

May 17, 2019

Tom Myers
City of Siloam Springs
975 Anderson Avenue
Siloam Springs, AR 72761

RE: Project: WET TEST
Pace Project No.: 60301930

Dear Tom Myers:

Enclosed are the analytical results for sample(s) received by the laboratory on May 07, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC 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,



Richard Mannz
richard.mannz@pacelabs.com
(913)599-5665
PM Lab Management

Enclosures



REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
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CERTIFICATIONS

Project: WET TEST

Pace Project No.: 60301930

Southeast Kansas Certification IDs

808 West McKay, Frontenac, KS 66763

Arkansas Certification #: 18-016-0

Iowa Certification #: 118

Kansas/NELAP Certification #: E-10426

Louisiana Certification #: 03055

Oklahoma Certification #: 9935

Texas Certification #: T104704407

Utah Certification #: KS00021

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: WET TEST

Pace Project No.: 60301930

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60301930001	CITY OF SILOAM SPRINGS	Water	05/06/19 09:00	05/07/19 08:00

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SAMPLE ANALYTE COUNT

Project: WET TEST

Pace Project No.: 60301930

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60301930001	CITY OF SILOAM SPRINGS	EPA 821/R-02/013	MEB	1	PASI-SE

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: WET TEST

Pace Project No.: 60301930

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Sample: CITY OF SILOAM SPRINGS Lab ID: 60301930001 Collected: 05/06/19 09:00 Received: 05/07/19 08:00 Matrix: Water								
Chronic Toxicity	Analytical Method: EPA 821/R-02/013							
Toxicity, Chronic	Complete		1.0	1		05/07/19 11:35		

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: WET TEST

Pace Project No.: 60301930

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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 - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

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.

LABORATORIES

PASI-SE Pace Analytical Services - SE Kansas

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: WET TEST
Pace Project No.: 60301930

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60301930001	CITY OF SILOAM SPRINGS	EPA 821/R-02/013	584778		

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Sample Condition Upon Receipt

WO#: 60301930
60301930

Client Name: Siloam Springs

Courier: FedEx UPS VIA Clay PEX ECI Pace Xroads Client Other

Tracking #: _____ Pace Shipping Label Used? Yes No

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

Packing Material: Bubble Wrap Bubble Bags Foam None Other

Thermometer Used: T-193 Type of Ice: Wet Blue None

Cooler Temperature (°C): As-read 3.0 Corr. Factor -1.0 Corrected 2.0

Date and initials of person examining contents:
5/7/19
8:00

Temperature should be above freezing to 6°C

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Chain of Custody relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples arrived within holding time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Short Hold Time analyses (<72hr):	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Correct containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Pace containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Sample labels match COC: Date / time / ID / analyses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples contain multiple phases? Matrix:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Containers requiring pH preservation in compliance? (HNO ₃ , H ₂ SO ₄ , HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks:		
Lead acetate strip turns dark? (Record only)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Potassium iodide test strip turns blue/purple? (Preserve)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Samples from USDA Regulated Area: State:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____



REFERENCE #60301930

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Lenexa, KS 66219
Phone: 913.599.5665
Fax: 913.599.1759

May 16, 2019

Tom Myers
City of Siloam Springs
975 Anderson Avenue
Siloam Springs, AR

Re: Lab Project Number: 60301930
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

Enclosures



REFERENCE #60301930

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**CHRONIC TOXICITY TEST FOR
City of Siloam Springs**

PERMIT # AR0020273
AFIN # 04-00106

PERFORMED ON:

Pimephales promelas

and

Ceriodaphnia dubia

PREPARED FOR:

City of Siloam Springs
Attn: Tom Myers
975 Anderson Avenue
Siloam Springs, AR
1-479-228-0934

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

May 16, 2019



REFERENCE #60301930

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TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
SUMMARY	4
INTRODUCTION	5
TEST MATERIAL	5
TEST METHODS	5
TEST ORGANISMS	5
RESULTS	6
TEST CONDITIONS	11
TEST VALIDITY	17
CONCLUSIONS	17
APPENDIX A – STATISTICAL ANALYSIS	
APPENDIX B - CHAIN OF CUSTODY FORMS	
APPENDIX C – REFERENCE TOXICANT SUMMARY	

SUMMARY

A Chronic Whole Effluent Toxicity Test using the 7-day chronic fathead minnows (*Pimephales promelas*), static renewal larval survival and growth test, and three brood 7-day chronic Cladoceran (*Ceriodaphnia dubia*), static renewal survival and reproduction test, was conducted on effluent discharge water collected at the City of Siloam Springs effluent discharge from May 6, 2019 to May 10, 2019. All the test methods followed are as listed in EPA 821-R-02-013, "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms."

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

In minnow section of testing, it was observed that the effluent had no significant effect on the survival of the larvae at the 100% concentration. No significant mortality was observed in the other effluent concentrations after the 7-day exposure period. The No Observed Effect Concentration (NOEC) was determined to be 100% for survival. No significant reduction in growth was observed in the 100% effluent concentration. The Toxic Units is < 1 . The IC₂₅ is > 100 . The NOEC for growth in effluent was determined to be 100%. The PMSD was 15.6.

In Cladoceran section of testing, it was observed that the effluent had no significant effect on the survival of the organisms in the 100% effluent concentration. No significant mortality was observed in the other effluent concentrations after the 7-day exposure period. The No Observed Effect Concentration (NOEC) was determined to be 100% for survival. No significant reduction in reproduction was observed in the 100% effluent concentrations. The Toxic Units is < 1 . The IC₂₅ is > 100 . The NOEC for reproduction in effluent was determined to be 100%. The PMSD was 16.0.

The chronic toxicity exhibited by the fathead minnows and the *Ceriodaphnia* treated by the effluent sampled from May 6 to May 10 from the City of Siloam Springs effluent discharge, is acceptable as described in EPA 821-R-02-013.

INTRODUCTION

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

TEST MATERIAL

City of Siloam Springs personnel collected sampling of the effluent. A sample of the effluent was delivered to Pace by commercial carrier on 5-7-19. Subsequent samples followed by delivery on 5-9-19 and on 5-11-19. All samples were stored at $\leq 6^{\circ}$ Celsius. Moderately Hard Synthetic Water was used as a control and also to make the required dilutions in the test as described in EPA 821-R-02-013.

TEST METHODS

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

The Pimephales and Ceriodaphnia tests were initiated on 5-7-19 and carried out until 5-14-19. The Pimephales tests were conducted in 500 ml plastic jars with 250 ml of test solution. Eight larvae were placed in each of at least 5 replicates to make a total of 40 larvae per sample concentration. The Ceriodaphnia tests were carried out in 35ml vials containing 25 ml of test solution. One Neonate was placed in each of 10 replicates to make a total of 10 neonates per sample concentration.

TEST ORGANISMS

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



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RESULTS

TABLE 1

Permittee: City of Siloam Springs Effluent discharge.

Date Sampled	No. 1: 5-6-19	9:00
	No. 2: 5-8-19	9:00
	No. 3: 5-10-19	9:00
Test Initiated: 11:35	Date: 5-7-19	

Dilution Water used: Moderately Hard Synthetic Water

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL
(Pimephales promelas)

DATA TABLE FOR GROWTH OF FATHEAD MINNOWS

Effluent Concentration (%)	Average Dry Weight in Milligrams in Replicate Chambers					Mean Dry Weight (mg)	CV% *
	A	B	C	D	E		
Control 0%	0.427	0.319	0.396	0.452	0.407	0.400	12.53
Dilution 1 32%	0.478	0.395	0.321	0.391	0.451	0.407	14.92
Dilution 2 42%	0.437	0.418	0.371	0.396	0.419	0.408	6.22
Dilution 3 56%	0.469	0.414	0.348	0.373	0.427	0.406	11.63
Dilution 4 75%	0.457	0.429	0.375	0.435	0.409	0.421	7.34
Dilution 5 100%	0.392	0.391	0.419	0.445	0.422	0.414	5.49

* Coefficient of Variation = Standard Deviation X 100 / Mean

Permittee: City of Siloam Springs Effluent discharge.

FATHEAD MINNOW SURVIVAL

Conc. %	Percent Survival in Replicate Chambers					Mean Percent Survival			CV %
	A	B	C	D	E	24hr	48hr	7 day	
Control 0%	100	87.5	100	100	100	100	100	97.5	4.79
Dilution 1 32%	100	100	87.5	100	100	100	100	97.5	4.79
Dilution 2 42%	100	100	100	100	100	100	100	100	0.00
Dilution 3 56%	100	100	87.5	100	100	100	100	97.5	4.79
Dilution 4 75%	100	100	87.5	100	100	100	100	97.5	4.79
Dilution 5 100%	100	100	100	100	100	100	100	100	0.00

Permittee: City of Siloam Springs Effluent discharge.

CERIODAPHNIA SURVIVAL AND REPRODUCTION

DATA TABLE FOR CERIODAPHNIA YOUNG PRODUCTION

Replicate	Control 0%	Dilution 1 32%	Dilution 2 42%	Dilution 3 56%	Dilution 4 75%	Dilution 5 100%
1	16	25	26	19	24	18
2	23	24	25	25	16	25
3	19	23	23	25	23	28
4	21	26	20	20	18	21
5	24	18	17	21	23	24
6	21	20	24	29	25	19
7	20	23	20	29	26	24
8	19	25	23	26	24	26
9	26	25	24	23	25	17
10	24	17	24	19	22	25
Mean	21.3	22.6	22.6	23.6	22.6	22.7
SD	2.983	3.169	2.757	3.806	3.204	3.713
CV %	14.01	14.02	12.20	16.13	14.18	16.36



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Permittee: City of Siloam Springs Effluent discharge.

CERIODAPHNIA MEAN PERCENT SURVIVAL

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

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 0.15 g newly hatched brine shrimp nauplii two 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

TABLE 2 (CONT.)

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

TABLE 2 (CONT.)

**SUMMARY OF TEST CONDITIONS FOR THE CLADOCERAN
(Ceriodaphnia dubia) SURVIVAL AND REPRODUCTION TEST**

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

TABLE 2 (CONT.)

8. Renewal of test concentrations	Daily
9. Age of test organism	< 24 hours
10. No. larvae/chamber	1
11. No. replicates/concentration	10
12. No. larvae/concentration	10
13. Feeding regime	Feed 0.1 ml YCT and 0.1 ml of Algae 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%, 32%, 42%, 56%, 75%, 100%
18. Test duration	Until 60% or more surviving control females have three broods or a maximum of 8 days.
19. Endpoints	Survival and Reproduction
20. Test acceptability	80% or greater survival in the controls, Average reproduction rate of 15 young / adult. Coefficient of variation in the control must not exceed 40%.

TABLE 2 (SECTION 2)

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

Permittee: City of Siloam Springs Effluent discharge.

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

SAMPLE NO. 1 COLLECTED: DATE: 5-6-18

SAMPLE NO. 2 COLLECTED: DATE: 5-8-18

SAMPLE NO. 3 COLLECTED: DATE: 5-10-18

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

	Control	100%
PH	7.62	7.75
D.O.	8.20	7.90
Temp	25.0	25.0
Alk	62	112
Hard	90	124
Cond	330	523
Chlorine	<0.1	<0.1

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

TEST WATER QUALITY

24-Hour Water Quality Measurements

Effluent Concentration (%)	PH	D.O. (mg/l)	Temperature (C)
0% Control	7.78	7.70	24.7
32% Effluent	7.78	6.60	24.8
42% Effluent	7.77	6.30	24.8
56% Effluent	7.76	5.80	24.8
75% Effluent	7.76	5.10	24.8
100% Effluent	7.75	4.60	24.8

48-Hour Water Quality Measurements

Effluent Concentration (%)	PH	D.O. (mg/l)	Temperature (C)
0% Control	7.73	7.10	24.9
32% Effluent	7.75	6.90	24.9
42% Effluent	7.79	6.70	24.9
56% Effluent	7.82	6.50	24.9
75% Effluent	7.90	6.40	24.9
100% Effluent	7.99	6.30	24.9



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FINAL WATER QUALITY

EFFLUENT CONCENTRATION

	Control	100%
pH	7.67	7.69
D.O.	7.70	6.50
Temp	25.2	25.0
Alk	64	110
Hard	94	128
Cond	411	588

- * 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

TEST VALIDITY

The Pimephales promelas control survival rate was 97.5%. The mean dry weight (growth) of the Pimephales promelas was determined at 0.400 mg/organism in the controls. The percent coefficient of variation (%CV) values for the fathead minnow control for survival and growth were 4.79 and 12.53. The Ceriodaphnia dubia survival rates were 100 in the control. The Ceriodaphnia in the control produced an average of 21.3 young over the seven-day exposure period. Percent CV values for Ceriodaphnia dubia control survival and reproduction was 0.00 and 14.01. Control data met or exceeded all criteria set out by EPA 821-R-02-013 for test acceptance.

CONCLUSIONS

The No Observed Effect Concentration (NOEC) for Pimephales promelas was 100% for survival and 100% for growth. The No Observed Effect Concentration (NOEC) for Ceriodaphnia dubia was 100% for Survival and 100% for Reproduction. The tests were ran using a synthetic control against effluent concentrations of 32%, 42%, 56%, 75%, and 100%. The effluent sampled on 5-6-19, 5-8-19, and 5-10-19 exhibited acceptable chronic toxicity in Pimephales promelas and in Ceriodaphnia dubia during the exposure period as described in EPA 821-R-02-013.



REFERENCE #60301930

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APPENDIX C

REFERENCE TOXICANTS

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

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

Start: 4/16/19 11:40 End: 4/23/19 11:20

Reference Toxicant (NaCl) Pimephales promelas

Concentration of Toxicant	Avg. # of Live Organisms/replicate			
	0 hrs	24 hrs	48 hrs	7 days
10 g/l	40	8	2	0
8 g/l	40	30	20	4
6 g/l	40	38	35	24
4 g/l	40	40	40	39
2 g/l	40	40	40	39

IC25 (4.94 g/l Sodium Chloride)

Survival NOEC: 4.0 g/l

Reference Toxicant (NaCl) Ceriodaphnia Dubia

Concentration of Toxicant	Avg. # of Live Organisms/replicate			
	0 hrs	24 hrs	48 hrs	7 days
2.5 g/l	10	4	0	0
2.0 g/l	10	10	7	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 (1.21 g/l Sodium Chloride)

Survival NOEC: 1.5 g/l

Submitted By: 
 Timothy Harrell, Technical Director

60301930 Siloam Springs FATHEAD SURVIVAL
File: 6301930A 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	0	26	0	0

Calculated Chi-Square goodness of fit test statistic = 36.9480
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.

60301930 Siloam Springs FATHEAD SURVIVAL
File: 6301930A Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.043

W = 0.596

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

Data FAIL normality test. Try another transformation.

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

60301930 Siloam Springs FATHEAD SURVIVAL
 File: 6301930A Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

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

60301930 Siloam Springs FATHEAD SURVIVAL
 File: 6301930A Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	CONTROL	0.003	0.052	0.023	4.79
2	32%	0.003	0.052	0.023	4.79
3	42%	0.000	0.000	0.000	0.00
4	56%	0.003	0.052	0.023	4.79
5	75%	0.003	0.052	0.023	4.79
6	100%	0.000	0.000	0.000	0.00

60301930 Siloam Springs FATHEAD SURVIVAL
 File: 6301930A Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.004	0.001	0.400
Within (Error)	24	0.043	0.002	
Total	29	0.047		

Critical F value = 2.62 (0.05,5,24)
 Since $F < \text{Critical } F$ FAIL TO REJECT H_0 : All equal

60301930 Siloam Springs FATHEAD SURVIVAL
 File: 6301930A Transform: ARC SINE(SQUARE ROOT(Y))

DUNNETT'S TEST

TABLE 1 OF 2

Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	1.084	0.780		
2	32%	1.084	0.780	0.000	
3	42%	1.107	0.800	-0.866	
4	56%	1.084	0.780	0.000	
5	75%	1.084	0.780	0.000	
6	100%	1.107	0.800	-0.866	

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

60301930 Siloam Springs FATHEAD SURVIVAL

File: 6301930A Transform: ARC SINE(SQUARE ROOT(Y))

DUNNETT'S TEST

TABLE 2 OF 2

Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	CONTROL	5			
2	32%	5	0.054	7.0	0.000
3	42%	5	0.054	7.0	-0.020
4	56%	5	0.054	7.0	0.000
5	75%	5	0.054	7.0	0.000
6	100%	5	0.054	7.0	-0.020

60301930 Siloam Springs FATHEAD GROWTH
File: 6301930B Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

D = 0.042

W = 0.973

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

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

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

60301930 Siloam Springs FATHEAD GROWTH
File: 6301930B Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance

Calculated B1 statistic = 5.49

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.

60301930 Siloam Springs FATHEAD GROWTH
 File: 6301930B Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	5	0.319	0.452	0.400
2	32%	5	0.321	0.478	0.407
3	42%	5	0.371	0.437	0.408
4	56%	5	0.348	0.469	0.406
5	75%	5	0.375	0.457	0.421
6	100%	5	0.391	0.445	0.414

60301930 Siloam Springs FATHEAD GROWTH
 File: 6301930B Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	CONTROL	0.003	0.050	0.022	12.53
2	32%	0.004	0.061	0.027	14.92
3	42%	0.001	0.025	0.011	6.22
4	56%	0.002	0.047	0.021	11.63
5	75%	0.001	0.031	0.014	7.34
6	100%	0.001	0.023	0.010	5.49

60301930 Siloam Springs FATHEAD GROWTH
 File: 6301930B Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.001	0.000	0.145
Within (Error)	24	0.042	0.002	
Total	29	0.043		

Critical F value = 2.62 (0.05,5,24)
 Since $F < \text{Critical } F$ FAIL TO REJECT H_0 : All equal

60301930 Siloam Springs FATHEAD GROWTH
 File: 6301930B Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	0.400	0.400		
2	32%	0.407	0.407	-0.264	
3	42%	0.408	0.408	-0.302	
4	56%	0.406	0.406	-0.226	
5	75%	0.421	0.421	-0.784	
6	100%	0.414	0.414	-0.513	

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

60301930 Siloam Springs FATHEAD GROWTH
 File: 6301930B Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	CONTROL	5			
2	32%	5	0.063	15.6	-0.007
3	42%	5	0.063	15.6	-0.008
4	56%	5	0.063	15.6	-0.006
5	75%	5	0.063	15.6	-0.021
6	100%	5	0.063	15.6	-0.014

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF		
	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
32%	10	0	10
TOTAL	20	0	20

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

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF		
	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
42%	10	0	10
TOTAL	20	0	20

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

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF		
	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
56%	10	0	10

TOTAL 20 0 20

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

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF		
	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
75%	10	0	10
TOTAL	20	0	20

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

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF		
	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
100%	10	0	10
TOTAL	20	0	20

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

SUMMARY OF FISHER'S EXACT TESTS

NUMBER

NUMBER

SIG

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

60301930 Siloam Springs CERIODAPHNIA DUBIA SURVIVA
File: 6301930D Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

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

60301930 Siloam Springs CERIODAPHNIA DUBIA SURVIVA
File: 6301930D Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

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

60301930 Siloam Springs CERIODAPHNIA DUBIA REPRODU
File: 6301930E Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.020	14.520	22.920	14.520	4.020
OBSERVED	5	13	19	22	1

Calculated Chi-Square goodness of fit test statistic = 7.1905
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

60301930 Siloam Springs CERIODAPHNIA DUBIA REPRODU
File: 6301930E Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 1.35

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.

60301930 Siloam Springs CERIODAPHNIA DUBIA REPRODU
 File: 6301930E Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	10	16.000	26.000	21.300
2	32%	10	17.000	26.000	22.600
3	42%	10	17.000	26.000	22.600
4	56%	10	19.000	29.000	23.600
5	75%	10	16.000	26.000	22.600
6	100%	10	17.000	28.000	22.700

60301930 Siloam Springs CERIODAPHNIA DUBIA REPRODU
 File: 6301930E Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	CONTROL	8.900	2.983	0.943	14.01
2	32%	10.044	3.169	1.002	14.02
3	42%	7.600	2.757	0.872	12.20
4	56%	14.489	3.806	1.204	16.13
5	75%	10.267	3.204	1.013	14.18
6	100%	13.789	3.713	1.174	16.36

60301930 Siloam Springs CERIODAPHNIA DUBIA REPRODU
 File: 6301930E Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	26.933	5.387	0.497
Within (Error)	54	585.800	10.848	
Total	59	612.733		

Critical F value = 2.45 (0.05,5,40)
 Since $F < \text{Critical } F$ FAIL TO REJECT H_0 : All equal

60301930 Siloam Springs CERIODAPHNIA DUBIA REPRODU
 File: 6301930E Transform: NO TRANSFORMATION

DUNNETT'S TEST

TABLE 1 OF 2

Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	21.300	21.300		
2	32%	22.600	22.600	-0.883	
3	42%	22.600	22.600	-0.883	
4	56%	23.600	23.600	-1.561	
5	75%	22.600	22.600	-0.883	
6	100%	22.700	22.700	-0.950	

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

60301930 Siloam Springs CERIODAPHNIA DUBIA REPRODU
File: 6301930E Transform: NO TRANSFORMATION

DUNNETT'S TEST

TABLE 2 OF 2

Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	CONTROL	10			
2	32%	10	3.403	16.0	-1.300
3	42%	10	3.403	16.0	-1.300
4	56%	10	3.403	16.0	-2.300
5	75%	10	3.403	16.0	-1.300
6	100%	10	3.403	16.0	-1.400

Conc. ID	1	2	3	4	5	6
Conc. Tested	0	32	42	56	75	100
Response 1	16	25	26	19	24	18
Response 2	23	24	25	25	16	25
Response 3	19	23	23	25	23	28
Response 4	21	26	20	20	18	21
Response 5	24	18	17	21	23	24
Response 6	21	20	24	29	25	19
Response 7	20	23	20	29	26	24
Response 8	19	25	23	26	24	26
Response 9	26	25	24	23	25	17
Response 10	24	17	24	19	22	25

*** Inhibition Concentration Percentage Estimate ***

Toxicant/Effluent: Siloam Springs

Test Start Date: 5/7/19 Test Ending Date: 5/14/19

Test Species: Dubia

Test Duration: 7 Day

DATA FILE:

Conc. ID	Number Replicates	Concentration	Response Means	Std. Dev.	Pooled Response Means
1	10	0.000	21.300	2.983	22.567
2	10	32.000	22.600	3.169	22.567
3	10	42.000	22.600	2.757	22.567
4	10	56.000	23.600	3.806	22.567
5	10	75.000	22.600	3.204	22.567
6	10	100.000	22.700	3.713	22.567

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

Conc. ID	1	2	3	4	5	6
Conc. Tested	0	32	42	56	75	100
Response 1	.427	.478	.437	.469	.457	.392
Response 2	.319	.395	.418	.414	.429	.391
Response 3	.396	.321	.371	.348	.375	.419
Response 4	.452	.391	.396	.373	.435	.445
Response 5	.407	.451	.419	.427	.409	.422

*** Inhibition Concentration Percentage Estimate ***

Toxicant/Effluent: Siloam Springs
 Test Start Date: 5/7/19 Test Ending Date: 5/14/19
 Test Species: Fathead
 Test Duration: 7 Day
 DATA FILE:

Conc. ID	Number Replicates	Concentration	Response Means	Std. Dev.	Pooled Response Means
1	5	0.000	0.400	0.050	0.409
2	5	32.000	0.407	0.061	0.409
3	5	42.000	0.408	0.025	0.409
4	5	56.000	0.406	0.047	0.409
5	5	75.000	0.421	0.031	0.409
6	5	100.000	0.414	0.023	0.409

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

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

Section A
Required Client Information:

Company: **City of Siloam Springs**
Address: **975 Anderson Avenue**
Siloam Springs, AR

Section B
Report Project Information:

Report To: **Tom Myers**
Purchase Order No.: **Myers @ Siloam Springs, AR**
Project Name: **Myers @ Siloam Springs, AR**
Project Number:

Section C
Invoice Information:

Attention: **Tom Myers**
Company Name: **City of Siloam Springs, AR**
Address: **975 Anderson Avenue**
Pace Quote Reference: **Richard Mannz**
Pace Project Manager: **Richard Mannz**
Pace Profile #: **10809**

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

Site Location: **AR**
STATE: **AR**

Requested Analysis Filtered (Y/N)

Preservatives	Y/N
Analysis Test	
Chronic WET Test	X
Residual Chlorine (Y/N)	N

Pace Project No./ Lab I.D.

ITEM #	Section D Required Client Information	Valid Matrix Codes CODE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED				SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives	Analysis Test	Requested Analysis Filtered (Y/N)	Residual Chlorine (Y/N)	ADDITIONAL COMMENTS			
					DATE	TIME	DATE	TIME							RELIQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION
1	City of Siloam Springs	DRINKING WATER DW WASTE WATER WW WASTE WATER P PRODUCT SOL/SOLID OIL WIPE AIR OTHER OT TISSUE TS	WW C	G	5/7/19	10:00	5/8/19	9:00	2.0	1	Other ICE	X	N	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)	
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: **Tom Myers**
SIGNATURE of SAMPLER: *Tom Myers*
DATE Signed (MM/DD/YY): **5/8/2019**

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Sample Condition Upon Receipt

Client Name: S. Loom Springs Courier: FedEx UPS V.I.A. Clay PEX ECI Pace Xroads Client Other

Tracking #: _____

Custody Seal on Cooler/Box Present: Yes No

Packing Material: Bubble Wrap Bubble Bags Foam None Other

Type of Ice: Wet Blue None

Thermometer Used: I-193

Cooler Temperature (C): As-read 3.0 Corr. Factor -1.0 Corrected 2.0

Date and initials of person examining contents: 5/9/19 Mr. 0800

Temperature should be above freezing to 6°C

Chain of Custody present: Yes No N/A

Chain of Custody relinquished: Yes No N/A

Samples arrived within holding time: Yes No N/A

Short Hold Time analyses (<72hrs): Yes No N/A

Rush Turn Around Time requested: Yes No N/A

Sufficient volume: Yes No N/A

Correct containers used: Yes No N/A

Pace containers used: Yes No N/A

Containers intact: Yes No N/A

Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs? Yes No N/A

Filtered volume received for dissolved tests? Yes No N/A

Sample labels match COC: Date / time / ID / analyses Yes No N/A

Samples contain multiple phases? Matrix: Yes No N/A

Containers requiring pH preservation in compliance? (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) Yes No N/A

Cyanide water sample checks: Yes No

Lead acetate strip turns dark? (Record only) Yes No

Potassium iodide test strip turns blue/purple? (Preserve) Yes No

Trip Blank present: Yes No N/A

Headspace in VOA vials (>6mm): Yes No N/A

Samples from USDA Regulated Area: State: Yes No N/A

Additional labels attached to 5035A / TX1005 vials in the field? Yes No N/A

Client Notification/ Resolution: _____

Person Contacted: _____

Comments/ Resolution: _____

Date: _____

Project Manager Review: _____

Sample Condition Upon Receipt

Client Name: Silam Springs Courier: FedEx UPS VIA Clay PEX ECI Pace Xroads Client Other

Tracking #: _____
 Chain of Custody Seal on Cooler/Box Present: Yes No Seals intact: Yes No Other

Packing Material: Bubble Wrap Bubble Bags Foam None Other

Thermometer Used: T-243 Cooler Temperature (°C): 3.0 As-read 3.0 Corr. Factor: 1.9 Corrected 2.1

Chain of Custody present: Yes No N/A

Chain of Custody relinquished: Yes No N/A

Samples arrived within holding time: Yes No N/A

Short Hold Time analyses (<72hr): Yes No N/A

Rush Turn Around Time requested: Yes No N/A

Sufficient volume: Yes No N/A

Correct containers used: Yes No N/A

Face containers used: Yes No N/A

Containers intact: Yes No N/A

Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs? Yes No N/A

Filtered volume received for dissolved tests? Yes No N/A

Sample labels match COC: Date / time / ID / analyses Yes No N/A

Samples contain multiple phases? Yes No N/A Matrix: WT

Containers requiring pH preservation in compliance? Yes No N/A

Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) Yes No N/A

Lead acetate strip turns dark? (Record only) Yes No

Potassium iodide test strip turns blue/purple? (Preserve) Yes No

Strip Blank present: Yes No N/A

Lead space in VOA vials (>6mm) Yes No N/A

Samples from USDA Regulated Area: State: Yes No N/A

Additional labels attached to 5035A / TX1005 vials in the field? Yes No N/A

Client Notification/ Resolution: Yes No N/A

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____

Field Data-Required? Y N

Copy COC to Client? Y N

List sample IDs, volumes, lot #'s of preservative and the date/time added

Date and initials of person examining contents: 5/11/19