

August 01, 2014

3°C GTR AROOZITSO

Pace Analytical Services, Inc. 9608 Loiret Blvd. Lenexa, KS 66219 (913)599-5665

## RECEIVED

AUG 8 2014

**WATER/WASTEWATER** 

Lance McAvoy City of Fort Smith 3900 Kelley Hwy. Fort Smith, AR 72904

RE: Project: MASSARD BIOMONITORING

Pace Project No.: 60174163

#### Dear Lance McAvoy:

Enclosed are the analytical results for sample(s) received by the laboratory on July 22, 2014. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Alice Flanagan

Alice Flanagan

alice.flanagan@pacelabs.com

**Project Manager** 

Enclosures

cc: Dan Clover, City of Fort Smith, AR





#### **CERTIFICATIONS**

Project:

MASSARD BIOMONITORING

Pace Project No.:

60174163

Southeast Kansas Certification IDs

808 West McKay, Frontenac, KS 66763 Arkansas Certification #: 13-012-0

Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055

Oklahoma Certification #: 2012-051 Texas Certification #: T104704407-13-4 Utah Certification #: KS000212013-3 Minnesota Certification #: 495004

#### REPORT OF LABORATORY ANALYSIS





#### SAMPLE SUMMARY

Project:

MASSARD BIOMONITORING

Pace Project No.:

60174163

| Lab ID      | Sample ID        | Matrix | Date Collected | Date Received  |
|-------------|------------------|--------|----------------|----------------|
| 60174163001 | MASSARD EFFLUENT | Water  | 07/21/14 08:00 | 07/22/14 13:30 |

#### **REPORT OF LABORATORY ANALYSIS**



#### **SAMPLE ANALYTE COUNT**

Project:

MASSARD BIOMONITORING

Pace Project No.:

60174163

| Lab ID      | Sample ID        | Method           | Analysts | Analytes<br>Reported |
|-------------|------------------|------------------|----------|----------------------|
| 60174163001 | MASSARD EFFLUENT | EPA 821/R-02/013 | TDH      | 1                    |

#### **REPORT OF LABORATORY ANALYSIS**





#### **ANALYTICAL RESULTS**

Project:

MASSARD BIOMONITORING

Pace Project No.:

60174163

Sample: MASSARD EFFLUENT

Parameters

Lab ID: 60174163001

Collected: 07/21/14 08:00

Report Limit

Received: 07
Prepared

Received: 07/22/14 13:30 M

Matrix: Water

CAS No.

Qual

**Chronic Toxicity** 

Analytical Method: EPA 821/R-02/013

Units

Toxicity, Chronic

Date: 08/01/2014 10:27 AM

Complete

Results

1.0

DF

07/22/14 14:00

Analyzed



#### **QUALIFIERS**

Project:

MASSARD BIOMONITORING

Pace Project No.:

60174163

#### **DEFINITIONS**

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

**DUP - Sample Duplicate** 

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

Date: 08/01/2014 10:27 AM





#### **QUALITY CONTROL DATA CROSS REFERENCE TABLE**

Project:

MASSARD BIOMONITORING

Pace Project No.:

Date: 08/01/2014 10:27 AM

60174163

| Lab ID      | Sample ID        | QC Batch Method  | QC Batch | Analytical Method | Analytical<br>Batch |
|-------------|------------------|------------------|----------|-------------------|---------------------|
| 60174163001 | MASSARD EFFLUENT | EPA 821/R-02/013 | BIO/1731 |                   | <del></del>         |



#### Sample Condition Upon Receipt



| Client Name: DA Shrikh   |   |  |  | Optional  |
|--|---|--|--|---|
| Courier: Fed Ex 🗆 UPS 🗆 USPS 🗀 Client 🗆  | Commercial Pa                                 | ice 🗆 Other 🗓  | Į.   | Proj Due Date   |
| Tracking #: F  | ace Shipping Label L                          | sed? Yes il N  | l Do   | Proj Name:  |
| Custody Seal on Cooler/Box Present: Yes No   | Seals intact Y                                | es√∏ No □  | 7 "  |   |
| Packing Material: Bubble Wrap ☐ Bubble Ba  | gs 🖟 💮 Foam (                                 | None (   | Other 🗱  |   |
| Thermometer Used:  | pe of Ice⊹ (Wet Blu                           | ië Nonë 🏳 Samp   | les received on i  | ce, cooling process has begun   |
| Cooler Temperature:  | <b>V</b> Scircle                              | rone)  | Date and initials  | of person examining   |
| Temperature should be above freezing to 6°C  | <del></del>                                   |  | contents:  | オチドレニシりひと   |
| Chain of Custody present:  | Alves LINO LINIA                              | 1  | * L  |   |
| Chain of Custody filled out:   | Nyes (INO (IN/A                               | 2,5  |  |   |
| Chain of Custody relinquished:   | Types CINO CINIA                              | 3  |  |   |
| Sampler name & signature on COC:   | Yes Elno Eln/A                                | 4.:  |  | 5.7   |
| Samples arrived within holding time:   | Xyes []No []N/A                               | 5  | A CONTRACTOR OF THE REAL PROPERTY OF THE PARTY OF THE PAR |   |
| Short Hold Time analyses (<72hr)   | TYPES ČÍNO ČÍN/A                              | 6,.  |  |   |
| Rush Turn Around Time requested:   | Dyes XING DNA                                 | 7::  |  | illighting to the tree of the |
| Süfficient volume:   | (Nes ĈNo LINA                                 | 8  |  |   |
| Correct containers used:   | Cres Line Linia                               | Pedre diagrams are at at attachment of the second of the s |  |   |
| Pace containers used   | Nes Elno Elnia                                | 9,   |  |   |
| Containers intact:   | Nyes Elno Elnia                               | 10.  |  |   |
| Unpreserved 5035A soils frozen w/in 48hrs?   | CIYes CINO NIN/A                              | 11.  | . <i></i>  |   |
| Filtered volume received for dissolved tests?  | Dyes TNO DINA                                 | 12.  | aar dari ga ka aa   |   |
| Sample labels match COC:   | Mives One Onia                                |  |  |   |
| Includes date/time/ID/arratyses Matrix   | 1   | 13 <sub>*</sub>  |  |   |
| All containers needing preservation have been checked.   | DYes DNo VNA                                  | Newhor to the second se | Control Management   |   |
| All containers needing preservation are found to be in compliance with EPA recommendation.   | □Yes □No ₩/A                                  | <b>4</b> 4   |  |   |
| exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)  | ElYes ElNo                                    | Initial when   |  | of added  |
| Phenolics Trip Blank present:  |   | completed  | preser   | valive  |
| 1  | Ciyes CiNo Cinva                              | 16   |  | :   |
| Pace Trip Blank lot # (if purchased): Headspace in VOA vials ( >6mm):  | ElYes ElNo INA                                | 15:  | A  |   |
|  | Lives Live specific                           | 4.0  |  |   |
| M & LODA M L. LODA M L. L. L. M. L. L. L. M. L. L. L. L. M. L.   |   | 16,  | ·  |   |
| Project sampled in USDA Regulated Area.  | · V · Z                                       | 17. List State:  |  |   |
|  | OC to Client? Y /                             | Field Data F   | requireo? Y  | / N   |
| Construction of the constr | te/Time:                                      | Andrews and the second  |  |   |
| Comments/ Resolution:  |   |  |  | annana (ja arabi Marak dada da d  |
| errormantation and the state of | <u> Himadasta est deltinista est transita</u> |  | and a same and the second comments of the sec | annakannannannan erikatti opposition opp omininati attagen erikation kapatita   |
| Project Manager Review:  | [<br>   | Date: 1 24   | Ц  | an ann an a-aireann an   |

## CHAIN-OF-CUSTODY / Analytical Request Document The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

| ₩₩.}¥₩₩₩.                                    |  |   | * 1+ # 2.  | Section C  |  |  |  | Pege:                                 | , (                                     | 1  |
|--|--|---|--|--|--|--|--|---------------------------------------|---|--|
|  | Section B Required Project Information   |   |  | Invoice Informati  | on:  |  |  | · · · · · · · · · · · · · · · · · · · | 127                                     | 1 / 1 1  |
| Companys 20 2 2 2 2 2 T                      | Report To: Lange 1   | 16 Avou   |  |  | NCL McAUSY   |  | Section and the disconnection                                |                                       | <u>, 1371</u>                           | <u>L 4 L L </u>  |
| Address 3900 kalloy Hwy                      | Сёру Тё  |   | description of the same of | Company Name   | THE STATE OF THE   | sath   | REGULATORY   |                                       | 49.45.47                                |  |
| E1 Smith JAR 72904                           |  |   |  | Address: Add |  | sanae  | T NPDES Γ  | GROUND V                              |   | DRINKING WATER   |
| Email To:                                    | Purchase Order No.:  | A POST POST POST POST POST POST POST POST   |  | Pace Quote<br>Reference:   | J  | en grade en de la companione de la compa | L NST L  | RCRA                                  |   | OTHER  |
| Phone: Fax:                                  | Project Name: M  | cl Biomontoi  | - 1  | Paco Project<br>Manager  | English Company Company                                    |  | Site Location  | 10                                    |   |  |
| Phone: 194-2337 Fax: Requested Due Date/TAT: | Project Number:  | Ly Diginguelor  | (1)  | Pace Profile #:  |  |  | STATE:   | HK_                                   |   |  |
|  | ALL DESCRIPTION OF THE PROPERTY OF THE PROPERT | Barrier to the Science of Company Little  |  | 2  | Granding and Articles                                      | Requested  | Analysis Filtere   | d (Y/N)                               | a minima ko iri arti                    |  |
| Section D Matrix C                           | odos [ _ ] _   |   |  |  |  |  |  |                                       | en in distrib                           |  |
| Required Client Information MATRIX /         | CODE (# CON  | COLLECTED   |  | . P  | reservatives   |  |  |                                       |   |  |
| Drinking Water<br>Water                      | WT 8 0   | COMPOSITE COMPOSITE   | ğ  |  |  | 2 2  |  |                                       | è                                       | The second secon |
| Waste Water<br>Product                       | RAB da wa  | START ENDIGRAB  |  |  |  | 183  |  |                                       | Residual Chlorine (Y/N)                 |  |
| Soil/Solid Oil SAMPLE ID                     | CODE (GEGRAB   |   |  | RS   |  | Mike<br>Cerioci  |  |                                       | rine                                    | 174/63   |
| (A-Z, 0-9 / -) Air                           | YVF deni le d  |   | VIP AT   | CONTAINERS<br>eserved<br>5 <sub>4</sub>  |  | 발범됐  |  |                                       | 욹 (/ ()                                 | 1, 1, ->   |
| Sample IDs MUST BE UNIQUE Tissue Other       | CCODE TO ST  |   | E TEMP   | ien s  | Lot Join   |  |  |                                       | nal (                                   |  |
| # 5  | MATRIX (   |   | SAMPLE SAMPLE  | # OF CONTAI<br>Unpreserved<br>HsSO <sub>4</sub>  | HCI<br>NaOH<br>Na <sub>2</sub> S <sub>2</sub> O<br>Methanc | Analysis Test<br>Aronic My<br>Showic Cerib   |  |                                       | pise                                    | 20 W 244 24 1 1 2  |
|  | MA MA  |   |  | # 5 £  | Med Nac  |  |  |                                       |   | Project No./ Lab I.D.  |
| 1 Massard Espent                             | v≈ € 7h  | 140800 7/4/4  | 9899   |  |  |  |  |                                       | H 1/5                                   | izeb   |
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| 6  |  |   | •  |  |  |  |  |                                       |   |  |
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| 11   |  |   |  |  |  |  |  |                                       |   |  |
| 12   | DELINOTICHE  | D BY / AFFILIATION  | DATE   | TIME   | ACCEPTED   | AFFILIATION  | DATE   | TIME                                  | SAMP                                    | LE CONDITIONS  |
| ADDITIONAL COMMENTS                          | grazi  | Allega James A. Martin and A. Carlotte and A. | أست المالية  | ॥५०  | - VZIV   | Paril  | 7/27/1   | 1330 2                                | 20/ 2/                                  | V (0   |
| T.Cl2 = 0,01 mg/L                            | Chris Cooper   | 1 3 Fait South  | 1/14/14  | 1110   | - U - 41   | Trige-   | 1/2/19   |                                       | 1/                                      | 7 7  |
| F.Cla = U. OlmalL                            |  | <u> </u>  | <u> </u>   | <u> </u>   | 25 C.                  | · · · ·  |  |                                       |   |  |
| J  |  |   | i i  |  |  |  |  |                                       | ·                                       |  |
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|  | RIGINAL  | SAMPLER NAME AN   | D SIGNATUR   | ₹Ĕ   |  |  | A CE CAS CALLED ALL SECTION                                  | ال حقر يدعون                          | Temp in °C Received on Ice (Y/N)        | Custody<br>Sealed Cooler<br>(YN)<br>Samples intact   |
| Ü  | HIGHAL   | PRINT Name  | of SAMPLER   | E Chris  | Connia   | dellamanamoria, di alla  | erican para a la para esta esta esta esta esta esta esta est |                                       | Temp in °C<br>Received or<br>Ice (Y/N)  | Cusk<br>(Y/h)<br>(Y/h)<br>(Y/h)  |
|  |  | SIGNATURE   | of SAMPLER   | 01   |  | DATE Signer<br>(MM/DD/YY)  |  | A                                     | ř & -                                   | Se Sec   |
|  |  | 11 <u>H. W </u>   | adam www   |  |  |  |  |                                       | ALL CLOSOPOUR                           | 07 15 May 2007   |

Pace Analytical Services, Inc. 9608 Loiret Blvd. Lenexa, KS 66219

> Phone: 913.599.5665 Fax: 913.599.1759

July 31, 2014

Lance McAvoy
City of Fort Smith (Massard)
3900 Kelley HWY
Fort Smith, AR 72904

ace Analytical

www.pacelabs.com

Re: Lab Project Number: 60174163
Client Project ID: Wet Test

Dear:

Enclosed are the analytical results for sample(s) received by the laboratory. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any question concerning this report, please feel free to contact me.

Sincerely,

Tim Harrell

Tim.Harrell@pacelabs.com

Technical Director





Pace Analytical Services, Inc. 9608 Loiret Blvd.

Lenexa, KS 66219

Phone: 913.599.5665 Fax: 913.599.1759

## CHRONIC TOXICITY TEST FOR CITY OF FORT SMITH (Massard)

PERMIT # AR 0021750 AFIN # 66-00226

PERFORMED ON:

Pimephales promelas

and

Ceriodaphnia dubia

PREPARED FOR:

Lance McAvoy
City of Fort Smith (Massard)
3900 Kelley HWY
Fort Smith, AR 72904

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

July 31, 2014

### **REPORT OF LABORATORY ANALYSIS**





Pace Analytical Services, Inc.

9608 Loiret Blvd. Lenexa, KS 66219

Phone: 913.599.5665 Fax: 913.599.1759

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## **REPORT OF LABORATORY ANALYSIS**







Pace Analytical Services, Inc. 9608 Loiret Blvd. Lenexa, KS 66219

> Phone: 913.599.5665 Fax: 913.599.1759

#### SUMMARY

A Chronic Whole Effluent Toxicity Test using the 7-day chronic fathead minnows (<u>Pimephales promelas</u>), static renewal larval survival and growth test, and three brood 7-day chronic Cladoceran (<u>Ceriodaphnia dubia</u>), static renewal survival and reproduction test, was conducted on effluent discharge water collected at the CITY OF FORT SMITH (Massard) effluent discharge from July 21, 2014 to July 25, 2014. All the test methods followed are as listed in <u>EPA 821-R-02-013</u>, "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-Karber 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 11% 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 11% for survival. The LC50 was estimated to be >11% effluent. No significant reduction in growth was observed in the 11% effluent concentration. The Toxic Units is <1. The IC25 is >11. The NOEC for growth in effluent was determined to be 11%. The PMSD is 16.7.

In Cladoceran section of testing, it was observed that the effluent had no significant effect on the survival of the organisms in the 11% 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 11% for survival. The LC50 was estimated to be >11% effluent. No significant reduction in reproduction was observed in the 11% effluent concentrations. The Toxic Units is <1. The IC25 is >11. The NOEC for reproduction in effluent was determined to be 11%. The PMSD is 14.1.

The chronic toxicity exhibited by the fathead minnows and the <u>Ceriodaphnia</u> treated by the effluent sampled from July 21 to July 25 from the CITY OF FORT SMITH (Massard) effluent discharge, is acceptable as described in <u>EPA 821-R-02-013</u>.

#### REPORT OF LABORATORY ANALYSIS





Pace Analytical Services, Inc. 9608 Loiret Blvd. Lenexa, KS 66219

> Phone: 913.599.5665 Fax: 913.599.1759



#### INTRODUCTION

Pace Analytical was contracted to perform this chronic toxicity test on effluent from the CITY OF FORT SMITH (Massard) effluent discharge. Chronic toxicity was measured using the <u>Pimephales promelas</u> at larval for survival and growth test and the <u>Ceriodaphnia dubia</u> survival and reproduction test described in <u>EPA 821-R-02-013</u>, "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, KŚ-66763.

#### **TEST MATERIAL**

City of Fort Smith (Massard) personnel collected sampling of the effluent. A sample of the effluent was delivered to Pace by commercial carrier on 7-22-14. Subsequent samples followed by delivery on 7-24-14 and on 7-26-14. All samples were stored at  $\leq$  6° 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, <u>Pimephales promelas</u>, Larval Survival and Growth Test. EPA test method 1002.0 was used for conducting the Cladoceran, <u>Ceriodaphnia dubia</u>, 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 <u>Pimephales</u> and <u>Ceriodaphnia</u> tests were initiated on 7-22-14 and carried out until 7-29-14. 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 <u>Ceriodaphnia</u> 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**

Organisms used in these tests were cultured at Pace under controlled temperature and photo period conditions and/or were purchased from an external supplier. Pace maintains records of culture techniques for all organisms, whether produced in house or purchased.

#### REPORT OF LABORATORY ANALYSIS





**Pace Analytical Services, Inc.** 9608 Loiret Blvd.

Lenexa, KS 66219

Phone: 913.599.5665 Fax: 913.599.1759

#### RESULTS

## **REPORT OF LABORATORY ANALYSIS**





Pace Analytical Services, Inc. 9608 Loiret Blvd.

Lenexa, KS 66219 Phone: 913.599.5665 Fax: 913.599.1759

#### TABLE 1

Permittee: CITÝ OF FORT SMITH (Massard) Effluent discharge.

Date Sampled

No. 1: 7-21-14 8:00

No. 2:

7-23-14

8:00

No. 3: 7-25-14

8:00

Test Initiated: 14:00

Date: 7-22-14

Dilution Water used: Moderately Hard Synthetic Water

#### FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL (Pimephales promelas)

#### DATA TABLE FOR GROWTH OF FATHEAD MINNOWS

| Effluent<br>Concentration<br>(%) | Averag<br>A | •     | eight in Mi<br>te Chamb<br>C | Mean Dry<br>Weight<br>(mg) | CV% * |       |       |
|----------------------------------|-------------|-------|------------------------------|----------------------------|-------|-------|-------|
| Control<br>0%                    | 0.350       | 0.429 | 0.456                        | 0.394                      | 0.432 | 0.412 | 10.00 |
| Dilution 1<br>3%                 | 0.440       | 0.489 | 0.438                        | 0.468                      | 0.369 | 0.441 | 10.29 |
| Dilution 2<br>5%                 | 0.451       | 0.367 | 0.452                        | 0.457                      | 0.355 | 0.416 | 12.20 |
| Dilution 3<br>6%                 | 0.472       | 0.451 | 0.478                        | 0.421                      | 0.381 | 0.441 | 9.10  |
| Dilution 4<br>8%                 | 0.311       | 0.405 | 0.457                        | 0.336                      | 0.432 | 0.388 | 16.10 |
| Dilution 5<br>11%                | 0.448       | 0.393 | 0.372                        | 0.429                      | 0.421 | 0.413 | 7.30  |

<sup>\*</sup> Coefficient of Variation = Standard Deviation X 100 / Mean

#### REPORT OF LABORATORY ANALYSIS





Pace Analytical Services, Inc.

9608 Loiret Blvd. Lenexa, KS 66219

Phone: 913.599.5665 Fax: 913.599.1759

Permittee: CITY OF FORT SMITH (Massard) Effluent discharge.

#### FATHEAD MINNOW SURVIVAL

| Conc. %           | Pe   |      | urvival i<br>Chambe | n Replica<br>rs | Mean Percent Survival |      |      | CV %  |      |
|-------------------|------|------|---------------------|-----------------|-----------------------|------|------|-------|------|
| 1                 | Α    | В    | С                   | D               | E                     | 24hr | 48hr | 7 day |      |
| Control<br>0%     | 87.5 | 100  | 100                 | 100             | 100                   | 100  | 100  | 95    | 5.99 |
| Dilution 1<br>3%  | 100  | 100  | 100                 | 100             | 87.5                  | 100  | 100  | 97.5  | 4.79 |
| Dilution 2<br>5%  | 100  | 87.5 | 100                 | 100             | 87.5                  | 100  | 100  | 95    | 5.99 |
| Dilution 3<br>6%  | 100  | 100  | 100                 | 100             | 87.5                  | 100  | 100  | 97.5  | 4.79 |
| Dilution 4<br>8%  | 87.5 | 100  | 100                 | 100             | 100                   | 100  | 100  | 97.5  | 4.79 |
| Dilution 5<br>11% | 100  | 100  | 100                 | 100             | 100                   | 100  | 100  | 100   | 0.00 |

#### **REPORT OF LABORATORY ANALYSIS**



Pace Analytical Services, Inc. 9608 Loiret Blvd. Lenexa, KS 66219

> Phone: 913.599.5665 Fax: 913.599.1759

Permitter (Massard) Effluent discharge.

#### CÉRIODAPHNIA SURVIVAL AND REPRODUCTION

#### DATA TABLE FOR CERIODAPHNIA YOUNG PRODUCTION

|           |         |            |            | ,,         | <del>, , , , , , , , , , , , , , , , , , , </del> |            |
|-----------|---------|------------|------------|------------|---|------------|
| Replicate | Control | Dilution 1 | Dilution 2 | Dilution 3 | Dilution 3  | Dilution 4 |
|           | 0%      | 3%         | 5%         | 6%         | 8%  | 11%        |
| //1       | 20      | 25         | 22         | 22         | 22  | 22         |
| 2         | 20      | 16         | 19         | 26         | 22  | 17         |
| 3         | 22      | 22         | 22         | 17         | 24  | 24         |
| 4         | 17      | 24         | 24         | 24         | 18  | 24         |
| 5         | 21      | 22         | 22         | 20         | 21  | 22         |
| 6         | 17      | 20         | 20         | 26         | 23  | 22         |
| 7         | 22      | 24         | 26         | 21         | 24  | 23         |
| 8         | 25      | 24         | 24         | 26         | 21  | 20         |
| 9         | 21      | 26         | 21         | 25         | 24  | 25         |
| 10        | 18      | 23         | 21         | 17         | 19  | 29         |
| Mean      | 20.3    | 22.6       | 22.1       | 22.4       | 21.8  | 21.8       |
| SD        | 2.497   | 2.875      | 2.079      | 3.565      | 2.098   | 3.155      |
| CV %      | 12.30   | 12.72      | 9.41       | 15.92      | 9.62  | 13.84      |

#### **REPORT OF LABORATORY ANALYSIS**





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Permittee: CITY OF FORT SMITH (Massard) Effluent discharge.

#### CERIODAPHNIA MEAN PERCENT SURVIVAL

| 11       |         | Percent Effluent (%) |            |            |            |            |  |  |  |
|----------|---------|----------------------|------------|------------|------------|------------|--|--|--|
| .∕ ,Time | Control | Dilution 1           | Dilution 2 | Dilution 3 | Dilution 4 | Dilution 5 |  |  |  |
| Elapsed  | 0%      | 3%                   | 5%         | 6%         | 8%         | 11%        |  |  |  |
| 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       | 0.0     | 0.0                  | 0.0        | 0.0        | 0.0        | 0.0        |  |  |  |
| CV %     | 0.0     | 0.0                  | 0.0        | 0.0        | 0.0        | 0.0        |  |  |  |

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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  |
| 15. 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%, 3%, 5%, 6%, 8%, 11%   |
| 18. Tést duration           | 7 days  |
| 19. Endpoints               | Survival and growth   |
| 20. Test acceptability      | 80% or greater survival in the controls,<br>Average dry weight in controls >0.25<br>mg, Coefficient of variation in the<br>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. larváe/chamber            | 1  |
| 11. No replicates/concentration   | 10   |
| 12. No./arvae/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   |
| 15. Aeration                      | None   |
| 16. Dilution Water                | Moderately Hard Synthetic Water prepared with MILLI-Q deionized water and reagent grade chemicals  |
| 17. Effluent concentrations       | 0%, 3%, 5%, 6%, 8%, 11%  |
| 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 15 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 FORT SMITH (Massard). Effluent discharge.

ÁNÁLYSTS: Pace Analytical Services, Inc.

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Timothy Harrell Mike Bollin

SAMPLE NO. 1 COLLECTED: DATE: 7-21-14

SAMPLE NO. 2 COLLECTED: DATE: 7-23-14

SAMPLE NO. 3 COLLECTED: DATE: 7-25-14

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

|          | Control | 100% |
|----------|---------|------|
| PH       | 7.53    | 7.34 |
| D.O.     | 8.30    | 9.00 |
| Temp     | 25.0    | 25.0 |
| Alk      | 58      | 79   |
| Hard     | 98      | 98   |
| Cond     | 410     | 570  |
| 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 Chlorine is reported as mg/L

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#### **TEST WATER QUALITY**

24-Hour Water Quality Measurements

| Effluent          | PH   | D.O.   | Temperature |
|-------------------|------|--------|-------------|
| Concentration (%) |      | (mg/l) | (C)         |
| 0% Control        | 7.55 | 7.20   | 25.2        |
| 3% Effluent       | 7.55 | 7.20   | 25.0        |
| √5% Effluent      | 7.55 | 7.20   | 25.0        |
| ∠/6% Effluent     | 7.56 | 7.20   | 25.0        |
| 8% Effluent       | 7.55 | 7.10   | 25.0        |
| 11% Effluent      | 7.55 | 7.10   | 25.0        |

48-Hour Water Quality Measurements

| 40-Flour Water Quality | Measurements |        |             |
|------------------------|--------------|--------|-------------|
| Effluent               | PH           | . D.O. | Temperature |
| Concentration (%)      |              | (mg/l) | (C)         |
| 0% Control             | 7.60         | 7.90   | 25.1        |
| 3% Effluent            | 7.60         | 7.90   | 25.0        |
| 5% Effluent            | 7.60         | 7.90   | 25.0        |
| 6% Effluent            | 7.60         | 7.80   | 25.0        |
| 8% Effluent            | 7.60         | 7.80   | 25.0        |
| 11% Effluent           | 7.60         | 7.80   | 25.0        |

## **REPORT OF LABORATORY ANALYSIS**





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FINAL WATER QUALITY

**EFFLUENT CONCENTRATION** 

|        | <u> </u>          |      |
|--------|-------------------|------|
|        | Cóntrol           | 11%  |
| pH /   | <sub>-</sub> 7.66 | 7.66 |
| D.O.   | 7.70              | 7.30 |
| Temp   | 25.0              | 25.0 |
| / Alk  | 64                | 66   |
| ∕ Hard | 98                | 144  |
| Cond   | 550               | 740  |

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\* 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 <u>Pimephales promelas</u> control survival rate was 95%. The mean dry weight (growth) of the <u>Pimephales promelas</u> was determined at 0.412 mg/organism in the controls. The percent coefficient of variation (%CV) values for the fathead minnow control for survival and growth were 5.99 and 10.00. The <u>Ceriodaphnia dubía</u> survival rates were 100 in the control. The <u>Ceriodaphnia in the control produced an average of 20.3 young over the seven-day exposure period. Percent CV values for <u>Ceriodaphnia dubia</u> control survival and reproduction was 0.00 and 12.30. Control data met or exceeded all criteria set out by <u>EPA 821-R-02-013</u> for test acceptance.</u>

#### CONCLUSIONS

The No Observed Effect Concentration (NOEC) for <u>Pimephales promelas</u> was 11% for survival and 11% for growth. The No Observed Effect Concentration (NOEC) for <u>Ceriodaphnia dubia</u> was 11% for Survival and 11% for Reproduction. The tests were ran using a synthetic control against effluent concentrations of 3%, 5%, 6%, 8%, and 11%. The effluent sampled on 7-21-14, 7-23-14, and 7-25-14 exhibited acceptable chronic toxicity in <u>Pimephales promelas</u> and in <u>Ceriodaphnia dubia</u> during the exposure period as described in <u>EPA 821-R-02-013</u>.

#### **REPORT OF LABORATORY ANALYSIS**





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**REFERENCE #60174163** 

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# APPENDIX A STATISTICAL ANNALYSIS

## **REPORT OF LABORATORY ANALYSIS**



60174163 Ft Smith FATHEAD SURVIVAL

File: 6174163A 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 | 4     | 2             | 21          | 3           |       |

Calculated Chi-Square goodness of fit test statistic = 18.2325 Table Chi-Square value (alpha = 0.01) = 13.277

Data FAIL normality test. Try another transformation.

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

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60174163 Ft Smith FATHEAD SURVIVAL
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File: 6174163A Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

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D = 0.059

W = 0.705

Critical W (P = 0.05) (n = 30) = 0.927Critical W (P = 0.01) (n = 30) = 0.900

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.

60174163 Ft Smith FATHEAD SURVIVAL

File: 6174163A Transform: ARC SINE(SQUARE ROOT(Y))

#### SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

| GRP | IDENTIFICATION | N | MIN   | XAM   | MEAN  |
|-----|----------------|---|-------|-------|-------|
| 1   | CONTROL        | 5 | 0.991 | 1.107 | 1.084 |
| 2   | 3%             | 5 | 0.991 | 1.107 | 1.084 |
| 3   | 5%             | 5 | 0.991 | 1.107 | 1.061 |
| 4   | 6%             | 5 | 0.991 | 1.107 | 1.084 |
| 5   | 8%             | 5 | 0.991 | 1.107 | 1.084 |
| 6   | 11%            | 5 | 1.107 | 1.107 | 1.107 |

60174163 Ft Smith FATHEAD SURVIVAL

File: 6174163A 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   | 3%             | 0.003    | 0.052 | 0.023 | 4.79   |
| 3   | 5%             | 0.004    | 0.064 | 0.028 | 5.99   |
| 4   | 6%             | 0.003    | 0.052 | 0.023 | 4.79   |
| 5   | 8%             | 0.003    | 0.052 | 0.023 | 4.79   |
| 6   | 11%            | 0.000    | 0.000 | 0.000 | 0.00   |

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60174163 Ft Smith FATHEAD SURVIVAL File: C:\TOXSTAT\6174163A. Transform: ARC SINE(SQUARE ROOT(Y))

STEEL'S MANY-ONE RANK TEST

| GROUP 7 | IDENTAL—                             | TPAMODO                 | ~                       | Ho:Control              | <treatm< th=""><th>ent</th></treatm<>  | ent |
|---------|--------------------------------------|-------------------------|-------------------------|-------------------------|--|-----|
|         | IDENTIFICATION                       | TRANSFORMED<br>MEAN     | RANK<br>SUM             | CRIT.<br>VALUE          | <del></del>                            | - ~ |
| 2       | CONTROL<br>3%                        | 1.084                   |                         |                         | df<br>                                 | SIG |
| 4<br>5  | 5 응<br>6 응                           | 1.084<br>1.061<br>1.084 | 27.50<br>25.00          | 16.00<br>16.00          | 5 <sub>-</sub> 00<br>5 <sub>-</sub> 00 |     |
| 6       | 8%<br>11%<br><br>values use k = 5, a | 1.084<br>1.107          | 27.50<br>27.50<br>30.00 | 16.00<br>16.00<br>16.00 | 5.00<br>5.00<br>5.00                   |     |

File: 6174163B Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

D = 0.051

W = 0.917

Critical W (P = 0.05) (n = 30) = 0.927Critical W (P = 0.01) (n = 30) = 0.900

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

File: 6174163B Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance Calculated B1 statistic = 2.14

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.

File: 6174163B Transform: NO TRANSFORMATION

#### SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

| GRP    | IDENTIFICATION | N      | MIN   | MAX   | MEAN  | • |  |
|--------|----------------|--------|-------|-------|-------|---|--|
| 1<br>2 | CONTROL 3%     | 5<br>5 | 0.350 | 0.456 | 0.412 |   |  |
| 3      | 5%             | 5      | 0.355 | 0.457 | 0.416 |   |  |
| 4      | 6%             | 5      | 0.381 | 0.478 | 0.441 |   |  |
| 5      | 8%             | 5      | 0.311 | 0.457 | 0.388 |   |  |
| 6      | 11%            | 5      | 0.372 | 0.448 | 0.413 |   |  |

60174163 Ft Smith FATHEAD GROWTH

File: 6174163B Transform: NO TRANSFORMATION

#### SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

| GRP | IDENTIFICATION | VARIANCE | SD    | SEM   | C.V. % |
|-----|----------------|----------|-------|-------|--------|
| 1   | CONTROL        | 0.002    | 0.041 | 0.018 | 10.00  |
| 2   | 3%             | 0.002    | 0.045 | 0.020 | 10.29  |
| 3   | 5%             | 0.003    | 0.051 | 0.023 | 12.20  |
| 4   | 6%             | 0.002    | 0.040 | 0.018 | 9.10   |
| 5   | 8%             | 0.004    | 0.062 | 0.028 | 16.10  |
| 6   | 11%            | 0.001    | 0.030 | 0.013 | 7.30   |

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#### ANOVA TABLE

| :              |    |       |       |       |  |
|----------------|----|-------|-------|-------|--|
| SOURCE         | DF | SS    | MS    | F     |  |
| Between        | 5  | 0.010 | 0.002 | 0.933 |  |
| Within (Error) | 24 | 0.051 | 0.002 |       |  |
| Total          | 29 | 0.061 |       |       |  |

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

File: 6174163B Transform: NO TRANSFORMATION

|        | DUNNETT'S TEST -     | TABLE 1 OF 2        | Ho:Control <treatment< th=""></treatment<> |        |     |
|--------|----------------------|---------------------|--|--------|-----|
| GROUP  | IDENTIFICATION       | TRANSFORMED<br>MEAN | MEAN CALCULATED IN ORIGINAL UNITS          | T STAT | SIG |
| 1      | CONTROL              | 0.412               | 0.412                                      |        |     |
| 2      | 3%                   | 0.441               | 0.441                                      | -0.981 |     |
| 3      | 5%                   | 0.416               | 0.416                                      | -0.144 |     |
| 4      | 6%                   | 0.441               | 0.441                                      | -0.974 |     |
| 5      | 8%                   | 0.388               | 0.388                                      | 0.823  |     |
| 6      | 11%                  | 0.413               | 0.413                                      | -0.014 |     |
| Dunnet | t table value = 2.36 | (1 Tailed V         | alue, P=0.05, df=24,                       | 5)     |     |

60174163 Ft Smith FATHEAD GROWTH
File: 6174163B Transform: NO TRANSFORMATION

|             | DUNNETT'S TEST -    |                | OF 2 Ho                           | Ho: Control <treatment< th=""></treatment<> |                            |  |
|-------------|---------------------|----------------|-----------------------------------|---|----------------------------|--|
| GROUP       | IDENTIFICATION      | NUM OF<br>REPS | Minimum Sig Diff (IN ORIG. UNITS) |   | DIFFERENCE<br>FROM CONTROL |  |
| 1<br>2<br>3 | CONTROL<br>3%<br>5% | 5<br>5<br>5    | 0.069<br>0.069                    | 16.7<br>16.7                                | -0.029<br>-0.004           |  |
| 4<br>5      | 6 %<br>8 %          | 5<br>5 .       | 0.069<br>0.069                    | 16.7<br>16.7                                | -0.028<br>0.024            |  |
| 6           | 11%                 | 5              | 0.069                             | 16.7  | -0.000                     |  |

#### FISHER'S EXACT TEST

| NOMBER OF |      |                        |
|-----------|------|------------------------|
|           |      |                        |
| ALIVE     | DEAD | TOTAL ANIMALS          |
| 10        | 0    | 10                     |
| 10        | 0    | 10                     |
| 20        | 0    | 20                     |
|           | 10   | ALIVE DEAD  10 0  10 0 |

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

|                |       | NUMB | ER OF         |
|----------------|-------|------|---------------|
| IDENTIFICATION | ALIVE | DEAD | TOTAL ANIMALS |
| CONTROL        | 10    | 0    | 10            |
| 5%             | 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

|                |       | NUMB     | ER OF         |
|----------------|-------|----------|---------------|
| IDENTIFICATION | ALIVE | DEAD<br> | TOTAL ANIMALS |
| CONTROL        | 10    | 0        | 10            |
| 6%             | 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            |  |
| 8%             | 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

|                |       | NUMBE | R OF          |
|----------------|-------|-------|---------------|
| IDENTIFICATION | ALIVE | DEAD  | TOTAL ANIMALS |
| CONTROL        | 10    | 0     | 10            |
| 11%            | 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) |  |
|--------------|----------------|---------|------|---------|--|
| <del>-</del> | CONTROL        | 10      | 0    |         |  |
| 1            | 3%             | 10      | 0    |         |  |
| 2            | 5%             | 10      | 0    |         |  |
| 3            | 6%             | 10      | 0    |         |  |
| 4            | 8%             | 10      | 0    |         |  |
| 5            | 11%            | 10      | 0    |         |  |
|              |                |         |      |         |  |

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| rile: 61/4               | 163E                      | Transform: NO TRAI                      | NSFORMATION             |              |       |
|--------------------------|---------------------------|---|-------------------------|--------------|-------|
| Chi-square               | test for r                | normality: actual a                     | and expected fre        | quencies     |       |
| INTERVAL                 | <-1.5                     | -1.5 to <-0.5                           | -0.5 to 0.5             | >0.5 to 1.5  | >1.5  |
| EXPECTED<br>OBSERVED     | 4.020<br>5                | 14.520<br>11                            | 22.920<br>26            | 14.520<br>15 | 4.020 |
| Calculated<br>Table Chi- | Chi-Square<br>Square valu | goodness of fit to the (alpha = 0.01) = | test statistic = 13.277 | 1.7808       |       |

Data PASS normality test. Continue analysis.

File: 6174163E Transform: NO TRANSFORMATION

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Bartlett's test for homogeneity of variance Calculated B1 statistic = 4.13

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.

File: 6174163E Transform: NO TRANSFORMATION

### SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

| GRP | IDENTIFICATION | N  | MIN    | XAM    | MEAN   |
|-----|----------------|----|--------|--------|--------|
|     |                |    |        |        |        |
| 1   | CONTROL        | 10 | 17.000 | 25.000 | 20.300 |
| 2   | 3%             | 10 | 16.000 | 26.000 | 22.600 |
| 3   | 5%             | 10 | 19.000 | 26.000 | 22.100 |
| 4   | 6%             | 10 | 17.000 | 26.000 | 22.400 |
| 5   | 8%             | 10 | 18.000 | 24.000 | 21.800 |
| 6   | 11%            | 10 | 17.000 | 29.000 | 22.800 |
|     |                |    |        |        |        |

60174163 Ft Smith CERIODAPHNIA DUBIA REPRODU

File: 6174163E Transform: NO TRANSFORMATION

### SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

| GRP | IDENTIFICATION | VARIANCE | SD    | SEM   | C.V. % |
|-----|----------------|----------|-------|-------|--------|
| 1   | CONTROL        | 6.233    | 2.497 | 0.790 | 12.30  |
| 2   | 3%             | 8.267    | 2.875 | 0.909 | 12.72  |
| 3   | 5%             | 4.322    | 2.079 | 0.657 | 9.41   |
| 4   | 6%             | 12.711   | 3.565 | 1.127 | 15.92  |
| 5   | 8%             | 4.400    | 2.098 | 0.663 | 9.62   |
| 6   | 11%            | 9.956    | 3.155 | 0.998 | 13.84  |

File: 6174163E Transform: NO TRANSFORMATION

### ANOVA TABLE

|                |    | •       |       |       |
|----------------|----|---------|-------|-------|
| SOURCE         | DF | SS      | MS    | F     |
| Between        | 5  | 41.000  | 8.200 | 1.072 |
| Within (Error) | 54 | 413.000 | 7.648 |       |
| Total          | 59 | 454.000 |       |       |

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

File: 6174163E Transform: NO TRANSFORMATION

|       | DUNNETT'S TEST - | TABLE 1 OF 2        | Ho:Control <t< th=""><th>reatment</th></t<> | reatment   |
|-------|------------------|---------------------|---|------------|
| GROUP | IDENTIFICATION   | TRANSFORMED<br>MEAN | MEAN CALCULATED IN ORIGINAL UNITS           | T STAT SIG |
| 1     | CONTROL          | 20.300              | 20.300                                      |            |
| 2     | 3%               | 22.600              | 22.600                                      | -1.860     |
| 3     | 5%               | 22.100              | 22.100                                      | -1.455     |
| 4     | 6%               | 22.400              | 22.400                                      | -1.698     |
| 5     | 8%               | 21.800              | 21.800                                      | -1.213     |
| 6     | 11%              | 22.800              | 22.800                                      | -2.021     |
|       |                  |                     |   |            |

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

60174163 Ft Smith CERIODAPHNIA DUBIA REPRODU

File: 6174163E Transform: NO TRANSFORMATION

|       | DUNNETT'S TEST - | TABLE 2        | OF 2 Ho                              | :Control<       | Treatment                  |
|-------|------------------|----------------|--------------------------------------|-----------------|----------------------------|
| GROUP | IDENTIFICATION   | NUM OF<br>REPS | Minimum Sig Diff<br>(IN ORIG. UNITS) | % of<br>CONTROL | DIFFERENCE<br>FROM CONTROL |
| 1     | CONTROL          | 10             |                                      |                 |                            |
| 2     | 3%               | 10             | 2.857                                | 14.1            | -2.300                     |
| 3     | 5%               | 10             | 2.857                                | 14.1            | -1.800                     |
| 4     | 6%               | 10             | 2.857                                | 14.1            | -2.100                     |
| 5     | 8%               | 10             | 2.857                                | 14.1            | -1.500                     |
| 6     | 11%              | 10             | 2.857                                | 14.1            | -2.500                     |

| Conc. ID |      | 1  | 2  | 3  | 4  | 5  | 6  |
|----------|------|----|----|----|----|----|----|
| Conc. Te | sted | 0  | 3  | 5  | 6  | 8  | 11 |
| Response | 1,   | 20 | 25 | 22 | 22 | 22 | 22 |
| Response | 2    | 20 | 16 | 19 | 26 | 22 | 17 |
| Response | 3    | 22 | 22 | 22 | 17 | 24 | 24 |
| Response | 4    | 17 | 24 | 24 | 24 | 18 | 24 |
| Response | 5    | 21 | 22 | 22 | 20 | 21 | 22 |
| Response | 6    | 17 | 20 | 20 | 26 | 23 | 22 |
| Response | 7    | 22 | 24 | 26 | 21 | 24 | 23 |
| Response | 8    | 25 | 24 | 24 | 26 | 21 | 20 |
| Response | 9    | 21 | 26 | 21 | 25 | 24 | 25 |
| Response | 10   | 18 | 23 | 21 | 17 | 19 | 29 |

\*\*\* Inhibition Concentration Percentage Estimate \*\*\*

Toxicant/Effluent: Ft Smith

Test Start Date: 7/22/14 Test Ending Date: 7/29/14

Test Species: Dubia

Test Duration:

7 Day

DATA FILE:

| Conc. | Number<br>Replicates | Concentration | Response<br>Means | Std.<br>Dev. | Pooled<br>Response Means |
|-------|----------------------|---------------|-------------------|--------------|--------------------------|
| 1     | 10                   | 0.000         | 20.300            | 2.497        | 22.000                   |
| 2     | 10                   | 3.000         | 22.600            | 2.875        | 22.000                   |
| 3     | 10                   | 5.000         | 22.100            | 2.079        | 22.000                   |
| 4     | 10                   | 6.000         | 22.400            | 3.565        | 22.000                   |
| 5     | 10                   | 8.000         | 21.800            | 2.098        | 22.000                   |
| 6     | 10                   | 11.000        | 22.800            | 3.155        | 22.000                   |

<sup>\*\*\*</sup> 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. Tes                                    | ted                   | 0                                    | 3                            | 5                            | 6                            | 8                            | 11                           |
| Response<br>Response<br>Response<br>Response | 1<br>2<br>3<br>4<br>5 | .350<br>.429<br>.456<br>.394<br>.432 | .440<br>.489<br>.438<br>.468 | .451<br>.367<br>.452<br>.457 | .472<br>.451<br>.478<br>.421 | .311<br>.405<br>.457<br>.336 | .448<br>.393<br>.372<br>.429 |

\*\*\* Inhibition Concentration Percentage Estimate \*\*\*

Toxicant/Effluent: Ft Smith
Test Start Date: 7/22/14 Test Ending Date: 7/29/14

Test Species: Fathead

Test Duration: 7 Day

DATA FILE:

| Conc. | Number<br>Replicates | Concentration | Response<br>Means | Std.<br>Dev. | Pooled<br>Response Means |
|-------|----------------------|---------------|-------------------|--------------|--------------------------|
| 1     | 5                    | 0.000         | 0.412             | 0.041        | 0.437                    |
| 2     | 5                    | 3.000         | 0.461             | 0.022        | 0.437                    |
| 3     | 5                    | 5.000         | 0.416             | 0.051        | 0.429                    |
| 4     | 5                    | 6.000         | 0.441             | 0.040        | 0.429                    |
| 5     | 5                    | 8.000         | 0.388             | 0.062        | 0.400                    |
| 6     | 5                    | 11.000        | 0.413             | 0.030        | 0.400                    |

<sup>\*\*\*</sup> 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.

ace Analytical®

Pace Analytical Services, Inc. 9608 Loiret Blvd. Lenexa, KS 66219

> Phone: 913.599.5665 Fax: 913.599.1759

# APPENDIX B CHAIN OF CUSTODY FORMS

# **REPORT OF LABORATORY ANALYSIS**

This report shall not be reproduced, except in full, without the written consent of Pace Analytical Services, Inc.



# CHAIN-OF-CUSTODY / Analytical Request Document The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

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| Section A  | Section B                             |                          | Section C  |   | Page                     | . ОТ  |
|--|---------------------------------------|--------------------------|--|---|--------------------------|---|
| Required Client Information:   | Required Project Information:         |                          | Invoice Information:   |   | 7                        | 1271/11   |
| Company: CAYOF FORT SMITH  | Report To Lanu Mc!                    | VDU                      | Attention Lance Madvo  | ΥΥ  |                          | 1371411   |
| Address 3900 kalley Hwy  | Copy To                               | J                        | Company Name City of A.  | ろべけり  | REGULATORY AGENCY        |   |
| Ft. Smith JAR 72904  |                                       |                          | Address. 3900 Kelley Huy Ft  | Sath AL                                       | NPDES F GROUN            | ND WATER   DRINKING WATER   |
| Emeil To.  | Purchasa Order No                     |                          | Pace Quote Reference:  | <del></del>                                   | UST [ RCRA               | OTHER   |
| Phone Fax:   | Project Name. 1                       | R                        | Pace Project   |   | Site Location / O        |   |
| Phone Y 7 84 - 233 Fax. Requested Due Date/TAT   | Project Name. Massard Project Number. | Diomontoring             | Manager.<br>Page Profile #:  |   | STATE: AR                |   |
| Reguested Due Date/TAT   | Trojacet various.                     |                          |  | Pontrector                                    | Analysis Filtered (Y/N)  |   |
|  |                                       |                          |  |   | Andrysis / incide ( incy | -   |
| Section D Matrix C Requires Cler' information MATRIX /   | Codes ( ) ( )                         | COLLECTED                | Preservatives  | 2<br>1<br>1<br>1<br>1                         |                          |   |
| Drinking Wal   | ter DW g S                            |                          |  | त्र   |                          |   |
| Water<br>Waste Water   | r WW B G COMFO                        |                          |  | is Test #  Minnson  (er: Ochpham              |                          | (N)   |
| Product<br>Soil/Solid  | SL 9 5                                | OFF                      | S  | Minns<br>Cioda                                |                          | Residual Chlorine (Y/N)  Page Project No./ Lab I.D.   |
| SAMPLE ID Oil Wipe   | OL 5 0                                |                          |  | Min<br>C: 00                                  |                          | Glorino 174163  |
| (A-2, 0-97 ) Air<br>Sample IDs MUST BE UNIQUE Tissue   | AR DO OO A                            | Mil d                    | # OF CONTAIN  # OF CONTAIN Unpreserved H <sub>2</sub> ,SO <sub>4</sub> HNO <sub>5</sub> HCI NaOH NaoA Methanol Other { C.5                               | [8]   |                          | <b>                                    </b>   |
| Other  | OT 0 C                                | Le H                     | CON 1  | rnalysis                                      |                          | dual  |
| TES #  | MATRIX<br>SAMPLE 1                    | TIME DATE TIME           | # OF CON<br>Unpresen<br>H <sub>2</sub> .SO <sub>4</sub><br>HNO <sub>3</sub><br>HCI<br>NaOH<br>Na <sub>2</sub> .S <sub>2</sub> O <sub>3</sub><br>Methanol | Analysis                                      |                          | Pace Project No./ Lab I.D.  |
|  |                                       |                          | =   ]   1   1   2   2   0  |   |                          | 1660b   |
| 1 Massard EADERAT  | W-1 C 7/2414                          | 0800 7/4/14 0800         | <del>                                     </del>   | i <del>(44+</del>                             | +                        | 1 / 3000  |
| 2  |                                       |                          |  | <b>┨ ┠╌┤</b> ┤╌├                              |                          |   |
| 3  |                                       |                          |  |   |                          |   |
| 4  |                                       |                          |  |   |                          |   |
| 5  |                                       |                          |  | 1 1   |                          |   |
| 6  |                                       |                          |  | <b>   </b>                                    |                          |   |
| 7  |                                       |                          |  | <b> </b>                                      |                          |   |
| 8  |                                       |                          |  | 1   |                          |   |
| 9  |                                       |                          | 1  |   |                          |   |
| 10   |                                       |                          |  | 1   |                          |   |
| 11   |                                       |                          |  | 1   |                          |   |
| ADDITIGNAL ROMMENTS  |                                       | AFFILIATION DATE         | TIME ACCEPTE   | PAT / AFFILIATION                             | DAT' TIME                | SAMPLE CONDITIONS   |
| ADDITIONAL TOMMENTS  T ( 1 2 2 , 0 / Mig/L  F ( 1 2 2 ) . Ogmy/L   | AEGRACION DE L                        |                          |  | W Process                                     | 1/03/61/330              | 2010  |
| 1 (12 = U. U/ My/L   | Chora Cuarcal                         | 的 蒙古与品的 7/21/14          | 11701-194  | 1-121 G/                                      | 177/6/128/               | 15717 17  |
| FCb = 2.02ma/4   |                                       |                          |  | <u>' (                                   </u> |                          |   |
| 1  |                                       | İ                        |  |   |                          | 1   |
| A STATE OF THE STA |                                       |                          |  |   |                          |   |
| }  |                                       | SAMPLER NAME AND SIGNATE | JRE  |   |                          | Received on the (YM)  Saland Color  Saland Color  The (YM)  |
| €.   | HREADAL.                              | PRINT Name of SAMPLE     | ·a. 6:   |   |                          | Received on the (YNN) Search Color No. Search Color No. 18. 18. 18. 18. 18. 18. 18. 18. 18. 18  |
|  |                                       | SIGNATURE of SAMPLE      |  | DATE Signe                                    | 7/21/:4                  | Rece From Long State of State |
|  | _                                     | argisatoric of SAMPLE    |  | C A C   | ) 11 (-1 / 12)           | F-ALL-Q-020rev.07 15-May 2007   |

Thillia



### **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<br>Required Pro  | piect Info  | formation:     |              |                  |   |                           | ectio           | n C   | ation:           |                   |   |                       |                   |             |               |             |                   |          |              | Pag  | ge:               |                         | <u> </u>                 | of                               | 1                       |
|---|----------------------------|---|----------------|--------------|------------------|---|---------------------------|-----------------|---|------------------|-------------------|---|-----------------------|-------------------|-------------|---------------|-------------|-------------------|----------|--------------|--|-------------------|-------------------------|--------------------------|----------------------------------|-------------------------|
|   | Danad Tax                  | <del>.                                      </del>                |                | ۰۸ م         |                  |   |                           | ttentic         | n:  |                  |                   | Mc  | Λ.,                   | <u>~</u>          |             |               |             |                   |          |              |  |                   | 1                       | 77                       | 704                              | 7                       |
| Address: 3900 Kelly Hwy   | Сору То:                   | LUA   | ia M           | CHVOO        | <del></del>      |   | C                         | ompa            | ny Nar  | ne: /            | <u>د</u><br>.ند . |   |                       |                   | • ]         |               | +           | PEGLI             | LATOR    | - A          | GENC                                       | <del>-</del>      |                         |                          |                                  |                         |
| F+. Smith AR 72904  |                            |   | . <u> </u>     |              |                  |   | A                         | ddres           | s.  |                  |                   | DF  | 3 6                   | <u>۸</u> ک.<br>۱۲ | <u>n 17</u> | \ 0           |             |                   | PDES     | <u></u>      |  | -                 | A/A T.C                 | D (~                     | DDINKI                           | IC WATER                |
| Email To:   | Purchase Or                | der No.:  |                |              |                  |   | Pa                        | ace Qu          |   | lley             | Hw                | 7 [   | +.5                   | <u>~111</u>       | <u> </u>    | 11            |             | , '\<br> - U      |          | ,            | GROUND WATER DRINKING WATER  RCRA TO OTHER |                   |                         |                          |                                  |                         |
| Phone:Fax:  | Project Name               | ∍: <b>^</b> ∧   | 1              | 10.          | 1.               | •   |                           | eferen          |   |                  |                   |   |                       |                   |             |               | -           |                   |          | <del>i</del> | KOKA                                       |                   |                         |                          | OTHER                            |                         |
| Phone:<br>479-784-2337 Fax:<br>Requested Due Date/TAT:  | Project Name               | oer:  | rssard         | Moich        | 10 m             | <u>~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ </u> |                           | anage<br>ace Pr | r:<br>ofile #:                                |                  |                   |   |                       |                   |             |               |             |                   | ocation  |              | AR   | 2                 |                         |                          |                                  |                         |
|   | L ',                       |   |                |              |                  |   |                           |                 |   |                  |                   |   |                       |                   |             |               |             |                   | STATE:   | ь.           |  | <u> </u>          | <u>-</u> L              |                          |                                  |                         |
| Seeding D   |                            |   |                |              |                  | ····  | _                         | 1               |   |                  |                   |   |                       | <b> </b>          |             |               | ed A        | naiys             | is Filte | rea          | ( T/NI)                                    | $\dashv$          |                         |                          |                                  |                         |
| Section D Matrix C Required Client Information MATRIX /   | CODE                       | o teft)   |                | COLL         | ECTED            |   |                           | - 1             |   | Prese            | ervat             | ives  |                       | N/A               | 2.          | 2             |             |                   |          |              |  |                   |                         |                          |                                  |                         |
| Drinking Wate Water Waste Water Waste Water Product Soil/Solid Oil Wipe (A-Z, 0-9 /,-) Air Sample IDs MUST BE UNIQUE Tissue Other | SL<br>OL<br>WP<br>AR<br>TS | MATRIX CODE (see valid codes to left) SAMPLE TYPE (G=GRAB C=COMP) | STA            |              | COMPOS<br>END/GF |   | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Unpreserved<br>H <sub>2</sub> SO <sub>4</sub> | INO <sub>3</sub> | NaOH              | Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> | Methanol<br>Other ICE | is Test 👃         | NOUN        | Cenio Japhnia |             |                   |          |              |  |                   | Residual Chlorine (Y/N) | <b>D</b>                 | Pariotal                         |                         |
| 1 Massard Efficent  |                            |   | 7/22/14        | +            | 7/23/14          |   | +                         | 1               | +   |                  | -   -             | ۲.  | Z<br>V                |                   | S           | <del>\</del>  | $\vdash$    | +                 | ++       | +            | +  | ╁┼                | -                       |                          | Project                          | No./ Lab I.D.           |
| 2   | <del> </del>               |   | 11 22714       | 000          | 11-11            | 0.024   | _                         |                 | +   | H                | +                 | H   | 1                     | 1                 |             | $\Delta$      |             | +-                |          | +            |  | $\dagger \dagger$ | 1                       | / 00                     |                                  |                         |
| 3   |                            |   | <del>-  </del> |              |                  |   | $\top$                    |                 |   | TT               | $\top$            | III   | $\top$                | 1 1               | $\vdash$    |               |             |                   | $\Box$   | H            | +  | 11                |                         |                          |                                  |                         |
| 4   |                            |   |                |              | 1                |   | 1                         |                 |   |                  | $\top$            | $\sqcap$                                      | 1                     | 1                 |             |               |             |                   |          | T            |  |                   | $\top$                  |                          |                                  |                         |
| 5   |                            |   |                |              | 1                |   | 十                         |                 |   |                  |                   |   |                       | 1                 |             |               |             | <u> </u>          |          |              |  | $\top$            | 7                       |                          |                                  |                         |
| 6   |                            |   |                | İ            |                  |   | $\top$                    |                 |   | П                |                   |   |                       | 1                 |             |               | П           |                   |          |              |  |                   |                         |                          |                                  |                         |
| 7   |                            |   |                |              |                  |   |                           |                 |   |                  |                   |   |                       | 1                 |             |               | П           |                   |          |              |  |                   |                         |                          |                                  |                         |
| 8   |                            |   | l              |              |                  |   |                           |                 |   |                  |                   |   |                       | 1 1               |             |               | П           |                   |          |              |  |                   |                         |                          |                                  |                         |
| 9   |                            |   |                |              |                  |   |                           |                 |   | П                |                   | П   |                       | 1                 |             |               |             |                   |          | 1            |  | T                 |                         |                          |                                  |                         |
| 10  |                            |   |                |              |                  |   | Т                         |                 |   |                  |                   | П   |                       | 1 [               |             |               |             |                   |          |              |  |                   |                         |                          |                                  |                         |
| 11  |                            |   |                |              |                  |   | T                         |                 |   | $\sqcap$         |                   | П   |                       | 1 1               |             |               | П           |                   |          |              |  | T                 |                         |                          |                                  |                         |
| 12  |                            |   |                |              |                  |   |                           |                 |   |                  |                   | 7   |                       | 1                 |             |               |             |                   |          |              |  |                   |                         |                          |                                  |                         |
| ADDITIONAL COMMENTS   |                            | RELING  | QUISHED BY     | / AFFILIAT   | ION              | DATE  |                           | TI              | ME  |                  | $\overline{}$     | ACC   | FFTF                  | Ó BY              | / AFF       | ILIATIO       | N           |                   | DATE     |              | TIME                                       |                   |                         | SAMP                     | LE CONDIT                        | TIONS                   |
| T.Cl2 = 0.02 ng/2   | Chris                      | (0)   | oper/C         | Husta        | 1.50             | 7/23/   | 14/                       | 12              | 00  |                  | $V_{\leq}$        | 2//   | 76                    | 201               | 0           | _             | 7           | 124               | 1/11/    | 1/           | 00   | 1                 | 8                       | \                        |                                  |                         |
| F. Clz= O. Dlmy/L   |                            |   |                | <u></u>      | 10. []           | ,, ,  |                           |                 |   | 1                |                   | ~   | 4                     |                   |             |               |             | <del>- ]/</del> , | 17       | 14           | <u> </u>                                   | 1                 | ٦,                      | <del>/</del>             |                                  |                         |
| 1.01  |                            |   |                |              |                  |   | -                         |                 |   |                  |                   |   |                       |                   |             |               |             |                   |          | +-           |  | ╁                 | -                       |                          |                                  | 1                       |
|   |                            |   |                |              |                  |   |                           |                 |   | -                |                   |   |                       |                   |             |               |             |                   |          | ╁            |  | <del> </del>      | -                       |                          |                                  |                         |
|   |                            |   | <del></del>    | SAMPLE       | R NAME A         | ND SIGNAT                                     | URE                       |                 |   | <u> </u>         |                   |   |                       |                   |             |               | <del></del> | 1_                |          |              |  | 1                 | +                       | c                        | ä                                | tg                      |
| OF  | RIGINAL                    |   |                | <b></b>      | PRINT Nan        | ne of SAMPL                                   | ER: /                     | - ما            | :.  | <u> </u>         | 00                |   |                       | -                 |             |               |             |                   |          |              |  | <b>-</b> ii       |                         | ved o                    | tody<br>(N)                      | S Int                   |
| Oi  | TANK ALI                   |   |                |              |                  | RE of SAMPL                                   |                           | <u> </u>        | · · ·   |                  | 70                | •   |                       |                   | DA          | TE Sign       | ned         | 1/2               | 3/14     |              |  | Temp in °C        |                         | Received on<br>Ice (Y/N) | Custody<br>Sealed Coole<br>(Y/N) | Samples Intact<br>(Y/N) |
| *Important Note: By eigning this form you are accer-  | ting Page's NF             | 30 day r  | payment terms  | and ogreeing | to late charge   | s of 1.5% per r                               | nonth                     | or any          | involce                                       | s not pa         | rid-with          | in 30 d                                       | laye-                 | 0                 | (M<br>C-    | M/DD/Y        | 1): (       | . , ,             | -114     |              |  |                   |                         |                          | 07, 15-Ma                        |                         |
|   | '                          |   |                |              |                  |   |                           |                 |   |                  |                   |   |                       | 7                 | 117         | -3/1          | 4           |                   |          |              |  |                   |                         |                          |                                  |                         |



# Sample Condition Upon Receipt

| Client Name: MASMM   |                                       |               |                             |   |                                       | 7          |
|--|---------------------------------------|---------------|-----------------------------|---|---------------------------------------|------------|
| " <del>\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \</del>   |                                       |               |                             |   | Optional                              | $\dashv$   |
| Courier: Fed Ex □ UPS □ USPS □ Client  | `                                     |               | Pace Other O                |   | Proj Due Date:                        |            |
| Tracking #:  | Pace Shippin                          | _             | ~(                          | NOX                                     | Proj Name:                            | لـ         |
| ,  |                                       | intact:       | ' /                         |   |                                       |            |
| Packing Material: Bubble Wrap 17 Bubble E  | · · · · · · · · · · · · · · · · · · · | Foam          | / \                         | Other i                                 |                                       | •          |
| 10   | Type of Ice:``                        | <b>\</b> 1    | llue None 🗀 Sam<br>lle one) | ples received                           | on ice, cooling process has begun     | 1.         |
| Cooler Temperature:  |                                       | 70110         | no one,                     | Date and in contents:                   | itials of person examining            | $M_{\ell}$ |
| Temperature should be above freezing to 6°C  | <b>X</b>                              | F73           |                             |   | 124/14 OV                             | 4          |
| Chain of Custody present:  | Yes 🗆 No                              | · · · · · · · | 1.                          |   | · · · · · · · · · · · · · · · · · · · | -          |
| Chain of Custody filled out:   |                                       | o []N/A       | 2.                          |   |                                       | _          |
| Chain of Custody relinquished:   | Yes DNo                               | D DIN/A       | 3.                          |   |                                       | -          |
| Sampler name & signature on COC:   | Yes DNC                               | C!N/A         | 4.                          | • |                                       | _          |
| Samples arrived within holding time:   | yes □No                               | E.N/A         | 5.                          |   |                                       |            |
| Short Hold Time analyses (<72hr):  | Yes DNo                               | Eln/A         | 6.                          |   |                                       |            |
| Rush Turn Around Time requested:   | □Yes XW                               | E EN/A        | 7.                          |   |                                       |            |
| Sufficient volume:   | Yes □No                               | Eln/A         | 8.                          |   |                                       | 7          |
| Correct containers used:   | Yes DNo                               | E]N/A         |                             |   |                                       |            |
| Pace containers used:  | XYes □No                              | D∃N/A         | 9.                          |   |                                       |            |
| Containers intact:   | ∐Yes □No                              | . □N/A        | 10.                         |   |                                       |            |
| Unpreserved 5035A soils frozen w/in 48hrs?   | □Yes □No                              | EN/A          | 11.                         |   |                                       |            |
| Filtered volume received for dissolved tests?  | □Yes 🎹                                | E)N/A         | 12.                         |   |                                       |            |
| Sample labels match COC:   | Øyes □No                              | LIN/A         |                             |   |                                       |            |
| Includes date/time/ID/analyses Matrix:   |                                       |               | 13.                         |   |                                       |            |
| All containers needing preservation have been checked.                                     | □Yes □No                              | TUNIA         |                             |   |                                       |            |
| All containers needing preservation are found to be in compliance with EPA recommendation. | □Yes □No                              | THAI/A        | 14.                         |   |                                       |            |
| Exceptions: VOA, coliform, TOC, O&G, WI-DRO (water), Phenolics                             | □Yes □No                              | /             | Initial when completed      |   | t # of added<br>eservative            |            |
| Trip Blank present:  | □Yes □No                              | Sinka         | Completed                   |   | SSCIVATIVO                            |            |
| Pace Trip Blank lot # (if purchased):  |                                       |               | 15.                         |   |                                       |            |
| Headspace in VOA vials ( >6mm):  | □Yes □No                              | Aliva         |                             |   |                                       | 1          |
|  |                                       | 7             | 16.                         |   |                                       |            |
| Project sampled in USDA Regulated Area:  | □Yes □No                              | E DANA        | 17. List State:             |   |                                       |            |
| Client Notification/ Resolution: Copy C  | COC to Client?                        | 4 >           | N Field Data F              | Required?                               | Y / N                                 |            |
| Person Contacted: D  | ate/Time:                             |               |                             |   |                                       |            |
| Comments/ Resolution:  |                                       |               |                             |   |                                       | _          |
|  | ····                                  |               |                             |   | · · · · · · · · · · · · · · · · · · · | _          |
| Project Manager Review   | <del></del>                           |               | 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               |                           | t Infor | mation:      |             |                    |                   |                 | ion C             |                  |                      |   |               |               |                    |                        |      |          |          |   | F                  | age:        |                         |                          | of                                | Ť.                      |
|---|-------------------------|---------------------------|---------|--------------|-------------|--------------------|-------------------|-----------------|-------------------|------------------|----------------------|---|---------------|---------------|--------------------|------------------------|------|----------|----------|---|--------------------|-------------|-------------------------|--------------------------|-----------------------------------|-------------------------|
| Company: CITY OF FORT SMITH                             | Report To:              |                           |         | Mc A         | 710n        |                    |                   | Atter           |                   | Δ. Δ             |                      | Mei   | Aun           | ч             |                    |                        |      |          |          |   |                    |             |                         | 177                      | 704                               | 6                       |
| Address: 7900 Kello. U.m.                               | Сору То:                | 14                        | nce     | 1105         | 1057        |                    |                   | Com             | pany N            | ame:             | () E                 | <u>. ۱۵٬</u>                                  | <u> </u>      | 11.5          |                    |                        |      | REG      | ULATO    | RY A  | AGEN               | <del></del> |                         |                          |                                   |                         |
| Address: 3900 Kelley Hwy<br>FA. Smith, AR 72904         |                         |                           |         |              |             |                    |                   | Addr<br>39      | ess:<br>Quote     | ر ال<br>الم      | <u>ئىئ</u><br>∞ىلا . | <u>۱۳۰</u> ا                                  | <u> </u>      | -1. 1V        | 4                  | AA                     |      |          | NPDES    |   |                    |             | WAT                     | ER [                     | DRINKIN                           | IG WATER                |
| Email To:   | Purchase C              |                           |         |              |             |                    |                   | Pace<br>Refer   | Quote<br>ence:    | 7                |                      | 7   | · Po          | · · · · · · · | . <del>,,,</del> , |                        |      | _        | UST      | Γ   | RCF                | RA          |                         | ٢                        | OTHER                             |                         |
| Phone: 474-784-2337 Fax:                                | Project Nar             | me: N                     | 125     | ssard        | Brami       | ontoni             | 1.R               |                 | Project           |                  |                      |   |               |               |                    | <u>-</u>               |      | Site     | Locatio  | n   | ٨                  | 2           |                         |                          |                                   |                         |
| Requested Due Date/TAT:                                 | Project Nur             | nber:                     | 1       | <del></del>  |             |                    | <del>-)</del>     |                 | Profile #         | <i>‡</i> :       |                      |   |               |               |                    | -                      |      |          | STATE    | <b>:</b> :                                    | 44                 | <u> </u>    | _                       |                          |                                   |                         |
|   |                         |                           |         |              |             |                    |                   |                 |                   |                  |                      |   |               |               |                    | eque                   | sted | Analy    | sis Filt | ered  | (Y/N)              |             | Γ                       |                          |                                   | 7-1-1                   |
| Section D Matrix C Required Client Information MATRIX / |                         | left)                     | (a)     |              | COLLE       | ECTED              |                   |                 |                   | Pre              | serva                | atives  |               | ¥/ N [        | 2                  | 2                      |      |          |          |   |                    |             |                         |                          |                                   |                         |
| Drinking Wate   | r DW                    | des to                    | C=COMP) |              |             | T                  |                   |                 | $\Box$            | Τ                |                      |   | İΤ            |               | _                  | -                      |      | $\vdash$ | ++       | +   | ++                 | +           | T                       |                          |                                   |                         |
| Water<br>Waste Water<br>Product                         | WT<br>WW<br>P           | (see valid codes to left) | NB C    | COMPO        |             | COMPOS<br>. END/GR |                   | ŀ               |                   |                  |                      |   |               |               | 3                  | Chrosis Cerisolaphinis |      |          |          |   |                    |             |                         |                          |                                   |                         |
| SAMPLE ID Oil   | SL<br>OL                | see ve                    | (G=GRAB |              |             |                    | COLL              | စ္ဆ             |                   |                  |                      |   |               |               | إكم                | 5                      |      |          |          |   |                    |             | Residual Chlorine (Y/N) |                          |                                   |                         |
| (A-Z, 0-9 / ,-) Air                                     | WP                      | 1                         | l 1     |              |             |                    | ΤΑ                | # OF CONTAINERS |                   |                  |                      |   |               | Test          | تح                 | 2.                     |      |          |          |   |                    | ĺ           | orin                    |                          |                                   |                         |
| Sample IDs MUST BE UNIQUE Tissue<br>Other               | AR<br>TS<br>OT          | CODE                      | TYPE    |              |             |                    | TEM               | NTA             | L S               |                  |                      |   |               | Sis.          | ارِ                | ည                      |      |          |          |   |                    |             | 등                       |                          |                                   |                         |
| #<br>E  |                         | MATRIX                    | SAMPLE  |              |             |                    | SAMPLETEMP        | 8               | rese              | ع اح             |                      | S <sub>2</sub> O                              | hanc          | <u> </u>      | اع ا               | 5                      |      | .        |          |   |                    |             | idua                    |                          |                                   |                         |
| ITEM#   |                         | MA.                       | SAN     | DATE         | TIME        | DATE               |                   | 0 #             | 5 5               | HNO <sub>3</sub> |                      | Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> | Methanol      | Analysis      | 5                  | さ                      |      |          |          |   |                    |             | Res                     | Pace                     | Project I                         | No./ Lab I.D.           |
| 1 Massard Effluent                                      |                         | 8                         | C       | 7/24/14      | 0800        | 7125/14            | 0890              |                 |                   |                  |                      |   |               | <u>र</u>      | X                  | X                      |      |          |          |   |                    |             |                         | 160                      | ub                                |                         |
| 2   |                         |                           |         |              |             |                    |                   | L               |                   |                  | Ш                    |   | Ш             |               |                    |                        |      |          |          |   |                    |             | Ш                       |                          |                                   |                         |
| 3   |                         |                           |         |              |             |                    |                   | _               | $\sqcup$          |                  | Ш                    | <u> </u>                                      |               | 4             |                    |                        |      |          | $\perp$  | $\perp$                                       |                    |             | Ш                       |                          |                                   |                         |
| 4   |                         |                           |         |              |             |                    |                   | ⊢               | +                 | -                | $\vdash$             | 4-  |               | -             | <u> </u>           |                        |      |          |          | _   | $\perp \downarrow$ |             | Ш                       |                          | <del></del>                       |                         |
| 5   |                         |                           |         |              |             |                    |                   | ├               | +                 | +                |                      | +   |               | 4             |                    | -                      |      |          | +        |   | +                  |             | $\vdash$                |                          |                                   |                         |
| 7   |                         |                           |         |              |             |                    |                   | ╁╌              | ╁┼                | +-               | $\vdash$             | +   | ${\mathbb H}$ | +             | $\vdash$           |                        | -    | $\vdash$ | ++       | +-  | ++                 |             | $\vdash$                |                          |                                   |                         |
| <u> </u>  |                         |                           |         |              |             |                    |                   |                 | ++                | +                | $\vdash$             | +   | ${}^{+}$      | ┨.            | $\vdash$           | $\vdash$               | +    | $\vdash$ | ++       | +   | ++                 | +           | Н                       |                          |                                   |                         |
| 9   |                         |                           |         |              |             | -                  |                   | 1               | $\dagger \dagger$ |                  |                      | +   | H             | 1             |                    | $\vdash$               | +    |          | ++       | $\dashv$                                      | ++                 | +           | H                       |                          |                                   |                         |
| 9<br>10<br>11<br>12                                     | -                       |                           |         |              |             |                    |                   |                 | $\Box$            |                  |                      |   | Ħ             | 1             |                    |                        |      |          | 11       | $\top$  | ††                 | $\top$      | $\Box$                  |                          | <del></del>                       |                         |
| 11  |                         |                           |         |              |             |                    |                   |                 |                   |                  |                      |   |               | 1             |                    |                        |      |          |          | 1   | $\top$             | $\top$      | П                       | -                        |                                   |                         |
| 12  |                         |                           |         |              |             |                    |                   |                 |                   |                  | $\coprod_{\ell}$     | 1   |               |               |                    |                        |      |          |          |   |                    |             |                         |                          |                                   |                         |
| ADDITIONAL COMMENTS                                     |                         |                           |         |              | AFFILIATI   |                    | DATE              | ļ               | TIME              |                  |                      | AC  | CEPT          | ₽D BY         | / AF               | FILIATI                | ION  |          | DATE     |   | TIME               |             |                         | SAMP                     | LE CONDIT                         | TIONS                   |
| T. Cl2 = 0.02 mg/L                                      | Chri                    | s (o                      | 002     | City         | of Ft. S    | mth -              | 7/25/14           | 12              | 00                | $\perp$          | K                    | SŁ  | 1             |               | / (                | e                      |      | 7/2      | 6/14     | 12  | 2/5                | 2           | 4                       | 4                        | 4                                 |                         |
| F. Cl2 = 0.01 mg/L                                      |                         |                           |         |              |             |                    |                   |                 | (                 | +                | 7                    |   | _,            |               |                    |                        |      |          | ,        |   |                    |             | '                       | /                        |                                   |                         |
|   |                         |                           |         |              | ·           |                    |                   |                 |                   |                  |                      |   |               |               |                    |                        |      |          |          |   |                    |             |                         |                          |                                   |                         |
|   |                         |                           |         |              |             | _                  |                   |                 |                   |                  |                      |   | -             |               |                    |                        |      |          |          | 十   |                    |             |                         |                          | ,                                 |                         |
|   | <u>L</u> .              |                           |         |              | SAMPLE      | R NAME A           | ND SIGNATUR       | E               |                   |                  |                      | -   |               |               |                    |                        |      |          |          |   |                    | $\neg$      | ·                       | 6 -                      | Jer -                             | gact                    |
| OF  | IIGINA                  | L                         |         |              |             | PRINT Nam          | ne of SAMPLER     | Ch              | 115               | Cool             | 32                   |   |               |               |                    |                        |      |          |          |   |                    | 7           | Temp in °C              | (Y/N)                    | stody<br>d Coo<br>(/N)            | es Int                  |
|   |                         |                           |         |              |             |                    | E of SAMPLER      |                 | , (               |                  | <u> </u>             |   |               |               | D/                 | ATE Sig                | gned | 7/1      | -5/11    | <u>,                                     </u> |                    |             | Tem                     | Received on<br>Ice (Y/N) | Custody<br>Sealed Cooler<br>(Y/N) | Samples Intact<br>(Y/N) |
| Important Note: By signing this form you are accept     | <del>ing Pacc's N</del> | ET-30-                    | day pay | yment terme- | nd agreeing | to late charge     | s of 1.5% per men | <u></u>         | ny invoid         | ces not          | paidw                | ithin 38                                      | days.         | COC           | <u> </u>           |                        | 11): |          | J/L      | 1   |                    | F           | -ALL-                   |                          | 07, 15-May                        |                         |
|   |                         |                           |         |              |             |                    |                   |                 |                   |                  |                      |   |               | 7/2           | Ls/                | 44                     |      |          |          |   |                    |             |                         |                          |                                   |                         |



# Sample Condition Upon Receipt

| Client Name: Ft SM/H   |                        |                        |                     | Optional  |
|--|------------------------|------------------------|---------------------|---|
| Courier: Fed Ex [] UPS [] USPS [] Client []  | Commercial             | Pace [ ] Other [       |                     | Proj Due Date:  |
| Tracking #:  | Pace Shipping Laborate | el Used? Yes 🖯 🕦       | 19/01               | Proj Name:  |
| Custody Seal on Cooler/Box Present: Yes N  | o □ Seals intact:      | Yes No 11              | •                   |   |
| Packing Material: Bubble Wrap [] Bubble E  | Bags □ Foa             | m □ None E             | Other [1]           |   |
|  | • • • •                |                        | ples received o     | n ice, cooling process has begun.   |
| Cooler Temperature: 2-4  | <u>(c</u>              | rcle one)              | Date and initiation | als of person examining   |
| Temperature should be above freezing to 6°C  |                        |                        | contents.           | 18 112414 1215  |
| Chain of Custody present:  | Yes []No []N/          | A 1.                   |                     |   |
| Chain of Custody filled out:   | Yes DNo LN/            | A 2.                   |                     |   |
| Chain of Custody relinquished:   | Cyes IINO IIN/         | A 3.                   |                     | reaches and the same of the control |
| Sampler name & signature on COC:   | Nes I No Lin/          | A 4.                   |                     |   |
| Samples arrived within holding time:   | Dyes DNo DN/           | A 5.                   |                     |   |
| Short Hold Time analyses (<72hr):  | Aires Cho Lini         | A 6.                   |                     |   |
| Rush Turn Around Time requested:   | □Yes XINO LIN/         | A 7.                   |                     |   |
| Sufficient volume:   | Yes DNo DN/            | A 8.                   |                     |   |
| Correct containers used:   | Yes Lino Line          | Α                      |                     | •   |
| Pace containers used:  | Xiyes Lino Lina        | ^ 9.                   |                     |   |
| Containers intact:   | Yes Elno Elno          | A 10.                  |                     |   |
| Unpreserved 5035A soils frozen w/in 48hrs?   | Elyes Elno IXN/        | 9 11.                  |                     |   |
| Filtered volume received for dissolved tests?  | □Yes UNO VINA          | A 12.                  |                     |   |
| Sample labels match COC:   | Yes DNo DNA            | P                      |                     |   |
| Includes date/time/ID/analyses Matrix:   | WI                     | 13.                    |                     |   |
| All containers needing preservation have been checked.                                     | □Yes □No N/N/          | <b>A</b>               |                     |   |
| All containers needing preservation are found to be in compliance with EPA recommendation. | □Yes □No XIN/          | 14.                    |                     | ,   |
| Exceptions: VOA. coliform, TOC, O&G, WI-DRO (water), Phenolics                             | □Yes MNo               | Initial when completed | i i                 | # of added<br>ervative  |
| Trip Blank present:  | Elyes Elno Linu        |                        |                     |   |
| Pace Trip Blank lot # (if purchased):  |                        | 15.                    |                     |   |
| Headspace in VOA vials ( >6mm):  | Liyes Fino <b>Y</b> N/ | <b>A</b>               |                     |   |
|  | ,                      | 16.                    |                     |   |
| Project sampled in USDA Regulated Area:  | □Yes □No XIN/          | 17. List State:        |                     |   |
| Client Notification/ Resolution: Copy C  | COC to Client? Y /     | N Field Data f         | Required? Y         | / N   |
| Person Contacted: D  | ate/Time:              |                        |                     |   |
| Comments/ Resolution:  |                        |                        |                     |   |
|  |                        |                        |                     | <u> </u>  |
| Project Manager Review:  |                        | Date:                  |                     |   |



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Pace Analytical Services, Inc. 9608 Loiret Blvd. Lenexa, KS 66219

> Phone: 913.599.5665 Fax: 913.599.1759

# APPENDIX C

REFÉRENCE TOXICANTS SUMMARY

# **REPORT OF LABORATORY ANALYSIS**

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**REFERENCE #60174163** 

Pace Analytical Services, Inc. 9608 Loiret Blvd. Lenexa, KS 66219

> Phone: 913.599.5665 Fax: 913.599.1759

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: 7/8/14 14:00

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End: 7/15/14 13:00

| Reference Toxicant (NaCl) <u>Pimephales promelas</u> |       |                                    |        |        |  |  |  |  |  |  |  |
|--|-------|------------------------------------|--------|--------|--|--|--|--|--|--|--|
| Concentration of Toxicant                            | F     | Avg. # of Live Organisms/replicate |        |        |  |  |  |  |  |  |  |
|  | 0 hrs | 24 hrs                             | 48 hrs | 7 days |  |  |  |  |  |  |  |
| 10 g/l   | 40    | 9                                  | 2      | 0      |  |  |  |  |  |  |  |
| 8 g/l  | 40    | 36                                 | 28     | 6      |  |  |  |  |  |  |  |
| 6 g/l  | 40    | 40                                 | 33     | 22     |  |  |  |  |  |  |  |
| 4 g/l  | 40    | 40                                 | 40     | 39     |  |  |  |  |  |  |  |
| 2 g/l  | 40    | 40                                 | 40     | 39     |  |  |  |  |  |  |  |

IC25 (4.87 g/l Sodium Chloride)

Survival NOEC: 4.0 g/l

Reference Toxicant (NaCl) Ceriodaphnia Dubia

| Çoncentration 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                                 | 8      | 1      |  |  |  |  |  |  |  |  |  |  |
| 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 (1.09 g/l Sodium Chloride)

Survival NOEC:

Submitted By:

Fimothy Harrell, Technical Director

**REPORT OF LABORATORY ANALYSIS** 

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**REFERENCE #60174163** 

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APPENDIX D
STATE AGENCY FORMS

# **REPORT OF LABORATORY ANALYSIS**

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Biomonitoring Form
Chronic Toxicity Summary Form
Ceriodaphnia dubia
Chemical Parameters Chart

Permittee: City of Fort Smith NPDES No.: AR 0021750

Contact: Lance McAvoy
Analyst: Tim Harrell

Mike Bollin

Sample No. 1 Collected: Date: Sample No. 2 Collected: Date: Sample No. 3 Collected: Date:

7/21/2014 Time: 7/23/2014 Time:

8:00 8:00

Test Begin: Date:

7/25/2014 Time: 7/22/2014 Time:

8:00 14:00

Test End: Date: 7/29/2014 Time: 13:10

| Dilution:<br>Day: |      |      |      |          |       |                                     |      |          | Dilution:<br>Day: | 6    |      |             |      |             |      | -    |              |
|-------------------|------|------|------|----------|-------|-------------------------------------|------|----------|-------------------|------|------|-------------|------|-------------|------|------|--------------|
|                   | 1    | 2    | 3    | 4        | 5     | 6                                   | 7    | Comments |                   | 1    | 2    | 3           | 4    | 5           | 6    | 7    | Comments     |
| Temp(C)           | 25.2 | 25.1 | 24.8 | 25       | .25.1 | 25.2                                | 25   |          | Temp(C)           | 25.1 | 24.9 | 24.8        | 25   | 24.9        | 25   | 25   | <del></del>  |
| DO Initial        | 8.3  | 8.2  | 8.1  | 8.9      | 8     | 8.2                                 | 8.1  |          | DO Initial        |      | 8.2  | 8.1         | 8.2  | 8.1         | 8.3  | 8.1  | <del></del>  |
| DO Final          | 7.2  | 7.9  | 7.4  | 7.3      | 7     | 7.3                                 | 7.7  |          | DO Final          | 7.2  | 7.8  | 7.4         | 7.3  | 7.1         | 7.3  | 7.3  |              |
| pH Initial        | 7.53 | 7.51 | 7.46 | 7.52     | 7.57  | 7.55                                | 7.5  |          | pH Initial        |      | 7.72 | 7.52        | 7.57 | 7.55        | 7.62 | 7.58 |              |
| pH Final          | 7.55 | 7.6  | 7.56 | 7.6      | 7.68  | 7.61                                | 7.66 |          | pH Final          | 7.56 | 7.6  | 7.61        | 7.62 | 7.8         | 7.65 |      | <del> </del> |
| Alkalinity        | 58   |      |      |          |       | † · · · · · · · · · · · · · · · · · |      |          | Alkalinity        | 7.50 | 7.0  | 7.01        | 7.02 | /.0         | 7.65 | 7.67 |              |
| Hardness          | 98   |      |      | <u> </u> |       |                                     |      | -        | Hardness          |      |      | <del></del> |      |             |      |      | <del></del>  |
| Conductivity      | 410  |      |      |          |       |                                     |      | -        | Conductivity      |      |      |             |      |             |      |      | +            |
| Chlorine          | <,1  |      |      |          |       |                                     | <.1  |          | Chlorine          |      |      |             |      | <del></del> |      |      | <del> </del> |

| Dilution:<br>Day: | 3    | <del>.</del> |      |      |      |      |      |          | Dilution:<br>Day: | 8    | }    |      |              |              |      | 17 18 14    |              |
|-------------------|------|--------------|------|------|------|------|------|----------|-------------------|------|------|------|--------------|--------------|------|-------------|--------------|
|                   | 1    | 2            | 3    | 4    | 5    | 6    | 7    | Comments |                   | 1    | 2    | 3    | 4            | 5            | 6    | 7           | Comments     |
| Temp(C)           | 25.1 | 24.9         | 24.8 | 25   | 24.9 | 25   | 25   |          | Temp(C)           | 25.1 | 24.9 | 24.8 | 25           | 24.9         | 25   | 25          |              |
| DO Initial        |      | 8.2          | 8.1  | 8.2  | 8    | 8.2  | 8.1  |          | DO Initial        |      | 8.3  | 8.1  | 8.2          | 8.1          | 8.3  | 8.2         | +            |
| DO Final          | 7.2  | 7.9          | 7.4  | 7.3  | 7    | 7.3  | 7.2  |          | DO Final          | 7.1  | 7.8  | 7.3  | 7.3          | 7.1          | 7.3  | 7.3         | <del> </del> |
| pH Initial        |      | 7.68         | 7.51 | 7.54 | 7.54 | 7.59 | 7.56 |          | pH Initial        |      | 7.73 | 7.53 | 7.59         | 7.55         | 7.62 | 7.59        | +            |
| pH Final          | 7.55 | 7.6          | 7.6  | 7.6  | 7.76 | 7.63 | 7.66 |          | pH Final          | 7.55 | 7.6  | 7.63 | 7.65         | 7.83         | 7.68 | 7.67        | <del></del>  |
| Alkalinity        |      |              |      | 1    |      |      |      |          | Alkalinity        |      |      | ,    | 1            | 7.05         | 7.00 | 7.07        |              |
| Hardness          |      |              |      |      |      |      |      |          | Hardness          |      |      |      | <del> </del> |              |      | <del></del> | +            |
| Conductivit       |      |              |      |      |      |      |      | 1        | Conductivit       |      |      |      | †            | <del> </del> |      |             |              |
| Chlorine          |      |              |      |      |      |      |      |          | Chlorine          |      |      |      | <u> </u>     |              | L    |             | <del></del>  |

| Dilution:<br>Day: | 5    |      |      |      |      |      |      |          | Dilution:<br>Day: | 11                                     |      |             |      |      |      |             |            |
|-------------------|------|------|------|------|------|------|------|----------|-------------------|--|------|-------------|------|------|------|-------------|------------|
|                   | 1    | 2    | 3    | 4    | 5    | 6    | 7    | Comments |                   | 1                                      | 2    | 3           | 4    | 5    | 6    | 7           | Comments   |
| Temp(C)           | 25.1 | 24.9 | 24.8 | 25   | 24.9 | 25   | 25   |          | Temp(C)           | 25.1                                   | 24.9 | 24.8        | 25   | 24.9 | 25   | 25          | Init. 100% |
| DO Initial        |      | 8.2  | 8.1  | 8.2  | 8    | 8.3  | 8.1  |          | DO Initial        |  | 8.4  | 8           | 8.2  | 8.2  | 8.3  | 8.2         | 0          |
| DO Final          | 7.2  | 7.9  | 7.4  | 7.3  | 7    | 7.3  | 7.3  |          | DO Final          | 7.1                                    | 7.8  | 7.3         | 7.3  | 7.1  | 7.3  | 7.3         | 7          |
| pH Initial        |      | 7.72 | 7.52 | 7.56 | 7.54 | 7.61 | 7.57 |          | pH Initial        |  | 7.75 | 7.55        | 7.61 | 7.58 | 7.62 | 7.59        | 7.34       |
| pH Final          | 7.55 | 7.6  | 7.61 | 7.62 | 7.78 | 7.65 | 7.67 |          | pH Final          | 7.55                                   | 7.6  | 7.64        | 7.66 | 7.83 | 7.68 | 7.67        | 1.34       |
| Alkalinity        |      |      |      |      |      |      |      |          | Alkalinity        |  | 7.0  | 7.0.        | 7.00 | 7.83 | 7.08 | 7.07        | 79         |
| Hardness          |      |      |      |      |      |      |      |          | Hardness          | ······································ |      | <del></del> |      |      |      |             | 98         |
| Conductivit       |      |      |      |      |      |      |      |          | Conductivit       |  |      |             |      | -    |      | <del></del> |            |
| Chlorine          |      |      |      |      |      |      |      |          | Chlorine          |  |      |             |      |      |      | <.1         | 570        |

# **Summary Reporting Forms Chronic Biomonitoring**

# Ceriodaphnia dubia Survival and Reproduction

Permittee:

City of Fort Smith

NPDES No.:

AR 0021750

| [                     | :    | Time: | Date:     |    | Time: | Date:     |
|-----------------------|------|-------|-----------|----|-------|-----------|
| Composite 1 Collected | From | 8:00  | 7/20/2014 | To | 8:00  | 7/21/2014 |
|                       |      |       |           |    |       |           |
| Composite 2 Collected | From | 8:00  | 7/22/2014 | То | 8:00  | 7/23/2014 |
|                       |      |       |           |    |       |           |
| Composite 3 Collected | From | 8:00  | 7/24/2014 | To | 8:00  | 7/25/2014 |

Test initiated:

am/pm

14:00 AM

date

7/22/2014

Test terminated: am/pm

12:30 AM

date

7/29/2014

Dilution water used:

Receiving

Reconstituted

X

### **Percent Survival**

| Time of Reading |     |     | Percent l | Effluent | · · · · · · · · · · · · · · · · · · · |     |
|-----------------|-----|-----|-----------|----------|---------------------------------------|-----|
|                 | 0   | 3   | 5         | 6        | 8                                     | 11  |
| 24h             | 100 | 100 | 100       | 100      | 100                                   | 100 |
| 48h             | 100 | 100 | 100       | 100      | 100                                   | 100 |
| End of test     | 100 | 100 | 100       | 100      | 100                                   | 100 |
|                 |     |     |           |          |                                       |     |

### Number of Young Produced per Female @ End of Test

| Rep  | 0    | 3     | 5    | 6     | 8    | 11    |
|------|------|-------|------|-------|------|-------|
| A    | 20   | 25    | 22   | 22    | 22   | 22    |
| В    | 20   | 16    | 19   | 26    | 22   | 17    |
| C    | 22   | 22    | 22   | 17    | 24   | 24    |
| D    | 17   | 24    | 24   | 24    | 18   | 24    |
| E    | 21   | 22    | 22   | 20    | 21   | 22    |
| F    | 17   | 20    | 20   | 26    | 23   | 22    |
| G    | 22   | 24    | 26   | 21    | 24   | 23    |
| H    | 25   | 24    | 24   | 26    | 21   | 20    |
| I    | 21   | 26    | 21   | 25    | 24   | 25    |
| J    | 18   | 23    | 21   | 17    | 19   | 29    |
| Mean | 20.3 | 22.6  | 22.1 | 22.4  | 21.8 | 22.8  |
| CV%* | 12.3 | 12.72 | 9.41 | 15.92 | 9.62 | 13.84 |

<sup>\*</sup>coefficient of variation = standard deviation x 100/mean.

# Ceriodaphnia dubia Survival and Reproduction (cont)

| 1. Fisher's Exact Test:   |                |                   |                |       |
|---|----------------|-------------------|----------------|-------|
| Is the mean survival at the end of the test s<br>the control survival for the % effluent corn                             |                | <b>V</b>          | han            |       |
| a) Low Flow or Critical Dilution  | (              | 8 %):<br>%):      | Yes:           | No: X |
| b) ½ Low Flow Dilution  | (              | %):               | Yes:           | No:   |
| 2. Dunnett's Procedure or Steel's Many  | -One Rank T    | est as appropria  | ıte:           |       |
| Is the mean number of young produced per<br>the control's number of young per female<br>(significant non-lethal effects): |                | •                 | \ <b>1</b>     |       |
| a) Low Flow or Critical Dilution  | (              | 8 %):             | Yes:           | No: X |
| b) ½ Low Flow Dilution  | • (            | 8 %):<br>%):      | Yes:           | No:   |
| 3. If you answered NO to 1. a) and 2. a)  | enter (0) othe | rwise enter (1):  | 0              |       |
| 4. If you answered NO to 1. b) and 2. b)  | enter (0) othe | erwise enter (1): |                |       |
| 5. Enter response to item 3 on DMR For  | m, parameter   | · #ТЕРЗВ.         |                |       |
| 6. Enter response to item 4 on DMR For  | m, parameter   | · #TFP3B.         |                |       |
| 7. Enter percent effluent corresponding   | to each NOE    | C below and cir   | cle lowest num | ıber: |
| a) NOEC survival:   | 11 % e         | ffluent           |                |       |
| b) NOEC reproduction:   | 11 % e         | ffluent           |                |       |

Biomonitoring Form Chronic Toxicity Summary Form Pimephales promelas Chemical Parameters Chart

Permittee: City of Fort Smith NPDES No.: AR 0021750 Contact: Lance McAvov Analyst:

Tim Harrell Mike Bollin

Sample No. 1 Collected: Date: 7/21/2014 Time: 8:00 Sample No. 2 Collected: Date: 7/23/2014 Time: 8:00 Sample No. 3 Collected: Date: 7/25/2014 Time: 8:00 Test Begin: Date: 7/22/2014 Time: 14:00

Test End: Date: 7/29/2014 Time: 13:10

| Dilution:<br>Day: | 0    |      |      |       |      |      |      |             | Dilution:<br>Day: | 6    |      |      |      |      |      |      |  |
|-------------------|------|------|------|-------|------|------|------|-------------|-------------------|------|------|------|------|------|------|------|--|
|                   | I    | 2    | 3    | 4     | 5    | 6    | 7    | Comments    |                   | 1    | 2    | 3    | 4    | 5    | 6    | 7    | Comments   |
| Temp(C)           | 25.2 | 25.1 | 24.8 | 25    | 25.1 | 25.2 | 25   | <del></del> | Temp(C)           | 25.1 | 24.9 | 24.8 | 25   | 24.9 | 25   | 26   | <del> </del>                                     |
| DO Initial        | 8.3  | 8.2  | 8. i | 8.9   | 8    | 8.2  | 8.1  |             | DO Initial        |      | 8.2  | 8.1  | 8.2  |      |      | 25   |  |
| DO Final          | 7.2  | 7.9  | 7.4  | 7.3   | 7    | 7.3  | 7.7  |             | DO Final          | 7.2  | 7.8  |      |      | 8.1  | 8.3  | 8.1  |  |
| pH Initial        | 7.53 | 7.51 | 7.46 | 7.52  | 7.57 | 7.55 | 7.5  |             | pH Initial        | 1.2  |      | 7.4  | 7.3  | 7.1  | 7.3  | 7.3  |  |
| pH Final          | 7.55 | 7.6  | 7.56 | 7.6   | 7.68 | 7.61 | 7.66 |             |                   |      | 7.72 | 7.52 | 7.57 | 7.55 | 7.62 | 7.58 |  |
| Alkalinity        | 58   |      | 7.50 | · ··· | 7.00 | 7.01 | 7.00 |             | pH Final          | 7.56 | 7.6  | 7.61 | 7.62 | 7.8  | 7.65 | 7.67 |  |
|                   |      |      |      |       |      |      |      |             | Alkalinity        |      |      |      |      |      |      |      |  |
| Hardness          | 98   |      | ļ    |       |      |      |      |             | Hardness          |      |      |      |      |      |      |      | <del>                                     </del> |
| Conductivity      | 410  | L    |      | ·     |      |      |      |             | Conductivity      |      |      |      |      |      |      |      | +  |
| Chlorine          | <.1  | L    |      |       |      |      | <.1  |             | Chlorine          |      |      |      | l    |      |      |      | +  |

| Dilution:<br>Day: | 3    |          |      |          |             |      |      | -        | Dilution:<br>Day: | 8    |      |      |      |              |      |             |             |
|-------------------|------|----------|------|----------|-------------|------|------|----------|-------------------|------|------|------|------|--------------|------|-------------|-------------|
|                   | 1    | 2        | 3    | 4        | 5           | 6    | 7    | Comments |                   | 1    | 2    | 3    | 4    | 5            | 6    | 7           | Comments    |
| Temp(C)           | 25.1 | 24.9     | 24.8 | 25       | 24.9        | 25   | 25   |          | Temp(C)           | 25.1 | 24.9 | 24.8 | 25   | 24.9         | 25   | 25          |             |
| DO Initial        |      | 8.2      | 8.1  | 8.2      | 8           | 8.2  | 8.1  |          | DO Initial        |      | 8.3  | 8.1  | 8.2  | 8.1          | 8.3  | <del></del> | <del></del> |
| DO Final          | 7.2  | 7.9      | 7.4  | 7.3      | 7           | 7.3  | 7.2  |          | DO Final          | 7.1  | 7.8  | 7.3  |      | <del> </del> |      | 8.2         | <del></del> |
| pH Initial        |      | 7.68     | 7.51 | 7.54     | 7.54        | 7.59 | 7.56 |          | pH Initial        |      | 7.73 |      | 7.3  | 7.1          | 7.3  | 7.3         |             |
| pH Final          | 7.55 | 7.6      | 7.6  | 7.6      | 7.76        | 7.63 | 7.66 |          | pH Final          | 7.55 |      | 7.53 | 7.59 | 7.55         | 7.62 | 7.59        |             |
| Alkalinity        |      |          |      |          | 1           | 7.03 | 7.00 |          | +                 | 7.33 | 7.6  | 7.63 | 7.65 | 7.83         | 7.68 | 7.67        |             |
| Hardness          |      |          |      |          | <del></del> |      |      |          | Alkalinity        |      |      |      |      |              |      |             |             |
| Conductivity      |      |          |      |          |             |      |      | <u> </u> | Hardness          |      |      |      |      |              |      |             |             |
|                   |      | ·-· ·- · |      |          |             |      |      |          | Conductivity      |      |      |      |      |              |      |             |             |
| Chlorine          |      |          | L    | <u> </u> |             |      |      | 1        | Chlorine          |      |      |      |      |              |      | f           | <del></del> |

| Dilution:<br>Day: | 5    |      |              |      |      |      |      |          | Dilution:<br>Day: | 11   |      |      |      |      |       |      |            |
|-------------------|------|------|--------------|------|------|------|------|----------|-------------------|------|------|------|------|------|-------|------|------------|
|                   | 1    | 2    | 3            | 4    | 5    | 6    | 7    | Comments | <del></del>       | 1    | 2    | 3    | 4    | 5    | 6     | 7    | Comments   |
| Temp(C)           | 25.1 | 24.9 | 24.8         | 25   | 24.9 | 25   | 25   |          | Temp(C)           | 25.1 | 24.9 | 24.8 | 25   | 24.9 | 25    | 7.   | 1 : 1000/  |
| DO Initial        |      | 8.2  | 8.1          | 8.2  | 8    | 8.3  | 8.1  |          | DO Initial        |      | 8.4  | 0    |      |      |       | 25   | Init, 100% |
| DO Final          | 7.2  | 7.9  | 7.4          | 7,3  | 7    | 7.3  | 7.3  |          | DO Final          | 7.1  |      | 7.2  | 8.2  | 8.2  | . 8.3 | 8.2  | 9          |
| pH Initial        |      | 7 72 | 7.52         | 7.56 | 7.54 | 7.61 | 7.57 |          | pH Initial        | 7.1  | 7.8  | 7.55 | 7.3  | /.1  | 7.3   | 7.3  | <u> </u>   |
| pH Final          | 7.55 | 76   | 7.61         | 7.62 | 7.78 | 7.65 | 7.67 |          | pH Final          | 7.75 |      |      | 7.61 | 7.58 | 7.62  | 7.59 | 7.34       |
| Alkalinity        |      |      |              |      | 1.70 | 7.03 | 7.07 |          | -                 | 7.55 | 7.6  | 7.64 | 7.66 | 7.83 | 7.68  | 7.67 |            |
| Hardness          |      |      | <del> </del> |      |      |      |      |          | Alkalinity        |      |      |      |      | 1    |       |      | 79         |
|                   |      |      |              | ļ    |      |      |      |          | Hardness          |      |      |      |      |      |       |      | 98         |
| Conductivity      |      |      |              |      |      |      | 1    |          | Conductivity      |      |      |      | t    |      |       |      |            |
| Chlorine          |      |      | l            |      |      |      |      |          | Chlorine          |      |      |      |      |      |       | < 1  | 570        |

### **Summary Reporting Forms Chronic Biomonitoring** Fathead Minnow Larvae Growth and Survival (Pimephales promelas)

Permittee:

City of Fort Smith

NPDES No.:

AR 0021750

|                       | · · · · · · · · · · · · · · · · · · · | Time:                                 | Date:                                 |    | Time: | Date:     |
|-----------------------|---------------------------------------|---------------------------------------|---------------------------------------|----|-------|-----------|
| Composite 1 Collected | From                                  | 8:00                                  | 7/20/2014                             | То | 8:00  | 7/21/2014 |
| _                     |                                       | · · · · · · · · · · · · · · · · · · · | · · · · · · · · · · · · · · · · · · · |    |       |           |
| Composite 2 Collected | From                                  | 8:00                                  | 7/22/2014                             | То | 8:00  | 7/23/2014 |
| <b>r</b> -            |                                       |                                       |                                       |    | ,     |           |
| Composite 3 Collected | From                                  | 8:00                                  | 7/24/2014                             | То | 8:00  | 7/25/2014 |

Test initiated:

am/pm

14:00 AM

date

7/22/2014

Test terminated: am/pm

12:30 AM

date

7/29/2014

Dilution water used:

Receiving

Reconstituted

Χ

## Data Table for Survival

| Effluent Conc.% | Perc | ent Surviv | al in Replic | cate Chaml | oers | Mean | Percent Su | rvival | CV%* |
|-----------------|------|------------|--------------|------------|------|------|------------|--------|------|
|                 | A    | В          | C            | D          | E    | 24h  | 48h        | 7 days |      |
| Syn 0 %         | 87.5 | 100        | 100          | 100        | 100  | 100  | 100        | 97.5   | 4.79 |
| 3%              | 100  | 100        | 100          | 100        | 87.5 | 100  | 100        | 97.5   | 4.79 |
| 5%              | 100  | 87.5       | 100          | 100        | 87.5 | 100  | 100        | 95     | 5.99 |
| 6%              | 100  | 100        | 100          | 100        | 87.5 | 100  | 100        | 97.5   | 4.79 |
| 8%              | 87.5 | 100        | 100          | 100        | 100  | 100  | 100        | 97.5   | 4.79 |
| 11%             | 100  | 100        | 100          | 100        | 100  | 100  | 100        | 100    | 0    |

### Data Table for Survival

| Effluent Conc.% | Averag | e Dry Weig | ht in millig<br>Chambers | •     | Mean Dry<br>Weight mg | CV%*  |       |
|-----------------|--------|------------|--------------------------|-------|-----------------------|-------|-------|
|                 | A      | В          | C                        | D     | E                     |       |       |
| Syn. 0%         | 0.35   | 0.429      | 0.456                    | 0.394 | 0.432                 | 0.412 | 10    |
| 3%              | 0.44   | 0.489      | 0.438                    | 0.468 | 0.369                 | 0.441 | 10.29 |
| 5%              | 0.451  | 0.367      | 0.452                    | 0.457 | 0.355                 | 0.416 | 12.2  |
| 6%              | 0.472  | 0.451      | 0.478                    | 0.421 | 0.381                 | 0.441 | 9.1   |
| 8%              | 0.311  | 0.405      | 0.457                    | 0.336 | 0.432                 | 0.388 | 16.1  |
| 11%             | 0.448  | 0.393      | 0.372                    | 0.429 | 0.421                 | 0.413 | 7.3   |

<sup>\*</sup>coefficient of variation = standard deviation x 100/mean.

# Fathead Minnow Larvae Growth and Survival (cont) (Pimephales promelas)

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

| Is the mean survival at 7 days significantly different | (p=.05) than | the control |
|--|--------------|-------------|
| survival for the % effluent corresponding to:          |              |             |

| a) Low Flow or Critical Dilution<br>b) ½ Low Flow Dilution   | (             | 8 %):<br>%):     | Yes:<br>Yes:   | No: X |
|--|---------------|------------------|----------------|-------|
| 2. Dunnett's Procedure (or appropriate te  | st):          |                  |                |       |
| Is the mean dry weight (growth) of the efflue (p=0.05) than the control's dry weight for the (significant non-lethal effects): | •             |                  |                |       |
| a) Low Flow or Critical Dilution   | (             | 8 %):            | Yes:           | No: X |
| b) ½ Low Flow Dilution   | (             | 8 %):<br>%):     | Yes:           | No:   |
| 3. If you answered NO to 1. a) and 2. a) en  | ter (0) othe  | rwise enter (1): | 0              |       |
| 4. If you answered NO to 1. b) and 2. b) en  | iter (0) othe | rwise enter (1): |                |       |
| 5. Enter response to item 3 on DMR Form  | , parameter   | ·#TEP6C.         |                |       |
| 6. Enter response to item 4 on DMR Form  | , parameter   | · #TFP6C.        |                |       |
| 7. Enter percent effluent corresponding to   | each NOE      | C below and cir  | cle lowest nun | iber: |
| a) NOEC survival:  | 11 % e        | ffluent          |                |       |
| b) NOEC reproduction:  | 11 % e        | ffluent          |                |       |