

AR0021750

INTEROFFICE MEMORANDUM

TO: STEVE FLOYD, SUPERINTENDENT OF OPERATIONS
FROM: LANCE A. MCAVOY, DEPUTY-DIRECTOR OF OPERATIONS *LM*
SUBJECT: 2015 FOURTH QUARTER MASSARD BIOMONITORING & PRIORITY POLLUTANT SCAN
DATE: NOVEMBER 30, 2015
CC:

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

If you have any questions, please contact me.



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 October 29, 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.

A handwritten signature in cursive script that reads 'Steve Bradford'.

Steve Bradford
Deputy 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) sludge sample(s) received on October 29, 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>
195662-1	Massard Influent	27-Oct-2015 1800	
195662-2	Massard Influent	27-Oct-2015 2208	
195662-3	Massard Effluent	27-Oct-2015 1804	
195662-4	Massard Effluent	28-Oct-2015 0800	
195662-5	Massard Raw Biosolid	27-Oct-2015 1206	

Qualifiers:

X Spiking level is invalid due to the high concentration of analyte in the spiked sample

Case Narrative:

Equivalent composite of four (4) samples was prepared for Control Numbers 195662-1 and 195662-3.

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).



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ANALYTICAL RESULTS

AIC No. 195662-1

Sample Identification: Massard Influent 27-Oct-2015 1800

Analyte	Result	RL	Units	Qualifier
Total Recoverable Phenolics EPA 420.1	38	5	ug/l	
Prep: 30-Oct-2015 0757 by 319	Analyzed: 10-Nov-2015 1618 by 319		Batch: W53751	
Total Cyanide SM 4500-CN C,E 1999	< 10	10	ug/l	
Prep: 30-Oct-2015 0903 by 319	Analyzed: 30-Oct-2015 1353 by 319		Batch: W53754	

AIC No. 195662-2

Sample Identification: Massard Influent 27-Oct-2015 2208

Analyte	Result	RL	Units	Qualifier
Mercury, low level EPA 245.7	0.078	0.0050	ug/l	
Prep: 06-Nov-2015 1341 by 271	Analyzed: 06-Nov-2015 1527 by 271		Batch: S40065	
Total Recoverable Molybdenum EPA 200.7	< 8	8	ug/l	
Prep: 03-Nov-2015 1449 by 317	Analyzed: 04-Nov-2015 1044 by 317		Batch: S40043	
Total Recoverable Antimony EPA 200.8	< 60	60	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1346 by 235		Batch: S40045	
Total Recoverable Arsenic EPA 200.8	2.3	0.5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1346 by 235		Batch: S40045	
Total Recoverable Beryllium EPA 200.8	< 0.5	0.5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1346 by 235		Batch: S40045	
Total Recoverable Cadmium EPA 200.8	0.58	0.5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1346 by 235		Batch: S40045	
Total Recoverable Chromium EPA 200.8	< 10	10	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1346 by 235		Batch: S40045	
Total Recoverable Copper EPA 200.8	21	0.5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1346 by 235		Batch: S40045	
Total Recoverable Lead EPA 200.8	2.4	0.5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1346 by 235		Batch: S40045	
Total Recoverable Nickel EPA 200.8	5.0	0.5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1346 by 235		Batch: S40045	
Total Recoverable Selenium EPA 200.8	< 5	5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1346 by 235		Batch: S40045	
Total Recoverable Silver EPA 200.8	1.3	0.5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1346 by 235		Batch: S40045	
Total Recoverable Thallium EPA 200.8	< 0.5	0.5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1346 by 235		Batch: S40045	
Total Recoverable Zinc EPA 200.8	370	20	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1346 by 235		Batch: S40045	

AIC No. 195662-3

Sample Identification: Massard Effluent 27-Oct-2015 1804

Analyte	Result	RL	Units	Qualifier
Total Recoverable Phenolics EPA 420.1	18	5	ug/l	
Prep: 30-Oct-2015 0757 by 319	Analyzed: 10-Nov-2015 1619 by 319		Batch: W53751	

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ANALYTICAL RESULTS

AIC No. 195662-3 (Continued)

Sample Identification: Massard Effluent 27-Oct-2015 1804

Analyte	Result	RL	Units	Qualifier
Total Cyanide SM 4500-CN C,E 1999	< 10	10	ug/l	
Prep: 30-Oct-2015 0903 by 319	Analyzed: 30-Oct-2015 1355 by 319		Batch: W53754	

AIC No. 195662-4

Sample Identification: Massard Effluent 28-Oct-2015 0800

Analyte	Result	RL	Units	Qualifier
Mercury, low level EPA 245.7	0.035	0.0050	ug/l	
Prep: 06-Nov-2015 1341 by 271	Analyzed: 06-Nov-2015 1501 by 271		Batch: S40065	
Total Recoverable Molybdenum EPA 200.7	< 8	8	ug/l	
Prep: 03-Nov-2015 1449 by 317	Analyzed: 04-Nov-2015 1048 by 317		Batch: S40043	
Total Recoverable Antimony EPA 200.8	< 60	60	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1352 by 235		Batch: S40045	
Total Recoverable Arsenic EPA 200.8	1.2	0.5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1352 by 235		Batch: S40045	
Total Recoverable Beryllium EPA 200.8	< 0.5	0.5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1352 by 235		Batch: S40045	
Total Recoverable Cadmium EPA 200.8	< 0.5	0.5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1352 by 235		Batch: S40045	
Total Recoverable Chromium EPA 200.8	< 10	10	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1352 by 235		Batch: S40045	
Total Recoverable Copper EPA 200.8	7.9	0.5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1352 by 235		Batch: S40045	
Total Recoverable Lead EPA 200.8	< 0.5	0.5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1352 by 235		Batch: S40045	
Total Recoverable Nickel EPA 200.8	3.6	0.5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1352 by 235		Batch: S40045	
Total Recoverable Selenium EPA 200.8	< 5	5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1352 by 235		Batch: S40045	
Total Recoverable Silver EPA 200.8	< 0.5	0.5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1352 by 235		Batch: S40045	
Total Recoverable Thallium EPA 200.8	< 0.5	0.5	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1352 by 235		Batch: S40045	
Total Recoverable Zinc EPA 200.8	38	20	ug/l	
Prep: 04-Nov-2015 0839 by 313	Analyzed: 05-Nov-2015 1352 by 235		Batch: S40045	

AIC No. 195662-5

Sample Identification: Massard Raw Biosolid 27-Oct-2015 1206

Analyte	Result	RL	Units	Qualifier
Total Cyanide EPA 9010C, 9014	< 3	3	mg/Kg	
Prep: 04-Nov-2015 0842 by 319	Analyzed: 04-Nov-2015 1336 by 319		Batch: W53793	

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ANALYTICAL RESULTS
AIC No. 195662-5 (Continued)
Sample Identification: Massard Raw Biosolid 27-Oct-2015 1206

Analyte	Result	RL	Units	Qualifier
Total Recoverable Phenolics	82	20	mg/Kg	
EPA 9065	Prep: 10-Nov-2015 0812 by 308	Analyzed: 10-Nov-2015 1630 by 308	Batch: W53854	
Total Solids	3.3	0.01	wt %	
SM 2540 G 1997	Prep: 30-Oct-2015 1104 by 100	Analyzed: 02-Nov-2015 1503 by 100	Batch: W53758	
Antimony	< 3	3	mg/Kg	
EPA 3051A, 6010C	Prep: 03-Nov-2015 0952 by 313	Analyzed: 03-Nov-2015 1852 by 317	Batch: S40037	
Arsenic	< 5	5	mg/Kg	
EPA 3051A, 6010C	Prep: 03-Nov-2015 0952 by 313	Analyzed: 03-Nov-2015 1852 by 317	Batch: S40037	
Beryllium	0.15	0.03	mg/Kg	
EPA 3051A, 6010C	Prep: 03-Nov-2015 0952 by 313	Analyzed: 03-Nov-2015 1852 by 317	Batch: S40037	
Cadmium	0.59	0.4	mg/Kg	
EPA 3051A, 6010C	Prep: 03-Nov-2015 0952 by 313	Analyzed: 03-Nov-2015 1852 by 317	Batch: S40037	
Chromium	21	0.7	mg/Kg	
EPA 3051A, 6010C	Prep: 03-Nov-2015 0952 by 313	Analyzed: 03-Nov-2015 1852 by 317	Batch: S40037	
Copper	1300	0.6	mg/Kg	
EPA 3051A, 6010C	Prep: 03-Nov-2015 0952 by 313	Analyzed: 03-Nov-2015 1852 by 317	Batch: S40037	
Lead	68	4	mg/Kg	
EPA 3051A, 6010C	Prep: 03-Nov-2015 0952 by 313	Analyzed: 03-Nov-2015 1852 by 317	Batch: S40037	
Molybdenum	9.0	0.8	mg/Kg	
EPA 3051A, 6010C	Prep: 03-Nov-2015 0952 by 313	Analyzed: 03-Nov-2015 1852 by 317	Batch: S40037	
Nickel	170	1	mg/Kg	
EPA 3051A, 6010C	Prep: 03-Nov-2015 0952 by 313	Analyzed: 03-Nov-2015 1852 by 317	Batch: S40037	
Selenium	< 7	7	mg/Kg	
EPA 3051A, 6010C	Prep: 03-Nov-2015 0952 by 313	Analyzed: 03-Nov-2015 1852 by 317	Batch: S40037	
Silver	6.7	0.7	mg/Kg	
EPA 3051A, 6010C	Prep: 03-Nov-2015 0952 by 313	Analyzed: 03-Nov-2015 1852 by 317	Batch: S40037	
Thallium	< 4	4	mg/Kg	
EPA 3051A, 6010C	Prep: 03-Nov-2015 0952 by 313	Analyzed: 03-Nov-2015 1852 by 317	Batch: S40037	
Zinc	930	0.2	mg/Kg	
EPA 3051A, 6010C	Prep: 03-Nov-2015 0952 by 313	Analyzed: 03-Nov-2015 1852 by 317	Batch: S40037	
Mercury	1.8	0.1	mg/Kg	
EPA 7471B	Prep: 03-Nov-2015 0954 by 313	Analyzed: 03-Nov-2015 1315 by 313	Batch: S40038	



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DUPLICATE RESULTS

Analyte	AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
Total Solids	195662-5	3.3 wt %			30Oct15 1104 by 100	02Nov15 1503 by 100		
	Batch: W53758 Duplicate	3.4 wt %	0.490	10.0	30Oct15 1105 by 100	02Nov15 1503 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	92.1	85.0-115			W53751	30Oct15 0800 by 319	10Nov15 1611 by 319		
Total Cyanide	0.1 mg/l	95.7	85.0-115			W53754	30Oct15 0903 by 319	30Oct15 1343 by 319		
Mercury, low level	0.01 ug/l	100	76.0-113			S40065	06Nov15 1341 by 271	06Nov15 1425 by 271		
Total Recoverable Molybdenum	0.5 mg/l	95.4	85.0-115			S40043	03Nov15 1449 by 317	04Nov15 1025 by 317		
Total Recoverable Antimony	0.05 mg/l	97.8	85.0-115			S40045	04Nov15 0839 by 313	05Nov15 1249 by 235		
Total Recoverable Arsenic	0.05 mg/l	99.7	85.0-115			S40045	04Nov15 0839 by 313	05Nov15 1249 by 235		
Total Recoverable Beryllium	0.05 mg/l	100	85.0-115			S40045	04Nov15 0839 by 313	05Nov15 1249 by 235		
Total Recoverable Cadmium	0.05 mg/l	99.9	85.0-115			S40045	04Nov15 0839 by 313	05Nov15 1249 by 235		
Total Recoverable Chromium	0.05 mg/l	99.4	85.0-115			S40045	04Nov15 0839 by 313	05Nov15 1249 by 235		
Total Recoverable Copper	0.05 mg/l	97.4	85.0-115			S40045	04Nov15 0839 by 313	05Nov15 1249 by 235		
Total Recoverable Lead	0.05 mg/l	98.9	85.0-115			S40045	04Nov15 0839 by 313	05Nov15 1249 by 235		
Total Recoverable Nickel	0.05 mg/l	98.4	85.0-115			S40045	04Nov15 0839 by 313	05Nov15 1249 by 235		
Total Recoverable Selenium	0.05 mg/l	102	85.0-115			S40045	04Nov15 0839 by 313	05Nov15 1249 by 235		
Total Recoverable Silver	0.02 mg/l	99.6	85.0-115			S40045	04Nov15 0839 by 313	05Nov15 1249 by 235		
Total Recoverable Thallium	0.05 mg/l	98.9	85.0-115			S40045	04Nov15 0839 by 313	05Nov15 1249 by 235		
Total Recoverable Zinc	0.05 mg/l	96.5	85.0-115			S40045	04Nov15 0839 by 313	05Nov15 1249 by 235		
Total Cyanide	0.500 mg/Kg	90.7	85.0-115			W53793	04Nov15 0842 by 319	04Nov15 1328 by 319		
Total Recoverable Phenolics	10.0 mg/Kg	97.4	85.0-115			W53854	10Nov15 0812 by 308	10Nov15 1627 by 308		
Antimony	500 mg/Kg	90.9	85.0-115			S40037	03Nov15 0952 by 313	03Nov15 1621 by 317		
Arsenic	500 mg/Kg	91.6	85.0-115			S40037	03Nov15 0952 by 313	03Nov15 1621 by 317		
Beryllium	50.0 mg/Kg	93.4	85.0-115			S40037	03Nov15 0952 by 313	03Nov15 1621 by 317		
Cadmium	500 mg/Kg	93.0	85.0-115			S40037	03Nov15 0952 by 313	03Nov15 1621 by 317		
Chromium	50.0 mg/Kg	96.0	85.0-115			S40037	03Nov15 0952 by 313	03Nov15 1621 by 317		
Copper	50.0 mg/Kg	94.4	85.0-115			S40037	03Nov15 0952 by 313	03Nov15 1621 by 317		
Lead	500 mg/Kg	96.8	85.0-115			S40037	03Nov15 0952 by 313	03Nov15 1621 by 317		
Molybdenum	50.0 mg/Kg	92.0	85.0-115			S40037	03Nov15 0952 by 313	03Nov15 1621 by 317		
Nickel	50.0 mg/Kg	95.2	85.0-115			S40037	03Nov15 0952 by 313	03Nov15 1621 by 317		
Selenium	500 mg/Kg	92.4	85.0-115			S40037	03Nov15 0952 by 313	03Nov15 1621 by 317		
Silver	10.0 mg/Kg	106	85.0-115			S40037	03Nov15 0952 by 313	03Nov15 1621 by 317		
Thallium	500 mg/Kg	93.3	85.0-115			S40037	03Nov15 0952 by 313	03Nov15 1621 by 317		
Zinc	50.0 mg/Kg	91.4	85.0-115			S40037	03Nov15 0952 by 313	03Nov15 1621 by 317		
Mercury	1.25 mg/Kg	102	85.0-115			S40038	03Nov15 0954 by 313	03Nov15 1244 by 313		



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MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Total Recoverable Phenolics	195663-3	0.1 mg/l	91.1	80.0-120	W53751	30Oct15 0800 by 319	10Nov15 1614 by 319		
	195663-3	0.1 mg/l	87.1	80.0-120	W53751	30Oct15 0800 by 319	10Nov15 1615 by 319		
	Relative Percent Difference:		4.32	10.0	W53751				
Total Cyanide	195663-3	0.1 mg/l	95.4	75.0-125	W53754	30Oct15 0903 by 319	30Oct15 1346 by 319		
	195663-3	0.1 mg/l	96.7	75.0-125	W53754	30Oct15 0903 by 319	30Oct15 1348 by 319		
	Relative Percent Difference:		1.35	20.0	W53754				
Mercury, low level	195782-4	0.01 ug/l	101	63.0-111	S40065	06Nov15 1341 by 271	06Nov15 1430 by 271		
	195782-4	0.01 ug/l	107	63.0-111	S40065	06Nov15 1341 by 271	06Nov15 1435 by 271		
	Relative Percent Difference:		3.49	18.0	S40065				
Total Recoverable Molybdenum	195700-1	0.5 mg/l	97.3	75.0-125	S40043	03Nov15 1449 by 317	04Nov15 1028 by 317		
	195700-1	0.5 mg/l	94.1	75.0-125	S40043	03Nov15 1449 by 317	04Nov15 1032 by 317		
	Relative Percent Difference:		3.31	20.0	S40043				
Total Recoverable Antimony	195753-3	0.05 mg/l	107	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1255 by 235		
	195753-3	0.05 mg/l	106	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1300 by 235		
	Relative Percent Difference:		0.983	20.0	S40045				
Total Recoverable Arsenic	195753-3	0.05 mg/l	106	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1255 by 235		
	195753-3	0.05 mg/l	105	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1300 by 235		
	Relative Percent Difference:		1.25	20.0	S40045				
Total Recoverable Beryllium	195753-3	0.05 mg/l	96.1	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1255 by 235		
	195753-3	0.05 mg/l	97.5	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1300 by 235		
	Relative Percent Difference:		1.45	20.0	S40045				
Total Recoverable Cadmium	195753-3	0.05 mg/l	98.4	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1255 by 235		
	195753-3	0.05 mg/l	98.0	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1300 by 235		
	Relative Percent Difference:		0.460	20.0	S40045				
Total Recoverable Chromium	195753-3	0.05 mg/l	97.2	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1255 by 235		
	195753-3	0.05 mg/l	95.2	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1300 by 235		
	Relative Percent Difference:		1.88	20.0	S40045				
Total Recoverable Copper	195753-3	0.05 mg/l	90.5	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1255 by 235		
	195753-3	0.05 mg/l	90.3	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1300 by 235		
	Relative Percent Difference:		0.204	20.0	S40045				
Total Recoverable Lead	195753-3	0.05 mg/l	96.2	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1255 by 235		
	195753-3	0.05 mg/l	96.0	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1300 by 235		
	Relative Percent Difference:		0.238	20.0	S40045				
Total Recoverable Nickel	195753-3	0.05 mg/l	92.7	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1255 by 235		
	195753-3	0.05 mg/l	92.2	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1300 by 235		
	Relative Percent Difference:		0.465	20.0	S40045				
Total Recoverable Selenium	195753-3	0.05 mg/l	103	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1255 by 235		
	195753-3	0.05 mg/l	98.0	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1300 by 235		
	Relative Percent Difference:		4.73	20.0	S40045				
Total Recoverable Silver	195753-3	0.02 mg/l	84.7	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1255 by 235		
	195753-3	0.02 mg/l	84.8	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1300 by 235		
	Relative Percent Difference:		0.0729	20.0	S40045				
Total Recoverable Thallium	195753-3	0.05 mg/l	99.2	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1255 by 235		
	195753-3	0.05 mg/l	99.1	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1300 by 235		
	Relative Percent Difference:		0.120	20.0	S40045				
Total Recoverable Zinc	195753-3	0.05 mg/l	86.1	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1255 by 235		
	195753-3	0.05 mg/l	85.0	75.0-125	S40045	04Nov15 0839 by 313	05Nov15 1300 by 235		
	Relative Percent Difference:		1.29	20.0	S40045				
Total Cyanide	195663-5	0.990 mg/Kg	79.8	75.0-125	W53793	04Nov15 0842 by 319	04Nov15 1332 by 319		
	195663-5	0.997 mg/Kg	90.0	75.0-125	W53793	04Nov15 0842 by 319	04Nov15 1334 by 319		
	Relative Percent Difference:		11.9	20.0	W53793				



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MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Total Recoverable Phenolics	195663-5	9.17 mg/Kg	86.1	80.0-120	W53854	10Nov15 0812 by 308	10Nov15 1628 by 308		
	195663-5	8.96 mg/Kg	83.8	80.0-120	W53854	10Nov15 0812 by 308	10Nov15 1629 by 308		
	Relative Percent Difference:		2.06	10.0	W53854				
Antimony	195684-1	491 mg/Kg	94.6	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1730 by 317		
	195684-1	498 mg/Kg	94.0	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1735 by 317		
	Relative Percent Difference:		0.720	20.0	S40037				
Arsenic	195684-1	491 mg/Kg	93.5	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1730 by 317		
	195684-1	498 mg/Kg	94.5	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1735 by 317		
	Relative Percent Difference:		0.999	20.0	S40037				
Beryllium	195684-1	49.1 mg/Kg	92.6	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1627 by 317		
	195684-1	49.8 mg/Kg	92.8	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1634 by 317		
	Relative Percent Difference:		0.118	20.0	S40037				
Cadmium	195684-1	491 mg/Kg	93.8	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1627 by 317		
	195684-1	498 mg/Kg	93.8	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1634 by 317		
	Relative Percent Difference:		0.0995	20.0	S40037				
Chromium	195684-1	49.1 mg/Kg	82.3	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1627 by 317		
	195684-1	49.8 mg/Kg	85.4	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1634 by 317		
	Relative Percent Difference:		0.892	20.0	S40037				
Copper	195684-1	49.1 mg/Kg	92.3	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1627 by 317		
	195684-1	49.8 mg/Kg	92.8	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1634 by 317		
	Relative Percent Difference:		0.237	20.0	S40037				
Lead	195684-1	491 mg/Kg	94.1	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1627 by 317		
	195684-1	498 mg/Kg	94.4	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1634 by 317		
	Relative Percent Difference:		0.132	20.0	S40037				
Molybdenum	195684-1	49.1 mg/Kg	94.4	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1730 by 317		
	195684-1	49.8 mg/Kg	93.8	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1735 by 317		
	Relative Percent Difference:		0.645	20.0	S40037				
Nickel	195684-1	49.1 mg/Kg	91.0	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1627 by 317		
	195684-1	49.8 mg/Kg	91.5	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1634 by 317		
	Relative Percent Difference:		0.239	20.0	S40037				
Selenium	195684-1	491 mg/Kg	100	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1730 by 317		
	195684-1	498 mg/Kg	100	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1735 by 317		
	Relative Percent Difference:		0.00262	20.0	S40037				
Silver	195684-1	9.83 mg/Kg	105	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1627 by 317		
	195684-1	9.96 mg/Kg	105	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1634 by 317		
	Relative Percent Difference:		0.103	20.0	S40037				
Thallium	195684-1	491 mg/Kg	97.8	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1730 by 317		
	195684-1	498 mg/Kg	97.4	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1735 by 317		
	Relative Percent Difference:		0.445	20.0	S40037				
Zinc	195684-1	49.1 mg/Kg	-	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1627 by 317		X
	195684-1	49.8 mg/Kg	-	75.0-125	S40037	03Nov15 0952 by 313	03Nov15 1634 by 317		X
	Relative Percent Difference:		1.24	20.0	S40037				
Mercury	195740-2	2.40 mg/Kg	97.0	70.0-130	S40038	03Nov15 0954 by 313	03Nov15 1248 by 313		
	195740-2	2.41 mg/Kg	103	70.0-130	S40038	03Nov15 0954 by 313	03Nov15 1252 by 313		
	Relative Percent Difference:		6.04	20.0	S40038				

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	W53751-1	30Oct15 0800 by 319	10Nov15 1610 by 319	
Total Cyanide	< 0.01 mg/l	0.01	0.01	W53754-1	30Oct15 0903 by 319	30Oct15 1341 by 319	
Mercury, low level	< 0.0050 ug/l	0.0050	0.0050	S40065-1	06Nov15 1341 by 271	06Nov15 1409 by 271	
Total Recoverable Molybdenum	< 0.008 mg/l	0.008	0.008	S40043-1	03Nov15 1449 by 317	04Nov15 1022 by 317	
Total Recoverable Antimony	< 0.03 mg/l	0.03	0.03	S40045-1	04Nov15 0839 by 313	05Nov15 1243 by 235	
Total Recoverable Arsenic	< 0.0005 mg/l	0.0005	0.0005	S40045-1	04Nov15 0839 by 313	05Nov15 1243 by 235	
Total Recoverable Beryllium	< 0.0003 mg/l	0.0003	0.0003	S40045-1	04Nov15 0839 by 313	05Nov15 1243 by 235	
Total Recoverable Cadmium	< 0.0002 mg/l	0.0002	0.0002	S40045-1	04Nov15 0839 by 313	05Nov15 1243 by 235	
Total Recoverable Chromium	< 0.007 mg/l	0.007	0.007	S40045-1	04Nov15 0839 by 313	05Nov15 1243 by 235	
Total Recoverable Copper	< 0.0005 mg/l	0.0005	0.0005	S40045-1	04Nov15 0839 by 313	05Nov15 1243 by 235	
Total Recoverable Lead	< 0.0005 mg/l	0.0005	0.0005	S40045-1	04Nov15 0839 by 313	05Nov15 1243 by 235	
Total Recoverable Nickel	< 0.0005 mg/l	0.0005	0.0005	S40045-1	04Nov15 0839 by 313	05Nov15 1243 by 235	
Total Recoverable Selenium	< 0.002 mg/l	0.002	0.002	S40045-1	04Nov15 0839 by 313	05Nov15 1243 by 235	
Total Recoverable Silver	< 0.0002 mg/l	0.0002	0.0002	S40045-1	04Nov15 0839 by 313	05Nov15 1243 by 235	
Total Recoverable Thallium	< 0.0005 mg/l	0.0005	0.0005	S40045-1	04Nov15 0839 by 313	05Nov15 1243 by 235	
Total Recoverable Zinc	< 0.002 mg/l	0.002	0.002	S40045-1	04Nov15 0839 by 313	05Nov15 1243 by 235	
Total Cyanide	< 0.1 mg/Kg	0.1	0.1	W53793-1	04Nov15 0842 by 319	04Nov15 1326 by 319	
Total Recoverable Phenolics	< 0.5 mg/Kg	0.5	0.5	W53854-1	10Nov15 0812 by 308	10Nov15 1626 by 308	
Total Solids	< 0.01 wt %	0.01	0.01	W53758-1	30Oct15 1105 by 100	02Nov15 1503 by 100	
Antimony	< 3 mg/Kg	3	3	S40037-1	03Nov15 0952 by 313	03Nov15 1616 by 317	
Arsenic	< 5 mg/Kg	5	5	S40037-1	03Nov15 0952 by 313	03Nov15 1616 by 317	
Beryllium	< 0.03 mg/Kg	0.03	0.03	S40037-1	03Nov15 0952 by 313	03Nov15 1616 by 317	
Cadmium	< 0.4 mg/Kg	0.4	0.4	S40037-1	03Nov15 0952 by 313	03Nov15 1616 by 317	
Chromium	< 0.7 mg/Kg	0.7	0.7	S40037-1	03Nov15 0952 by 313	03Nov15 1616 by 317	
Copper	< 0.6 mg/Kg	0.6	0.6	S40037-1	03Nov15 0952 by 313	03Nov15 1616 by 317	
Lead	< 4 mg/Kg	4	4	S40037-1	03Nov15 0952 by 313	03Nov15 1616 by 317	
Molybdenum	< 0.8 mg/Kg	0.8	0.8	S40037-1	03Nov15 0952 by 313	03Nov15 1616 by 317	
Nickel	< 1 mg/Kg	1	1	S40037-1	03Nov15 0952 by 313	03Nov15 1616 by 317	
Selenium	< 7 mg/Kg	7	7	S40037-1	03Nov15 0952 by 313	03Nov15 1616 by 317	
Silver	< 0.7 mg/Kg	0.7	0.7	S40037-1	03Nov15 0952 by 313	03Nov15 1616 by 317	
Thallium	< 4 mg/Kg	4	4	S40037-1	03Nov15 0952 by 313	03Nov15 1616 by 317	
Zinc	< 0.2 mg/Kg	0.2	0.2	S40037-1	03Nov15 0952 by 313	03Nov15 1616 by 317	
Mercury	< 0.1 mg/Kg	0.1	0.1	S40038-1	03Nov15 0954 by 313	03Nov15 1240 by 313	

AMERICAN INTERPLEX CORPORATION

LABORATORIES

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

PAGE 1 OF 1


Client: City of Fort Smith				PO No.		Analysis Requested										AIC CONTROL NO: <u>195662</u>										
Project Reference: Massard Table III Priority Pollutants				NO. OF BOTTLES		<input type="checkbox"/> T. Cyanide <input type="checkbox"/> Phenolics <input type="checkbox"/> PP Metals + MO <input type="checkbox"/> HG.LL (245.7) <input type="checkbox"/> Table III: 13 PP Metals, CN-T, Phenolics, T.Solids <input type="checkbox"/> MO										AIC PROPOSAL NO:										
Project Manager: Lance McAvoy																Remarks										
Sampled By: <u>Chris Cooper</u> <u>Rachel Sharp</u>																Carrier: <u>Fed X</u> Received Temperature C: <u>0.1</u> <u>CS</u>										
AIC No.	Sample Identification	Date(s) Collected	Time(s) Collected	GRAB	COMP	WATER	SOIL											Remarks								
1	Massard Influent	10/27/15	0001	X		X		2	X	X																
1	Massard Influent	10/27/15	0557	X		X		2	X	X																
1	Massard Influent	10/27/15	1158	X		X		2	X	X																
1	Massard Influent	10/27/15	1800	X		X		2	X	X																
2	Massard Influent	10/27/15	0011-2208		X	X		2			X	X														
3	Massard Effluent	10/27/15	0005	X		X		2	X	X																
3	Massard Effluent	10/27/15	0603	X		X		2	X	X																
3	Massard Effluent	10/27/15	1203	X		X		2	X	X																
3	Massard Effluent	10/27/15	1804	X		X		2	X	X																
4	Massard Effluent	10/27-28/15	0800-0800		X	X		2			X	X														
5	Massard Raw Biosolid	10/27/15	1206	X		X		1					X	X												
				Container Type		P	G	P	G	G											Field pH calibration on _____ @ _____					
				Preservative		B	S	N	No	No											Buffer:					
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										Relinquished By: <u>CC</u> Date/Time: <u>10/28/15 1000</u> Received By:												
Expedited results requested by: _____														Relinquished By: _____ Date/Time: _____ Received By: <u>D. Brown</u> Date/Time: <u>10-29-15/0900</u>												
Who should AIC contact with questions: <u>Lance McAvoy</u>														Comments: <u>FedEx Tracking #: 8088 8472 3199</u>												
Phone: <u>479-784-2337</u> Fax: _____																										
Report Attention to: <u>Lance McAvoy</u>																										
Report Address to: _____																										
City of Fort Smith																										
3900 Kelley Hwy.																										
Fort Smith, AR 72904																										

INTER-OFFICE MEMO

AR0021750

4th QTR 15

TO: Steve Floyd, Superintendent of Water and Wastewater Operations

FROM: Don Clover, Biologist 

DATE: November 16, 2015

RE: Biomonitoring Results - Massard Plant

Please find below the chronic biomonitoring retest results for the fourth quarter of 2015. 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- 0

Parameter #TGP6C- 0

Parameter #TLP3B- 0

Parameter #TLP6C- 0

Parameter #TOP3B- 9%

Parameter # TOP6C- 9%


Parameter #TPP3B- 9%

Parameter #TPP6C- 9%

Parameter #TQP3B- 16.75%

Parameter #TQP6C- 9.61%

Prepared By: Don Clover Date: 11/16/15

Reviewed By:  Date: 11/30/15



November 09, 2015

RECEIVED

NOV 16 2015

WATER/WASTEWATER

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

RE: Project: WET TEST
Pace Project No.: 60205953

Dear Lance McAvoy:

Enclosed are the analytical results for sample(s) received by the laboratory on October 27, 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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Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: WET TEST
Pace Project No.: 60205953

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

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SAMPLE SUMMARY

Project: WET TEST
Pace Project No.: 60205953

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60205953001	MASSARD EFFLUENT	Water	10/26/15 08:00	10/27/15 14:20

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SAMPLE ANALYTE COUNT

Project: WET TEST
Pace Project No.: 60205953

Lab ID	Sample ID	Method	Analysts	Analytes Reported
60205953001	MASSARD EFFLUENT	EPA 821/R-02/013	TDH	1

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ANALYTICAL RESULTS

Project: WET TEST
Pace Project No.: 60205953

Sample: MASSARD EFFLUENT	Lab ID: 60205953001	Collected: 10/26/15 08:00	Received: 10/27/15 14:20	Matrix: Water				
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Chronic Toxicity	Analytical Method: EPA 821/R-02/013							
Toxicity, Chronic	Complete		1.0	1		10/27/15 14:40		

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QUALIFIERS

Project: WET TEST
Pace Project No.: 60205953

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.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: WET TEST
Pace Project No.: 60205953

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60205953001	MASSARD EFFLUENT	EPA 821/R-02/013	BIO/1859		

REPORT OF LABORATORY ANALYSIS

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Sample Condition: Upon Receipt

WO#: 60205953

60205953

Client Name: Ft Smith

Capital Ex.

Courier: FedEx UPS VIA Clay PEX ECI Pace Other Client

Optional _____
 Proj Due Date: _____
 Proj Name: _____

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: 3.2

Date and initials of person examining contents: 10/27/15 M3
1420

Temperature should be above freezing to 6°C

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	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.
Impreserved 5035A soils frozen w/in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	11.
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	12.
Sample labels match COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Includes date/time/ID/analyses Matrix: <u>WT</u>		13.
All containers needing preservation have been checked.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
All containers needing preservation are found to be in compliance with EPA recommendation.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14.
Exceptions: VOA, Coliform, O&G, WI-DRO (water)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Initial when completed
Trip Blank present:	<input type="checkbox"/> Yes <input 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:
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: AAF Date: 1028/15



REFERENCE #60205953

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

November 5, 2015

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

Re: Lab Project Number: 60205953
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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REFERENCE #60205953

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

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

PERMIT # AR 0021750
AFIN # 66-01652

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

November 5, 2015

REPORT OF LABORATORY ANALYSIS

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REFERENCE #60205953

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

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REPORT OF LABORATORY ANALYSIS

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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 October 26, 2015 to October 30, 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 14.8

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 >9. The NOEC for reproduction in effluent was determined to be 9%. The PMSD is 17.2.

The chronic toxicity exhibited by the fathead minnows and the Ceriodaphnia treated by the effluent sampled from October 26 to October 30 from the CITY OF FORT SMITH (Massard) effluent discharge, is acceptable as described in EPA 821-R-02-013.

REPORT OF LABORATORY ANALYSIS

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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 10-27-15. Subsequent samples followed by delivery on 10-29-15 and on 10-31-15. 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 10-27-15 and carried out until 11-3-15. 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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Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
Phone: 913.599.5665
Fax: 913.599.1759

RESULTS

REPORT OF LABORATORY ANALYSIS

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TABLE 1

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

Date Sampled No. 1: 10-26-15 8:00
 No. 2: 10-28-15 8:00
 No. 3: 10-30-15 8:00
 Test Initiated: 14:40 Date: 10-27-15

Dilution Water used: Moderately Hard Synthetic Water

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

DATA TABLE FOR GROWTH OF FATHEAD MINNOWS

Effluent Concentration (%)	Average Dry Weight in Milligrams in Replicate Chambers					Mean Dry Weight (mg)	CV% *
	A	B	C	D	E		
Control 0%	0.412	0.365	0.399	0.439	0.401	0.403	6.61
Dilution 1 3%	0.301	0.436	0.381	0.319	0.389	0.365	15.05
Dilution 2 4%	0.440	0.401	0.367	0.377	0.399	0.397	7.09
Dilution 3 5%	0.451	0.373	0.448	0.448	0.401	0.424	8.34
Dilution 4 7%	0.382	0.456	0.367	0.374	0.427	0.401	9.61
Dilution 5 9%	0.325	0.389	0.407	0.364	0.456	0.388	12.57

* Coefficient of Variation = Standard Deviation X 100 / Mean

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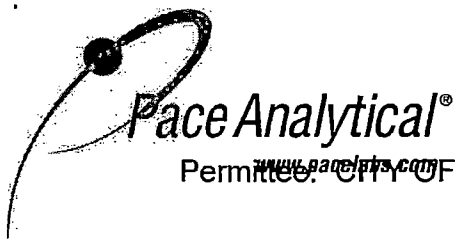
Permittee: CITY OF FORT SMITH (Massard) Effluent discharge.

FATHEAD MINNOW SURVIVAL

Conc. %	Percent Survival in Replicate Chambers					Mean Percent Survival			CV %
	A	B	C	D	E	24hr	48hr	7 day	
Control 0%	100	100	100	100	100	100	100	100	0.00
Dilution 1 3%	87.5	100	100	87.5	100	100	100	95	5.99
Dilution 2 4%	100	100	87.5	100	100	100	100	97.5	4.79
Dilution 3 5%	100	100	100	100	100	100	100	100	0.00
Dilution 4 7%	100	100	100	87.5	100	100	100	97.5	4.79
Dilution 5 9%	87.5	100	100	100	100	100	100	97.5	4.79

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 Lenexa, KS 66219
 Phone: 913.599.5665
 Fax: 913.599.1759

Permitter: 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	18	19	22	19	20	16
2	17	23	14	23	18	19
3	21	22	22	17	20	19
4	19	16	18	20	22	23
5	19	24	17	24	17	20
6	13	20	25	23	18	21
7	16	21	24	20	24	19
8	15	15	21	13	21	24
9	21	20	16	19	23	21
10	23	19	20	25	16	20
Mean	18.2	19.9	19.9	20.3	19.9	20.2
SD	3.048	2.846	3.573	3.622	2.644	2.251
CV %	16.75	14.30	17.96	17.84	13.28	11.14

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

CERIODAPHNIA MEAN PERCENT SURVIVAL

Time Elapsed	Percent Effluent (%)					
	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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 Fax: 913.599.1759

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: 10-26-15

SAMPLE NO. 2 COLLECTED: DATE: 10-28-15

SAMPLE NO. 3 COLLECTED: DATE: 10-30-15

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

	Control	100%
PH	7.56	7.23
D.O.	8.20	7.60
Temp	25.0	25.0
Alk	58	72
Hard	86	112
Cond	304	450
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	7.64	7.00	24.9
3% Effluent	7.64	7.00	24.9
4% Effluent	7.64	7.00	24.9
5% Effluent	7.65	7.00	24.9
7% Effluent	7.66	7.10	24.9
9% Effluent	7.68	7.10	24.9

48-Hour Water Quality Measurements

Effluent Concentration (%)	PH	D.O. (mg/l)	Temperature (C)
0% Control	7.50	6.80	25.0
3% Effluent	7.52	6.90	25.0
4% Effluent	7.53	6.90	25.0
5% Effluent	7.55	7.00	25.0
7% Effluent	7.57	7.00	25.0
9% Effluent	7.59	7.10	25.0

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FINAL WATER QUALITY

EFFLUENT CONCENTRATION

	Control	9%
pH	7.62	7.64
D.O.	6.90	6.90
Temp	25.1	25.1
Alk	62	68
Hard	98	102
Cond	468	517

- * 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 100%. The mean dry weight (growth) of the Pimephales promelas was determined at 0.403 mg/organism in the controls. The percent coefficient of variation (%CV) values for the fathead minnow control for survival and growth were 0.00 and 6.61. The Ceriodaphnia dubia survival rates were 100 in the control. The Ceriodaphnia in the control produced an average of 18.2 young over the seven-day exposure period. Percent CV values for Ceriodaphnia dubia control survival and reproduction was 0.00 and 16.75. 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 10-26-15, 10-28-15, and 10-30-15 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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60205953 Ft Smith FATHEAD SURVIVAL

File: C:\TOXSTAT\6205953A.

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.

60205953 Ft Smith FATHEAD SURVIVAL

File: C:\TOXSTAT\6205953A.

Transform: ARC SINE(SQUARE ROOT(Y))

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	2.010	7.260	11.460	7.260	2.010
OBSERVED	3	2	22	3	0

Calculated Chi-Square goodness of fit test statistic = 18.5021

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.

60205953 Ft Smith FATHEAD SURVIVAL

File: 6205953A Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.048

W = 0.752

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.

60205953 Ft Smith FATHEAD SURVIVAL

File: 6205953A

Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	5	1.107	1.107	1.107
2	3%	5	0.991	1.107	1.061
3	4%	5	0.991	1.107	1.084
4	5%	5	1.107	1.107	1.107
5	7%	5	0.991	1.107	1.084
6	9%	5	0.991	1.107	1.084

60205953 Ft Smith FATHEAD SURVIVAL

File: 6205953A

Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	CONTROL	0.000	0.000	0.000	0.00
2	3%	0.004	0.064	0.028	5.99
3	4%	0.003	0.052	0.023	4.79
4	5%	0.000	0.000	0.000	0.00
5	7%	0.003	0.052	0.023	4.79
6	9%	0.003	0.052	0.023	4.79

60205953 Ft Smith FATHEAD SURVIVAL
File: C:\TOXSTAT\6205953A.

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	1.107				
2	3%	1.061	22.50	16.00	5.00	
3	4%	1.084	25.00	16.00	5.00	
4	5%	1.107	27.50	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 $\alpha = 0.05$

60205953 Ft Smith FATHEAD GROWTH
File: 6205953B Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

D = 0.039

W = 0.972

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.

60205953 Ft Smith FATHEAD GROWTH
File: 6205953B Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 3.02

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.

60205953 Ft Smith FATHEAD GROWTH
File: 6205953B Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	5	0.365	0.439	0.403
2	3%	5	0.301	0.436	0.365
3	4%	5	0.367	0.440	0.397
4	5%	5	0.373	0.451	0.424
5	7%	5	0.367	0.456	0.401
6	9%	5	0.325	0.456	0.388

60205953 Ft Smith FATHEAD GROWTH
File: 6205953B Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	CONTROL	0.001	0.027	0.012	6.61
2	3%	0.003	0.055	0.025	15.05
3	4%	0.001	0.028	0.013	7.09
4	5%	0.001	0.035	0.016	8.34
5	7%	0.001	0.039	0.017	9.61
6	9%	0.002	0.049	0.022	12.57

60205953 Ft Smith FATHEAD GROWTH

File: 6205953B

Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.009	0.002	1.171
Within (Error)	24	0.039	0.002	
Total	29	0.048		

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

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

60205953 Ft Smith FATHEAD GROWTH
 File: 6205953B Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	0.403	0.403		
2	3%	0.365	0.365	1.499	
3	4%	0.397	0.397	0.252	
4	5%	0.424	0.424	-0.828	
5	7%	0.401	0.401	0.079	
6	9%	0.388	0.388	0.592	

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

60205953 Ft Smith FATHEAD GROWTH
 File: 6205953B Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	CONTROL	5			
2	3%	5	0.060	14.8	0.038
3	4%	5	0.060	14.8	0.006
4	5%	5	0.060	14.8	-0.021
5	7%	5	0.060	14.8	0.002
6	9%	5	0.060	14.8	0.015

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

NUMBER OF

IDENTIFICATION	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

NUMBER OF

IDENTIFICATION	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	

60205953 Ft Smith CERIODAPHNIA DUBIA REPRODU
File: 6205953E Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.020	14.520	22.920	14.520	4.020
OBSERVED	5	14	22	16	3

Calculated Chi-Square goodness of fit test statistic = 0.7041

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

Data PASS normality test. Continue analysis.

60205953 Ft Smith CERIODAPHNIA DUBIA REPRODU
File: 6205953E Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 2.77

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.

60205953 Ft Smith CERIODAPHNIA DUBIA REPRODU
File: 6205953E Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	10	13.000	23.000	18.200
2	3%	10	15.000	24.000	19.900
3	4%	10	14.000	25.000	19.900
4	5%	10	13.000	25.000	20.300
5	7%	10	16.000	24.000	19.900
6	9%	10	16.000	24.000	20.200

60205953 Ft Smith CERIODAPHNIA DUBIA REPRODU
File: 6205953E Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	CONTROL	9.289	3.048	0.964	16.75
2	3%	8.100	2.846	0.900	14.30
3	4%	12.767	3.573	1.130	17.96
4	5%	13.122	3.622	1.146	17.84
5	7%	6.989	2.644	0.836	13.28
6	9%	5.067	2.251	0.712	11.14

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	29.733	5.947	0.645
Within (Error)	54	498.000	9.222	
Total	59	527.733		

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

60205953 Ft Smith CERIODAPHNIA DUBIA REPRODU
 File: 6205953E 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	18.200	18.200		
2	3%	19.900	19.900	-1.252	
3	4%	19.900	19.900	-1.252	
4	5%	20.300	20.300	-1.546	
5	7%	19.900	19.900	-1.252	
6	9%	20.200	20.200	-1.473	

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

60205953 Ft Smith CERIODAPHNIA DUBIA REPRODU
 File: 6205953E 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	3.137	17.2	-1.700
3	4%	10	3.137	17.2	-1.700
4	5%	10	3.137	17.2	-2.100
5	7%	10	3.137	17.2	-1.700
6	9%	10	3.137	17.2	-2.000

Conc. ID	1	2	3	4	5	6
Conc. Tested	0	3	4	5	7	9
Response 1	18	19	22	19	20	16
Response 2	17	23	14	23	18	19
Response 3	21	22	22	17	20	19
Response 4	19	16	18	20	22	23
Response 5	19	24	17	24	17	20
Response 6	13	20	25	23	18	21
Response 7	16	21	24	20	24	19
Response 8	15	15	21	13	21	24
Response 9	21	20	16	19	23	21
Response 10	23	19	20	25	16	20

*** Inhibition Concentration Percentage Estimate ***

Toxicant/Effluent: Ft Smith

Test Start Date: 10/27/15 Test Ending Date: 11/3/15

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	18.200	3.048	19.733
2	10	3.000	19.900	2.846	19.733
3	10	4.000	19.900	3.573	19.733
4	10	5.000	20.300	3.622	19.733
5	10	7.000	19.900	2.644	19.733
6	10	9.000	20.200	2.251	19.733

*** 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	.412	.301	.440	.451	.382	.325
Response 2	.365	.436	.401	.373	.456	.389
Response 3	.399	.381	.367	.448	.367	.407
Response 4	.439	.319	.377	.448	.374	.364
Response 5	.401	.389	.399	.401	.427	.456

*** Inhibition Concentration Percentage Estimate ***

Toxicant/Effluent: Ft Smith

Test Start Date: 10/27/15 Test Ending Date: 11/3/15

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	0.403	0.027	0.403
2	5	3.000	0.365	0.055	0.397
3	5	4.000	0.397	0.028	0.397
4	5	5.000	0.424	0.035	0.397
5	5	7.000	0.401	0.039	0.397
6	5	9.000	0.388	0.049	0.388

*** 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 #60205953

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

APPENDIX B
CHAIN OF CUSTODY FORMS

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
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CHAIN-OF-CUSTODY / Analytical Request Document

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

Section A

Required Client Information:

Company: City of Fort Smith, AR
 Address: 3900 Kelley Hwy
 Fort Smith, AR 72904
 Email:
 Phone: 479-784-2337 Fax:
 Requested Due Date:

Section B

Required Project Information:

Report To: John Hancock
 Copy To:
 Purchase Order #:
 Project Name: Wet Test
 Project #:

Section C

Invoice Information:

Attention: Lance McAvoy
 Company Name: City of Fort Smith
 Address: 3900 Kelley Hwy, Fort Smith, AR
 Pace Quote:
 Pace Project Manager: alice.finanagan@pacelabs.com,
 Pace Profile #: 460

Page: 1 Of 1

ITEM #	SAMPLE ID <small>One Character per box. (A-Z, 0-9 / , .)</small> Sample IDs must be unique	MATRIX CODE <small>(see valid codes to left)</small>	CODE <small>Drinking Water DW Water WT Wastewater WW Product P Solid/Solid SL Oil OL Wipe WP Air AR Other OT Tissue TS</small>	COLLECTED				SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives										ANALYSIS TEST <small>(see valid codes to left)</small>	Requested Analysis Filtered (Y/N)										Residual Chlorine (Y/N)					
				START		END				Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2SO3	Methanol	Other	ICE																		
				DATE	TIME	DATE	TIME																													
1	Massard Effluent	WW	C	10/29/15	0800	10/30/15	0800	1																												
2																																				
3																																				
4																																				
5																																				
6																																				
7																																				
8																																				
9																																				
10																																				
11																																				
12																																				
ADDITIONAL COMMENTS				RELINQUISHED BY / AFFILIATION				DATE	TIME	ACCEPTED BY / AFFILIATION				DATE	TIME	SAMPLE CONDITIONS																				
T. Cl ₂ = 0.02 mg/L F. Cl ₂ = 0.03 mg/L				Rachel L. Sharp City of Fort Smith				10/30/15	1700	Ellen Castagno Pace				10/31/15	10:39	3.0 Y Y Y																				

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Rachel L. Sharp

SIGNATURE of SAMPLER: *Rachel L. Sharp* DATE Signed: 10/30/15

TEMP in C Received on Ice (Y/N) Custody Sealed (Y/N) Cooler (Y/N) Samples Intact (Y/N)



Sample Condition Upon Receipt

Client Name: AT 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: Water Blue None Samples received on ice, cooling process has begun (circle one)

Cooler Temperature: 30

Optional
Proj Due Date:
Proj Name:

Date and initials of person examining contents: 10/31/15 RC 800
10:39

Temperature should be above freezing to 6°C

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	1.
Chain of Custody filled out:	<input 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:		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 Capital Ex

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: 3.2 (circle one)

Optional
Proj Due Date:
Proj Name:

Date and initials of person examining contents: 10/29/15 MJB
1930

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 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:
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: _____



REFERENCE #60205953

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

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: 10/20/15 10:30 End: 10/27/15 11:15

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	7	2	0
8 g/l	40	35	27	6
6 g/l	40	38	34	26
4 g/l	40	40	40	39
2 g/l	40	40	40	40

IC25 (5.26 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 (1.21 g/l Sodium Chloride)

Survival NOEC: 1.5 g/l

Submitted By: 
Timothy Harrell, Technical Director

REPORT OF LABORATORY ANALYSIS

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REFERENCE #60205953

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

APPENDIX D
STATE AGENCY FORMS

REPORT OF LABORATORY ANALYSIS

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**Biomonitoring Form
Chronic Toxicity Summary Form
Ceriodaphnia dubia
Chemical Parameters Chart**

Permittee: City of Fort Smith
 NPDES No.: AR 0021750
 Contact: Lance McAvoy
 Analyst: Tim Harrell
 Mike Bollin

Sample No. 1 Collected: Date: 10/26/2015 Time: 8:00
 Sample No. 2 Collected: Date: 10/28/2015 Time: 8:00
 Sample No. 3 Collected: Date: 10/30/2015 Time: 8:00
 Test Begin: Date: 10/27/2015 Time: 14:40
 Test End: Date: 11/3/2015 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)	24.9	25	25.1	25	25.1	24.6	25.1		Temp (C)	24.9	25	25.1	25	25.1	24.6	25.1	
DO Initial	8.2	7.6	7.3	7.4	7.5	8	7.9		DO Initial		7.7	7.4	7.4	7.5	8	7.9	
DO Final	7	6.8	6.5	6.4	6.9	7.4	6.9		DO Final	7	7	6.5	6.4	6.9	7.4	6.9	
pH Initial	7.56	7.42	7.4	7.43	7.41	7.43	7.49		pH Initial		7.46	7.46	7.42	7.41	7.46	7.5	
pH Final	7.64	7.5	7.63	7.54	7.57	7.4	7.62		pH Final	7.65	7.55	7.6	7.45	7.58	7.59	7.62	
Alkalinity	58								Alkalinity								
Hardness	86								Hardness								
Conductivity	304								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)	24.9	25	25.1	25	25.1	24.6	25.1		Temp (C)	24.9	25	25.1	25	25.1	24.6	25.1	
DO Initial		7.6	7.3	7.4	7.5	8	7.9		DO Initial		7.7	7.4	7.4	7.5	8	7.9	
DO Final	7.4	6.9	6.5	6.4	6.9	7.4	6.9		DO Final	7.1	7	6.6	6.5	7	7.4	6.9	
pH Initial		7.44	7.45	7.44	7.43	7.45	7.49		pH Initial		7.47	7.47	7.41	7.4	7.47	7.51	
pH Final	7.64	7.52	7.65	7.56	7.57	7.6	7.62		pH Final	7.66	7.57	7.46	7.37	7.59	7.58	7.63	
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)	24.9	25	25.1	25	25.1	24.6	25.1		Temp (C)	24.9	25	25.1	25	25.1	24.6	25.1	
DO Initial		7.7	7.3	7.4	7.5	8	7.9		DO Initial		7.8	7.5	7.4	7.5	7.9	7.9	
DO Final	7	6.9	6.5	6.4	6.9	7.4	6.9		DO Final	7.1	7.1	6.6	6.5	7	7.4	6.9	
pH Initial		7.45	7.46	7.43	7.42	7.45	7.49		pH Initial		7.48	7.48	7.42	7.38	7.48	7.52	
pH Final	7.64	7.53	7.63	7.48	7.57	7.39	7.62		pH Final	7.68	7.59	7.33	7.38	7.6	7.58	7.64	
Alkalinity									Alkalinity								
Hardness									Hardness								
Conductivity									Conductivity								
Chlorine									Chlorine							<.1	<.1

**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	10/25/2015	To	8:00	10/26/2015

Composite 2 Collected	From 8:00	10/27/2015	To	8:00	10/28/2015
-----------------------	-----------	------------	----	------	------------

Composite 3 Collected	From 8:00	10/29/2015	To	8:00	10/30/2015
-----------------------	-----------	------------	----	------	------------

Test initiated: am/pm 14:40 date 10/27/2015
 Test terminated: am/pm 14:00 date 11/3/2015

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	18	19	22	19	20	16
B	17	23	14	23	18	19
C	21	22	22	17	20	19
D	19	16	18	20	22	23
E	19	24	17	24	17	20
F	13	20	25	23	18	21
G	16	21	24	20	24	19
H	15	15	21	13	21	24
I	21	20	16	19	23	21
J	23	19	20	25	16	20
Mean	18.2	19.9	19.9	20.3	19.9	20.2
CV%*	16.75	14.3	17.96	17.84	13.28	11.14

*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) 1/2 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) 1/2 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

**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: 10/26/2015 Time: 8:00
 Sample No. 2 Collected: Date: 10/28/2015 Time: 8:00
 Sample No. 3 Collected: Date: 10/30/2015 Time: 8:00
 Test Begin: Date: 10/27/2015 Time: 14:40
 Test End: Date: 11/3/2015 Time: 14:00

Dilution: 0									Dilution: 5								
Day:									Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	24.9	25	25.1	25	25.1	24.6	25.1		Temp (C)	24.9	25	25.1	25	25.1	24.6	25.1	
DO Initial	8.2	7.6	7.3	7.4	7.5	8	7.9		DO Initial		7.7	7.4	7.4	7.5	8	7.9	
DO Final	7	6.8	6.5	6.4	6.9	7.4	6.9		DO Final	7	7	6.5	6.4	6.9	7.4	6.9	
pH Initial	7.56	7.42	7.4	7.43	7.41	7.43	7.49		pH Initial		7.46	7.46	7.42	7.41	7.46	7.5	
pH Final	7.64	7.5	7.63	7.54	7.57	7.4	7.62		pH Final	7.65	7.55	7.6	7.45	7.58	7.59	7.62	
Alkalinity	58								Alkalinity								
Hardness	86								Hardness								
Conductivity	304								Conductivity								
Chlorine	<.1						<.1		Chlorine								

Dilution: 3									Dilution: 7								
Day:									Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	24.9	25	25.1	25	25.1	24.6	25.1		Temp (C)	24.9	25	25.1	25	25.1	24.6	25.1	
DO Initial		7.6	7.3	7.4	7.5	8	7.9		DO Initial		7.7	7.4	7.4	7.5	8	7.9	
DO Final	7.4	6.9	6.5	6.4	6.9	7.4	6.9		DO Final	7.1	7	6.6	6.5	7	7.4	6.9	
pH Initial		7.44	7.45	7.44	7.43	7.45	7.49		pH Initial		7.47	7.47	7.41	7.4	7.47	7.51	
pH Final	7.64	7.52	7.65	7.56	7.57	7.6	7.62		pH Final	7.66	7.57	7.46	7.37	7.59	7.58	7.63	
Alkalinity									Alkalinity								
Hardness									Hardness								
Conductivity									Conductivity								
Chlorine									Chlorine								

Dilution: 4									Dilution: 9								
Day:									Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	24.9	25	25.1	25	25.1	24.6	25.1		Temp (C)	24.9	25	25.1	25	25.1	24.6	25.1	
DO Initial		7.7	7.3	7.4	7.5	8	7.9		DO Initial		7.8	7.5	7.4	7.5	7.9	7.9	
DO Final	7	6.9	6.5	6.4	6.9	7.4	6.9		DO Final	7.1	7.1	6.6	6.5	7	7.4	6.9	
pH Initial		7.45	7.46	7.43	7.42	7.45	7.49		pH Initial		7.48	7.48	7.42	7.38	7.48	7.52	
pH Final	7.64	7.53	7.63	7.48	7.57	7.39	7.62		pH Final	7.68	7.59	7.33	7.38	7.6	7.58	7.64	
Alkalinity									Alkalinity								
Hardness									Hardness								
Conductivity									Conductivity								
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	10/25/2015		8:00	10/26/2015

	From	Time:	Date:	To	Time:	Date:
Composite 2 Collected		8:00	10/27/2015		8:00	10/28/2015

	From	Time:	Date:	To	Time:	Date:
Composite 3 Collected		8:00	10/29/2015		8:00	10/30/2015

Test initiated: am/pm 14:40

date 10/27/2015

Test terminated: am/pm 14:00

date 11/3/2015

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 %	100	100	100	100	100	100	100	100	0
3%	87.5	100	100	87.5	100	100	100	95	5.99
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	100	87.5	100	100	100	97.5	4.79
9%	87.5	100	100	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		
Syn. 0%	0.412	0.365	0.399	0.439	0.401	0.403	6.61
3%	0.301	0.436	0.381	0.319	0.389	0.365	15.05
4%	0.44	0.401	0.367	0.377	0.399	0.397	7.09
5%	0.451	0.373	0.448	0.448	0.401	0.424	8.34
7%	0.382	0.456	0.367	0.374	0.427	0.401	9.61
9%	0.325	0.389	0.407	0.364	0.456	0.388	12.57

*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

ORIGIN ID:FSMA (479) 784-2330
STEVE FLOYD
CITY OF FORT SMITH
3900 KELLEY HIGHWAY

FORT SMITH, AR 72904
UNITED STATES US

SHIP DATE: 21JAN16
ACTWGT: 1.50 LB
CAD: 1731127/INET3730

BILL SENDER

TO NPDES ENFORCEMENT SECTION, WATER
ADEQ
5301 NORTSHORE DRIVE

NORTH LITTLE ROCK AR 72118

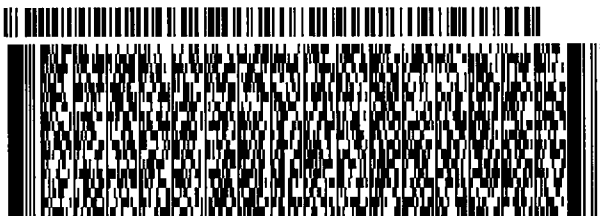
(501) 682-0638

REF:

INV:

PO:

DEPT:



FedEx
Express



J1610101401ur

540J110E617Z7F

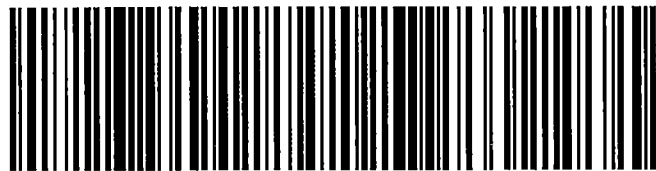
MON - 25 JAN 4:30P

** 2DAY **

TRK# 7754 7273 0021
0201

SA LITA

72118
AR-US LIT



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