



September 16, 2019

Mr. Les Arnold  
ALS Environmental  
3352 128<sup>th</sup> Avenue  
Holland, MI 49424

Reference: 0501867.0152

**Subject: Whole Effluent Toxicity Test Results**

Dear Les,

Enclosed please find the final results of the following Chronic Toxicity Tests performed on samples of the ArcelorMittal Burns Harbor Outfall 011 effluent.

- 26 August 2019, Chronic *Ceriodaphnia dubia* Toxicity Test
- 26 August 2019, Chronic *Pimephales promelas* Toxicity Test

If you have any questions concerning this report or if I can be of any further assistance to you, please feel free to contact me at (616) 738-7308 or via e-mail at [bruce.rabe@erm.com](mailto:bruce.rabe@erm.com).

Yours sincerely,

Bruce A. Rabe  
Director, Aquatic Toxicology Laboratory

BAR:km

Enclosure: Whole Effluent Toxicity Test Report

cc: Amanda Grzybowski  
Brandon Frye  
File

<b>Permittee/Location:</b> ArcelorMittal Burns Harbor LLC 250 West U.S. Hwy 12 Burns Harbor, IN 46304				<b>Permit number:</b> IN0000175		<b>Outfall number:</b> 011	
<b>Laboratory Name and Contact:</b> Environmental Resources Management 3352 128 <sup>th</sup> Avenue Holland, MI 49424				<b>Report <u>Due</u> Date:</b> N/A		<b>Report Date:</b> September 16, 2019	
<b>WETT Reporting Frequency or Type:</b>	Monthly	Quarterly	Semi-annual	Annual	TRE	Post TRE	<u>First</u> (per Reporting Frequency)?
	<u>Re-take</u> (per Reporting Frequency)?						

Test Organism	Test Type	Endpoint	Units	Result	Pass/Fail	Limit	Reporting
<i>Ceriodaphnia dubia</i>	7-day Survival and Reproduction	NOEC Survival	%	100		N/A	Laboratory Report
			TU <sub>c</sub>	1.0		1.0	
	Definitive Static-Renewal	NOEC Reproduction	%	100		N/A	Laboratory Report and <b>NetDMR</b> (Parameter Code 61426)
			TU <sub>c</sub>	1.0		1.0	
		IC <sub>25</sub> Reproduction	%	>100		N/A	
			TU <sub>c</sub>	1.0		1.0	
	48 hr. LC <sub>50</sub>		%	>100		N/A	Laboratory Report and <b>NetDMR</b> (Parameter Code 61425)
			TU <sub>a</sub>	1.0		1.0	
	<b>Toxicity (chronic)</b>		TU <sub>c</sub>	1.0	Pass	1.0	Laboratory Report and <b>NetDMR</b> (Parameter Code 61426)
	<b>Toxicity (acute)</b>		TU <sub>a</sub>	1.0	Pass	1.0	Laboratory Report and <b>NetDMR</b> (Parameter Code 61425)
<i>Pimephales promelas</i>	7-day Larval Survival and Growth	NOEC Survival	%	100		N/A	Laboratory Report
			TU <sub>c</sub>	1.0		1.0	
	Definitive Static-Renewal	NOEC Growth	%	100		N/A	Laboratory Report and <b>NetDMR</b> (Parameter Code 61428)
			TU <sub>c</sub>	1.0		1.0	
		IC <sub>25</sub> Growth	%	>100		N/A	
			TU <sub>c</sub>	1.0		1.0	
	96 hr. LC <sub>50</sub>		%	>100		N/A	Laboratory Report and <b>NetDMR</b> (Parameter Code 61427)
			TU <sub>a</sub>	1.0		1.0	
	<b>Toxicity (chronic)</b>		TU <sub>c</sub>	1.0	Pass	1.0	Laboratory Report and <b>NetDMR</b> (Parameter Code 61428)
	<b>Toxicity (acute)</b>		TU <sub>a</sub>	1.0	Pass	1.0	Laboratory Report and <b>NetDMR</b> (Parameter Code 61427)

# FINAL REPORT

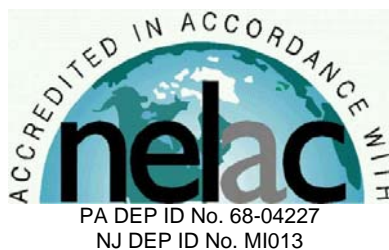
Chronic Toxicity Test  
Freshwater Invertebrate,  
*Ceriodaphnia dubia*  
EPA Test Method 1002.0

*Submitted To:*  
*ALS Environmental*  
*3352 128<sup>th</sup> Avenue*  
*Holland, MI 49424*

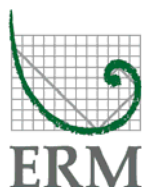
Sample: ArcelorMittal Burns Harbor, LLC - Outfall 011

Testing Period: 26 August – 2 September 2019

Laboratory I.D. Number: 082619-2



Conducted By:  
**Environmental Resources Management, Inc.**  
3352 128th Avenue  
Holland, Michigan 49424



# Test Overview



Permittee: ArcelorMittal Burns Harbor, LLC  
Location: 250 West U.S. Hwy 12  
Burns Harbor, IN 46304  
Contact: Robert Maciel  
Telephone #: 219.787.2120

NPDES Permit #: IN0000175  
Permit Requirements: Acute Toxicity Limit = 1.0 TUa  
Chronic Toxicity Limit = 1.0 TUc  
Test Sample: Outfall 011  
Receiving Water: East Branch, Little Calumet River

Testing Date: 26 August – 2 September  
2019

Sample Date(s): 26 August 2019  
28 August 2019  
30 August 2019

Test/Method: Daphnid, *Ceriodaphnia dubia*,  
Survival and Reproduction  
Test EPA 821-R-02-013  
Method 1002.0.

QC Objectives: Test data met all test  
acceptability criteria, except  
where noted below.

Data Qualifiers: None

## DATA SUMMARY

Effluent Concentrations (%)	Survival (%)	Reproduction (Average Young/Female)
Control	100	27.3
6	100	25.7
13	100	29.3
25	80	24.4
50	100	36.7
100	90	36.4

## TEST RESULTS

48-Hour LC <sub>50</sub>	>100%
NOEC (Survival & Reproduction)	100%
LOEC (Survival & Reproduction)	>100%
IC <sub>25</sub>	>100%
MSDp (Reproduction)	31.9%
TUa (100/LC <sub>50</sub> )	1.0
TUc (100/IC <sub>25</sub> )	1.0

## TEST CONCLUSION

In accordance with the NPDES permit requirements for ArcelorMittal Burns Harbor, LLC, this toxicity test did not exceed either the acute or the chronic toxicity limit.

Bruce A. Rabe  
Director, Aquatic  
Toxicology Laboratory  
ERM Project No. 0501867.0152

Environmental Resources Management  
3352 128<sup>th</sup> Avenue  
Holland, Michigan 49424-9263  
Phone: 616.399.3500  
Fax: 616.399.3777



## ERM Testing Method

### *Ceriodaphnia dubia* – Survival and Reproduction Toxicity Test



Upon sample receipt, each effluent sample was analyzed for a suite of water quality parameters (Appendix A - Table 1). Where indigenous organisms were present, the sample was filtered through a 60 micron ( $\mu\text{m}$ ) NITEX® screen. All samples were maintained at 0 – 6 degrees Celsius ( $^{\circ}\text{C}$ ) until needed for testing.

A series of five effluent concentrations and a control solution were established for testing. All test solutions were prepared by mixing appropriate volumes of dilution water and effluent in the test containers. Dilution water consisted of reconstituted moderately hard water. The control solution consisted of 100 percent dilution water.

*Ceriodaphnia dubia* used to initiate this test were obtained from individual, in-house cultures and were less than 24-hours old, and had an age range of 0 to 8 hours at test initiation. Test organisms used to initiate this test were released from adults which met acceptable performance criteria (i.e.,  $\geq 15$  young/surviving female within 3 broods and obtained from a brood of at least 8 young) and were maintained in reconstituted moderately hard water prior to test initiation.

The *Ceriodaphnia dubia* test was conducted using 30-milliliter (mL) disposable polystyrene containers containing 15 mL of control water or test solution. One *Ceriodaphnia dubia* was added to each test chamber with ten replicate chambers per treatment. Each *Ceriodaphnia dubia* test chamber was fed a 0.2-mL suspension consisting of yeast-Cerophyll-trout chow (YCT) and green algae (*Raphidocelis subcapitata*) mixture daily.

The test solutions were renewed daily during the exposure by transferring the adult daphnid, by way of a wide bore pipette, into fresh control water or test solution.

Percent survival of exposed *Ceriodaphnia dubia* was determined by inspecting for adult mortality daily. Mortality was defined as no body or appendage movement after gentle prodding. Production of young was also determined by daily inspections and enumeration. When 60 percent of the surviving females in the control treatment produced three broods, mean reproduction was determined by calculating the average number of live young produced per female for each treatment.

The test was conducted at a temperature of  $25 \pm 1^{\circ}\text{C}$  under fluorescent lighting with a photoperiod of 16 hours light and 8 hours dark. Water quality measurements were performed on all control and test solutions prior to test initiation and on selected treatments daily thereafter, as indicated in the raw data (Appendix A - Table 2).

Following termination of the chronic toxicity test, No Observed Effect Concentrations (NOEC) and Lowest Observed Effect Concentrations (LOEC) were determined for *Ceriodaphnia dubia* survival and reproduction, and a 25 percent Inhibition Concentration ( $\text{IC}_{25}$ ) was determined for *Ceriodaphnia dubia* reproduction. An NOEC is defined as the highest effluent concentration that does not produce any observed adverse effect to the exposed test organism. An LOEC is defined as the lowest effluent concentration that does produce an observed adverse effect to the exposed test organism. An adverse effect is determined as a statistically significant difference between the control and a given effluent concentration. Significant differences in *Ceriodaphnia dubia* survival were determined using the Fisher's Exact Test.

Prior to the determination of any significant differences in *Ceriodaphnia dubia* reproduction, the data were evaluated for normal distribution and homogeneity characteristics. Depending on the result and the number of test replicates per concentration, an analysis of variance test was performed followed by one of the following mean comparison tests: Dunnett's Procedure, Bonferroni t-Test, Steel's Many-One Rank Test, Wilcoxon Rank Sum Test, or the T-Test. For reporting purposes, a chronic toxic unit (TU<sub>c</sub>) is calculated and is defined as the most conservative of either 100/NOEC based on the more sensitive test endpoint or 100/IC<sub>25</sub>.

To evaluate acute toxicity, a 48-hour LC<sub>50</sub> and corresponding 95 percent confidence interval was also calculated, where possible. The LC<sub>50</sub> value estimate was determined by using one of the following statistical methods: graphical, Spearman-Kärber, Trimmed Spearman-Kärber, or Probit. The method selected for reporting test results was determined by the characteristics of the data; that is, the presence or absence of 0 and 100 percent mortality and the number of concentrations in which mortalities between 0 and 100 percent occurred. For reporting purposes, the 48-hour LC<sub>50</sub> value was converted to an acute toxic unit (TU<sub>a</sub>) by 100/LC<sub>50</sub>. All statistical analyses were performed using the CETIS™ Version 1.9.4.3 software program.

The reference toxicant, sodium chloride, was used to monitor the sensitivity of the test organisms and the precision of the testing procedure. Chronic reference toxicant tests are performed at least monthly and the resulting IC<sub>25</sub> are plotted to determine if the results are within prescribed limits (Appendix A - Standard Reference Toxicant Data). If the IC<sub>25</sub> of a particular reference toxicant test does not fall within the expected range of ± two standard deviations from the mean for a given test organism, the sensitivity of that organism and the overall credibility of the test system is suspect.

#### Reference:

USEPA. 2002. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, 4<sup>th</sup> Ed. U.S. Environmental Protection Agency, Office of Water, Washington, D.C., EPA-821-R-02-013.

# Case Narrative



## **1.0 TEST PERFORMANCE CRITERIA**

The quality control results achieved laboratory specifications.

## **2.0 MODIFICATIONS TO ERM'S STANDARD TEST METHOD**

Test was performed in accordance with ERM's standard test method (see page 3).

*Appendix A*  
*Supporting Documents*

- *Raw Test Data*
- *Statistical Analysis (if necessary)*
- *Chain-of-Custody Forms*
- *Standard Reference Toxicant Data*



**Environmental Resources Management**

**Ceriodaphnia dubia - Chronic Toxicity Test  
Initial Water Quality and Test Solution Preparation**

Permittee/Client: ArcelorMittal Burns Harbor, LLC  
 Effluent/Location: Outfall 011  
 Lab I.D.#: 082619-2  
 Beginning Date: 08/26/15  
 Ending Date: 09/10/19

*run 8/26*

Control/Dilution Water: RMHW  
 Organism Batch #: ~~0810319~~ ~~119-19~~ 150-19  
 Organism Age: 4-16 ~~24~~ ~~5~~ ~~18~~ ~~15~~  
 QC Review: SMR  
 QC Review Date: 09/10/19

Time: ~~1530~~ 1600  
 Time: 1130

**Initial Water Quality:**

Parameter	Units	Effluent			Synthetic Water		
		1	2	3	--	--	--
Sample #	--	1	2	3	--	--	--
Lab I.D.#/ Batch #	--	082619-2	082619-2	083019-2	99-19	-	-
Temperature	° C	5	5	2	--	--	--
Dissolved Oxygen	mg / L	9.9	5.8	6.7	--	--	--
pH	S.U.	7.5	7.3	7.2	7.8	-	-
Conductivity	umhos/cm	444	459	464	315	-	-
Alkalinity	mg / L CaCO <sub>3</sub>	110	106	100	60	-	-
Hardness	mg / L CaCO <sub>3</sub>	140	160	160	80	-	-
Total Ammonia	mg / L NH <sub>3</sub>	0.14	0.09	0.01	--	--	--
Total Residual Chlorine	mg / L Cl <sub>2</sub>	<0.01	<0.01	<0.01	<0.01	-	-
Total mls of 7.0 g/L Sodium Thiosulfate added per liter	mL / L	--	--	--	--	--	--
Initials	--	RH	RH	RMS	KM	-	-

**Test Solution Preparation:**

Test Solution Prepared For Both Species.

Treatment (% Effluent)	Effluent (mL)	Dilution (mL)	Test Day	Initials	Effluent Sample #	Synthetic Batch #
Control	0	1200	0	<del>99-19</del>	1	99-19
6%	72	1128	1	RH	1	99-19
13%	156	1044	2	RH	2	99-19
25%	300	900	3	RHM	2	99-19
50%	600	600	4	RMS	3	99-19
100%	1200	0	5	RH	3	99-19
			6	RH	3	99-19
			7	--	--	--

Permittee/Client: ArcelorMittal Burns Harbor, LLC  
Effluent/Location: Outfall 011  
Lab I.D.#: 082619-2

Water Quality Data:

Dissolved Oxygen (mg/L)														
Day														
Meter #	5	5	3	5	5	3	3	5	5	3	3	3	3	3
Treatment (% Effluent)	1		2		3		4		5		6		7	
	I	F	I	F	I	F	I	F	I	F	I	F	I	F
Control	7.8	7.7	8.3	8.0	7.9	8.1	8.4	7.8	8.0	7.9	8.2	8.2	8.0	7.9
6%	7.8	7.7	8.3	8.0	7.9	8.1	8.4	7.8	8.0	7.9	8.2	8.2	8.0	8.1
13%	7.8	7.7	8.3	8.0	7.9	8.1	8.3	7.7	7.9	8.0	8.2	8.2	8.0	8.1
25%	7.9	7.7	8.4	8.0	8.0	8.1	8.3	7.7	7.9	8.0	8.2	8.1	8.0	8.0
50%	8.0	7.7	8.4	8.0	8.0	8.1	8.2	7.6	7.9	8.0	8.1	8.1	8.0	8.0
100%	8.1	7.8	8.4	8.0	8.1	8.1	7.9	7.6	7.8	8.0	8.1	8.1	8.0	8.0

pH (S.U.)														
Day														
Meter #	9	9	10	8	8	10	10	9	9	10	10	10	10	10
Treatment (% Effluent)	1		2		3		4		5		6		7	
	I	F	I	F	I	F	I	F	I	F	I	F	I	F
Control	7.8	7.3	7.9	7.8	7.8	7.9	7.6	8.0	7.8	7.8	7.8	7.7	7.8	7.9
6%	--	7.4	--	7.8	--	7.9	--	8.1	--	8.0	--	7.8	--	8.0
13%	--	7.5	--	7.9	--	7.9	--	8.0	--	8.0	--	7.8	--	8.0
25%	--	7.7	--	7.9	--	7.9	--	8.1	--	8.1	--	7.8	--	8.0
50%	--	7.7	--	7.9	--	7.9	--	8.1	--	8.1	--	7.9	--	8.1
100%	7.7	7.9	7.7	7.9	7.6	8.0	7.7	8.2	7.7	8.1	7.7	8.0	7.5	8.2

Conductivity (umhos / cm)														
Day														
Meter #	4	--	4	--	4	--	34	--	4	--	3	--	3	--
Treatment (% Effluent)	1		2		3		4		5		6		7	
	I	F	I	F	I	F	I	F	I	F	I	F	I	F
Control	318	--	320	--	321	--	316	--	309	--	317	--	318	--
6%	324	--	327	--	329	--	327	--	317	--	323	--	324	--
13%	331	--	330	--	331	--	337	--	327	--	331	--	337	--
25%	345	--	344	--	343	--	354	--	344	--	350	--	352	--
50%	371	--	367	--	379	--	380	--	380	--	387	--	392	--
100%	431	--	421	--	452	--	463	--	453	--	440	--	467	--

Temperature (°C)														
Day														
Meter #	5	5	3	5	5	3	3	5	5	3	3	3	3	3
Treatment (% Effluent)	1		2		3		4		5		6		7	
	I	F	I	F	I	F	I	F	I	F	I	F	I	F
Control	24	24	24	24	24	24	24	24	24	24	24	24	24	25
6%	24	24	24	24	24	24	24	24	24	24	24	24	24	25
13%	24	24	24	24	24	24	24	24	24	24	24	24	24	25
25%	24	24	24	24	24	24	24	24	24	24	24	24	24	25
50%	24	24	24	24	24	24	24	24	24	24	24	24	24	25
100%	24	25	24	24	24	24	25	24	24	24	24	24	25	25

I = Initial Chemistry F = Final Chemistry

Note: D.O. meter also used for temperature measurement unless otherwise noted.

Permittee/Client: ArcelorMittal Burns Harbor, LLC  
Effluent/Location: Outfall 011  
Lab I.D.#: 082619-2

Treatment (% Effluent)	Day No.	Replicate										Average Young/Female	Number of Live Adults (% Sur.)	Average Young/Female % CV
		1	2	3	4	5	6	7	8	9	10			
Control	1	--	--	--	--	--	--	--	--	--	--	--	10	
	2	--	--	--	--	--	--	--	--	--	--	--	10	
	3	--	--	--	--	--	--	--	--	--	--	--	10	
	4	5	5	6	7	3	8	6	6	6	8		10	
	5	--	--	12	10	8	10	12	11	--	10		10	
	6	12	11	--	--	--	--	--	--	7	--		10	
	7	17	15	15	5	13	5	2	15	18	5		10	
Totals:		34	31	33	22	24	23	20	32	31	23	27.3	(100)	19.5
# Broods (% 3rd Brood)		3	2	3	3	3	3	3	3	3	3	(100)		
6%	1	--	--	--	--	--	--	--	--	--	--	10		
	2	--	--	--	--	--	--	--	--	--	--	10		
	3	--	--	--	--	--	--	--	--	--	--	10		
	4	7	5	5	6	6	5(1)	6	9	6	7		10	
	5	6	12	11	11	10	10	10	11	--	13		10	
	6	--	--	--	--	--	--	--	--	11	--		10	
	7	10	17	18	4	13	15	5	5	3	--		10	
Totals:		23	34	34	21	29	30	21	25	20	20	25.7	(100)	21.9
13%	1	--	--	--	--	--	--	--	--	--	--	10		
	2	--	--	--	--	--	--	--	--	--	--	10		
	3	--	--	--	--	--	--	--	--	--	--	10		
	4	6	8	6	6	4	6	5	8	7	6		10	
	5	10	11	10	10	10	13	12	11	9	12		10	
	6	--	--	--	--	--	--	7	10	--	--		10	
	7	14	18	11	--	15	18	--	--	9	13		10	
Totals:		30	37	27	24	29	37	24	29	25	31	29.3	(100)	16.2
25%	1	--	--	--	--	--	--	--	--	--	--	10		
	2	--	--	--	--	--	--	--	--	--	--	10		
	3	--	--	--	--	--	--	--	--	X	--	9		
	4	7	4	7	7	5	7	7	8	X	9		9	
	5	14	8	10	11	10	14	12	10	X	12		9	
	6	--	--	--	--	--	18	X	--	X	--		8	
	7	14	12	10	--	10	--	X	8	X	10		8	
Totals:		35	24	27	18	25	39	19	26	0	31	24.4	(80)	44.2
50%	1	--	--	--	--	--	--	--	--	--	--	10		
	2	--	--	--	--	--	--	--	--	--	--	10		
	3	--	--	--	--	--	--	--	--	--	--	10		
	4	8	7	7	7	5(1)	6	8	3	5	6		10	
	5	--	14	12	12	10	13	14	10	10	9		10	
	6	15	--	--	13	--	--	--	16	--	15		10	
	7	24	20	23	--	14	27	17	--	13	--		10	
Totals:		47	41	42	36	29	46	39	29	28	30	36.7	(100)	20.0
100%	1	--	--	--	--	--	--	--	--	--	--	10		
	2	--	--	--	--	X	--	--	--	--	--	9		
	3	--	--	--	--	X	--	--	--	--	--	9		
	4	6	5	7	7	X	8	6	8	7	7		9	
	5	--	14	13	13	X	14	12	13	12	12		9	
	6	13	--	--	--	X	--	16	--	--	--		9	
	7	24	23	23	13	X	24	--	23	22	19		9	
Totals:		43	42	43	33	0	46	34	44	41	38	36.7	(90)	37.0

X = DEAD ADULT      1X = DEAD ADULT, ONE YOUNG PRODUCED BEFORE DEATH      -- = NO YOUNG RECORDED  
(E) = ABORTED EMBRYOS /EGGS      (1) = ONE DEAD YOUNG      (S) = SPLIT BROOD      \* = 4th BROOD EXCLUDED FROM TOTAL

Permittee/Client: ArcelorMittal Burns Harbor, LLC  
Effluent/Location: Outfall 011  
Lab I.D.#: 082619-2

Brood Board Information:

Replicate	1	2	3	4	5	6	7	8	9	10	Brood Board Date: 08/12/19
Chamber Number	58	57	56	55	48	47	46	45	41	21	Young Age Range: <del>10-18</del> hours 8-16 spr 09/03/19

Test Information:

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
YCT Batch #:	17-19	17-19	17-19	17-19	17-19	17-19	17-19	—
Algae Batch #:	18-19	18-19	18-19	18-19	18-19	18-19	18-19	—
Observation Time:	<del>1600</del> 1530	1630	1430	1430	1600	1300	1300	1130
Initials:	PR	SPR	RL	RL	MS	KM	RL	MS
Date:	08/26/19	08/27/19	8-28-19	8-29-19	08/30/19	08/31/19	9-1-19	09/02/19

Comment Section: *PR 08/26*

Day	Date	Initials	Comments

**CETIS Analytical Report**

Report Date: 04 Sep-19 10:33 (p 1 of 2)  
 Test Code/ID: 4F96F16F / 13-3529-2271

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

ERM

Analysis ID: 19-0967-6830	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.9.4
Analyzed: 04 Sep-19 10:33	Analysis: STP 2xK Contingency Tables	Status Level: 1
Batch ID: 17-5546-6047	Test Type: Reproduction-Survival (7d)	Analyst: Lab Tech
Start Date: 26 Aug-19 16:00	Protocol: EPA/821/R-02-013 (2002)	Diluent: Reconstituted Water
Ending Date: 02 Sep-19 11:30	Species: Ceriodaphnia dubia	Brine:
Test Length: 6d 20h	Taxon: Branchiopoda	Source: In-House Culture
		Age: <24
Sample ID: 00-3804-3900	Code: 24480FC	Project: WET Testing
Sample Date: 26 Aug-19 06:08	Material: Industrial Effluent	Source: ArcelorMittal Burns Harbor, LLC
Receipt Date: 26 Aug-19 12:00	CAS (PC):	Station: Outfall 011
Sample Age: 10h (5 °C)	Client: ArcelorMittal Burns Harbor, LLC	

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU
Untransformed	C > T	100	>100	n/a	1

**Fisher Exact/Bonferroni-Holm Test**

Control	vs	Group	Test Stat	P-Type	P-Value	Decision(α:5%)
Lab Water		6	1.0000	Exact	1.0000	Non-Significant Effect
		13	1.0000	Exact	1.0000	Non-Significant Effect
		25	0.2368	Exact	1.0000	Non-Significant Effect
		50	1.0000	Exact	1.0000	Non-Significant Effect
		100	0.5000	Exact	1.0000	Non-Significant Effect

**Test Acceptability Criteria**

Attribute	Test Stat	TAC Limits		Overlap	Decision
		Lower	Upper		
Control Resp	1	0.8	>>	Yes	Passes Criteria

**Data Summary**

Conc-%	Code	NR	R	NR + R	Prop NR	Prop R	%Effect
0	L	10	0	10	1	0	0.0%
6		10	0	10	1	0	0.0%
13		10	0	10	1	0	0.0%
25		8	2	10	0.8	0.2	20.0%
50		10	0	10	1	0	0.0%
100		9	1	10	0.9	0.1	10.0%

**7d Survival Rate Detail**

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	L	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
13		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	0.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000

**7d Survival Rate Binomials**

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	L	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
13		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	0/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1

# CETIS Analytical Report

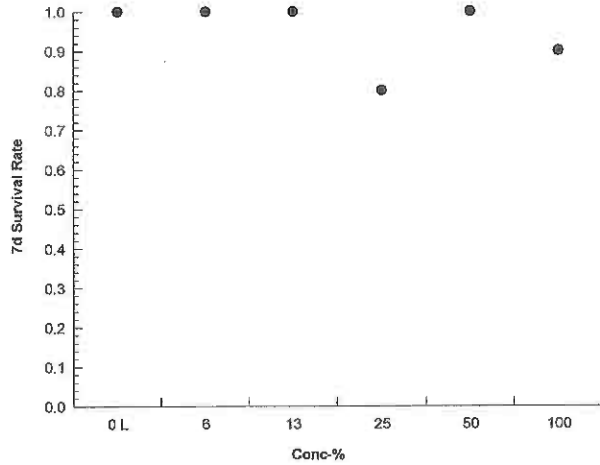
Report Date: 04 Sep-19 10:33 (p 2 of 2)  
Test Code/ID: 4F96F16F / 13-3529-2271

## Ceriodaphnia 7-d Survival and Reproduction Test

ERM

Analysis ID: 19-0967-6830      Endpoint: 7d Survival Rate      CETIS Version: CETISv1.9.4  
Analyzed: 04 Sep-19 10:33      Analysis: STP 2xK Contingency Tables      Status Level: 1

### Graphics



**CETIS Analytical Report**

Report Date: 04 Sep-19 10:34 (p 1 of 2)  
 Test Code/ID: 4F96F16F / 13-3529-2271

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

ERM

Analysis ID: 18-7421-2304	Endpoint: Reproduction	CETIS Version: CETISv1.9.4
Analyzed: 04 Sep-19 10:33	Analysis: Nonparametric-Control vs Treatments	Status Level: 1
Batch ID: 17-5546-6047	Test Type: Reproduction-Survival (7d)	Analyst: Lab Tech
Start Date: 26 Aug-19 16:00	Protocol: EPA/821/R-02-013 (2002)	Diluent: Reconstituted Water
Ending Date: 02 Sep-19 11:30	Species: Ceriodaphnia dubia	Brine:
Test Length: 6d 20h	Taxon: Branchiopoda	Source: In-House Culture Age: <24
Sample ID: 00-3804-3900	Code: 24480FC	Project: WET Testing
Sample Date: 26 Aug-19 06:08	Material: Industrial Effluent	Source: ArcelorMittal Burns Harbor, LLC
Receipt Date: 26 Aug-19 12:00	CAS (PC):	Station: Outfall 011
Sample Age: 10h (5 °C)	Client: ArcelorMittal Burns Harbor, LLC	

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	31.89%

**Steel Many-One Rank Sum Test**

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Lab Water		6	95	75	3	18	Asymp	0.5278	Non-Significant Effect
		13	115	75	2	18	Asymp	0.9697	Non-Significant Effect
		25	100.5	75	2	18	Asymp	0.7129	Non-Significant Effect
		50	135	75	0	18	Asymp	0.9999	Non-Significant Effect
		100	143	75	2	18	Asymp	1.0000	Non-Significant Effect

**Test Acceptability Criteria**

Attribute	Test Stat	TAC Limits		Overlap	Decision
		Lower	Upper		
Control Resp	27.3	15	>>	Yes	Passes Criteria

**ANOVA Table**

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1434.73	286.947	5	3.968	0.0039	Significant Effect
Error	3905.2	72.3185	54			
Total	5339.93		59			

**Distributional Tests**

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance Test	15.82	15.09	0.0074	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.8615	0.9459	6.8E-06	Non-Normal Distribution

**Reproduction Summary**

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	L	10	27.3	23.48	31.12	27.5	20	34	1.687	19.54%	0.00%
6		10	25.7	21.68	29.72	24	20	34	1.777	21.86%	5.86%
13		10	29.3	25.91	32.69	29	24	37	1.499	16.17%	-7.33%
25		10	24.4	16.69	32.11	25.5	0	39	3.407	44.15%	10.62%
50		10	36.7	31.45	41.95	37.5	28	47	2.319	19.98%	-34.43%
100		10	36.4	26.76	46.04	41.5	0	46	4.261	37.02%	-33.33%

**Reproduction Detail**

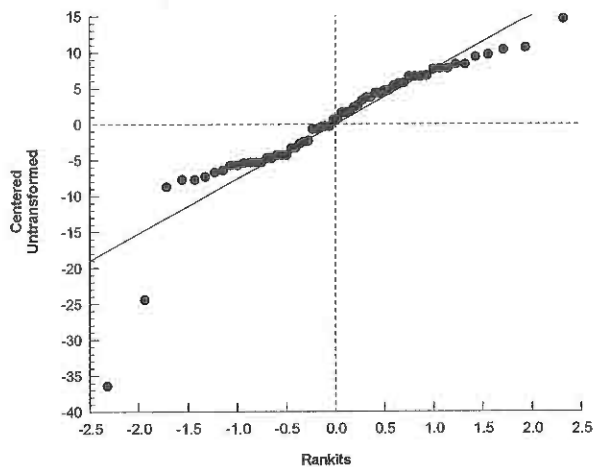
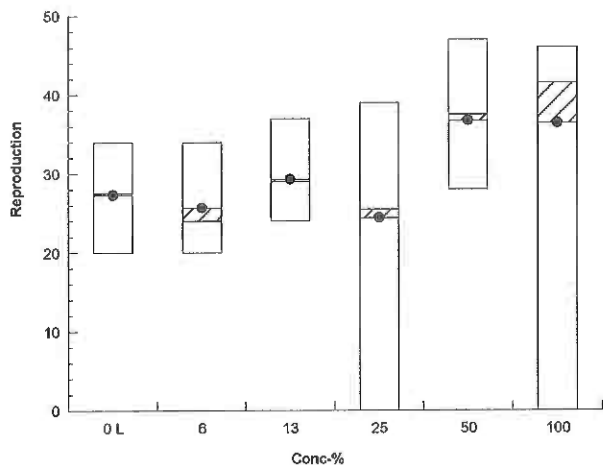
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	L	34	31	33	22	24	23	20	32	31	23
6		23	34	34	21	29	30	21	25	20	20
13		30	37	27	24	29	37	24	29	25	31
25		35	24	27	18	25	39	19	26	0	31
50		47	41	42	36	29	46	39	29	28	30
100		43	42	43	33	0	46	34	44	41	38

Ceriodaphnia 7-d Survival and Reproduction Test

ERM

Analysis ID: 18-7421-2304      Endpoint: Reproduction      CETIS Version: CETISv1.9.4  
 Analyzed: 04 Sep-19 10:33      Analysis: Nonparametric-Control vs Treatments      Status Level: 1

Graphics





# CETIS Analytical Report

Report Date: 04 Sep-19 10:34 (p 1 of 2)  
 Test Code/ID: 4F96F16F / 13-3529-2271

## Ceriodaphnia 7-d Survival and Reproduction Test

ERM

Analysis ID: 20-0346-2896	Endpoint: Reproduction	CETIS Version: CETISv1.9.4
Analyzed: 04 Sep-19 10:33	Analysis: Linear Interpolation (ICPIN)	Status Level: 1
Batch ID: 17-5546-6047	Test Type: Reproduction-Survival (7d)	Analyst: Lab Tech
Start Date: 26 Aug-19 16:00	Protocol: EPA/821/R-02-013 (2002)	Diluent: Reconstituted Water
Ending Date: 02 Sep-19 11:30	Species: Ceriodaphnia dubia	Brine:
Test Length: 6d 20h	Taxon: Branchiopoda	Source: In-House Culture Age: <24
Sample ID: 00-3804-3900	Code: 24480FC	Project: WET Testing
Sample Date: 26 Aug-19 06:08	Material: Industrial Effluent	Source: ArcelorMittal Burns Harbor, LLC
Receipt Date: 26 Aug-19 12:00	CAS (PC):	Station: Outfall 011
Sample Age: 10h (5 °C)	Client: ArcelorMittal Burns Harbor, LLC	

### Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1261666	200	Yes	Two-Point Interpolation

### Test Acceptability Criteria

#### TAC Limits

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	27.3	15	>>	Yes	Passes Criteria

### Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	n/a	n/a	<1	n/a	n/a
IC10	>100	n/a	n/a	<1	n/a	n/a
IC15	>100	n/a	n/a	<1	n/a	n/a
IC20	>100	n/a	n/a	<1	n/a	n/a
IC25	>100	n/a	n/a	<1	n/a	n/a
IC40	>100	n/a	n/a	<1	n/a	n/a
IC50	>100	n/a	n/a	<1	n/a	n/a

### Reproduction Summary

#### Calculated Variate

#### Isotonic Variate

Conc-%	Code	Count	Mean	Min	Max	Std Dev	CV%	%Effect	Mean	%Effect
0	L	10	27.3	20	34	5.334	19.54%	0.0%	29.97	0.0%
6		10	25.7	20	34	5.618	21.86%	5.86%	29.97	0.0%
13		10	29.3	24	37	4.739	16.17%	-7.33%	29.97	0.0%
25		10	24.4	0	39	10.77	44.15%	10.62%	29.97	0.0%
50		10	36.7	28	47	7.334	19.98%	-34.43%	29.97	0.0%
100		10	36.4	0	46	13.48	37.02%	-33.33%	29.97	0.0%

### Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	L	34	31	33	22	24	23	20	32	31	23
6		23	34	34	21	29	30	21	25	20	20
13		30	37	27	24	29	37	24	29	25	31
25		35	24	27	18	25	39	19	26	0	31
50		47	41	42	36	29	46	39	29	28	30
100		43	42	43	33	0	46	34	44	41	38

# CETIS Analytical Report

Report Date: 04 Sep-19 10:34 (p 2 of 2)  
Test Code/ID: 4F96F16F / 13-3529-2271

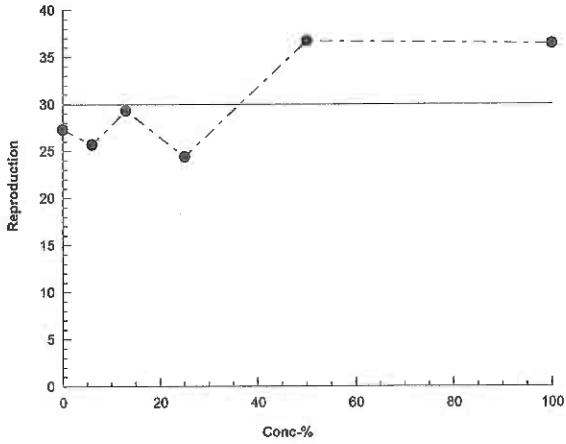
## Ceriodaphnia 7-d Survival and Reproduction Test

ERM

Analysis ID: 20-0346-2896      Endpoint: Reproduction  
Analyzed: 04 Sep-19 10:33      Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.9.4  
Status Level: 1

### Graphics





**ERM**<sup>®</sup>

**ENVIRONMENTAL RESOURCES MANAGEMENT**

3352 128<sup>th</sup> Avenue Holland, Michigan 49424-9263

Phone: 616-399-3500 FAX: 616-399-3777

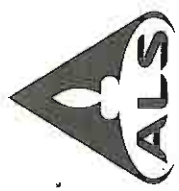
**AQUATIC TOXICITY LAB CHAIN OF CUSTODY FORM \***

CLIENT NAME:	Ambia (Arcebob)											
ADDRESS:												
SAMPLE DESCRIPTION (i.e. Outfall 001)	DATE (Begin/End)	TIME (Begin/End)	GRAB OR COMP	NUMBER AND SIZE OF CONTAINERS	FIELD PARAMETERS	SAMPLE ID NUMBER (Filled in by ERM)	INITIAL WATER QUALITY PARAMETERS UPON RECEIPT BY LABORATORY (filled in by ERM)					
	08/25/19 8:54	06:18		1-2.5 gal	pH= NH <sub>3</sub> = s.u. mg/L	082619-1	Temp. (°C) On Ice	D.O. mg/L	pH	s.u.	Cond	umhos/cm
SR 012519 011 Arcebob	08/25/19 8:54	06:08		1-2.5 gal	pH= NH <sub>3</sub> = s.u. mg/L	082619-2	Temp. (°C) On Ice	D.O. mg/L	pH	s.u.	Cond	umhos/cm
					pH= NH <sub>3</sub> = s.u. mg/L		Temp. (°C) On Ice	D.O. mg/L	pH	s.u.	Cond	umhos/cm
					pH= NH <sub>3</sub> = s.u. mg/L		Temp. (°C) On Ice	D.O. mg/L	pH	s.u.	Cond	umhos/cm
					pH= NH <sub>3</sub> = s.u. mg/L		Temp. (°C) On Ice	D.O. mg/L	pH	s.u.	Cond	umhos/cm
					pH= NH <sub>3</sub> = s.u. mg/L		Temp. (°C) On Ice	D.O. mg/L	pH	s.u.	Cond	umhos/cm
ANALYSES REQUESTED [check item(s)]	Test Material: ___ Water/Wastewater ___ Sediment ___ Product		Test Type: ___ Acute ___ Chronic ___ Other		Test Species: ___ <i>Ceriodaphnia dubia</i> ___ Rainbow Trout ( <i>Oncorhynchus mykiss</i> ) ___ <i>Americamysis batia</i> ___ <i>Daphnia magna</i> ___ Sheephead minnow ( <i>Cyprinodon variegatus</i> ) ___ <i>Hyalella azteca</i> ___ <i>Daphnia pulex</i> ___ Silverside minnow ( <i>Menidia beryllina</i> ) ___ <i>Chironomus dilutus</i> ___ Fathead minnow ( <i>Pimephales promelas</i> ) ___ Other (write in comments section)							
COMMENT SECTION:	see ALS COC 41579											

**SAMPLE TRANSFERS**

RELINQUISHED BY: Signature / Organization	DATE	TIME	ACCEPTED BY: Signature / Organization	DATE	TIME

\* See Instructions for Sample Collection on Back of Sheet



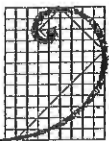
# Chain of Custody Form

Cincinnati, OH +1 513 733 5336  
 Fort Collins, CO +1 970 490 1511  
 Houston, TX +1 281 530 5656  
 Spring City, PA +1 610 948 4903  
 South Charleston, WV +1 304 356 3168  
 Everett, WA +1 425 356 2600  
 Holland, MI +1 616 399 6070  
 Middlestown, PA +1 717 944 5541  
 Salt Lake City, UT +1 801 266 7700  
 York, PA +1 717 505 5280

Page      of       
**COC ID: 41579**

Customer Information				Project Information												ALS Project Manager:			ALS Work Order #:		
Purchase Order	Project Name	Project Number	Project Name	A	B	C	D	E	F	G	H	I	J	Parameter/Method Request for Analysis							
Work Order	Project Number	Project Name	Project Name	WETT - Sub EAM																	
Company Name	Bill To Company	Invoice Attn	Company Name	AMBH WETT week 2																	
Send Report To	Address	City/State/Zip	Address	AMBH																	
Address	City/State/Zip	Phone	City/State/Zip																		
Phone	Phone	Fax	Phone																		
Fax	Fax	e-Mail Address	Fax																		
e-Mail Address	e-Mail Address		e-Mail Address																		
No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	Turnaround Time in Business Days (BD)														
1	Outfall 001 Comp	* 8-25-19	0618	AA	8	1	<input type="checkbox"/> 10 BD	<input type="checkbox"/> 5 BD	<input type="checkbox"/> 3 BD	<input type="checkbox"/> 2 BD	<input type="checkbox"/> 1 BD										
2	Outfall 011 Comp	* 8-25-19	0608	AA	8	1															
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
Sampler(s) Please Print & Sign				Shipment Method				Results Due Date:													
Relinquished by: <i>B. Foye</i>				Received by: <i>[Signature]</i>				Time: 8-26-19				Time: 12:00									
Relinquished by: <i>[Signature]</i>				Received by (Laboratory):				Time:				Time: 8:26 AM - 12:00									
Logged by (Laboratory):				Checked by (Laboratory):				Time:				Time:									
Preservative Key: 1-HCl 2-HNO <sub>3</sub> 3-H <sub>2</sub> SO <sub>4</sub> 4-NaOH 5-Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> 6-NaHSO <sub>4</sub> 7-Other 8-4°C 9-5035																					

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
 2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
 3. The Chain of Custody is a legal document. All information must be completed accurately.



**ERM**

**ENVIRONMENTAL RESOURCES MANAGEMENT**

3352 128<sup>th</sup> Avenue Holland, Michigan 49424-9263

Phone: 616-399-3500 FAX: 616-399-3777

**AQUATIC TOXICITY LAB CHAIN OF CUSTODY FORM \***

CLIENT NAME:		ADDRESS:		SAMPLER		PHONE NUMBER:		
SAMPLE DESCRIPTION (i.e. Outfall 001)		DATE (Begin/End)	TIME (Begin/End)	GRAB OR COMP	NUMBER AND SIZE OF CONTAINERS	FIELD PARAMETERS	SAMPLE ID NUMBER (Filled in by ERM)	INITIAL WATER QUALITY PARAMETERS UPON RECEIPT BY LABORATORY (filled in by ERM)
001	03/27/19	0610			2.5g	pH= NH <sub>3</sub> = s.u. mg/L	082819-1	Temp. (°C) On Ice <input checked="" type="checkbox"/> 5.9 D.O. 7.3 mg/L pH 7.2 s.u. Cond 891 umhos/cm
011	03/27/19	0555			2.5g	pH= NH <sub>3</sub> = s.u. mg/L	082819-2	Temp. (°C) On Ice <input checked="" type="checkbox"/> 5.5 D.O. 5.5 mg/L pH 7.3 s.u. Cond 459 umhos/cm
						pH= NH <sub>3</sub> = s.u. mg/L		Temp. (°C) On Ice <input type="checkbox"/> D.O. mg/L pH s.u. Cond umhos/cm
						pH= NH <sub>3</sub> = s.u. mg/L		Temp. (°C) On Ice <input type="checkbox"/> D.O. mg/L pH s.u. Cond umhos/cm
						pH= NH <sub>3</sub> = s.u. mg/L		Temp. (°C) On Ice <input type="checkbox"/> D.O. mg/L pH s.u. Cond umhos/cm
						pH= NH <sub>3</sub> = s.u. mg/L		Temp. (°C) On Ice <input type="checkbox"/> D.O. mg/L pH s.u. Cond umhos/cm
ANALYSES REQUESTED [check item(s)]		Test Material:		Test Type:		Test Species:		
		Water/Wastewater		Acute		Rainbow Trout ( <i>Oncorhynchus mykiss</i> )		Americamysis bahia
		Sediment		Chronic		Sheepshead minnow ( <i>Cyprinodon variegatus</i> )		Hyalalella azteca
		Product		Other		Silverside minnow ( <i>Menidia beryllina</i> )		Chironomus dilutus
						Fathead minnow ( <i>Pimephales promelas</i> )		Other (write in comments section)
COMMENT SECTION: <i>Sre ALS LOC #12011</i>								

**SAMPLE TRANSFERS**

RELINQUISHED BY: Signature / Organization	DATE	TIME	ACCEPTED BY: Signature / Organization	DATE	TIME

\* See Instructions for Sample Collection on Back of Sheet

February 2018

**Customer Information**  
 Project Name: **AMBH WETT week 2**  
 Project Number: **AMBH**  
 Bill To Company: **AMBH**  
 Invoice Attn: **AMBH**  
 Address: **AMBH + EPT**  
 City/State/Zip: **AMBH**  
 Phone: **AMBH**  
 Fax: **AMBH**  
 e-Mail Address: **AMBH**

**ALS Project Manager:** **AMBH WETT week 2**  
**ALS Work Order #:** **WETT sub to ER**  
**Parameter/Method Request for Analysis:**

Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H
Outfall 001 Comp	*8-27-19	0610	AA	8	1-2gal	X							
Outfall 011 Comp	*8-27-19	0555	AA	8	1-2gal	X							

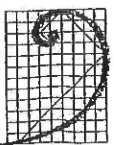
ALS Work Order #	Project Information	Project Name	Project Number	Bill To Company	Invoice Attn	Address	City/State/Zip	Phone	Fax	e-Mail Address	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	
		AMBH WETT week 2	AMBH	AMBH	AMBH	AMBH + EPT	AMBH	AMBH	AMBH	AMBH	*8-27-19	0610	AA	8	1-2gal	X								
											*8-27-19	0555	AA	8	1-2gal	X								

**Shipper(s) Please Print & Sign**  
 Relinquished by: *[Signature]*  
 Relinquished by: *[Signature]*  
 Logged by (Laboratory): *[Signature]*

Date: 8-28-19  
 Date: 8-28-19  
 Date: 8-28-19

Turnaround Time in Business Days (BD):  10 BD  5 BD  3 BD  2 BD  1 BD  
 Other:

Notes: \*Composite sample ends in 09/28/19 at 10:00 AM  
 QC Package: (Check 1)  Level II Std QC  Level III Std QC  Level IV SW646 (C)  Other



**ERM**

**ENVIRONMENTAL RESOURCES MANAGEMENT**

3352 128<sup>th</sup> Avenue Holland, Michigan 49424-9263

Phone: 616-399-3500 FAX: 616-399-3777

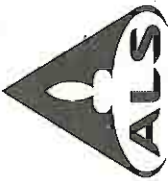
**AQUATIC TOXICITY LAB CHAIN OF CUSTODY FORM \***

CLIENT NAME:	SAMPLER		PHONE NUMBER:				INITIAL WATER QUALITY PARAMETERS UPON RECEIPT BY LABORATORY (filled in by ERM)						
	NAME:	ADDRESS:	FIELD PARAMETERS	SAMPLE ID NUMBER (Filled in by ERM)	Temp. (°C) <input type="checkbox"/> On Ice	D.O. mg/L	pH	s.u.	Conduct	umhos/cm			
001	8/22/14	0622	1 gal + 2.5 gal	083019-1	2 (°C) <input type="checkbox"/> On Ice	9.2 mg/L	7.3	s.u.	454	umhos/cm			
											8/30/14	0622	2 (°C) <input type="checkbox"/> On Ice
011	8/29	0608	1 gal + 2.5 gal	083019-2	Temp. (°C) <input type="checkbox"/> On Ice	D.O. mg/L	pH	s.u.	Conduct	umhos/cm			
											8/30	0608	Temp. (°C) <input type="checkbox"/> On Ice
ANALYSES REQUESTED [check item(s)]	DATE (Begin/End)	TIME (Begin/End)	GRAB OR COMP	NUMBER AND SIZE OF CONTAINERS	FIELD PARAMETERS	SAMPLE ID NUMBER (Filled in by ERM)	Temp. (°C) <input type="checkbox"/> On Ice	D.O. mg/L	pH	s.u.	Conduct	umhos/cm	Test Species: <input type="checkbox"/> <i>Ceriodaphnia dubia</i> <input type="checkbox"/> <i>Daphnia magna</i> <input type="checkbox"/> <i>Daphnia pulex</i> <input type="checkbox"/> Fathead minnow ( <i>Pimephales promelas</i> ) <input type="checkbox"/> Rainbow Trout ( <i>Oncorhynchus mykiss</i> ) <input type="checkbox"/> Sheephead minnow ( <i>Cyprinodon variegatus</i> ) <input type="checkbox"/> Silverside minnow ( <i>Menidia beryllina</i> ) <input type="checkbox"/> Other (write in comments section)
COMMENT SECTION: see ALS C0C 42012													

**SAMPLE TRANSFERS**

RELINQUISHED BY: Signature / Organization	DATE	TIME	ACCEPTED BY: Signature / Organization	DATE	TIME
<i>[Signature]</i>			<i>[Signature]</i>	8/30/14	1330

\* See Instructions for Sample Collection on Back of Sheet



# Chain of Custody Form

Cincinnati, OH +1 513 733 5336  
 Fort Collins, CO +1 970 490 1511  
 Houston, TX +1 281 530 5656  
 Spring City, PA +1 610 948 4903  
 South Charleston, WV +1 304 356 3168  
 Everett, WA +1 425 356 2600  
 Holland, MI +1 616 399 6070  
 Middletown, PA +1 717 944 5541  
 Salt Lake City, UT +1 801 266 7700  
 York, PA +1 717 505 5280

Page \_\_\_\_\_ of \_\_\_\_\_  
**COC ID: 42012**

Customer Information				Project Information				ALS Work Order #:											
ALS Project Manager:				Parameter/Method Request for Analysis															
Purchase Order	Project Name	Project Information		ALS Work Order #:															
Work Order	Project Number	Project Information		ALS Work Order #:															
Company Name	Bill To Company	Project Information		ALS Work Order #:															
Send Report To	Invoice Attn	Project Information		ALS Work Order #:															
Address	Address	Project Information		ALS Work Order #:															
City/State/Zip	City/State/Zip	Project Information		ALS Work Order #:															
Phone	Phone	Project Information		ALS Work Order #:															
Fax	Fax	Project Information		ALS Work Order #:															
e-Mail Address	e-Mail Address	Project Information		ALS Work Order #:															
No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold		
1	Outfall 001 Comp	* 8-27-19	0622	AD	8	2-3gal	X												
2	Outfall 011 Comp	* 8-28-19	0608	AD	8	2-3gal	X												
4																			
5																			
6																			
7																			
8																			
9																			
10																			
Sampler(s) Please Print & Sign				Shipment Method				Turnaround Time in Business Days (BD)											
Relinquished by: <i>B. Faye</i>				Received by (Laboratory): <i>Mark B...</i>				<input type="checkbox"/> 10 BD <input type="checkbox"/> 5 BD <input type="checkbox"/> 3 BD <input type="checkbox"/> 2 BD <input type="checkbox"/> 1 BD <input type="checkbox"/> Other _____											
Relinquished by: <i>B. Faye</i>				Received by (Laboratory): <i>Mark B...</i>				Results Due Date: _____											
Logged by (Laboratory):				Checked by (Laboratory):				Note: <i>See positive sample ends on 08/28/19 at same time - 311 09/03/19</i> DC Package: (Check One Box Below) <input type="checkbox"/> Level II Std QC <input type="checkbox"/> TRRP Checklist <input type="checkbox"/> Level III Std QC/Raw Data <input type="checkbox"/> TRRP Level IV <input type="checkbox"/> Level IV SW846/CLP <input type="checkbox"/> Other _____											
Preservative Key: 1-HCl 2-HNO <sub>3</sub> 3-H <sub>2</sub> SO <sub>4</sub> 4-NaOH 5-Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> 6-NaHSO <sub>4</sub> 7-Other 8-4°C 9-5035																			

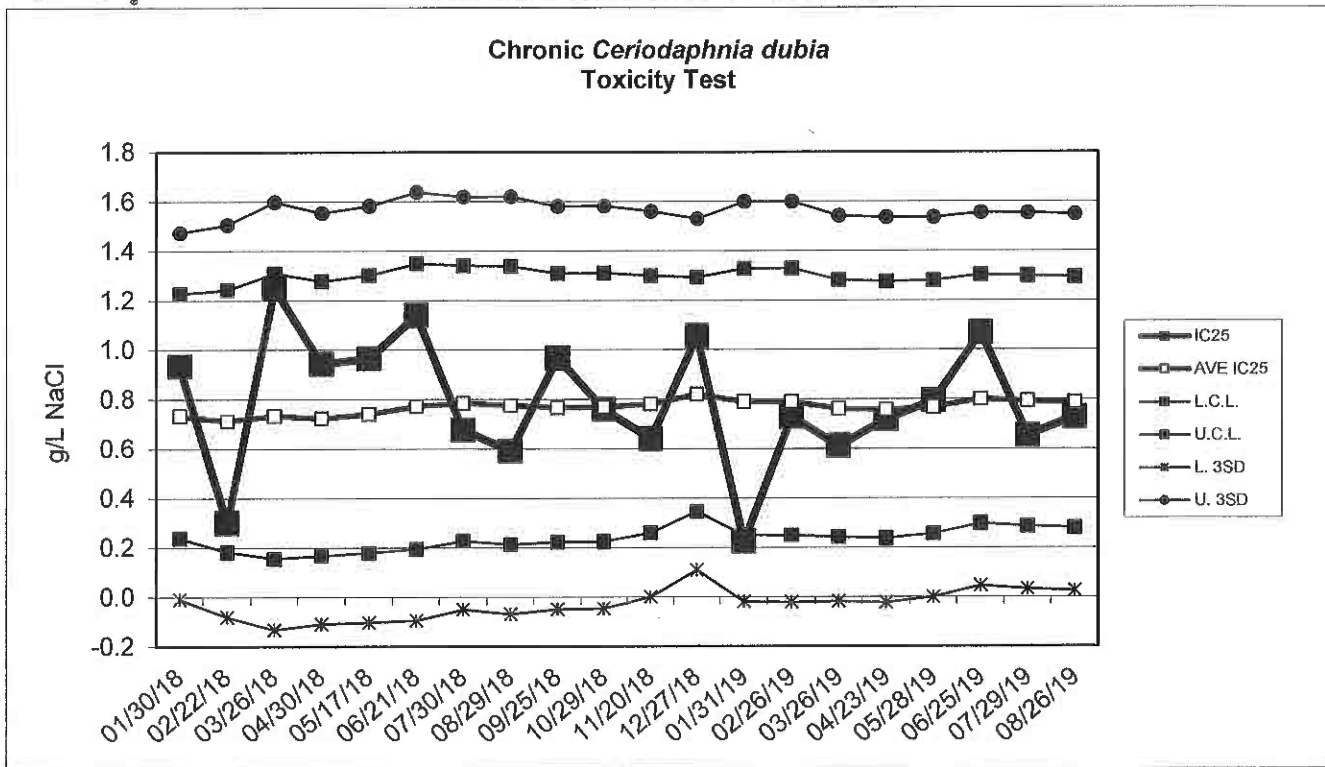
Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
 2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
 3. The Chain of Custody is a legal document. All information must be completed accurately.





# Environmental Resources Management

## Standard Reference Toxicant Data



**Chronic *Ceriodaphnia dubia* Toxicity Test Data**

Date	IC25 (g/L NaCl)	AVE IC25 (g/L NaCl)	CONTROL LIMIT		Survival (%)	CONTROL Reproduction (ave. young)	CV (%)
			Lower	Upper			
01/30/18	0.93	0.7	0.24	1.23	100	25.5	36.3
02/22/18	0.30	0.7	0.18	1.24	100	17.8	35.0
03/26/18	1.25	0.7	0.16	1.31	90	32.5	38.5
04/30/18	0.94	0.7	0.17	1.28	100	32.0	25.5
05/17/18	0.97	0.7	0.18	1.30	100	30.0	38.6
06/21/18	1.14	0.8	0.19	1.35	80	35.2	8.2
07/30/18	0.68	0.8	0.23	1.34	100	25.5	16.3
08/29/18	0.59	0.8	0.21	1.34	100	30.1	26.2
09/25/18	0.97	0.8	0.22	1.31	100	27.6	26.7
10/29/18	0.76	0.8	0.22	1.31	100	32.7	24.8
11/20/18	0.64	0.8	0.26	1.30	100	34.8	15.2
12/27/18	1.06	0.8	0.35	1.29	100	26.8	43.7
01/31/19	0.23	0.8	0.25	1.33	100	34.7	14.9
02/26/19	0.73	0.8	0.25	1.33	100	27.9	9.3
03/26/19	0.61	0.8	0.24	1.28	100	40.2	9.9
04/23/19	0.72	0.8	0.24	1.28	100	36.1	25.4
05/28/19	0.79	0.8	0.26	1.28	100	37.6	3.1
06/25/19	1.07	0.8	0.30	1.30	100	29.4	26.7
07/29/19	0.65	0.8	0.29	1.30	100	33.7	14.6
08/26/19	0.73	0.8	0.28	1.29	100	30.4	23.5

# FINAL REPORT

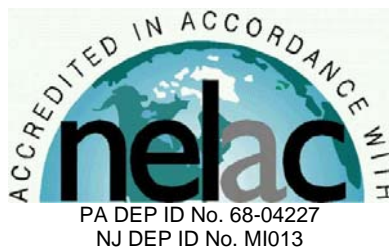
Chronic Toxicity Test  
Freshwater Vertebrate,  
*Pimephales promelas*  
EPA Test Method 1000.0

*Submitted To:*  
*ALS Environmental*  
*3352 128<sup>th</sup> Avenue*  
*Holland, MI 49424*

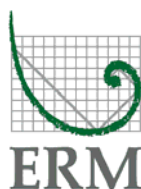
Sample: ArcelorMittal Burns Harbor, LLC - Outfall 011

Testing Period: 26 August – 2 September 2019

Laboratory I.D. Number: 082619-2



Conducted By:  
**Environmental Resources Management, Inc.**  
3352 128th Avenue  
Holland, Michigan 49424



# Test Overview



Permittee: ArcelorMittal Burns Harbor, LLC  
Location: 250 West U.S. Hwy 12  
Burns Harbor, IN 46304  
Contact: Robert Maciel  
Telephone #: 219.787.2120

NPDES Permit #: IN0000175  
Permit Requirements: Acute Toxicity Limit = 1.0 TUa  
Chronic Toxicity Limit = 1.0 TUC  
Test Sample: Outfall 011  
Receiving Water: East Branch, Little Calumet River

Testing Date: 26 August – 2 September 2019

Sample Date(s): 26 August 2019  
28 August 2019  
30 August 2019

Test/Method: Fathead Minnow, *Pimephales promelas*, Survival and Growth  
Test EPA 821-R-02-013  
Method 1000.0.

QC Objectives: Test data met all test acceptability criteria, except where noted below.

Data Qualifiers: See Case Narrative.

## DATA SUMMARY

Effluent Concentrations (%)	Survival (%)	Growth Average Wt./ Organism (mg)
Control	100	0.506
6	95	0.482
13	95	0.471
25	85	0.476
50	85* <sup>DQ</sup>	0.460
100	90	0.480

\* Significantly lower than the control (P=0.05)

<sup>DQ</sup> See Data Qualifiers in Case Narrative

## TEST RESULTS

96-Hour LC <sub>50</sub>	>100%
NOEC (Survival)	100%
LOEC (Survival)	>100%
IC <sub>25</sub>	>100%
MSDp (Survival)	26.3%
TUa (100/LC <sub>50</sub> )	1.0
TUc (100/ NOEC or IC <sub>25</sub> )	1.0

## TEST CONCLUSION

In accordance with the NPDES permit requirements for ArcelorMittal Burns Harbor, LLC, this toxicity test did not exceed either the acute or the chronic toxicity limit.

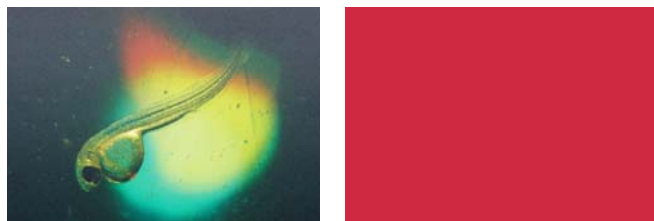
Bruce A. Rabe  
Director, Aquatic  
Toxicology Laboratory  
ERM Project No. 0501867.0152

Environmental Resources Management  
3352 128<sup>th</sup> Avenue  
Holland, Michigan 49424-9263  
Phone: 616.399.3500  
Fax: 616.399.3777



# ERM Testing Method

## *Pimephales promelas* – Survival and Growth Toxicity Test



Upon sample receipt, each effluent sample was analyzed for a suite of water quality parameters (Appendix A - Table 1). Where indigenous organisms were present, the sample was filtered through a 60 micron ( $\mu\text{m}$ ) NITEX® screen. All samples were maintained at 0 – 6 degrees Celsius ( $^{\circ}\text{C}$ ) until needed for testing.

A series of five effluent concentrations and a control solution were established for testing. All test solutions were prepared by mixing appropriate volumes of dilution water and effluent in the test containers. Dilution water consisted of reconstituted moderately hard water. The control solution consisted of 100 percent dilution water.

*Pimephales promelas* used to initiate this test were obtained from in-house cultures and were less than 24-hours old at test initiation. Test organisms were maintained in reconstituted moderately hard water prior to test initiation.

The *Pimephales promelas* test was conducted using 300 to 500-milliliter (mL) disposable polypropylene containers containing 250 mL of control water or test solution. Ten fish were randomly added to each test chamber with four replicate chambers per treatment. Each *Pimephales promelas* test chamber was fed 0.2 mL of a concentrated suspension of less than 24-hour old live brine shrimp nauplii (*Artemia* sp.) two times per day. Test solutions were renewed daily during the exposure by replacing approximately 90 percent of the 24-hour old solution with fresh control water or appropriate test solution. Prior to test solution renewal, uneaten and dead brine shrimp, along with other debris, were removed from the bottom of the test chambers.

Percent survival of exposed *Pimephales promelas* was determined daily by enumeration of live organisms. Mortality was defined as no body movement after gentle prodding. At the termination of the chronic test, larvae in each test chamber were counted, dried, and weighed to the nearest 0.01 milligram (mg) on an analytical balance.

The test was conducted at a temperature of  $25 \pm 1^{\circ}\text{C}$  under fluorescent lighting with a photoperiod of 16 hours light and 8 hours dark. Water quality measurements were performed on all control and test solutions prior to test initiation and on selected treatments daily thereafter, as indicated in the raw data (Appendix A - Table 2).

Following termination of the chronic toxicity test, No Observed Effect Concentration (NOEC) and Lowest Observed Effect Concentration (LOEC) were determined for both *Pimephales promelas* survival and growth and a 25 percent Inhibition Concentration ( $\text{IC}_{25}$ ) was determined for *Pimephales promelas* growth. The NOEC is defined as the highest effluent concentration which does not produce any observed adverse effect to the exposed test organism whereas the LOEC is defined as the lowest effluent concentration which does produce an observed adverse effect to the exposed test organism. An adverse effect is determined as a statistically significant difference between the control and a given effluent concentration.

Prior to the determination of any significant differences in *Pimephales promelas* survival and growth, the data were evaluated for normal distribution and homogeneity characteristics. Depending on the result and the number of test replicates per concentration, an analysis of variance test was performed, followed by one of the following mean comparison tests: Dunnett's Procedure, Bonferroni t-Test, Steel's Many-One Rank Test, Wilcoxon Rank Sum Test, or the T-Test.

For reporting purposes, a chronic toxic unit (TU<sub>c</sub>) is calculated and is defined as the most conservative of either 100/NOEC based on the most sensitive test endpoint or 100/ $\text{IC}_{25}$ .

To evaluate acute toxicity, a 96-hour LC<sub>50</sub> and corresponding 95 percent confidence interval were also calculated, where possible. The LC<sub>50</sub> value estimate was determined by using one of the following statistical methods: graphical, Spearman-Kärber, Trimmed Spearman-Kärber, or Probit. The method selected for reporting test results was determined by the characteristics of the data; that is, the presence or absence of 0 and 100 percent mortality and the number of concentrations in which mortalities between 0 and 100 percent occurred. For reporting purposes, the 96-hour LC<sub>50</sub> value was converted to an acute toxic unit (TUa) by 100/LC<sub>50</sub>. All statistical analyses were performed using the CETIS™ Version 1.9.4.3 software program.

The reference toxicant, sodium chloride, was used to monitor the sensitivity of the test organisms. Chronic reference toxicant tests are performed at least monthly and the resulting Inhibition Concentrations (IC<sub>25</sub>) are plotted to determine if the results are within prescribed limits (Appendix A - Standard Reference Toxicant Data). If the IC<sub>25</sub> of a particular reference toxicant test does not fall within the expected range of ± two standard deviations from the mean for a given test organism, the sensitivity of that organism and the overall credibility of the test system is suspect.

Reference:

USEPA. 2002. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, 4<sup>th</sup> Ed. U.S. Environmental Protection Agency, Office of Water, Washington, D.C., EPA-821-R-02-013.

# Case Narrative



## **1.0 TEST PERFORMANCE CRITERIA**

The quality control results achieved laboratory specifications.

## **2.0 MODIFICATIONS TO ERM'S STANDARD TEST METHOD**

Test was performed in accordance with ERM's standard test method (see page 3).

## **3.0 DATA QUALIFIERS**

One of the organisms in replicate A of the 13 percent concentration was discovered stuck above the water line of the test chamber and was therefore not included in final totals or statistical analysis. Additionally, *Pimephales promelas* survival was significantly less than the control in the 50 percent effluent concentration, but not in the 100 percent effluent concentration. Therefore, the statistical difference observed in the 50 percent effluent concentration was deemed anomalous, and was not considered for determining an NOEC or LOEC value.

*Appendix A*  
*Supporting Documents*

- *Raw Test Data*
- *Statistical Analysis (if necessary)*
- *Chain-of-Custody Forms*
- *Standard Reference Toxicant Data*

**Environmental Resources Management**

**Pimephales promelas - Chronic Toxicity Test  
Initial Water Quality and Test Solution Preparation**

Table 1  
Page 1 of 1

Permittee/Client:	ArcelorMittal Burns Harbor, LLC	Control/Dilution Water:	RMHW
Effluent/Location:	Outfall 011	Organism Batch #:	149-19
Lab I.D.#:	082619-2	Organism Age:	224 hrs
Beginning Date:	08/26/19	QC Review:	KM
Ending Date:	09-02-19	QC Review Date:	09/09/19
	Time: 1530		
	Time: 1530		

Initial Water Quality:

Parameter	Units	Effluent			Synthetic Water		
		1	2	3	--	--	--
Sample #	--	1	2	3	--	--	--
Lab I.D.#/ Batch #	--	082619-2	082819-2	083019-2	99-19	-	-
Temperature	° C	5	5	2	--	--	--
Dissolved Oxygen	mg / L	9.9	5.5	6.7	--	--	--
pH	S.U.	7.8	7.3	7.2	7.8	-	-
Conductivity	umhos/cm	444	459	464	315	-	-
Alkalinity	mg / L CaCO <sub>3</sub>	110	106	100	60	-	-
Hardness	mg / L CaCO <sub>3</sub>	140	160	160	80	-	-
Total Ammonia	mg / L NH <sub>3</sub>	0.14	0.09	<0.01	--	--	--
Total Residual Chlorine	mg / L Cl <sub>2</sub>	<0.01	<0.01	<0.01	<0.01	-	-
Total mls of 7.0 g/L Sodium Thiosulfate added per liter	mL / L	--	--	--	--	--	--
Initials	--	RA	RA	MS	KM	-	-

Test Solution Preparation:

Test Solution Prepared For Both Species.

Treatment (% Effluent)	Effluent (mL)	Dilution (mL)	Test Day	Initials	Effluent Sample #	Synthetic Batch #
Control	0	1200	0	RA	1	99-19
6%	72	1128	1	RA	1	99-19
13%	156	1044	2	RA	2	99-19
25%	300	900	3	RWM	2	99-19
50%	600	600	4	MS	3	99-19
100%	1200	0	5	RA	3	99-19
			6	RA	3	99-19
			7	RA	-	--



Environmental Resources Management

Pimephales promelas - Chronic Toxicity Test  
Water Quality Data

Permittee/Client: ArcelorMittal Burns Harbor, LLC  
Effluent/Location: Outfall 011  
Lab I.D.#: 082619-2

Water Quality Data:

Dissolved Oxygen (mg/L)														
Day														
Meter #	5	3	3	3	5	5	3	3	5	3	3	3	3	3
Treatment (% Effluent)	0	1		2		3		4		5		6		7
	I	F	I	F	I	F	I	F	I	F	I	F	I	F
Control	7.8	6.8	8.3	7.0	7.9	6.2	8.4	6.5	8.0	6.6	8.2	6.6	8.2	7.2
6%	7.8	6.1	8.3	7.1	7.9	5.8	8.4	6.4	8.0	6.3	8.2	6.2	8.2	7.2
13%	7.8	5.8	8.3	7.0	7.9	6.3	8.3	6.4	7.9	6.4	8.2	6.3	8.2	7.3
25%	7.9	5.8	8.4	6.8	8.0	6.3	8.2	6.0	7.9	6.3	8.2	6.0	8.2	7.0
50%	8.0	5.6	8.4	6.6	8.0	6.5	8.2	6.2	7.9	6.2	8.1	6.1	8.2	7.2
100%	8.1	5.5	8.4	6.2	8.1	6.1	7.9	5.3	7.8	6.1	8.1	7.0	8.0	7.1

pH (S.U.)														
Day														
Meter #	9	10	10	10	8	8	10	10	9	10	10	10	10	10
Treatment (% Effluent)	0	1		2		3		4		5		6		7
	I	F	I	F	I	F	I	F	I	F	I	F	I	F
Control	7.8	7.4	7.9	7.3	7.8	7.3	7.6	7.4	7.8	7.3	7.8	7.4	7.8	7.5
6%	--	7.4	--	7.4	--	7.4	--	7.4	--	7.3	--	7.4	--	7.6
13%	--	7.5	--	7.4	--	7.5	--	7.5	--	7.4	--	7.4	--	7.6
25%	--	7.5	--	7.4	--	7.6	--	7.5	--	7.5	--	7.4	--	7.6
50%	--	7.5	--	7.5	--	7.6	--	7.6	--	7.7	--	7.5	--	7.6
100%	7.7	7.6	7.7	7.6	7.6	7.8	7.7	7.6	7.7	7.6	7.7	7.5	7.5	7.7

Conductivity (umhos / cm)														
Day														
Meter #	4	--	4	--	4	--	3	--	4	--	3	--	3	--
Treatment (% Effluent)	0	1		2		3		4		5		6		7
	I	F	I	F	I	F	I	F	I	F	I	F	I	F
Control	318	--	320	--	321	--	316	--	309	--	317	--	318	--
6%	324	--	327	--	329	--	327	--	317	--	325	--	324	--
13%	331	--	330	--	331	--	337	--	327	--	331	--	337	--
25%	345	--	344	--	343	--	354	--	344	--	350	--	352	--
50%	371	--	367	--	379	--	380	--	380	--	387	--	392	--
100%	431	--	421	--	452	--	463	--	457	--	448	--	467	--

Temperature (° C)														
Day														
Meter #	5	3	3	3	5	10	3	3	5	3	3	3	3	3
Treatment (% Effluent)	0	1		2		3		4		5		6		7
	I	F	I	F	I	F	I	F	I	F	I	F	I	F
Control	24	25	24	24	24	25	24	24	24	25	24	25	24	25
6%	24	25	24	24	24	25	24	24	24	25	24	25	24	25
13%	24	25	24	24	24	25	24	24	24	25	24	25	24	25
25%	24	25	24	24	24	25	24	25	24	25	24	25	24	25
50%	24	25	24	24	24	26	24	25	25	25	24	25	24	25
100%	24	25	24	24	24	25	24	25	25	25	24	25	24	25

I = Initial Chemistry      F = Final Chemistry

Note: D.O. meter also used for temperature measurement unless otherwise noted.

Permittee/Client: ArcelorMittal Burns Harbor, LLC  
 Effluent/Location: Outfall 011  
 Lab I.D.#: 082619-2

Survival Data:

Treatment (% Effluent)	Rep.	# Live Organisms Day								Rep.	# Live Organisms Day								96 Hour Survival Summary		
		0	1	2	3	4	5	6	7		0	1	2	3	4	5	6	7	Initial	Final	% Survival
		Control	A	10	10	10	10	10	10		10	10	B	10	10	10	10	10	10	10	40
6%	A	10	10	10	10	10	10	10	10	B	10	10	10	10	10	10	10	40	39	97.5	
13%	A	10	10	10	9	9	9	8	8	B	10	10	10	10	10	10	9	340	326	100	
25%	A	10	10	10	7	7	6	6		B	10	10	10	9	9	9	9	40	35	87.5	
50%	A	10	10	10	9	9	9	9		B	10	10	10	9	8	8	8	40	34	85	
100%	A	10	10	10	8	8	8	8		B	10	10	10	10	10	10	10	40	37	92.5	

Treatment (% Effluent)	Rep.	# Live Organisms Day								Rep.	# Live Organisms Day								7 Day Survival Summary		
		0	1	2	3	4	5	6	7		0	1	2	3	4	5	6	7	Initial	Final	% Survival
		Control	C	10	10	10	10	10	10		10	10	D	10	10	10	10	10	10	10	40
6%	C	10	10	10	10	10	10	10	10	D	10	10	10	9	9	8	8	40	38	95	
13%	C	10	10	10	10	10	10	10	10	D	10	10	10	10	10	10	10	340	326	95	
25%	C	10	10	10	9	9	9	9		D	10	10	10	10	10	10	10	40	34	85	
50%	C	10	10	10	8	8	8	8		D	10	10	9	9	9	9	9	40	34	85	
100%	C	10	10	10	10	10	9	9		D	10	10	10	9	9	9	9	40	36	90	

Test Information:

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Time:	1530	1530	1430	1400	1600	1330	1230	1530
Initials:	km	km	km	km	SPR	km	km	km
Date:	08/26/19	08/27/19	08/28/19	08/29/19	08/30/19	08/31/19	9-1-19	9-2-19

Feeding:

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Batch #:	237-19	238-19	239-19	240-19	241-19	242-19	243-19	--
Initials AM:	--	km	km	SPR	km	km	km	--
Initials PM:	km	SPR	km	km	km	km	km	--

Oven:

Date In	Time In	Initials	Date Out	Time Out	Initials
9-2-19	1530	km	09-03-19	1530	km

Comment Section:

Day	Date	Initials	Comments
			1330 Rep A Fish struck above water line - not included in totals

Permittee/Client: ArcelorMittal Burns Harbor, LLC  
Effluent/Location: Outfall 011  
Lab I.D.#: 082619-2

Pan #	Conc. (% Effluent)	Replicate	Final Weight (mg)	Initial Weight (mg)	Larvae Weight (mg)	# of Initial Organisms	Avg. Wt./ Organism/ Replicate (mg)	Avg. Wt./ Organism/ Treatment (mg)	Avg. Wt./ Organism/ Treatment % CV
Date			9/4/2019	9/11/2019					
Analyst			rh	km					
1	Control	A	26.31	21.11	5.20	10	0.520		
2	Control	B	24.49	19.94	4.55	10	0.455		
3	Control	C	26.80	21.58	5.22	10	0.522		
4	Control	D	27.36	22.11	5.25	10	0.525	0.506	6.7
5	6%	A	27.39	22.44	4.95	10	0.495		
6	6%	B	28.55	23.19	5.36	10	0.536		
7	6%	C	24.96	20.33	4.63	10	0.463		
8	6%	D	22.08	17.75	4.33	10	0.433	0.482	9.2
9	13%	A	19.41	15.81	3.60	9	0.400		
10	13%	B	25.55	18.69	6.86	10	0.686		
11	13%	C	25.45	20.92	4.53	10	0.453		
12	13%	D	26.55	23.10	3.45	10	0.345	0.471	31.8
13	25%	A	22.41	18.47	3.94	10	0.394		
14	25%	B	22.26	18.18	4.08	10	0.408		
15	25%	C	24.20	18.64	5.56	10	0.556		
16	25%	D	26.01	20.57	5.44	10	0.544	0.476	18.2
17	50%	A	22.30	17.03	5.27	10	0.527		
18	50%	B	20.62	16.03	4.59	10	0.459		
19	50%	C	24.21	20.05	4.16	10	0.416		
20	50%	D	25.72	21.35	4.37	10	0.437	0.460	10.5
21	100%	A	22.68	17.71	4.97	10	0.497		
22	100%	B	25.97	20.79	5.18	10	0.518		
23	100%	C	32.21	27.53	4.68	10	0.468		
24	100%	D	27.88	23.52	4.36	10	0.436	0.480	7.4

Quality Assurance			Final Wt. (mg)		
25	Blank	A	12.17	12.18	-0.01
26	Blank	B	10.77	10.77	0.00

\* Biomass data were transferred directly to the spreadsheet using the data transfer function of the analytical balance.

**CETIS Analytical Report**

Report Date: 04 Sep-19 15:11 (p 1 of 2)  
 Test Code/ID: 1AD8AA09 / 04-5040-6921

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

ERM

<b>Analysis ID:</b> 12-1626-0092	<b>Endpoint:</b> 7d Survival Rate	<b>CETIS Version:</b> CETISv1.9.4
<b>Analyzed:</b> 04 Sep-19 15:09	<b>Analysis:</b> Parametric-Control vs Treatments	<b>Status Level:</b> 1
<b>Batch ID:</b> 02-9297-1643	<b>Test Type:</b> Growth-Survival (7d)	<b>Analyst:</b> Lab Tech
<b>Start Date:</b> 26 Aug-19 15:30	<b>Protocol:</b> EPA/821/R-02-013 (2002)	<b>Diluent:</b> Reconstituted Water
<b>Ending Date:</b> 02 Sep-19 15:30	<b>Species:</b> Pimephales promelas	<b>Brine:</b>
<b>Test Length:</b> 7d 0h	<b>Taxon:</b> Actinopterygii	<b>Source:</b> In-House Culture <b>Age:</b> <24
<b>Sample ID:</b> 18-4353-6291	<b>Code:</b> 6DE221A3	<b>Project:</b> WET Testing
<b>Sample Date:</b> 26 Aug-19 06:08	<b>Material:</b> Industrial Effluent	<b>Source:</b> ArcelorMittal Burns Harbor, LLC
<b>Receipt Date:</b> 26 Aug-19 12:00	<b>CAS (PC):</b>	<b>Station:</b> Outfall 011
<b>Sample Age:</b> 9h (5 °C)	<b>Client:</b> ArcelorMittal Burns Harbor, LLC	

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	>100	n/a	1	14.02%

**Dunnett Multiple Comparison Test**

Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Lab Water		6	0.8155	2.407	0.225	6	CDF	0.5051	Non-Significant Effect
		13	0.9202	2.407	0.225	6	CDF	0.4575	Non-Significant Effect
		25	2.279	2.407	0.225	6	CDF	0.0636	Non-Significant Effect
		50*	2.503	2.407	0.225	6	CDF	0.0416	Significant Effect
		100	1.687	2.407	0.225	6	CDF	0.1731	Non-Significant Effect

**Test Acceptability Criteria**

Attribute	Test Stat	TAC Limits		Overlap	Decision
		Lower	Upper		
Control Resp	1	0.8	>>	Yes	Passes Criteria

**ANOVA Table**

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.160598	0.0321197	5	1.838	0.1560	Non-Significant Effect
Error	0.314484	0.0174713	18			
Total	0.475082		23			

**Distributional Tests**

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Levene Equality of Variance Test	2.157	4.248	0.1049	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.7053	4.248	0.6269	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.929	0.884	0.0926	Normal Distribution

**7d Survival Rate Summary**

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	L	4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
6		4	0.9500	0.7909	1.0000	1.0000	0.8000	1.0000	0.0500	10.53%	5.00%
13		4	0.9472	0.8500	1.0000	0.9500	0.8889	1.0000	0.0306	6.45%	5.28%
25		4	0.8500	0.5744	1.0000	0.9000	0.6000	1.0000	0.0866	20.38%	15.00%
50		4	0.8500	0.7581	0.9419	0.8500	0.8000	0.9000	0.0289	6.79%	15.00%
100		4	0.9000	0.7701	1.0000	0.9000	0.8000	1.0000	0.0408	9.07%	10.00%

**Angular (Corrected) Transformed Summary**

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	L	4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.00%	0.00%
6		4	1.336	1.093	1.578	1.412	1.107	1.412	0.07622	11.41%	5.40%
13		4	1.326	1.168	1.484	1.331	1.231	1.412	0.04979	7.51%	6.09%
25		4	1.199	0.8453	1.553	1.249	0.8861	1.412	0.1112	18.54%	15.08%
50		4	1.178	1.048	1.308	1.178	1.107	1.249	0.04096	6.95%	16.57%
100		4	1.254	1.056	1.453	1.249	1.107	1.412	0.06231	9.93%	11.17%

Fathead Minnow 7-d Larval Survival and Growth Test

ERM

Analysis ID: 12-1626-0092      Endpoint: 7d Survival Rate      CETIS Version: CETISv1.9.4  
 Analyzed: 04 Sep-19 15:09      Analysis: Parametric-Control vs Treatments      Status Level: 1

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	L	1.0000	1.0000	1.0000	1.0000
6		1.0000	1.0000	1.0000	0.8000
13		0.8889	0.9000	1.0000	1.0000
25		0.6000	0.9000	0.9000	1.0000
50		0.9000	0.8000	0.8000	0.9000
100		0.8000	1.0000	0.9000	0.9000

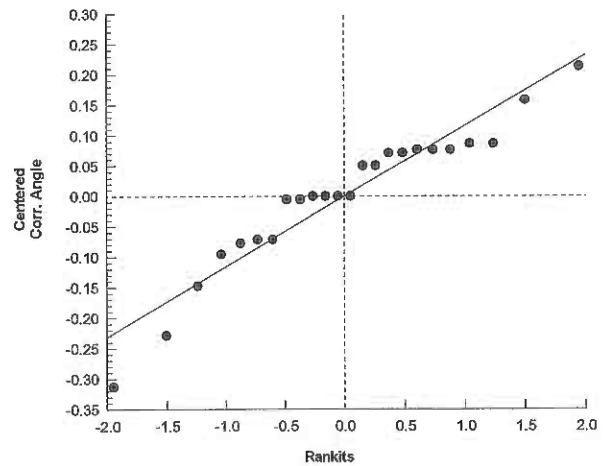
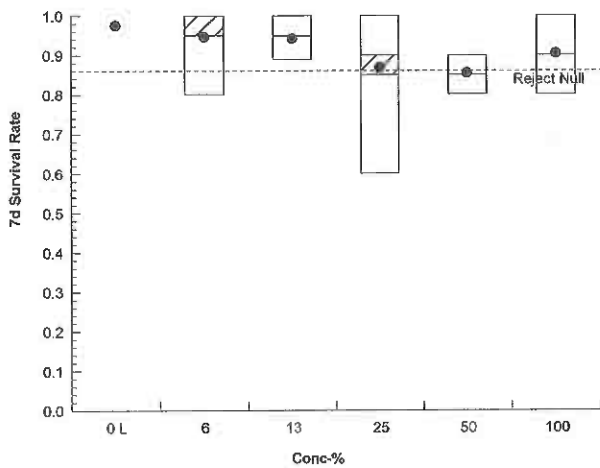
Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	L	1.412	1.412	1.412	1.412
6		1.412	1.412	1.412	1.107
13		1.231	1.249	1.412	1.412
25		0.8861	1.249	1.249	1.412
50		1.249	1.107	1.107	1.249
100		1.107	1.412	1.249	1.249

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	L	10/10	10/10	10/10	10/10
6		10/10	10/10	10/10	8/10
13		8/9	9/10	10/10	10/10
25		6/10	9/10	9/10	10/10
50		9/10	8/10	8/10	9/10
100		8/10	10/10	9/10	9/10

Graphics



**CETIS Analytical Report**

Report Date: 04 Sep-19 15:11 (p 1 of 2)  
 Test Code/ID: 1AD8AA09 / 04-5040-6921

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

ERM

Analysis ID: 03-4273-7431	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.9.4
Analyzed: 04 Sep-19 15:09	Analysis: Parametric-Control vs Treatments	Status Level: 1
Batch ID: 02-9297-1643	Test Type: Growth-Survival (7d)	Analyst: Lab Tech
Start Date: 26 Aug-19 15:30	Protocol: EPA/821/R-02-013 (2002)	Diluent: Reconstituted Water
Ending Date: 02 Sep-19 15:30	Species: Pimephales promelas	Brine:
Test Length: 7d 0h	Taxon: Actinopterygii	Source: In-House Culture Age: <24
Sample ID: 18-4353-6291	Code: 6DE221A3	Project: WET Testing
Sample Date: 26 Aug-19 06:08	Material: Industrial Effluent	Source: ArcelorMittal Burns Harbor, LLC
Receipt Date: 26 Aug-19 12:00	CAS (PC):	Station: Outfall 011
Sample Age: 9h (5 °C)	Client: ArcelorMittal Burns Harbor, LLC	

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	26.31%

**Dunnett Multiple Comparison Test**

Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Lab Water		6	0.4299	2.407	0.133	6	CDF	0.6775	Non-Significant Effect
		13	0.6245	2.407	0.133	6	CDF	0.5923	Non-Significant Effect
		25	0.5431	2.407	0.133	6	CDF	0.6287	Non-Significant Effect
		50	0.8282	2.407	0.133	6	CDF	0.4993	Non-Significant Effect
		100	0.4661	2.407	0.133	6	CDF	0.6622	Non-Significant Effect

**Test Acceptability Criteria**

Attribute	Test Stat	TAC Limits		Overlap	Decision
		Lower	Upper		
Control Resp	0.5055	0.25	>>	Yes	Passes Criteria

**ANOVA Table**

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0046284	0.0009257	5	0.1517	0.9769	Non-Significant Effect
Error	0.109864	0.0061036	18			
Total	0.114493		23			

**Distributional Tests**

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance Test	10.24	15.09	0.0688	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9303	0.884	0.0991	Normal Distribution

**Mean Dry Biomass-mg Summary**

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	L	4	0.5055	0.4518	0.5592	0.521	0.455	0.525	0.01686	6.67%	0.00%
6		4	0.4817	0.4115	0.552	0.479	0.433	0.536	0.02207	9.16%	4.70%
13		4	0.471	0.2324	0.7096	0.4265	0.345	0.686	0.07498	31.84%	6.82%
25		4	0.4755	0.3381	0.6129	0.476	0.394	0.556	0.04318	18.16%	5.93%
50		4	0.4597	0.3831	0.5364	0.448	0.416	0.527	0.02407	10.47%	9.05%
100		4	0.4797	0.423	0.5365	0.4825	0.436	0.518	0.01782	7.43%	5.09%

**Mean Dry Biomass-mg Detail**

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	L	0.52	0.455	0.522	0.525
6		0.495	0.536	0.463	0.433
13		0.4	0.686	0.453	0.345
25		0.394	0.408	0.556	0.544
50		0.527	0.459	0.416	0.437
100		0.497	0.518	0.468	0.436

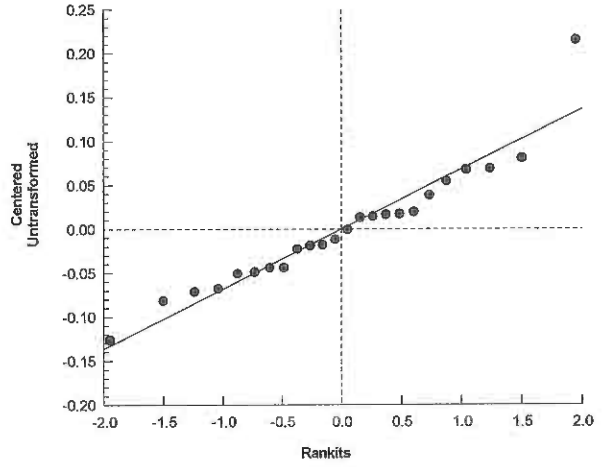
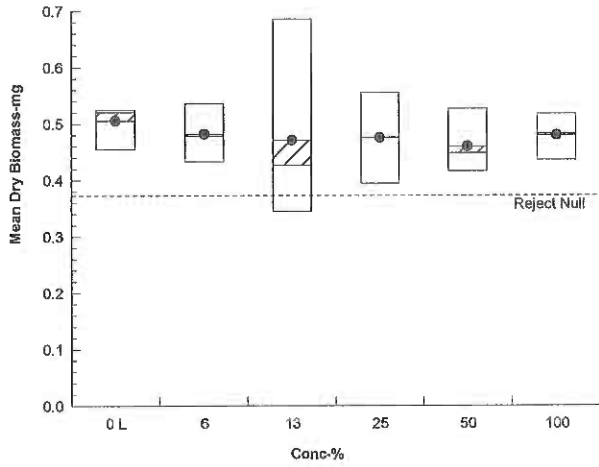
Fathead Minnow 7-d Larval Survival and Growth Test

ERM

Analysis ID: 03-4273-7431      Endpoint: Mean Dry Biomass-mg  
Analyzed: 04 Sep-19 15:09      Analysis: Parametric-Control vs Treatments

CETIS Version: CETISv1.9.4  
Status Level: 1

Graphics



**CETIS Analytical Report**

Report Date: 04 Sep-19 15:11 (p 1 of 2)  
 Test Code/ID: 1AD8AA09 / 04-5040-6921

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

ERM

Analysis ID: 08-5635-0722	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.9.4
Analyzed: 04 Sep-19 15:09	Analysis: Linear Interpolation (ICPIN)	Status Level: 1
Batch ID: 02-9297-1643	Test Type: Growth-Survival (7d)	Analyst: Lab Tech
Start Date: 26 Aug-19 15:30	Protocol: EPA/821/R-02-013 (2002)	Diluent: Reconstituted Water
Ending Date: 02 Sep-19 15:30	Species: Pimephales promelas	Brine:
Test Length: 7d 0h	Taxon: Actinopterygii	Source: In-House Culture Age: <24
Sample ID: 18-4353-6291	Code: 6DE221A3	Project: WET Testing
Sample Date: 26 Aug-19 06:08	Material: Industrial Effluent	Source: ArcelorMittal Burns Harbor, LLC
Receipt Date: 26 Aug-19 12:00	CAS (PC):	Station: Outfall 011
Sample Age: 9h (5 °C)	Client: ArcelorMittal Burns Harbor, LLC	

**Linear Interpolation Options**

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1887872	200	Yes	Two-Point Interpolation

**Test Acceptability Criteria**

Attribute	Test Stat	TAC Limits		Overlap	Decision
		Lower	Upper		
Control Resp	0.5055	0.25	>>	Yes	Passes Criteria

**Point Estimates**

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	6.927	n/a	n/a	14.44	n/a	n/a
IC10	>100	n/a	n/a	<1	n/a	n/a
IC15	>100	n/a	n/a	<1	n/a	n/a
IC20	>100	n/a	n/a	<1	n/a	n/a
IC25	>100	n/a	n/a	<1	n/a	n/a
IC40	>100	n/a	n/a	<1	n/a	n/a
IC50	>100	n/a	n/a	<1	n/a	n/a

**Mean Dry Biomass-mg Summary**

Conc-%	Code	Count	Calculated Variate						Isotonic Variate	
			Mean	Min	Max	Std Dev	CV%	%Effect	Mean	%Effect
0	L	4	0.5055	0.455	0.525	0.03373	6.67%	0.0%	0.5055	0.0%
6		4	0.4817	0.433	0.536	0.04415	9.16%	4.7%	0.4817	4.7%
13		4	0.471	0.345	0.686	0.15	31.84%	6.83%	0.4732	6.38%
25		4	0.4755	0.394	0.556	0.08635	18.16%	5.94%	0.4732	6.38%
50		4	0.4597	0.416	0.527	0.04815	10.47%	9.05%	0.4697	7.07%
100		4	0.4797	0.436	0.518	0.03565	7.43%	5.09%	0.4697	7.07%

**Mean Dry Biomass-mg Detail**

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	L	0.52	0.455	0.522	0.525
6		0.495	0.536	0.463	0.433
13		0.4	0.686	0.453	0.345
25		0.394	0.408	0.556	0.544
50		0.527	0.459	0.416	0.437
100		0.497	0.518	0.468	0.436



# CETIS Analytical Report

Report Date: 04 Sep-19 15:11 (p 2 of 2)  
Test Code/ID: 1AD8AA09 / 04-5040-6921

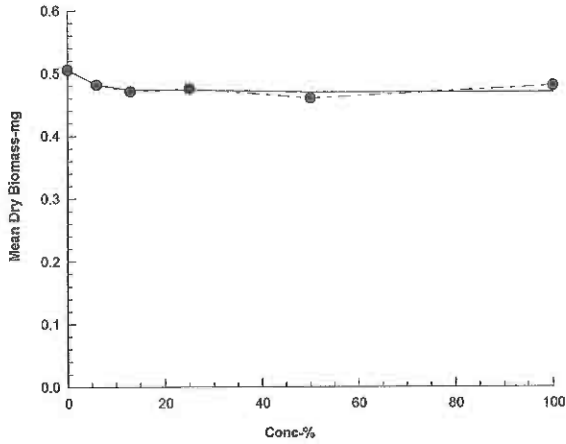
## Fathead Minnow 7-d Larval Survival and Growth Test

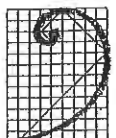
ERM

Analysis ID: 08-5635-0722      Endpoint: Mean Dry Biomass-mg  
Analyzed: 04 Sep-19 15:09      Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.9.4  
Status Level: 1

### Graphics





**ERM**<sup>®</sup>

**ENVIRONMENTAL RESOURCES MANAGEMENT**

3352 128<sup>th</sup> Avenue Holland, Michigan 49424-9263

Phone: 616-399-3500 FAX: 616-399-3777

**AQUATIC TOXICITY LAB CHAIN OF CUSTODY FORM \***

CLIENT NAME:		ADDRESS:				SAMPLER		PHONE NUMBER:				
SAMPLE DESCRIPTION (i.e. Outfall 001)	DATE (Begin/End)	TIME (Begin/End)	GRAB OR COMP	NUMBER AND SIZE OF CONTAINERS	FIELD PARAMETERS	SAMPLE ID NUMBER (filled in by ERM)	INITIAL WATER QUALITY PARAMETERS UPON RECEIPT BY LABORATORY (filled in by ERM)					
001	08/25/19	0618		1-2.5 gal	pH= s.u. NH <sub>3</sub> = mg/L	082619-1	Temp. (°C) 5 On Ice <input checked="" type="checkbox"/>	D.O. mg/L 10.5	pH 7.1	s.u.	Cond 417	umhos/cm
011	08/25/19	0608		1-2.5 gal	pH= s.u. NH <sub>3</sub> = mg/L	082619-2	Temp. (°C) 5 On Ice <input checked="" type="checkbox"/>	D.O. mg/L 9.9	pH 7.5	s.u.	Cond 444	umhos/cm
					pH= s.u. NH <sub>3</sub> = mg/L		Temp. (°C) <input type="checkbox"/> On Ice	D.O. mg/L	pH	s.u.	Cond	umhos/cm
					pH= s.u. NH <sub>3</sub> = mg/L		Temp. (°C) <input type="checkbox"/> On Ice	D.O. mg/L	pH	s.u.	Cond	umhos/cm
					pH= s.u. NH <sub>3</sub> = mg/L		Temp. (°C) <input type="checkbox"/> On Ice	D.O. mg/L	pH	s.u.	Cond	umhos/cm
					pH= s.u. NH <sub>3</sub> = mg/L		Temp. (°C) <input type="checkbox"/> On Ice	D.O. mg/L	pH	s.u.	Cond	umhos/cm

**ANALYSES REQUESTED** [check item(s)]

Test Material:  Water/Wastewater  Sediment  Product

Test Type:  Acute  Chronic  Other

Test Species:  *Ceriodaphnia dubia*  Rainbow Trout (*Oncorhynchus mykiss*)  *Americamyxis baltica*  
 *Daphnia magna*  Sheepshead minnow (*Cyprinodon variegatus*)  *Hyalella azteca*  
 *Daphnia pulex*  Silverside minnow (*Menidia beryllina*)  *Chironomus dilutus*  
 Fathead minnow (*Pimephales promelas*)  Other (write in comments section)

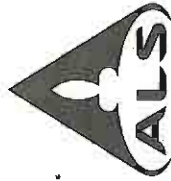
COMMENT SECTION: See ALS LOC 41579

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**SAMPLE TRANSFERS**

RELINQUISHED BY: Signature / Organization	DATE	TIME	ACCEPTED BY: Signature / Organization	DATE	TIME

\* See Instructions for Sample Collection on Back of Sheet

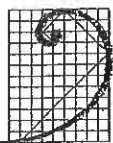


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 Fort Collins, CO +1 970 490 1511  
 Everett, WA +1 425 356 2600  
 Houston, TX +1 281 530 5656  
 Spring City, PA +1 610 948 4903  
 Middlestown, PA +1 717 944 5541  
 Salt Lake City, UT +1 801 266 7700  
 South Charleston, WV +1 304 356 3168  
 York, PA +1 717 505 5280

**Chain of Custody Form**  
 Page      of       
**COC ID: 41579**

Customer Information		Project Information		ALS Work Order #:													
Purchase Order	Project Name	ALS Project Manager:	Parameter/Method Request for Analysis														
Work Order	Project Number	AMBH WETT week 2	WETT - Sub ERM														
Company Name	Bill To Company	AMBH															
Send Report To	Invoice Attn	AMBH															
Address	Address																
City/State/Zip	City/State/Zip																
Phone	Phone																
Fax	Fax																
e-Mail Address	e-Mail Address																
No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	Outfall 001 Comp	*8-25-19	0618	AA	8	1	X										
2	Outfall 011 Comp	*8-25-19	0608	AA	8	1	X										
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign  
 Relinquished by: *B. Foy*  
 Date: 8-26-19  
 Time: 12:17  
 Received by (Laboratory): *BRM*  
 Received by (Laboratory): 8/26/19 12:00  
 Checked by (Laboratory):  
 Preservative Key: 1-HCl 2-HNO<sub>3</sub> 3-H<sub>2</sub>SO<sub>4</sub> 4-NaOH 5-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 6-NaHSO<sub>4</sub> 7-Other 8-4°C 9-5035  
 Turnaround Time in Business Days (BD):  10 BD  5 BD  3 BD  2 BD  1 BD  
 Results Due Date:  
 Notes: \*Composite sample ends on 08/26/19 at same time - SR 09/03/19  
 QC Package: (Check One Box Below)  
 Level II Std QC  TRRP Checklist  
 Level III Std QC/Raw Date  TRRP Level IV  
 Level IV SW846/CLP  Other



# ENVIRONMENTAL RESOURCES MANAGEMENT

3352 128<sup>th</sup> Avenue Holland, Michigan 49424-9263

Phone: 616-399-3500 FAX: 616-399-3777

**ERM**<sup>®</sup>

## AQUATIC TOXICITY LAB CHAIN OF CUSTODY FORM \*

CLIENT NAME:		ADDRESS:		SAMPLER		PHONE NUMBER:		
SAMPLE DESCRIPTION (i.e. Outfall 001)		DATE (Begin/End)	TIME (Begin/End)	GRAB OR COMP	NUMBER AND SIZE OF CONTAINERS	FIELD PARAMETERS	SAMPLE ID NUMBER (filled in by ERM)	INITIAL WATER QUALITY PARAMETERS UPON RECEIPT BY LABORATORY (filled in by ERM)
001	03/12/14	0610			2.5g	pH= s.u. NH <sub>3</sub> = mg/L	082819-1	Temp. (°C) 5.0 On Ice <input checked="" type="checkbox"/> D.O. 7.3 mg/L pH 7.2 s.u. Cond 391 umhos/cm
011	03/12/14	0555			2.5g	pH= s.u. NH <sub>3</sub> = mg/L	082819-2	Temp. (°C) 5.5 On Ice <input checked="" type="checkbox"/> D.O. 5.5 mg/L pH 7.3 s.u. Cond 459 umhos/cm
						pH= s.u. NH <sub>3</sub> = mg/L		Temp. (°C) On Ice <input type="checkbox"/> D.O. mg/L pH s.u. Cond umhos/cm
						pH= s.u. NH <sub>3</sub> = mg/L		Temp. (°C) On Ice <input type="checkbox"/> D.O. mg/L pH s.u. Cond umhos/cm
						pH= s.u. NH <sub>3</sub> = mg/L		Temp. (°C) On Ice <input type="checkbox"/> D.O. mg/L pH s.u. Cond umhos/cm
						pH= s.u. NH <sub>3</sub> = mg/L		Temp. (°C) On Ice <input type="checkbox"/> D.O. mg/L pH s.u. Cond umhos/cm
ANALYSES REQUESTED [check item(s)]		Test Material: Water/Wastewater Sediment Product		Test Type: Acute Chronic Other		Test Species: <input type="checkbox"/> <i>Ceriodaphnia dubia</i> <input type="checkbox"/> <i>Daphnia magna</i> <input type="checkbox"/> <i>Daphnia pulex</i> <input type="checkbox"/> Fathead minnow ( <i>Pimephales promelas</i> ) <input type="checkbox"/> Rainbow Trout ( <i>Oncorhynchus mykiss</i> ) <input type="checkbox"/> Sheephead minnow ( <i>Cyprinodon variegatus</i> ) <input type="checkbox"/> Silverside minnow ( <i>Menidia beryllina</i> ) <input type="checkbox"/> Other (write in comments section)		
COMMENT SECTION: <i>Sre ALS COC 4/2011</i>								

### SAMPLE TRANSFERS

RELINQUISHED BY: Signature / Organization	DATE	TIME	ACCEPTED BY: Signature / Organization	DATE	TIME

\* See Instructions for Sample Collection on Back of Sheet

AMBH WETT week 2  
AMBH  
AMBH  
WETT sub to EK

Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H
Outfall 001 Comp	*8-27-19	0610	AA	8	1-2gal	X			082819-1				
Outfall 011 Comp	*8-27-19	0555	AA	8	1-2gal	X			082819-2				

ALS Project Manager:	ALS Work Order #:
AMBH WETT week 2	WETT sub to EK

Project Information  
Parameter/Method Request for Analysis:  
WETT sub to EK

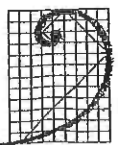
Project Name: AMBH WETT week 2  
Project Number: AMBH  
Bill To Company: AMBH  
Invoice Attn: AMBH

Address:  
City/State/Zip:  
Phone:  
Fax:  
e-Mail Address:

Customer Information

Sample Description: Outfall 001 Comp, Outfall 011 Comp  
Date: \*8-27-19, \*8-27-19  
Time: 0610, 0555  
Matrix: AA, AA  
Pres.: 8, 8  
# Bottles: 1-2gal, 1-2gal

Shipment Method: Turnaround Time in Business Days (BD)  
Received by (Laboratory):  
Checked by (Laboratory):



ERM®

# ENVIRONMENTAL RESOURCES MANAGEMENT

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Phone: 616-399-3500 FAX: 616-399-3777

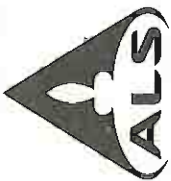
## AQUATIC TOXICITY LAB CHAIN OF CUSTODY FORM \*

CLIENT NAME: ADDRESS:	SAMPLER		PHONE NUMBER:		INITIAL WATER QUALITY PARAMETERS UPON RECEIPT BY LABORATORY (filled in by ERM)						
	DATE (Begin/End)	TIME (Begin/End)	GRAB OR COMP	NUMBER AND SIZE OF CONTAINERS	FIELD PARAMETERS	SAMPLE ID NUMBER (Filled in by ERM)	Temp. (°C) <input type="checkbox"/> On Ice	D.O. mg/L	pH	pH s.u.	Conductivity umhos/cm
001	8/22/14	0622		1 gal + 2.5 gal	pH= NH <sub>3</sub> = s.u. mg/L	083019-1	<input checked="" type="checkbox"/> On Ice	9.2	7.3	454	umhos/cm
	8/31/14	0622					<input type="checkbox"/> On Ice				
011	8/29/14	0608		1 gal + 2.5 gal	pH= NH <sub>3</sub> = s.u. mg/L	083019-2	<input checked="" type="checkbox"/> On Ice	6.7	7.2	464	umhos/cm
	8/30	0608					<input type="checkbox"/> On Ice				
					pH= NH <sub>3</sub> = s.u. mg/L		<input type="checkbox"/> On Ice				umhos/cm
					pH= NH <sub>3</sub> = s.u. mg/L		<input type="checkbox"/> On Ice				umhos/cm
					pH= NH <sub>3</sub> = s.u. mg/L		<input type="checkbox"/> On Ice				umhos/cm
					pH= NH <sub>3</sub> = s.u. mg/L		<input type="checkbox"/> On Ice				umhos/cm
					pH= NH <sub>3</sub> = s.u. mg/L		<input type="checkbox"/> On Ice				umhos/cm
ANALYSES REQUESTED [check item(s)]					Test Species: <input type="checkbox"/> <i>Ceriodaphnia dubia</i> <input type="checkbox"/> Rainbow Trout ( <i>Oncorhynchus mykiss</i> ) <input type="checkbox"/> <i>Americanysis baltica</i> <input type="checkbox"/> <i>Daphnia magna</i> <input type="checkbox"/> Sheepshead minnow ( <i>Cyprinodon variegatus</i> ) <input type="checkbox"/> <i>Hyalella azteca</i> <input type="checkbox"/> <i>Daphnia pulex</i> <input type="checkbox"/> Silverside minnow ( <i>Menidia beryllina</i> ) <input type="checkbox"/> <i>Chironomus dilutus</i> <input type="checkbox"/> Fathead minnow ( <i>Pimephales promelas</i> ) <input type="checkbox"/> Other (write in comments section)						
COMMENT SECTION: see ALS C0C 42012											

SAMPLE TRANSFERS

RELINQUISHED BY: Signature / Organization	DATE	TIME	ACCEPTED BY: Signature / Organization	DATE	TIME
<i>[Signature]</i>			<i>[Signature]</i>	8/31/14	1330

\* See Instructions for Sample Collection on Back of Sheet



Cincinnati, OH +1 513 733 5336  
 Fort Collins, CO +1 970 490 1511  
 Houston, TX +1 281 530 5656  
 Spring City, PA +1 610 948 4903  
 South Charleston, WV +1 304 356 3168  
 Everett, WA +1 425 356 2600  
 Holland, MI +1 616 399 6070  
 Middletown, PA +1 717 944 5541  
 Salt Lake City, UT +1 801 266 7700  
 York, PA +1 717 505 5280

# Chain of Custody Form

Page      of       
 COC ID: **42012**

Customer Information				Project Information				ALS Work Order #:											
Purchase Order	Project Name	ALS Project Manager:	Parameter/Method Request for Analysis																
Work Order	Project Number	AMBH WETT week 2	AMBH WETT sub to ERM																
Company Name	Bill To Company	AMBH																	
Send Report To	Invoice Attn																		
Address	Address																		
City/State/Zip	City/State/Zip																		
Phone	Phone																		
Fax	Fax																		
e-Mail Address	e-Mail Address																		
No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold		
1	Outfall 001 Comp	* 8-28-19	0622	AD	8	2-3gal	X												
2	Outfall 011 Comp	* 8-28-19	0608	AD	8	2-3gal	X												
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Turnaround Time in Business Days (BD)  10 BD  5 BD  3 BD  2 BD  1 BD  Other \_\_\_\_\_ Results Due Date: \_\_\_\_\_

Shipment Method: Express

Relinquished by: B. Faye Date: 8-30-19 Time: \_\_\_\_\_

Relinquished by: [Signature] Date: \_\_\_\_\_ Time: \_\_\_\_\_

Logged by (Laboratory): \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Preservative Key: 1-HCl 2-HNO<sub>3</sub> 3-H<sub>2</sub>SO<sub>4</sub> 4-NaOH 5-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 6-NaHSO<sub>4</sub> 7-Other 8-4°C 9-5035

Notes: Composite sample only on 08/28/19 of same time - in 09/03/19

QC Package: (Check One Box Below)

Level II Std QC  TRRP Checklist  
 Level III Std QC/Raw Date  TRRP Level IV  
 Level IV SW846/CLP  Other \_\_\_\_\_

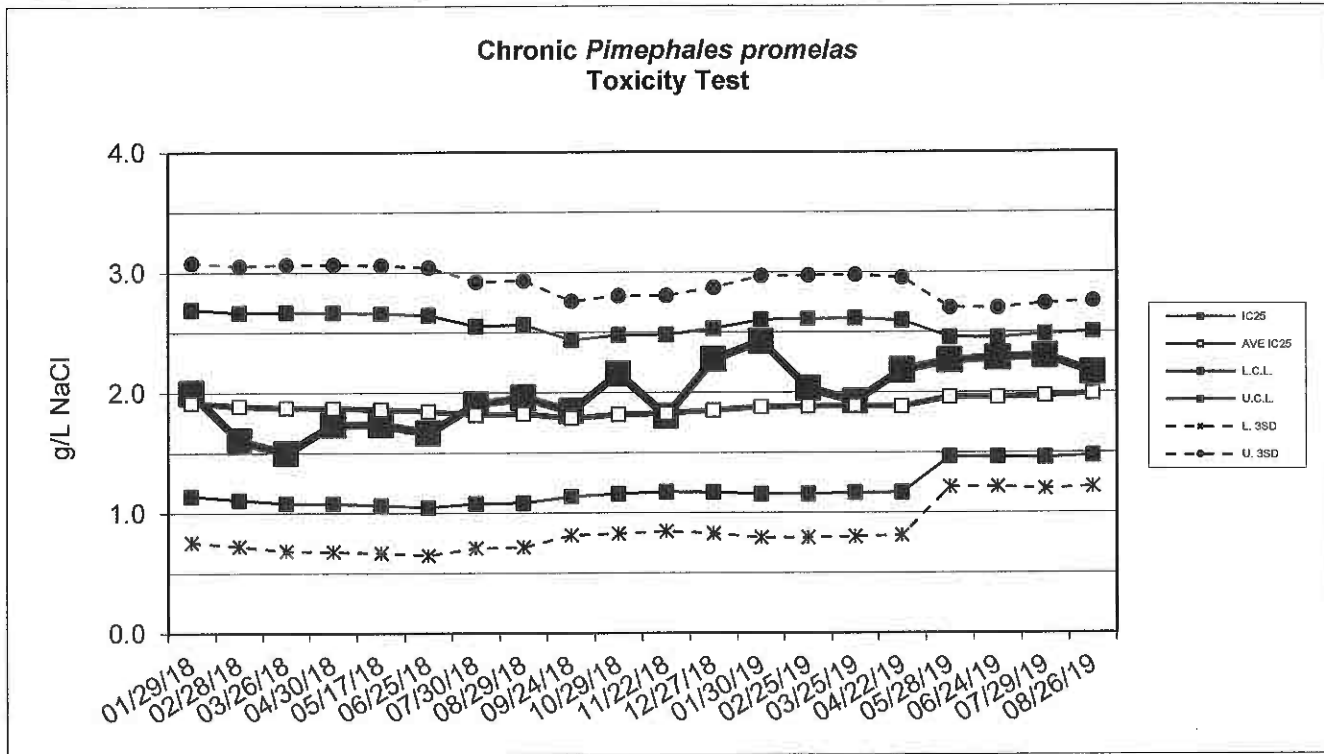
Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
 2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
 3. The Chain of Custody is a legal document. All information must be completed accurately.

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# Environmental Resources Management

## Standard Reference Toxicant Data



**Chronic *Pimephales promelas* Toxicity Test Data**

Date	IC25 (g/L NaCl)	AVE IC25 (g/L NaCl)	CONTROL LIMIT		Survival (%)	CONTROL Growth (mg)	CV (%)
			Lower	Upper			
01/29/18	2.0	1.9	1.1	2.7	97.5	0.39	4.8
02/28/18	1.6	1.9	1.1	2.7	92.5	0.44	10.7
03/26/18	1.5	1.9	1.1	2.7	97.5	0.47	3.5
04/30/18	1.7	1.9	1.1	2.7	95	0.45	11.4
05/17/18	1.7	1.9	1.1	2.7	100	0.54	10.8
06/25/18	1.7	1.8	1.0	2.6	95	0.56	17.8
07/30/18	1.9	1.8	1.1	2.6	97.5	0.43	4.3
08/29/18	2.0	1.8	1.1	2.6	100	0.58	9.4
09/24/18	1.8	1.8	1.1	2.4	97.5	0.46	8.2
10/29/18	2.2	1.8	1.2	2.5	97.5	0.45	7.7
11/22/18	1.8	1.8	1.2	2.5	95	0.65	5.2
12/27/18	2.3	1.8	1.2	2.5	97.5	0.64	7.4
01/30/19	2.4	1.9	1.2	2.6	100	0.53	10.5
02/25/19	2.0	1.9	1.2	2.6	95	0.53	10.2
03/25/19	1.9	1.9	1.2	2.6	97.5	0.63	6.0
04/22/19	2.2	1.9	1.2	2.6	100	0.57	2.0
05/28/19	2.3	2.0	1.5	2.5	100	0.68	10.4
06/24/19	2.3	2.0	1.5	2.5	92.5	0.48	11.0
07/29/19	2.3	2.0	1.5	2.5	100	0.51	5.6
08/26/19	2.2	2.0	1.5	2.5	100	0.38	15.0