ERM

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September 12, 2019

Mr. Les Arnold
ALS Environmental
3352 128th Avenue
Holland, MI 49424

Reference: 0501867.0152

Subject: Whole Effluent Toxicity Test Results

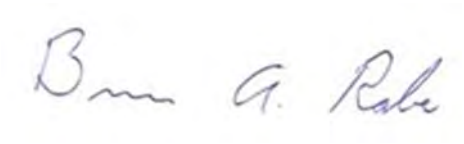
Dear Les,

Enclosed please find the final results of the following Chronic Toxicity Tests performed on samples of the ArcelorMittal Burns Harbor Outfall 001 effluent.

- 19 August 2019, Chronic *Ceriodaphnia dubia* Toxicity Test
- 19 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.

Yours sincerely,



Bruce A. Rabe
Director, Aquatic Toxicology Laboratory

BAR:km

Enclosure: Whole Effluent Toxicity Test Report

cc: Amanda Grzybowski
Brandon Frye
File

Permittee/Location: ArcelorMittal Burns Harbor LLC 250 West U.S. Hwy 12 Burns Harbor, IN 46304	**Permit number:** IN0000175	**Outfall number:** 001
Laboratory Name and Contact: Environmental Resources Management 3352 128th Avenue Holland, MI 49424	**Report Due Date:** N/A	**Report Date:** September 12, 2019

WETT Reporting Frequency or Type:	Monthly	Quarterly	Semi-annual	Annual	TRE	Post TRE	First (per Reporting Frequency)?
							Re-take (per Reporting Frequency)?

Test Organism	Test Type	Endpoint	Units	Result	Pass/ Fail	Limit	Reporting
Ceriodaphnia dubia	7-day Survival and Reproduction Definitive Static-Renewal	NOEC Survival	%	100		N/A	Laboratory Report
			TU_c	1.0		1.0	
		NOEC Reproduction	%	100		N/A	
			TU_c	1.0		1.0	
		IC_{25} Reproduction	%	>100		N/A	
			TU_c	1.0		1.0	
		48 hr. LC_{50}	%	>100		N/A	
			TU_a	1.0		1.0	
		Toxicity (chronic)	**TU_c**	**1.0**	Pass	**1.0**	Laboratory Report and **NetDMR** (Parameter Code 61426)
		Toxicity (acute)	**TU_a**	**1.0**	Pass	**1.0**	Laboratory Report and **NetDMR** (Parameter Code 61425)
Pimephales promelas	7-day Larval Survival and Growth Definitive Static-Renewal	NOEC Survival	%	100		N/A	Laboratory Report
			TU_c	1.0		1.0	
		NOEC Growth	%	100		N/A	
			TU_c	1.0		1.0	
		IC_{25} Growth	%	>100		N/A	
			TU_c	1.0		1.0	
		96 hr. LC_{50}	%	>100		N/A	
			TU_a	1.0		1.0	
		Toxicity (chronic)	**TU_c**	**1.0**	Pass	**1.0**	Laboratory Report and **NetDMR** (Parameter Code 61428)
		Toxicity (acute)	**TU_a**	**1.0**	Pass	**1.0**	Laboratory Report and **NetDMR** (Parameter Code 61427)

FINAL REPORT

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

Submitted To:
ALS Environmental
3352 128th Avenue
Holland, MI 49424

Sample: ArcelorMittal Burns Harbor, LLC - Outfall 001

Testing Period: 19 – 25 August 2019

Laboratory I.D. Number: 081919-2

PA DEP ID No. 68-04227
NJ DEP ID No. MI013

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 001
Receiving Water:	East Branch, Little Calumet River
Testing Date:	19 – 25 August 2019
Sample Date(s):	19 August 2019 21 August 2019 22 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	38.2
6	100	42.2
13	100	43.8
25	100	44.1
50	100	43.3
100	100	43.2

TEST RESULTS

48-Hour LC_{50}	>100%
NOEC (Survival & Reproduction)	100%
LOEC (Survival & Reproduction)	>100%
IC_{25}	>100%
MSDp (Reproduction)	12.6%
TUa ($100/LC_{50}$)	1.0
TUc ($100/IC_{25}$)	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 128th 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 (µm) NITEX® screen. All samples were maintained at 0 – 6 degrees Celsius (°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., ≥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 ± 1°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 (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 (TUc) is calculated and is defined as the most conservative of either 100/NOEC based on the more sensitive test endpoint or $100/IC_{25}$.

To evaluate acute toxicity, a 48-hour LC_{50} and corresponding 95 percent confidence interval was also calculated, where possible. The LC_{50} value estimate was determined by using one of the following statistical methods: graphical, Spearman-Karber, Trimmed Spearman-Karber, 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_{50} value was converted to an acute toxic unit (TUa) by $100/LC_{50}$. 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_{25} are plotted to determine if the results are within prescribed limits (Appendix A - Standard Reference Toxicant Data). If the IC_{25} 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, 4th 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	Control/Dilution Water:	RMHW
Effluent/Location:	Outfall 001 RM 08/19	Organism Batch #:	144-19
Lab I.D.#:	081919-2	Organism Age:	19 - 23.5 hrs
Beginning Date:	08/19/19 Time: ~~1500~~ 1700	QC Review:	KM
Ending Date:	08/25/19 Time: 1530	QC Review Date:	09/09/19

Initial Water Quality:

Parameter	Units	Effluent			Synthetic Water		
Sample #	--	1	2	3	--	--	--
Lab I.D.#/ Batch #	--	081919-2	0821A-1	082319-3	96-19	99-19	-
Temperature	° C	5	3	2	--	--	--
Dissolved Oxygen	mg / L	12.3	11.0	10.7	--	--	--
pH	S.U.	7.9	7.1	7.7	7.6	7.8	-
Conductivity	umhos/cm	394	417	407	321	315	-
Alkalinity	mg / L $CaCO_3$	110	108	104	60	60	-
Hardness	mg / L $CaCO_3$	156	160	160	84	90	-
Total Ammonia	mg / L NH_3	0.43	0.29	0.26	--	--	--
Total Residual Chlorine	mg / L Cl_2	<0.01	<0.01	<0.01	<0.01	<0.01	-
Total mls of 7.0 g/L Sodium Thiosulfate added per liter	mL / L	--	--	--	--	--	--
Initials	--	SPR	RA	SPR	SPR	SPR	-

Test Solution Preparation: Test Solution Prepared For Both Species.

Treatment (% Effluent)	Effluent (mL)	Dilution (mL)
Control	0	1200
6%	72	1128
13%	156	1044
25%	300	900
50%	600	600
100%	1200	0

Test Day	Initials	Effluent Sample #	Synthetic Batch #
0	RWM	1	96-19
1	RWM	1	96-19
2	RH	2	96-19
3	MB	2	96-19
4	[illegible]	3	96-19
5	~~KM~~ RH KM 8/24	3	99-19
6	KM	3	99-19
7			

Environmental Resources Management

Ceriodaphnia dubia - Chronic Toxicity Test
Water Quality Data

Permittee/Client: ArcelorMittal Burns Harbor, LLC
Effluent/Location: Outfall 001
Lab I.D.#: 081919-2

Water Quality Data:

Dissolved Oxygen (mg/L)

Day														
Meter #	5	3	5	5	5	5	5	5	3	3	5	3	5	
Treatment	0	1		2		3		4		5		6		7
(% Effluent)	I	F	I	F	I	F	I	F	I	F	I	F	I	F
Control	7.9	8.1	7.9	7.4	8.0	7.8	8.0	7.9	8.4	8.1	8.1	8.1	8.0	
6%	7.9	8.1	7.9	7.3	8.0	7.7	8.1	7.9	8.4	8.2	8.1	8.2	8.0	
13%	8.0	8.2	8.0	7.2	8.0	7.7	8.1	7.8	8.4	8.2	8.2	8.1	8.0	
25%	8.1	8.2	8.0	7.2	8.0	7.6	8.1	7.9	8.4	8.2	8.2	8.0	8.1	
50%	8.1	8.2	8.1	7.1	8.1	7.6	8.1	7.9	8.4	8.1	8.2	7.9	8.2	
100%	8.4	8.1	8.2	7.0	8.1	7.5	8.1	7.9	8.5	8.2	8.3	7.9	8.2	

pH (S.U.)

Day														
Meter #	10	8	10	9	10	9	10	10	9	8	10	8	10	
Treatment	0	1		2		3		4		5		6		7
(% Effluent)	I	F	I	F	I	F	I	F	I	F	I	F	I	F
Control	7.9	7.8	7.8	7.6	7.8	7.5	7.8	7.4	8.0	7.6	7.8	7.8	7.9	
6%	--	7.8	--	7.6	--	7.6	--	7.6	--	7.8	--	8.0	--	
13%	--	7.8	--	7.7	--	7.6	--	7.7	--	7.8	--	8.0	--	
25%	--	7.8	--	7.7	--	7.7	--	7.8	--	7.9	--	8.1	--	
50%	--	7.9	--	7.8	--	7.7	--	7.8	--	7.9	--	8.1	--	
100%	8.0	7.9	7.8	7.9	7.7	7.8	7.6	7.9	7.9	8.1	7.9	8.2	7.9	

Conductivity (umhos / cm)

Day														
Meter #	4	--	4	--	4	--	4	--	4	--	4	--	4	--
Treatment	0	1		2		3		4		5		6		7
(% Effluent)	I	F	I	F	I	F	I	F	I	F	I	F	I	F
Control	323	--	322	--	323	--	326	--	323	--	315	--	313	--
6%	326	--	327	--	326	--	332	--	328	--	320	--	322	--
13%	332	--	332	--	332	--	338	--	334	--	326	--	329	--
25%	340	--	341	--	342	--	349	--	343	--	335	--	336	--
50%	363	--	362	--	366	--	372	--	364	--	357	--	359	--
100%	405	--	404	--	414	--	421	--	409	--	402	--	404	--
		--		--		--		--		--		--		--

Temperature (° C)

Day														
Meter #	5	3	5	5	8	5	5	5	3	3	5	3	5	
Treatment	0	1		2		3		4		5		6		7
(% Effluent)	I	F	I	F	I	F	I	F	I	F	I	F	I	F
Control	24	24	24	24	24	25	24	24	24	24	24	24	24	
6%	24	24	24	24	24	25	24	24	24	24	24	24	24	
13%	24	24	24	24	24	25	24	24	24	24	24	24	24	
25%	24	24	24	24	24	25	24	24	24	24	24	24	24	
50%	24	24	24	24	25	25	24	24	24	24	24	24	24	
100%	24	24	24	24	25	25	24	24	25	24	24	24	24	

I = Initial Chemistry F = Final Chemistry

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

Environmental Resources Management

Ceriodaphnia dubia - Chronic Toxicity Test
Survival and Reproduction Data

Permittee/Client: ArcelorMittal Burns Harbor, LLC
Effluent/Location: Outfall 001
Lab I.D.#: 081919-2

Treatment (% Effluent)	Day No.	Replicate 1	2	3	4	5	6	7	8	9	10	Average Young/ Female	Number of Live Adults (% Sur.)	Average Young/ Female % CV
Control	1	--	--	--	--	--	--	--	--	--	--		10	
	2	--	--	--	--	--	--	--	--	--	--		10	
	3	-	6	7	-	-	5	-	6	-	-		10	
	4	6	-	-	8	6	-	6	-	4	6		10	
	5	13	14	13	17	11	17	14	14	11	11	SPA 08/27/19	10	
	6	21	24	20	21	21	23	20	26	16	19	38.2	10	
	7						SPA 08/27/19							
Totals:		40	44	40	46	38	46 (15)	40	22	31	36	~~38.3~~	(100)	18.9
# Broods (% 3rd Brood)		3	3	3	3	3	3	3	3	3	3	(100)		
6%	1	--	--	--	--	--	--	--	--	--	--		10	
	2	--	--	--	--	--	--	--	--	--	--		10	
	3	-	5	7	-	5	5	6	5	-	7		10	
	4	6	-	-	7	-	-	-	-	7	-		10	
	5	14	13	15	16	14	17	15	19	16	19		10	
	6	21	18	20	14	19	23	24	23	23	19		10	
	7													
Totals:		41	36	42	37	38	45	45	47	46	45	42.2	(100)	9.9
13%	1	--	--	--	--	--	--	--	--	--	--		10	
	2	--	--	--	--	--	--	--	--	--	--		10	
	3	-	7	5	6	5	4	6	5	-	6		10	
	4	7	-	-	-	-	-	-	-	7	-		10	
	5	15	12	14	15	15	15	15	16	16	18		10	
	6	27	16	20	22	24	19	26	26	24	27		10	
	7													
Totals:		49	35	39	41	44	38	47	47	47	51	43.8	(100)	12.1
25%	1	--	--	--	--	--	--	--	--	--	--		10	
	2	--	--	--	--	--	--	--	--	--	--		10	
	3	-	5	6	6	7	4	5	4	-	6		10	
	4	7	-	-	-	-	-	-	-	6	-		10	
	5	15	17	13	15	16	18	17	16	19	15		10	
	6	19	25	22	20	24	23	24	21	25	21		10	
	7													
Totals:		41	47	41	41	47	45	~~47~~ 46	41	50	42	44.1	(100)	7.5
50%	1	--	--	--	--	--	--	SPA 8/25	--	--	--		10	
	2	--	--	--	--	--	--	--	--	--	--		10	
	3	-	6	6	5	5	-	6	6	-	7		10	
	4	6	-	-	-	-	9	-	-	6	-		10	
	5	14	15	15	12	17	15	17	18	13	13		10	
	6	21	24	26	23	22	22	25	22	19	22		10	
	7													
Totals:		41	45	47	40	44	42	48	46	38	42	43.3	(100)	7.5
100%	1	--	--	--	--	--	--	--	--	--	--		10	
	2	--	--	--	--	--	--	--	--	--	--		10	
	3	-	5	7	6	-	6	6	6	-	7		10	
	4	7	-	-	-	8	-	-	-	6	-		10	
	5	17	14	13	13	14	18	16	14	15	16		10	
	6	25	21	22	18	23	24	25	20	20	20		10	
	7													
Totals:		49	40	42	37	45	48	47	40	41	43	43.2	(100)	9.1

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

Environmental Resources Management

Ceriodaphnia dubia - Chronic Toxicity Test Support Data

Permittee/Client: ArcelorMittal Burns Harbor, LLC
Effluent/Location: Outfall 001
Lab I.D.#: 081919-2

Brood Board Information:

Replicate	1	2	3	4	5	6	7	8	9	10	Brood Board Date: 08/12/19
Chamber Number	2	7	8	17	18	27	28	41	43	56	Young Age Range: 19-23.5 hours

Test Information:

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
YCT Batch #:	16-19	16-19	16-19	17-19	17-19	17-19	17-19	
Algae Batch #:	17-19	17-19	18-19	18-19	18-19	18-19	18-19	
Observation Time:	1700 1500	1430	1530	1530	1530	1530	1530	
Initials:	RM	RH	[illegible]	KM	KM	RM	RM	
Date:	08/19/19	08-20-19	08/21/19	08/22/19	08/23/19	08/24/19	08/25/19	

Comment Section:

Day	Date	Initials	Comments

Ceriodaphnia 7-d Survival and Reproduction Test

ERM

Analysis ID:	02-7071-9699	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.4
Analyzed:	28 Aug-19 12:31	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	03-4677-8939	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Lab Tech
Start Date:	19 Aug-19 17:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Reconstituted Water
Ending Date:	25 Aug-19 15:30	**Species:**	Ceriodaphnia dubia	**Brine:**	
Test Length:	5d 22h	**Taxon:**	Branchiopoda	**Source:**	In-House Culture **Age:** <24
Sample ID:	17-2993-0268	**Code:**	671CA41C	**Project:**	WET Testing
Sample Date:	19 Aug-19 07:15	**Material:**	Industrial Effluent	**Source:**	ArcelorMittal Burns Harbor, LLC
Receipt Date:	19 Aug-19 15:30	**CAS (PC):**		**Station:**	Outfall 001
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	12.63%

Dunnett Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Lab Water		6	-1.898	2.289	4.825	18	CDF	0.9993	Non-Significant Effect
		13	-2.657	2.289	4.825	18	CDF	1.0000	Non-Significant Effect
		25	-2.799	2.289	4.825	18	CDF	1.0000	Non-Significant Effect
		50	-2.42	2.289	4.825	18	CDF	0.9999	Non-Significant Effect
		100	-2.372	2.289	4.825	18	CDF	0.9999	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	38.2	15	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	239.533	47.9067	5	2.157	0.0725	Non-Significant Effect
Error	1199.4	22.2111	54			
Total	1438.93		59			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance Test	9.051	15.09	0.1071	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9554	0.9459	0.0282	Normal Distribution

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	L	10	38.2	33.03	43.37	40	22	46	2.284	18.91%	0.00%
6		10	42.2	39.32	45.08	43.5	36	47	1.272	9.53%	-10.47%
13		10	43.8	40.02	47.58	45.5	35	51	1.672	12.07%	-14.66%
25		10	44.1	41.73	46.47	43.5	41	50	1.048	7.52%	-15.45%
50		10	43.3	40.99	45.61	43	38	48	1.023	7.47%	-13.35%
100		10	43.2	40.38	46.02	42.5	37	49	1.245	9.12%	-13.09%

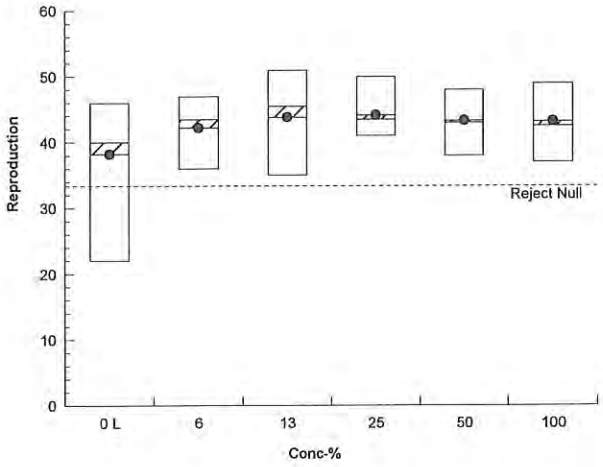
Reproduction Detail

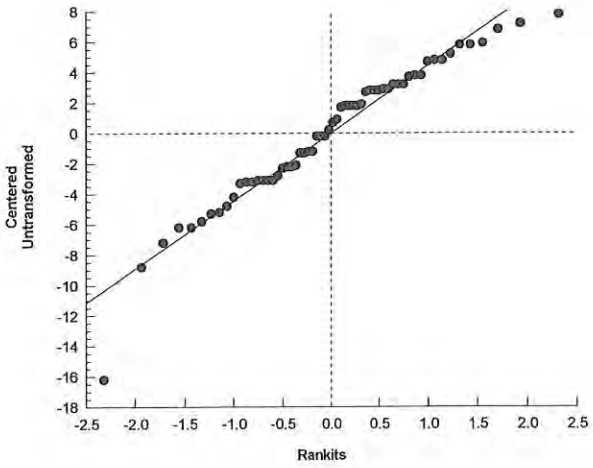
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	L	40	44	40	46	38	45	40	22	31	36
6		41	36	42	37	38	45	45	47	46	45
13		49	35	39	41	44	38	47	47	47	51
25		41	47	41	41	47	45	46	41	50	42
50		41	45	47	40	44	42	48	46	38	42
100		49	40	42	37	45	48	47	40	41	43

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

Analysis ID:	02-7071-9699	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.4
Analyzed:	28 Aug-19 12:31	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Graphics





Ceriodaphnia 7-d Survival and Reproduction Test

ERM

Analysis ID:	10-7912-2024	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.4
Analyzed:	28 Aug-19 12:31	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	03-4677-8939	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Lab Tech
Start Date:	19 Aug-19 17:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Reconstituted Water
Ending Date:	25 Aug-19 15:30	**Species:**	Ceriodaphnia dubia	**Brine:**	
Test Length:	5d 22h	**Taxon:**	Branchiopoda	**Source:**	In-House Culture **Age:** <24
Sample ID:	17-2993-0268	**Code:**	671CA41C	**Project:**	WET Testing
Sample Date:	19 Aug-19 07:15	**Material:**	Industrial Effluent	**Source:**	ArcelorMittal Burns Harbor, LLC
Receipt Date:	19 Aug-19 15:30	**CAS (PC):**		**Station:**	Outfall 001
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	1089740	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	38.2	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	38.2	22	46	7.223	18.91%	0.0%	42.47	0.0%
6		10	42.2	36	47	4.022	9.53%	-10.47%	42.47	0.0%
13		10	43.8	35	51	5.287	12.07%	-14.66%	42.47	0.0%
25		10	44.1	41	50	3.315	7.52%	-15.45%	42.47	0.0%
50		10	43.3	38	48	3.234	7.47%	-13.35%	42.47	0.0%
100		10	43.2	37	49	3.938	9.12%	-13.09%	42.47	0.0%

Reproduction Detail

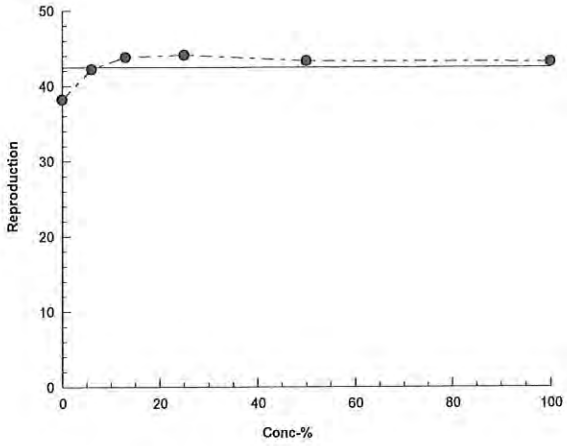
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	L	40	44	40	46	38	45	40	22	31	36
6		41	36	42	37	38	45	45	47	46	45
13		49	35	39	41	44	38	47	47	47	51
25		41	47	41	41	47	45	46	41	50	42
50		41	45	47	40	44	42	48	46	38	42
100		49	40	42	37	45	48	47	40	41	43

Ceriodaphnia 7-d Survival and Reproduction Test

ERM

Analysis ID:	10-7912-2024	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.4
Analyzed:	28 Aug-19 12:31	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



ERM®

ENVIRONMENTAL RESOURCES MANAGEMENT

3352 128th Avenue Holland, Michigan 49424-9263
Phone: 616- 399-3500 FAX: 616-399-3777

AQUATIC TOXICITY LAB CHAIN OF CUSTODY FORM *

CLIENT NAME:		SAMPLER	
ADDRESS:		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	08/19/19	0715	C	1 cubitainer 2.5G	pH= s.u. NH₃= mg/L	081919-2	Temp. 5 (° C) ☒ On Ice	D.O. 12.3 mg/L	pH 7.9 s.u.	Cond 394 umhos/cm
011	08/19/19	0930	G	~	pH= s.u. NH₃= mg/L	-3	Temp. 3 (° C) ☒ On Ice	D.O. 5.2 mg/L	pH 7.7 s.u.	Cond 409 umhos/cm
					pH= s.u. NH₃= mg/L		Temp. (° C) ☐ On Ice	D.O. mg/L	pH s.u.	Cond umhos/cm
					pH= s.u. NH₃= mg/L		Temp. (° C) ☐ On Ice	D.O. mg/L	pH s.u.	Cond umhos/cm
					pH= s.u. NH₃= mg/L		Temp. (° C) ☐ On Ice	D.O. mg/L	pH s.u.	Cond umhos/cm
					pH= s.u. NH₃= 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: ___ *Ceriodaphnia dubia* ___ *Daphnia magna* ___ *Daphnia pulex* ___ Fathead minnow (*Pimephales promelas*) ___ Rainbow Trout (*Oncorhynchus mykiss*) ___ Sheepshead minnow (*Cyprinodon variegatus*) ___ Silverside minnow (*Menidia beryllina*) ___ *Americamysis bahia* ___ *Hyalella azteca* ___ *Chironomus dilutus* ___ Other (write in comments section)

COMMENT SECTION: See ALS COC 41531 -SPR

SAMPLE TRANSFERS

RELINQUISHED BY: Signature / Organization	DATE	TIME	ACCEPTED BY: Signature /Organization	DATE	TIME
			/ ERM	081919	1530

* See Instructions for Sample Collection on Back of Sheet

February 2018

ALS

…513 733 5336 | Everett, WA +1 425 356 2600 | …Collins, CO +1 970 490 1511 | Holland, MI +1 616 399 6070 | Houston, TX +1 281 530 5656 | Middletown, PA +1 717 944 5541

Chain of Custody Form

Page ____ of ____

COC ID: 41581

Customer Information		Project Information	
…der		Project Name	Arcelor Mittal BA - WETT
…der		Project Number	
…me	ALS	Bill To Company	ALS
…t To		Invoice Attn	
…ess		Address	
…Zip		City/State/Zip	
…one		Phone	
Fax		Fax	
…ress		e-Mail Address	

ALS Project Manager:

ALS Work Order #:

	Parameter/Method Request for Analysis
A	WETT (Acute + Chronic - Flea…)
B	
C	
D	
E	
F	
G	
H	
I	
J	

Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
Composite	8-19-19	0715	AQ	NEAT	1-2gal	X										
Grab	8-19-19	0830	AQ	NEAT	1-2.5gal	X										

…er(s) Please Print & Sign: B. Page

…quished by: [signature] | Date: 8-19-19 | Time: | Received by: [signature] / AERA

…quished by: | Date: 081919 | Time: 1530 | Received by (Laboratory): " "

…ed by (Laboratory): | Date: | Time: | Checked by (Laboratory):

Shipment Method

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

Results Due Date:

Notes:

Cooler ID	Cooler Temp

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 ____

…eservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

…e: 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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York, PA +1 717 505 5280

Chain of Custody Form

Page ____ of ____

COC ID: 41865

ALS Project Manager: | ALS Work Order #: 19081459

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	Arcelor Mittal WETT	A	Round 2 Volume - WETT (Sub ERM)
Work Order		Project Number		B	
Company Name	U	Bill To Company		C	
Send Report To		Invoice Attn		D	
Address		Address		E	
				F	
City/State/Zip		City/State/Zip		G	
Phone		Phone		H	
Fax		Fax		I	
e-Mail Address		e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	Outfall 001 - Comp	8-21-19	0625	AQ	8	1-2.5gal.	X	Sample ID:				08219-1					
2	Outfall 011 - Comp	8-21-19	0605	AQ	8	2-2gal.	X	Sample ID:				08219-2					
3		001	011														
4	Temp	3	3														
5	~~pH~~ D.O.	11.0	7.1														
6	pH	7.1	7.3														
7	Cond	417	426														
8																	
9																	
10																	

081919-2 Cd
Page 17 of 20

Sampler(s) Please Print & Sign: B. Frye

Shipment Method:

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

Results Due Date:

Relinquished by:	Date: 8-21-19	Time:	Received by:	Notes:
Relinquished by:	Date:	Time:	Received by (Laboratory):	
Logged by (Laboratory): ERM	Date: 08-21-19	Time: 1100	Checked by (Laboratory):	

Cooler ID	Cooler Temp

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 ____

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 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.
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ERM

ENVIRONMENTAL RESOURCES MANAGEMENT
3352 128th Avenue Holland, Michigan 49424-9263
Phone: 616- 399-3500 FAX: 616-399-3777

AQUATIC TOXICITY LAB CHAIN OF CUSTODY FORM *

CLIENT NAME:	ArcelorMittal	SAMPLER	
ADDRESS:		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	05/22/19	0620			pH= s.u. NH_3= mg/L	082319-3	Temp. 7 (° C) ☒ On Ice	D.O. 10.7 mg/L	pH 7.7 s.u.	Cond 407 umhos/cm
011	05/22/19	0635			pH= s.u. NH_3= mg/L	-4	Temp. 7 (° C) ☒ On Ice	D.O. 8.9 mg/L	pH 7.7 s.u.	Cond 415 umhos/cm
					pH= s.u. NH_3= mg/L		Temp. (° C) ☐ On Ice	D.O. mg/L	pH s.u.	Cond umhos/cm
					pH= s.u. NH_3= mg/L		Temp. (° C) ☐ On Ice	D.O. mg/L	pH s.u.	Cond umhos/cm
					pH= s.u. NH_3= mg/L		Temp. (° C) ☐ On Ice	D.O. mg/L	pH s.u.	Cond umhos/cm
					pH= s.u. NH_3= 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:
- ___ *Ceriodaphnia dubia*
- ___ *Daphnia magna*
- ___ *Daphnia pulex*
- ___ Fathead minnow (*Pimephales promelas*)
- ___ Rainbow Trout (*Oncorhynchus mykiss*)
- ___ Sheepshead minnow (*Cyprinodon variegatus*)
- ___ Silverside minnow (*Menidia beryllina*)
- ___ *Americamysis bahia*
- ___ *Hyalella azteca*
- ___ *Chironomus dilutus*
- ___ Other (write in comments section)

COMMENT SECTION: See ALS COC 41578 -SPR

SAMPLE TRANSFERS

RELINQUISHED BY: Signature / Organization	DATE	TIME	ACCEPTED BY: Signature /Organization	DATE	TIME
			[signature] / ERM	082319	1430

* See Instructions for Sample Collection on Back of Sheet

February 2018

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South Charleston, WV +1 304 356 3168
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: 41578

ALS Project Manager: | ALS Work Order #: 19081459

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	AM BH WETT #3	A	WETT - Sub to ERM
Work Order		Project Number		B	
Company Name	Arcelor Mittal + EPT	Bill To Company	Arcelor Mittal	C	
Send Report To		Invoice Attn		D	
Address		Address		E	
				F	
City/State/Zip		City/State/Zip		G	
Phone		Phone		H	
Fax		Fax		I	
e-Mail Address		e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	Outfall 001 COMP	8-22-19	0620	AQ	8	(2)-3gal.	X										
2	Outfall 011 Comp	8-22-19	0635	AQ	8	(2)-3gal	X										
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: B. Fogle

Shipment Method:

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

Results Due Date:

Relinquished by: B. Fogle	Date: 8-23-19	Time:	Received by:
Relinquished by:	Date:	Time:	Received by (Laboratory): 082319 1430
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes:

Cooler ID	Cooler Temp

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 ____

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

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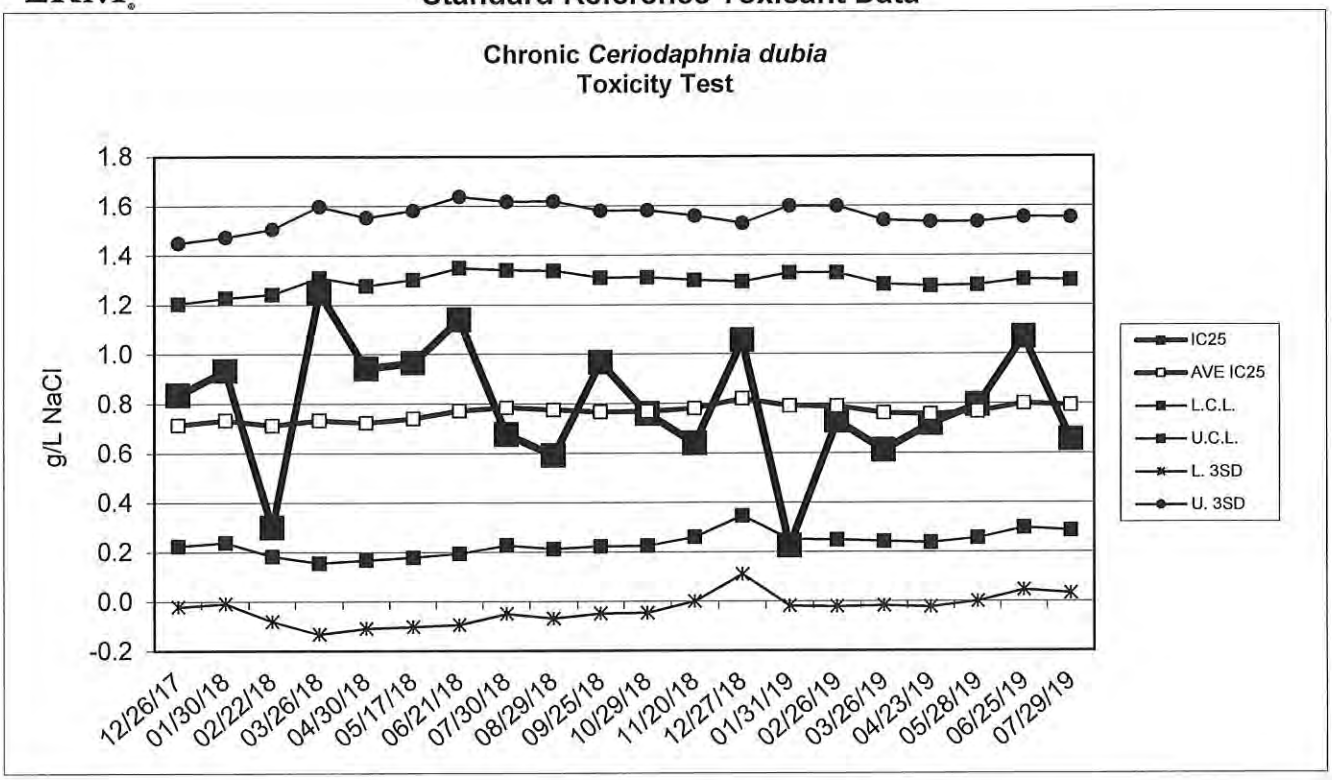
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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 Lower	CONTROL LIMIT Upper	Survival (%)	CONTROL Reproduction (ave. young)	CV (%)
12/26/17	0.83	0.7	0.22	1.20	100	21.9	11.9
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

FINAL REPORT

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

Submitted To:
ALS Environmental
3352 128th Avenue
Holland, MI 49424

Sample: ArcelorMittal Burns Harbor, LLC - Outfall 001

Testing Period: 19 – 26 August 2019

Laboratory I.D. Number: 081919-2

ACCREDITED IN ACCORDANCE WITH nelac
PA DEP ID No. 68-04227
NJ DEP ID No. MI013

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

ERM

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 001
Receiving Water:	East Branch, Little Calumet River
Testing Date:	19 – 26 August 2019
Sample Date(s):	19 August 2019 21 August 2019 22 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:	None

DATA SUMMARY

Effluent Concentrations (%)	Survival (%)	Growth Average Wt./ Organism (mg)
Control	100	0.521
6	100	0.504
13	95	0.506
25	97.5	0.508
50	95	0.493
100	95	0.522

TEST RESUL TS

96-Hour LC_{50}	>100%
NOEC (Survival)	100%
LOEC (Survival)	>100%
IC_{25}	>100%
MSDp (Survival)	16.7%
TUa (100/LC_{50})	1.0
TUc (100/ NOEC or IC_{25})	1.0

TEST CONCLUSION

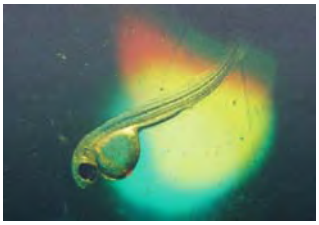
In accordance with the NPDES permit requirements for ArcelorMittal Burns Harbor, LLC, this toxicity test did not exceed either the acute or the chronic toxicity limit.

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

Environmental Resources Management
3352 128th 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 (µm) NITEX® screen. All samples were maintained at 0 – 6 degrees Celsius (°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± 1°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 (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 (TUc) is calculated and is defined as the most conservative of either 100/NOEC based on the most sensitive test endpoint or $100/IC_{25}$.

To evaluate acute toxicity, a 96-hour LC_{50} and corresponding 95 percent confidence interval were also calculated, where possible. The LC_{50} value estimate was determined by using one of the following statistical methods: graphical, Spearman-Karber, Trimmed Spearman-Karber, 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_{50} value was converted to an acute toxic unit (TUa) by $100/LC_{50}$. 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_{25}) are plotted to determine if the results are within prescribed limits (Appendix A - Standard Reference Toxicant Data). If the IC_{25} of a particular reference toxicant test does not fall within the expected range of $\pm$ 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, 4th 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

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

Permittee/Client:	ArcelorMittal Burns Harbor, LLC	Control/Dilution Water:	RMHW
Effluent/Location:	Outfall 001	Organism Batch #:	144-19
Lab I.D.#:	081919-2	Organism Age:	<24 hrs old
Beginning Date:	08/19/19 Time: 1730	QC Review:	KM
Ending Date:	08/26/19 Time: 1630	QC Review Date:	09/09/19

Initial Water Quality:

Parameter	Units	Effluent			Synthetic Water		
Sample #	--	1	2	3	--	--	--
Lab I.D.#/ Batch #	--	081919-2	08219-1	082319-3	96-19	99-19	-
Temperature	° C	5	3	7	--	--	--
Dissolved Oxygen	mg / L	12.3	11.0	10.7	--	--	--
pH	S.U.	7.9	7.1	7.7	7.6	7.6	-
Conductivity	umhos/cm	394	417	407	321	315	-
Alkalinity	mg / L $CaCO_3$	110	104	104	60	60	-
Hardness	mg / L $CaCO_3$	156	160	160	84	80	-
Total Ammonia	mg / L NH_3	0.43	0.28	0.26	--	--	--
Total Residual Chlorine	mg / L Cl_2	<0.01	<0.01	<0.01	<0.01	<0.01	-
Total mls of 7.0 g/L Sodium Thiosulfate added per liter	mL / L	--	--	--	--	--	--
Initials	--	SPR	RM	SPR	SPR	SPR	-

Test Solution Preparation: Test Solution Prepared For Both Species.

Treatment (% Effluent)	Effluent (mL)	Dilution (mL)
Control	0	1200
6%	72	1128
13%	156	1044
25%	300	900
50%	600	600
100%	1200	0

Test Day	Initials	Effluent Sample #	Synthetic Batch #
0	RWM	1	96-19
1	RWM	1	96-19
2	RM	2	96-19
3	MB	2	96-19
4	[illegible]	3	96-19
5	RH	3	99-19
6	KM	3	99-19
7	SPR	--	--

Environmental Resources Management

Pimephales promelas - Chronic Toxicity Test
Water Quality Data

Permittee/Client: ArcelorMittal Burns Harbor, LLC
Effluent/Location: Outfall 001
Lab I.D.#: 081919-2

Water Quality Data:

Dissolved Oxygen (mg/L)

Day														
Meter #	5	3	5	5	5	5	5	3	3	5	5	3	5	3
Treatment	0	1		2		3		4		5		6		7
(% Effluent)	I	F	I	F	I	F	I	F	I	F	I	F	I	F
Control	7.9	7.3	7.9	6.7	8.0	7.6	8.0	6.7	8.4	6.9	8.1	6.6	8.0	7.1
6%	7.9	7.2	7.9	6.2	8.0	6.8	8.1	6.5	8.4	7.0	8.1	6.2	8.0	7.2
13%	8.0	7.2	8.0	6.3	8.0	6.6	8.1	6.4	8.4	7.0	8.2	6.3	8.0	7.4
25%	8.1	7.3	8.0	6.3	8.0	6.6	8.1	6.4	8.4	6.6	8.2	6.2	8.1	7.0
50%	8.1	7.0	8.1	6.0	8.1	6.5	8.1	6.4	8.4	6.3	8.2	5.7	8.2	7.0
100%	8.4	7.1	8.2	5.7	8.1	6.5	8.1	6.4	8.5	6.1	8.3	6.5	8.2	7.1

pH (S.U.)

Day														
Meter #	10	8	10	10	10	9	10	9	9	10	10	8	10	8
Treatment	0	1		2		3		4		5		6		7
(% Effluent)	I	F	I	F	I	F	I	F	I	F	I	F	I	F
Control	7.4	7.5	7.8	7.5	7.8	7.5	7.8	7.4	8.0	7.4	7.8	7.4	7.9	7.4
6%	--	7.6	--	7.5	--	7.5	--	7.4	--	7.5	--	7.3	--	7.4
13%	--	7.7	--	7.6	--	7.4	--	7.4	--	7.5	--	7.4	--	7.4
25%	--	7.8	--	7.7	--	7.5	--	7.5	--	7.6	--	7.4	--	7.5
50%	--	7.9	--	7.7	--	7.6	--	7.7	--	7.7	--	7.4	--	7.5
100%	8.0	8.0	7.8	7.8	7.7	7.7	7.6	7.8	7.9	7.8	7.9	7.6	7.9	7.6

Conductivity (umhos / cm)

Day														
Meter #	4	--	4	--	4	--	4	--	4	--	4	--	4	--
Treatment	0	1		2		3		4		5		6		7
(% Effluent)	I	F	I	F	I	F	I	F	I	F	I	F	I	F
Control	323	--	322	--	323	--	326	--	323	--	315	--	313	--
6%	326	--	327	--	326	--	332	--	328	--	320	--	322	--
13%	332	--	332	--	332	--	338	--	334	--	326	--	329	--
25%	340	--	341	--	342	--	349	--	343	--	335	--	336	--
50%	363	--	362	--	366	--	372	--	364	--	357	--	359	--
100%	405	--	404	--	414	--	421	--	409	--	402	--	404	--

Temperature (° C)

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

I = Initial Chemistry F = Final Chemistry

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

Environmental Resources Management

Pimephales promelas - Chronic Toxicity Test
Survival Data

Permittee/Client: ArcelorMittal Burns Harbor, LLC
Effluent/Location: Outfall 001
Lab I.D.#: 081919-2

Survival Data:

Treatment		# Live Organisms Day									# Live Organisms Day (KM 08/24)								96 Hour Survival Summary		
																			Total Live		%
(% Effluent)	Rep.	0	1	2	3	4	5	6	7	Rep.	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	10	40	40	100
6%	A	10	10	10	10	10	10	10	10	B	10	10	10	10	10	10	10	10	40	40	100
13%	A	10	10	10	10	9	9	9	9	B	10	10	10	10	10	10	10	10	40	38	95
25%	A	10	10	10	10	10	10	10	10	B	10	10	10	10	10	10	10	10	40	39	97.5
50%	A	10	10	10	10	10	10	10	10	B	10	10	10	10	10	10	9	9	40	39	97.5
100%	A	10	10	10	10	10	9	9	9	B	10	10	10	9	9	9	9	9	40	39	97.5

Treatment		# Live Organisms Day									# Live Organisms Day								7 Day Survival Summary		
																			Total Live		%
(% Effluent)	Rep.	0	1	2	3	4	5	6	7	Rep.	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	10	40	40	100
6%	C	10	10	10	10	10	10	10	10	D	10	10	10	10	10	10	10	10	40	40	100
13%	C	10	10	10	10	10	10	10	10	D	10	10	10	10	9	9	9	9	40	36	95
25%	C	10	10	10	10	10	10	10	10	D	10	10	10	10	9	9	9	9	40	39	97.5
50%	C	10	10	10	10	9	9	9	9	D	10	10	10	10	10	10	10	10	40	38	95
100%	C	10	10	10	10	10	10	10	10	D	10	10	10	10	10	10	10	10	40	38	95

Test Information:

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Time:	1730	1500	1600	1600	1600	1600	1530	1630
Initials:	SPR	KM		KM	KM	KM		SPR
Date:	08/19/19	08/20/19	08/21/19	08/22/19	08/23/19	08/24/19	08/25/19	08/26/19

Feeding:

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Batch #:	230-19	231-19	232-19	233-19	234-19	235-19	236-19	--
Initials AM:	--	RA		RM		KM	KM	--
Initials PM:	RM					KM		--

Oven:

Date In	Time In	Initials		Date Out	Time Out	Initials
08/26/19	1630	SPR		08/27/19	1630	KM

Comment Section:

Day	Date	Initials	Comments

Permittee/Client: ArcelorMittal Burns Harbor, LLC
Effluent/Location: Outfall 001
Lab I.D.#: 081919-2

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			8/27/2019	8/26/2019					
Analyst			km	km					
1	Control	A	25.69	20.83	4.86	10	0.486		
2	Control	B	26.73	21.85	4.88	10	0.488		
3	Control	C	24.13	18.81	5.32	10	0.532		
4	Control	D	27.14	21.35	5.79	10	0.579	0.521	8.4
5	6%	A	22.13	16.43	5.70	10	0.570		
6	6%	B	22.39	17.13	5.26	10	0.526		
7	6%	C	28.75	24.30	4.45	10	0.445		
8	6%	D	24.07	19.33	4.74	10	0.474	0.504	11.0
9	13%	A	22.80	18.03	4.77	10	0.477		
10	13%	B	21.99	16.97	5.02	10	0.502		
11	13%	C	23.25	18.11	5.14	10	0.514		
12	13%	D	26.45	21.15	5.30	10	0.530	0.506	4.4
13	25%	A	28.84	23.23	5.61	10	0.561		
14	25%	B	26.87	21.52	5.35	10	0.535		
15	25%	C	23.32	18.47	4.85	10	0.485		
16	25%	D	23.01	18.51	4.50	10	0.450	0.508	9.8
17	50%	A	26.21	21.18	5.03	10	0.503		
18	50%	B	29.80	24.72	5.08	10	0.508		
19	50%	C	26.31	22.11	4.20	10	0.420		
20	50%	D	30.75	25.34	5.41	10	0.541	0.493	10.4
21	100%	A	30.27	24.52	5.75	10	0.575		
22	100%	B	26.31	21.99	4.32	10	0.432		
23	100%	C	33.14	27.33	5.81	10	0.581		
24	100%	D	36.36	31.38	4.98	10	0.498	0.522	13.5

Quality Assurance

					Final Wt. (mg)
25	Blank	A	15.84	15.82	0.02
26	Blank	B	22.13	22.1	0.03

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

Fathead Minnow 7-d Larval Survival and Growth Test

ERM

Analysis ID:	01-2616-6693	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.4		
Analyzed:	28 Aug-19 12:31	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1		
Batch ID:	17-4757-0902	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Lab Tech		
Start Date:	19 Aug-19 17:30	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Reconstituted Water		
Ending Date:	26 Aug-19 16:30	**Species:**	Pimephales promelas	**Brine:**			
Test Length:	6d 23h	**Taxon:**	Actinopterygii	**Source:**	In-House Culture	**Age:**	<24
Sample ID:	17-9487-7362	**Code:**	6AFBA7B2	**Project:**	WET Testing		
Sample Date:	19 Aug-19 07:15	**Material:**	Industrial Effluent	**Source:**	ArcelorMittal Burns Harbor, LLC		
Receipt Date:	19 Aug-19 15:30	**CAS (PC):**		**Station:**	Outfall 001		
Sample Age:	10h (5 °C)	**Client:**	ArcelorMittal Burns Harbor, LLC				

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	>100	n/a	1	7.93%

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Lab Water		6	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		13	14	10	1	6	Asymp	0.3451	Non-Significant Effect
		25	16	10	1	6	Asymp	0.6105	Non-Significant Effect
		50	14	10	1	6	Asymp	0.3451	Non-Significant Effect
		100	14	10	1	6	Asymp	0.3451	Non-Significant Effect

Test Acceptability Criteria

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

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0320925	0.0064185	5	1.16	0.3663	Non-Significant Effect
Error	0.0995975	0.0055332	18			
Total	0.13169		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Levene Equality of Variance Test	23.4	4.248	2.7E-07	Unequal Variances
Variances	Mod Levene Equality of Variance Test	5.8	4.248	0.0023	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.8745	0.884	0.0064	Non-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	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
13		4	0.9500	0.8581	1.0000	0.9500	0.9000	1.0000	0.0289	6.08%	5.00%
25		4	0.9750	0.8954	1.0000	1.0000	0.9000	1.0000	0.0250	5.13%	2.50%
50		4	0.9500	0.8581	1.0000	0.9500	0.9000	1.0000	0.0289	6.08%	5.00%
100		4	0.9500	0.8581	1.0000	0.9500	0.9000	1.0000	0.0289	6.08%	5.00%

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	1.412	1.412	1.412	1.412	1.412	1.412	0	0.00%	0.00%
13		4	1.331	1.181	1.48	1.331	1.249	1.412	0.04705	7.07%	5.77%
25		4	1.371	1.242	1.501	1.412	1.249	1.412	0.04074	5.94%	2.89%
50		4	1.331	1.181	1.48	1.331	1.249	1.412	0.04705	7.07%	5.77%
100		4	1.331	1.181	1.48	1.331	1.249	1.412	0.04705	7.07%	5.77%

Fathead Minnow 7-d Larval Survival and Growth Test ERM

Analysis ID:	01-2616-6693	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.4
Analyzed:	28 Aug-19 12:31	**Analysis:**	Nonparametric-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	1.0000
13		0.9000	1.0000	1.0000	0.9000
25		1.0000	1.0000	1.0000	0.9000
50		1.0000	0.9000	0.9000	1.0000
100		0.9000	0.9000	1.0000	1.0000

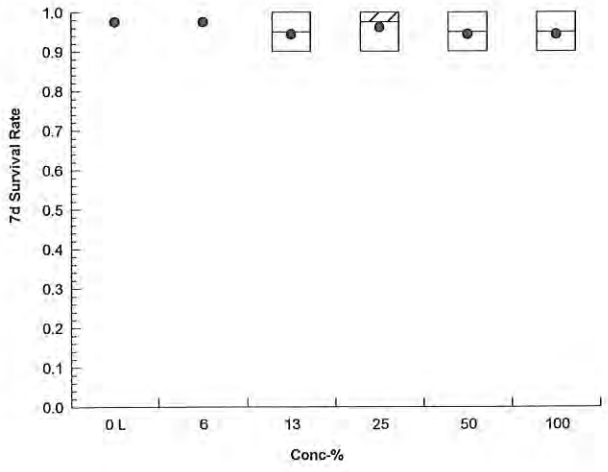
Angular (Corrected) Transformed Detail

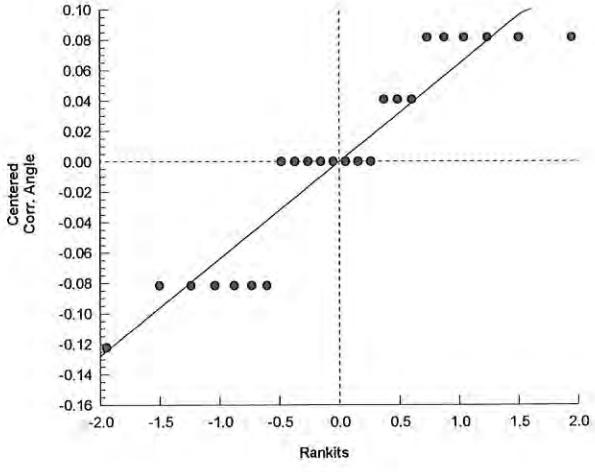
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	L	1.412	1.412	1.412	1.412
6		1.412	1.412	1.412	1.412
13		1.249	1.412	1.412	1.249
25		1.412	1.412	1.412	1.249
50		1.412	1.249	1.249	1.412
100		1.249	1.249	1.412	1.412

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	10/10
13		9/10	10/10	10/10	9/10
25		10/10	10/10	10/10	9/10
50		10/10	9/10	9/10	10/10
100		9/10	9/10	10/10	10/10

Graphics





Fathead Minnow 7-d Larval Survival and Growth Test

ERM

Analysis ID:	09-9546-1868	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.4
Analyzed:	28 Aug-19 12:30	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	17-4757-0902	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Lab Tech
Start Date:	19 Aug-19 17:30	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Reconstituted Water
Ending Date:	26 Aug-19 16:30	**Species:**	Pimephales promelas	**Brine:**	
Test Length:	6d 23h	**Taxon:**	Actinopterygii	**Source:**	In-House Culture **Age:** <24
Sample ID:	17-9487-7362	**Code:**	6AFBA7B2	**Project:**	WET Testing
Sample Date:	19 Aug-19 07:15	**Material:**	Industrial Effluent	**Source:**	ArcelorMittal Burns Harbor, LLC
Receipt Date:	19 Aug-19 15:30	**CAS (PC):**		**Station:**	Outfall 001
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	16.66%

Dunnett Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Lab Water		6	0.485	2.407	0.087	6	CDF	0.6540	Non-Significant Effect
		13	0.4296	2.407	0.087	6	CDF	0.6777	Non-Significant Effect
		25	0.3741	2.407	0.087	6	CDF	0.7007	Non-Significant Effect
		50	0.7829	2.407	0.087	6	CDF	0.5200	Non-Significant Effect
		100	-0.00693	2.407	0.087	6	CDF	0.8354	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	0.5212	0.25	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0024073	0.0004815	5	0.1849	0.9646	Non-Significant Effect
Error	0.04687	0.0026039	18			
Total	0.0492773		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance Test	3.096	15.09	0.6852	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9534	0.884	0.3198	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	0.5212	0.4513	0.5912	0.51	0.486	0.579	0.02198	8.43%	0.00%
6		4	0.5037	0.4155	0.592	0.5	0.445	0.57	0.02772	11.01%	3.36%
13		4	0.5057	0.4702	0.5413	0.508	0.477	0.53	0.01117	4.42%	2.97%
25		4	0.5078	0.4286	0.5869	0.51	0.45	0.561	0.02488	9.80%	2.59%
50		4	0.493	0.411	0.575	0.5055	0.42	0.541	0.02575	10.45%	5.42%
100		4	0.5215	0.4091	0.6339	0.5365	0.432	0.581	0.03531	13.54%	-0.05%

Mean Dry Biomass-mg Detail

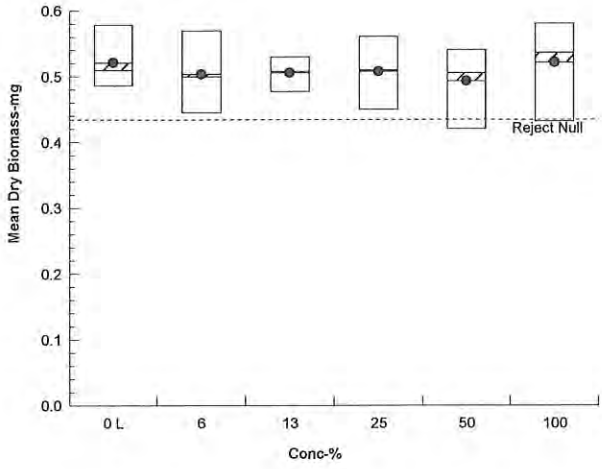
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	L	0.486	0.488	0.532	0.579
6		0.57	0.526	0.445	0.474
13		0.477	0.502	0.514	0.53
25		0.561	0.535	0.485	0.45
50		0.503	0.508	0.42	0.541
100		0.575	0.432	0.581	0.498

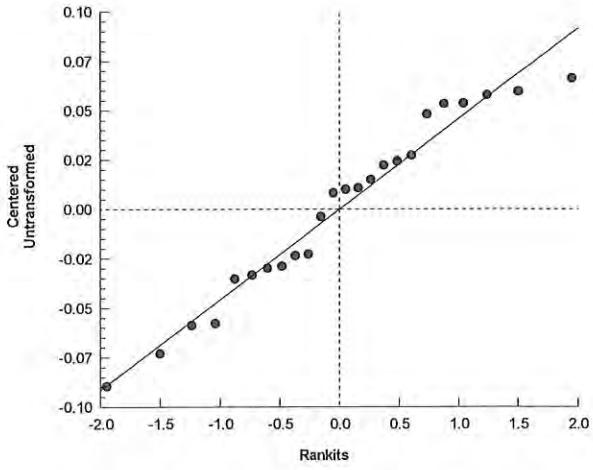
Fathead Minnow 7-d Larval Survival and Growth Test

ERM

Analysis ID:	09-9546-1868	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.4
Analyzed:	28 Aug-19 12:30	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Graphics





Fathead Minnow 7-d Larval Survival and Growth Test

ERM

Analysis ID:	02-1580-4861	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.4
Analyzed:	28 Aug-19 12:30	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	17-4757-0902	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Lab Tech
Start Date:	19 Aug-19 17:30	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Reconstituted Water
Ending Date:	26 Aug-19 16:30	**Species:**	Pimephales promelas	**Brine:**	
Test Length:	6d 23h	**Taxon:**	Actinopterygii	**Source:**	In-House Culture **Age:** <24
Sample ID:	17-9487-7362	**Code:**	6AFBA7B2	**Project:**	WET Testing
Sample Date:	19 Aug-19 07:15	**Material:**	Industrial Effluent	**Source:**	ArcelorMittal Burns Harbor, LLC
Receipt Date:	19 Aug-19 15:30	**CAS (PC):**		**Station:**	Outfall 001
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	1624462	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.5212	0.25	>>	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

Mean Dry Biomass-mg Summary

			Calculated Variate						Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	L	4	0.5212	0.486	0.579	0.04396	8.44%	0.0%	0.5212	0.0%
6		4	0.5037	0.445	0.57	0.05544	11.01%	3.36%	0.5063	2.86%
13		4	0.5057	0.477	0.53	0.02234	4.42%	2.97%	0.5063	2.86%
25		4	0.5078	0.45	0.561	0.04977	9.80%	2.59%	0.5063	2.86%
50		4	0.493	0.42	0.541	0.0515	10.45%	5.42%	0.5063	2.86%
100		4	0.5215	0.432	0.581	0.07063	13.54%	-0.05%	0.5063	2.86%

Mean Dry Biomass-mg Detail

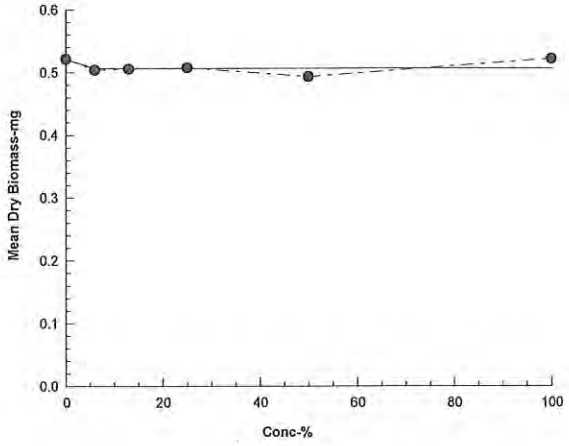
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	L	0.486	0.488	0.532	0.579
6		0.57	0.526	0.445	0.474
13		0.477	0.502	0.514	0.53
25		0.561	0.535	0.485	0.45
50		0.503	0.508	0.42	0.541
100		0.575	0.432	0.581	0.498

Fathead Minnow 7-d Larval Survival and Growth Test

ERM

Analysis ID:	02-1580-4861	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.4
Analyzed:	28 Aug-19 12:30	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



ERM®

ENVIRONMENTAL RESOURCES MANAGEMENT

3352 128th Avenue Holland, Michigan 49424-9263
Phone: 616- 399-3500 FAX: 616-399-3777

AQUATIC TOXICITY LAB CHAIN OF CUSTODY FORM *

CLIENT NAME:		SAMPLER	
ADDRESS:		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	 08/19/19	 0715	C	1 cubitainer 2.5G	pH= s.u. NH₃= mg/L	081919-2	Temp. 5 (° C) ☑ On Ice	D.O. 12.3 mg/L	pH 7.9 s.u.	Cond 394 umhos/cm
011	 08/19/19	 0930	G	~	pH= s.u. NH₃= mg/L	-3	Temp. 3 (° C) ☑ On Ice	D.O. 5.2 mg/L	pH 7.7 s.u.	Cond 409 umhos/cm
					pH= s.u. NH₃= mg/L		Temp. (° C) ☐ On Ice	D.O. mg/L	pH s.u.	Cond umhos/cm
					pH= s.u. NH₃= mg/L		Temp. (° C) ☐ On Ice	D.O. mg/L	pH s.u.	Cond umhos/cm
					pH= s.u. NH₃= mg/L		Temp. (° C) ☐ On Ice	D.O. mg/L	pH s.u.	Cond umhos/cm
					pH= s.u. NH₃= 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: ___ *Ceriodaphnia dubia* ___ *Daphnia magna* ___ *Daphnia pulex* ___ Fathead minnow (*Pimephales promelas*) ___ Rainbow Trout (*Oncorhynchus mykiss*) ___ Sheepshead minnow (*Cyprinodon variegatus*) ___ Silverside minnow (*Menidia beryllina*) ___ *Americamysis bahia* ___ *Hyalella azteca* ___ *Chironomus dilutus* ___ Other (write in comments section)

COMMENT SECTION: See ALS COC 41531 -SPR

SAMPLE TRANSFERS

RELINQUISHED BY: Signature / Organization	DATE	TIME	ACCEPTED BY: Signature /Organization	DATE	TIME
			/ ERM	81919	1530

* See Instructions for Sample Collection on Back of Sheet

February 2018

Everett, WA
+1 425 356 2600

Fort Collins, CO
+1 970 490 1511

Holland, MI
+1 616 399 6070

Chain of Custody Form

Page ____ of ____

COC ID: 41581

ALS Project Manager:

Customer Information		Project Information		ALS Work Order # / Parameter/Method Requested for analysis	
Order		Project Name	Arcelor Mittal BA - WETT	A	WETT (Acute + Chronic - Fleas +
Order		Project Number		B	
Name	ALS	Bill To Company	ALS	C	
Bill To		Invoice Attn		D	
Address		Address		E	
				F	
Zip		City/State/Zip		G	
Phone		Phone		H	
Fax		Fax		I	
Address		e-Mail Address		J	

Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
Composite	8-19-19	0715	AQ	NEAT	1-2gal	X										
Grab	8-19-19	0830	AQ	NEAT	1-2.5gal	X										

Sampler(s) Please Print & Sign

Relinquished by: [signature]

Relinquished by: Date: 8-19-19 Time: Received by: [signature]

Relinquished by: Date: 08/19/19 Time: 1530 Received by (Laboratory): [signature]

Shipped by (Laboratory): Date: Time: Checked by (Laboratory):

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Shipment Method

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

Results Due Date:

Notes:

Cooler ID	Cooler Temp

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 ____

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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Middletown, PA +1 717 944 5541
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Chain of Custody Form

Page ____ of ____

COC ID: 41865

ALS Project Manager: | ALS Work Order #: 19081459

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	Arcelor Mittal WETT	A	Round 2 Volume - WETT (s.b ERM)
Work Order		Project Number		B	
Company Name	U	Bill To Company		C	
Send Report To		Invoice Attn		D	
Address		Address		E	
				F	
City/State/Zip		City/State/Zip		G	
Phone		Phone		H	
Fax		Fax		I	
e-Mail Address		e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	Outfall 001 - Comp	8-21-19	0625	AQ	8	1=2.5gal.	X	Sample ID:					08219-1				
2	Outfall 011 - Comp	8-21-19	0605	AQ	8	2=2gal.	X	Sample ID:					08219-2				
3		001	011														
4	Temp	3	3														
5	~~pH~~ D.O.	11.0	7.1														
6	pH	7.1	7.3														
7	Cond	417	426														
8																	
9																	
10																	

Sampler(s) Please Print & Sign: B. Frye

Shipment Method:

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

Results Due Date:

Relinquished by:	Date: 8-21-19	Time:	Received by:	Notes:
Relinquished by:	Date:	Time:	Received by (Laboratory):	
Logged by (Laboratory): ERM	Date: 08-21-19	Time: 1100	Checked by (Laboratory):	

Cooler ID	Cooler Temp

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 ____

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

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3. The Chain of Custody is a legal document. All information must be completed accurately.

ENVIRONMENTAL RESOURCES MANAGEMENT

3352 128th Avenue Holland, Michigan 49424-9263
Phone: 616- 399-3500 FAX: 616-399-3777

AQUATIC TOXICITY LAB CHAIN OF CUSTODY FORM *

CLIENT NAME:	ArcelorMittal	SAMPLER	
ADDRESS:		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	05/22/19	0620			pH= s.u. NH_3= mg/L	082319-3	Temp. 7 (° C) ☒ On Ice	D.O. 10.7 mg/L	pH 7.7 s.u.	Cond 407 umhos/cm
011	05/22/19	0635			pH= s.u. NH_3= mg/L	-4	Temp. 7 (° C) ☒ On Ice	D.O. 8.9 mg/L	pH 7.7 s.u.	Cond 405 umhos/cm
					pH= s.u. NH_3= mg/L		Temp. (° C) ☐ On Ice	D.O. mg/L	pH s.u.	Cond umhos/cm
					pH= s.u. NH_3= mg/L		Temp. (° C) ☐ On Ice	D.O. mg/L	pH s.u.	Cond umhos/cm
					pH= s.u. NH_3= mg/L		Temp. (° C) ☐ On Ice	D.O. mg/L	pH s.u.	Cond umhos/cm
					pH= s.u. NH_3= mg/L		Temp. (° C) ☐ On Ice	D.O. mg/L	pH s.u.	Cond umhos/cm

ANALYSES REQUESTED [check item(s)]	Test Material:	Test Type:	Test Species:
	____ Water/Wastewater ____ Sediment ____ Product	____ Acute ____ Chronic ____ Other	___ *Ceriodaphnia dubia* ___ *Daphnia magna* ___ *Daphnia pulex* ___ Fathead minnow (*Pimephales promelas*) ___ Rainbow Trout (*Oncorhynchus mykiss*) ___ Sheepshead minnow (*Cyprinodon variegatus*) ___ Silverside minnow (*Menidia beryllina*) ___ *Americamysis bahia* ___ *Hyalella azteca* ___ *Chironomus dilutus* ___ Other (write in comments section)

COMMENT SECTION: See ALS COC 41573 -SPR

SAMPLE TRANSFERS

RELINQUISHED BY: Signature / Organization	DATE	TIME	ACCEPTED BY: Signature /Organization	DATE	TIME
			/ERM	082319	1430

* See Instructions for Sample Collection on Back of Sheet

February 2018

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Spring City, PA +1 610 948 4903
South Charleston, WV +1 304 356 3168
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: 41578

ALS Project Manager: | ALS Work Order #: 19081459

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	AM BH WETT #3	A	WETT - Sub to ERM
Work Order		Project Number		B	
Company Name	Arcelor M-Hal + EPT	Bill To Company	Arcelor Mittal	C	
Send Report To		Invoice Attn		D	
Address		Address		E	
				F	
City/State/Zip		City/State/Zip		G	
Phone		Phone		H	
Fax		Fax		I	
e-Mail Address		e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	Outfall 001 COMP	8-22-19	0620	AQ	8	(2)-3gal.	X										
2	Outfall 011 Comp	8-22-19	0635	AQ	8	(2)-3gal	X										
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: B. Fogle

Shipment Method:

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

Results Due Date:

Relinquished by:	Date: 8-23-19	Time:	Received by:
Relinquished by:	Date:	Time:	Received by (Laboratory): 082319 1430
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes:

Cooler ID	Cooler Temp

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 _____

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

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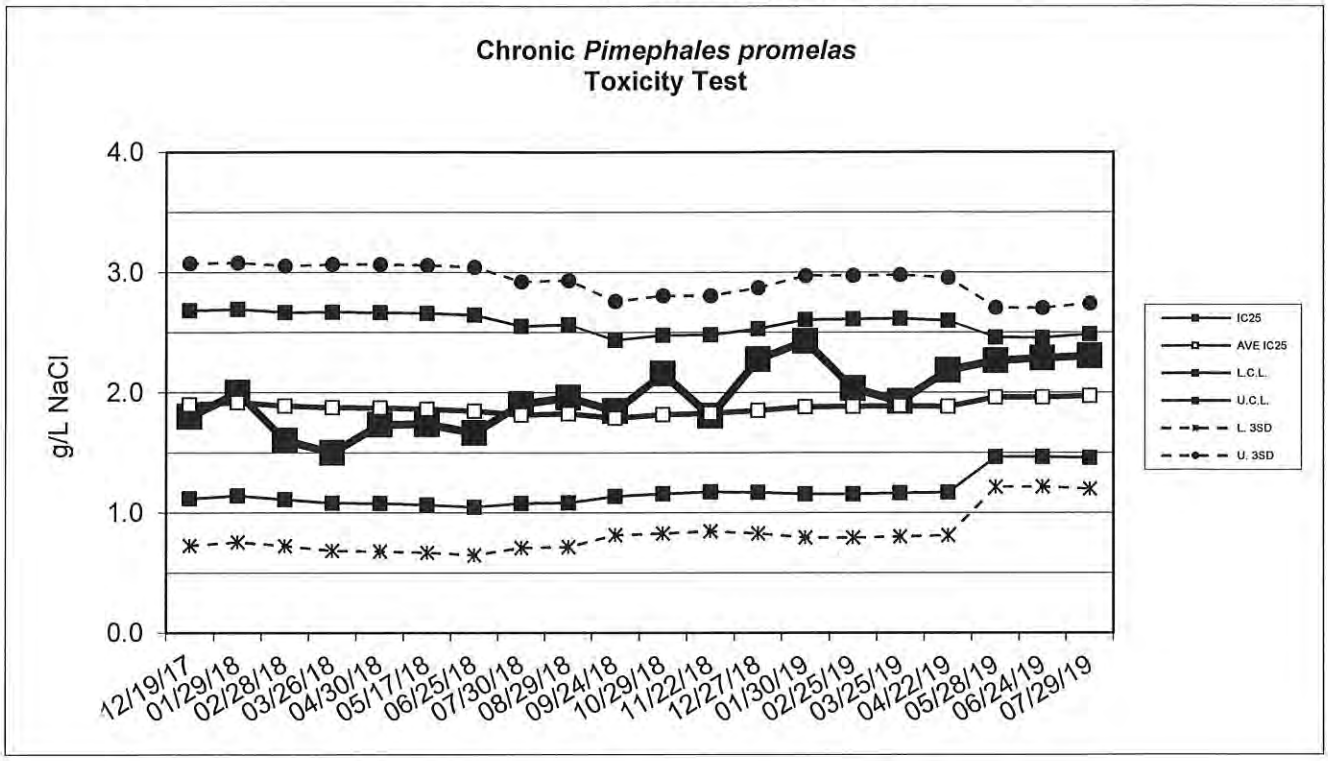
3. The Chain of Custody is a legal document. All information must be completed accurately.

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 Lower	CONTROL LIMIT Upper	Survival (%)	CONTROL Growth (mg)	CV (%)
12/19/17	1.8	1.9	1.1	2.7	100	0.58	5.3
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