



700 Clay Street
P. O. Box 495
Arkadelphia, AR 71923
Phone (870) 246-5863
Fax (870) 246-9546

July 25, 2012

Ms. Sara Clem
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317

RE: Biomonitoring for NPDES Permit No. AR0020605

Dear Ms. Clem:

Enclosed please find a copy of the results from the most recent Chronic Biomonitoring performed on wastewater samples from our system. The samples were submitted to Sorrels Research Associates in June 2012.

If there are questions, please contact me.

Sincerely,

Brenda Gills

Brenda Gills
Utilities Manager

Enclosure

Environmental Analysis

Biomonitoring
Acute Toxicity
Chronic Toxicity
Storm Water 24 hr. Toxicity



*Sorrells Research*TM

8100 National Drive, Little Rock, AR 72209
(501) 562-8139

CITY OF ARKADELPHIA
PERMIT NO: AR0020605
CHRONIC BIOMONITORING

METHOD 1000.0 - PIMEPHALES PROMELAS
METHOD 1002.0 - CERIODAPHNIA DUBIA

Report Prepared by:
Sorrells Research Associates, Inc.
8100 National Dr.
Little Rock, AR 72209

Cecil A. Sorrells, Biomonitoring Laboratory Supervisor

K. E. Sorrells, M.S., Quality Assurance Officer

July 17, 2012

Laboratory Number:14602.0001, 0002, 0003

TABLE OF CONTENTS

	PAGE
1. INTRODUCTION AND SUMMARY	3
2. TEST ACCEPTANCE CRITERIA	4
3. OUTLINED REPORT	5
4. CHEMICAL PARAMETER CHART	6
5. DATA ANALYSES	8
6. TEST 1000.0 RESULTS	9
7. TEST 1002.0 RESULTS	13
8. REFERENCE TOXICANTS	17
9. APPENDIX	
A. RAW DATA	
1. TEST 1000.0	18
2. TEST 1002.0	19
B. ORGANISM HISTORY	20
C. CHAINS OF CUSTODY	21
D. LABORATORY CONTROL - CERIO CULTURE RECORD	22
E. COMPLETED DATA PAGES FOR DEQ ATTACHED	23

INTRODUCTION AND SUMMARY

Chronic biomonitoring tests:

7 day fathead minnow larval survival and growth (method 1000.0) and 7 day ceriodaphnia dubia survival and reproduction (method 1002.0) were performed by Sorrells Research Associates for Arkadelphia 24 hour composite samples of plant effluent for dates 06/03-04/12, 06/05-06/12, 06/07-08/12.

The samples were delivered to Sorrells lab in ice chest, cooled to 4 degrees c.

These samples were logged in as #14602.0001, 0002 and 0003. Chain of custody included in report.

Moderately hard 20% deionized mineral water was used as dilution water.

Testing was initiated 06/05/12 at 1620 hours and continued through 06/13/12 at 1620 hours.

The results of these tests are as follows:

TEST 1000.0 FATHEAD MINNOW

SURVIVAL - NOEL 6.3% Effluent

GROWTH - NOEL 6.3% Effluent

TEST 1002.0 CERIODAPHNIA DUBIA

SURVIVAL - NOEL 6.3% Effluent

REPRODUCTION - NOEL 6.3% Effluent

Fishers Exact Test statistics are included in this report for these observations. No other adjustments were made.

TEST ACCEPTANCE CRITERIA
FOR CONTROL

TEST METHOD	ORGANISM	CRITERIA	RESULTS	PASS/FAIL
1000	Pimephales promelas	Control surv. >or= 80 %	100%	PASS
1002	Ceriodaphnia dubia	Control surv. >or= 80 %	100%	PASS
1000	Pimephales promelas	Control wt. .25 mg or> per larvae.	.329	PASS
1002	Ceriodaphnia dubia	Control repro. 15 or> neonates per surviving female.	18.8	PASS
1000	Pimephales promelas	Control CV 40 % or <	2.7	PASS
1002	Ceriodaphnia Dubia	Control CV 40 % or <	6.54	PASS

NOTE: The test acceptance criteria is based upon the synthetic laboratory control. Laboratory control is moderately hard 20% deionized mineral water, as directed by EPA/600/4-91/002.

OUTLINED REPORT

PERMIT NO: AR0020605
PERMIT REQUIREMENTS:
PLANT LOCATION:
RECEIVING WATER BODY:

CLIENT: Arkadelphia, City of
ADDRESS: 700 Clay St.
Arkadelphia, AR 71923

PLANT OPERATIONS

PRODUCT (S): n/a
RAW MATERIALS: n/a
OPERATING SCHEDULE:
SCHEMATIC OF WASTE TREATMENT:

RETENTION TIME:

VOLUME OF WASTE FLOW (MGD, CFS, GPM)

BIOMONITORING CHRONIC TOXICITY REPORT
CHEMICAL PARAMETER CHART

SOURCE OF EFFLUENT (AMBIENT) AND DILUTION WATER

EFFLUENT SAMPLES-

SAMPLING POINT: PLANT EFFLUENT

COLLECTION DATES/TIMES: 06/03-04/12	06/05-06/12	06/07-08/12
0800-0800	0800-0800	0800-0800

SAMPLING COLLECTION METHOD: COMPOSITE

PHYSICAL AND CHEMICAL DATA:

	DATE	DATE	DATE
CONTROL	06/05/12	06/07/12	06/09/12
DO (mg/l)	8.75	8.52	8.50
pH (S.U.)	7.22	7.16	7.26
Conductivity (umhos)	344	314	325
Alkalinity (mg/l)	76	84	82
Hardness (mg/l)	90	98	102
Res. Chlorine (mg/l)	0	0	0
3.5%	DATE	DATE	DATE
	06/05/12	06/07/12	06/09/12
DO (mg/l)	8.48	8.46	8.44
pH (S.U.)	7.62	7.30	7.35
Conductivity (umhos)	342	295	281
Alkalinity (mg/l).	80	79	94
Hardness (mg/l)	78	87	96

(Cont.)

PHYSICAL AND CHEMICAL DATA: 6.3 EFFLUENT	DATE 06/05/12	DATE 06/07/12	DATE 06/09/12
DO (mg/l)	8.30	8.35	8.39
pH (S.U.)	7.81	7.38	7.52
Conductivity (umhos)	347	295	286
Alkalinity (mg/l)	80	73	84
Hardness (mg/l)	81	76	92
Res. Chlorine (mg/l)	0	0	0
Temperature .c	25	25	25

DILUTION WATER SAMPLES -

SOURCE: 20% DMW

COLLECTION DATE: N/A

TIME: N/A

PRETREATMENT: AERATED

Hardness is to be reported as mg/l CaCO₃

D.O. Dissolved Oxygen mg/l

Temperature degrees centigrade

pH standard units

Conductivity = us/cm

Chlorine Residual = mg/l

Chemical Data For Daily Biomonitoring							
Permitee	Arkadelphia			Date	6-5-12 1620		
Analyst	A. TM			Lab no.	14602		
Dilution <u>Control</u>							
Day	1	2	3	4	5	6	7 notes
Temp	25.0	25.0	25.0	25.0	25.0	25.0	
pH	7.22	7.24	7.16	7.18	7.26	7.21	
D.O.	8.75	8.64	8.52	8.47	8.50	8.44	
Alk	76		84		82		
Hard.	90		98		102		
Cond.	344		314		325		
Dilution <u>3.5</u>							
Day	1	2	3	4	5	6	7 notes
Temp	25.0	25.0	25.0	25.0	25.0	25.0	
pH	7.62	7.51	7.30	7.34	7.35	7.30	
D.O.	8.48	8.40	8.46	8.36	8.44	8.26	
Alk	80		79			94	
Hard.	78		87			96	
Cond.	342		295		281		
Dilution <u>6.3</u>							
Day	1	2	3	4	5	6	7 notes
Temp	25.0	25.0	25.0	25.0	25.1	25.0	
pH	7.81	7.66	7.38	7.42	7.52	7.48	
D.O.	8.30	8.19	8.35	8.25	8.39	8.15	
Alk	80		73		84		
Hard.	81		76		92		
Cond.	347		295		286		
	0		0		0		

DATA ANALYSIS

ACCORDING TO EPA/600/4-91/002.

STATISTICAL ANALYSIS

TOXSTAT VERSION 3.3

Percent minimum significant difference (PMSD) calculated for sub-lethal endpoints.

This information for *C. dubia* reproduction is found in the inserted tables after page 8. We will highlight these values in Dunnetts Table 2, for all sub-lethal endpoints.

TITLE: . ARKADELPHIA 14602 CERIO REPS
 FILE: 14602ACR
 TRANSFORM: NO TRANSFORM

NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	17.0000	17.0000
1	CONTROL	2	19.0000	19.0000
1	CONTROL	3	18.0000	18.0000
1	CONTROL	4	21.0000	21.0000
1	CONTROL	5	17.0000	17.0000
1	CONTROL	6	19.0000	19.0000
1	CONTROL	7	20.0000	20.0000
1	CONTROL	8	19.0000	19.0000
1	CONTROL	9	19.0000	19.0000
1	CONTROL	10	19.0000	19.0000
2	2.00	1	19.0000	19.0000
2	2.00	2	16.0000	16.0000
2	2.00	3	23.0000	23.0000
2	2.00	4	19.0000	19.0000
2	2.00	5	19.0000	19.0000
2	2.00	6	18.0000	18.0000
2	2.00	7	19.0000	19.0000
2	2.00	8	18.0000	18.0000
2	2.00	9	17.0000	17.0000
2	2.00	10	15.0000	15.0000
3	2.60	1	16.0000	16.0000
3	2.60	2	19.0000	19.0000
3	2.60	3	18.0000	18.0000
3	2.60	4	20.0000	20.0000
3	2.60	5	22.0000	22.0000
3	2.60	6	17.0000	17.0000
3	2.60	7	18.0000	18.0000
3	2.60	8	20.0000	20.0000
3	2.60	9	19.0000	19.0000
3	2.60	10	22.0000	22.0000
4	3.50	1	16.0000	16.0000
4	3.50	2	17.0000	17.0000
4	3.50	3	18.0000	18.0000
4	3.50	4	17.0000	17.0000
4	3.50	5	17.0000	17.0000
4	3.50	6	19.0000	19.0000
4	3.50	7	19.0000	19.0000
4	3.50	8	19.0000	19.0000
4	3.50	9	19.0000	19.0000
4	3.50	10	20.0000	20.0000
5	4.70	1	18.0000	18.0000
5	4.70	2	16.0000	16.0000
5	4.70	3	17.0000	17.0000
5	4.70	4	18.0000	18.0000
5	4.70	5	19.0000	19.0000
5	4.70	6	17.0000	17.0000
5	4.70	7	18.0000	18.0000
5	4.70	8	22.0000	22.0000
5	4.70	9	17.0000	17.0000
5	4.70	10	19.0000	19.0000

6	6.30	1	20.0000	20.0000
6	6.30	2	21.0000	21.0000
6	6.30	3	17.0000	17.0000
6	6.30	4	20.0000	20.0000
6	6.30	5	20.0000	20.0000
6	6.30	6	19.0000	19.0000
6	6.30	7	21.0000	21.0000
6	6.30	8	20.0000	20.0000
6	6.30	9	18.0000	18.0000
6	6.30	10	19.0000	19.0000

ARKADELPHIA 14602 CERIO REPS
 File: 14602ACR Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	10	17.000	21.000	18.800
2	2.00	10	15.000	23.000	18.300
3	2.60	10	16.000	22.000	19.100
4	3.50	10	16.000	20.000	18.100
5	4.70	10	16.000	22.000	18.100
6	6.30	10	17.000	21.000	19.500

ARKADELPHIA 14602 CERIO REPS
 File: 14602ACR Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	CONTROL	1.511	1.229	0.389
2	2.00	4.678	2.163	0.684
3	2.60	3.878	1.969	0.623
4	3.50	1.656	1.287	0.407
5	4.70	2.767	1.663	0.526
6	6.30	1.611	1.269	0.401

ARKADELPHIA 14602 CERIO REPS
 File: 14602ACR Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	16.750	3.350	1.248
Within (Error)	54	144.900	2.683	

 Total 59 161.650

Critical F value = 2.45 (0.05,5,40)
 Since F < Critical F FAIL TO REJECT Ho:All groups equal

ARKADELPHIA 14602 CERIO REPS
 File: 14602ACR Transform: NO TRANSFORM

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	18.800	18.800		
2	2.00	18.300	18.300	0.683	
3	2.60	19.100	19.100	-0.410	
4	3.50	18.100	18.100	0.956	
5	4.70	18.100	18.100	0.956	
6	6.30	19.500	19.500	-0.956	

 Dunnett table value = 2.31 (1 Tailed Value, P=0.05, df=40,5)

ARKADELPHIA 14602 CERIO REPS
 File: 14602ACR Transform: NO TRANSFORM

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	CONTROL	10			
2	2.00	10	1.692	9.0	0.500
3	2.60	10	1.692	9.0	-0.300
4	3.50	10	1.692	9.0	0.700
5	4.70	10	1.692	9.0	0.700
6	6.30	10	1.692	9.0	-0.700

ARKADELPHIA 14602 CERIO REPS
 File: 14602ACR Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	CONTROL	10	18.800	18.800	18.480
2	2.00	10	18.300	18.300	18.480
3	2.60	10	19.100	19.100	18.480
4	3.50	10	18.100	18.100	18.480
5	4.70	10	18.100	18.100	18.480
6	6.30	10	19.500	19.500	19.500

ARKADELPHIA 14602 CERIO REPS

File: 14602ACR

Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model)

TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
CONTROL	18.480				
2.00	18.480	0.437		1.68	k= 1, v=54
2.60	18.480	0.437		1.76	k= 2, v=54
3.50	18.480	0.437		1.79	k= 3, v=54
4.70	18.480	0.437		1.80	k= 4, v=54
6.30	19.500	0.956		1.80	k= 5, v=54

S = 1.638

Note: df used for table values are approximate when v > 20.

ARKADELPHIA 14602 CERIO REPS

File: 14602ACR

Transform: NO TRANSFORM

STEELS MANY-ONE RANK TEST

Ho: Control < Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	18.800				
2	2.00	18.300	93.00	75.00	10.00	
3	2.60	19.100	109.00	75.00	10.00	
4	3.50	18.100	91.00	75.00	10.00	
5	4.70	18.100	86.50	75.00	10.00	
6	6.30	19.500	122.50	75.00	10.00	

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

TITLE: ARKADELPHIA 14602 MINNOW WEIGHTS

FILE: 14602AMW

TRANSFORM: NO TRANSFORM

NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.3170	0.3170
1	CONTROL	2	0.3220	0.3220
1	CONTROL	3	0.3300	0.3300
1	CONTROL	4	0.3280	0.3280
2	2.00	1	0.3360	0.3360
2	2.00	2	0.3410	0.3410
2	2.00	3	0.3080	0.3080
2	2.00	4	0.3260	0.3260
3	2.60	1	0.3050	0.3050
3	2.60	2	0.3330	0.3330
3	2.60	3	0.3240	0.3240
3	2.60	4	0.3100	0.3100
4	3.50	1	0.3210	0.3210
4	3.50	2	0.3460	0.3460
4	3.50	3	0.3270	0.3270
4	3.50	4	0.3310	0.3310
5	4.70	1	0.3020	0.3020
5	4.70	2	0.3280	0.3280
5	4.70	3	0.3410	0.3410
5	4.70	4	0.3200	0.3200
6	6.30	1	0.3350	0.3350
6	6.30	2	0.3160	0.3160
6	6.30	3	0.3290	0.3290
6	6.30	4	0.3350	0.3350

ARKADELPHIA 14602 MINNOW WEIGHTS

File: 14602AMW

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	4	0.317	0.330	0.324
2	2.00	4	0.308	0.341	0.328
3	2.60	4	0.305	0.333	0.318
4	3.50	4	0.321	0.346	0.331
5	4.70	4	0.302	0.341	0.323
6	6.30	4	0.316	0.335	0.329

ARKADELPHIA 14602 MINNOW WEIGHTS

File: 14602AMW

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	CONTROL	0.000	0.006	0.003
2	2.00	0.000	0.015	0.007
3	2.60	0.000	0.013	0.006
4	3.50	0.000	0.011	0.005
5	4.70	0.000	0.016	0.008
6	6.30	0.000	0.009	0.004

ARCADELPHIA 14602 MINNOW WEIGHTS

File: 14602AMW Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.000	0.000	0.628
Within (Error)	18	0.003	0.000	
Total	23	0.003		

Critical F value = 2.77 (0.05,5,18)

Since $F < \text{Critical } F$ FAIL TO REJECT H_0 :All groups equal

ARCADELPHIA 14602 MINNOW WEIGHTS

File: 14602AMW Transform: NO TRANSFORM

DUNNETTS TEST - TABLE 1 OF 2

H_0 :Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	0.324	0.324		
2	2.00	0.328	0.328	-0.411	
3	2.60	0.318	0.318	0.733	
4	3.50	0.331	0.331	-0.821	
5	4.70	0.323	0.323	0.176	
6	6.30	0.329	0.329	-0.528	

Dunnett table value = 2.41 (1 Tailed Value, $P=0.05$, $df=18,5$)

ARCADELPHIA 14602 MINNOW WEIGHTS

File: 14602AMW Transform: NO TRANSFORM

DUNNETTS TEST - TABLE 2 OF 2

H_0 :Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
-------	----------------	-------------	-----------------------------------	--------------	-------------------------

1	CONTROL	4				
2	2.00	4	0.021	6.3	-0.003	
3	2.60	4	0.021	6.3	0.006	
4	3.50	4	0.021	6.3	-0.007	
5	4.70	4	0.021	6.3	0.001	
6	6.30	4	0.021	6.3	-0.005	

ARCADELPHIA 14602 MINNOW WEIGHTS

File: 14602AMW Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	CONTROL	4	0.324	0.324	0.323
2	2.00	4	0.328	0.328	0.323
3	2.60	4	0.318	0.318	0.323
4	3.50	4	0.331	0.331	0.327
5	4.70	4	0.323	0.323	0.327
6	6.30	4	0.329	0.329	0.329

ARCADELPHIA 14602 MINNOW WEIGHTS

File: 14602AMW Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
CONTROL	0.323				
2.00	0.323	0.106		1.73	k= 1, v=18
2.60	0.323	0.106		1.82	k= 2, v=18
3.50	0.327	0.318		1.85	k= 3, v=18
4.70	0.327	0.318		1.86	k= 4, v=18
6.30	0.329	0.520		1.87	k= 5, v=18

= 0.012

Note: df used for table values are approximate when v > 20.

ARCADELPHIA 14602 MINNOW WEIGHTS

File: 14602AMW Transform: NO TRANSFORM

STEELS MANY-ONE RANK TEST Ho: Control < Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	0.324				
2	2.00	0.328	20.00	10.00	4.00	
3	2.60	0.318	16.00	10.00	4.00	

4	3.50	0.331	21.00	10.00	4.00
5	4.70	0.323	17.50	10.00	4.00
6	6.30	0.329	21.00	10.00	4.00

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

TEST METHOD
1000.0

TEST METHOD USED: 1000.0
END POINT(S) OF TEST: NOEL 6.3%
DEVIATIONS FROM REFERENCE METHOD: None

DATE AND TIME TEST STARTED: 06/05/12 1620
DATE AND TIME TEST TERMINATED: 06/12/12 1620
TYPE OF TEST CHAMBERS: 600 ml
VOLUME OF SOLUTIONS USED/CHAMBER: 400 ml
NUMBER OF ORGANISMS/TEST CHAMBER: 10
NUMBER OF REPLICATE TEST CHAMBERS/TREATMENT: 4

TEST TEMPERATURE (MEAN): mean = 25

TEST ORGANISMS

SCIENTIFIC NAME: Pimephales promelas
AGE: Less than 24 hours
LIFE STAGE: Larvae
SOURCE: Aquatic BioSystems, Inc.
DISEASES AND TREATMENT: None
FEEDING REGIME: 2/day Brine Shrimp
ORGANISM HISTORY SHEETS ARE ATTACHED

RESULTS SUMMARY

FATHEAD MINNOW, PIMEPHALES PROMELAS, LARVAL SURVIVAL AND GROWTH TEST
METHOD 1000.0

Larvae are exposed in a static renewal system for seven days to different concentrations of effluent or to receiving water. Test results are based on the survival and growth (increase in weight) of the larvae. Effluent dilution's chosen for this test were 2.0%, 2.6%, 3.5%, 4.7% and 6.3% in accordance with the NPDES permit. The low flow or "critical" dilution is specified in the NPDES Permit as 6.3% effluent.

NOEL(S) ARE AS FOLLOWS:

100% Survival 6.3% effluent

NOEL Growth 6.3% effluent

BIOMONITORING REPORT
FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL

DATA TABLE FOR FATHEAD MINNOW SURVIVAL

Effluent Conc. %	Percent Survival In				Mean Percent			CV%*
	A	B	C	D	24h	48h	7d	
Dilution Water	100	100	100	100	100	100	100	0.0
2.0%	100	100	100	100	100	100	100	0.0
2.6%	100	100	100	100	100	100	100	0.0
3.5%	100	100	100	100	100	100	100	0.0
4.7%	100	100	100	100	100	100	100	0.0
6.3%	100	100	100	100	100	100	100	0.0

*coefficient of variation = standard deviation x 100/mean

**ph unadjusted 6.3% effluent

1. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate:
Is the mean survival at 7 days significantly different (p=0.5)
than the control survival for the % effluent corresponding to:

- a.) LOW FLOW OR CRITICAL DILUTION (6.3%): YES [] NO [X]
- b.) 1/2 LOW FLOW OR 2 X CRITICAL DILUTION (4.7%): YES [] NO [X]

2. Dunnett's Procedure:

Is the mean dry weight (growth) at 7 days effluent significantly
different (p=0.05) than the control's dry weight (growth) for the %
effluent corresponding to (significant non-lethal effects):

- a.) LOW FLOW OR CRITICAL DILUTION (6.3%): YES [] NO [X]
- b.) 1/2 LOW FLOW OR 2 X CRITICAL DILUTION (4.7%): YES [] NO [X]

3. If you answered NO to 1.a) and 2.a) enter [0]
otherwise enter [1]: [0]

4. If you answered NO to 1.b) and 2.b) enter [0]
otherwise enter [1]: [0]

5. Enter response to item 3 on DMR Form, parameter # TEP6C.

6. Enter response to item 4 on DMR Form, parameter # TFP6C.

7. Enter percent effluent corresponding to each NOEL below and
circle lowest number:

- a.) NOEL survival = 6.3% effluent

- b.) NOEL growth = 6.3% effluent

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL
(Pimephales promelas)

Permittee: Arkadelphia, City of NPDES permit no. AR0020605

Dilution water used: Receiving [] Reconstituted [X]

DATA TABLE FOR GROWTH

EFFLUENT CONC. %	AVERAGE DRY WEIGHT IN MILLIGRAMS IN REPLICATE CHAMBERS				MEAN DRY WEIGHT (MG) 7 days	CV%*
	A	B	C	D		
CONTROL	.317	.322	.330	.328	.324	1.8
2.0	.336	.341	.308	.326	.328	4.4
2.6	.305	.333	.324	.310	.318	4.0
3.5	.321	.346	.327	.331	.331	6.2
4.7	.302	.328	.341	.320	.323	5.1
6.3	.335	.316	.329	.335	.329	2.7

*Coefficient of variation = standard deviation X 100/mean

(Coef Of Var Statre 7Day Chronic Pimephales TQP6C = 5.1)

TEST METHOD
1002.0

TEST METHOD USED: 1002.0
END POINT(S) OF TEST: NOEL 6.3%
DEVIATIONS FROM REFERENCE METHOD: None

DATE AND TIME TEST STARTED: 06/05/12 1620
DATE AND TIME TEST TERMINATED: 06/13/12 1620
TYPE OF TEST CHAMBERS: 30 ml
VOLUME OF SOLUTIONS USED/CHAMBER: 15 ml
NUMBER OF ORGANISMS/TEST CHAMBER: 1
NUMBER OF REPLICATE TEST CHAMBERS/TREATMENT: 10

TEST TEMPERATURE (MEAN AND RANGE): 25

TEST ORGANISMS

SCIENTIFIC NAME: Ceriodaphnia dubia
AGE: Less than 24 hours
LIFE STAGE: Neonates
SOURCE: Aquatic BioSystems, Inc.
DISEASES AND TREATMENT: None
FEEDING REGIME: Daily
ORGANISM HISTORY SHEETS ARE ATTACHED

RESULTS SUMMARY
CLADOCERAN, CERIODAPHNIA DUBIA, SURVIVAL AND REPRODUCTION TEST
METHOD 1002.0

Ceriodaphnia are exposed in a static renewal system to different concentrations of effluent, and to receiving water until 60% of surviving control organisms have three broods of offspring (15 neonates per surviving female). Effluent dilutions for this test were 2.0%, 2.6%, 3.5%, 4.7%, and 6.3% in accordance with the NPDES Permit. The "critical" dilution is specified as 6.3% effluent. Test results are based on survival and reproduction. If the test is conducted as described, the control organism should produce three broods of young during a seven-day period.

BIOMONITORING REPORT
CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION

PERCENT SURVIVAL

Time of Reading	0%	2.0%	2.6%	3.5%	4.7%	6.3%
24h	100	100	100	100	100	100
48h	100	100	100	100	100	100
7 day	100	100	100	100	100	100

1. Fisher's Exact Test:

Is the mean survival at 7 days significantly different ($p=0.05$) than the control survival for the % effluent corresponding to (lethality):

a.) LOW FLOW OR CRITICAL DILUTION (6.3 %): YES [] NO [**X**]

b.) 1/2 LOW FLOW OR 2 X

CRITICAL DILUTION (4.7%): YES [] NO [**X**]

2. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate:

Is the mean number of young produced per female significantly different ($p=0.05$) than the control's number of young per female for the % effluent corresponding to (significant non-lethal effects):

a.) LOW FLOW OR CRITICAL DILUTION (6.3%): YES [] NO [**X**]

b.) 1/2 LOW FLOW OR 2 X

CRITICAL DILUTION (4.7%): YES [] NO [**X**]

3. If you answered NO to 1.a) and 2.a) enter [0] otherwise enter [1]: **[0]**

4. If you answered NO to 1.b) and 2.b) enter [0] otherwise enter [1]: **[0]**

5. Enter response to item 3 on DMR Form, parameter #TEP3B.

6. Enter response to item 4 on DMR Form, parameter #TFP3B.

7. Enter percent effluent corresponding to each NOEL below and circle lowest number:

a.) NOEL survival = 6.3% effluent

b.) NOEL reproduction = 6.3% effluent

BIOMONITORING REPORT
CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION

Permittee: Arkadelphia, City of NPDES NO. AR0020605
Dilution water used: Receiving () Reconstituted (X)

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

PERCENT EFFLUENT (%)

REP	0 %	2.0%	2.6%	3.5%	4.7%	6.3%
A	17	19	16	16	18	20
B	19	16	19	17	16	21
C	18	23	18	18	17	17
D	21	19	20	17	18	20
E	17	19	22	17	19	20
F	19	18	17	19	17	19
G	20	19	18	19	18	21
H	19	18	20	19	22	20
I	19	17	19	19	17	18
J	19	15	22	20	19	19
*CV%	6.54	11.82	10.31	7.11	9.19	6.51
MEAN	18.8	18.3	19.1	18.1	18.1	19.5

*coefficient of variation = standard deviation x 100/mean

(Coef Of Var Statre 7Day Chronic Ceriodaphnia TQP3B = **9.19**)

STANDARD REFERENCE TOXICANTS

STANDARD TOXICANT USED AND SOURCE: SODIUM CHLORIDE *
DATES AND TIMES OF CONCURRENT TEST: 06/20/12 1000

DILUTION WATER USED IN TEST: 20% DMW
RESULTS (LC50 OR, NOEC AND/OR ECL): LC50 = 1587 FATHEAD MINNOW
RESULTS (LC50 OR, NOEC AND/OR ECL): LC50 = 735 CERIODAPHNIA
ACCEPTABLE PERFORMANCE, STUDY 31 = 100%
PHYSICAL AND CHEMICAL METHODS USED:

SPECIFIC CONDUCTANCE METHOD 2510 B
OXYGEN, DISSOLVED METHOD 4500- O G
CHLORINE, TOTAL RESIDUAL METHOD 4500- C I F
ALKALINITY, CaCO3 METHOD 2320 B

SUMMARY OF REFERENCE TOXICANT (S) ARE AS FOLLOWS:

FATHEAD MINNOW

Standard Recovery FATHEAD MINNOW 91.3%

CERIODAPHNIA

Standard Recovery CERODAPHNIA 97.7%

APPENDIX 1A
TEST 1000.0

Permittee Arkadelphia 14602								
Effluent	Percent Survival In Rep. Chambers				Mean Percent Survival			CV%*
	A	B	C	D	24h	48h	7 days	*
Conc.								
CONTROL	100	100	100	100	100	100	100	0.0
2.00%	100	100	100	100	100	100	100	0.0
2.60%	100	100	100	100	100	100	100	0.0
3.50%	100	100	100	100	100	100	100	0.0
4.70%	100	100	100	100	100	100	100	0.0
6.30%	100	100	100	100	100	100	100	0.0
Permittee Arkadelphia 14602								
Effluent	Average Dry Weight (mg)				Mean Dry Weight (mg)			
	A	B	C	D	7 days	CV%*		
Conc.								
CONTROL	0.317	0.322	0.330	0.328	0.324	1.8		
2	0.336	0.341	0.308	0.326	0.328	4.4		
2.6	0.305	0.333	0.324	0.310	0.318	4.0		
3.5	0.321	0.346	0.327	0.331	0.331	3.2		
4.7	0.302	0.328	0.341	0.320	0.323	5.1		
6.3	0.335	0.316	0.329	0.335	0.329	2.7		

Figure 2. Survival data for fathead minnow larval survival and growth to

Discharger: Arkadelphia Test Dates: 6-5-12 16:20
 Location: 14602 Analyst: AAE

Conc:	Rep. No.	No. Survivors							Remarks
		Day							
		1	2	3	4	5	6	7	
Control	1	10	10	10	10	10	10	10	
	2	10	10	10	10	10	10	10	
	3	10	10	10	10	10	10	10	
	4	10	10	10	10	10	10	10	
Conc:	5	10	10	10	10	10	10	10	
	6	10	10	10	10	10	10	10	
	7	10	10	10	10	10	10	10	
<u>2.0</u>	8	10	10	10	10	10	10	10	
	9	10	10	10	10	10	10	10	
Conc:	10	10	10	10	10	10	10	10	
	11	10	10	10	10	10	10	10	
<u>2.6</u>	12	10	10	10	10	10	10	10	
	13	10	10	10	10	10	10	10	
Conc:	14	10	10	10	10	10	10	10	
	15	10	10	10	10	10	10	10	
<u>3.5</u>	16	10	10	10	10	10	10	10	
	17	10	10	10	10	10	10	10	
Conc:	18	10	10	10	10	10	10	10	
	19	10	10	10	10	10	10	10	
<u>4.7</u>	20	10	10	10	10	10	10	10	
	21	10	10	10	10	10	10	10	
Conc:	22	10	10	10	10	10	10	10	
	23	10	10	10	10	10	10	10	
<u>6.3</u>	24	10	10	10	10	10	10	10	

Comments:

Discharge: Arkadelphia
 Location: 14602
 Analyst: _____

Test Date(s): 6-5-12
 Weighing Date: _____

Drying Temperature (°C): _____
 Drying Time (h): _____

Conc:	Rep. No.	A Wgt. of boat (mg)	B Dry wgt: foil and larvae (mg)	B-A Total dry wgt of larvae (mg)	C No. of larvae	(B-A)/C Mean dry wgt of larvae (mg)	Remarks
Control	1	125215	125532	317	10	.317	
	2	128151	128473	322	10	.322	
	3	123967	124297	330	10	.330	
	4	127656	127984	328	10	.328	
Conc:	5	123631	123967	336	10	.336	
	6	121153	121494	341	10	.341	
	7	127797	128105	308	10	.308	
2.0	8	123255	123581	326	10	.326	
46 Conc:	9	121487	121792	305	10	.305	
	10	129621	129954	333	10	.333	
	11	122367	122691	324	10	.324	
2.6	12	125402	125712	310	10	.310	
Conc:	13	122504	122825	321	10	.321	
	14	124355	124701	346	10	.346	
	15	126145	126472	327	10	.327	
3.5	16	122443	122774	331	10	.331	331 <i>NY</i>
Conc:	17	123470	123772	302	10	.302	
	18	126351	126679	328	10	.328	
	19	128205	128546	341	10	.341	
4.7	20	131109	131429	320	10	.320	
Conc:	21	132006	132341	335	10	.335	
	22	127433	127749	316	10	.316	
	23	123135	123464	329	10	.329	
6.3	24	122446	122781	335	10	.335	

Adapted from Hughes, et al., 1987.

Control: 122257 122258

FIGURE 3 - FATHEAD MINNOW
page 14

APPENDIX 2A
TEST 1002.0

Arkadelphia 14602		CERIO REPLICATE CONTAINERS										s.d. = 1.22927		CV% = 6.538684	
control	DAY	1	2	3	4	5	6	7	8	9	10	#young	#adult		
temp:	1											0	10	0.00	
temp:	2											0	10	0.00	
temp:	3		1			1			1			3	10	0.30	
temp:	4	3	2	1	4	2	2	4		4	3	25	10	2.50	
temp:	5	1		3			1		4			9	10	0.90	
temp:	6	6	5	5	7	7	7	6	3	7	5	58	10	5.80	
temp:	7		3	1				2	5		1	12	10	1.20	
temp:	8	7	8	8	10	7	9	8	6	8	10	81	10	8.10	
TOTAL		17	19	18	21	17	19	20	19	19	19	188	10	18.80	
2.00 DAY		REPLICATE CONTAINERS										s.d. = 2.16282		CV% = 11.818673	
temp:	1	1	2	3	4	5	6	7	8	9	10	no. young	no. adults		
temp:	1											0	10	0.00	
temp:	2											0	10	0.00	
temp:	3			1								1	10	0.10	
temp:	4	3	3	3	4	2	1	4	4	4	2	30	10	3.00	
temp:	5			1		2	2				1	6	10	0.60	
temp:	6	6	5	7	6	6	6	6	5	3	7	57	10	5.70	
temp:	7		1						3	2	1	7	10	0.70	
temp:	8	10	7	11	9	9	9	9	6	7	5	82	10	8.20	
TOTAL		19	16	23	19	19	18	19	18	17	15	183	10	18.30	
2.60 DAY		REPLICATE CONTAINERS										s.d. = 1.96921		CV% = 10.309986	
temp:	1	1	2	3	4	5	6	7	8	9	10	no. young	no. adults		
temp:	1											0	10	0.00	
temp:	2											0	10	0.00	
temp:	3				2		1			1		4	10	0.40	
temp:	4	3	4	4	3	2	2	5	1	3	3	30	10	3.00	
temp:	5					4			3		1	8	10	0.80	
temp:	6	5	6	7	7	4	5	5	6	5	7	57	10	5.70	
temp:	7		2			6		1		3		12	10	1.20	
temp:	8	8	7	7	8	6	9	7	10	7	11	80	10	8.00	
TOTAL		16	19	18	20	22	17	18	20	19	22	191	10	19.10	
3.50 DAY		REPLICATE CONTAINERS										s.d. = 1.28668		CV% = 7.108751	
temp:	1	1	2	3	4	5	6	7	8	9	10	no. young	no. adults		
temp:	1											0	10	0.00	
temp:	2											0	10	0.00	
temp:	3	2	2			1						5	10	0.50	
temp:	4	1		4	2	2	1	3	5	5	5	28	10	2.80	
temp:	5		2		1	1	3			1		8	10	0.80	
temp:	6	6	5	5	7	7	4	7	6	5	7	59	10	5.90	
temp:	7	1		2			5		2			10	10	1.00	
temp:	8	6	8	7	7	7	5	9	6	8	8	71	10	7.10	
TOTAL		16	17	18	17	17	19	19	19	19	20	181	10	18.10	
4.70 DAY		REPLICATE CONTAINERS										s.d. = 1.66333		CV% = 9.1896685	
temp:	1	1	2	3	4	5	6	7	8	9	10	no. young	no. adults		
temp:	1											0	10	0.00	
temp:	2											0	10	0.00	
temp:	3				1							1	10	0.10	
temp:	4	4	2	2	2	3	4	2	5	1	3	28	10	2.80	
temp:	5		1	1		2		1		2		7	10	0.70	
temp:	6	6	5	5	5	5	6	6	7	7	5	57	10	5.70	
temp:	7		1	2	1	3		1			2	10	10	1.00	
temp:	8	8	7	7	9	6	7	8	10	7	9	78	10	7.80	
TOTAL		18	16	17	18	19	17	18	22	17	19	181	10	18.10	
6.30 DAY		REPLICATE CONTAINERS										s.d. = 1.2693		CV% = 6.5092078	
temp:	1	1	2	3	4	5	6	7	8	9	10	no. young	no. adults		
temp:	1											0	10	0.00	
temp:	2											0	10	0.00	
temp:	3		1			2		1	1			5	10	0.50	
temp:	4	1	3	3	4	3	2	1	4	3	3	27	10	2.70	
temp:	5	3					1	2				6	10	0.60	
temp:	6	5	7	7	6	7	5	7	6	6	7	63	10	6.30	
temp:	7		1		3		3		2	1		10	10	1.00	
temp:	8	11	9	7	7	8	8	10	7	8	9	84	10	8.40	
TOTAL		20	21	17	20	20	19	21	20	18	19	195	10	19.50	

B56022

Arkadelphia 14602 Ceria 6-5-12 1620

CONC.	DAY	REPLICATE CONTAINERS										s.d.=	CVX =	#DIV/O!	
control		1	2	3	4	5	6	7	8	9	10	no. youn	no. adults	young/adult	
temp:	1											0	10	#DIV/O!	
temp:	2											0	10	#DIV/O!	
temp:	3											0	10	#DIV/O!	
temp:	4	3	2	1	4	2	2	4	1	4	3	0	10	#DIV/O!	
temp:	5	1		3			1	6	4			0	10	#DIV/O!	
temp:	6	10	5	3	7	7	7	6	3	7	5	0	10	#DIV/O!	
temp:	7		3	1				2	5			0	10	#DIV/O!	
temp:	8	2	8	8	10	7	9	8	6	8	10	0	10	#DIV/O!	
* TOTAL		0	0	0	0	0	0	0	0	0	0	0	0	10	0.00

CONC.	DAY	REPLICATE CONTAINERS										s.d.=	CVX =	#DIV/O!	
2.0		1	2	3	4	5	6	7	8	9	10	no. youn	no. adults	young/adult	
temp:	1											0	10	#DIV/O!	
temp:	2											0	10	#DIV/O!	
temp:	3											0	10	#DIV/O!	
temp:	4	3	3	1	4	2	1	4	4	4	2	0	10	#DIV/O!	
temp:	5			1		2	2			1		0	10	#DIV/O!	
temp:	6	6	5	7	6	6	6	6	5	3	7	0	10	#DIV/O!	
temp:	7		1						3	2	1	0	10	#DIV/O!	
temp:	8	10	7	11	9	9	9	9	6	7	5	0	10	#DIV/O!	
* TOTAL		0	0	0	0	0	0	0	0	0	0	0	0	10	0.00

CONC.	DAY	REPLICATE CONTAINERS										s.d.=	CVX =	#DIV/O!	
2.6		1	2	3	4	5	6	7	8	9	10	no. youn	no. adults	young/adult	
temp:	1											0	10	#DIV/O!	
temp:	2											0	10	#DIV/O!	
temp:	3					2		1		1		0	10	#DIV/O!	
temp:	4	3	4	4	3	2	2	5	1	3	3	0	10	#DIV/O!	
temp:	5					4			3		1	0	10	#DIV/O!	
temp:	6	5	6	7	7	4	5	5	6	5	7	0	10	#DIV/O!	
temp:	7		2			6		1		3		0	10	#DIV/O!	
temp:	8	8	7	7	8	6	9	7	10	7	11	0	10	#DIV/O!	
* TOTAL		0	0	0	0	0	0	0	0	0	0	0	0	10	0.00

CONC.	DAY	REPLICATE CONTAINERS										s.d.=	CVX =	#DIV/O!	
3.5		1	2	3	4	5	6	7	8	9	10	no. youn	no. adults	young/adult	
temp:	1											0	10	#DIV/O!	
temp:	2											0	10	#DIV/O!	
temp:	3	2	2									0	10	#DIV/O!	
temp:	4	1		4	2	2	1	3	5	5	5	0	10	#DIV/O!	
temp:	5		2		1	1	3			1		0	10	#DIV/O!	
temp:	6	6	5	5	7	7	4	7	6	5	7	0	10	#DIV/O!	
temp:	7	6		2			4		2			0	10	#DIV/O!	
temp:	8	6	8	7	7	7	5	9	6	8	8	0	10	#DIV/O!	
* TOTAL		0	0	0	0	0	0	0	0	0	0	0	0	10	0.00

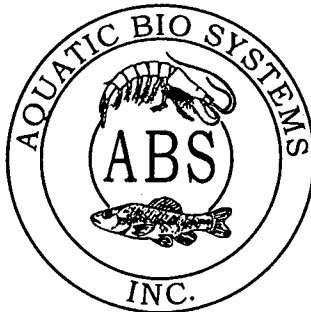
CONC.	DAY	REPLICATE CONTAINERS										s.d.=	CVX =	#DIV/O!	
4.7		1	2	3	4	5	6	7	8	9	10	no. youn	no. adults	young/adult	
temp:	1											0	10	#DIV/O!	
temp:	2											0	10	#DIV/O!	
temp:	3				1							0	10	#DIV/O!	
temp:	4	4	2	2	2	3	4	2	5	1	3	0	10	#DIV/O!	
temp:	5		1	1		2		1		2		0	10	#DIV/O!	
temp:	6	6	5	5	5	5	6	6	7	7	5	0	10	#DIV/O!	
temp:	7		1	2	1	3		1			2	0	10	#DIV/O!	
temp:	8	8	4	9	9	6	7	8	10	7	9	0	10	#DIV/O!	
* TOTAL		0	0	0	0	0	0	0	0	0	0	0	0	10	0.00

CONC.	DAY	REPLICATE CONTAINERS										s.d.=	CVX =	#DIV/O!	
6.3		1	2	3	4	5	6	7	8	9	10	no. youn	no. adults	young/adult	
temp:	1											0	10	#DIV/O!	
temp:	2											0	10	#DIV/O!	
temp:	3		1			2			1			0	10	#DIV/O!	
temp:	4	1	3	3	4	3	2	1	4	3	3	0	10	#DIV/O!	
temp:	5						1	2				0	10	#DIV/O!	
temp:	6	5	7	7	6	7	5	7	6	6	7	0	10	#DIV/O!	
temp:	7		1		3		3		2	1		0	10	#DIV/O!	
temp:	8	11	9	7	7	8	8	10	7	8	9	0	10	#DIV/O!	
* TOTAL		0	0	0	0	0	0	0	0	0	0	0	0	10	0.00

Fig. 2 - CERIO page 34

APPENDIX B
ORGANISM HISTORY

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524



Toll Free: 800/331-5916
Tel: 970/484-5091 Fax: 970/484-2514

ORGANISM HISTORY

DATE: 6/4/2012

SPECIES: *Pimephales promelas*

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 6/4/2012

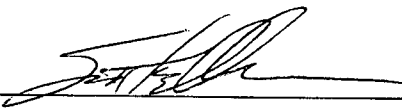
BEGAN FEEDING: N/A

FOOD: N/A

Water Chemistry Record:

	Current	Range
TEMPERATURE:	<u>24°C</u>	<u>--</u>
SALINITY/CONDUCTIVITY:	<u>--</u>	<u>--</u>
TOTAL HARDNESS (as CaCO ₃):	<u>120 mg/l</u>	<u>--</u>
TOTAL ALKALINITY (as CaCO ₃):	<u>80 mg/l</u>	<u>--</u>
pH:	<u>7.93</u>	<u>--</u>

Comments:



Facility Supervisor

Rec'd 6-5-12
14602

APPENDIX C
CHAINS OF CUSTODY

SORRELLS RESEARCH ASSOCIATES, INC

8100 NATIONAL DRIVE, LITTLE ROCK, AR 72209

501-562-8139 800-331-8139

FAX 501-562-7025

CHAIN OF CUSTODY RECORD

TURN AROUND TIME

RUSH 24HR. 48 HR.

5 DAY REG

OTHER _____

FOR LAB/OFFICE USE ONLY

LAB # 14602.0002B

CLIENT # 1144

P.O.# _____

STANDARD METHODS PRESERVATION PER EPA 40 CFR

C4= COOL TO 4.C

S<2= SULFURIC ACID TO pH<2

N<2= NITRIC ACID TO pH<2

T= THIOSULFATE FOR DECHLORINATION

W= WINKLER AZIDE MODIFICATION

P= MEMBRANE ELECTRODE

NaOH= pH >12

110913K2

NAME OF COMPANY, CITY, OR PROJECT

PROJECT NO:

SAMPLER(S) NAME: (PRINT)

Philadelphia, city

out Falls pool

Randy Windham

SAMPLE ID AND/OR COLLECTION LOCATION	START	END	COMP	FIELD ANALYSIS				D.O (W)	CONTAINER TYPE	ANALYSIS REQUIRED
	DATE/TIME	DATE/TIME	GRAB	pH	TEMP	FLOW	CL2	D.O(P)	PRESERVATIVE	
<u>out Falls pool</u>	<u>6/5/00</u>	<u>6/6/00</u>							<u>Plastic None</u>	<u>channel Bio</u>

METHOD OF SHIPMENT (CIRCLE)

FED EX WALK IN SRA UPS OTHER

FIELD CALIBRATION RECORD

pH 7

pH 4

pH 10

D.O

NOTES/COMMENTS/OBSERVATIONS

TYPE OF SAMPLE(S): (CIRCLE)

WATER SOIL W/W SLUDGE OTHER

FIELD ANALYSIS CONDUCTED BY: (CIRCLE) SRA CLIENT

RELINQUISHED Randy Windham

DATE/TIME: 6-6-12 0955

RECEIVED BY Dan Riddle

DATE/TIME: 9:58

Temp @ Lab 3.5°C

RECEIVED BY: _____ DATE/TIME: _____

8100 NATIONAL DRIVE, LITTLE ROCK, AR 72209

501-562-8139 800-331-8139

FAX 501-562-7025

CHAIN OF CUSTODY RECORD

TURN AROUND TIME

RUSH 24HR. 48 HR.

5 DAY REG

OTHER _____

FOR LAB/OFFICE USE ONLY

LAB # ~~14602~~ 14602.0003B

CLIENT # 1144

P.O.# _____

STANDARD METHODS PRESERVATION PER EPA 40 CFR

C4= COOL TO 4.C

S<2= SULFURIC ACID TO pH<2

N<2= NITRIC ACID TO pH<2

T= THIOSULFATE FOR DECHLORINATION

W= WINKLER AZIDE MODIFICATION

P= MEMBRANE ELECTRODE

NaOH= pH >12

110213k2

NAME OF COMPANY, CITY, OR PROJECT

PROJECT NO:

SAMPLER(S) NAME: (PRINT)

Arkadelphia, city

Randy Windham

SAMPLE NO:	SAMPLE ID AND/OR COLLECTION LOCATION	START	END	COMP	FIELD ANALYSIS				D.O (W)	CONTAINER TYPE	ANALYSIS REQUIRED	
		DATE/TIME	DATE/TIME	GRAB	pH	TEMP	FLOW	CL2	D.O(P)	PRESERVATIVE		
	<u>outfalls edl</u>	<u>6-7/0800</u>	<u>6-7/0800</u>	<u>comp</u>		<u>3.5^c</u>				<u>Plastic</u>	<u>None</u>	<u>chrome / Bio</u>

METHOD OF SHIPMENT (CIRCLE) FED EX <input checked="checked" type="checkbox"/> WALK IN <input type="checkbox"/> SRA <input type="checkbox"/> UPS <input type="checkbox"/> OTHER <input type="checkbox"/>	FIELD CALIBRATION RECORD pH 7 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> pH 4 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> pH 10 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> D.O <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	NOTES/COMMENTS/OBSERVATIONS
TYPE OF SAMPLE(S): (CIRCLE) WATER <input checked="checked" type="checkbox"/> SOIL <input type="checkbox"/> SLUDGE <input type="checkbox"/> OTHER <input type="checkbox"/>		FIELD ANALYSIS CONDUCTED BY: (CIRCLE) SRA <input type="checkbox"/> CLIENT <input type="checkbox"/>

RELINQUISHED BY: Randy Windham DATE/TIME: 6-8-12 RECEIVED BY: _____ DATE/TIME: _____

RELINQUISHED BY: _____ DATE/TIME: _____ RECEIVED BY (LAB): Kristi Matthews DATE/TIME: 6/11/12

APPENDIX D
LABORATORY CONTROL
CERIO CULTURE RECORD

5-29-12 Corio

DATE START	*															
DATE END	*															
ANALYST	*															
WATER TYPE	*					day 8						day 14				
% SURVIVAL	*					#VALUE!						#VALUE!				
#YOUNG MEAN						0										
stnd DEV from mean						0						#DIV/0!				
REPLICATE NUMBER													No.	No.	Young/	
DAY	1	2	3	4	5	6	7	8	9	10	10	Young	Adults	Adult		
1												0		#####		
2												0		#####		
3		1					1					0	10	#####		
4	3	2	4	4	2	2		3	3	3		0	10	#####		
5		1			3		6	2				0	10	#####		
6	6	5	5	5	3	7	2	3	4	5		0	10	#####		
7			3		4		3	5	1			0	10	#####		
8	9	9	7	10	3	5	9	6	7	8		0	10	#####		
total8	0	0	0	0	0	0	0	0	0	0		0		#####		
9												0		#####		
10												0		#####		
11												0		#####		
12												0		#####		
13												0		#####		
14												0		#####		
total14												0		#####		
REPLICATE NUMBER													No.	No.	Young/	
DAY	11	12	13	14	15	16	17	18	19	20	20	Young	Adults	Adult		
1												0		#####		
2												0		#####		
3				1		2						0	10	#####		
4	4	4	1	3	2	2	4	3	5	2		0	10	#####		
5		1	3		2			1		3		0	10	#####		
6	6	6	5	5	6	5	7	2	5	6		0	10	#####		
7		1		2		3			1			0	10	#####		
8	8	9	11	5	9	7	8	9	6	10		0	10	#####		
total8	0	0	0	0	0	0	0	0	0	0		0	10	0		
9												0		#####		
10												0		#####		
11												0		#####		
12												0		#####		
13												0		#####		
14												0		#####		
total14	0	0	0	0	0	0	0	0	0	0		0	10	0		

FIGURE 5
page 82

BIOMONITORING ANALYSIS
BY
SORRELLS RESEARCH ASSOCIATES, INC.

ANALYSIS


KLUGH E. SORRELLS, II
LABORATORY TECHNICIAN



CECIL A. SORRELLS
BIOMONITORING MANAGER/PRESIDENT

KLUGH E. SORRELLS, M.S.
QUALITY ASSURANCE OFFICER

Arkadelphia Water Co.
700 Clay Street
P.O. Box 495
Arkadelphia, AR 71923

UNITED STATES POSTAGE

PITNEY BOWES
2 1P \$ 002.70⁰
003925991 JUL 30 2012
MAILED FROM ZIP CODE 71923

Ms. Sara Clem
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317