APPENDIX E

WET TEST RESULTS

TRE Environmental Strategies, LLC
4303 West LaPorte Avenue, Fort Collins, Colorado, 80521-2154
T 970.416.0916 F 970.490.2963 www.aecom.com

July 29, 2014

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 – July 2014

Dear Ms. Staley,

Attached are copies of the reports for the *Ceriodaphnia dubia* (water flea) and *Pimephales promelas* (fathead minnow) toxicity tests conducted in July 2014 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,

Ashley Romero, M.S.
Data Analyst
romeroam.tre@gmail.com

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

Attachments:

14001-412-019
14001-412-020

TRE

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

Project ID: 14001-412-019
July 2014

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 4303 West LaPorte Ave. Fort Collins, CO 80521 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	Ashley Romero, M.S. (970) 416-0916 email: romeroam.tre@gmail.com

Test Information

Test	Short-Term Chronic under Static-Renewal Conditions
Basis	USEPA (2002), method 1002.0
Test Dates and Time	July 8, 2014 @ 1910 to July 15, 2014 @ 1630
Test Length	7 days
Species	*Ceriodaphnia dubia*
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	_X_ **Pass** ____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	07/07/14 @ 0700	27939	07/08/14	3.9
2	N/A	07/09/14 @ 0700	27947	07/10/14	3.2
3	N/A	07/11/14 @ 0930	27953	07/12/14	2.4

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	7.2	64	35	206	<0.02	1.2
2	7.3	70	36	194	<0.02	<1.0
3	7.5	66	37	212	0.03	<1.0

[a] As $CaCO_3$
[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)[c]
11184	8.4	84	57	297	<0.02	<1.0

[a] As $CaCO_3$
[b] Total residual chlorine
[c] Measured on source water

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	*Ceriodaphnia dubia*
Age	<24 hours (all within 8 hours of the same age)
Source	TRE in-house culture, batch 070814
Acclimation	Test temperature
Feeding	0.2 ml YTC/Algae mixed per test chamber daily during the test
Reference Toxicant Testing	Initiated July 1, 2014 using sodium chloride (NaCl)

TEST RESULTS

Biological Data

Treatment (% Effluent)	Percent Survival of *Ceriodaphnia dubia*							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	38.8	N/A	N/A
12.5	100	100	100	100	100	80	80	31.5	No	No
25	100	100	100	100	100	100	90	38.3	No	No
50	100	100	100	100	100	100	80	38.9	No	No
75	100	100	100	100	100	90	90	35.3	No	No
100	100	100	100	100	100	100	100	36.0	No	No
Percent Minimum Significant Difference (Reproduction)								21.6	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
IC_{25} = 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)	8.2	8.5	6.5	6.7	272	302	25	26
100	7.2	8.0	6.2	6.9	190	219	24	26
All Treatments	7.2	8.5	≥6.1		NA		24[a]	26[a]
							24.8[b]	25.8[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
282	58	653

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.

Anita Rehner — July 29, 2014

Quality Assurance Unit — Date

7/29/14

Data Analyst — Date

APPENDIX A

Chain of Custody Records

AECOM ① TRE (019-020)

CHAIN OF CUSTODY RECORD

Client/Project Name: Sumitomo Metal Mining

Project Location: TRE

Project Number: 14001-412

Field Logbook No.:

Sampler (Print Name)/(Affiliation):

Chain of Custody Tape Nos.: 44779 (intact)

Signature:

Send Results/Report to:

TAT:

Analysis Requested: Cu, Ni, Zn

Container Type: P – Plastic; A – Amber Glass; G – Clear Glass; V – VOA Vial; O – Other; E – Encore

Preservation: 1 – HCl, 4°; 2 – H2SO4, 4°; 3 – HNO3, 4°; 4 – NaOH, 4°; 5 – NaOH/ZnAc, 4°; 6 – Na2S2O3, 4°; 7 – 4°

Matrix Codes: DW – Drinking Water; WW – Wastewater; GW – Groundwater; SW – Surface Water; ST – Storm Water; W – Water; S – Soil; SL – Sludge; SD – Sediment; SO – Solid; A – Air; L – Liquid; P – Product

Field Sample No./Identification	Date	Time	COMP	GRAB	Sample Container (Size/Mat'l)	Matrix	Preserv.	Field Filtered	Cu, Ni, Zn	Lab I.D.	Remarks
Eff 1 #1	7/7/14	0700			2.5gal	L	Ice		X	27939	
" "	7/7/14	0700			1gal	L	Ice		X		

Relinquished by: (Print Name)/(Affiliation)	Date	Received by: (Print Name)/(Affiliation)	Date
Leonel G. Hamm Signature:	7/7/14 Time:	Jeff A. Hiller Pojo LLC Signature:	7/7/14 Time: 1100
Relinquished by: (Print Name)/(Affiliation) Signature:	Date: Time:	Received by: (Print Name)/(Affiliation) Amber Potts/TRE Signature: Amber Potts	Date: 7/8/14 Time: 1935
Relinquished by: (Print Name)/(Affiliation) Signature:	Date: Time:	Received by: (Print Name)/(Affiliation) Signature:	Date: Time:

Analytical Laboratory (Destination):
Rec. on ice temp = 3.9°C (L-4)
TRE ① ~~AECOM Toxicology Lab~~
4303 W. Laporte Avenue
Fort Collins, CO 80521
(970) 416-0916
(970) 490-2963 (FAX)

Sample Shipped Via: UPS FedEx Courier Other

Temp blank: Yes No

① KS 8/29/14 E

Serial No. № 0415

TRE

AECOM ① (019 - 020)

CHAIN OF CUSTODY RECORD

Client/Project Name: Sumitomo Metal Mining

Project Location: TRE

Project Number: 14001 - 412

Field Logbook No.:

Sampler (Print Name)/(Affiliation): Leonard Z Hanson Tech Simmons

Chain of Custody Tape Nos.: 44778 intact

Signature: Leonard Z Hanson

Send Results/Report to:

TAT:

Analysis Requested: CyFC

Container Type	Preservation
P – Plastic	1 – HCl, 4°
A – Amber Glass	2 – H2SO4, 4°
G – Clear Glass	3 – HNO3, 4°
V – VOA Vial	4 – NaOH, 4°
O – Other	5 – NaOH/ZnAc, 4°
E – Encore	6 – Na2S2O3, 4°
	7 – 4°

Matrix Codes:

DW – Drinking Water	S – Soil
WW – Wastewater	SL – Sludge
GW – Groundwater	SD – Sediment
SW – Surface Water	SO – Solid
ST – Storm Water	A – Air
W – Water	L – Liquid
	P – Product

Field Sample No./Identification	Date	Time	COMP	GRAB	Sample Container (Size/Mat'l)	Matrix	Preserv.	Field Filtered	CyFC	Lab I.D.	Remarks
Eff 1 #2	7/9/14	0700			2.5 gal	L	Ice		X	27947	
" "					1 gal	L	"		X		

Relinquished by: (Print Name)/(Affiliation)	Date	Received by: (Print Name)/(Affiliation)	Date
Leonard Z Hanson	7/9/14	Jeff A. Hiller	7/9/14
Signature:	Time: 0700	Signature:	Time: 1100
Relinquished by: (Print Name)/(Affiliation)	Date:	Received by: (Print Name)/(Affiliation) Ashley Romero (TRE)	Date: 7/10/14
Signature:	Time:	Signature:	Time: 1330
Relinquished by: (Print Name)/(Affiliation)	Date:	Received by: (Print Name)/(Affiliation)	Date:
Signature:	Time:	Signature:	Time:

Analytical Laboratory (Destination): Received on ice @ 3.2°C

~~AECOM Toxicology Lab~~ ① TRE
4303 W. Laporte Avenue
Fort Collins, CO 80521
(970) 416-0916
(970) 490-2963 (FAX) (L-4)

Sample Shipped Via: UPS FedEx Courier Other

Temp blank: Yes No

DMB 8/29/14

Serial No. № 0418

TRE

AECOM @ (019 -020)

CHAIN OF CUSTODY RECORD

Client/Project Name: Sumitomo metal mining

Project Location: TRE

Project Number: 14001-412

Field Logbook No.:

Sampler (Print Name)/(Affiliation):

Chain of Custody Tape Nos.: In tact 44977

Signature:

Send Results/Report to:

TAT:

Analysis Requested: CLP

Container Type: P – Plastic; A – Amber Glass; G – Clear Glass; V – VOA Vial; O – Other; E – Encore

Preservation: 1 – HCl, 4°; 2 – H2SO4, 4°; 3 – HNO3, 4°; 4 – NaOH, 4°; 5 – NaOH/ZnAc, 4°; 6 – Na2S2O3, 4°; 7 – 4°

Matrix Codes: DW – Drinking Water; WW – Wastewater; GW – Groundwater; SW – Surface Water; ST – Storm Water; W – Water; S – Soil; SL – Sludge; SD – Sediment; SO – Solid; A – Air; L – Liquid; P – Product

Field Sample No./Identification	Date	Time	COMP	GRAB	Sample Container (Size/Mat'l)	Matrix	Preserv.	Field Filtered	CLP	Lab I.D.	Remarks
Eff1 #3	7-11-14	0930		X	2.5gal	L	Ice	NO	X	27953	
" "	"	0930		X	1gal	L	"	NO	X		

Relinquished by: (Print Name)/(Affiliation)	Date	Received by: (Print Name)/(Affiliation)	Date
Stacy Staley - Pag O Signature: Stacy Staley	7-11-14 Time:	Jeff A. Hiller Signature:	7/11/14 Time: 1030
Relinquished by: (Print Name)/(Affiliation) Jeff A. Hiller Signature:	Date: 7/11/14 Time: 1415	Received by: (Print Name)/(Affiliation) Robyn Bay / TRE Signature:	Date: 7/12/14 Time: 1315
Relinquished by: (Print Name)/(Affiliation) Signature:	Date: Time:	Received by: (Print Name)/(Affiliation) Signature:	Date: Time:

Analytical Laboratory (Destination): Received on ice @ 2.4°C (<-4) @ TRE

~~AECOM Toxicology Lab~~
4303 W. Laporte Avenue
Fort Collins, CO 80521
(970) 416-0916
(970) 490-2963 (FAX)

Sample Shipped Via: UPS FedEx Courier Other

Temp blank: Yes No

@ 5/29/14 E

Serial No. № 0417

APPENDIX B

Test Data

TOXICITY DATA PACKAGE COVER SHEET

A 7/23/14
QA: AR 7/23/14

Test Type: Chronic

Project Number: 14001-412-019

Test Substance: Effluent-(Outfall 001)

Species: *Ceriodaphnia dubia*

Dilution Water Type: Mod Hard

Organism Lot or Batch Number: 070814*

Concurrent Control Water Type: NA

Age: <24hrs (< 24 hr) Supplier: TRE

Date and Time Test Began: 7/8/14 @ 1910

Date and Time Test Ended: 7/15/14 @1630

Protocol Number: USEPA 2002, Method 1002.0

Investigator(s): RR/MT/KB/AB/MW/A

Background Information

pH control?: Yes No

Type of Test: Static-Renewal

If yes, give % CO_2: N/A

Test Temperature: 25 ± 1 °C

Env. Chmbr/Bath #: 21 Test Chmbrs: 30-ml cups

Test Solution Vol.: 15 ml

Number of Replicates per Treatment: 10

Length of Test: 3 broods

Number of Organisms per Replicate: 1

Photoperiod: 16 h light : 8 h dark

Light Intensity: 50 to 100 ft.-c.

Type of Food and Quantity per Chamber: 0.2 ml YTC/ALG

Feeding Frequency: 1 x Daily

Test Substance Characterization Parameters and Frequency:

Hardness: Sx Receipt Alkalinity: Sx Receipt NH_3: 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: 7/1/14 to 7/7/14 IC_{25}: 282 mg/L

Hist. 95% Control Limits: 58 to 653 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: [illegible] Date: 7/7/14

* organisms obtained day of initiation

① ~~FCETL~~ QA Form No. 014
Revision ~~0~~ 1 ①
Effective 02/14

TEST SUBSTANCE USAGE LOG

Project Number: 14001-412-019

QA: AR 7/21/14

	Sample 1	Sample 2	Sample 3	Sample 4
Test Substance Number	27939	27947	27953	
Test Substance Collection Date and Time	From: @	From: @	From: NA @	From: @
	To: 7/7/14 @ 0900	To: 7/09/14 @ 0700	To: 7/11/14 @ 0930	To: @
Sample Type (Grab or Comp)	unknown	unknown	Grab	
Date Test Substance Received	7/8/14	7/10/14	7/12/14	
Dilution Water Number RW# or TRE#, circle one	11184	11184	11184	
Concurrent Control Water RW#	NA	NA	NA	
Date(s) Used	7/8/14	7/10/14	7/12/14	
	7/9/14	7/11/14	7/13/14	
	~~7/10/14~~ ①		7/14/14	

① MT 7/10/14 up

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	MT 7/8/14 mixed cc								
Initials / Date	KS 7/9/14 " "								
Initials / Date	MT 7/10/14 " "								
Initials / Date	MT 7/11/14 " "								
Initials / Date	AB 7/12/14 " "								
Initials / Date	KS 7/13/14 " "								
Initials / Date	MW 7/14/14 " "								
Initials / Date									

① AR for (?) 7/23/14 CF ② AR 7/23/14 CF

CERIODAPHNIA DUBIA
CHRONIC BIOLOGICAL DATA

QA: AR 7/21/14

Project Number: 14001-412-019

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			100%
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0	0		
	4	5/1	6/1	8/1	7/1	7/1	6/1	6/1	6/1	6/1	6/1	63		
	5	0	11/2	14/2	14/2	0	0	0	10/2	14/2	0	63		
	6	15/2	0	14/3	11/3	18/2	14/2	12/2	0	18/3	13/2	124		
	7	21/3	29/3	6/3 M	0	21/3	22/3	19/3	16/3	0	18/3	138 ▲		*1/3+5/4
	8													
Total		41	37	37 ▲	39	46	44	37	32	38	37	388 ▲	38.8 ▲	
12.5%	1	0	0	0	0	0	0	0	0	0	0			80%
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0	0		
	4	6/1	0	7/1	6/1	6/1	5/1	5/1	6/1	6/1	6/1	53		
	5	0	3/1	16/2	13/2	0	0	1/1 Δ	1/1 Δ	5/2 *	14/2	53		Δ large neo * under NOAEC
	6	16/2	12/2	0	15/3	14/2	12/2 X	12/2 X	14/2	13/3	0	109		
	7	23/3	0	20/3	0	19/3	|	|	21/3	0	18/3	101		
	8													
Total		45	15	47	34	39	15-X	18-X	44	24	38	315	31.5	
25%	1	0	0	0	0	0	0	0	0	0	0			90%
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0	0		
	4	6/1	7/1	6/1	7/1	6/1	0	6/1	6/1	9/1	6/1	59		
	5	0	11/2	13/2	0 ②	16/2	8/1	17/2	0	13/2	13/2	91		
	6	12/2	14/3	0	18/3	0	12/2	1/2 Δ	14/2	0	0	75 ③		Δ large neo
	7	21/3	0 X	18/3	11/3	19/3	0	22/3	21/3	16/3	22/3	~~139~~ 58		
	8		|		②									
Total		39	34-X	37	44 ▲	41	20	46	43	38	41	383	38.3	

Day:	1	2	3	4	5	6	7	8	
Date:	7/9/14	7/10/14	7/11/14	7/12/14	7/13/14	7/14/14	7/15/14		
Time:	1130	1500	1130	1150	1405	1720	1630		
Initials:	KB	MT	MT	AB	KB	MW	A		

Key to symbols: NC – not counted
X = Original organism died.
M = Male
▲ excluded 4th brood

① MW 7/14/14 ② KZN 7/17/14 CF

CERIODAPHNIA DUBIA
CHRONIC BIOLOGICAL DATA

QA: AC 7/21/14

Project Number: 14001-412-019

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			80%
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0	0		
	4	5/1	6/1	6/1	6/1	8/1	6/1	5/1	6/1	5/1	6/1	59		
	5	0	16/2	15/2	12/2	16/2	15/2	11/2	0	0	13/2	101		
	6	12/2	18/3	20/3	18/3	0	0	0	16/2	16/2	0	94		
	7	22/3	0	20/4	0 X	20/3	19/3	20/3	21/3	19/3	19/3	135 ▲		
	8													
Total		39	40	41 ▲	36-X	44	40	39	43	29-X	38	389 ▲	38.9 ▲	
75%	1	0	0	0	0	0	0	0	0	0	0			90%
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0	0		
	4	6/1	3/1	4/1	6/1	6/1	7/1	7/1	7/1	7/1	6/1	59		
	5	12/2	1/2*	15/2	18/2	15/2	1/1 Δ	0	15/2	13/2	0	87		*under neos - NC Δ large neos
	6	0	20/3	16/3	17/3	0	20/2	8/2 X	0	15/3	12/2	102		
	7	21/3	0	19/4	9/3 Δ	19/3	20/3		18/3	1/3 Δ	17/3	105 ▲		Δ large neos
	8													
Total		39	24	35 ▲	41	40	48	15-X	40	36	35	353 ▲	35.3 ▲	
100%	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	0	0	0	0	0	0	0	0		
	4	6/1	7/1	6/1	6/1	5/1	4/1	6/1	0	5/1	4/1	49		
	5	14/2	12/2	0*	12/2	0	0	11/2	8/1	0	17/2	74		*under neos - NC
	6	0	0	0	2/2 Δ	16/2	16/2	0	14/2	14/2	0	62		Δ large neos
	7	21/3	19/3	12/2	18/3	17/3	24/3	24/3	0	21/3	19/3	175		
	8													
Total		41	38	18	38	38	44	41	22	40	40	360	36.0	
Day:		1	2	3	4	5	6	7	8					
Date:		7/9/14	7/10/14	7/11/14	7/12/14	7/13/14	7/14/14	7/15/14						
Time:		1420	1500	1130	1450	1405	1720	1630						
Initials:		KB	MX	MX	AB	KB	MW	AL						

Key to symbols: NC - not counted
X = Original organism died.
M = Male
▲ excluded 4th brood

CHRONIC CHEMICAL DATA (INITIAL)

AR 7/23/14
QA: AR 7/23/14

Project Number: 14001-412-019

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	8.4	8.4	8.3	8.5	8.3	8.4	8.4		Fm21	
D.O. (mg/L)	6.5	6.5	6.5	6.6	6.6	6.6	6.7		5	
Temp. (°C)	25	25	25	25	25	25	25		LR6	
Cond. (µS/cm)	297	272	281	286	282	286	284		15	
Hard. (mg/L)	84		80		90				Titr.	
Alk. (mg/L)	57		57		60				Titr.	
TRC (mg/L) (7/1)	<0.02								21	
NH_3 (mg/L) **	<1.0								HA#1	
Conc.: 12.5%										
pH	8.2	8.3	8.1	8.4	8.2	8.3	8.2			
D.O. (mg/L)	6.5	6.5	6.5	6.6	6.7	6.6	6.7			
Temp. (°C)	*	*	*	*	*	*	*			
Cond. (µS/cm)	284	267	276	273	286	277	276			
Hard. (mg/L)										
Alk. (mg/L)										
TRC (mg/L)										
NH_3 (mg/L)										
Conc.: 25%										
pH	8.0	8.1	8.0	8.3	8.1	8.2	8.1			
D.O. (mg/L)	6.5	6.5	6.5	6.6	6.7	6.6	6.7			
Temp. (°C)	*	*	*	*	*	*	*			
Cond. (µS/cm)	274	260	266	264	277	268	240			
Conc.: 50%										
pH	7.7	7.8	7.7	8.0	7.9	8.0	7.9			
D.O. (mg/L)	6.5	6.5	6.5	6.6	6.7	6.5	6.8			
Temp. (°C)	*	*	*	*	*	*	*			
Cond. (µS/cm)	252	248	242	239	256	250	230			
Date:	7/8/14	7/9/14	7/10/14	7/11/14	7/12/14	7/13/14	7/14/14			
Time:	1855	1615	1440	1120	1425	1340	1255			
Initials:	RR	KB	MT	MT	AS	KB	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.

** Measured in source water

QA Form No. 058
Revision 4
Effective 02/14

QA: AR 7/23/14
A 7/23/14

CHRONIC CHEMICAL DATA (INITIAL)

Project Number: 14001-412-019

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	7.5	7.6	7.5	7.8	7.7	7.9	7.7			
D.O. (mg/L)	6.5	6.6	6.5	6.6	6.7	6.6	6.7			
Temp. (°C)	*	*	*	*	*	*	*			
Cond. (µS/cm)	217	217	222	215	235	228	206			
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	7.2	7.4	7.3	7.6	7.5	7.6	7.4			
D.O. (mg/L)	6.6	6.6	6.4	6.6	6.9	6.5	6.7			
Temp. (°C)	25	25	25	25	25	25	25			
Cond. (µS/cm)	206	196	194	190	212	207	204			
Hard. (mg/L)	64		70		66					
Alk. (mg/L)	35		36		37					
TRC (mg/L)	<0.02		<0.02		0.03					
NH_3 (mg/L)	1.18		<1.0		<1.0				HS#1	
Date:	7/8/14	7/9/14	7/10/14	7/11/14	7/12/14	7/13/14	7/14/14			
Time:	1855	1615	1440	1120	1425	1300	1055			
Initials:	RR	KR	MK	MK	AB	AB	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.

DXB 7/13/14

QA Form No. 059
Revision ~~1~~ 3 ①
Effective 02/14
QA: AR 7/23/14
A 7/23/14

CHRONIC CHEMICAL DATA (FINAL)

Project Number:	14001-412-019
Test Species:	*Ceriodaphnia dubia*

%		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
pH		8.2	8.3	8.3	8.3	8.3	8.2	8.2		Fm 21	
D.O. (mg/L)		6.5	6.6	6.7	6.6	6.6	6.5	6.5		5	
Temp (°C)		26	26	25	25	25	25	26		L12	
Conc.:	12.5%										
pH		8.2	8.2	8.3	8.2	8.3	8.2	8.1			
D.O. (mg/L)		6.4	6.5	6.7	6.6	6.4	6.6	6.3			
Temp (°C)		25	24	24	24	24	24	26			
Conc.:	25%										
pH		8.1	8.2	8.2	8.2	8.2	8.2	8.2			
D.O. (mg/L)		6.5	6.2	6.7	6.7	6.5	6.6	6.5			
Temp (°C)		25	24	24	25	24	24	25			
Conc.:	50%										
pH		8.1	8.1	8.2	8.1	8.2	8.1	8.1			
D.O. (mg/L)		6.5	6.4	6.7	6.6	6.3	6.3	6.6			
Temp (°C)		25	24	25	25	25	24	25			
Conc.:	75%										
pH		8.0	8.0	8.2	8.1	8.2	8.1	8.0			
D.O. (mg/L)		6.3	6.1	6.5	6.6	6.3	6.4	6.2			
Temp (°C)		26	24	25	25	25	24	26			
Conc.:	100%							219			* conductivity
pH		8.0	7.9	8.0	7.9	8.0	8.0	7.8			
D.O. (mg/L)		6.4	6.4	6.5	6.5	6.6	6.3	6.2			
Temp (°C)		26	25	25	25	24	25	25			
Conc.:											
pH											
D.O. (mg/L)											
Temp (°C)											
Date:		7/9/14	7/10/14	7/11/14	7/12/14	7/13/14	7/14/14	7/15/14			
Time:		1625	1455	1135	1445	1410	1705	1615			
Initials:		KB	MJ	MJ	KB	KB	MW	[illegible]			

①AR 7/23/14 E

QA Form No. 055
Revision 3
Effective 02/14

AR 7/21/14
QA: AR 7/21/14

DAILY TOXICITY TEST LOG

Project Number:	14001-412-019
Test Species:	***Ceriodaphnia dubia***

General Comments	Neonates obtained from 070114 HT cerio monoculture board (Black marked cups) Random Chart: Nova	Feeding 0.2 ml YTC/ALG Daily	Initials/Date
Test Day 0	Test Solution Mixed at: 1850 Test Organisms Added at: 1910	Fed @ 1850	mt/RR 7/8/14
Test Day 1	CT= 25.4 °C Range = 24.8 - 25.8 °C	Fed @ 1610	KB 7/9/14
Test Day 2	CT=25.4 °C Range = 24.8 - 25.8 °C	Fed @ ~~1610~~ 1445	mt 7/10/14
Test Day 3	CT=25.4 °C Range = 25.0 - 25.8 °C	Fed @ 1125	mt 7/11/14
Test Day 4	CT= 25.2 °C Range = 24.8 - 25.8 °C	Fed @ 1430	AB 7/12/14
Test Day 5	CT= 25.4 °C Range = 25.0 - 25.8 °C	Fed @ 1335	KB 7/13/14
Test Day 6	CT= 25.4 °C Range = 25.0 - 25.8 °C	Fed @ 1700	MW 7/14/14
Test Day 7	CT= 25.4 °C Range = 24.8 - 25.8 °C	Fed @ None	AR 7/15/14
Test Day 8	CT= °C Range = °C	NONE	

DKB 7/9/14 MP

CETIS Analytical Report

Report Date: 19 Jul-14 15:18 (p 1 of 2)
Test Code: 412-019 | 18-3003-2366

Ceriodaphnia 7-d Survival and Reproduction Test — TRE Environmental Strategies, LLC

Analysis ID:	01-7290-7076	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	19 Jul-14 15:17	**Analysis:**	Single 2x2 Contingency Table	**Official Results:**	Yes

Batch ID:	20-1743-3154	**Test Type:**	Reproduction-Survival (6-8d)	**Analyst:**	Lab Tech
Start Date:	08 Jul-14 19:10	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	15 Jul-14 16:30	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	6d 21h	**Source:**	In-House Culture	**Age:**	<24

Sample ID:	19-5615-3682	**Code:**	74988952	**Client:**	Sumitomo Mining (Pogo)
Sample Date:	07 Jul-14 07:00	**Material:**	Ambient Sample	**Project:**	WET Annual Compliance Test
Receive Date:	08 Jul-14 18:35	**Source:**			
Sample Age:	36h	**Station:**			

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

Fisher Exact Test

Control	vs	C-%	Test Stat	P-Value	P-Type	Decision(α:5%)
Dilution Water		12.5	0.2368	0.2368	Exact	Non-Significant Effect
		25	0.5	0.5000	Exact	Non-Significant Effect
		50	0.2368	0.2368	Exact	Non-Significant Effect
		75	0.5	0.5000	Exact	Non-Significant Effect
		100	1	1.0000	Exact	Non-Significant Effect

Data Summary

C-%	Control Type	NR	R	NR + R	Prop NR	Prop R	%Effect
0	Dilution Water	10	0	10	1	0	0.0%
12.5		8	2	10	0.8	0.2	20.0%
25		9	1	10	0.9	0.1	10.0%
50		8	2	10	0.8	0.2	20.0%
75		9	1	10	0.9	0.1	10.0%
100		10	0	10	1	0	0.0%

7d Survival Rate 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	1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	0	0	1	1	1
25		1	0	1	1	1	1	1	1	1	1
50		1	1	1	0	1	1	1	0	1	1
75		1	1	1	1	1	1	0	1	1	1
100		1	1	1	1	1	1	1	1	1	1

7d Survival Rate Binomials

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	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	0/1	0/1	1/1	1/1	1/1
25		1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1 ①	1/1 ①	1/1
50		1/1	1/1	1/1	0/1	1/1	1/1	1/1	~~0/1~~ 1/1	~~1/1~~ 0/1	1/1
75		1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

① AR for RBN 7/21/14 WP

Analyst: RBN QA: AR 7/21/14

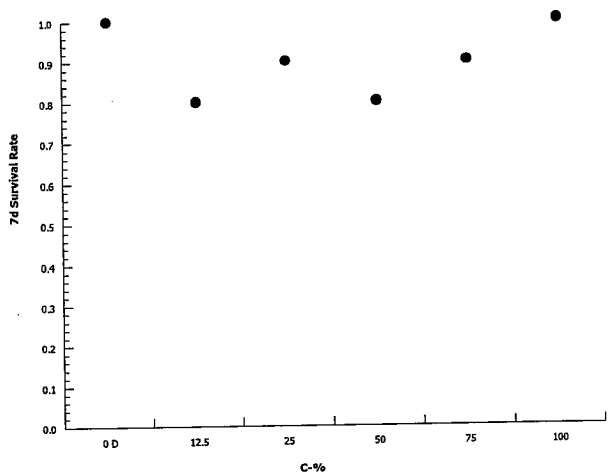
CETIS Analytical Report

Report Date: 19 Jul-14 15:18 (p 2 of 2)
Test Code: 412-019 | 18-3003-2366

Ceriodaphnia 7-d Survival and Reproduction Test — **TRE Environmental Strategies, LLC**

Analysis ID:	01-7290-7076	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	19 Jul-14 15:17	**Analysis:**	Single 2x2 Contingency Table	**Official Results:**	Yes

Graphics



CETIS Analytical Report

Report Date: 19 Jul-14 15:24 (p 1 of 2)
Test Code: 412-019 | 18-3003-2366

Ceriodaphnia 7-d Survival and Reproduction Test — TRE Environmental Strategies, LLC

Analysis ID:	18-8813-9228	**Endpoint:**	7d Reproduction	**CETIS Version:**	CETISv1.8.7
Analyzed:	19 Jul-14 15:23	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	20-1743-3154	**Test Type:**	Reproduction-Survival (6-8d)	**Analyst:**	Lab Tech
Start Date:	08 Jul-14 19:10	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	15 Jul-14 16:30	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	6d 21h	**Source:**	In-House Culture	**Age:**	<24
Sample ID:	19-5615-3682	**Code:**	74988952	**Client:**	Sumitomo Mining (Pogo)
Sample Date:	07 Jul-14 07:00	**Material:**	Ambient Sample	**Project:**	WET Annual Compliance Test
Receive Date:	08 Jul-14 18:35	**Source:**			
Sample Age:	36h	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	21.6%	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	93.5	75	3	18	0.4745	Asymp	Non-Significant Effect
		25	112	75	6	18	0.9455	Asymp	Non-Significant Effect
		50	112.5	75	4	18	0.9503	Asymp	Non-Significant Effect
		75	96	75	2	18	0.5631	Asymp	Non-Significant Effect
		100	109	75	3	18	0.9082	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	409.7333	81.94666	5	1.225	0.3103	Non-Significant Effect
Error	3613.2	66.91111	54			
Total	4022.933		59			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	15.45	15.1	0.0086	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.9068	0.946	0.0002	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	38.8	35.94	41.66	37.5	32	46	1.263	10.3%	0.0%
12.5		10	31.5	22.71	40.29	36	15	45	3.885	39.0%	18.8%
25		10	38.3	33.05	43.55	40	20	46	2.319	19.1%	1.29%
50		10	38.9	35.91	41.89	39.5	29	44	1.32	10.7%	-0.26%
75		10	35.3	28.59	42.01	37.5	15	48	2.967	26.6%	9.02%
100		10	36	29.79	42.21	39	18	44	2.745	24.1%	7.22%

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	41	37	37	39	46	44	37	32	38	37
12.5		45	15	43	34	39	15	18	44	24	38
25		39	34	37	44	41	20	46	43	38	41
50		39	40	41	36	44	40	39	43	29	38
75		39	24	35	41	40	48	15	40	36	35
100		41	38	18	38	38	44	41	22	40	40

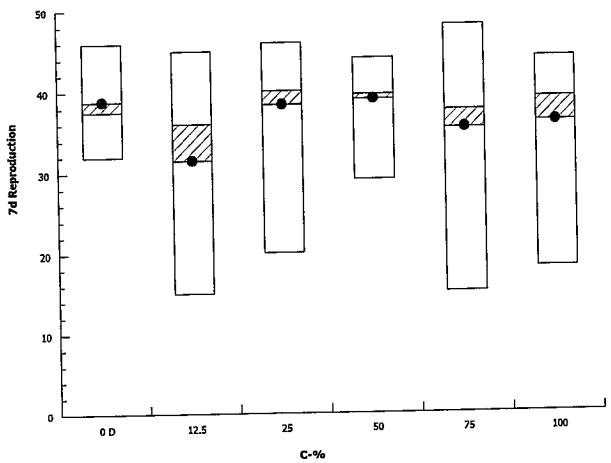
CETIS Analytical Report

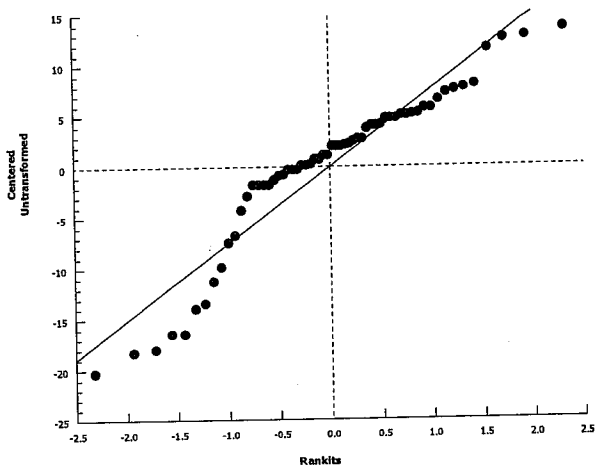
Report Date: 19 Jul-14 15:24 (p 2 of 2)
Test Code: 412-019 | 18-3003-2366

Ceriodaphnia 7-d Survival and Reproduction Test — **TRE Environmental Strategies, LLC**

Analysis ID:	18-8813-9228	**Endpoint:**	7d Reproduction	**CETIS Version:**	CETISv1.8.7
Analyzed:	19 Jul-14 15:23	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Report Date: 19 Jul-14 15:24 (p 1 of 2)
Test Code: 412-019 | 18-3003-2366

Ceriodaphnia 7-d Survival and Reproduction Test — TRE Environmental Strategies, LLC

Analysis ID:	17-9013-5034	**Endpoint:**	7d Reproduction	**CETIS Version:**	CETISv1.8.7
Analyzed:	19 Jul-14 15:24	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	20-1743-3154	**Test Type:**	Reproduction-Survival (6-8d)	**Analyst:**	Lab Tech
Start Date:	08 Jul-14 19:10	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	15 Jul-14 16:30	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	6d 21h	**Source:**	In-House Culture	**Age:**	<24

Sample ID:	19-5615-3682	**Code:**	74988952	**Client:**	Sumitomo Mining (Pogo)
Sample Date:	07 Jul-14 07:00	**Material:**	Ambient Sample	**Project:**	WET Annual Compliance Test
Receive Date:	08 Jul-14 18:35	**Source:**			
Sample Age:	36h	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1379989	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	6.151	1.38	N/A	16.26	NA	72.47
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

7d Reproduction Summary

			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	10	38.8	32	46	1.263	3.994	10.3%	0.0%
12.5		10	31.5	15	45	3.885	12.29	39.0%	18.8%
25		10	38.3	20	46	2.319	7.334	19.1%	1.29%
50		10	38.9	29	44	1.32	4.175	10.7%	-0.26%
75		10	35.3	15	48	2.967	9.381	26.6%	9.02%
100		10	36	18	44	2.745	8.679	24.1%	7.22%

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	41	37	37	39	46	44	37	32	38	37
12.5		45	15	43	34	39	15	18	44	24	38
25		39	34	37	44	41	20	46	43	38	41
50		39	40	41	36	44	40	39	43	29	38
75		39	24	35	41	40	48	15	40	36	35
100		41	38	18	38	38	44	41	22	40	40

Analyst: VSN QA: AR 7/21/14

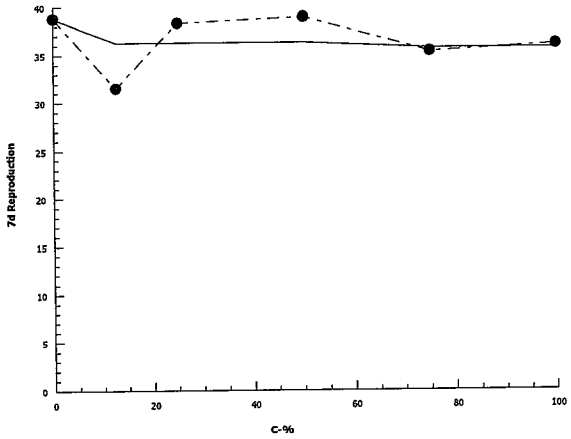
CETIS Analytical Report

Report Date: 19 Jul-14 15:24 (p 2 of 2)
Test Code: 412-019 | 18-3003-2366

Ceriodaphnia 7-d Survival and Reproduction Test — **TRE Environmental Strategies, LLC**

Analysis ID:	17-9013-5034	**Endpoint:**	7d Reproduction	**CETIS Version:**	CETISv1.8.7
Analyzed:	19 Jul-14 15:24	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



TRE

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

Project ID: 14001-412-020
July 2014

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 4303 West LaPorte Ave. Fort Collins, CO 80521 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	Ashley Romero, M.S. (970) 416-0916 email: romeroam.tre@gmail.com

Test Information

Test	Short-Term Chronic under Static-Renewal Conditions
Basis	USEPA (2002), method 1000.0
Test Dates and Time	July 8, 2014 @ 1930 to July 15, 2014 @ 1700
Test Length	7 days
Species	*Pimephales promelas*
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	__X__ **Pass** ____ 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	07/07/14 @ 0700	27939	07/08/14	3.9
2	N/A	07/09/14 @ 0700	27947	07/10/14	3.2
3	N/A	07/11/14 @ 0930	27953	07/12/14	2.4

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	7.3	64	35	202	<0.02	1.2
2	7.2	70	36	193	<0.02	<1.0
3	7.4	66	37	206	0.03	<1.0

[a] As $CaCO_3$
[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)[c]
11191	8.4	88	60	313	<0.02	<1.0

[a] As $CaCO_3$
[b] Total residual chlorine
[c] Measured on source water

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	*Pimephales promelas*
Age	<24 hours
Source	TRE in-house culture, batch 070814
Acclimation	Test temperature
Feeding	0.10 ml concentrated suspension of brine shrimp (*Artemia* sp.) nauplii per test chamber three times daily during the test.
Reference Toxicant Testing	Initiated July 7, 2014 using sodium chloride (NaCl)

TEST RESULTS

Biological Data

Treatment (% Effluent)	Percent Survival of *Pimephales promelas*								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)	95	95	95	95	95	95	92.5	0.529	N/A	N/A
12.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	0.535	No	No
25	97.5	97.5	97.5	97.5	97.5	97.5	97.5	0.494	No	No
50	95	95	95	95	95	92.5	92.5	0.531	No	No
75	97.5	97.5	97.5	97.5	97.5	97.5	95	0.581	No	No
100	95	95	95	95	95	95	95	0.530	No	No
Percent Minimum Significant Difference (Growth)								16.9	Acceptable	

[a] Mean dry weight calculated based on the original number of organisms per replicate (mean dry weight per surviving organism in the control treatment was 0.571 mg)
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
IC_{25} = 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	8.4	4.7	6.8	285	341	24	26
100	7.2	7.6	4.1	6.9	193	215	24	25
All Treatments	7.2	8.4	≥4.1		NA		24[a]	26[a]
							24.8[b]	25.8[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
1,101	940	1,314

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.

Anita Rehner — July 29, 2014
Quality Assurance Unit — Date

7/29/14
Data Analyst — Date

APPENDIX A

Chain of Custody Records

AECOM ① TRE (019-020)

CHAIN OF CUSTODY RECORD

Client/Project Name: Sumitomo Metal Mining

Project Location: TRE

Project Number: 14001 - 412

Field Logbook No.:

Sampler (Print Name)/(Affiliation):

Chain of Custody Tape Nos.: 44779 (intact)

Signature:

Send Results/Report to:

TAT:

Analysis Requested: Cyanide

Container Type: P – Plastic; A – Amber Glass; G – Clear Glass; V – VOA Vial; O – Other; E – Encore

Preservation: 1 – HCl, 4°; 2 – H2SO4, 4°; 3 – HNO3, 4°; 4 – NaOH, 4°; 5 – NaOH/ZnAc, 4°; 6 – Na2S2O3, 4°; 7 – 4°

Matrix Codes: DW – Drinking Water; WW – Wastewater; GW – Groundwater; SW – Surface Water; ST – Storm Water; W – Water; S – Soil; SL – Sludge; SD – Sediment; SO – Solid; A – Air; L – Liquid; P – Product

Field Sample No./Identification	Date	Time	COMP	GRAB	Sample Container (Size/Mat'l)	Matrix	Preserv.	Field Filtered	Cyanide	Lab I.D.	Remarks
Eff 1 #1	7/7/14	0700			2.5gal	L	Ice		X	27939	
" "	7/7/14	0700			1gal	L	Ice		X		

Relinquished by: (Print Name)/(Affiliation)	Date	Received by: (Print Name)/(Affiliation)	Date	Analytical Laboratory (Destination)
Lloyd G Hamm Signature:	7/7/14 Time:	Jeff A. Hiller Pozo LLC Signature:	7/7/14 Time: 1100	Rec. on ice temp = 3.9°C (L-4) TRE ① ~~AECOM Toxicology Lab~~ 4303 W. Laporte Avenue Fort Collins, CO 80521 (970) 416-0916 (970) 490-2963 (FAX)
Relinquished by: (Print Name)/(Affiliation) Signature:	Date: Time:	Received by: (Print Name)/(Affiliation) Amber Potts/TRE Signature: Amber Potts	Date: 7/8/14 Time: 1935	
Relinquished by: (Print Name)/(Affiliation) Signature:	Date: Time:	Received by: (Print Name)/(Affiliation) Signature:	Date: Time:	Sample Shipped Via: UPS FedEx ~~Courier~~ Other Temp blank: Yes ~~No~~

① KS 5/29/14 E

Q:\GRAPHICS\FORMS\Chain of Custody (COC)\Chain-of-Custody_Ft. Collins_10_07.doc

Serial No. № 0415

TRE

AECOM ① (019 - 020)

CHAIN OF CUSTODY RECORD

Client/Project Name: Sumitomo metal mining

Project Location: TRE

Project Number: 14001 - 412

Field Logbook No.:

Sampler (Print Name)/(Affiliation): Leonard Z Hanson Tech Simmons

Chain of Custody Tape Nos.: 44778 intact

Signature: Leonard Z Hanson

Send Results/Report to:

TAT:

Analysis Requested: CLP

Container Type: P – Plastic; A – Amber Glass; G – Clear Glass; V – VOA Vial; O – Other; E – Encore

Preservation: 1 – HCl, 4°; 2 – H2SO4, 4°; 3 – HNO3, 4°; 4 – NaOH, 4°; 5 – NaOH/ZnAc, 4°; 6 – Na2S2O3, 4°; 7 – 4°

Matrix Codes: DW – Drinking Water; WW – Wastewater; GW – Groundwater; SW – Surface Water; ST – Storm Water; W – Water; S – Soil; SL – Sludge; SD – Sediment; SO – Solid; A – Air; L – Liquid; P – Product

Field Sample No./Identification	Date	Time	COMP	GRAB	Sample Container (Size/Mat'l)	Matrix	Preserv.	Field Filtered	CLP	Lab I.D.	Remarks
Eff 1 #2	7/9/14	0700			2.5 gal	L	Ice		X	27947	
" "					1 gal	L	"		X		

Relinquished by: (Print Name)/(Affiliation)	Date	Received by: (Print Name)/(Affiliation)	Date
Leonard Z Hanson	7/9/14	Jeff A. Hiller	7/9/14
Signature:	Time: 1700	Signature:	Time: 1100
Relinquished by: (Print Name)/(Affiliation)	Date:	Received by: (Print Name)/(Affiliation) Ashley Romero (TLA)	Date: 7/10/14
Signature:	Time:	Signature:	Time: 1300
Relinquished by: (Print Name)/(Affiliation)	Date:	Received by: (Print Name)/(Affiliation)	Date:
Signature:	Time:	Signature:	Time:

Analytical Laboratory (Destination): Received on ice @ 3.2°C

~~AECOM Toxicology Lab~~ ① TRE
4303 W. Laporte Avenue
Fort Collins, CO 80521
(970) 416-0916
(970) 490-2963 (FAX) (L-4)

Sample Shipped Via: UPS FedEx Courier Other

Temp blank: Yes No

DMB 5/29/14G

Q:\GRAPHICS\FORMS\Chain of Custody (COC)\Chain-of-Custody_Ft. Collins_10_07.doc

Serial No.№ 0418

TRE

AECOM ① (019-020)

CHAIN OF CUSTODY RECORD

Client/Project Name: Sumitomo metal mining

Project Location: TRE

Project Number: 14001-412

Field Logbook No.:

Sampler (Print Name)/(Affiliation):

Chain of Custody Tape Nos.: In tact 44777

Signature:

Send Results/Report to:

TAT:

Analysis Requested: 4 4 4

Container Type: P – Plastic; A – Amber Glass; G – Clear Glass; V – VOA Vial; O – Other; E – Encore

Preservation: 1 – HCl, 4°; 2 – H2SO4, 4°; 3 – HNO3, 4°; 4 – NaOH, 4°; 5 – NaOH/ZnAc, 4°; 6 – Na2S2O3, 4°; 7 – 4°

Matrix Codes: DW – Drinking Water; WW – Wastewater; GW – Groundwater; SW – Surface Water; ST – Storm Water; W – Water; S – Soil; SL – Sludge; SD – Sediment; SO – Solid; A – Air; L – Liquid; P – Product

Field Sample No./Identification	Date	Time	COMP	GRAB	Sample Container (Size/Mat'l)	Matrix	Preserv.	Field Filtered										Lab I.D.	Remarks
Effl #3	7-11-14	0930		X	2.5gal	L	Ice	NO	X									27953	
" "	"	0930		X	1gal	L	"	NO	X										

Relinquished by: (Print Name)/(Affiliation) Stacy Staley - TRE ①
Signature: Stacy Staley
Date: 7-11-14
Time:

Received by: (Print Name)/(Affiliation) Jeff A. Hiler
Signature: [illegible]
Date: 7/11/14
Time: 1030

Relinquished by: (Print Name)/(Affiliation) Jeff A. Hiler
Signature: [illegible]
Date: 7/11/14
Time: 1415

Received by: (Print Name)/(Affiliation) Robyn Ray/TRE
Signature: [illegible]
Date: 7/12/14
Time: 1315

Relinquished by: (Print Name)/(Affiliation)
Signature:
Date:
Time:

Received by: (Print Name)/(Affiliation)
Signature:
Date:
Time:

Analytical Laboratory (Destination): Received on ice @ 2.4°C (2-4) ① TRE

~~AECOM Toxicology Lab~~
4303 W. Laporte Avenue
Fort Collins, CO 80521
(970) 416-0916
(970) 490-2963 (FAX)

Sample Shipped Via: UPS FedEx Courier Other

Temp blank: Yes No

① JB 5/29/14 E

Serial No. № 0417

APPENDIX B

Test Data

QA Form No. 051
Revision 5
Effective 02/14

QA: AR 7/23/14
RM 7/23/14

TOXICITY DATA PACKAGE COVER SHEET

Test Type: Chronic

Project Number: 14001-412-020

Test Substance: Effluent-(Outfall 001)

Species: *Pimephales promelas*

Dilution Water Type: Mod Hard (MQMH)

Organism Lot or Batch Number: 070814

Concurrent Control Water Type: NA

Age: <24hrs (< 24 hr) Supplier: TRE

Date and Time Test Began: 7/8/14 @ 1930

Date and Time Test Ended: 7/15/14 @ 1700

Protocol Number: USEPA 2002, Method 1000.0

Investigator(s): R/RR/MT/AB/RB/MW

Background Information

pH control?: Yes No

If yes, give % CO_2: N/A

Type of Test: Static-Renewal

Test Temperature: 25 ± 1 °C

Env. Chmbr/Bath #: 21

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 NH_3: 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: 7/7/14 to 7/14/14 IC_{25}: 1.01 mg/L CT

Hist. 95% Control Limits: 940 to 1,314 Method for Determining Ref. Tox. Value: Lin. Interp.

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: R Date: 7/7/14

TEST SUBSTANCE USAGE LOG

Project Number: 14001-412-020

QA: AR 7/23/14

	Sample 1	Sample 2	Sample 3	Sample 4
Test Substance Number	27939	27947	27953	
Test Substance Collection Date and Time	From: @	From: @	From: @ NA	From: @
	To: 7/07/14 @ 0700	To: 7/09/14 @ 0700	To: 7/11/14 @ 0930	To: @
Sample Type (Grab or Comp)	unknown	unknown	Grab	
Date Test Substance Received	7/8/14	7/10/14	7/12/14	
Dilution Water Number RW# or TRE#, circle one	11191	11192	11192	
Concurrent Control Water RW#	NA	NA	NA	
Date(s) Used ①	7/8/14	7/10/14	7/12/14	
	7/9/14	7/11/14	7/13/14	
	~~7/10/14~~		7/14/14	

① MT 7/10/14 WP

Preparation of Test Solutions

Test Substance Conc. (% Effluent)	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	1000	1000			
12.5%	150	1050	1200	125	875	1000			
25%	300	900	1200	250	750	1000			
50%	600	600	1200	500	500	1000			
75%	900	300	1200	750	250	1000			
100%	1200	0	1200	1000	0	1000			
Total	3150	4050	7200	2625	3375	6000			

Initials / Date		⊛ 7/8/14	
Initials / Date		RR 7/9/14	
Initials / Date		MT 7/10/14	
Initials / Date		AB 7/11/14	
Initials / Date		RR 7/12/14	
Initials / Date		KB 7/13/14	
Initials / Date		MW 7/14/14	
Initials / Date			

① AR 7/23/14 TB

FATHEAD MINNOW (*PIMEPHALES PROMELAS*)
CHRONIC BIOLOGICAL DATA

7/23/14

Project Number: 14001-412-020

QA: 7/17/14

%Conc.	Test Replicate	Number of Surviving Organisms Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	% survival Remarks
0 (MH)	A	10	10	10	10	10	10	10	9	
	B	10	9	9	9	9	9	9	9	92.5
	C	10	9	9	9	9	9	9	9	
	D	10	10	10	10	10	10	10	10	
12.5%	A	10	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	10	97.5
	C	10	9	9	9	9	9	9	9	
	D	10	10	10	10	10	10	10	10	
25%	A	10	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	10	97.5
	C	10	9	9	9	9	9	9	9	
	D	10	10	10	10	10	10	10	10	
50%	A	10	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	9	9	92.5
	C	10	8	8	8	8	8	8	8	
	D	10	10	10	10	10	10	10	10	
75%	A	10	10	10	10	10	10	10	10	
	B	10	9	9	9	9	9	9	9	95
	C	10	10	10	10	10	10	10	9	
	D	10	10	10	10	10	10	10	10	
100%	A	10	9	9	9	9	9	9	9	
	B	10	9	9	9	9	9	9	9	95
	C	10	10	10	10	10	10	10	10	
	D	10	10	10	10	10	10	10	10	
	A									
	B									
	C									
	D									
Date:		7/8/14	7/9/14	7/10/14	7/11/14	7/12/14	7/13/14	7/14/14	7/15/14	
Time:		1930	1630	1535	1115	1455	1105	1150	1700	
Initials:		[illegible]	RR	MK	AJ	RR	KS	MW	RR	

QA: AR 7/23/14
AR 7/28/14

CHRONIC CHEMICAL DATA (INITIAL)

Project Number: 14001-412-020

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	8.4	8.3	8.3	8.3	8.3	8.4	8.4		Fm21	
D.O. (mg/L)	6.5	6.6	6.5	6.5	6.6	6.7	6.8		5	
Temp. (°C)	25	25	25	25	~~26~~ 25	25	25		L-17	
Cond. (µS/cm)	313	309	316	285	325	314	309		15	
Hard. (mg/L) ③	~~8488~~		92		~~9088~~ ④				Titr.	
Alk. (mg/L) ③	~~5160~~		63		~~6062~~ ④				Titr.	
TRC (mg/L)	(7/7) <0.02		(7/8) <0.02						21	
NH_3 (mg/L) **	<1.0		<1.0						HA#1	
Conc.: 12.5%										
pH	8.2	8.2	8.2	8.3	8.2	8.3	8.3			
D.O. (mg/L)	6.5	6.6	6.5	6.4	6.6	6.6	6.8			
Temp. (°C)	*	*	*	*	*	*	*			
Cond. (µS/cm)	298	294	306	294	309	310	304			
Hard. (mg/L)										
Alk. (mg/L)										
TRC (mg/L)										
NH_3 (mg/L)										
Conc.: 25%										
pH	8.1	8.1	8.0	8.2	8.1	8.2	8.2			
D.O. (mg/L)	6.6	6.6	6.5	6.4	6.7	6.6	6.8			
Temp. (°C)	*	*	*	*	*	*	*			
Cond. (µS/cm)	286	278	291	283	292	284	298			
Conc.: 50%					7.9 ②					
pH	7.8	7.9	7.7	8.0	~~8.0~~	8.0	7.9			
D.O. (mg/L)	6.6	6.6	6.5	6.6	6.7	6.6	6.8			
Temp. (°C)	*	*	*	*	*	*	*			
Cond. (µS/cm)	259	253	259	257	238	264	265			
Date:	7/8/14	7/9/14	7/10/14	7/11/14	7/12/14	7/13/14	7/14/14			
Time:	1905	1605	1525	1050	1435	1045	1120			
Initials:	RR	RR	MJ	AB	RR	RB	MN			

Note: Hardness, alkalinity, TRC, and NH3 data appearing on this page have been transcribed from the wet chemistry log QA Form No. 084. ① RR 7/12/14 WD ② RR 7/12/14 E ③ AR for RR 7/22/14 E

*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. ④ AR for RR 7/22/14 E

** Measured in source water

QA - AR 7/23/14
AR 7/20/14

CHRONIC CHEMICAL DATA (INITIAL)

Project Number: 14001-412-020

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	7.5	7.7	7.5	7.7	7.7	7.8	7.7			
D.O. (mg/L)	6.6	6.6	6.5	6.7	6.8	6.7	6.5			
Temp. (°C)	*	*	*	*	*	*	*			
Cond. (µS/cm)	231	224	226	224	235	235	234			
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	7.3	7.5	7.2	7.5	7.4	7.6	7.5			
D.O. (mg/L)	6.7	6.6	6.6	6.7	6.8	6.7	6.9			
Temp. (°C)	25	25	25	25	25	25	25			
Cond. (µS/cm)	202	197	193	193	206	207	207			
Hard. (mg/L)	64		70		66					
Alk. (mg/L)	35		36		37					
TRC (mg/L)	<0.02		<0.02		0.03					
NH_3 (mg/L)	1.18		<1.0		<1.0				HSA	
Date:	7/8/14	7/9/14	7/10/14	7/11/14	7/12/14	7/13/14	7/14/14			
Time:	1905	1605	1525	1050	1435	1045	1120			
Initials:	RR	RR	MY	AS	RR	KB	MW			

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

DMW 7/14/14

*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 No. 059
Revision 3
Effective 02/14

QA: AR 7/23/14
A 7/20/14

CHRONIC CHEMICAL DATA (FINAL)

Project Number:	14001-412-020
Test Species:	*Pimephales promelas*

%	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Meter #	Remarks
Conc.: 0 (MH)							341		All Conc.	* conductivity
pH	7.6	7.5	7.7	7.5	7.7	7.6	7.8		Fm21	
D.O. (mg/L)	5.4	5.1	5.2	5.6	4.7	~~[illegible]~~ 5.1	5.7		5	
Temp (°C)	25	25	25	26	24	25	24		L17	
Conc.: 12.5%										
pH	7.6	7.4	7.7	7.4	7.7	7.7	7.6			
D.O. (mg/L)	5.1	4.5	5.0	5.2	4.7	4.7	5.0			
Temp (°C)	25	24	25	24	24	25	25			
Conc.: 25%										
pH	7.6	7.4	7.7	7.4	7.6	7.6	7.6			
D.O. (mg/L)	5.0	4.4	5.0	5.1	4.3	5.4	4.8			
Temp (°C)	25	24	25	25	24	25	25			
Conc.: 50%										
pH	7.6	7.3	7.6	7.4	7.5	7.5	7.5			
D.O. (mg/L)	5.3	4.5	5.2	5.1	4.3	5.0	4.6			
Temp (°C)	25	25	24	25	25	24	25			
Conc.: 75%										
pH	7.5	7.2	7.6	7.3	7.4	7.5	7.4			
D.O. (mg/L)	5.1	4.4	4.9	5.0	4.3	4.7	4.4			
Temp (°C)	25	25	25	25	25	25	25			
Conc.: 100%							215			* conductivity
pH	7.4	7.2	7.5	7.3	7.4	7.4	7.3			
D.O. (mg/L)	5.1	4.5	5.1	5.0	4.8	5.2	4.1			
Temp (°C)	25	25	25	25	24	24	25			
Conc.:										
pH										
D.O. (mg/L)										
Temp (°C)										
Date:	7/9/14	7/10/14	7/11/14	7/12/14	7/13/14	7/14/14	7/15/14			
Time:	1600	1525	1050	1435	1030	1115	1630			
Initials:	RR	MT	AS	RR	KS	MW	RR			

① MW 7/14/14

QA Form No. 055
Revision 3
Effective 02/14

DAILY TOXICITY TEST LOG

A 7/23/14
QA: AR 7/23/14

Project Number:	14001-412-020
Test Species:	***Pimephales promelas***

General Comments	Random Chart: Zeta			Feeding 0.1 ml B.S. 3 x Daily	Initials/Date
Test Day 0	Test Solution Mixed at: 1900 Test Organisms Added at: 1930			Fed @ 1935 MT	7/8/14
Test Day 1	CT= 25.4 °C	Range = 24.8 - 25.8	°C	Fed @ 0825 RR 1155 MW 1655 RR	RR 7/9/14
Test Day 2	CT= 25.4 °C	Range = 24.8 - 25.8	°C	Fed @ 0825 MT 1155 MW 1655 MT	MT 7/10/14
Test Day 3	CT= 25.4 °C	Range = 25.0 - 25.8	°C	Fed @ 0820 MT 1155 RR 1655 RR	AB 7/11/14
Test Day 4	CT= 25.2 °C	Range = 24.8 - 25.8	°C	Fed @ 0830 RB 1155 RB 1700 RR	RR 7/12/14
Test Day 5	CT= 25.4 °C	Range = 25.0 - 25.8	°C	Fed @ 0825 MW 1200 MW 1805 MW	KB 7/13/14
Test Day 6	CT= 25.4 °C	Range = 250 - 25.8	°C	Fed @ 0830 RB 1200 MW 1825 AR	MW 7/14/14
Test Day 7	CT= 25.4 °C	Range = 24.8 - 25.8	°C	NONE	RR 7/15/14
Test Day 8					

QA Form No.010
Revision 6
Effective 02/14
A 7/20/14
QA: AKT 7/17/14

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 14001-412-020
Species: P. promelas
Date/Time of Tare Wt.: 7/15/14 @1500

Test Substance: Effluent
Analyst Tare: AB Analyst Gross: RR
Date/Time of Gross Wt.: 7/16/14 @ 1435

Comments:
Analytical Balance ID: SMRT#1
Dried in Oven # 2 from Date: 7/15/14 Time: 1715
to Date: 7/16/14 Time: 1015

Weight Type (Circle): Wet Blot Dry Dry (>100°C) AFDW (>500°C)
Lot or Batch Number: 070814

Boat No.	Treatment	Rep.	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	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)
	MH	A		0.93997	0.94486	0.00489					9		
		B		0.93833	0.94303	0.00470					9		
		C		0.94295	0.94831	0.00536					9		
		D		0.94114	0.94736	0.00622					10		
	12.5%	A		0.94366	0.94908	0.00542					10		
		B		0.94489	0.95010	0.00521					10		
		C		0.93925	0.94419	0.00494					9		
		D		0.94362	0.~~93857~~ 4945 ①	0.00583					10		
	25%	A		0.93842	0.94335	0.00493					10		
		B		0.94005	0.94518	0.00513					①~~9~~ 10		
		C		0.94306	0.94770	0.00464					①~~10~~ 9		
		D		0.94384	0.94888	0.00504					10		
Blank				0.93861	0.938862	+0.00001							
Range													
Mean													

Test Solution Volume:
Loading Rate:

[1] Add in weight loss of blank boat, if appropriate.

①RR 7/16/14

QA Form No.010
Revision 6
Effective 02/14
2/23/14
QA: AR 7/17/14

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 14001-412-020
Species: P. promelas
Date/Time of Tare Wt.: 7/15/14 @1500

Test Substance: Effluent
Analyst Tare: AS Analyst Gross: RR
Date/Time of Gross Wt.: 7/16/14 @ 1435

Comments:
Analytical Balance ID: SART #
Dried in Oven # 2 from Date: 7/15/14 Time: 1715
to Date: 7/16/14 Time: 1015

Weight Type (Circle): Wet Blot Dry Dry (>100°C) AFDW (>500°C)
Lot or Batch Number: 070814

Boat No.	Treatment	Rep.	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	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)
	50%	A		0.93921	0.94510	0.00589					10		
		B		0.94193	0.94681	0.00488					9		
		C		0.94240	0.94707	0.00467					8		
		D		0.94423	0.95002	0.00579					10		
	75%	A		0.93977	0.94512	0.00535					10		
		B		0.94060	0.94641	0.00581					9		
		C		0.94612	0.95159	0.00547					9		
		D		0.94732	0.95394	0.00662					10		
	100%	A		0.94283	0.94815	0.00532					9		
		B		0.94467	0.95053	0.00586					9		
		C		0.94216	0.94671	0.00455					10		
		D		0.93947	0.94492	0.00545					10		
Blank													
Range													
Mean													

Test Solution Volume:
Loading Rate:

[1] Add in weight loss of blank boat, if appropriate.

① ~~FCETL~~ QA Form No. 010a
Revision 0
Effective 10/06

WMC
QA: AR 7/17/14

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 14001-412-020 Species: Fathead minnow

Treatment	Rep	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)	No of Orig. Organisms	Mean Wt./ Original Organism (mg)	Mean Wt./ Treatment (mg) (Original)	Number of Surv. Organisms	Mean Wt./ Surviving Organism (mg)	Mean Wt./ Treatment (mg) (Surviving)
MH	A		0.93997	0.94486	0.00489	0.00489	10	0.489	0.5293	9	0.543	0.5708
	B		0.93833	0.94303	0.00470	0.00470	10	0.470		9	0.522	
	C		0.94295	0.94831	0.00536	0.00536	10	0.536		9	0.596	
	D		0.94114	0.94736	0.00622	0.00622	10	0.622		10	0.622	
12.5%	A		0.94366	0.94908	0.00542	0.00542	10	0.542	0.5350	10	0.542	0.5487
	B		0.94489	0.95010	0.00521	0.00521	10	0.521		10	0.521	
	C		0.93925	0.94419	0.00494	0.00494	10	0.494		9	0.549	
	D		0.94362	0.94945	0.00583	0.00583	10	0.583		10	0.583	
25%	A		0.93842	0.94335	0.00493	0.00493	10	0.493	0.4935	10	0.493	0.5064
	B		0.94005	0.94518	0.00513	0.00513	10	0.513		10	0.513	
	C		0.94306	0.94770	0.00464	0.00464	10	0.464		9	0.516	
	D		0.94384	0.94888	0.00504	0.00504	10	0.504		10	0.504	
50%	A		0.93921	0.94510	0.00589	0.00589	10	0.589	0.5307	10	0.589	0.5735
	B		0.94193	0.94681	0.00488	0.00488	10	0.488		9	0.542	
	C		0.94240	0.94707	0.00467	0.00467	10	0.467		8	0.584	
	D		0.94423	0.95002	0.00579	0.00579	10	0.579		10	0.579	
75%	A		0.93977	0.94512	0.00535	0.00535	10	0.535	0.5813	10	0.535	0.6126
	B		0.94060	0.94641	0.00581	0.00581	10	0.581		9	0.646	
	C		0.94612	0.95159	0.00547	0.00547	10	0.547		9	0.608	
	D		0.94732	0.95394	0.00662	0.00662	10	0.662		10	0.662	
100%	A		0.94283	0.94815	0.00532	0.00532	10	0.532	0.5295	9	0.591	0.5606
	B		0.94467	0.95053	0.00586	0.00586	10	0.586		9	0.651	
	C		0.94216	0.94671	0.00455	0.00455	10	0.455		10	0.455	
	D		0.93947	0.94492	0.00545	0.00545	10	0.545		10	0.545	
Blank			0.93861	0.93862	0.00001							

① AR 7/17/14 NA

① ~~FCETL~~ QA Form No. 010a
Revision 0
Effective 10/06

Project Number: 14001-412-020 Species: Fathead minnow

QA2 AR7/17/14

Summary Statistics for Survival Data

Treatment	N	Min	Max	Mean	SD	C.V.
MH	4	0.9	1.0	0.9250	0.0500	5.405%
12.5%	4	0.9	1.0	0.9750	0.0500	5.128%
25%	4	0.9	1.0	0.9750	0.0500	5.128%
50%	4	0.8	1.0	0.9250	0.0957	10.351%
75%	4	0.9	1.0	0.9500	0.0577	6.077%
100%	4	0.9	1.0	0.9500	0.0577	6.077%

Summary Statistics for Growth Data (dry wt per original)

Treatment	N	Min	Max	Mean	SD	C.V.
MH	4	0.470	0.622	0.5293	0.0678	12.805%
12.5%	4	0.494	0.583	0.5350	0.0375	7.019%
25%	4	0.464	0.513	0.4935	0.0213	4.316%
50%	4	0.467	0.589	0.5307	0.0622	11.722%
75%	4	0.535	0.662	0.5813	0.0573	9.849%
100%	4	0.455	0.586	0.5295	0.0547	10.338%

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

Treatment	N	Min	Max	Mean	SD	C.V.
MH	4	0.522	0.622	0.5708	0.0460	8.059%
12.5%	4	0.521	0.583	0.5487	0.0257	4.692%
25%	4	0.493	0.516	0.5064	0.0102	2.016%
50%	4	0.542	0.589	0.5735	0.0212	3.704%
75%	4	0.535	0.662	0.6126	0.0565	9.221%
100%	4	0.455	0.651	0.5606	0.0827	14.753%

① AR7/17/14 NA

CETIS Analytical Report

Report Date: 19 Jul-14 06:25 (p 1 of 2)
Test Code: 412-020 | 02-1485-5211

Fathead Minnow 7-d Larval Survival and Growth Test — **TRE Environmental Strategies, LLC**

Analysis ID:	13-7248-0303	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	19 Jul-14 6:24	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	13-0695-4945	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Lab Tech
Start Date:	08 Jul-14 19:30	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	15 Jul-14 17:00	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Duration:	6d 22h	**Source:**	In-House Culture	**Age:**	<24

Sample ID:	00-3366-1802	**Code:**	201A36A	**Client:**	Suncor Refinery
Sample Date:	07 Jul-14 07:00	**Material:**	Ambient Sample	**Project:**	WET Annual Compliance Test
Receive Date:	08 Jul-14 18:35	**Source:**			
Sample Age:	37h	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	16.9%	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	-0.1546	2.41	0.09	6	0.8748	CDF	Non-Significant Effect
		25	0.9612	2.41	0.09	6	0.4391	CDF	Non-Significant Effect
		50	-0.04033	2.41	0.09	6	0.8449	CDF	Non-Significant Effect
		75	-1.398	2.41	0.09	6	0.9944	CDF	Non-Significant Effect
		100	-0.00672	2.41	0.09	6	0.8353	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.5293	0.25 - NL	Yes	Passes Acceptability Criteria
PMSD	0.1692	0.12 - 0.3	Yes	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0156937	0.003138741	5	1.134	0.3781	Non-Significant Effect
Error	0.04980425	0.002766903	18			
Total	0.06549796		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.693	15.1	0.5944	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9612	0.884	0.4632	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	0.5292	0.4214	0.6371	0.5125	0.47	0.622	0.03389	12.8%	0.0%
12.5		4	0.535	0.4752	0.5948	0.5315	0.494	0.583	0.01878	7.02%	-1.09%
25		4	0.4935	0.4596	0.5274	0.4985	0.464	0.513	0.01065	4.32%	6.75%
50		4	0.5307	0.4317	0.6298	0.5335	0.467	0.589	0.03111	11.7%	-0.28%
75		4	0.5812	0.4902	0.6723	0.564	0.535	0.662	0.02863	9.85%	-9.83%
100		4	0.5295	0.4424	0.6166	0.5385	0.455	0.586	0.02737	10.3%	-0.05%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	0.489	0.47	0.536	0.622
12.5		0.542	0.521	0.494	0.583
25		0.493	0.513	0.464	0.504
50		0.589	0.488	0.467	0.579
75		0.535	0.581	0.547	0.662
100		0.532	0.586	0.455	0.545

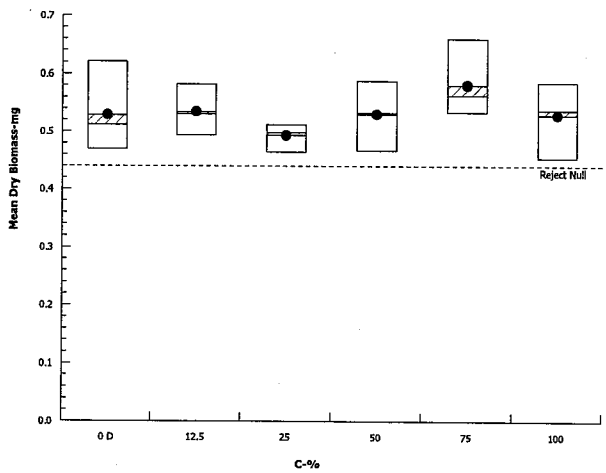
CETIS Analytical Report

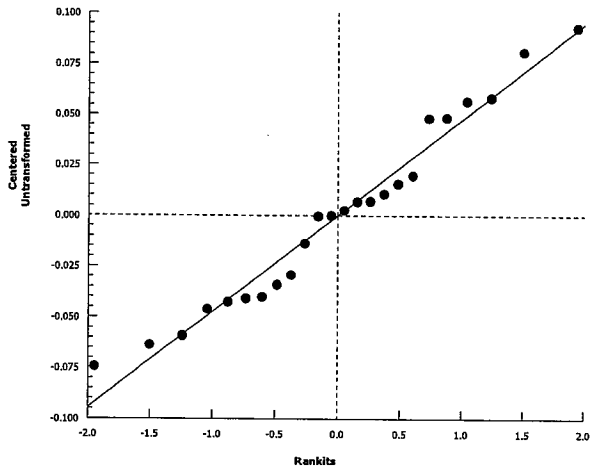
Report Date: 19 Jul-14 06:25 (p 2 of 2)
Test Code: 412-020 | 02-1485-5211

Fathead Minnow 7-d Larval Survival and Growth Test — **TRE Environmental Strategies, LLC**

Analysis ID:	13-7248-0303	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	19 Jul-14 6:24	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Report Date:	19 Jul-14 06:25 (p 1 of 2)
Test Code:	412-020 | 02-1485-5211

Fathead Minnow 7-d Larval Survival and Growth Test — **TRE Environmental Strategies, LLC**

Analysis ID:	00-4422-6637	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	19 Jul-14 6:25	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	13-0695-4945	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Lab Tech
Start Date:	08 Jul-14 19:30	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	15 Jul-14 17:00	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Duration:	6d 22h	**Source:**	In-House Culture	**Age:**	<24

Sample ID:	00-3366-1802	**Code:**	201A36A	**Client:**	Suncor Refinery
Sample Date:	07 Jul-14 07:00	**Material:**	Ambient Sample	**Project:**	WET Annual Compliance Test
Receive Date:	08 Jul-14 18:35	**Source:**			
Sample Age:	37h	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	626540	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.5293	0.25 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>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	0.5292	0.47	0.622	0.03389	0.06777	12.8%	0.0%
12.5		4	0.535	0.494	0.583	0.01878	0.03755	7.02%	-1.09%
25		4	0.4935	0.464	0.513	0.01065	0.0213	4.32%	6.75%
50		4	0.5307	0.467	0.589	0.03111	0.06222	11.7%	-0.28%
75		4	0.5812	0.535	0.662	0.02863	0.05725	9.85%	-9.83%
100		4	0.5295	0.455	0.586	0.02737	0.05474	10.3%	-0.05%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	0.489	0.47	0.536	0.622
12.5		0.542	0.521	0.494	0.583
25		0.493	0.513	0.464	0.504
50		0.589	0.488	0.467	0.579
75		0.535	0.581	0.547	0.662
100		0.532	0.586	0.455	0.545

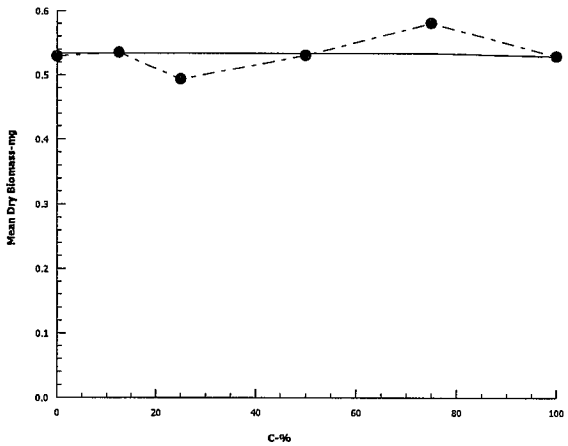
CETIS Analytical Report

Report Date:	19 Jul-14 06:25 (p 2 of 2)
Test Code:	412-020 | 02-1485-5211

Fathead Minnow 7-d Larval Survival and Growth Test — **TRE Environmental Strategies, LLC**

Analysis ID:	00-4422-6637	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	19 Jul-14 6:25	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



BIOASSAY REPORT
CHRONIC
BIOASSAYS CONDUCTED
July 12 through 19, 2014

Prepared for

SUMITOMO METAL MINING-POGO MINE
DELTA JUNCTION, ALASKA

Prepared by

CH2MHILL
Applied Sciences Laboratory (ASL)
1100 NE Circle Boulevard, Suite 300
Corvallis, Oregon 97330
541-768-3160

NELAC #OR100022

Report Date: August 12, 2014
Lab I.D. No. B3155

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APPENDIX A. RAW DATA SHEETS
APPENDIX B. REFERENCE TOXICANT DATA SHEETS
APPENDIX C. CHAIN OF CUSTODY

INTRODUCTION

CH2M HILL conducted a chronic bioassay from July 12 through 19, 2014, on samples provided by Sumitomo Metal Mining – Pogo Mine, Delta Junction, Alaska. The test was conducted using the fathead minnow (*Pimephales promelas*).

Note: There were sample delivery issues involved with this testing event. Specifically, the samples shipped on July 7 and 9 were delayed during shipment (held at the Lynden airfreight facility in Portland, Oregon) and were not delivered as scheduled to CH2M Hill in Corvallis Oregon within the 36 hour holding time. These samples were not used.

The sample collected on July 11 was successfully delivered to CH2M Hill within holding time and was used to initiate the *P. promelas* testing on July 12. However, due to the earlier delays, the in-house *C. dubia* cultures were off-schedule and did not produce sufficient neonates to initiate *C. dubia* chronic testing on July 12, 2014.

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
P. promelas	25.0	12.5	30.5	3.28

Note: acronyms are as defined below.

Chronic Toxicity: Toxicity is shown if the TUc value (= 100% / IC_{25}) is equal to or greater than 2.

Please note that the data set showed an interrupted dose response. This type of data set can provide unreliable hypothesis test results (NOEC / LOEC values).

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).
IC_{25} = 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 IC_{25} 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.

Additional guidance was provided by:

- *Method Guidance and Recommendations for Whole Effluent Toxicity (WET) Testing* (40 CFR Part 136), (EPA July 2000), EPA 821-B-00-004.

DEVIATIONS FROM PROTOCOLS

Deviations from required procedures in the test methods:

- None noted.

Deviations from recommended procedures in the test methods:

- For the *P. promelas* chronic test, some of the instantaneous temperature readings fell outside of the recommended range of 25±1°C. However, the required test condition of a temperature deviation (i.e. maximum minus minimum) of no more than 3 °C was met. This situation is detailed further in the Results and Discussion section of this report.

TEST ORGANISMS

The *P. promelas* were obtained from Aquatox Inc., Hot Springs, Arkansas, and were less than 48 hours old and within a 24-hour age range at test initiation. All organisms tested were fed and maintained during culturing, acclimation, and testing as prescribed by the EPA (2002). However, it was noted that while the test organisms were alive on receipt, they appeared less than typically vigorous and in fair to poor condition prior to testing.

DILUTION WATER

The dilution water used was reconstituted, moderately hard water with a total hardness of 80 to 100 mg/L as $CaCO_3$ and an alkalinity of 60 to 70 mg/L as $CaCO_3$.

TEST CONCENTRATIONS

The concentrations for the chronic tests were 12.5, 25, 50, 75, and 100 percent sample with dilution water for the control. For the *P. promelas* chronic test, 10 organisms per chamber, with four chambers per concentration for a total of 40 organisms per concentration were used.

SAMPLE COLLECTION

Samples were collected by Sumitomo - Pogo personnel on July 11, 14, and 16, 2014. The samples were accepted as scheduled by CH2M HILL's Corvallis Aquatic Toxicology Laboratory.

As noted above, the samples collected and shipped on July 7 and 9 were delayed during shipment, arrived after the 36 hour hold time, and therefore were not used.

The tests were initiated within 36 hours of sample collection. The samples were stored in the dark at 0 to 6°C until daily test solutions were prepared. Chain of custody forms documenting sample collection and handling are provided in Appendix C

SAMPLE PREPARATION

Samples used during these tests were filtered through a 60 µm net upon arrival and temperature was adjusted prior to test initiation and each daily renewal.

MONITORING OF BIOASSAYS

Samples were monitored on arrival for hardness, total residual chlorine, ammonia, and temperature.

For the *P. promelas* chronic test, pre- and post-renewal solutions were monitored for dissolved oxygen and pH daily in all the concentrations. Conductivity was measured in each new sample (100 percent sample) and in the control. *P. promelas* mortality was measured daily and fish growth was measured by dry weight analysis at the conclusion of the *P. promelas* chronic test. Temperature was monitored in pre-renewal solutions daily.

DATA ANALYSIS

The effects measured during the *P. promelas* chronic test included survival and growth over the exposure period. The statistical analyses performed were those outlined in *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, using CETIS. The chronic NOEC and LOEC values were established by hypothesis testing as follows: Dunnett's Procedure or Bonferroni's T-Test was used to compare the survival, fecundity, or growth data between the control and each sample concentration. When the assumptions of normality or homogeneity of variance necessary for Dunnett's Procedure or T-test with Bonferroni Adjustment could not be met, Steel's Many-One Rank Test or Wilcoxon Rank Sum with Bonferroni Adjustment was used to analyze the data. The chronic point estimate values (IC_{25} values) were calculated for growth, reproduction, and/or fecundity effects by use of the Linear Interpolation method.

DATA INTERPRETATION

The NPDES discharge permit issued to Sumitomo Metal Mining-Pogo Mine Site (AK0053341) specifies the use of the chronic toxic unit (TUc) as the Toxicity Trigger. TUc values of 2 or higher indicate the need for additional testing.

RESULTS AND DISCUSSION

CHRONIC BIOASSAYS

Table 1 summarizes the survival and growth data for the *P. promelas* chronic test.

Table 1
Summary of Chronic Results
P. promelas

Sample Concentration (%)	Percent Survival	Mean Dry Weight Per Fish (mg)
Control	100	0.593
12.5	80.0	0.470 [a]
25	100	0.553
50	35.0 [a]	0.266
75	40.0 [a]	0.291
100	22.5 [a]	0.174

[a] Indicates a statistically significant reduction from the control at p equal to 0.05.

The *P. promelas* test resulted in a statistically significant reduction in survival at the 50, 75, and 100 percent sample concentrations when compared to the control. Additionally, the tests also resulted in a statistically significant reduction in growth at the 12.5 percent sample concentration when compared to the control. By EPA definition, the NOEC and the LOEC were 25 and 12.5 percent sample, respectively.

EPA 821-B-00-004, page 4-13, identifies this data set as an interrupted concentration-response with a non-significant effect bracketed by significant effects. With this pattern "point estimation techniques generally will yield reliable results, but hypothesis testing results should be interpreted carefully." and " ... the identification of NOEC and LOEC values is severely compromised." The results of the EPA recommended review actions found that the test sensitivity was moderate and within EPA guidelines.

The IC_{25} value on *P. promelas* growth was calculated as 30.5 percent sample.

The chronic toxic unit ($TU_c = 100/IC_{25}$) was 3.28.

From the NPDES permit: "A target level for chronic toxicity of 2 TUc shall apply for purposes of determining compliance ...". (i.e. a TUc value of greater than 2 shall indicate the need for additional testing.)

EPA guidance recommends test temperature to remain at 25±1°C for the chronic tests. On day 3 of the *P. promelas* test, the instantaneous temperatures in the test concentrations were slightly outside of this range at 23.5 to 23.8 °C. However, the required test condition of a temperature deviation (i.e. maximum minus minimum) over the entire test period of no more than 3 °C was met (24.3 – 23.5 = 0.8°C). The EPA chronic manual Section 4.9.2 states: "An individual test may be conditionally acceptable if the temperature, DO, and other specified conditions fall outside specifications, depending on the degree of departure and the objectives of the tests. The acceptability of the test would depend on the experience and professional judgment of the laboratory investigator and the reviewing staff of the regulatory authority". It is the laboratory's professional judgment that the minor deviation in the test temperature from the recommended conditions did not appear to affect the test results and the test should be accepted.

The dissolved oxygen levels in the chronic tests remained above 4.0 mg/L. Except as noted, test temperatures remained at 25±1°C.

The 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".

Note: A fungus was noted in test chambers at the 12.5, 50, 75, and 100 percent sample concentrations as well as in multiple chambers in the concurrent reference toxicant test. Since the fungus was noted in sample containers that did not contain Sumitomo effluent sample, the fungus did not originate there. On investigation, the most likely source of the fungus was in the *P. promelas* culture batch used for this testing. (Other testing conducted at this time showed no fungus using the same dilution waters and foods, reducing the chance that the fungus originated there)

This fungus may be the cause of the interrupted dose response noted in the Sumitomo test. Apparently, fungus was present in larger than normal amounts, but still relatively small quantities. This was not enough to effect to cause the reftox test results to fall outside of cusum chart range. But perhaps the added nutrient content in the client sample allowed the fungus to bloom in sufficient quantities to impact the fish, confound the Sumitomo test results, and show apparent toxicity. This is one reasonable explanation, but not necessarily true. It is ASL's professional opinion that this test result should be used with caution and that retesting may provide a higher confidence in the bioassay results.

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.

The results of the reftox test conducted using sodium chloride indicate that the test organisms were within their respective cusum chart range based on EPA guidelines.

Note: in accordance with the NPDES permit, the *P. promelas* reftox was conducted concurrently with the client testing.

The data sheets for the reference toxicant tests are provided in Appendix B.

Table 2 summarizes the reference toxicant test results and Cusum chart limits.

Table 2
Chronic Reference Toxicant Tests (g/L)

Species	IC_{25}	Cusum Chart Limits
P. promelas (survival)	2.4	1.7 to 3.9
P. promelas (growth)	2.4	1.9 to 3.0

APPENDIX A

RAW DATA SHEETS

CH2M HILL

FRESHWATER TOXICITY TEST: SAMPLE AND DILUTION WATER DATA

Client: Sumitomo Metal Mining - Pogo

Contact: Stacy Staley or Luke Walker 1.907.895.2761

SDG # B 3155-01

Test Initiation: Date 7/12/2014

Test Termination: Date 7/19/14

Sample ID Number	Field ID	Collected Date (mm/dd/yy)	Collected Time (Pacific Zone)	Date Received	Temp (°C) as Rc'vd	Total Residual Chlorine (mg/l) ☐ Dechlorination allowed as Rc'vd / after Dechlor.	Ammonia NH_3-N mg/l as Rc'vd	Hardness mg/l as $CaCO_3$ as Rc'vd	Alkalinity mg/l as $CaCO_3$ as Rc'vd	DO (mg/L) as Rc'vd	pH as Rc'vd	Cond. (uS) as Rc'vd	60 um filtered prior to use?
B3155 -01	Outfall 001	7/11/14	(ADJUSTED) 10:40	7/12/14	4.4	<0.02 / -	1.03	65	-	-	-	-	☑
B3155 -02	Outfall 001	07/14/14	10:10	07/15/14	3.2	0.02 / -	1.35	63	-	-	-	-	☑
B3155 -03	Outfall 001	7/16/14	09:30	7/17/14	2.4	<0.02 / -	1.19	63	-	-	-	-	☑
						/							
						/							
						/							
						/							
						/							
						/							
						/							
						/							
						/							
						/							
			Reporting Limits:		na	0.02 mg/L	0.10 mg/L	4 mg/L	4 mg/L	na	na	na	na

Note: "–" Indicates data collection or dechlorination not needed. Any other adjustments to samples prior to use are documented in Comments below or on Dilutions page.

Dilution Water	ID#	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$
Recon MH (FHM)	4076	92	66
Recon MH	4079	88	66
↓	4080	96	68

Comments: ☑ Indicates the action was taken, (☐= action not taken): " – " = sample not dechlorinated, or analyte not collected/needed.

* Previous samples collected on 7/7 & 7/9 were not delivered on time. These samples were not used. gm

Water Quality Meters Used/ID#: Dissolved Oxygen # 3 pH # 10 Conductivity # 2

CH2M HILL **FRESHWATER TOXICITY TEST: TEST ORGANISM INFORMATION**

Client: Sumitomo Metal Mining - Pogo

Sample Designation (SDG): B 3155-01

Test Species Information	Cd # *Ceriodaphnia dubia* Chronic	FHM # 1772 *Pimephales promelas* 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 *Artemia*, 2 x Daily			
Aeration: In Test Chambers via Slow Bubble :	☐ None ☐ Prior to use	☒ None ☐ Prior to use ☐ @ _____ hrs			
Acclimation Period	<24 hrs	<24 hrs			
Organism Source	In-House	AQUATOX			
Size	-	-			
Loading Rate	-	-			

CERIO NOT REQUIRED BY PERMIT. DOUG CHECKED W/CLIENT

Dissolved Oxygen aeration justifications (in test chambers):

Test(s): ☐ All ☐ _____

Date:

Comments:

* MC NOTED TO ME ON 7/12/2014 THAT THIS BATCH OF P. PROMELAS (FHM # 1772) LOOKED TO BE IN LESS THAN OPTIMAL CONDITION. I LOOKED IN THE TANK AND AGREED. WE DECIDED TO FEED THEM AND TO NOT PERFORM A WATER CHANGE HOPING TO NOT STRESS THEM FURTHER. TESTING CONTINUED ON SCHEDULE AS THERE WAS A CONCURRENT REFTOX BEING PERFORMED.

DAVE AGEE

Test Solution Preparation and Dilution Record

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.

Client: Sumitomo Metal Mining - Pogo

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 -	☐ Temp adj, ☐ Aerated	ID #	#	#	/ /20	:	
1	B -	☐ Temp adj, ☐ Aerated	ID #	#	#	/ /"	:	
2	B -	☐ Temp adj, ☐ Aerated	ID #	#	#	/ /"	:	
3	B -	☐ Temp adj, ☐ Aerated	ID #	#	#	/ /"	:	
4	B -	☐ Temp adj, ☐ Aerated	ID #	#	#	/ /"	:	
5	B -	☐ Temp adj, ☐ Aerated	ID #	#	#	/ /"	:	
6	B -	☐ Temp adj, ☐ Aerated	ID #	#	#	/ /"	:	
7	B -	☐ Temp adj, ☐ Aerated	ID #	#	#	/ /"	:	

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)	B3155-01	☐ Temp adj, ☐ Aerated	ID # 4076	7/12/2014	10:00	MC/DST
1	B3155-01	☐ Temp adj, ☐ Aerated	ID # 4076	7/13/"	10:40	BA
2	B3155-01	☐ Temp adj, ☐ Aerated	ID # 4076	7/14/"14	08:30	JDL
3	B3155-02	☐ Temp adj, ☐ Aerated	ID # 4079	7/15/"	12:15	BA
4	B3155-02	☐ Temp adj, ☐ Aerated	ID # 4079	7/16/14	07:00	KJ
5	B3155-03	☐ Temp adj, ☐ Aerated	ID # 4080	7/17/14	13:30	MC
6	B3155-03	☐ Temp adj, ☐ Aerated	ID # 4080	7/18/"14	08:45	DW

CH2M HILL

FATHEAD MINNOW 7-DAY SURVIVAL AND WATER QUALITY DATA

Random Template Used: 6 conc. x 4 reps. # 8 | Waterbath/incubator Used: # 4 | Date Initiated 7 / 12 / 20 14 Time 15 : 55

Initial sample ID B 3155 - 01 | Date Terminated 7 / 19 / 20 14 Time 10 : 30

Client: Sumitomo Metal Mining - Pogo | Sample Description: Outfall 001

Tech: Day 0 MC Day 1 BAm Day 2 JPG/MC Day 3 BAm Day 4 BAm Day 5 MC Day 6 BAm (*) Day 7 BAm

Time: Day 0 1555 Day 1 1230 Day 2 1340 Day 3 1430 Day 4 1020 Day 5 1555 Day 6 1230 Day 7 1030

Conc. or Percent	Day	Number of Live Organisms A	B	C	D	Dissolved O_2 (mg/l) Pre	Post	pH Pre	Post	Temp. (°C) Pre	Therm. ID #	Conductivity (µS) Post (1st use)
Control	0	10	10	10	10		8.1		8.1	Post: 24.2	212	338
	1	10	10	10	10	7.6	7.1	8.2	7.8	24.0	177	
	2	10	10	10	10	7.8	8.1	8.2	8.2	(23.6)	202	~~311~~
	3	10	10	10	10	8.1	8.1	8.0	8.1	24.1	214	311
	4	10	10	10	10	7.4	8.1	7.7	8.1	24.0	186	
	5	10	10	10	10	6.4	7.8	7.8	~~8.2~~	24.1	217	316
	6	10	10	10	10	6.4	7.4	8.2	8.4	24.0	177	
	7	10	10	10	10	6.4		8.1		24.0	177	
12.5 %	0	10	10	10	10		8.1		8.0	Post: 24.2		
	1	10	10	10	10	7.8	7.2	8.1	7.9	24.0		
	2	10	10	10	10	7.7	8.2	8.1	8.2	(23.6)		
	3	10	10	10	10	8.2	8.1	7.7	8.1	24.3		
	4	10	10	10	10	7.7	8.0	7.7	8.2	24.0		
	5	10	9	8F	10	6.3	7.7	7.8	8.4	24.3		
	6	9F	9	~~9F~~ 5F	10	6.5	7.7	8.2	8.4	24.0		
	7	9	9	4F	10	6.8		8.2		24.0		
25 %	0	10	10	10	10		8.2		7.9	Post: 24.2		
	1	10	10	10	10	7.9	7.4	8.0	7.9	24.0		
	2	10	10	10	10	7.8	8.3	8.0	8.1	(23.8)		
	3	10	10	10	10	8.2	8.0	7.7	8.0	24.1		
	4	10	10	10	10	7.8	7.4	7.8	8.1	24.0		
	5	10	10	10	10	6.3	8.1	7.8	8.3	24.3		
	6	10	10	10	10	6.6	7.9	8.1	8.4	24.0		
	7	10	10	10	10	6.8		8.1		24.0		
50 %	0	10	10	10	10		8.4		7.6	Post: 24.1		
	1	10	10	10	10	8.1	7.5	8.0	7.8	24.0		
	2	10	10	10	9	7.9	8.3	7.9	7.9	(23.8)		
	3	9	8	7	7	8.2	7.7	7.7	7.8	24.1		
	4	9	6	4	4	8.0	7.3	7.8	8.0	24.0		
	5	6F	5F	1F	3F	6.3	8.3	7.6	8.1	24.3		
	6	6	4	1	3	6.7	7.9	8.0	8.3	24.0		
	7	6	4	1	3	6.9		8.1		24.0		
75 %	0	10	10	10	10		8.4		7.7	Post: 24.1		
	1	10	10	10	10	☆8.3	7.6	7.8	7.8	24.0		
	2	10	10	10	10	7.6	8.3	7.9	7.7	(23.5)		
	3	10	~~6~~ 5	0	5	~~7.6 8.3~~	~~7.6~~ 8.3	7.6	7.7	24.0		
	4	10	4F		3F	~~7.2 8.3~~	☆ ~~7.2~~ 8.3	7.7	8.0	24.0		
	5	10	4		2F	6.1	8.3☆	7.6	8.0	24.3		
	6	10	4		2	6.7	8.3☆	7.9	8.0	24.0		
	7	10	4		2	6.9		8.0		24.0		
100 %	0	10	10	10	10		8.4		7.5	Post: 24.0		205
	1	10	10	10	10	☆8.3	7.6	7.5	7.8	24.0		
	2	10	10	10	10	7.5	8.3	7.5	7.5	(23.5)		~~203~~
	3	2	1	10	3	8.3	7.7	7.5	7.5	24.1		203
	4	1	1	6F	2F	8.3	7.1	7.7	7.7	24.0		
	5	1	1	6	1F	6.0	8.3☆	7.5	7.7	24.3		200
	6	1	1	6	1	6.8	8.3☆	7.8	7.9	24.0		
	7	1	1	6	1	6.9		8.0		24.0		

✓ 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.

☐ Aeration in test chambers begun @ _____ (Note observations on Test Organism Info sheet)

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

☆ Dilution cups changed out for new solution due to [illegible]

☆ Shook down 7-13-14 BAm

☆ post shakedown

FATHEAD MINNOW 7-DAY GROWTH DATA

Client: Sumitomo Metal Mining - Pogo Tins Labeled As: POGO (6/24/2014)

Lab ID: Start Date: 7/8/2014

Sample Description:

Technician:	MC	KJ
Date:	7/23/2014	6/13/2014
Balance Serial #:	B328543647	B328543647

Percent	Replicate	Total Weight (mg)	Tare Weight (mg)	No. of Fish
Control	A	1195.92	1190.57	10
	B	1170.83	1164.45	10
	C	1180.05	1174.14	10
	D	1156.08	1150.00	10
12.5 %	A	1179.10	1174.43	9
	B	1181.22	1175.60	9
	C	1167.18	1163.78	4
	D	1185.13	1180.04	10
25 %	A	1186.23	1180.79	10
	B	1158.04	1152.51	10
	C	1163.21	1157.53	10
	D	1170.62	1165.17	10
50 %	A	1171.36	1167.92	6
	B	1195.61	1192.24	4
	C	1158.36	1157.73	1
	D	1182.49	1179.31	3
75 %	A	1176.30	1170.51	10
	B	1175.15	1171.74	4
	C	1187.11	1187.11	0
	D	1155.10	1152.65	2
100 %	A	1166.12	1165.05	1
	B	1170.98	1169.53	1
	C	1169.81	1165.84	6
	D	1168.15	1167.68	1

weigh to 0.01 mg

FATHEAD MINNOW 7-DAY GROWTH DATA

Client: Sumitomo Metal Mining - Pogo Tins Labeled As: POGO (6/24/2014)

Lab ID: B3155-01 Start Date: 7/8/2014

Sample Description: outfall 001

Technician:	BA	KJ
Date:	07/19/14	6/13/2014
Balance Serial #:	B328543647	B328543647

Percent	Replicate	Total Weight (mg)	Tare Weight (mg)	No. of Fish
Control	A		1190.57	10
	B		1164.45	10
	C		1174.14	10
	D		1150.00	10
12.5 %	A		1174.43	9
	B		1175.60	9
	C		1163.78	4
	D		1180.04	10
25 %	A		1180.79	10
	B		1152.51	10
	C		1157.53	10
	D		1165.17	10
50 %	A		1167.92	6
	B		1192.24	4
	C		1157.73	1
	D		1179.31	3
75 %	A		1170.51	10
	B		1171.74	4
	C		1187.11	–
	D		1152.65	2
100 %	A		1165.05	1
	B		1169.53	1
	C		1165.84	6
	D		1167.68	1

weigh to 0.01 mg

CETIS Summary Report

Report Date:	30 Jul-14 11:31 (p 1 of 2)
Test Code:	B315501ppc | 10-4718-0533

Fathead Minnow 7-d Larval Survival and Growth Test — **CH2M HILL - ASL**

Batch ID:	20-7433-4200	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	12 Jul-14 15:55	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	19 Jul-14 10:30	**Species:**	Pimephales promelas	**Brine:**	
Duration:	6d 19h	**Source:**	Aquatox, AR	**Age:**	<48h

Sample ID:	19-2214-3317	**Code:**	B3155-01	**Client:**	
Sample Date:	11 Jul-14 10:40	**Material:**	Unknown	**Project:**	
Receive Date:	12 Jul-14 09:30	**Source:**	Sumitomo Mining - Pogo (AK0053341)		
Sample Age:	29h (4.4 °C)	**Station:**			

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
12-0740-2986	7d Survival Rate	25	50	35.36	37.6%	4	Dunnett Multiple Comparison Test
11-1766-1944	Mean Dry Biomass-mg	~~<12.5~~ 25	12.5	N/A	15.7%	>8	Dunnett Multiple Comparison Test

D.W.

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
12-4711-1462	Mean Dry Biomass-mg	IC25	30.5	25.2	44.4	3.279	Linear Interpolation (ICPIN)

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
12-0740-2986	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
11-1766-1944	Mean Dry Biomass-mg	Control Resp	0.593	0.25 - NL	Yes	Passes Acceptability Criteria
12-4711-1462	Mean Dry Biomass-mg	Control Resp	0.593	0.25 - NL	Yes	Passes Acceptability Criteria
11-1766-1944	Mean Dry Biomass-mg	PMSD	0.1571	0.12 - 0.3	Yes	Passes 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	4	1	1	1	1	1	0	0	0.0%	0.0%
12.5		4	0.8	0.6989	0.9011	0.4	1	0.1354	0.2708	33.85%	20.0%
25		4	1	1	1	1	1	0	0	0.0%	0.0%
50		4	0.35	0.2723	0.4277	0.1	0.6	0.1041	0.2082	59.48%	65.0%
75		4	0.4	0.2387	0.5613	0	1	0.216	0.432	108.0%	60.0%
100		4	0.225	0.1316	0.3184	0.1	0.6	0.125	0.25	111.1%	77.5%

Mean Dry Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	4	0.593	0.5768	0.6092	0.535	0.638	0.02163	0.04327	7.3%	0.0%
12.5		4	0.4695	0.4341	0.5049	0.34	0.562	0.04734	0.09468	20.17%	20.83%
25		4	0.5525	0.5484	0.5566	0.544	0.568	0.005545	0.01109	2.01%	6.83%
50		4	0.2655	0.2149	0.3161	0.063	0.344	0.06772	0.1354	51.02%	55.23%
75		4	0.2913	0.2018	0.3807	0	0.579	0.1198	0.2396	82.27%	50.89%
100		4	0.174	0.1165	0.2315	0.047	0.397	0.07702	0.154	88.53%	70.66%

$TU_c = 100 \div 30.5 = 3.28$

Fathead Minnow 7-d Larval Survival and Growth Test — **CH2M HILL - ASL**

7d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	1	1	1	1
12.5		0.9	0.9	0.4	1
25		1	1	1	1
50		0.6	0.4	0.1	0.3
75		1	0.4	0	0.2
100		0.1	0.1	0.6	0.1

Mean Dry Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	0.535	0.638	0.591	0.608
12.5		0.467	0.562	0.34	0.509
25		0.544	0.553	0.568	0.545
50		0.344	0.337	0.063	0.318
75		0.579	0.341	0	0.245
100		0.107	0.145	0.397	0.047

Fathead Minnow 7-d Larval Survival and Growth Test — **CH2M HILL - ASL**

Analysis ID:	12-0740-2986	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	30 Jul-14 11:20	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	20-7433-4200	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	12 Jul-14 15:55	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	19 Jul-14 10:30	**Species:**	Pimephales promelas	**Brine:**	
Duration:	6d 19h	**Source:**	Aquatox, AR	**Age:**	<48h

Sample ID:	19-2214-3317	**Code:**	B3155-01	**Client:**	
Sample Date:	11 Jul-14 10:40	**Material:**	Unknown	**Project:**	
Receive Date:	12 Jul-14 09:30	**Source:**	Sumitomo Mining - Pogo (AK0053341)		
Sample Age:	29h (4.4 °C)	**Station:**			

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	0	C > T	Not Run	25	50	35.36	4	37.6%

Dunnett Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Dilution Water		12.5	1.263	2.407	6	0.5016	0.3120	Non-Significant Effect
		25	0	2.407	6	0.5016	0.8333	Non-Significant Effect
		50*	3.81	2.407	6	0.5016	0.0028	Significant Effect
		75*	3.514	2.407	6	0.5016	0.0052	Significant Effect
		100*	4.555	2.407	6	0.5016	0.0006	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.547019	0.7094037	5	8.167	0.0004	Significant Effect
Error	1.563501	0.08686114	18			
Total	5.110519	0.7962648	23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.569	4.248	0.2190	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9141	0.884	0.0434	Normal Distribution

7d Survival Rate Summary

Conc-%	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	0.8	0.697	0.903	0.4	1	0.1354	0.2708	33.85%	20.0%
25		4	1	1	1	1	1	0	0	0.0%	0.0%
50		4	0.35	0.2708	0.4292	0.1	0.6	0.1041	0.2082	59.48%	65.0%
75		4	0.4	0.2357	0.5643	0	1	0.216	0.432	108.0%	60.0%
100		4	0.225	0.1299	0.3201	0.1	0.6	0.125	0.25	111.1%	77.5%

Angular (Corrected) Transformed Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
12.5		4	1.149	1.027	1.27	0.6847	1.412	0.1594	0.3187	27.75%	18.65%
25		4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
50		4	0.618	0.5287	0.7074	0.3218	0.8861	0.1175	0.2349	38.01%	56.23%
75		4	0.6798	0.4768	0.8828	0.1588	1.412	0.2668	0.5337	78.5%	51.86%
100		4	0.4628	0.3555	0.5702	0.3218	0.8861	0.1411	0.2822	60.96%	67.22%

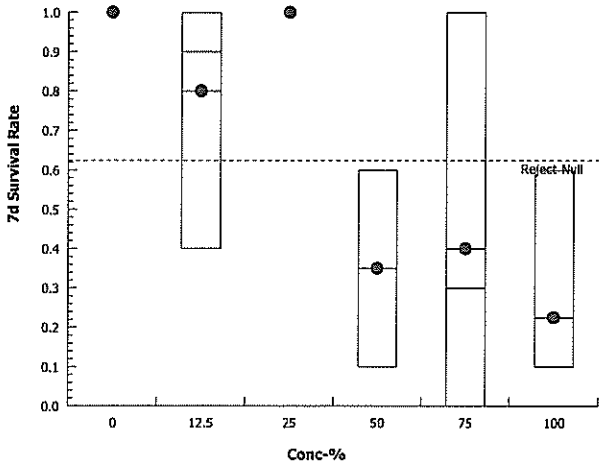
Fathead Minnow 7-d Larval Survival and Growth Test — **CH2M HILL - ASL**

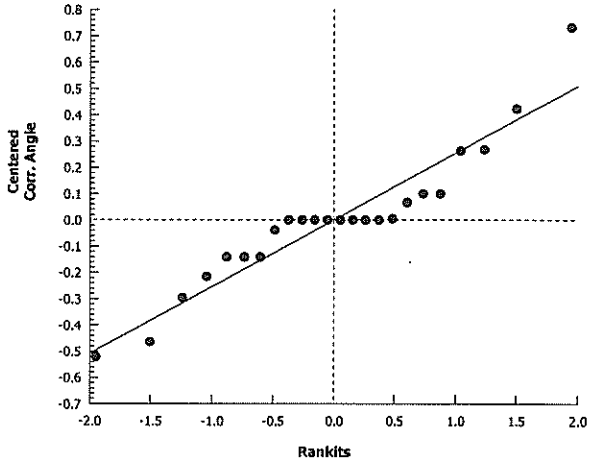
Analysis ID:	12-0740-2986	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	30 Jul-14 11:20	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

7d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	1	1	1	1
12.5		0.9	0.9	0.4	1
25		1	1	1	1
50		0.6	0.4	0.1	0.3
75		1	0.4	0	0.2
100		0.1	0.1	0.6	0.1

Graphics





CETIS Analytical Report

Report Date:	30 Jul-14 11:31 (p 1 of 4)
Test Code:	B315501ppc | 10-4718-0533

Fathead Minnow 7-d Larval Survival and Growth Test — **CH2M HILL - ASL**

Analysis ID:	11-1766-1944	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	30 Jul-14 11:25	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	20-7433-4200	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	12 Jul-14 15:55	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	19 Jul-14 10:30	**Species:**	Pimephales promelas	**Brine:**	
Duration:	6d 19h	**Source:**	Aquatox, AR	**Age:**	<48h

Sample ID:	19-2214-3317	**Code:**	B3155-01	**Client:**	
Sample Date:	11 Jul-14 10:40	**Material:**	Unknown	**Project:**	
Receive Date:	12 Jul-14 09:30	**Source:**	Sumitomo Mining - Pogo (AK0053341)		
Sample Age:	29h (4.4 °C)	**Station:**			

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	0	C > T	Not Run	<12.5	12.5	N/A	>8	15.7%

Dunnett Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Dilution Water		12.5*	2.89	2.18	6	0.09316	0.0161	Significant Effect
		25	0.9478	2.18	6	0.09316	0.2883	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.03171054	0.01585527	2	4.34	0.0479	Significant Effect
Error	0.03287778	0.003653086	9			
Total	0.06458832	0.01950836	11			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	8.262	9.21	0.0161	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9039	0.8025	0.1779	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	4	0.593	0.5765	0.6095	0.535	0.638	0.02163	0.04327	7.3%	0.0%
12.5		4	0.4695	0.4335	0.5055	0.34	0.562	0.04734	0.09468	20.17%	20.83%
25		4	0.5525	0.5483	0.5567	0.544	0.568	0.005545	0.01109	2.01%	6.83%

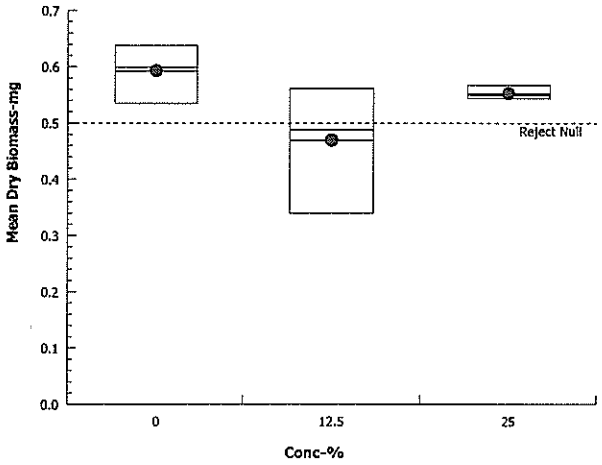
Fathead Minnow 7-d Larval Survival and Growth Test — **CH2M HILL - ASL**

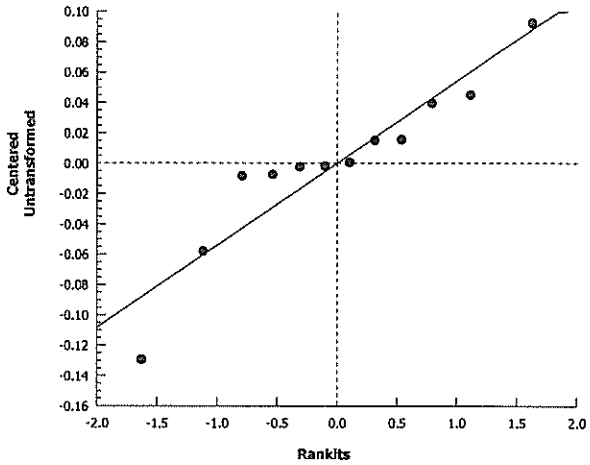
Analysis ID:	11-1766-1944	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	30 Jul-14 11:25	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Mean Dry Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	0.535	0.638	0.591	0.608
12.5		0.467	0.562	0.34	0.509
25		0.544	0.553	0.568	0.545

Graphics





CETIS Analytical Report

Report Date:	30 Jul-14 11:31 (p 1 of 1)
Test Code:	B315501ppc | 10-4718-0533

Fathead Minnow 7-d Larval Survival and Growth Test — **CH2M HILL - ASL**

Analysis ID:	12-4711-1462	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	30 Jul-14 11:21	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	20-7433-4200	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	12 Jul-14 15:55	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	19 Jul-14 10:30	**Species:**	Pimephales promelas	**Brine:**	
Duration:	6d 19h	**Source:**	Aquatox, AR	**Age:**	<48h

Sample ID:	19-2214-3317	**Code:**	B3155-01	**Client:**	
Sample Date:	11 Jul-14 10:40	**Material:**	Unknown	**Project:**	
Receive Date:	12 Jul-14 09:30	**Source:**	Sumitomo Mining - Pogo (AK0053341)		
Sample Age:	29h (4.4 °C)	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	517204685	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC25	30.5	25.2	44.4	3.279	2.252	3.968

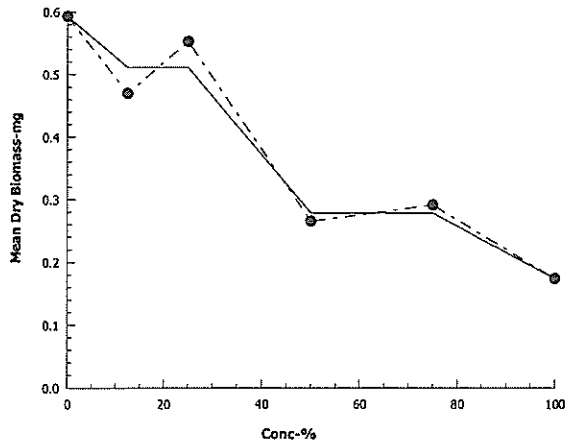
Mean Dry Biomass-mg Summary

			Calculated Variate						
Conc-%	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**
0	Dilution Water	4	0.593	0.535	0.638	0.02163	0.04327	7.3%	0.0%
12.5		4	0.4695	0.34	0.562	0.04734	0.09468	20.17%	20.83%
25		4	0.5525	0.544	0.568	0.005545	0.01109	2.01%	6.83%
50		4	0.2655	0.063	0.344	0.06772	0.1354	51.02%	55.23%
75		4	0.2913	0	0.579	0.1198	0.2396	82.27%	50.89%
100		4	0.174	0.047	0.397	0.07702	0.154	88.53%	70.66%

Mean Dry Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	0.535	0.638	0.591	0.608
12.5		0.467	0.562	0.34	0.509
25		0.544	0.553	0.568	0.545
50		0.344	0.337	0.063	0.318
75		0.579	0.341	0	0.245
100		0.107	0.145	0.397	0.047

Graphics



APPENDIX B

REFERENCE TOXICANT DATA SHEETS

CH2M HILL

FATHEAD MINNOW 7-DAY SURVIVAL AND WATER QUALITY DATA

Random Template Used: 6 conc. x 4 reps. # 3 | Waterbath/incubator Used: # 4 | Date Initiated 7/12/2014 Time 16:10

Stock Sol. ID ZB046-05 - | Date Terminated 7/19/2014 Time 11:30

Organism ID: FHM #1772 | Test Container Size: 800 ml | Solution Volume / rep: 500 ml

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

Tech: Day 0 JDL/MC Day 1 [illegible] Day 2 JDL/MC Day 3 [illegible] Day 4 [illegible] Day 5 MC/JDL Day 6 [illegible] Day 7 [illegible]

Time: Day 0 1610 Day 1 1130 Day 2 1310 Day 3 1100 Day 4 0940 Day 5 1200 Day 6 1300 Day 7 1130

Conc. or Percent	Day	Number of Live Organisms A	B	C	D	Dissolved O_2 (mg/l) Pre	Post	pH Pre	Post	Temp. (°C) Pre	Therm. ID#	Conductivity (µS) Post (daily)
Control	0	10	10	10	10		7.9		8.1	Post: 24.2	177	321
	1	10	10	10	10	6.8	7.8	7.7	8.1	24.0	177	330
	2	10	10	10	10	7.9	8.0	8.0	8.3	24.0	202	331
	3	10	10	10	10	7.0	8.0	7.6	8.1	24.0	177	347
	4	10	10	10	10	7.3	7.0	7.7	8.0	24.0	186	296
	5	10	10	8 *	10	6.5	7.8	8.0	8.4	24.0	184	303
	6	10	10	~~8~~ 7F	10	6.1	7.5	8.0	8.5	23.6	177	303
	7	10	10	7	10	6.0		8.1		24.0	177	
0.3 g/L	0	10	10	10	10		8.0		8.2	Post: 24.3		819
	1	10	10	10	10	7.1	7.8	7.8	8.1	24.1		843
	2	9	10	10	10	7.8	8.0	8.1	8.3	24.0		806
	3	9	10	10	10	7.8	8.0	7.6	8.1	24.0		893
	4	8	10	10	10	7.7	7.0	7.8	7.9	24.0		853
	5	6 *	9 *	10	9 *	6.5	7.9	8.0	8.4	24.0		857
	6	5 F	9	10	8 F	6.1	7.6	8.0	8.5	23.6		806
	7	5	9	9	8	6.2		8.1		24.0		
1.0 g/L	0	10	10	10	10		8.1		8.2	Post: 24.4		2080
	1	10	10	10	10	7.3	8.0	7.7	8.1	23.6		1985
	2	10	10	10	10	7.8	8.1	8.0	8.3	23.9		2039
	3	10	10	10	10	7.0	8.1	7.6	8.0	24.0		2080
	4	10	10	10	10	7.8	7.1	7.9	7.8	24.0		2020
	5	10	10	10	10	6.6	7.9	8.0	8.4	24.1		2060
	6	10	10	10	10	6.4	7.7	8.0	8.5	23.6		1986
	7	10	10	10	10	6.5		8.0		24.0		
2.0 g/L	0	10	10	10	10		8.2		8.2	Post: 24.2		3770
	1	10	10	10	10	7.4	8.1	7.7	8.0	23.8		3750
	2	10	9	10	10	7.2	8.1	8.0	8.2	23.9		3780
	3	10	9	10	10	7.0	8.2	7.6	8.6	24.0		3780
	4	10	9	10	10	7.9	7.1	7.9	7.8	24.0		3810
	5	10	9 *	9 *	10	6.6	8.0	8.0	8.4	24.0		3800
	6	9	9	9	9	6.5	7.8	7.9	8.5	23.6		3710
	7	7	9	9	9	6.6		8.0		24.0		
4.0 g/L	0	10	10	10	10		8.3		8.1	Post: 24.4		7000
	1	10	10	10	10	7.4	8.1	7.7	8.0	23.6		6770
	2	10	10	9	10	7.3	8.1	8.0	8.2	24.0		6840
	3	10	10	9	10	7.1	8.3	7.6	8.0	24.0		6890
	4	10	10	9	10	7.9	7.0	7.9	7.7	24.0		6960
	5	7	6	4	8	6.8	8.0	8.0	8.3	24.0		7000
	6	4	5	2	5	6.6	7.8	7.9	8.4	23.6		6950
	7	2	5	1	2	6.8		7.9		24.0		
8.0 g/L	0	10	10	10	10		8.4		8.1	Post: 24.3		13080
	1	10	10	10	10	7.5	8.1	7.7	8.0	23.2		12530
	2	1	3	1	1	7.4	8.2	7.9	8.1	24.1		12870
	3	0	0	0	1	7.3	8.3	7.5	7.8	24.0		12990
	4				0	7.9	7.1	7.9	7.6	24.0		12160
	5											
	6											
	7											

✓ 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	2.4	1.7 to 3.9
Growth	2.4	1.9 to 3.0

Task Manager [signature]

Project Manager [signature]

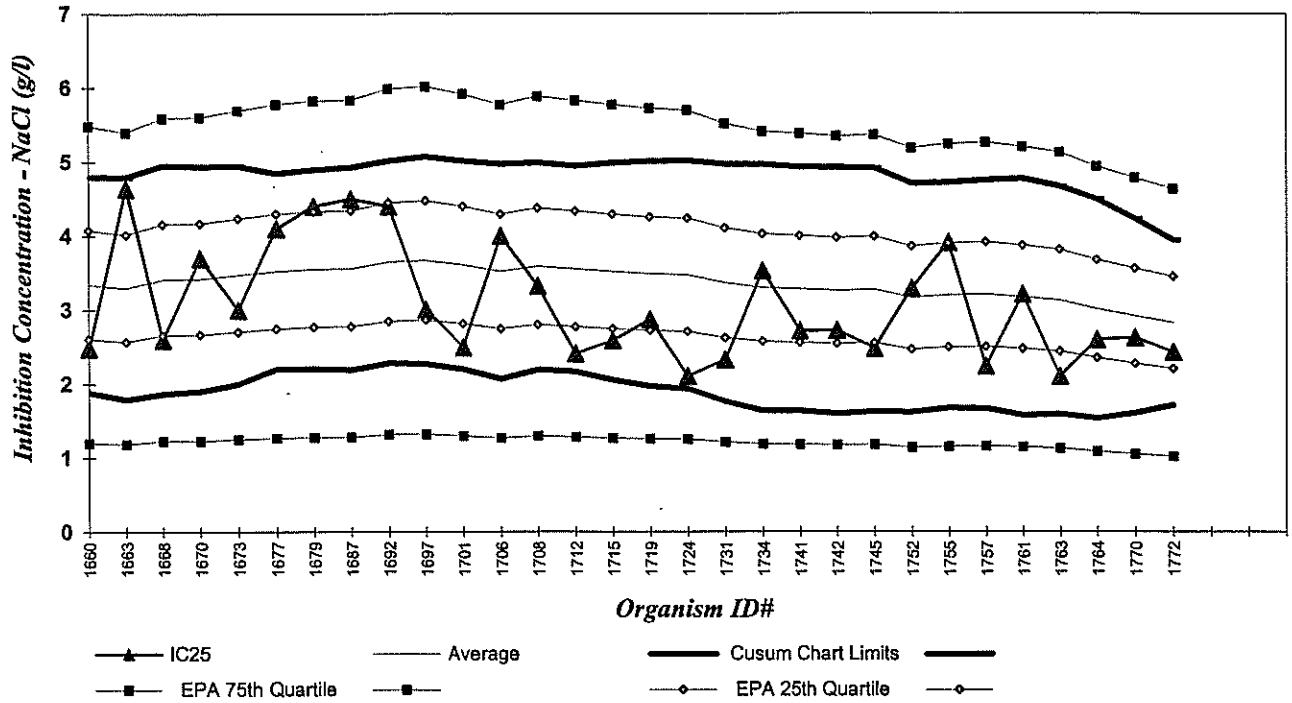
QA Officer Ginger Collins

Date 7/21/14

REFTOX - FHM chronic ASI 675-0213.xlsm Doc Control ID: ASI 675-0213

* Two with fair recruitment (24.4 - 23.2 = 0.8 < 3.0) B 7/24/14

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



***Pimephales 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

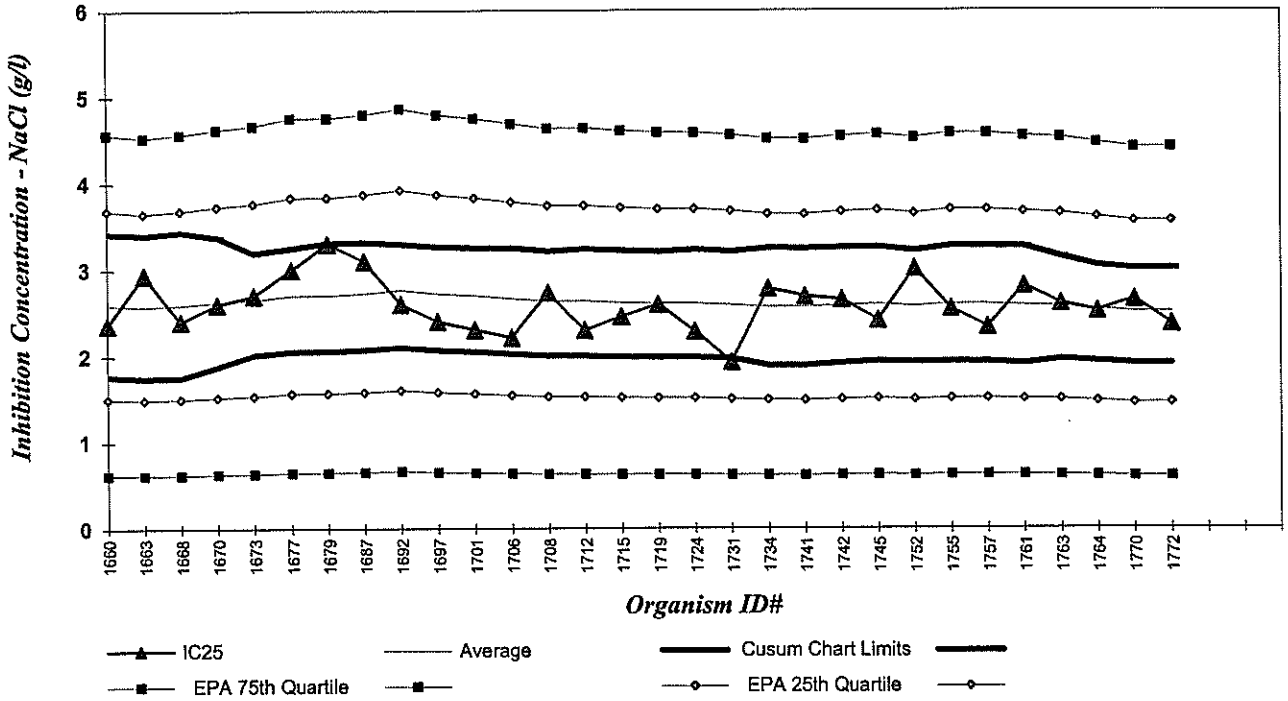
90th Quartile CV (*control limit*) = 0.52

*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 AVG-2SD	Cusum Chart Limits AVG+2SD	Intralab CV
296	1734	10/08/13	**3.5**	3.3	0.83	**1.6**	**5.0**	0.25
297	1741	11/13/13	**2.7**	3.3	0.82	**1.6**	**4.9**	0.26
298	1742	12/03/13	**2.7**	3.3	0.83	**1.6**	**4.9**	0.25
299	1745	01/07/14	**2.5**	3.3	0.82	**1.6**	**4.9**	0.24
300	1752	02/18/14	**3.3**	3.2	0.77	**1.6**	**4.7**	0.24
301	1755	03/04/14	**3.9**	3.2	0.76	**1.7**	**4.7**	0.24
302	1757	03/18/14	**2.2**	3.2	0.77	**1.7**	**4.7**	0.25
303	1761	04/15/14	**3.2**	3.2	0.80	**1.6**	**4.8**	0.25
304	1763	05/06/14	**2.1**	3.1	0.77	**1.6**	**4.7**	0.25
305	1764	05/13/14	**2.6**	3.0	0.74	**1.5**	**4.5**	0.23
306	1770	06/24/14	**2.6**	2.9	0.66	**1.6**	**4.2**	0.20
307	1772	07/12/14	**2.4**	2.8	0.56	**1.7**	**3.9**	0.20
308								
309								

REFERENCE TOXICANT CUMLATIVE 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 AVG-2SD	Cusum Chart Limits AVG+2SD	Intralab CV
296	1734	10/8/2013	**2.8**	2.6	0.34	**1.9**	**3.2**	0.13
297	1741	11/19/2013	**2.7**	2.6	0.34	**1.9**	**3.2**	0.13
298	1742	12/3/2013	**2.7**	2.6	0.33	**1.9**	**3.3**	0.13
299	1745	1/7/2014	**2.4**	2.6	0.33	**1.9**	**3.3**	0.13
300	1752	2/18/2014	**3.0**	2.6	0.32	**1.9**	**3.2**	0.13
301	1755	3/4/2014	**2.5**	2.6	0.33	**1.9**	**3.3**	0.13
302	1757	3/18/2014	**2.3**	2.6	0.33	**1.9**	**3.3**	0.13
303	1761	4/15/2014	**2.8**	2.6	0.34	**1.9**	**3.3**	0.13
304	1763	5/6/2014	**2.6**	2.6	0.33	**2.0**	**3.1**	0.11
305	1764	5/13/2014	**2.5**	2.5	0.28	**1.9**	**3.0**	0.10
306	1770	6/24/2014	**2.6**	2.5	0.25	**1.9**	**3.0**	0.10
307	1772	7/12/2014	**2.4**	2.5	0.25	**1.9**	**3.0**	0.10
308								
309								

APPENDIX C

CHAIN OF CUSTODY

CH2MHILL **CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING**

Client: Sumitomo Metal Mining Pogo LLC NPDES#: AK 0053341
Address: PO Box 145, Delta Junction AK 99737

Contact Person: Stacy Staley
Phone: 907-895-2761
E-mail: Stacy.Staley@smmpogo.com
Pogo.Environmental@smmpogo.com
CH2M HILL Project # / Purchase Order #

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

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

Analysis Required / Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Green Algae	Trout Acute	Sheepshead Acute	Sheepshead Chronic	Menidia Acute	Menidia Chronic	Mysid Acute	Mysid Chronic	Haz Waste				Concentration and/or Comments
Outfall 001	7-11-14	9:40		X	1	B5155-01		X		X													

Sampled By & Title (Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time
Stacy Staley Stacy Staley	7-11-14 10:30	Stacy Staley Stacy Staley	7-11-14 10:30
Received By (Please sign and print name)	**Date/Time**	**Relinquished By (Please sign and print name)**	**Date/Time**
Jeff A. Hiller	7/11/14 10:30	Jeff A. Hiller	7/11/14 1415
Received By (Please sign and print name)	**Date/Time**	**Relinquished By (Please sign and print name)**	**Date/Time**
DAVID AGEE	7/12/2014 0930		
Received By (Please sign and print name)	**Date/Time**	**Shipped Via**	**Shipping #**
		UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	
Work Authorized By (Please sign and print name)	**Remarks**		

CH2MHILL
Applied Sciences Laboratory (ASL)

Bioassay Sample Receipt Record

Batch Number: B3155-01 Date received: 7/12/2014

Client/Project: SUMITOMO POGO Checked by: DAVE AGEE

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation	NA	YES	NO
Were custody seals intact and on the outside of the cooler?		X	
Type of packing material: Ice Blue Ice Bubble wrap		X	
Was a Chain of Custody provided?		X	
Was the Chain of Custody properly filled out? If not document in SRER below.		X	
Were the sample containers in good condition (broken or leaking)?		X	
Are all samples within 36 hours of collection? If not, contact LPM		X	
Was there ice in the cooler? Enter temp. If >6°C contact client/SRER 4.4 °C		X	

Sample Receipt Exception Report

The following exceptions were noted:		Comments (write number of exception description and the impacted sample numbers)
	1. No custody seal as required by project	
	2. No chain-of-custody provided	
	3. Analysis, description, date of collection not provided	
	4. Samples broken or leaking on receipt.	
	5. Temperature of samples inappropriate for analysis requested. (EPA recommends 0-6 °C for WET testing)	
	6. Container inappropriate for analysis requested	
	7. Inadequate sample volume.	
	8. Preservation inappropriate for analysis requested	
	9. Samples received out of holding time for analysis requested	
	10. Discrepancies between COC form and container labels.	
	11. Other.	

ACTION TAKEN (date/time):
Client notified on (date/time):
Originator:
Client Contact:

CH2MHILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client Sumitomo Metal Mining Pogo LLC NPDES# AK 0053341
Address PO Box 145, Delta Junction
AK 99737

Contact Person: Stacy Staley
Phone: 907-895-2761
E-mail: Stacy.Staley@smmpogo.com
Pogo.Environmental@smmpogo.com
CH2M HILL Project # / Purchase Order # _____

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

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

Analysis Required / Comments

Sample ID	Date	Time	Sample Type Comp.	Sample Type Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Ceriio Acute	Ceriio Chronic	Green Algae	Trout Acute	Sheepshead Acute	Sheepshead Chronic	Menidia Acute	Menidia Chronic	Mysid Acute	Mysid Chronic	Haz Waste				Concentration and/or Comments
Outfall 001	7/14/2014	0910		X	1			X		X													

Sampled By & Title (Please sign and print name) Jim Ward, Env. Spec.	Date/Time 7/14/2014	Relinquished By (Please sign and print name) Jim Ward	Date/Time 7/14/2014
Received By (Please sign and print name) Jennifer Colle 7/15/14 1110	Date/Time 7/14/14	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks B3155-02		

CH2MHILL
Applied Sciences Laboratory (ASL)

Bioassay Sample Receipt Record

Batch Number: B3155 Date received: 7-15-14

Client/Project: Sumitomo Checked by: CC

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation	NA	YES	NO
Were custody seals intact and on the outside of the cooler?		✓	
Type of packing material: Ice Blue Ice Bubble wrap		✓	
Was a Chain of Custody provided?		✓	
Was the Chain of Custody properly filled out? If not document in SRER below.		✓	
Were the sample containers in good condition (broken or leaking)?		✓	
Are all samples within 36 hours of collection? If not, contact LPM		✓	
Was there ice in the cooler? Enter temp. If >6°C contact client/SRER 3.2 °C		✓	

Sample Receipt Exception Report

The following exceptions were noted:		Comments (write number of exception description and the impacted sample numbers)
	1. No custody seal as required by project	
	2. No chain-of-custody provided	
	3. Analysis, description, date of collection not provided	
	4. Samples broken or leaking on receipt.	
	5. Temperature of samples inappropriate for analysis requested. (EPA recommends 0-6 °C for WET testing)	
	6. Container inappropriate for analysis requested	
	7. Inadequate sample volume.	
	8. Preservation inappropriate for analysis requested	
	9. Samples received out of holding time for analysis requested	
	10. Discrepancies between COC form and container labels.	
	11. Other.	

ACTION TAKEN (date/time):
Client notified on (date/time):
Originator:
Client Contact:

CH2MHILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client: Sumitomo Metal Mining Pogo LLC NPDES# AK 0053341
Address: PO Box 145 Delta Junction AK 99737

Contact Person: Stacy Staley
Phone: 907-895-2761
E-mail: Stacy.Staley@smmpogo.com
Pogo.Environmental@smmpogo.com
CH2M HILL Project # / Purchase Order #

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

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

Analysis Required / Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Ceriodaphnia Acute	Ceriodaphnia Chronic	Green Algae	Trout Acute	Sheepshead Acute	Sheepshead Chronic	Menidia Acute	Menidia Chronic	Mysid Acute	Mysid Chronic	Haz Waste				Concentration and/or Comments
Outfall 001	7/16/2014	0930		X	1			X		X													

Sampled By & Title (Please sign and print name) Jim Ward Env Spec	Date/Time 7/16/2014 11:00	Relinquished By (Please sign and print name)	Date/Time 7.16.14
Received By (Please sign and print name) Michelle Cartwright	Date/Time 7/17/14 1235	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time 7/17/14	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks 33105-03		

CH2MHILL
Applied Sciences Laboratory (ASL)

Bioassay Sample Receipt Record

Batch Number: B3155-03 Date received: 7/17/14

Client/Project: Sumitomo Checked by: MC

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation	NA	YES	NO
Were custody seals intact and on the outside of the cooler?		X	
Type of packing material: Ice Blue Ice Bubble wrap		X	
Was a Chain of Custody provided?		X	
Was the Chain of Custody properly filled out? If not document in SRER below.		X	
Were the sample containers in good condition (broken or leaking)?		X	
Are all samples within 36 hours of collection? If not, contact LPM		X	
Was there ice in the cooler? Enter temp. If >6°C contact client/SRER 2.4 °C		X	

Sample Receipt Exception Report

The following exceptions were noted:		Comments (write number of exception description and the impacted sample numbers)
	1. No custody seal as required by project	
	2. No chain-of-custody provided	
	3. Analysis, description, date of collection not provided	
	4. Samples broken or leaking on receipt.	
	5. Temperature of samples inappropriate for analysis requested. (EPA recommends 0-6 °C for WET testing)	
	6. Container inappropriate for analysis requested	
	7. Inadequate sample volume.	
	8. Preservation inappropriate for analysis requested	
	9. Samples received out of holding time for analysis requested	
	10. Discrepancies between COC form and container labels.	
	11. Other.	

ACTION TAKEN (date/time):
Client notified on (date/time):
Originator:
Client Contact:

LYNDEN INTERNATIONAL

Lynden Air Freight, Inc.
P. O. BOX 84167
SEATTLE, WA 98124
www.laf.lynden.com

Shipper's Copy

AIRBILL NUMBER 5131217

* NOTE: IF SERVICE DESCRIPTION IS NOT IDENTIFIED LYNDEN WILL AUTOMATICALLY SHIP AS STANDARD SERVICE.

ORIGIN	DATE SHIPPED
PDX	07/12/14

SERVICE DESCRIPTION

1. ☐ NEXT BUSINESS DAY BY 5 PM ☐ SECOND BUSINESS DAY BY 5 PM ☐ FIFTH BUSINESS DAY BY 5 PM

CUSTOMER SPECIFIED (MAY RESULT IN ADDITIONAL CHARGES) ☐ DEL DEADLINE DATE ☒

SHIPPER'S LAF ACCOUNT NO.	SHIPPER'S REFERENCE NO. OR P.O. NO.	CONSIGNEE'S LAF ACCOUNT NO.	CONSIGNEE'S REFERENCE NO. OR P.O. NO.	TARIFF DEST.	TRANS. CITY
				PDX	

2. FROM: SHIPPER (NAME AND STREET ADDRESS) RESIDENCE ☐
SUMITOMO METAL MINING POGO
PO BOX 145

CITY	STATE	ZIP REQUIRED
DELTA JUNCTION	AK	99737

3. TO: CONSIGNEE (NAME AND STREET ADDRESS) RESIDENCE ☐
CH2M HILL
1100 NE CIRCLE BLVD, STE 300 BIOASSAY

CITY	STATE	ZIP REQUIRED
CORVALLIS	OR	97330

4. BILL CHARGES TO: CHARGES ARE PREPAID UNLESS OTHERWISE INDICATED
PREPAID ☐ COLLECT ☐ 3RD PARTY ☒
DRIVER COLLECT FUNDS AS CHECKED ABOVE ☐ COMAT ☐

SENT BY (NAME/DEPT.)	PHONE	ATTENTION (NAME/DEPT.)	PHONE
			541-768-3160

3RD PARTY BILLING (IF OTHER THAN SHIPPER OR CONSIGNEE) PLEASE INCLUDE CITY, STATE AND ZIP
SUMITOMO METAL MINING POGO
PO BOX 145
DELTA JUNCTION, AK 99737
907-895-2841
907-895-2756

DEL. DEADLINE DATE	TIME
07/12/14	17:00
SCALE/ITEM	**RATE**
77P	

PIECES	DESCRIPTION OF COMMODITY	DIMENSIONS LxWxH = CUBIC IN.	WEIGHT	DIM. WEIGHT
1	SAMPLES	25.14.14	80	30
1	< TOTAL >	CHARGEABLE WT:	80	

SHIPPER'S COD DOLLARS CENTS

LIABILITY IS AGREED AND UNDERSTOOD TO BE $50.00 OR $0.50 PER POUND PER PIECE WHICHEVER IS GREATER UNLESS A HIGHER VALUE IS DECLARED AND APPLICABLE CHARGES PAID. SEE REVERSE SIDE OF AIRBILL FOR DECLARED VALUE INFORMATION.

UNLESS OTHERWISE SPECIFIED BY SHIPPER COLLECT CASH OR CERTIFIED FUNDS. ☐ COMPANY CHECK OK

TYPE OF PACKAGING	INSURANCE	DECLARED VALUE	CUBIC FT.	DENSITY
INTERNAL EXTERNAL			2.8	28.2

SPECIAL SERVICES
☐ COUNTER TO COUNTER ☐ SPECIAL DELIVERY ☐ PROOF OF DELIVERY ☐ HAZARDOUS MATERIAL
☐ SPECIAL PICK UP ☐ HOLD AND NOTIFY ☐ OTHER

5. SHIPPER'S SIGNATURE
X

FORWARDER'S SIGNATURE	DATE RECV'D	TIME RECV'D	LOCATION	NO. OF SHIPMENTS TENDERED
X			SHIPPERS DOOR ☐ TERMINAL ☒	

CONSENT TO SCREEN CARGO GRANTED PER ITEM 16 ON REVERSE.

NON-NEGOTIABLE AIRBILL SUBJECT TO CONDITIONS OF CONTRACT ON REVERSE SIDE AND LYNDEN TARIFFS AT WWW.LAF.LYNDEN.COM.c

WORLDWIDE COMMUNICATION CENTER - SEATTLE, WA
1(800)926-5703

ID TYPE	PHOTO Y/N	NAME

(Rev 01/28/09)

LYNDEN AIR FREIGHT, INC. STANDARD TRANSPORTATION TERMS AND CONDITIONS (Transportion by Air)

1. Definitions.
(a). "Carrier" refers to the Carrier identified on the air waybill or other transportation documentation, all those providing services as identified in section 8, below, all vessels, vehicles, aircraft and other conveyances used to perform transportation services hereunder, and the respective owners, employees and agents of each of the foregoing.
(b). "Shipper" refers to the entity engaging Carrier with respect to the goods and, unless the context herein clearly indicates to the contrary, Shipper shall include the owner, consignee and all others who may have right of claim by, through or with respect to the goods, all of whom shall be jointly and severally liable for performance hereunder. Shipper expressly warrants that it has authority to bind each of the foregoing to the terms and conditions set forth herein.
(c). "Goods" refers to those items with respect to which Carrier has been requested to or does perform services hereunder, including all packing and packaging as well as all other items or materials associated with such goods, including, without limitation, all wrappings, boxes, crates, cradles, pallets and containers.
(d). "Consignee" refers to the entity identified to receive the goods. (e). "Montreal Convention" refers to the Convention For The Unification Of Certain Rules Relating To International Carriage By Air, signed at Montreal, 28 May 1999, including any Protocols thereto ratified by the United States.

2. Basic Agreement. In tendering goods to Carrier, Shipper agrees to the terms and conditions set forth herein as well as such additional terms and conditions set forth in Carrier's tariff. If Carrier should complete the air waybill and/or execute it on the behalf of Shipper and/or Consignee, then Carrier shall be deemed to have done so at the request and on behalf of Shipper and/or Consignee, as applicable. The face of the air waybill shall identify the places of departure and destination as well as all agreed upon stopping places, provided that Carrier is authorized to alter or add additional places/stops as needed. Shipper warrants the accuracy and completeness of all instructions and particulars relating to the goods, including their nature, description, special characteristics, marks, number, weight, volume and quantity, upon all of which Carrier shall be entitled to rely. Shipper shall reimburse Carrier for any loss or expense (including legal fees and other expenses) resulting from insufficient, inaccurate and/or incomplete instructions and/or particulars relating to the goods. The goods are received by Carrier in apparent good order (unless noted otherwise on the face of the air waybill or other accompanying transportation documentation) for the intended carriage. Carrier shall have the right to refuse carriage of goods at any time if it deems the goods and/or intended carriage are in any way dangerous, likely to cause harm or otherwise inappropriate. Carrier shall have the right to re-weigh and/or inspect goods at any time for any reason.

3. Freight, Charges and Payment.
(a). Freight. Freight, including all charges assessed pursuant to the transportation agreement to which these Terms and Conditions are attached or, if not identified therein, pursuant to Carrier's tariff, shall be based upon instructions or particulars furnished by Shipper but may be recalculated if the instructions or particulars are inaccurate and/or incomplete.
(b). Charges. Charges shall be as set forth in the applicable transportation agreement or, if not identified therein, pursuant to Carrier's tariff. All other charges, dues, taxes, duties, fines, penalties applicable to the goods, all advances made by Carrier, all additional expenses incurred by Carrier by virtue of Shipper's actions, omissions or failure to comply with its obligations herein, and all expenses incurred as a result of any unforeseen or extraordinary circumstances shall be for the account of Shipper.
(c). Payment. Freight and all charges shall be fully earned upon tender of the goods by Shipper and shall be due and payable as set forth in the applicable transportation agreement or, if not identified therein, pursuant to Carrier's tariff. All sums shall be paid in US dollars without deduction or offset. Sums which are due but which have not been paid shall accrue interest at the rate of one percent (1%) per month (or the highest rate allowed by law) from date due until paid in full. Shipper, including all entities identified in the definition of that term, shall be jointly and severally liable for the payment of all sums due Carrier.
(d). Lien. Carrier shall have a lien upon the goods which shall survive delivery to secure payment of all sums due Carrier. Further, Shipper grants Carrier a consensual lien upon all Shipper's personal property subsequently in the possession of Carrier to secure payment of said sums. Carrier shall be entitled to assert such lien rights at any time, including withholding delivery until payment is made and/or holding public or private sale of personal property; sale proceeds shall be first applied to all costs of sale, then to sums due Carrier, with the balance to be paid to Shipper.

4. Special and/or Hazardous Goods. Shipper must identify to Carrier in writing and prior to shipment all goods requiring specialized handling and/or which are dangerous or hazardous in character, and Carrier must specifically assent to the carriage of such goods. If accepted by Carrier, Shipper shall provide complete and accurate handling instructions, including all relevant safety procedures, shall provide all documentation, and shall otherwise comply with all laws and regulations applicable to such goods. If the special, dangerous and/or hazardous character of such goods creates risk of harm to person or property or makes the continued carriage impractical, Carrier shall, a t Shipper's sole risk and expense, discharge, store and/or dispose of such goods.

5. Routes, Modes and Methods, Etc. Carrier shall use reasonable dispatch and due diligence to complete carriage hereunder, but does not guarantee any particular departure, arrival or connection times or dates, and shall have liberty with respect to selection of conveyances, routes, procedures modes, and methods of carriage.

6. Hindrances. Carrier shall not be liable for delay, inability to perform or failure to perform caused by events beyond its direct and reasonable control. In the event such hindrances occur, Carrier shall, if feasible, notify Shipper for instructions with respect to the goods or, if insufficient time exists and/or instructions are not provided, shall, at Shipper's risk and expense, store and/or dispose of the goods as appears reasonable. Upon occurrence of any hindrance, either party may terminate the transportation agreement.

7. Tender and Delivery. Unless otherwise set forth in the applicable transportation agreement, Shipper shall tender the goods to Carrier at the airport identified in good order and condition, packaged, protected, packed, stowed and/or shored sufficiently to withstand the rigors of the contemplated transportation services. Unless otherwise set forth in the applicable transportation agreement, the goods shall be deemed delivered to Consignee at the destination airport upon notification to Consignee of their arrival, with Consignee obligated to receive and take the goods as promptly as they can be discharged and with such discharge to be at Shipper's sole risk and expense. Goods which have been received and taken by Consignee, which have been tendered to Consignee by notification but have either been refused or not promptly received or taken by Consignee, which have been taken or seized by governmental authorities or under legal process, or which cannot be delivered because of Shipper's fault or neglect or inaccuracy or inadequacy of instructions or for other reasons beyond Carrier's control, shall be deemed to have been fully delivered with Carrier's responsibility with respect to such goods to thereupon cease. Any actions taken by Carrier with respect to the goods after delivery shall be deemed performed solely as agent for Shipper and shall be at Shipper's sole risk and expense.

8. Subcontracting. Carrier shall be entitled to subcontract all or any portion of the transportation services hereunder. This agreement, including all benefits, defenses, exceptions, immunities and limitations upon liability set forth herein, shall apply whenever claim is made against Carrier and/or any carrier, servant, agent, contractor or any other whose services have been used to perform the transportation services. All claims arising out of and/or involving the goods or their transportation hereunder shall be subject to this agreement and commenced and maintained as set forth herein.

9. Customs and Documentation. Shipper shall furnish and attach to the air waybill or other accompanying transportation documentation all such information and documentation necessary to meet the requirements of foreign law and/or customs, and shall comply with all laws and regulations of any country to, from, through or over which the goods may be carried, including those relating to packaging, carriage and/or delivery. Carrier shall not be liable for loss, damage or expense occasioned by the absence, irregularity or insufficiency of any such information or documentation.

10. Montreal Convention. If the carriage involves a destination or stop(s) in a country other than the United States, the Montreal Convention may be applicable. The Montreal Convention governs, and in most cases limits the liability of carriers with respect to, loss, damage or delay to cargoes unless a higher value is declared in advance by Shipper and a supplementary charge is paid (if required). If the Montreal Convention is applicable, then it shall be deemed fully incorporated herein and shall override any conflicting provision hereof to the extent of such conflict but no more, and only for that portion of the carriage service as to which the Montreal Convention applies.

11. Liability. Carrier's liability with respect to the goods, Shipper and/or any other party claiming with respect to the goods, and whether for loss, damage, delay, shortage, misdelivery, failure to deliver or otherwise, shall be only as follows:
(a). Exceptions. Carrier shall not be liable for loss, damage, delay, shortage, misdelivery, failure to deliver or other result caused by: acts of God; perils of the air; public enemies; acts of terrorism; acts of war; public authorities acting with actual or apparent authority; fire (unless caused by the actual fault or privity of Carrier); quarantines; acts or omissions of Shipper and/or the owner of the goods, including their agents or representatives; strikes; lockouts or other labor disputes; sabotage; riots and civil commotions; wastage in bulk or weight or arising from the nature of the goods; inherent vice; improper or insufficient packing, securing, packaging, marking or addressing; latent defect not discoverable by due diligence; compliance with instructions from Shipper; goods loaded by Shipper into sealed containers or other packages, provided the seal remains unbroken and the container or other package is not physically damaged; errors in aircraft piloting, handling or navigation; and/or any other cause arising without the actual fault and privity of Carrier.
(b). Consequential Damages. Carrier shall not be liable for any consequential or special damages of any type or nature whatsoever and howsoever arising, whether Carrier had or should have had knowledge such damages might be incurred, including without limitation loss of profits, income, business opportunities and ability to use undamaged component or system parts.
(c). Limitation of Liability; Higher Value. Carrier's liability with respect to the goods, whether for loss, damage, delay, shortage, misdelivery, failure to deliver or otherwise, shall be the lesser of the actual cost to repair, replace and/or deliver the goods or fifty cents ($0.50) per pound actual weight of the lost, damaged, etc. goods, with a minimum liability of fifty dollars ($50.00) for any given shipment, unless Shipper has declared to Carrier in writing a higher value for the goods, Carrier has agreed to carry the goods at that higher value and Shipper has agreed to pay increased freight with respect to such higher declaration, in which event Carrier's liability shall be the lesser of the actual cost to repair, replace and/or deliver such goods or the higher value so declared and agreed. Carrier shall not be liable to Shipper or any other party claiming with respect to the goods, whether for loss, delay, shortage, misdelivery, failure to deliver or otherwise, or in tort, contract or upon any other theory, other than as set forth herein, and Shipper agrees to indemnify and hold harmless (including legal fees and costs) Carrier of and from any loss, damage, expense, liability, claim and/or suit arising out of or in any fashion relating to the goods other than as specifically allocated to Carrier herein.
(d). Delivery in Good Condition. Delivery of the goods without written notification of damage on the face of the air waybill or the delivery receipt shall be prima facie evidence that the goods have been delivered in the same good order, count and condition as when received by Carrier.

12. Claims. As a condition precedent to recovery against Carrier:
(a). The goods must be carefully inspected immediately upon delivery and any loss or damage then evident must be noted on Carrier's copy of the air waybill or on the delivery receipt.
(b). In the event of loss or damage which is not ascertainable at delivery, written notice of loss, damage, shortage, etc. involving the goods must be given to Carrier within seven (7) days following delivery, or in the case of perishables verbally within twenty four (24) hours and written follow-up within forty eight (48) hours from delivery, after which time it shall be conclusively presumed that the goods were delivered in the same condition as when received.
(c). In the event of goods which have been delayed, lost or otherwise not delivered, Carrier must be given written notice of said delay, loss or failure to deliver within fifteen (15) days from the date upon which the goods should have been delivered.
(d). Carrier shall have a reasonable opportunity to inspect the goods, including their packing or packaging, in the same condition as when delivered and before any alteration or destruction.
(e). A written claim for loss or damage specifying the particulars thereof must be filed with Carrier within ninety (90) days of the date of delivery or date on which goods should have been delivered.
(f). Suit against Carrier must be filed within one (1) year following the date of delivery of the goods, date on which the goods should have been delivered, or date from which Carrier disallowed the claim or pertinent part of the claim, whichever is later.
(g). Notwithstanding the foregoing, there shall be no recovery from Carrier until the freight and all other sums due Carrier have been paid in full.

13. Extension of Benefits. All limitations upon, and exceptions and defenses to, liability granted to Carrier pursuant to this agreement shall be deemed automatically extended to all parent, subsidiary and affiliated entities and all subcontractors of Carrier, and the members, directors, officers, employees and agents of each of the foregoing.

14. Law and Forum. Any lawsuit relating to the goods, the transportation services and/or this agreement must be filed in the federal court located in Seattle, Washington, United States. The parties consent to the exclusive jurisdiction of said court, and agree that the prevailing party shall be entitled to recover its legal fees and costs.

15. Tariff Availability. Carrier's tariff, incorporated herein, is available at any Carrier office during regular working hours, and is also available on Carrier's website at the following address: www.laf.lynden.com.

16. Shipper grants carrier consent to screen cargo as may be required by the Transportation Security Administration. Screening may include, but not be limited to physical search, trace detection and x-ray technologies.

Staci Savage

From: Cory Myren
Sent: Thursday, July 10, 2014 6:53 PM
Subject: DOMESTIC PRE ALERT FOR BILL# 027.5191.4542

```
      Number:  KAYAK/327567
Message date:  10 JUL 2014  06:51pm
      Sender:  Cory Myren (CMYREN) LAF,ANC
        From:  LAFANC
          To:  PDXOPS; PDXCS
     Subject:  DOMESTIC PRE ALERT FOR BILL# 027.5191.4542
          cc:  LAFANC IMAIL ANCCSA CMYREN

LYNDEN AIRFREIGHT             ALERT FOR PDX       GOL       07/10/14

AIRLINE BILL#        ORG DST FLIGHT#            EST.ARRIVAL BILL   PCS WEIGHT
027.5191.4542        ANC PDX AS                 071114-0800    1     1     66
-------------------------------------------------------------------------------
CONTAINER TYPE  LOOSE         NUMBER LOOSE                NET WEIGHT 66

SVC ORG BILL#       SHIPPER CONSIGNEE       PCS     WGT     CHARGES DST  CITY

PRI ANC 7189899     COMINCO  CH2M HILL        1      66       33.00 PDX CORVALL
SDL     07.10.14    DDL 07.11.14 17:00 TECK                   OTHER
                    INS                D/V



                BILLS    PIECES     WEIGHT
TOTALS              1         1         66

GRAND TOTAL         1         1         66

*******************************************************************************

PLEASE ARRANGE HOT SHOT DELIVERY TO CORVALIS.
```

Hotshot w/ WCOU 7/11

LYNDEN INTERNATIONAL

Lynden Air Freight, Inc.
P. O. BOX 84167
SEATTLE, WA 98124
www.laf.lynden.com

Delivery Receipt

AIRBILL NUMBER 5130774

* NOTE: IF SERVICE DESCRIPTION IS NOT IDENTIFIED LYNDEN WILL AUTOMATICALLY SHIP AS STANDARD SERVICE.

ORIGIN: PDX
DATE SHIPPED: 07/10/14

SERVICE DESCRIPTION
1. ☐ NEXT BUSINESS DAY BY 5 PM ☐ SECOND BUSINESS DAY BY 5 PM ☐ FIFTH BUSINESS DAY BY 5 PM

CUSTOMER SPECIFIED (MAY RESULT IN ADDITIONAL CHARGES)
☒ DEL DEADLINE DATE

SHIPPER'S LAF ACCOUNT NO.	SHIPPER'S REFERENCE NO. OR P.O. NO.	CONSIGNEE'S LAF ACCOUNT NO.	CONSIGNEE'S REFERENCE NO. OR P.O. NO.	TARIFF DEST.	TRANS. CITY
				PDX	

2. FROM: SHIPPER (NAME AND STREET ADDRESS) RESIDENCE ☐
SUMITOMO METAL MINING POGO
PO BOX 145

CITY	STATE	ZIP REQUIRED
DELTA JUNCTION	AK	99737

SENT BY (NAME/DEPT.) | PHONE

3. TO: CONSIGNEE (NAME AND STREET ADDRESS) RESIDENCE ☐
CH2M HILL
1100 NE CIRCLE BLVD, STE 300 BIOASSAY

CITY	STATE	ZIP REQUIRED
CORVALLIS	OR	97330

ATTENTION (NAME/DEPT.) | PHONE: 541-768-3160

4. BILL CHARGES TO: CHARGES ARE PREPAID UNLESS OTHERWISE INDICATED
PREPAID ☒ COLLECT ☐ 3RD PARTY ☐
☐ DRIVER COLLECT FUNDS AS CHECKED ABOVE
COMAT ☐

3RD PARTY BILLING (IF OTHER THAN SHIPPER OR CONSIGNEE) PLEASE INCLUDE CITY, STATE AND ZIP
SUMITOMO METAL MINING POGO
PO BOX 145
DELTA JUNCTION, AK 99737
907-895-2841
907-895-2756

DEL. DEADLINE DATE: 07/11/14 | TIME: 17:00
SCALE/ITEM: 77S | RATE:

PIECES	DESCRIPTION OF COMMODITY	DIMENSIONS LxWxH = CUBIC IN.	WEIGHT	DIM. WEIGHT
1	SAMPLES	14.13.21	74	20
1	< TOTAL >	CHARGEABLE WT:	74	

SHIPPER'S COD DOLLARS CENTS

LIABILITY IS AGREED AND UNDERSTOOD TO BE $50.00 OR $0.50 PER POUND PER PIECE WHICHEVER IS GREATER UNLESS A HIGHER VALUE IS DECLARED AND APPLICABLE CHARGES PAID. SEE REVERSE SIDE OF AIRBILL FOR DECLARED VALUE INFORMATION.

UNLESS OTHERWISE SPECIFIED BY SHIPPER COLLECT CASH OR CERTIFIED FUNDS. ☐ COMPANY CHECK OK

TYPE OF PACKAGING	INSURANCE	DECLARED VALUE	CUBIC FT.	DENSITY
INTERNAL EXTERNAL			2.2	33.5

SPECIAL SERVICES
☐ COUNTER TO COUNTER ☐ SPECIAL DELIVERY ☐ PROOF OF DELIVERY ☐ HAZARDOUS MATERIAL
☐ SPECIAL PICK UP ☐ HOLD AND NOTIFY ☐ OTHER

5. SHIPPER'S SIGNATURE
X

FORWARDER'S SIGNATURE	DATE RECV'D	TIME RECV'D	LOCATION	NO. OF SHIPMENTS TENDERED
X			SHIPPERS DOOR ☒ TERMINAL ☐	

RECEIVED IN ORDER EXCEPT AS NOTED: (SIGNATURE)	PRINT NAME	DATE	TIME
X			

CONSENT TO SCREEN CARGO GRANTED PER ITEM 16 ON REVERSE.

NON-NEGOTIABLE AIRBILL SUBJECT TO CONDITIONS OF CONTRACT ON REVERSE SIDE AND LYNDEN TARIFFS AT WWW.LAF.LYNDEN.COM.

WORLDWIDE COMMUNICATION CENTER - SEATTLE, WA
1(800)926-5703

ID TYPE	PHOTO Y/N	NAME

(Rev 01/28/09)

VAA 7/11/14 1130

LYNDEN INTERNATIONAL

Lynden Air Freight, Inc.
P. O. BOX 84167
SEATTLE, WA 98124
www.laf.lynden.com

Delivery Receipt

AIRBILL NUMBER 5130777

* NOTE: IF SERVICE DESCRIPTION IS NOT IDENTIFIED LYNDEN WILL AUTOMATICALLY SHIP AS STANDARD SERVICE.

ORIGIN: PDX
DATE SHIPPED: 07/10/14

SERVICE DESCRIPTION
1. ☐ NEXT BUSINESS DAY BY 5 PM ☐ SECOND BUSINESS DAY BY 5 PM ☐ FIFTH BUSINESS DAY BY 5 PM

CUSTOMER SPECIFIED (MAY RESULT IN ADDITIONAL CHARGES): ☒ DEL DEADLINE DATE

SHIPPER'S LAF ACCOUNT NO.	SHIPPER'S REFERENCE NO. OR P.O. NO.	CONSIGNEE'S LAF ACCOUNT NO.	CONSIGNEE'S REFERENCE NO. OR P.O. NO.	TARIFF DEST.	TRANS. CITY
				PDX	

2. FROM: SHIPPER (NAME AND STREET ADDRESS) RESIDENCE ☐
SUMITOMO METAL MINING POGO
PO BOX 145

CITY	STATE	ZIP REQUIRED
DELTA JUNCTION	AK	99737

3. TO: CONSIGNEE (NAME AND STREET ADDRESS) RESIDENCE ☐
CH2M HILL
1100 NE CIRCLE BLVD, STE 300 BIOASSAY

CITY	STATE	ZIP REQUIRED
CORVALLIS	OR	97330

4. BILL CHARGES TO: CHARGES ARE PREPAID UNLESS OTHERWISE INDICATED
PREPAID ☒ COLLECT ☐ 3RD PARTY ☐
☐ DRIVER COLLECT FUNDS AS CHECKED ABOVE COMAT ☐

SENT BY (NAME/DEPT.)	PHONE	ATTENTION (NAME/DEPT.)	PHONE
			541-768-3160

3RD PARTY BILLING (IF OTHER THAN SHIPPER OR CONSIGNEE) PLEASE INCLUDE CITY, STATE AND ZIP
SUMITOMO METAL MINING POGO
PO BOX 145
DELTA JUNCTION, AK 99737
907-895-2841
907-895-2756

DEL. DEADLINE DATE	TIME
07/11/14	17:00
SCALE/ITEM	RATE
77S	

PIECES	DESCRIPTION OF COMMODITY	DIMENSIONS LxWxH = CUBIC IN.	WEIGHT	DIM. WEIGHT
1	SAMPLES	14.13.21	76	20
1	< TOTAL >	CHARGEABLE WT:	76	

SHIPPER'S COD ☐ DO ☐

LIABILITY IS AGREED AND UNDERSTOOD TO BE $50.00 OR $0.50 PER POUND PER PIECE WHICHEVER IS GREATER UNLESS A HIGHER VALUE IS DECLARED AND APPLICABLE CHARGES PAID. SEE REVERSE SIDE OF AIRBILL FOR DECLARED VALUE INFORMATION.

UNLESS OTHERWISE SPECIFIED BY SHIPPER COLLECT CASH OR CERTIFIED FUNDS. ☐ COMPANY CHECK OK

TYPE OF PACKAGING	INSURANCE	DECLARED VALUE	CUBIC FT.	DENSITY
INTERNAL EXTERNAL			2.2	34.4

SPECIAL SERVICES
☐ COUNTER TO COUNTER ☐ SPECIAL DELIVERY ☐ PROOF OF DELIVERY ☐ HAZARDOUS MATERIAL
☐ SPECIAL PICK UP ☐ HOLD AND NOTIFY ☐ OTHER

5. SHIPPER'S SIGNATURE
X

FORWARDER'S SIGNATURE	DATE RECV'D	TIME RECV'D	LOCATION	NO. OF SHIPMENTS TENDERED
X			SHIPPERS DOOR ☒ TERMINAL ☐	

RECEIVED IN ORDER EXCEPT AS NOTED: (SIGNATURE)	PRINT NAME	DATE	TIME
X			

CONSENT TO SCREEN CARGO GRANTED PER ITEM 16 ON REVERSE.

NON-NEGOTIABLE AIRBILL SUBJECT TO CONDITIONS OF CONTRACT ON REVERSE SIDE AND LYNDEN TARIFFS AT WWW.LAF.LYNDEN.COM.

WORLDWIDE COMMUNICATION CENTER - SEATTLE, WA
1(800)926-5703

ID TYPE	PHOTO Y/N	NAME

(Rev 01/28/09)

LYNDEN INTERNATIONAL

Lynden Air Freight, Inc.
P. O. BOX 84167
SEATTLE, WA 98124
www.laf.lynden.com

Delivery Receipt

AIRBILL NUMBER 5131820

* NOTE: IF SERVICE DESCRIPTION IS NOT IDENTIFIED LYNDEN WILL AUTOMATICALLY SHIP AS STANDARD SERVICE.

ORIGIN: PDX
DATE SHIPPED: 07/15/14

SERVICE DESCRIPTION
1. ☐ NEXT BUSINESS DAY BY 5 PM ☐ SECOND BUSINESS DAY BY 5 PM ☐ FIFTH BUSINESS DAY BY 5 PM

CUSTOMER SPECIFIED (MAY RESULT IN ADDITIONAL CHARGES) ☒ DEL DEADLINE DATE

SHIPPER'S LAF ACCOUNT NO.	SHIPPER'S REFERENCE NO. OR P.O. NO.	CONSIGNEE'S LAF ACCOUNT NO.	CONSIGNEE'S REFERENCE NO. OR P.O. NO.	TARIFF DEST.	TRANS. CITY
				PDX	

2. FROM: SHIPPER (NAME AND STREET ADDRESS) RESIDENCE ☐
SUMITOMO METAL MINING POGO
PO BOX 145

CITY	STATE	ZIP REQUIRED
DELTA JUNCTION	AK	99737

3. TO: CONSIGNEE (NAME AND STREET ADDRESS) RESIDENCE ☐
CH2M HILL
1100 NE CIRCLE BLVD, STE 300 BIOASSAY

CITY	STATE	ZIP REQUIRED
CORVALLIS	OR	97330

4. BILL CHARGES TO: CHARGES ARE PREPAID UNLESS OTHERWISE INDICATED
PREPAID ☒ COLLECT ☐ 3RD PARTY ☐
☐ DRIVER COLLECT FUNDS AS CHECKED ABOVE COMAT ☐

SENT BY (NAME/DEPT.)	PHONE	ATTENTION (NAME/DEPT.)	PHONE
			541-768-3160

3RD PARTY BILLING (IF OTHER THAN SHIPPER OR CONSIGNEE) PLEASE INCLUDE CITY, STATE AND ZIP
SUMITOMO METAL MINING POGO
PO BOX 145
DELTA JUNCTION, AK 99737
907-895-2841
907-895-2756

DEL. DEADLINE DATE	TIME
07/15/14	17:00
SCALE/ITEM	RATE
77S	

PIECES	DESCRIPTION OF COMMODITY	DIMENSIONS LxWxH = CUBIC IN.	WEIGHT	DIM. WEIGHT
1	SAMPLES	14.24.15	76	26
1	< TOTAL >	CHARGEABLE WT:	76	

SHIPPER'S COD DOLLARS CENTS

LIABILITY IS AGREED AND UNDERSTOOD TO BE $50.00 OR $0.50 PER POUND PER PIECE WHICHEVER IS GREATER UNLESS A HIGHER VALUE IS DECLARED AND APPLICABLE CHARGES PAID. SEE REVERSE SIDE OF AIRBILL FOR DECLARED VALUE INFORMATION.

UNLESS OTHERWISE SPECIFIED BY SHIPPER COLLECT CASH OR CERTIFIED FUNDS. ☐ COMPANY CHECK OK

TYPE OF PACKAGING	INSURANCE	DECLARED VALUE	CUBIC FT.	DENSITY
INTERNAL EXTERNAL			2.9	26.1

SPECIAL SERVICES
☐ COUNTER TO COUNTER ☐ SPECIAL DELIVERY ☐ PROOF OF DELIVERY ☐ HAZARDOUS MATERIAL
☐ SPECIAL PICK UP ☐ HOLD AND NOTIFY ☐ OTHER

5. SHIPPER'S SIGNATURE
X

FORWARDER'S SIGNATURE	DATE RECV'D	TIME RECV'D	LOCATION	NO. OF SHIPMENTS TENDERED
X			SHIPPERS DOOR ☒ TERMINAL ☐	

RECEIVED IN ORDER EXCEPT AS NOTED: (SIGNATURE)	PRINT NAME	DATE	TIME
X			

CONSENT TO SCREEN CARGO GRANTED PER ITEM 16 ON REVERSE.

NON-NEGOTIABLE AIRBILL SUBJECT TO CONDITIONS OF CONTRACT ON REVERSE SIDE AND LYNDEN TARIFFS AT WWW.LAF.LYNDEN.COM.

WORLDWIDE COMMUNICATION CENTER - SEATTLE, WA
1(800)926-5703

ID TYPE	PHOTO Y/N	NAME

(Rev 01/28/09)

LYNDEN INTERNATIONAL

Lynden Air Freight, Inc.
P. O. BOX 84167
SEATTLE, WA 98124
www.laf.lynden.com

Delivery Receipt

AIRBILL NUMBER 5133119

* NOTE: IF SERVICE DESCRIPTION IS NOT IDENTIFIED LYNDEN WILL AUTOMATICALLY SHIP AS STANDARD SERVICE.

ORIGIN: PDX
DATE SHIPPED: 07/17/14

SERVICE DESCRIPTION
1. ☐ NEXT BUSINESS DAY BY 5 PM ☐ SECOND BUSINESS DAY BY 5 PM ☐ FIFTH BUSINESS DAY BY 5 PM

CUSTOMER SPECIFIED (MAY RESULT IN ADDITIONAL CHARGES)
☒ DEL DEADLINE DATE

SHIPPER'S LAF ACCOUNT NO.	SHIPPER'S REFERENCE NO. OR P.O. NO.	CONSIGNEE'S LAF ACCOUNT NO.	CONSIGNEE'S REFERENCE NO. OR P.O. NO.	TARIFF DEST.	TRANS. CITY
				PDX	

2. FROM: SHIPPER (NAME AND STREET ADDRESS) RESIDENCE ☐
SUMITOMO METAL MINING POGO
PO BOX 145

CITY	STATE	ZIP REQUIRED
DELTA JUNCTION	AK	99737

3. TO: CONSIGNEE (NAME AND STREET ADDRESS) RESIDENCE ☐
CH2M HILL
1100 NE CIRCLE BLVD, STE 300 BIOASSAY

CITY	STATE	ZIP REQUIRED
CORVALLIS	OR	97330

4. BILL CHARGES TO: CHARGES ARE PREPAID UNLESS OTHERWISE INDICATED
PREPAID ☒ COLLECT ☐ 3RD PARTY ☐
☐ DRIVER COLLECT FUNDS AS CHECKED ABOVE
COMAT ☐

SENT BY (NAME/DEPT.)	PHONE	ATTENTION (NAME/DEPT.)	PHONE
			541-768-3160

3RD PARTY BILLING (IF OTHER THAN SHIPPER OR CONSIGNEE) PLEASE INCLUDE CITY, STATE AND ZIP
SUMITOMO METAL MINING POGO
PO BOX 145
DELTA JUNCTION, AK 99737
907-895-2841
907-895-2756

DEL. DEADLINE DATE: 07/17/14
TIME: 17:00
SCALE/ITEM: 77S
RATE:

PIECES	DESCRIPTION OF COMMODITY	DIMENSIONS LxWxH = CUBIC IN.	WEIGHT	DIM. WEIGHT
1	SAMPLES	24.13.14	72	23
1	< TOTAL >	CHARGEABLE WT:	72	

SHIPPER'S COD DOLLARS CENTS

LIABILITY IS AGREED AND UNDERSTOOD TO BE $50.00 OR $0.50 PER POUND PER PIECE WHICHEVER IS GREATER UNLESS A HIGHER VALUE IS DECLARED AND APPLICABLE CHARGES PAID. SEE REVERSE SIDE OF AIRBILL FOR DECLARED VALUE INFORMATION.

UNLESS OTHERWISE SPECIFIED BY SHIPPER COLLECT CASH OR CERTIFIED FUNDS. ☐ COMPANY CHECK OK

TYPE OF PACKAGING	INSURANCE	DECLARED VALUE	CUBIC FT.	DENSITY
INTERNAL EXTERNAL			2.5	28.5

SPECIAL SERVICES
☐ COUNTER TO COUNTER ☐ SPECIAL DELIVERY ☐ PROOF OF DELIVERY ☐ HAZARDOUS MATERIAL
☐ SPECIAL PICK UP ☐ HOLD AND NOTIFY ☐ OTHER

5. SHIPPER'S SIGNATURE
X

FORWARDER'S SIGNATURE	DATE RECV'D	TIME RECV'D	LOCATION	NO. OF SHIPMENTS TENDERED
X			SHIPPERS DOOR ☒ TERMINAL ☐	

RECEIVED IN ORDER EXCEPT AS NOTED: (SIGNATURE)	PRINT NAME	DATE	TIME
X			

CONSENT TO SCREEN CARGO GRANTED PER ITEM 16 ON REVERSE.

NON-NEGOTIABLE AIRBILL SUBJECT TO CONDITIONS OF CONTRACT ON REVERSE SIDE AND LYNDEN TARIFFS AT WWW.LAF.LYNDEN.COM.

WORLDWIDE COMMUNICATION CENTER - SEATTLE, WA 1(800)926-5703

ID TYPE	PHOTO Y/N	NAME

(Rev 01/28/09)

027 FAI 1075 8506

027-1075 8506

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

Alaska Air Cargo
ALASKA AIRLINES & HORIZON AIR
P.O. BOX 68900 SEATTLE, WA 98168
800-225-2752 ALASKACARGO.COM

Consignee's Name and Address
LYNDEN INTERNATIONA
TO BE DLVD TO
CH2M HILL APPLIED SCIENCE
PORTLAND, OR X
USA
Tel: 503-257-0365

Consignee's Account Number

Also notify
Tel:

Issuing Carrier's Agent and City

Agent's IATA Code

Account No.

Accounting Information
10659
Sumitomo Metal Mining Pogo LLC
Mile 50 Pogo Mile Road
Delta Junction, AK 99737
USA

GoldStreak

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

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

Airport of Destination	Flight/Date	Flight/Date	Amount of Insurance
Portland	AS 144/17		XXX

Handling Information
ETA 545AM

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	72.0	L Q		72.0	1.58	113.76	CHILL WATER SAMPLES Dims: 24 x 13 x14 x 1 GSX PER
1	72.0					113.76	Volume:2.528

Prepaid	Weight Charge	Collect
	113.76	
	Valuation Charge	
	Tax	
	2.20	
	Total Other Charges Due Agent	
	Total Other Charges Due Carrier	
	14.96	
Total Prepaid		Total Collect
130.92		

Other Charges
MYC 12.96
SCC 2.00
XBC 0.00

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

☒ THIS SHIPMENT DOES NOT CONTAIN DANGEROUS GOODS

☐ THIS SHIPMENT DOES CONTAIN DANGEROUS GOODS

16 Jul 2014 15:11 Fairbanks Alaska Airlines

Executed On (Date) at (Place) Signature of Issuing Carrier or Its Agent

027-1075 8506

CH2M HILL Applied Science

Bioassay Lab Mgr

1100 NE Circle BLVD, STE 300

Corvallis, OR 97330

USA

541. 768. 3160

Keep Cool!

NOA (Notify on Arrival)

907. 243. 6150

877. 856. 9696

027 FAI 1075 6970 027-1075 6970

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

Consignee's Name and Address	Consignee's Account Number	Also notify
CH2M Hill 1100 NE Circle Blvd, ste 300 Hfpu Corvallis, OR 97330 USA Tel: 907-243-6150		Tel:

Issuing Carrier's Agent and City	Accounting Information
	10659 Sumitomo Metal Mining Pogo LLC Mile 50 Pogo Mile Road Delta Junction, AK 99737 USA
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
PDX	Alaska Airlines			USD	PX	X	X	NVD	NCV

Airport of Destination	Flight/Date	Flight/Date	Amount of Insurance
Portland	AS 144/12		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	78.0	L	Q		78.0		AS AGREED	WATER SAMPLES Dims: 25 x 14 x14 x 1 GSX
1	78.0						AS AGREED	Volume: 2.836

Prepaid	Weight Charge	Collect	Other Charges
	AS AGREED		MYC 14.04 SCC 2.00 XBC 0.00
	Valuation Charge		
	Tax		
	Total Other Charges Due Agent		
	Total Other Charges Due Carrier		
Total Prepaid		Total Collect	
AS AGREED			

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

☒ THIS SHIPMENT DOES NOT CONTAIN DANGEROUS GOODS

☐ THIS SHIPMENT DOES CONTAIN DANGEROUS GOODS

11 Jul 2014 14:16 Fairbanks Alaska Airlines

Executed On (Date) at (Place) Signature of Issuing Carrier or its Agent

027-1075 6970

CH2MHILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client: Sumitomo Metal Mining Pogo LLC
Address: PO Box 145, Delta Junction AK 99737
NPDES#: AK 005334-1

Contact Person: Stacy Staley
Phone: (907) 895-2761
E-mail: PogoEnvironmental@smmpogo.com

CH2M HILL Project # / Purchase Order #

Composite Sample Information:
Initiated: Date ____ Time ____
Ended: Date ____ Time ____
Chilled During Collection ? Yes ___ No ___
Dechlorinated prior to shipping ? Yes ___ No ___

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

Analysis Required / Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Green Algae	Trout Acute	Sheepshead Acute	Sheepshead Chronic	Menidia Acute	Menidia Chronic	Mysid Acute	Mysid Chronic	Haz Waste				Concentration and/or Comments
OutfallOO1	7/7/14	0700		X	1			X		X													

SAMPLE NOT USED 7/12/2014

Sampled By & Title (Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time
Leonard E Hamm Leonard	7-7-14	Leonard E Hamm Leonard E Hamm	7/7/14 1100
Received By (Please sign and print name)	**Date/Time**	**Relinquished By (Please sign and print name)**	**Date/Time**
Jeff A. Hiller	7/7/14 1100		
Received By (Please sign and print name)	**Date/Time**	**Relinquished By (Please sign and print name)**	**Date/Time**
Annie Horton	7/11/14 1130		
Received By (Please sign and print name)	**Date/Time**	**Shipped Via** UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	**Shipping #**
Work Authorized By (Please sign and print name)	**Remarks** Out of ~~tim~~ holding time		

CH2MHILL **CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING**

Client: Sumitomo Metal Mining Pogo LLC
Address: PO Box 145, Delta Junction AK 99737

NPDES#: AK 0053341

Contact Person: Stacey Staley
Phone: 907-895-2761
E-mail: Stacey.Staley@smmpogo.com
Pogo.Environmental@smmpogo.com
CH2M HILL Project # / Purchase Order #:

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

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

Analysis Required / Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Green Algae	Trout Acute	Sheepshead Acute	Sheepshead Chronic	Menidia Acute	Menidia Chronic	Mysid Acute	Mysid Chronic	Haz Waste				Concentration and/or Comments
Outfall 001	7/9/2014	0700		X	1			X		X													

SAMPLE NOT USED

7/12/2014

Sampled By & Title (Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time
Leonard E Hanson — Leonard E Hanson	7/9/2014 1100	Leonard E Hanson — Leonard Hanson	7/9/14 1100
Received By (Please sign and print name)	**Date/Time**	**Relinquished By (Please sign and print name)**	**Date/Time**
Jeff A. Hiller	7/9/14 1100		
Received By (Please sign and print name)	**Date/Time**	**Relinquished By (Please sign and print name)**	**Date/Time**
Annie Horton — Annie Horton			
Received By (Please sign and print name)	**Date/Time**	**Shipped Via** UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	**Shipping #**
Work Authorized By (Please sign and print name)	**Remarks**		

Alaska Airlines / Ha

T-818 HA969

COO

Sumitomo Metal Mining Pogo LLC
PO Box 145
Mine 50 Pogo Road
Delta Junction, AK 99737
907-897-2760 or 907-895-2761

CH2MHill Applied Sciences Lab
C/O Lynden International
7770 NE Air Cargo Road
Portland, OR 97238 USA
Tel: 503-257-0365

KEEP CHILLED

PROBLEM

Hold for Pick Up

BIOASSAY REPORT
CHRONIC
BIOASSAYS CONDUCTED
August 26 through September 2, 2014

Prepared for

SUMITOMO METAL MINING-POGO MINE
DELTA JUNCTION, ALASKA

Prepared by

CH2MHILL
Applied Sciences Laboratory (ASL)
1100 NE Circle Boulevard, Suite 300
Corvallis, Oregon 97330
541-768-3160

NELAC #OR100022

Report Date: September 16, 2014
Lab I.D. No. B3182

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INTRODUCTION

CH2M HILL conducted chronic bioassays from August 26 through September 2, 2014, 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*).

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
C. dubia	100	50	> 100	< 1
P. promelas	75	100	96.4	1.04

Note: acronyms are as defined below.

Chronic Toxicity: Toxicity is shown if the TUc value (= 100% / IC_{25}) is equal to or greater than 2.

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).
IC_{25} = 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 IC_{25} 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.

Additional guidance was provided by:

- *Method Guidance and Recommendations for Whole Effluent Toxicity (WET) Testing* (40 CFR Part 136), (EPA September 2000), EPA 821-B-00-004.

DEVIATIONS FROM PROTOCOLS

Deviations from required procedures in the test methods:

- None noted.

Deviations from recommended procedures in the test methods:

- None noted.

TEST ORGANISMS

The *C. dubia* were obtained from CH2M HILL's in-house cultures and were less than 24 hours old for the acute test and less than 24 hours old and within an 8-hour age range for the chronic test. The *P. promelas* were obtained from Aquatox Inc., Hot Springs, Arkansas, and were less than 48 hours old and within a 24-hour age range at test initiation. 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.

DILUTION WATER

The dilution water used was reconstituted, moderately hard water with a total hardness of 80 to 100 mg/L as $CaCO_3$ and an alkalinity of 60 to 70 mg/L as $CaCO_3$.

TEST CONCENTRATIONS

The concentrations for the chronic tests were 12.5, 25, 50, 75, and 100 percent sample with dilution water for the control. For the chronic *C. dubia* test, 10 organisms per concentration were used with 10 test vessels per concentration and one organism per vessel. For the *P. promelas* chronic test, 10 organisms per chamber, with four chambers per concentration for a total of 40 organisms per concentration were used.

SAMPLE COLLECTION

Samples were collected by Sumitomo - Pogo personnel on August 25, 27, and 29, 2014. The samples were accepted as scheduled by CH2M HILL's Corvallis Aquatic Toxicology Laboratory.

The tests were initiated within 36 hours of sample collection. The samples were stored in the dark at 0 to 6°C until daily test solutions were prepared. Chain of custody forms documenting sample collection and handling are provided in Appendix C

SAMPLE PREPARATION

Samples used during these tests were filtered through a 60 µm net upon arrival and temperature was adjusted prior to test initiation and each daily renewal.

MONITORING OF BIOASSAYS

Samples were monitored on arrival for hardness, total residual chlorine, ammonia, and temperature.

For the *P. promelas* and *C. dubia* chronic tests, pre- and post-renewal solutions were monitored for dissolved oxygen and pH daily in all the concentrations. Conductivity was measured in each new sample (100 percent sample) and in the control. *C. dubia* survival and neonate production was measured daily in the chronic tests. According to EPA, *C. dubia* tests should be terminated when 60 percent or more of the surviving female *C. dubia* in the controls have produced their third brood and at least 15 neonates per adult are produced. *P. promelas* mortality was measured daily and fish growth was measured by dry weight analysis at the conclusion of the *P. promelas* chronic test. Temperature was monitored in pre-renewal solutions daily.

DATA ANALYSIS

The effects measured during the *C. dubia* chronic test included survival and reproduction over the exposure period. The effects measured during the *P. promelas* chronic test included survival and growth over the exposure period. The statistical analyses performed were those outlined in *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, using CETIS. The chronic NOEC and LOEC values were established by hypothesis testing as follows: Dunnett's Procedure or Bonferroni's T-Test was used to compare the survival, fecundity, or growth data between the control and each sample concentration. When the assumptions of normality or homogeneity of variance necessary for Dunnett's Procedure or T-test with Bonferroni Adjustment could not be met, Steel's Many-One Rank Test or Wilcoxon Rank Sum with Bonferroni Adjustment was used to analyze the data. The chronic point estimate values (IC_{25} values) were calculated for growth, reproduction, and/or fecundity effects by use of the Linear Interpolation method.

DATA INTERPRETATION

The NPDES discharge permit issued to Sumitomo Metal Mining-Pogo Mine Site (AK0053341) specifies the use of the chronic toxic unit (TUc) as the Toxicity Trigger. TUc values of 2 or higher indicate the need for additional testing.

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
C. dubia

Concentration (%)	Percent Survival	Ave. No. Young Per Adult
Control	100	31.1
12.5	90	30.3
25	100	29.9
50	100	22.4 [a]
75	90	23.5 [a]
100	100	27.5 [a]

[a] Indicates a statistically significant reduction from the control at p = 0.05.

The *C. dubia* test results indicated no statistically significant reduction in survival and a statistically significant reduction in reproduction only at the 50, 75, and 100 percent sample concentrations when compared to the control. By EPA definition, the NOEC and the LOEC were 25 and 50 percent sample, respectively.

EPA-821-R-02-013 (section 10.2.8.2.5) states "a test concentration shall not be considered toxic (i.e. significantly different from the control) if the relative difference from the control is less than the lower PMSD bounds." The EPA lower percent minimum significant difference (PMSD) bounds for *C. dubia* reproduction is 13 percent. The reduction at the 100 percent sample concentration was 11.6 percent and therefore should not be considered statistically significant. As a result, the NOEC and LOEC values should be reported as 100 and 50 percent sample, respectively.

The IC_{25} value calculated on *C. dubia* reproduction was greater than 100 percent sample.

The chronic toxic unit ($TU_c = 100/IC_{25}$) was less than 1.

From the NPDES permit: "A target level for chronic toxicity of 2 TUc shall apply for purposes of determining compliance ...". (i.e. a TUc value of greater than 2 shall indicate the need for additional testing.)

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

The 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 2 summarizes the survival and growth data for the *P. promelas* chronic test.

Table 2 **Summary of Chronic Results** ***P. promelas***		
Sample Concentration (%)	**Percent Survival**	**Mean Dry Weight Per Fish (mg)**
Control	95.0	0.665
12.5	100	0.660
25	97.5	0.623
50	97.5	0.610
75	89.4	0.616
100	67.5	0.482 [a]
[a] Indicates a statistically significant reduction from the control at p = 0.05.		

The *P. promelas* test results no statistically significant reduction in survival at any sample concentration tested and a statistically significant reduction in growth only at the 100 percent sample concentration when compared to the control. By EPA definition, the NOEC and the LOEC were 75 and 100 percent sample, respectively.

The IC_{25} value on *P. promelas* growth was calculated as 96.4 percent sample.

The chronic toxic unit ($TU_c = 100/IC_{25}$) was 1.04.

From the NPDES permit: "A target level for chronic toxicity of 2 TUc shall apply for purposes of determining compliance ...". (i.e. a TUc value of greater than 2 shall indicate the need for additional testing.)

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

The 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.

The results of the reftox tests conducted using sodium chloride indicate that the test organisms were within their respective cusum chart range based on EPA guidelines.

Note: in accordance with the NPDES permit, the *P. promelas* reftox was conducted concurrently with the client testing.

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.

Table 3
Chronic Reference Toxicant Tests (g/L)

Species	IC_{25}	Cusum Chart Limits
C. dubia (survival)	1.65	0.96 to 1.91
C. dubia (reproduction)	1.01	0.17 to 1.02
P. promelas (survival)	2.3	1.7 to 3.9
P. promelas (growth)	2.2	1.9 to 3.0

APPENDIX A

RAW DATA SHEETS

CH2M HILL **FRESHWATER TOXICITY TEST: SAMPLE AND DILUTION WATER DATA**

Client: Sumitomo Metal Mining - Pogo
Contact: Stacy Staley 1.907.895.2761
SDG # B 3182
Test Initiation: Date 08/26/14
Test Termination: Date 9-2-14

Sample ID Number	Field ID	Collected Date (mm/dd/yy)	Collected Time (Pacific Zone)	Date Received	Temp (°C) as Rc'vd	Total Residual Chlorine (mg/l) ☐ Dechlorination allowed as Rc'vd / after Dechlor.	Ammonia NH_3-N mg/l as Rc'vd	Hardness mg/l as $CaCO_3$ as Rc'vd	Alkalinity mg/l as $CaCO_3$ as Rc'vd	DO (mg/L) as Rc'vd	pH as Rc'vd	Cond. (uS) as Rc'vd	60 um filtered prior to use?
B3182 -01	Outfall 001	08/25/14	07:45	08/26/14	1.9	0.02 / -	1.22	64	-	-	-	-	☑
B3182 -02	Outfall 001	08/27/14	08:20	08/28/14	1.2	<0.02 / -	1.25	66	-	-	-	-	☑
B3182 -03	Outfall 001	08/29/14	08:23	08/30/14	0.7	<0.02 / -	1.34	75	-	-	-	-	☑
						/							
						/							
						/							
						/							
						/							
						/							
						/							
						/							
						/							
Reporting Limits:					na	0.02 mg/L	0.10 mg/L	4 mg/L	4 mg/L	na	na	na	na

Note: "-" Indicates data collection or dechlorination not needed. Any other adjustments to samples prior to use are documented in Comments below or on Dilutions page.

Dilution Water	ID#	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$
Recon MH (FHM)	4106	98	64
↓	4108	86	64

Comments: ☑ Indicates the action was taken, (☐= action not taken): " - " = sample not dechlorinated, or analyte not collected/needed.

Water Quality Meters Used/ID#: Dissolved Oxygen # 3 pH # 11 Conductivity # 2

CH2M HILL **FRESHWATER TOXICITY TEST: TEST ORGANISM INFORMATION**

Client Sumitomo Metal Mining - Pogo Sample Designation (SDG): B 3182

Test Species Information	Cd # 2983 *Ceriodaphnia dubia* Chronic	FHM # 1779 *Pimephales promelas* 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 *Artemia*, 2 x Daily			
Aeration: In Test Chambers via Slow Bubble :	☒ None ☐ Prior to use	☒ None ☐ Prior to use ☐ @ _____ hrs			
Acclimation Period	<24 hrs	<24 hrs			
Organism Source	In-House	AQUATOX			
Size	-	-			
Loading Rate	-	-			

Dissolved Oxygen aeration justifications (in test chambers):

Test(s): ☐ All ☐ _____

Date:

Comments:

Test Solution Preparation and Dilution Record

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.

Client: Sumitomo Metal Mining - Pogo

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 3182-01	☐ Temp adj, ☐ Aerated	ID # 4106	#1026	#1027	8/26/2014	12:45	[illegible]
1	B - 01	☐ Temp adj, ☐ Aerated	ID # 4106	#1026	#1027	8/27/14	07:30	DW
2	B - 02	☐ Temp adj, ☐ Aerated	ID # 4108	#1026	#1027	8/28/14	13:00	DK
3	B - 02	☐ Temp adj, ☐ Aerated	ID # 4108	#1026	#1027	8/29/14	07:55	MC
4	B - 03	☐ Temp adj, ☐ Aerated	ID # 4108	~~#1032~~ 1026	#1032	8/30/14	11:18	DK
5	B - 03	☐ Temp adj, ☐ Aerated	ID # 4108	#1026	#1032	8/31/14	10:35	JW
6	B - 03	☐ Temp adj, ☐ Aerated	ID # 4108	#1026	#1032	9/01/14	11:00	JW
7	B -	☐ Temp adj, ☐ Aerated	ID #	#	#	"	:	

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 3182-01	☐ Temp adj, ☐ Aerated	ID # 4106	8/26/2014	12:45	[illegible]
1	B - 01	☐ Temp adj, ☐ Aerated	ID # 4106	8/27/14	07:30	DW
2	B - 02	☐ Temp adj, ☐ Aerated	ID # 4108	8/28/14	12:30	DK
3	B - 02	☐ Temp adj, ☐ Aerated	ID # 4108	8/29/14	07:55	MC
4	B - 03	☐ Temp adj, ☐ Aerated	ID # 4108	8/30/14	11:00	DK
5	B - 03	☐ Temp adj, ☐ Aerated	ID # 4108	8/31/14	10:35	JW
6	B - 03	☐ Temp adj, ☐ Aerated	ID # 4108	9/1/14	11:00	JW

CH2M HILL

Ceriodaphnia dubia
Survival and Reproduction
Test Data Summary

Client: Sumitomo Metal Mining - Pogo

Test Start Date: 8/26/14

Sample Description: Outfall 001

Initial Sample ID#: B3182-01,02,03

Data summarized by: DW

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	30	31	35	34	32	29	31	27	31	31	10	311
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		
12.5 %	33	34	33	35	34	~~4~~ DW 26	30	31	29	18	9	303
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD? ✓		
25 %	~~38~~ DW 21	34	35	30	28	31	28	34	27	31	10	299
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		
50 %	~~32~~ 17 DW	26	21	22	30	21	28	15	29	~~28~~ 15 DW	10	224
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		
75 %	16	32	27	0	34	25	30	28	18	25	9	235
	AD?	AD?	AD?	AD? ✓	AD?	AD?	AD?	AD?	AD?	AD?		
100 %	28	31	24	24	26	31	30	25	29	27	10	275
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		

Test Organism Mortality (Adult dead) = AD? ✓

Test Organism identified as Male = AD? M

Test Organism Injured during test = AD? I

# of Alive Adults = Number of test organism alive at termination

Total Live Young = Total neonates produced in first 3 broods

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."

* Summarized results are from day 6!

CH2M HILL

CERIODAPHNIA CHRONIC SURVIVAL AND REPRODUCTION DATA

Neo's obtained from	A	B	C	D	E	F	G	H	I	J
Culture Board ID:	W	W	W	W	W	W	W	W	W	W
Slot #:	16	41	55	9	53	37	18	47	5	60

Incubator Used: # 6

Random Template Used: 6 conc # 19

Client: Sumitomo Metal Mining - Pogo

Test Initiation: Date: 8/26/2014 Time: 13:50

Sample Description: Outfall 001 Initial Sample ID # B3182-01

Termination: Date: 9/2/2014 Time: 10:15

Technician: Day 0 MC Day 1 MC Day 2 [illegible] Day 3 MC Day 4 JW Day 5 JW Day 6 JW Day 7 DW Day 8 ____

Time: Day 0 1350 Day 1 0935 Day 2 1400 Day 3 0920 Day 4 1235 Day 5 1315 Day 6 1435 Day 7 1015 Day 8 ____

Cerio ID: Cd 2983

Percent	Day	Daily Number of Live Young for each Replicate A	B	C	D	E	F	G	H	I	J	No. Live Adults	Daily Total Live Young
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	3	0	5	5	3	5	5	0	0	10	26
	4	7	2/0	8	1/0	11	0	8	9	6	6	10	~~48~~ 58
	5	10	11	11	11	0	12	0	0	11	10	10	76
	6	13	15	16	17	16	14	18	13	14	15	10	151
	7	0	0	0	0	0	0	0	0	0	0	10	0
	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	4	6	6	7	6	0	5	6	5	0	10	45
	4	0	0	1/10	1/9	10	11	9	0	0	7	10	58
	5	12	11	0	0	0	15	0	10	8	11 AD	9	67
	6	17	17	16	18	18	0	16	15	16		9	133
	7	0	0	0	0	0	15	0	0	0		9	15 —
	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	5	9	5	0	0	4	6	0	0	10	29
	4	7	0	11	2/9	6	7	0	10	6	6	10	~~55~~ 64
	5	14	11	0	0	15	12	10	0	12	11	10	85
	6	0	18	17	14	7	12	14	18	9	14	10	123
	7	17	0	0	0	0	0	0	0	0	0	10	—
	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	2	3	5	0	3	0	0	0	10	13
	4	6	6	0	7	9	7	0	5	6	6	10	52
	5	11	9	8	0	1/0	0	10	0	11	9	10	59
	6	0	11	11	12	15	14	15	10	12	0	10	100
	7	15	0	0	0	0	0	0	0	0	13	10	—
	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	4	4	0 AD	0	4	3	4	0	0	9	19
	4	6	0	0		6	1/8	9	0	7	5	9	42
	5	10	10	8		12	12	0	10	11	9	9	82
	6	0	18	15		16	0	18	14	0	11	9	92
	7	13	0	0		0	12	0	0	15	0	9	—
	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	3	4	3	3	4	4	4	2	3	2	10	32
	4	0	0	0	8	7	11	0	0	0	3/0	10	29
	5	8	9	9	0	0	0	10	9	9	9	10	63
	6	17	18	12	13	15	16	16	14	17	13	10	151
	7	0	0	0	0	0	0	0	0	0	0	10	
	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.

CH2M HILL

CERIODAPHNIA WATER QUALITY DATA

Client: Sumitomo Metal Mining - Pogo
Sample Description: Outfall 001
Initiated Date: 8/26/2014 Time: 13:50
Initial Sample ID #: B 3182-01
Adults Isolated Date: 8/25/2014 Time: 14:00
Neo's Collected Date: 8/25/2014 Time: 17:00

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Tech:	MC	MC	MA	MC	SW	SW	SW	DW	
Time	14:00	09:55	14:00	09:40	12:45	13:25	14:40	10:15	:
Therm. #	184	177	216	216	216	216	216	216	#

%	Dissolved Oxygen (mg/l) Day 0	1	2	3	4	5	6	7	8
Control	7.5	7.9 / 7.9	7.6 / 7.5	7.3 / 7.7	7.1 / 7.4	7.7 / 7.5	7.0 / 7.1	8.0 /	
12.5 %	7.8	8.0 / 8.1	7.5 / 7.7	7.5 / 7.9	7.3 / 7.4	8.0 / 7.5	7.2 / 7.2	7.8 /	
25 %	8.0	8.0 / 8.2	7.5 / 8.0	7.5 / 8.1	7.4 / 7.6	7.9 / 7.8	7.2 / 7.4	7.9 /	
50 %	8.0	8.0 / 8.3	7.6 / 8.1	7.5 / 8.2	7.3 / 7.7	7.9 / 7.9	7.4 / 7.6	7.8 /	
75 %	8.2	8.1 / 8.3	7.6 / 8.3	7.5 / 8.5	7.6 / 7.9	8.0 / 8.0	7.4 / 7.7	7.9 /	
100 %	8.3	8.1 / 8.4	7.5 / 8.6	7.5 / 8.7	7.4 / 8.0	7.8 / 8.0	7.4 / 7.9	7.9 /	

%	pH Day 0	1	2	3	4	5	6	7	8
Control	7.9	8.1 / 7.9	8.0 / 8.0	7.9 / 8.0	8.0 / 8.0	7.9 / 7.8	8.0 / 7.8	7.9 /	
12.5 %	7.9	8.0 / 7.8	8.0 / 7.9	7.9 / 7.9	7.9 / 7.9	7.8 / 7.7	8.0 / 7.9	8.0 /	
25 %	7.8	8.0 / 7.7	8.0 / 7.8	7.9 / 7.7	7.9 / 7.8	7.8 / 7.7	8.0 / 7.9	8.1 /	
50 %	7.6	7.9 / 7.6	8.0 / 7.6	7.9 / 7.6	7.9 / 7.6	7.7 / 7.6	8.0 / 7.7	8.0 /	
75 %	7.5	7.9 / 7.4	7.9 / 7.5	7.8 / 7.4	7.8 / 7.4	7.7 / 7.4	7.9 / 7.6	8.0 /	
100 %	7.4	7.8 / 7.4	7.9 / 7.4	7.7 / 7.4	7.7 / 7.3	7.6 / 7.3	7.8 / 7.6	8.0 /	

%	Temperature (°C) / Conductivity (µS) (1st use of each sample only) Day 0	1	2	3	4	5	6	7	8
Control	24.8 / 323	24.9 /	26.0 / 326	25.1 /	25.4 / 250	25.3 /	24.5 /	25.8 /	
12.5 %	25.0 / -	25.0 / -	25.2 / -	25.2 / -	24.9 / -	25.5 / -	24.6 / -	25.9 / -	
25 %	25.0 / -	25.3 / -	24.9 / -	26.0 / -	25.0 / -	25.3 / -	24.3 / -	25.2 / -	
50 %	25.3 / -	25.2 / -	25.5 / -	25.2 / -	24.9 / -	25.4 / -	24.7 / -	24.8 / -	
75 %	25.3 / -	24.6 / -	25.0 / -	25.4 / -	24.2 / -	25.5 / -	24.5 / -	25.3 / -	
100 %	25.3 / 216	25.0 /	24.8 / 221	25.2 /	24.7 / 220	25.5 /	25.3 /	24.8 /	

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.

CETIS Summary Report

Report Date: 11 Sep-14 18:35 (p 1 of 2)
Test Code: B318201cdc | 02-5404-5960

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

Batch ID:	08-8700-9191	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	26 Aug-14 13:50	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	02 Sep-14 10:15	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 20h	**Source:**	In-House Culture	**Age:**	<24h

Sample ID:	17-2482-0460	**Code:**	B3182-01	**Client:**	
Sample Date:	25 Aug-14 07:45	**Material:**	Unknown	**Project:**	
Receive Date:	26 Aug-14 11:30	**Source:**	Sumitomo Mining - Pogo (AK0053341)		
Sample Age:	30h (1.9 °C)	**Station:**			

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
06-2480-6007	6d Survival Rate	100	>100	N/A	N/A	1	Fisher Exact/Bonferroni-Holm Test
03-3311-2463	Reproduction	25	50	35.36	18.4%	4	Steel Many-One Rank Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
01-3566-5517	Reproduction	IC25	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
01-3566-5517	Reproduction	Control Resp	31.1	15 - NL	Yes	Passes Acceptability Criteria
03-3311-2463	Reproduction	Control Resp	31.1	15 - NL	Yes	Passes Acceptability Criteria
03-3311-2463	Reproduction	PMSD	0.1844	0.13 - 0.47	Yes	Passes Acceptability Criteria

6d 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	0.9	0.7819	1	0	1	0.1	0.3162	35.14%	10.0%
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	0.9	0.7819	1	0	1	0.1	0.3162	35.14%	10.0%
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	31.1	30.25	31.95	27	35	0.7219	2.283	7.34%	0.0%
12.5		10	30.3	28.39	32.21	18	35	1.62	5.122	16.9%	2.57%
25		10	29.9	28.34	31.46	21	35	1.32	4.175	13.96%	3.86%
50		10	22.4	20.29	24.51	15	30	1.79	5.661	25.27%	27.97%
75		10	23.5	19.76	27.24	0	34	3.163	10	42.57%	24.44%
100		10	27.5	26.48	28.52	24	31	0.8596	2.718	9.89%	11.58%

$TU_c = 100 / IC_{25} = <1$

less than lower PMSD bound of 13%

NOEL = 100 %
LOEL = 50 %

3m

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

6d 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	0
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	0	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	30	31	35	34	32	29	31	27	31	31
12.5		33	34	33	35	34	26	30	31	29	18
25		21	34	35	30	28	31	28	34	27	31
50		17	26	21	22	30	21	28	15	29	15
75		16	32	27	0	34	25	30	28	18	25
100		28	31	24	24	26	31	30	25	29	27

CETIS Analytical Report

Report Date:	11 Sep-14 18:35 (p 1 of 1)
Test Code:	B318201cdc | 02-5404-5960

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

Analysis ID:	06-2480-6007	**Endpoint:**	6d Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	11 Sep-14 18:34	**Analysis:**	STP 2x2 Contingency Tables	**Official Results:**	Yes

Batch ID:	08-8700-9191	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	26 Aug-14 13:50	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	02 Sep-14 10:15	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 20h	**Source:**	In-House Culture	**Age:**	<24h

Sample ID:	17-2482-0460	**Code:**	B3182-01	**Client:**	
Sample Date:	25 Aug-14 07:45	**Material:**	Unknown	**Project:**	
Receive Date:	26 Aug-14 11:30	**Source:**	Sumitomo Mining - Pogo (AK0053341)		
Sample Age:	30h (1.9 °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	0.5	1.0000	Non-Significant Effect
		25	1	1.0000	Non-Significant Effect
		50	1	1.0000	Non-Significant Effect
		75	0.5	1.0000	Non-Significant Effect
		100	1	1.0000	Non-Significant Effect

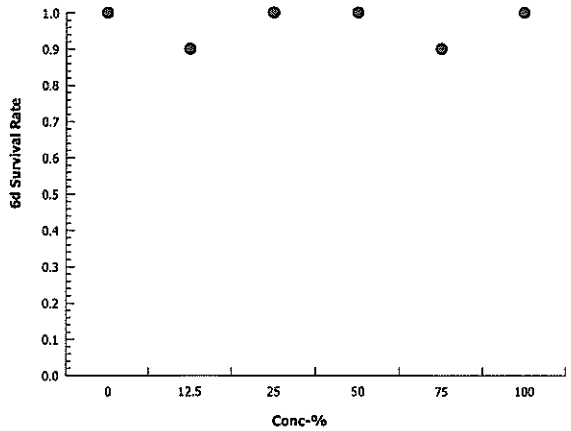
Data Summary

Conc-%	Control Type	No-Resp	Resp	Total
0	Dilution Water	10	0	10
12.5		9	1	10
25		10	0	10
50		10	0	10
75		9	1	10
100		10	0	10

6d 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	0
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	0	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

Graphics



CETIS Analytical Report

Report Date:	11 Sep-14 18:35 (p 1 of 1)
Test Code:	B318201cdc | 02-5404-5960

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

Analysis ID:	01-3566-5517	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.1
Analyzed:	11 Sep-14 18:35	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	08-8700-9191	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	26 Aug-14 13:50	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	02 Sep-14 10:15	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 20h	**Source:**	In-House Culture	**Age:**	<24h

Sample ID:	17-2482-0460	**Code:**	B3182-01	**Client:**	
Sample Date:	25 Aug-14 07:45	**Material:**	Unknown	**Project:**	
Receive Date:	26 Aug-14 11:30	**Source:**	Sumitomo Mining - Pogo (AK0053341)		
Sample Age:	30h (1.9 °C)	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	704634800	200	Yes	Two-Point Interpolation

Point Estimates

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

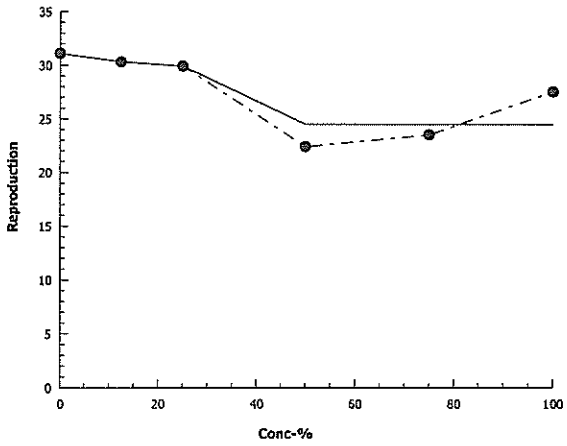
Reproduction Summary

			Calculated Variate						
Conc-%	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**
0	Dilution Water	10	31.1	27	35	0.7219	2.283	7.34%	0.0%
12.5		10	30.3	18	35	1.62	5.122	16.9%	2.57%
25		10	29.9	21	35	1.32	4.175	13.96%	3.86%
50		10	22.4	15	30	1.79	5.661	25.27%	27.97%
75		10	23.5	0	34	3.163	10	42.57%	24.44%
100		10	27.5	24	31	0.8596	2.718	9.89%	11.58%

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	30	31	35	34	32	29	31	27	31	31
12.5		33	34	33	35	34	26	30	31	29	18
25		21	34	35	30	28	31	28	34	27	31
50		17	26	21	22	30	21	28	15	29	15
75		16	32	27	0	34	25	30	28	18	25
100		28	31	24	24	26	31	30	25	29	27

Graphics



CETIS Analytical Report

Report Date:	11 Sep-14 18:35 (p 1 of 2)
Test Code:	B318201cdc | 02-5404-5960

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

Analysis ID:	03-3311-2463	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.1
Analyzed:	11 Sep-14 18:34	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	08-8700-9191	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	26 Aug-14 13:50	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	02 Sep-14 10:15	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 20h	**Source:**	In-House Culture	**Age:**	<24h

Sample ID:	17-2482-0460	**Code:**	B3182-01	**Client:**	
Sample Date:	25 Aug-14 07:45	**Material:**	Unknown	**Project:**	
Receive Date:	26 Aug-14 11:30	**Source:**	Sumitomo Mining - Pogo (AK0053341)		
Sample Age:	30h (1.9 °C)	**Station:**			

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	0	C > T	Not Run	25	50	35.36	4	18.4%

Steel Many-One Rank Test

Control	vs	Conc-%	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
Dilution Water		12.5	106.5	75	18	5	0.8650	Non-Significant Effect
		25	96.5	75	18	5	0.5806	Non-Significant Effect
		50*	60	75	18	2	0.0016	Significant Effect
		75*	75	75	18	4	0.0461	Significant Effect
		100*	70.5	75	18	4	0.0193	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	685.55	137.11	5	4.367	0.0021	Significant Effect
Error	1695.3	31.39444	54			
Total	2380.85	168.5044	59			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	24.42	15.09	0.0002	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.9044	0.9459	0.0002	Non-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	31.1	30.23	31.97	27	35	0.7219	2.283	7.34%	0.0%
12.5		10	30.3	28.35	32.25	18	35	1.62	5.122	16.9%	2.57%
25		10	29.9	28.31	31.49	21	35	1.32	4.175	13.96%	3.86%
50		10	22.4	20.25	24.55	15	30	1.79	5.661	25.27%	27.97%
75		10	23.5	19.7	27.3	0	34	3.163	10	42.57%	24.44%
100		10	27.5	26.47	28.53	24	31	0.8596	2.718	9.89%	11.58%

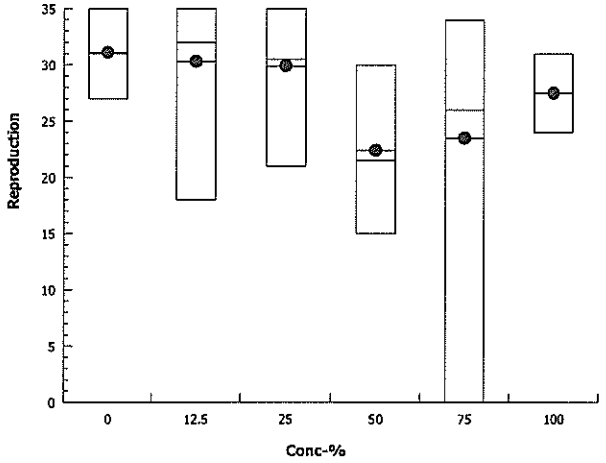
Ceriodaphnia 7-d Survival and Reproduction Test — **CH2M HILL - ASL**

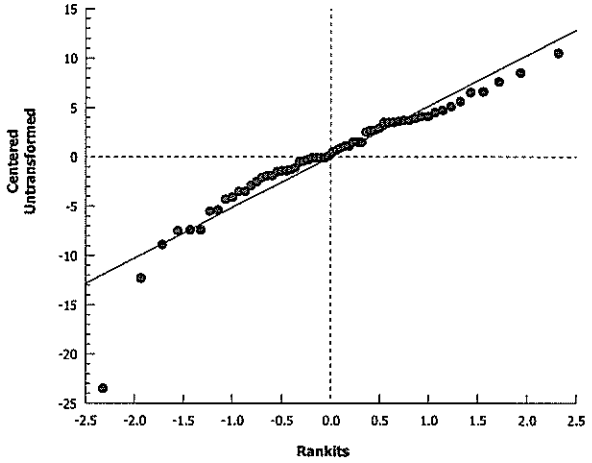
Analysis ID:	03-3311-2463	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.1
Analyzed:	11 Sep-14 18:34	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

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	30	31	35	34	32	29	31	27	31	31
12.5		33	34	33	35	34	26	30	31	29	18
25		21	34	35	30	28	31	28	34	27	31
50		17	26	21	22	30	21	28	15	29	15
75		16	32	27	0	34	25	30	28	18	25
100		28	31	24	24	26	31	30	25	29	27

Graphics





CH2M HILL

FATHEAD MINNOW 7-DAY SURVIVAL AND WATER QUALITY DATA

Random Template Used: 6 conc. x 4 reps. # 5 | Waterbath/incubator Used: # 4 | Date Initiated 8/26/2014 Time 14:55

Initial sample ID B 3182 - 01 | Date Terminated 9/2/2014 Time 09:40

Client: Sumitomo Metal Mining - Pogo | Sample Description: Outfall 001

Tech: Day 0 MC, Day 1 [illegible], Day 2 MC/[illegible], Day 3 [illegible], Day 4 [illegible], Day 5 JW, Day 6 JW/JW, Day 7 JW

Time: Day 0 1455, Day 1 1000, Day 2 1530, Day 3 1100, Day 4 1400, Day 5 1355, Day 6 1500, Day 7 0940

Conc. or Percent	Day	Number of Live Organisms A	B	C	D	Dissolved O_2 (mg/l) Pre	Post	pH Pre	Post	Temp. (°C) Pre	Therm. ID #	Conductivity (µS) Post (1st use)
Control	0	10	10	10	10		7.7		8.0	Post: 25.1	216	317
	1	10	10	10	10	7.4	7.8	7.9	8.2	25.6	84	
	2	10	9	10	10	6.6	7.7	7.7	8.1	25.5	177	324
	3	9	9	10	10	7.2	7.8	7.9	8.2	25.3	177	—
	4	9	9	10	10	6.5	7.7	7.4	7.8	25.4	182	290
	5	9	9	10	10	6.4	6.8	7.5	8.0	25.1	177	
	6	9	9	10	10	6.9	7.8	7.9	8.2	25.4	184	
	7	9	9	10	10	6.9		7.4		25.4	184	
12.5 %	0	10	10	10	10		7.7		8.0	Post: 25.1		
	1	10	10	10	10	7.3	8.0	7.9	8.1	25.7		
	2	10	10	10	10	6.6	7.9	7.7	8.1	25.7		
	3	10	10	10	10	7.1	7.9	7.9	8.1	25.3		
	4	10	10	10	10	6.6	7.9	7.5	7.9	25.5		
	5	10	10	10	10	6.7	7.2	7.6	7.9	25.2		
	6	10	10	10	10	7.0	7.7	7.8	8.1	25.4		
	7	10	10	10	10	6.8		7.4		25.4		
25 %	0	10	10	10	10		7.8		8.0	Post: 25.0		
	1	10	10	10	10	7.3	8.2	7.8	8.0	25.7		
	2	10	10	9	10	6.6	7.9	7.7	8.0	25.8		
	3	10	10	9	10	7.2	8.0	7.8	8.0	25.4		
	4	10	10	9	10	6.7	7.9	7.4	7.9	25.5		
	5	10	10	9	10	6.7	7.5	7.6	7.8	25.0		
	6	10	10	9	10	6.7	7.8	7.8	8.0	25.3		
	7	10	10	9	10	6.7		7.5		25.4		
50 %	0	10	10	10	10		7.8		7.8	Post: 25.0		
	1	10	10	10	10	7.3	7.9	7.8	7.8	25.6		
	2	10	10	10	10	6.6	8.1	7.7	7.8	25.8		
	3	10	10	10	9	7.3	8.2	7.8	7.9	25.5		
	4	10	10	10	9	7.0	8.1	7.3	7.5	25.5		
	5	10	10	10	9	6.9	7.5	7.5	7.6	25.0		
	6	10	10	10	9	6.7	7.9	7.7	7.7	25.4		
	7	10	10	10	9	6.8		7.5		25.4		
75 %	0	10	10	10	~~10~~ 9		7.9		7.7	Post: 25.1		
	1	10	10	10	10	7.2	7.9	7.7	7.6	25.6		
	2	10	10	10	10	6.8	8.2	7.6	7.6	25.8		
	3	10	10	10	8	7.3	8.3	7.7	7.7	25.4		
	4	10	9	10	8	7.1	8.3	7.2	7.2	25.4		
	5	10	9	9	8	6.9	8.0	7.4	7.3	25.1		
	6	10	9	9	8	6.7	8.0	7.6	7.5	25.2		
	7	10	9	9	7m	6.6		7.5		25.3		
100 %	0	10	10	10	10		7.9		7.5	Post: 24.8		215
	1	10	10	10	10	7.1	8.1	7.6	7.4	25.6		
	2	10	10	10	10	6.7	8.1	7.5	7.4	25.8		218
	3	10	10	10	10	7.4	8.3	7.6	7.2	25.4		—
	4	10	7	8	10	7.3	8.3	7.1	7.0	25.5		218
*	5	10	6F	6F	6F	7.0	8.2	7.1	7.2	25.1		
	6	10	6	6	6	6.8	8.3	7.4	7.4	25.3		
	7	10	6	6	5	6.5		7.4		25.4		

✓ 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.

☐ Aeration in test chambers begun @ _____ (Note observations on Test Organism Info sheet)

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

* All dead fish had visible fungus. 8/31/2014 JW

FATHEAD MINNOW 7-DAY GROWTH DATA

Client: Sumitomo Metal Mining - Pogo Tins Labeled As: SUMITOMO

Lab ID: B3182 Start Date: 8/26/2014

Sample Description:

Technician:	KJ	KJ
Date:	9/3/2014	8/13/2014
Balance Serial #:	B328543647	B328543647

Percent	Replicate	Total Weight (mg)	Tare Weight (mg)	No. of Fish
Control	A	1188.23	1182.60	9
	B	1178.17	1172.03	9
	C	1168.34	1160.85	10
	D	1173.44	1166.09	10
12.5 %	A	1170.62	1164.28	10
	B	1171.35	1164.52	10
	C	1169.85	1162.97	10
	D	1180.75	1174.39	10
25 %	A	1178.57	1172.61	10
	B	1168.57	1162.02	10
	C	1168.01	1162.49	9
	D	1168.22	1161.32	10
50 %	A	1169.07	1163.19	10
	B	1170.28	1164.28	10
	C	1172.30	1165.82	10
	D	1166.80	1160.77	9
75 %	A	1182.40	1176.03	10
	B	1173.22	1167.04	9
	C	1173.25	1166.76	9
	D	1170.87	1165.83	7 of 9
100 %	A	1177.04	1170.46	10
	B	1159.19	1154.82	6
	C	1171.41	1167.52	6
	D	1180.09	1175.65	5

weigh to 0.01 mg

FATHEAD MINNOW 7-DAY GROWTH DATA

Client: Sumitomo Metal Mining - Pogo Tins Labeled As: SUMITOMO

Lab ID: Start Date: 8/26/2014

Sample Description:

Technician:		KJ
Date:		8/13/2014
Balance Serial #:	B328543647	B328543647

Percent	Replicate	Total Weight (mg)	Tare Weight (mg)	No. of Fish
Control	A		1182.60	9
	B		1172.03	9
	C		1160.85	10
	D		1166.09	10
12.5 %	A		1164.28	10
	B		1164.52	10
	C		1162.97	10
	D		1174.39	10
25 %	A		1172.61	10
	B		1162.02	10
	C		1162.49	9
	D		1161.32	10
50 %	A		1163.19	10
	B		1164.28	10
	C		1165.82	10
	D		1160.77	9
75 %	A		1176.03	10
	B		1167.04	9
	C		1166.76	9
	D		1165.83	7
100 %	A		1170.46	10
	B		1154.82	6
	C		1167.52	6
	D		1175.65	5

weigh to 0.01 mg

CETIS Summary Report

Report Date:	11 Sep-14 18:41 (p 1 of 2)
Test Code:	B318201ppc | 21-3507-9302

Fathead Minnow 7-d Larval Survival and Growth Test — **CH2M HILL - ASL**

Batch ID:	18-5022-9395	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	26 Aug-14 14:55	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	
Ending Date:	02 Sep-14 09:40	**Species:**	Pimephales promelas	**Brine:**	
Duration:	6d 19h	**Source:**	In-House Culture	**Age:**	<48h

Sample ID:	17-2482-0460	**Code:**	B3182-01	**Client:**	
Sample Date:	25 Aug-14 07:45	**Material:**	Unknown	**Project:**	
Receive Date:	26 Aug-14 11:30	**Source:**	Sumitomo Mining - Pogo (AK0053341)		
Sample Age:	31h (1.9 °C)	**Station:**			

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
03-0514-5096	7d Survival Rate	100	>100	N/A	17.4%	1	Steel Many-One Rank Test
20-3061-8143	Mean Dry Biomass-mg	75	100	86.6	18.0%	1.333	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
07-5068-2411	Mean Dry Biomass-mg	IC25	96.35	74.26	N/A	1.038	Linear Interpolation (ICPIN)

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
03-0514-5096	7d Survival Rate	Control Resp	0.95	0.8 - NL	Yes	Passes Acceptability Criteria
07-5068-2411	Mean Dry Biomass-mg	Control Resp	0.6652	0.25 - NL	Yes	Passes Acceptability Criteria
20-3061-8143	Mean Dry Biomass-mg	Control Resp	0.6652	0.25 - NL	Yes	Passes Acceptability Criteria
20-3061-8143	Mean Dry Biomass-mg	PMSD	0.1796	0.12 - 0.3	Yes	Passes 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	4	0.95	0.9284	0.9716	0.9	1	0.02887	0.05774	6.08%	0.0%
12.5		4	1	1	1	1	1	0	0	0.0%	-5.26%
25		4	0.975	0.9563	0.9937	0.9	1	0.025	0.05	5.13%	-2.63%
50		4	0.975	0.9563	0.9937	0.9	1	0.025	0.05	5.13%	-2.63%
75		4	0.8944	0.8605	0.9284	0.7778	1	0.04547	0.09095	10.17%	5.85%
100		4	0.675	0.5922	0.7578	0.5	1	0.1109	0.2217	32.85%	28.95%

Mean Dry Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	4	0.6652	0.6312	0.6993	0.563	0.749	0.04561	0.09121	13.71%	0.0%
12.5		4	0.6602	0.6493	0.6712	0.634	0.688	0.01462	0.02924	4.43%	0.75%
25		4	0.6232	0.6003	0.6461	0.552	0.69	0.03066	0.06133	9.84%	6.31%
50		4	0.6098	0.5999	0.6196	0.588	0.648	0.01316	0.02632	4.32%	8.34%
75		4	0.616	0.6013	0.6307	0.56	0.649	0.01973	0.03945	6.41%	7.4%
100		4	0.482	0.4372	0.5268	0.389	0.658	0.05993	0.1199	24.87%	27.55%

$TU_c = 100 / IC_{25} = 1.04$

Fathead Minnow 7-d Larval Survival and Growth Test **CH2M HILL - ASL**

7d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	0.9	0.9	1	1
12.5		1	1	1	1
25		1	1	0.9	1
50		1	1	1	0.9
75		1	0.9	0.9	0.7778
100		1	0.6	0.6	0.5

Mean Dry Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	0.563	0.614	0.749	0.735
12.5		0.634	0.683	0.688	0.636
25		0.596	0.655	0.552	0.69
50		0.588	0.6	0.648	0.603
75		0.637	0.618	0.649	0.56
100		0.658	0.437	0.389	0.444

CETIS Analytical Report

Report Date:	11 Sep-14 18:41 (p 1 of 1)
Test Code:	B318201ppc | 21-3507-9302

Fathead Minnow 7-d Larval Survival and Growth Test — **CH2M HILL - ASL**

Analysis ID:	07-5068-2411	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	11 Sep-14 18:41	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	18-5022-9395	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	26 Aug-14 14:55	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	
Ending Date:	02 Sep-14 09:40	**Species:**	Pimephales promelas	**Brine:**	
Duration:	6d 19h	**Source:**	In-House Culture	**Age:**	<48h

Sample ID:	17-2482-0460	**Code:**	B3182-01	**Client:**	
Sample Date:	25 Aug-14 07:45	**Material:**	Unknown	**Project:**	
Receive Date:	26 Aug-14 11:30	**Source:**	Sumitomo Mining - Pogo (AK0053341)		
Sample Age:	31h (1.9 °C)	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	238605384	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC25	96.35	74.26	N/A	1.038	N/A	1.347

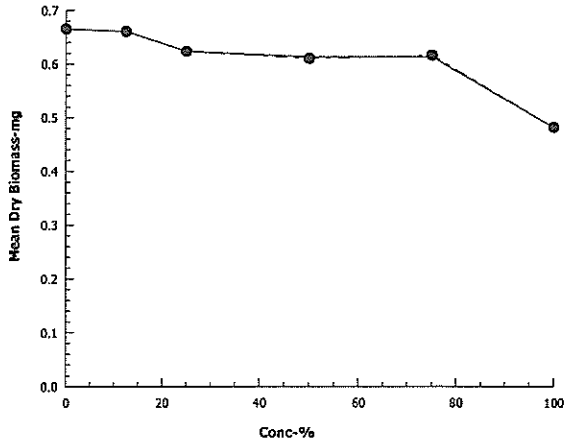
Mean Dry Biomass-mg Summary

			Calculated Variate						
Conc-%	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**
0	Dilution Water	4	0.6652	0.563	0.749	0.04561	0.09121	13.71%	0.0%
12.5		4	0.6602	0.634	0.688	0.01462	0.02924	4.43%	0.75%
25		4	0.6232	0.552	0.69	0.03066	0.06133	9.84%	6.31%
50		4	0.6098	0.588	0.648	0.01316	0.02632	4.32%	8.34%
75		4	0.616	0.56	0.649	0.01973	0.03945	6.41%	7.4%
100		4	0.482	0.389	0.658	0.05993	0.1199	24.87%	27.55%

Mean Dry Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	0.563	0.614	0.749	0.735
12.5		0.634	0.683	0.688	0.636
25		0.596	0.655	0.552	0.69
50		0.588	0.6	0.648	0.603
75		0.637	0.618	0.649	0.56
100		0.658	0.437	0.389	0.444

Graphics



Fathead Minnow 7-d Larval Survival and Growth Test — **CH2M HILL - ASL**

Analysis ID:	20-3061-8143	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	11 Sep-14 18:41	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	18-5022-9395	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	26 Aug-14 14:55	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	
Ending Date:	02 Sep-14 09:40	**Species:**	Pimephales promelas	**Brine:**	
Duration:	6d 19h	**Source:**	In-House Culture	**Age:**	<48h

Sample ID:	17-2482-0460	**Code:**	B3182-01	**Client:**	
Sample Date:	25 Aug-14 07:45	**Material:**	Unknown	**Project:**	
Receive Date:	26 Aug-14 11:30	**Source:**	Sumitomo Mining - Pogo (AK0053341)		
Sample Age:	31h (1.9 °C)	**Station:**			

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	0	C > T	Not Run	75	100	86.6	1.333	18.0%

Dunnett Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Dilution Water		12.5	0.1008	2.407	6	0.1195	0.8019	Non-Significant Effect
		25	0.8464	2.407	6	0.1195	0.4910	Non-Significant Effect
		50	1.118	2.407	6	0.1195	0.3708	Non-Significant Effect
		75	0.9925	2.407	6	0.1195	0.4252	Non-Significant Effect
		100*	3.693	2.407	6	0.1195	0.0036	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.08868282	0.01773656	5	3.601	0.0197	Significant Effect
Error	0.08865121	0.004925067	18			
Total	0.177334	0.02266163	23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	9.4	15.09	0.0941	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9566	0.884	0.3740	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	4	0.6652	0.6306	0.6999	0.563	0.749	0.04561	0.09121	13.71%	0.0%
12.5		4	0.6602	0.6491	0.6714	0.634	0.688	0.01462	0.02924	4.43%	0.75%
25		4	0.6232	0.5999	0.6466	0.552	0.69	0.03066	0.06133	9.84%	6.31%
50		4	0.6098	0.5997	0.6198	0.588	0.648	0.01316	0.02632	4.32%	8.34%
75		4	0.616	0.601	0.631	0.56	0.649	0.01973	0.03945	6.41%	7.4%
100		4	0.482	0.4364	0.5276	0.389	0.658	0.05993	0.1199	24.87%	27.55%

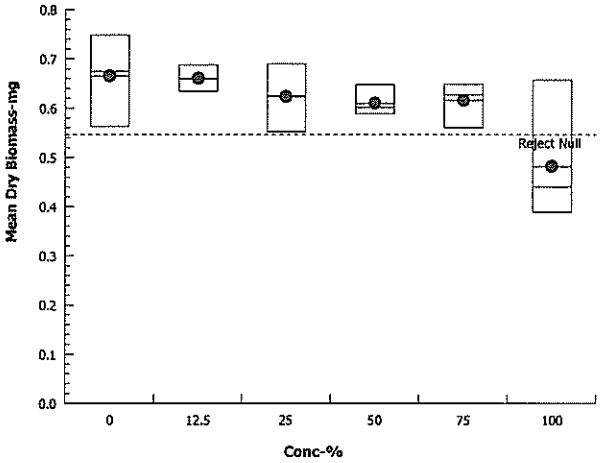
Fathead Minnow 7-d Larval Survival and Growth Test — **CH2M HILL - ASL**

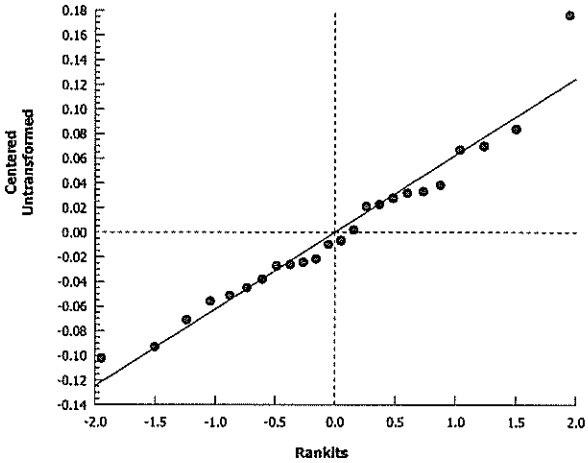
Analysis ID:	20-3061-8143	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	11 Sep-14 18:41	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Mean Dry Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	0.563	0.614	0.749	0.735
12.5		0.634	0.683	0.688	0.636
25		0.596	0.655	0.552	0.69
50		0.588	0.6	0.648	0.603
75		0.637	0.618	0.649	0.56
100		0.658	0.437	0.389	0.444

Graphics





Fathead Minnow 7-d Larval Survival and Growth Test — **CH2M HILL - ASL**

Analysis ID:	03-0514-5096	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	11 Sep-14 18:41	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	18-5022-9395	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	26 Aug-14 14:55	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	
Ending Date:	02 Sep-14 09:40	**Species:**	Pimephales promelas	**Brine:**	
Duration:	6d 19h	**Source:**	In-House Culture	**Age:**	<48h

Sample ID:	17-2482-0460	**Code:**	B3182-01	**Client:**	
Sample Date:	25 Aug-14 07:45	**Material:**	Unknown	**Project:**	
Receive Date:	26 Aug-14 11:30	**Source:**	Sumitomo Mining - Pogo (AK0053341)		
Sample Age:	31h (1.9 °C)	**Station:**			

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	0	C > T	Not Run	100	>100	N/A	1	17.4%

Steel Many-One Rank Test

Control	vs	Conc-%	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
Dilution Water		12.5	22	10	6	2	0.9908	Non-Significant Effect
		25	20	10	6	3	0.9516	Non-Significant Effect
		50	20	10	6	3	0.9516	Non-Significant Effect
		75	15	10	6	3	0.4761	Non-Significant Effect
		100	13	10	6	2	0.2311	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.4803206	0.09606413	5	4.762	0.0060	Significant Effect
Error	0.3630904	0.02017169	18			
Total	0.843411	0.1162358	23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.8084	4.248	0.5587	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8685	0.884	0.0049	Non-normal Distribution

7d Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	4	0.95	0.928	0.972	0.9	1	0.02887	0.05773	6.08%	0.0%
12.5		4	1	1	1	1	1	0	0	0.0%	-5.26%
25		4	0.975	0.956	0.994	0.9	1	0.025	0.05	5.13%	-2.63%
50		4	0.975	0.956	0.994	0.9	1	0.025	0.05	5.13%	-2.63%
75		4	0.8944	0.8598	0.929	0.7778	1	0.04547	0.09095	10.17%	5.85%
100		4	0.675	0.5907	0.7593	0.5	1	0.1109	0.2217	32.85%	28.95%

Angular (Corrected) Transformed Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	4	1.331	1.295	1.366	1.249	1.412	0.04705	0.09409	7.07%	0.0%
12.5		4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	-6.12%
25		4	1.371	1.34	1.402	1.249	1.412	0.04074	0.08149	5.94%	-3.06%
50		4	1.371	1.34	1.402	1.249	1.412	0.04074	0.08149	5.94%	-3.06%
75		4	1.248	1.196	1.299	1.08	1.412	0.0678	0.1356	10.87%	6.24%
100		4	0.9924	0.8845	1.1	0.7854	1.412	0.1419	0.2837	28.59%	25.41%

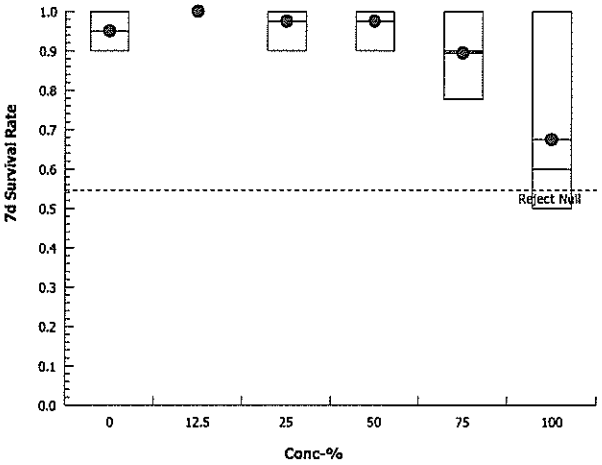
Fathead Minnow 7-d Larval Survival and Growth Test **CH2M HILL - ASL**

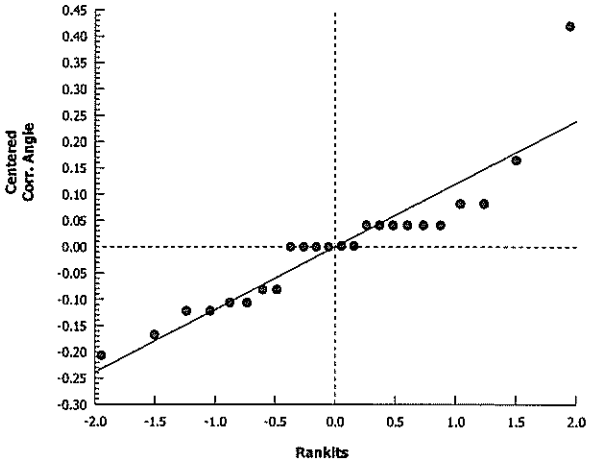
Analysis ID:	03-0514-5096	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	11 Sep-14 18:41	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

7d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	0.9	0.9	1	1
12.5		1	1	1	1
25		1	1	0.9	1
50		1	1	1	0.9
75		1	0.9	0.9	0.7778
100		1	0.6	0.6	0.5

Graphics





APPENDIX B

REFERENCE TOXICANT DATA SHEETS

CH2M HILL

Ceriodaphnia dubia
Survival and Reproduction
Test Data Summary

Client: QA / QC

Test Start Date: 8-5-2014

Sample Description: NaCl

Initial Sample ID#: 2 B048-05

Data summarized by: DAVE AGEE

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	32	33	40	32	37	31	33	32	31	35	10	336
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		
0.25 g/L	35	32	34	38	29	36	35	34	34	31	10	338
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		
0.50 g/L	37	38	27	31	32	33	33	26	36	32	10	325
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		
1.0 g/L	28	21	21	25	28	26	31	30	24	22	10	256
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		
1.5 g/L	15	18	13	13	13	11	14	14	20	16	10	147
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		
2.0 g/L	Ø	Ø	Ø	Ø	Ø	3	Ø	Ø	Ø	Ø	2	3
	AD? X	AD? X	AD?	AD? X	AD? X	AD?	AD? X	AD? X	AD? X	AD? X		
4.0 g/L	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
	AD? X	AD? X	AD? X	AD? X	AD? X	AD? X	AD? X	AD? X	AD? X	AD? X		

Test Organism Mortality (Adult dead) = AD? ✓

Test Organism identified as Male = AD? M

Test Organism Injured during test = AD? I

# of Alive Adults = Number of test organism alive at termination

Total Live Young = Total neonates produced in first 3 broods

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."

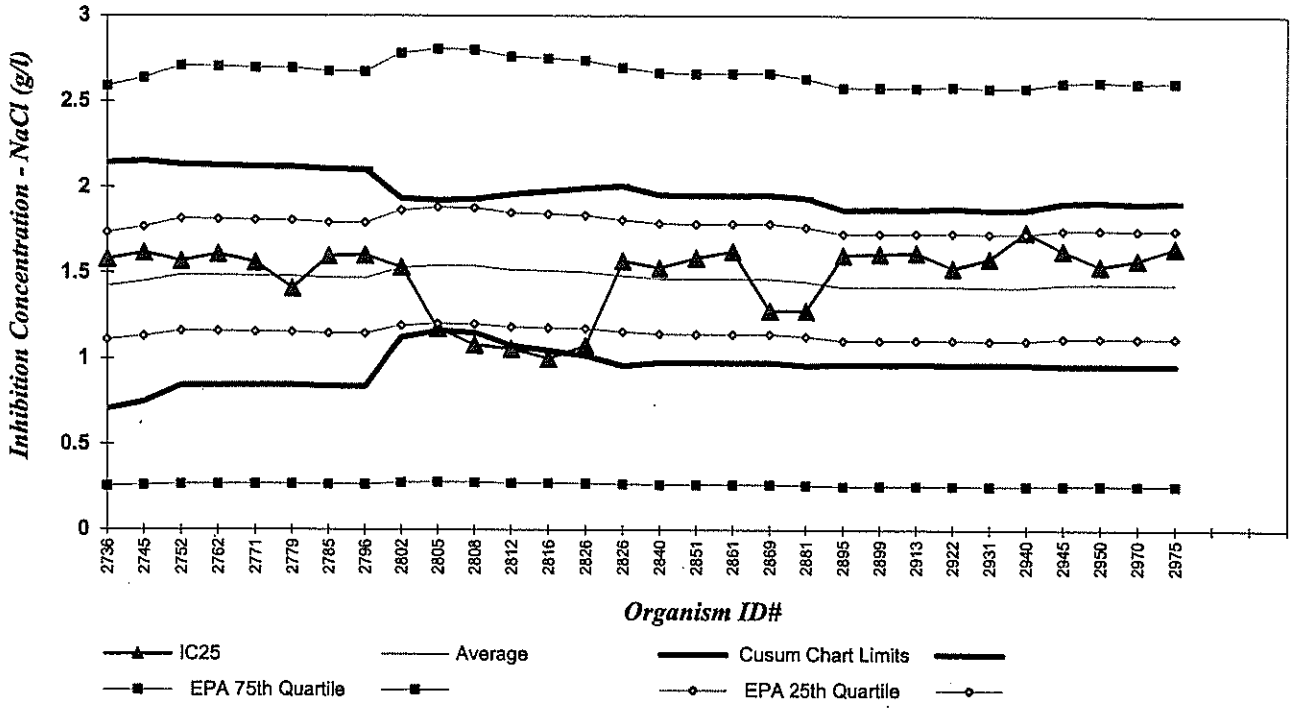
Endpoint	IC25	Cusum Chart Limits
Survival	1.65	0.96 to 1.91
Reproduction	1.01	0.17 to 1.02

Task Manager: [signature]

Project Manager: [signature]

QA Officer: [signature]

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

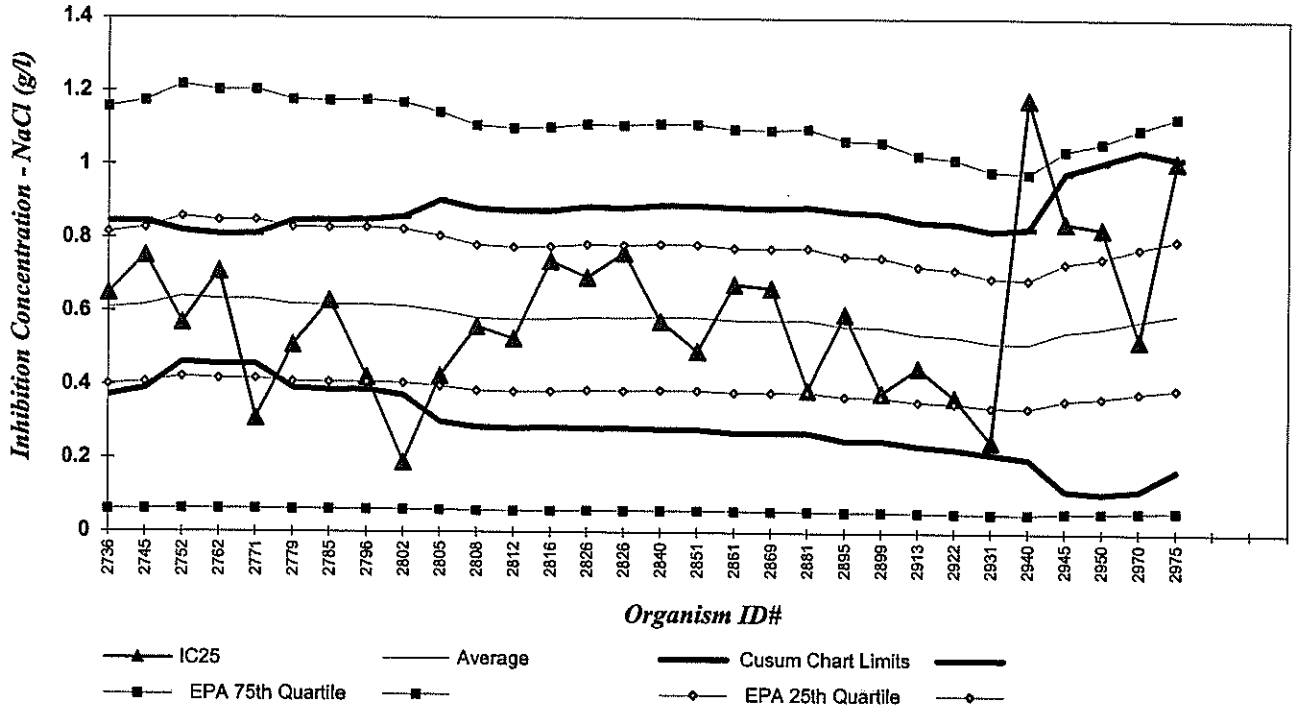
90th Quartile CV (*control limit*) = 0.81

*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 AVG-2SD	Cusum Chart Limits AVG+2SD	Intralab CV
267	2861	08/08/13	1.63	1.46	0.24	**0.98**	**1.95**	0.17
268	2869	09/05/13	1.28	1.46	0.24	**0.98**	**1.95**	0.17
269	2881	10/09/13	1.28	1.45	0.24	**0.96**	**1.93**	0.16
270	2895	11/19/13	1.60	1.42	0.23	**0.97**	**1.87**	0.16
271	2899	12/03/13	1.61	1.42	0.23	**0.96**	**1.87**	0.16
272	2913	01/14/14	1.62	1.42	0.23	**0.96**	**1.87**	0.16
273	2922	02/11/14	1.53	1.42	0.23	**0.96**	**1.88**	0.16
274	2931	03/04/14	1.58	1.42	0.23	**0.97**	**1.87**	0.16
275	2940	04/01/14	1.74	1.42	0.23	**0.96**	**1.87**	0.17
276	2945	04/15/14	1.63	1.43	0.24	**0.96**	**1.91**	0.17
277	2950	05/07/14	1.54	1.44	0.24	**0.96**	**1.91**	0.17
278	2970	07/22/14	1.58	1.43	0.24	**0.96**	**1.91**	0.17
279	2975	08/05/14	1.65	1.43	0.24	**0.96**	**1.91**	0.16
280								

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 #	Cerio ID #	Test Start Date	IC25	Running Average	Running SD	Cusum Chart Limits AVG-2SD	Cusum Chart Limits AVG+2SD	Intralab CV
267	2861	8/8/2013	0.68	0.58	0.15	**0.27**	**0.88**	0.26
268	2869	9/5/2013	0.67	0.58	0.15	**0.27**	**0.88**	0.27
269	2881	10/9/2013	0.39	0.58	0.15	**0.27**	**0.89**	0.28
270	2895	11/19/2013	0.60	0.56	0.16	**0.25**	**0.87**	0.28
271	2899	12/3/2013	0.38	0.56	0.15	**0.25**	**0.87**	0.28
272	2913	1/14/2014	0.45	0.54	0.15	**0.24**	**0.85**	0.29
273	2922	2/11/2014	0.37	0.54	0.15	**0.23**	**0.84**	0.29
274	2931	3/4/2014	0.25	0.52	0.15	**0.21**	**0.82**	0.30
275	2940	4/1/2014	**1.18**	0.52	0.16	**0.20**	**0.83**	0.39
276	2945	4/15/2014	0.85	0.55	0.22	**0.12**	**0.98**	0.40
277	2950	5/7/2014	0.83	0.56	0.23	**0.11**	**1.01**	0.40
278	2970	7/22/2014	0.53	0.58	0.23	**0.12**	**1.04**	0.36
279	2975	8/5/2014	1.01	0.60	0.21	**0.17**	**1.02**	0.36
280								

CH2M HILL

FATHEAD MINNOW 7-DAY SURVIVAL AND WATER QUALITY DATA

Random Template Used: 6 conc. x 4 reps. # 11 | Waterbath/incubator Used: # 4 | Date Initiated 8/26/2014 Time 15:40

Stock Sol. ID 2B048-05 | Date Terminated 9/2/2014 Time 10:20

Organism ID: FHM 1779 | Test Container Size: 800 ml | Solution Volume / rep: 500 ml

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

Tech: Day 0 JPW/MC Day 1 DST Day 2 DST Day 3 DST/JPW Day 4 DST Day 5 JW Day 6 JPW Day 7 JPW

Time: Day 0 1540 Day 1 1100 Day 2 0930 Day 3 1030 Day 4 1330 Day 5 1420 Day 6 1230 Day 7 1020

Conc. or Percent	Day	Number of Live Organisms A	B	C	D	Dissolved O_2 (mg/l) Pre	Post	pH Pre	Post	Temp. (°C) Pre	Therm. ID #	Conductivity (µS) Post (daily)
Control	0	10	10	10	10		7.7		8.1	Post: 25.2	216	308
	1	10	10	10	10	6.7	7.4	7.8	8.3	25.4	184	313
	2	10	10	10	10	6.6	7.5	7.7	8.3	25.5	214	307
	3	10	10	10	10	6.9	7.6	7.8	8.3	25.1	177	302
	4	10	10	10	10	6.5	7.5	7.6	8.2	25.7	186	293
	5	10	10	10	10	7.3	7.3	7.6	8.3	25.0	177	285
	6	10	10	10	10	7.0	7.7	7.7	8.3	25.0	184	285
	7	10	10	10	10	6.8		7.8		25.1	*	
0.3 g/L	0	10	10	10	10		7.7		8.0	Post: 25.3		800
	1	10	10	10	10	6.6	7.4	7.8	8.3	25.5		861
	2	10	10	10	10	6.5	7.6	7.7	8.3	25.6		864
	3	10	10	10	10	7.0	7.7	7.8	8.2	25.2		877
	4	10	10	10	10	6.6	7.6	7.6	8.1	25.2		812
	5	10	10	10	10	7.1	7.5	7.7	8.3	25.1		812
	6	10	10	10	10	7.0	7.7	7.7	8.3	25.1		805
	7	10	10	10	10	6.8		7.8		25.1		
1.0 g/L	0	10	10	10	10		7.8		8.1	Post: 25.4		2,000
	1	10	10	10	10	6.6	7.5	7.8	8.2	25.5		2000
	2	10	10	10	10	6.5	7.8	7.7	8.2	25.6		2000
	3	10	10	10	10	7.1	7.8	7.8	8.2	25.2		2030
	4	10	9	10	10	6.7	7.7	7.6	8.0	25.3		2020
	5	10	9	10	10	7.0	7.7	7.7	8.2	25.0		2000
	6	10	9	10	10	7.0	7.7	7.7	8.2	25.1		2010
	7	10	9	10	10	7.0		7.8		25.1		
2.0 g/L	0	10	10	10	10		7.7		8.1	Post: 25.4		3,700
	1	10	10	10	10	6.8	7.6	7.7	8.1	25.4		3600
	2	10	10	10	10	6.7	7.9	7.8	8.1	25.5		3730
	3	10	10	10	10	7.0	8.0	7.7	8.1	25.2		3750
	4	9	10	10	10	6.7	7.7	7.5	8.0	25.2		3760
	5	9	10	10	10	7.2	7.7	7.8	8.2	25.0		3760
	6	8	10	10	9	6.9	7.7	7.7	8.1	25.0		3659
	7	8	10	10	9	7.0		7.8		25.1		
4.0 g/L	0	10	10	10	10		7.8		8.0	Post: 25.3		6,670
	1	10	10	10	10	6.9	7.6	7.8	8.1	25.4		6990
	2	10	10	10	10	6.8	8.0	7.8	8.0	25.5		6830
	3	10	10	10	10	7.0	8.0	7.7	8.1	25.2		7010
	4	10	10	9	10	6.8	7.8	7.5	8.0	25.2		7050
	5	7	10	8	10	7.1	7.9	7.7	8.1	25.0		7020
	6	4	6	5	3	6.9	7.7	7.8	8.1	25.1		6880
	7	0	2	0	0	7.0		7.8		25.0		
8.0 g/L	0	10	10	10	10		7.9		7.9	Post: 25.5		12,720
	1	10	10	10	10	6.9	7.7	7.8	7.9	25.4		12860
	2	6	5	6	8	6.9	8.0	7.7	7.9	25.5		13150
	3	2	1	3	4	7.1	7.9	7.7	7.9	25.1		13170
	4	2	1	3	4	7.0	8.0	7.5	7.9	25.1		13000
	5	2	1	1	2	7.2	7.9	7.7	8.0	25.0		13180
	6	0	0	0	0	6.9	7.8	7.8	8.0	25.1		12880
	7	—	—	—	—	—		—		—		

✓ 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	1.7 to 3.9
Growth	2.2	1.9 to 3.0

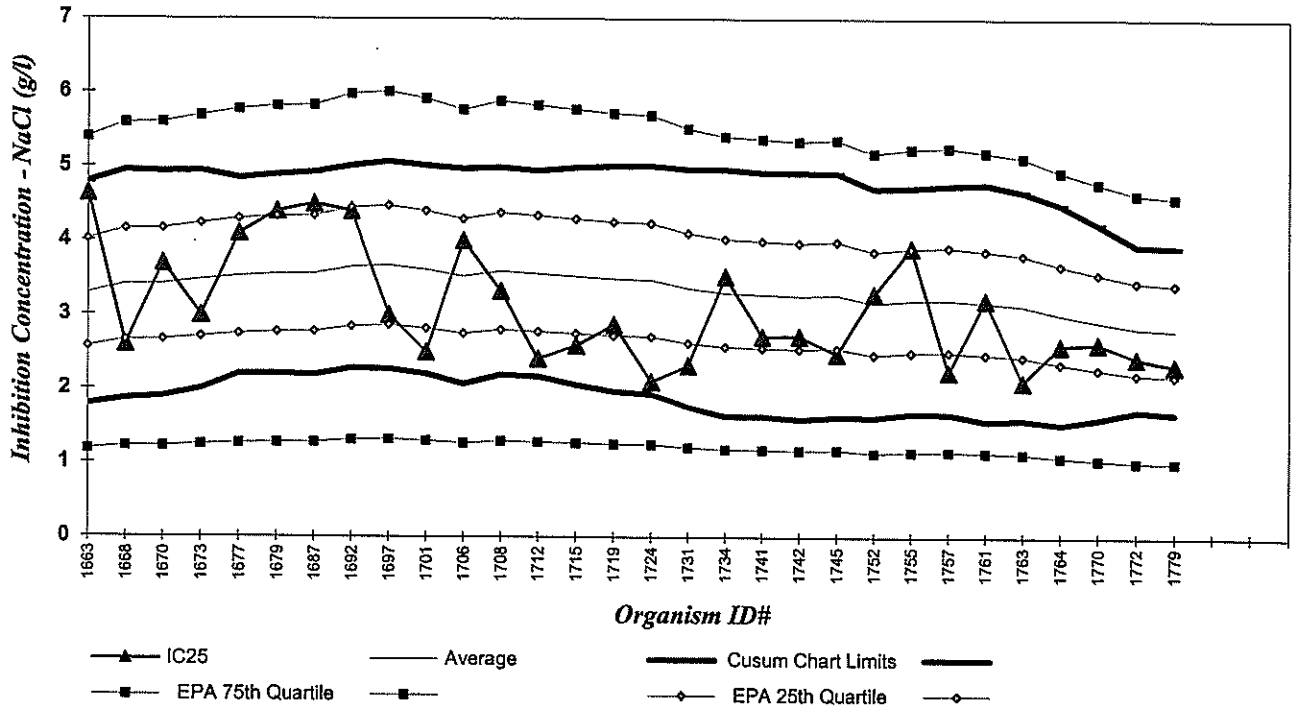
* Not recorded JPW

Task Manager

Project Manager

QA Officer Ginger Collins

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



***Pimephales 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

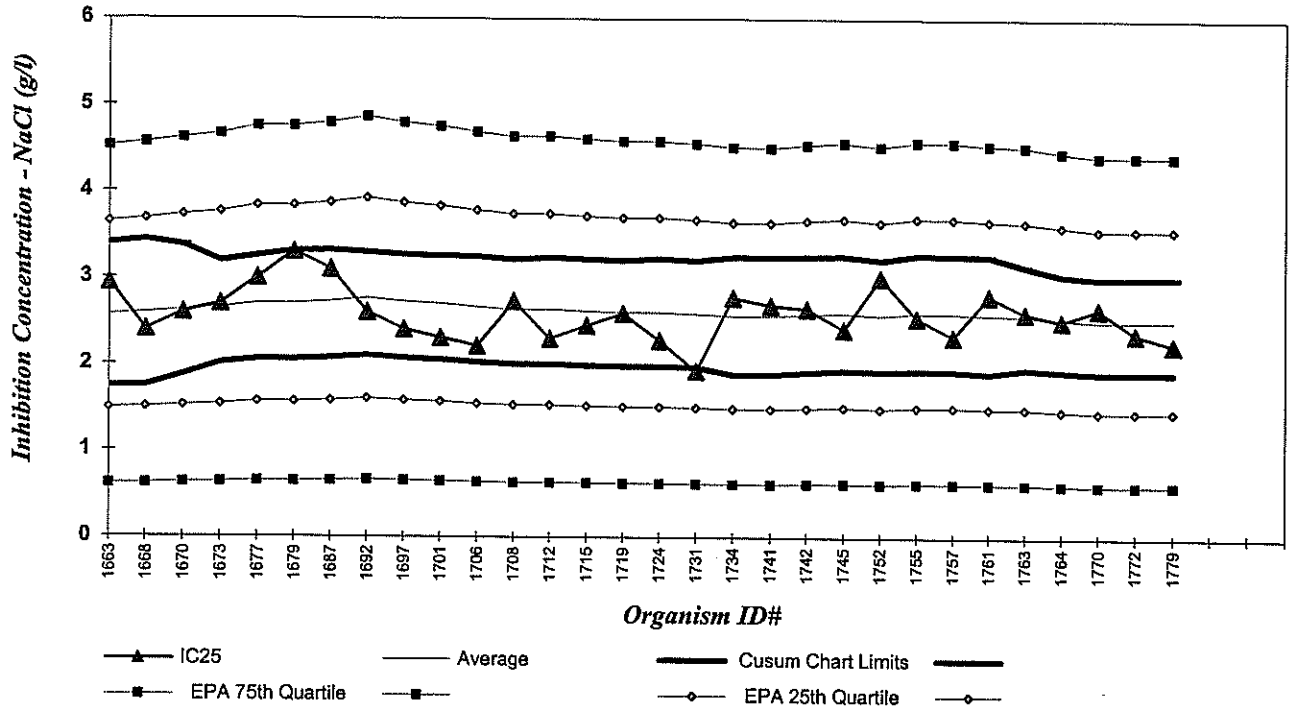
90th Quartile CV (*control limit*) = 0.52

*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 AVG-2SD	Cusum Chart Limits AVG+2SD	Intralab CV
296	1734	10/08/13	**3.5**	3.3	0.83	**1.6**	**5.0**	0.25
297	1741	11/13/13	**2.7**	3.3	0.82	**1.6**	**4.9**	0.26
298	1742	12/03/13	**2.7**	3.3	0.83	**1.6**	**4.9**	0.25
299	1745	01/07/14	**2.5**	3.3	0.82	**1.6**	**4.9**	0.24
300	1752	02/18/14	**3.3**	3.2	0.77	**1.6**	**4.7**	0.24
301	1755	03/04/14	**3.9**	3.2	0.76	**1.7**	**4.7**	0.24
302	1757	03/18/14	**2.2**	3.2	0.77	**1.7**	**4.7**	0.25
303	1761	04/15/14	**3.2**	3.2	0.80	**1.6**	**4.8**	0.25
304	1763	05/06/14	**2.1**	3.1	0.77	**1.6**	**4.7**	0.25
305	1764	05/13/14	**2.6**	3.0	0.74	**1.5**	**4.5**	0.23
306	1770	06/24/14	**2.6**	2.9	0.66	**1.6**	**4.2**	0.20
307	1772	07/12/14	**2.4**	2.8	0.56	**1.7**	**3.9**	0.20
308	1779	08/26/14	**2.3**	2.8	0.56	**1.7**	**3.9**	0.20
309								

REFERENCE TOXICANT CUMLATIVE 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 AVG-2SD	AVG+2SD	Intralab CV
296	1734	10/8/2013	**2.8**	2.6	0.34	**1.9**	**3.2**	0.13
297	1741	11/19/2013	**2.7**	2.6	0.34	**1.9**	**3.2**	0.13
298	1742	12/3/2013	**2.7**	2.6	0.33	**1.9**	**3.3**	0.13
299	1745	1/7/2014	**2.4**	2.6	0.33	**1.9**	**3.3**	0.13
300	1752	2/18/2014	**3.0**	2.6	0.32	**1.9**	**3.2**	0.13
301	1755	3/4/2014	**2.5**	2.6	0.33	**1.9**	**3.3**	0.13
302	1757	3/18/2014	**2.3**	2.6	0.33	**1.9**	**3.3**	0.13
303	1761	4/15/2014	**2.8**	2.6	0.34	**1.9**	**3.3**	0.13
304	1763	5/6/2014	**2.6**	2.6	0.33	**2.0**	**3.1**	0.11
305	1764	5/13/2014	**2.5**	2.5	0.28	**1.9**	**3.0**	0.10
306	1770	6/24/2014	**2.6**	2.5	0.25	**1.9**	**3.0**	0.10
307	1772	7/12/2014	**2.4**	2.5	0.25	**1.9**	**3.0**	0.10
308	1779	8/26/2014	**2.2**	2.5	0.25	**1.9**	**3.0**	0.10
309								

APPENDIX C

CHAIN OF CUSTODY

CH2MHILL **CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING**

Client SMS Sumitomo Metal Mining - Pogo
Address PO Box 145
Delta Junction, AK 99737

Contact Person: Stacy Staley
Phone: (907) 895-2761
E-mail: stacy.staley@smmpogo.com

CH2M HILL Project # / Purchase Order # _____

NPDES# _____

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

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

Analysis Required / Comments

Sample ID	Date	Time	Sample Type Comp.	Sample Type Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Green Algae	Trout Acute	Sheepshead Acute	Sheepshead Chronic	Menidia Acute	Menidia Chronic	Mysid Acute	Mysid Chronic	Haz Waste				Concentration and/or Comments
Outfall 001	8/25/2014	845		X	2																		

Sampled By & Title (Please sign and print name) Jim Ward - Env. Spec	Date/Time 8/25/2014 @ 845	Relinquished By (Please sign and print name) Jim Ward	Date/Time 8/25/2014 @ 1200
Received By (Please sign and print name) Jeff A. Hiller	Date/Time 8/25/14 1200	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name) Dennis Coll	Date/Time 8/26/14 1130	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks B3182		

CH2MHILL
Applied Sciences Laboratory (ASL)

Bioassay Sample Receipt Record

Batch Number: B3182

Date received: 8/26/14

Client/Project: Sumitomo

Checked by: CC

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation	NA	YES	NO
Were custody seals intact and on the outside of the cooler?		✓	
Type of packing material: (Ice) Blue Ice Bubble wrap		✓	
Was a Chain of Custody provided?		✓	
Was the Chain of Custody properly filled out? If not document in SRER below.		✓	
Were the sample containers in good condition (broken or leaking)?		✓	
Are all samples within 36 hours of collection? If not, contact LPM		✓	
Was there ice in the cooler? Enter temp. If >6°C contact client/SRER 1.9 °C		✓	

Sample Receipt Exception Report

The following exceptions were noted:		Comments (write number of exception description and the impacted sample numbers)
	1. No custody seal as required by project	
	2. No chain-of-custody provided	
	3. Analysis, description, date of collection not provided	
	4. Samples broken or leaking on receipt.	
	for analysis requested. (EPA recommends 0-6 °C for WET testing)	
	6. Container inappropriate for analysis requested	
	7. Inadequate sample volume.	
	8. Preservation inappropriate for analysis requested	
	9. Samples received out of holding time for analysis requested	
	10. Discrepancies between COC form and container labels.	
	11. Other.	

ACTION TAKEN (date/time):
Client notified on (date/time):
Originator:
Client Contact:

CH2MHILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client SUMITOMO POGO (Dat 8-28) NPDES#
Address

Contact Person:
Phone:
E-mail:

CH2M HILL Project # / Purchase Order #

Composite Sample Information:
Initiated: Date Time
Ended: Date Time
Chilled During Collection ? Yes No
Dechlorinated prior to shipping ? Yes No

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

Analysis Required / Comments

Sample ID	Date	Time	Sample Type Comp.	Sample Type Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Green Algae	Trout Acute	Sheepshead Acute	Sheepshead Chronic	Menidia Acute	Menidia Chronic	Mysid Acute	Mysid Chronic	Haz Waste				Concentration and/or Comments
WET	8/27/2014	820		X	2	B3182-02																	

Sampled By & Title (Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time
Jim Ward 8/27/2014	8/27/2014 820	Jim Ward	8/27/2014 1100
Received By (Please sign and print name)	**Date/Time**	**Relinquished By (Please sign and print name)**	**Date/Time**
Jeff A. Hiller	8/27/14 1100		
Received By (Please sign and print name)	**Date/Time**	**Relinquished By (Please sign and print name)**	**Date/Time**
Clara Thomann	8/28/14 1153		
Received By (Please sign and print name)	**Date/Time**	**Shipped Via** UPS Bus Fed-Ex Hand Other	**Shipping #**
Work Authorized By (Please sign and print name)	**Remarks** B3182-B		

CH2MHILL
Applied Sciences Laboratory (ASL)

Bioassay Sample Receipt Record

Batch Number: B 3182-B

Date received: 8/28/14

Client/Project: Sumitomo

Checked by: CT

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation	NA	YES	NO
Were custody seals intact and on the outside of the cooler?		X	
Type of packing material: (Ice) Blue Ice Bubble wrap		X	
Was a Chain of Custody provided?		X	
Was the Chain of Custody properly filled out? If not document in SRER below.		X	
Were the sample containers in good condition (broken or leaking)?		X	
Are all samples within 36 hours of collection? If not, contact LPM		X	
Was there ice in the cooler? Enter temp. If >6°C contact client/SRER 1.2 °C		X	

Sample Receipt Exception Report

The following exceptions were noted:		Comments (write number of exception description and the impacted sample numbers)
	1. No custody seal as required by project	
	2. No chain-of-custody provided	
	3. Analysis, description, date of collection not provided	
	4. Samples broken or leaking on receipt.	
	for analysis requested. (EPA recommends 0-6 °C for WET testing)	
	6. Container inappropriate for analysis requested	
	7. Inadequate sample volume.	
	8. Preservation inappropriate for analysis requested	
	9. Samples received out of holding time for analysis requested	
	10. Discrepancies between COC form and container labels.	
	11. Other.	

ACTION TAKEN (date/time):
Client notified on (date/time):
Originator:
Client Contact:

CH2MHILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client: Sumitomo Metal Mining Pogo LLC NPDES#: AK 0053341

Address: PO Box 245 Delta Junction AK 99737

Contact Person: Stacy Staley
Phone: 907 895-2761
E-mail: Stacy.Staley@smmpogo.com

CH2M HILL Project # / Purchase Order #

Composite Sample Information:
Initiated: Date 8-29-14 Time 8:12
Ended: Date 8-29-14 Time 8:23
Chilled During Collection ? Yes X No
Dechlorinated prior to shipping ? Yes No X

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

Analysis Required / Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Green Algae	Trout Acute	Sheepshead Acute	Sheepshead Chronic	Menidia Acute	Menidia Chronic	Mysid Acute	Mysid Chronic	Haz Waste				Concentration and/or Comments
Outfall 001	8-29-14	0823		X	2	53182-03		X		X													

Sampled By & Title (Please sign and print name) Stacy Staley - Enviro Coordinator Stacy Staley	Date/Time 8-29-14 0930	Relinquished By (Please sign and print name) Leonard Hanson Leonard Hanson	Date/Time 8/29/14 10:15
Received By (Please sign and print name) Jeff A. Hiller	Date/Time 8/29/14 1015	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name) JAY WELL	Date/Time 08/30/2014 1010	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks		

0.7°C

CH2MHILL
Applied Sciences Laboratory (ASL)

Bioassay Sample Receipt Record

Batch Number: B3102-03 Date received: 08/30/2014

Client/Project: Sumitomo Checked by: JW

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation	NA	YES	NO
Were custody seals intact and on the outside of the cooler?		✓	
Type of packing material: Ice Blue Ice Bubble wrap		✓	
Was a Chain of Custody provided?		✓	
Was the Chain of Custody properly filled out? If not document in SRER below.		✓	
Were the sample containers in good condition (broken or leaking)?		✓	
Are all samples within 36 hours of collection? If not, contact LPM		✓	
Was there ice in the cooler? Enter temp. If >6°C contact client/SRER 0.7 °C		✓	

Sample Receipt Exception Report

The following exceptions were noted:		Comments (write number of exception description and the impacted sample numbers)
	1. No custody seal as required by project	
	2. No chain-of-custody provided	
	3. Analysis, description, date of collection not provided	
	4. Samples broken or leaking on receipt.	
	for analysis requested. (EPA recommends 0-6 °C for WET testing)	
	6. Container inappropriate for analysis requested	
	7. Inadequate sample volume.	
	8. Preservation inappropriate for analysis requested	
	9. Samples received out of holding time for analysis requested	
	10. Discrepancies between COC form and container labels.	
	11. Other.	

ACTION TAKEN (date/time):
Client notified on (date/time):
Originator:
Client Contact:

027 FAI 1077 4153 027-1077 4153

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

Consignee's Name and Address	Consignee's Account Number	Also notify
City Delivery Service CH2M Hill c/o City Delivery Portland, OR NONE USA Tel: 541-926-7300		Tel:

Issuing Carrier's Agent and City	Accounting Information
	10659 Sumitomo Metal Mining Pogo LLC Mile 50 Pogo Mile Road Delta Junction, AK 99737 USA
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
PDX	Alaska Airlines			USD PX	X	X	NVD	NCV

Airport of Destination	Flight/Date	Flight/Date	Amount of Insurance
Portland	AS 144/26		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	78.0	L Q		78.0		AS AGREED	WATER SAMPLES Dims: 24 x 13 x14 x 1 GSX
1	78.0					AS AGREED	Volume: 2.528

Prepaid	Weight Charge	Collect	Other Charges
	AS AGREED		MYC 14.04 SCC 2.00 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		For: Sumitomo Metal Mining Pogo LLC Signature of Shipper or his Agent
			☐ THIS SHIPMENT DOES NOT CONTAIN DANGEROUS GOODS ☐ THIS SHIPMENT DOES CONTAIN DANGEROUS GOODS
Total Prepaid	Total Collect		
AS AGREED			25 Aug 2014 15:48 Fairbanks Alaska Airlines
			Executed On (Date) at (Place) Signature of Issuing Carrier or its Agent

027-1077 4153

B 3182-03 Recd 08/30/2014 dw

027 FAI 1077 5785 027-1077 5785

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

Consignee's Name and Address	Consignee's Account Number	Also notify
CH2M Hill C/O city delivery Porland, OR X USA Tel: 541-926-7300		Tel:

Issuing Carrier's Agent and City	Accounting Information
	10659 Sumitomo Metal Mining Pogo LLC Mile 50 Pogo Mile Road Delta Junction, AK 99737 USA
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
PDX	Alaska Airlines			USD PX	X	X	NVD	NCV

Airport of Destination	Flight/Date	Flight/Date	Amount of Insurance
Portland	AS 144/30		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	76.0	L	Q		76.0		AS AGREED	CHILL WATER SAMPLES NON HAZ Dims: 24 x 13 x14 x 1 GSX
1	76.0						AS AGREED	Volume: 2.528

Prepaid	Weight Charge	Collect	Other Charges
	AS AGREED		MYC 13.68 SCC 2.00 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		For: Sumitomo Metal Mining Pogo LLC Signature of Shipper or his Agent
			☒ THIS SHIPMENT DOES NOT CONTAIN DANGEROUS GOODS ☐ THIS SHIPMENT DOES CONTAIN DANGEROUS GOODS
Total Prepaid	Total Collect		
AS AGREED			29 Aug 2014 13:43 Fairbanks Alaska Airlines
			Executed On (Date) at (Place) Signature of Issuing Carrier or its Agent

027-1077 5785