

# Arkansas Analytical, Inc.

**Toxicity Test Results**  
**AECC – Magnet Cove Plant**  
**April 2015**  
**AFIN #30-00337**

*Pimephales promelas*, Acute Toxicity, EPA-821-R-02-012, October 2002

*Daphnia pulex*, Acute Toxicity, EPA-821-R-02-012, October 2002

Prepared for: **Mr. John Morgan**  
**AECC – Magnet Cove**  
**410 Henderson**  
**Malvern, AR 72104**

Prepared by: Arkansas Analytical, Inc.  
11701 I-30, Bldg 1, Suite 115  
Little Rock, Arkansas 72209  
**Lab Number K1504003**

Tuesday, April 14, 2015

## **Introduction**

This report contains test results for the toxicity testing of AECC – Magnet Cove Plant. The NPDES permit number is AR0049611. The permit requires acute biomonitoring testing semi annually for both *Daphnia pulex* and *Pimephales promelas*. The test results in this report represent the testing for the first half of 2015.

The facility is located 6.5 miles North of Malvern and 2.3 miles South of Magnet Cove near Highway 270 in Section 28, Township 3 South, Range 17 West in Hot Spring County, Arkansas. The discharge is to receiving waters named Ouachita River in Segment 2F of the Ouachita River Basin.

## **Plant Operations**

To be provided by permittee.

### Source of Effluent and Dilution Water

The samples were 24-hour composites collected at the final discharge of Outfall 001. Mean daily discharge is to be provided by permittee.

Effluent samples were collected as follows:

Sample Collection:	Date, Time Started	Date, Time Ended	Date, Time Received	Storage Temperature (°C)
SAMPLE A:	4-6-15, 0920	4-7-15, 0820	4-7-15, 1040	4
SAMPLE B:	4-7-15, 0945	4-8-15, 0845	4-8-15, 1018	5

The dilution water used was soft synthetic water prepared in the lab.

Chain of custody documentation and flow documentation are located in Appendix A.

Both effluent samples and dilution water samples were analyzed for pH, hardness, total alkalinity, and conductivity. Results are provided in Appendix B.

### Dilution Series

Five dilutions in addition to a control (0% effluent) were used in the toxicity tests. The dilutions, which were made with soft synthetic water, were 5%, 7%, 10%, 13%, and 17%. The low-flow effluent concentration (**critical dilution**) was defined as **13% effluent**.

## Test Methods

The analyses performed were 48 Hour Static Renewal Acute Toxicity Tests using the fathead minnow, *Pimephales promelas*, and the daphnid, *Daphnia pulex*. The tests were conducted according to EPA-821-R-02-012, October 2002. The endpoint of the test is death, established by either no movement or no reaction to gentle prodding. Raw data is provided in Appendix B. Statistics are provided in Appendix C.

	<i>Daphnia Pulex</i>	<i>Pimephales promelas</i>
Deviation from method:	None	None
Date, Time Started	4-7-15, 1140	4-7-15, 1450
Date, Time Ended	4-9-15, 1015	4-9-15, 1330
Type and volume of test chambers:	1-ounce plastic cups	500 ml plastic cups
Volume of solution per chamber:	25 milliliters	250 milliliters
Number of organisms per chamber:	8	10
Number of replicates:	5	5
Feeding frequency and amount:	None	None
Acclimation temperature of organisms:	25 degrees Centigrade	25 degrees Centigrade
Test temperature:	25 degrees Centigrade	25 degrees Centigrade

## Test Organisms

	<i>Daphnia pulex</i>	<i>Pimephales promelas</i>
Scientific name:	<i>Daphnia pulex</i>	<i>Pimephales promelas</i>
Age:	< 24 hours old	6 days old
Source:	In house culture	Aquatox
Diseases and treatment	None	None

Organism History is provided in Appendix D.

## Quality Assurance

### Test Acceptability

#### TEST ACCEPTANCE CRITERIA for *Daphnia pulex*

Control Criteria	Results	Pass	Fail
Greater than or equal to 90% survival	100%	X	

#### TEST ACCEPTANCE CRITERIA for *Pimephales promelas*

Control Criteria	Results	Pass	Fail
Greater than or equal to 90% survival	100%	X	

### Reference Toxicant

The reference toxicant used was Potassium Chloride prepared in-house. The tests were performed using moderately hard synthetic as dilution water. The results of the reference toxicant were:

#### REFERENCE TOXICANT

<i>Daphnia pulex</i> 3/26/15 – 3/28/15		<i>Pimephales promelas</i> 3/26/15 – 3/28/15	
NOEC Survival:	500 ppm KCl	NOEC Survival:	500ppm KCl
LOEC Survival:	1000 ppm KCl	LOEC Survival:	1000 ppm KCl
LC50:	872 ppm KCl	LC50:	750 ppm KCl

Quality Assurance charts are provided in Appendix E.

**Summary of Results**  
**AECC – Magnet Cove Plant**

<i>Daphnia pulex</i>			<i>Pimephales promelas</i>		
NOEC / LOEC Survival	17% / NA	PASS	NOEC / LOEC Survival	17% / NA	PASS
LC50	NA	NA	LC50	NA	NA

**Conclusion**

EPA-821-R-02-012, October 2002, *Pimephales promelas*

The permit issued to AECC – Magnet Cove, permit AR0049611, specifies that the **critical dilution is 13% effluent**. The effluent samples **did not** exhibit acute toxicity at the critical dilution, and, as such, the effluent samples **passed** the test. Therefore, there is no further action to be taken.


EPA-821-R-02-012, October 2002, *Daphnia pulex*

The permit issued to AECC – Magnet Cove, permit AR0049611, specifies that the **critical dilution is 13% effluent**. The effluent samples **did not** exhibit acute toxicity at the critical dilution, and, as such, the effluent samples **passed** the test. Therefore, there is no further action to be taken.

Biomonitoring Analyst:

Ryan Hudgin

Reviewed by:

  
Tracy Bounds, lab manager

**ACUTE FORMS**  
**FATHEAD MINNOW SURVIVAL RESULTS**  
*(Pimephales promelas)*

PERMITTEE: AECC – Magnet Cove

NPDES #: AR0049611

Sample Collection:	Date, Time Started	Date, Time Ended
SAMPLE A:	4-6-15, 0920	4-7-15, 0820
SAMPLE B:	4-7-15, 0945	4-8-15, 0845

Test initiated (date, time): 4-7-15, 1450      Test terminated (date, time): 4-9-15, 1330

Dilution water used:      Soft Synthetic

**DATA TABLE FOR FATHEAD MINNOW SURVIVAL**

Effluent Conc %	Percent Survival in Replicate Chambers						Mean Percent Survival		
	A	B	C	D	E		24 hours	48 hours	CV %
Control	100	100	100	100	100		100	100	0.00
5%	100	100	90	100	100		98	98	
7%	100	100	100	100	90		100	100	
10%	100	100	100	100	100		100	100	
13%	100	100	100	100	100		100	100	0.00
17%	100	100	100	100	100		100	100	

Coefficient of Variation = standard deviation / mean \* 100

SUMMARY REPORTING FORMS FOR ACUTE BIOMONITORING  
FATHEAD MINNOW LARVAE SURVIVAL

48 hr Acute

*Pimephales promelas*

1. Dunnett's procedure or Steel's Many-One Rank Test as appropriate:

Is the mean survival at 48 hours significantly different ( $p=0.05$ ) than the control survival for:

a) LOW FLOW OR CRITICAL DILUTION, (100%)      YES \_\_\_\_\_ NO X \_\_\_\_\_

2. If you answered NO to 1a. enter [0] otherwise enter [1]: 0 \_\_\_\_\_

3. Enter the response to item 2 on DMR Form, parameter #TEM6C.

4. Enter percentage for the corresponding parameters below:

a.) Survival NOEC (parameter TOM6C): 17 \_\_\_\_\_ % effluent.

b.) Coefficient of variation (parameter TQM6C): 0.00 \_\_\_\_\_ %.



**ACUTE FORMS**  
***Daphnia pulex* SURVIVAL RESULTS**

Permittee: AECC – Magnet Cove

NPDES #: AR0049611

Sample Collection:	Date, Time Started	Date, Time Ended
SAMPLE A:	4-6-15, 0920	4-7-15, 0820
SAMPLE B:	4-7-15, 0945	4-8-15, 0845

Test initiated (date, time): 4-7-15, 1140      Test terminated (date, time): 4-9-15, 1015

Dilution water used:    Soft Synthetic

**DATA TABLE FOR *Daphnia pulex* SURVIVAL**

Effluent Conc %	Percent Survival in Replicate Chambers					Mean Percent Survival			CV %
	A	B	C	D	E		24 hours	48 hours	
Control	100	100	100	100	100		100	100	0.00
5%	100	100	100	100	100		100	100	
7%	100	100	100	100	100		100	100	
10%	87.5	100	100	100	100		100	97.5	
13%	100	100	100	100	100		100	100	0.00
17%	100	100	100	87.5	100		97.5	97.5	

Coefficient of Variation = standard deviation/ mean \* 100

SUMMARY REPORTING FORMS FOR ACUTE BIOMONITORING  
*Daphnia pulex* SURVIVAL  
48 hr Acute

1. Dunnett's procedure or Steel's Many-One Rank Test as appropriate:

Is the mean survival at 48 hours significantly different ( $p=0.05$ ) than the control survival for:

a) LOW FLOW OR CRITICAL DILUTION, (100%) YES \_\_\_\_\_ NO X

2. If you answered NO to 1a. Enter [0] otherwise enter [1]: 0

3. Enter the response to item 2 on DMR Form, parameter #TEM3D.

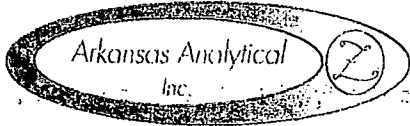
4. Enter percentage corresponding to the parameters below:

a.) Survival NOEC (parameter TOM3D): 17 % effluent.

b.) Coefficient of variation (parameter TQM3D): 0.00 %.

APPENDIX A

Chain of Custody Forms

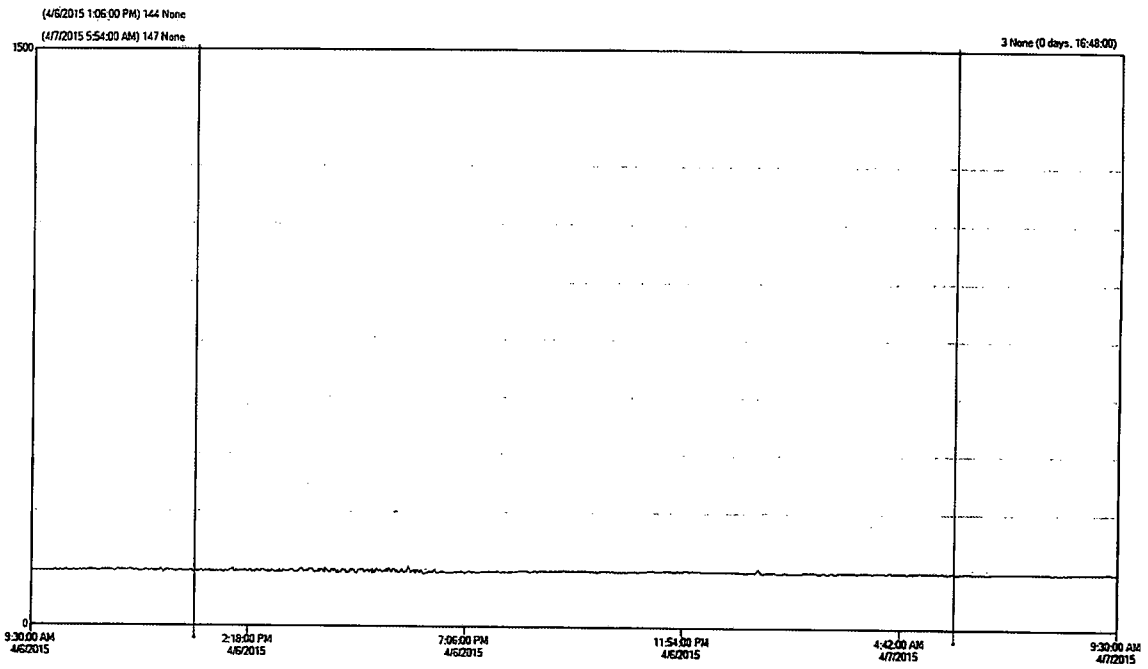


11701 Interstate 30, Bldg. 1, Ste. 115  
 Little Rock, AR 72209  
 PHONE: 501-455-3233  
 FAX: 501-455-8118

# CHAIN OF CUSTODY RECORD

CLIENT INFORMATION			Project Description			Turnaround Time		Preservation Codes:											
AECC - Magnet Cove Plant			Acute Toxicity			1 Day (100%)		1. Cool, 4 Degrees Centigrade				4. Thiosulfate for Dechlorination							
410 Henderson Rd.						2 Day (50%)		2. Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> ), pH < 2				5. Hydrochloric Acid(HCl)							
Malvern, AR 72109			Reporting Information			3 Day (25%)		3. Nitric Acid (HNO <sub>3</sub> ), pH < 2				6. Sodium Hydroxide (NaOH), pH > 12							
Attn: John Morgan			Telephone: 501-467-3232			Routine		TEST PARAMETERS										Bottle Type Code	
			Fax: 501-467-3233			Preservative Code: 1												G = Glass; P = Plastic	
			Email: john.morgan@aecc.com; john.mehlin@aecc.com			Bottle Type: P												V = Septum; A = Amber	
Will Lindsey			WFW GINDSEY															Arkansas Analytical Work Order Number:	
Sampler(s) Signature			Sampler(s) Printed																
Field Number	SAMPLE COLLECTION		Grab	Comp	Number of Bottles	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION		Acute Biomonitoring										
	Date/s	Time/s																	
K1504003	4/6-4/7/15	0920-0820		X	24	Water	Outfall 001	X											
1. Relinquished by: (Signature)			Date/Time		2. Received by: (Signature)			SAMPLE CONDITION UPON RECEIPT IN LAB				REMARKS / SAMPLE COMMENTS							
Will Lindsey			4/7/15 1040		[Signature] RH			1. CUSTODY SEALS: <input checked="" type="checkbox"/> Yes ___ No											
3. Relinquished by: (Signature)			Date/Time		4. Received by lab: (Signature)			2. CONTAINERS CORRECT: ___ Yes ___ No											
_____			_____		[Signature]			3. COC/LABELS AGREE: ___ Yes ___ No											
								4. RECEIVED ON ICE: ___ Yes ___ No											
								5. TEMPERATURE ON RECEIPT: 4°C											
								6. TEMPERATURE GUN ID: HHT #2											
FOR COMPLETION BY LAB ONLY																			

### Outfall Flow



HOT:\w011w\19GMA9SCF101.XD01 (BestFit - 00 00:06:00.291)

Tag Name	Description	Number	Server	Color	Units	Minimum	Maximum	ID Address	Time Offset	Source Tag	Source Server	Value at X1	Value at X2
<input checked="" type="checkbox"/> 19GMA9SCF101.XD01	COMBINED EFFLUENT BLOWDOWN	1	HOTWW...	None	None	0	1500	\\HOTWWW02WPUFG...	0:00:00.000			144	147

146 GPM / AVG

4/7/2015 9:36:43 AM

P:\Documents\Trends\Outfall Flow.aaTrend

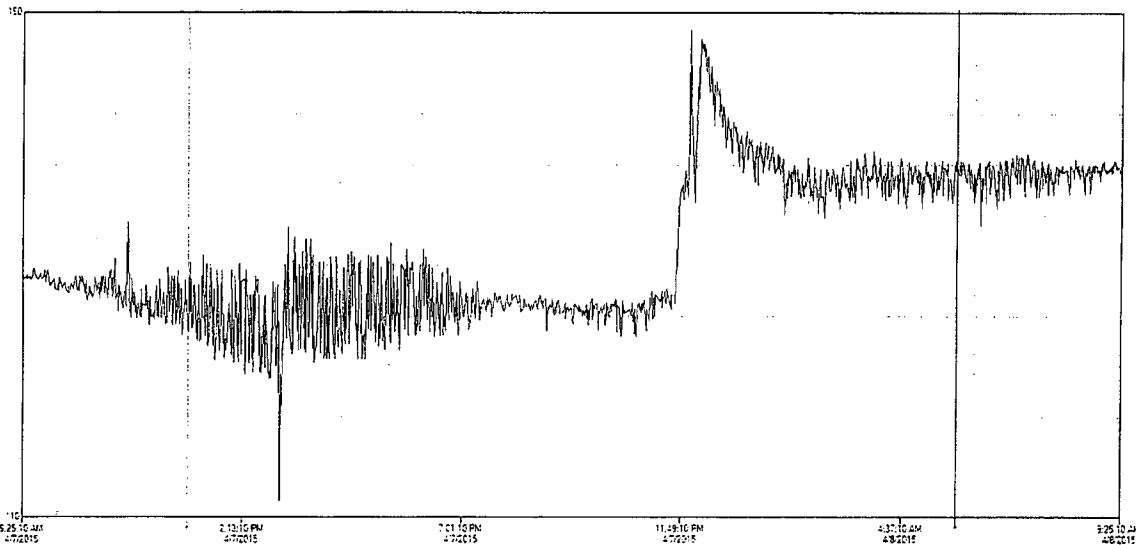
Arkansas Analytical # K1504003 A  
Magnet Cove  
Flow Composite Information

Date	Time	Sample #	Volume (mL)	Flow (GPM)
4/6/2015	0930	1	50	146
4/6/2015	1030	2	50	146
4/6/2015	1130	3	50	146
4/6/2015	1230	4	50	146
4/6/2015	1330	5	50	146
4/6/2015	1430	6	50	146
4/6/2015	1530	7	50	146
4/6/2015	1630	8	50	146
4/6/2015	1730	9	50	146
4/6/2015	1830	10	50	146
4/6/2015	1930	11	50	146
4/6/2015	2030	12	50	146
4/6/2015	2130	13	50	146
4/6/2015	2230	14	50	146
4/6/2015	2330	15	50	146
4/7/2015	2430	16	50	146
4/7/2015	0130	17	50	146
4/7/2015	0230	18	50	146
4/7/2015	0330	19	50	146
4/7/2015	0430	20	50	146
4/7/2015	0530	21	50	146
4/7/2015	0630	22	50	146
4/7/2015	0730	23	50	146
4/7/2015	0830	24	50	146
TOT VOL=			1200	



4-8-15

Trend2



HIDDEN: H0TWWY111-EL182UP1000162X001-BeaF11-201105111271

Tag Name	Description	Number	Server	Color	Units	Minimum	Maximum	ID Address	Time Offset	Source Tag	Source Server	Value at X1	Value at X2
<input checked="" type="checkbox"/> LU196MASC	COMBINED EFFLUENT	1	H0TWWY		None	110	150	\\H0TWWY02WPP-F55	0:00:00:000			142	167
<input type="checkbox"/> LU190UP12C	CIRC WATER PH	2	H0TWWY		None	6:00000	10:00000	\\H0TWWY02WPP-F55	0:00:00:000			5:50200	7:75800

AVERAGE

152 GPM



**Arkansas Analytical # K1504003 B**  
**Magnet Cove**  
**Flow Composite Information**

<b>Date</b>	<b>Time</b>	<b>Sample #</b>	<b>Volume (mL)</b>	<b>Flow (GPM)</b>
4/7/2015	1000	1	63	150
4/7/2015	1100	2	63	150
4/7/2015	1200	3	63	150
4/7/2015	1300	4	63	150
4/7/2015	1400	5	58	140
4/7/2015	1500	6	58	140
4/7/2015	1600	7	58	140
4/7/2015	1700	8	63	150
4/7/2015	1800	9	63	150
4/7/2015	1900	10	63	150
4/7/2015	2000	11	63	150
4/7/2015	2100	12	63	150
4/7/2015	2200	13	63	150
4/7/2015	2300	14	63	150
4/8/2015	2400	15	73	175
4/8/2015	0100	16	75	180
4/8/2015	0200	17	75	180
4/8/2015	0300	18	71	170
4/8/2015	0400	19	71	170
4/8/2015	0500	20	71	170
4/8/2015	0600	21	71	170
4/8/2015	0700	22	71	170
4/8/2015	0800	23	71	170
4/8/2015	0900	24	71	170
		<b>TOT VOL=</b>	<b>1581</b>	

APPENDIX B

Physical, Chemical, and Raw Data for Fathead Minnow and *Daphnia pulex*

Biomonitoring Report  
Acute 24/48 Hour Static Test

Lab Number: <u>61504003</u>	Test Organism: <u>Pimephales promelas</u>
Client: <u>Magnet Cove</u>	Age of Organism: <u>6 days old</u>
Date/ Time Started: <u>4-7-15 1450</u>	Source of Organism: <u>Aquatox</u>
Date/ Time Ended: <u>4-9-15 1330</u>	Dilution Water: <u>SS</u>

Conc.	Rep #	# Live Organisms			pH/Temp.		Dissolved O <sub>2</sub> mg/L		Alkalinity mg/L		Hardness mg/L		Conductivity		T Res Cl mg/L	
		0 hr	24 hr	48 hr	24 hr	48 hr	24 hr	48 hr	24 hr	48 hr	24 hr	48 hr	24 hr	48 hr	24 hr	48 hr
SS	A	10	10	10	7.8	7.8	8.5	8.6	34	+	40	+	254	+	0.05	+
	B	1	1	1	7.6	7.6	7.6	8.0								
	C	1	1	1												
	D	1	1	1	23	22										
	E	1	1	1	25	25										
5	A	10	10	10	7.8	8.6	8.3	8.5	54	66	72	90	329	339	0.05	+
	B	1	10	10	7.6	7.8	7.5	RH 8.6								
	C	1	9	9												
	D	1	10	10	22	22										
	E	1	10	10	25	25										
7	A	10	10	10	7.8	7.9	8.0	8.4								
	B	1	1	1	7.7	7.6	7.6	7.6								
	C	1	1	1												
	D	1	1	1	23	22										
	E	1	1	1	25	25										
10	A	10	10	10	7.7	8.0	8.1	8.6								
	B	1	1	1	7.7	7.7	7.7	7.8								
	C	1	1	1												
	D	1	1	1	23	22										
	E	1	1	1	25	25										
13	A	10	10	10	7.7	8.0	7.8	8.5								
	B	1	1	1	7.6	7.8	7.2	7.2								
	C	1	1	1												
	D	1	1	1	23	22										
	E	1	1	1	25	25										
17	A	10	10	10	7.8	8.0	7.4	8.3								
	B	1	1	1	7.7	7.8	7.6	7.3								
	C	1	1	1												
	D	1	1	1	23	22										
	E	1	1	1	25	25										

**Biomonitoring Quality Control Benchsheet**

Analyst	RH	RH	RH	RH	TC	HE	RH	RH
Date	4-7-15	4-8-15	4-9-15	4-10-15	4-11-15	4-12-15	4-13-15	4-14-15
pH Meter ID	AR60							
LIN pH 4 Buffer	1401107							
LIN pH 7 Buffer	1401173							
LIN pH 10 Buffer	1401168							
Slope (>90%)	97.7%	96.5%	98.9%	96.7%	95.4%	93.1%	97.4%	95.6%

<b>Dissolved O<sub>2</sub> Meter</b>								
Meter Reading	8.36	8.56	8.65	8.72	8.59	8.57	8.58	8.47
Temp.	24	22	22	22	23	22.2	22	23
Chart Value at Temp.	8.418	8.743	8.743	8.743	8.578	8.743	8.743	8.578
Difference	0.058	0.183	0.093	0.023	0.012	0.173	0.163	0.108
Acceptance Criteria	<0.2mg/L	<0.2mg/L	<0.2mg/L	<0.2mg/L	<0.2mg/L	<0.2mg/L	<0.2mg/L	<0.2mg/L

<b>Temp. Meter ID</b>								
Meter Reading	21	22	22	23	23	22	22	23
Thermometer Reading	20	21	22	22.5	22.5	21.5	21	22.5
Thermometer ID	PB	PB	PB	PB	PB	PB	PB	PB
Acceptance Criteria	±1°C	±1°C	±1°C	±1°C	±1°C	±1°C	±1°C	±1°C

<b>Alkalinity</b>								
Blank (<5mg/L)	0							
STD Result	104							
T.V. / %REC	100/104%							
Acceptance Criteria	93.5-108.5% Recovery							

<b>Hardness</b>								
Blank (<2mg/L)	0							
STD. Result	92							
T.V. / %REC	100/92%							
Acceptance Criteria	90.0-105.5% Recovery							

<b>Conductivity Meter ID</b>								
Blank (<1)	0							
STD Result	1436							
T.V. / %REC	141/1102%							
Acceptance Criteria	99.2-104.0% Recovery							

<b>Chlorine Meter ID</b>								
Blank (<0.05mg/L)	0							
STD Result	0.21							
T.V. / % REC	0.20/110%							
Acceptance Criteria	100.0-120% Recovery							

Revision 0  
Effective Date 01APR15

Biomonitoring Report

Acute 24/48 Hour Static Test

Lab Number: K1504003	Test Organism: <i>Daphnia pulex</i>
Client: Magnet Cove	Age of Organism: < 24 hrs old
Date/ Time Started: 9-7-15 1140	Source of Organism: In house culture
Date/ Time Ended: 9-9-15 1015	Dilution Water: SS

Conc.	Rep #	# Live Organisms			pH/Temp.		Dissolved O <sub>2</sub> mg/L		Alkalinity mg/L		Hardness mg/L		Conductivity		T Res Cl mg/L	
		0 hr	24 hr	48 hr	24 hr	48 hr	24 hr	48 hr	24 hr	48 hr	24 hr	48 hr	24 hr	48 hr	24 hr	48 hr
55	A	8	8	8	7.8	7.8	8.5	8.6	34	+	40	+	254	+	<0.05	+
	B				7.8	7.7	8.3	8.0								
	C															
	D				23	22										
	E				25	25										
5	A	8	8	8	7.8	8.0	8.3	8.5	54	66	72	90	329	339	<0.05	+
	B				7.9	7.8	8.3	8.2								
	C															
	D				22	22										
	E				25	25										
7	A	8	8	8	7.8	7.9	8.0	8.4								
	B				7.9	7.8	8.3	8.0								
	C															
	D				23	22										
	E				25	25										
10	A	8	8	7	7.7	8.0	8.1	8.6								
	B			8	7.9	7.9	8.3	8.0								
	C			8												
	D			8	23	22										
	E			8	25	25										
13	A	8	8	8	7.7	8.0	7.8	8.5								
	B				7.9	7.9	8.3	8.0								
	C															
	D				23	22										
	E				25	25										
17	A	8	8	8	7.8	8.0	7.4	8.3								
	B		8	8	7.9	8.0	8.3	7.9								
	C		8	8												
	D		7	7	23	22										
	E		8	8	25	25										

APPENDIX C

Fathead Minnow and *Daphnia pulex* Statistics

AA #K1504003, PIMEPHALES PROMELAS, 48 HR ACUTE, 4-7-15

File: C:\COPYTO~1\TOXSTAT\PP52B3~1.48H

Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

---

D = 0.021

W = 0.416

Critical W (P = 0.05) (n = 30) = 0.927

Critical W (P = 0.01) (n = 30) = 0.900

---

Data FAIL normality test. Try another transformation.

Warning - The first three homogeneity tests are sensitive to non-normal data and should not be performed.

AA #K1504003, PIMEPHALES PROMELAS, 48 HR ACUTE, 4-7-15

File: C:\COPYTO~1\TOXSTAT\PP52B3~1.48H

Transform: ARC SINE(SQUARE ROOT(Y))

Hartley's test for homogeneity of variance

Bartlett's test for homogeneity of variance

---

These two tests can not be performed because at least one group has zero variance.

Data FAIL to meet homogeneity of variance assumption.

Additional transformations are useless.

---

TITLE: AA #K1504003, PIMEPHALES PROMELAS, 48 HR ACUTE, 4-7-15  
 FILE: C:\COPYTO~1\TOXSTAT\PP52B3~1.48H  
 TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	1.0000	1.4120
1	CONTROL	2	1.0000	1.4120
1	CONTROL	3	1.0000	1.4120
1	CONTROL	4	1.0000	1.4120
1	CONTROL	5	1.0000	1.4120
2	5 %	1	1.0000	1.4120
2	5 %	2	1.0000	1.4120
2	5 %	3	0.9000	1.2490
2	5 %	4	1.0000	1.4120
2	5 %	5	1.0000	1.4120
3	7 %	1	1.0000	1.4120
3	7 %	2	1.0000	1.4120
3	7 %	3	1.0000	1.4120
3	7 %	4	1.0000	1.4120
3	7 %	5	1.0000	1.4120
4	10 %	1	1.0000	1.4120
4	10 %	2	1.0000	1.4120
4	10 %	3	1.0000	1.4120
4	10 %	4	1.0000	1.4120
4	10 %	5	1.0000	1.4120
5	13 %	1	1.0000	1.4120
5	13 %	2	1.0000	1.4120
5	13 %	3	1.0000	1.4120
5	13 %	4	1.0000	1.4120
5	13 %	5	1.0000	1.4120
6	17 %	1	1.0000	1.4120
6	17 %	2	1.0000	1.4120
6	17 %	3	1.0000	1.4120
6	17 %	4	1.0000	1.4120
6	17 %	5	1.0000	1.4120

AA #K1504003, PIMEPHALES PROMELAS, 48 HR ACUTE, 4-7-15  
 File: C:\COPYTO~1\TOXSTAT\PP52B3~1.48H Transform: ARC SINE(SQUARE ROOT(Y))

STEEL'S MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	1.412				
2	5 %	1.379	25.00	16.00	5.00	
3	7 %	1.412	27.50	16.00	5.00	
4	10 %	1.412	27.50	16.00	5.00	
5	13 %	1.412	27.50	16.00	5.00	
6	17 %	1.412	27.50	16.00	5.00	

Critical values use k = 5, are 1 tailed, and alpha = 0.05



AA # K1504003, Daphnia pulex, 48 HR ACUTE, 4-7-15

File: C:\COPYTO~1\TOXSTAT\DPULEX5.

Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

-----  
D = 0.054

W = 0.547

Critical W (P = 0.05) (n = 30) = 0.927

Critical W (P = 0.01) (n = 30) = 0.900  
-----

Data FAIL normality test. Try another transformation.

Warning - The first three homogeneity tests are sensitive to non-normal data and should not be performed.

AA # K1504003, Daphnia pulex, 48 HR ACUTE, 4-7-15

File: C:\COPYTO~1\TOXSTAT\DPULEX5.

Transform: ARC SINE(SQUARE ROOT(Y))

Hartley's test for homogeneity of variance

Bartlett's test for homogeneity of variance

-----  
These two tests can not be performed because at least one group has zero variance.

Data FAIL to meet homogeneity of variance assumption.  
Additional transformations are useless.  
-----

TITLE: AA # K1504003, Daphnia pulex, 48 HR ACUTE, 4-7-15  
 FILE: C:\COPYTO~1\TOXSTAT\DPULEX5.  
 TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	1.0000	1.3931
1	CONTROL	2	1.0000	1.3931
1	CONTROL	3	1.0000	1.3931
1	CONTROL	4	1.0000	1.3931
1	CONTROL	5	1.0000	1.3931
2	5 %	1	1.0000	1.3931
2	5 %	2	1.0000	1.3931
2	5 %	3	1.0000	1.3931
2	5 %	4	1.0000	1.3931
2	5 %	5	1.0000	1.3931
3	7 %	1	1.0000	1.3931
3	7 %	2	1.0000	1.3931
3	7 %	3	1.0000	1.3931
3	7 %	4	1.0000	1.3931
3	7 %	5	1.0000	1.3931
4	10 %	1	0.8750	1.2094
4	10 %	2	1.0000	1.3931
4	10 %	3	1.0000	1.3931
4	10 %	4	1.0000	1.3931
4	10 %	5	1.0000	1.3931
5	13 %	1	1.0000	1.3931
5	13 %	2	1.0000	1.3931
5	13 %	3	1.0000	1.3931
5	13 %	4	1.0000	1.3931
5	13 %	5	1.0000	1.3931
6	17 %	1	1.0000	1.3931
6	17 %	2	1.0000	1.3931
6	17 %	3	1.0000	1.3931
6	17 %	4	0.8750	1.2094
6	17 %	5	1.0000	1.3931

AA # K1504003, Daphnia pulex, 48 HR ACUTE, 4-7-15  
 File: C:\COPYTO~1\TOXSTAT\DPULEX5. Transform: ARC SINE(SQUARE ROOT(Y))

STEEL'S MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	1.393				
2	5 %	1.393	27.50	16.00	5.00	
3	7 %	1.393	27.50	16.00	5.00	
4	10 %	1.356	25.00	16.00	5.00	
5	13 %	1.393	27.50	16.00	5.00	
6	17 %	1.356	25.00	16.00	5.00	

Critical values use k = 5, are 1 tailed, and alpha = 0.05

APPENDIX D

Organism History

**AQUATOX, INC.**  
416 TWIN POINTS ROAD  
HOT SPRINGS, ARKANSAS 71913  
501-520-0560

**TEST ORGANISM HISTORY**

DATE SHIPPED 4/7/15 CLIENT ARK. ANALYTICAL  
Purchase Order #: \_\_\_\_\_  
SPECIES: Pimephales promelas  
Quantity Shipped: 600<sup>T</sup> 300<sup>T</sup> 15-1600<sup>CST</sup>  
Age: 448 6 DAYS TODAY  
Brood Stock Source: Anderson Farms, AR  
Culture Water: Groundwater  
Hardness (Mg/l CaCO3): 160  
Dissolved Oxygen (Mg/l): 8.2  
Temperature (°C): 25.1°  
Feeding: ARTEMIA  
Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Shipped Via:  Federal Express  UPS Overnight  Shuttle  
Packaged By: \_\_\_\_\_



# Aquatic Research Organisms

## DATA SHEET

### I. Organism History

Species: Daphnia pulex

Source: Lab reared  Hatchery reared \_\_\_\_\_ Field collected \_\_\_\_\_

Hatch date 7/06 Receipt date \_\_\_\_\_

Lot number 01 00 06 DP Strain ARKO

Brood Origination EPF 04

### II. Water Quality

Temperature 23 °C Salinity — ppt DO SAT

pH 7.2 Hardness 275 ppm

### III. Culture Conditions

System: Fw static renewal

Diet: Flake Food \_\_\_\_\_ Phytoplankton  Trout Chow \_\_\_\_\_

Brine Shrimp \_\_\_\_\_ Rotifers \_\_\_\_\_ Other YCT


Prophylactic Treatments: \_\_\_\_\_

Comments: All gravid as of 1:45 pm EST

### IV. Shipping Information

Client: ARK ANAK # of Organisms: 1 culture

Carrier: FedEx Date Shipped: 7/27/06

Biologist: 

1 - 800 - 927 - 1650

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

APPENDIX E

Quality Assurance Charts

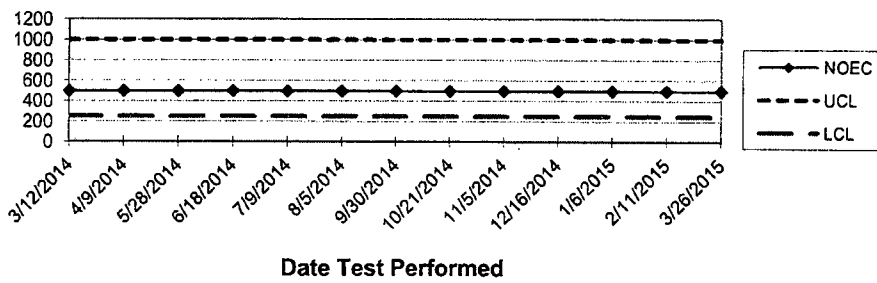
# ARKANSAS ANALYTICAL, INC.

FATHEAD MINNOW NOEC

QUALITY ASSURANCE

48 HOUR ACUTE

Reference Toxicant, KCl, ppm



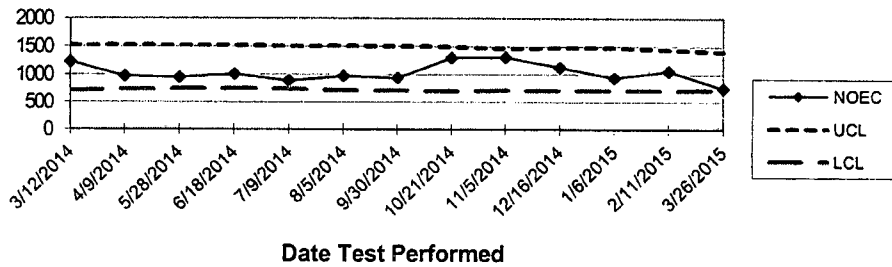
# ARKANSAS ANALYTICAL, INC.

FATHEAD MINNOW LC50

QUALITY ASSURANCE

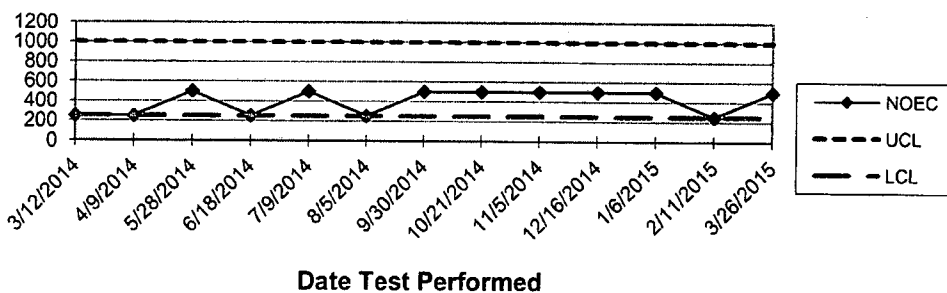
48 HOUR ACUTE

Reference Toxicant, KCl, ppm



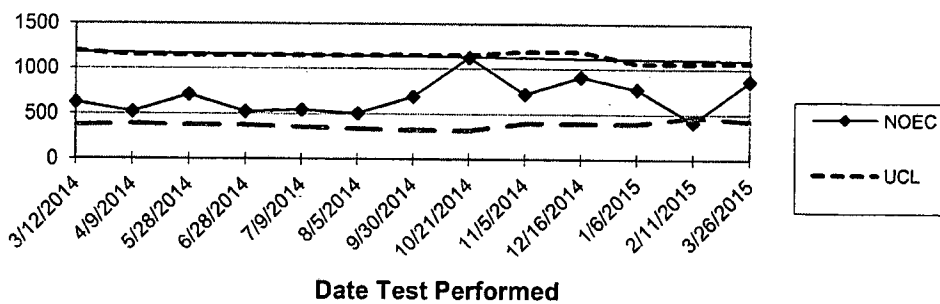
**ARKANSAS ANALYTICAL, INC.**  
**DAPHNIA PULEX NOEC**  
**QUALITY ASSURANCE**  
**48 HOUR ACUTE**

Reference Toxicant, KCl, ppm



**ARKANSAS ANALYTICAL, INC.**  
**DAPHNIA PULEX LC50**  
**QUALITY ASSURANCE**  
**48 HOUR ACUTE**

Reference Toxicant, KCl, ppm





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NPDES Enforcement Section

5301 Northshore Drive

North Little Rock, AR 72118-5317

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