

AR 0021750

August 4, 2015
Control No. 192803
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City of Fort Smith
ATTN: Mr. Lance McAvoy
3900 Kelley Highway
Fort Smith, AR 72904

This report contains the analytical results and supporting information for samples submitted on July 30, 2015. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Laboratory Director or a qualified designee.

John Overbey
Laboratory Director

A handwritten signature in black ink, appearing to read 'John Overbey', is written over a horizontal line. Below the line, the name 'John Overbey' and title 'Laboratory Director' are printed in a standard font.

This document has been distributed to the following:

PDF cc: City of Fort Smith
ATTN: Mr. Lance McAvoy
lmcavoy@fortsmithar.gov



City of Fort Smith
3900 Kelley Highway
Fort Smith, AR 72904

SAMPLE INFORMATION

Project Description:

Ten (10) water sample(s) received on July 30, 2015
Massard table III Priority Pollutants

Receipt Details:

A Chain of Custody was provided. The samples were delivered in one (1) ice chest.
Ice chest #1 was delivered with a custody seal intact and signed with shipping documentation.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

<u>Laboratory ID</u>	<u>Client Sample ID</u>	<u>Sampled Date/Time</u>	<u>Notes</u>
192803-1	Massard Influent	28-Jul-2015 1757	
192803-2	Massard Influent	28-Jul-2015 2213	
192803-3	Massard Effluent	28-Jul-2015 1759	
192803-4	Massard Effluent	29-Jul-2015 0800	
192803-5	Massard Raw Biosolids	28-Jul-2015 1147	

Qualifiers:

- D Result is from a secondary dilution factor
- W Result is presented on a Wet Weight Basis

Case Narrative:

Analysis of soils/sludges are reported on a dry-weight basis unless otherwise specified.

References:

- "Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
- "Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
- "Standard Methods for the Examination of Water and Wastewaters", (SM).
- "American Society for Testing and Materials" (ASTM).
- "Association of Analytical Chemists" (AOAC).



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ANALYTICAL RESULTS

AIC No. 192803-1

Sample Identification: Massard Influent 28-Jul-2015 1757

<u>Analyte</u>	<u>Result</u>	<u>RL</u>	<u>Units</u>	<u>Qualifier</u>
Total Recoverable Phenolics EPA 420.1	51 Prep: 31-Jul-2015 0820 by 308 Analyzed: 31-Jul-2015 1557 by 308	5	ug/l Batch: W52740	
Total Cyanide SM 4500-CN C,E 1999	< 10 Prep: 31-Jul-2015 0828 by 308 Analyzed: 31-Jul-2015 1213 by 308	10	ug/l Batch: W52742	

AIC No. 192803-2

Sample Identification: Massard Influent 28-Jul-2015 2213

<u>Analyte</u>	<u>Result</u>	<u>RL</u>	<u>Units</u>	<u>Qualifier</u>
Molybdenum EPA 200.8	< 8 Prep: 30-Jul-2015 1105 by 313 Analyzed: 31-Jul-2015 1313 by 302	8	ug/l Batch: S39477	
Mercury, low level EPA 245.7	0.046 Prep: 03-Aug-2015 1018 by 308 Analyzed: 03-Aug-2015 1257 by 308	0.025	ug/l Batch: S39491	D Dil: 5
Total Recoverable Antimony EPA 200.8	< 60 Prep: 30-Jul-2015 1105 by 313 Analyzed: 31-Jul-2015 1313 by 302	60	ug/l Batch: S39477	
Total Recoverable Arsenic EPA 200.8	2.0 Prep: 30-Jul-2015 1105 by 313 Analyzed: 31-Jul-2015 1313 by 302	0.5	ug/l Batch: S39477	
Total Recoverable Beryllium EPA 200.8	< 0.5 Prep: 30-Jul-2015 1105 by 313 Analyzed: 31-Jul-2015 1313 by 302	0.5	ug/l Batch: S39477	
Total Recoverable Cadmium EPA 200.8	< 0.5 Prep: 30-Jul-2015 1105 by 313 Analyzed: 31-Jul-2015 1313 by 302	0.5	ug/l Batch: S39477	
Total Recoverable Chromium EPA 200.8	< 10 Prep: 30-Jul-2015 1105 by 313 Analyzed: 31-Jul-2015 1313 by 302	10	ug/l Batch: S39477	
Total Recoverable Copper EPA 200.8	25 Prep: 30-Jul-2015 1105 by 313 Analyzed: 31-Jul-2015 1313 by 302	0.5	ug/l Batch: S39477	
Total Recoverable Lead EPA 200.8	2.4 Prep: 30-Jul-2015 1105 by 313 Analyzed: 31-Jul-2015 1313 by 302	0.5	ug/l Batch: S39477	
Total Recoverable Nickel EPA 200.8	7.8 Prep: 30-Jul-2015 1105 by 313 Analyzed: 31-Jul-2015 1313 by 302	0.5	ug/l Batch: S39477	
Total Recoverable Selenium EPA 200.8	< 5 Prep: 30-Jul-2015 1105 by 313 Analyzed: 31-Jul-2015 1313 by 302	5	ug/l Batch: S39477	
Total Recoverable Silver EPA 200.8	0.89 Prep: 30-Jul-2015 1105 by 313 Analyzed: 31-Jul-2015 1313 by 302	0.5	ug/l Batch: S39477	
Total Recoverable Thallium EPA 200.8	< 0.5 Prep: 30-Jul-2015 1105 by 313 Analyzed: 31-Jul-2015 1313 by 302	0.5	ug/l Batch: S39477	
Total Recoverable Zinc EPA 200.8	280 Prep: 30-Jul-2015 1105 by 313 Analyzed: 31-Jul-2015 1313 by 302	20	ug/l Batch: S39477	

AIC No. 192803-3

Sample Identification: Massard Effluent 28-Jul-2015 1759

<u>Analyte</u>	<u>Result</u>	<u>RL</u>	<u>Units</u>	<u>Qualifier</u>
Total Recoverable Phenolics EPA 420.1	8.5 Prep: 31-Jul-2015 0820 by 308 Analyzed: 31-Jul-2015 1558 by 308	5	ug/l Batch: W52740	



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ANALYTICAL RESULTS

AIC No. 192803-3 (Continued)

Sample Identification: Massard Effluent 28-Jul-2015 1759

Analyte	Result	RL	Units	Qualifier
Total Cyanide SM 4500-CN C,E 1999	< 10	10	ug/l	
Prep: 31-Jul-2015 0828 by 308	Analyzed: 31-Jul-2015 1215 by 308		Batch: W52742	

AIC No. 192803-4

Sample Identification: Massard Effluent 29-Jul-2015 0800

Analyte	Result	RL	Units	Qualifier
Molybdenum EPA 200.8	< 8	8	ug/l	
Prep: 30-Jul-2015 1105 by 313	Analyzed: 31-Jul-2015 1319 by 302		Batch: S39477	
Mercury, low level EPA 245.7	0.0050	0.0050	ug/l	
Prep: 03-Aug-2015 1018 by 308	Analyzed: 03-Aug-2015 1205 by 308		Batch: S39491	
Total Recoverable Antimony EPA 200.8	< 60	60	ug/l	
Prep: 30-Jul-2015 1105 by 313	Analyzed: 31-Jul-2015 1319 by 302		Batch: S39477	
Total Recoverable Arsenic EPA 200.8	1.2	0.5	ug/l	
Prep: 30-Jul-2015 1105 by 313	Analyzed: 31-Jul-2015 1319 by 302		Batch: S39477	
Total Recoverable Beryllium EPA 200.8	< 0.5	0.5	ug/l	
Prep: 30-Jul-2015 1105 by 313	Analyzed: 31-Jul-2015 1319 by 302		Batch: S39477	
Total Recoverable Cadmium EPA 200.8	< 0.5	0.5	ug/l	
Prep: 30-Jul-2015 1105 by 313	Analyzed: 31-Jul-2015 1319 by 302		Batch: S39477	
Total Recoverable Chromium EPA 200.8	< 10	10	ug/l	
Prep: 30-Jul-2015 1105 by 313	Analyzed: 31-Jul-2015 1319 by 302		Batch: S39477	
Total Recoverable Copper EPA 200.8	4.4	0.5	ug/l	
Prep: 30-Jul-2015 1105 by 313	Analyzed: 31-Jul-2015 1319 by 302		Batch: S39477	
Total Recoverable Lead EPA 200.8	< 0.5	0.5	ug/l	
Prep: 30-Jul-2015 1105 by 313	Analyzed: 31-Jul-2015 1319 by 302		Batch: S39477	
Total Recoverable Nickel EPA 200.8	5.0	0.5	ug/l	
Prep: 30-Jul-2015 1105 by 313	Analyzed: 31-Jul-2015 1319 by 302		Batch: S39477	
Total Recoverable Selenium EPA 200.8	< 5	5	ug/l	
Prep: 30-Jul-2015 1105 by 313	Analyzed: 31-Jul-2015 1319 by 302		Batch: S39477	
Total Recoverable Silver EPA 200.8	< 0.5	0.5	ug/l	
Prep: 30-Jul-2015 1105 by 313	Analyzed: 31-Jul-2015 1319 by 302		Batch: S39477	
Total Recoverable Thallium EPA 200.8	< 0.5	0.5	ug/l	
Prep: 30-Jul-2015 1105 by 313	Analyzed: 31-Jul-2015 1319 by 302		Batch: S39477	
Total Recoverable Zinc EPA 200.8	42	20	ug/l	
Prep: 30-Jul-2015 1105 by 313	Analyzed: 31-Jul-2015 1319 by 302		Batch: S39477	

AIC No. 192803-5

Sample Identification: Massard Raw Biosolids 28-Jul-2015 1147

Analyte	Result	RL	Units	Qualifier
Total Cyanide EPA 9010C, 9014	< 0.1	0.1	mg/Kg	W
Prep: 04-Aug-2015 0801 by 308	Analyzed: 04-Aug-2015 1255 by 308		Batch: W52770	



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ANALYTICAL RESULTS

AIC No. 192803-5 (Continued)

Sample Identification: Massard Raw Biosolids 28-Jul-2015 1147

Analyte	Result	RL	Units	Qualifier
Total Recoverable Phenolics	2.6	0.5	mg/Kg	W
EPA 9065 Prep: 04-Aug-2015 0801 by 308	Analyzed: 04-Aug-2015 1129 by 308		Batch: W52769	
Total Solids	3.7	0.01	wt %	
SM 2540 G 1997 Prep: 30-Jul-2015 1033 by 100	Analyzed: 31-Jul-2015 1235 by 100		Batch: W52733	
Antimony	< 3	3	mg/Kg	
EPA 3051A, 6010C Prep: 31-Jul-2015 1230 by 313	Analyzed: 03-Aug-2015 1111 by 317		Batch: S39488	
Arsenic	12	5	mg/Kg	
EPA 3051A, 6010C Prep: 31-Jul-2015 1230 by 313	Analyzed: 31-Jul-2015 1800 by 317		Batch: S39488	
Beryllium	0.75	0.03	mg/Kg	
EPA 3051A, 6010C Prep: 31-Jul-2015 1230 by 313	Analyzed: 31-Jul-2015 1800 by 317		Batch: S39488	
Cadmium	4.7	0.4	mg/Kg	
EPA 3051A, 6010C Prep: 31-Jul-2015 1230 by 313	Analyzed: 31-Jul-2015 1800 by 317		Batch: S39488	
Chromium	40	0.7	mg/Kg	
EPA 3051A, 6010C Prep: 31-Jul-2015 1230 by 313	Analyzed: 31-Jul-2015 1800 by 317		Batch: S39488	
Copper	370	0.6	mg/Kg	
EPA 3051A, 6010C Prep: 31-Jul-2015 1230 by 313	Analyzed: 31-Jul-2015 1800 by 317		Batch: S39488	
Lead	48	4	mg/Kg	
EPA 3051A, 6010C Prep: 31-Jul-2015 1230 by 313	Analyzed: 31-Jul-2015 1800 by 317		Batch: S39488	
Molybdenum	6.4	0.8	mg/Kg	
EPA 3051A, 6010C Prep: 31-Jul-2015 1230 by 313	Analyzed: 31-Jul-2015 1800 by 317		Batch: S39488	
Nickel	81	1	mg/Kg	
EPA 3051A, 6010C Prep: 31-Jul-2015 1230 by 313	Analyzed: 31-Jul-2015 1800 by 317		Batch: S39488	
Selenium	< 7	7	mg/Kg	
EPA 3051A, 6010C Prep: 31-Jul-2015 1230 by 313	Analyzed: 31-Jul-2015 1800 by 317		Batch: S39488	
Silver	8.8	0.7	mg/Kg	
EPA 3051A, 6010C Prep: 31-Jul-2015 1230 by 313	Analyzed: 31-Jul-2015 1800 by 317		Batch: S39488	
Thallium	4.7	4	mg/Kg	
EPA 3051A, 6010C Prep: 31-Jul-2015 1230 by 313	Analyzed: 31-Jul-2015 1800 by 317		Batch: S39488	
Zinc	1200	0.2	mg/Kg	
EPA 3051A, 6010C Prep: 31-Jul-2015 1230 by 313	Analyzed: 31-Jul-2015 1800 by 317		Batch: S39488	
Mercury	1.7	0.1	mg/Kg	
EPA 7471B Prep: 03-Aug-2015 0919 by 313	Analyzed: 03-Aug-2015 1142 by 308		Batch: S39490	



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DUPLICATE RESULTS

Analyte	AIC No.	Result	RPD		Preparation Date	Analysis Date	Dil	Qual
			RPD	Limit				
Total Solids	192803-5	3.7 wt %			30Jul15 1033 by 100	31Jul15 1235 by 100		
	Batch: W52733 Duplicate	3.7 wt %	0.290	10.0	30Jul15 1034 by 100	31Jul15 1235 by 100		

LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
Total Recoverable Phenolics	0.1 mg/l	92.6	85.0-115			W52740	31Jul15 0820 by 308	31Jul15 1554 by 308		
Total Cyanide	0.1 mg/l	91.1	85.0-115			W52742	31Jul15 0828 by 308	31Jul15 1203 by 308		
Molybdenum	0.05 mg/l	99.3	85.0-115			S39477	30Jul15 0845 by 313	31Jul15 1159 by 302		
Mercury, low level	0.01 ug/l	99.5	76.0-113			S39491	03Aug15 1019 by 308	03Aug15 1210 by 308		
Total Recoverable Antimony	0.05 mg/l	99.5	85.0-115			S39477	30Jul15 0845 by 313	31Jul15 1159 by 302		
Total Recoverable Arsenic	0.05 mg/l	99.9	85.0-115			S39477	30Jul15 0845 by 313	31Jul15 1159 by 302		
Total Recoverable Beryllium	0.05 mg/l	99.2	85.0-115			S39477	30Jul15 0845 by 313	31Jul15 1159 by 302		
Total Recoverable Cadmium	0.05 mg/l	99.2	85.0-115			S39477	30Jul15 0845 by 313	31Jul15 1159 by 302		
Total Recoverable Chromium	0.05 mg/l	98.8	85.0-115			S39477	30Jul15 0845 by 313	31Jul15 1159 by 302		
Total Recoverable Copper	0.05 mg/l	102	85.0-115			S39477	30Jul15 0845 by 313	31Jul15 1159 by 302		
Total Recoverable Lead	0.05 mg/l	99.2	85.0-115			S39477	30Jul15 0845 by 313	31Jul15 1159 by 302		
Total Recoverable Nickel	0.05 mg/l	101	85.0-115			S39477	30Jul15 0845 by 313	31Jul15 1159 by 302		
Total Recoverable Selenium	0.05 mg/l	101	85.0-115			S39477	30Jul15 0845 by 313	31Jul15 1159 by 302		
Total Recoverable Silver	0.02 mg/l	96.4	85.0-115			S39477	30Jul15 0845 by 313	31Jul15 1159 by 302		
Total Recoverable Thallium	0.05 mg/l	103	85.0-115			S39477	30Jul15 0845 by 313	31Jul15 1159 by 302		
Total Recoverable Zinc	0.05 mg/l	101	85.0-115			S39477	30Jul15 0845 by 313	31Jul15 1159 by 302		
Total Cyanide	0.500 mg/Kg	98.1	85.0-115			W52770	04Aug15 0802 by 308	04Aug15 1253 by 308		
Total Recoverable Phenolics	10.0 mg/Kg	96.9	85.0-115			W52769	04Aug15 0801 by 308	04Aug15 1152 by 308		
Antimony	500 mg/Kg	96.6	85.0-115			S39488	31Jul15 1231 by 313	03Aug15 1038 by 317		
Arsenic	500 mg/Kg	93.7	85.0-115			S39488	31Jul15 1231 by 313	31Jul15 1627 by 317		
Beryllium	50.0 mg/Kg	94.1	85.0-115			S39488	31Jul15 1231 by 313	31Jul15 1627 by 317		
Cadmium	500 mg/Kg	92.5	85.0-115			S39488	31Jul15 1231 by 313	31Jul15 1627 by 317		
Chromium	50.0 mg/Kg	92.4	85.0-115			S39488	31Jul15 1231 by 313	31Jul15 1627 by 317		
Copper	50.0 mg/Kg	93.4	85.0-115			S39488	31Jul15 1231 by 313	31Jul15 1627 by 317		
Lead	500 mg/Kg	91.8	85.0-115			S39488	31Jul15 1231 by 313	31Jul15 1627 by 317		
Molybdenum	50.0 mg/Kg	92.9	85.0-115			S39488	31Jul15 1231 by 313	31Jul15 1627 by 317		
Nickel	50.0 mg/Kg	91.3	85.0-115			S39488	31Jul15 1231 by 313	31Jul15 1627 by 317		
Selenium	500 mg/Kg	96.3	85.0-115			S39488	31Jul15 1231 by 313	31Jul15 1627 by 317		
Silver	10.0 mg/Kg	92.0	85.0-115			S39488	31Jul15 1231 by 313	31Jul15 1627 by 317		
Thallium	500 mg/Kg	93.1	85.0-115			S39488	31Jul15 1231 by 313	31Jul15 1627 by 317		
Zinc	50.0 mg/Kg	90.7	85.0-115			S39488	31Jul15 1231 by 313	31Jul15 1627 by 317		
Mercury	1.25 mg/Kg	94.0	85.0-115			S39490	03Aug15 0919 by 313	03Aug15 1227 by 308		



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MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Total Recoverable Phenolics	192758-1	0.1 mg/l	100	80.0-120	W52740	31Jul15 0820 by 308	31Jul15 1556 by 308		
	192758-1	0.1 mg/l	94.9	80.0-120	W52740	31Jul15 0820 by 308	31Jul15 1621 by 308		
	Relative Percent Difference:		4.26	10.0	W52740				
Total Cyanide	192835-1	0.1 mg/l	92.5	75.0-125	W52742	31Jul15 0828 by 308	31Jul15 1332 by 308		
	192835-1	0.1 mg/l	105	75.0-125	W52742	31Jul15 0828 by 308	31Jul15 1334 by 308		
	Relative Percent Difference:		12.5	20.0	W52742				
Molybdenum	192739-1	0.05 mg/l	98.1	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1205 by 302		
	192739-1	0.05 mg/l	96.4	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1210 by 302		
	Relative Percent Difference:		1.73	20.0	S39477				
Mercury, low level	192806-4	0.01 ug/l	101	63.0-111	S39491	03Aug15 1019 by 308	03Aug15 1220 by 308		
	192806-4	0.01 ug/l	98.9	63.0-111	S39491	03Aug15 1019 by 308	03Aug15 1246 by 308		
	Relative Percent Difference:		1.44	18.0	S39491				
Total Recoverable Antimony	192739-1	0.05 mg/l	100	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1205 by 302		
	192739-1	0.05 mg/l	98.3	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1210 by 302		
	Relative Percent Difference:		2.04	20.0	S39477				
Total Recoverable Arsenic	192739-1	0.05 mg/l	101	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1205 by 302		
	192739-1	0.05 mg/l	100	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1210 by 302		
	Relative Percent Difference:		0.694	20.0	S39477				
Total Recoverable Beryllium	192739-1	0.05 mg/l	94.7	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1205 by 302		
	192739-1	0.05 mg/l	96.0	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1210 by 302		
	Relative Percent Difference:		1.34	20.0	S39477				
Total Recoverable Cadmium	192739-1	0.05 mg/l	98.8	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1205 by 302		
	192739-1	0.05 mg/l	96.9	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1210 by 302		
	Relative Percent Difference:		1.97	20.0	S39477				
Total Recoverable Chromium	192739-1	0.05 mg/l	95.5	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1205 by 302		
	192739-1	0.05 mg/l	95.7	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1210 by 302		
	Relative Percent Difference:		0.214	20.0	S39477				
Total Recoverable Copper	192739-1	0.05 mg/l	97.5	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1205 by 302		
	192739-1	0.05 mg/l	94.7	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1210 by 302		
	Relative Percent Difference:		2.23	20.0	S39477				
Total Recoverable Lead	192739-1	0.05 mg/l	98.8	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1205 by 302		
	192739-1	0.05 mg/l	96.1	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1210 by 302		
	Relative Percent Difference:		2.80	20.0	S39477				
Total Recoverable Nickel	192739-1	0.05 mg/l	101	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1205 by 302		
	192739-1	0.05 mg/l	97.6	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1210 by 302		
	Relative Percent Difference:		3.23	20.0	S39477				
Total Recoverable Selenium	192739-1	0.05 mg/l	100	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1205 by 302		
	192739-1	0.05 mg/l	100	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1210 by 302		
	Relative Percent Difference:		0.0369	20.0	S39477				
Total Recoverable Silver	192739-1	0.02 mg/l	95.9	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1205 by 302		
	192739-1	0.02 mg/l	95.5	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1210 by 302		
	Relative Percent Difference:		0.410	20.0	S39477				
Total Recoverable Thallium	192739-1	0.05 mg/l	103	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1205 by 302		
	192739-1	0.05 mg/l	99.0	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1210 by 302		
	Relative Percent Difference:		3.54	20.0	S39477				
Total Recoverable Zinc	192739-1	0.05 mg/l	80.8	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1205 by 302		
	192739-1	0.05 mg/l	81.1	75.0-125	S39477	30Jul15 0845 by 313	31Jul15 1210 by 302		
	Relative Percent Difference:		0.119	20.0	S39477				
Total Cyanide	192803-5	0.945 mg/Kg	75.5	75.0-125	W52770	04Aug15 0802 by 308	04Aug15 1257 by 308		
	192803-5	0.948 mg/Kg	91.7	75.0-125	W52770	04Aug15 0802 by 308	04Aug15 1259 by 308		
	Relative Percent Difference:		19.4	20.0	W52770				



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MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Total Recoverable Phenolics	192803-5	8.63 mg/Kg	112	80.0-120	W52769	04Aug15 0801 by 308	04Aug15 1130 by 308		
	192803-5	9.78 mg/Kg	115	80.0-120	W52769	04Aug15 0801 by 308	04Aug15 1131 by 308		
	Relative Percent Difference:		3.16	10.0		W52769			
Antimony	192727-6	499 mg/Kg	98.0	75.0-125	S39488	31Jul15 1231 by 313	03Aug15 1133 by 317		
	192727-6	493 mg/Kg	99.0	75.0-125	S39488	31Jul15 1231 by 313	03Aug15 1138 by 317		
	Relative Percent Difference:		1.03	20.0		S39488			
Arsenic	192727-6	499 mg/Kg	87.5	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1631 by 317		
	192727-6	493 mg/Kg	88.1	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1636 by 317		
	Relative Percent Difference:		0.867	20.0		S39488			
Beryllium	192727-6	49.9 mg/Kg	83.6	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1631 by 317		
	192727-6	49.3 mg/Kg	84.3	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1636 by 317		
	Relative Percent Difference:		1.01	20.0		S39488			
Cadmium	192727-6	499 mg/Kg	84.6	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1631 by 317		
	192727-6	493 mg/Kg	85.4	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1636 by 317		
	Relative Percent Difference:		1.22	20.0		S39488			
Chromium	192727-6	49.9 mg/Kg	83.9	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1631 by 317		
	192727-6	49.3 mg/Kg	84.0	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1636 by 317		
	Relative Percent Difference:		0.417	20.0		S39488			
Copper	192727-6	49.9 mg/Kg	87.6	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1631 by 317		
	192727-6	49.3 mg/Kg	88.1	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1636 by 317		
	Relative Percent Difference:		0.710	20.0		S39488			
Lead	192727-6	499 mg/Kg	83.4	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1631 by 317		
	192727-6	493 mg/Kg	84.3	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1636 by 317		
	Relative Percent Difference:		1.34	20.0		S39488			
Molybdenum	192727-6	49.9 mg/Kg	82.0	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1631 by 317		
	192727-6	49.3 mg/Kg	85.6	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1636 by 317		
	Relative Percent Difference:		3.77	20.0		S39488			
Nickel	192727-6	49.9 mg/Kg	82.3	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1631 by 317		
	192727-6	49.3 mg/Kg	82.9	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1636 by 317		
	Relative Percent Difference:		0.983	20.0		S39488			
Selenium	192727-6	499 mg/Kg	91.4	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1631 by 317		
	192727-6	493 mg/Kg	92.5	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1636 by 317		
	Relative Percent Difference:		1.29	20.0		S39488			
Silver	192727-6	9.99 mg/Kg	86.5	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1631 by 317		
	192727-6	9.86 mg/Kg	87.5	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1636 by 317		
	Relative Percent Difference:		1.36	20.0		S39488			
Thallium	192727-6	499 mg/Kg	86.1	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1631 by 317		
	192727-6	493 mg/Kg	87.4	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1636 by 317		
	Relative Percent Difference:		1.75	20.0		S39488			
Zinc	192727-6	49.9 mg/Kg	86.2	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1631 by 317		
	192727-6	49.3 mg/Kg	79.4	75.0-125	S39488	31Jul15 1231 by 313	31Jul15 1636 by 317		
	Relative Percent Difference:		4.22	20.0		S39488			
Mercury	192803-5	2.30 mg/Kg	70.9	70.0-130	S39490	03Aug15 0919 by 313	03Aug15 1231 by 308		
	192803-5	2.47 mg/Kg	88.6	70.0-130	S39490	03Aug15 0919 by 313	03Aug15 1138 by 308		
	Relative Percent Difference:		6.45	20.0		S39490			

City of Fort Smith
3900 Kelley Highway
Fort Smith, AR 72904

LABORATORY BLANK RESULTS

Analyte	Result	RL	PQL	QC Sample	Preparation Date	Analysis Date	Qual
Total Recoverable Phenolics	< 0.005 mg/l	0.005	0.005	W52740-1	31Jul15 0820 by 308	31Jul15 1619 by 308	
Total Cyanide	< 0.01 mg/l	0.01	0.01	W52742-1	31Jul15 0828 by 308	31Jul15 1201 by 308	
Molybdenum	< 0.008 mg/l	0.008	0.008	S39477-1	30Jul15 0845 by 313	31Jul15 1153 by 302	
Mercury, low level	< 0.0050 ug/l	0.0050	0.0050	S39491-1	03Aug15 1019 by 308	03Aug15 1155 by 308	
Total Recoverable Antimony	< 0.03 mg/l	0.03	0.03	S39477-1	30Jul15 0845 by 313	31Jul15 1153 by 302	
Total Recoverable Arsenic	< 0.0005 mg/l	0.0005	0.0005	S39477-1	30Jul15 0845 by 313	31Jul15 1153 by 302	
Total Recoverable Beryllium	< 0.0003 mg/l	0.0003	0.0003	S39477-1	30Jul15 0845 by 313	31Jul15 1153 by 302	
Total Recoverable Cadmium	< 0.0002 mg/l	0.0002	0.0002	S39477-1	30Jul15 0845 by 313	31Jul15 1153 by 302	
Total Recoverable Chromium	< 0.007 mg/l	0.007	0.007	S39477-1	30Jul15 0845 by 313	31Jul15 1153 by 302	
Total Recoverable Copper	< 0.0005 mg/l	0.0005	0.0005	S39477-1	30Jul15 0845 by 313	31Jul15 1153 by 302	
Total Recoverable Lead	< 0.0005 mg/l	0.0005	0.0005	S39477-1	30Jul15 0845 by 313	31Jul15 1153 by 302	
Total Recoverable Nickel	< 0.0005 mg/l	0.0005	0.0005	S39477-1	30Jul15 0845 by 313	31Jul15 1153 by 302	
Total Recoverable Selenium	< 0.002 mg/l	0.002	0.002	S39477-1	30Jul15 0845 by 313	31Jul15 1153 by 302	
Total Recoverable Silver	< 0.0002 mg/l	0.0002	0.0002	S39477-1	30Jul15 0845 by 313	31Jul15 1153 by 302	
Total Recoverable Thallium	< 0.0005 mg/l	0.0005	0.0005	S39477-1	30Jul15 0845 by 313	31Jul15 1153 by 302	
Total Recoverable Zinc	< 0.002 mg/l	0.002	0.002	S39477-1	30Jul15 0845 by 313	31Jul15 1153 by 302	
Total Cyanide	< 0.1 mg/Kg	0.1	0.1	W52770-1	04Aug15 0802 by 308	04Aug15 1251 by 308	
Total Recoverable Phenolics	< 0.5 mg/Kg	0.5	0.5	W52769-1	04Aug15 0801 by 308	04Aug15 1128 by 308	
Total Solids	< 0.01 wt %	0.01	0.01	W52733-1	30Jul15 1034 by 100	31Jul15 1235 by 100	
Antimony	< 3 mg/Kg	3	3	S39488-1	31Jul15 1231 by 313	03Aug15 1034 by 317	
Arsenic	< 5 mg/Kg	5	5	S39488-1	31Jul15 1231 by 313	31Jul15 1623 by 317	
Beryllium	< 0.03 mg/Kg	0.03	0.03	S39488-1	31Jul15 1231 by 313	31Jul15 1623 by 317	
Cadmium	< 0.4 mg/Kg	0.4	0.4	S39488-1	31Jul15 1231 by 313	31Jul15 1623 by 317	
Chromium	< 0.7 mg/Kg	0.7	0.7	S39488-1	31Jul15 1231 by 313	31Jul15 1623 by 317	
Copper	< 0.6 mg/Kg	0.6	0.6	S39488-1	31Jul15 1231 by 313	31Jul15 1623 by 317	
Lead	< 4 mg/Kg	4	4	S39488-1	31Jul15 1231 by 313	31Jul15 1623 by 317	
Molybdenum	< 0.8 mg/Kg	0.8	0.8	S39488-1	31Jul15 1231 by 313	31Jul15 1623 by 317	
Nickel	< 1 mg/Kg	1	1	S39488-1	31Jul15 1231 by 313	31Jul15 1623 by 317	
Selenium	< 7 mg/Kg	7	7	S39488-1	31Jul15 1231 by 313	31Jul15 1623 by 317	
Silver	< 0.7 mg/Kg	0.7	0.7	S39488-1	31Jul15 1231 by 313	31Jul15 1623 by 317	
Thallium	< 4 mg/Kg	4	4	S39488-1	31Jul15 1231 by 313	31Jul15 1623 by 317	
Zinc	< 0.2 mg/Kg	0.2	0.2	S39488-1	31Jul15 1231 by 313	31Jul15 1623 by 317	
Mercury	< 0.1 mg/Kg	0.1	0.1	S39490-1	03Aug15 0919 by 313	03Aug15 1118 by 308	

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Laboratories

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

PAGE 1 OF 1

Client: City of Fort Smith				PO No.				Analysis Requested										AIC CONTROL NO: <u>192803</u>						
Project Reference: Massard Table III Priority Pollutants				Sample Type				Sample Matrix				NO. OF BOTTLES										AIC PROPOSAL NO:		
Project Manager: Lance McAvoyn																						GRAB		COMP
Sampled By: <u>Rachel J. Sharp</u> <u>u-c</u>				WATER		SOIL		NO. OF BOTTLES		T. Cyanide		Phenolics		PP Metals + MO		HG.LL (245.7)		Table III: 13 PP Metals, CN.T, Phenolics, + MO		Received Temperature C: <u>4.2</u>		Remarks		
Date(s) Collected				Time(s) Collected				NO. OF BOTTLES		T. Cyanide		Phenolics		PP Metals + MO		HG.LL (245.7)		Table III: 13 PP Metals, CN.T, Phenolics, + MO						
AIC No.	Sample Identification	Date(s) Collected	Time(s) Collected	GRAB	COMP	WATER	SOIL	NO. OF BOTTLES	T. Cyanide	Phenolics	PP Metals + MO	HG.LL (245.7)	Table III: 13 PP Metals, CN.T, Phenolics, + MO											
1	Massard Influent	7/28/15	0001	X		X		2	X	X														
1	Massard Influent	7/28/15	0558	X		X		2	X	X														
1	Massard Influent	7/28/15	1157	X		X		2	X	X														
1	Massard Influent	7/28/15	1757	X		X		2	X	X														
2	Massard Influent	7/28/15	0000-2213		X	X		2			X	X												
3	Massard Effluent	7/28/15	0005	X		X		2	X	X														
3	Massard Effluent	7/28/15	0602	X		X		2	X	X														
3	Massard Effluent	7/28/15	1159	X		X		2	X	X														
3	Massard Effluent	7/28/15	1759	X		X		2	X	X														
4	Massard Effluent	7/28-29/15	0500-0500		X	X		2			X	X												
5	Massard Raw Biosolid	7/28/15	1147	X		X		1					X											
Container Type									P	G	P	G	G									Field pH calibration		
Preservative									B	S	N	No	No										on _____ @ _____	
Turnaround Time Requested: (Please Circle) <u>NORMAL</u> or EXPEDITED IN _____ DAYS									G = Glass, P = Plastic, V = VOA vials, H = HCL to pH2, T = Sodium Thiosulfate, NO = none, S = Sulfuric acid pH2, N = Nitric acid pH2, B = NaOH to pH12, Z = Zinc acetate										Buffer:					
Expedited results requested by: _____									Relinquished By: <u>Rachel J. Sharp</u>			Date/Time: <u>7/29/15 1000</u>			Relinquished By: _____				Date/Time: _____					
Who should AIC contact with questions: <u>Lance McAvoyn</u>									Relinquished By: _____			Date/Time: _____			Relinquished By: <u>[Signature]</u>				Date/Time: <u>7/30/15 0830</u>					
Phone: <u>479-784-2337</u> Fax: _____									Comments: <u>FED EX # 8024 7222 2120</u>															
Report Attention to: <u>Lance McAvoyn</u>																								
Report Address to: <u>City of Fort Smith, 3900 Kelley Hwy, Fort Smith, AR 72904</u>																								

AR 0021750

INTEROFFICE MEMORANDUM

TO: STEVE FLOYD, SUPERINTENDENT OF OPERATIONS
FROM: LANCE A. MCAVOY, ENVIRONMENTAL MANAGER *LA*
SUBJECT: 2015 THIRD QUARTER MASSARD BIOMONITORING & PRIORITY POLLUTANT SCAN
DATE: SEPTEMBER 18, 2015
CC:

Attached are the 2015 Third Quarter biomonitoring and priority pollutant scan analysis reports for the Massard Wastewater Plant.

As you can see there are two separate reports, one for sample collected in July and one set for samples collected in August. The biomonitoring collected in July was invalid due to "instream toxicity". As a result, the City was required to resample/reanalyze in August. I have also attached a copy of the e-mail from ADEQ stating that we are now allowed to use synthetic water for the remainder of our required WET testing.

If you have any questions, please contact me.

Mcavoy, Lance

From: Barnett, Mary <BARNETT@adeq.state.ar.us>
Sent: Wednesday, August 19, 2015 16:12
To: Mcavoy, Lance
Cc: Clover, Don; Floyd, Steve; Hancock, John
Subject: RE: Fort Smith Massard Plant Biomonitoring (AR0021750) (AFIN: 66-01652)

Lance,

After reviewing the July test for Fort Smith Massard plant, as per our conversation last week, and noted in your e-mail below:

The receiving water control/dilution water for the July test for Fort Smith Massard plant WET test did exhibit signs of receiving water toxicity.

In accordance with Part II.10.3.c.ii "...if the receiving water is unsatisfactory as a result of instream toxicity..., the permittee may substitute synthetic dilution water for the receiving water in all subsequent tests..."

Therefore it is appropriate to use synthetic laboratory dilution water for future WET tests for the Fort Smith Massard plant.

Please let me know if you have any further concerns.

Mary Barnett
Ecologist Coordinator
501-682-0666

From: Mcavoy, Lance [mailto:LanceM@FortSmithAR.gov]
Sent: Tuesday, August 18, 2015 11:12 AM
To: Barnett, Mary
Cc: Clover, Don; Floyd, Steve; Hancock, John
Subject: Fort Smith Massard Plant Biomonitoring

Dear Ms. Barnett,

As we discussed via telephone last week, the City of Fort Smiths Massard Plant biomonitoring failed due to toxicity of the receiving water. Attached is the report showing the higher the dilution the greater the survival rate of the *C. dubia*. As we discussed, it is a classic toxic receiving water response.

We have contacted Pace and have scheduled a retest for the week of August 24. We will be performing the entire test (*P. promelas* and *C. dubia*) using synthetic moderately hard water as our receiving water is the Arkansas River.

As we know this will be an issue going forward from this point on, we would like permission to utilize synthetic moderately hard water for Massard's biomonitoring from this point forward.

If you have any questions, please contact me.

Thank you for your help in this matter.

Sincerely,

Lance A. McAvoy,
Environmental Manager
Fort Smith Utility Department
City of Fort Smith
3900 Kelley Hwy
Fort Smith, AR 72904
479-784-2337
LMcAvoy@FortSmithAR.gov

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INTER-OFFICE MEMO

AR 00 21750

TO: Steve Floyd, Superintendent of Water and Wastewater Operations

FROM: Don Clover, Biologist *DK*

DATE: August 13, 2015

RE: Biomonitoring Results - Massard Plant

Please find below the chronic biomonitoring results for the third quarter of 2015. The Arkansas River control did not meet the acceptance criteria as outlined in AR0021750 for the *Ceriodaphnia dubia* test organism resulting in an invalid test. A retest is scheduled for the week of August 24th using synthetic laboratory water for dilution purposes. Lethal and sub-lethal toxicity were not experienced in the low-flow dilution of 7% effluent for the fathead minnow (*Pimephales promelas*) test organism. The test therefore passes at the low-flow dilution of 7% effluent for lethal and sub-lethal effects.

Parameter #TGP3B- NA

Parameter #TGP6C- 0

Parameter #TLP3B- NA

Parameter #TLP6C- 0

Parameter #TOP3B- NA

Parameter # TOP6C- 9%

Parameter #TPP3B- NA

Parameter #TPP6C- 9%

Parameter #TQP3B- NA

Parameter #TQP6C- 10.55%

Prepared By: Don Clover Date: 8/13/15

Reviewed By: [Signature] Date: 08/17/15



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

August 10, 2015

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

RE: Project: MASSARD BIOMONITORING
Pace Project No.: 60199358

Dear Lance McAvoy:

Enclosed are the analytical results for sample(s) received by the laboratory on July 28, 2015. 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@pacelabs.com
Project Manager

Enclosures

cc: Dan Clover, City of Fort Smith, AR



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: MASSARD BIOMONITORING
Pace Project No.: 60199358

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

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SAMPLE SUMMARY

Project: MASSARD BIOMONITORING
Pace Project No.: 60199358

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60199358001	MASSARD EFFLUENT	Water	07/27/15 08:00	07/28/15 13:40
60199358002	ARKANSAS RIVER WATER	Water	07/27/15 08:30	07/28/15 13:40

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SAMPLE ANALYTE COUNT

Project: MASSARD BIOMONITORING
Pace Project No.: 60199358

Lab ID	Sample ID	Method	Analysts	Analytes Reported
60199358001	MASSARD EFFLUENT	EPA 821/R-02/013	TDH	1
60199358002	ARKANSAS RIVER WATER	EPA 821/R-02/013	TDH	1

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ANALYTICAL RESULTS

Project: MASSARD BIOMONITORING
 Pace Project No.: 60199358

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
------------	---------	-------	--------------	----	----------	----------	---------	------

Sample: MASSARD EFFLUENT		Lab ID: 60199358001	Collected: 07/27/15 08:00	Received: 07/28/15 13:40	Matrix: Water			
Chronic Toxicity		Analytical Method: EPA 821/R-02/013						
Toxicity, Chronic	Complete		1.0	1		07/28/15 14:30		

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
------------	---------	-------	--------------	----	----------	----------	---------	------

Sample: ARKANSAS RIVER WATER		Lab ID: 60199358002	Collected: 07/27/15 08:30	Received: 07/28/15 13:40	Matrix: Water			
Chronic Toxicity		Analytical Method: EPA 821/R-02/013						
Toxicity, Chronic	Complete		1.0	1		07/28/15 14:30		

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: MASSARD BIOMONITORING
Pace Project No.: 60199358

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.
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 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.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: MASSARD BIOMONITORING
Pace Project No.: 60199358

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60199358001	MASSARD EFFLUENT	EPA 821/R-02/013	BIO/1829		
60199358002	ARKANSAS RIVER WATER	EPA 821/R-02/013	BIO/1829		

REPORT OF LABORATORY ANALYSIS



Sample Condition Upon Receipt

WO#: 60199358



Client Name: Et Smith

Courier: Fed Ex UPS USPS Client Commercial Pace 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-111

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

Cooler Temperature: 3.0

Temperature should be above freezing to 6°C

Date and Initials of person examining contents: 7/28/15 1340
MB

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

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: AAF

Date: 07/29/15

REFERENCE #60199358

August 6, 2015

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

Re: Lab Project Number: 60199358
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

REFERENCE #60199358

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

PERMIT # AR 0021750
AFIN # 66-01652

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

August 6, 2015

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SUMMARY

A Chronic Whole Effluent Toxicity Test using the 7-day chronic fathead minnows (Pimephales promelas), static renewal larval survival and growth test, and three brood 7-day chronic Cladoceran (Ceriodaphnia dubia), static renewal survival and reproduction test, was conducted on effluent discharge water collected at the CITY OF FORT SMITH (Massard) effluent discharge from July 27, 2015 to July 31, 2015. All the test methods followed are as listed in EPA 821-R-02-013, "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms."

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

In minnow section of testing, it was observed that the effluent had no significant effect on the survival of the larvae at the 9% 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 9% for survival. The LC50 was estimated to be >9% effluent. No significant reduction in growth was observed in the 9% effluent concentration. The Toxic Units is <1. The IC25 is >9. The NOEC for growth in effluent was determined to be 9%. The PMSD is 18.2.

In Cladoceran section of testing, the upstream water did not meet the minimum requirement for control water. Pace also ran a synthetic control with the test that did meet the requirements. The PMSD is 55.4.

The chronic toxicity exhibited by the fathead minnows and the Ceriodaphnia treated by the effluent sampled from July 27 to July 31 from the CITY OF FORT SMITH (Massard) effluent discharge, is not 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 FORT SMITH (Massard) 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 Fort Smith (Massard) personnel collected sampling of the effluent. A sample of the effluent was delivered to Pace by commercial carrier on 7-28-15. Subsequent samples followed by delivery on 7-30-15 and on 8-1-15. All samples were stored at $\leq 6^{\circ}$ Celsius. Upstream Water was used as a control and also to make the required dilutions in the test as described in EPA 821-R-02-013.

TEST METHODS

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

The Pimephales and Ceriodaphnia tests were initiated on 7-28-15 and carried out until 8-4-15. 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

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.

REFERENCE #60199358

RESULTS

TABLE 1

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

Date Sampled No. 1: 7-27-15 8:00

No. 2: 7-29-15 8:00

No. 3: 7-31-15 8:00

Test Initiated: 14:30 Date: 7-28-15

Dilution Water used: Upstream

**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		
Upstream 0%	0.489	0.390	0.427	0.481	0.409	0.439	10.00
Dilution 1 3%	0.487	0.376	0.403	0.414	0.458	0.428	10.40
Dilution 2 4%	0.400	0.534	0.300	0.418	0.452	0.421	20.17
Dilution 3 5%	0.411	0.441	0.445	0.438	0.447	0.436	3.35
Dilution 4 7%	0.485	0.457	0.435	0.471	0.366	0.443	10.55
Dilution 5 9%	0.431	0.510	0.443	0.456	0.342	0.436	13.93
Synthetic 0%	0.497	0.432	0.347	0.401	0.462	0.428	13.44

* Coefficient of Variation = Standard Deviation X 100 / Mean

REFERENCE #60199358

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

FATHEAD MINNOW SURVIVAL

Conc. %	Percent Survival in Replicate Chambers					Mean Percent Survival			CV %
	A	B	C	D	E	24hr	48hr	7 day	
Upstream 0%	100	100	100	100	100	100	100	100	0.00
Dilution 1 3%	100	100	100	100	100	100	100	100	0.00
Dilution 2 4%	100	100	87.5	100	100	100	100	97.5	4.79
Dilution 3 5%	87.5	100	100	100	100	100	100	97.5	4.79
Dilution 4 7%	100	100	100	100	87.5	100	100	97.5	4.79
Dilution 5 9%	100	100	100	100	87.5	100	100	97.5	4.79
Synthetic 0%	100	100	87.5	100	100	100	100	97.5	4.79

REFERENCE #60199358

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

CERIODAPHNIA SURVIVAL AND REPRODUCTION

DATA TABLE FOR CERIODAPHNIA YOUNG PRODUCTION

Replicate	Upstream 0%	Dilution 1 3%	Dilution 2 4%	Dilution 3 5%	Dilution 3 7%	Dilution 4 9%	Synthetic 0%
1	13	9	3	10	10	12	21
2	2	3	8	6	6	9	21
3	3	9	6	11	5	4	17
4	12	4	6	11	4	6	18
5	6	2	4	5	7	10	14
6	0	4	12	2	10	9	19
7	5	7	11	6	9	9	14
8	2	3	7	9	3	9	19
9	6	2	4	8	11	12	24
10	12	2	2	4	8	11	20
Mean	6.1	4.5	6.3	7.2	7.3	9.1	18.7
SD	4.701	2.799	3.302	3.084	2.751	2.514	3.129
CV %	77.07	62.20	52.40	42.83	37.68	27.63	16.73

REFERENCE #60199358

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

CERIODAPHNIA MEAN PERCENT SURVIVAL

Time Elapsed	Percent Effluent (%)						Synthetic 0%
	Upstream 0%	Dilution 1 3%	Dilution 2 4%	Dilution 3 5%	Dilution 4 7%	Dilution 5 9%	
24 hrs	100	100	100	100	100	100	100
48 hrs	100	100	100	100	100	100	100
7-day	30	40	60	60	60	70	100
SD	0.483	0.516	0.516	0.516	0.516	0.483	0.000
CV %	161.02	129.10	86.07	86.07	86.07	69.01	0.00

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
9. 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.
15. Cleaning	Siphon daily, immediately before test solution renewal
15. Aeration	None

TABLE 2 (CONT.)

16. Dilution Water	Upstream
17. Effluent concentrations	0%, 3%, 4%, 5%, 7%, 9%, Synthetic
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.)

REFERENCE #60199358

8. Renewal of test concentrations	Daily
9. Age of test organism	< 24 hours
10. No. larvae/chamber	1
9. No. replicates/concentration	10
12. No. larvae/concentration	10
13. Feeding regime	Feed 0.1 ml YCT three times daily. Larvae are not fed 12 hours prior to termination of test.
15. Cleaning	Siphon daily, immediately before test solution renewal
15. Aeration	None
16. Dilution Water	Upstream
17. Effluent concentrations	0%, 3%, 4%, 5%, 7%, 9%, Synthetic
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 FORT SMITH (Massard). Effluent discharge.

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

SAMPLE NO. 1 COLLECTED: DATE: 7-27-15

SAMPLE NO. 2 COLLECTED: DATE: 7-29-15

SAMPLE NO. 3 COLLECTED: DATE: 7-31-15

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

	Upstream	100%	Synthetic
PH	7.80	7.41	7.62
D.O.	8.00	7.00	8.00
Temp	25.0	25.0	25.0
Alk	84	62	60
Hard	122	86	90
Cond	473	410	320
Chlorine	<0.1	<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

TEST WATER QUALITY

24-Hour Water Quality Measurements

Effluent Concentration (%)	PH	D.O. (mg/l)	Temperature (C)
0% Upstream	8.02	6.90	25.1
3% Effluent	8.02	6.90	24.9
4% Effluent	8.02	6.90	24.9
5% Effluent	8.03	6.90	24.9
7% Effluent	8.03	7.00	24.9
9% Effluent	8.04	7.10	24.9
0% Control	7.69	7.10	25.1

48-Hour Water Quality Measurements

Effluent Concentration (%)	PH	D.O. (mg/l)	Temperature (C)
0% Upstream	7.94	7.10	25.1
3% Effluent	7.95	7.10	25.0
4% Effluent	7.96	7.10	25.0
5% Effluent	7.96	7.20	25.0
7% Effluent	7.98	7.20	25.0
9% Effluent	8.02	7.30	25.0
0% Control	7.58	7.20	25.1

FINAL WATER QUALITY

EFFLUENT CONCENTRATION

	Upstream	9%	Synthetic
pH	7.86	7.90	7.75
D.O.	6.90	7.00	6.80
Temp	25.1	25.1	25.0
Alk	92	86	62
Hard	150	146	98
Cond	752	695	475

- * 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 100%. The mean dry weight (growth) of the Pimephales promelas was determined at 0.439 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 10.00. The Ceriodaphnia dubia survival rates were 30% in the control. The Ceriodaphnia in the control produced an average of 6.1 young over the seven-day exposure period. Percent CV values for Ceriodaphnia dubia control survival and reproduction was 161.02 and 77.07. Control data did not meet or exceeded all criteria set out by EPA 821-R-02-013 for test acceptance. A secondary synthetic control was ran with the test that did meet 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 9% for survival and 9% for growth. The No Observed Effect Concentration (NOEC) for Ceriodaphnia dubia was in conclusive for Survival and in conclusive for Reproduction. The tests were ran using a upstream control against effluent concentrations of 3%, 4%, 5%, 7%, and 9%. The effluent sampled on 7-27-15, 7-29-15, and 7-31-15 exhibited not acceptable chronic toxicity in Ceriodaphnia dubia and acceptable chronic toxicity for Pimephales promelas during the exposure period as described in EPA 821-R-02-013.

REPORT OF LABORATORY ANALYSIS

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without the written consent of Pace Analytical Services, Inc.

APPENDIX A
STATISTICAL ANALYSIS

60199358 Ft Smith FATHEAD SURVIVAL

File: 6199358A

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.

60199358 Ft Smith FATHEAD SURVIVAL

File: 6199358A 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.

60199358 Ft Smith FATHEAD SURVIVAL

File: 6199358A

Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Upstream	5	1.107	1.107	1.107
2	3%	5	1.107	1.107	1.107
3	4%	5	0.991	1.107	1.084
4	5%	5	0.991	1.107	1.084
5	7%	5	0.991	1.107	1.084
6	9%	5	0.991	1.107	1.084

60199358 Ft Smith FATHEAD SURVIVAL

File: 6199358A

Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Upstream	0.000	0.000	0.000	0.00
2	3%	0.000	0.000	0.000	0.00
3	4%	0.003	0.052	0.023	4.79
4	5%	0.003	0.052	0.023	4.79
5	7%	0.003	0.052	0.023	4.79
6	9%	0.003	0.052	0.023	4.79

60199358 Ft Smith FATHEAD SURVIVAL

File: C:\TOXSTAT\6199358A.

Transform: ARC SINE(SQUARE ROOT(Y))

STEEL'S MANY-ONE RANK TEST

-

Ho: Control < Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	Upstream	1.107				
2	3%	1.107	27.50	16.00	5.00	
3	4%	1.084	25.00	16.00	5.00	
4	5%	1.084	25.00	16.00	5.00	
5	7%	1.084	25.00	16.00	5.00	
6	9%	1.084	25.00	16.00	5.00	

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

60199358 Ft Smith FATHEAD GROWTH
File: 6199358B Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

D = 0.069

W = 0.980

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.

60199358 Ft Smith FATHEAD GROWTH
File: 6199358B Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 8.98

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.

60199358 Ft Smith FATHEAD GROWTH
File: 6199358B Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Upstream	5	0.390	0.489	0.439
2	3%	5	0.376	0.487	0.428
3	4%	5	0.300	0.534	0.421
4	5%	5	0.411	0.447	0.436
5	7%	5	0.366	0.485	0.443
6	9%	5	0.342	0.510	0.436

60199358 Ft Smith FATHEAD GROWTH
File: 6199358B Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Upstream	0.002	0.044	0.020	10.00
2	3%	0.002	0.044	0.020	10.40
3	4%	0.007	0.085	0.038	20.17
4	5%	0.000	0.015	0.007	3.35
5	7%	0.002	0.047	0.021	10.55
6	9%	0.004	0.061	0.027	13.93

60199358 Ft Smith FATHEAD GROWTH
File: 6199358B Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.002	0.000	0.115
Within (Error)	24	0.069	0.003	
Total	29	0.070		

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

60199358 Ft Smith FATHEAD GROWTH
 File: 6199358B 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	Upstream	0.439	0.439		
2	3%	0.428	0.428	0.343	
3	4%	0.421	0.421	0.543	
4	5%	0.436	0.436	0.083	
5	7%	0.443	0.443	-0.106	
6	9%	0.436	0.436	0.083	

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

60199358 Ft Smith FATHEAD GROWTH
 File: 6199358B 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	Upstream	5			
2	3%	5	0.080	18.2	0.012
3	4%	5	0.080	18.2	0.018
4	5%	5	0.080	18.2	0.003
5	7%	5	0.080	18.2	-0.004
6	9%	5	0.080	18.2	0.003

Conc. ID	1	2	3	4	5	6
Conc. Tested	0	3	4	5	7	9
Response 1	13	9	3	10	10	12
Response 2	2	3	8	6	6	9
Response 3	3	9	6	11	5	4
Response 4	12	4	6	11	4	6
Response 5	6	2	4	5	7	10
Response 6	0	4	12	2	10	9
Response 7	5	7	11	6	9	9
Response 8	2	3	7	9	3	9
Response 9	6	2	4	8	11	12
Response 10	12	2	2	4	8	11

*** Inhibition Concentration Percentage Estimate ***

Toxicant/Effluent: Ft Smith

Test Start Date: 7/28/15 Test Ending Date: 8/4/15

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	6.100	4.701	6.750
2	10	3.000	4.500	2.799	6.750
3	10	4.000	6.300	3.302	6.750
4	10	5.000	7.200	3.084	6.750
5	10	7.000	7.300	2.751	6.750
6	10	9.000	9.100	2.514	6.750

*** 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	3	4	5	7	9
Response 1	.489	.487	.400	.411	.485	.431
Response 2	.390	.376	.534	.441	.457	.510
Response 3	.427	.403	.300	.445	.435	.443
Response 4	.481	.414	.418	.438	.471	.456
Response 5	.409	.458	.452	.447	.366	.342

*** Inhibition Concentration Percentage Estimate ***

Toxicant/Effluent: Ft Smith

Test Start Date: 7/28/15 Test Ending Date: 8/4/15

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	0.439	0.044	0.439
2	5	3.000	0.428	0.044	0.433
3	5	4.000	0.421	0.085	0.433
4	5	5.000	0.436	0.015	0.433
5	5	7.000	0.443	0.047	0.433
6	5	9.000	0.436	0.061	0.433

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

REFERENCE #60199358

APPENDIX B
CHAIN OF CUSTODY FORMS



Sample Condition Upon Receipt

Client Name: Farr Smith Optional
 Courier: FedEx UPS VIA Clay PEX ECI Pace Other Client Proj Due Date:
 Tracking #: _____ Pace Shipping Label Used? Yes No Proj Name:

Custody Seal on Cooler/Box Present: Yes No Seals intact: Yes No
 Packing Material: Bubble Wrap Bubble Bags Foam None Other
 Thermometer Used: T-243 Type of Ice: Wet Blue None Samples received on ice, cooling process has begun.
 Cooler Temperature: 2.8 (circle one)

Date and initials of person examining contents: 8/1/15 EC 8:00

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

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N
 Person Contacted: _____ Date/Time: _____
 Comments/ Resolution: _____

Project Manager Review: _____ Date: _____



Sample Condition Upon Receipt

Client Name: Ft Smith

Courier: FedEx UPS VIA Clay PEX ECI Pace Other Client

Tracking #: _____ Pace Shipping Label Used? Yes No

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

Packing Material: Bubble Wrap Bubble Bags Foam None Other

Thermometer Used: T=243 Type of Ice: Wet Blue None Samples received on Ice, cooling process has begun.

Cooler Temperature: 3.0

Optional
Proj Due Date:
Proj Name:

Temperature should be above freezing to 6°C

Date and initials of person examining contents: 7/30/15 MB
1405

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

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____

APPENDIX C

REFERENCE TOXICANTS SUMMARY

REFERENCE #60199358

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: 7/14/15 11:40 End: 7/21/15 10:45

Reference Toxicant (NaCl) Pimephales promelas

Concentration of Toxicant	Avg. # of Live Organisms/replicate			
	0 hrs	24 hrs	48 hrs	7 days
10 g/l	40	6	2	0
8 g/l	40	32	27	5
6 g/l	40	39	35	27
4 g/l	40	40	40	39
2 g/l	40	40	40	40

IC25 (5.15 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	8	2
1.5 g/l	10	10	10	10
1.0 g/l	10	10	10	10
0.5 g/l	10	10	10	10

IC25 (1.21 g/l Sodium Chloride)

Survival NOEC: 1.5 g/l

Submitted By: _____
 Timothy Harrell, Technical Director

REFERENCE #60199358

**APPENDIX D
STATE AGENCY FORMS**

**Biomonitoring Form
Chronic Toxicity Summary Form
Pimephales promelas
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: 7/27/2015 Time: 8:00
Sample No. 2 Collected: Date: 7/29/2015 Time: 8:00
Sample No. 3 Collected: Date: 7/31/2015 Time: 8:00
Test Begin: Date: 7/28/2015 Time: 14:30
Test End: Date: 8/4/2015 Time: 14:00

Dilution: 0 Day:									Dilution: 5 Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	25	25.1	25.1	25	25.1	24.9	25		Temp (C)	25	25	24.9	25	25.1	25	25	
DO Initial	8	7.8	8.1	8	7.7	7.6	7.6		DO Initial		7.8	8.2	8	7.8	7.6	7.6	
DO Final	8.02	7.1	7.2	7.1	7.2	7.1	6.9		DO Final	6.9	7.2	7.2	7.1	7.2	7.1	6.9	
pH Initial	7.8	7.75	7.77	7.6	7.74	7.78	7.8		pH Initial		7.73	7.77	7.61	7.73	7.82	7.82	
pH Final	6.9	7.94	7.94	7.98	8.01	7.82	7.86		pH Final	8.03	7.96	7.98	8.01	8.03	7.85	7.87	
Alkalinity	84								Alkalinity								
Hardness	122								Hardness								
Conductivity	473								Conductivity								
Chlorine	<.1						<.1		Chlorine								

Dilution: 3 Day:									Dilution: 7 Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	25	25	24.9	25	25.1	25	25		Temp (C)	25	25	24.9	25	25.1	25	25	
DO Initial		7.8	8.1	8	7.7	7.6	7.6		DO Initial		7.7	8.2	8	7.8	7.6	7.6	
DO Final	6.9	7.1	7.2	7.1	7.2	7.1	6.9		DO Final	7	7.2	7.1	7.1	7.3	7.1	6.9	
pH Initial		7.74	7.77	7.6	7.74	7.8	7.8		pH Initial		7.72	7.77	7.63	7.73	7.84	7.83	
pH Final	8.02	7.95	7.95	7.99	8.02	7.82	7.86		pH Final	8.03	7.98	8.02	8.02	8.04	7.86	7.88	
Alkalinity									Alkalinity								
Hardness									Hardness								
Conductivity									Conductivity								
Chlorine									Chlorine								

Dilution: 4 Day:									Dilution: 9 Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	25	25	24.9	25	25.1	25	25		Temp (C)	25	25	24.9	25	25.1	25	25	Init. 100%
DO Initial		7.8	8.1	8	7.7	7.6	7.6		DO Initial		7.7	8.2	8	7.9	7.7	7.6	
DO Final	6.9	7.1	7.2	7.1	7.2	7.1	6.9		DO Final	7.1	7.3	7.1	7.1	7.3	7.1	7	
pH Initial		7.74	7.77	7.61	7.94	7.82	7.8		pH Initial		7.7	7.77	7.65	7.72	7.86	7.85	
pH Final	8.02	7.96	7.98	7.99	8.02	7.83	7.86		pH Final	8.04	8.02	8.06	8.04	8.06	7.89	7.9	
Alkalinity									Alkalinity								62
Hardness									Hardness								86
Conductivity									Conductivity								410
Chlorine									Chlorine							<.1	<.1

Dilution: Synthetic Day:								
	1	2	3	4	5	6	7	Comments
Temp (C)	25	25	24.9	25	25.1	25	25	
DO Initial	8	7.8	8.1	8	8.2	8.1	7.9	
DO Final	6.9	7.2	7.2	7.1	7.2	7	6.8	
pH Initial	7.62	7.47	7.6	7.6	7.55	7.51	7.66	
pH Final	8.02	7.58	7.71	7.71	7.64	7.58	7.75	
Alkalinity	60							
Hardness	90							
Conductivity	320							
Chlorine	<.1							

**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	7/26/2015	To	8:00	7/27/2015

Composite 2 Collected	From	8:00	7/28/2015	To	8:00	7/29/2015
-----------------------	-------------	------	-----------	-----------	------	-----------

Composite 3 Collected	From	8:00	7/30/2015	To	8:00	7/31/2015
-----------------------	-------------	------	-----------	-----------	------	-----------

Test initiated: am/pm 14:30

date 7/28/2015

Test terminated: am/pm 14:00

date 8/4/2015

Dilution water used: Receiving X

Reconstituted

Data Table for Survival

Effluent Conc. %	Percent Survival in Replicate Chambers					Mean Percent Survival			CV%*
	A	B	C	D	E	24h	48h	7 days	
0%	100	100	100	100	100	100	100	100	0
3%	100	100	100	100	100	100	100	100	0
4%	100	100	87.5	100	100	100	100	97.5	4.79
5%	87.5	100	100	100	100	100	100	97.5	4.79
7%	100	100	100	100	87.5	100	100	97.5	4.79
9%	100	100	100	100	87.5	100	100	97.5	4.79
Synthetic	100	100	87.5	100	100	100	100	97.5	4.79

Data Table for Survival

Effluent Conc. %	Average Dry Weight in milligrams in Replicate Chambers					Mean Dry Weight mg	CV%*
	A	B	C	D	E		
0%	0.489	0.39	0.427	0.481	0.409	0.439	10
3%	0.487	0.376	0.403	0.414	0.458	0.428	10.4
4%	0.4	0.534	0.3	0.418	0.452	0.421	20.17
5%	0.411	0.441	0.445	0.438	0.447	0.436	3.35
7%	0.485	0.457	0.435	0.471	0.366	0.443	10.55
9%	0.431	0.51	0.443	0.456	0.342	0.436	13.93
Synthetic	0.497	0.432	0.347	0.401	0.462	0.428	13.44

*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	(7 %):	Yes:	No: X
b) ½ Low Flow Dilution	(%):	Yes:	No:

2. Dunnett's Procedure (or appropriate test):

Is the mean dry weight (growth) of the effluent at 7 days significantly different ($p=0.05$) than the control's dry weight for the % effluent corresponding to (significant non-lethal effects):

a) Low Flow or Critical Dilution	(7 %):	Yes:	No: X
b) ½ Low Flow Dilution	(%):	Yes:	No:

3. If you answered NO to 1. a) and 2. a) enter (0) otherwise enter (1): 0

4. If you answered NO to 1. b) and 2. b) enter (0) otherwise enter (1):

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 NOEC below and circle lowest number:

a) NOEC survival:	9 % effluent
b) NOEC reproduction:	9 % effluent

**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	7/26/2015	To	8:00	7/27/2015

Composite 2 Collected	From 8:00	7/28/2015	To	8:00	7/29/2015
-----------------------	-----------	-----------	----	------	-----------

Composite 3 Collected	From 8:00	7/30/2015	To	8:00	7/31/2015
-----------------------	-----------	-----------	----	------	-----------

Test initiated: am/pm 14:30 date 7/28/2015
 Test terminated: am/pm 14:00 date 8/4/2015

Dilution water used: Receiving X Reconstituted

Percent Survival

Time of Reading	Percent Effluent						Synthetic
	Up 0	3	4	5	7	9	
24h	100	100	100	100	100	100	100
48h	100	100	100	100	100	100	100
End of test	30	40	40	60	60	70	100

Number of Young Produced per Female @ End of Test

Rep	UP 0	3	4	5	7	9	Synthetic
A	13	9	3	10	10	12	21
B	2	3	8	6	6	9	21
C	3	9	6	11	5	4	17
D	12	4	6	11	4	6	18
E	6	2	4	5	7	10	14
F	0	4	12	2	10	9	19
G	5	7	11	6	9	9	14
H	2	3	7	9	3	9	19
I	6	2	4	8	11	12	24
J	12	2	2	4	8	11	20
Mean	6.1	4.5	6.3	7.2	7.3	9.1	18.7
CV%*	77.07	62.2	52.4	42.83	37.68	27.63	16.73

*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 significantly different ($p=.05$) than the control survival for the % effluent corresponding to (lethality):

a) Low Flow or Critical Dilution	(	%)	Yes:	No:
b) ½ Low Flow Dilution	(	%)	Yes:	No:

2. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate:

Is the mean number of young produced per female significantly different ($p=.05$) than the control's number of young per female for the % effluent corresponding to (significant non-lethal effects):

a) Low Flow or Critical Dilution	(	%)	Yes:	No:
b) ½ Low Flow Dilution	(	%)	Yes:	No:

3. If you answered NO to 1. a) and 2. a) enter (0) otherwise enter (1): 0

4. If you answered NO to 1. b) and 2. b) enter (0) otherwise enter (1):

5. Enter response to item 3 on DMR Form, parameter #TEP3B.

6. Enter response to item 4 on DMR Form, parameter #TFP3B.

7. Enter percent effluent corresponding to each NOEC below and circle lowest number:

a) NOEC survival:	% effluent
b) NOEC reproduction:	% effluent



Sample Condition Upon Receipt

WO# : 60199358



Client Name: Et Smith

Courier: Fed Ex UPS USPS Client Commercial Pace 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-111

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

Cooler Temperature: 3.0

Temperature should be above freezing to 6°C

Date and initials of person examining contents: 7/29/15 1340
MS

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

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: AAF

Date: 07/29/15

AR00 21750



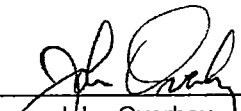
September 3, 2015
Control No. 193668
Page 1 of 9

City of Fort Smith
ATTN: Mr. Lance McAvoy
3900 Kelley Highway
Fort Smith, AR 72904

This report contains the analytical results and supporting information for samples submitted on August 27, 2015. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Laboratory Director or a qualified designee.



John Overbey
Laboratory Director

This document has been distributed to the following:

PDF cc: City of Fort Smith
ATTN: Mr. Lance McAvoy
lmcavoy@fortsmithar.gov



City of Fort Smith
3900 Kelley Highway
Fort Smith, AR 72904

SAMPLE INFORMATION

Project Description:

Ten (10) water and one (1) one sludge sample(s) received on August 27, 2015
Massard Table III Priority Pollutants

Receipt Details:

A Chain of Custody was provided. The samples were delivered in one (1) ice chest.
Ice chest #1 was delivered with shipping documentation.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

<u>Laboratory ID</u>	<u>Client Sample ID</u>	<u>Sampled Date/Time</u>	<u>Notes</u>
193668-1	Massard Influent	25-Aug-2015 1727	
193668-2	Massard Influent	25-Aug-2015 2210	
193668-3	Massard Effluent	25-Aug-2015 1730	
193668-4	Massard Effluent	26-Aug-2015 0800	
193668-5	Massard Raw Biosolid	26-Aug-2015 0921	

Qualifiers:

- D Result is from a secondary dilution factor
- X Spiking level is invalid due to the high concentration of analyte in the spiked sample

Case Narrative:

Equivalent composite of four samples was prepared for Control Numbers 193686-1 and 193686-3.

Analysis of soils/sludges are reported on a dry-weight basis unless specified.

References:

- "Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
- "Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
- "Standard Methods for the Examination of Water and Wastewaters", (SM).
- "American Society for Testing and Materials" (ASTM).
- "Association of Analytical Chemists" (AOAC).

City of Fort Smith
 3900 Kelley Highway
 Fort Smith, AR 72904

ANALYTICAL RESULTS
AIC No. 193668-1
Sample Identification: Massard Influent 25-Aug-2015 1727

Analyte	Result	RL	Units	Qualifier
Total Recoverable Phenolics EPA 420.1	49 Prep: 31-Aug-2015 0818 by 308 Analyzed: 31-Aug-2015 1110 by 308	5	ug/l Batch: W53057	
Total Cyanide SM 4500-CN C,E 1999	< 10 Prep: 27-Aug-2015 1033 by 308 Analyzed: 27-Aug-2015 1541 by 308	10	ug/l Batch: W53028	

AIC No. 193668-2
Sample Identification: Massard Influent 25-Aug-2015 2210

Analyte	Result	RL	Units	Qualifier
Molybdenum EPA 200.8	< 8 Prep: 28-Aug-2015 0834 by 313 Analyzed: 28-Aug-2015 1219 by 235	8	ug/l Batch: S39656	
Mercury, low level EPA 245.7	0.071 Prep: 28-Aug-2015 1012 by 308 Analyzed: 28-Aug-2015 1212 by 308	0.0050	ug/l Batch: S39659	
Total Recoverable Zinc EPA 200.7	440 Prep: 28-Aug-2015 0834 by 313 Analyzed: 28-Aug-2015 1347 by 235	20	ug/l Batch: S39656	D Dil: 2
Total Recoverable Antimony EPA 200.8	< 60 Prep: 28-Aug-2015 0834 by 313 Analyzed: 28-Aug-2015 1219 by 235	60	ug/l Batch: S39656	
Total Recoverable Arsenic EPA 200.8	2.3 Prep: 28-Aug-2015 0834 by 313 Analyzed: 28-Aug-2015 1219 by 235	0.5	ug/l Batch: S39656	
Total Recoverable Beryllium EPA 200.8	< 0.5 Prep: 28-Aug-2015 0834 by 313 Analyzed: 28-Aug-2015 1219 by 235	0.5	ug/l Batch: S39656	
Total Recoverable Cadmium EPA 200.8	0.64 Prep: 28-Aug-2015 0834 by 313 Analyzed: 28-Aug-2015 1219 by 235	0.5	ug/l Batch: S39656	
Total Recoverable Chromium EPA 200.8	< 10 Prep: 28-Aug-2015 0834 by 313 Analyzed: 28-Aug-2015 1219 by 235	10	ug/l Batch: S39656	
Total Recoverable Copper EPA 200.8	28 Prep: 28-Aug-2015 0834 by 313 Analyzed: 28-Aug-2015 1219 by 235	0.5	ug/l Batch: S39656	
Total Recoverable Lead EPA 200.8	3.9 Prep: 28-Aug-2015 0834 by 313 Analyzed: 28-Aug-2015 1219 by 235	0.5	ug/l Batch: S39656	
Total Recoverable Nickel EPA 200.8	8.1 Prep: 28-Aug-2015 0834 by 313 Analyzed: 28-Aug-2015 1219 by 235	0.5	ug/l Batch: S39656	
Total Recoverable Selenium EPA 200.8	< 5 Prep: 28-Aug-2015 0834 by 313 Analyzed: 28-Aug-2015 1219 by 235	5	ug/l Batch: S39656	
Total Recoverable Silver EPA 200.8	1.8 Prep: 28-Aug-2015 0834 by 313 Analyzed: 28-Aug-2015 1219 by 235	0.5	ug/l Batch: S39656	
Total Recoverable Thallium EPA 200.8	< 0.5 Prep: 28-Aug-2015 0834 by 313 Analyzed: 28-Aug-2015 1219 by 235	0.5	ug/l Batch: S39656	

AIC No. 193668-3
Sample Identification: Massard Effluent 25-Aug-2015 1730

Analyte	Result	RL	Units	Qualifier
Total Recoverable Phenolics EPA 420.1	14 Prep: 31-Aug-2015 0818 by 308 Analyzed: 31-Aug-2015 1107 by 308	5	ug/l Batch: W53057	



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ANALYTICAL RESULTS

AIC No. 193668-3 (Continued)

Sample Identification: Massard Effluent 25-Aug-2015 1730

<u>Analyte</u>	<u>Result</u>	<u>RL</u>	<u>Units</u>	<u>Qualifier</u>
Total Cyanide SM 4500-CN C,E 1999	< 10	10	ug/l	
Prep: 27-Aug-2015 1033 by 308	Analyzed: 27-Aug-2015 1543 by 308		Batch: W53028	

AIC No. 193668-4

Sample Identification: Massard Effluent 26-Aug-2015 0800

<u>Analyte</u>	<u>Result</u>	<u>RL</u>	<u>Units</u>	<u>Qualifier</u>
Molybdenum EPA 200.8	< 8	8	ug/l	
Prep: 28-Aug-2015 0834 by 313	Analyzed: 28-Aug-2015 1224 by 235		Batch: S39656	
Mercury, low level EPA 245.7	< 0.0050	0.0050	ug/l	
Prep: 28-Aug-2015 1012 by 308	Analyzed: 28-Aug-2015 1217 by 308		Batch: S39659	
Total Recoverable Antimony EPA 200.8	< 60	60	ug/l	
Prep: 28-Aug-2015 0834 by 313	Analyzed: 28-Aug-2015 1224 by 235		Batch: S39656	
Total Recoverable Arsenic EPA 200.8	1.3	0.5	ug/l	
Prep: 28-Aug-2015 0834 by 313	Analyzed: 28-Aug-2015 1224 by 235		Batch: S39656	
Total Recoverable Beryllium EPA 200.8	< 0.5	0.5	ug/l	
Prep: 28-Aug-2015 0834 by 313	Analyzed: 28-Aug-2015 1224 by 235		Batch: S39656	
Total Recoverable Cadmium EPA 200.8	< 0.5	0.5	ug/l	
Prep: 28-Aug-2015 0834 by 313	Analyzed: 28-Aug-2015 1224 by 235		Batch: S39656	
Total Recoverable Chromium EPA 200.8	< 10	10	ug/l	
Prep: 28-Aug-2015 0834 by 313	Analyzed: 28-Aug-2015 1224 by 235		Batch: S39656	
Total Recoverable Copper EPA 200.8	4.0	0.5	ug/l	
Prep: 28-Aug-2015 0834 by 313	Analyzed: 28-Aug-2015 1224 by 235		Batch: S39656	
Total Recoverable Lead EPA 200.8	< 0.5	0.5	ug/l	
Prep: 28-Aug-2015 0834 by 313	Analyzed: 28-Aug-2015 1224 by 235		Batch: S39656	
Total Recoverable Nickel EPA 200.8	3.5	0.5	ug/l	
Prep: 28-Aug-2015 0834 by 313	Analyzed: 28-Aug-2015 1224 by 235		Batch: S39656	
Total Recoverable Selenium EPA 200.8	< 5	5	ug/l	
Prep: 28-Aug-2015 0834 by 313	Analyzed: 28-Aug-2015 1224 by 235		Batch: S39656	
Total Recoverable Silver EPA 200.8	< 0.5	0.5	ug/l	
Prep: 28-Aug-2015 0834 by 313	Analyzed: 28-Aug-2015 1224 by 235		Batch: S39656	
Total Recoverable Thallium EPA 200.8	< 0.5	0.5	ug/l	
Prep: 28-Aug-2015 0834 by 313	Analyzed: 28-Aug-2015 1224 by 235		Batch: S39656	
Total Recoverable Zinc EPA 200.8	40	20	ug/l	
Prep: 28-Aug-2015 0834 by 313	Analyzed: 28-Aug-2015 1224 by 235		Batch: S39656	

AIC No. 193668-5

Sample Identification: Massard Raw Biosolid 26-Aug-2015 0921

<u>Analyte</u>	<u>Result</u>	<u>RL</u>	<u>Units</u>	<u>Qualifier</u>
Total Cyanide EPA 9010C, 9014	< 4	4	mg/Kg	
Prep: 01-Sep-2015 0803 by 308	Analyzed: 01-Sep-2015 1502 by 308		Batch: W53071	

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ANALYTICAL RESULTS

AIC No. 193668-5 (Continued)

Sample Identification: Massard Raw Biosolid 26-Aug-2015 0921

Analyte	Result	RL	Units	Qualifier
Total Recoverable Phenolics EPA 9065	700 Prep: 01-Sep-2015 0803 by 308 Analyzed: 02-Sep-2015 1016 by 308	20	mg/Kg Batch: W53072	
Total Solids SM 2540 G 1997	2.9 Prep: 27-Aug-2015 1033 by 100 Analyzed: 28-Aug-2015 0956 by 100	0.01	wt % Batch: W53027	
Antimony EPA 3051A, 6010C	< 3 Prep: 28-Aug-2015 0926 by 313 Analyzed: 28-Aug-2015 1551 by 317	3	mg/Kg Batch: S39658	
Arsenic EPA 3051A, 6010C	8.2 Prep: 28-Aug-2015 0926 by 313 Analyzed: 28-Aug-2015 1551 by 317	5	mg/Kg Batch: S39658	
Beryllium EPA 3051A, 6010C	0.34 Prep: 28-Aug-2015 0926 by 313 Analyzed: 28-Aug-2015 1551 by 317	0.03	mg/Kg Batch: S39658	
Cadmium EPA 3051A, 6010C	3.0 Prep: 28-Aug-2015 0926 by 313 Analyzed: 28-Aug-2015 1551 by 317	0.4	mg/Kg Batch: S39658	
Chromium EPA 3051A, 6010C	21 Prep: 28-Aug-2015 0926 by 313 Analyzed: 28-Aug-2015 1551 by 317	0.7	mg/Kg Batch: S39658	
Copper EPA 3051A, 6010C	730 Prep: 28-Aug-2015 0926 by 313 Analyzed: 28-Aug-2015 1551 by 317	0.6	mg/Kg Batch: S39658	
Lead EPA 3051A, 6010C	40 Prep: 28-Aug-2015 0926 by 313 Analyzed: 28-Aug-2015 1551 by 317	4	mg/Kg Batch: S39658	
Molybdenum EPA 3051A, 6010C	6.1 Prep: 28-Aug-2015 0926 by 313 Analyzed: 28-Aug-2015 1551 by 317	0.8	mg/Kg Batch: S39658	
Nickel EPA 3051A, 6010C	27 Prep: 28-Aug-2015 0926 by 313 Analyzed: 28-Aug-2015 1551 by 317	1	mg/Kg Batch: S39658	
Selenium EPA 3051A, 6010C	< 7 Prep: 28-Aug-2015 0926 by 313 Analyzed: 28-Aug-2015 1551 by 317	7	mg/Kg Batch: S39658	
Silver EPA 3051A, 6010C	7.5 Prep: 28-Aug-2015 0926 by 313 Analyzed: 28-Aug-2015 1551 by 317	0.7	mg/Kg Batch: S39658	
Thallium EPA 3051A, 6010C	4.3 Prep: 28-Aug-2015 0926 by 313 Analyzed: 28-Aug-2015 1551 by 317	4	mg/Kg Batch: S39658	
Zinc EPA 3051A, 6010C	770 Prep: 28-Aug-2015 0926 by 313 Analyzed: 28-Aug-2015 1551 by 317	0.2	mg/Kg Batch: S39658	
Mercury EPA 7471B	1.5 Prep: 31-Aug-2015 1041 by 313 Analyzed: 31-Aug-2015 1308 by 235	0.1	mg/Kg Batch: S39669	



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DUPLICATE RESULTS

Analyte	AIC No.	Result	RPD		Preparation Date	Analysis Date	Dil	Qual
			RPD	Limit				
Total Solids	193652-1	5.0 wt %			27Aug15 0819 by 100	28Aug15 0956 by 100		
	Batch: W53027 Duplicate	5.1 wt %	0.647	10.0	27Aug15 0820 by 100	28Aug15 0956 by 100		

LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
Total Recoverable Phenolics	0.1 mg/l	99.3	85.0-115			W53057	31Aug15 0819 by 308	31Aug15 1106 by 308		
Total Cyanide	0.1 mg/l	99.8	85.0-115			W53028	27Aug15 0843 by 308	27Aug15 1531 by 308		
Molybdenum	0.05 mg/l	101	85.0-115			S39656	28Aug15 0834 by 313	28Aug15 1156 by 235		
Mercury, low level	0.01 ug/l	83.3	76.0-113			S39659	28Aug15 1012 by 308	28Aug15 1120 by 308		
Total Recoverable Antimony	0.05 mg/l	101	85.0-115			S39656	28Aug15 0834 by 313	28Aug15 1156 by 235		
Total Recoverable Arsenic	0.05 mg/l	99.3	85.0-115			S39656	28Aug15 0834 by 313	28Aug15 1156 by 235		
Total Recoverable Beryllium	0.05 mg/l	97.9	85.0-115			S39656	28Aug15 0834 by 313	28Aug15 1156 by 235		
Total Recoverable Cadmium	0.05 mg/l	100	85.0-115			S39656	28Aug15 0834 by 313	28Aug15 1156 by 235		
Total Recoverable Chromium	0.05 mg/l	105	85.0-115			S39656	28Aug15 0834 by 313	28Aug15 1156 by 235		
Total Recoverable Copper	0.05 mg/l	102	85.0-115			S39656	28Aug15 0834 by 313	28Aug15 1156 by 235		
Total Recoverable Lead	0.05 mg/l	101	85.0-115			S39656	28Aug15 0834 by 313	28Aug15 1156 by 235		
Total Recoverable Nickel	0.05 mg/l	102	85.0-115			S39656	28Aug15 0834 by 313	28Aug15 1156 by 235		
Total Recoverable Selenium	0.05 mg/l	98.3	85.0-115			S39656	28Aug15 0834 by 313	28Aug15 1156 by 235		
Total Recoverable Silver	0.02 mg/l	101	85.0-115			S39656	28Aug15 0834 by 313	28Aug15 1156 by 235		
Total Recoverable Thallium	0.05 mg/l	101	85.0-115			S39656	28Aug15 0834 by 313	28Aug15 1156 by 235		
Total Recoverable Zinc	0.05 mg/l	101	85.0-115			S39656	28Aug15 0834 by 313	28Aug15 1156 by 235		
Total Cyanide	0.500 mg/Kg	99.8	85.0-115			W53071	01Sep15 0803 by 308	01Sep15 1459 by 308		
Total Recoverable Phenolics	10.0 mg/Kg	105	85.0-115			W53072	01Sep15 0803 by 308	02Sep15 1015 by 308		
Antimony	500 mg/Kg	94.5	85.0-115			S39658	28Aug15 0927 by 313	28Aug15 1530 by 317		
Arsenic	500 mg/Kg	94.8	85.0-115			S39658	28Aug15 0927 by 313	28Aug15 1530 by 317		
Beryllium	50.0 mg/Kg	95.6	85.0-115			S39658	28Aug15 0927 by 313	28Aug15 1530 by 317		
Cadmium	500 mg/Kg	94.9	85.0-115			S39658	28Aug15 0927 by 313	28Aug15 1530 by 317		
Chromium	50.0 mg/Kg	95.0	85.0-115			S39658	28Aug15 0927 by 313	28Aug15 1530 by 317		
Copper	50.0 mg/Kg	94.6	85.0-115			S39658	28Aug15 0927 by 313	28Aug15 1530 by 317		
Lead	500 mg/Kg	95.2	85.0-115			S39658	28Aug15 0927 by 313	28Aug15 1530 by 317		
Molybdenum	50.0 mg/Kg	95.3	85.0-115			S39658	28Aug15 0927 by 313	28Aug15 1530 by 317		
Nickel	50.0 mg/Kg	94.2	85.0-115			S39658	28Aug15 0927 by 313	28Aug15 1530 by 317		
Selenium	500 mg/Kg	87.3	85.0-115			S39658	28Aug15 0927 by 313	28Aug15 1530 by 317		
Silver	10.0 mg/Kg	87.0	85.0-115			S39658	28Aug15 0927 by 313	28Aug15 1530 by 317		
Thallium	500 mg/Kg	97.7	85.0-115			S39658	28Aug15 0927 by 313	28Aug15 1530 by 317		
Zinc	50.0 mg/Kg	93.4	85.0-115			S39658	28Aug15 0927 by 313	28Aug15 1530 by 317		
Mercury	1.25 mg/Kg	95.6	85.0-115			S39669	31Aug15 1041 by 313	31Aug15 1253 by 235		

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MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Total Recoverable Phenolics	193668-3	0.1 mg/l	101	80.0-120	W53057	31Aug15 0819 by 308	31Aug15 1108 by 308		
	193668-3	0.1 mg/l	98.6	80.0-120	W53057	31Aug15 0819 by 308	31Aug15 1109 by 308		
	Relative Percent Difference:		1.93	10.0	W53057				
Total Cyanide	193623-4	0.1 mg/l	96.0	75.0-125	W53028	27Aug15 0843 by 308	27Aug15 1535 by 308		
	193623-4	0.1 mg/l	94.8	75.0-125	W53028	27Aug15 0843 by 308	27Aug15 1537 by 308		
	Relative Percent Difference:		1.26	20.0	W53028				
Molybdenum	193674-1	0.05 mg/l	105	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1202 by 235		
	193674-1	0.05 mg/l	104	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1207 by 235		
	Relative Percent Difference:		0.509	20.0	S39656				
Mercury, low level	193591-1	0.01 ug/l	78.5	63.0-111	S39659	28Aug15 1012 by 308	28Aug15 1130 by 308		
	193591-1	0.01 ug/l	77.5	63.0-111	S39659	28Aug15 1012 by 308	28Aug15 1135 by 308		
	Relative Percent Difference:		1.13	18.0	S39659				
Total Recoverable Antimony	193674-1	0.05 mg/l	106	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1202 by 235		
	193674-1	0.05 mg/l	105	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1207 by 235		
	Relative Percent Difference:		0.964	20.0	S39656				
Total Recoverable Arsenic	193674-1	0.05 mg/l	103	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1202 by 235		
	193674-1	0.05 mg/l	103	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1207 by 235		
	Relative Percent Difference:		0.389	20.0	S39656				
Total Recoverable Beryllium	193674-1	0.05 mg/l	100	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1202 by 235		
	193674-1	0.05 mg/l	101	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1207 by 235		
	Relative Percent Difference:		1.02	20.0	S39656				
Total Recoverable Cadmium	193674-1	0.05 mg/l	102	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1202 by 235		
	193674-1	0.05 mg/l	101	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1207 by 235		
	Relative Percent Difference:		0.412	20.0	S39656				
Total Recoverable Chromium	193674-1	0.05 mg/l	106	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1202 by 235		
	193674-1	0.05 mg/l	105	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1207 by 235		
	Relative Percent Difference:		0.927	20.0	S39656				
Total Recoverable Copper	193674-1	0.05 mg/l	105	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1202 by 235		
	193674-1	0.05 mg/l	105	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1207 by 235		
	Relative Percent Difference:		0.216	20.0	S39656				
Total Recoverable Lead	193674-1	0.05 mg/l	104	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1202 by 235		
	193674-1	0.05 mg/l	104	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1207 by 235		
	Relative Percent Difference:		0.106	20.0	S39656				
Total Recoverable Nickel	193674-1	0.05 mg/l	106	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1202 by 235		
	193674-1	0.05 mg/l	105	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1207 by 235		
	Relative Percent Difference:		0.444	20.0	S39656				
Total Recoverable Selenium	193674-1	0.05 mg/l	99.9	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1202 by 235		
	193674-1	0.05 mg/l	101	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1207 by 235		
	Relative Percent Difference:		0.797	20.0	S39656				
Total Recoverable Silver	193674-1	0.02 mg/l	102	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1202 by 235		
	193674-1	0.02 mg/l	101	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1207 by 235		
	Relative Percent Difference:		1.16	20.0	S39656				
Total Recoverable Thallium	193674-1	0.05 mg/l	109	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1202 by 235		
	193674-1	0.05 mg/l	110	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1207 by 235		
	Relative Percent Difference:		0.795	20.0	S39656				
Total Recoverable Zinc	193674-1	0.05 mg/l	101	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1202 by 235		
	193674-1	0.05 mg/l	99.8	75.0-125	S39656	28Aug15 0834 by 313	28Aug15 1207 by 235		
	Relative Percent Difference:		0.977	20.0	S39656				
Total Cyanide	193668-5	0.993 mg/Kg	91.1	75.0-125	W53071	01Sep15 0803 by 308	01Sep15 1504 by 308		
	193668-5	0.993 mg/Kg	91.0	75.0-125	W53071	01Sep15 0803 by 308	01Sep15 1506 by 308		
	Relative Percent Difference:		0.114	20.0	W53071				



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MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Total Recoverable Phenolics	193668-5	9.26 mg/Kg	-	80.0-120	W53072	01Sep15 0803 by 308	02Sep15 1017 by 308		X
	193668-5	9.44 mg/Kg	-	80.0-120	W53072	01Sep15 0803 by 308	02Sep15 1018 by 308		X
	Relative Percent Difference:		0.510		10.0	W53072			
Antimony	193652-1	497 mg/Kg	96.2	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1629 by 317		
	193652-1	498 mg/Kg	95.2	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1634 by 317		
	Relative Percent Difference:		1.05		20.0	S39658			
Arsenic	193652-1	497 mg/Kg	94.0	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1534 by 317		
	193652-1	498 mg/Kg	95.3	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1539 by 317		
	Relative Percent Difference:		1.19		20.0	S39658			
Beryllium	193652-1	49.7 mg/Kg	95.8	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1534 by 317		
	193652-1	49.8 mg/Kg	95.1	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1539 by 317		
	Relative Percent Difference:		0.738		20.0	S39658			
Cadmium	193652-1	497 mg/Kg	90.2	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1534 by 317		
	193652-1	498 mg/Kg	92.1	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1539 by 317		
	Relative Percent Difference:		2.11		20.0	S39658			
Chromium	193652-1	49.7 mg/Kg	89.2	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1534 by 317		
	193652-1	49.8 mg/Kg	92.7	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1539 by 317		
	Relative Percent Difference:		2.45		20.0	S39658			
Copper	193652-1	49.7 mg/Kg	-	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1534 by 317		X
	193652-1	49.8 mg/Kg	-	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1539 by 317		X
	Relative Percent Difference:		0.778		20.0	S39658			
Lead	193652-1	497 mg/Kg	92.3	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1534 by 317		
	193652-1	498 mg/Kg	93.0	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1539 by 317		
	Relative Percent Difference:		0.760		20.0	S39658			
Molybdenum	193652-1	49.7 mg/Kg	80.9	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1534 by 317		
	193652-1	49.8 mg/Kg	80.4	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1539 by 317		
	Relative Percent Difference:		0.653		20.0	S39658			
Nickel	193652-1	49.7 mg/Kg	89.0	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1534 by 317		
	193652-1	49.8 mg/Kg	91.4	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1539 by 317		
	Relative Percent Difference:		2.01		20.0	S39658			
Selenium	193652-1	497 mg/Kg	89.0	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1534 by 317		
	193652-1	498 mg/Kg	90.4	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1539 by 317		
	Relative Percent Difference:		1.47		20.0	S39658			
Silver	193652-1	9.95 mg/Kg	93.6	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1534 by 317		
	193652-1	9.95 mg/Kg	86.2	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1539 by 317		
	Relative Percent Difference:		8.08		20.0	S39658			
Thallium	193652-1	497 mg/Kg	98.2	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1534 by 317		
	193652-1	498 mg/Kg	98.8	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1539 by 317		
	Relative Percent Difference:		0.581		20.0	S39658			
Zinc	193652-1	49.7 mg/Kg	95.3	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1534 by 317		
	193652-1	49.8 mg/Kg	87.1	75.0-125	S39658	28Aug15 0927 by 313	28Aug15 1539 by 317		
	Relative Percent Difference:		3.81		20.0	S39658			
Mercury	193652-1	2.45 mg/Kg	105	70.0-130	S39669	31Aug15 1041 by 313	31Aug15 1257 by 235		
	193652-1	2.50 mg/Kg	103	70.0-130	S39669	31Aug15 1041 by 313	31Aug15 1301 by 235		
	Relative Percent Difference:		1.65		20.0	S39669			

City of Fort Smith
3900 Kelley Highway
Fort Smith, AR 72904

LABORATORY BLANK RESULTS

Analyte	Result	RL	PQL	QC		Qual
				Sample	Preparation Date	
Total Recoverable Phenolics	< 0.005 mg/l	0.005	0.005	W53057-1	31Aug15 0819 by 308	31Aug15 1105 by 308
Total Cyanide	< 0.01 mg/l	0.01	0.01	W53028-1	27Aug15 0843 by 308	27Aug15 1529 by 308
Molybdenum	< 0.008 mg/l	0.008	0.008	S39656-1	28Aug15 0834 by 313	28Aug15 1150 by 235
Mercury, low level	< 0.0050 ug/l	0.0050	0.0050	S39659-1	28Aug15 1012 by 308	28Aug15 1049 by 308
Total Recoverable Antimony	< 0.03 mg/l	0.03	0.03	S39656-1	28Aug15 0834 by 313	28Aug15 1150 by 235
Total Recoverable Arsenic	< 0.0005 mg/l	0.0005	0.0005	S39656-1	28Aug15 0834 by 313	28Aug15 1150 by 235
Total Recoverable Beryllium	< 0.0003 mg/l	0.0003	0.0003	S39656-1	28Aug15 0834 by 313	28Aug15 1150 by 235
Total Recoverable Cadmium	< 0.0002 mg/l	0.0002	0.0002	S39656-1	28Aug15 0834 by 313	28Aug15 1150 by 235
Total Recoverable Chromium	< 0.007 mg/l	0.007	0.007	S39656-1	28Aug15 0834 by 313	28Aug15 1150 by 235
Total Recoverable Copper	< 0.0005 mg/l	0.0005	0.0005	S39656-1	28Aug15 0834 by 313	28Aug15 1150 by 235
Total Recoverable Lead	< 0.0005 mg/l	0.0005	0.0005	S39656-1	28Aug15 0834 by 313	28Aug15 1150 by 235
Total Recoverable Nickel	< 0.0005 mg/l	0.0005	0.0005	S39656-1	28Aug15 0834 by 313	28Aug15 1150 by 235
Total Recoverable Selenium	< 0.002 mg/l	0.002	0.002	S39656-1	28Aug15 0834 by 313	28Aug15 1150 by 235
Total Recoverable Silver	< 0.0002 mg/l	0.0002	0.0002	S39656-1	28Aug15 0834 by 313	28Aug15 1150 by 235
Total Recoverable Thallium	< 0.0005 mg/l	0.0005	0.0005	S39656-1	28Aug15 0834 by 313	28Aug15 1150 by 235
Total Recoverable Zinc	< 0.002 mg/l	0.002	0.002	S39656-1	28Aug15 0834 by 313	28Aug15 1150 by 235
Total Cyanide	< 0.1 mg/Kg	0.1	0.1	W53071-1	01Sep15 0803 by 308	01Sep15 1457 by 308
Total Recoverable Phenolics	< 0.5 mg/Kg	0.5	0.5	W53072-1	01Sep15 0803 by 308	02Sep15 1014 by 308
Total Solids	< 0.01 wt %	0.01	0.01	W53027-1	27Aug15 0820 by 100	28Aug15 0956 by 100
Antimony	< 3 mg/Kg	3	3	S39658-1	28Aug15 0927 by 313	28Aug15 1525 by 317
Arsenic	< 5 mg/Kg	5	5	S39658-1	28Aug15 0927 by 313	28Aug15 1525 by 317
Beryllium	< 0.03 mg/Kg	0.03	0.03	S39658-1	28Aug15 0927 by 313	28Aug15 1525 by 317
Cadmium	< 0.4 mg/Kg	0.4	0.4	S39658-1	28Aug15 0927 by 313	28Aug15 1525 by 317
Chromium	< 0.7 mg/Kg	0.7	0.7	S39658-1	28Aug15 0927 by 313	28Aug15 1525 by 317
Copper	< 0.6 mg/Kg	0.6	0.6	S39658-1	28Aug15 0927 by 313	28Aug15 1525 by 317
Lead	< 4 mg/Kg	4	4	S39658-1	28Aug15 0927 by 313	28Aug15 1525 by 317
Molybdenum	< 0.8 mg/Kg	0.8	0.8	S39658-1	28Aug15 0927 by 313	28Aug15 1525 by 317
Nickel	< 1 mg/Kg	1	1	S39658-1	28Aug15 0927 by 313	28Aug15 1525 by 317
Selenium	< 7 mg/Kg	7	7	S39658-1	28Aug15 0927 by 313	28Aug15 1525 by 317
Silver	< 0.7 mg/Kg	0.7	0.7	S39658-1	28Aug15 0927 by 313	28Aug15 1525 by 317
Thallium	< 4 mg/Kg	4	4	S39658-1	28Aug15 0927 by 313	28Aug15 1525 by 317
Zinc	< 0.2 mg/Kg	0.2	0.2	S39658-1	28Aug15 0927 by 313	28Aug15 1525 by 317
Mercury	< 0.1 mg/Kg	0.1	0.1	S39669-1	31Aug15 1041 by 313	31Aug15 1249 by 235

INTER-OFFICE MEMO

AR 0021750

TO: Steve Floyd, Superintendent of Water and Wastewater Operations

FROM: Don Clover, Biologist 

DATE: September 14, 2015

RE: Biomonitoring Results - Massard Plant

Please find below the chronic biomonitoring retest results for the third quarter of 2015. In previous testing, the Arkansas River control did not meet acceptance criteria as outlined in AR0021750 for the *Ceriodaphnia dubia* test organism resulting in an invalid test. Retests were conducted the week of August 24th for both test organisms, using moderately hard synthetic laboratory water for dilution purposes. Sub-lethal and lethal toxicity were not experienced in the low-flow dilution of 7% effluent for the *Ceriodaphnia dubia* test. The test therefore passes at the low-flow dilution of 7% for lethal and sub-lethal effects. Lethal and sub-lethal toxicity were not experienced in the low-flow dilution of 7% effluent for the fathead minnow (*Pimephales promelas*) test organism. The test therefore passes at the low-flow dilution of 7% effluent for lethal and sub-lethal effects.

Parameter #TGP3B- 0Parameter #TGP6C- 0Parameter #TLP3B- 0Parameter #TLP6C- 0Parameter #TOP3B- 9%Parameter # TOP6C- 9%Parameter #TPP3B- 9%Parameter #TPP6C- 9%Parameter #TQP3B- 15.69%Parameter #TQP6C- 13.46%Prepared By: Don Clover Date: 9/14/15Reviewed By: R. A. M. B. Date: 09/18/15



REFERENCE #60201334

Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
Phone: 913.599.5665
Fax: 913.599.1759

September 3, 2015

RECEIVED

SEP 11 2015

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

WATER/WASTEWATER

Re: Lab Project Number: 60201334
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

REPORT OF LABORATORY ANALYSIS

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

PERMIT # AR 0021750
AFIN # 66-01652

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

September 3, 2015

REPORT OF LABORATORY ANALYSIS

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SUMMARY

A Chronic Whole Effluent Toxicity Test using the 7-day chronic fathead minnows (Pimephales promelas), static renewal larval survival and growth test, and three brood 7-day chronic Cladoceran (Ceriodaphnia dubia), static renewal survival and reproduction test, was conducted on effluent discharge water collected at the CITY OF FORT SMITH (Massard) effluent discharge from August 24, 2015 to August 28, 2015. All the test methods followed are as listed in EPA 821-R-02-013, "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms."

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

In minnow section of testing, it was observed that the effluent had no significant effect on the survival of the larvae at the 9% 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 9% for survival. The LC50 was estimated to be >9% effluent. No significant reduction in growth was observed in the 9% effluent concentration. The Toxic Units is <1. The IC25 is >11. The NOEC for growth in effluent was determined to be 9%. The PMSD is 16.5

In Cladoceran section of testing, it was observed that the effluent had no significant effect on the survival of the organisms in the 9% 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 9% for survival. The LC50 was estimated to be >9% effluent. No significant reduction in reproduction was observed in the 9% effluent concentrations. The Toxic Units is <1. The IC25 is >11. The NOEC for reproduction in effluent was determined to be 9%. The PMSD is 14.3.

The chronic toxicity exhibited by the fathead minnows and the Ceriodaphnia treated by the effluent sampled from August 24 to August 28 from the CITY OF FORT SMITH (Massard) effluent discharge, is acceptable as described in EPA 821-R-02-013.

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INTRODUCTION

Pace Analytical was contracted to perform this chronic toxicity test on effluent from the CITY OF FORT SMITH (Massard) 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 Fort Smith (Massard) personnel collected sampling of the effluent. A sample of the effluent was delivered to Pace by commercial carrier on 8-25-15. Subsequent samples followed by delivery on 8-27-15 and on 8-29-15. All samples were stored at $\leq 6^{\circ}$ Celsius. Moderately Hard Synthetic Water was used as a control and also to make the required dilutions in the test as described in EPA 821-R-02-013.

TEST METHODS

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

The Pimephales and Ceriodaphnia tests were initiated on 8-25-15 and carried out until 9-1-15. 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

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.

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RESULTS

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Permittee: CITY OF FORT SMITH (Massard) 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%	87.5	100	100	100	100	100	100	97.5	4.79
Dilution 1 3%	100	100	87.5	100	100	100	100	97.5	4.79
Dilution 2 4%	100	100	100	100	100	100	100	100	0.00
Dilution 3 5%	100	100	100	100	100	100	100	100	0.00
Dilution 4 7%	100	100	87.5	87.5	100	100	100	95	5.99
Dilution 5 9%	100	100	100	100	100	100	100	100	0.00

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Permitted City of FORT SMITH (Massard) Effluent discharge.

CERIODAPHNIA SURVIVAL AND REPRODUCTION

DATA TABLE FOR CERIODAPHNIA YOUNG PRODUCTION

Replicate	Control 0%	Dilution 1 3%	Dilution 2 4%	Dilution 3 5%	Dilution 3 7%	Dilution 4 9%
1	17	21	23	22	23	21
2	20	17	22	18	22	20
3	22	22	20	26	22	20
4	23	24	20	22	17	16
5	15	22	16	20	21	22
6	18	22	17	17	22	23
7	22	17	20	18	22	15
8	15	23	22	22	19	21
9	17	21	17	21	18	23
10	21	22	23	18	22	24
Mean	19.0	21.1	20.0	20.4	20.8	20.5
SD	2.981	2.331	2.582	2.757	2.044	2.953
CV %	15.69	11.05	12.91	13.51	9.83	14.41

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

CERIODAPHNIA MEAN PERCENT SURVIVAL

Percent Effluent (%)						
Time Elapsed	Control 0%	Dilution 1 3%	Dilution 2 4%	Dilution 3 5%	Dilution 4 7%	Dilution 5 9%
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.
15. Cleaning	Siphon daily, immediately before test solution renewal
15. Aeration	None

REPORT OF LABORATORY ANALYSIS

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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%, 4%, 5%, 7%, 9%
18. Test duration	7 days
19. Endpoints	Survival and growth
20. Test acceptability	80% or greater survival in the controls, Average dry weight in controls >0.25 mg, Coefficient of variation in the control must not exceed 40%.

TABLE 2 (CONT.)

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

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

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TABLE 2 (CONT.)

8. Renewal of test concentrations	Daily
9. Age of test organism	< 24 hours
10. No. larvae/chamber	1
11. No. replicates/concentration	10
12. No. larvae/concentration	10
13. Feeding regime	Feed 0.1 ml YCT three times daily. Larvae are not fed 12 hours prior to termination of test.
15. 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%, 4%, 5%, 7%, 9%
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.

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

SAMPLE NO. 1 COLLECTED: DATE: 8-24-15

SAMPLE NO. 2 COLLECTED: DATE: 8-26-15

SAMPLE NO. 3 COLLECTED: DATE: 8-28-15

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

	Control	100%
PH	7.58	7.36
D.O.	8.00	6.80
Temp	25.0	25.0
Alk	58	98
Hard	90	84
Cond	312	369
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 Concentration (%)	PH	D.O. (mg/l)	Temperature (C)
0% Control	7.58	7.10	25.1
3% Effluent	7.58	7.10	25.0
4% Effluent	7.58	7.10	25.0
5% Effluent	7.58	7.10	25.0
7% Effluent	7.59	7.00	25.0
9% Effluent	7.60	6.90	25.0

48-Hour Water Quality Measurements

Effluent Concentration (%)	PH	D.O. (mg/l)	Temperature (C)
0% Control	7.61	6.70	25.1
3% Effluent	7.60	7.20	24.9
4% Effluent	7.67	7.20	24.9
5% Effluent	7.73	7.10	24.9
7% Effluent	7.75	7.00	24.9
9% Effluent	7.77	6.90	24.9

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FINAL WATER QUALITY

EFFLUENT CONCENTRATION

	Control	9%
pH	7.66	7.70
D.O.	7.20	7.20
Temp	25.1	24.9
Alk	62	74
Hard	98	98
Cond	388	570

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

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TEST VALIDITY

The Pimephales promelas control survival rate was 97.5%. The mean dry weight (growth) of the Pimephales promelas was determined at 0.399 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 13.46. The Ceriodaphnia dubia survival rates were 100 in the control. The Ceriodaphnia in the control produced an average of 19.0 young over the seven-day exposure period. Percent CV values for Ceriodaphnia dubia control survival and reproduction was 0.00 and 15.69. 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 9% for survival and 9% for growth. The No Observed Effect Concentration (NOEC) for Ceriodaphnia dubia was 9% for Survival and 9% for Reproduction. The tests were ran using a synthetic control against effluent concentrations of 3%, 4%, 5%, 7%, and 9%. The effluent sampled on 8-24-15, 8-26-15, and 8-28-15 exhibited acceptable chronic toxicity in Pimephales promelas and in Ceriodaphnia dubia during the exposure period as described in EPA 821-R-02-013.

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APPENDIX A STATISTICAL ANNALYSIS

REPORT OF LABORATORY ANALYSIS

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60201334 FtSmith Massard FATHEAD SURVIVAL

File: 6201334A 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	2	2	23	3	0

Calculated Chi-Square goodness of fit test statistic = 19.9412

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.

60201334 FtSmith Massard FATHEAD SURVIVAL

File: 6201334A Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.038

W = 0.760

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.

60201334 FtSmith Massard FATHEAD SURVIVAL

File: C:\TOXSTAT\6201334A. Transform: ARC SINE(SQUARE ROOT(Y))

Hartley's test for homogeneity of variance

Bartlett's test for homogeneity of variance

These two tests can not be performed because at least one group has zero variance.

Data FAIL to meet homogeneity of variance assumption.

Additional transformations are useless.

60201334 FtSmith Massard FATHEAD SURVIVAL

File: 6201334A 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	3%	5	0.991	1.107	1.084
3	4%	5	1.107	1.107	1.107
4	5%	5	1.107	1.107	1.107
5	7%	5	0.991	1.107	1.061
6	9%	5	1.107	1.107	1.107

60201334 FtSmith Massard FATHEAD SURVIVAL

File: 6201334A 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	4%	0.000	0.000	0.000	0.00
4	5%	0.000	0.000	0.000	0.00
5	7%	0.004	0.064	0.028	5.99
6	9%	0.000	0.000	0.000	0.00

60201334 FtSmith Massard FATHEAD SURVIVAL

File: C:\TOXSTAT\6201334A.

Transform: ARC SINE(SQUARE ROOT(Y))

STEEL'S MANY-ONE RANK TEST

Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	1.084				
2	3%	1.084	27.50	16.00	5.00	
3	4%	1.107	30.00	16.00	5.00	
4	5%	1.107	30.00	16.00	5.00	
5	7%	1.061	25.00	16.00	5.00	
6	9%	1.107	30.00	16.00	5.00	

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

60201334 Ft Smith Massard FATHEAD GROWTH
File: 6201334B Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

D = 0.047

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.

60201334 Ft Smith Massard FATHEAD GROWTH
File: 6201334B Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 2.16

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.

60201334 Ft Smith Massard FATHEAD GROWTH
File: 6201334B Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	5	0.312	0.452	0.399
2	3%	5	0.378	0.464	0.427
3	4%	5	0.344	0.488	0.393
4	5%	5	0.346	0.411	0.381
5	7%	5	0.322	0.408	0.378
6	9%	5	0.374	0.476	0.424

60201334 Ft Smith Massard FATHEAD GROWTH
File: 6201334B Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	CONTROL	0.003	0.054	0.024	13.46
2	3%	0.001	0.037	0.016	8.61
3	4%	0.003	0.058	0.026	14.66
4	5%	0.001	0.030	0.013	7.89
5	7%	0.001	0.039	0.017	10.21
6	9%	0.002	0.041	0.018	9.71

60201334 Ft Smith Massard FATHEAD GROWTH
File: 6201334B Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.011	0.002	1.128
Within (Error)	24	0.047	0.002	
Total	29	0.058		

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

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

60201334 Ft Smith Massard FATHEAD GROWTH
 File: 6201334B Transform: NO TRANSFORM

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	0.399	0.399		
2	3%	0.427	0.427	-1.005	
3	4%	0.393	0.393	0.215	
4	5%	0.381	0.381	0.646	
5	7%	0.378	0.378	0.739	
6	9%	0.424	0.424	-0.904	

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

60201334 Ft Smith Massard FATHEAD GROWTH
 File: 6201334B Transform: NO TRANSFORM

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	3%	5	0.066	16.5	-0.028
3	4%	5	0.066	16.5	0.006
4	5%	5	0.066	16.5	0.018
5	7%	5	0.066	16.5	0.021
6	9%	5	0.066	16.5	-0.025

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF		
	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
3%	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
4%	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
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

IDENTIFICATION	NUMBER OF		
	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
7%	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
9%	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	3%	10	0	
2	4%	10	0	
3	5%	10	0	
4	7%	10	0	
5	9%	10	0	

60201334 Ft Smith Massard CERIODAPHNIA DUBIA REPRODU
File: 6201334E 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	6	12	18	23	1

Calculated Chi-Square goodness of fit test statistic = 9.6900
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

60201334 Ft Smith Massard CERIODAPHNIA DUBIA REPRODU
File: 6201334E Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 1.76

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.

60201334 Ft Smith Massard CERIODAPHNIA DUBIA REPRODU
File: 6201334E Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	10	15.000	23.000	19.000
2	3%	10	17.000	24.000	21.100
3	4%	10	16.000	23.000	20.000
4	5%	10	17.000	26.000	20.400
5	7%	10	17.000	23.000	20.800
6	9%	10	15.000	24.000	20.500

60201334 Ft Smith Massard CERIODAPHNIA DUBIA REPRODU
File: 6201334E Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	CONTROL	8.889	2.981	0.943	15.69
2	3%	5.433	2.331	0.737	11.05
3	4%	6.667	2.582	0.816	12.91
4	5%	7.600	2.757	0.872	13.51
5	7%	4.178	2.044	0.646	9.83
6	9%	8.722	2.953	0.934	14.41

60201334 Ft Smith Massard CERIODAPHNIA DUBIA REPRODU
File: 6201334E Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	27.200	5.440	0.787
Within (Error)	54	373.400	6.915	
Total	59	400.600		

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

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

60201334 Ft Smith Massard CERIODAPHNIA DUBIA REPRODU
 File: 6201334E 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	19.000	19.000		
2	3%	21.100	21.100	-1.786	
3	4%	20.000	20.000	-0.850	
4	5%	20.400	20.400	-1.190	
5	7%	20.800	20.800	-1.531	
6	9%	20.500	20.500	-1.276	

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

60201334 Ft Smith Massard CERIODAPHNIA DUBIA REPRODU
 File: 6201334E 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	3%	10	2.717	14.3	-2.100
3	4%	10	2.717	14.3	-1.000
4	5%	10	2.717	14.3	-1.400
5	7%	10	2.717	14.3	-1.800
6	9%	10	2.717	14.3	-1.500

Conc. ID	1	2	3	4	5	6
Conc. Tested	0	3	4	5	7	9
Response 1	.312	.452	.488	.404	.408	.433
Response 2	.401	.464	.344	.346	.406	.392
Response 3	.397	.378	.379	.352	.322	.446
Response 4	.452	.442	.353	.411	.354	.476
Response 5	.433	.399	.401	.392	.402	.374

*** Inhibition Concentration Percentage Estimate ***

Toxicant/Effluent: Ft Smith Massard

Test Start Date: 8/21/15 Test Ending Date: 9/1/15

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	0.399	0.054	0.413
2	5	3.000	0.427	0.037	0.413
3	5	4.000	0.393	0.058	0.394
4	5	5.000	0.381	0.030	0.394
5	5	7.000	0.378	0.039	0.394
6	5	9.000	0.424	0.041	0.394

*** 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	3	4	5	7	9
Response 1	17	21	23	22	23	21
Response 2	20	17	22	18	22	20
Response 3	22	22	20	26	22	20
Response 4	23	24	20	22	17	16
Response 5	15	22	16	20	21	22
Response 6	18	22	17	17	22	23
Response 7	22	17	20	18	22	15
Response 8	15	23	22	22	19	21
Response 9	17	21	17	21	18	23
Response 10	21	22	23	18	22	24

*** Inhibition Concentration Percentage Estimate ***

Toxicant/Effluent: Ft Smith Massard

Test Start Date: 8/21/15 Test Ending Date: 9/1/15

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	19.000	2.981	20.300
2	10	3.000	21.100	2.331	20.300
3	10	4.000	20.000	2.582	20.300
4	10	5.000	20.400	2.757	20.300
5	10	7.000	20.800	2.044	20.300
6	10	9.000	20.500	2.953	20.300

*** 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.

APPENDIX B
CHAIN OF CUSTODY FORMS

REPORT OF LABORATORY ANALYSIS

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Sample Condition Upon Receipt

Client Name: F + Smith

Courier: FedEx UPS VIA Clay PEX ECI Pace Other Client

Tracking #: _____ Pace Shipping Label Used? Yes No

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

Packing Material: Bubble Wrap Bubble Bags Foam None Other

Thermometer Used: 7-111 Type of Ice: Wet Blue None Samples received on ice, cooling process has begun.

Cooler Temperature: 1.9

Temperature should be above freezing to 6°C

Optional
Proj Due Date:
Proj Name:

Date and initials of person examining contents: 8/27/15 15:00 TH

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

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____



Sample Condition Upon Receipt

(Massard)

Client Name: Fort Smith

Courier: FedEx UPS VIA Clay PEX ECI Pace Other Client

Tracking #: _____ Pace Shipping Label Used? Yes No

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

Packing Material: Bubble Wrap Bubble Bags Foam None Other

Thermometer Used: T-111 Type of Ice: Wet Blue None Samples received on ice, cooling process has begun.

Cooler Temperature: 2.4

Temperature should be above freezing to 6°C

Optional
Proj Due Date:
Proj Name:

Date and initials of person examining contents: 8/21/15 JC 800

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

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____

APPENDIX C

REFERENCE TOXICANTS SUMMARY

REPORT OF LABORATORY ANALYSIS

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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: 8/25/15 14:50 End: 9/1/15 14:

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	5	1	0
8 g/l	40	31	23	4
6 g/l	40	40	35	23
4 g/l	40	40	40	38
2 g/l	40	40	40	39

IC25 (4.83 g/l Sodium Chloride)

Survival NOEC: 4.0 g/l

Reference Toxicant (NaCl) Ceriodaphnia Dubia

Concentration of Toxicant	Avg. # of Live Organisms/replicate			
	0 hrs	24 hrs	48 hrs	7 days
2.5 g/l	10	5	0	0
2.0 g/l	10	10	8	2
1.5 g/l	10	10	10	10
1.0 g/l	10	10	10	10
0.5 g/l	10	10	10	10

IC25 (1.19 g/l Sodium Chloride)

Survival NOEC: 1.5 g/l

Submitted By: _____
Timothy Harrell, Technical Director

REPORT OF LABORATORY ANALYSIS

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APPENDIX D STATE AGENCY FORMS

REPORT OF LABORATORY ANALYSIS

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Biomonitoring Form
Chronic Toxicity Summary Form
Pimephales promelas
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: 8/24/2015 Time: 8:00
 Sample No. 2 Collected: Date: 8/26/2015 Time: 8:00
 Sample No. 3 Collected: Date: 8/28/2015 Time: 8:00
 Test Begin: Date: 8/25/2015 Time: 14:10
 Test End: Date: 9/1/2015 Time: 13:30

Dilution: 0 Day:									Dilution: 5 Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	25.1	25.1	25.2	25.1	25	25.1	25.1		Temp (C)	25	24.9	25.1	25	24.9	25	24.9	
DO Initial	8	8.4	8.1	8.2	8.2	8.3	8		DO Initial		8.3	8.1	8.2	8.2	8.3	8	
DO Final	7.1	6.7	6.9	7	7.1	7.4	7.2		DO Final	7.1	7.1	7.2	7.1	7.1	7.4	7.2	
pH Initial	7.58	7.58	7.41	7.54	7.46	7.47	7.55		pH Initial		7.56	7.49	7.55	7.5	7.53	7.56	
pH Final	7.58	7.61	7.54	7.5	7.57	7.68	7.66		pH Final	7.58	7.67	7.57	7.55	7.6	7.7	7.68	
Alkalinity	58								Alkalinity								
Hardness	90								Hardness								
Conductivity	312								Conductivity								
Chlorine	<.1						<.1		Chlorine								

Dilution: 3 Day:									Dilution: 7 Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	25	24.9	25.1	25	24.9	25	24.9		Temp (C)	25	24.9	25.1	25	24.9	25	24.9	
DO Initial		8.4	8.1	8.2	8.2	8.3	8		DO Initial		8.3	8.1	8.2	8.1	8.2	8	
DO Final	7.1	7.2	7	7	7.1	7.4	7.2		DO Final	7	7	7.3	7.1	7.1	7.3	7.2	
pH Initial		7.56	7.43	7.54	7.48	7.5	7.55		pH Initial		7.54	7.52	7.56	7.52	7.54	7.58	
pH Final	7.58	7.6	7.55	7.52	7.58	7.69	7.66		pH Final	7.59	7.75	7.59	7.56	7.61	7.72	7.68	
Alkalinity									Alkalinity								
Hardness									Hardness								
Conductivity									Conductivity								
Chlorine									Chlorine								

Dilution: 4 Day:									Dilution: 9 Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	25	24.9	25.1	25	24.9	25	24.9		Temp (C)	25	24.9	25.1	25	24.9	25	24.9	Init. 100%
DO Initial		8.3	8.1	8.2	8.2	8.3	8		DO Initial		8.3	8.1	8.2	8.1	8.2	8	6.8
DO Final	7.1	7.2	8.1	7	7.1	7.4	7.2		DO Final	6.9	6.9	7.3	7.2	7.1	7.3	7.2	
pH Initial		7.56	7.45	7.54	7.49	7.51	7.55		pH Initial		7.52	7.52	7.57	7.53	7.55	7.6	7.36
pH Final	7.58	7.67	7.56	7.53	7.58	7.69	7.68		pH Final	7.6	7.77	7.6	7.57	7.63	7.72	7.7	
Alkalinity									Alkalinity								98
Hardness									Hardness								84
Conductivity									Conductivity								369
Chlorine									Chlorine							<.1	<.1

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

Permittee: City of Fort Smith

NPDES No.:

AR 0021750

	From	Time:	Date:	To	Time:	Date:
Composite 1 Collected		8:00	8/23/2015		8:00	8/24/2015

	From	Time:	Date:	To	Time:	Date:
Composite 2 Collected		8:00	8/25/2015		8:00	8/26/2015

	From	Time:	Date:	To	Time:	Date:
Composite 3 Collected		8:00	8/27/2015		8:00	8/28/2015

Test initiated: am/pm 14:50

date 8/25/2015

Test terminated: am/pm 14:15

date 9/1/2015

Dilution water used: Receiving

Reconstituted X

Data Table for Survival

Effluent Conc. %	Percent Survival in Replicate Chambers					Mean Percent Survival			CV%*
	A	B	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	100	100	100	100	0
4%	100	100	87.5	100	100	100	100	97.5	4.79
5%	100	100	100	100	100	100	100	100	0
7%	100	100	87.5	87.5	100	100	100	95	5.99
9%	100	100	100	100	100	100	100	100	0

Data Table for Survival

Effluent Conc. %	Average Dry Weight in milligrams in Replicate Chambers					Mean Dry Weight mg	CV%*
	A	B	C	D	E		
Syn. 0%	0.312	0.401	0.397	0.452	0.433	0.399	13.46
3%	0.452	0.464	0.378	0.442	0.399	0.427	8.61
4%	0.488	0.344	0.379	0.353	0.401	0.393	14.66
5%	0.404	0.346	0.352	0.411	0.392	0.381	7.89
7%	0.408	0.406	0.322	0.354	0.402	0.378	10.21
9%	0.433	0.392	0.446	0.476	0.374	0.424	9.71

*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	(7 %):	Yes:	No: X
b) ½ Low Flow Dilution	(%):	Yes:	No:

2. Dunnett's Procedure (or appropriate test):

Is the mean dry weight (growth) of the effluent at 7 days significantly different ($p=0.05$) than the control's dry weight for the % effluent corresponding to (significant non-lethal effects):

a) Low Flow or Critical Dilution	(7 %):	Yes:	No: X
b) ½ Low Flow Dilution	(%):	Yes:	No:

3. If you answered NO to 1. a) and 2. a) enter (0) otherwise enter (1): 0

4. If you answered NO to 1. b) and 2. b) enter (0) otherwise enter (1):

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 NOEC below and circle lowest number:

a) NOEC survival:	9 % effluent
b) NOEC reproduction:	9 % effluent

**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: 8/24/2015 Time: 8:00
Sample No. 2 Collected: Date: 8/26/2015 Time: 8:00
Sample No. 3 Collected: Date: 8/28/2018 Time: 8:00
Test Begin: Date: 8/25/2015 Time: 14:10
Test End: Date: 9/1/2015 Time: 13:30

Dilution: 0 Day:									Dilution: 5 Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	25.1	25.1	25.2	25.1	25	25.1	25.1		Temp (C)	25	24.9	25.1	25	24.9	25	24.9	
DO Initial	8	8.4	8.1	8.2	8.2	8.3	8		DO Initial		8.3	8.1	8.2	8.2	8.3	8	
DO Final	7.1	6.7	6.9	7	7.1	7.4	7.2		DO Final	7.1	7.1	7.2	7.1	7.1	7.4	7.2	
pH Initial	7.58	7.58	7.41	7.54	7.46	7.47	7.55		pH Initial		7.56	7.49	7.55	7.5	7.53	7.56	
pH Final	7.58	7.61	7.54	7.5	7.57	7.68	7.66		pH Final	7.58	7.67	7.57	7.55	7.6	7.7	7.68	
Alkalinity	58								Alkalinity								
Hardness	90								Hardness								
Conductivity	312								Conductivity								
Chlorine	<.1						<.1		Chlorine								

Dilution: 3 Day:									Dilution: 7 Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	25	24.9	25.1	25	24.9	25	24.9		Temp (C)	25	24.9	25.1	25	24.9	25	24.9	
DO Initial		8.4	8.1	8.2	8.2	8.3	8		DO Initial		8.3	8.1	8.2	8.1	8.2	8	
DO Final	7.1	7.2	7	7	7.1	7.4	7.2		DO Final	7	7	7.3	7.1	7.1	7.3	7.2	
pH Initial		7.56	7.43	7.54	7.48	7.5	7.55		pH Initial		7.54	7.52	7.56	7.52	7.54	7.58	
pH Final	7.58	7.6	7.55	7.52	7.58	7.69	7.66		pH Final	7.59	7.75	7.59	7.56	7.61	7.72	7.68	
Alkalinity									Alkalinity								
Hardness									Hardness								
Conductivity									Conductivity								
Chlorine									Chlorine								

Dilution: 4 Day:									Dilution: 9 Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	25	24.9	25.1	25	24.9	25	24.9		Temp (C)	25	24.9	25.1	25	24.9	25	24.9	Init. 100%
DO Initial		8.3	8.1	8.2	8.2	8.3	8		DO Initial		8.3	8.1	8.2	8.1	8.2	8	6.8
DO Final	7.1	7.2	8.1	7	7.1	7.4	7.2		DO Final	6.9	6.9	7.3	7.2	7.1	7.3	7.2	
pH Initial		7.56	7.45	7.54	7.49	7.51	7.55		pH Initial		7.52	7.52	7.57	7.53	7.55	7.6	7.36
pH Final	7.58	7.67	7.56	7.53	7.58	7.69	7.68		pH Final	7.6	7.77	7.6	7.57	7.63	7.72	7.7	
Alkalinity									Alkalinity								98
Hardness									Hardness								84
Conductivity									Conductivity								369
Chlorine									Chlorine							<.1	<.1

**Summary Reporting Forms
Chronic Biomonitoring**

Ceriodaphnia dubia Survival and Reproduction

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

	From	Time:	Date:	To	Time:	Date:
Composite 1 Collected		8:00	8/23/2015		8:00	8/24/2015

Composite 2 Collected	From	8:00	8/25/2015	To	8:00	8/26/2015
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Composite 3 Collected	From	8:00	8/27/2015	To	8:00	8/28/2015
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Test initiated: am/pm 14:50 date 8/25/2015
 Test terminated: am/pm 14:15 date 9/1/2015

Dilution water used: Receiving Reconstituted X

Percent Survival

Time of Reading	Percent Effluent					
	0	3	4	5	7	9
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	4	5	7	9
A	17	21	23	22	23	21
B	20	17	22	18	22	20
C	22	22	20	26	22	20
D	23	24	20	22	17	16
E	15	22	16	20	21	22
F	18	22	17	17	22	23
G	22	17	20	18	22	15
H	15	23	22	22	19	21
I	17	21	17	21	18	23
J	21	22	23	18	22	24
Mean	19	21.1	20	20.4	20.8	20.5
CV%*	15.69	11.05	12.91	13.51	9.83	14.41

*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 significantly different ($p=.05$) than the control survival for the % effluent corresponding to (lethality):

a) Low Flow or Critical Dilution	(	7 %):	Yes:	No: X
b) ½ Low Flow Dilution	(	%):	Yes:	No:

2. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate:

Is the mean number of young produced per female significantly different ($p=.05$) than the control's number of young per female for the % effluent corresponding to (significant non-lethal effects):

a) Low Flow or Critical Dilution	(	7 %):	Yes:	No: X
b) ½ Low Flow Dilution	(	%):	Yes:	No:

3. If you answered NO to 1. a) and 2. a) enter (0) otherwise enter (1): 0

4. If you answered NO to 1. b) and 2. b) enter (0) otherwise enter (1):

5. Enter response to item 3 on DMR Form, parameter #TEP3B.

6. Enter response to item 4 on DMR Form, parameter #TFP3B.

7. Enter percent effluent corresponding to each NOEC below and circle lowest number:

a) NOEC survival:	9 % effluent
b) NOEC reproduction:	9 % effluent