STATE OF COLORADO

Hays - DNR, Peter <peter.hays@state.co.us>

SWO Q3 WET Test Results

1 message

Chris Prosper <chris.prosper@linkan.com> Fri, Aug 15, 2025 at 11:04 AM
To: "Hays - DNR, Peter" <peter.hays@state.co.us>
Cc: "pdelaney@blackfoxmining.com" <pdelaney@blackfoxmining.com>, Adam Billin <Adam.Billin@linkan.com>, Alex Schwiebert <alex.schwiebert@linkan.com>

Hello Everyone,

Please see the attached WET Test results for Q3.

Thank you,

Chris Prosper

Engineer

Linkan

Office: 775-777-8003

Cell: 719-247-0564

400 Corporate Circle • Suite H

Golden, Colorado 80401

An Employee-Owned Company

linkan.com • chris.prosper@linkan.com

525390.B report.pdf
4241K

SEACREST GROUP
ENVIRONMENTAL SERVICES LABORATORY

August 15, 2025

Jared Buck
Linkan Engineering
400 Corporate Circle Suite H
Golden, CO 80401

Dear Jared:

Enclosed is the report for chronic biomonitoring tests performed for Linkan Engineering on effluent from the Schwartzwalder Mine 001A outfall. There was no statistically significant lethal toxicity to either test species at any effluent concentration. The effluent passes WET (Whole Effluent Toxicity) testing requirements for this sampling period.

If you have any questions or concerns, please do not hesitate to contact me at (303) 661-9324.

Best regards,

Cat Cash
Lab Manager

REPORT OF CHRONIC BIOMONITORING TESTS CONDUCTED FOR LINKAN ENGINEERING ON EFFLUENT FROM THE SCHWARTZWALDER MINE 001A OUTFALL

Prepared for:

Jared Buck
Linkan Engineering
400 Corporate Circle Suite H
Golden, CO 80401

Prepared by:

Cat Cash
SeaCrest Group
500 S Arthur Ave. Suite 450
Louisville, Colorado 80027-3065
(303) 661-9324

August 15, 2025

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LIST OF TABLES

Chronic Toxicity Test Summary

Test:	7-day static renewal using *Ceriodaphnia dubia* 7-day static renewal using fathead minnow *(Pimephales promelas)*
Client:	Linkan Engineering
Test Procedure Followed:	*Ceriodaphnia dubia*: EPA/821/R-02-013. Method 1002.0 (2002) fathead minnow: EPA/821/R-02-013. Method 1000.0 (2002)
Sample Number:	525390.B
Dilution Water:	moderately hard laboratory reconstituted water
Test Organism Source:	SeaCrest Group
Reference Toxicant:	Sodium Chloride

Sample	Time of Collection	Date of Collection	Time of Receipt	Date of Receipt
Effluent 1	1430	08-04-2025	1500	08-04-2025
Effluent 2	1415	08-05-2025	1500	08-05-2025
Effluent 3	1420	08-06-2025	1500	08-06-2025

	Ceriodaphnia dubia	fathead minnow
Test Initiation Time	1605	1530
Test Initiation Date	08-04-2025	08-04-2025
Test Completion Time	1600	1445
Test Completion Date	08-10-2025	08-11-2025

Abstract with Results

Test Concentrations:	Control (0%), 20%, 40%, 60%, 80%, 100%
Number of Organisms/Concentration:	10 for *Ceriodaphnia dubia* 40 for fathead minnow
Replicates at each Concentration:	10 for *Ceriodaphnia dubia* 4 for fathead minnow

	Ceriodaphnia dubia	**fathead minnow**
Test vessel size/Exposure volume	30ml/15ml	500ml/200ml
Lethal LOEL/LC25	>100%/>100%	>100%/>100%
Pass/Fail Status	**PASS**	**PASS**
Temperature Range (°C)	24.7 – 25.9	24.3 – 25.9
Dissolved Oxygen Range (mg/L)	6.8 – 7.8	3.6 – 7.9
pH Range	7.6 – 8.3	7.5 – 8.1

	Control (*Cerio*/FHM)	**Effluent Sample**
Hardness (mg/L as $CaCO_3$)	91/89	6/18/3
Alkalinity (mg/L as $CaCO_3$)	58/58	92/116/91
Total residual chlorine (mg/L)	<0.01	<0.01
Total ammonia (mg/L as NH_3)	<0.03	0.06/0.09/0.08

INTRODUCTION

Biomonitoring provides an effective means by which the toxicity of discharges from municipal, industrial, and mining operations can be tested. Among the advantages of biomonitoring is the ability to test complex effluents containing a broad range of contaminants. Biomonitoring, when used in conjunction with chemical analyses, can generate data capable of identifying a much wider range of contaminants.

The Colorado Water Quality Control Division requires certain NPDES permittees to perform acute and/or chronic biomonitoring tests. The chronic test measures significant differences in lethality and in reproduction (*Ceriodaphnia dubia*) or growth (fathead minnow – *Pimephales promelas*) between control and effluent-exposed organisms.

The present report discusses the results of chronic biomonitoring tests conducted on effluent from the Linkan Engineering Schwartzwalder Mine 001A discharge. These tests were conducted in accordance with EPA and State of Colorado procedures in August 2025.

MATERIALS AND METHODS

Sample Collection

Two gallons of the effluent were collected on three separate dates as specified in Permit CO-0001244. Samples were delivered chilled to the SeaCrest lab where they were held at 0-6°C. Chain of custody forms showing sample collection and laboratory arrival times are included (Appendix 1).

Dilution Water

Laboratory reconstituted water was used as both the dilution water source and the control for the tests. Reconstituted water for the *Ceriodaphnia dubia* test was produced by adding sodium bicarbonate, calcium sulfate, magnesium sulfate, potassium chloride, and sodium selenate to deionized water. Reconstituted water for the fathead minnow test was produced by adding sodium bicarbonate, calcium sulfate, magnesium sulfate, and potassium chloride to deionized water.

Test Organisms

The biomonitoring test used *Ceriodaphnia dubia,* cultured in the SeaCrest laboratory. The organisms are cultured in brood culture boards from which individual females are monitored for survival and reproduction for periods of up to two weeks. Neonates less than 24-hours old, released from third or subsequent broods of eight or more within an 8-hour period, are collected from the brood chambers and used in tests. The animals are fed daily with a mixture of Yeast, Cereal Leaves, and Trout Chow (YCT), produced in-house. This is supplemented with cultured green algae *(Selenastrum capricornutum)* provided by Aquatic Biosystems.

Less than one-day-old fathead minnow, cultured in the laboratory, were also used in the test. Adult fish are maintained in 10-gallon aquaria where females deposit their eggs on the under-surface of split PVC pipe sections. The eggs are collected daily and transferred to aerated containers where they hatch after three to four days. The larval fish are fed newly hatched brine shrimp *(Artemia* sp.) at least twice per day.

In-house organisms are tested monthly in a reference toxicant test using sodium chloride to monitor overall health and test reproducibility. (Appendix 4).

Test Procedures

Upon receipt at the lab, samples were analyzed for alkalinity, ammonia, chlorine, conductivity, dissolved oxygen, hardness, and pH.

Methods used in chemical analysis

Alkalinity	EPA 310.2	Hach 8203	I-2030-85.2
Ammonia	SM4500-NH_3, C-E1997	ASTM D1426-08	
Chlorine	SM4500-Cl D	Hach 10026	
Conductivity	SM2510		
Dissolved Oxygen	SM4500-O	Electrode: G-2001	Winkler (QC): B-F-2001
Hardness	SM2340 B or C	Hach 8213	
pH	SM4500-H+ B-2000		

The test followed procedures in EPA[3] and CDPHE[4] guidelines. Exposure concentrations included control (0%), 20%, 40%, 60%, 80%, and 100% mixtures, diluted with moderately hard laboratory reconstituted water.

Individual *Ceriodaphnia dubia* were placed in 30ml plastic containers containing approximately 15ml of exposure medium. Ten replicates at each concentration were used. The animals were fed daily with the YCT mixture and an equal volume of the green algae *(Selenastrum capricornutum)*. The exposure medium was changed daily in each container and the number of young released overnight were counted and recorded. Young were removed from the containers daily and discarded. Routine measurements were made each day of temperature, dissolved oxygen, and pH before and after the water changes.

Fathead minnow were exposed in 500ml plastic cups to which 250ml of media was replaced daily. Four replicates were used at each concentration. Ten fish, less than 24-hours old, were placed in each cup. The fish were monitored daily for survival and fed live brine shrimp at least twice per day. After seven days, the fish were removed from the cups, euthanized with isopropyl alcohol, and then placed in aluminum pans and dried in an oven for a minimum of six hours at 100ºC. The pans were then weighed on a five-place analytical balance to determine the average dry weight of the fish from each replicate.

Data Analysis

Data from the tests were analyzed on a personal computer using the CETIS program (developed by Tidepool Scientific Software). Statistical tests used in the analyses are shown in Table 1. Test acceptability was determined using control survival and reproduction/growth criteria, concentration-response relationships, and percent minimum significant differences (USEPA [5,6]).

Table 1. Statistical methods used in testing for significant differences in test parameters.

Variance	Distribution
Bartlett Equality of Variance Test	Shapiro-Wilk W Normality Test

Statistical Difference				
Species	Survival	Growth	Reproduction	IC_{25}
Ceriodaphnia dubia	N/A	N/A	Dunnett Multiple Comparison Test	ICp
fathead minnow	N/A	Dunnett Multiple Comparison Test	N/A	ICp

RESULTS

Ceriodaphnia dubia Test Results

Test results for the *Ceriodaphnia dubia* are summarized in Table 2 and provided on the data sheets located in Appendix 2. Survival was 100% in the 100% effluent and was 100% in the remaining effluent concentrations. Control survival was 100%. No statistically significant lethality was measured in any effluent concentration when compared to the control. The LOEL (Lowest Observed Effect Level) for lethality was >100% and the LC_{25} (Lethal Concentration 25) for lethality was >100%.

Average number of neonates was 9.1 in the 100% effluent concentration and ranged from 23.6 – 27.5 in the remaining effluent concentrations. Average number of neonates in the control was 25.6 for statistical analyses and test acceptability criteria. Statistically significant differences in the number of neonates were found between the control and the 100% effluent concentration. The LOEL for reproduction was 100% and the IC_{25} (Inhibition Concentration 25) for reproduction was 85.1%.

Table 2. Summary of *Ceriodaphnia dubia* test results. An asterisk (*) denotes a statistically significant difference from the control.

Concentration	Percent Survival	Mean Neonates	Min.	Max.	Significant Difference	
					Lethality	Reprod.
Control (0%)	100	25.6	21	36		
20%	100	27.5	15	38		
40%	100	25.5	15	35		
60%	100	25.1	13	40		
80%	100	23.6	16	31		
100%	100	9.1	1	18		*

Fathead Minnow Test Results

Fathead minnow results are summarized in Table 3 and are provided on data sheets in Appendix 3. Survival was 100% in the 100% effluent concentration and was 100% in the remaining effluent concentrations. Control survival was 100%. No statistically significant lethality was measured in any effluent concentration when compared to the control. The LOEL (Lowest Observed Effect Level) for lethality was >100% and the LC_{25} (Lethal Concentration 25) for lethality was >100%.

Average weight in the 100% effluent concentration was 0.463mg and ranged from 0.455mg - 0.525mg per individual in the remaining effluent concentrations. Average weight for the control fish was 0.515mg for statistical analyses and test acceptability criteria. Statistically significant differences for growth were measured in the 80% and 100% effluent concentration when compared to the control. The LOEL for growth was 80% and the IC_{25} for growth was >100%.

Table 3. Summary of fathead minnow test results. An asterisk (*) denotes a statistically significant difference from the control.

Concentration	Percent Survival	Average Weight (mg)	Min.	Max.	Significant Difference	
					Lethality	Growth
Control (0%)	100	0.515	0.502	0.528		
20%	100	0.488	0.436	0.535		
40%	100	0.525	0.492	0.560		
60%	100	0.500	0.479	0.520		
80%	100	0.455	0.425	0.498		*
100%	100	0.463	0.441	0.491		*

Test Acceptability

Acceptable control survival was achieved in both tests. Similarly, *Ceriodaphnia dubia* reproduction and fathead minnow growth in control organisms met required levels. PMSD for fathead minnow growth in effluent concentrations was not within the required limits for an acceptable test due to the presence of statistically significant toxicity in the 80% and 100% effluent dilutions (Table 4).

Table 4. PMSD for chronic test parameters.

	fathead minnow growth		***C. dubia* reproduction**	
	Lower bound	Upper bound	Lower bound	Upper bound
PMSD	12	30	13	47
(% Minimum significant difference)	9.6		26.2	

DISCUSSION

A failed test for this discharge occurs when there is a statistical difference and LC_{25} less than the IWC (Instream Waste Concentration) of 100%. The LOEL represents the lowest effluent concentration at which a statistically significant effect is observed. The LC_{25} represents an estimate of the effluent concentration that would cause a 25 percent reduction in survival. Since there was no statistically significant differences meeting this criterion, the effluent passes WET (Whole Effluent Toxicity) testing for this sampling period.

REFERENCES

1. **Hach Chemical Company.** 2008. *Hach's Water Analysis Handbook*. Fifth Edition. Hach Chemical Company, Loveland, Colorado**.** Digital Medium.
2. **APHA/AWWA/WEF.** 1998. *Standard Methods for the Examination of Water and Wastewater.* 20th Edition. American Public Health Association, Washington, D.C.
3. **USEPA.** 2002. *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms.* EPA-821-R-02-013. 335 pp.
4. **CDPHE (Colorado Department of Public Health and Environment).** 1998. *Laboratory Guidelines for Conducting Whole Effluent Toxicity Tests.* Water Quality Control Division.
5. **USEPA.** 2000. *Method of Guidance and Recommendations for Whole Effluent Toxicity (WET) Testing* (40 CFR Part 136). EPA/821/B-00/004.
6. **USEPA**. 2000. *Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications under the National Pollutant Discharge Elimination System Program*. EPA/833/R-00/003.

Appendix 1 – Chain of Custody with Sample Receipt Forms

SEACREST GROUP
ENVIRONMENTAL SERVICES LABORATORY

CHAIN OF CUSTODY

500 S. Arthur Avenue, Unit 450 - Louisville, CO 80027
(303) 661.9324 - FAX (303) 661.9325

Client/Project Name: Linkan Schwartzwalder Mine
P. O./Project Number:
Contact: Alex Schwiebert
Address: 2720 Ruby Vista Dr Elko NV 89801
Phone # 719-247-0864 E-Mail: alex.schwiebert@linkan.com
Fax # Sampler: Bryant Acevedo
Report By: ☐ Mail ☒ PDF ☐ FAX

Sample Location or ID	Date	Time	Grab/ Comp	Lab ID (LAB Use Only)	WET: Acute (Indicate Below)	WET: Chronic (Indicate Below)	WET: Accelerated (Indicate Below)	WET: PTI/TIE/TRE (Indicate Below)	Metals (List Below)	Solids (TS/TDS/TSS) (Circle)	Anions (List Below)	Chromium III/VI (Circle)	Oil and Grease	Coliform (Total/Fecal/E-Coli) (Circle)	BOD/COD (Circle)	Other Analysis (List Below)			Number of Containers	Total Volume
Outfall 001A	8/4/25	1430	Comp	525390.B1		X													2	2gal

Turnaround Requirements (Analytical Testing Only)
X Standard (10 days) ____ 6-9 Day
____ 3-5 Day ____ 1-2 Day
Requested Report Date:

Test Species: ☒ Fathead Minnow ☒ Cerio daphnia ☐ Daphnia magna ☐ Daphnia pulex ☐ Other (List Below)

Special Instructions/Comments: Email results to: chrisprosper@linkan.com adam.hill@linkan.com peter.hays@state.co.us as well
WET #

Relinquished By (1)		Received By (1)		Relinquished By (2)		Received By (2)	
Signature	Date/Time	Signature	Date/Time	Signature	Date/Time	Signature	Date/Time
	8/4/1500		8/4/25 1500				

SeaCrest Group
Louisville, CO

Sample Receipt Form

Form #: 42
Effective: January 2024

Project # 525 390.B Sample #: 1
Date: 080425 Initials: CC

Samples Were:

1. FedEx UPS Courier Hand Delivery (circle one)
   Notes:

2. Chilled to Ship — Ambient (Chilled)

3. Cooler Received Broken or Leaking — Y (N) NA
   Notes:

4. Sample Received Broken or Leaking — Y (N)
   Notes:

5. Received Within 36hr Holding Time — (Y) N
   Notes:

6. Aeration necessary — Y (N)

7. pH adjustment necessary — Y (N)

8. Sample Received at Temperature between 0-6° C . — Y N (NA)
   Notes: same day

9. Description of Sample (Color, Odor, and/or Presence of Particulate Matter):
   Effluent: no visible P.M
   Receiving: N/A
   Presence of native species: Y (N)

Lab #	Temp	D.O.	pH	Cond
390B#	8.0	7.5	7.7	199

Custody Seals:

1. Present on Outer Package — Y (N)
2. Unbroken on Outer Package — Y N (NA)
3. Present on Sample — Y (N)
4. Unbroken on Sample — Y N (NA)

Custody Documentation (Chain of Custody):

1. Present Upon Receipt of Sample — (Y) N

CC

SEACREST GROUP
ENVIRONMENTAL SERVICES LABORATORY

CHAIN OF CUSTODY

500 S. Arthur Avenue, Unit 450 - Louisville, CO 80027
(303) 661.9324 - FAX (303) 661.9325

Client/Project Name: Linkan Schwartzwalder Mine
P. O./Project Number:
Contact: Alex Schwiebert
Address: 2740 Ruby Vista Dr Elko NV 89801
Phone # 719-247-0854 E-Mail: alex.schwiebert@linkan.com
Fax # Sampler: Bryant Acuesta
Report By: ☐ Mail ☒ PDF ☐ FAX

Sample Location or ID	Date	Time	Grab/ Comp	Lab ID (LAB Use Only)	WET: Acute (Indicate Below)	WET: Chronic (Indicate Below)	WET: Accelerated (Indicate Below)	WET: PTI/TIE/TRE (Indicate Below)		Metals (List Below)	Solids (TS/TDS/TSS) (Circle)	Anions (List Below)	Chromium III/VI (Circle)	Oil and Grease	Coliform (Total/Fecal/E-Coli) (Circle)	BOD/COD (Circle)	Other Analysis (List Below)			Number of Containers	Total Volume
Outfall 001A	8/5/25	1415	Comp	525390.B2	X															2	2 gal

Analysis (Check all applicable)

Turnaround Requirements (Analytical Testing Only)
X Standard (10 days) ____ 6-9 Day
____ 3-5 Day ____ 1-2 Day
Requested Report Date:

Test Species: ☒ Fathead Minnow ☒ Cerio daphnia ☐ Daphnia magna ☐ Daphnia pulex ☐ Other (List Below)

Special Instructions/Comments: Email results: WET to o asuell
chris.prosser@linkan.com
adam.billin@linkan.com
peter.hays@state.co.us

Relinquished By (1)	Date/Time	Received By (1)	Date/Time	Relinquished By (2)	Date/Time	Received By (2)	Date/Time
Signature		Signature		Signature		Signature	
	8/5/1500	Hannah Trudu	08/05/25 1500				

SeaCrest Group
Louisville, CO

Sample Receipt Form

Form #: 42
Effective: January 2024

Project # 525 390 . B Sample #: 2
Date: 08 05 25 Initials: HT

Samples Were:

1. FedEx UPS Courier Hand Delivery (circle one)
   Notes:

2. Chilled to Ship Ambient (Chilled)

3. Cooler Received Broken or Leaking Y (N) NA
   Notes:

4. Sample Received Broken or Leaking Y (N)
   Notes:

5. Received Within 36hr Holding Time (Y) N
   Notes:

6. Aeration necessary Y (N)

7. pH adjustment necessary Y (N)

8. Sample Received at Temperature between 0-6° C . Y N (NA)
   Notes: same day

9. Description of Sample (Color, Odor, and/or Presence of Particulate Matter):
   Effluent: No visible PM
   Receiving: N/A
   Presence of native species: Y (N)

Lab #	Temp	D.O.	pH	Cond
525390.B 2	10.2	7.3	7.6	179

Custody Seals:

1. Present on Outer Package Y (N)
2. Unbroken on Outer Package Y N (NA)
3. Present on Sample Y (N)
4. Unbroken on Sample Y N (NA)

Custody Documentation (Chain of Custody):

1. Present Upon Receipt of Sample (Y) N CC

SEACREST GROUP
ENVIRONMENTAL SERVICES LABORATORY

CHAIN OF CUSTODY

500 S. Arthur Avenue, Unit 450 - Louisville, CO 80027
(303) 661.9324 - FAX (303) 661.9325

Client/Project Name: Linkan Schwartzwalder Mine
P. O./Project Number:
Contact: Alex Schwindt
Address: 2720 Ruby Vista Dr Elko NV 89801
Phone # 719-247-0564 E-Mail: alex.schwindt@linkanen
Fax # Sampler: Bryant Acuedo
Report By: ☐ Mail ☒ PDF ☐ FAX

Sample Location or ID	Date	Time	Grab/ Comp	Lab ID (LAB Use Only)	WET: Acute (Indicate Below)	WET: Chronic (Indicate Below)	WET: Accelerated (Indicate Below)	WET: PTI/TIE/TRE (Indicate Below)	Metals (List Below)	Solids (TS/TDS/TSS) (Circle)	Anions (List Below)	Chromium III/VI (Circle)	Oil and Grease	Coliform (Total/Fecal/E-Coli) (Circle)	BOD/COD (Circle)	Other Analysis (List Below)			Number of Containers	Total Volume
Outfall 001A	8/16/25	1420	Comp	525390.BH5		X													2	2 gal

Analysis (Check all applicable)

Turnaround Requirements (Analytical Testing Only)
X Standard (10 days) ____ 6-9 Day
____ 3-5 Day ____ 1-2 Day
Requested Report Date:

Test Species: ☒ Fathead Minnow ☒ Cerio daphnia ☐ Daphnia magna ☐ Daphnia pulex ☐ Other (List Below)

Special Instructions/Comments:
WET Email results:
chris.prosper@linkan.com
adam.billin@linkan.com
peter.hays@state.co.us
too aswell

Relinquished By (1)		Received By (1)		Relinquished By (2)		Received By (2)	
Signature	Date/Time	Signature	Date/Time	Signature	Date/Time	Signature	Date/Time
	8/16/1500		0806251500				

SeaCrest Group
Louisville, CO

Sample Receipt Form

Form #: 42
Effective: January 2024

Project # 525390.B Sample #: 3
Date: 080625 Initials: EW

Samples Were:

1. FedEx UPS Courier Hand Delivery (circle one)
   Notes:

2. Chilled to Ship Ambient Chilled

3. Cooler Received Broken or Leaking Y N NA
   Notes:

4. Sample Received Broken or Leaking Y N
   Notes:

5. Received Within 36hr Holding Time Y N
   Notes:

6. Aeration necessary Y N

7. pH adjustment necessary Y N

8. Sample Received at Temperature between 0-6° C . Y N NA
   Notes: Same day

9. Description of Sample (Color, Odor, and/or Presence of Particulate Matter):
   Effluent: No visible P.M
   Receiving: N/A
   Presence of native species: Y N

Lab #	Temp	D.O.	pH	Cond
390.BTB	11.2	7.1	7.7	181

Custody Seals:

1. Present on Outer Package Y N
2. Unbroken on Outer Package Y N NA
3. Present on Sample Y N
4. Unbroken on Sample Y N NA

Custody Documentation (Chain of Custody):

1. Present Upon Receipt of Sample Y N

CC

Appendix 2 – Data Sheets for the *Ceriodaphnia dubia* Test

WET TEST REPORT FORM – CHRONIC

Permittee: Linkan Engineering-Schwartzwalder Mine
Permit No.: CO-0001244

Outfall: 001A – IWC: 100%

Test Type: Routine ☒ Accelerated ☐ Screen ☐

Test Species: *Ceriodaphnia dubia*

Test Start Time	Test Start Date	Test End Time	Test End Date
1605	08-04-2025	1600	08-10-2025

Test Results	Lethality/TCP3B	Reproduction/TKP3B
S code: LOEL	100%	100%
	PASS	**N/A**
P code: LC_{25}/IC_{25}	>100%	85.1%
	PASS	**N/A**
T code:	>100%	100%

Test Summary

Measurements	Control (0%)	20%	40%	60%	80%	100%
Exposed organisms	10	10	10	10	10	10
Survival for day 1	10	10	10	10	10	10
Survival for day 2	10	10	10	10	10	10
Survival for day 3	10	10	10	10	10	10
Survival for day 4	10	10	10	10	10	10
Survival for day 5	10	10	10	10	10	10
Survival for day 6	10	10	10	10	10	10
Mean 3 Brood Total	25.6	27.5	25.5	25.1	23.6	9.1

Hardness (mg/L) – Receiving Water: N/A Effluent: 6/18/3 Recon Water: 91
Alkalinity (mg/L) – Receiving Water: N/A Effluent: 92/116/91 Recon Water: 58
Chlorine (mg/L) – Effluent: <0.01 pH (initial/final) – Control: 8.1/7.8 100%: 7.7/7.6
Total Ammonia as NH_3 (mg/L) - Effluent: 0.06/0.09/0.08

Were all Test Conditions in Conformance with Division Guidelines? YES ☒ NO ☐
If **NO**, list deviations from test specifications: N/A
Laboratory: SeaCrest Group
Comments:
Analyst's Name: Lou Watkins and Katie Maranowski

Signature Cat Cash *Date* August 15, 2025

SeaCrest Group
Louisville, CO

Ceriodaphnia Chronic Benchsheet

Form #: 101a
Effective: March 2023

Permittee: Linkan Engineering **Lab #:** 525390.B **Site:** 001A
IWC %: 100 **Template #:** 5 **Dilution Water:** MH25-018 **Sample Date:** 080425
Age & Source: 080425 2200 **Test Start:** 080425 1605 **Test End:** ~~080425 1600~~ 080525 1600
Test Conditions:

	0	1	2	3	4	5	6	7	Total
(C)	0	0	0	5	7	5	12	24	24
	0	0	0	10	13	0	13	36	36
	0	0	0	8	5	0	18	28	28
	0	0	0	3	7	0	13	23	23
	0	0	0	5	7	0	13	25	25
0	0	0	0	4	9	0	11	24	24
	0	0	0	5	8	0	10	23	23
	0	0	0	7	12	0	11	30	30
	0	0	0	3	8	0	11	22	22
	0	0	0	4	6	0	11		21
DO	7.4	7.1 / 6.8	7.3 / 6.9	7.2 / 6.8	6.8 / 7.0	6.9 / 7.2	6.8		
Temp	25.9	25.5 / 24.9	25.7 / 25.5	25.3 / 24.7	25.2 / 25.6	25.4 / 24.9	24.7		25.6
pH	8.1	7.8 / 8.1	7.6 / 8.1	7.9 / 8.0	8.0 / 8.1	8.1 / 8.2	7.8		
Cond	246	244	245	244	325	342	~~345~~		
(1)	0	0	0	4	9+1	0	17	31	31
	0	0	0	6	10+2	0	11		29
	0	0	0	8	9+2	0	16		35
	0	0	0	6	12+3	0	11		32
	0	0	0	5	13	0	12		30
	0	0	0	7	5	0	6		18
20	0	0	0	12	11+2	0	13		38
	0	0	0	6	14	4	18		24
	0	0	0	7	4	4	7		15
	0	0	0	8	8	7	14		27
DO	7.4	7.2 / 6.8	7.3 / 6.9	7.2 / 7.0	7.0 / 7.2	7.0 / 7.3	6.9		
Temp	25.9	25.5 / 24.9	25.7 / 25.5	25.3 / 24.7	25.2 / 25.5	25.4 / 24.9	24.7		27.5
pH	8.0	7.9 / 7.9	7.6 / 8.0	7.9 / 8.0	8.0 / 8.0	8.1 / 7.9	7.8		
Cond	274	276	277	274	299	283	—		
(2)	0	0	0	5	8	0	13		26
	0	0	0	7	13	0	15		35
	0	0	0	4	7	4	14		15
	0	0	0	4	8+3	0	7		22
	0	0	0	7	6+3	0	11		27
40	0	0	0	0	31 10	5	14		32
	0	0	0	6	9	7	13		22
	0	0	0	5	8	0	15		28
	0	0	0	9	9	0	12		30
	0	0	0	4	8	6	12		18
DO	7.4	7.3 / 6.9	7.4 / 6.9	7.3 / 7.1	7.2 / 7.4	7.2 / 7.4	7.0		
Temp	25.9	25.5 / 24.9	25.7 / 25.5	25.3 / 24.7	25.2 / 25.5	25.4 / 24.9	24.7		25.5
pH	7.9	8.0 / 7.9	7.7 / 7.9	7.0 / 7.9	7.9 / 7.9	8.0 / 7.8	7.7		
Cond	258	358	259	259	290	280	—		
(3)	0	0	0	8	13	0	14		35
	0	0	0	4	14	0	12		30
	0	0	0	9	12	10	0		31
	0	0	0	3	0	0	10		13
	0	0	0	0	10	18	12		40
60	0	0	0	8	10	0	10		28
	0	0	0	8 6	12 13	0	0		21
	0	0	0	0	9	4	12		25
	0	0	0	0	0	4	9		13
	0	0	0	6	0	5	10		15
DO	7.5	7.4 / 6.9	7.4 / 7.0	7.4 / 7.4	7.4 / 7.5	7.3 / 7.5	7.3		
Temp	25.9	25.4 / 24.9	25.6 / 25.5	25.3 / 24.7	25.2 / 25.5	25.4 / 24.9	24.7		25.1
pH	7.8	8.1 / 7.8	7.8 / 7.8	7.8 / 7.9	7.8 / 7.9	8.0 / 7.8	7.7		
Cond	240	239	242	240	271	266	—		

CC

SeaCrest Group
Louisville, CO

Ceriodaphnia Chronic Benchsheet

Form #: 101a
Effective: March 2023

	0	1	2	3	4	5	6	7	Total
(4)	0	0	0	8	9	0	11	5	28
	0	0	0	0	14	0	13	4	27
	0	0	0	11	9	6	12	8	26
	0	0	0	13	0	6	0	6	19
	0	0	0	17	6	4	13	7	27
	0	0	0	9	10	8	12	2	31
80	0	0	0	5	9	3	0	0	17
	0	0	0	6	9	7	13	0	22
	0	0	0	9	3	1	7	0	23
	0	0	0	8	0	0	8 8	3	16
DO	7.5	7.6 7.0	7.5 7.0	7.5 7.5	7.6 7.6	7.5 7.7	7.4		23.6
Temp	25.9	25.4 24.9	25.6 25.5	25.3 24.7	25.1 25.5	25.4 24.9	24.7		
pH	7.8	8.2 7.7	7.9 7.8	7.8 7.9	7.7 7.9	7.9 7.7	7.6		
Cond	219	221	222	222	251	263	—		
(5)	0	0	0	0	8	0	5		13
	0	0	0	5	7	0	6		18
	0	0	0	5	0	0	0		5
	0	0	0	8	6	0	6		14
	0	0	0	9	3	0	0		12
100	0	0	0	7	1	0	0		8
	0	0	0	8	1	0	0		1
	0	0	0	0	3	0	0		3
	0	0	0	6	0	0	0		6
	0	0	0	4	4	0	3		11
DO	7.5	7.8 7.1	7.5 7.0	7.5 7.6	7.8 7.7	7.6 7.8	7.5		9.1
Temp	25.9	25.4 24.9	25.6 25.5	25.3 24.7	25.1 25.5	25.4 24.9	24.7		
pH	7.7	8.3 7.7	8.0 7.8	7.8 7.9	7.7 7.8	7.9 7.7	7.6		
Cond	199	181	182	184	183	192	—		
Algae	ABS	ABS	ABS	ABS	ABS	ABS	ABS		
YCT	2505	2505	2505	2505	2505	2505	2505		
H_2O		1	2	2	3	3	—		
Initials	KM	KM	KM	LW	LW	LW	LW		

	Eff #1	Eff #2	Eff #3	Recon
Hardness	4	18	3	91
Alkalinity	92	116	91	58
Chlorine	<0.01	<0.01	<0.01	<0.01
Ammonia	0.06	0.09	0.08	<0.03

Exposure Chamber:
Total Capacity: 30mL
Total Solution Volume: 15mL

Feeding Schedule:
Fed daily
Food used: YCT, Algae

Units:
DO: mg/L
Temp: °C
pH: N/A
Cond: µS/cm³
Hardness: mg/L
Alkalinity: mg/L
Chlorine: mg/L
Ammonia: mg/L

Comments:

1	2	3	4	5	6	7	8	9	10
A1	A2	A5	A6	A9	A10	B2	B5	B9	B10

CC

CETIS Analytical Report

Report Date: 12 Aug-25 12:59 (p 1 of 1)
Test Code/ID: 525390cd / 12-7307-0884

Ceriodaphnia 7-d Survival and Reproduction Test **SeaCrest Group**

Analysis ID:	14-9116-3429	**Endpoint:**	Reproduction	**CETIS Version:**	CETIS v2.1.6
Analyzed:	12 Aug-25 12:18	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Edit Date:	12 Aug-25 0:00	**MD5 Hash:**	8C6914AAA9C43A1F55F7593D1AEF23A3	**Editor ID:**	000-346-492-2
Batch ID:	06-8332-8891	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	04 Aug-25	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	11 Aug-25	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Branchiopoda	**Source:**	In-House Culture **Age:**

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	Tox Units	MSDu	PMSD
Untransformed	C > T	80	100	89.44	1.2	6.701	26.18%

Dunnett Multiple Comparison Test

Control	vs	Conc-%	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Dilution Water		20	18	-0.6491	2.289	6.701	CDF	0.9590	Non-Significant Effect
		40	18	0.03416	2.289	6.701	CDF	0.8230	Non-Significant Effect
		60	18	0.1708	2.289	6.701	CDF	0.7777	Non-Significant Effect
		80	18	0.6832	2.289	6.701	CDF	0.5631	Non-Significant Effect
		100*	18	5.637	2.289	6.701	CDF	<1.0E-05	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	25.6	15	>>	Yes	Passes Criteria
PMSD	0.2618	0.13	0.47	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2308.13	461.627	5	10.77	<1.0E-05	Significant Effect
Error	2313.6	42.8444	54			
Total	4621.73		59			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	6.644	15.09	0.2485	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9851	0.9459	0.6751	Normal Distribution

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	10	25.6	22.34	28.86	24	21	36	1.439	17.78%	0.00%
20		10	27.5	22.24	32.76	29.5	15	38	2.325	26.74%	-7.42%
40		10	25.5	21.02	29.98	26.5	15	35	1.979	24.54%	0.39%
60		10	25.1	18.36	31.84	26.5	13	40	2.979	37.54%	1.95%
80		10	23.6	20	27.2	24.5	16	31	1.593	21.35%	7.81%
100		10	9.1	5.248	12.95	9.5	1	18	1.703	59.17%	64.45%

Convergent Rounding (4 sf) CETIS™ v2.1.6.2 x64 (000-346-492-2) Analyst: CC QA: HW

CETIS Analytical Report

Report Date: 12 Aug-25 12:59 (p 2 of 2)
Test Code/ID: 525390cd / 12-7307-0884

Ceriodaphnia 7-d Survival and Reproduction Test **SeaCrest Group**

Analysis ID:	10-2189-0812	**Endpoint:**	Reproduction	**CETIS Version:**	CETIS v2.1.6
Analyzed:	12 Aug-25 12:59	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Edit Date:	12 Aug-25 0:00	**MD5 Hash:**	8C6914AAA9C43A1F55F7593D1AEF23A3	**Editor ID:**	000-346-492-2
Batch ID:	06-8332-8891	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	04 Aug-25	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	11 Aug-25	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Branchiopoda	**Source:**	In-House Culture **Age:**

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	22556	1000	Yes	Two-Point Interpolation

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	25.6	15	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	Tox Units	95% LCL	95% UCL
IC15	81.42	38.38	84.58	1.2	1.2	2.6
IC20	83.26	57.2	86.44	1.2	1.2	1.7
IC25	85.09	80.09	88.2	1.2	1.1	1.2
IC40	90.58	86.64	94.22	1.1	1.1	1.2
IC50	94.24	90.58	98.66	1.1	1	1.1

Reproduction Summary

			Calculated Variate						Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Median**	**Min**	**Max**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	D	10	25.6	24	21	36	17.78%	0.00%	26.55	0.00%
20		10	27.5	29.5	15	38	26.74%	-7.42%	26.55	0.00%
40		10	25.5	26.5	15	35	24.54%	0.39%	25.5	3.95%
60		10	25.1	26.5	13	40	37.54%	1.95%	25.1	5.46%
80		10	23.6	24.5	16	31	21.35%	7.81%	23.6	11.11%
100		10	9.1	9.5	1	18	59.17%	64.45%	9.1	65.73%

Convergent Rounding (4 sf) CETIS™ v2.1.6.2 x64 (000-346-492-2) Analyst: CC QA: HW

Appendix 3 – Data Sheets for the Fathead Minnow Test

WET TEST REPORT FORM – CHRONIC

Permittee: Linkan Engineering-Schwartzwalder Mine
Permit No.: CO-0001244
Outfall: 001A – IWC: 100%
Test Type: Routine ☒ Accelerated ☐ Screen ☐
Test Species: fathead minnow

Test Start Time	Test Start Date	Test End Time	Test End Date
1530	08-04-2025	1445	08-11-2025

Test Results	Lethality/TCP6C	Growth/TKP6C
S code: LOEL	>100%	80%
	PASS	**N/A**
P code: LC_{25}/IC_{25}	>100%	>100%
	PASS	**N/A**
T code:	>100%	>100%

Test Summary

Measurements	Control (0%)	12.5%	25%	50%	75%	100%
Exposed organisms	40	40	40	40	40	40
Survival for day 1	40	40	40	40	40	40
Survival for day 2	40	40	40	40	40	40
Survival for day 3	40	40	40	40	40	40
Survival for day 4	40	40	40	40	40	40
Survival for day 5	40	40	40	40	40	40
Survival for day 6	40	40	40	40	40	40
Survival for day 7	40	40	40	40	40	40
Mean Dry Wt. (mg)	0.515	0.488	0.525	0.500	0.455	0.463

Hardness (mg/L) – Receiving Water: N/A Effluent: 6/18/3 Recon Water: 89
Alkalinity (mg/L) – Receiving Water: N/A Effluent: 92/116/91 Recon Water: 58
Chlorine (mg/L) – Effluent: <0.01 pH (initial/final) – Control: 8.1/7.6 100%: 7.6/7.7
Total Ammonia as NH_3 (mg/L) -Effluent: 0.06/0.09/0.08

Were all Test Conditions in Conformance with Division Guidelines? YES ☒ NO ☐
If **NO**, list deviations from test specifications: N/A
Laboratory: SeaCrest Group
Comments:
Analyst's Name: Haley West, Ethan White, and Hannah Tiede

Signature Cat Cash *Date* August 15, 2025

SeaCrest Group
Louisville, CO

Fathead Minnow Chronic Benchsheet

Form #: 103a
Effective: March 2022

Client: Linkan Engineering Site: 001A Lab #: 525 390.B Sample Date: 080425 IWC: 100 Dilution H_2O: MH25-052
Test Start: 080425 1530 Test End: 081125 1445 Species Info: IH 080425 Template: FHM Test Conditions:

Conc	Read	0	1		2		3		4	5	6	7
0	DO	7.1	5.1	6.8	4.4	7.1	5.0	6.8	4.1	4.5	6.8	4.5	6.9	3.8
	Temp	24.5	25.2	24.3	24.6	24.3	24.7	24.5	24.5	25.0	24.8	25.8	25.1	25.0
	pH	8.1	7.6	8.0	7.5	8.0	7.7	8.1	7.7	7.5	8.0	7.5	8.1	7.6
	Cond	307	324		324		327		309	316		317		
20	DO	7.2	5.2	6.9	4.4	7.1	4.9	7.0	4.1	4.5	7.0	4.4	7.0	3.8
	Temp	24.7	25.2	24.4	24.6	24.5	24.8	24.5	24.5	25.0	24.8	25.8	25.1	25.0
	pH	7.9	7.7	7.9	7.4	7.9	7.7	8.0	7.7	7.4	7.9	7.5	8.1	7.6
	Cond	292	304		305		308		299	296		298		
40	DO	7.3	5.2	7.1	4.5	7.2	4.8	7.2	4.0	4.5	7.2	4.3	7.1	3.7
	Temp	25.0	25.3	24.5	24.6	24.6	24.9	24.5	24.5	25.0	24.9	25.8	25.0	25.0
	pH	7.8	7.7	7.9	7.5	7.8	7.8	7.9	7.8	7.5	7.7	7.6	8.0	7.6
	Cond	277	284		284		282		279	276		276		
60	DO	7.4	5.3	7.3	4.5	7.2	4.7	7.5	4.0	4.6	7.3	4.1	7.2	3.7
	Temp	25.3	25.3	24.7	24.6	24.8	24.9	24.4	24.5	25.0	24.9	25.8	24.9	26.0
	pH	7.7	7.8	7.8	7.6	7.7	7.8	7.8	7.8	7.6	7.6	7.6	7.9	7.7
	Cond	221	220		224		217		220	221		216		
80	DO	7.5	5.3	7.5	4.6	7.3	4.6	7.7	3.9	4.6	7.5	4.0	7.4	3.6
	Temp	25.4	25.4	24.8	24.6	25.0	25.0	24.4	24.5	25.0	25.0	25.8	24.8	25.0
	pH	7.6	7.8	7.7	7.7	7.6	7.9	7.8	7.9	7.6	7.6	7.7	7.9	7.7
	Cond	206	199		203		199		202	203		198		
100	DO	7.6	5.4	7.6	4.6	7.3	4.5	7.9	3.9	4.6	7.7	3.9	7.6	3.6
	Temp	25.9	25.4	24.9	24.6	25.2	25.1	24.4	24.5	25.0	25.0	25.8	24.8	25.0
	pH	7.6	7.9	7.7	7.7	7.6	7.9	7.7	7.9	7.7	7.5	7.7	7.9	7.7
	Cond	187	177		179		176		181	180		178		
	DO													
	Temp													
	pH													
	Cond													
Initials		HT	EW		HT		EW		HW	HT		HT		HT
Water #		1	1		2		2		#3	3		3		

	Eff 1	Eff 2	Eff 3	Recon	Rcv 1	Rcv 2	Rcv 3	MR
Hard	10	18	3	49				
Alk	92	116	91	58				
Chlor	<0.01	<0.01	<0.01	<0.01				
NH_3	0.06	0.09	0.08	<0.03				

Feeding	0	1	2	3	4	5	6	7
AM		✓	✓	✓	✓	✓	✓	✓
Initials		EW	HT	EW	HW	HT	HT	HT
PM	✓	✓	✓	✓	✓	✓	✓	
Initials	HT	EW	HT	EW	HW	HT	HT	

Exposure Chamber

Total Capacity:	500 mL
Test Solution Volume:	250 mL
Test Solution Surface Area:	50.2 cm
Water Depth (constant):	6.5 cm

Feeding Schedule

Fed:	2x per day
Food Used:	<24hr artemia

	0	1	2	3	4	5	6	7	#	Fish & Tare	Tare	Fish Wt mg	Ave wt
	10	10	10	10	10	10	10	10	#1	1.089160	1.08450	0.510	0.515
	10	10	10	10	10	10	10	10	#2	1.087165	1.08245	0.520	
	10	10	10	10	10	10	10	10	#3	1.089380	1.08478	0.502	
	10	10	10	10	10	10	10	10	#4	1.082251	1.07723	0.528	
	10	10	10	10	10	10	10	10	#5	1.091054	1.08519	0.535	0.488
	10	10	10	10	10	10	10	10	#6	1.081533	1.07065	0.468	
	10	10	10	10	10	10	10	10	#7	1.080947	1.07535	0.512	
	10	10	10	10	10	10	10	10	#8	1.082401	1.07905	0.496	
	10	10	10	10	10	10	10	10	#9	1.083578	1.07818	0.540	0.525
	10	10	10	10	10	10	10	10	#10	1.093538	1.09320	0.518	
	10	10	10	10	10	10	10	10	#11	1.086863	1.08332	0.531	
	10	10	10	10	10	10	10	10	#12	1.083370	1.07878	0.492	
	10	10	10	10	10	10	10	10	#13	1.085463	1.07948	0.570	0.500
	10	10	10	10	10	10	10	10	#14	1.085200	1.07700	0.500	
	10	10	10	10	10	10	10	10	#15	1.085601	1.08099	0.502	
	10	10	10	10	10	10	10	10	#16	1.086048	1.08101	0.447	
	10	10	10	10	10	10	10	10	#17	1.091821	1.08602	0.473	0.455
	10	10	10	10	10	10	10	10	#18	1.085184	1.07713	0.441	
	10	10	10	10	10	10	10	10	#19	1.078891	1.07463	0.426	
	10	10	10	10	10	10	10	10	#20	1.076731	1.07175	0.498	
	10	10	10	10	10	10	10	10	#21	1.082260	1.07784	0.447	0.463
	10	10	10	10	10	10	10	10	#22	1.088105	1.08364	0.441	
	10	10	10	10	10	10	10	10	#23	1.078511	1.07475	0.476	
	10	10	10	10	10	10	10	10	#24	1.078444	1.07353	0.491	
	10								#				
	10								#				
	10								#				
	10								#				
									pretest	1.084491	1.08500		

Units:
DO: mg/L Hard: mg/L
Temp: °C Alk: mg/L
pH: N/A Chlor: mg/L
Cond: µS/cm³ NH_3: mg/L

Comments:

CETIS Analytical Report

Report Date: 12 Aug-25 09:58 (p 1 of 1)
Test Code/ID: 525390fhm / 14-5033-1343

Fathead Minnow 7-d Larval Survival and Growth Test **SeaCrest Group**

Analysis ID:	08-2831-2005	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETIS v2.1.6
Analyzed:	12 Aug-25 9:58	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Edit Date:	12 Aug-25 0:00	**MD5 Hash:**	D7FD82B738E2DB1169BEF76F8CCECC4	**Editor ID:**	000-346-492-2
Batch ID:	04-4598-3199	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	04 Aug-25	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	11 Aug-25	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	In-House Culture **Age:**

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	Tox Units	MSDu	PMSD
Untransformed	C > T	60	80	69.28	1.7	0.04953	9.62%

Dunnett Multiple Comparison Test

Control	vs	Conc-%	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Dilution Water		20	6	1.324	2.407	0.04953	CDF	0.2889	Non-Significant Effect
		40	6	-0.498	2.407	0.04953	CDF	0.9393	Non-Significant Effect
		60	6	0.7168	2.407	0.04953	CDF	0.5503	Non-Significant Effect
		80*	6	2.916	2.407	0.04953	CDF	0.0183	Significant Effect
		100*	6	2.551	2.407	0.04953	CDF	0.0379	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.515	0.25	>>	Yes	Passes Criteria
PMSD	0.09618	0.12	0.3	Yes	Below Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0158148	0.003163	5	3.735	0.0170	Significant Effect
Error	0.015244	0.0008469	18			
Total	0.0310588		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	5.537	15.09	0.3539	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9821	0.884	0.9317	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	4	0.515	0.4969	0.5331	0.515	0.502	0.528	0.005687	2.21%	0.00%
20		4	0.4878	0.4172	0.5583	0.49	0.436	0.535	0.02215	9.08%	5.29%
40		4	0.5253	0.4803	0.5702	0.5245	0.492	0.56	0.01414	5.38%	-1.99%
60		4	0.5003	0.4735	0.527	0.501	0.479	0.52	0.008391	3.35%	2.86%
80		4	0.455	0.398	0.512	0.4485	0.425	0.498	0.0179	7.87%	11.65%
100		4	0.4625	0.4227	0.5023	0.459	0.441	0.491	0.0125	5.41%	10.19%

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	0.51	0.52	0.502	0.528
20		0.535	0.468	0.512	0.436
40		0.56	0.518	0.531	0.492
60		0.52	0.5	0.502	0.479
80		0.425	0.471	0.426	0.498
100		0.442	0.441	0.476	0.491

Convergent Rounding (4 sf) CETIS™ v2.1.6.2 x64 (000-346-492-2) Analyst: CC QA: HW

CETIS Analytical Report

Report Date: 12 Aug-25 09:58 (p 1 of 1)
Test Code/ID: 525390fhm / 14-5033-1343

Fathead Minnow 7-d Larval Survival and Growth Test **SeaCrest Group**

Analysis ID:	04-0435-7646	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETIS v2.1.6
Analyzed:	12 Aug-25 9:58	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Edit Date:	12 Aug-25 0:00	**MD5 Hash:**	D7FD82B738E2DB1169BEF76F8CCECC4	**Editor ID:**	000-346-492-2
Batch ID:	04-4598-3199	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	04 Aug-25	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	11 Aug-25	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	In-House Culture **Age:**

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	2120579	1000	Yes	Two-Point Interpolation

Test Acceptability Criteria **TAC Limits**

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	0.515	0.25	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	Tox Units	95% LCL	95% UCL
IC15	>100	---	---	<1	---	---
IC20	>100	---	---	<1	---	---
IC25	>100	---	---	<1	---	---
IC40	>100	---	---	<1	---	---
IC50	>100	---	---	<1	---	---

Mean Dry Biomass-mg Summary

			Calculated Variate						Isotonic Variate	
Conc-%	Code	Count	Mean	Median	Min	Max	CV%	%Effect	Mean	%Effect
0	D	4	0.515	0.515	0.502	0.528	2.21%	0.00%	0.515	0.00%
20		4	0.4878	0.49	0.436	0.535	9.08%	5.29%	0.5065	1.65%
40		4	0.5253	0.5245	0.492	0.56	5.38%	-1.99%	0.5065	1.65%
60		4	0.5003	0.501	0.479	0.52	3.35%	2.86%	0.5003	2.86%
80		4	0.455	0.4485	0.425	0.498	7.87%	11.65%	0.4587	10.92%
100		4	0.4625	0.459	0.441	0.491	5.41%	10.19%	0.4587	10.92%

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	0.51	0.52	0.502	0.528
20		0.535	0.468	0.512	0.436
40		0.56	0.518	0.531	0.492
60		0.52	0.5	0.502	0.479
80		0.425	0.471	0.426	0.498
100		0.442	0.441	0.476	0.491

Convergent Rounding (4 sf) CETIS™ v2.1.6.2 x64 (000-346-492-2) Analyst: CC QA: HW

Appendix 4 – QA/QC and Reference Toxicant Test Chart

Quality Assurance Check List – Chronic Whole Effluent Toxicity Test

Client:	Linkan Engineering-Schwartzwalder Mine
SeaCrest Sample No:	525390.B
Species Tested:	*Ceriodaphnia dubia* and fathead minnow

Sample Dates	**Start Date of Test (*Ceriodaphnia dubia)***	**Start Date of Test (fathead minnow)**
08-04-2025		
08-05-2025		
08-06-2025	08-04-2025	08-04-2025

Sample received in lab properly preserved (0-6°C)?	**N***
Sample received at laboratory within 36 hours of collection?	**Y**
Sample delivered on ice or equivalent?	**Y**
Test initiated within 36-hours of collection?	**Y**
Test protocol conforms to CDPHE guidelines (*Ceriodaphnia dubia)*?	**Y**
Test protocol conforms to CDPHE guidelines (fathead minnow)?	**Y**
Average test temp. ±1°C (*Ceriodaphnia dubia*)?	**Y**
Average test temp. ±1°C (fathead minnow)?	**Y**
DO level ≥4.0mg/L; no super-saturation (*Ceriodaphnia dubia*)?	**Y**
DO level ≥4.0mg/L; no super-saturation (fathead minnow)?	**Y**
Survival in control ≥80% (*Ceriodaphnia dubia*)?	**Y**
Survival in control ≥80% (fathead minnow)?	**Y**
Ceriodaphnia dubia neonates <24-hours old?	**Y**
Fathead minnow larvae <24-hours old?	**Y**
Appropriate reference toxicity test conducted?	**Y**
Reference toxicity test results within the confidence limits for the lab?	**Y**

* The samples were received at 8.0°C, 10.2°C and 11.2°C on the same day as sampling.

Author Cat Cash *Date* August 15, 2025
Position:

Quality Control Haley West *Date* August 15, 2025

SEACREST GROUP
ENVIRONMENTAL SERVICES LABORATORY

METHOD QC

Method	Analyte	Date	LCS (rec)	%REC	%RPD	QC LIMITS
2320 B	Alkalinity - Total	7/4/2025	96.80%	101.82%	3.17%	± 5.00%
2320 B	Alkalinity - Total	7/10/2025	99.20%	104.97%	-4.00%	± 5.00%
2320 B	Alkalinity - Total	7/19/2025	95.20%	101.08%	-2.30%	± 5.00%
2320 B	Alkalinity - Total	7/24/2025	100.00%	98.32%	-4.26%	± 5.00%
4500 NH_3 D	Ammonia	7/4/2025	102.60%	95.23%	-3.90%	± 10.00%
4500 NH_3 D	Ammonia	7/9/2025	95.40%	104.40%	3.51%	± 10.00%
4500 NH_3 D	Ammonia	7/18/2025	96.60%	101.00%	0.95%	± 10.00%
4500 NH_3 D	Ammonia	7/23/2025	103.60%	104.23%	-2.15%	± 10.00%
4500 Cl D	Chlorine	7/30/2025	103.45%	103.20%	0.00%	± 5.00, ± 20.00%
2340 B	Hardness - Total	7/4/2025	104.39%	99.68%	-0.88%	± 5.00%
2340 B	Hardness - Total	7/12/2025	104.00%	103.00%	-0.77%	± 5.00%
2340 B	Hardness - Total	7/18/2025	100.00%	98.00%	2.04%	± 5.00%
2340 B	Hardness - Total	7/25/2025	101.75%	104.62%	3.28%	± 5.00%

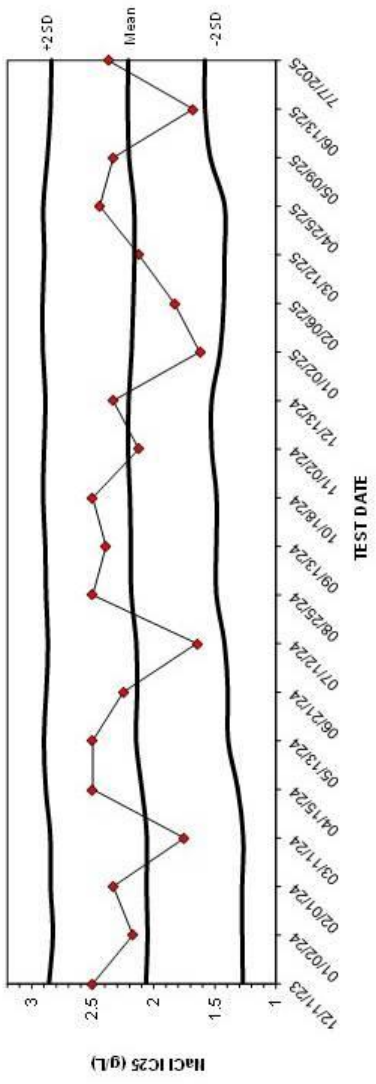
			LCS (rec)	%REC M1	%REC M2	QC Limits
4500 O	DO - Winkler	7/1/2025	N/A	97.14%	98.53%	± 5.00%
4500 O	DO - Winkler	7/8/2025	N/A	97.14%	97.14%	± 5.00%
4500 O	DO - Winkler	7/16/2025	N/A	95.71%	98.53%	± 5.00%
4500 O	DO - Winkler	7/24/2025	N/A	97.10%	100.00%	± 5.00%

			Blank	%REC MR S	%RPD	QC Limits
2540 D	Suspended Solids (TTL)	7/15/2025	100.00%	103.90%	0.00%	± 15%
2540 C	Dissolved Solids (TTL)	7/15/2025	100.00%	96.97%	0.00%	± 15%

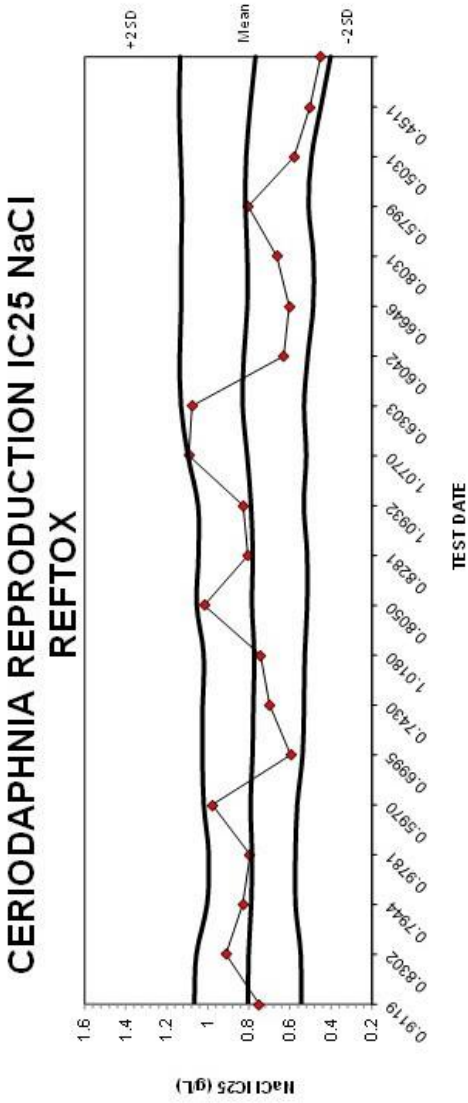
Signature: Cat Cash
Date: August 1, 2025

Signature: Haley West
Date: August 1, 2025

CERIODAPHNIA SURVIVAL LC25 NaCl REFTOX

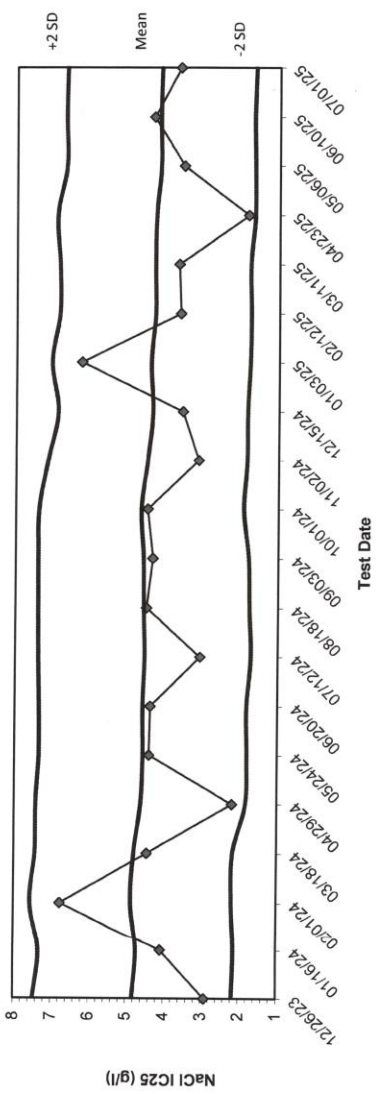


Date	LC25	Mean	-2 SD	+2 SD
12/11/23	2.5000	2.0655	1.2717	2.8592
01/02/24	2.1720	2.0518	1.2767	2.8269
02/01/24	2.3330	2.0617	1.2774	2.8460
03/11/24	1.7500	2.0578	1.2678	2.8477
04/15/24	2.5000	2.0995	1.3131	2.8858
05/13/24	2.5000	2.1471	1.3927	2.9014
06/21/24	2.2500	2.1378	1.3941	2.8816
07/12/24	1.6500	2.1444	1.4215	2.8672
08/25/24	2.5000	2.1860	1.4885	2.8836
09/13/24	2.3930	2.1889	1.4883	2.8895
10/18/24	2.5000	2.1968	1.4857	2.9080
11/02/24	2.1250	2.2130	1.5260	2.8999
12/13/24	2.3330	2.2075	1.5266	2.8884
01/02/25	1.6250	2.1835	1.4569	2.9100
02/06/25	1.8330	2.1695	1.4273	2.9118
03/12/25	2.1250	2.1596	1.4210	2.8983
04/25/25	2.4440	2.1628	1.4197	2.9059
05/09/25	2.3330	2.2054	1.5383	2.8726
06/13/25	1.6790	2.2140	1.5809	2.8470
7/7/2025	2.3750	2.2105	1.5821	2.8389



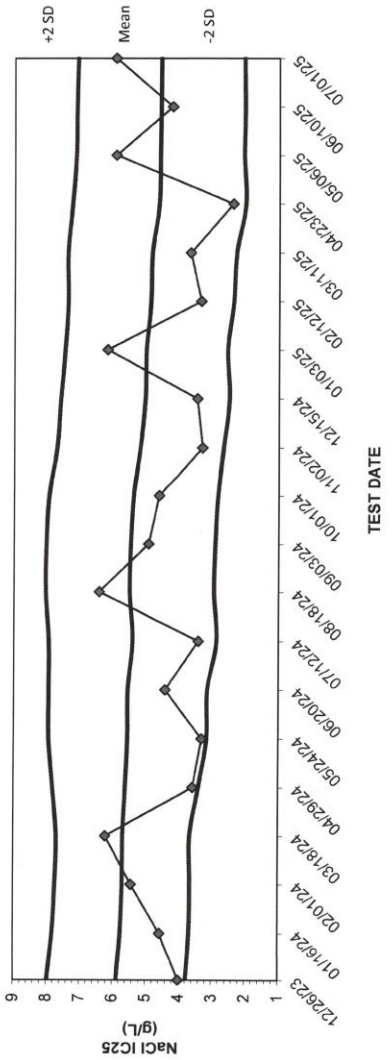
Date	IC25	Mean	-2 SD	+2 SD
12/11/23	0.7500	0.8049	0.5440	1.0658
1/2/2024	0.9119	0.80187255	0.547725125	1.056019975
02/01/24	0.8302	0.7888	0.5736	1.0040
03/11/24	0.7944	0.7848	0.5734	0.9962
04/15/24	0.9781	0.7923	0.5644	1.0202
05/13/24	0.5970	0.7824	0.5384	1.0265
06/21/24	0.6995	0.7784	0.5315	1.0252
07/12/24	0.7430	0.7741	0.5279	1.0202
08/25/24	1.0180	0.7853	0.5160	1.0545
09/13/24	0.8050	0.7810	0.5161	1.0458
10/18/24	0.8281	0.7901	0.5324	1.0478
11/02/24	1.0932	0.8090	0.5208	1.0972
12/13/24	1.0770	0.8310	0.5311	1.1309
01/02/25	0.6303	0.8248	0.5133	1.1362
02/06/25	0.6042	0.8080	0.4866	1.1295
03/12/25	0.6646	0.8078	0.4860	1.1297
04/25/25	0.8031	0.8175	0.5094	1.1256
05/09/25	0.5799	0.8135	0.4950	1.1321
06/13/25	0.5031	0.7943	0.4493	1.1394
07/07/25	0.4511	0.7681	0.4020	1.1342

FHM SURVIVAL LC25 NaCl REFTOX



Date	IC25	Mean	-2 SD	+2 SD
12/26/23	2.9120	4.8223	2.1721	7.4725
01/16/24	4.0800	4.7287	2.1284	7.3289
02/01/24	6.7670	4.8732	2.1868	7.5596
03/18/24	4.4550	4.7999	2.1625	7.4374
04/29/24	2.1900	4.6245	1.8268	7.4222
05/24/24	4.4090	4.5749	1.8037	7.3461
06/20/24	4.3800	4.5839	1.8168	7.3510
07/12/24	3.0670	4.5415	1.7090	7.3739
08/18/24	4.5000	4.5714	1.7560	7.3867
09/03/24	4.3333	4.5865	1.7805	7.3926
10/01/24	4.4760	4.6480	1.9181	7.3779
11/02/24	3.1230	4.4893	1.8336	7.1450
12/15/24	3.5620	4.3567	1.8292	6.8841
01/03/25	6.2500	4.4135	1.7718	7.0552
02/12/25	3.6250	4.3019	1.7493	6.8545
03/11/25	3.6670	4.3085	1.7635	6.8534
04/23/25	1.8150	4.2837	1.6502	6.9172
05/06/25	3.5380	4.1641	1.6533	6.6748
06/10/25	4.3390	4.1795	1.6688	6.6901
07/01/25	3.6360	4.1437	1.6251	6.6622

FHM GROWTH IC25 NaCl REFTOX



Date	IC25	Mean	-2 SD	+2 SD
12/26/23	4.0036	5.8797	3.7796	7.9799
01/16/24	4.5690	5.7497	3.6808	7.8186
02/01/24	5.4310	5.6958	3.6572	7.7345
03/18/24	6.2100	5.6820	3.6624	7.7017
04/29/24	3.5807	5.6121	3.4072	7.8170
05/24/24	3.3150	5.5507	3.1637	7.9377
06/20/24	4.4150	5.5436	3.1435	7.9437
07/12/24	3.4180	5.4037	2.8641	7.9433
08/18/24	6.4180	5.4925	2.9474	8.0376
09/03/24	4.9290	5.4628	2.9061	8.0194
10/01/24	4.6060	5.3852	2.8281	7.9423
11/02/24	3.3070	5.1862	2.6657	7.7066
12/15/24	3.4660	5.0417	2.4899	7.5935
01/03/25	6.1720	5.0062	2.5449	7.4674
02/12/25	3.3550	4.8745	2.3681	7.3809
03/11/25	3.6790	4.8385	2.2844	7.3927
04/23/25	2.3840	4.6342	2.0116	7.2567
05/06/25	5.9270	4.6037	2.0618	7.1455
06/10/25	4.2170	4.5816	2.0345	7.1287
07/01/25	5.9270	4.5698	2.0516	7.0880