C	1155.80	1147.34	8
	D	1161.25	1152.43	10
50 %	A	1163.14	1155.08	9
	B	1159.06	1150.68	10
	C	1165.66	1154.52	10
	D	1152.89	1145.56	8
75 %	A	1156.82	1145.81	10
	B	1165.00	1155.24	9
	C	1159.33	1150.26	9
	D	1175.03	1164.41	10
100 %	A	1178.47	1168.18	10
	B	1156.27	1146.47	10
	C	1163.68	1153.05	10
	D	1163.39	1151.41	10

weigh to 0.01 mg

FATHEAD MINNOW 7-DAY GROWTH DATA

Client Sumitomo Metal Mining - Pogo Tins Labeled As: POGO (6/14)
 Lab ID: _____ Start Date: 6/14/2016
 Sample Description: _____

Technician: KJ
 Date: 6/8/2016
 Balance Serial #: B328543647 B328543647

Percent	Replicate	Total Weight (mg)	Tare Weight (mg)	No. of Fish
Control	A		1150.09	10
	B		1135.07	10
	C		1144.68	10
	D		1140.62	10
12.5 %	A		1147.16	10
	B		1140.62	10
	C		1182.68	9
	D		1135.62	9
25 %	A		1159.27	10
	B		1149.95	10
	C		1147.34	8
	D		1152.43	10
50 %	A		1155.08	9
	B		1150.68	10
	C		1154.52	10
	D		1145.56	8
75 %	A		1145.81	10
	B		1155.24	9
	C		1150.26	9
	D		1164.41	10
100 %	A		1168.18	10
	B		1146.47	10
	C		1153.05	10
	D		1151.41	10

weigh to 0.01 mg

CETIS Summary Report

Report Date: 07 Jul-16 15:36 (p 1 of 2)
 Test Code: B356401ppc | 18-5387-4573

Fathead Minnow 7-d Larval Survival and Growth Test

CH2M HILL - ASL

Batch ID: 08-5801-7193	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 14 Jun-16 14:25	Protocol: EPA/821/R-02-013 (2002)	Diluent:
Ending Date: 21 Jun-16 14:15	Species: Pimephales promelas	Brine:
Duration: 7d	Source: Aquatox, AR	Age: <48h

Sample ID: 13-2729-6357	Code: B3564-01	Client:
Sample Date: 13 Jun-16 10:30	Material: Unknown	Project:
Receive Date: 14 Jun-16 12:25	Source: Sumitomo Mining - Pogo (AK0053341)	
Sample Age: 28h (0.5 °C)	Station:	

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
19-0259-9168	7d Survival Rate	100	>100	NA	10.7%	1	Dunnett Multiple Comparison Test
09-0890-6107	Mean Dry Biomass-mg	100	>100	NA	24.9%	1	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
10-5490-9036	Mean Dry Biomass-mg	IC25	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
19-0259-9168	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria ✓
09-0890-6107	Mean Dry Biomass-mg	Control Resp	0.9323	0.25 - NL	Yes	Passes Acceptability Criteria ✓
10-5490-9036	Mean Dry Biomass-mg	Control Resp	0.9323	0.25 - NL	Yes	Passes Acceptability Criteria ✓
09-0890-6107	Mean Dry Biomass-mg	PMSD	0.2493	0.12 - 0.3	Yes	Passes Acceptability Criteria ✓

7d Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	4	1	1	1	1	1	0	0	0.0%	0.0%
12.5		4	0.95	0.8581	1	0.9	1	0.02887	0.05774	6.08%	5.0%
25		4	0.95	0.7909	1	0.8	1	0.05	0.1	10.53%	5.0%
50		4	0.925	0.7727	1	0.8	1	0.04787	0.09574	10.35%	7.5%
75		4	0.95	0.8581	1	0.9	1	0.02887	0.05774	6.08%	5.0%
100		4	1	1	1	1	1	0	0	0.0%	0.0%

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	4	0.9323	0.6566	1.208	0.69	1.101	0.08663	0.1733	18.59%	0.0%
12.5		4	0.9537	0.6585	1.249	0.774	1.16	0.09277	0.1855	19.45%	-2.31%
25		4	0.9122	0.8205	1.004	0.846	0.964	0.02884	0.05769	6.32%	2.15%
50		4	0.8728	0.6074	1.138	0.733	1.114	0.08336	0.1667	19.1%	6.38%
75		4	1.011	0.873	1.15	0.907	1.101	0.04353	0.08706	8.61%	-8.5%
100		4	1.067	0.9188	1.216	0.98	1.198	0.04672	0.09343	8.75%	-14.51%

CETIS Summary Report

Report Date: 07 Jul-16 15:36 (p 2 of 2)
 Test Code: B356401ppc | 18-5387-4573

Fathead Minnow 7-d Larval Survival and Growth Test

CH2M HILL - ASL

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	1	1	1	1
12.5		1	1	0.9	0.9
25		1	1	0.8	1
50		0.9	1	1	0.8
75		1	0.9	0.9	1
100		1	1	1	1

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	0.959	0.979	1.101	0.69
12.5		1.16	1.059	0.774	0.822
25		0.957	0.964	0.846	0.882
50		0.806	0.838	1.114	0.733
75		1.101	0.976	0.907	1.062
100		1.029	0.98	1.063	1.198

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	10/10	10/10	10/10	10/10
12.5		10/10	10/10	9/10	9/10
25		10/10	10/10	8/10	10/10
50		9/10	10/10	10/10	8/10
75		10/10	9/10	9/10	10/10
100		10/10	10/10	10/10	10/10

CETIS Analytical Report

Report Date: 07 Jul-16 15:36 (p 1 of 4)
 Test Code: B356401ppc | 18-5387-4573

Fathead Minnow 7-d Larval Survival and Growth Test

CH2M HILL - ASL

Analysis ID: 19-0259-9168	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.1
Analyzed: 29 Jun-16 13:08	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 08-5801-7193	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 14 Jun-16 14:25	Protocol: EPA/821/R-02-013 (2002)	Diluent:
Ending Date: 21 Jun-16 14:15	Species: Pimephales promelas	Brine:
Duration: 7d	Source: Aquatox, AR	Age: <48h
Sample ID: 13-2729-6357	Code: B3564-01	Client:
Sample Date: 13 Jun-16 10:30	Material: Unknown	Project:
Receive Date: 14 Jun-16 12:25	Source: Sumitomo Mining - Pogo (AK0053341)	
Sample Age: 28h (0.5 °C)	Station:	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	10.7%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		12.5	1.129	2.407	0.174	6	0.3664		Non-Significant Effect
		25	1.056	2.407	0.174	6	0.3975		Non-Significant Effect
		50	1.62	2.407	0.174	6	0.1916		Non-Significant Effect
		75	1.129	2.407	0.174	6	0.3664		Non-Significant Effect
		100	0	2.407	0.174	6	0.8333		Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.532	2.802	0.1570	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04651245	0.00930249	5	0.8925	0.5067	Non-Significant Effect
Error	0.1876122	0.0104229	18			
Total	0.2341246		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.974	4.248	0.1316	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8929	0.884	0.0152	Normal Distribution

7d Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	4	1	1	1	1	1	1	0	0.0%	0.0%
12.5		4	0.95	0.8581	1	0.95	0.9	1	0.02887	6.08%	5.0%
25		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	5.0%
50		4	0.925	0.7727	1	0.95	0.8	1	0.04787	10.35%	7.5%
75		4	0.95	0.8581	1	0.95	0.9	1	0.02887	6.08%	5.0%
100		4	1	1	1	1	1	1	0	0.0%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	0.0%
12.5		4	1.331	1.181	1.48	1.331	1.249	1.412	0.04705	7.07%	5.77%
25		4	1.336	1.093	1.578	1.412	1.107	1.412	0.07622	11.41%	5.4%
50		4	1.295	1.061	1.529	1.331	1.107	1.412	0.07348	11.35%	8.28%
75		4	1.331	1.181	1.48	1.331	1.249	1.412	0.04705	7.07%	5.77%
100		4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	0.0%

CETIS Analytical Report

Report Date: 07 Jul-16 15:36 (p 2 of 4)
 Test Code: B356401ppc | 18-5387-4573

Fathead Minnow 7-d Larval Survival and Growth Test

CH2M HILL - ASL

Analysis ID: 19-0259-9168 Endpoint: 7d Survival Rate
 Analyzed: 29 Jun-16 13:08 Analysis: Parametric-Control vs Treatments

CETIS Version: CETISv1.8.1
 Official Results: Yes

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	1	1	1	1
12.5		1	1	0.9	0.9
25		1	1	0.8	1
50		0.9	1	1	0.8
75		1	0.9	0.9	1
100		1	1	1	1

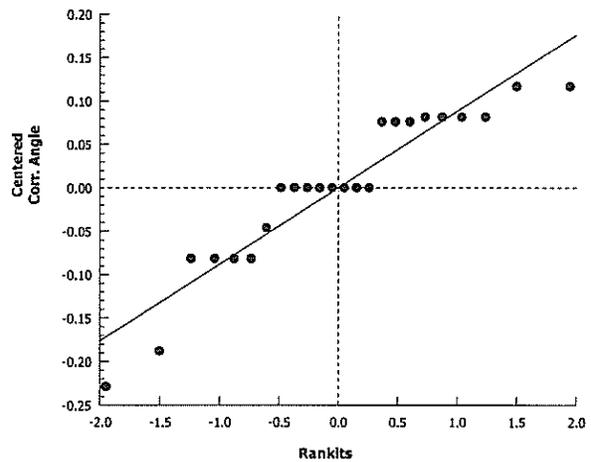
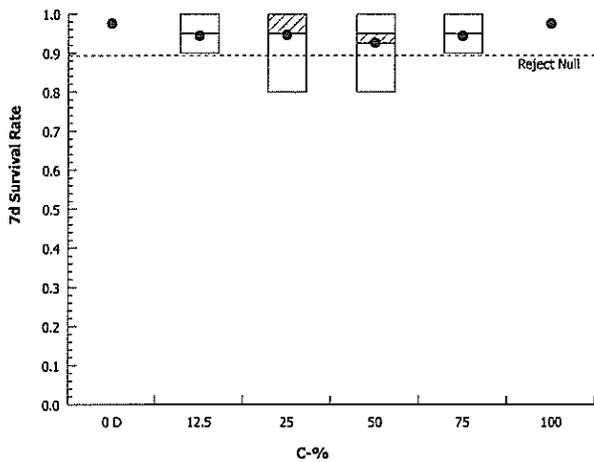
Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	1.412	1.412	1.412	1.412
12.5		1.412	1.412	1.249	1.249
25		1.412	1.412	1.107	1.412
50		1.249	1.412	1.412	1.107
75		1.412	1.249	1.249	1.412
100		1.412	1.412	1.412	1.412

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	10/10	10/10	10/10	10/10
12.5		10/10	10/10	9/10	9/10
25		10/10	10/10	8/10	10/10
50		9/10	10/10	10/10	8/10
75		10/10	9/10	9/10	10/10
100		10/10	10/10	10/10	10/10

Graphics



CETIS Analytical Report

Report Date: 07 Jul-16 15:36 (p 3 of 4)
 Test Code: B356401ppc | 18-5387-4573

Fathead Minnow 7-d Larval Survival and Growth Test

CH2M HILL - ASL

Analysis ID: 09-0890-6107	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.8
Analyzed: 07 Jul-16 15:35	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 08-5801-7193	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 14 Jun-16 14:25	Protocol: EPA/821/R-02-013 (2002)	Diluent:
Ending Date: 21 Jun-16 14:15	Species: Pimephales promelas	Brine:
Duration: 7d	Source: Aquatox, AR	Age: <48h
Sample ID: 13-2729-6357	Code: B3564-01	Client:
Sample Date: 13 Jun-16 10:30	Material: Unknown	Project:
Receive Date: 14 Jun-16 12:25	Source: Sumitomo Mining - Pogo (AK0053341)	
Sample Age: 28h (0.5 °C)	Station:	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	24.9%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		12.5	-0.2226	2.407	0.232	6	0.8905	CDF	Non-Significant Effect
		25	0.2071	2.407	0.232	6	0.7652	CDF	Non-Significant Effect
		50	0.6162	2.407	0.232	6	0.5960	CDF	Non-Significant Effect
		75	-0.8207	2.407	0.232	6	0.9723	CDF	Non-Significant Effect
		100	-1.401	2.407	0.232	6	0.9945	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.005	2.802	0.8968	No Outliers Detected
Control Trend	Mann-Kendall Trend	2.005		1.0000	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.09957094	0.01991419	5	1.068	0.4103	Non-Significant Effect
Error	0.3356506	0.01864725	18			
Total	0.4352215		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.03	15.09	0.4123	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9891	0.884	0.9937	Normal Distribution

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	4	0.9323	0.6566	1.208	0.969	0.69	1.101	0.08663	18.59%	0.0%
12.5		4	0.9537	0.6585	1.249	0.9405	0.774	1.16	0.09277	19.45%	-2.31%
25		4	0.9122	0.8205	1.004	0.9195	0.846	0.964	0.02884	6.32%	2.15%
50		4	0.8728	0.6074	1.138	0.822	0.733	1.114	0.08336	19.1%	6.38%
75		4	1.011	0.873	1.15	1.019	0.907	1.101	0.04353	8.61%	-8.5%
100		4	1.067	0.9188	1.216	1.046	0.98	1.198	0.04672	8.75%	-14.51%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	0.959	0.979	1.101	0.69
12.5		1.16	1.059	0.774	0.822
25		0.957	0.964	0.846	0.882
50		0.806	0.838	1.114	0.733
75		1.101	0.976	0.907	1.062
100		1.029	0.98	1.063	1.198

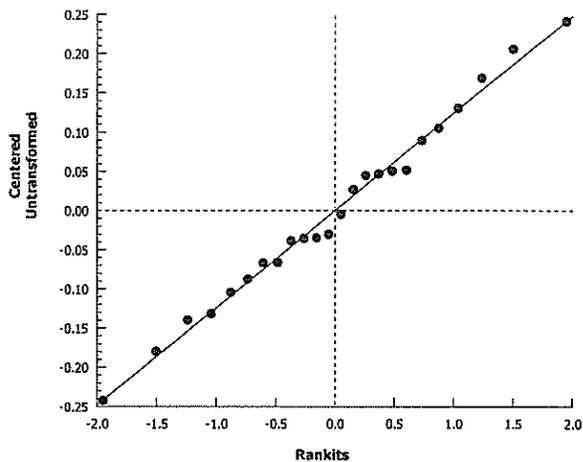
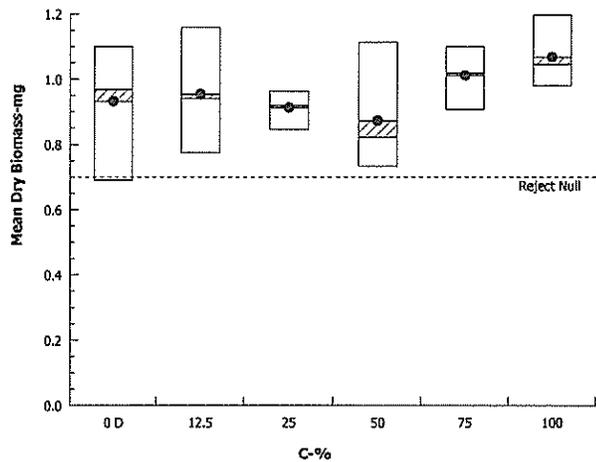
Fathead Minnow 7-d Larval Survival and Growth Test

CH2M HILL - ASL

Analysis ID: 09-0890-6107 Endpoint: Mean Dry Biomass-mg
Analyzed: 07 Jul-16 15:35 Analysis: Parametric-Control vs Treatments

CETIS Version: CETISv1.8.8
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 07 Jul-16 15:36 (p 1 of 2)
 Test Code: B356401ppc | 18-5387-4573

Fathead Minnow 7-d Larval Survival and Growth Test

CH2M HILL - ASL

Analysis ID: 10-5490-9036	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.8
Analyzed: 07 Jul-16 15:36	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 08-5801-7193	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 14 Jun-16 14:25	Protocol: EPA/821/R-02-013 (2002)	Diluent:
Ending Date: 21 Jun-16 14:15	Species: Pimephales promelas	Brine:
Duration: 7d	Source: Aquatox, AR	Age: <48h
Sample ID: 13-2729-6357	Code: B3564-01	Client:
Sample Date: 13 Jun-16 10:30	Material: Unknown	Project:
Receive Date: 14 Jun-16 12:25	Source: Sumitomo Mining - Pogo (AK0053341)	
Sample Age: 28h (0.5 °C)	Station:	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1141590	200	Yes	Two-Point Interpolation

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.005	2.802	0.8968	No Outliers Detected
Control Trend	Mann-Kendall Trend	2.005		1.0000	Non-significant Trend in Controls

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC25	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	4	0.9323	0.69	1.101	0.08663	0.1733	18.59%	0.0%
12.5		4	0.9537	0.774	1.16	0.09277	0.1855	19.45%	-2.31%
25		4	0.9122	0.846	0.964	0.02884	0.05769	6.32%	2.15%
50		4	0.8728	0.733	1.114	0.08336	0.1667	19.1%	6.38%
75		4	1.011	0.907	1.101	0.04353	0.08706	8.61%	-8.5%
100		4	1.067	0.98	1.198	0.04672	0.09343	8.75%	-14.51%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	0.959	0.979	1.101	0.69
12.5		1.16	1.059	0.774	0.822
25		0.957	0.964	0.846	0.882
50		0.806	0.838	1.114	0.733
75		1.101	0.976	0.907	1.062
100		1.029	0.98	1.063	1.198

CETIS Analytical Report

Report Date: 07 Jul-16 15:36 (p 2 of 2)
Test Code: B356401ppc | 18-5387-4573

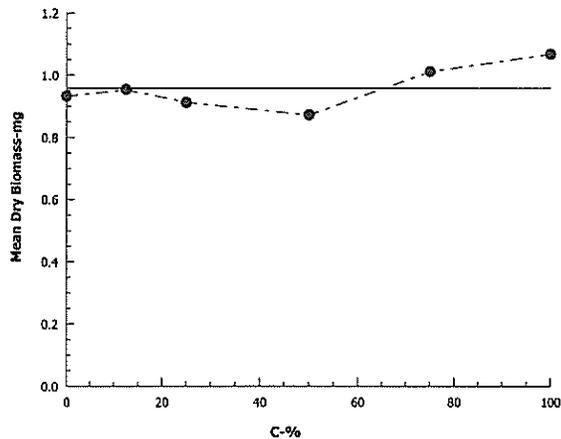
Fathead Minnow 7-d Larval Survival and Growth Test

CH2M HILL - ASL

Analysis ID: 10-5490-9036 Endpoint: Mean Dry Biomass-mg
Analyzed: 07 Jul-16 15:36 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.8
Official Results: Yes

Graphics



APPENDIX B
REFERENCE TOXICANT DATA SHEETS



Ceriodaphnia dubia
Survival and Reproduction
Test Data Summary

Client QA/QC Test Start Date 6-2-2016
 Sample Description NaCl Initial Sample ID# 2B 058-03
 Data summarized by MC

Percent or Concentration	Total Live Young Produced in First 3 Broods per Replicate										# Alive Adults	Total Live Young
	A	B	C	D	E	F	G	H	I	J		
Control	48 AD?	37 AD?	48 AD?	42 AD?	38 AD?	38 AD?	35 AD?	37 AD?	38 AD?	44 AD?	10	405
0.25 g/L	42 AD?	38 AD?	38 AD?	37 AD?	39 AD?	37 AD?	36 AD?	37 AD?	42 AD?	43 AD?	10	389
0.50 g/L	45 AD?	35 AD?	40 AD?	33 AD?	36 AD?	32 AD?	37 AD?	36 AD?	35 AD?	44 AD?	10	373
1.0 g/L	35 AD?	31 AD?	30 AD?	2 AD? X	31 AD?	25 AD?	3 AD? X	17 AD?	23 AD?	30 AD?	8	227
1.5 g/L	24 AD?	21 AD?	23 AD?	10 AD? X	3 AD?	23 AD?	22 AD?	14 AD? X	15 AD?	23 AD?	8	178
2.0 g/L	0 AD? X	0 AD? X	8 AD?	4 AD?	0 AD? X	0 AD? X	0 AD? X	0 AD? X	0 AD? X	6 AD? X	3	18
4.0 g/L	0 AD? X	0 AD? X	0 AD? X	0 AD? X	0 AD? X	0 AD? X	0 AD? X	0 AD? X	0 AD? X	0 AD? X	0	0

Test Organism Mortality (Adult dead) = AD? # of Alive Adults = Number of test organism alive at termination

Test Organism identified as Male = AD? M Total Live Young = Total neonates produced in first 3 broods

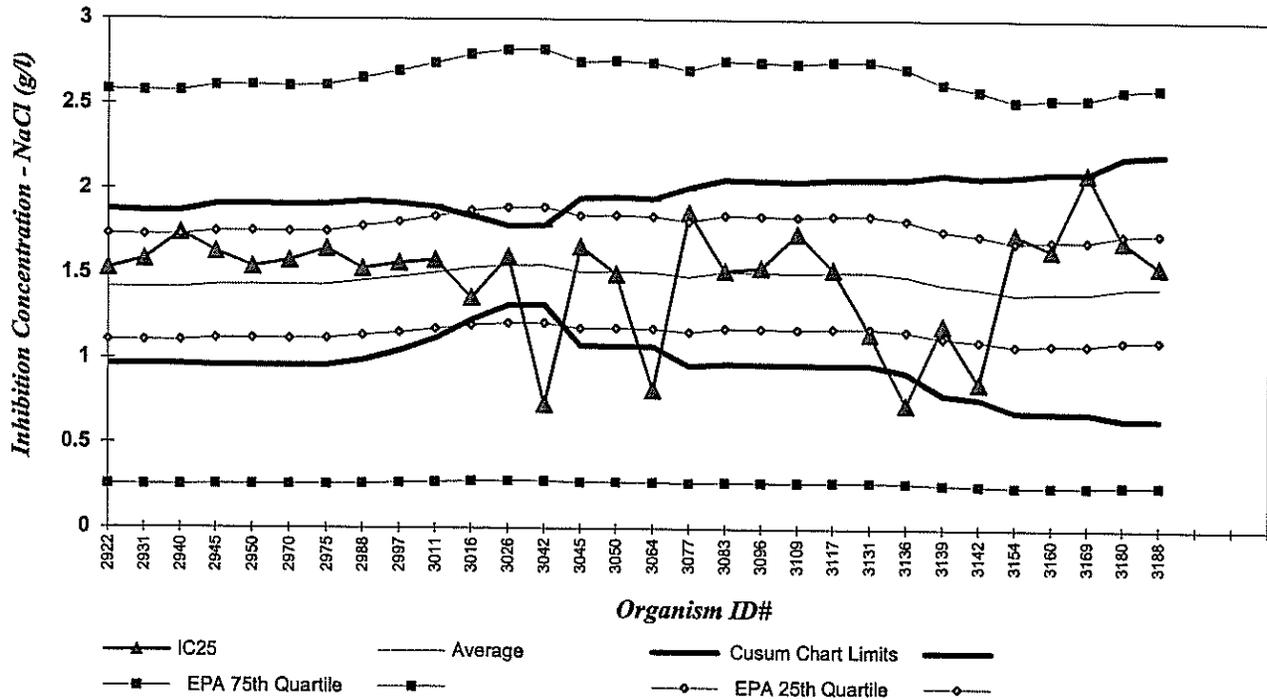
Test Organism Injured during test = AD? I

Footnote: As per EPA-600-4-91-002 and EPA-821-R-02-013, *Ceriodaphnia dubia* test should be terminated when 60% of the surviving control organisms have produced their third brood, or at the end of eight days, whichever occurs first.

Also as per EPA-821-R-02-013 (13.10.9.1), "In this three-brood test, offspring from fourth or higher broods should not be counted and should not be included in the total number of neonates produced during the test."

Endpoint	<u>IC25</u>	<u>Cusum Chart Limits</u>	Task Manager	<u>[Signature]</u>
Survival	<u>1.55</u>	<u>0.65 to 2.21</u>	Project Manager	<u>[Signature]</u>
Reproduction	<u>0.72</u>	<u>0.20 to 1.18</u>	QA Officer	<u>[Signature]</u>

REFERENCE TOXICANT CUMLATIVE SUMMARY (CUSUM) CHART
***Ceriodaphnia dubia* Chronic Survival - IC25 Values**



***Ceriodaphnia dubia* - Chronic (EPA Test Method 1002.0)**

SODIUM CHLORIDE (g/L)

Endpoint: Chronic Survival

Stats Method: Linear Interpolation

Test Conditions: Recon MH, 25 oC

From EPA 833-R-00-003:

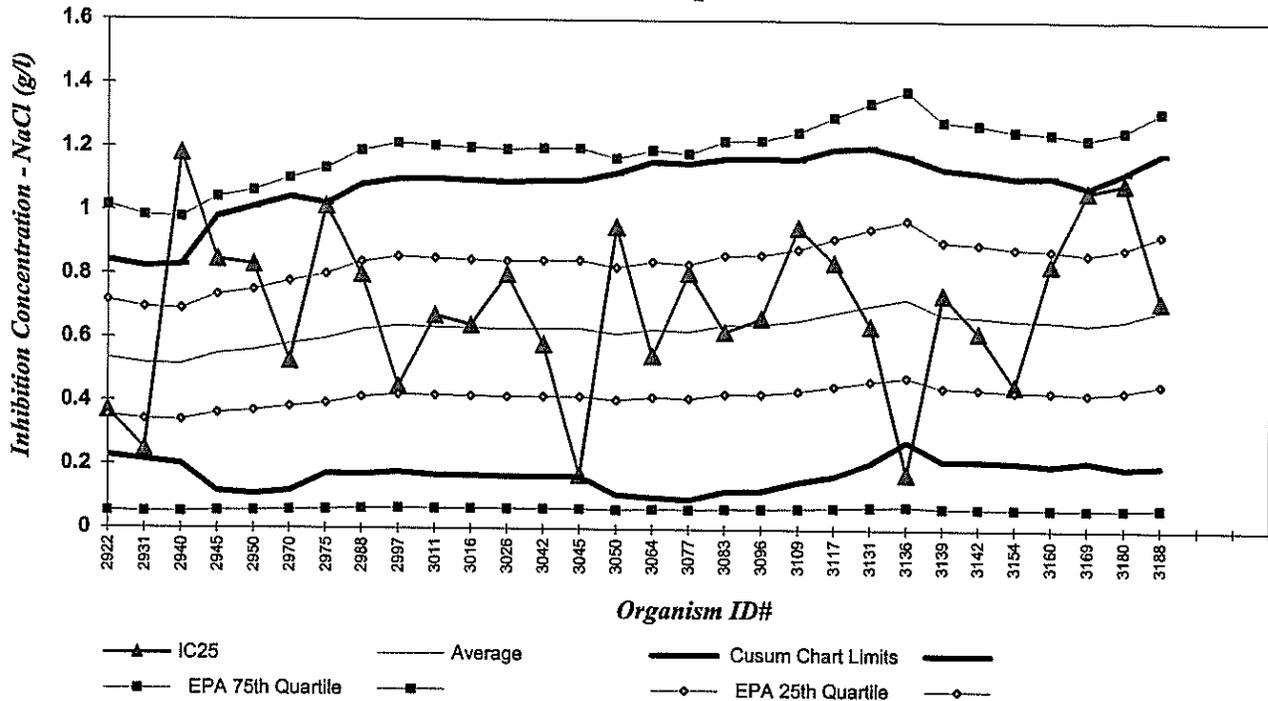
- 10th Quartile CV (control limit) = 0.07
- 25th Quartile CV (warning limit) = 0.11
- 75th Quartile CV (warning limit) = 0.41
- 90th Quartile CV (control limit) = 0.81

Intralab CV is compared to EPA Warning limits (25th and 75th CV's) and Control limits (10th and 90th CV's).

If lab CV is outside EPA Control limits, the EPA Control limits are used to set Cusum chart limits.

Event #	Cerio ID #	Test Start Date	IC25	Running Average	Running SD	Cusum Chart Limits		Intralab CV
						AVG-2SD	AVG+2SD	
292	3109	09/09/15	1.74	1.51	0.27	0.97	2.05	0.18
293	3117	10/06/15	1.53	1.51	0.27	0.96	2.06	0.18
294	3131	11/17/15	1.15	1.51	0.27	0.96	2.06	0.19
295	3136	12/03/15	0.73	1.49	0.28	0.92	2.06	0.23
296	3139	12/15/15	1.20	1.44	0.32	0.79	2.09	0.23
297	3142	01/05/16	0.86	1.42	0.33	0.77	2.07	0.25
298	3154	02/09/16	1.74	1.38	0.35	0.69	2.08	0.25
299	3160	03/08/16	1.64	1.39	0.35	0.69	2.10	0.25
300	3169	04/05/16	2.097	1.39	0.35	0.69	2.100	0.27
301	3180	05/03/16	1.70	1.42	0.39	0.65	2.19	0.27
302	3188	06/02/16	1.55	1.43	0.39	0.65	2.21	0.27
303								

REFERENCE TOXICANT CUMLATIVE SUMMARY (CUSUM) CHART
Ceriodaphnia dubia Chronic Reproduction - IC25 Values



***Ceriodaphnia dubia* - Chronic (EPA Test Method 1002.0)**

SODIUM CHLORIDE (g/L)

Endpoint: Chronic Reproduction
 Stats Method: Linear Interpolation
 Test Conditions: Recon MH, 25 oC

From EPA 833-R-00-003:

10th Quartile CV (control limit) = 0.08
 25th Quartile CV (warning limit) = 0.17
 75th Quartile CV (warning limit) = 0.45
 90th Quartile CV (control limit) = 0.62

Intralab CV is compared to EPA Warning limits (25th and 75th CV's) and Control limits (10th and 90th CV's),

If lab CV is outside EPA Control limits, the EPA Control limits are used to set Cusum chart limits.

Event #	Ceriodaphnia ID #	Test Start Date	IC25	Running Average	Running SD	Cusum Chart Limits		Intralab CV
						AVG-2SD	AVG+2SD	
292	3109	9/9/2015	0.95	0.66	0.25	0.15	1.17	0.38
293	3117	10/6/2015	0.84	0.68	0.26	0.17	1.20	0.35
294	3131	11/17/2015	0.64	0.71	0.25	0.21	1.20	0.31
295	3136	12/3/2015	0.18	0.73	0.22	0.28	1.17	0.34
296	3139	12/15/2015	0.74	0.68	0.23	0.22	1.14	0.34
297	3142	1/5/2016	0.62	0.67	0.23	0.22	1.12	0.34
298	3154	2/9/2016	0.45	0.66	0.22	0.21	1.11	0.35
299	3160	3/8/2016	0.83	0.66	0.23	0.20	1.11	0.33
300	3169	4/5/2016	1.06	0.65	0.22	0.22	1.08	0.35
301	3180	5/3/2016	1.09	0.66	0.23	0.20	1.13	0.35
302	3188	6/2/2016	0.72	0.69	0.25	0.20	1.18	0.35
303								

Random Template Used: 6 conc. x 4 reps. # 5 Waterbath/incubator Used: _____ Date Initiated 6/14/2016 Time 11:44
 Stock Sol. ID 2B058-03 # 7 Date Terminated 6/21/2016 Time 10:30
 Organism ID: FHM 1875 Test Container Size: 800 ml Solution Volume / rep: 500 ml

Client QA/QC - RefTox Sample Description _____ NaCl (50 g/L stock) _____

Tech: Day 0 DW Day 1 MC Day 2 0 Day 3 0 Day 4 0/5m Day 5 3m Day 6 3m Day 7 0
 Time Day 0 1144 Day 1 1015 Day 2 0900 Day 3 1220 Day 4 1350 Day 5 1510 Day 6 1555 Day 7 1030

Conc. or Percent	Day	Number of Live Organisms				Dissolved O ₂ (mg/l)		pH		Temp. (°C) Pre	Therm. ID #	Conductivity (µS) Post (daily)
		A	B	C	D	Pre	Post	Pre	Post			
Control	0	10	10	10	10		8.1		7.9	Post: 24.7	177	294
	1	10	10	9	10	7.4	8.0	7.7	8.2	24.0	184	319
	2	10	10	9	10	6.6	7.7	7.6	8.2	24.5	184	303
	3	10	10	9	10	6.7	7.6	7.4	8.3	24.3	244	314
	4	10	10	9	10	6.6	7.7	7.2	8.0	24.6	444	309
	5	10	10	9	10	7.0	8.0	7.3	8.3	24.0	202	282
	6	10	10	9	10	7.1	7.8	7.4	8.2	24.5	184	302
	7	10	10	9	10	7.9		7.4		24.7	202	
0.3 g/L	0	10	10	10	10		8.1		7.8	Post: 24.8		838
	1	10	10	10	10	7.4	7.8	7.7	8.2	24.1		852
	2	10	10	10	10	6.6	7.6	7.6	8.1	24.4		691
	3	10	10	9	10	6.6	7.5	7.4	8.2	24.4		845
	4	10	10	9	10	6.5	7.7	7.3	8.0	24.6		853
	5	10	10	9	10	7.0	8.0	7.3	8.3	24.0		809
	6	10	10	9	10	7.1	7.8	7.4	8.2	24.7		836
	7	10	10	9	10	7.9		7.4		24.7		
1.0 g/L	0	10	10	10	10		8.1		7.9	Post: 24.8		2100
	1	10	10	10	10	7.4	7.8	7.7	8.1	24.3		2010
	2	10	10	10	10	6.3	7.7	7.5	8.1	24.4		2160
	3	10	10	10	10	6.6	7.5	7.4	8.1	24.4		2010
	4	10	10	10	10	6.3	7.7	7.3	8.0	24.9		2110
	5	10	10	10	10	6.9	8.0	7.3	8.2	24.0		2040
	6	10	10	10	9	7.1	7.7	7.4	8.1	24.7		2070
	7	10	10	10	9	7.8		7.3		24.8		
2.0 g/L	0	10	10	10	10		8.1		7.9	Post: 24.8		3140
	1	10	10	10	11	7.5	7.9	7.7	8.1	24.2		3840
	2	10	10	10	11	6.7	7.7	7.5	8.0	24.4		3790
	3	10	10	10	11	6.7	7.5	7.5	8.1	24.4		3830
	4	10	10	10	11	6.5	7.8	7.4	8.0	24.7		3810
	5	10	10	10	11	6.9	8.0	7.3	8.1	24.1		3720
	6	10	10	9	10	7.0	7.7	7.3	8.1	24.6		3840
	7	10	8	8	8	7.5		7.3		24.6		
4.0 g/L	0	10	10	10	10		8.1		7.9	Post: 24.8		6810
	1	10	10	10	10	7.4	7.9	7.8	8.0	24.2		6980
	2	10	10	10	10	6.7	7.8	7.6	7.9	24.3		7050
	3	9	10	10	10	6.7	7.5	7.4	8.0	24.4		7000
	4	9	10	10	10	6.7	7.9	7.4	7.8	24.7		6940
	5	8	9	9	9	7.1	8.0	7.4	8.1	24.0		6990
	6	4	7	7	4	7.0	7.6	7.5	8.1	24.6		7000
	7	2	5	4	2	7.5		7.5		24.7		
8.0 g/L	0	10	10	10	10		8.1		7.9	Post: 24.8		12680
	1	6	4	6	3	7.4	7.9	7.7	7.9	24.3		13040
	2	1	1	5	2	6.5	7.8	7.4	7.9	24.4		12460
	3	1	1	5	2	6.8	7.6	7.4	7.9	24.5		12960
	4	1	1	5	1	6.8	7.7	7.4	7.7	24.7		12490
	5	1	0	3	0	7.3	8.0	7.4	8.0	24.1		12860
	6	1	1	2	1	7.0	7.7	7.4	8.0	24.5		12500
	7	0	1	0	1	7.5		7.6		24.6		

✓ Indicates one organism inadvertently poured off during solution renewal, replaced into container.

"M" = organism missing, start count reduced. "inj" = organism injured, remove from stats.

"F" = fungus noted on dead organisms.

Pre =Pre-renewal solutions. Post =Post-renewal solutions.

Day 0 Temperatures = Post-renewals

Therm ID# = Thermometer ID used for all measurements that day.

23.8 = Temp. out of recommended range

Endpoint IC25 Cusum Chart Limits

Survival 2.3

1.1 to 3.9

Growth 2.4

1.1 to 3.2

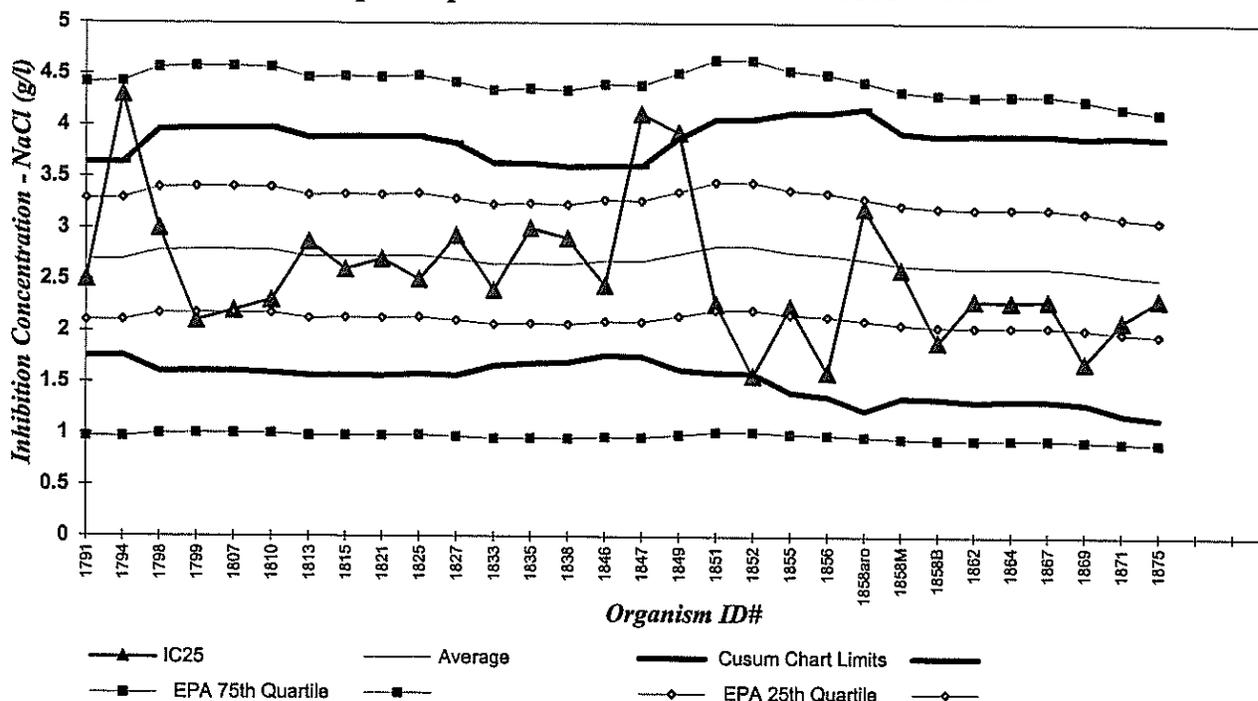
On 6/14/16

Task Manager [Signature]

Project Manager [Signature]

QA Officer [Signature]

REFERENCE TOXICANT CUMULATIVE SUMMARY (CUSUM) CHART
Pimphales promelas Chronic Survival - IC25 Values



***Pimphales promelas* - Chronic (EPA Test Method 1000.0)**

SODIUM CHLORIDE (g/L)

Endpoint: Chronic Survival

Stats Method: Linear Interpolation

Test Conditions: Recon MH, 25 oC

From EPA 833-R-00-003:

- 10th Quartile CV (control limit) = 0.03
- 25th Quartile CV (warning limit) = 0.11
- 75th Quartile CV (warning limit) = 0.32
- 90th Quartile CV (control limit) = 0.52

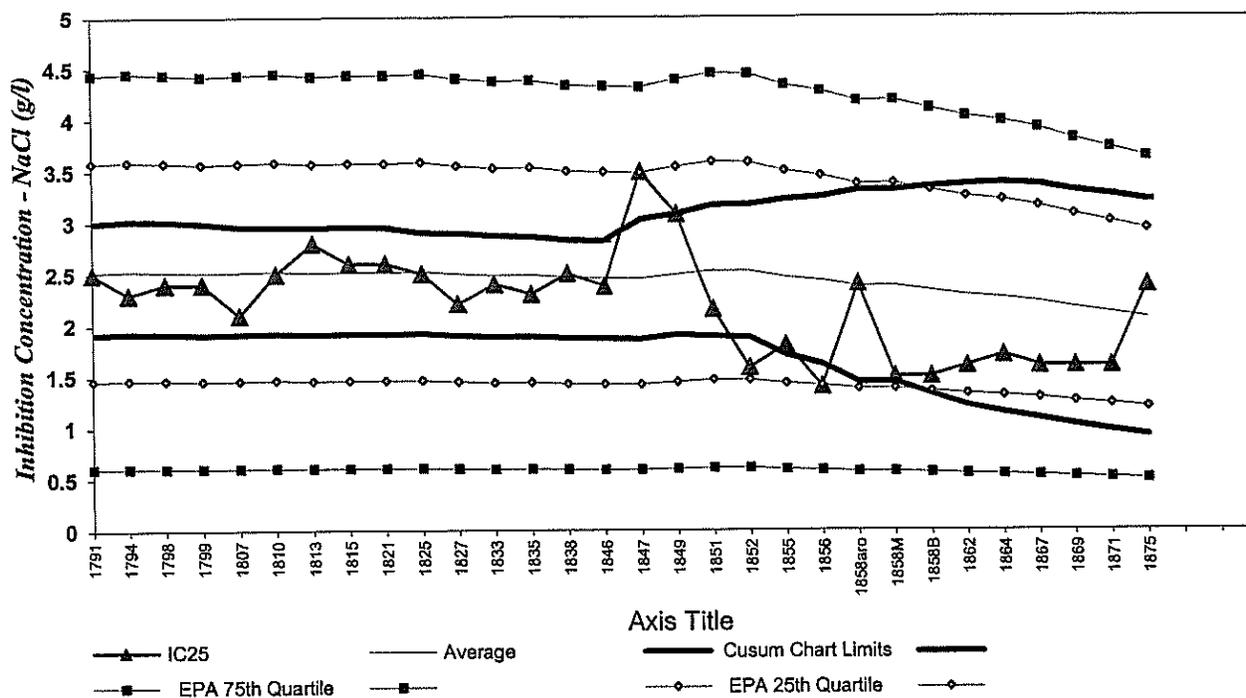
Intralab CV is compared to EPA Warning limits (25th and 75th CV's) and Control limits (10th and 90th CV's).

If lab CV is outside EPA Control limits, the EPA Control limits are used to set Cusum chart limits.

Event #	FHM ID #	Test Start Date	IC25	Running Average	Running SD	Cusum Chart Limits		Intralab CV
						AVG-2SD	AVG+2SD	
328	1851	12/29/16	2.3	2.8	0.62	1.6	4.1	0.22
329	1852	01/12/16	1.57	2.8	0.62	1.59	4.06	0.25
330	1855	01/26/16	2.2	2.8	0.68	1.4	4.1	0.25
331	1856	02/02/16	1.6	2.7	0.69	1.4	4.1	0.27
332	1858aro	02/16/16	3.2	2.7	0.73	1.2	4.2	0.24
333	1858M	02/16/16	2.6	2.6	0.64	1.4	3.9	0.24
334	1858B	02/16/16	1.9	2.6	0.64	1.3	3.9	0.25
335	1862	03/08/16	2.3	2.6	0.65	1.3	3.9	0.25
336	1864	03/22/16	2.3	2.6	0.65	1.3	3.9	0.25
337	1867	04/05/16	2.3	2.6	0.65	1.3	3.9	0.25
338	1869	04/19/16	1.7	2.6	0.65	1.3	3.9	0.27
339	1871	05/10/16	2.1	2.5	0.68	1.2	3.9	0.27
340	1875	06/14/16	2.3	2.5	0.68	1.1	3.9	0.27

REFERENCE TOXICANT CUMULATIVE SUMMARY (CUSUM) CHART

Pimephales promelas Chronic Biomass - IC25 Values



Pimephales promelas - Chronic (EPA Test Method 1000.0)

SODIUM CHLORIDE (g/L)

Endpoint: Chronic Growth (Biomass)

Stats Method: Linear Interpolation

Test Conditions: Recon MH, 25 oC

From EPA 833-R-00-003:

10th Quartile CV (control limit) = 0.12

25th Quartile CV (warning limit) = 0.21

75th Quartile CV (warning limit) = 0.38

90th Quartile CV (control limit) = 0.45

Intralab CV is compared to EPA Warning limits (25th and 75th CV's) and Control limits (10th and 90th CV's).

If lab CV is outside EPA Control limits, the EPA Control limits are used to set Cusum chart limits.

Event #	FHM ID #	Test Start Date	IC25	Running Average	Running SD	Cusum Chart Limits		Intralab CV
						AVG-2SD	AVG+2SD	
328	1851	12/29/2015	2.2	2.5	0.32	1.9	3.2	0.13
329	1852	1/12/2016	1.6	2.5	0.32	1.9	3.2	0.15
330	1855	1/26/2016	1.8	2.5	0.38	1.7	3.2	0.17
331	1856	2/2/2016	1.4	2.4	0.41	1.6	3.2	0.20
332	1858aro	2/16/2016	2.4	2.4	0.47	1.4	3.3	0.20
333	1858M	2/16/2016	1.5	2.4	0.47	1.4	3.3	0.22
334	1858B	2/16/2016	1.5	2.3	0.51	1.3	3.3	0.24
335	1862	3/8/2016	1.6	2.3	0.54	1.2	3.4	0.25
336	1864	3/22/2016	1.7	2.3	0.56	1.1	3.4	0.26
337	1867	4/5/2016	1.6	2.2	0.57	1.1	3.4	0.26
338	1869	4/19/2016	1.6	2.2	0.57	1.0	3.3	0.27
339	1871	5/10/2016	1.6	2.1	0.57	1.0	3.3	0.28
340	1875	6/14/2016	2.4	2.1	0.57	0.9	3.2	0.28

APPENDIX C
CHAIN OF CUSTODY



Batch Number: B 3564 A

Date Received: 10/14/16

Client/Project: Sumitomo Metal Mining

Received By: RC

Were custody seals intact? Yes No N/A

Packing Material: Ice Blue Ice Box

Temp OK? (<6C) Therm ID: TH173 Exp. 7/16 0.5 °C Yes No N/A

Was a Chain of Custody (CoC) Provided? Yes No N/A

Was the CoC correctly filled out (If No, document below) Yes No N/A

Were the sample containers in good condition (not broken or leaking)? Yes No N/A

Are all samples within 36 hours of collection? Yes No N/A

Method of Shipment: Hand Delivered FedEx UPS Greyhound Other: Courier N/A

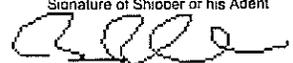
Sample Exception Report (The following exceptions were noted)

Client was notified on: _____ Client contact: _____

Resolution to Exception:

027 FAI 4946 8366

027-4946 8366

Shipper's Name and Address Sumitomo Metal Mining Po Mile 50 Pogo Mile Road Delta Junction, AK 99737 USA Tel: 9078952841		Shipper's Account Number 27442319143 Customer's ID Number 10659		Not Negotiable Air Waybill Issued By  P.O. BOX 68900 SEATTLE, WA 98168 800-225-2752 ALASKACARGO.COM					
Consignee's Name and Address CH2M Hill 1100 ne Circle Blvd, Suite 300 Corvallis, OR 97330 USA Tel: 5417524271		Consignee's Account Number		Also notify Tel:					
Issuing Carrier's Agent and City Fairbanks		Accounting Information Sumitomo Metal Mining Pogo LLC Mile 50 Pogo Mile Road Delta Junction, AK 99737 USA		10659					
Agent's IATA Code		Account No.		GoldStreak					
Airport of Departure (Addr. of First Carrier) and Requested Routing Fairbanks		Airport of Destination Portland		Amount of Insurance XXX					
To By First Carrier SEA Alaska Airlines		To / By PDX AS		Currency USD PX					
Flight/Date AS 194/13		Flight/Date AS 2329/14		Declared Value For Carriage NVD					
Declared Value For Customs NCV		WT/VAL X		Other X					
Handling Information NOA 9078952760 PERISHABLE CARGO (NON - FOOD)									
					SCI				
No of Pieces	Gross Weight	kg	lb	Commodity Item No.	Chargeable Weight	Rate / Charge	Total	Nature and Quantity of Goods (Incl. Dimensions or Volume)	
1	80.0	L	Q		80.0		AS AGREED	NON HAZ WATER SAMPLE CHILL Dims: 24 x 13 x14 x 1	
1	80.0						AS AGREED	GSX PER Volume: 2.528	
Prepaid AS AGREED		Weight Charge Collect		Other Charges XBC 0.00					
Valuation Charge		Tax		Total Other Charges Due Agent		Shipper certifies that the particulars on the face hereof are correct and that insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations. I consent to the inspection of this cargo.			
Total Other Charges Due Carrier		Total Prepaid		Total Collect		For: Sumitomo Metal Mining Pogo LLC Signature of Shipper or his Agent 			
AS AGREED		AS AGREED		AS AGREED		<input checked="" type="checkbox"/> THIS SHIPMENT DOES NOT CONTAIN DANGEROUS GOODS <input type="checkbox"/> THIS SHIPMENT DOES CONTAIN DANGEROUS GOODS			
AS AGREED		AS AGREED		AS AGREED		13 Jun 2016 15:04 Fairbanks Alaska Airlines Executed On (Date) at (Place) Signature of Issuing Carrier or its Agent			

027-4946 8366

Handwritten notes: Delta (MMA) 6/14/16 12:25

CH2MHILL

CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client SMM Logo LLC
 Address 3205 International Street
Fairbanks AK 99701
 Contact Person: Jim Ward
 Phone: 907-895-2760
 E-mail: James.Ward@SmmLogo.com

Ship Samples to:
 CH2M HILL - Applied Sciences Laboratory
 Attention: Bioassay Lab
 1100 NE Circle Blvd. Suite 300
 Corvallis, OR 97330
 Lab Phone: (541) 768-3160
 Customer Service: (541) 768-3120

NPDES# _____

Composite Sample Information:

Initiated: Date _____ Time _____
 Ended: Date _____ Time _____
 Chilled During Collection? Yes ___ No ___
 Dechlorinated prior to shipping? Yes ___ No ___

CH2M HILL Project # / Purchase Order # _____

Analysis Required / Comments

Sample ID	Date	Time	Sample Type		# of Containers	Lab ID#	Fathead Chronic		Fathead Acute		Certo Chronic		Certo Acute		Green Algae		Trout Acute		Sheepshead Acute		Sheepshead Chronic		Menidia Acute		Menidia Chronic		Mysid Acute		Mysid Chronic		Haz Waste		Concentration and/or Comments	
			Comp.	Grab			Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic		
Outfall 001	6/15/2016	940		X	2	B3504-02	X	X	X	X																								

Sampled By & Title	(Please sign and print name)	Date/Time	Relinquished By	(Please sign and print name)	Date/Time
Received By	<u>Jim Ward Environmental Specialist</u>	<u>6/15/2016 @ 11:15</u>	Relinquished By	<u>Jim Ward Env. Specialist</u>	<u>6/15/2016 @ 11:15 AM</u>
Received By	<u>Michelle Weber, Buyer</u>	<u>6/15/2016 @ 11:5 AM</u>	Relinquished By	<u>Michelle Weber</u>	<u>6/15/2016 @ 2:45 PM</u>
Received By	<u>[Signature]</u>	<u>6/16/2016 11:15</u>	Relinquished By	<u>[Signature]</u>	<u>[Signature]</u>

Work Authorized By	Received By	Date/Time	Shipped Via	Shipping #
<u>[Signature]</u>	<u>[Signature]</u>	<u>6/16/2016 11:15</u>	Shipped Via	
			UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	
			Remarks	
			<u>B 3504 B</u>	<u>100.0.600</u>



Batch Number: B 3564 B
Client/Project: SMM

Date Received: 6/16/16
Received By: PC

- Were custody seals intact? Yes No N/A
- Packing Material: Ice Blue Ice Box
- Temp OK? (<6C) Therm ID: TH173 Exp. 7/16 0.6 °C Yes No N/A
- Was a Chain of Custody (CoC) Provided? Yes No N/A
- Was the CoC correctly filled out (If No, document below) Yes No N/A
- Were the sample containers in good condition (not broken or leaking)? Yes No N/A
- Are all samples within 36 hours of collection? Yes No N/A
- Method of Shipment: Hand Delivered FedEx UPS Greyhound Other: Courier N/A

Sample Exception Report (The following exceptions were noted)

Client was notified	<table border="1"> <tr> <td>PDX</td> <td colspan="3">Goldstreak</td> </tr> <tr> <td>AS 194 SEA 1750</td> <td colspan="3">027 FAI: 4011 5342</td> </tr> <tr> <td>AS 2329 PDX 0610</td> <td colspan="3"> <table border="1"> <tr> <td>Date</td> <td>15 JUN 16</td> <td>SHIPPER PHONE #</td> <td>9078952841</td> </tr> <tr> <td>Pieces</td> <td>1</td> <td>CONSIGNEE PHONE #</td> <td>541-768-3120</td> </tr> <tr> <td>Total Weight</td> <td>80</td> <td></td> <td></td> </tr> <tr> <td>Piece Weight</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Box Number</td> <td>1</td> <td></td> <td></td> </tr> </table> </td> </tr> <tr> <td>Resolution to E</td> <td colspan="3"> <table border="1"> <tr> <td><u>2471 PDX</u></td> <td></td> <td></td> <td></td> </tr> </table> </td> <td> <table border="1"> <tr> <td>Goldstreak</td> <td>Goldstreak</td> </tr> </table> </td> </tr> </table>				PDX	Goldstreak			AS 194 SEA 1750	027 FAI: 4011 5342			AS 2329 PDX 0610	<table border="1"> <tr> <td>Date</td> <td>15 JUN 16</td> <td>SHIPPER PHONE #</td> <td>9078952841</td> </tr> <tr> <td>Pieces</td> <td>1</td> <td>CONSIGNEE PHONE #</td> <td>541-768-3120</td> </tr> <tr> <td>Total Weight</td> <td>80</td> <td></td> <td></td> </tr> <tr> <td>Piece Weight</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Box Number</td> <td>1</td> <td></td> <td></td> </tr> </table>			Date	15 JUN 16	SHIPPER PHONE #	9078952841	Pieces	1	CONSIGNEE PHONE #	541-768-3120	Total Weight	80			Piece Weight				Box Number	1			Resolution to E	<table border="1"> <tr> <td><u>2471 PDX</u></td> <td></td> <td></td> <td></td> </tr> </table>			<u>2471 PDX</u>				<table border="1"> <tr> <td>Goldstreak</td> <td>Goldstreak</td> </tr> </table>	Goldstreak	Goldstreak
PDX	Goldstreak																																														
AS 194 SEA 1750	027 FAI: 4011 5342																																														
AS 2329 PDX 0610	<table border="1"> <tr> <td>Date</td> <td>15 JUN 16</td> <td>SHIPPER PHONE #</td> <td>9078952841</td> </tr> <tr> <td>Pieces</td> <td>1</td> <td>CONSIGNEE PHONE #</td> <td>541-768-3120</td> </tr> <tr> <td>Total Weight</td> <td>80</td> <td></td> <td></td> </tr> <tr> <td>Piece Weight</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Box Number</td> <td>1</td> <td></td> <td></td> </tr> </table>			Date	15 JUN 16	SHIPPER PHONE #	9078952841	Pieces	1	CONSIGNEE PHONE #	541-768-3120	Total Weight	80			Piece Weight				Box Number	1																										
Date	15 JUN 16	SHIPPER PHONE #	9078952841																																												
Pieces	1	CONSIGNEE PHONE #	541-768-3120																																												
Total Weight	80																																														
Piece Weight																																															
Box Number	1																																														
Resolution to E	<table border="1"> <tr> <td><u>2471 PDX</u></td> <td></td> <td></td> <td></td> </tr> </table>			<u>2471 PDX</u>				<table border="1"> <tr> <td>Goldstreak</td> <td>Goldstreak</td> </tr> </table>	Goldstreak	Goldstreak																																					
<u>2471 PDX</u>																																															
Goldstreak	Goldstreak																																														



Batch Number: B3564-03
Client/Project: Suintoma Paga

Date Received: 6-16-16
Received By: [Signature]

Were custody seals intact? Yes No N/A

Packing Material: Ice Blue Ice Box

Temp OK? (<6C) Therm ID: TH173 Exp. 7-15-16 1.8 °C Yes No N/A

Was a Chain of Custody (CoC) Provided? Yes No N/A

Was the CoC correctly filled out (If No, document below) Yes No N/A

Were the sample containers in good condition (not broken or leaking)? Yes No N/A

Are all samples within 36 hours of collection? Yes No N/A

Method of Shipment: Hand Delivered FedEx UPS Greyhound Other: City N/A

Sample Exception Report (The following exceptions were noted)

	PDX	Goldstreak	027 FAI 4011 6296																																				
Client was notified Resolution to Ex	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">AS</td> <td style="width: 25%;">2810</td> <td style="width: 25%;">ANC</td> <td style="width: 25%;">1800</td> </tr> <tr> <td>AS</td> <td>134</td> <td>PDX</td> <td>0040</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	AS	2810	ANC	1800	AS	134	PDX	0040									<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Date</td> <td>17 JUN 16</td> <td>SHIPPER PHONE #</td> <td>9078952841</td> </tr> <tr> <td>Pieces</td> <td>1</td> <td>CONSIGNEE PHONE #</td> <td>541-768-3210</td> </tr> <tr> <td>Total Weight</td> <td>82</td> <td></td> <td></td> </tr> <tr> <td>Piece Weight</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Box Number</td> <td>1</td> <td></td> <td></td> </tr> </table>	Date	17 JUN 16	SHIPPER PHONE #	9078952841	Pieces	1	CONSIGNEE PHONE #	541-768-3210	Total Weight	82			Piece Weight				Box Number	1			
AS	2810	ANC	1800																																				
AS	134	PDX	0040																																				
Date	17 JUN 16	SHIPPER PHONE #	9078952841																																				
Pieces	1	CONSIGNEE PHONE #	541-768-3210																																				
Total Weight	82																																						
Piece Weight																																							
Box Number	1																																						
	Goldstreak	Goldstreak																																					

027 FAI 4011 6296

027-4011 6296

Shipper's Name and Address Sumitomo Metal Mining Po Mile 50 Pogo Mile Road Delta Junction, AK 99737 USA Tel: 9078952841	Shipper's Account Number 27442319143 Customer's ID Number 10659	Not Negotiable Air Waybill Issued By  P.O. BOX 68900 SEATTLE, WA 98168 800-225-2752 ALASKACARGO.COM
--	--	--

Consignee's Name and Address CH2MHill C/O City Delivery Service Corvallis, OR 997330 USA Tel: 541-768-3210	Consignee's Account Number 541-768-3160	Also notify Tel:
---	--	-------------------------

Issuing Carrier's Agent and City Fairbanks	Accounting Information Sumitomo Metal Mining Pogo LLC Mile 50 Pogo Mile Road Delta Junction, AK 99737 USA	10659
---	---	-------

Agent's IATA Code	Account No.
-------------------	-------------

Airport of Departure (Addr. of First Carrier) and Requested Routing Fairbanks GoldStreak
--

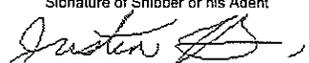
To	By First Carrier	To / By	To / By	Currency	WT/VAL	Other	Declared Value For Carriage	Declared Value For Customs
ANC	Alaska Airlines	PDX	AS	USD	PX	X	NVD	NCV

Airport of Destination	Flight/Date	Flight/Date	Amount of Insurance
Portland	AS 2810/17	AS 134/18	XXX

Handling Information SCI

No of Pieces	Gross Weight	kg	lb	Commodity Item No.	Chargeable Weight	Rate / Charge	Total	Nature and Quantity of Goods (Incl. Dimensions or Volume)
1	82.0	L	Q		82.0		AS AGREED	WATER SAMPLES Dims: 24 x 13 x14 x 1 GSX PEM
1	82.0						AS AGREED	Volume: 2.528

Prepaid AS AGREED	Weight Charge Collect	Other Charges XBC 0.00
Valuation Charge		
Tax		

Total Other Charges Due Agent Total Other Charges Due Carrier	Shipper certifies that the particulars on the face hereof are correct and that insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations. I consent to the inspection of this cargo. For: Sumitomo Metal Mining Pogo LLC Signature of Shipper or his Agent  <input checked="" type="checkbox"/> THIS SHIPMENT DOES NOT CONTAIN DANGEROUS GOODS <input type="checkbox"/> THIS SHIPMENT DOES CONTAIN DANGEROUS GOODS
--	--

Total Prepaid AS AGREED	Total Collect	17 Jun 2016 15:18 Executed On (Date)	Fairbanks at (Place)	Alaska Airlines Signature of Issuing Carrier or its Agent
----------------------------	---------------	---	-------------------------	--

027-4011 6296