

Environmental Analysis

**Biomonitoring
Acute Toxicity
Chronic Toxicity
Storm Water 24 hr. Toxicity**



Sorrells Research

**8100 National Drive, Little Rock, AR 72209
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HOPE, CITY OF
PERMIT NO: AR0038466
CHRONIC BIOMONITORING

METHOD 1000.0 - PIMEPHALES PROMELAS
METHOD 1002.0 - CERIODAPHNIA DUBIA

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July 17, 2012

Laboratory Number: 14550.0001, 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 ADPC&E ATTACHED	23

INTRODUCTION AND SUMMARY

Chronic biomonitoring tests:

7 day ceriodaphnia dubia survival and reproduction (method 1002.0) was performed by Sorrells Research Associates for Hope 24 hour composite samples of plant effluent for dates 05/13-14/12, 05/15-16/12, 05/17-18/12.

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

These samples were logged in as 14550.0001, 0002, 0003. Chain of custody included in report.

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

Testing was initiated 05/15/12 at 16:10 hours and continued through 05/23/12 at 16:10 hours.

The results of these tests are as follows:

TEST 1000.0 FATHEAD MINNOW

SURVIVAL - NOEL 100% Effluent

GROWTH - NOWL 100% Effluent

TEST 1002.0 CERIODAPHNIA DUBIA

SURVIVAL - 100% Effluent

REPRODUCTION - 100% 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.	.324	PASS
1002	Ceriodaphnia dubia	Control repro. 15 or> neonates per surviving female.	19.1	PASS
1000	Pimephales promelas	Control CV 40 % or <	4.6	PASS
1002	Ceriodaphnia Dubia	Control CV 40 % or <	10.6	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: AR0038466
PERMIT REQUIREMENTS:
PLANT LOCATION:
RECEIVING WATER BODY:

CLIENT: Hope, City of
ADDRESS: P.O. Box 667
PHONE NO: Hope, AR 71801

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)

(Cont.)

PHYSICAL AND CHEMICAL DATA:

	DATE	DATE	DATE
100 % EFFLUENT	05/15/12	05/17/12	05/19/12
DO (mg/l)	8.16	7.75	8.15
pH (S.U.)	7.53	7.35	7.45
Conductivity (umhos)	940	908	986
Alkalinity (mg/l)	220	218	206
Hardness (mg/l)	62	64	68
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

000000
B570210

Chemical Data For Daily Biomonitoring							
Permitee <u>Hope</u>				Date <u>5-15-12</u> <u>1610</u>			
Analyst <u>JTM</u>				Lab no. <u>14550</u>			
Dilution <u>Control</u>							
Day	1	2	3	4	5	6	7 notes
Temp	25.0	25.0	25.0	25	25.0	25.0	
pH	7.20	7.26	7.13	7.18	7.14	7.15	
D.O.	8.45	8.39	8.41	8.36	8.60	8.51	
Alk	112		106		102		
Hard.	116		113		104		
Cond.	380		392		391		
Dilution <u>56.3</u>							
Day	1	2	3	4	5	6	7 notes
Temp	25.0	25.0	25.0	25.0	25.0	25.0	
pH	7.35	7.39	7.20	7.26	7.36	7.33	
D.O.	8.33	8.21	8.11	7.92	8.40	8.33	
Alk	160		168		162		
Hard.	75		78		80		
Cond.	657		672		711		
Dilution <u>160</u>							
Day	1	2	3	4	5	6	7 notes
Temp	25.0	25.0	25.0	25.0	25.0	25.0	
pH	7.53	7.48	7.35	7.40	7.45	7.52	
D.O.	8.16	8.01	7.75	7.63	8.15	8.02	
Alk	220		218		206		
Hard.	62		64		68		
Cond.	940		908		986		

0

0

0

DATA ANALYSIS

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

STATISTICAL ANALYSES

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: HOPE 14550 CERIO REPS
FILE: 14550HCR
TRANSFORM: NO TRANSFORM

NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	21.0000	21.0000
1	CONTROL	2	19.0000	19.0000
1	CONTROL	3	20.0000	20.0000
1	CONTROL	4	16.0000	16.0000
1	CONTROL	5	17.0000	17.0000
1	CONTROL	6	20.0000	20.0000
1	CONTROL	7	22.0000	22.0000
1	CONTROL	8	18.0000	18.0000
1	CONTROL	9	17.0000	17.0000
1	CONTROL	10	21.0000	21.0000
2	31.60	1	18.0000	18.0000
2	31.60	2	21.0000	21.0000
2	31.60	3	21.0000	21.0000
2	31.60	4	18.0000	18.0000
2	31.60	5	18.0000	18.0000
2	31.60	6	20.0000	20.0000
2	31.60	7	20.0000	20.0000
2	31.60	8	19.0000	19.0000
2	31.60	9	21.0000	21.0000
2	31.60	10	18.0000	18.0000
3	42.20	1	21.0000	21.0000
3	42.20	2	17.0000	17.0000
3	42.20	3	19.0000	19.0000
3	42.20	4	18.0000	18.0000
3	42.20	5	19.0000	19.0000
3	42.20	6	21.0000	21.0000
3	42.20	7	19.0000	19.0000
3	42.20	8	18.0000	18.0000
3	42.20	9	18.0000	18.0000
3	42.20	10	19.0000	19.0000
4	56.30	1	21.0000	21.0000
4	56.30	2	21.0000	21.0000
4	56.30	3	19.0000	19.0000
4	56.30	4	23.0000	23.0000
4	56.30	5	20.0000	20.0000
4	56.30	6	18.0000	18.0000
4	56.30	7	20.0000	20.0000
4	56.30	8	18.0000	18.0000
4	56.30	9	17.0000	17.0000
4	56.30	10	20.0000	20.0000
5	75.00	1	17.0000	17.0000
5	75.00	2	21.0000	21.0000
5	75.00	3	20.0000	20.0000
5	75.00	4	19.0000	19.0000
5	75.00	5	17.0000	17.0000
5	75.00	6	19.0000	19.0000
5	75.00	7	17.0000	17.0000
5	75.00	8	20.0000	20.0000
5	75.00	9	18.0000	18.0000
5	75.00	10	17.0000	17.0000

6	100.00	1	19.0000	19.0000
6	100.00	2	22.0000	22.0000
6	100.00	3	20.0000	20.0000
6	100.00	4	17.0000	17.0000
6	100.00	5	18.0000	18.0000
6	100.00	6	21.0000	21.0000
6	100.00	7	20.0000	20.0000
6	100.00	8	19.0000	19.0000
6	100.00	9	19.0000	19.0000
6	100.00	10	17.0000	17.0000

HOPE 14550 CERIO REPS
File: 14550HCR Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	10	16.000	22.000	19.100
2	31.60	10	18.000	21.000	19.400
3	42.20	10	17.000	21.000	18.900
4	56.30	10	17.000	23.000	19.700
5	75.00	10	17.000	21.000	18.500
6	100.00	10	17.000	22.000	19.200

HOPE 14550 CERIO REPS
File: 14550HCR Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	CONTROL	4.100	2.025	0.640
2	31.60	1.822	1.350	0.427
3	42.20	1.656	1.287	0.407
4	56.30	3.122	1.767	0.559
5	75.00	2.278	1.509	0.477
6	100.00	2.622	1.619	0.512

HOPE 14550 CERIO REPS
File: 14550HCR Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	8.533	1.707	0.656
Within (Error)	54	140.400	2.600	

 Total 59 148.933

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

HOPE 14550 CERIO REPS
 File: 14550HCR 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	19.100	19.100		
2	31.60	19.400	19.400	-0.416	
3	42.20	18.900	18.900	0.277	
4	56.30	19.700	19.700	-0.832	
5	75.00	18.500	18.500	0.832	
6	100.00	19.200	19.200	-0.139	

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

HOPE 14550 CERIO REPS
 File: 14550HCR 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	31.60	10	1.666	8.7	-0.300
3	42.20	10	1.666	8.7	0.200
4	56.30	10	1.666	8.7	-0.600
5	75.00	10	1.666	8.7	0.600
6	100.00	10	1.666	8.7	-0.100

HOPE 14550 CERIO REPS
 File: 14550HCR Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	CONTROL	10	19.100	19.100	19.100
2	31.60	10	19.400	19.400	19.125
3	42.20	10	18.900	18.900	19.125
4	56.30	10	19.700	19.700	19.125
5	75.00	10	18.500	18.500	19.125
6	100.00	10	19.200	19.200	19.200

HOPE 14550 CERIO REPS

File: 14550HCR

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	19.100				
31.60	19.125	0.035		1.68	k= 1, v=54
42.20	19.125	0.035		1.76	k= 2, v=54
56.30	19.125	0.035		1.79	k= 3, v=54
75.00	19.125	0.035		1.80	k= 4, v=54
100.00	19.200	0.139		1.80	k= 5, v=54

$t = 1.612$

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

HOPE 14550 CERIO REPS

File: 14550HCR

Transform: NO TRANSFORM

STEELS MANY-ONE RANK TEST

H_0 : Control < Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	19.100				
2	31.60	19.400	109.50	75.00	10.00	
3	42.20	18.900	101.50	75.00	10.00	
4	56.30	19.700	112.50	75.00	10.00	
5	75.00	18.500	95.50	75.00	10.00	
6	100.00	19.200	105.50	75.00	10.00	

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

TITLE: HOPE 14550 MINNOW WEIGHTS

FILE: 14550HMMW

TRANSFORM: NO TRANSFORM

NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.3050	0.3050
1	CONTROL	2	0.3210	0.3210
1	CONTROL	3	0.3320	0.3320
1	CONTROL	4	0.3390	0.3390
2	31.60	1	0.3120	0.3120
2	31.60	2	0.3220	0.3220
2	31.60	3	0.3080	0.3080
2	31.60	4	0.3240	0.3240
3	42.20	1	0.3300	0.3300
3	42.20	2	0.3290	0.3290
3	42.20	3	0.3040	0.3040
3	42.20	4	0.3210	0.3210
4	56.30	1	0.3350	0.3350
4	56.30	2	0.3310	0.3310
4	56.30	3	0.3200	0.3200
4	56.30	4	0.3390	0.3390
5	75.00	1	0.3160	0.3160
5	75.00	2	0.3430	0.3430
5	75.00	3	0.3180	0.3180
5	75.00	4	0.3060	0.3060
6	100.00	1	0.3350	0.3350
6	100.00	2	0.3220	0.3220
6	100.00	3	0.3100	0.3100
6	100.00	4	0.3260	0.3260

HOPE 14550 MINNOW WEIGHTS

File: 14550HMMW

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	4	0.305	0.339	0.324
2	31.60	4	0.308	0.324	0.316
3	42.20	4	0.304	0.330	0.321
4	56.30	4	0.320	0.339	0.331
5	75.00	4	0.306	0.343	0.321
6	100.00	4	0.310	0.335	0.323

HOPE 14550 MINNOW WEIGHTS

File: 14550HMMW

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	CONTROL	0.000	0.015	0.007
2	31.60	0.000	0.008	0.004
3	42.20	0.000	0.012	0.006
4	56.30	0.000	0.008	0.004
5	75.00	0.000	0.016	0.008
6	100.00	0.000	0.010	0.005

HOPE 14550 MINNOW WEIGHTS
File: 14550HMW Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.000	0.000	0.686
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

HOPE 14550 MINNOW WEIGHTS
File: 14550HMW 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	31.60	0.316	0.316	0.923	
3	42.20	0.321	0.321	0.387	
4	56.30	0.331	0.331	-0.834	
5	75.00	0.321	0.321	0.417	
6	100.00	0.323	0.323	0.119	

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

HOPE 14550 MINNOW WEIGHTS
File: 14550HMW 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	31.60	4	0.020	6.2	0.008
3	42.20	4	0.020	6.2	0.003
4	56.30	4	0.020	6.2	-0.007
5	75.00	4	0.020	6.2	0.004
6	100.00	4	0.020	6.2	0.001

HOPE 14550 MINNOW WEIGHTS

File: 14550HMW 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	0.324
2	31.60	4	0.316	0.316	0.323
3	42.20	4	0.321	0.321	0.323
4	56.30	4	0.331	0.331	0.323
5	75.00	4	0.321	0.321	0.322
6	100.00	4	0.323	0.323	0.322

HOPE 14550 MINNOW WEIGHTS

File: 14550HMW 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	0.324				
31.60	0.323	0.159		1.73	k= 1, v=18
42.20	0.323	0.159		1.82	k= 2, v=18
56.30	0.323	0.159		1.85	k= 3, v=18
75.00	0.322	0.269		1.86	k= 4, v=18
100.00	0.322	0.269		1.87	k= 5, v=18

$\alpha = 0.012$

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

HOPE 14550 MINNOW WEIGHTS

File: 14550HMW 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	31.60	0.316	16.00	10.00	4.00	
3	42.20	0.321	15.50	10.00	4.00	

4	56.30	0.331	19.50	10.00	4.00
5	75.00	0.321	17.00	10.00	4.00
6	100.00	0.323	18.00	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 100 %
DEVIATIONS FROM REFERENCE METHOD: None

DATE AND TIME TEST STARTED: 05/15/12 1610
DATE AND TIME TEST TERMINATED: 05/22/12 1610

TYPE OF TEST CHAMBERS: 500 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: 24 hours
LIFE STAGE: Embryos
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 dilutions chosen for this test were 100 %, 75%, 56.3%, 42.2% and 31.6% in accordance with the NPDES permit. The low flow or "critical" dilution is specified in the NPDES Permit as 100% effluent.

NOEL(S) ARE AS FOLLOWS:

100% Survival	100%	effluent
NOEL Growth	100%	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
31.6%	100	100	100	100	100	100	100	0.0
42.2%	100	100	100	100	100	100	100	0.0
56.3%	100	100	100	100	100	100	100	0.0
75%	100	100	100	100	100	100	100	0.0
100%	100	100	100	100	100	100	100	0.0

*coefficient of variation = standard deviation x 100/mean

**ph unadjusted 100% effluent

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

Is the mean survival at 7x days significantly different (XX0.5) than the control survival for the % effluent corresponding to:

a.) LOW FLOW OR CRITICAL DILUTION (100%): YES [] NO [**x**]

b.) 1/2 LOW FLOW OR 2 X CRITICAL DILUTION (56.3 %): 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 (100%): YES [] NO [**x**]

b.) 1/2 LOW FLOW OR 2 X CRITICAL DILUTION (56.3 %): 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 = 100% effluent

b.) NOEL growth = 100% effluent

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL
(Pimephales promelas)

Permittee: **CITY OF HOPE** NPDES NO. AR0038466

Dilution water used: Receiving [] Reconstituted [x]

DATA TABLE FOR GROWTH

EFFLUENT CONC. %	AVERAGE DRY WEIGHT IN MILLIGRAMS IN REPLICATE CHAMBERS				MEAN DRY WEIGHT (MG)	CV%*
	A	B	C	D	7 days	
CONTROL	.305	.321	.332	.339	.324	4.6
31.6 %	.312	.322	.308	.324	.317	2.4
42.2 %	.330	.329	.304	.321	.321	3.7
56.3 %	.335	.331	.320	.339	.331	2.5
75 %	.316	.343	.318	.306	.321	4.9
100%	.335	.322	.310	.326	.323	3.2

*Coefficient of variation = standard deviation X 100/mean

(Coef Of Var Statre 7Day Chronic Pimephales TQP6C = 4.6)

TEST METHOD
1002.0

TEST METHOD USED: 1002.0

DATE AND TIME TEST STARTED: 05/15/12 1610

DATE AND TIME TEST TERMINATED: 05/23/12 1610

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 100%, 75%, 56.3%, 42.2%, and 31.6% in accordance with the NPDES Permit. The "critical" dilution is specified as 100% 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 %	31.6%	42.2 %	56.3 %	75 %	100 %
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 (100 %): YES [] NO [**X**]

b.) 1/2 LOW FLOW OR 2 X

CRITICAL DILUTION (56.3 %): 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 (100 %): YES [] NO [**X**]

b.) 1/2 LOW FLOW OR 2 X

CRITICAL DILUTION (56.3 %): 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 = 100 % effluent

b.) NOEL reproduction = 100 % effluent

BIOMONITORING REPORT
CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION

Permittee: CITY OF HOPE NPDES NO. AR0038466
Dilution water used: Receiving [] Reconstituted [X]

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

PERCENT EFFLUENT (%)

REP	0 %	31.6%	42.2%	56.3%	75 %	100 %
A	21	18	21	21	17	19
B	19	21	17	21	21	22
C	20	21	19	19	20	20
D	16	18	18	23	19	17
E	17	18	19	20	17	18
F	20	20	21	18	19	21
G	22	20	19	20	17	20
H	18	19	18	18	20	19
I	17	21	18	17	18	19
J	21	18	19	20	17	17
CV%	10.60	6.96	6.81	8.97	8.16	8.43
MEAN	19.1	19.4	18.9	19.7	18.5	19.2

*coefficient of variation = standard deviation x 100/mean

(Coef Of Var Statre 7Day Chronic Ceriodaphnia TQP3B = **10.60**)

STANDARD REFERENCE TOXICANTS

STANDARD TOXICANT USED AND SOURCE: SODIUM CHLORIDE
DATE AND TIME OF MOST RECENT 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 CERIODAPHNIA 97.7%

APPENDIX 1A
TEST 1000.0

Permittee Hope 14550								
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	0.0
31.60%	100	100	100	100	100	100	100	0.0
42.20%	100	100	100	100	100	100	100	0.0
56.30%	100	100	100	100	100	100	100	0.0
75.00%	100	100	100	100	100	100	100	0.0
100.00%	100	100	100	100	100	100	100	0.0
Permittee Hope 14550								
Effluent	Average Dry Weight (mg)				Mean Dry Weight (mg)			
Conc.	A	B	C	D	7 days	CV%*		
CONTROL	0.305	0.321	0.332	0.339	0.324	4.6		
31.6	0.312	0.322	0.308	0.324	0.317	2.4		
42.2	0.330	0.329	0.304	0.321	0.321	3.7		
56.3	0.335	0.331	0.320	0.339	0.331	2.5		
75	0.316	0.343	0.318	0.306	0.321	4.9		
100	0.335	0.322	0.310	0.326	0.323	3.2		

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

Discharger: Hope 14650
 Location: _____

Test Dates: 5-15-12 1620
 Analyst: AV

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	
31.6	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	
	12	10	10	10	10	10	10	10	
42.2	13	10	10	10	10	10	10	10	
	14	10	10	10	10	10	10	10	
Conc:	15	10	10	10	10	10	10	10	
	16	10	10	10	10	10	10	10	
	17	10	10	10	10	10	10	10	
56.3	18	10	10	10	10	10	10	10	
	19	10	10	10	10	10	10	10	
Conc:	20	10	10	10	10	10	10	10	
	21	10	10	10	10	10	10	10	
	22	10	10	10	10	10	10	10	
75	23	10	10	10	10	10	10	10	
	24	10	10	10	10	10	10	10	
100	23	10	10	10	10	10	10	10	
	24	10	10	10	10	10	10	10	

Comments:

Discharge: Utape
 Location: 14550
 Analyst: _____

Test Date(s): 5-15-12
 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	122436	122741	305	10	.305	
	2	122051	122372	321	10	.321	
	3	124308	124640	332	10	.332	
	4	128112	128451	339	10	.339	
Conc:	5	125106	125418	312	10	.312	
	6	123769	124091	322	10	.322	
	7	127101	127409	308	10	.308	
31.6 Conc:	8	128532	128856	324	10	.324	
	9	124123	124453	330	10	.330	
42.2 Conc:	10	126323	126652	329	10	.329	
	11	127420	127724	304	10	.304	
	12	122199	122520	321	10	.321	
56.3 Conc:	13	126724	127054	335	10	.335	127069
	14	122659	122990	331	10	.331	
	15	129780	130050	320	10	.320	
75 Conc:	16	131255	131594	339	10	.339	
	17	125108	125424	316	10	.316	
	18	121777	122120	343	10	.343	
100 Conc:	19	137566	137884	318	10	.318	
	20	128105	128411	306	10	.306	
	21	124311	124646	335	10	.335	
	22	125177	125499	322	10	.322	
	23	124680	124990	310	10	.310	
	24	122390	122716	326	10	.326	

Adapted from Hughes, et al., 1987.

Control: 128197 128199

APPENDIX 2A
TEST 1002.0

conc.	Hope 14550	CERIO	REPLICATE CONTAINERS					s.d. =	2.02485	CV% =	10.601286			
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				2	10	0.20
temp:	4	3	4	2	2	3	5	4	1	3	3	30	10	3.00
temp:	5	2	5	3	1			2			1	9	10	0.90
temp:	6	5	6	6	7	7	5	7	7	6	5	61	10	6.10
temp:	7	3	1				2		1		3	10	10	1.00
temp:	8	8	7	9	6	7	8	10	7	8	9	79	10	7.90
	TOTAL	21	19	20	16	17	20	22	18	17	21	191	10	19.10
conc.			REPLICATE CONTAINERS					s.d. =	1.3499	CV% =	6.9582326			
	31.60 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	2		1	6	10	0.60
temp:	4	4	4	4	2	3	3	2	1	5	4	32	10	3.20
temp:	5		1			3			1			5	10	0.50
temp:	6	5	5	5	6	3	8	7	7	6	5	57	10	5.70
temp:	7		3	4		3			1	2		13	10	1.30
temp:	8	9	7	8	10	6	9	9	7	8	8	81	10	8.10
	TOTAL	18	21	21	18	18	20	20	19	21	18	194	10	19.40
CONC.			REPLICATE CONTAINERS					s.d. =	1.28668	CV% =	6.8078515			
	42.20 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	10	0.10
temp:	4	4	3	5	1	4	4	2	2	3	3	31	10	3.10
temp:	5			3			1		2		1	7	10	0.70
temp:	6	6	5	7	5	7	6	6	4	7	5	58	10	5.80
temp:	7		4		2		1	1	3		2	13	10	1.30
temp:	8	10	5	7	7	8	9	10	7	8	8	79	10	7.90
	TOTAL	21	17	19	18	19	21	19	18	18	19	189	10	18.90
CONC.			REPLICATE CONTAINERS					s.d. =	1.76698	CV% =	8.9694472			
	56.30 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	4	10	0.40
temp:	4	4	3	3	5	2	4	4	3	3	2	33	10	3.30
temp:	5		1	1		2			1	2		7	10	0.70
temp:	6	7	6	5	7	5	6	6	5	5	7	59	10	5.90
temp:	7		4	1		1		2	4			12	10	1.20
temp:	8	10	7	9	11	9	7	8	5	7	9	82	10	8.20
	TOTAL	21	21	19	23	20	18	20	18	17	20	197	10	19.70
CONC.			REPLICATE CONTAINERS					s.d. =	1.50923	CV% =	8.1580046			
	75.00 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					1		4	10	0.40
temp:	4	4	2	2	2	2	3	4	5		2	26	10	2.60
temp:	5		2	3		1				4		10	10	1.00
temp:	6	6	5	7	7	7	7	5	6	6	8	64	10	6.40
temp:	7		3		1		1	2				7	10	0.70
temp:	8	6	8	8	8	7	8	6	9	7	7	74	10	7.40
	TOTAL	17	21	20	19	17	19	17	20	18	17	185	10	18.50
CONC.			REPLICATE CONTAINERS					s.d. =	1.61933	CV% =	8.4339985			
	100.00 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						3	10	0.30
temp:	4	5	1	4	2	2	5	3	3	2	4	31	10	3.10
temp:	5		3		2			1		2	1	9	10	0.90
temp:	6	5	7	6	5	5	6	7	6	7	5	59	10	5.90
temp:	7	4	3		2	1		2			1	13	10	1.30
temp:	8	5	8	9	8	7	9	9	8	8	6	77	10	7.70
	TOTAL	19	22	20	17	18	21	20	19	19	17	192	10	19.20

B560223

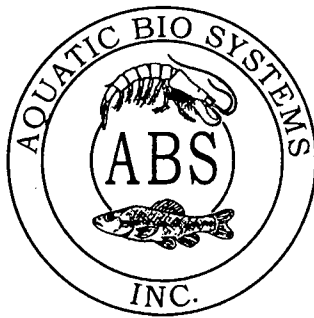
Hope 14550 *Conc* 5-15-12 1610

7

CONC.	DAY	REPLICATE CONTAINERS										s.d. =	0	CVX =	#DIV/O!	young/adult
control	DAY	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	4	2	2	3	5	4	1	3	3	0	10	#DIV/O!		
temp:	5	2		3	1				2			0	10	#DIV/O!		
temp:	6	5	6	6	7	7	5	7	7	6	5	0	10	#DIV/O!		
temp:	7	3	5	9	6	7	2		1			0	10	#DIV/O!		
temp:	8	8	7	9	6	7	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	
31.6	DAY	REPLICATE CONTAINERS										s.d. =	0	CVX =	#DIV/O!	young/adult
temp:	1											0	10	#DIV/O!		
temp:	2											0	10	#DIV/O!		
temp:	3		1					2	2		1	0	10	#DIV/O!		
temp:	4	4	4	4	2	3	3	2	1	5	4	0	10	#DIV/O!		
temp:	5					3			1			0	10	#DIV/O!		
temp:	6	5	5	5	6	3	8	7	7	6	5	0	10	#DIV/O!		
temp:	7		3	4		3			1	2		0	10	#DIV/O!		
temp:	8	9	7	8	10	4	9	9	7	8	8	0	10	#DIV/O!		
* TOTAL		0	0	0	0	0	0	0	0	0	0	0	0	10	0.00	
42.2	DAY	REPLICATE CONTAINERS										s.d. =	0	CVX =	#DIV/O!	young/adult
temp:	1											0	10	#DIV/O!		
temp:	2											0	10	#DIV/O!		
temp:	3	1										0	10	#DIV/O!		
temp:	4	4	3	5	1	4	4	2	2	3	3	0	10	#DIV/O!		
temp:	5				3				2		1	0	10	#DIV/O!		
temp:	6	6	5	7	5	7	6	6	4	7	5	0	10	#DIV/O!		
temp:	7		4	7	2				1	3		0	10	#DIV/O!		
temp:	8	10	5	7	7	8	9	10	7	8	8	0	10	#DIV/O!		
* TOTAL		0	0	0	0	0	0	0	0	0	0	0	0	10	0.00	
56.3	DAY	REPLICATE CONTAINERS										s.d. =	0	CVX =	#DIV/O!	young/adult
temp:	1											0	10	#DIV/O!		
temp:	2											0	10	#DIV/O!		
temp:	3					1		1			2	0	10	#DIV/O!		
temp:	4	4	3	3	5	2	4	4	3	3	2	0	10	#DIV/O!		
temp:	5		1	1		2			1	2		0	10	#DIV/O!		
temp:	6	7	6	5	7	5	6	6	5	5	7	0	10	#DIV/O!		
temp:	7		4	1		1			2	4		0	10	#DIV/O!		
temp:	8	10	7	9	11	9	7	8	5	7	9	0	10	#DIV/O!		
* TOTAL		0	0	0	0	0	0	0	0	0	0	0	0	10	0.00	
75	DAY	REPLICATE CONTAINERS										s.d. =	0	CVX =	#DIV/O!	young/adult
temp:	1											0	10	#DIV/O!		
temp:	2											0	10	#DIV/O!		
temp:	3		1		1					1		0	10	#DIV/O!		
temp:	4	4	2	2	2	2	3	4	5		2	0	10	#DIV/O!		
temp:	5		2	3		1				4		0	10	#DIV/O!		
temp:	6	6	5	7	7	7	7	5	6	6	8	0	10	#DIV/O!		
temp:	7		3		1			2	4			0	10	#DIV/O!		
temp:	8	6	8	8	8	7	8	6	9	7	7	0	10	#DIV/O!		
* TOTAL		0	0	0	0	0	0	0	0	0	0	0	0	10	0.00	
100	DAY	REPLICATE CONTAINERS										s.d. =	0	CVX =	#DIV/O!	young/adult
temp:	1											0	10	#DIV/O!		
temp:	2											0	10	#DIV/O!		
temp:	3					2						0	10	#DIV/O!		
temp:	4	5	1	4	2	2	5	3	3	2	4	0	10	#DIV/O!		
temp:	5		3		2				1	2	1	0	10	#DIV/O!		
temp:	6	5	3	6	5	5	6	7	6	7	5	0	10	#DIV/O!		
temp:	7	4	3			2			2		1	0	10	#DIV/O!		
temp:	8	5	8	9	8	7	9	9	8	8	6	0	10	#DIV/O!		
* TOTAL		0	0	0	0	0	0	0	0	0	0	0	0	10	0.00	

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: 5/14/2012

SPECIES: *Pimephales promelas*

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 5/14/2012

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>118 mg/l</u>	<u>--</u>
TOTAL ALKALINITY (as CaCO ₃):	<u>85 mg/l</u>	<u>--</u>
pH:	<u>8.02</u>	<u>--</u>

Comments:



Facility Supervisor

Rec'd
5-15-12
14550
08

APPENDIX C
CHAINS OF CUSTODY

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 # 14550.0001B
 CLIENT # 15020
 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

NAME OF COMPANY, CITY, OR PROJECT

PROJECT NO:

SAMPLER(S) NAME: (PRINT)

11091342

City of Hope

ISCO Automatic Sampler

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	
	WPFE	6AM 5/13/12	6AM 5/14/12	24HR COMP		C4				6 1/2gal PLASTIC	W.E.T
METHOD OF SHIPMENT (CIRCLE)		FIELD CALIBRATION RECORD			NOTES/COMMENTS/OBSERVATIONS						
FED EX WALK IN SRA UPS OTHER		pH 7			Temp @ Lab 4.2°						
		pH 4									
		pH 10									
		D.O									
TYPE OF SAMPLE(S): (CIRCLE)											
WATER SOIL W/W SLUDGE OTHER					FIELD ANALYSIS CONDUCTED BY: (CIRCLE) SRA CLIENT						

RELINQUISHED BY: Carol Smith DATE/TIME: 5/14/12 @ 10:22am RECEIVED BY: Kim Holston DATE/TIME: 5/14/12 10:2
 RELINQUISHED BY: Kim Holston DATE/TIME: 5/14/12 12:28 RECEIVED BY (LAB): Jimmy Riddle DATE/TIME: 5/14/12 12:21



SURRELLS RESEARCH ASSOCIATES, INC
8100 NATIONAL DRIVE, LITTLE ROCK, AR 72209
501-562-8139 800-331-8139
FAX 501-562-7025

14550.0002 B CHAIN OF CUSTODY RECORD

TURN AROUND TIME
 RUSH 24HR. 48 HR.
 5 DAY REG
 OTHER _____

FOR LAB/OFFICE USE ONLY

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

LAB # 14569-0001
 CLIENT # 15020
 P.O.# _____

NAME OF COMPANY, CITY, OR PROJECT PROJECT NO: SAMPLER(S) NAME: (PRINT) 11091362

City of Hope

1500 Auto Sampler

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	
	WPFE	6am 5/15/12	6am 5/16/12	2HR COMP		C4				6 1/2gal Plastic	W.E.T
METHOD OF SHIPMENT (CIRCLE)		FIELD CALIBRATION RECORD			NOTES/COMMENTS/OBSERVATIONS						
FED EX WALK IN <u>SRA</u> UPS OTHER		pH 7			All containers C4						
		pH 4									
		pH 10									
		D.O									
TYPE OF SAMPLE(S): (CIRCLE)					FIELD ANALYSIS CONDUCTED BY: (CIRCLE) <u>SRA</u> CLIENT						
WATER SOIL <u>W/W</u> SLUDGE OTHER											

RELINQUISHED BY: Carol Smith DATE/TIME: 5/16/12 @ 11:21am RECEIVED BY: [Signature] DATE/TIME: 5.16.12 11:24
 RELINQUISHED BY: _____ DATE/TIME: _____ RECEIVED BY (LAB): [Signature] DATE/TIME: 5-12 1953

SUKKELLS 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 # 14550.0003B
 CLIENT # 15020
 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: City of Hope PROJECT NO: _____ SAMPLER(S) NAME: (PRINT) 1500 Auto Sampler 11091362

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>WPFE</u>	<u>6AM 5/17/12</u>	<u>6AM 5/18/12</u>	<u>24Hr Comp</u>		<u>CH</u>				<u>6 1/2gal Plastic</u>	<u>W.E.T</u>
METHOD OF SHIPMENT (CIRCLE)		FIELD CALIBRATION RECORD			NOTES/COMMENTS/OBSERVATIONS						
FED EX WALK IN SRA UPS OTHER		pH 7			<u>Temp @ Lab 4.0°</u>						
		pH 4									
		pH 10									
		D.O									
TYPE OF SAMPLE(S): (CIRCLE)		FIELD ANALYSIS CONDUCTED BY: (CIRCLE) SRA CLIENT									
WATER SOIL W/W SLUDGE OTHER											

RELINQUISHED Carol Smith DATE/TIME: 5/18/12 @ 8:00 RECEIVED BY: Kim Holston DATE/TIME: 5-18-12 8:00
 RELINQUISHED BY: Kim Holston DATE/TIME: 5/18/12 11:53A RECEIVED BY(LAB): Jammy Riddick DATE/TIME: 5-18-12 11:53

APPENDIX D
LABORATORY CONTROL
CERIO CULTURE RECORD

DATE START	5/7/12 HOPE 14550		
DATE END	*		
ANALYST	*		
WATER TYPE	*	day 8	day 14
% SURVIVAL	*	100	100
#YOUNG MEAN		19.3	
stnd DEV from mean	1.5252	14.301	

DAY	REPLICATE NUMBER										No.	No.	Young/	
	1	2	3	4	5	6	7	8	9	10	Young	Adults	Adult	
1												0	10	0
2												0	10	0
3			2			1				1		4	10	0.4
4	3	4	1	2	5	3	3	3	2	5		31	10	3.1
5			2			1						3	10	0.3
6	6	6	5	3	6	5	7	7	7	7		59	10	5.9
7		3		5		3			1			12	10	1.2
8	10	7	9	6	8	7	11	9	9	9		85	10	8.5
total8	19	20	19	16	19	20	21	20	19	21		194	10	19.4
9												0	10	0
10												0	10	0
11												0	10	0
12												0	10	0
13												0	10	0
14												0	10	0
total14												0	10	0

DAY	REPLICATE NUMBER										No.	No.	Young/	
	11	12	13	14	15	16	17	18	19	20	Young	Adults	Adult	
1												0	10	0
2												0	10	0
3		1		1	1							3	10	0.3
4	4	1	3	3	3	2	4	4	2	3		29	10	0
5		3			2		1		2			8	10	0.8
6	6	5	7	7	5	6	6	7	7	6		62	10	6.2
7		2	1			3				2		8	10	0.8
8	8	7	7	10	7	6	9	11	10	7		82	10	8.2
total8	18	19	18	21	18	17	20	22	21	18		192	10	19.2
9												0	10	0
10												0	10	0
11												0	10	0
12												0	10	0
13												0	10	0
14												0	10	0
total14	0	0	0	0	0	0	0	0	0	0		0	10	0

5-7-12 Series

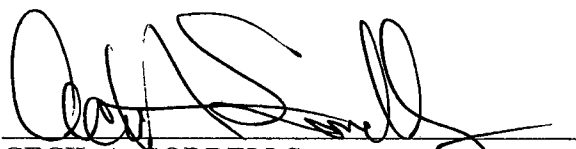
DATE START	*																	
DATE END	*																	
ANALYST	*																	
WATER TYPE	*					day 8						day 14						
% SURVIVAL	*					#VALUE!						#VALUE!						
#YOUNG MEAN						0												
stnd DEV from mean	0					#DIV/0!												
	REPLICATE NUMBER										No.	No.	Young/					
DAY	1	2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

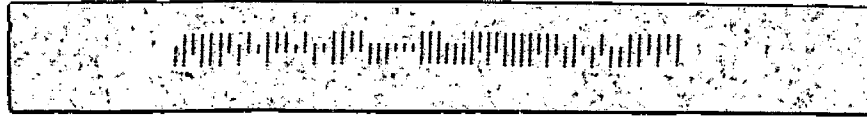
ANALYSIS

KLUGH E. SORRELLS, II
LABORATORY TECHNICIAN

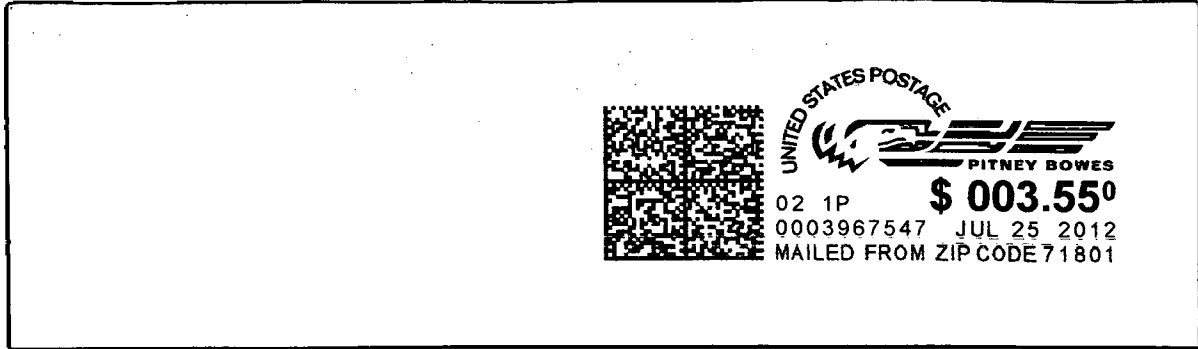


CECIL A. SORRELLS
BIOMONITORING MANAGER/PRESIDENT

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



City of Hope
 PO BOX 667
 Hope, AR 71802-0667



ADEC
 NPDECS Enforcement Section
 5301 Northshore Drive
 North Little Rock, AR
 72218