

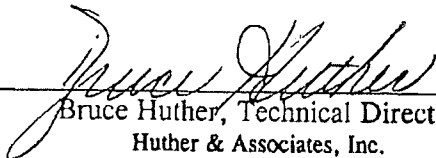
**CITY OF MENA WWTF
OUTFALL 001**

Chronic Biomonitoring Report
Permit Number NPDES AR0036692
AFIN Number 57-00042

Ceriodaphnia dubia
Pimephales promelas

October 16, 2012

Reviewed by:



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TOXICITY TEST REPORT - CHRONIC

ClientCity of Mena WWTF Laboratory I.D.20239
Permit No. NPDES AR0036692 Begin Date October 16, 2012
Sample Outfall 001

Results: Pass Ceriodaphnia dubia survival and reproduction and Pimephales promelas survival and growth at the critical low flow concentration (100% effluent).

SAMPLE COLLECTION

Composite effluent samples from City of Mena WWTF were delivered by United Parcel Service courier to Huthur & Associates on October 16, October 18, and October 20, 2012. Effluent samples were collected and composited from Outfall 001 using an automatic sampler. Two toxicity tests were requested: a seven-day Ceriodaphnia dubia survival and reproduction test (EPA Method 1002.0), and a seven-day Pimephales promelas larval survival and growth test (EPA Method 1000.0). Test organisms, procedures and quality assurance requirements were in accordance with the EPA manual, "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition" (EPA-821-R-02-013).

The effluent samples were analyzed for total residual chlorine (Standard Methods, 22nd Edition, 4500-Cl D) and contained <0.01 mg/L, <0.01 mg/L, and <0.01 mg/L, respectively. Effluent and laboratory dilution water hardness, alkalinity, conductivity, pH, and dissolved oxygen data were collected and recorded.

TEST SETUP Ceriodaphnia dubia



The seven-day Ceriodaphnia dubia survival and reproduction test was initiated at 1545 hours, October 16, 2012. Five concentrations were prepared (32%, 42%, 56%, 75%, and 100% effluent) utilizing distilled, deionized laboratory water reconstituted to match the hardness, alkalinity and pH of the receiving stream (unnamed tributary of Prairie Creek). The test was conducted in 25 mL distilled water rinsed plastic beakers containing 15 mL of solution (one organism per beaker, ten beakers per concentration). C. dubia neonates were less than 24 hours old and within eight hours of the same age at test initiation. Neonates were placed in beakers following a randomized block test design. Fresh solutions were prepared and renewed daily. Daily feeding consisted of 0.5 mL Selenastrum capricornutum and cerophyll per test chamber. The test proceeded for seven days during which survival, reproduction and water quality data were collected daily.

A control of 10 replicate beakers containing one neonate each in distilled, deionized, reconstituted water (same as diluent) was conducted concurrently with the test. There was 100% survival in the control. The test ended at 1545 hours, October 23, 2012. Survival and reproduction data were statistically analyzed ($p = 0.05$) according to EPA procedures to determine the Lowest Observable Effect Concentration (LOEC) and the No Observable Effect Concentration (NOEC).

SURVIVAL
Ceriodaphnia dubia

There was 100% survival to *C. dubia* in all of the effluent concentrations tested. Therefore, statistical analyses were not required to determine a no effect concentration.

LOEC: Not Applicable
NOEC: 100% Effluent

REPRODUCTION
Ceriodaphnia dubia

C. dubia reproduction data were normally distributed at the 0.01 alpha level (13.277) using Chi-Square test for normality. Reproduction data were homogeneous using Bartlett's test at the 0.01 alpha level (15.09) without data transformations. Therefore, a parametric test was performed on the homogeneous data. Dunnett's test on *C. dubia* reproduction data demonstrated that there were no statistically significant differences between the control and any of the effluent concentrations.

LOEC: Not Applicable **PMSD: 11.0%**
NOEC: 100% Effluent

TEST SETUP
Pimephales promelas



The seven-day *Pimephales promelas* larval survival and growth test was initiated at 1505 hours, October 16, 2012. Five concentrations were prepared (32%, 42%, 56%, 75%, and 100% effluent) utilizing distilled, deionized laboratory water reconstituted to match the hardness, alkalinity and pH of the receiving stream (unnamed tributary of Prairie Creek). The test was conducted in 300 mL distilled water rinsed plastic beakers containing 250 mL of solution (eight larvae per beaker, five beakers per concentration). *P. promelas* larvae were less than 24-hours old at test initiation and originated from a minimum of three in-house spawnings. Fresh solutions were prepared and renewed daily. Larvae in each test chamber were fed <24 hour old *Artemia* (brine shrimp) three times per day. The test proceeded for seven days during which survival and water quality data were collected daily.

A control of five replicate chambers containing eight larvae each in distilled, deionized, reconstituted water (same as diluent) was conducted concurrently with the test. There was 100% survival in the control. The test ended at 1505 hours, October 23, 2012. At test termination, all larvae were sacrificed, dried for 24-hours, and weighed. Survival and growth (weight) data were statistically analyzed ($p = 0.05$) according to EPA procedures to determine the Lowest Observable Effect Concentration (LOEC) and the No Observable Effect Concentration (NOEC).

SURVIVAL
Pimephales promelas

There was 100% survival to *P. promelas* in all of the effluent concentrations tested. Therefore, statistical analyses were not required to determine a no effect concentration.

LOEC: Not Applicable
NOEC: 100% Effluent

GROWTH
Pimephales promelas

P. promelas growth data were normally distributed at the 0.01 alpha level (0.900) using Shapiro Wilk's test for normality. Growth data were homogeneous using Bartlett's test at the 0.01 alpha level (15.09) without data transformations. Therefore, a parametric test was performed on the homogeneous data. Dunnett's test on *P. promelas* growth data demonstrated that there were no statistically significant differences between the control and any of the effluent concentrations.

LOEC: Not Applicable **PMSD: 12.4%**
NOEC: 100% Effluent

SUMMARY

There were no statistically significant differences between the control and the critical low flow concentration (100% effluent) for *C. dubia* survival and reproduction and *P. promelas* survival and growth. Based on biomonitoring requirements for Outfall 001 contained in Permit Number NPDES AR0036692 for City of Mena WWTF, Outfall 001 passed for this testing period.

Huther and Associates

7-Day/3 Brood *Ceriodaphnia dubia* Survival and Reproduction Chronic Toxicity Test

CLIENT City of Mena, WWTF
 NPDES # AR0036692
 LAB ID # 20239
 TEST TYPE 7 Day Chronic
 TEST ORGANISM *Ceriodaphnia dubia*
 ORGANISM AGE < 24 Hours
 ORGANISM SOURCE In House
 RECEIVING WATER unnamed tributary of Prairie Creek
 DILUTION WATER Laboratory Adjusted

SAMPLE TYPE 24 Hour Composite
 DATE COLLECTED 10/15/12, 10/17/12, 10/19/12
 DATE RECEIVED 10/16/12, 10/18/12, 10/20/12
 BEGIN DATE/TIME 10/16/12 1545
 END DATE/TIME 10/23/12 1545
 TEST TEMPERATURE (°C) 25.0
 PHOTO PERIOD 16-hr Light, 8-hr Dark
 LIGHT INTENSITY 50-100 ft. cndf
 TECHNICIAN N. Lehr

SURVIVAL & REPRODUCTION SUMMARY

| Control | | | | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Date | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
| 10/17/12 | A | A | A | A | A | A | A | A | A | A |
| 10/18/12 | A | A | A | A | A | A | A | A | A | A |
| 10/19/12 | A | A | A | A | A | A | A | A | A | A |
| 10/20/12 | A | A | 2 | A | 2 | A | A | A | 2 | A |
| 10/21/12 | 3 | 2 | A | 3 | A | 3 | 2 | 2 | A | 3 |
| 10/22/12 | 8 | 7 | 8 | 8 | 6 | 8 | 7 | 6 | 7 | 7 |
| 10/23/12 | 12 | 12 | 11 | 13 | 11 | 13 | 12 | 10 | 12 | 13 |
| x# Young 21.1 C.V. 9.85% x% Survival 100% C.V. 0.00% | | | | | | | | | | |

| 32% Effluent | | | | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Date | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
| 10/17/12 | A | A | A | A | A | A | A | A | A | A |
| 10/18/12 | A | A | A | A | A | A | A | A | A | A |
| 10/19/12 | A | A | A | A | A | A | A | A | A | A |
| 10/20/12 | A | A | 4 | A | A | A | A | 3 | 2 | A |
| 10/21/12 | 3 | 4 | A | 2 | 3 | 3 | 2 | A | A | 3 |
| 10/22/12 | 7 | 8 | 7 | 8 | 7 | 7 | 6 | 8 | 6 | 7 |
| 10/23/12 | 13 | 14 | 13 | 11 | 12 | 13 | 12 | 14 | 13 | 12 |
| x# Young 22.5 C.V. 9.68% x% Survival 100% C.V. 0.00% | | | | | | | | | | |

| 42% Effluent | | | | | | | | | | |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Date | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
| 10/17/12 | A | A | A | A | A | A | A | A | A | A |
| 10/18/12 | A | A | A | A | A | A | A | A | A | A |
| 10/19/12 | A | A | A | A | A | A | A | A | A | A |
| 10/20/12 | 3 | 3 | 2 | 3 | A | 2 | A | A | A | A |
| 10/21/12 | 7 | 7 | 8 | 8 | 7 | 8 | 7 | 8 | 6 | 7 |
| 10/22/12 | 13 | 12 | 11 | 13 | 11 | 12 | 13 | 14 | 12 | 13 |
| 10/23/12 | 23 | 22 | 19 | 24 | 20 | 20 | 23 | 26 | 20 | 23 |
| x# Young 22.0 C.V. 10.05% x% Survival 100% C.V. 0.00% | | | | | | | | | | |

| 58% Effluent | | | | | | | | | | |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Date | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
| 10/17/12 | A | A | A | A | A | A | A | A | A | A |
| 10/18/12 | A | A | A | A | A | A | A | A | A | A |
| 10/19/12 | A | A | A | A | A | A | A | A | A | A |
| 10/20/12 | A | A | A | 2 | 4 | 3 | A | A | A | A |
| 10/21/12 | 2 | 4 | 3 | A | A | A | 2 | 3 | 4 | 3 |
| 10/22/12 | 6 | 8 | 7 | 6 | 8 | 7 | 6 | 7 | 7 | 8 |
| 10/23/12 | 11 | 13 | 12 | 13 | 14 | 13 | 12 | 12 | 13 | 14 |
| x# Young 22.7 C.V. 10.18% x% Survival 100% C.V. 0.00% | | | | | | | | | | |

where. A = Alive
 5 = Alive, 5 young
 D = Dead
 D5 = 5 Young, Female died

ex 1:

| | |
|---|---------------------|
| A | alive today |
| 4 | total young to date |

ex 2:

| | |
|----|----------------------|
| 5 | alive, 5 young today |
| 12 | total young to date |

Huther and Associates
7-Day/3 Brood *Ceriodaphnia dubia* Survival and Reproduction Chronic Toxicity Test

City of Mena WWTF

Lab ID# 20239

Test Date: October 16, 2012

75% Effluent

| Date | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|----------|-------|-------------|-------|-------|-------|-------|-------|--------|-------|--------|
| 10/17/12 | A | A | A | A | A | A | A | A | A | A |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10/18/12 | A | A | A | A | A | A | A | A | A | A |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10/19/12 | A | A | A | A | A | A | A | A | A | A |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 3 | A | 2 | A | 5 | 3 | 4 | 2 | 2 | 4 |
| 10/20/12 | 3 | 0 | 2 | 0 | 5 | 3 | 4 | 12 | 2 | 14 |
| | A | 2 | 6 | 4 | A | A | A | A | A | A |
| 10/21/12 | 3 | 2 | 8 | 4 | 5 | 3 | 4 | 12 | 2 | 14 |
| | 7 | 7 | A | 8 | 9 | 8 | 7 | 6 | 7 | 8 |
| 10/22/12 | 10 | 9 | 8 | 12 | 14 | 11 | 11 | 8 | 9 | 12 |
| | 13 | 14 | 12 | 13 | 14 | 13 | 14 | 12 | 13 | 14 |
| 10/23/12 | 23 | 23 | 20 | 25 | 28 | 24 | 25 | 20 | 22 | 28 |
| | | x# Young | | 23.6 | | C.V. | | 10.79% | | |
| | | x% Survival | | 100% | | C.V. | | 0.00% | | |

100% Effluent

| Date | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|----------|-------|-------------|-------|-------|-------|-------|-------|-------|-------|--------|
| 10/17/12 | A | A | A | A | A | A | A | A | A | A |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10/18/12 | A | A | A | A | A | A | A | A | A | A |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10/19/12 | A | A | A | A | A | A | A | A | A | A |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 5 | 5 | 3 | 4 | 4 | 4 | 3 | 2 | 3 | 2 |
| 10/20/12 | 5 | 5 | 3 | 4 | 4 | 4 | 3 | 2 | 3 | 2 |
| | A | A | A | A | A | A | A | A | A | A |
| 10/21/12 | 5 | 5 | 3 | 4 | 4 | 4 | 3 | 2 | 3 | 2 |
| | 8 | 8 | 7 | 8 | 7 | 8 | 9 | 7 | 8 | 7 |
| 10/22/12 | 13 | 14 | 10 | 12 | 11 | 12 | 12 | 9 | 11 | 9 |
| | 13 | 14 | 13 | 15 | 13 | 14 | 14 | 13 | 14 | 13 |
| 10/23/12 | 26 | 28 | 23 | 27 | 24 | 26 | 26 | 22 | 25 | 22 |
| | | x# Young | | 24.9 | | C.V. | | 8.35% | | |
| | | x% Survival | | 100% | | C.V. | | 0.00% | | |

where: A = Alive
5 = Alive, 5 young
D = Dead
D5 = 5 Young, Female died

ex 1:

| |
|---|
| A |
| 4 |

 alive today
total young to date

ex 2:

| |
|----|
| 5 |
| 12 |

 alive, 5 young today
total young to date

Huthner and Associates
7-Day/3 Brood *Ceriodaphnia dubia* Survival and Reproduction Chronic Toxicity Test

City of Mena WWTF

Lab ID# 20239

Test Date: October 16, 2012

WET CHEMISTRY MEASUREMENTS

| Date | Time | Temp | Samp. No. | pH of Solution | | | | | | Analysis |
|----------|---------|------|-----------|----------------|------|------|------|------|------|----------|
| | | | | CON | 32% | 42% | 56% | 75% | 100% | |
| 10/16/12 | Start | 25.0 | 1 | 7.71 | 7.59 | 7.51 | 7.45 | 7.37 | 7.24 | STC |
| 10/17/12 | 24 Hr. | 25.3 | 1 | 7.92 | 7.95 | 7.77 | 7.69 | 7.64 | 7.58 | MJ |
| 10/17/12 | Renew | 25.1 | 1 | 8.00 | 8.08 | 7.88 | 7.76 | 7.67 | 7.55 | MJ |
| 10/18/12 | 48 Hr. | 24.0 | 1 | 7.94 | 7.83 | 7.78 | 7.73 | 7.68 | 7.58 | STC |
| 10/18/12 | Renew | 25.0 | 2 | 7.59 | 7.46 | 7.39 | 7.32 | 7.24 | 7.21 | STC |
| 10/19/12 | 72 Hr. | 24.0 | 2 | 7.88 | 7.80 | 7.76 | 7.71 | 7.66 | 7.60 | SK |
| 10/19/12 | Renew | 24.0 | 2 | 7.64 | 7.59 | 7.52 | 7.43 | 7.34 | 7.11 | SK |
| 10/20/12 | 96 Hr. | 24.3 | 2 | 7.74 | 7.70 | 7.69 | 7.65 | 7.62 | 7.66 | SK |
| 10/20/12 | Renew | 25.0 | 3 | 7.61 | 7.55 | 7.50 | 7.45 | 7.38 | 7.15 | SK |
| 10/21/12 | 120 Hr. | 24.4 | 3 | 8.02 | 7.91 | 7.83 | 7.77 | 7.71 | 7.65 | SK |
| 10/21/12 | Renew | 24.2 | 3 | 7.63 | 7.54 | 7.50 | 7.43 | 7.35 | 7.24 | SK |
| 10/22/12 | 144 Hr. | 25.6 | 3 | 7.91 | 7.75 | 7.67 | 7.60 | 7.53 | 7.47 | STC |
| 10/22/12 | Renew | 25.4 | 3 | 7.58 | 7.47 | 7.38 | 7.28 | 7.13 | 6.92 | STC |
| 10/23/12 | 168 Hr. | 25.0 | 3 | 8.02 | 7.91 | 7.83 | 7.77 | 7.69 | 7.61 | STC |

| Date | Time | Temp | Samp. No. | DO (mg/L) of Solution | | | | | | Analysis |
|----------|---------|------|-----------|-----------------------|------|------|------|------|------|----------|
| | | | | CON | 32% | 42% | 56% | 75% | 100% | |
| 10/16/12 | Start | 25.0 | 1 | 8.40 | 8.37 | 8.47 | 8.53 | 8.63 | 8.79 | STC |
| 10/17/12 | 24 Hr. | 25.3 | 1 | 8.00 | 8.09 | 8.08 | 8.03 | 7.99 | 7.96 | MJ |
| 10/17/12 | Renew | 25.1 | 1 | 7.78 | 7.86 | 7.89 | 7.92 | 7.94 | 7.99 | MJ |
| 10/18/12 | 48 Hr. | 24.0 | 1 | 8.37 | 8.33 | 8.30 | 8.27 | 8.24 | 8.18 | STC |
| 10/18/12 | Renew | 25.0 | 2 | 8.56 | 8.52 | 8.69 | 8.45 | 8.53 | 8.69 | STC |
| 10/19/12 | 72 Hr. | 24.0 | 2 | 8.02 | 8.10 | 8.11 | 8.14 | 8.12 | 8.12 | SK |
| 10/19/12 | Renew | 24.0 | 2 | 7.99 | 7.96 | 7.99 | 8.00 | 8.06 | 8.10 | SK |
| 10/20/12 | 96 Hr. | 24.3 | 2 | 7.68 | 7.66 | 7.70 | 7.75 | 7.80 | 7.84 | SK |
| 10/20/12 | Renew | 25.0 | 3 | 8.00 | 7.93 | 7.93 | 7.97 | 8.04 | 8.09 | SK |
| 10/21/12 | 120 Hr. | 24.4 | 3 | 7.79 | 7.79 | 7.79 | 7.79 | 7.79 | 7.79 | SK |
| 10/21/12 | Renew | 24.2 | 3 | 8.31 | 8.27 | 8.27 | 8.29 | 8.36 | 8.34 | SK |
| 10/22/12 | 144 Hr. | 25.6 | 3 | 8.40 | 8.44 | 8.48 | 8.51 | 8.53 | 8.59 | STC |
| 10/22/12 | Renew | 25.4 | 3 | 7.85 | 7.91 | 8.04 | 8.11 | 8.19 | 8.23 | STC |
| 10/23/12 | 168 Hr. | 25.0 | 3 | 7.81 | 7.81 | 7.77 | 7.77 | 7.77 | 7.74 | STC |

Huther and Associates
7-Day/3 Brood *Ceriodaphnia dubia* Survival and Reproduction Chronic Toxicity Test

City of Mena WWTF

Lab ID# 20239

Test Date: October 16, 2012

INITIAL CHEMISTRY MEASUREMENTS @ 100% EFFLUENT

| Date | Samp. No. | pH | DO | Hardness mg/L CaCO ₃ | Alkalinity mg/L CaCO ₃ | Conduct. umhos/cm | Resid. Cl ₂ mg/L | Dechlor(mL) Na ₂ S ₂ O ₃ mg/L | Analyst |
|----------|-----------|------|------|------------------------------------|--------------------------------------|----------------------|--------------------------------|---|---------|
| 10/16/12 | 1 | 7.24 | 8.79 | 48 | 30 | 209 | <0.01 | N/A | TN |
| 10/18/12 | 2 | 7.21 | 8.69 | 52 | 28 | 204 | <0.01 | N/A | TN |
| 10/20/12 | 3 | 7.15 | 8.09 | 48 | 24 | 212 | <0.01 | N/A | TN |
| 10/16/12 | Con | 7.71 | 8.40 | 40 | 28 | 118 | - | - | TN |

† Measurements taken in 100% solution.

CERIODAPHNIA DUBIA STATISTICAL ANALYSES
Reproduction

Summary Statistics on Transformed Data Table 1 of 2

| Grp | Identification | N | Min | Max | Mean |
|-----|----------------|----|--------|--------|--------|
| 1 | Control | 10 | 18.000 | 24.000 | 21.100 |
| 2 | 32% Effluent | 10 | 19.000 | 26.000 | 22.500 |
| 3 | 42% Effluent | 10 | 19.000 | 26.000 | 22.000 |
| 4 | 56% Effluent | 10 | 19.000 | 26.000 | 22.700 |
| 5 | 75% Effluent | 10 | 20.000 | 28.000 | 23.600 |
| 6 | 100% Effluent | 10 | 22.000 | 28.000 | 24.900 |

Summary Statistics on Transformed Data Table 2 of 2

| Grp | Identification | Variance | Sd | Sem | C.V.% |
|-----|----------------|----------|-------|-------|-------|
| 1 | Control | 4.322 | 2.079 | 0.657 | 9.85 |
| 2 | 32% Effluent | 4.722 | 2.173 | 0.687 | 9.66 |
| 3 | 42% Effluent | 4.889 | 2.211 | 0.699 | 10.05 |
| 4 | 56% Effluent | 5.344 | 2.312 | 0.731 | 10.18 |
| 5 | 75% Effluent | 6.489 | 2.547 | 0.806 | 10.79 |
| 6 | 100% Effluent | 4.322 | 2.079 | 0.657 | 8.35 |

Chi-Square Test For Normality: Actual And Expected Frequencies

| Interval | < -1.5 | -1.5 to -0.5 | -0.5 to 0.5 | >0.5 to 1.5 | >1.5 |
|----------|--------|--------------|-------------|-------------|-------|
| Expected | 4.020 | 14.520 | 22.920 | 14.520 | 4.020 |
| Observed | 2 | 17 | 20 | 18 | 3 |

Calculated Chi-Square goodness of fit test statistic = 2.9035
 Table Chi-Square value (alpha = 0.01) = 13.277

Data Pass normality test. Continue analysis.

Bartlett's Test For Homogeneity of Variance

Calculated B1 statistic = 0.53

Table Chi-square value = 15.09 (alpha = 0.01, DF = 5)
 Table Chi-square value = 11.07 (alpha = 0.05, DF = 5)

Data Pass B1 homogeneity test at 0.01 level. Continue analysis.

ANOVA Table

| SOURCE | DF | SS | MS | F |
|----------------|----|---------|--------|-------|
| Between | 5 | 86.800 | 17.360 | 3.462 |
| Within (Error) | 54 | 270.800 | 5.015 | |
| Total | 59 | 357.600 | | |

Critical F value = 2.45 (0.05,5,40)

Since F > Critical F REJECT Ho: All equal

Dunnnett's Test - Table 1 of 2 Ho: Control < Treatment

| Grp | Identification | Transformed | Mean | T Stat | Sig |
|-----|----------------|-------------|------------------------------|--------|-----|
| | | Mean | Calculated In Original Units | | |
| 1 | Control | 21.100 | 21.100 | | |
| 2 | 32% Effluent | 22.500 | 22.500 | -1.398 | |
| 3 | 42% Effluent | 22.000 | 22.000 | -0.899 | |
| 4 | 56% Effluent | 22.700 | 22.700 | -1.598 | |
| 5 | 75% Effluent | 23.600 | 23.600 | -2.496 | |
| 6 | 100% Effluent | 24.900 | 24.900 | -3.794 | |

Dunnnett table value = 2.31 (1 Tailed Value, P=0.05, DF=40,5)
 No statistically significant difference

Dunnnett's Test - Table 1 of 2 Ho: Control < Treatment

| Grp | Identification | Num of Reps | Minimum Sig Diff | % of Control | Difference |
|-----|----------------|-------------|------------------|--------------|--------------|
| | | | (In Orig. Units) | | from Control |
| 1 | Control | 10 | | | |
| 2 | 32% Effluent | 10 | 2.313 | 11.0 | -1.400 |
| 3 | 42% Effluent | 10 | 2.313 | 11.0 | -0.900 |
| 4 | 56% Effluent | 10 | 2.313 | 11.0 | -1.600 |
| 5 | 75% Effluent | 10 | 2.313 | 11.0 | -2.500 |
| 6 | 100% Effluent | 10 | 2.313 | 11.0 | -3.800 |

Huthier and Associates
7-Day *Pimephales promelas* Survival and Growth Chronic Toxicity Test

| | |
|--|---|
| CLIENT City of Mena WWTP | SAMPLE TYPE 24 Hour Composite |
| NPDES # AR0036692 | DATE COLLECTED 10/15/12, 10/17/12, 10/19/12 |
| LAB ID # 20239 | DATE RECEIVED 10/16/12, 10/18/12, 10/20/12 |
| TEST TYPE 7 Day Chronic | BEGIN DATE/TIME 10/16/12 1505 |
| TEST ORGANISM <i>Pimephales promelas</i> | END DATE/TIME 10/23/12 1505 |
| ORGANISM AGE < 24 Hours | TEST TEMPERATURE (°C) 25 |
| ORGANISM SOURCE In House | PHOTO PERIOD 16-hr. Light 8-hr. Dark |
| RECEIVING WATER unnamed tributary of Prairie Creek | LIGHT INTENSITY 50-100 ft. candle |
| DILUTION WATER Laboratory Adjusted | TECHNICIAN Lopez |

SURVIVAL SUMMARY

| Conc. | 10/17/12 | | | | | 10/18/12 | | | | | 10/19/12 | | | | | 10/20/12 | | | | | 10/21/12 | | | | |
|-------|----------|---|---|---|---|----------|---|---|---|---|----------|---|---|---|---|----------|---|---|---|---|----------|---|---|---|---|
| | A | B | C | D | E | A | B | C | D | E | A | B | C | D | E | A | B | C | D | E | A | B | C | D | E |
| Con | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 32% | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 42% | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 56% | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 75% | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 100% | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

| Conc. | 10/22/12 | | | | | 10/23/12 | | | | | x % Survival | C.V. % |
|-------|----------|---|---|---|---|----------|---|---|---|---|--------------|--------|
| | A | B | C | D | E | A | B | C | D | E | | |
| Con | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 100.0 | 0.00 |
| 32% | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 100.0 | 0.00 |
| 42% | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 100.0 | 0.00 |
| 56% | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 100.0 | 0.00 |
| 75% | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 100.0 | 0.00 |
| 100% | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 100.0 | 0.00 |

MEAN DRY WEIGHT PER REP

| % Effluent | Rep A | Rep B | Rep C | Rep D | Rep E | x | C.V. % |
|------------|--------|--------|--------|--------|--------|--------|--------|
| Con | 0.4110 | 0.5020 | 0.4260 | 0.5030 | 0.4390 | 0.4562 | 9.52 |
| 32% | 0.4760 | 0.4520 | 0.5030 | 0.4810 | 0.4690 | 0.4762 | 3.90 |
| 42% | 0.4950 | 0.4500 | 0.4260 | 0.5040 | 0.4970 | 0.4744 | 7.26 |
| 56% | 0.4350 | 0.5060 | 0.4120 | 0.4690 | 0.4990 | 0.4642 | 8.72 |
| 75% | 0.5030 | 0.4250 | 0.4960 | 0.5040 | 0.4370 | 0.4730 | 8.18 |
| 100% | 0.4060 | 0.4830 | 0.4250 | 0.5060 | 0.4970 | 0.4634 | 9.71 |

Huther and Associates
7-Day *Pimephales promelas* Survival and Growth Chronic Toxicity Test

City of Mena WWTF

Lab ID# 20239

Test Date: October 16, 2012

WET CHEMISTRY MEASUREMENTS

| Date | Time | Temp | Samp. No. | pH of Solution | | | | | | Analysis |
|----------|---------|------|-----------|----------------|------|------|------|------|------|----------|
| | | | | CON | 32% | 42% | 56% | 75% | 100% | |
| 10/16/12 | Start | 25.0 | 1 | 7.71 | 7.59 | 7.51 | 7.45 | 7.37 | 7.24 | STC |
| 10/17/12 | 24 Hr. | 25.5 | 1 | 8.21 | 7.91 | 7.87 | 7.81 | 7.74 | 7.70 | MJ |
| 10/17/12 | Renew | 25.1 | 1 | 8.00 | 8.08 | 7.88 | 7.76 | 7.67 | 7.55 | MJ |
| 10/18/12 | 48 Hr. | 24.0 | 1 | 7.78 | 7.69 | 7.62 | 7.58 | 7.52 | 7.41 | STC |
| 10/18/12 | Renew | 25.0 | 2 | 7.59 | 7.46 | 7.39 | 7.32 | 7.24 | 7.21 | STC |
| 10/19/12 | 72 Hr. | 24.0 | 2 | 7.69 | 7.61 | 7.57 | 7.51 | 7.46 | 7.35 | SK |
| 10/19/12 | Renew | 24.0 | 2 | 7.64 | 7.59 | 7.52 | 7.43 | 7.34 | 7.11 | SK |
| 10/20/12 | 96 Hr. | 24.5 | 2 | 7.87 | 7.76 | 7.63 | 7.58 | 7.49 | 7.39 | SK |
| 10/20/12 | Renew | 25.0 | 3 | 7.61 | 7.55 | 7.50 | 7.45 | 7.38 | 7.15 | SK |
| 10/21/12 | 120 Hr. | 24.5 | 3 | 7.90 | 7.77 | 7.70 | 7.63 | 7.56 | 7.46 | SK |
| 10/21/12 | Renew | 24.2 | 3 | 7.63 | 7.54 | 7.50 | 7.43 | 7.35 | 7.24 | SK |
| 10/22/12 | 144 Hr. | 25.8 | 3 | 7.81 | 7.67 | 7.55 | 7.50 | 7.42 | 7.32 | STC |
| 10/22/12 | Renew | 25.4 | 3 | 7.58 | 7.47 | 7.38 | 7.28 | 7.13 | 6.92 | STC |
| 10/23/12 | 168 Hr. | 25.3 | 3 | 7.73 | 7.63 | 7.56 | 7.51 | 7.43 | 7.31 | STC |

| Date | Time | Temp | Samp. No. | DO (mg/l) of Solution | | | | | | Analysis |
|----------|---------|------|-----------|-----------------------|------|------|------|------|------|----------|
| | | | | CON | 32% | 42% | 56% | 75% | 100% | |
| 10/16/12 | Start | 25.0 | 1 | 8.40 | 8.37 | 8.47 | 8.53 | 8.63 | 8.79 | STC |
| 10/17/12 | 24 Hr. | 25.5 | 1 | 8.08 | 8.16 | 8.19 | 8.20 | 8.10 | 8.15 | MJ |
| 10/17/12 | Renew | 25.1 | 1 | 7.78 | 7.86 | 7.89 | 7.92 | 7.94 | 7.99 | MJ |
| 10/18/12 | 48 Hr. | 24.0 | 1 | 7.86 | 7.92 | 7.96 | 7.94 | 7.95 | 7.96 | STC |
| 10/18/12 | Renew | 25.0 | 2 | 8.56 | 8.52 | 8.69 | 8.45 | 8.53 | 8.69 | STC |
| 10/19/12 | 72 Hr. | 24.0 | 2 | 7.72 | 7.70 | 7.67 | 7.62 | 7.77 | 7.78 | SK |
| 10/19/12 | Renew | 24.0 | 2 | 7.99 | 7.96 | 7.99 | 8.00 | 8.06 | 8.10 | SK |
| 10/20/12 | 96 Hr. | 24.5 | 2 | 8.13 | 8.08 | 8.08 | 8.09 | 8.11 | 8.24 | SK |
| 10/20/12 | Renew | 25.0 | 3 | 8.00 | 7.93 | 7.93 | 7.97 | 8.04 | 8.09 | SK |
| 10/21/12 | 120 Hr. | 24.5 | 3 | 7.80 | 7.82 | 7.82 | 7.84 | 7.84 | 7.87 | SK |
| 10/21/12 | Renew | 24.2 | 3 | 8.31 | 8.27 | 8.27 | 8.29 | 8.36 | 8.34 | SK |
| 10/22/12 | 144 Hr. | 25.8 | 3 | 7.84 | 7.86 | 7.99 | 8.02 | 8.05 | 8.03 | STC |
| 10/22/12 | Renew | 25.4 | 3 | 7.85 | 7.91 | 8.04 | 8.11 | 8.19 | 8.23 | STC |
| 10/23/12 | 168 Hr. | 25.3 | 3 | 7.86 | 7.83 | 7.80 | 7.78 | 7.77 | 7.75 | STC |

Huther and Associates
 7-Day *Pimephales promelas* Survival and Growth Chronic Toxicity Test

City of Mena WWTF

Lab ID# 20239

Test Date: October 16, 2012

INITIAL CHEMISTRY MEASUREMENTS @ 100% EFFLUENT

| Date | Samp. No. | pH | DO | Hardness mg/L CaCO ₃ | Alkalinity mg/L CaCO ₃ | Conduct. umhos/cm | Resid. Cl ₂ mg/L | Dechlor(mL) Na ₂ S ₂ O ₃ mg/L | Analyst |
|----------|-----------|------|------|------------------------------------|--------------------------------------|----------------------|--------------------------------|---|---------|
| 10/16/12 | 1 | 7.24 | 8.79 | 48 | 30 | 209 | <0.01 | N/A | TN |
| 10/18/12 | 2 | 7.21 | 8.69 | 52 | 28 | 204 | <0.01 | N/A | TN |
| 10/20/12 | 3 | 7.15 | 8.09 | 48 | 24 | 212 | <0.01 | N/A | TN |
| 10/16/12 | Con | 7.71 | 8.40 | 40 | 28 | 118 | - | - | TN |

Measurements taken in 100% solution.

PIMEPHALES PROMELAS STATISTICAL ANALYSES
 Growth

Summary Statistics on Transformed Data Table 1 of 2

| Grp | Identification | N | Min | Max | Mean |
|-----|----------------|---|-------|-------|-------|
| 1 | Control | 5 | 0.411 | 0.503 | 0.456 |
| 2 | 32% Effluent | 5 | 0.452 | 0.503 | 0.476 |
| 3 | 42% Effluent | 5 | 0.426 | 0.504 | 0.474 |
| 4 | 56% Effluent | 5 | 0.412 | 0.506 | 0.464 |
| 5 | 75% Effluent | 5 | 0.425 | 0.504 | 0.473 |
| 6 | 100% Effluent | 5 | 0.406 | 0.506 | 0.463 |

Summary Statistics on Transformed Data Table 2 of 2

| Grp | Identification | Variance | Sd | Sem | C.V.% |
|-----|----------------|----------|-------|-------|-------|
| 1 | Control | 0.002 | 0.043 | 0.019 | 9.52 |
| 2 | 32% Effluent | 0.000 | 0.019 | 0.008 | 3.90 |
| 3 | 42% Effluent | 0.001 | 0.034 | 0.015 | 7.26 |
| 4 | 56% Effluent | 0.002 | 0.040 | 0.018 | 8.72 |
| 5 | 75% Effluent | 0.001 | 0.039 | 0.017 | 8.18 |
| 6 | 100% Effluent | 0.002 | 0.045 | 0.020 | 9.71 |

Shapiro - Wilk's Test For Normality

D = 0.034

W = 0.903

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

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

Data Pass normality test at P=0.01 level. Continue analysis.

Bartlett's Test For Homogeneity of Variance

Calculated B1 statistic = 2.92

Table Chi-square value = 15.09 (alpha = 0.01, DF = 5)

Table Chi-square value = 11.07 (alpha = 0.05, DF = 5)

Data Pass B1 homogeneity test at 0.01 level. Continue analysis.

ANOVA Table

| SOURCE | DF | SS | MS | F |
|----------------|----|-------|-------|-------|
| Between | 5 | 0.002 | 0.000 | 0.215 |
| Within (Error) | 24 | 0.034 | 0.001 | |
| Total | 29 | 0.036 | | |

Critical F value = 2.62 (0.05,5,24)

Since F < Critical F Fail to Reject Ho: All equal

Dunnnett's Test - Table 1 of 2 Ho:Control < Treatment

| Grp | Identification | Transformed | Mean | T Stat | Sig |
|-----|----------------|-------------|------------------------------|--------|-----|
| | | Mean | Calculated In Original Units | | |
| 1 | Control | 0.456 | 0.456 | | |
| 2 | 32% Effluent | 0.476 | 0.476 | -0.836 | |
| 3 | 42% Effluent | 0.474 | 0.474 | -0.761 | |
| 4 | 56% Effluent | 0.464 | 0.464 | -0.335 | |
| 5 | 75% Effluent | 0.473 | 0.473 | -0.703 | |
| 6 | 100% Effluent | 0.463 | 0.463 | -0.301 | |

Dunnnett table value = 2.36 (1 Tailed Value, P=0.05, DF=24,5)

No statistically significant difference

Dunnnett's Test - Table 1 of 2 Ho:Control < Treatment

| Grp | Identification | Num of Reps | Minimum Sig Diff (In Orig. Units) | % of Control | Difference from Control |
|-----|----------------|-------------|-----------------------------------|--------------|-------------------------|
| | | | | | |
| 1 | Control | 5 | | | |
| 2 | 32% Effluent | 5 | 0.056 | 12.4 | -0.020 |
| 3 | 42% Effluent | 5 | 0.056 | 12.4 | -0.018 |
| 4 | 56% Effluent | 5 | 0.056 | 12.4 | -0.008 |
| 5 | 75% Effluent | 5 | 0.056 | 12.4 | -0.017 |
| 6 | 100% Effluent | 5 | 0.056 | 12.4 | -0.007 |

**APPENDIX A
RAW DATA**

7-DAY CERIODAPHNIA DUBIA SURVIVAL & REPRODUCTION

DAILY RAW DATA TABLE

PAGE 1 OF 2

CLIENT Meng

START DATE/TIME 10-16-12 NL 1545

OUTFALL 001

END DATE/TIME 10-23-12 NL 1545

LAB ID # 20239

Con

| Date | Rep1 | Rep2 | Rep3 | Rep4 | Rep5 | Rep6 | Rep7 | Rep8 | Rep9 | Rep10 | Analyst | Time |
|-------|------|------|------|------|------|------|------|------|------|-------|---------|------|
| 10/17 | A | A | A | A | A | A | A | A | A | A | WD | 1545 |
| 10/18 | A | A | A | A | A | A | A | A | A | A | NL | 1330 |
| 10/19 | A | A | A | A | A | A | A | A | A | A | WD | 1055 |
| 10/20 | A | A | 2 | A | 2 | A | A | A | 2 | A | AL | 1615 |
| 10/21 | 3 | 2 | A | 3 | A | 3 | 2 | 2 | A | 3 | AL | 1140 |
| 10/22 | 6 | 7 | 6 | 8 | 6 | 8 | 7 | 6 | 7 | 7 | NL | 1400 |
| 10/23 | 12 | 12 | 11 | 13 | 11 | 13 | 12 | 10 | 12 | 13 | NL | 1545 |
| | 21 | 21 | 19 | 24 | 19 | 24 | 21 | 18 | 21 | 23 | | |

\bar{x} # Young w/o Dead = 21.1 CV% = 9.85
 \bar{x} # Young w/Dead = CV% =
 \bar{x} % Survival = 100.0 CV% = 0.00

32

| Date | Rep1 | Rep2 | Rep3 | Rep4 | Rep5 | Rep6 | Rep7 | Rep8 | Rep9 | Rep10 | Analyst | Time |
|-------|------|------|------|------|------|------|------|------|------|-------|---------|------|
| 10/17 | A | A | A | A | A | A | A | A | A | A | WD | 1545 |
| 10/18 | A | A | A | A | A | A | A | A | A | A | NL | 1330 |
| 10/19 | A | A | A | A | A | A | A | A | A | A | WD | 1055 |
| 10/20 | A | A | 4 | A | A | A | A | 3 | 2 | A | AL | 1615 |
| 10/21 | 3 | 4 | A | 2 | 3 | 3 | 2 | A | A | 3 | AL | 1140 |
| 10/22 | 7 | 8 | 7 | 6 | 7 | 7 | 6 | 8 | 6 | 7 | NL | 1400 |
| 10/23 | 13 | 14 | 13 | 11 | 12 | 13 | 12 | 14 | 13 | 12 | NL | 1545 |
| | 23 | 26 | 24 | 19 | 22 | 23 | 20 | 25 | 21 | 22 | | |

\bar{x} # Young w/o Dead = 22.5 CV% = 9.66
 \bar{x} # Young w/Dead = CV% =
 \bar{x} % Survival = 100.0 CV% = 0.00

42

| Date | Rep1 | Rep2 | Rep3 | Rep4 | Rep5 | Rep6 | Rep7 | Rep8 | Rep9 | Rep10 | Analyst | Time |
|-------|------|------|------|------|------|------|------|------|------|-------|---------|------|
| 10/17 | A | A | A | A | A | A | A | A | A | A | WD | 1545 |
| 10/18 | A | A | A | A | A | A | A | A | A | A | NL | 1330 |
| 10/19 | A | A | A | A | A | A | A | A | A | A | WD | 1055 |
| 10/20 | 3 | 3 | 2 | 3 | A | 2 | A | A | A | A | AL | 1615 |
| 10/21 | A | A | A | A | 2 | 4 | 3 | 4 | 2 | 3 | AL | 1140 |
| 10/22 | 7 | 7 | 6 | 8 | 7 | 6 | 7 | 8 | 6 | 7 | NL | 1400 |
| 10/23 | 13 | 12 | 11 | 15 | 11 | 12 | 13 | 14 | 12 | 13 | NL | 1545 |
| | 23 | 22 | 19 | 24 | 20 | 20 | 23 | 26 | 20 | 23 | | |

\bar{x} # Young w/o Dead = 22.0 CV% = 10.05
 \bar{x} # Young w/Dead = CV% =
 \bar{x} % Survival = 100.0 CV% = 0.00

56

| Date | Rep1 | Rep2 | Rep3 | Rep4 | Rep5 | Rep6 | Rep7 | Rep8 | Rep9 | Rep10 | Analyst | Time |
|-------|------|------|------|------|------|------|------|------|------|-------|---------|------|
| 10/17 | A | A | A | A | A | A | A | A | A | A | WD | 1545 |
| 10/18 | A | A | A | A | A | A | A | A | A | A | NL | 1330 |
| 10/19 | A | A | A | A | A | A | A | A | A | A | WD | 1055 |
| 10/20 | A | A | A | 2 | 4 | 3 | 8 | A | 8 | A | AL | 1615 |
| 10/21 | 2 | 4 | 3 | A | A | A | 2 | 3 | 4 | 3 | AL | 1140 |
| 10/22 | 6 | 8 | 7 | 6 | 8 | 7 | 6 | 7 | 7 | 8 | NL | 1400 |
| 10/23 | 11 | 13 | 12 | 13 | 14 | 13 | 12 | 12 | 13 | 14 | NL | 1545 |
| | 19 | 25 | 22 | 21 | 26 | 23 | 20 | 22 | 24 | 25 | | |

\bar{x} # Young w/o Dead = 22.7 CV% = 10.18
 \bar{x} # Young w/Dead = CV% =
 \bar{x} % Survival = 100.0 CV% = 0.00

7-DAY CERIODAPHNIA DUBIA SURVIVAL & REPRODUCTION

DAILY RAW DATA TABLE

PAGE 2 OF 2

CLIENT Meda

START DATE/TIME 10-16-12 NL 1545

OUTFALL 001

END DATE/TIME 10-23-12 NL 1545

LAB ID # 20239

75

| Date | Rep1 | Rep2 | Rep3 | Rep4 | Rep5 | Rep6 | Rep7 | Rep8 | Rep9 | Rep10 | Analyst | Time |
|-------|------|------|------|------|------|------|------|------|------|-------|---------|------|
| 10/17 | A | A | A | A | A | A | A | A | A | A | WD | 1545 |
| 10/18 | A | A | A | A | A | A | A | A | A | A | NL | 1330 |
| 10/19 | A | A | A | A | A | A | A | A | A | A | WD | 1055 |
| 10/20 | 3 | A | 2 | A | 5 | 3 | 4 | 2 | 2 | 4 | PL | 1615 |
| 10/21 | A | 2 | 6 | 4 | A | A | A | A | A | A | PL | 1140 |
| 10/22 | 7 | 7 | A | 8 | 9 | 8 | 7 | 6 | 7 | 8 | NL | 1400 |
| 10/23 | 13 | 14 | 12 | 13 | 14 | 13 | 14 | 12 | 13 | 14 | NL | 1545 |

\bar{x} # Young w/o Dead = 23.6 CV% = 10.79

\bar{x} # Young w/Dead = CV% =

\bar{x} % Survival = 100.0 CV% = 0.00

100

| Date | Rep1 | Rep2 | Rep3 | Rep4 | Rep5 | Rep6 | Rep7 | Rep8 | Rep9 | Rep10 | Analyst | Time |
|-------|------|------|------|------|------|------|------|------|------|-------|---------|------|
| 10/17 | A | A | A | A | A | A | A | A | A | A | WD | 1545 |
| 10/18 | A | A | A | A | A | A | A | A | A | A | NL | 1330 |
| 10/19 | A | A | A | A | A | A | A | A | A | A | WD | 1055 |
| 10/20 | 5 | 5 | 3 | 4 | 4 | 4 | 3 | 2 | 3 | 2 | PL | 1615 |
| 10/21 | A | A | A | A | A | A | A | A | A | A | PL | 1140 |
| 10/22 | 8 | 9 | 7 | 8 | 7 | 8 | 9 | 7 | 8 | 7 | NL | 1400 |
| 10/23 | 13 | 14 | 13 | 15 | 13 | 14 | 14 | 13 | 14 | 13 | NL | 1545 |

\bar{x} # Young w/o Dead = 24.9 CV% = 8.35

\bar{x} # Young w/Dead = CV% =

\bar{x} % Survival = 100.0 CV% = 0.00

| Date | Rep1 | Rep2 | Rep3 | Rep4 | Rep5 | Rep6 | Rep7 | Rep8 | Rep9 | Rep10 | Analyst | Time |
|------|------|------|------|------|------|------|------|------|------|-------|---------|------|
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\bar{x} # Young w/o Dead = CV% =

\bar{x} # Young w/Dead = CV% =

\bar{x} % Survival = CV% =

| Date | Rep1 | Rep2 | Rep3 | Rep4 | Rep5 | Rep6 | Rep7 | Rep8 | Rep9 | Rep10 | Analyst | Time |
|------|------|------|------|------|------|------|------|------|------|-------|---------|------|
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\bar{x} # Young w/o Dead = CV% =

\bar{x} # Young w/Dead = CV% =

\bar{x} % Survival = CV% =

7-DAY CHRONIC TOXICITY TEST
PIMEPHALES PROMELAS (fathead minnow) SURVIVAL

CLIENT/FACILITY

Mena

DATE/TIME STARTED

10-16-12/L 1505

OUTFALL #

001 PROJECT # 20239

DATE/TIME ENDED

10-23-12/L 1505

ORGANISM ID#

PPU-12-289

| Conc. | A | | | | | B | | | | | C | | | | | D | | | | | E | | | | | | | | | |
|-----------------------|------------------------|---|---|---|---|------------------------|---|---|---|---|-------------------------|---|---|---|---|------------------------|---|---|---|---|------------------------|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | A | B | C | D | E | A | B | C | D | E | A | B | C | D | E | A | B | C | D | E | | | | | |
| CON | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 32 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 42 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 56 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 75 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 100 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Initials Date/Time | <u>10-17-12/L 1505</u> | | | | | <u>10-18-12/L 0935</u> | | | | | <u>10-19-12 MH 0835</u> | | | | | <u>10-20-12/L 0935</u> | | | | | <u>10-21-12/L 0945</u> | | | | | | | | | |

| Conc. | A | B | C | D | E | A | B | C | D | E | Mean Survival | C.V. % |
|-----------------------|-------------------------|---|---|---|---|------------------------|---|---|---|---|---------------|--------|
| CON | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 100.0 | 0.00 |
| 32 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 100.0 | 0.00 |
| 42 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 100.0 | 0.00 |
| 56 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 100.0 | 0.00 |
| 75 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 100.0 | 0.00 |
| 100 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 100.0 | 0.00 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| Initials Date/Time | <u>10-22-12 MH 0845</u> | | | | | <u>10-23-12/L 1505</u> | | | | | | |

Client / Facility Mena
 Lab ID Number 20239
 Outfall Number 001
 Test Date 10-16-12

INITIAL CHEMISTRY MEASUREMENTS @ 100% EFFLUENT

| Date | Samp. No. | pH | DO | Hardness mg/L CaCO ₃ ¹ | Alkalinity mg/L CaCO ₃ ¹ | Conduct. umhos/cm ¹ | Resid. Cl ₂ mg/L ¹ | Dechlor(mL) Na ₂ S ₂ O ₃ mg/L ¹ | Analyst |
|-------|-----------|------|------|--|--|--------------------------------|--|---|---------|
| 10/16 | 1 | 7.24 | 8.79 | 48 | 30 | 209 | 20.01 | Na | TN |
| 10/18 | 2 | 7.21 | 8.69 | 52 | 28 | 204 | ~ | ~ | ~ |
| 10/20 | 3 | 7.15 | 8.09 | 48 | 24 | 212 | ~ | ~ | ~ |
| 10/16 | CON | 7.71 | 8.40 | 40 | 28 | 118 | - | - | ~ |

INITIAL CHEMISTRY MEASUREMENTS @ RECEIVING WATER

| Date | Samp. No. | pH | DO | Hardness mg/L CaCO ₃ ¹ | Alkalinity mg/L CaCO ₃ ¹ | Conduct. umhos/cm ¹ | Resid. Cl ₂ mg/L ¹ | Dechlor(mL) Na ₂ S ₂ O ₃ mg/L ¹ | Analyst |
|------|-----------|----|----|--|--|--------------------------------|--|---|---------|
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

Notes:

APPENDIX B
REFERENCE TOXICANTS

CHRONIC REFERENCE TOXICANT TEST RESULTS

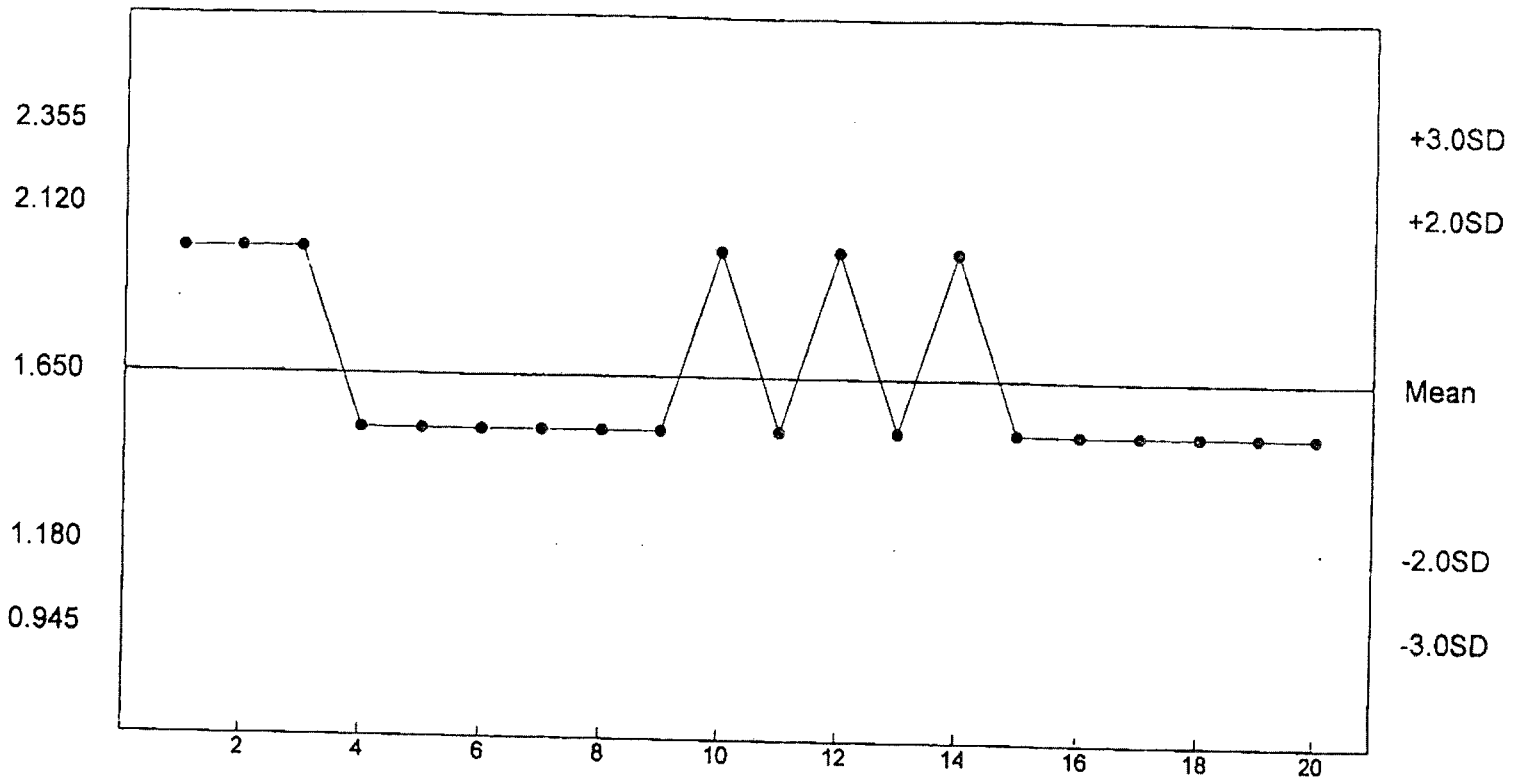
SPECIES: *Ceriodaphnia dubia*
 CHEMICAL: Sodium Chloride
 DURATION: 7-Days
 TEST NUMBER: 10
 TEST DATE/TIME: 10/01/12 - 10/07/12
 1630 Hrs - 1630 Hrs
 STATISTICAL METHOD: Fishers, Dunnetts/Steels

| CONCENTRATION (g/L) | NUMBER EXPOSED | NUMBER DEAD |
|---------------------|----------------|-------------|
| 0.5 | 10 | 0 |
| 1.0 | 10 | 0 |
| 1.5 | 10 | 1 |
| 2.0 | 10 | 5 |
| 2.5 | 10 | 10 |
| 3.0 | 10 | 10 |
| 4.0 | 10 | 10 |

| LOEC FOR SURVIVAL | NOEC FOR SURVIVAL | LOEC FOR REPRODUCTION | NOEC FOR REPRODUCTION |
|-------------------|-------------------|-----------------------|-----------------------|
| 2.0 g/L | 1.5 g/L | 1.0 g/L | 0.5 g/L |

Reference Tox Sodium Chloride g/L

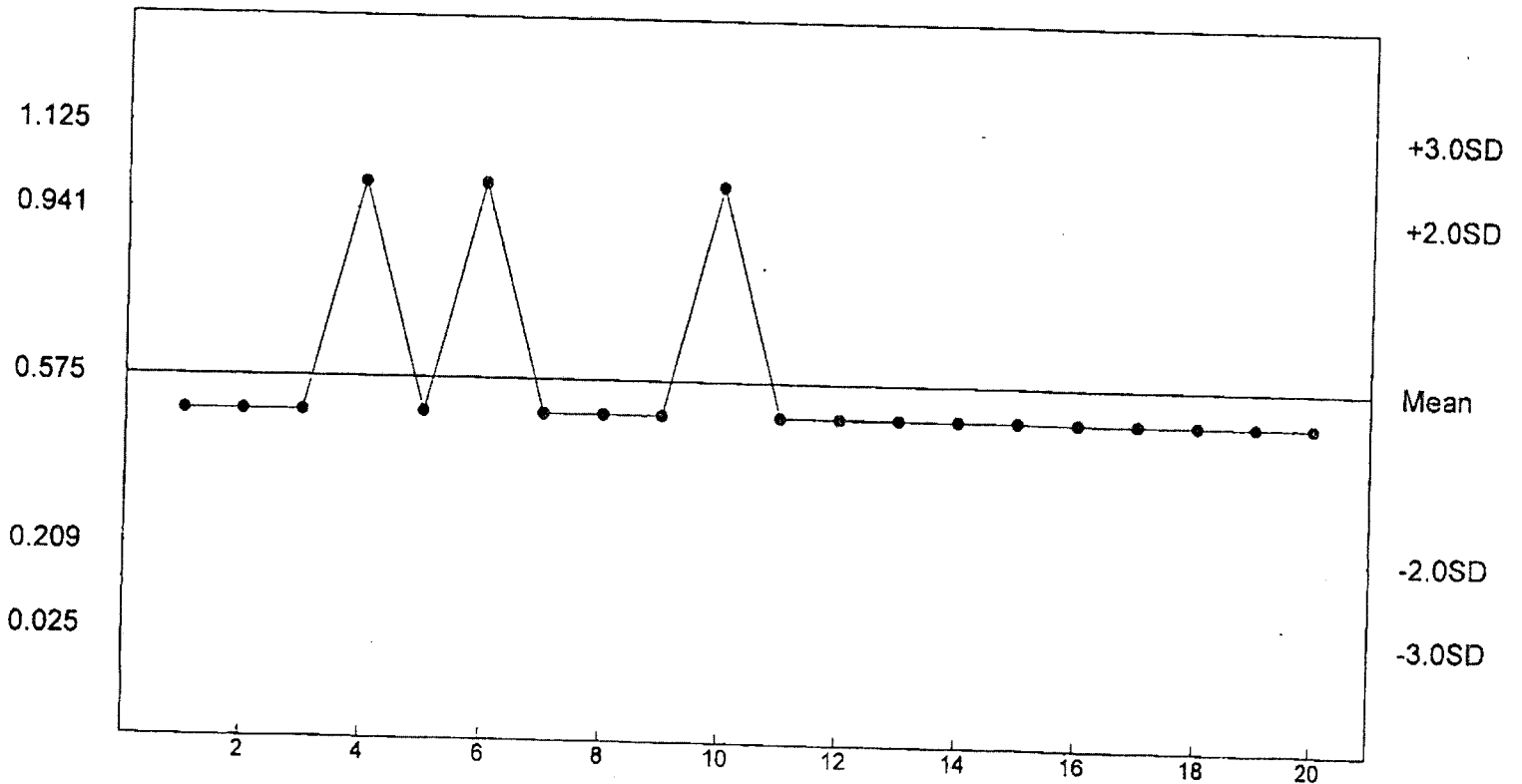
C. dubia Survival - NOEC



n= 20 Mean= 1.650 SD= 0.235 CV= 14.25% Min= 1.500 Max= 2.000

Reference Tox Sodium Chloride g/L

C. dubia Reproduction - NOEC



n= 20 Mean= 0.575 SD= 0.183 CV= 31.86% Min= 0.500 Max= 1.000

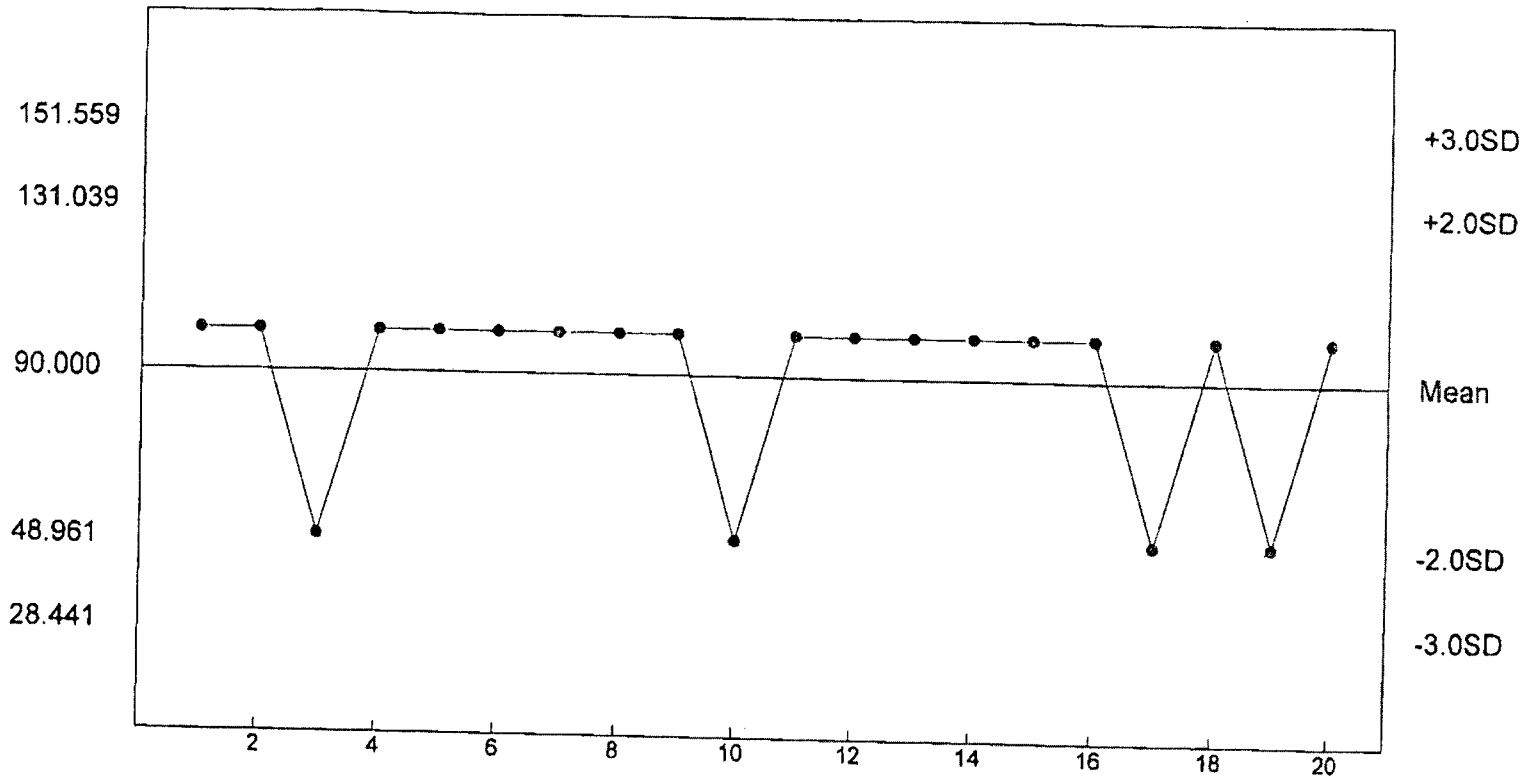
CHRONIC REFERENCE TOXICANT TEST RESULTS

SPECIES: *Pimephales promelas*
 CHEMICAL: Copper Nitrate
 DURATION: 7-Days
 TEST NUMBER: 10
 TEST DATE/TIME: 10/01/12 - 10/07/12
 1625 Hrs - 1625 Hrs
 STATISTICAL METHOD: Dunnetts/Steels

| CONCENTRATION (ug/L) | NUMBER EXPOSED | NUMBER DEAD |
|----------------------|----------------|-------------|
| 12.5 | 40 | 0 |
| 25 | 40 | 0 |
| 50 | 40 | 0 |
| 100 | 40 | 3 |
| 200 | 40 | 25 |
| 400 | 40 | 38 |
| 800 | 40 | 40 |

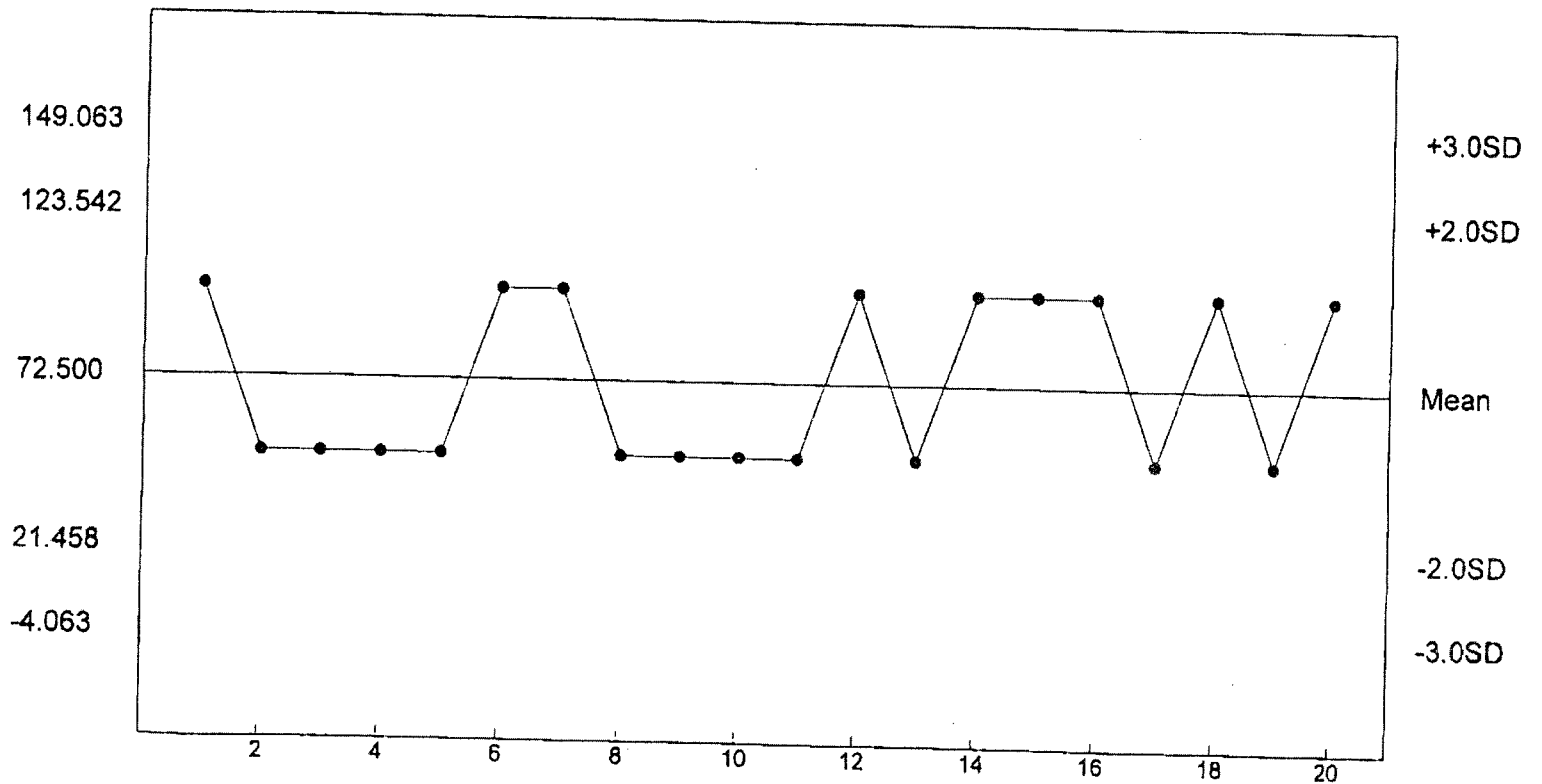
| LOEC FOR SURVIVAL | NOEC FOR SURVIVAL | LOEC FOR GROWTH | NOEC FOR GROWTH |
|-------------------|-------------------|-----------------|-----------------|
| 200 ug/L | 100 ug/L | 200 ug/L | 100 ug/L |

Reference Tox Copper Nitrate ug/L
P. promelas Chronic Survival - NOEC



n= 20 Mean= 90.000 SD= 20.520 CV= 22.80% Min= 50.000 Max= 100.000

Reference Tox Copper Nitrate ug/L
P. promelas Growth - NOEC



n= 20 Mean= 72.500 SD= 25.521 CV= 35.20% Min= 50.000 Max= 100.000

APPENDIX C
CHAIN OF CUSTODY SHEETS

HUTHER & ASSOCIATES
 1156 NORTH BONNIE BRAE STREET
 DENTON, TX 76201
 (940) 387-1025 • FAX (940) 387-1036

CHAIN OF CUSTODY RECORD

PROJECT # 20239 PROJECT NAME Mena PERMIT# NPDES AR003669

OUTFALL SAMPLES

24-Hr Flow Weighted Composite Other _____

| OUTFALL NUMBER | PERSON TAKING SAMPLE | START DATE/TIME | END DATE/TIME | # OF PORTIONS COMPOSITED | METHODS OF COLLECTION AND COMPOSITE | | | # OF CONTAINERS TO BE SHIPPED |
|----------------|----------------------|-------------------|-------------------|--------------------------|-------------------------------------|---------------------------|-------------------------|-------------------------------|
| | | | | | AUTO COLL. AUTO COMP. | MANUAL COLL. MANUAL COMP. | AUTO COLL. MANUAL COMP. | |
| 001 | Jeff | 0900 14 OCT 12 | 0900 15 OCT 12 | 24 | X | | | |
| | | | | | | | | |
| | | | | | | | | |

RECEIVING WATER SAMPLES

| SAMPLE IDENTIFICATION (FOR REC'NG) H.O GRABS, GIVE NAME OF STREAM AND LOCATION | PERSON TAKING SAMPLE | DATE | TIME | # OF CONTAINERS TO BE SHIPPED |
|---|----------------------|------|------|-------------------------------|
| | | | | |
| | | | | |

TYPE OF TEST 7 day C/F
 NAME OF RECEIVING WATER unnamed trib. of Prairie Creek
 DILUTION WATER USED FOR THIS TEST Lab

RELINQUISHED BY: Jeff DATE: 15 OCT 12 TIME: 1330 RECEIVED BY AT THIS DATE/TIME: UPS STORE - Hot Springs

RELINQUISHED BY: _____ DATE: _____ TIME: _____ RECEIVED BY AT THIS DATE/TIME: _____

RELINQUISHED BY: _____ DATE: _____ TIME: _____ RECEIVED BY AT THIS DATE/TIME: _____

METHOD OF SHIPMENT: Greyhound Pick Up _____ Client Delivered _____ Other UPS

RECEIVED: Matt Horner DATE: 10-16-12 TIME: 1030 SAMPLE TEMP. @ RECEIPT: 1.9

HUTHER & ASSOCIATES
 1156 NORTH BONNIE BRAE STREET
 DENTON, TX 76201
 (940) 387-1025 • FAX (940) 387-1036

CHAIN OF CUSTODY RECORD

PROJECT # 20239 PROJECT NAME Mena PERMIT# NRPDES AL0036092

OUTFALL SAMPLES

24-Hr Flow Weighted Composite Other _____

| OUTFALL NUMBER | PERSON TAKING SAMPLE | START DATE/TIME | END DATE/TIME | # OF PORTIONS COMPOSITED | METHODS OF COLLECTION AND COMPOSITE | | | # OF CONTAINERS TO BE SHIPPED |
|----------------|----------------------|---------------------|---------------------|--------------------------|-------------------------------------|---------------------------|-------------------------|-------------------------------|
| | | | | | AUTO COLL. AUTO COMP. | MANUAL COLL. MANUAL COMP. | AUTO COLL. MANUAL COMP. | |
| 001 | JEFF | 0900 16 OCT 2012 | 0900 17 OCT 2012 | 24 | X | | | |
| | | | | | | | | |
| | | | | | | | | |

RECEIVING WATER SAMPLES

| SAMPLE IDENTIFICATION (FOR REC'NG) H ₂ O GRABS, GIVE NAME OF STREAM AND LOCATION | PERSON TAKING SAMPLE | DATE | TIME | # OF CONTAINERS TO BE SHIPPED |
|---|----------------------|------|------|-------------------------------|
| | | | | |
| | | | | |

TYPE OF TEST 7 day C/E
 NAME OF RECEIVING WATER unnamed trib. of Prairie Creek
 DILUTION WATER USED FOR THIS TEST Lab

RELINQUISHED BY: JEFF DATE: 17 OCT 12 TIME: 1030 RECEIVED BY AT THIS DATE/TIME: UPS STORE 17 OCT 2012
 RELINQUISHED BY: _____ DATE: _____ TIME: _____ RECEIVED BY AT THIS DATE/TIME: _____
 RELINQUISHED BY: _____ DATE: _____ TIME: _____ RECEIVED BY AT THIS DATE/TIME: _____
 METHOD OF SHIPMENT: Greyhound Pick Up _____ Client Delivered _____ Other UPS
 RECEIVED: Matt Turner DATE: 10-18-12 TIME: 0930 SAMPLE TEMP. @ RECEIPT: 0.7

HUTHER & ASSOCIATES
 1156 NORTH BONNIE BRAE STREET
 DENTON, TX 76201
 (940) 387-1025 • FAX (940) 387-1036

CHAIN OF CUSTODY RECORD

PROJECT # 20239 PROJECT NAME Mena PERMIT# NPDES AR00310092

OUTFALL SAMPLES

24-Hr Flow Weighted Composite Other _____

| OUTFALL NUMBER | PERSON TAKING SAMPLE | START DATE/TIME | END DATE/TIME | # OF PORTIONS COMPOSITED | METHODS OF COLLECTION AND COMPOSITE | | | # OF CONTAINERS TO BE SHIPPED |
|----------------|----------------------|---------------------|---------------------|--------------------------|-------------------------------------|---------------------------|-------------------------|-------------------------------|
| | | | | | AUTO COLL. AUTO COMP. | MANUAL COLL. MANUAL COMP. | AUTO COLL. MANUAL COMP. | |
| 001 | JEFF | 0800 18 OCT 2012 | 0800 19 OCT 2012 | 24 | X | | | 1 |
| | | | | | | | | |
| | | | | | | | | |

RECEIVING WATER SAMPLES

| SAMPLE IDENTIFICATION (FOR REC'NG) H.O GRABS, GIVE NAME OF STREAM AND LOCATION | PERSON TAKING SAMPLE | DATE | TIME | # OF CONTAINERS TO BE SHIPPED |
|--|----------------------|------|------|-------------------------------|
| | | | | |
| | | | | |

TYPE OF TEST 7 day CF
 NAME OF RECEIVING WATER unnamed trib. of Prairie Creek
 DILUTION WATER USED FOR THIS TEST lab

RELINQUISHED BY: MIKE DATE: 19 OCT 12 TIME: 0930 RECEIVED BY AT THIS DATE/TIME: UPS STORE - HOT SPRING 19 OCT 2012 / 0930

RELINQUISHED BY: _____ DATE: _____ TIME: _____ RECEIVED BY AT THIS DATE/TIME: _____

RELINQUISHED BY: _____ DATE: _____ TIME: _____ RECEIVED BY AT THIS DATE/TIME: _____

METHOD OF SHIPMENT: Greyhound Pick Up _____ Client Delivered _____ Other UPS

RECEIVED: [Signature] DATE: 10-26-12 TIME: 0910 SAMPLE TEMP. @ RECEIPT: 38°

**CITY OF MENA WWTF
 NPDES PERMIT NO. AR0036692
 AFIN 57-00042
 BIOMONITORING REPORTING
 TEST DATE: 10/16/12**

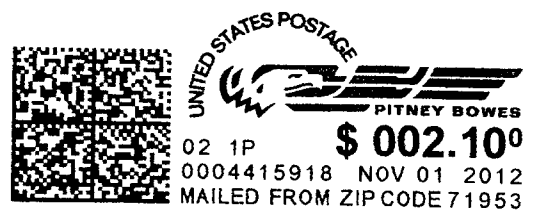
Ceriodaphnia dubia

| | Response |
|---|-----------------|
| A. If the NOEC for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter TLP3B | 0 |
| B. Report the NOEC value for survival. Parameter TOP3B | 100% |
| C. Report the NOEC value for reproduction. Parameter TPP3B | 100% |
| D. If the NOEC for reproduction is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter TGP3B | 0 |
| E. Report the higher (critical dilution or control) Coefficient of Variation (CV%), Parameter TQP3B | 9.85% |
| Report Parameter No. 22414 (lowest NOEC value) for <i>Ceriodaphnia dubia</i> . | 100% |

Pimephales promelas

| | Response |
|---|-----------------|
| A. If the NOEC for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter TLP6C | 0 |
| B. Report the NOEC value for survival. Parameter TOP6C | 100% |
| C. Report the NOEC value for reproduction. Parameter TPP6C | 100% |
| D. If the NOEC for reproduction is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter TGP6C | 0 |
| E. Report the higher (critical dilution or control) Coefficient of Variation (CV%), Parameter TQP6C | 9.71% |
| Report Parameter No. 22414 (lowest NOEC value) for <i>Pimephales promelas</i> . | 100% |

1
MENA WCTP
323 POIK 53
MENA AR
71953



ADEQ
5301 North Shore Dr
(ATTN: Bio Monitoring)
North Little Rock AR
72118-5317