AR0021750 3rd QTR

AMERICAN INTERPLEX CORPORATION
LABORATORIES

August 1, 2013
Control No. 169247

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 26, 2013. 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. Jay Lor
jlor@fortsmithar.gov

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

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

SAMPLE INFORMATION

Project Description:
Two (2) water and one (1) sludge sample(s) received on July 26, 2013
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:

Laboratory ID	Client Sample ID	Sampled Date/Time	Notes
169247-1	Massard Influent 7/25/13 0815	25-Jul-2013 0815	
169247-2	Massard Effluent 7/25/13 1315	25-Jul-2013 1315	
169247-3	Massard Raw Biosolid 7/25/13 1306	25-Jul-2013 1306	

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

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", 21st edition.
"American Society for Testing and Materials" (ASTM).
"Association of Analytical Chemists" (AOAC).

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ANALYTICAL RESULTS

AIC No. 169247-1
Sample Identification: Massard Influent 7/25/13 0815

Analyte		Result	RL	Units	Qualifier
Total Recoverable Phenolics		**98**	5	**ug/l**	
EPA 420.1	Prep: 29-Jul-2013 0822 by 308	Analyzed: 29-Jul-2013 1400 by 308		Batch: W44331	
Total Cyanide		**< 10**	10	**ug/l**	
SM 4500-CN C,E	Prep: 29-Jul-2013 0823 by 308	Analyzed: 29-Jul-2013 1359 by 302		Batch: W44332	
Mercury, low level		**0.096**	0.0050	**ug/l**	
EPA 245.7	Prep: 01-Aug-2013 0822 by 271	Analyzed: 01-Aug-2013 1026 by 271		Batch: S35116	
Total Recoverable Antimony		**< 60**	60	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1328 by 305		Batch: S35093	
Total Recoverable Arsenic		**2.2**	0.5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1328 by 305		Batch: S35093	
Total Recoverable Beryllium		**< 0.5**	0.5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1328 by 305		Batch: S35093	
Total Recoverable Cadmium		**< 0.5**	0.5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1328 by 305		Batch: S35093	
Total Recoverable Chromium		**< 10**	10	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1328 by 305		Batch: S35093	
Total Recoverable Copper		**21**	0.5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1328 by 305		Batch: S35093	
Total Recoverable Lead		**4.7**	0.5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1328 by 305		Batch: S35093	
Total Recoverable Molybdenum		**< 8**	8	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1328 by 305		Batch: S35093	
Total Recoverable Nickel		**5.6**	0.5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1328 by 305		Batch: S35093	
Total Recoverable Selenium		**< 5**	5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1328 by 305		Batch: S35093	
Total Recoverable Silver		**0.93**	0.5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1328 by 305		Batch: S35093	
Total Recoverable Thallium		**< 0.5**	0.5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1328 by 305		Batch: S35093	
Total Recoverable Zinc		**180**	20	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1328 by 305		Batch: S35093	

AIC No. 169247-2
Sample Identification: Massard Effluent 7/25/13 1315

Analyte		Result	RL	Units	Qualifier
Total Recoverable Phenolics		**32**	5	**ug/l**	
EPA 420.1	Prep: 29-Jul-2013 0822 by 308	Analyzed: 29-Jul-2013 1400 by 308		Batch: W44331	
Total Cyanide		**< 10**	10	**ug/l**	
SM 4500-CN C,E	Prep: 29-Jul-2013 0823 by 308	Analyzed: 29-Jul-2013 1354 by 302		Batch: W44332	

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ANALYTICAL RESULTS

AIC No. 169247-2 (Continued)
Sample Identification: Massard Effluent 7/25/13 1315

Analyte		Result	RL	Units	Qualifier
Mercury, low level		**< 0.0050**	0.0050	**ug/l**	
EPA 245.7	Prep: 01-Aug-2013 0822 by 271	Analyzed: 01-Aug-2013 1021 by 271		Batch: S35116	
Total Recoverable Antimony		**< 60**	60	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1333 by 305		Batch: S35093	
Total Recoverable Arsenic		**0.88**	0.5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1333 by 305		Batch: S35093	
Total Recoverable Beryllium		**< 0.5**	0.5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1333 by 305		Batch: S35093	
Total Recoverable Cadmium		**< 0.5**	0.5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1333 by 305		Batch: S35093	
Total Recoverable Chromium		**< 10**	10	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1333 by 305		Batch: S35093	
Total Recoverable Copper		**2.8**	0.5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1333 by 305		Batch: S35093	
Total Recoverable Lead		**< 0.5**	0.5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1333 by 305		Batch: S35093	
Total Recoverable Molybdenum		**< 8**	8	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1333 by 305		Batch: S35093	
Total Recoverable Nickel		**2.9**	0.5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1333 by 305		Batch: S35093	
Total Recoverable Selenium		**< 5**	5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1333 by 305		Batch: S35093	
Total Recoverable Silver		**< 0.5**	0.5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1333 by 305		Batch: S35093	
Total Recoverable Thallium		**< 0.5**	0.5	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1333 by 305		Batch: S35093	
Total Recoverable Zinc		**22**	20	**ug/l**	
EPA 200.8	Prep: 26-Jul-2013 1143 by 305	Analyzed: 26-Jul-2013 1333 by 305		Batch: S35093	

AIC No. 169247-3
Sample Identification: Massard Raw Biosolid 7/25/13 1306

Analyte		Result	RL	Units	Qualifier
Total Cyanide		**4.5**	3	**mg/Kg**	
EPA 9010C, 9014	Prep: 30-Jul-2013 0806 by 308	Analyzed: 30-Jul-2013 1342 by 308		Batch: W44346	
Total Recoverable Phenolics		**220**	20	**mg/Kg**	
EPA 9065	Prep: 30-Jul-2013 0805 by 308	Analyzed: 30-Jul-2013 1430 by 308		Batch: W44345	
Total Solids		**3.1**	0.01	**wt %**	
SM 2540 G	Prep: 31-Jul-2013 1112 by 302	Analyzed: 01-Aug-2013 0909 by 302		Batch: W44369	
Antimony		**< 3**	3	**mg/Kg**	
EPA 3051A, 6010C	Prep: 29-Jul-2013 0824 by 100	Analyzed: 29-Jul-2013 1321 by 305		Batch: S35099	

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ANALYTICAL RESULTS

AIC No. 169247-3 (Continued)
Sample Identification: Massard Raw Biosolid 7/25/13 1306

Analyte		Result	RL	Units	Qualifier
Arsenic		**6.5**	5	**mg/Kg**	
EPA 3051A, 6010C	Prep: 29-Jul-2013 0824 by 100	Analyzed: 29-Jul-2013 1321 by 305		Batch: S35099	
Beryllium		**0.34**	0.03	**mg/Kg**	
EPA 3051A, 6010C	Prep: 29-Jul-2013 0824 by 100	Analyzed: 29-Jul-2013 1321 by 305		Batch: S35099	
Cadmium		**4.1**	0.4	**mg/Kg**	
EPA 3051A, 6010C	Prep: 29-Jul-2013 0824 by 100	Analyzed: 29-Jul-2013 1321 by 305		Batch: S35099	
Chromium		**35**	0.7	**mg/Kg**	
EPA 3051A, 6010C	Prep: 29-Jul-2013 0824 by 100	Analyzed: 29-Jul-2013 1321 by 305		Batch: S35099	
Copper		**930**	0.6	**mg/Kg**	
EPA 3051A, 6010C	Prep: 29-Jul-2013 0824 by 100	Analyzed: 29-Jul-2013 1321 by 305		Batch: S35099	
Lead		**65**	4	**mg/Kg**	
EPA 3051A, 6010C	Prep: 29-Jul-2013 0824 by 100	Analyzed: 29-Jul-2013 1321 by 305		Batch: S35099	
Molybdenum		**16**	0.8	**mg/Kg**	
EPA 3051A, 6010C	Prep: 29-Jul-2013 0824 by 100	Analyzed: 29-Jul-2013 1321 by 305		Batch: S35099	
Nickel		**96**	1	**mg/Kg**	
EPA 3051A, 6010C	Prep: 29-Jul-2013 0824 by 100	Analyzed: 29-Jul-2013 1321 by 305		Batch: S35099	
Selenium		**9.7**	7	**mg/Kg**	
EPA 3051A, 6010C	Prep: 29-Jul-2013 0824 by 100	Analyzed: 29-Jul-2013 1321 by 305		Batch: S35099	
Silver		**8.9**	0.7	**mg/Kg**	
EPA 3051A, 6010C	Prep: 29-Jul-2013 0824 by 100	Analyzed: 29-Jul-2013 1321 by 305		Batch: S35099	
Thallium		**< 4**	4	**mg/Kg**	
EPA 3051A, 6010C	Prep: 29-Jul-2013 0824 by 100	Analyzed: 29-Jul-2013 1321 by 305		Batch: S35099	
Zinc		**1300**	0.2	**mg/Kg**	
EPA 3051A, 6010C	Prep: 29-Jul-2013 0824 by 100	Analyzed: 29-Jul-2013 1321 by 305		Batch: S35099	
Mercury		**1.8**	0.1	**mg/Kg**	
EPA 7471B	Prep: 31-Jul-2013 0900 by 271	Analyzed: 31-Jul-2013 1515 by 271		Batch: S35113	

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DUPLICATE RESULTS

Analyte		AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
Total Solids		169247-3	3.1 wt %			31Jul13 1112 by 302	01Aug13 0909 by 302		
	Batch: W44369	Duplicate	3.2 wt %	2.05	10.0	31Jul13 1112 by 302	01Aug13 0909 by 302		

LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
Total Recoverable Phenolics	0.1 mg/l	101	85.0-115			W44331	29Jul13 0823 by 308	29Jul13 1400 by 308		
Total Cyanide	0.1 mg/l	93.2	85.0-115			W44332	29Jul13 0823 by 308	29Jul13 1353 by 302		
Mercury, low level	0.01 ug/l	90.6	76.0-113			S35116	01Aug13 0822 by 271	01Aug13 1006 by 271		
Total Recoverable Antimony	0.05 mg/l	95.8	85.0-115			S35093	26Jul13 0858 by 100	26Jul13 1210 by 305		
Total Recoverable Arsenic	0.05 mg/l	92.3	85.0-115			S35093	26Jul13 0858 by 100	26Jul13 1210 by 305		
Total Recoverable Beryllium	0.05 mg/l	92.2	85.0-115			S35093	26Jul13 0858 by 100	26Jul13 1210 by 305		
Total Recoverable Cadmium	0.05 mg/l	95.3	85.0-115			S35093	26Jul13 0858 by 100	26Jul13 1210 by 305		
Total Recoverable Chromium	0.05 mg/l	96.5	85.0-115			S35093	26Jul13 0858 by 100	26Jul13 1210 by 305		
Total Recoverable Copper	0.05 mg/l	98.2	85.0-115			S35093	26Jul13 0858 by 100	26Jul13 1210 by 305		
Total Recoverable Lead	0.05 mg/l	95.2	85.0-115			S35093	26Jul13 0858 by 100	26Jul13 1210 by 305		
Total Recoverable Molybdenum	0.05 mg/l	102	85.0-115			S35093	26Jul13 0858 by 100	26Jul13 1210 by 305		
Total Recoverable Nickel	0.05 mg/l	90.4	85.0-115			S35093	26Jul13 0858 by 100	26Jul13 1210 by 305		
Total Recoverable Selenium	0.05 mg/l	92.4	85.0-115			S35093	26Jul13 0858 by 100	26Jul13 1210 by 305		
Total Recoverable Silver	0.02 mg/l	94.2	85.0-115			S35093	26Jul13 0858 by 100	26Jul13 1210 by 305		
Total Recoverable Thallium	0.05 mg/l	93.2	85.0-115			S35093	26Jul13 0858 by 100	26Jul13 1210 by 305		
Total Recoverable Zinc	0.05 mg/l	97.3	85.0-115			S35093	26Jul13 0858 by 100	26Jul13 1210 by 305		
Total Cyanide	0.500 mg/Kg	88.5	85.0-115			W44346	30Jul13 0806 by 308	30Jul13 1341 by 308		
Total Recoverable Phenolics	10.0 mg/Kg	90.4	85.0-115			W44345	30Jul13 0805 by 308	30Jul13 1430 by 308		
Antimony	500 mg/Kg	103	85.0-115			S35099	29Jul13 0824 by 100	29Jul13 1310 by 305		
Arsenic	500 mg/Kg	101	85.0-115			S35099	29Jul13 0824 by 100	29Jul13 1310 by 305		
Beryllium	50.0 mg/Kg	97.0	85.0-115			S35099	29Jul13 0824 by 100	29Jul13 1310 by 305		
Cadmium	500 mg/Kg	95.8	85.0-115			S35099	29Jul13 0824 by 100	29Jul13 1310 by 305		
Chromium	50.0 mg/Kg	96.4	85.0-115			S35099	29Jul13 0824 by 100	29Jul13 1310 by 305		
Copper	50.0 mg/Kg	98.0	85.0-115			S35099	29Jul13 0824 by 100	29Jul13 1310 by 305		
Lead	500 mg/Kg	96.4	85.0-115			S35099	29Jul13 0824 by 100	29Jul13 1310 by 305		
Molybdenum	50.0 mg/Kg	96.8	85.0-115			S35099	29Jul13 0824 by 100	29Jul13 1310 by 305		
Nickel	50.0 mg/Kg	96.6	85.0-115			S35099	29Jul13 0824 by 100	29Jul13 1310 by 305		
Selenium	500 mg/Kg	96.4	85.0-115			S35099	29Jul13 0824 by 100	29Jul13 1310 by 305		
Silver	10.0 mg/Kg	95.1	85.0-115			S35099	29Jul13 0824 by 100	29Jul13 1310 by 305		
Thallium	500 mg/Kg	102	85.0-115			S35099	29Jul13 0824 by 100	29Jul13 1310 by 305		
Zinc	50.0 mg/Kg	94.2	85.0-115			S35099	29Jul13 0824 by 100	29Jul13 1310 by 305		
Mercury	1.25 mg/Kg	90.6	85.0-115			S35113	31Jul13 0901 by 271	31Jul13 1413 by 271		

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MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Total Recoverable Phenolics	169247-2	0.1 mg/l	83.8	80.0-120	W44331	29Jul13 0823 by 308	29Jul13 1400 by 308		
	169247-2	0.1 mg/l	81.6	80.0-120	W44331	29Jul13 0823 by 308	29Jul13 1400 by 308		
	Relative Percent Difference:		1.91	10.0	W44331				
Total Cyanide	169247-2	0.1 mg/l	90.6	75.0-125	W44332	29Jul13 0823 by 308	29Jul13 1356 by 302		
	169247-2	0.1 mg/l	95.7	75.0-125	W44332	29Jul13 0823 by 308	29Jul13 1358 by 302		
	Relative Percent Difference:		5.48	20.0	W44332				
Mercury, low level	169331-4	0.01 ug/l	89.6	71.0-122	S35116	01Aug13 0822 by 271	01Aug13 1011 by 271		
	169331-4	0.01 ug/l	94.1	71.0-122	S35116	01Aug13 0822 by 271	01Aug13 1016 by 271		
	Relative Percent Difference:		4.51	18.0	S35116				
Total Recoverable Antimony	169225-1	0.05 mg/l	97.3	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1215 by 305		
	169225-1	0.05 mg/l	97.4	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1220 by 305		
	Relative Percent Difference:		0.134	20.0	S35093				
Total Recoverable Arsenic	169225-1	0.05 mg/l	91.9	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1215 by 305		
	169225-1	0.05 mg/l	92.5	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1220 by 305		
	Relative Percent Difference:		0.669	20.0	S35093				
Total Recoverable Beryllium	169225-1	0.05 mg/l	93.3	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1215 by 305		
	169225-1	0.05 mg/l	93.5	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1220 by 305		
	Relative Percent Difference:		0.205	20.0	S35093				
Total Recoverable Cadmium	169225-1	0.05 mg/l	94.9	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1215 by 305		
	169225-1	0.05 mg/l	95.3	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1220 by 305		
	Relative Percent Difference:		0.361	20.0	S35093				
Total Recoverable Chromium	169225-1	0.05 mg/l	96.5	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1215 by 305		
	169225-1	0.05 mg/l	95.3	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1220 by 305		
	Relative Percent Difference:		1.26	20.0	S35093				
Total Recoverable Copper	169225-1	0.05 mg/l	96.0	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1215 by 305		
	169225-1	0.05 mg/l	96.5	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1220 by 305		
	Relative Percent Difference:		0.467	20.0	S35093				
Total Recoverable Lead	169225-1	0.05 mg/l	97.0	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1215 by 305		
	169225-1	0.05 mg/l	97.0	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1220 by 305		
	Relative Percent Difference:		0.0423	20.0	S35093				
Total Recoverable Molybdenum	169225-1	0.05 mg/l	103	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1215 by 305		
	169225-1	0.05 mg/l	104	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1220 by 305		
	Relative Percent Difference:		0.790	20.0	S35093				
Total Recoverable Nickel	169225-1	0.05 mg/l	92.2	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1215 by 305		
	169225-1	0.05 mg/l	92.5	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1220 by 305		
	Relative Percent Difference:		0.327	20.0	S35093				
Total Recoverable Selenium	169225-1	0.05 mg/l	92.0	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1215 by 305		
	169225-1	0.05 mg/l	92.3	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1220 by 305		
	Relative Percent Difference:		0.332	20.0	S35093				
Total Recoverable Silver	169225-1	0.02 mg/l	93.1	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1215 by 305		
	169225-1	0.02 mg/l	93.5	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1220 by 305		
	Relative Percent Difference:		0.395	20.0	S35093				
Total Recoverable Thallium	169225-1	0.05 mg/l	95.6	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1215 by 305		
	169225-1	0.05 mg/l	95.2	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1220 by 305		
	Relative Percent Difference:		0.423	20.0	S35093				
Total Recoverable Zinc	169225-1	0.05 mg/l	92.6	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1215 by 305		
	169225-1	0.05 mg/l	94.3	75.0-125	S35093	26Jul13 0858 by 100	26Jul13 1220 by 305		
	Relative Percent Difference:		1.41	20.0	S35093				
Total Cyanide	169247-3	0.997 mg/Kg	81.8	75.0-125	W44346	30Jul13 0806 by 308	30Jul13 1344 by 308		
	169247-3	0.996 mg/Kg	80.1	75.0-125	W44346	30Jul13 0806 by 308	30Jul13 1346 by 308		
	Relative Percent Difference:		1.79	20.0	W44346				

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MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Total Recoverable Phenolics	169247-3	9.61 mg/Kg	92.8	80.0-120	W44345	30Jul13 0805 by 308	30Jul13 1430 by 308		
	169247-3	9.55 mg/Kg	107	80.0-120	W44345	30Jul13 0805 by 308	30Jul13 1430 by 308		
	Relative Percent Difference:		8.58	10.0	W44345				
Antimony	169247-3	994 mg/Kg	97.0	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1314 by 305		
	169247-3	989 mg/Kg	100	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1317 by 305		
	Relative Percent Difference:		3.24	20.0	S35099				
Arsenic	169247-3	994 mg/Kg	98.3	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1314 by 305		
	169247-3	989 mg/Kg	102	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1317 by 305		
	Relative Percent Difference:		3.56	20.0	S35099				
Beryllium	169247-3	99.4 mg/Kg	100	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1314 by 305		
	169247-3	98.9 mg/Kg	102	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1317 by 305		
	Relative Percent Difference:		1.95	20.0	S35099				
Cadmium	169247-3	994 mg/Kg	90.2	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1314 by 305		
	169247-3	989 mg/Kg	91.8	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1317 by 305		
	Relative Percent Difference:		1.79	20.0	S35099				
Chromium	169247-3	99.4 mg/Kg	-	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1314 by 305		X
	169247-3	98.9 mg/Kg	-	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1317 by 305		X
	Relative Percent Difference:		2.47	20.0	S35099				
Copper	169247-3	99.4 mg/Kg	-	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1314 by 305		X
	169247-3	98.9 mg/Kg	-	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1317 by 305		X
	Relative Percent Difference:		1.55	20.0	S35099				
Lead	169247-3	994 mg/Kg	102	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1314 by 305		
	169247-3	989 mg/Kg	104	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1317 by 305		
	Relative Percent Difference:		2.51	20.0	S35099				
Molybdenum	169247-3	99.4 mg/Kg	113	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1314 by 305		
	169247-3	98.9 mg/Kg	116	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1317 by 305		
	Relative Percent Difference:		2.65	20.0	S35099				
Nickel	169247-3	99.4 mg/Kg	-	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1314 by 305		X
	169247-3	98.9 mg/Kg	-	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1317 by 305		X
	Relative Percent Difference:		1.79	20.0	S35099				
Selenium	169247-3	994 mg/Kg	85.2	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1314 by 305		
	169247-3	989 mg/Kg	88.2	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1317 by 305		
	Relative Percent Difference:		3.48	20.0	S35099				
Silver	169247-3	19.9 mg/Kg	-	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1314 by 305		X
	169247-3	19.8 mg/Kg	-	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1317 by 305		X
	Relative Percent Difference:		2.44	20.0	S35099				
Thallium	169247-3	994 mg/Kg	105	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1314 by 305		
	169247-3	989 mg/Kg	107	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1317 by 305		
	Relative Percent Difference:		2.61	20.0	S35099				
Zinc	169247-3	99.4 mg/Kg	-	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1314 by 305		X
	169247-3	98.9 mg/Kg	-	75.0-125	S35099	29Jul13 0824 by 100	29Jul13 1317 by 305		X
	Relative Percent Difference:		1.12	20.0	S35099				
Mercury	169247-3	1.23 mg/Kg	-	70.0-130	S35113	31Jul13 0901 by 271	31Jul13 1507 by 271		X
	169247-3	1.24 mg/Kg	-	70.0-130	S35113	31Jul13 0901 by 271	31Jul13 1511 by 271		X
	Relative Percent Difference:		7.94	20.0	S35113				

AMERICAN INTERPLEX CORPORATION
LABORATORIES

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	W44331-1	29Jul13 0823 by 308	29Jul13 1400 by 308	
Total Cyanide	< 0.01 mg/l	0.01	0.01	W44332-1	29Jul13 0823 by 308	29Jul13 1351 by 302	
Mercury, low level	< 0.0018 ug/l	0.0018	0.0050	S35116-1	01Aug13 0822 by 271	01Aug13 0951 by 271	
Total Recoverable Antimony	< 0.03 mg/l	0.03	0.03	S35093-1	26Jul13 0858 by 100	26Jul13 1204 by 305	
Total Recoverable Arsenic	< 0.0005 mg/l	0.0005	0.0005	S35093-1	26Jul13 0858 by 100	26Jul13 1204 by 305	
Total Recoverable Beryllium	< 0.0003 mg/l	0.0003	0.0003	S35093-1	26Jul13 0858 by 100	26Jul13 1204 by 305	
Total Recoverable Cadmium	< 0.0001 mg/l	0.0001	0.0001	S35093-1	26Jul13 0858 by 100	26Jul13 1204 by 305	
Total Recoverable Chromium	< 0.007 mg/l	0.007	0.007	S35093-1	26Jul13 0858 by 100	26Jul13 1204 by 305	
Total Recoverable Copper	< 0.0005 mg/l	0.0005	0.0005	S35093-1	26Jul13 0858 by 100	26Jul13 1204 by 305	
Total Recoverable Lead	< 0.0005 mg/l	0.0005	0.0005	S35093-1	26Jul13 0858 by 100	26Jul13 1204 by 305	
Total Recoverable Molybdenum	< 0.008 mg/l	0.008	0.008	S35093-1	26Jul13 0858 by 100	26Jul13 1204 by 305	
Total Recoverable Nickel	< 0.0005 mg/l	0.0005	0.0005	S35093-1	26Jul13 0858 by 100	26Jul13 1204 by 305	
Total Recoverable Selenium	< 0.002 mg/l	0.002	0.002	S35093-1	26Jul13 0858 by 100	26Jul13 1204 by 305	
Total Recoverable Silver	< 0.0002 mg/l	0.0002	0.0002	S35093-1	26Jul13 0858 by 100	26Jul13 1204 by 305	
Total Recoverable Thallium	< 0.0005 mg/l	0.0005	0.0005	S35093-1	26Jul13 0858 by 100	26Jul13 1204 by 305	
Total Recoverable Zinc	< 0.002 mg/l	0.002	0.002	S35093-1	26Jul13 0858 by 100	26Jul13 1204 by 305	
Total Cyanide	< 0.1 mg/Kg	0.1	0.1	W44346-1	30Jul13 0806 by 308	30Jul13 1339 by 308	
Total Recoverable Phenolics	< 0.5 mg/Kg	0.5	0.5	W44345-1	30Jul13 0805 by 308	30Jul13 1430 by 308	
Total Solids	< 0.01 wt %	0.01	0.01	W44369-1	31Jul13 1112 by 302	01Aug13 0909 by 302	
Antimony	< 3 mg/Kg	3	3	S35099-1	29Jul13 0824 by 100	29Jul13 1307 by 305	
Arsenic	< 5 mg/Kg	5	5	S35099-1	29Jul13 0824 by 100	29Jul13 1307 by 305	
Beryllium	< 0.03 mg/Kg	0.03	0.03	S35099-1	29Jul13 0824 by 100	29Jul13 1307 by 305	
Cadmium	< 0.4 mg/Kg	0.4	0.4	S35099-1	29Jul13 0824 by 100	29Jul13 1307 by 305	
Chromium	< 0.7 mg/Kg	0.7	0.7	S35099-1	29Jul13 0824 by 100	29Jul13 1307 by 305	
Copper	< 0.6 mg/Kg	0.6	0.6	S35099-1	29Jul13 0824 by 100	29Jul13 1307 by 305	
Lead	< 4 mg/Kg	4	4	S35099-1	29Jul13 0824 by 100	29Jul13 1307 by 305	
Molybdenum	< 0.8 mg/Kg	0.8	0.8	S35099-1	29Jul13 0824 by 100	29Jul13 1307 by 305	
Nickel	< 1 mg/Kg	1	1	S35099-1	29Jul13 0824 by 100	29Jul13 1307 by 305	
Selenium	< 7 mg/Kg	7	7	S35099-1	29Jul13 0824 by 100	29Jul13 1307 by 305	
Silver	< 0.7 mg/Kg	0.7	0.7	S35099-1	29Jul13 0824 by 100	29Jul13 1307 by 305	
Thallium	< 4 mg/Kg	4	4	S35099-1	29Jul13 0824 by 100	29Jul13 1307 by 305	
Zinc	< 0.2 mg/Kg	0.2	0.2	S35099-1	29Jul13 0824 by 100	29Jul13 1307 by 305	
Mercury	< 0.1 mg/Kg	0.1	0.1	S35113-1	31Jul13 0901 by 271	31Jul13 1409 by 271	

AMERICAN INTERPLEX CORPORATION
LABORATORIES

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: City of Fort Smith
Project Reference: MASSARD Table III Priority Pollutants
Project Manager: Lance McAvoy
Sampled By: Kristy Cantu

PO No.

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	SAMPLE MATRIX: WATER	SOIL	NO OF BOTTLES	Phenolics	T.CNT	PP Metals	Table III: BPP Metals CNT Phenolics T. Slds	Mo	Mo										
1	MASSARD INFLUENT	7/25/13 0815	X		X		1	X															
1	MASSARD INFLUENT	7/25/13 0815	X		X		1		X														
1	MASSARD INFLUENT	7/25/13 0815	X		X		1			X		X											
2	MASSARD Effluent	7/25/13 1315	X		X		1	X															
2	MASSARD Effluent	7/25/13 1315	X		X		1		X														
2	MASSARD Effluent	7/25/13 1315	X		X		1			X		X											
3	MASSARD RAW BIOSOLID	7/25/13 1304	X		X		1				X		X										
		Container Type						G	P	P	G	P	G										
		Preservative						S	B	N	N_a	N	N_a										

ANALYSES REQUESTED[1]

AIC CONTROL NO: 169247
AIC PROPOSAL NO:
Carrier/Tracking No.
Received Temperature C: 4.1
Remarks
Field pH calibration on ____ @ ____
Buffer:

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

Turnaround Time Requested: (Please circle)
NORMAL or EXPEDITED IN ____ DAYS
Expedited results requested by:
Who should AIC contact with questions: Lance McAvoy
Phone: 4797842337 Fax:
Report Attention to:
Report Address to: LANCE McAvoy

Relinquished By	Date/Time	Received By	Date/Time
Kristy Cantu	7/25/13		
Relinquished By:	Date/Time	Received in Lab By:	Date/Time
			7-26-13 8:45Am

Comments: [1] Required Reporting Limit for Metals must be identified on back of COC.
FedEx # 8024 7206 7851

19-Oct-09

FORM 0060

AMERICAN INTERPLEX CORPORATION
LABORATORIES

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: City of Fort Smith
Project Reference: MASSARD TABLE III PP (Hg)
Project Manager: Lance McAvoy
Sampled By: Kristy Cantu

PO No.

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	SAMPLE MATRIX: WATER	SOIL	NO OF BOTTLES	ANALYSES REQUESTED[1]: Hg, LL (245.7)
1	MASSARD INFLUENT	7/25/13 0815	X		X		1	X
2	MASSARD Effluent	7/25/13 1315	X		X		1	X
		Container Type					G	
		Preservative					NO	

AIC CONTROL NO: 169247
AIC PROPOSAL NO:
Carrier/Tracking No.
Received Temperature C: 4.1
Remarks
Field pH calibration on ____ @ ____
Buffer:

G = Glass, NO = none, P = Plastic, S = Sulfuric acid pH2, V = VOA vials, N = Nitric acid pH2, H = HCl to pH2, B = NaOH to pH12, T = Sodium Thiosulfate, Z = Zinc acetate

Turnaround Time Requested: (Please circle)
NORMAL or EXPEDITED IN ____ DAYS
Expedited results requested by: ____
Who should AIC contact with questions: LANCE McAvoy
Phone: 479 784 2337 Fax: ____
Report Attention to:
Report Address to: LANCE McAvoy

Relinquished By	Date/Time	Received By	Date/Time
Kristy Cantu	7/25/13		
Relinquished By:	Date/Time	Received in Lab By: Dana Pinson	Date/Time 7-26-13 8:45 AM

Comments: [1] Required Reporting Limit for Metals must be identified on back of COC.
FedEx # 8024 7206 7851

19-Oct-09

FORM 0060

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

AR0021750 3rd QR

August 06, 2013

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

RE: Project: MASSARD BIOMONITORING
Pace Project No.: 60149472

Dear Lance McAvoy:
Enclosed are the analytical results for sample(s) received by the laboratory on July 23, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

Alice Flanagan

Alice Flanagan

alice.flanagan@pacelabs.com
Project Manager

Enclosures

cc: Dan Clover, City of Fort Smith, AR

REPORT OF LABORATORY ANALYSIS

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

SAMPLE ANALYTE COUNT

Project: MASSARD BIOMONITORING
Pace Project No.: 60149472

Lab ID	Sample ID	Method	Analysts	Analytes Reported
60149472001	**MASSARD EFFLUENT**	EPA 821/R-02/013	TDH	1

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QUALIFIERS

Project: MASSARD BIOMONITORING
Pace Project No.: 60149472

DEFINITIONS

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

ND - Not Detected at or above adjusted reporting limit.

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

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

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

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

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

TNI - The NELAC Institute.

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

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: MASSARD BIOMONITORING
Pace Project No.: 60149472

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60149472001	MASSARD EFFLUENT	EPA 821/R-02/013	BIO/1637		

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Sample Condition Upon Receipt

WO#: 60149472

Client Name: Ft Smith

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☒ Commercial ☐ Pace ☐ Other ____

Tracking #: ____ Pace Shipping Label Used? ☐ Yes ☐ No

Optional:
Proj. Due Date:
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-111 Type of Ice: Wet Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature: 3.6

Temperature should be above freezing to 6°C

Date and Initials of person examining contents: MB 7/23/13 1445

		Comments:
Chain of Custody present:	☒Yes ☐No ☐N/A	1.
Chain of Custody filled out:	☒Yes ☐No ☐N/A	2.
Chain of Custody relinquished:	☒Yes ☐No ☐N/A	3.
Sampler name & signature on COC:	☒Yes ☐No ☐N/A	4.
Samples arrived within holding time:	☒Yes ☐No ☐N/A	5.
Short Hold Time analyses (<72hr):	☒Yes ☐No ☐N/A	6.
Rush Turn Around Time requested:	☐Yes ☒No ☐N/A	7.
Sufficient volume:	☒Yes ☐No ☐N/A	8.
Correct containers used:	☒Yes ☐No ☐N/A	9.
-Pace containers used:	☒Yes ☐No ☐N/A	
Containers intact:	☒Yes ☐No ☐N/A	10.
Unpreserved 5035A soils frozen w/in 48hrs?	☐Yes ☐No ☒N/A	11.
Filtered volume received for dissolved tests	☐Yes ☐No ☒N/A	12.
Sample labels match COC:	☒Yes ☐No ☐N/A	13.
-Includes date/time/ID/analyses Matrix: WT		
All containers needing preservation have been checked.	☐Yes ☐No ☒N/A	14.
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes ☐No ☒N/A	
Exceptions: VOA, coliform, TOC, O&G, WI-DRO (water), Phenolics	☐Yes ☒No	Initial when completed ____ Lot # of added preservative ____
Trip Blank present:	☐Yes ☐No ☒N/A	15.
Pace Trip Blank lot # (if purchased): ____		
Headspace in VOA vials (>6mm):	☐Yes ☐No ☒N/A	16.
Project sampled in USDA Regulated Area:	☐Yes ☐No ☒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: KMF Date: 7/24/13

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

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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.

Page: 1 of 1

1695982

Section A Required Client Information:

Company: City of Fort Smith
Address: 3900 Kelley Hwy
Ft. Smith AR 72904
Email To:
Phone: 4797842335 Fax:
Requested Due Date/TAT:

Section B Required Project Information:

Report To: Don Clower
Copy To:
Purchase Order No.:
Project Name: MASSARD BIOMONITORING
Project Number:

Section C Invoice Information:

Attention: Same as A + B
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #: 9122/13

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: AR

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Matrix Codes — MATRIX / CODE
Drinking Water DW
Water WT
Waste Water WW
Product P
Soil/Solid SL
Oil OL
Wipe WP
Air AR
Tissue TS
Other OT

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test ↓	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	MASSARD EFFLUENT	WW	C	7/21/13	0800	7/22/13	0800										X	Chronic Ceriodaphnia	N	60149472 01
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. Cl2 = <0.01 mg/L	Kristy L Cantu	7/22/13	0900	[illegible]	7/23/13	1445	2-4	Y	Y	Y
F Cl2 = < 0.01 mg/L										

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Kristy L Cantu

SIGNATURE of SAMPLER: Kristy L Cantu

DATE Signed (MM/DD/YY): 7/22/13

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

ORIGINAL

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

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REFERENCE #60149472

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

August 1, 2013

Don Clover
City of Fort Smith (Massard)
3900 Kelley HWY
Fort Smith , AR 72904

Re: Lab Project Number: 60149472
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
Tim.Harrell@pacelabs.com
Technical Director

REPORT OF LABORATORY ANALYSIS

ACCREDITED IN ACCORDANCE WITH nelac

Pace Analytical®
www.pacelabs.com

REFERENCE #60149472

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

CHRONIC TOXICITY TEST FOR CITY OF FORT SMITH (MASSARD)

PERMIT # AR 0021750
AFIN # 66-00226

PERFORMED ON:

Pimephales promelas

and

Ceriodaphnia dubia

PREPARED FOR:

Don Clover
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 1, 2013

REPORT OF LABORATORY ANALYSIS

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

TABLE OF CONTENTS

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

SUMMARY

A Chronic Whole Effluent Toxicity Test using the 7-day chronic fathead minnows (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 22, 2013 to July 26, 2013. 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-Karber method. Statistical analysis is accomplished by following steps in EPA 821-R-02-013, November 2002 and by use of Toxstat version 3.4.

In minnow section of testing, it was observed that the effluent had no significant effect on the survival of the larvae at the 11% concentration. No significant mortality was observed in the other effluent concentrations after the 7-day exposure period. The No Observed Effect Concentration (NOEC) was determined to be 11% for survival. The LC50 was estimated to be >11% effluent. No significant reduction in growth was observed in the 11% effluent concentration. The Toxic Units is <1. The IC25 is >11. The NOEC for growth in effluent was determined to be 11%. The PMSD is 11.1.

In Cladoceran section of testing, it was observed that the effluent had no significant effect on the survival of the organisms in the 11% effluent concentration. No significant mortality was observed in the other effluent concentrations after the 7-day exposure period. The No Observed Effect Concentration (NOEC) was determined to be 11% for survival. The LC50 was estimated to be >11% effluent. No significant reduction in reproduction was observed in the 11% effluent concentrations. The Toxic Units is <1. The IC25 is >11. The NOEC for reproduction in effluent was determined to be 11%. The PMSD is 15.3.

The chronic toxicity exhibited by the fathead minnows and the Ceriodaphnia treated by the effluent sampled from July 22 to July 26 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 7-23-13. Subsequent samples followed by delivery on 7-25-13 and on 7-27-13. All samples were stored at ≤ 6° Celsius. Moderately Hard Synthetic Water was used as a control and also to make the required dilutions in the test as described in EPA 821-R-02-013.

TEST METHODS

Pace used EPA test method 1000.0 for conducting the Fathead Minnow, 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 7-23-13 and carried out until 7-30-13. 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

Pace Analytical®
www.pacelabs.com

REFERENCE #60149472

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TABLE 1

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

Date Sampled No. 1: 7-22-13 8:00

No. 2: 7-24-13 8:00

No. 3: 7-26-13 8:00

Test Initiated: 14:50 Date: 7-23-13

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 A	B	C	D	E	Mean Dry Weight (mg)	CV% *
Control 0%	0.389	0.421	0.480	0.432	0.449	0.434	4.73
Dilution 1 3%	0.470	0.475	0.489	0.432	0.417	0.457	4.14
Dilution 2 5%	0.475	0.465	0.410	0.440	0.422	0.442	3.82
Dilution 3 6%	0.402	0.430	0.484	0.472	0.457	0.449	4.55
Dilution 4 8%	0.480	0.457	0.421	0.484	0.392	0.447	5.45
Dilution 5 11%	0.423	0.485	0.458	0.429	0.411	0.441	4.15

* Coefficient of Variation = Standard Deviation X 100 / Mean

REPORT OF LABORATORY ANALYSIS

nelac

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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	100	100	100	100	100	100	0.00
Dilution 2 5%	100	100	100	100	100	100	100	100	0.00
Dilution 3 6%	100	100	100	100	100	100	100	100	0.00
Dilution 4 8%	100	100	100	100	87.5	100	100	97.5	4.79
Dilution 5 11%	87.5	100	100	100	100	100	100	97.5	4.79

REPORT OF LABORATORY ANALYSIS

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CERIODAPHNIA SURVIVAL AND REPRODUCTION

DATA TABLE FOR CERIODAPHNIA YOUNG PRODUCTION

Replicate	Control 0%	Dilution 1 3%	Dilution 2 5%	Dilution 3 6%	Dilution 3 8%	Dilution 4 11%
1	18	28	21	20	24	22
2	19	20	24	21	18	17
3	25	24	23	22	27	20
4	21	25	25	17	19	26
5	18	16	22	23	17	25
6	25	24	14	20	23	24
7	22	25	21	20	25	25
8	23	22	22	25	19	25
9	22	20	20	23	23	20
10	17	22	25	17	21	18
Mean	21.0	22.6	21.7	20.8	21.6	22.2
SD	2.906	3.373	3.199	2.573	3.307	3.259
CV %	13.84	14.93	14.74	12.37	15.31	14.68

REPORT OF LABORATORY ANALYSIS

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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 5%	Dilution 3 6%	Dilution 4 8%	Dilution 5 11%
24 hrs	100	100	100	100	100	100
48 hrs	100	100	100	100	100	100
7-day	100	100	100	100	100	100
SD	0.0	0.0	0.0	0.0	0.0	0.0
CV %	0.0	0.0	0.0	0.0	0.0	0.0

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

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

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TABLE 2 (CONT.)

16. Dilution Water	Moderately Hard Synthetic Water prepared with MILLI-Q deionized water and reagent grade chemicals
17. Effluent concentrations	0%, 3%, 5%, 6%, 8%, 11%
18. Test duration	7 days
19. Endpoints	Survival and growth
20. Test acceptability	80% or greater survival in the controls, Average dry weight in controls >0.25 mg, Coefficient of variation in the control must not exceed 40%.

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

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

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TABLE 2 (CONT.)

8. Renewal of test concentrations	Daily
9. Age of test organism	< 24 hours
10. No. larvae/chamber	1
11. No. replicates/concentration	10
12. No. larvae/concentration	10
13. Feeding regime	Feed 0.1 ml YCT three times daily. Larvae are not fed 12 hours prior to termination of test.
14. Cleaning	Siphon daily, immediately before test solution renewal
15. Aeration	None
16. Dilution Water	Moderately Hard Synthetic Water prepared with MILLI-Q deionized water and reagent grade chemicals
17. Effluent concentrations	0%, 3%, 5%, 6%, 8%, 11%
18. Test duration	6 days - 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: 7-22-13

SAMPLE NO. 2 COLLECTED: DATE: 7-24-13

SAMPLE NO. 3 COLLECTED: DATE: 7-26-13

TABLE 2 (SECTION 2)
INITIAL WATER QUALITY
EFFLUENT CONCENTRATION

	Control	100%
PH	7.67	7.41
D.O.	8.50	7.10
Temp	25	25
Alk	58	120
Hard	90	82
Cond	368	497
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	7.71	7.50	25
3% Effluent	7.82	7.50	25
5% Effluent	7.85	7.50	25
6% Effluent	7.86	7.50	25
8% Effluent	7.89	7.50	25
11% Effluent	7.92	7.50	25

48-Hour Water Quality Measurements

Effluent Concentration (%)	PH	D.O. (mg/l)	Temperature (C)
0% Control	7.51	7.40	25
3% Effluent	7.52	7.40	25
5% Effluent	7.55	7.50	25
6% Effluent	7.56	7.50	25
8% Effluent	7.58	7.50	25
11% Effluent	7.61	7.50	25

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FINAL WATER QUALITY

EFFLUENT CONCENTRATION

	Control	11%
pH	7.68	7.88
D.O.	7.30	7.30
Temp	25	25
Alk	62	76
Hard	98	124
Cond	468	687

* 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 0.434 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 4.73. The Ceriodaphnia dubia survival rates were 100 in the control. The Ceriodaphnia in the control produced an average of 21.0 young over the seven-day exposure period. Percent CV values for Ceriodaphnia dubia control survival and reproduction was 0.00 and 13.84. 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 11% for survival and 11% for growth. The No Observed Effect Concentration (NOEC) for Ceriodaphnia dubia was 11% for Survival and 11% for Reproduction. The tests were ran using a synthetic control against effluent concentrations of 3%, 5%, 6%, 8%, and 11%. The effluent sampled on 7-22-13, 7-24-13, and 7-26-13 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

60149472 Ft Smith FATHEAD SURVIVAL
File: 6149472A 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	0	27	0	0

Calculated Chi-Square goodness of fit test statistic = 38.0902
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.

60149472 Ft Smith FATHEAD SURVIVAL
File: 6149472A Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.032

W = 0.597

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.

60149472 Ft Smith FATHEAD SURVIVAL
File: 6149472A 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	1.107	1.107	1.107
3	5%	5	1.107	1.107	1.107
4	6%	5	1.107	1.107	1.107
5	8%	5	0.991	1.107	1.084
6	11%	5	0.991	1.107	1.084

60149472 Ft Smith FATHEAD SURVIVAL
File: 6149472A 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%	0.000	0.000	0.000	0.00
3	5%	0.000	0.000	0.000	0.00
4	6%	0.000	0.000	0.000	0.00
5	8%	0.003	0.052	0.023	4.79
6	11%	0.003	0.052	0.023	4.79

60149472 Ft Smith FATHEAD SURVIVAL
File: C:\TOXSTAT\6149472A. 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%	1.107	30.00	16.00	5.00	
3	5%	1.107	30.00	16.00	5.00	
4	6%	1.107	30.00	16.00	5.00	
5	8%	1.084	27.50	16.00	5.00	
6	11%	1.084	27.50	16.00	5.00	

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

60149472 Ft Smith FATHEAD GROWTH
File: C:\TOXSTAT\6149472B. Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

D = 0.026

W = 0.946

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.

60149472 Ft Smith FATHEAD GROWTH
File: C:\TOXSTAT\6149472B. Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 0.58

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.

60149472 Ft Smith FATHEAD GROWTH
File: C:\TOXSTAT\6149472B. Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.001	0.000	0.274
Within (Error)	24	0.026	0.001	
Total	29	0.027		

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

60149472 Ft Smith FATHEAD GROWTH
File: C:\TOXSTAT\6149472B. 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	0.434	0.434		
2	3%	0.457	0.457	-1.085	
3	5%	0.442	0.442	-0.397	
4	6%	0.449	0.449	-0.717	
5	8%	0.447	0.447	-0.610	
6	11%	0.441	0.441	-0.339	

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

60149472 Ft Smith FATHEAD GROWTH
File: C:\TOXSTAT\6149472B. 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	0.049	11.2	-0.022
3	5%	5	0.049	11.2	-0.008
4	6%	5	0.049	11.2	-0.015
5	8%	5	0.049	11.2	-0.013
6	11%	5	0.049	11.2	-0.007

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
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
6%	10	0	10

TOTAL	20	0	20

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

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	NUMBER OF DEAD	TOTAL ANIMALS
CONTROL	10	0	10
8%	10	0	10
TOTAL	20	0	20

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

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	NUMBER OF DEAD	TOTAL ANIMALS
CONTROL	10	0	10
11%	10	0	10
TOTAL	20	0	20

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

SUMMARY OF FISHER'S EXACT TESTS

	NUMBER	NUMBER	SIG

GROUP	IDENTIFICATION	EXPOSED	DEAD	(P=.05)
	CONTROL	10	0	
1	3%	10	0	
2	5%	10	0	
3	6%	10	0	
4	8%	10	0	
5	11%	10	0	

60149472 Ft Smith CERIODAPHNIA DUBIA SURVIVAl
File: 6149472D Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	10	1.000	1.000	1.000
2	3%	10	1.000	1.000	1.000
3	5%	10	1.000	1.000	1.000
4	6%	10	1.000	1.000	1.000
5	8%	10	1.000	1.000	1.000
6	11%	10	1.000	1.000	1.000

60149472 Ft Smith CERIODAPHNIA DUBIA SURVIVAl
File: 6149472D Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	CONTROL	0.000	0.000	0.000	0.00
2	3%	0.000	0.000	0.000	0.00
3	5%	0.000	0.000	0.000	0.00
4	6%	0.000	0.000	0.000	0.00
5	8%	0.000	0.000	0.000	0.00
6	11%	0.000	0.000	0.000	0.00

60149472 Ft Smith CERIODAPHNIA DUBIA REPRODU
File: 6149472E 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	3	16	21	17	3

Calculated Chi-Square goodness of fit test statistic = 1.2529
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

60149472 Ft Smith CERIODAPHNIA DUBIA REPRODU
File: 6149472E Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 0.86

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.

60149472 Ft Smith CERIODAPHNIA DUBIA REPRODU
File: 6149472E Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	10	17.000	25.000	21.000
2	3%	10	16.000	28.000	22.600
3	5%	10	14.000	25.000	21.700
4	6%	10	17.000	25.000	20.800
5	8%	10	17.000	27.000	21.600
6	11%	10	17.000	26.000	22.200

60149472 Ft Smith CERIODAPHNIA DUBIA REPRODU
File: 6149472E Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	CONTROL	8.444	2.906	0.919	13.84
2	3%	11.378	3.373	1.067	14.93
3	5%	10.233	3.199	1.012	14.74
4	6%	6.622	2.573	0.814	12.37
5	8%	10.933	3.307	1.046	15.31
6	11%	10.622	3.259	1.031	14.68

60149472 Ft Smith CERIODAPHNIA DUBIA REPRODU
File: 6149472E Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	23.550	4.710	0.485
Within (Error)	54	524.100	9.706	
Total	59	547.650		

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

60149472 Ft Smith CERIODAPHNIA DUBIA REPRODU
File: 6149472E Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	21.000	21.000		
2	3%	22.600	22.600	-1.148	
3	5%	21.700	21.700	-0.502	
4	6%	20.800	20.800	0.144	
5	8%	21.600	21.600	-0.431	
6	11%	22.200	22.200	-0.861	

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

60149472 Ft Smith CERIODAPHNIA DUBIA REPRODU
File: 6149472E 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	3.218	15.3	-1.600
3	5%	10	3.218	15.3	-0.700
4	6%	10	3.218	15.3	0.200
5	8%	10	3.218	15.3	-0.600
6	11%	10	3.218	15.3	-1.200

Conc. ID	1	2	3	4	5	6
Conc. Tested	0	3	5	6	8	11
Response 1	18	28	21	20	24	22
Response 2	19	20	24	21	18	17
Response 3	25	24	23	22	27	20
Response 4	21	25	25	17	19	26
Response 5	18	16	22	23	17	25
Response 6	25	24	14	20	23	24
Response 7	22	25	21	20	25	25
Response 8	23	22	22	25	19	25
Response 9	22	20	20	23	23	20
Response 10	17	22	25	17	21	18

*** Inhibition Concentration Percentage Estimate ***
Toxicant/Effluent: Ft Smith
Test Start Date: 7/23/13 Test Ending Date: 7/30/13
Test Species: Dubia
Test Duration: 7 Day
DATA FILE:

Conc. ID	Number Replicates	Concentration	Response Means	Std. Dev.	Pooled Response Means
1	10	0.000	21.000	2.906	21.800
2	10	3.000	22.600	3.373	21.800
3	10	5.000	21.700	3.199	21.700
4	10	6.000	20.800	2.573	21.533
5	10	8.000	21.600	3.307	21.533
6	10	11.000	22.200	3.259	21.533

*** 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	5	6	8	11
Response 1	.385	.332	.318	.399	.385	.394
Response 2	.407	.380	.384	.398	.328	.363
Response 3	.372	.336	.408	.303	.395	.322
Response 4	.352	.385	.335	.375	.408	.424
Response 5	.301	.395	.401	.402	.309	.389

*** Inhibition Concentration Percentage Estimate ***
Toxicant/Effluent: Ft Smith
Test Start Date: 7/23/13 Test Ending Date: 7/30/13
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	0.363	0.040	0.370
2	5	3.000	0.366	0.029	0.370
3	5	5.000	0.369	0.040	0.370
4	5	6.000	0.375	0.042	0.370
5	5	8.000	0.365	0.044	0.370
6	5	11.000	0.378	0.038	0.370

*** 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.

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www.pacelabs.com

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

APPENDIX B
CHAIN OF CUSTODY FORMS

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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.

Page: 1 of 1

1695982

Section A — Required Client Information:

Company: City of Fort Smith
Address: 3900 Kelley Hwy Ft. Smith AR 72904
Email To:
Phone: 4794842335 Fax:
Requested Due Date/TAT:

Section B — Required Project Information:

Report To: Don Clowers
Copy To:
Purchase Order No.:
Project Name: MASSARD BIOMONITORING
Project Number:

Section C — Invoice Information:

Attention: Same as A + B
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: AR

Section D — Required Client Information

Matrix Codes (MATRIX / CODE): Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Tissue TS; Other OT

ITEM #	SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Requested Analysis Filtered (Y/N)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
	Analysis Test ↓																	Y/N		
																		Chronic Ceriodaphnia		
1	MASSARD EFFLUENT	WW	C	7/21/13	0800	7/22/13	0800									X	ICE	N	N	16Cub
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: Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
T.Cl2 = <0.01 mg/L	Kristy L Cantu	7/22/13	0900	[illegible]	7/23/13	1445	2.4	Y	Y	Y
F.Cl2 = <0.01 mg/L										

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Kristy L Cantu

SIGNATURE of SAMPLER: Kristy L Cantu

DATE Signed (MM/DD/YY): 7/22/13

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing [illegible]

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CHAIN-OF-CUSTODY / Analytical Request Document

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Page: 1 of 1

1695981

Section A Required Client Information:

Company: City of Fort Smith
Address: 3900 Kelley Hwy Fort Smith 72904
Email To:
Phone: 479 784 2335 Fax:
Requested Due Date/TAT:

Section B Required Project Information:

Report To: Don Clover
Copy To:
Purchase Order No.:
Project Name: MASSARD BIOMONITORING
Project Number:

Section C Invoice Information:

Attention: SAME AS Section A+B
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: AR

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Matrix Codes MATRIX / CODE

Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Tissue	TS
Other	OT

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Y/N	Analysis Test ↓	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																		Y/N	↓ Analysis Test ↓	
1	MASSARD Effluent	WW	C	7/23/13	0800	7/24/13	0800		1								X	X	Chronic Mimm Ceriodaphnia		16Cab
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			
$T.Cl_2$ = 0.01 mg/L	Kristy L Canto	7/24/13	0950	[illegible] Pace	7/25/13	1420	3.2	Y	Y	Y
FCl_2 = 0.02 mg/L										

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Kristy L Canto
SIGNATURE of SAMPLER: Kristy L Canto
DATE Signed (MM/DD/YY): 7/24/13

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

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

F-ALL-Q-020rev.07, 15-May-2007

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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.

Page: 1 of 1

1695980

Section A Required Client Information:

Company: City of Fort Smith
Address: 3900 Kelley Hwy
Fort Smith AR 72903
Email To:
Phone: 4797842334 Fax:
Requested Due Date/TAT:

Section B Required Project Information:

Report To: Don Clover
Copy To:
Purchase Order No.:
Project Name: MASSARD Biomonitoring
Project Number:

Section C Invoice Information:

Attention: same
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: AR

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Matrix Codes MATRIX / CODE

Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Tissue	TS
Other	OT

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Chronic Ceriodaphnia	Chronic Menomas	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	MASSARD EFFLUENT	WW	C	7/25/13	0800	7/26/13	0800		1								X ICE					16ccb
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. Cl2 = 0.03 mg/L F Cl2 = 0.02 mg/L	Kristy L Cantu	7/26/13	1000	Pace	7/27/13	0800	3.2	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Kristy L Cantu

SIGNATURE of SAMPLER: Kristy L Cantu DATE Signed (MM/DD/YY): 7/26/13

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

ORIGINAL

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

F-ALL-Q-020rev.07, 15-May-2007

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

APPENDIX C

REFERENCE TOXICANTS SUMMARY

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

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

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

Start: 7/23/13 14:50 End: 7/30/13 13:00

Reference Toxicant (NaCl) Pimephales promelas

Concentration of Toxicant	Avg. # of Live Organisms/replicate			
	0 hrs	24 hrs	48 hrs	7 days
10 g/l	40	9	3	0
8 g/l	40	37	30	6
6 g/l	40	40	40	22
4 g/l	40	40	40	38
2 g/l	40	40	40	39

IC25 (4.94 g/l Sodium Chloride)

Survival NOEC: 4.0 g/l

Reference Toxicant (NaCl) Ceriodaphnia Dubia

Concentration of Toxicant	Avg. # of Live Organisms/replicate			
	0 hrs	24 hrs	48 hrs	7 days
2.5 g/l	10	6	0	0
2.0 g/l	10	10	7	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 (1.20 g/l Sodium Chloride)

Survival NOEC: 1.5 g/l

Submitted By: Tim Harrell
Timothy Harrell, Technical Director

REPORT OF LABORATORY ANALYSIS

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

APPENDIX D
STATE AGENCY FORMS

Biomonitoring Form
Chronic Toxicity Summary Form
Pimephales promelas
Chemical Parameters Chart

Permittee: City of Fort Smith
NPDES No.: AR 0033278
Contact: Don Clover
Analyst: Tim Harrell
Mike Bollin

Sample No. 1 Collected: Date: 7/22/2013 Time: 8:00
Sample No. 2 Collected: Date: 7/24/2013 Time: 8:00
Sample No. 3 Collected: Date: 7/26/2013 Time: 8:00
Test Begin: Date: 7/23/2013 Time: 14:50
Test End: Date: 7/30/2013 Time: 13:00

Dilution: 0 / Day:	1	2	3	4	5	6	7	Comments
Temp (C)	25	25	25	25	25	25	25	
DO Initial	8.5	8.2	8.1	8.3	8.3	8.2	8.1	
DO Final	7.5	7.4	7.6	7.4	7.5	7.2	7.3	
pH Initial	7.67	7.46	7.67	7.56	7.62	7.61	7.52	
pH Final	7.71	7.51	7.78	7.6	7.7	7.61	7.68	
Alkalinity								
Hardness								
Conductivity								
Chlorine	<.1						<.1	

Dilution: 6 / Day:	1	2	3	4	5	6	7	Comments
Temp (C)	25	25	25	25	25	25	25	
DO Initial		8.2	8.1	8.3	8.4	8.2	8.1	
DO Final	7.5	7.5	7.6	7.4	7.6	7.2	7.3	
pH Initial		7.58	7.84	7.7	7.7	7.72	7.65	
pH Final	7.86	7.56	7.95	7.74	7.83	7.8	7.75	
Alkalinity								
Hardness								
Conductivity								
Chlorine								

Dilution: 3 / Day:	1	2	3	4	5	6	7	Comments
Temp (C)	25	25	25	25	25	25	25	
DO Initial		8.2	8.2	8.3	8.3	8.2	8.1	
DO Final	7.5	7.4	7.6	7.4	7.5	7.2	7.3	
pH Initial		7.54	7.79	7.64	7.66	7.68	7.6	
pH Final	7.82	7.52	7.89	7.69	7.78	7.74	7.7	
Alkalinity								
Hardness								
Conductivity								
Chlorine								

Dilution: 8 / Day:	1	2	3	4	5	6	7	Comments
Temp (C)	25	25	25	25	25	25	25	
DO Initial		8.1	8	8.2	8.4	8.1	8.1	
DO Final	7.5	7.5	7.6	7.4	7.6	7.3	7.3	
pH Initial		7.58	7.88	7.73	7.7	7.72	7.66	
pH Final	7.89	7.58	7.97	7.78	7.88	7.81	7.8	
Alkalinity								
Hardness								
Conductivity								
Chlorine								

Dilution: 5 / Day:	1	2	3	4	5	6	7	Comments
Temp (C)	25	25	25	25	25	25	25	
DO Initial		8.2	8.1	8.3	8.3	8.2	8.1	
DO Final	7.5	7.5	7.6	7.4	7.6	7.2	7.3	
pH Initial		7.56	7.83	7.68	7.69	7.7	7.63	
pH Final	7.85	7.55	7.92	7.72	7.81	7.76	7.73	
Alkalinity								
Hardness								
Conductivity								
Chlorine								

Dilution: 11 / Day:	1	2	3	4	5	6	7	Comments
Temp (C)	25	25	25	25	25	25	25	Init. 100%
DO Initial		8.1	8	8.2	8.5	8.1	8	7.1
DO Final	7.5	7.5	7.5	7.4	7.6	7.3	7.3	
pH Initial		7.62	7.96	7.78	7.72	7.74	7.7	7.41
pH Final	7.92	7.61	8.02	7.81	7.9	7.83	7.88	
Alkalinity								120
Hardness								82
Conductivity								497
Chlorine							<.1	<.1

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

Permittee: City of Fort Smith **NPDES No.:** AR 0033278

		Time:	Date:		Time:	Date:
Composite 1 Collected	**From**	8:00	7/21/2013	**To**	8:00	7/22/2013
Composite 2 Collected	**From**	8:00	7/23/2013	**To**	8:00	7/24/2013
Composite 3 Collected	**From**	8:00	7/25/2013	**To**	8:00	7/26/2013

Test initiated: **am/pm** 14:50 AM **date** 7/23/2013
Test terminated: **am/pm** 13:00 AM **date** 7/30/2013

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
5%	100	100	100	100	100	100	100	100	0
6%	100	100	100	100	100	100	100	100	0
8%	100	100	100	100	87.5	100	100	97.5	4.79
11%	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%	0.389	0.421	0.48	0.432	0.449	0.434	4.73
3%	0.47	0.475	0.489	0.432	0.417	0.457	4.14
5%	0.475	0.465	0.41	0.44	0.422	0.442	3.82
6%	0.402	0.43	0.484	0.472	0.457	0.449	4.55
8%	0.48	0.457	0.421	0.484	0.392	0.447	5.45
11%	0.423	0.485	0.458	0.429	0.411	0.441	4.15

*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	**(**	**8 %):**	**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	**(**	**8 %):**	**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: 11 **% effluent**
b) NOEC reproduction: 11 **% effluent**

Biomonitoring Form
Chronic Toxicity Summary Form
Ceriodaphnia dubia
Chemical Parameters Chart

Permittee: City of Fort Smith
NPDES No.: AR 0033278
Contact: Don Clover
Analyst: Tim Harrell
Mike Bollin

Sample No. 1 Collected: Date: 7/22/2013 Time: 8:00
Sample No. 2 Collected: Date: 7/24/2013 Time: 8:00
Sample No. 3 Collected: Date: 7/26/2013 Time: 8:00
Test Begin: Date: 7/23/2013 Time: 14:50
Test End: Date: 7/30/2013 Time: 13:00

Dilution: 0 Day:	1	2	3	4	5	6	7	Comments
Temp (C)	25	25	25	25	25	25	25	
DO Initial	8.5	8.2	8.1	8.3	8.3	8.2	8.1	
DO Final	7.5	7.4	7.6	7.4	7.5	7.2	7.3	
pH Initial	7.67	7.46	7.67	7.56	7.62	7.61	7.52	
pH Final	7.71	7.51	7.78	7.6	7.7	7.61	7.68	
Alkalinity								
Hardness								
Conductivity								
Chlorine	<.1						<.1	

Dilution: 6 Day:	1	2	3	4	5	6	7	Comments
Temp (C)	25	25	25	25	25	25	25	
DO Initial		8.2	8.1	8.3	8.4	8.2	8.1	
DO Final	7.5	7.5	7.6	7.4	7.6	7.2	7.3	
pH Initial		7.58	7.84	7.7	7.7	7.72	7.65	
pH Final	7.86	7.56	7.95	7.74	7.83	7.8	7.75	
Alkalinity								
Hardness								
Conductivity								
Chlorine								

Dilution: 3 Day:	1	2	3	4	5	6	7	Comments
Temp (C)	25	25	25	25	25	25	25	
DO Initial		8.2	8.2	8.3	8.3	8.2	8.1	
DO Final	7.5	7.4	7.6	7.4	7.5	7.2	7.3	
pH Initial		7.54	7.79	7.64	7.66	7.68	7.6	
pH Final	7.82	7.52	7.89	7.69	7.78	7.74	7.7	
Alkalinity								
Hardness								
Conductivit								
Chlorine								

Dilution: 8 Day:	1	2	3	4	5	6	7	Comments
Temp (C)	25	25	25	25	25	25	25	
DO Initial		8.1	8	8.2	8.4	8.1	8.1	
DO Final	7.5	7.5	7.6	7.4	7.6	7.3	7.3	
pH Initial		7.58	7.88	7.73	7.7	7.72	7.66	
pH Final	7.89	7.58	7.97	7.78	7.88	7.81	7.8	
Alkalinity								
Hardness								
Conductivit								
Chlorine								

Dilution: 5 Day:	1	2	3	4	5	6	7	Comments
Temp (C)	25	25	25	25	25	25	25	
DO Initial		8.2	8.1	8.3	8.3	8.2	8.1	
DO Final	7.5	7.5	7.6	7.4	7.6	7.2	7.3	
pH Initial		7.56	7.83	7.68	7.69	7.7	7.63	
pH Final	7.85	7.55	7.92	7.72	7.81	7.76	7.73	
Alkalinity								
Hardness								
Conductivit								
Chlorine								

Dilution: 11 Day:	1	2	3	4	5	6	7	Comments
Temp (C)	25	25	25	25	25	25	25	Init. 100%
DO Initial		8.1	8	8.2	8.5	8.1	8	7.1
DO Final	7.5	7.5	7.5	7.4	7.6	7.3	7.3	
pH Initial		7.62	7.96	7.78	7.72	7.74	7.7	7.41
pH Final	7.92	7.61	8.02	7.81	7.9	7.83	7.88	
Alkalinity								120
Hardness								82
Conductivit								497
Chlorine							<.1	<.1

Summary Reporting Forms
Chronic Biomonitoring

Ceriodaphnia dubia Survival and Reproduction

Permittee: City of Fort Smith **NPDES No.:** AR 0033278

		Time:	Date:		Time:	Date:
Composite 1 Collected	**From**	8:00	7/21/2013	**To**	8:00	7/22/2013
Composite 2 Collected	**From**	8:00	7/23/2013	**To**	8:00	7/24/2013
Composite 3 Collected	**From**	8:00	7/25/2013	**To**	8:00	7/26/2013

Test initiated: **am/pm** 14:50 AM **date** 7/23/2013
Test terminated: **am/pm** 13:00 AM **date** 7/30/2013

Dilution water used: **Receiving** **Reconstituted** X

Percent Survival

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

Number of Young Produced per Female @ End of Test

Rep	0	3	5	6	8	11
A	18	28	21	20	24	22
B	19	20	24	21	18	17
C	25	24	23	22	27	20
D	21	25	25	17	19	26
E	18	16	22	23	17	25
F	25	24	14	20	23	24
G	22	25	21	20	25	25
H	23	22	22	25	19	25
I	22	20	20	23	23	20
J	17	22	25	17	21	18
Mean	21	22.6	21.7	20.8	21.6	22.2
CV%*	13.84	14.93	14.74	12.37	15.31	14.68

***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	**(**	**8 %):**	**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	**(**	**8 %):**	**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:	**11 % effluent**
b) NOEC reproduction:	**11 % effluent**