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October 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 September 2012.

If there are questions, please contact me.

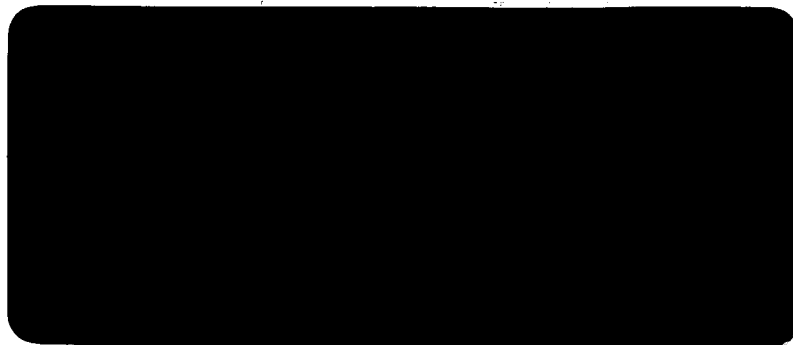
Sincerely,

Brenda Gills
Utilities Manager

Enclosure

Environmental Analysis

Biomonitoring
Acute Toxicity
Chronic Toxicity
Storm Water 24 hr. Toxicity



Sorrell's Research

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

October 10, 2012

Laboratory Number: 14970.0001, 0002, 0003

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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 09/16-17/12, 09/18-19/12, 09/20-21/12.

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

These samples were logged in as #14970.0001, 0002 and 0003. Chain of custody included in report.

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

Testing was initiated 09/18/12 at 1430 hours and continued through 09/26/12 at 1430 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.	.320	PASS
1002	Ceriodaphnia dubia	Control repro. 15 or> neonates per surviving female.	18.9	PASS
1000	Pimephales promelas	Control CV 40 % or <	3.6	PASS
1002	Ceriodaphnia Dubia	Control CV 40 % or <	6.81	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: 09/16-17/12 0800-0800	09/18-19/12 0800-0800	09/20-21/12 0800-0800
--	--------------------------	--------------------------

SAMPLING COLLECTION METHOD: COMPOSITE

PHYSICAL AND CHEMICAL DATA:

CONTROL	DATE 09/18/12	DATE 09/20/12	DATE 09/22/12
DO (mg/l)	8.70	8.50	8.62
pH (S.U.)	7.30	7.35	7.44
Conductivity (umhos)	285	260	271
Alkalinity (mg/l)	61	59	53
Hardness (mg/l)	58	52	65
Res. Chlorine (mg/l)	0	0	0

3.5%	DATE 09/18/12	DATE 09/20/12	DATE 09/22/12
DO (mg/l)	8.66	8.39	8.60
pH (S.U.)	7.33	7.41	7.39
Conductivity (umhos)	272	261	276
Alkalinity (mg/l)	60	59	61
Hardness (mg/l)	67	65	56

(Cont.)

PHYSICAL AND CHEMICAL DATA:
6.3 EFFLUENT

	DATE	DATE	DATE
	09/18/12	09/20/12	09/22/12
DO (mg/l)	8.60	8.35	8.55
pH (S.U.)	7.49	7.56	7.40
Conductivity (umhos)	270	263	279
Alkalinity (mg/l)	59	44	59
Hardness (mg/l)	81	91	77
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

Permittee Arkadelphia Date 9-18-12 1430

Analyst A/JJM Lab no. 14970

Dilution Control

Day	1	2	3	4	5	6	7	notes
Temp	25.0	28.0	25.0	26.0	26.0	26.0		
pH	7.30	7.27	7.35	7.30	7.44	7.47		
D.O.	8.70	8.64	8.50	8.44	8.62	8.55		
Alk	61		59		53			
Hard.	58		52		65			
Cond.	285 287		260		271			

Dilution 3.5

Day	1	2	3	4	5	6	7	notes
Temp	25.1	25.0	25.0	25.0	25.0	26.0		
pH	7.33	7.35	7.41	7.36	7.39	7.42		
D.O.	8.66	8.56	8.39	8.32	8.60	8.45		
Alk	60		59		61			
Hard.	67		65		56			
Cond.	272		261		276			

Dilution 6.3

Day	1	2	3	4	5	6	7	notes
Temp	25.0	25.0	25.0	25.0	26.0	26.0		
pH	7.49	7.48	7.56	7.44	7.40	7.50		
D.O.	8.60	8.48	8.35	8.29	8.55	8.40		
Alk	59		44		59			
Hard.	81		91		77			
Cond.	270		263		279			

0

0

0

Cal pH 7.200 104-12
4.7401 TSV/00

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 14970 CERIO REPS

FILE: 14970ACR

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	19.0000	19.0000
1	CONTROL	5	18.0000	18.0000
1	CONTROL	6	20.0000	20.0000
1	CONTROL	7	17.0000	17.0000
1	CONTROL	8	19.0000	19.0000
1	CONTROL	9	19.0000	19.0000
1	CONTROL	10	21.0000	21.0000
2	2.00	1	18.0000	18.0000
2	2.00	2	20.0000	20.0000
2	2.00	3	19.0000	19.0000
2	2.00	4	17.0000	17.0000
2	2.00	5	19.0000	19.0000
2	2.00	6	17.0000	17.0000
2	2.00	7	17.0000	17.0000
2	2.00	8	21.0000	21.0000
2	2.00	9	18.0000	18.0000
2	2.00	10	19.0000	19.0000
3	2.60	1	17.0000	17.0000
3	2.60	2	19.0000	19.0000
3	2.60	3	19.0000	19.0000
3	2.60	4	19.0000	19.0000
3	2.60	5	20.0000	20.0000
3	2.60	6	19.0000	19.0000
3	2.60	7	17.0000	17.0000
3	2.60	8	19.0000	19.0000
3	2.60	9	15.0000	15.0000
3	2.60	10	18.0000	18.0000
4	3.50	1	15.0000	15.0000
4	3.50	2	17.0000	17.0000
4	3.50	3	17.0000	17.0000
4	3.50	4	17.0000	17.0000
4	3.50	5	20.0000	20.0000
4	3.50	6	21.0000	21.0000
4	3.50	7	20.0000	20.0000
4	3.50	8	18.0000	18.0000
4	3.50	9	19.0000	19.0000
4	3.50	10	18.0000	18.0000
5	4.70	1	19.0000	19.0000
5	4.70	2	17.0000	17.0000
5	4.70	3	19.0000	19.0000
5	4.70	4	20.0000	20.0000
5	4.70	5	18.0000	18.0000
5	4.70	6	20.0000	20.0000
5	4.70	7	22.0000	22.0000
5	4.70	8	20.0000	20.0000
5	4.70	9	19.0000	19.0000
5	4.70	10	18.0000	18.0000

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

ARKADELPHIA 14970 CERIO REPS
File: 14970ACR 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	18.700
2	2.00	10	17.000	21.000	18.500
3	2.60	10	15.000	20.000	18.200
4	3.50	10	15.000	21.000	18.200
5	4.70	10	17.000	22.000	19.200
6	6.30	10	17.000	21.000	18.900

ARKADELPHIA 14970 CERIO REPS
File: 14970ACR Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	CONTROL	1.567	1.252	0.396
2	2.00	1.833	1.354	0.428
3	2.60	2.178	1.476	0.467
4	3.50	3.289	1.814	0.573
5	4.70	1.956	1.398	0.442
6	6.30	1.656	1.287	0.407

ARKADELPHIA 14970 CERIO REPS
File: 14970ACR Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	7.883	1.577	0.758
Within (Error)	54	112.300	2.080	

 Total 59 120.183

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

ARKADELPHIA 14970 CERIO REPS
 File: 14970ACR 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	18.700	18.700		
2	2.00	18.500	18.500	0.310	
3	2.60	18.200	18.200	0.775	
4	3.50	18.200	18.200	0.775	
5	4.70	19.200	19.200	-0.775	
6	6.30	18.900	18.900	-0.310	

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

ARKADELPHIA 14970 CERIO REPS
 File: 14970ACR 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	1.490	8.0	0.200
3	2.60	10	1.490	8.0	0.500
4	3.50	10	1.490	8.0	0.500
5	4.70	10	1.490	8.0	-0.500
6	6.30	10	1.490	8.0	-0.200

ARKADELPHIA 14970 CERIO REPS
 File: 14970ACR Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	CONTROL	10	18.700	18.700	18.400
2	2.00	10	18.500	18.500	18.400
3	2.60	10	18.200	18.200	18.400
4	3.50	10	18.200	18.200	18.400
5	4.70	10	19.200	19.200	19.050
6	6.30	10	18.900	18.900	19.050

ARKADELPHIA 14970 CERIO REPS

File: 14970ACR

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	18.400				
2.00	18.400	0.465		1.68	k= 1, v=54
2.60	18.400	0.465		1.76	k= 2, v=54
3.50	18.400	0.465		1.79	k= 3, v=54
4.70	19.050	0.543		1.80	k= 4, v=54
6.30	19.050	0.543		1.80	k= 5, v=54

s = 1.442

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

ARKADELPHIA 14970 CERIO REPS

File: 14970ACR

Transform: NO TRANSFORM

STEELS MANY-ONE RANK TEST

Ho: Control < Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	18.700				
2	2.00	18.500	100.00	75.00	10.00	
3	2.60	18.200	98.50	75.00	10.00	
4	3.50	18.200	96.50	75.00	10.00	
5	4.70	19.200	115.50	75.00	10.00	
6	6.30	18.900	109.00	75.00	10.00	

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

TITLE: ARKADELPHIA 14970 MINNOW WEIGHTS

FILE: 14970AMW

TRANSFORM: NO TRANSFORM

NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.3120	0.3120
1	CONTROL	2	0.3240	0.3240
1	CONTROL	3	0.3350	0.3350
1	CONTROL	4	0.3100	0.3100
2	2.00	1	0.3300	0.3300
2	2.00	2	0.3150	0.3150
2	2.00	3	0.3090	0.3090
2	2.00	4	0.3380	0.3380
3	2.60	1	0.3160	0.3160
3	2.60	2	0.3280	0.3280
3	2.60	3	0.3040	0.3040
3	2.60	4	0.3440	0.3440
4	3.50	1	0.3170	0.3170
4	3.50	2	0.3120	0.3120
4	3.50	3	0.3250	0.3250
4	3.50	4	0.3350	0.3350
5	4.70	1	0.3110	0.3110
5	4.70	2	0.3180	0.3180
5	4.70	3	0.3290	0.3290
5	4.70	4	0.3020	0.3020
6	6.30	1	0.3310	0.3310
6	6.30	2	0.3190	0.3190
6	6.30	3	0.3280	0.3280
6	6.30	4	0.3140	0.3140

ARKADELPHIA 14970 MINNOW WEIGHTS

File: 14970AMW

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	4	0.310	0.335	0.320
2	2.00	4	0.309	0.338	0.323
3	2.60	4	0.304	0.344	0.323
4	3.50	4	0.312	0.335	0.322
5	4.70	4	0.302	0.329	0.315
6	6.30	4	0.314	0.331	0.323

ARKADELPHIA 14970 MINNOW WEIGHTS

File: 14970AMW

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	CONTROL	0.000	0.012	0.006
2	2.00	0.000	0.013	0.007
3	2.60	0.000	0.017	0.009
4	3.50	0.000	0.010	0.005
5	4.70	0.000	0.011	0.006
6	6.30	0.000	0.008	0.004

ARKADELPHIA 14970 MINNOW WEIGHTS
File: 14970AMW Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.000	0.000	0.268
Within (Error)	18	0.003	0.000	
Total	23	0.003		

Critical F value = 2.77 (0.05,5,18)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

ARKADELPHIA 14970 MINNOW WEIGHTS
File: 14970AMW 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	0.320	0.320		
2	2.00	0.323	0.323	-0.318	
3	2.60	0.323	0.323	-0.318	
4	3.50	0.322	0.322	-0.231	
5	4.70	0.315	0.315	0.607	
6	6.30	0.323	0.323	-0.318	

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

ARKADELPHIA 14970 MINNOW WEIGHTS
File: 14970AMW 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	4			
2	2.00	4	0.021	6.5	-0.003
3	2.60	4	0.021	6.5	-0.003
4	3.50	4	0.021	6.5	-0.002
5	4.70	4	0.021	6.5	0.005
6	6.30	4	0.021	6.5	-0.003

ARKADELPHIA 14970 MINNOW WEIGHTS
 File: 14970AMW Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	CONTROL	4	0.320	0.320	0.320
2	2.00	4	0.323	0.323	0.321
3	2.60	4	0.323	0.323	0.321
4	3.50	4	0.322	0.322	0.321
5	4.70	4	0.315	0.315	0.321
6	6.30	4	0.323	0.323	0.323

ARKADELPHIA 14970 MINNOW WEIGHTS
 File: 14970AMW 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	0.320				
2.00	0.321	0.065		1.73	k= 1, v=18
2.60	0.321	0.065		1.82	k= 2, v=18
3.50	0.321	0.065		1.85	k= 3, v=18
4.70	0.321	0.065		1.86	k= 4, v=18
6.30	0.323	0.318		1.87	k= 5, v=18

S = 0.012

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

ARKADELPHIA 14970 MINNOW WEIGHTS
 File: 14970AMW Transform: NO TRANSFORM

STEELS MANY-ONE RANK TEST Ho: Control < Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	0.320				
2	2.00	0.323	19.00	10.00	4.00	
3	2.60	0.323	19.00	10.00	4.00	

4	3.50	0.322	20.00	10.00	4.00
5	4.70	0.315	16.00	10.00	4.00
6	6.30	0.323	20.00	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: 09/18/12 1430

DATE AND TIME TEST TERMINATED: 09/25/12 1430

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	.312	.324	.335	.310	.320	3.6
2.0	.330	.315	.309	.338	.323	4.1
2.6	.316	.328	.304	.344	.323	5.3
3.5	.317	.312	.325	.335	.322	3.1
4.7	.311	.318	.329	.302	.315	3.6
6.3	.331	.319	.328	.314	.323	2.4

*Coefficient of variation = standard deviation X 100/mean

(Coef Of Var Statre 7Day Chronic Pimephales TQP6C = 3.6)

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: 09/18/12 1430

DATE AND TIME TEST TERMINATED: 09/26/12 1430

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	18	17	15	19	21
B	19	20	19	17	17	20
C	18	19	19	17	19	20
D	19	17	19	17	20	18
E	18	19	20	20	18	18
F	20	17	19	21	20	18
G	17	17	17	20	22	18
H	19	21	19	18	20	17
I	19	18	15	19	19	20
J	21	19	18	18	18	19
*CV%	6.69	7.32	8.11	9.96	7.28	6.81
MEAN	18.7	18.5	18.2	18.2	19.2	18.9

*coefficient of variation = standard deviation x 100/mean

(Coef Of Var Statre 7Day Chronic Ceriodaphnia TQP3B = **7.28**)

STANDARD REFERENCE TOXICANTS

STANDARD TOXICANT USED AND SOURCE: SODIUM CHLORIDE *
DATES AND TIMES OF CONCURRENT TEST: 09/18/12 1:00

DILUTION WATER USED IN TEST: 20% DMW
RESULTS (LC50 OR, NOEC AND/OR ECL): LC50 = 1473 FATHEAD MINNOW
RESULTS (LC50 OR, NOEC AND/OR ECL): LC50 = 743 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 90.4%

CERIODAPHNIA

Standard Recovery CERODAPHNIA 101.2%

APPENDIX 1A
TEST 1000.0

Permittee Arkadelphia 14970									
Effluent	Percent Survival In Rep. Chambers				Mean Percent Survival			CV%*	
	Conc.	A	B	C	D	24h	48h	7 days	*
CONTROL	100	100	100	100	100	100	100	100	0.0
2.00%	100	100	100	100	100	100	100	100	0.0
2.60%	100	100	100	100	100	100	100	100	0.0
3.50%	100	100	100	100	100	100	100	100	0.0
4.70%	100	100	100	100	100	100	100	100	0.0
6.30%	100	100	100	100	100	100	100	100	0.0
Permittee Arkadelphia 14970									
Effluent	Average Dry Weight (mg)				Mean Dry Weight (mg)				
	Conc.	A	B	C	D	7 days	CV%*		
CONTROL	0.312	0.324	0.335	0.310	0.320	3.6			
2	0.330	0.315	0.309	0.338	0.323	4.1			
2.6	0.316	0.328	0.304	0.344	0.323	5.3			
3.5	0.317	0.312	0.325	0.335	0.322	3.1			
4.7	0.311	0.318	0.329	0.302	0.315	3.6			
6.3	0.331	0.319	0.328	0.314	0.323	2.4			

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

Discharger: Arkadelphia Test Dates: 9-18-12
 Location: 14970 Analyst: McJannet

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	
2.0	7	10	10	10	10	10	10	10	
	8	10	10	10	10	10	10	10	
Conc:	9	10	10	10	10	10	10	10	
	10	10	10	10	10	10	10	10	
2.6	11	10	10	10	10	10	10	10	
	12	10	10	10	10	10	10	10	
Conc:	13	10	10	10	10	10	10	10	
	14	10	10	10	10	10	10	10	
3.5	15	10	10	10	10	10	10	10	
	16	10	10	10	10	10	10	10	
Conc:	17	10	10	10	10	10	10	10	
	18	10	10	10	10	10	10	10	
4.7	19	10	10	10	10	10	10	10	
	20	10	10	10	10	10	10	10	
Conc:	21	10	10	10	10	10	10	10	
	22	10	10	10	10	10	10	10	
6.3	23	10	10	10	10	10	10	10	
	24	10	10	10	10	10	10	10	

Comments:

Discharge: Arkadelphia
 Location: 14970
 Analyst: _____

Test Date(s): 9-18-12
 Weighing Date: 9-28-12

Drying Temperature (°C): 108
 Drying Time (h): 2

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	128838	129156	3.12	10	.312	
	2	125330	125654	3.24	10	.324	
	3	130542	130883	3.35	10	.335	
	4	130481	130791	3.10	10	.310	
Conc:	5	129181	129511	3.30	10	.330	
	6	124438	124753	3.15	10	.315	
2.0	7	124067	124371	3.09	10	.309	
	8	123990	124328	3.38	10	.338	
46 Conc:	9	123964	124220	3.16	10	.316	
	10	123290	123618	3.28	10	.328	
	11	129037	129341	3.04	11	.304	
2.6	12	128496	128840	3.44	10	.344	
	13	129899	130216	3.17	10	.317	
Conc:	14	128406	128718	3.12	10	.312	
	15	131310	131635	3.25	10	.325	
	16	129503	129838	3.35	10	.335	
3.5	17	127162	127473	3.11	10	.311	
	18	128082	128400	3.18	10	.318	
4.7	19	128235	128564	3.29	10	.329	
	20	129615	129917	3.02	10	.302	
Conc:	21	125633	125964	3.31	11	.331	
	22	129465	129784	3.19	10	.319	
	23	123722	124050	3.28	10	.328	
6.3	24	130330	130644	3.14	10	.314	

Adapted from Hughes, et al., 1987.

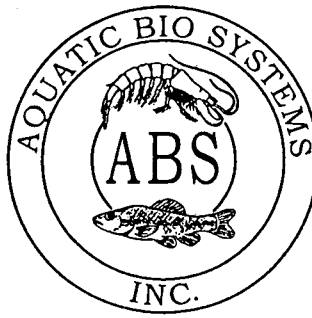
Control: 129913 129912

APPENDIX 2A
TEST 1002.0

Arkadelphia 14970		CERIO	REPLICATE CONTAINERS								s.d. = 1.25167	CV% =	6.6933987	
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		2				1					3	10	0.30
temp:	4	4	1	3	3	4	2	4	3	1	3	28	10	2.80
temp:	5		1		2					3	1	7	10	0.70
temp:	6	5	5	6	6	5	7	6	7	5	8	60	10	6.00
temp:	7	3	2		1	1				2		9	10	0.90
temp:	8	5	8	9	7	8	10	7	9	8	9	80	10	8.00
	TOTAL	17	19	18	19	18	20	17	19	19	21	187	10	18.70
2.00 DAY		REPLICATE CONTAINERS								s.d. = 1.35401	CV% =	7.3189535		
temp:	DAY	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			1				2	10	0.20
temp:	4	2	4	4	3	5	1	2	2	4	3	30	10	3.00
temp:	5		1				2	2				5	10	0.50
temp:	6	7	5	6	6	5	4	7	7	7	8	62	10	6.20
temp:	7		3		1		2					6	10	0.60
temp:	8	8	7	9	6	9	8	7	10	7	8	79	10	7.90
	TOTAL	18	20	19	17	19	17	17	21	18	19	185	10	18.50
2.60 DAY		REPLICATE CONTAINERS								s.d. = 1.47573	CV% =	8.1084043		
temp:	DAY	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	3	1	4	2	2	3	1	3	4	2	25	10	2.50
temp:	5		3			1						4	10	0.40
temp:	6	6	6	5	7	7	6	7	5	5	6	60	10	6.00
temp:	7			4		1			3			8	10	0.80
temp:	8	8	9	6	9	9	10	7	8	5	9	80	10	8.00
	TOTAL	17	19	19	19	20	19	17	19	15	18	182	10	18.20
3.50 DAY		REPLICATE CONTAINERS								s.d. = 1.81353	CV% =	9.9644473		
temp:	DAY	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				1	2	5	10	0.50
temp:	4	4	1	3	3	2	5	1	3	4	2	24	10	2.40
temp:	5		2			2		5		4	1	14	10	1.40
temp:	6	1	5	7	7	7	6	4	7	6	5	55	10	5.50
temp:	7	5	1				2	2			3	13	10	1.30
temp:	8	5	7	7	6	9	8	8	8	8	5	71	10	7.10
	TOTAL	15	17	17	17	20	21	20	18	19	18	182	10	18.20
4.70 DAY		REPLICATE CONTAINERS								s.d. = 1.39841	CV% =	7.2833948		
temp:	DAY	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					1				3	10	0.30
temp:	4	3	2	4	4	1	3	3	5	5	2	32	10	3.20
temp:	5		1			3	1				1	6	10	0.60
temp:	6	7	5	5	6	5	7	7	5	7	6	60	10	6.00
temp:	7		1	3		2			5			11	10	1.10
temp:	8	8	7	7	10	7	9	11	5	7	9	80	10	8.00
	TOTAL	19	17	19	20	18	20	22	20	19	18	192	10	19.20
6.30 DAY		REPLICATE CONTAINERS								s.d. = 1.28668	CV% =	6.8078515		
temp:	DAY	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		2	1			1		6	10	0.60
temp:	4	3	4	4		2	1	3	4	3	2	29	10	2.90
temp:	5				2	2			1	1		6	10	0.60
temp:	6	6	6	5	5	5	6	7	7	5	7	59	10	5.90
temp:	7			4	2		1			3		10	10	1.00
temp:	8	12	9	6	7	8	7	7	6	8	9	79	10	7.90
	TOTAL	21	20	20	18	18	18	18	17	20	19	189	10	18.90

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: 9/17/2012

SPECIES: *Pimephales promelas*

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 9/17/2012

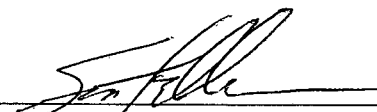
BEGAN FEEDING: N/A

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>160 mg/l</u>	<u>--</u>
TOTAL ALKALINITY (as CaCO ₃):	<u>95 mg/l</u>	<u>--</u>
pH:	<u>8.20</u>	<u>--</u>

Comments:



Facility Supervisor

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 # 14970.0001B

CLIENT # 1144

P.O.# _____

STANDARD METHODS PRESERVATION PER EPA 40 CFR

C 4= 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)

City of Arkadelphia

outfalls 001

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>out Falls 001</u>	<u>9-16/0800</u>	<u>9-17/0800</u>	<u>comp</u>						<u>plastic</u>	<u>None</u>	<u>chronal 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

Temp @ Lab 2.1°C

TYPE OF SAMPLE(S): (CIRCLE)

WATER SOIL W/W SLUDGE OTHER

FIELD ANALYSIS CONDUCTED BY: (CIRCLE) SRA CLIENT

RELINQUISHED BY: Randy Windham

DATE/TIME: 9-17-12 9:56

RECEIVED BY: Jimmy Riddle

DATE/TIME: 9-17-12 9:56

RELINQUISHED BY: _____

DATE/TIME: _____

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 # 14970.0002B

CLIENT # 1144

P.O.# _____

STANDARD METHODS PRESERVATION PER EPA 40 CFR

C 4= 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)

Arkadelphia Water Dept

David Thomson

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>Out fall 001</u>	<u>9/18/12 0800</u>	<u>9/19/12 0800</u>	<u>Comp</u>						<u>Plastic/None</u>	<u>Chronic Bio</u>
METHOD OF SHIPMENT (CIRCLE)		FIELD CALIBRATION RECORD			NOTES/COMMENTS/OBSERVATIONS						
FED EX <input checked="" type="checkbox"/> WALK IN <input type="checkbox"/> SRA <input type="checkbox"/> UPS <input type="checkbox"/> OTHER		pH 7			<u>Temp @ Lab 2.9°C</u> <u>10:08am</u>						
		pH 4									
		pH 10									
		D.O									
TYPE OF SAMPLE(S): (CIRCLE)					FIELD ANALYSIS CONDUCTED BY: (CIRCLE) SRA CLIENT						
WATER SOIL <input checked="" type="checkbox"/> W/W <input type="checkbox"/> SLUDGE <input type="checkbox"/> OTHER											

RELINQUISHED BY:

DATE/TIME:

RECEIVED BY:

DATE/TIME:

RELINQUISHED BY: David Thomson

DATE/TIME: 9-19-12
10:05

RECEIVED BY (LAB): Jammy Riddle

DATE/TIME: 9-19-12
05

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 #

14970.000313

CLIENT #

1144

P.O.# _____

STANDARD METHODS PRESERVATION PER EPA 40 CFR

C 4= 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

NAME OF COMPANY, CITY, OR PROJECT

PROJECT NO:

SAMPLER(S) NAME: (PRINT)

110913k2

Arkadelphia Water Dept

David Thomason

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>OUT Fall 201</u>	<u>09-20-12</u> <u>0800</u>	<u>09-21-12</u> <u>0800</u>	<u>COMP</u>						<u>Plastic/None</u>	<u>Chronic 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

Temp @ Lab .7°C

TYPE OF SAMPLE(S): (CIRCLE)

WATER SOIL W/W SLUDGE OTHER

FIELD ANALYSIS CONDUCTED BY: (CIRCLE) SRA CLIENT

RELINQUISHED BY: _____

DATE/TIME: _____

RECEIVED BY: _____

DATE/TIME: _____

RECEIVED BY: _____ DATE/TIME: _____

APPENDIX D
LABORATORY CONTROL
CERIO CULTURE RECORD

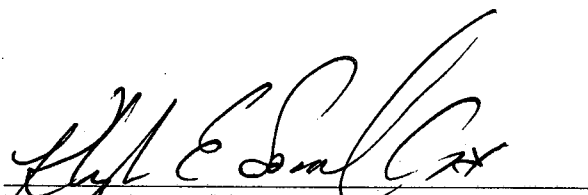
7-10-12 Ceño

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	Young	Adults	Adult			
1											0		#####			
2											0		#####			
3			1			1					0	10	#####			
4	3	3	4	2	5	1	3	3		2	0	10	#####			
5		1				3		1	4	2	0	10	#####			
6	6	5	5	7	7	6	6	5	4	7	0	20	#####			
7		3	2			1		2	4		0	10	#####			
8	9	7	8	10	7	7	9	9	6	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	Young	Adults	Adult			
1											0		#####			
2											0		#####			
3	1			2							0	10	#####			
4	2	2	3	1	4	2	4	4	4	3	0	10	#####			
5		1		2		1					0	10	#####			
6	7	8	7	6	6	5	5	7	6	6	0	10	#####			
7			1		4	1	2		5		0	10	#####			
8	8	10	7	7	9	6	8	8	8	9	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			

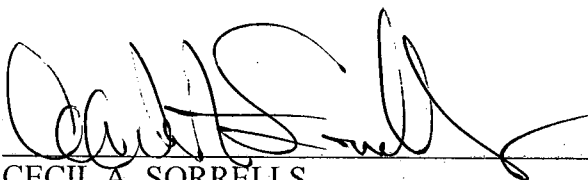
FIGURE 5

BIOMONITORING ANALYSIS
BY
SORRELLS RESEARCH ASSOCIATES, INC.

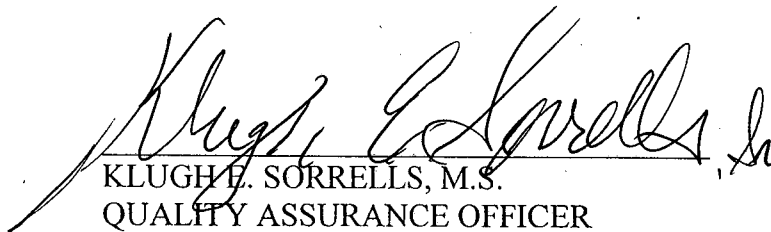
ANALYSIS



KLUGH E. SORRELLS, II
LABORATORY TECHNICIAN



CECIL A. SORRELLS
BIOMONITORING MANAGER/PRESIDENT



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