CITY OF STUTTGART
PERMIT NO: AR0034380
CHRONIC BIOMONITORING

METHOD 1000.0 - PIMEPHALES PROMELAS
METHOD 1002.0 - CERIODAPHNIA DUBIA

Report Prepared by:
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January 16, 2012

Laboratory Number:13918.0001,0002,0003

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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 Cabot 24 hour composite samples of plant effluent for dates 12/04-05/11, 12/06-07/11, 12/08-09/11.

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

These samples were logged in as #13918.0001,0002 and 0003. Chain of custody included in report.

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

Testing was initiated 12/06/11 at 1420 hours and continued through 12/14/11 at 1420 hours.

The results of these tests are as follows:

TEST 1000.0 FATHEAD MINNOW

SURVIVAL - NOEL 100% Effluent

GROWTH - NOEL 100% Effluent

TEST 1002.0 CERIODAPHNIA DUBIA

SURVIVAL - NOEL 100% Effluent

REPRODUCTION - NOEL 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.	.346	PASS
1002	Ceriodaphnia dubia	Control repro. 15 or> neonates per surviving female.	17.9	PASS
1000	Pimephales promelas	Control CV 40 % or <	**4.1**	PASS
1002	Ceriodaphnia Dubia	Control CV 40 % or <	**12.5**	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: AR0021661
PERMIT REQUIREMENTS: MONTHLY
PLANT LOCATION:
RECEIVING WATER BODY:

CLIENT: Stuttgart, City of
ADDRESS: P.O. Box 130
Stuttgart, AR 72160

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: 12/04-05/11 1300-1300 | 12/06-07/11 1200-1200 | 12/08-09/11 1200-1100

SAMPLING COLLECTION METHOD: COMPOSITE

PHYSICAL AND CHEMICAL DATA:

CONTROL	DATE **12/06/11**	DATE **12/08/11**	DATE **12/10/11**
DO (mg/l)	8.36	8.45	8.51
pH (S.U.)	7.22	7.09	7.21
Conductivity (umhos)	387	273	298
Alkalinity (mg/l)	70	69	76
Hardness (mg/l)	76	70	77
Res. Chlorine (mg/l)	0	0	0

56%	DATE **12/06/11**	DATE **12/08/11**	DATE **12/10/11**
DO (mg/l)	8.19	8.31	8.38
pH (S.U.)	7.40	7.15	7.30
Conductivity (umhos)	460	443	506
Alkalinity (mg/l)	94	106	94
Hardness (mg/l)	87	99	87

(Cont.)

PHYSICAL AND CHEMICAL DATA: **100 % EFFLUENT**	DATE **12/06/11**	DATE **12/08/11**	DATE **12/10/11**
DO (mg/l)	8.02	8.10	8.22
pH (S.U.)	7.12	7.26	7.42
Conductivity (umhos)	585	573	683
Alkalinity (mg/l)	114	110	130
Hardness (mg/l)	98	99	118
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/1 CaCO3
D.O. Dissolved Oxygen mg/1
Temperature degrees centigrade
pH s
tandard units
Conductivity = us/cm
Chlorine Residual = mg/1

Chemical Data For Daily Biomonitoring

Permitee Stuttgart Date 12-6-11 1420

Analyst ASTM Lab no. 13918

Dilution

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	7.20	7.09	7.28	7.21	7.20		
D.O.	8.36	8.30	8.46	8.35	8.51	8.45		
Alk	70		69		76			
Hard.	76		70		77			
Cond.	387		273		298			

Dilution 56

Day	1	2	3	4	5	6	7	notes
Temp	25.0	25.0	25.0	25.0	25.0	25.0		
pH	7.40	7.33	7.15	7.20	7.30	7.33		
D.O.	8.19	8.10	8.31	8.20	8.38	8.30		
Alk	94		106		94			
Hard.	87		99		87			
Cond.	460		443		506			

Dilution 100

Day	1	2	3	4	5	6	7	notes
Temp	25.0	25.0	25.0	25.05	25.0	25.0		
pH	7.12	7.30	7.26	7.32	7.42	7.40		
D.O.	8.02	7.93	8.10	7.99	8.22	8.16		
Alk	114		110		130			
Hard.	98		99		118			
Cond.	585		573		683			

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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: STUTTGART 13918 CERIO REPS
FILE: 13918SCR
TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	18.0000	18.0000
1	CONTROL	2	19.0000	19.0000
1	CONTROL	3	20.0000	20.0000
1	CONTROL	4	20.0000	20.0000
1	CONTROL	5	17.0000	17.0000
1	CONTROL	6	19.0000	19.0000
1	CONTROL	7	16.0000	16.0000
1	CONTROL	8	17.0000	17.0000
1	CONTROL	9	20.0000	20.0000
1	CONTROL	10	13.0000	13.0000
2	32	1	18.0000	18.0000
2	32	2	18.0000	18.0000
2	32	3	15.0000	15.0000
2	32	4	17.0000	17.0000
2	32	5	18.0000	18.0000
2	32	6	18.0000	18.0000
2	32	7	17.0000	17.0000
2	32	8	17.0000	17.0000
2	32	9	19.0000	19.0000
2	32	10	20.0000	20.0000
3	42	1	20.0000	20.0000
3	42	2	16.0000	16.0000
3	42	3	17.0000	17.0000
3	42	4	17.0000	17.0000
3	42	5	18.0000	18.0000
3	42	6	18.0000	18.0000
3	42	7	16.0000	16.0000
3	42	8	18.0000	18.0000
3	42	9	18.0000	18.0000
3	42	10	19.0000	19.0000
4	56	1	18.0000	18.0000
4	56	2	17.0000	17.0000
4	56	3	15.0000	15.0000
4	56	4	19.0000	19.0000
4	56	5	19.0000	19.0000
4	56	6	22.0000	22.0000
4	56	7	18.0000	18.0000
4	56	8	19.0000	19.0000
4	56	9	21.0000	21.0000
4	56	10	18.0000	18.0000
5	75	1	19.0000	19.0000
5	75	2	19.0000	19.0000
5	75	3	20.0000	20.0000
5	75	4	22.0000	22.0000
5	75	5	17.0000	17.0000
5	75	6	21.0000	21.0000
5	75	7	17.0000	17.0000
5	75	8	22.0000	22.0000
5	75	9	19.0000	19.0000
5	75	10	18.0000	18.0000

6	100	1	20.0000	20.0000
6	100	2	19.0000	19.0000
6	100	3	18.0000	18.0000
6	100	4	17.0000	17.0000
6	100	5	18.0000	18.0000
6	100	6	20.0000	20.0000
6	100	7	18.0000	18.0000
6	100	8	20.0000	20.0000
6	100	9	20.0000	20.0000
6	100	10	23.0000	23.0000

STUTTGART 13918 CERIO REPS
File: 13918SCR Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	10	13.000	20.000	17.900
2	32	10	15.000	20.000	17.700
3	42	10	16.000	20.000	17.700
4	56	10	15.000	22.000	18.600
5	75	10	17.000	22.000	19.400
6	100	10	17.000	23.000	19.300

STUTTGART 13918 CERIO REPS
File: 13918SCR Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	CONTROL	4.989	2.234	0.706
2	32	1.789	1.337	0.423
3	42	1.567	1.252	0.396
4	56	3.822	1.955	0.618
5	75	3.378	1.838	0.581
6	100	2.900	1.703	0.539

STUTTGART 13918 CERIO REPS
File: 13918SCR Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	30.733	6.147	2.000
Within (Error)	54	166.000	3.074	

Total	59	196.733

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

STUTTGART 13918 CERIO REPS
File: 13918SCR 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	17.900	17.900		
2	32	17.700	17.700	0.255	
3	42	17.700	17.700	0.255	
4	56	18.600	18.600	-0.893	
5	75	19.400	19.400	-1.913	
6	100	19.300	19.300	-1.785	

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

STUTTGART 13918 CERIO REPS
File: 13918SCR 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	32	10	1.811	10.1	0.200
3	42	10	1.811	10.1	0.200
4	56	10	1.811	10.1	-0.700
5	75	10	1.811	10.1	-1.500
6	100	10	1.811	10.1	-1.400

STUTTGART 13918 CERIO REPS
File: 13918SCR Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	CONTROL	10	17.900	17.900	17.767
2	32	10	17.700	17.700	17.767
3	42	10	17.700	17.700	17.767
4	56	10	18.600	18.600	18.600
5	75	10	19.400	19.400	19.350
6	100	10	19.300	19.300	19.350

STUTTGART 13918 CERIO REPS
File: 13918SCR 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	17.767				
32	17.767	0.170		1.68	k= 1, v=54
42	17.767	0.170		1.76	k= 2, v=54
56	18.600	0.893		1.79	k= 3, v=54
75	19.350	1.849	*	1.80	k= 4, v=54
100	19.350	1.849	*	1.80	k= 5, v=54

s = 1.753
Note: df used for table values are approximate when v > 20.

STUTTGART 13918 CERIO REPS
File: 13918SCR Transform: NO TRANSFORM

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	17.900				
2	32	17.700	97.50	75.00	10.00	
3	42	17.700	96.50	75.00	10.00	
4	56	18.600	110.50	75.00	10.00	
5	75	19.400	122.00	75.00	10.00	
6	100	19.300	121.50	75.00	10.00	

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

TITLE: STUTTGART 13918 MINNOW WEIGHTS
FILE: 13918SMW
TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.3400	0.3400
1	CONTROL	2	0.3290	0.3290
1	CONTROL	3	0.3600	0.3600
1	CONTROL	4	0.3550	0.3550
2	32	1	0.3360	0.3360
2	32	2	0.3500	0.3500
2	32	3	0.3420	0.3420
2	32	4	0.3220	0.3220
3	42	1	0.3670	0.3670
3	42	2	0.3510	0.3510
3	42	3	0.3650	0.3650
3	42	4	0.3350	0.3350
4	56	1	0.3280	0.3280
4	56	2	0.3530	0.3530
4	56	3	0.3400	0.3400
4	56	4	0.3730	0.3730
5	75	1	0.3180	0.3180
5	75	2	0.3460	0.3460
5	75	3	0.3610	0.3610
5	75	4	0.3420	0.3420
6	100	1	0.3380	0.3380
6	100	2	0.3550	0.3550
6	100	3	0.3660	0.3660
6	100	4	0.3260	0.3260

STUTTGART 13918 MINNOW WEIGHTS
File: 13918SMW Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	4	0.329	0.360	0.346
2	32	4	0.322	0.350	0.338
3	42	4	0.335	0.367	0.355
4	56	4	0.328	0.373	0.349
5	75	4	0.318	0.361	0.342
6	100	4	0.326	0.366	0.346

STUTTGART 13918 MINNOW WEIGHTS
File: 13918SMW Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	CONTROL	0.000	0.014	0.007
2	32	0.000	0.012	0.006
3	42	0.000	0.015	0.007
4	56	0.000	0.019	0.010
5	75	0.000	0.018	0.009
6	100	0.000	0.018	0.009

STUTTGART 13918 MINNOW WEIGHTS
File: 13918SMW Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.001	0.000	0.517
Within (Error)	18	0.005	0.000	
Total	23	0.005		

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

STUTTGART 13918 MINNOW WEIGHTS
File: 13918SMW 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	0.346	0.346		
2	32	0.338	0.338	0.745	
3	42	0.355	0.355	-0.745	
4	56	0.349	0.349	-0.219	
5	75	0.342	0.342	0.372	
6	100	0.346	0.346	-0.022	

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

STUTTGART 13918 MINNOW WEIGHTS
File: 13918SMW 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	32	4	0.028	8.0	0.008
3	42	4	0.028	8.0	-0.009
4	56	4	0.028	8.0	-0.003
5	75	4	0.028	8.0	0.004
6	100	4	0.028	8.0	-0.000

STUTTGART 13918 MINNOW WEIGHTS
File: 13918SMW Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	CONTROL	4	0.346	0.346	0.342
2	32	4	0.338	0.338	0.342
3	42	4	0.355	0.355	0.348
4	56	4	0.349	0.349	0.348
5	75	4	0.342	0.342	0.348
6	100	4	0.346	0.346	0.348

STUTTGART 13918 MINNOW WEIGHTS
File: 13918SMW 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	0.342				
32	0.342	0.373		1.73	k= 1, v=18
42	0.348	0.153		1.82	k= 2, v=18
56	0.348	0.153		1.85	k= 3, v=18
75	0.348	0.153		1.86	k= 4, v=18
100	0.348	0.153		1.87	k= 5, v=18

s = 0.016
Note: df used for table values are approximate when v > 20.

STUTTGART 13918 MINNOW WEIGHTS
File: 13918SMW Transform: NO TRANSFORM

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	0.346				
2	32	0.338	15.00	10.00	4.00	
3	42	0.355	21.00	10.00	4.00	

4	56	0.349	17.50	10.00	4.00
5	75	0.342	18.00	10.00	4.00
6	100	0.346	17.50	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: 12/06/11 1420
DATE AND TIME TEST TERMINATED: 12/13/11 1420
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 32%, 42%, 56%, 75% and 100% 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
32%	100	100	100	100	100	100	100	0.0
42%	100	100	100	100	100	100	100	0.0
56%	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 7 days significantly different (p=0.5) 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 (50 %): 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 (50 %): 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.) b.) NOEL growth = 100% effluent

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL
(Pimephales promelas)

Permittee: Cabot, City of NPDES NO. AR0021661

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	.340	.329	.360	.355	.346	4.1
32	.336	.350	.342	.322	.338	3.5
42	.367	.351	.365	.335	.355	4.2
56	.328	.353	.340	.373	.349	5.5
75	.318	.346	.361	.342	.342	5.2
100	.338	.355	.366	.326	.346	**5.1**

*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 100 %
DEVIATIONS FROM REFERENCE METHOD: None

DATE AND TIME TEST STARTED: 12/06/11 1420
DATE AND TIME TEST TERMINATED: 12/14/11 1420
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 32%, 42%, 56%, 75%, and 100% 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%	32 %	42%	56%	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 (50%): 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 (50%): 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: Cabot, City of NPDES NO. AR0021661
Dilution water used: Receiving ( ) Reconstituted (X)

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

PERCENT EFFLUENT (%)

REP	0%	32%	42%	56%	75%	100%
A	18	18	20	18	19	20
B	19	18	16	17	19	19
C	20	15	17	15	20	18
D	20	17	17	19	22	17
E	17	18	18	19	17	18
F	19	18	18	22	21	20
G	16	17	16	18	17	18
H	17	17	18	19	22	20
I	20	19	18	21	19	20
J	13	20	19	18	18	23
*CV%	**12.5**	7.56	7.07	10.5	9.47	8.82
MEAN	17.90	17.70	17.70	18.60	19.40	19.30

*coefficient of variation = standard deviation x 100/mean

(Coef Of Var Statre 7Day Chronic Ceriodaphnia TQP3B = **12.5**)

STANDARD REFERENCE TOXICANTS

STANDARD TOXICANT USED AND SOURCE: SODIUM CHLORIDE
DATE AND TIME OF MOST RECENT TEST: 11/15/11, 1405
DILUTION WATER USED IN TEST: 20% DMW
RESULTS(LC50 OR, NOEC AND/OR ECL): LC50 = 1763 FATHEAD MINNOW
RESULTS(LC50 OR, NOEC AND/OR ECL): LC50 = 743 CERIODAPHNIA
ACCEPTABLE PERFORMANCE, STUDY 29 = 100% recovery
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 **101.4%**

CERIODAPHNIA

Standard Recovery CERODAPHNIA **98%**

APPENDIX 1A
TEST 1000.0

Permittee	Stuttgart 13918							
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**
32.00%	100	100	100	100	100	100	**100**	**0.0**
42.00%	100	100	100	100	100	100	**100**	**0.0**
56.00%	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	Stuttgart 13918					
Effluent	Average Dry Weight (mg)				Mean Dry Weight (mg)	
Conc.	A	B	C	D	7 days	CV%*
CONTROL	0.340	0.329	0.360	0.355	**0.346**	**4.1**
32	0.336	0.350	0.342	0.322	**0.3375**	**3.5**
42	0.367	0.351	0.365	0.335	**0.3545**	**4.2**
56	0.328	0.353	0.340	0.373	**0.3485**	**5.5**
75	0.318	0.346	0.361	0.342	**0.34175**	**5.2**
100	0.338	0.355	0.366	0.326	**0.34625**	**5.1**

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

Discharger: Stuttgart 13918 Test Dates: 12-6-11 1420
Location: _____ Analyst: _____

Conc:	Rep. No.	No. Survivors Day 1	2	3	4	5	6	7	Remarks
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	
32	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	
	11	10	10	10	10	10	10	10	
47	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	
	15	10	10	10	10	10	10	10	
56	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	
	19	10	10	10	10	10	10	10	
75	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	
	23	10	10	10	10	10	10	10	
100	24	10	10	10	10	10	10	10	

Comments:

Discharge: Stuttgart Test Date(s): 12-6-11 Drying Temperature (°C): _____
Location: # 13918 Weighing Date: _____ Drying Time (h): _____
Analyst: AB

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	134079	134419	3.40	10	.340	
	2	123791	124120	3.29	10	.329	
	3	129024	129384	3.60	10	.360	
	4	129870	130225	3.55	10	.355	
Conc:	5	129436	129772	3.36	10	.336	
	6	123241	123591	3.50	10	.350	
	7	125249	125591	3.42	10	.342	
32	8	123222	123544	3.22	10	.322	
Conc:	9	122484	122851	3.67	10	.367	
	10	122704	123055	3.51	10	.351	
	11	124398	124763	3.65	10	.365	
42	12	124460	124795	3.35	10	.335	
Conc:	13	129313	129641	3.28	10	.328	
	14	129315	129668	3.53	10	.353	
	15	124432	124772	3.40	10	.340	
56	16	123193	123566	3.73	10	.373	
Conc:	17	124246	124564	3.18	10	.318	
	18	130387	130733	3.46	10	.346	
	19	123045	123406	3.61	10	.361	
75	20	130593	130935	3.42	10	.342	
Conc:	21	130685	131023	3.38	10	.338	
	22	130884	131239	3.55	10	.355	
	23	122845	123211	3.66	10	.366	
100	24	123422	123748	3.26	10	.326	

[1]Adapted from Hughes, et al., 1987.

Control 130094 130094

FIGURE 3 - FATHEAD MINNOW
page 14

APPENDIX 2A
TEST 1002.0

	Stuttgart 13918	CERIO	REPLICATE CONTAINERS						s.d.=	2.23358		CV% =	12.478112	
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	3	3	3	3	1	4	2	5	3	2	29	10	2.90
temp:	5			1			1			2		4	10	0.40
temp:	6	4	6	7	7	5	7	6	6	5	2	55	10	5.50
temp:	7	5	2					1		2		10	10	1.00
temp:	8	6	8	9	10	9	7	7	6	8	8	78	10	7.80
	TOTAL	18	19	20	20	17	19	16	17	20	13	179	10	17.90
conc			REPLICATE CONTAINERS						s.d.=	1.33749		CV% =	7.5564605	
32.00	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	10	0.10
temp:	4	4	2	1	3	3	4	2	5	3	1	28	10	2.80
temp:	5							1			3	4	10	0.40
temp:	6	5	7	7	7	7	6	5	5	7	8	64	10	6.40
temp:	7	3				1		2				6	10	0.60
temp:	8	5	9	7	7	7	8	6	7	9	8	73	10	7.30
	TOTAL	18	18	15	17	18	18	17	17	19	20	177	10	17.70
CONC.			REPLICATE CONTAINERS						s.d.=	1.25167		CV% =	7.0715568	
42.00	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	10	0.10
temp:	4	4	2	3	3	4	4	2	2		4	28	10	2.80
temp:	5							1		5	1	7	10	0.70
temp:	6	7	6	6	5	5	7	7	7	3	7	60	10	6.00
temp:	7		1	1		3				5		10	10	1.00
temp:	8	9	7	7	8	6	7	6	9	5	7	71	10	7.10
	TOTAL	20	16	17	17	18	18	16	18	18	19	177	10	17.70
CONC.			REPLICATE CONTAINERS						s.d.=	1.95505		CV% =	10.511024	
56.00	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											0	10	0.00
temp:	4	5	1	3	3	4	4	4	4	4	2	34	10	3.40
temp:	5		4				1				3	8	10	0.80
temp:	6	5	5	6	6	7	7	7	6	8	5	62	10	6.20
temp:	7		2		3				4		2	11	10	1.10
temp:	8	8	5	6	7	8	10	7	5	9	6	71	10	7.10
	TOTAL	18	17	15	19	19	22	18	19	21	18	186	10	18.60
CONC.			REPLICATE CONTAINERS						s.d.=	1.83787		CV% =	9.473573	
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			3	10	0.30
temp:	4	3	3	4	2	2	4	1	4	2	3	28	10	2.80
temp:	5		1		2			2				5	10	0.50
temp:	6	8	7	6	6	5	7	5	6	7	7	64	10	6.40
temp:	7		1		3	4		2		1		11	10	1.10
temp:	8	8	7	9	9	5	10	7	11	9	8	83	10	8.30
	TOTAL	19	19	20	22	17	21	17	22	19	18	194	10	19.40
CONC.			REPLICATE CONTAINERS						s.d.=	1.70294		CV% =	8.8235163	
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				2		1					3	10	0.30
temp:	4	4	5	1	2	4	3	3	4	5	6	37	10	3.70
temp:	5			3			1					4	10	0.40
temp:	6	7	5	6	6	7	7	8	7	6	7	66	10	6.60
temp:	7		5	1						3		9	10	0.90
temp:	8	9	4	7	7	7	8	7	9	6	10	74	10	7.40
*	TOTAL	20	19	18	17	18	20	18	20	20	23	193	10	19.30

13918 Stuttgart Cric 12-6-11 1420

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

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

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

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

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

CONC.				REPLICATE CONTAINERS					s.d.=	0		CV% =	#DIV/0!	
188	DAY	1	2	3	4	5	6	7	8	9	10	no. youn	no. adults	young/adult
temp:	1											0	10	#DIV/0!
temp:	2											0	10	#DIV/0!
temp:	3				2		1					0	10	#DIV/0!
temp:	4	4	5	1	2	4	3	3	4	5	6	0	10	#DIV/0!
temp:	5			3			1					0	10	#DIV/0!
temp:	6	7	5	6	6	7	7	8	7	6	7	0	10	#DIV/0!
temp:	7		6	1						3		0	10	#DIV/0!
temp:	8	9	4	7	7	7	8	7	9	6	10	0	10	#DIV/0!
*	TOTAL	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: 12/5/2011

SPECIES: *Pimephales promelas*

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 12/5/2011

BEGAN FEEDING: N/A

FOOD: N/A

Water Chemistry Record:	Current	Range
TEMPERATURE:	23°C	--
SALINITY/CONDUCTIVITY:	--	--
TOTAL HARDNESS (as $CaCO_3$):	130 mg/l	--
TOTAL ALKALINITY (as $CaCO_3$):	90 mg/l	--
pH:	8.26	--

Comments:

Facility Supervisor

12-6-11
dat 13918

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 # 13918-0001B
CLIENT # 37021
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 STUTTGART
PROJECT NO: 110913k2
SAMPLER(S) NAME: (PRINT)

SAMPLE NO:	SAMPLE ID AND/ OR COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP GRAB	FIELD ANALYSIS pH	TEMP	FLOW	CL2	D.O (W) D.O(P)	CONTAINER TYPE PRESERVATIVE	ANALYSIS REQUIRED
	BIO-MON Eff OUTFALL001	12-4-11 1300	12-5-11 1300	C						6½ Gal cy	BIO-MON

METHOD OF SHIPMENT (CIRCLE)
FED EX WALK IN (SRA) UPS OTHER

TYPE OF SAMPLE(S): (CIRCLE)
WATER SOIL W/W SLUDGE OTHER

FIELD CALIBRATION RECORD

pH 7				
pH 4				
pH 10				
D.O				

NOTES/COMMENTS/OBSERVATIONS
Temp @ Lab 6°

FIELD ANALYSIS CONDUCTED BY: (CIRCLE) (SRA) CLIENT

RELINQUISHED: DATE/TIME:
RECEIVED BY: DATE/TIME: 1350 12-5-11

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 # 13918.0002B
CLIENT # 37021
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: Stevenson BIO
PROJECT NO: 110913K2
SAMPLER(S) NAME: (PRINT)

SAMPLE NO:	SAMPLE ID AND/ OR COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP GRAB	FIELD ANALYSIS pH	TEMP	FLOW	CL2	D,O (W) D.O(P)	CONTAINER TYPE PRESERVATIVE	ANALYSIS REQUIRED
	Outfall	1200 12-6-11	1200 12-9-11			5.8°C				6 1/2 gallon	BIO

METHOD OF SHIPMENT (CIRCLE)
FED EX WALK IN SRA UPS OTHER

FIELD CALIBRATION RECORD

pH 7	7.01			
pH 4				
pH 10	10.03			
D.O				

TYPE OF SAMPLE(S): (CIRCLE)
WATER SOIL WW SLUDGE OTHER

NOTES/COMMENTS/OBSERVATIONS

FIELD ANALYSIS CONDUCTED BY: (CIRCLE) SRA CLIENT

RELINQUISHED B... DATE/TIME: ...EIVED BY: DATE/TIME: 10:40 -9-11

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 # 13918.0003

CLIENT # _____

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 Stuttgart

PROJECT NO:

SAMPLER(S) NAME: (PRINT)

110913k2

SAMPLE NO:	SAMPLE ID AND/ OR COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP GRAB	FIELD ANALYSIS pH	TEMP	FLOW	CL2	D,O (W) D.O(P)	CONTAINER TYPE PRESERVATIVE	ANALYSIS REQUIRED
	Eff Outfall 001	12-8-11 1200	12-9-11 1100	C						6 1/2 Gallon	BIO-MON

METHOD OF SHIPMENT (CIRCLE)
FED EX WALK IN (SRA) UPS OTHER

TYPE OF SAMPLE(S): (CIRCLE)
WATER SOIL W/W SLUDGE OTHER

FIELD CALIBRATION RECORD

pH 7			
pH 4			
pH 10			
D.O			

NOTES/COMMENTS/OBSERVATIONS

Temp @ Lab 5°

FIELD ANALYSIS CONDUCTED BY: (CIRCLE) SRA CLIENT

RELINQUISHED B[illegible] DATE/TIME: [illegible]EIVED BY: [signature] DATE/TIME: 1150 12-9-11

APPENDIX D
LABORATORY CONTROL
CERIO CULTURE RECORD

DATE START	11/28/11	STUTTGART 13918													
DATE END		*													
ANALYST		*													
WATER TYPE		*		day 8		day 14									
% SURVIVAL		*		100		100									
#YOUNG MEAN				18.1											
stnd DEV from mean		2.4688		14.088											

	REPLICATE NUMBER											No.	No.	Young/
DAY	1	2	3	4	5	6	7	8	9	10		Young	Adults	Adult
1												0	10	0
2												0	10	0
3					1						2	3	10	0.3
4	3	2	2	4	3	4	1	3	2	1		25	10	2.5
5		3			1		4		1	5		14	10	1.4
6	6	5	7	7	7	6	6	5	7	3		59	10	5.9
7		3				2				4		9	10	0.9
8	9	7	10	7	8	8	8	8	6	5		76	10	7.6
total8	18	20	19	18	20	20	19	16	16	20		186	10	18.6
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

	REPLICATE NUMBER											No.	No.	Young/
DAY	11	12	13	14	15	16	17	18	19	20		Young	Adults	Adult
1												0	10	0
2												0	10	0
3			1				1					2	10	0.2
4	4	4	2	4	3		3	2	4	4		30	10	0
5			2			5		1				8	10	0.8
6	5	6	6	6	6	3	5	7	7	6		57	10	5.7
7	1			3		4				2		10	10	1
8	9	7	7	8	1	6	7	7	8	9		69	10	6.9
total8	19	17	18	21	10	18	16	17	19	21		176	10	17.6
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

11-28-11 Cerio

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					2	0	10	#######
4	3	2	2	4	3	4	1	3	2	1	0	10	#######
5		3			1		4		1	5	0	10	#######
6	6	5	7	7	7	6	6	5	7	3	0	10	#######
7		3				2				4	0	10	#######
8	9	7	10	7	8	8	8	8	6	5	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		#######

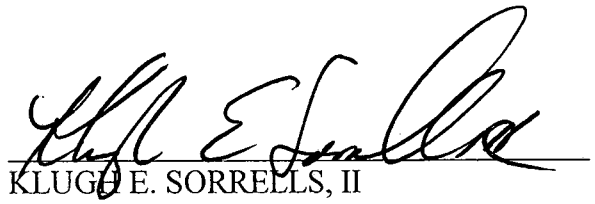
	REPLICATE NUMBER										No.	No.	Young/
DAY	11	12	13	14	15	16	17	18	19	20	Young	Adults	Adult
1											0		#######
2											0		#######
3			1				1				0	10	#######
4	4	4	2	4	3		3	2	4	4	0	10	#######
5			2			5		1			0	10	#######
6	5	6	6	6	6	3	5	7	7	6	0	10	#######
7	1			3		4				2	0	10	#######
8	9	7	7	8	11	6	7	7	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

11

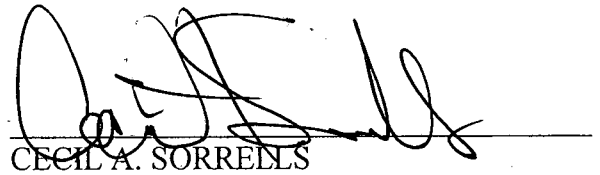
FIGURE 5

BIOMONITORING ANALYSIS
BY
SORRELLS RESEARCH ASSOCIATES, INC.

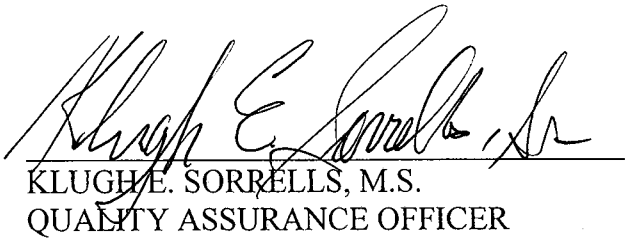
ANALYSIS



KLUGH E. SORRELLS, II
LABORATORY TECHNICIAN



CECIL A. SORRELLS
BIOMONITORING MANAGER/PRESIDENT



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

CITY OF STUTTGART
PERMIT NO: AR0034380
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

April 13, 2012

Laboratory Number:14204.0001,0002,0003

TABLE OF CONTENTS

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 Cabot 24 hour composite samples of plant effluent for dates 02/12-13/12, 02/14-15/12, 02/16-17/12.

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

These samples were logged in as #14204.0001,0002 and 0003. Chain of custody included in report.

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

Testing was initiated 02/14/12 at 1410 hours and continued through 02/22/12 at 1410 hours.

The results of these tests are as follows:

TEST 1000.0 FATHEAD MINNOW

SURVIVAL - NOEL 100% Effluent

GROWTH - NOEL 100% Effluent

TEST 1002.0 CERIODAPHNIA DUBIA

SURVIVAL - NOEL 100% Effluent

REPRODUCTION - NOEL 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.	.327	PASS
1002	Ceriodaphnia dubia	Control repro. 15 or> neonates per surviving female.	18.3	PASS
1000	Pimephales promelas	Control CV 40 % or <	**3.8**	PASS
1002	Ceriodaphnia Dubia	Control CV 40 % or <	**9.99**	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: AR0021661
PERMIT REQUIREMENTS: MONTHLY
PLANT LOCATION:
RECEIVING WATER BODY:

CLIENT: Stuttgart, City of
ADDRESS: P.O. Box 130
Stuttgart, AR 72160

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: 02/12-13/12 0800-0800 | 02/14-15/12 0800-0800 | 02/16-17/12 0800-0800

SAMPLING COLLECTION METHOD: COMPOSITE

PHYSICAL AND CHEMICAL DATA:

CONTROL	DATE **02/14/12**	DATE **02/16/12**	DATE **02/18/12**
DO (mg/l)	8.43	8.65	8.40
pH (S.U.)	7.10	7.21	7.21
Conductivity (umhos)	401	309	306
Alkalinity (mg/l)	86	74	74
Hardness (mg/l)	82	78	76
Res. Chlorine (mg/l)	0	0	0

56%	DATE **02/14/12**	DATE **02/16/12**	DATE **02/18/12**
DO (mg/l)	8.22	8.25	8.23
pH (S.U.)	6.92	7.33	7.35
Conductivity (umhos)	586	580	510
Alkalinity (mg/l)	122	108	102
Hardness (mg/l)	109	106	92

(Cont.)

PHYSICAL AND CHEMICAL DATA: **100 % EFFLUENT**	D14E **02/06/12**	DATE **02/16/12**	DATE **02/18/12**
DO (mg/l)	7.96	8.04	8.16
pH (S.U.)	6.96	7.40	7.43
Conductivity (umhos)	869	854	708
Alkalinity (mg/l)	172	144	128
Hardness (mg/l)	143	134	108
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/1 CaCO3
D.O. Dissolved Oxygen mg/1
Temperature degrees centigrade
pH s
tandard units
Conductivity = us/cm
Chlorine Residual = mg/1

B5702D6

Chemical Data For Daily Biomonitoring

Permitee Stuttgart Date 2-14-12 1410

Analyst MA/JTM Lab no. 14204

Dilution Control

Day	1	2	3	4	5	6	7	notes
Temp	25	25	25.0	25.0	25.0	25.0		Dup Cond std 1366
pH	7.10	7.16	7.21	7.26	7.21	7.18		
D.O.	8.43	8.41	8.66	8.55	8.40	8.33		
Alk	86		74		74			
Hard.	82		78		76			
Cond.	401		309		306			

Dilution 56

Day	1	2	3	4	5	6	7	notes
Temp	25.0	25.0	25.0	25.0	25.0	25.0		
pH	6.92	6.98	7.33	7.19	7.35	7.42		
D.O.	8.22	8.03	8.25	8.02	8.23	8.10		
Alk	122		108		102			
Hard.	109		106		92			
Cond.	586		580		510			

Dilution 100

Day	1	2	3	4	5	6	7	notes
Temp	25.0	25.0	25.0	25.0	25.0	25.0		
pH	6.96	7.10	7.40	7.35	7.43 ~~25.0~~	7.50		
D.O.	7.96	7.82	8.04	7.91	8.16	7.91		
Alk	172		144		128			
Hard.	143		134		108			
Cond.	869		854		708			

Dr 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: STUTTGART 14204 CERIO REPS
FILE: 14204SCR
TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	20.0000	20.0000
1	CONTROL	2	18.0000	18.0000
1	CONTROL	3	18.0000	18.0000
1	CONTROL	4	18.0000	18.0000
1	CONTROL	5	18.0000	18.0000
1	CONTROL	6	15.0000	15.0000
1	CONTROL	7	18.0000	18.0000
1	CONTROL	8	19.0000	19.0000
1	CONTROL	9	17.0000	17.0000
1	CONTROL	10	22.0000	22.0000
2	32	1	21.0000	21.0000
2	32	2	22.0000	22.0000
2	32	3	17.0000	17.0000
2	32	4	15.0000	15.0000
2	32	5	18.0000	18.0000
2	32	6	21.0000	21.0000
2	32	7	22.0000	22.0000
2	32	8	19.0000	19.0000
2	32	9	19.0000	19.0000
2	32	10	20.0000	20.0000
3	42	1	21.0000	21.0000
3	42	2	21.0000	21.0000
3	42	3	16.0000	16.0000
3	42	4	18.0000	18.0000
3	42	5	19.0000	19.0000
3	42	6	22.0000	22.0000
3	42	7	21.0000	21.0000
3	42	8	19.0000	19.0000
3	42	9	17.0000	17.0000
3	42	10	18.0000	18.0000
4	56	1	17.0000	17.0000
4	56	2	20.0000	20.0000
4	56	3	21.0000	21.0000
4	56	4	20.0000	20.0000
4	56	5	17.0000	17.0000
4	56	6	19.0000	19.0000
4	56	7	21.0000	21.0000
4	56	8	20.0000	20.0000
4	56	9	22.0000	22.0000
4	56	10	17.0000	17.0000
5	75	1	19.0000	19.0000
5	75	2	19.0000	19.0000
5	75	3	19.0000	19.0000
5	75	4	13.0000	13.0000
5	75	5	17.0000	17.0000
5	75	6	19.0000	19.0000
5	75	7	19.0000	19.0000
5	75	8	16.0000	16.0000
5	75	9	20.0000	20.0000
5	75	10	18.0000	18.0000

6	100	1	20.0000	20.0000
6	100	2	18.0000	18.0000
6	100	3	19.0000	19.0000
6	100	4	20.0000	20.0000
6	100	5	20.0000	20.0000
6	100	6	22.0000	22.0000
6	100	7	19.0000	19.0000
6	100	8	23.0000	23.0000
6	100	9	18.0000	18.0000
6	100	10	19.0000	19.0000

STUTTGART 14204 CERIO REPS
File: 14204SCR Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	10	15.000	22.000	18.300
2	32	10	15.000	22.000	19.400
3	42	10	16.000	22.000	19.200
4	56	10	17.000	22.000	19.400
5	75	10	13.000	20.000	17.900
6	100	10	18.000	23.000	19.800

STUTTGART 14204 CERIO REPS
File: 14204SCR Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	CONTROL	3.344	1.829	0.578
2	32	5.156	2.271	0.718
3	42	3.956	1.989	0.629
4	56	3.378	1.838	0.581
5	75	4.322	2.079	0.657
6	100	2.622	1.619	0.512

STUTTGART 14204 CERIO REPS
File: 14204SCR Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	27.000	5.400	1.422
Within (Error)	54	205.000	3.796	

Total	59	232.000

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

STUTTGART 14204 CERIO REPS
File: 14204SCR 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	18.300	18.300		
2	32	19.400	19.400	-1.262	
3	42	19.200	19.200	-1.033	
4	56	19.400	19.400	-1.262	
5	75	17.900	17.900	0.459	
6	100	19.800	19.800	-1.721	

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

STUTTGART 14204 CERIO REPS
File: 14204SCR 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	32	10	2.013	11.0	-1.100
3	42	10	2.013	11.0	-0.900
4	56	10	2.013	11.0	-1.100
5	75	10	2.013	11.0	0.400
6	100	10	2.013	11.0	-1.500

STUTTGART 14204 CERIO REPS
File: 14204SCR Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	CONTROL	10	18.300	18.300	18.300
2	32	10	19.400	19.400	18.975
3	42	10	19.200	19.200	18.975
4	56	10	19.400	19.400	18.975
5	75	10	17.900	17.900	18.975
6	100	10	19.800	19.800	19.800

STUTTGART 14204 CERIO REPS
File: 14204SCR 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	18.300				
32	18.975	0.775		1.68	k= 1, v=54
42	18.975	0.775		1.76	k= 2, v=54
56	18.975	0.775		1.79	k= 3, v=54
75	18.975	0.775		1.80	k= 4, v=54
100	19.800	1.721		1.80	k= 5, v=54

s = 1.948
Note: df used for table values are approximate when v > 20.

STUTTGART 14204 CERIO REPS
File: 14204SCR Transform: NO TRANSFORM

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	18.300				
2	32	19.400	122.00	75.00	10.00	
3	42	19.200	118.00	75.00	10.00	
4	56	19.400	120.00	75.00	10.00	
5	75	17.900	108.00	75.00	10.00	
6	100	19.800	131.50	75.00	10.00	

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

TITLE: STUTTGART 14204 MINNOW WEIGHTS
FILE: 14204SMW
TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.3400	0.3400
1	CONTROL	2	0.3270	0.3270
1	CONTROL	3	0.3100	0.3100
1	CONTROL	4	0.3290	0.3290
2	32	1	0.3240	0.3240
2	32	2	0.3180	0.3180
2	32	3	0.3080	0.3080
2	32	4	0.3190	0.3190
3	42	1	0.3350	0.3350
3	42	2	0.3120	0.3120
3	42	3	0.3430	0.3430
3	42	4	0.3070	0.3070
4	56	1	0.3220	0.3220
4	56	2	0.3430	0.3430
4	56	3	0.3130	0.3130
4	56	4	0.3340	0.3340
5	75	1	0.3100	0.3100
5	75	2	0.3330	0.3330
5	75	3	0.3210	0.3210
5	75	4	0.3190	0.3190
6	100	1	0.3410	0.3410
6	100	2	0.3250	0.3250
6	100	3	0.3150	0.3150
6	100	4	0.3420	0.3420

STUTTGART 14204 MINNOW WEIGHTS
File: 14204SMW Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	4	0.310	0.340	0.327
2	32	4	0.308	0.324	0.317
3	42	4	0.307	0.343	0.324
4	56	4	0.313	0.343	0.328
5	75	4	0.310	0.333	0.321
6	100	4	0.315	0.342	0.331

STUTTGART 14204 MINNOW WEIGHTS
File: 14204SMW 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	32	0.000	0.007	0.003
3	42	0.000	0.017	0.009
4	56	0.000	0.013	0.007
5	75	0.000	0.009	0.005
6	100	0.000	0.013	0.007

STUTTGART 14204 MINNOW WEIGHTS
File: 14204SMW Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.000	0.000	0.624
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

STUTTGART 14204 MINNOW WEIGHTS
File: 14204SMW 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	0.327	0.327		
2	32	0.317	0.317	1.046	
3	42	0.324	0.324	0.254	
4	56	0.328	0.328	-0.170	
5	75	0.321	0.321	0.650	
6	100	0.331	0.331	-0.481	

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

STUTTGART 14204 MINNOW WEIGHTS
File: 14204SMW 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	32	4	0.021	6.5	0.009
3	42	4	0.021	6.5	0.002
4	56	4	0.021	6.5	-0.001
5	75	4	0.021	6.5	0.006
6	100	4	0.021	6.5	-0.004

STUTTGART 14204 MINNOW WEIGHTS
File: 14204SMW Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	CONTROL	4	0.327	0.327	0.322
2	32	4	0.317	0.317	0.322
3	42	4	0.324	0.324	0.324
4	56	4	0.328	0.328	0.324
5	75	4	0.321	0.321	0.324
6	100	4	0.331	0.331	0.331

STUTTGART 14204 MINNOW WEIGHTS
File: 14204SMW 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	0.322				
32	0.322	0.517		1.73	k= 1, v=18
42	0.324	0.252		1.82	k= 2, v=18
56	0.324	0.238		1.85	k= 3, v=18
75	0.324	0.238		1.86	k= 4, v=18
100	0.331	0.475		1.87	k= 5, v=18

= 0.013
Note: df used for table values are approximate when v > 20.

STUTTGART 14204 MINNOW WEIGHTS
File: 14204SMW Transform: NO TRANSFORM

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	0.327				
2	32	0.317	13.00	10.00	4.00	
3	42	0.324	18.00	10.00	4.00	

4	56	0.328	19.00	10.00	4.00
5	75	0.321	15.50	10.00	4.00
6	100	0.331	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 100 %
DEVIATIONS FROM REFERENCE METHOD: None

DATE AND TIME TEST STARTED: 02/14/12 1410
DATE AND TIME TEST TERMINATED: 02/21/12 1410
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 32%, 42%, 56%, 75% and 100% 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
32%	100	100	100	100	100	100	100	0.0
42%	100	100	100	100	100	100	100	0.0
56%	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 7 days significantly different (p=0.5) 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 (50 %): 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 (50 %): 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.) b.) NOEL growth = 100% effluent

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL
(Pimephales promelas)

Permittee: Cabot, City of NPDES NO. AR0021661

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	.340	.329	.310	.329	.327	3.8
32	.324	.318	.308	.319	.317	2.1
42	.335	.312	.343	.307	.324	5.4
56	.322	.343	.313	.334	.328	4.0
75	.310	.333	.321	.319	.321	3.0
100	.341	.325	.315	.342	.331	**4.0**

*Coefficient of variation = standard deviation X 100/mean

(Coef Of Var Statre 7day Chronic Pimephales TQP6C = **4.0**)

TEST METHOD
1002.0

TEST METHOD USED: 1002.0
END POINT(S) OF TEST: NOEL 100 %
DEVIATIONS FROM REFERENCE METHOD: None

DATE AND TIME TEST STARTED: 02/14/12 1410
DATE AND TIME TEST TERMINATED: 02/22/12 1410
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 32%, 42%, 56%, 75%, and 100% 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%	32 %	42%	56%	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 (50%): 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 (50%): 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: Cabot, City of NPDES NO. AR0021661
Dilution water used: Receiving ( ) Reconstituted (X)

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

PERCENT EFFLUENT (%)

REP	0%	32%	42%	56%	75%	100%
A	20	21	21	17	19	20
B	18	22	21	20	19	18
C	18	17	16	21	19	19
D	18	15	18	20	13	20
E	18	18	19	17	17	20
F	15	21	22	19	19	22
G	18	22	21	21	19	19
H	19	19	19	20	16	23
I	17	19	17	22	20	18
J	22	20	18	17	18	19
*CV%	**9.99**	11.7	10.4	9.47	11.6	8.18
MEAN	18.30	19.40	19.20	19.40	17.90	19.80

*coefficient of variation = standard deviation x 100/mean

(Coef Of Var Statre 7Day Chronic Ceriodaphnia TQP3B = **9.99**)

STANDARD REFERENCE TOXICANTS

STANDARD TOXICANT USED AND SOURCE: SODIUM CHLORIDE
DATE AND TIME OF MOST RECENT TEST: 02/14/12, 1410
DILUTION WATER USED IN TEST: 20% DMW
RESULTS(LC50 OR, NOEC AND/OR ECL): LC50 = 1427 FATHEAD MINNOW
RESULTS(LC50 OR, NOEC AND/OR ECL): LC50 = 707 CERIODAPHNIA
ACCEPTABLE PERFORMANCE, STUDY 29 = 100% recovery
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 **82.1%**

CERIODAPHNIA

Standard Recovery CERODAPHNIA **94%**

APPENDIX 1A
TEST 1000.0

Permittee	Stuttgart 14204							
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**
32.00%	100	100	100	100	100	100	**100**	**0.0**
42.00%	100	100	100	100	100	100	**100**	**0.0**
56.00%	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	Stuttgart 14204					
Effluent	Average Dry Weight (mg)				Mean Dry Weight (mg)	
Conc.	A	B	C	D	7 days	CV%*
CONTROL	0.340	0.327	0.310	0.329	**0.3265**	**3.8**
32	0.324	0.318	0.308	0.319	**0.31725**	**2.1**
42	0.335	0.312	0.343	0.307	**0.32425**	**5.4**
56	0.322	0.343	0.313	0.334	**0.328**	**4.0**
75	0.310	0.333	0.321	0.319	**0.32075**	**3.0**
100	0.341	0.325	0.315	0.342	**0.33075**	**4.0**

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

Discharger: Stuttgart
Location: 14204

Test Dates: 2-14-12 1410
Analyst:

Conc:	Rep. No.	No. Survivors Day 1	2	3	4	5	6	7	Remarks
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	
32	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	
	11	10	10	10	10	10	10	10	
42	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	
	15	10	10	10	10	10	10	10	
56	16	10	11	10	10	10	10	10	
Conc:	17	10	10	10	10	10	10	10	
	18	10	10	10	10	10	10	10	
	19	10	10	10	10	10	10	10	
75	20	10	10	10	10	10	10	10	
Conc:	21	10	11	10	10	10	10	11	
	22	10	10	10	10	10	10	10	
	23	10	10	10	10	10	10	10	
100	24	10	10	10	10	10	10	10	

Comments:

Discharge: Stuttgart
Location: 14204
Analyst:

Test Date(s): 2-14-12
Weighing Date: 4-5-12

Drying Temperature (°C): 104
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	124249	124589	3.40	10	.340	
	2	123887	124208	3.27	10	.327	9 am
	3	123204	123514	3.10	10	.310	
	4	123614	123943	3.29	10	.329	
Conc:	5	122914	123238	3.24	10	.324	
	6	129859	130177	3.18	10	.318	
	7	129338	129646	3.08	10	.308	
32	8	121927	122246	3.19	10	.319	
Conc:	9	125574	125909	3.35	10	.335	
	10	123348	123660	3.12	10	.312	
	11	123026	123369	3.43	10	.343	
42	12	123108	123415	3.07	10	.307	
Conc:	13	129070	129392	3.22	10	.322	
	14	124215	124558	3.43	10	.343	
	15	129157	129470	3.13	10	.313	
56	16	123863	124197	3.34	10	.334	
Conc:	17	125500	125810	3.10	10	.310	
	18	125149	125482	3.33	10	.333	
	19	130232	130553	3.21	10	.321	
75	20	125002	125321	3.19	10	.319	
Conc:	21	124185	124526	3.41	10	.341	
	22	129513	129838	3.25	10	.325	
	23	130431	130746	3.15	10	.315	
100	24	129522	129864	3.42	10	.342	

[1]Adapted from Hughes, et al., 1987.

Control 122581 122580

FIGURE 3 - FATHEAD MINNOW
page 14

APPENDIX 2A
TEST 1002.0

	Stuttgart 14204	CERIO	REPLICATE CONTAINERS					s.d.=	1.82878		CV% =	9.9933455	
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	1	2	1	3	3	2	4	2	2	4	24	10	2.40
temp:	5	3			1				2			6	10	0.60
temp:	6	6	8	7	5	5	7	7	6	7	7	65	10	6.50
temp:	7	3			2				1		1	7	10	0.70
temp:	8	7	8	10	7	9	6	7	7	8	10	79	10	7.90
	TOTAL	20	18	18	18	18	15	18	19	17	22	183	10	18.30
conc			REPLICATE CONTAINERS					s.d.=	2.27058		CV% =	11.704046	
	32.00 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				2	10	0.20
temp:	4	3	4	2	2	2	3	4	2	1	5	28	10	2.80
temp:	5		1		2				1	3		7	10	0.70
temp:	6	7	7	6	5	7	7	7	6	7	6	65	10	6.50
temp:	7		1	3	1			2		1	1	9	10	0.90
temp:	8	10	9	6	5	9	9	9	10	7	8	82	10	8.20
	TOTAL	21	22	17	15	18	21	22	19	19	20	194	10	19.40
CONC.			REPLICATE CONTAINERS					s.d.=	1.98886		CV% =	10.358635	
	42.00 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										0	10	0.00
temp:	4	3	4	2	2	3	4	4	4	2	3	31	10	3.10
temp:	5		1			1		1		3		6	10	0.60
temp:	6	8	7	7	7	7	6	5	5	5	7	64	10	6.40
temp:	7		2		2		3		1			8	10	0.80
temp:	8	10	7	7	7	8	9	11	9	7	8	83	10	8.30
	TOTAL	21	21	16	18	19	22	21	19	17	18	192	10	19.20
CONC.			REPLICATE CONTAINERS					s.d.=	1.83787		CV% =	9.473573	
	56.00 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	3	10	0.30
temp:	4	3	4	2	2	4	3	4	2	4	3	31	10	3.10
temp:	5			2			1		2			5	10	0.50
temp:	6	6	5	7	7	6	5	7	7	6	6	62	10	6.20
temp:	7		3		1		3			2		9	10	0.90
temp:	8	8	8	9	10	7	7	9	9	10	7	84	10	8.40
	TOTAL	17	20	21	20	17	19	21	20	22	17	194	10	19.40
CONC.			REPLICATE CONTAINERS					s.d.=	2.079		CV% =	11.6145	
	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		2								2	10	0.20
temp:	4	3	2	4		2	2	4	2	3	5	27	10	2.70
temp:	5				1		2			2		5	10	0.50
temp:	6	6	7	7	2	6	6	7	7	5	6	59	10	5.90
temp:	7	2			5					1	1	9	10	0.90
temp:	8	8	8	8	5	9	9	8	7	9	6	77	10	7.70
	TOTAL	19	19	19	13	17	19	19	16	20	18	179	10	17.90
CONC.			REPLICATE CONTAINERS					s.d.=	1.61933		CV% =	8.1784228	
	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	1							1		3	10	0.30
temp:	4	4	2	5	3	4	2	2	4	3	3	32	10	3.20
temp:	5		1		1		3				1	6	10	0.60
temp:	6	5	6	7	7	7	6	8	7	6	6	65	10	6.50
temp:	7	3			2					2		7	10	0.70
temp:	8	7	8	7	7	9	11	9	12	6	9	85	10	8.50
*	TOTAL	20	18	19	20	20	22	19	23	18	19	198	10	19.80

Stuttgart Cerio 2-14-12 1410 14204

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

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

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

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

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

CONC.				REPLICATE CONTAINERS					s.d.=	0		CV% =	#DIV/0!	
100	DAY	1	2	3	4	5	6	7	8	9	10	no. youn	no. adults	young/adult
temp:	1											0	10	#DIV/0!
temp:	2											0	10	#DIV/0!
temp:	3											0	10	#DIV/0!
temp:	4	1/4	1/2	5	3	4	2	2	4	1/3	3	0	10	#DIV/0!
temp:	5						3				1	0	10	#DIV/0!
temp:	6	5	6	7	1/7	7	6	8	7	6	6	0	10	#DIV/0!
temp:	7	3			2					2		0	10	#DIV/0!
temp:	8	7	8	7	7	9	11	9	12	6	9	0	10	#DIV/0!
*	TOTAL	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: 2/13/2012

SPECIES: *Pimephales promelas*

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 2/13/2012

BEGAN FEEDING: N/A

FOOD: N/A

Water Chemistry Record:	Current	Range
TEMPERATURE:	25°C	--
SALINITY/CONDUCTIVITY:	--	--
TOTAL HARDNESS (as $CaCO_3$):	125 mg/l	--
TOTAL ALKALINITY (as $CaCO_3$):	90 mg/l	--
pH:	8.20	--

Comments:

Facility Supervisor

14204
14205
14206

Rec'd
2-14-12

APPENDIX C
CHAINS OF CUSTODY

SORRELLS RESEARCH ASSOCIATES, INC.
8002 STANTON ROAD, LITTLE ROCK, AR 72209
(501) 562-8139 (800) 331-8139
FAX # (501) 562-7025

CHAIN OF CUSTODY RECORD

PAGE _____ OF _____

TURNAROUND TIME
RUSH 24 HR. 48 HR.
5 DAY REG.
OTHER _____

FOR LAB/OFFICE USE ONLY

LAB # 1420A.0001B

CLIENT # 37021

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
W = AZIDE MODIFICATION (4500-O C)
P = MEMBRANE ELECTRODE (4500-O G)
NaOH = pH > 12

NAME OF COMPANY, CITY, OR PROJECT: Stuttgart (BIO-MON)

PROJECT NO:

SAMPLER(S) SIGNATURE

SAMPLE NO.	SAMPLE COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP/ GRAB	FIELD ANALYSIS PH	TEMP	FLOW	CL2	D.O. (W) D.O. (P)	CONTAINER TYPE PRESERVATIVE	ANALYSIS REQUIRED
	EFFLUENT OUTFALL 001			C						½ GALLON (P)	CBOD, TSS
				C						500ML S(2 (P)	AMMONIA NITROGEN
				G						120ML (T) (P)	FECAL COLIFORM, DO
				G						ON SITE	PH, TEMP, FLOW Cl_2
	EFF OUTFALL001	800 2-12-12	800 2-13-12	C						6½ GALCN	BIO-MON
										ALL CONTAINERS COOLED TO C4	

METHOD OF SHIPMENT (CIRCLE)
FED-EX WALK-IN (SRA) UPS OTHER

TYPE OF SAMPLE(S): (CIRCLE)
WATER SOIL (WW) SLUDGE OTHER

FIELD CALIBRATION RECORD

PH 7	
PH 4	
PH 10	
D.O.	

NOTES/COMMENTS/OBSERVATIONS
Temp in lab 6°

FIELD ANALYSIS CONDUCTED BY: (SRA) CLIENT

RELINQUISHED BY: DATE/TIME RECEIVED BY: DATE/TIME 2/13/12 1150

RELINQUISHED BY: DATE/TIME RECEIVED BY: (LAB) DATE/TIME 2/13/12 1600

SORRELLS RESEARCH ASSOCIATES, INC.
8002 STANTON ROAD, LITTLE ROCK, AR 72209
(501) 562-8139 (800) 331-8139
FAX # (501) 562-7025

CHAIN OF CUSTODY RECORD

PAGE _____ OF _____

TURNAROUND TIME
RUSH 24 HR. 48 HR.
5 DAY REG.
OTHER _____

FOR LAB/OFFICE USE ONLY

LAB # 14204.0002B
CLIENT # 37021
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
W = AZIDE MODIFICATION (4500-O C)
P = MEMBRANE ELECTRODE (4500-O G)
NaOH = pH > 12

NAME OF COMPANY, CITY, OR PROJECT: Stuttgart

PROJECT NO:

SAMPLER(S) SIGNATURE

SAMPLE NO.	SAMPLE COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP/ GRAB	FIELD ANALYSIS PH	TEMP	FLOW	CL2	D.O. (W) D.O. (P)	CONTAINER TYPE PRESERVATIVE	ANALYSIS REQUIRED
	EFFLUENT OUTFALL 001			C						¼ GALLON (P)	CBOD, TSS
				C						500ML S(2 (P)	AMMONIA NITROGEN
				G						120ML (T) (P)	FECAL COLIFORM, DO
				G						ON SITE	PH, TEMP, FLOW, Cl2
	BIO-MON	8:00 2/14/12	8:00 2/15/12	C						6½ GALLON	BIO-MON
										ALL CONTAINERS COOLED TO C4	

METHOD OF SHIPMENT (CIRCLE)
FED-EX WALK-IN (SRA) UPS OTHER

TYPE OF SAMPLE(S): (CIRCLE)
WATER SOIL (NPW) SLUDGE OTHER

FIELD CALIBRATION RECORD
PH 7
PH 4
PH 10
D.O.

NOTES/COMMENTS/OBSERVATIONS
Temp Lab 4.5°

FIELD ANALYSIS CONDUCTED BY: (SRA) CLIENT

RELINQUISHED BY:	DATE/TIME	RECEIVED BY:	DATE/TIME 1040 2/15/12
RELINQUISHED BY:	DATE/TIME	RECEIVED BY: (LAB)	DATE/TIME 1610 2/15/12

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 # 14204.0003B
CLIENT # _____
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

AME OF COMPANY, CITY, OR PROJECT: Stuttgart BIO
PROJECT NO:
SAMPLER(S) NAME: (PRINT)
110913K2

AMPLE NO:	SAMPLE ID AND/ OR COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP GRAB	FIELD ANALYSIS pH	TEMP	FLOW	CL2	D,O (W) D.O(P)	CONTAINER TYPE PRESERVATIVE	ANALYSIS REQUIRED
	Outfall	2-16-12 800	2-17-12 800	C		6.7°					

METHOD OF SHIPMENT (CIRCLE)
FED EX WALK IN SRA UPS OTHER

TYPE OF SAMPLE(S): (CIRCLE)
WATER SOIL W/W SLUDGE OTHER

FIELD CALIBRATION RECORD

pH 7	7.01		
pH 4	4.03		
pH 10	9.99		
D.O			

NOTES/COMMENTS/OBSERVATIONS

FIELD ANALYSIS CONDUCTED BY: (CIRCLE) SRA CLIENT

RELINQUISHED BY: _____ DATE/TIME: _____ RECEIVED BY: _____ DATE/TIME: 2-17-12 1200

APPENDIX D
LABORATORY CONTROL
CERIO CULTURE RECORD

DATE START	2/6/2012	Stuttgart 14204													
DATE END		*													
ANALYST		*													
WATER TYPE		*	day 8		day 14										
% SURVIVAL		*	100		100										
#YOUNG MEAN			18.35												
stnd DEV from mean		2.059	14.169												

	REPLICATE NUMBER										No.	No.	Young/
DAY	1	2	3	4	5	6	7	8	9	10	Young	Adults	Adult
1											0	10	0
2											0	10	0
3					1				1		2	10	0.2
4	3	4	2	1	3	3	4	2	2	5	29	10	2.9
5			2	3		1					6	10	0.6
6	6	5	5	5	7	5	7	7	6	6	59	10	5.9
7		3		2			1			3	9	10	0.9
8	9	9	6	9	7	8	8	10	7	9	82	10	8.2
total8	18	21	15	20	18	17	20	19	16	23	187	10	18.7
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

	REPLICATE NUMBER										No.	No.	Young/
DAY	11	12	13	14	15	16	17	18	19	20	Young	Adults	Adult
1											0	10	0
2											0	10	0
3					2		1	1			4	10	0.4
4	1	3	3	3	2	4	3	1	4	2	26	10	0
5	2							2			4	10	0.4
6	5	4	7	7	8	6	6	5	7	7	62	10	6.2
7		5		1		2		2	1		11	10	1.1
8	8	7	7	8	6	5	7	9	9	7	73	10	7.3
total8	16	19	17	19	18	17	17	20	21	16	180	10	18
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

2-6-12 Ceno

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		#######
4	3	4	2	1	3	3	4	2	2	5	0		#######
5			2	3		1					0		#######
6	6	5	5	5	7	5	7	7	6	6	0		#######
7		3		2			1			3	0		#######
8	9	9	6	9	7	8	8	10	7	9	0		#######
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		#######

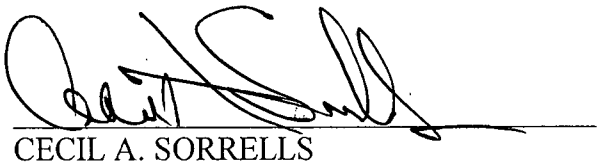
	REPLICATE NUMBER										No.	No.	Young/
DAY	11	12	13	14	15	16	17	18	19	20	Young	Adults	Adult
1											0		#######
2											0		#######
3					2		1	1			0		#######
4	1	3	3	3	2	4	3	1	4	2	0		#######
5	2							2			0		#######
6	5	4	7	7	8	6	6	5	7	7	0		#######
7		5		1		2		2	1		0		#######
8	8	7	7	8	6	5	7	9	9	7	0		#######
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 STUTTGART
PERMIT NO: AR0034380
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

April 16, 2013

Laboratory Number:15746.0001,0002,0003

TABLE OF CONTENTS

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 Cabot 24 hour composite samples of plant effluent for dates 03/10-11/13, 03/12-13/13, 03/14-15/13.

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

These samples were logged in as #15746.0001,0002 and 0003. Chain of custody included in report.

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

Testing was initiated 03/12/13 at 1530 hours and continued through 03/20/13 at 1530 hours.

The results of these tests are as follows:

TEST 1000.0 FATHEAD MINNOW

SURVIVAL - NOEL 100% Effluent

GROWTH - NOEL 100% Effluent

TEST 1002.0 CERIODAPHNIA DUBIA

SURVIVAL - NOEL 100% Effluent

REPRODUCTION - NOEL 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.	.323	PASS
1002	Ceriodaphnia dubia	Control repro. 15 or> neonates per surviving female.	18.7	PASS
1000	Pimephales promelas	Control CV 40 % or <	**5.0**	PASS
1002	Ceriodaphnia Dubia	Control CV 40 % or <	**11.3**	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: AR0021661
PERMIT REQUIREMENTS: MONTHLY
PLANT LOCATION:
RECEIVING WATER BODY:

CLIENT: Stuttgart, City of
ADDRESS: P.O. Box 130
Stuttgart, AR 72160

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: 03/10-11/13 1200-1200 | 03/12-13/13 1020-1020 | 03/14-15/13 1100-1100

SAMPLING COLLECTION METHOD: COMPOSITE

PHYSICAL AND CHEMICAL DATA:

CONTROL	DATE **03/12/13**	DATE **03/14/13**	DATE **03/16/13**
DO (mg/l)	8.65	8.53	8.55
pH (S.U.)	7.14	7.25	7.5
Conductivity (umhos)	292	230	263
Alkalinity (mg/l)	76	71	71
Hardness (mg/l)	48	38	48
Res. Chlorine (mg/l)	0	0	0

56%	DATE **03/12/13**	DATE **03/14/13**	DATE **03/16/13**
DO (mg/l)	8.31	8.40	8.25
pH (S.U.)	7.30	7.38	7.40
Conductivity (umhos)	465	452	505
Alkalinity (mg/l)	94	98	48
Hardness (mg/l)	78	78	80

(Cont.)

PHYSICAL AND CHEMICAL DATA: **100 % EFFLUENT**	D14E **03/12/13**	DATE **03/14/13**	DATE **03/16/13**
DO (mg/l)	8.26	8.13	8.12
pH (S.U.)	7.36	7.49	7.45
Conductivity (umhos)	709	688	713
Alkalinity (mg/l)	134	144	136
Hardness (mg/l)	152	130	140
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/1 CaCO3
D.O. Dissolved Oxygen mg/1
Temperature degrees centigrade
pH s
tandard units
Conductivity = us/cm
Chlorine Residual = mg/1

Chemical Data For Daily Biomonitoring

Permitee Stuttgart Date 3-12-13 1530

Analyst AS / JTH Lab no. 15746

Dilution Control

Day	1	2	3	4	5	6	7	notes
Temp	25.0	25.0	25.0	25.0	25.0	25.0		
pH	7.14	7.19	7.25	7.19	7.25	7.20		
D.O.	8.65	8.61	8.53	8.49	8.55	8.51		
Alk	76		71		71			
Hard.	~~98~~ 242 RE		38		98			
Cond.	~~340~~		~~319~~ 230 RE		263			

Dilution 56

Day	1	2	3	4	5	6	7	notes
Temp	25.0	25.0	25.0	25.0	25.0	25.0		
pH	7.30	7.33	7.38	7.42	7.40	7.46		
D.O.	8.31	8.20	8.40	8.33	8.25	8.22		
Alk	94		98		48			
Hard.	78		78		80			
Cond.	465		~~452~~		505			

Dilution 100

Day	1	2	3	4	5	6	7	notes
Temp	25.0	25.0	25.0	25.0	25.0	25.0		
pH	7.36	7.40	7.49	7.56	7.45	7.53		
D.O.	8.26	8.03	8.13	8.03	8.12	8.01		
Alk	134		144			136		
Hard.	152		130			140		
Cond.	709		688		713			

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: STUTTGART 15746 CERIO REPS
FILE: 15746SCR
TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	15.0000	15.0000
1	CONTROL	2	18.0000	18.0000
1	CONTROL	3	21.0000	21.0000
1	CONTROL	4	18.0000	18.0000
1	CONTROL	5	18.0000	18.0000
1	CONTROL	6	18.0000	18.0000
1	CONTROL	7	21.0000	21.0000
1	CONTROL	8	17.0000	17.0000
1	CONTROL	9	18.0000	18.0000
1	CONTROL	10	18.0000	18.0000
2	32.00	1	19.0000	19.0000
2	32.00	2	14.0000	14.0000
2	32.00	3	17.0000	17.0000
2	32.00	4	18.0000	18.0000
2	32.00	5	20.0000	20.0000
2	32.00	6	19.0000	19.0000
2	32.00	7	23.0000	23.0000
2	32.00	8	19.0000	19.0000
2	32.00	9	17.0000	17.0000
2	32.00	10	20.0000	20.0000
3	42.00	1	18.0000	18.0000
3	42.00	2	22.0000	22.0000
3	42.00	3	14.0000	14.0000
3	42.00	4	19.0000	19.0000
3	42.00	5	18.0000	18.0000
3	42.00	6	20.0000	20.0000
3	42.00	7	19.0000	19.0000
3	42.00	8	23.0000	23.0000
3	42.00	9	22.0000	22.0000
3	42.00	10	19.0000	19.0000
4	56.00	1	17.0000	17.0000
4	56.00	2	22.0000	22.0000
4	56.00	3	15.0000	15.0000
4	56.00	4	17.0000	17.0000
4	56.00	5	21.0000	21.0000
4	56.00	6	19.0000	19.0000
4	56.00	7	20.0000	20.0000
4	56.00	8	18.0000	18.0000
4	56.00	9	18.0000	18.0000
4	56.00	10	20.0000	20.0000
5	75.00	1	17.0000	17.0000
5	75.00	2	0.0000	0.0000
5	75.00	3	17.0000	17.0000
5	75.00	4	22.0000	22.0000
5	75.00	5	22.0000	22.0000
5	75.00	6	19.0000	19.0000
5	75.00	7	17.0000	17.0000
5	75.00	8	19.0000	19.0000
5	75.00	9	20.0000	20.0000
5	75.00	10	20.0000	20.0000

6	100.00	1	18.0000	18.0000
6	100.00	2	19.0000	19.0000
6	100.00	3	21.0000	21.0000
6	100.00	4	18.0000	18.0000
6	100.00	5	16.0000	16.0000
6	100.00	6	20.0000	20.0000
6	100.00	7	17.0000	17.0000
6	100.00	8	15.0000	15.0000
6	100.00	9	19.0000	19.0000
6	100.00	10	18.0000	18.0000

STUTTGART 15746 CERIO REPS
File: 15746SCR Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	10	15.000	21.000	18.200
2	32.00	10	14.000	23.000	18.600
3	42.00	10	14.000	23.000	19.400
4	56.00	10	15.000	22.000	18.700
5	75.00	10	0.000	22.000	17.300
6	100.00	10	15.000	21.000	18.100

STUTTGART 15746 CERIO REPS
File: 15746SCR Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	CONTROL	3.067	1.751	0.554
2	32.00	5.600	2.366	0.748
3	42.00	6.711	2.591	0.819
4	56.00	4.456	2.111	0.667
5	75.00	40.456	6.360	2.011
6	100.00	3.211	1.792	0.567

STUTTGART 15746 CERIO REPS
File: 15746SCR Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	24.683	4.937	0.466
Within (Error)	54	571.500	10.583	

Total	59	596.183

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

STUTTGART 15746 CERIO REPS
File: 15746SCR 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	18.200	18.200		
2	32.00	18.600	18.600	-0.275	
3	42.00	19.400	19.400	-0.825	
4	56.00	18.700	18.700	-0.344	
5	75.00	17.300	17.300	0.619	
6	100.00	18.100	18.100	0.069	

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

STUTTGART 15746 CERIO REPS
File: 15746SCR 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	32.00	10	3.361	18.5	-0.400
3	42.00	10	3.361	18.5	-1.200
4	56.00	10	3.361	18.5	-0.500
5	75.00	10	3.361	18.5	0.900
6	100.00	10	3.361	18.5	0.100

STUTTGART 15746 CERIO REPS
File: 15746SCR Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	CONTROL	10	18.200	18.200	18.733
2	32.00	10	18.600	18.600	18.733
3	42.00	10	19.400	19.400	18.733
4	56.00	10	18.700	18.700	18.700
5	75.00	10	17.300	17.300	17.700
6	100.00	10	18.100	18.100	17.700

STUTTGART 15746 CERIO REPS
File: 15746SCR 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	18.733				
32.00	18.733	0.367		1.68	k= 1, v=54
42.00	18.733	0.367		1.76	k= 2, v=54
56.00	18.700	0.344		1.79	k= 3, v=54
75.00	17.700	0.344		1.80	k= 4, v=54
100.00	17.700	0.344		1.80	k= 5, v=54

s = 3.253
Note: df used for table values are approximate when v > 20.

STUTTGART 15746 CERIO REPS
File: 15746SCR Transform: NO TRANSFORM

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	18.200				
2	32.00	18.600	113.00	75.00	10.00	
3	42.00	19.400	127.00	75.00	10.00	
4	56.00	18.700	111.50	75.00	10.00	
5	75.00	17.300	111.50	75.00	10.00	
6	100.00	18.100	106.00	75.00	10.00	

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

TITLE: STUTTGART 15746 MINNOW WEIGHTS
FILE: 15746SMW
TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.3080	0.3080
1	CONTROL	2	0.3450	0.3450
1	CONTROL	3	0.3230	0.3230
1	CONTROL	4	0.3140	0.3140
2	32.00	1	0.3260	0.3260
2	32.00	2	0.3090	0.3090
2	32.00	3	0.3290	0.3290
2	32.00	4	0.3490	0.3490
3	42.00	1	0.3350	0.3350
3	42.00	2	0.3200	0.3200
3	42.00	3	0.3080	0.3080
3	42.00	4	0.3410	0.3410
4	56.00	1	0.3280	0.3280
4	56.00	2	0.3310	0.3310
4	56.00	3	0.3290	0.3290
4	56.00	4	0.3180	0.3180
5	75.00	1	0.3400	0.3400
5	75.00	2	0.3060	0.3060
5	75.00	3	0.3340	0.3340
5	75.00	4	0.3250	0.3250
6	100.00	1	0.3230	0.3230
6	100.00	2	0.3370	0.3370
6	100.00	3	0.3310	0.3310
6	100.00	4	0.3080	0.3080

STUTTGART 15746 MINNOW WEIGHTS
File: 15746SMW Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	4	0.308	0.345	0.323
2	32.00	4	0.309	0.349	0.328
3	42.00	4	0.308	0.341	0.326
4	56.00	4	0.318	0.331	0.327
5	75.00	4	0.306	0.340	0.326
6	100.00	4	0.308	0.337	0.325

STUTTGART 15746 MINNOW WEIGHTS
File: 15746SMW Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	CONTROL	0.000	0.016	0.008
2	32.00	0.000	0.016	0.008
3	42.00	0.000	0.015	0.007
4	56.00	0.000	0.006	0.003
5	75.00	0.000	0.015	0.007
6	100.00	0.000	0.013	0.006

STUTTGART 15746 MINNOW WEIGHTS
File: 15746SMW Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.000	0.000	0.077
Within (Error)	18	0.003	0.000	
Total	23	0.004		

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

STUTTGART 15746 MINNOW WEIGHTS
File: 15746SMW 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	0.323	0.323		
2	32.00	0.328	0.328	-0.583	
3	42.00	0.326	0.326	-0.355	
4	56.00	0.327	0.327	-0.406	
5	75.00	0.326	0.326	-0.381	
6	100.00	0.325	0.325	-0.228	

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

STUTTGART 15746 MINNOW WEIGHTS
File: 15746SMW 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	32.00	4	0.024	7.4	-0.006
3	42.00	4	0.024	7.4	-0.003
4	56.00	4	0.024	7.4	-0.004
5	75.00	4	0.024	7.4	-0.004
6	100.00	4	0.024	7.4	-0.002

STUTTGART 15746 MINNOW WEIGHTS
File: 15746SMW Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	CONTROL	4	0.323	0.323	0.323
2	32.00	4	0.328	0.328	0.326
3	42.00	4	0.326	0.326	0.326
4	56.00	4	0.327	0.327	0.326
5	75.00	4	0.326	0.326	0.326
6	100.00	4	0.325	0.325	0.326

STUTTGART 15746 MINNOW WEIGHTS
File: 15746SMW 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				
32.00	0.326	0.395		1.73	k= 1, v=18
42.00	0.326	0.395		1.82	k= 2, v=18
56.00	0.326	0.395		1.85	k= 3, v=18
75.00	0.326	0.395		1.86	k= 4, v=18
100.00	0.326	0.395		1.87	k= 5, v=18

s = 0.014
Note: df used for table values are approximate when v > 20.

STUTTGART 15746 MINNOW WEIGHTS
File: 15746SMW Transform: NO TRANSFORM

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	0.323				
2	32.00	0.328	21.00	10.00	4.00	
3	42.00	0.326	18.50	10.00	4.00	

4	56.00	0.327	21.00	10.00	4.00
5	75.00	0.326	19.00	10.00	4.00
6	100.00	0.325	19.00	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: 03/12/13 1530
DATE AND TIME TEST TERMINATED: 03/19/13 1530
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 32%, 42%, 56%, 75% and 100% 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
32%	100	100	100	100	100	100	100	0.0
42%	100	100	100	100	100	100	100	0.0
56%	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 7 days significantly different (p=0.5) 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 %): 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 (50 %): 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.) b.) NOEL growth = 100% effluent

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL
(Pimephales promelas)

Permittee: Cabot, City of NPDES NO. AR0021661

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	.308	.345	.323	.314	.323	**5.0**
32	.326	.309	.329	.349	.328	5.0
42	.335	.320	.308	.341	.326	4.6
56	.328	.331	.329	.318	.327	1.8
75	.340	.306	.334	.325	.326	4.5
100	.323	.337	.331	.308	.325	3.9

*Coefficient of variation = standard deviation X 100/mean

(Coef Of Var Statre 7day Chronic Pimephales TQP6C = **5.0**)

TEST METHOD
1002.0

TEST METHOD USED: 1002.0
END POINT(S) OF TEST: NOEL 100 %
DEVIATIONS FROM REFERENCE METHOD: None

DATE AND TIME TEST STARTED: 03/12/13 1530
DATE AND TIME TEST TERMINATED: 03/20/13 1530
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 32%, 42%, 56%, 75%, and 100% 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%	32 %	42%	56%	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%): 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 (50%): 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: Cabot, City of NPDES NO. AR0021661
Dilution water used: Receiving ( ) Reconstituted (X)

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

PERCENT EFFLUENT (%)

REP	0%	32%	42%	56%	75%	100%
A	15	19	18	17	17	18
B	18	14	22	22	0	19
C	21	17	14	15	17	21
D	18	18	19	17	22	18
E	18	20	18	21	22	16
F	18	19	20	19	19	20
G	21	23	19	20	17	17
H	17	19	23	18	19	15
I	18	17	22	18	20	19
J	18	20	19	20	20	18
*CV%	9.62	12.7	13.4	**11.3**	36.8	9.90
MEAN	18.20	18.60	19.4	18.70	17.30	18.10

*coefficient of variation = standard deviation x 100/mean

(Coef Of Var Statre 7Day Chronic Ceriodaphnia TQP3B = **11.3**)

STANDARD REFERENCE TOXICANTS

STANDARD TOXICANT USED AND SOURCE: SODIUM CHLORIDE
DATE AND TIME OF MOST RECENT TEST: 03/12/13 1530
DILUTION WATER USED IN TEST: 20% DMW
RESULTS(LC50 OR, NOEC AND/OR ECL): LC50 = 1720.2 FATHEAD MINNOW
RESULTS(LC50 OR, NOEC AND/OR ECL): LC50 = 734.9 CERIODAPHNIA
ACCEPTABLE PERFORMANCE, STUDY 29 = 100% recovery
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 **98.9%**

CERIODAPHNIA

Standard Recovery CERODAPHNIA **97.7%**

APPENDIX 1A
TEST 1000.0

Permittee	Stuttgart 15746							
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
32.00%	100	100	100	100	100	100	100	0.0
42.00%	100	100	100	100	100	100	100	0.0
56.00%	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	Stuttgart 15746					
Effluent	Average Dry Weight (mg)				Mean Dry Weight (mg)	
Conc.	A	B	C	D	7 days	CV%*
CONTROL	0.308	0.345	0.323	0.314	0.3225	5.0
32	0.326	0.309	0.329	0.349	0.32825	5.0
42	0.335	0.320	0.308	0.341	0.326	4.6
56	0.328	0.331	0.329	0.318	0.3265	1.8
75	0.340	0.306	0.334	0.325	0.32625	4.5
100	0.323	0.337	0.331	0.308	0.32475	3.9

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

Discharger: ~~Shotgun~~ 15746 Test Dates: 3-12-13 153.0
Location: _____ Analyst: _____

Conc:	Rep. No.	No. Survivors Day 1	2	3	4	5	6	7	Remarks
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	
32	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	
	11	10	10	10	10	10	10	10	
42	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	
	15	10	10	10	10	10	10	10	
56	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	
	19	10	10	10	10	10	10	10	
75	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	
	23	10	10	10	10	10	10	10	
100	24	10	10	10	10	10	10	10	

Comments:

FIGURE 2 - FATHEAD MINNOW

Discharge: Stuart Test Date(s): 3-12-13 Drying Temperature (°C): _____
Location: 15746 Weighing Date: _____ Drying Time (h): _____
Analyst: _____

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	129255	129563	3.08	10	.308	
	2	129371	129716	3.45	10	.345	
	3	128386	128709	3.23	10	.323	
	4	128334	128648	3.14	10	.314	
Conc:	5	129108	129434	3.26	10	.326	
	6	129257	129566	3.09	10	.309	
	7	127886	128215	3.29	10	.329	
32	8	128350	128699	3.49	10	.349	
Conc:	9	128891	129226	3.35	10	.335	
	10	129102	129422	3.20	10	.320	
	11	129375	129683	3.08	10	.308	
42	12	128333	128674	3.41	10	.341	
Conc:	13	128096	128424	3.28	10	.328	
	14	129113	129444	3.31	10	.331	
	15	128455	128784	3.29	10	.329	
56	16	128270	128588	3.18	10	.318	
Conc:	17	128496	128836	3.40	10	.340	
	18	129192	129498	3.06	10	.306	
	19	128996	129330	3.34	10	.334	
75	20	128430	128755	3.25	10	.325	
Conc:	21	129004	129327	3.23	10	.323	
	22	128605	128942	3.37	10	.337	
	23	128329	128660	3.31	10	.331	
100	24	128507	128815	3.08	10	.308	

[1]Adapted from Hughes, et al., 1987.

Control 128750 128751

FIGURE 3 - FATHEAD MINNOW
page 19

APPENDIX 2A
TEST 1002.0

	Stuttgart 15746	CERIO	REPLICATE CONTAINERS					s.d.=	1.75119		CV% =	9.6219235	
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	3	2	4	3	1	3	5	1	2 27	10	2.70
temp:	5			2			1			3	1 7	10	0.70
temp:	6	3	7	7	6	7	7	5	5	7	6 60	10	6.00
temp:	7	3			1			3	1		1 9	10	0.90
temp:	8	6	7	10	7	8	8	9	6	7	8 76	10	7.60
	TOTAL	15	18	21	18	18	18	21	17	18	18 182	10	18.20
conc			REPLICATE CONTAINERS					s.d.=	2.36643		CV% =	12.722752	
32.00	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	3	2	3	3	4	2	1	3	3	2 26	10	2.60
temp:	5		2				3	2			1 8	10	0.80
temp:	6	7	1	7	7	6	5	5	6	7	3 54	10	5.40
temp:	7					1		3			5 9	10	0.90
temp:	8	9	9	7	7	8	9	11	10	7	8 85	10	8.50
	TOTAL	19	14	17	18	20	19	23	19	17	20 186	10	18.60
CONC.			REPLICATE CONTAINERS					s.d.=	2.59058		CV% =	13.353511	
42.00	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		2			1				2	5	10	0.50
temp:	4	4	2	2	3	3	4	2	4	1	3 28	10	2.80
temp:	5				1			2		3	6	10	0.60
temp:	6	5	5	5	6	6	7	5	8	7	6 60	10	6.00
temp:	7		6		1			2			2 11	10	1.10
temp:	8	9	7	7	8	8	9	8	11	9	8 84	10	8.40
	TOTAL	18	22	14	19	18	20	19	23	22	19 194	10	19.40
CONC.			REPLICATE CONTAINERS					s.d.=	2.11082		CV% =	11.2878	
56.00	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					3	10	0.30
temp:	4	2	4	3	3	4	1	2	5	3	3 30	10	3.00
temp:	5						3	4			1 8	10	0.80
temp:	6	7	6	6	7	7	7	6	5	7	7 65	10	6.50
temp:	7		4				1		3		1 9	10	0.90
temp:	8	7	8	6	6	9	7	8	5	8	8 72	10	7.20
	TOTAL	17	22	15	17	21	19	20	18	18	20 187	10	18.70
CONC.			REPLICATE CONTAINERS					s.d.=	6.36047		CV% =	36.765712	
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	2	2			1	2	8	10	0.80
temp:	4	3		2	2	3	1	3	2	4	3 23	10	2.30
temp:	5	X					3				1 4	10	0.40
temp:	6	7		6	6	7	5	7	7	6	7 58	10	5.80
temp:	7			2	5		3				1 11	10	1.10
temp:	8	7		6	7	10	7	7	9	8	8 69	10	6.90
	TOTAL	17	0	17	22	22	19	17	19	20	20 173	10	17.30
CONC.			REPLICATE CONTAINERS					s.d.=	1.79196		CV% =	9.9003168	
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	1			1				3	10	0.30
temp:	4	4	3	3	2	2	2	4	3	1	3 27	10	2.70
temp:	5		1			1	3			2	1 8	10	0.80
temp:	6	8	7	8	6	6	5	7	6	7	6 66	10	6.60
temp:	7				2		4				1 7	10	0.70
temp:	8	6	7	9	8	7	5	6	6	9	7 70	10	7.00
*	TOTAL	18	19	21	18	16	20	17	15	19	18 181	10	18.10

Stuttgart 15746 Cerio 3-12-13 1530

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

CONC.				REPLICATE CONTAINERS					s.d.=	0		CV% =	#DIV/0!	
32	DAY	1	2	3	4	5	6	7	8	9	10	no. youn	no. adults	young/adu
temp:	1											0	10	#DIV/0!
temp:	2											0	10	#DIV/0!
temp:	3				1	1		1			1	0	10	#DIV/0!
temp:	4	3	2	3	3	4	2	1	3	3	2	0	10	#DIV/0!
temp:	5		2				3	2			1	0	10	#DIV/0!
temp:	6	7	7	7	7	6	5	5	6	7	3	0	10	#DIV/0!
temp:	7				1			3			5	0	10	#DIV/0!
temp:	8	9	9	7	7	8	9	11	10	7	8	0		#DIV/0!
*	TOTAL	0	0	0	0	0	0	0	0	0	0	0	10	0

CONC.				REPLICATE CONTAINERS					s.d.=	0		CV% =	#DIV/0!	
42	DAY	1	2	3	4	5	6	7	8	9	10	no. youn	no. adults	young/adu
temp:	1											0	10	#DIV/0
temp:	2											0	10	#DIV/0
temp:	3		2			1				2		0	10	#DIV/0
temp:	4	4	2	2	3	3	4	2	4	1	3	0	10	#DIV/0
temp:	5				1			2		3		0	10	#DIV/0
temp:	6	5	5	5	6	6	7	5	8	7	6	0	10	#DIV/0
temp:	7		6		1			2			2	0	10	#DIV/0
temp:	8	9	7	7	8	8	9	8	11	9	8	0	10	#DIV/0
*	TOTAL	0	0	0	0	0	0	0	0	0	0	0	10	0

CONC.				REPLICATE CONTAINERS					s.d.=	0		CV% =	#DIV/0!	
56	DAY	1	2	3	4	5	6	7	8	9	10	no. youn	no. adults	young/ad
temp:	1											0	10	#DIV/0
temp:	2											0	10	#DIV/0
temp:	3	1			1	1						0	10	#DIV/0
temp:	4	2	4	3	3	4	1	2	5	3	3	0	10	#DIV/0
temp:	5						3	4			1	0	10	#DIV/0
temp:	6	7	6	6	7	7	7	6	5	7	7	0	10	#DIV/0
temp:	7		4				1		3		1	0	10	#DIV/0
temp:	8	7	8	6	6	9	7	8	5	8	8	0	10	#DIV/0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	10	

CONC.				REPLICATE CONTAINERS					s.d.=	0		CV% =	#DIV/0!	
75	DAY	1	2	3	4	5	6	7	8	9	10	no. youn	no. adults	young/a
temp:	1											0	10	#DIV/
temp:	2											0	10	#DIV/
temp:	3			1	2	2			1	2		0	10	#DIV/
temp:	4	3		2	2	3	1	3	2	4	3	0	10	#DIV/
temp:	5		X				3				1	0	10	#DIV/
temp:	6	4		6	6	7	5	7	7	6	7	0	10	#DIV/
temp:	7			2	5		3				1	0	10	#DIV/
temp:	8	7		6	7	10	9	7	9	8	8	0	10	#DIV/
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	10	

CONC.				REPLICATE CONTAINERS					s.d.=	0		CV% =	#DIV/0!	
100	DAY	1	2	3	4	5	6	7	8	9	10	no. youn	no. adults	young/a
temp:	1											0	10	#DIV/
temp:	2											0	10	#DIV/
temp:	3		1	1			1					0	10	#DIV/
temp:	4	4	3	3	2	2	2	4	3	1	3	0	10	#DIV/
temp:	5		1			1	3			2	1	0	10	#DIV/
temp:	6	8	7	8	6	6	5	7	6	7	6	0	10	#DIV/
temp:	7				2		4				1	0	10	#DIV/
temp:	8	10	7	9	8	7	←	6	6	9	7	0	10	#DIV/

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: 3/11/2013

SPECIES: *Pimephales promelas*

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 3/11/2013

BEGAN FEEDING: N/A

FOOD: N/A

Water Chemistry Record:	Current	Range
TEMPERATURE:	23°C	--
SALINITY/CONDUCTIVITY:	--	--
TOTAL HARDNESS (as $CaCO_3$):	122 mg/l	--
TOTAL ALKALINITY (as $CaCO_3$):	95 mg/l	--
pH:	8.02	--

Comments:

Facility Supervisor

fred
3-12-13

APPENDIX C
CHAINS OF CUSTODY

TURNAROUND TIME
RUSH 24 HR. 48 HR.
5 DAY REG.
OTHER _____

FOR LAB/OFFICE USE ONLY

LAB # 15246.0001B
CLIENT # 37021
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
W = AZIDE MODIFICATION (4500-O C)
F = MEMBRANE ELECTRODE (4500-O G)
NaOH = pH > 12

NAME OF COMPANY, CITY, OR PROJECT: Stuttgart (BIO-MON)

PROJECT NO:

SAMPLER(S) SIGNATURE

SAMPLE NO.	SAMPLE COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP/ GRAB	FIELD ANALYSIS PH	TEMP	FLOW	CL2	D.O. (W) D.O. (F)	CONTAINER TYPE PRESERVATIVE	ANALYSIS REQUIRED
	EFFLUENT OUTFALL 001			C						¼ GALLON (P)	CBOD, TSS
				C						500ML S(2 (P)	AMMONIA NITROGEN
				G						120ML (T) (P)	FECAL COLIFORM, DO
				G						ON SITE	PH, TEMP, FLOW Cl2
	BIO-MON	1200 3/10/13	1200 3/11/13	C							
										6½ Gallon	BIO-MON
										ALL CONTAINERS COOLED TO 04	

METHOD OF SHIPMENT (CIRCLE)
FED-EX WALK-IN (SRA) UPS OTHER

TYPE OF SAMPLE(S): (CIRCLE)
WATER SOIL (MW) SLUDGE OTHER

FIELD CALIBRATION RECORD

PH 7			
PH 4			
PH 10			
D.O.			

NOTES/COMMENTS/OBSERVATIONS

Temp @ Lab 7°

FIELD ANALYSIS CONDUCTED BY: (SRA) CLIENT

RELINQUISHED BY: _____ DATE/TIME _____ RECEIVED BY: _____ DATE/TIME 3/11/13 1230

RELINQUISHED BY: _____ DATE/TIME _____ RECEIVED BY: (LAB) _____ DATE/TIME 3/11/13 1630

TURNAROUND TIME
RUSH 24 HR. · 48 HR.
5 DAY REG.
OTHER _____

FOR LAB/OFFICE USE ONLY

LAB # 15746.0002B
CLIENT # 37021
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
W = AZIDE MODIFICATION (4500-O C)
P = MEMBRANE ELECTRODE (4500-O G)
NaOH = pH > 12

NAME OF COMPANY, CITY, OR PROJECT: Stuttgart (BIO-MON)

PROJECT NO:

SAMPLER(S) SIGNATURE: R. Ellwood

SAMPLE NO.	SAMPLE COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP/GRAB	FIELD ANALYSIS PH	TEMP °C	FLOW	CL2	D.O. (W) D.O. (P)	CONTAINER TYPE / PRESERVATIVE	ANALYSIS REQUIRED
	EFFLUENT OUTFALL 001			C						½ GALLON (P)	CBOD, TSS
				C						500ML S<2 (P)	AMMONIA NITROGEN
				G						120ML (T) (P)	FECAL COLIFORM, DO
				G						ON SITE	PH, TEMP, FLOW Cl2
	BIO-MON	3-12-13 1020	3-13-13 1020	C						6½ GALLON	BIO-MON
										ALL CONTAINERS COOLED TO C4	

METHOD OF SHIPMENT (CIRCLE)
FED-EX WALK-IN (SRA) UPS OTHER

TYPE OF SAMPLE(S): (CIRCLE)
WATER SOIL (AIW) SLUDGE OTHER

FIELD CALIBRATION RECORD
PH 7
PH 4
PH 10
D.O.

NOTES/COMMENTS/OBSERVATIONS

FIELD ANALYSIS CONDUCTED BY: (SRA) CLIENT

RELINQUISHED BY: _____ DATE/TIME _____
RECEIVED BY: R. Ellwood DATE/TIME 1033 3-13-13

RELINQUISHED BY: _____ DATE/TIME _____
RECEIVED BY: (LAB) R. Ellwood DATE/TIME 1220 3-13-13

Temp when Received @ LAB 8°C

TURNAROUND TIME
RUSH 24 HR. · 48 HR.
5 DAY REG.
OTHER _____

FOR LAB/OFFICE USE ONLY

LAB # 15746-0003B

CLIENT # 37021

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
W = AZIDE MODIFICATION (4500-O C)
P = MEMBRANE ELECTRODE (4500-O G)
NaOH = pH > 12

NAME OF COMPANY, CITY, OR PROJECT: Stuttgart (BIO)

PROJECT NO:

SAMPLER(S) SIGNATURE

SAMPLE NO.	SAMPLE COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP/ GRAB	FIELD ANALYSIS PH	TEMP	FLOW	CL2	D.O. (W) D.O. (P)	CONTAINER TYPE PRESERVATIVE	ANALYSIS REQUIRED
	EFFLUENT OUTFALL 001			C						½ GALLON (P)	CBOD, TSS
				C						500ML S(2 (P)	AMMONIA NITROGEN
				G						120ML (T) (P)	FECAL COLIFORM, D
				G						ON SITE	PH, TEMP, FLOW Cl
	BIO-MON	1100 3-14-13	1100 3-15-13	C						6½ Gallon	BIO-MON
										ALL CONTAINERS COOLED TO 04	

METHOD OF SHIPMENT (CIRCLE)
FED-EX WALK-IN (SRA) UPS OTHER

TYPE OF SAMPLE(S): (CIRCLE)
WATER SOIL (MW) SLUDGE OTHER

FIELD CALIBRATION RECORD

PH 7				
PH 4				
PH 10				
D.O.				

NOTES/COMMENTS/OBSERVATIONS

Temp Cal 4.3, 6.9

FIELD ANALYSIS CONDUCTED BY: (SRA) CLIENT

RELINQUISHED BY: _____ DATE/TIME _____

RECEIVED BY: _____ DATE/TIME 1135 3-15-13

RELINQUISHED BY: _____ DATE/TIME _____

RECEIVED BY: (LAB) _____ DATE/TIME 1545 3-15-13

APPENDIX D
LABORATORY CONTROL
CERIO CULTURE RECORD

DATE START	3/4/2013	Stuttgart 15746											
DATE END		*											
ANALYST		*											
WATER TYPE		*		day 8		day 14							
% SURVIVAL		*		100		100							
#YOUNG MEAN				18.7									
stnd DEV from mean		3.2943		14.011									

	REPLICATE NUMBER										No.	No.	Young/
DAY	1	2	3	4	5	6	7	8	9	10	Young	Adults	Adult
1											0	10	0
2											0	10	0
3					1					2	3	10	0.3
4	3	4	2	2	4	3	2	2	4	1	27	10	2.7
5	1						2			1	4	10	0.4
6	6	7	7	5	5		3	5	6	6	50	10	5
7	2				1		5	3		1	12	10	1.2
8	8	10	7	9	9	9	8	7	10	9	86	10	8.6
total8	20	21	16	16	20	12	20	17	20	20	182	10	18.2
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	10	0

	REPLICATE NUMBER										No.	No.	Young/
DAY	11	12	13	14	15	16	17	18	19	20	Young	Adults	Adult
1											0	10	0
2											0	10	0
3	1										1	10	0.1
4	3	3	4	2	1	1		3	4	4	25	10	0
5		1		3	2	4	3		1		14	10	1.4
6	5	7	7	6	4	7	7	6	5	7	61	10	6.1
7	2		1		4		1		3		11	10	1.1
8	8	1	13	12	10	9	8	7	3	9	80	10	8
total8	19	12	25	23	21	21	19	16	16	20	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

5-4-13

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					2	0	10	######
4	3	4	2	2	4	3	2	2	4	1	0	10	######
5	1						2			1	0	10	######
6	6	7	7	5	5		3	5	6	6	0	10	######
7	2				1		5	3		1	0	10	######
8	8	10	7	9	9	9	8	7	10	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		######

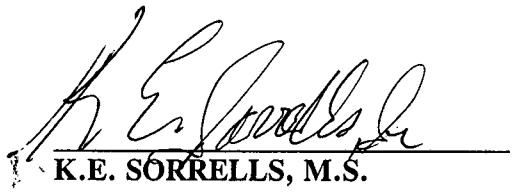
	REPLICATE NUMBER										No.	No.	Young/
DAY	11	12	13	14	15	16	17	18	19	20	Young	Adults	Adult
1											0		######
2											0		######
3	1										0	10	######
4	3	3	4	2	1	1		3	4	4	0	10	######
5		1		3	2	4	3		1		0	10	######
6	5	7	7	6	4	7	7	6	5	7	0	10	######
7	2		1		4		1		3		0	10	######
8	8	11	13	12	10	9	8	7	3	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

REVIEW

CECIL A. SORRELLS
BIOMONITORING MANAGER/PRESIDENT



K.E. SORRELLS, M.S.
QUALITY ASSURANCE/OFFICER

CITY OF STUTTGART
PERMIT NO: AR0034380
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 3, 2013

Laboratory Number:16346.0001,0002,0003

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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 Cabot 24 hour composite samples of plant effluent for dates 09/08-09/13, 09/10-11/13, 09/12-13/13.

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

These samples were logged in as #16346.0001,0002 and 0003. Chain of custody included in report.

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

Testing was initiated 09/10/13 at 1400 hours and continued through 09/18/13 at 1400 hours.

The results of these tests are as follows:

TEST 1000.0 FATHEAD MINNOW

SURVIVAL - NOEL 100% Effluent

GROWTH - NOEL 100% Effluent

TEST 1002.0 CERIODAPHNIA DUBIA

SURVIVAL - NOEL 100% Effluent

REPRODUCTION - NOEL 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.	.318	PASS
1002	Ceriodaphnia dubia	Control repro. 15 or> neonates per surviving female.	18.4	PASS
1000	Pimephales promelas	Control CV 40 % or <	**3.6**	PASS
1002	Ceriodaphnia Dubia	Control CV 40 % or <	**7.34**	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: AR0021661
PERMIT REQUIREMENTS: MONTHLY
PLANT LOCATION:
RECEIVING WATER BODY:

CLIENT: Stuttgart, City of
ADDRESS: P.O. Box 130
Stuttgart, AR 72160

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: 09/08-09/13 0900-0900 | 09/10-11/13 0600-0600 | 09/12-13/13 1100-1100

SAMPLING COLLECTION METHOD: COMPOSITE

PHYSICAL AND CHEMICAL DATA:

CONTROL	DATE **09/10/13**	DATE **09/12/13**	DATE **09/14/13**
DO (mg/l)	8.54	8.63	8.50
pH (S.U.)	7.14	7.23	7.15
Conductivity (umhos)	261	294	299
Alkalinity (mg/l)	54	66	60
Hardness (mg/l)	100	100	100
Res. Chlorine (mg/l)	0	0	0

56%	DATE **09/10/13**	DATE **09/12/13**	DATE **09/14/13**
DO (mg/l)	8.40	8.40	8.44
pH (S.U.)	7.30	7.36	7.31
Conductivity (umhos)	758	766	704
Alkalinity (mg/l)	158	170	154
Hardness (mg/l)	162	168	156

(Cont.)

PHYSICAL AND CHEMICAL DATA: **100 % EFFLUENT**	D14E **09/10/13**	DATE **09/12/13**	DATE **09/14/13**
DO (mg/l)	8.32	8.08	8.26
pH (S.U.)	7.48	7.48	7.42
Conductivity (umhos)	1172	1161	1135
Alkalinity (mg/l)	230	247	236
Hardness (mg/l)	264	262	192
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/1 CaCO3
D.O. Dissolved Oxygen mg/1
Temperature degrees centigrade
pH s
tandard units
Conductivity = us/cm
Chlorine Residual = mg/1

B57 0222

Chemical Data For Daily Biomonitoring

Permitee Stuttgart Date 9-10-13 1400

Analyst AS/ED Lab no. 16346.

Dilution Control

Day	1	2	3	4	5	6	7	notes
Temp	25.0	25.0	25.0	25.0	25.0	25.0		
pH	7.14	7.16	7.23	7.19	7.15	7.17		
D.O.	8.54	8.50	8.63	8.58	8.50	8.46		
Alk	54		66		60			
Hard.	100		100		100			
Cond.	261		294		299			

Dilution 56

Day	1	2	3	4	5	6	7	notes
Temp	25.0	25.0	25.0	25.0	25.0	25.0		
pH	7.30	7.33	7.36	7.29	7.31	7.25		
D.O.	8.40	8.35	8.40	8.36	8.44	8.40		
Alk	158		170		154			
Hard.	162		168		156			
Cond.	758		766		704			

Dilution 100

Day	1	2	3	4	5	6	7	notes
Temp	25.0	25.0	25.0	25.0	25.0	25.0		
pH	7.48	7.52	7.48	7.45	7.42	7.38		
D.O.	8.32	8.11	8.08	8.10	8.26	8.15		
Alk	230		247		236			
Hard.	264		262		192			
Cond.	1172		1161		1135			

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: STUTTGART 16346 CERIO REPS
FILE: 16346SCR
TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	19.0000	19.0000
1	CONTROL	2	21.0000	21.0000
1	CONTROL	3	17.0000	17.0000
1	CONTROL	4	20.0000	20.0000
1	CONTROL	5	18.0000	18.0000
1	CONTROL	6	18.0000	18.0000
1	CONTROL	7	17.0000	17.0000
1	CONTROL	8	18.0000	18.0000
1	CONTROL	9	19.0000	19.0000
1	CONTROL	10	17.0000	17.0000
2	32.00	1	17.0000	17.0000
2	32.00	2	20.0000	20.0000
2	32.00	3	19.0000	19.0000
2	32.00	4	18.0000	18.0000
2	32.00	5	21.0000	21.0000
2	32.00	6	20.0000	20.0000
2	32.00	7	15.0000	15.0000
2	32.00	8	17.0000	17.0000
2	32.00	9	16.0000	16.0000
2	32.00	10	16.0000	16.0000
3	42.00	1	18.0000	18.0000
3	42.00	2	20.0000	20.0000
3	42.00	3	15.0000	15.0000
3	42.00	4	19.0000	19.0000
3	42.00	5	15.0000	15.0000
3	42.00	6	17.0000	17.0000
3	42.00	7	15.0000	15.0000
3	42.00	8	19.0000	19.0000
3	42.00	9	17.0000	17.0000
3	42.00	10	19.0000	19.0000
4	56.00	1	18.0000	18.0000
4	56.00	2	17.0000	17.0000
4	56.00	3	20.0000	20.0000
4	56.00	4	21.0000	21.0000
4	56.00	5	20.0000	20.0000
4	56.00	6	17.0000	17.0000
4	56.00	7	18.0000	18.0000
4	56.00	8	20.0000	20.0000
4	56.00	9	17.0000	17.0000
4	56.00	10	17.0000	17.0000
5	75.00	1	17.0000	17.0000
5	75.00	2	17.0000	17.0000
5	75.00	3	19.0000	19.0000
5	75.00	4	20.0000	20.0000
5	75.00	5	17.0000	17.0000
5	75.00	6	21.0000	21.0000
5	75.00	7	16.0000	16.0000
5	75.00	8	14.0000	14.0000
5	75.00	9	20.0000	20.0000
5	75.00	10	19.0000	19.0000

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

STUTTGART 16346 CERIO REPS
File: 16346SCR 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	18.400
2	32.00	10	15.000	21.000	17.900
3	42.00	10	15.000	20.000	17.400
4	56.00	10	17.000	21.000	18.500
5	75.00	10	14.000	21.000	18.000
6	100.00	10	17.000	21.000	19.000

STUTTGART 16346 CERIO REPS
File: 16346SCR Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	CONTROL	1.822	1.350	0.427
2	32.00	4.100	2.025	0.640
3	42.00	3.600	1.897	0.600
4	56.00	2.500	1.581	0.500
5	75.00	4.667	2.160	0.683
6	100.00	1.333	1.155	0.365

STUTTGART 16346 CERIO REPS
File: 16346SCR Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	15.400	3.080	1.025
Within (Error)	54	162.200	3.004	

Total	59	177.600

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

STUTTGART 16346 CERIO REPS
File: 16346SCR 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	18.400	18.400		
2	32.00	17.900	17.900	0.645	
3	42.00	17.400	17.400	1.290	
4	56.00	18.500	18.500	-0.129	
5	75.00	18.000	18.000	0.516	
6	100.00	19.000	19.000	-0.774	

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

STUTTGART 16346 CERIO REPS
File: 16346SCR 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	32.00	10	1.790	9.7	0.500
3	42.00	10	1.790	9.7	1.000
4	56.00	10	1.790	9.7	-0.100
5	75.00	10	1.790	9.7	0.400
6	100.00	10	1.790	9.7	-0.600

STUTTGART 16346 CERIO REPS
File: 16346SCR Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	CONTROL	10	18.400	18.400	17.900
2	32.00	10	17.900	17.900	17.900
3	42.00	10	17.400	17.400	17.900
4	56.00	10	18.500	18.500	18.250
5	75.00	10	18.000	18.000	18.250
6	100.00	10	19.000	19.000	19.000

STUTTGART 16346 CERIO REPS
File: 16346SCR 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	17.900				
32.00	17.900	0.645		1.68	k= 1, v=54
42.00	17.900	0.645		1.76	k= 2, v=54
56.00	18.250	0.194		1.79	k= 3, v=54
75.00	18.250	0.194		1.80	k= 4, v=54
100.00	19.000	0.774		1.80	k= 5, v=54

s = 1.733
Note: df used for table values are approximate when v > 20.

STUTTGART 16346 CERIO REPS
File: 16346SCR Transform: NO TRANSFORM

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	18.400				
2	32.00	17.900	96.00	75.00	10.00	
3	42.00	17.400	92.00	75.00	10.00	
4	56.00	18.500	105.00	75.00	10.00	
5	75.00	18.000	100.00	75.00	10.00	
6	100.00	19.000	120.00	75.00	10.00	

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

TITLE: STUTTGART 16346 MINNOW WEIGHTS
FILE: 16346SMW
TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.3200	0.3200
1	CONTROL	2	0.3130	0.3130
1	CONTROL	3	0.3110	0.3110
1	CONTROL	4	0.3230	0.3230
2	32.00	1	0.3270	0.3270
2	32.00	2	0.3000	0.3000
2	32.00	3	0.3250	0.3250
2	32.00	4	0.3170	0.3170
3	42.00	1	0.3350	0.3350
3	42.00	2	0.3100	0.3100
3	42.00	3	0.3190	0.3190
3	42.00	4	0.2890	0.2890
4	56.00	1	0.3040	0.3040
4	56.00	2	0.3320	0.3320
4	56.00	3	0.3180	0.3180
4	56.00	4	0.3260	0.3260
5	75.00	1	0.3120	0.3120
5	75.00	2	0.3250	0.3250
5	75.00	3	0.3020	0.3020
5	75.00	4	0.3240	0.3240
6	100.00	1	0.3070	0.3070
6	100.00	2	0.3310	0.3310
6	100.00	3	0.3260	0.3260
6	100.00	4	0.3110	0.3110

STUTTGART 16346 MINNOW WEIGHTS
File: 16346SMW Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	4	0.311	0.323	0.317
2	32.00	4	0.300	0.327	0.317
3	42.00	4	0.289	0.335	0.313
4	56.00	4	0.304	0.332	0.320
5	75.00	4	0.302	0.325	0.316
6	100.00	4	0.307	0.331	0.319

STUTTGART 16346 MINNOW WEIGHTS
File: 16346SMW 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	32.00	0.000	0.012	0.006
3	42.00	0.000	0.019	0.010
4	56.00	0.000	0.012	0.006
5	75.00	0.000	0.011	0.005
6	100.00	0.000	0.012	0.006

STUTTGART 16346 MINNOW WEIGHTS
File: 16346SMW Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.000	0.000	0.140
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

STUTTGART 16346 MINNOW WEIGHTS
File: 16346SMW 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	0.317	0.317		
2	32.00	0.317	0.317	-0.056	
3	42.00	0.313	0.313	0.393	
4	56.00	0.320	0.320	-0.365	
5	75.00	0.316	0.316	0.112	
6	100.00	0.319	0.319	-0.225	

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

STUTTGART 16346 MINNOW WEIGHTS
File: 16346SMW 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	32.00	4	0.021	6.8	-0.000
3	42.00	4	0.021	6.8	0.004
4	56.00	4	0.021	6.8	-0.003
5	75.00	4	0.021	6.8	0.001
6	100.00	4	0.021	6.8	-0.002

STUTTGART 16346 MINNOW WEIGHTS
File: 16346SMW Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	CONTROL	4	0.317	0.317	0.316
2	32.00	4	0.317	0.317	0.316
3	42.00	4	0.313	0.313	0.316
4	56.00	4	0.320	0.320	0.318
5	75.00	4	0.316	0.316	0.318
6	100.00	4	0.319	0.319	0.319

STUTTGART 16346 MINNOW WEIGHTS
File: 16346SMW 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	0.316				
32.00	0.316	0.112		1.73	k= 1, v=18
42.00	0.316	0.112		1.82	k= 2, v=18
56.00	0.318	0.126		1.85	k= 3, v=18
75.00	0.318	0.126		1.86	k= 4, v=18
100.00	0.319	0.224		1.87	k= 5, v=18

s = 0.013
Note: df used for table values are approximate when v > 20.

STUTTGART 16346 MINNOW WEIGHTS
File: 16346SMW Transform: NO TRANSFORM

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	0.317				
2	32.00	0.317	20.00	10.00	4.00	
3	42.00	0.313	16.00	10.00	4.00	

4	56.00	0.320	20.00	10.00	4.00
5	75.00	0.316	19.00	10.00	4.00
6	100.00	0.319	18.50	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: 09/10/13 1400
DATE AND TIME TEST TERMINATED: 09/17/13 1400
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 32%, 42%, 56%, 75% and 100% 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
32%	100	100	100	100	100	100	100	0.0
42%	100	100	100	100	100	100	100	0.0
56%	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 7 days significantly different (p=0.5) 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 %): 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 (50 %): 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.) b.) NOEL growth = 100% effluent

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL
(Pimephales promelas)

Permittee: Cabot, City of NPDES NO. AR0021661

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	.320	.313	.311	.323	.317	1.8
32	.327	.300	.325	.317	.317	3.9
42	.335	.310	.319	.289	.313	6.1
56	.304	.332	.318	.326	.320	3.8
75	.312	.325	.302	.324	.316	3.5
100	.307	.331	.326	.311	.319	3.6

*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 100 %
DEVIATIONS FROM REFERENCE METHOD: None

DATE AND TIME TEST STARTED: 09/10/13 1400
DATE AND TIME TEST TERMINATED: 09/18/13 1400
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 32%, 42%, 56%, 75%, and 100% 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%	32 %	42%	56%	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%): 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 (50%): 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: Cabot, City of NPDES NO. AR0021661
Dilution water used: Receiving ( ) Reconstituted (X)

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

PERCENT EFFLUENT (%)

REP	0%	32%	42%	56%	75%	100%
A	19	17	18	18	17	19
B	21	20	20	17	17	20
C	17	19	15	20	19	18
D	20	18	19	21	20	21
E	18	21	15	20	17	19
F	18	20	17	17	21	17
G	17	15	15	18	16	19
H	18	17	19	20	14	18
I	19	16	17	17	20	20
J	17	16	19	17	19	19
*CV%	**7.34**	11.3	10.9	8.55	12.0	6.08
MEAN	18.40	17.90	17.4	18.50	18.00	19.00

*coefficient of variation = standard deviation x 100/mean

(Coef Of Var Statre 7Day Chronic Ceriodaphnia TQP3B = **7.34**)

STANDARD REFERENCE TOXICANTS

STANDARD TOXICANT USED AND SOURCE: SODIUM CHLORIDE
DATE AND TIME OF MOST RECENT TEST: 03/12/13 1530
DILUTION WATER USED IN TEST: 20% DMW
RESULTS(LC50 OR, NOEC AND/OR ECL): LC50 = 1427 FATHEAD MINNOW
RESULTS(LC50 OR, NOEC AND/OR ECL): LC50 = 735 CERIODAPHNIA
ACCEPTABLE PERFORMANCE, STUDY 29 = 100% recovery
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 **87.6%**

CERIODAPHNIA

Standard Recovery CERODAPHNIA **100%**

APPENDIX 1A
TEST 1000.0

Permittee	Stuttgart 16346							
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
32.00%	100	100	100	100	100	100	100	0.0
42.00%	100	100	100	100	100	100	100	0.0
56.00%	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	Stuttgart 16346					
Effluent	Average Dry Weight (mg)				Mean Dry Weight (mg)	
Conc.	A	B	C	D	7 days	CV%*
CONTROL	0.320	0.313	0.311	0.323	0.31675	1.8
32	0.327	0.300	0.325	0.317	0.31725	3.9
42	0.335	0.310	0.319	0.289	0.31325	6.1
56	0.304	0.332	0.318	0.326	0.32	3.8
75	0.312	0.325	0.302	0.324	0.31575	3.5
100	0.307	0.331	0.326	0.311	0.31875	3.6

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

Discharger: Stuttgart
Location: 16346

Test Dates: 9-10-13 1400
Analyst: MAS/ED

Conc:	Rep. No.	No. Survivors Day 1	2	3	4	5	6	7	Remarks
Control	1	10	10	10	10	10	10		
	2	10	10	10	10	10	10		
	3	10	10	10	10	10	10		
	4	10	10	10	10	10	10		
Conc:	5	10	10	10	10	10	10		
	6	10	10	10	10	10	10		
32	7	10	10	10	10	10	10		
	8	10	10	10	10	10	10		
Conc:	9	10	10	10	10	10	10		
	10	10	10	10	10	10	10		
	11	10	10	10	10	10	10		
42	12	10	10	10	10	10	10		
Conc:	13	10	10	10	10	10	10		
	14	10	10	10	10	10	10		
	15	10	10	10	10	10	10		
56	16	10	10	10	10	10	10		
Conc:	17	10	10	10	10	10	10		
	18	10	10	10	10	10	10		
	19	10	10	10	10	10	10		
75	20	10	10	10	10	10	10		
Conc:	21	10	10	10	10	10	10		
	22	10	10	10	10	10	10		
	23	10	10	10	10	10	10		
100	24	10	10	10	10	10	10		

Comments:

Discharge: Stuttgart 16346 Test Date(s): 9-10-13 Drying Temperature (°C): 104
Location: Weighing Date: 9-22-13 Drying Time (h): 72
Analyst: BK / IED

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	124184	124504	320	10	.320	
	2	124829	125142	313	10	.313	
	3	129302	129613	311	10	.311	
	4	124434	124757	323	10	.323	
Conc:	5	125565	125892	327	10	.327	
	6	126530	126830	300	10	.300	
	7	127155	127480	325	10	.325	
32	8	123491	123808	317	10	.317	
Conc:	9	126403	126738	335	10	.335	
	10	128205	128515	310	10	.310	
	11	126162	126481	319	10	.319	
42	12	123105	123394	289	10	.289	
Conc:	13	122572	122876	304	10	.304	
	14	121341	121673	332	10	.332	
	15	123550	123868	318	10	.318	
56	16	126155	126481	326	10	.326	
Conc:	17	122910	123222	312	10	.312	
	18	121387	121712	325	10	.325	
	19	123205	123507	302	10	.302	
75	20	121005	121329	324	10	.324	
Conc:	21	124193	124500	307	10	.307	
	22	120280	120611	331	10	.331	
100	23	122409	122735	326	10	.326	
	24	122010	122321	311	10	.311	

[1]Adapted from Hughes, et al., 1987.

Control 123255 123256

FIGURE 3 - FATHEAD MINNOW
page 14

APPENDIX 2A
TEST 1002.0

	Stuttgart 16346		CERIO	REPLICATE CONTAINERS					s.d.=	1.3499		CV% =	7.3363974	
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	2	4	2	3	3	3	4	1	2	27	10	2.70
temp:	5		2		2		1			4		9	10	0.90
temp:	6	6	5	7	7	6	5	7	7	5	8	63	10	6.30
temp:	7	3	4			1	2		1	3		14	10	1.40
temp:	8	7	8	6	9	7	7	7	6	5	7	69	10	6.90
	TOTAL	19	21	17	20	18	18	17	18	19	17	184	10	18.40
conc				REPLICATE CONTAINERS					s.d.=	2.02485		CV% =	11.311987	
32.00	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	3	4	4	2	4	5	3	3	2	1	31	10	3.10
temp:	5				1							1	10	0.10
temp:	6	6	7	5	7	7	5	6	7	7	5	62	10	6.20
temp:	7			3			5			2	3	13	10	1.30
temp:	8	8	9	7	7	10	5	6	7	5	5	69	10	6.90
	TOTAL	17	20	19	18	21	20	15	17	16	16	179	10	17.90
CONC.				REPLICATE CONTAINERS					s.d.=	1.89737		CV% =	10.904406	
42.00	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											0	10	0.00
temp:	4	4	2	1	3	3	3	4	2	3	4	29	10	2.90
temp:	5		3									3	10	0.30
temp:	6	6	5	7	7	7	6	6	8	7	6	65	10	6.50
temp:	7		4		2			3			1	10	10	1.00
temp:	8	8	6	7	7	5	8	2	9	7	8	67	10	6.70
	TOTAL	18	20	15	19	15	17	15	19	17	19	174	10	17.40
CONC.				REPLICATE CONTAINERS					s.d.=	1.58114		CV% =	8.5466964	
56.00	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	3	2	4	1	3	3	2	4	4	5	31	10	3.10
temp:	5				3			1				4	10	0.40
temp:	6	6	6	7	5	7	7	4	7	6	5	60	10	6.00
temp:	7		1		3			4			2	10	10	1.00
temp:	8	8	7	9	8	10	7	6	9	7	5	76	10	7.60
	TOTAL	18	17	20	21	20	17	18	20	17	17	185	10	18.50
CONC.				REPLICATE CONTAINERS					s.d.=	2.16025		CV% =	12.001372	
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	2		1			4	10	0.40
temp:	4	1	3	3	3	4	1	2	3	5	1	26	10	2.60
temp:	5	1					5				2	8	10	0.80
temp:	6	7	6	7	7	6	5	7	7	6	7	65	10	6.50
temp:	7			1	1		3		2	2		9	10	0.90
temp:	8	8	8	8	9	6	5	7	1	7	9	68	10	6.80
	TOTAL	17	17	19	20	17	21	16	14	20	19	180	10	18.00
CONC.				REPLICATE CONTAINERS					s.d.=	1.1547		CV% =	6.0773713	
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		1		2				6	10	0.60
temp:	4	3	2	2	4	3	4	3	1	3	2	27	10	2.70
temp:	5		4		1				1		3	9	10	0.90
temp:	6	7	5	7	7	6	6	6	8	7	5	64	10	6.40
temp:	7		3			2	2			1	3	11	10	1.10
temp:	8	8	6	7	9	7	5	8	8	9	6	73	10	7.30
*	TOTAL	19	20	18	21	19	17	19	18	20	19	190	10	19.00

9-10-13 Stuttgart 16346 Ceriodaphnia 1400

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

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

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

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

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

CONC.				REPLICATE CONTAINERS					s.d.=	0		CV% =	#DIV/0!	
100	DAY	1	2	3	4	5	6	7	8	9	10	no. youn	no. adults	young/adult
temp:	1											0	10	#DIV/0!
temp:	2											0	10	#DIV/0!
temp:	3	1		2		1		2				0	10	#DIV/0!
temp:	4	3	2	2	4	3	4	3	1	3	2	0	10	#DIV/0!
temp:	5		4		1				1		3	0	10	#DIV/0!
temp:	6	7	5	7	7	6	6	6	8	7	5	0	10	#DIV/0!
temp:	7		3			2	2			1	3	0	10	#DIV/0!
temp:	8	8	6	7	9	7	5	8	8	9	6	0	10	#DIV/0!
*	TOTAL	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: 9/9/2013

SPECIES: *Pimephales promelas*

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 9/9/2013

BEGAN FEEDING: N/A

FOOD: N/A

Water Chemistry Record:	Current	Range
TEMPERATURE:	25°C	--
SALINITY/CONDUCTIVITY:	--	--
TOTAL HARDNESS (as $CaCO_3$):	122 mg/l	--
TOTAL ALKALINITY (as $CaCO_3$):	85 mg/l	--
pH:	7.65	--

Comments:

Facility Supervisor

Rec'd
9-10-13

APPENDIX C
CHAINS OF CUSTODY

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 # 16346-0001B
CLIENT # 37021
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 STUTTGART
PROJECT NO:
SAMPLER(S) NAME: (PRINT) 110913k2

SAMPLE NO:	SAMPLE ID AND/ OR COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP GRAB	FIELD ANALYSIS pH	TEMP	FLOW	CL2	D,O (W) D.O(P)	CONTAINER TYPE PRESERVATIVE	ANALYSIS REQUIRED
	EFFOUT FA11001	900 9-8-13	900 9-9-13	C						6 1/2 GALNS	BIO-MON

METHOD OF SHIPMENT (CIRCLE)
FED EX WALK IN (SRA) UPS OTHER

TYPE OF SAMPLE(S): (CIRCLE)
WATER SOIL (W/W) SLUDGE OTHER

FIELD CALIBRATION RECORD

pH 7			
pH 4			
pH 10			
D.O			

NOTES/COMMENTS/OBSERVATIONS
Temp @ Lab 9°

FIELD ANALYSIS CONDUCTED BY: (CIRCLE) (SRA) CLIENT

RELINQUISHED BY: _____ DATE/TIME: _____ RECEIVED BY: _____ DATE/TIME: 9-9-13 1430

RELINQUISHED BY: _____ DATE/TIME: _____ RECEIVED BY(LAB): _____ DATE/TIME: 9 10.45 13

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 # 16346 . 0002 ~~B001~~ S2
CLIENT # 37021
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

ME OF COMPANY, CITY, OR PROJECT: Stuttgart BIO
PROJECT NO:
SAMPLER(S) NAME: (PRINT)

MPLE NO:	SAMPLE ID AND/ OR COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP GRAB	FIELD ANALYSIS pH	TEMP	FLOW	CL2	D,O (W) D.O(P)	CONTAINER TYPE PRESERVATIVE	ANALYSIS REQUIRED
	Dexter 11	6:00 9-10-13	6:00 9-11-13	C		5°				6 1/2 gallon	BIO

METHOD OF SHIPMENT (CIRCLE)
FED EX WALK IN (SRA) UPS OTHER

TYPE OF SAMPLE(S): (CIRCLE)
WATER SOIL W/W SLUDGE OTHER

FIELD CALIBRATION RECORD

pH 7			
pH 4			
pH 10			
D.O			

NOTES/COMMENTS/OBSERVATIONS

FIELD ANALYSIS CONDUCTED BY: (CIRCLE) (SRA) CLIENT

RELINQUISHED BY: DATE/TIME: RECEIVED BY: DATE/TIME: 9-11-13 9:05

RELINQUISHED BY: DATE/TIME: RECEIVED BY(LAB): DATE/TIME: 9-13 10:2

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 # 16346-0003B
CLIENT # 37021
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: CITY OF STUTTGART
PROJECT NO:
SAMPLER(S) NAME: (PRINT)

SAMPLE NO:	SAMPLE ID AND/ OR COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP GRAB	FIELD ANALYSIS pH	TEMP	FLOW	CL2	D,O (W) D.O(P)	CONTAINER TYPE PRESERVATIVE	ANALYSIS REQUIRED
	EFF OUT FALL 001 (BIO-MON)	1100 9-12-13	1100 9-13-13	C						6 1/2 GALNS CY	BIO-MON

METHOD OF SHIPMENT (CIRCLE)
FED EX WALK IN (SRA) UPS OTHER

TYPE OF SAMPLE(S): (CIRCLE)
WATER SOIL (W/W) SLUDGE OTHER

FIELD CALIBRATION RECORD

pH 7			
pH 4			
pH 10			
D.O			

NOTES/COMMENTS/OBSERVATIONS
Temp @ LAB 8°

FIELD ANALYSIS CONDUCTED BY: (CIRCLE) (SRA) CLIENT

RELINQUISHED BY:
DATE/TIME:
RECEIVED BY:
DATE/TIME: 9-13-13 1130

RELINQUISHED BY:
DATE/TIME:
RECEIVED BY(LAB):
DATE/TIME: 9-13 1550

APPENDIX D
LABORATORY CONTROL
CERIO CULTURE RECORD

DATE START	9/2/13	STUTTGART 16346									
DATE END		*									
ANALYST		*									
WATER TYPE		*	day 8		day 14						
% SURVIVAL		*	100		100						
#YOUNG MEAN			18.35								
stnd DEV from mean		2.5397	13.896								

	REPLICATE NUMBER										No.	No.	Young/
DAY	1	2	3	4	5	6	7	8	9	10	Young	Adults	Adult
1											0	10	0
2											0	10	0
3		1									1	10	0.1
4	3	2	4	5	2	3	1	3	3	3	29	10	2.9
5		2			1		3	1			7	10	0.7
6	6	5	5	3	5	6	4	7	7	6	54	10	5.4
7		3		5			4		1	2	15	10	1.5
8	8	6	9	7	10	7	5	9	9	8	78	10	7.8
total8	17	19	18	20	18	16	17	20	20	19	184	10	18.4
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

	REPLICATE NUMBER										No.	No.	Young/
DAY	11	12	13	14	15	16	17	18	19	20	Young	Adults	Adult
1											0	10	0
2											0	10	0
3				1			1				2	10	0.2
4	4	4	4	2	1	3	2	4	2	2	28	10	0
5				2	2		1		3		8	10	0.8
6	6	7	5	5	6	8	7	6	6	7	63	10	6.3
7	3		4	1			1	2			11	10	1.1
8	3	10	6	7	1	9	9	8	10	8	71	10	7.1
total8	16	21	19	18	10	20	21	20	21	17	183	10	18.3
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

9-2-13 Daniel

DATE START		*											
DATE END		*											
ANALYST		*											
WATER TYPE		*		day 8		day 14							
% SURVIVAL		*		#VALUE!		#VALUE!							
#YOUNG MEAN				0									
stnd DEV from mean		0		#DIV/0!									

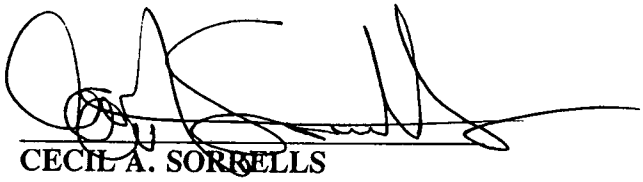
	REPLICATE NUMBER										No.	No.	Young/
DAY	1	2	3	4	5	6	7	8	9	10	Young	Adults	Adult
1											0		######
2											0		######
3		1									0		######
4	3	2	4	5	2	3	1	3	3	3	0	10	######
5		2			1		3	1			0	10	######
6	6	5	5	3	5	6	4	7	7	6	0	10	######
7		3		5			4		1	2	0	10	######
8	8	6	9	7	10	7	5	9	9	8	0	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			1				0		######
4	4	4	4	2	1	3	2	4	2	2	0	10	######
5				2	2		1		3		0	10	######
6	6	7	5	5	6	8	7	6	6	7	0	10	######
7	3		4	1			1	2			0	10	######
8	3	10	6	7	11	9	9	8	10	8	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

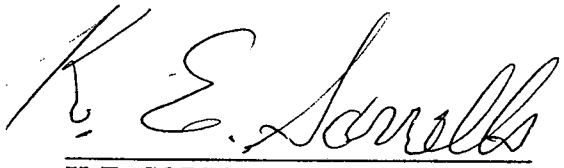
FIGURE 5

BIOMONITORING ANALYSIS
BY
SORRELLS RESEARCH ASSOCIATES, INC

REVIEW



CECIL A. SORRELLS
BIOMONITORING MANAGER/PRESIDENT



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