



REFERENCE #60220782

Pace Analytical Services, Inc.
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**CHRONIC TOXICITY TEST FOR
City of Decatur**

PERMIT # AR0022292
AFIN # 04-00052

PERFORMED ON:

Pimephales promelas

and

Ceriodaphnia dubia

PREPARED FOR:

City of Decatur
Attn: James Boston
P.O. Box 247
Decatur, AR 72722
1-479-752-3912

PREPARED BY:
Pace Analytical Services, Inc.
808 West McKay
Frontenac, KS 66763
1-620-235-0003

June 16, 2016

REPORT OF LABORATORY ANALYSIS

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SUMMARY

A Chronic Whole Effluent Toxicity Test using the 7-day chronic fathead minnows (*Pimephales promelas*), static renewal larval survival and growth test, and three brood 7-day chronic Cladoceran (*Ceriodaphnia dubia*), static renewal survival and reproduction test, was conducted on effluent discharge water collected at the City of Decatur effluent discharge from June 7, 2016 to June 10, 2016. All the test methods followed are as listed in EPA 821-R-02-013, "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms."

Statistically significant ($p < 0.05$) mortality is determined by Dunnet's procedure using average percent survival of each test concentration versus the average survival of the controls. If significant mortality occurs, median lethal concentrations (LC50) are calculated using effluent concentrations and their corresponding percent mortality data. The LC50's and the 95% confidence intervals are calculated where appropriate by the Spearman-Kärber method. Statistical analysis is accomplished by following steps in EPA 821-R-02-013, November 2002 and by use of Toxstat version 3.4.

In minnow section of testing, it was observed that the effluent had no significant effect on the survival of the larvae at the 100% concentration. No significant mortality was observed in the other effluent concentrations after the 7-day exposure period. The No Observed Effect Concentration (NOEC) was determined to be 100% for survival. The LC50 was estimated to be >100% effluent. No significant reduction in growth was observed in the 100% effluent concentration. The Toxic Units is <1. The IC25 is >100. The NOEC for growth in effluent was determined to be 100%. The PMSD was 15.3.

In Cladoceran section of testing, it was observed that the effluent had no significant effect on the survival of the organisms in the 100% effluent concentration. No significant mortality was observed in the other effluent concentrations after the 7-day exposure period. The No Observed Effect Concentration (NOEC) was determined to be 100% for survival. The LC50 was estimated to be >100% effluent. No significant reduction in reproduction was observed in the 100% effluent concentrations. The Toxic Units is <1. The IC25 is >100. The NOEC for reproduction in effluent was determined to be 100%. The PMSD was 13.0.

The chronic toxicity exhibited by the fathead minnows and the *Ceriodaphnia* treated by the effluent sampled from June 7 to June 10 from the City of Decatur effluent discharge, is acceptable as described in EPA 821-R-02-013.

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INTRODUCTION

Pace Analytical was contracted to perform this chronic toxicity test on effluent from the City of Decatur effluent discharge. Chronic toxicity was measured using the Pimephales promelas at larval for survival and growth test and the Ceriodaphnia dubia survival and reproduction test described in EPA 821-R-02-013, "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms." The raw data of the study is stored at Pace Analytical Services, INC. 808 West McKay, Frontenac, KS 66763.

TEST MATERIAL

City of Decatur personnel collected sampling of the effluent. A sample of the effluent was delivered to Pace by commercial carrier on 6-7-16. Subsequent samples followed by delivery on 6-8-16 and on 6-10-16. All samples were stored at $\leq 6^{\circ}$ Celsius. Moderately Hard Synthetic Water was used as a control and also to make the required dilutions in the test as described in EPA 821-R-02-013.

TEST METHODS

Pace used EPA test method 1000.0 for conducting the Fathead Minnow, Pimephales promelas, Larval Survival and Growth Test. EPA test method 1002.0 was used for conducting the Cladoceran, Ceriodaphnia dubia, Survival and Reproduction Test. The tests were conducted to estimate the LC50, NOEC, and LOEC for survival, growth, and reproduction of these test species.

The Pimephales and Ceriodaphnia tests were initiated on 6-7-16 and carried out until 6-14-16. The Pimephales tests were conducted in 500 ml plastic jars with 250 ml of test solution. Eight larvae were placed in each of at least 5 replicates to make a total of 40 larvae per sample concentration. The Ceriodaphnia tests were carried out in 35ml vials containing 25 ml of test solution. One Neonate was placed in each of 10 replicates to make a total of 10 neonates per sample concentration.

TEST ORGANISMS

The organisms used in these tests were cultured at Pace under controlled temperature and photoperiod conditions and/or were purchased from an external supplier. Pace maintains records of all culture techniques used in producing organisms.

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RESULTS

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TABLE 1

Permittee: City of Decatur Effluent discharge.

| | | | |
|-----------------------|--------|---------|------|
| Date Sampled | No. 1: | 6-7-16 | 8:00 |
| | No. 2: | 6-8-16 | 7:30 |
| | No. 3: | 6-10-16 | 7:30 |
| Test Initiated: 14:50 | Date: | 6-7-16 | |

Dilution Water used: Moderately Hard Synthetic Water

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL
(Pimephales promelas)

DATA TABLE FOR GROWTH OF FATHEAD MINNOWS

| Effluent Concentration (%) | Average Dry Weight in Milligrams in Replicate Chambers | | | | | Mean Dry Weight (mg) | CV% * |
|----------------------------|--|-------|-------|-------|-------|----------------------|-------|
| | A | B | C | D | E | | |
| Control 0% | 0.379 | 0.432 | 0.407 | 0.336 | 0.419 | 0.395 | 9.67 |
| Dilution 1 32% | 0.361 | 0.454 | 0.343 | 0.433 | 0.446 | 0.407 | 12.65 |
| Dilution 2 42% | 0.436 | 0.360 | 0.366 | 0.382 | 0.439 | 0.397 | 9.63 |
| Dilution 3 56% | 0.401 | 0.367 | 0.431 | 0.374 | 0.421 | 0.399 | 7.05 |
| Dilution 4 75% | 0.374 | 0.349 | 0.380 | 0.377 | 0.439 | 0.384 | 8.66 |
| Dilution 5 100% | 0.322 | 0.305 | 0.397 | 0.376 | 0.420 | 0.364 | 13.47 |

* Coefficient of Variation = Standard Deviation X 100 / Mean

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Permittee: City of Decatur Effluent discharge.

FATHEAD MINNOW SURVIVAL

| Conc. % | Percent Survival in Replicate Chambers | | | | | Mean Percent Survival | | | CV % |
|--------------------|--|------|------|------|-----|-----------------------|------|-------|------|
| | A | B | C | D | E | 24hr | 48hr | 7 day | |
| Control 0% | 100 | 100 | 100 | 87.5 | 100 | 100 | 100 | 97.5 | 4.79 |
| Dilution 1 32% | 87.5 | 100 | 87.5 | 100 | 100 | 100 | 100 | 95 | 5.99 |
| Dilution 2 42% | 100 | 87.5 | 87.5 | 100 | 100 | 100 | 100 | 95 | 5.99 |
| Dilution 3 56% | 100 | 87.5 | 100 | 100 | 100 | 100 | 100 | 97.5 | 4.79 |
| Dilution 4 75% | 100 | 87.5 | 100 | 100 | 100 | 100 | 100 | 97.5 | 4.79 |
| Dilution 5 100% | 87.5 | 87.5 | 100 | 100 | 100 | 100 | 100 | 95 | 5.99 |

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Permittee: City of Decatur Effluent discharge.

CERIODAPHNIA SURVIVAL AND REPRODUCTION

DATA TABLE FOR CERIODAPHNIA YOUNG PRODUCTION

| Replicate | Control 0% | Dilution 1 32% | Dilution 2 42% | Dilution 3 56% | Dilution 4 75% | Dilution 5 100% |
|-----------|---------------|-------------------|-------------------|-------------------|-------------------|--------------------|
| 1 | 20 | 22 | 24 | 18 | 24 | 19 |
| 2 | 21 | 21 | 24 | 23 | 22 | 24 |
| 3 | 25 | 19 | 23 | 25 | 17 | 20 |
| 4 | 22 | 18 | 22 | 23 | 23 | 25 |
| 5 | 19 | 23 | 17 | 26 | 25 | 24 |
| 6 | 18 | 21 | 25 | 24 | 24 | 24 |
| 7 | 18 | 26 | 25 | 23 | 23 | 23 |
| 8 | 18 | 26 | 24 | 20 | 26 | 26 |
| 9 | 24 | 19 | 25 | 23 | 22 | 25 |
| 10 | 24 | 23 | 26 | 23 | 23 | 17 |
| Mean | 20.9 | 21.8 | 23.5 | 22.8 | 22.9 | 22.7 |
| SD | 2.726 | 2.781 | 2.550 | 2.300 | 2.424 | 2.983 |
| CV % | 13.05 | 12.76 | 10.85 | 10.09 | 10.59 | 13.14 |

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Permittee: City of Decatur Effluent discharge.

CERIODAPHNIA MEAN PERCENT SURVIVAL

| Time Elapsed | Percent Effluent (%) | | | | | |
|--------------|----------------------|----------------|----------------|----------------|----------------|-----------------|
| | Control 0% | Dilution 1 32% | Dilution 2 42% | Dilution 3 56% | Dilution 4 75% | Dilution 5 100% |
| 24 hrs | 100 | 100 | 100 | 100 | 100 | 100 |
| 48 hrs | 100 | 100 | 100 | 100 | 100 | 100 |
| 7-day | 100 | 100 | 100 | 100 | 100 | 100 |
| SD | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| CV % | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |

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TABLE 2
SUMMARY OF TEST CONDITIONS FOR THE FATHEAD MINNOW
(*Pimephales promelas*) LARVAL SURVIVAL AND GROWTH TEST

| | |
|-----------------------------------|---|
| 1. Test type | Static renewal |
| 2. Temperature | 25 degrees Celsius |
| 3. Light quality | Ambient laboratory light |
| 4. Light intensity | Ambient laboratory levels |
| 5. Photoperiod | 16 hr light, 8 hr dark |
| 6. Test chamber size | 500 ml |
| 7. Test solution volume | 250 ml |
| 8. Renewal of test concentrations | Daily |
| 9. Age of test organism | < 24 hours |
| 10. No. larvae/chamber | 8 |
| 11. No. replicates/concentration | 5 |
| 12. No. larvae/concentration | 40 |
| 13. Feeding regime | Feed 0.1 ml newly hatched brine shrimp nauplii three times daily. Larvae are not fed 12 hours prior to termination of test. |
| 14. Cleaning | Siphon daily, immediately before test solution renewal |
| 16. Aeration | None |

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TABLE 2 (CONT.)

| | |
|-----------------------------|--|
| 16. Dilution Water | Moderately Hard Synthetic Water prepared with MILLI-Q deionized water and reagent grade chemicals |
| 17. Effluent concentrations | 0%, 32%, 42%, 56%, 75%, 100% |
| 18. Test duration | 7 days |
| 19. Endpoints | Survival and growth |
| 20. Test acceptability | 80% or greater survival in the controls, Average dry weight in controls >0.25 mg, Coefficient of variation in the control must not exceed 40%. |

**TABLE 2 (CONT.)
SUMMARY OF TEST CONDITIONS FOR THE CLADOCERAN
(Ceriodaphnia dubia) SURVIVAL AND REPRODUCTION TEST**

| | |
|-------------------------|---------------------------|
| 1. Test type | Static renewal |
| 2. Temperature | 25 degrees Celsius |
| 3. Light quality | Ambient laboratory light |
| 4. Light intensity | Ambient laboratory levels |
| 5. Photoperiod | 16 hr light, 8 hr dark |
| 6. Test chamber size | 30 ml |
| 7. Test solution volume | 25 ml |

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TABLE 2 (CONT.)

| | |
|-----------------------------------|--|
| 8. Renewal of test concentrations | Daily |
| 9. Age of test organism | < 24 hours |
| 10. No. larvae/chamber | 1 |
| 11. No. replicates/concentration | 10 |
| 12. No. larvae/concentration | 10 |
| 13. Feeding regime | Feed 0.1 ml YCT three times daily. Larvae are not fed 12 hours prior to termination of test. |
| 14. Cleaning | Siphon daily, immediately before test solution renewal |
| 16. Aeration | None |
| 16. Dilution Water | Moderately Hard Synthetic Water prepared with MILLI-Q deionized water and reagent grade chemicals |
| 17. Effluent concentrations | 0%, 32%, 42%, 56%, 75%, 100% |
| 18. Test duration | Until 60% or more surviving control females have three broods or a maximum of 8 days. |
| 19. Endpoints | Survival and Reproduction |
| 20. Test acceptability | 80% or greater survival in the controls, Average reproduction rate of 16 young / adult. Coefficient of variation in the control must not exceed 40%. |

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TABLE 2 (SECTION 2)

**BIOMONITORING CHRONIC TOXICITY REPORT
 FATHEAD MINNOW (*Pimephales promelas*)
 CHEMICAL PARAMETERS CHART**

Permittee: City of Decatur Effluent discharge.

ANALYSTS: Pace Analytical Services, Inc.
 Timothy Harrell
 Mike Bollin

SAMPLE NO. 1 COLLECTED: DATE: 6-7-16

SAMPLE NO. 2 COLLECTED: DATE: 6-8-16

SAMPLE NO. 3 COLLECTED: DATE: 6-10-16

**TABLE 2 (SECTION 2)
 INITIAL WATER QUALITY
 EFFLUENT CONCENTRATION**

| | Control | 100% |
|----------|---------|------|
| PH | 7.54 | 7.61 |
| D.O. | 8.10 | 8.40 |
| Temp | 25.0 | 25.0 |
| Alk | 60 | 202 |
| Hard | 92 | 130 |
| Cond | 308 | 764 |
| Chlorine | <0.1 | <0.1 |

- * D.O. is reported as mg/L
- Alkalinity is reported as mg/L CaCO₃
- Hardness is reported as mg/L CaCO₃
- Conductance is reported as umhos
- Ammonia is reported as mg/L
- Chlorine is reported as mg/L

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TEST WATER QUALITY

24-Hour Water Quality Measurements

| Effluent Concentration (%) | PH | D.O. (mg/l) | Temperature (C) |
|----------------------------|------|-------------|-----------------|
| 0% Control | 7.43 | 7.00 | 25.0 |
| 32% Effluent | 7.59 | 7.10 | 25.1 |
| 42% Effluent | 7.66 | 7.10 | 25.1 |
| 56% Effluent | 7.73 | 7.20 | 25.1 |
| 75% Effluent | 7.78 | 7.30 | 25.1 |
| 100% Effluent | 7.82 | 7.40 | 25.1 |

48-Hour Water Quality Measurements

| Effluent Concentration (%) | PH | D.O. (mg/l) | Temperature (C) |
|----------------------------|------|-------------|-----------------|
| 0% Control | 7.46 | 6.80 | 25.1 |
| 32% Effluent | 7.56 | 6.90 | 25.0 |
| 42% Effluent | 7.64 | 6.90 | 25.0 |
| 56% Effluent | 7.77 | 7.00 | 25.0 |
| 75% Effluent | 7.92 | 7.00 | 25.0 |
| 100% Effluent | 8.07 | 7.10 | 25.0 |

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FINAL WATER QUALITY

EFFLUENT CONCENTRATION

| | Control | 100% |
|------|---------|------|
| pH | 7.62 | 8.23 |
| D.O. | 7.00 | 7.10 |
| Temp | 25.1 | 25.0 |
| Alk | 60 | 188 |
| Hard | 88 | 144 |
| Cond | 382 | 1430 |

- * D.O. is reported as mg/L
- Alkalinity is reported as mg/L CaCO₃
- Hardness is reported as mg/L CaCO₃
- Conductance is reported as umhos

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TEST VALIDITY

The Pimephales promelas control survival rate was 97.5%. The mean dry weight (growth) of the Pimephales promelas was determined at 0.395 mg/organism in the controls. The percent coefficient of variation (%CV) values for the fathead minnow control for survival and growth were 4.79 and 9.67. The Ceriodaphnia dubia survival rates were 100 in the control. The Ceriodaphnia in the control produced an average of 20.9 young over the seven-day exposure period. Percent CV values for Ceriodaphnia dubia control survival and reproduction was 0.00 and 13.05. Control data met or exceeded all criteria set out by EPA 821-R-02-013 for test acceptance.

CONCLUSIONS

The No Observed Effect Concentration (NOEC) for Pimephales promelas was 100% for survival and 100% for growth. The No Observed Effect Concentration (NOEC) for Ceriodaphnia dubia was 100% for Survival and 100% for Reproduction. The tests were ran using a synthetic control against effluent concentrations of 32%, 42%, 56%, 75%, and 100%. The effluent sampled on 6-7-16, 6-8-16, and 6-10-16 exhibited acceptable chronic toxicity in Pimephales promelas and in Ceriodaphnia dubia during the exposure period as described in EPA 821-R-02-013.

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APPENDIX C

REFERENCE TOXICANTS

The absence of significant control mortality during this test indicated the health of the organisms and indicated that any significant mortality in the test concentrations was not due to contaminants or variations in testing conditions.

Reference toxicity testing is routinely performed by staff members in our biomonitoring - bioassay laboratory.

Start: 6/7/16 14:50 End: 6/14/16 14:00

Reference Toxicant (NaCl) Pimephales promelas

| Concentration of Toxicant | Avg. # of Live Organisms/replicate | | | |
|---------------------------|------------------------------------|--------|--------|--------|
| | 0 hrs | 24 hrs | 48 hrs | 7 days |
| 10 g/l | 40 | 6 | 1 | 0 |
| 8 g/l | 40 | 34 | 23 | 3 |
| 6 g/l | 40 | 37 | 33 | 22 |
| 4 g/l | 40 | 40 | 40 | 39 |
| 2 g/l | 40 | 40 | 40 | 40 |

IC25 (4.89 g/l Sodium Chloride)

Survival NOEC: 4.0 g/l

Reference Toxicant (NaCl) Ceriodaphnia Dubia

| Concentration of Toxicant | Avg. # of Live Organisms/replicate | | | |
|---------------------------|------------------------------------|--------|--------|--------|
| | 0 hrs | 24 hrs | 48 hrs | 7 days |
| 2.5 g/l | 10 | 5 | 0 | 0 |
| 2.0 g/l | 10 | 10 | 9 | 2 |
| 1.5 g/l | 10 | 10 | 10 | 10 |
| 1.0 g/l | 10 | 10 | 10 | 10 |
| 0.5 g/l | 10 | 10 | 10 | 10 |

IC25 (1.16 g/l Sodium Chloride)

Survival NOEC: 1.5 g/l

Submitted By: _____
 Timothy Harrell, Technical Director

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File: 6220782A Transform: ARC SINE(SQUARE ROOT(Y))

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 | 2.010 | 7.260 | 11.460 | 7.260 | 2.010 |
| OBSERVED | 3 | 6 | 12 | 9 | 0 |

Calculated Chi-Square goodness of fit test statistic = 3.1588
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

60220782 Decatur FATHEAD SURVIVAL
File: 6220782A Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.081

W = 0.731

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

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

Data FAIL normality test. Try another transformation.

Warning - The first three homogeneity tests are sensitive to non-normal data and should not be performed.

60220782 Decatur FATHEAD SURVIVAL

File: 6220782A Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

| GRP | IDENTIFICATION | N | MIN | MAX | MEAN |
|-----|----------------|---|-------|-------|-------|
| 1 | CONTROL | 5 | 0.991 | 1.107 | 1.084 |
| 2 | 32% | 5 | 0.991 | 1.107 | 1.061 |
| 3 | 42% | 5 | 0.991 | 1.107 | 1.061 |
| 4 | 56% | 5 | 0.991 | 1.107 | 1.084 |
| 5 | 75% | 5 | 0.991 | 1.107 | 1.084 |
| 6 | 100% | 5 | 0.991 | 1.107 | 1.061 |

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File: 6220782A Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

| GRP | IDENTIFICATION | VARIANCE | SD | SEM | C.V. % |
|-----|----------------|----------|-------|-------|--------|
| 1 | CONTROL | 0.003 | 0.052 | 0.023 | 4.79 |
| 2 | 32% | 0.004 | 0.064 | 0.028 | 5.99 |
| 3 | 42% | 0.004 | 0.064 | 0.028 | 5.99 |
| 4 | 56% | 0.003 | 0.052 | 0.023 | 4.79 |
| 5 | 75% | 0.003 | 0.052 | 0.023 | 4.79 |
| 6 | 100% | 0.004 | 0.064 | 0.028 | 5.99 |

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File: 6220782A Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

| SOURCE | DF | SS | MS | F |
|----------------|----|-------|-------|-------|
| Between | 5 | 0.004 | 0.001 | 0.240 |
| Within (Error) | 24 | 0.081 | 0.003 | |
| Total | 29 | 0.085 | | |

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

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

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File: 6220782A Transform: ARC SINE(SQUARE ROOT(Y))

DUNNETT'S TEST

- TABLE 1 OF 2

Ho:Control<Treatment

| GROUP | IDENTIFICATION | TRANSFORMED MEAN | MEAN CALCULATED IN ORIGINAL UNITS | T STAT | SIG |
|-------|----------------|---------------------|--------------------------------------|--------|-----|
| 1 | CONTROL | 1.084 | 0.780 | | |
| 2 | 32% | 1.061 | 0.760 | 0.632 | |
| 3 | 42% | 1.061 | 0.760 | 0.632 | |
| 4 | 56% | 1.084 | 0.780 | 0.000 | |
| 5 | 75% | 1.084 | 0.780 | 0.000 | |
| 6 | 100% | 1.061 | 0.760 | 0.632 | |

Dunnett table value = 2.36 (1 Tailed Value, P=0.05, df=24,5)

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File: 6220782A

Transform: ARC SINE(SQUARE ROOT(Y))

DUNNETT'S 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 | 5 | | | |
| 2 | 32% | 5 | 0.075 | 9.7 | 0.020 |
| 3 | 42% | 5 | 0.075 | 9.7 | 0.020 |
| 4 | 56% | 5 | 0.075 | 9.7 | 0.000 |
| 5 | 75% | 5 | 0.075 | 9.7 | 0.000 |
| 6 | 100% | 5 | 0.075 | 9.7 | 0.020 |

60220782 Decatur FATHEAD GROWTH
File: 6220782B Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

D = 0.039

W = 0.940

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.

60220782 Decatur FATHEAD GROWTH
File: 6220782B Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance

Calculated B1 statistic = 1.88

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.

60220782 Decatur FATHEAD GROWTH
 File: 6220782B Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

| GRP | IDENTIFICATION | N | MIN | MAX | MEAN |
|-----|----------------|---|-------|-------|-------|
| 1 | CONTROL | 5 | 0.336 | 0.432 | 0.395 |
| 2 | 32% | 5 | 0.343 | 0.454 | 0.407 |
| 3 | 42% | 5 | 0.360 | 0.439 | 0.397 |
| 4 | 56% | 5 | 0.367 | 0.431 | 0.399 |
| 5 | 75% | 5 | 0.349 | 0.439 | 0.384 |
| 6 | 100% | 5 | 0.305 | 0.420 | 0.364 |

60220782 Decatur FATHEAD GROWTH
 File: 6220782B Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

| GRP | IDENTIFICATION | VARIANCE | SD | SEM | C.V. % |
|-----|----------------|----------|-------|-------|--------|
| 1 | CONTROL | 0.001 | 0.038 | 0.017 | 9.67 |
| 2 | 32% | 0.003 | 0.052 | 0.023 | 12.65 |
| 3 | 42% | 0.001 | 0.038 | 0.017 | 9.63 |
| 4 | 56% | 0.001 | 0.028 | 0.013 | 7.05 |
| 5 | 75% | 0.001 | 0.033 | 0.015 | 8.66 |
| 6 | 100% | 0.002 | 0.049 | 0.022 | 13.47 |

60220782 Decatur FATHEAD GROWTH
 File: 6220782B Transform: NO TRANSFORMATION

ANOVA TABLE

| SOURCE | DF | SS | MS | F |
|----------------|----|-------|-------|-------|
| Between | 5 | 0.006 | 0.001 | 0.702 |
| Within (Error) | 24 | 0.039 | 0.002 | |
| Total | 29 | 0.045 | | |

Critical F value = 2.62 (0.05,5,24)
 Since F < Critical F FAIL TO REJECT Ho: All equal

60220782 Decatur FATHEAD GROWTH
 File: 6220782B Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 1 OF 2

Ho:Control<Treatment

| GROUP | IDENTIFICATION | TRANSFORMED MEAN | MEAN CALCULATED IN ORIGINAL UNITS | T STAT | SIG |
|-------|----------------|------------------|-----------------------------------|--------|-----|
| 1 | CONTROL | 0.395 | 0.395 | | |
| 2 | 32% | 0.407 | 0.407 | -0.499 | |
| 3 | 42% | 0.397 | 0.397 | -0.078 | |
| 4 | 56% | 0.399 | 0.399 | -0.164 | |
| 5 | 75% | 0.384 | 0.384 | 0.421 | |
| 6 | 100% | 0.364 | 0.364 | 1.193 | |

Dunnett table value = 2.36 (1 Tailed Value, P=0.05, df=24,5)

60220782 Decatur FATHEAD GROWTH

File: 6220782B Transform: NO TRANSFORMATION

DUNNETT'S 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 | 5 | | | |
| 2 | 32% | 5 | 0.061 | 15.3 | -0.013 |
| 3 | 42% | 5 | 0.061 | 15.3 | -0.002 |
| 4 | 56% | 5 | 0.061 | 15.3 | -0.004 |
| 5 | 75% | 5 | 0.061 | 15.3 | 0.011 |
| 6 | 100% | 5 | 0.061 | 15.3 | 0.031 |

FISHER'S EXACT TEST

NUMBER OF

| IDENTIFICATION | ALIVE | DEAD | TOTAL ANIMALS |
|----------------|-------|------|---------------|
| CONTROL | 10 | 0 | 10 |
| 32% | 10 | 0 | 10 |
| TOTAL | 20 | 0 | 20 |

CRITICAL FISHER'S VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 10.
 Since b is greater than 6 there is no significant difference
 between CONTROL and TREATMENT at the 0.05 level.

FISHER'S EXACT TEST

NUMBER OF

| IDENTIFICATION | ALIVE | DEAD | TOTAL ANIMALS |
|----------------|-------|------|---------------|
| CONTROL | 10 | 0 | 10 |
| 42% | 10 | 0 | 10 |
| TOTAL | 20 | 0 | 20 |

CRITICAL FISHER'S VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 10.
 Since b is greater than 6 there is no significant difference
 between CONTROL and TREATMENT at the 0.05 level.

FISHER'S EXACT TEST

NUMBER OF

| IDENTIFICATION | ALIVE | DEAD | TOTAL ANIMALS |
|----------------|-------|------|---------------|
| CONTROL | 10 | 0 | 10 |
| 56% | 10 | 0 | 10 |

TOTAL 20 0 20

CRITICAL FISHER'S VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 10.
Since b is greater than 6 there is no significant difference
between CONTROL and TREATMENT at the 0.05 level.

FISHER'S EXACT TEST

NUMBER OF

| IDENTIFICATION | ALIVE | DEAD | TOTAL ANIMALS |
|----------------|-------|------|---------------|
| CONTROL | 10 | 0 | 10 |
| 75% | 10 | 0 | 10 |
| TOTAL | 20 | 0 | 20 |

CRITICAL FISHER'S VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 10.
Since b is greater than 6 there is no significant difference
between CONTROL and TREATMENT at the 0.05 level.

FISHER'S EXACT TEST

NUMBER OF

| IDENTIFICATION | ALIVE | DEAD | TOTAL ANIMALS |
|----------------|-------|------|---------------|
| CONTROL | 10 | 0 | 10 |
| 100% | 10 | 0 | 10 |
| TOTAL | 20 | 0 | 20 |

CRITICAL FISHER'S VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 10.
Since b is greater than 6 there is no significant difference
between CONTROL and TREATMENT at the 0.05 level.

SUMMARY OF FISHER'S EXACT TESTS

NUMBER NUMBER SIG

| GROUP | IDENTIFICATION | EXPOSED | DEAD | (P= .05) |
|-------|----------------|---------|------|----------|
| | CONTROL | 10 | 0 | |
| 1 | 32% | 10 | 0 | |
| 2 | 42% | 10 | 0 | |
| 3 | 56% | 10 | 0 | |
| 4 | 75% | 10 | 0 | |
| 5 | 100% | 10 | 0 | |

60220782 Decatur CERIODAPHNIA DUBIA SURVIVAL
File: 6220782D Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

| GRP | IDENTIFICATION | N | MIN | MAX | MEAN |
|-----|----------------|----|-------|-------|-------|
| 1 | CONTROL | 10 | 1.000 | 1.000 | 1.000 |
| 2 | 32% | 10 | 1.000 | 1.000 | 1.000 |
| 3 | 42% | 10 | 1.000 | 1.000 | 1.000 |
| 4 | 56% | 10 | 1.000 | 1.000 | 1.000 |
| 5 | 75% | 10 | 1.000 | 1.000 | 1.000 |
| 6 | 100% | 10 | 1.000 | 1.000 | 1.000 |

60220782 Decatur CERIODAPHNIA DUBIA SURVIVAL
File: 6220782D Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

| GRP | IDENTIFICATION | VARIANCE | SD | SEM | C.V. % |
|-----|----------------|----------|-------|-------|--------|
| 1 | CONTROL | 0.000 | 0.000 | 0.000 | 0.00 |
| 2 | 32% | 0.000 | 0.000 | 0.000 | 0.00 |
| 3 | 42% | 0.000 | 0.000 | 0.000 | 0.00 |
| 4 | 56% | 0.000 | 0.000 | 0.000 | 0.00 |
| 5 | 75% | 0.000 | 0.000 | 0.000 | 0.00 |
| 6 | 100% | 0.000 | 0.000 | 0.000 | 0.00 |

60220782 Decatur CERIODAPHNIA DUBIA REPRODU
File: 6220782E Transform: NO TRANSFORMATION

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 | 4 | 11 | 28 | 14 | 3 |

Calculated Chi-Square goodness of fit test statistic = 2.2568

Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

60220782 Decatur CERIODAPHNIA DUBIA REPRODU
File: 6220782E Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance

Calculated B1 statistic = 0.79

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.

60220782 Decatur CERIODAPHNIA DUBIA REPRODU
 File: 6220782E Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

| GRP | IDENTIFICATION | N | MIN | MAX | MEAN |
|-----|----------------|----|--------|--------|--------|
| 1 | CONTROL | 10 | 18.000 | 25.000 | 20.900 |
| 2 | 32% | 10 | 18.000 | 26.000 | 21.800 |
| 3 | 42% | 10 | 17.000 | 26.000 | 23.500 |
| 4 | 56% | 10 | 18.000 | 26.000 | 22.800 |
| 5 | 75% | 10 | 17.000 | 26.000 | 22.900 |
| 6 | 100% | 10 | 17.000 | 26.000 | 22.700 |

60220782 Decatur CERIODAPHNIA DUBIA REPRODU
 File: 6220782E Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

| GRP | IDENTIFICATION | VARIANCE | SD | SEM | C.V. % |
|-----|----------------|----------|-------|-------|--------|
| 1 | CONTROL | 7.433 | 2.726 | 0.862 | 13.05 |
| 2 | 32% | 7.733 | 2.781 | 0.879 | 12.76 |
| 3 | 42% | 6.500 | 2.550 | 0.806 | 10.85 |
| 4 | 56% | 5.289 | 2.300 | 0.727 | 10.09 |
| 5 | 75% | 5.878 | 2.424 | 0.767 | 10.59 |
| 6 | 100% | 8.900 | 2.983 | 0.943 | 13.14 |

60220782 Decatur CERIODAPHNIA DUBIA REPRODU
 File: 6220782E Transform: NO TRANSFORMATION

ANOVA TABLE

| SOURCE | DF | SS | MS | F |
|----------------|----|---------|-------|-------|
| Between | 5 | 43.133 | 8.627 | 1.240 |
| Within (Error) | 54 | 375.600 | 6.956 | |
| Total | 59 | 418.733 | | |

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

60220782 Decatur CERIODAPHNIA DUBIA REPRODU
 File: 6220782E Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 1 OF 2 Ho:Control<Treatment

| GROUP | IDENTIFICATION | TRANSFORMED MEAN | MEAN CALCULATED IN ORIGINAL UNITS | T STAT | SIG |
|-------|----------------|------------------|-----------------------------------|--------|-----|
| 1 | CONTROL | 20.900 | 20.900 | | |
| 2 | 32% | 21.800 | 21.800 | -0.763 | |
| 3 | 42% | 23.500 | 23.500 | -2.204 | |
| 4 | 56% | 22.800 | 22.800 | -1.611 | |
| 5 | 75% | 22.900 | 22.900 | -1.696 | |
| 6 | 100% | 22.700 | 22.700 | -1.526 | |

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

60220782 Decatur CERIODAPHNIA DUBIA REPRODU
 File: 6220782E Transform: NO TRANSFORMATION

DUNNETT'S 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 | 2.725 | 13.0 | -0.900 |
| 3 | 42% | 10 | 2.725 | 13.0 | -2.600 |
| 4 | 56% | 10 | 2.725 | 13.0 | -1.900 |
| 5 | 75% | 10 | 2.725 | 13.0 | -2.000 |
| 6 | 100% | 10 | 2.725 | 13.0 | -1.800 |

| Conc. ID | 1 | 2 | 3 | 4 | 5 | 6 |
|--------------|----|----|----|----|----|-----|
| Conc. Tested | 0 | 32 | 42 | 56 | 75 | 100 |
| Response 1 | 20 | 22 | 24 | 18 | 24 | 19 |
| Response 2 | 21 | 21 | 24 | 23 | 22 | 24 |
| Response 3 | 25 | 19 | 23 | 25 | 17 | 20 |
| Response 4 | 22 | 18 | 22 | 23 | 23 | 25 |
| Response 5 | 19 | 23 | 17 | 26 | 25 | 24 |
| Response 6 | 18 | 21 | 25 | 24 | 24 | 24 |
| Response 7 | 18 | 26 | 25 | 23 | 23 | 23 |
| Response 8 | 18 | 26 | 24 | 20 | 26 | 26 |
| Response 9 | 24 | 19 | 25 | 23 | 22 | 25 |
| Response 10 | 24 | 23 | 26 | 23 | 23 | 17 |

*** Inhibition Concentration Percentage Estimate ***

Toxicant/Effluent: Decatur

Test Start Date: 6/7/16 Test Ending Date: 6/14/16

Test Species: Dubia

Test Duration: 7 Day

DATA FILE:

| Conc. ID | Number Replicates | Concentration | Response Means | Std. Dev. | Pooled Response Means |
|----------|-------------------|---------------|----------------|-----------|-----------------------|
| 1 | 10 | 0.000 | 20.900 | 2.726 | 22.433 |
| 2 | 10 | 32.000 | 21.800 | 2.781 | 22.433 |
| 3 | 10 | 42.000 | 23.500 | 2.550 | 22.433 |
| 4 | 10 | 56.000 | 22.800 | 2.300 | 22.433 |
| 5 | 10 | 75.000 | 22.900 | 2.424 | 22.433 |
| 6 | 10 | 100.000 | 22.700 | 2.983 | 22.433 |

*** No Linear Interpolation Estimate can be calculated from the input data since none of the (possibly pooled) group response means were less than 75% of the control response mean.

| Conc. ID | 1 | 2 | 3 | 4 | 5 | 6 |
|--------------|------|------|------|------|------|------|
| Conc. Tested | 0 | 32 | 42 | 56 | 75 | 100 |
| Response 1 | .379 | .361 | .436 | .401 | .374 | .322 |
| Response 2 | .432 | .454 | .360 | .367 | .349 | .305 |
| Response 3 | .407 | .343 | .366 | .431 | .380 | .397 |
| Response 4 | .336 | .433 | .382 | .374 | .377 | .376 |
| Response 5 | .419 | .446 | .439 | .421 | .439 | .420 |

*** Inhibition Concentration Percentage Estimate ***

Toxicant/Effluent: Decatur

Test Start Date: 6/7/16 Test Ending Date: 6/14/16

Test Species: Fathead

Test Duration: 7 Day

DATA FILE:

| Conc. ID | Number Replicates | Concentration | Response Means | Std. Dev. | Pooled Response Means |
|----------|-------------------|---------------|----------------|-----------|-----------------------|
| 1 | 5 | 0.000 | 0.395 | 0.038 | 0.401 |
| 2 | 5 | 32.000 | 0.407 | 0.052 | 0.401 |
| 3 | 5 | 42.000 | 0.397 | 0.038 | 0.398 |
| 4 | 5 | 56.000 | 0.399 | 0.028 | 0.398 |
| 5 | 5 | 75.000 | 0.384 | 0.033 | 0.384 |
| 6 | 5 | 100.000 | 0.364 | 0.049 | 0.364 |

*** No Linear Interpolation Estimate can be calculated from the input data since none of the (possibly pooled) group response means were less than 75% of the control response mean.



CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

| | | | | | | | |
|--|------|---|--|--|--|---|--|
| Section A Required Client Information: | | Section B Required Project Information: | | Section C Invoice Information: | | Page: _____ of _____ | |
| Company: <u>City of Des Moines</u> | | Report To: <u>James Boston</u> | | Attention: | | 2058080 | |
| Address: | | Copy To: | | Company Name: | | REGULATORY AGENCY | |
| Email To: | | Purchase Order No.: | | Address: | | <input type="checkbox"/> NPDES <input type="checkbox"/> GROUND WATER <input type="checkbox"/> DRINKING WATER <input type="checkbox"/> UST <input type="checkbox"/> RCRA <input type="checkbox"/> OTHER _____ | |
| Phone: | Fax: | Project Name: | | Pace Quote Reference: | | Site Location | |
| Requested Due Date/TAT: | | Project Number: | | Pace Project Manager: | | STATE: _____ | |
| | | | | Pace Profile #: | | | |

| ITEM # | Section D Required Client Information | Matrix Codes MATRIX / CODE | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED | | | | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Requested Analysis Filtered (Y/N) | | | | | | | | | | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. | | | | | | |
|--------|--|-------------------------------|---------------------------------------|-----------------------------|-----------------|------------|--------------------|------------|---------------------------|-----------------|-----------------------------------|--------------------------------|------------------|-----|------|---|----------|-------|-----------------|--|-------------------------|----------------------------|-------------------|--|--|-----------------|------------------|--|
| | | | | | COMPOSITE START | | COMPOSITE END/GRAB | | | | Unpreserved | Preservatives | | | | | | | | | | | Chlorine w/d test | | | | | |
| | | | | | DATE | TIME | DATE | TIME | | | | H ₂ SO ₄ | HNO ₃ | HCl | NaOH | Na ₂ S ₂ O ₃ | Methanol | Other | Analysis Test ↓ | | | | | | | | | |
| 1 | <u>Chronic Bio (1)</u> | | <u>WW</u> | <u>C</u> | <u>6/6</u> | <u>9am</u> | <u>6/7</u> | <u>8am</u> | <u>30</u> | <u>1</u> | | | | | | | | | | | | | | | | <u>60220782</u> | <u>19sub-001</u> | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | |
|--|----------------------------|--------------------------------------|---------------|----------------|----------------------------------|---------------|--------------|--------------------------|----------|----------|----------|
| | ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS | | | |
| | | <u>mdk RB</u> | <u>7/7/16</u> | <u>8:30 AM</u> | <u>Ethan Castagna PCB</u> | <u>6/7/16</u> | <u>14:40</u> | <u>2.2</u> | <u>Y</u> | <u>Y</u> | <u>Y</u> |

ORIGINAL

| | | | | | |
|-----------------------------------|------------------|-------------------------|-----------------------|-----------------------------|----------------------|
| SAMPLER NAME AND SIGNATURE | | Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N) |
| PRINT Name of SAMPLER: | <u>Mike Gray</u> | | | | |
| SIGNATURE of SAMPLER: | <u>mdk RB</u> | DATE Signed (MM/DD/YY): | <u>7/7/16</u> | | |



CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

| | | | | | | | |
|--|------|---|--|--|--|---|--|
| Section A Required Client Information: | | Section B Required Project Information: | | Section C Invoice Information: | | Page: _____ of _____ | |
| Company: <u>City of Decatur</u> | | Report To: <u>James Boston</u> | | Attention: | | 2058079 | |
| Address: | | Copy To: | | Company Name: | | REGULATORY AGENCY <input type="checkbox"/> NPDES <input type="checkbox"/> GROUND WATER <input type="checkbox"/> DRINKING WATER <input type="checkbox"/> UST <input type="checkbox"/> RCRA <input type="checkbox"/> OTHER _____ | |
| Email To: | | Purchase Order No.: | | Address: | | | |
| Phone: | Fax: | Project Name: | | Pace Quote Reference: | | Site Location STATE: _____ | |
| Requested Due Date/TAT: | | Project Number: | | Pace Project Manager: | | | |
| | | | | Pace Profile #: | | | |

| ITEM # | SAMPLE ID (A-Z, 0-9 / -) Sample IDs MUST BE UNIQUE | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED | | | | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives | | | | | | | | Analysis Test Y/N | Requested Analysis Filtered (Y/N) | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|--------|--|--|--------------------------------|-----------------|------------|--------------------|-----------|---------------------------|-----------------|---------------|--------------------------------|------------------|-----|------|---|----------|-------|----------------------|-----------------------------------|-------------------------|----------------------------|
| | | | | COMPOSITE START | | COMPOSITE END/GRAB | | | | Unpreserved | H ₂ SO ₄ | HNO ₃ | HCl | NaOH | Na ₂ S ₂ O ₃ | Methanol | Other | | | | |
| | | | | DATE | TIME | DATE | TIME | | | | | | | | | | | | | | |
| 1 | <u>Chronic Bio (2)</u> | <u>WWC</u> | <u>B/L</u> | <u>8:30</u> | <u>B/8</u> | <u>7:30</u> | <u>10</u> | <u>1</u> | <u>X</u> | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | |

| | | | | | | | |
|----------------------------|--------------------------------------|---------------|---------------|----------------------------------|---------------|---------------|--------------------------|
| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS |
| | <u>Mike Lyle</u> | <u>6/8/16</u> | <u>8:15AM</u> | <u>[Signature]</u> | <u>6/8/16</u> | <u>1:53PM</u> | <u>2.4 y y x</u> |

ORIGINAL

| | | | | | |
|-----------------------------------|--------------------|-------------------------|-----------------------|-----------------------------|----------------------|
| SAMPLER NAME AND SIGNATURE | | Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N) |
| PRINT Name of SAMPLER: | <u>Mike Lyle</u> | | | | |
| SIGNATURE of SAMPLER: | <u>[Signature]</u> | DATE Signed (MM/DD/YY): | <u>6/8/16</u> | | |

Sample Condition Upon Receipt

Client Name: Decor

Courier: FedEx UPS VIA Clay PEX ECI Pace Other Client

Tracking #: _____ Pace Shipping Label Used? Yes No

Custody Seal on Cooler/Box Present: Yes No Seals intact: Yes No

Packing Material: Bubble Wrap Bubble Bags Foam None Other

Thermometer Used: T-043 Type of Ice: Wet Blue None Samples received on ice, cooling process has begun
Cooler Temperature: 2.4 (circle one)

Date and initials of person examining contents: 6/7/16 MB

| | | |
|--|--|-----------------------------|
| Chain of Custody present: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 1. |
| Chain of Custody filled out: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 2. |
| Chain of Custody relinquished: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 3. |
| Sampler name & signature on COC: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 4. |
| Samples arrived within holding time: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 5. |
| Short Hold Time analyses (<72hr): | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 6. |
| Rush Turn Around Time requested: | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | 7. |
| Sufficient volume: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 8. |
| Correct containers used: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 9. |
| Pace containers used: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 9. |
| Containers intact: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 10. |
| Unpreserved 5035A soils frozen w/in 48hrs? | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | 11. |
| Filtered volume received for dissolved tests? | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | 12. |
| Sample labels match COC: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 13. |
| Includes date/time/ID/analyses Matrix: <u>L/I</u> | | 13. |
| All containers needing preservation have been checked. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | 14. |
| All containers needing preservation are found to be in compliance with EPA recommendation. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | 14. |
| Exceptions: VOA, Coliform, O&G, WI-DRO (water) | <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No <u>M2</u> | initial when completed |
| Trip Blank present: | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Lot # of added preservative |
| Pace Trip Blank lot # (if purchased): | | 15. |
| Headspace in VOA vials (>6mm): | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | 16. |
| Project sampled in USDA Regulated Area: | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | 17. List State: |
| Additional labels attached to 5035A vials in the field? | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | 18. |

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____



CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

| | | | | | | | |
|--|------|---|--|--|--|---|--|
| Section A Required Client Information: | | Section B Required Project Information: | | Section C Invoice Information: | | Page: _____ of _____ | |
| Company: <u>City of Decatur</u> | | Report To: <u>James Boston</u> | | Attention: | | 2058078 | |
| Address: | | Copy To: | | Company Name: | | REGULATORY AGENCY | |
| Email To: | | Purchase Order No.: | | Address: | | | |
| Phone: | Fax: | Project Name: | | Pace Quote Reference: | | <input type="checkbox"/> NPDES <input type="checkbox"/> GROUND WATER <input type="checkbox"/> DRINKING WATER <input type="checkbox"/> UST <input type="checkbox"/> RCRA <input type="checkbox"/> OTHER _____ | |
| Requested Due Date/TAT: | | Project Number: | | Pace Project Manager: | | Site Location | |
| | | | | Pace Profile #: | | STATE: _____ | |

| ITEM # | Section D Required Client Information | Matrix Codes MATRIX / CODE | COLLECTED | | | | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives | | | | | | | Analysis Test | Requested Analysis Filtered (Y/N) | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. | | |
|--------|--|-------------------------------|-----------------|------------|--------------------|-------------|---------------------------|-----------------|---------------|--------------------------------|------------------|-----|------|---|----------|---------------|-----------------------------------|-------------------------|----------------------------|-------|--|
| | | | COMPOSITE START | | COMPOSITE END/GRAB | | | | Unpreserved | H ₂ SO ₄ | HNO ₃ | HCl | NaOH | Na ₂ S ₂ O ₃ | Methanol | | | | | Other | |
| | | | DATE | TIME | DATE | TIME | | | | | | | | | | | | | | | |
| 1 | <u>Chronic Bio (3)</u> | | <u>UWC</u> | <u>6/9</u> | <u>8:30</u> | <u>6/10</u> | <u>2:30</u> | <u>2</u> | <u>X</u> | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | |

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS | | | |
|---------------------|-------------------------------|----------------|----------------|----------------------------|----------------|-------------|-------------------|----------|----------|----------|
| | <u>not rel</u> | <u>6/10/16</u> | <u>9:30 AM</u> | <u>Ethan Costagno Pace</u> | <u>6/11/16</u> | <u>8:00</u> | <u>2.0</u> | <u>Y</u> | <u>Y</u> | <u>Y</u> |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

ORIGINAL

| | | | | | |
|--|--|------------|-----------------------|-----------------------------|----------------------|
| SAMPLER NAME AND SIGNATURE | | Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N) |
| PRINT Name of SAMPLER: <u>Mike Liley</u> | | | | | |
| SIGNATURE of SAMPLER: <u>[Signature]</u> | DATE Signed (MM/DD/YY): <u>6/10/16</u> | | | | |



Sample Condition Upon Receipt

Client Name: Decator

| |
|----------------|
| Optional |
| Proj Due Date: |
| Proj Name: |

Courier: FedEx UPS VIA Clay PEX ECI Pace Other Client

Tracking #: _____ Pace Shipping Label Used? Yes No

Custody Seal on Cooler/Box Present: Yes No Seals intact: Yes No

Packing Material: Bubble Wrap Bubble Bags Foam None Other

Thermometer Used: T-24.3 Type of Ice: Wet Blue None Samples received on ice, cooling process has begun. (circle one)

Cooler Temperature: 2.0

Temperature should be above freezing to 6°C

Date and initials of person examining contents:

6/11/16
EC 8:00

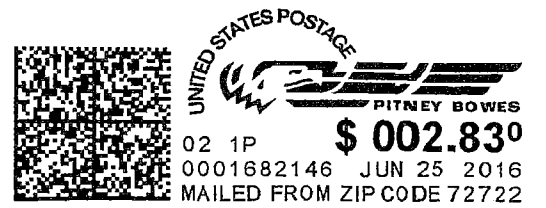
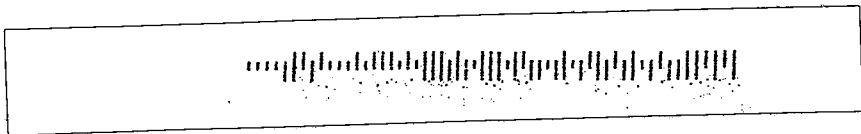
| | | |
|--|--|-----------------------------|
| Chain of Custody present: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 1. |
| Chain of Custody filled out: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 2. |
| Chain of Custody relinquished: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 3. |
| Sampler name & signature on COC: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 4. |
| Samples arrived within holding time: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 5. |
| Short Hold Time analyses (<72hr): | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 6. |
| Rush Turn Around Time requested: | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | 7. |
| Sufficient volume: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 8. |
| Correct containers used: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 9. |
| Pace containers used: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 9. |
| Containers intact: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | 10. |
| Inpreserved 5035A soils frozen w/in 48hrs? | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | 11. |
| Filtered volume received for dissolved tests? | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | 12. |
| Sample labels match COC: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | |
| Includes date/time/ID/analyses Matrix: <u>WT</u> | | 13. |
| All containers needing preservation have been checked. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | |
| All containers needing preservation are found to be in compliance with EPA recommendation. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | 14. |
| Exceptions: VOA, Coliform, O&G, WI-DRO (water) | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Initial when completed |
| Trip Blank present: | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Lot # of added preservative |
| Pace Trip Blank lot # (if purchased): | | 15. |
| Headspace in VOA vials (>6mm): | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | |
| | | 16. |
| Project sampled in USDA Regulated Area: | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | 17. List State: |
| Additional labels attached to 5035A vials in the field? | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | 18. |

Client Notification/ Resolution: _____ Copy COC to Client? Y / N _____ Field Data Required? Y / N _____

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____ Page 47 of 47



Arkansas Dept. of Environmental Quality
Water Division - Enforcement Branch
5301 Northshore Drive
North Little Rock AR 72118-5317