

Sanitary Sewer Overflow (SSO) Monthly Report

Utility Name: Hot Springs Wastewater NPDES Permit No.: AR0033880 Monitoring Period (Month/Year) December / 2012

No Sanitary Sewer Overflows This Monitoring Period

Summary Report Code Descriptions

Cause(s) of SSO	SSO Impact	Action(s) Taken	Ultimate Discharge Location
CO -Construction	D -Debris	NEAH -No Evidence Adverse Health/Environmental Impact	CR -Creek/Stream/River (specify)
E -Equipment Failure	G -Grease	OEHC -Observed or Evidence of Human Contact	DI -Ditch
HC -Hydro Clean	LF -Line Failure	EFK -Evidence of Fish Kill	DR -Drop Inlet
R -Rainfall	RG -Roots/Grease		HR -Hand Rodded
RO -Roots	V -Vandalism		EN -Referred to Engineering
		PN -Public Notification	PA -Paved Area
			CB -Contained in Building

Location	Manhole #	Start Date of SSO	End Date of SSO	Estimated Volume (in gallons)	Cause of SSO	Environmental Impact	Action(s) Taken to Address SSO	Discharge Location
2600 Albert Pike Rd.	MH# 9451	12/09/2012	12/09/2012	10000	R	NEAH	HC & EC	CR-Lake Hamilton
Catherine Heights Rd	MH# 1750	12/09/2012	12/09/2012	500	R	NEAH	HC	CR-Gulpha
Fontana Rd.	MH# 1865	12/09/2012	12/09/2012	1000	R	NEAH	HC	CR—Hot Springs
Foxwood St.	MH# 8001	12/10/2012	12/10/2012	8000	E	NEAH	HC & EC	DI into Lake Hamilton
151 Sunnyside St	MH# 869	12/12/2012	12/12/2012	600	G & D	NEAH	HC & EC	DI
Albert Pike Rd	MH# 9451	12/26/2012	12/17/2012	Still Overflowing at time	R	NEAH		CR-Lake Hamilton
Fontana Rd	MH#1866	12/26/2012	12/27/2012	Unknown	Power Failure	NEAH	HC & EC	CR-Hot Springs
Albert Pike	MH # 9451	12/26/2012	12/28/2012	Unknown	R	NEAH	HC & EC	CR-Lake Hamilton
Carpenter Dam	Lift Station	12/31/2012	12/31/2012	6000	Power Failure	NEAH	HC & EC	DI
804 Quapaw Ave	MH # 520	12/30/2012	12/30/2012	500	LF	NEAH	HC	DR



Signature of Cognizant or Ranking Official

1-11-13

Date

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are

CONFIRMATION NUMBER

FE7C8E22-4158-490F-A64E-7C450E4C8747

(NOTE: You will need this number should you ever need to contact ADEQ concerning this report)

The following information has been sent.

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24-Hour Sanitary Sewer Overflow Report

SSO ID#: FE7C8E22-4158-490F-A64E-7C450E4C8747

Date Sent: 12/10/2012

SSO Bypass Upset

Facility Permit Number:	AR0033880	Facility name:	Hot Springs Wastewater
Date Overflow Began:	12/09/12	Time:	8:00 am
Date Overflow Ended:	12/09/12	Time:	10:30 pm

Location: **Manhole # 9451, 2600 Albert Pike Rd, Ran over in stream of Lake Hamilton.**

(Give address, manhole number-if numbered. Include where the overflow went-yard, ditch, stream, storm sewer, building, other).

Type of Overflow

- Manhole Overflow
- Lift Station Overflow
- Main Line Overflow
- Service Line Overflow
- Other Overflow Type:

(Enter overflow type if not listed)

Cause of Overflow

- I & I - Rainfall
- Roots
- Grease
- Debris
- Equipment Failure
- Construction
- Vandalism
- Power Failure
- Line Failure/Break
- Other Cause:

Volume: **10000**

(Give an estimate in gallons)

Impact of SSO Event: **SSO Reached Receiving Water (river,stream)**

Action Taken - Check all that apply

(Short term and long-term action, including clean-up and any plans to remediate I & I).

- | | |
|--|--|
| <input type="checkbox"/> Machine rodded | <input type="checkbox"/> Disinfected and Deodorized |
| <input type="checkbox"/> Jet-Vac | <input checked="" type="checkbox"/> Hydro Cleaned |
| <input type="checkbox"/> Hand rodded | <input checked="" type="checkbox"/> Spread Lime on Affected Area |
| <input type="checkbox"/> Used Generator To Power Pumps/Equipment | <input type="checkbox"/> Public Notification |
| <input type="checkbox"/> Other: Describe | Raked up |

Environmental Damage

- | | |
|--|---|
| <input type="checkbox"/> OEHC - Observed or Evidence of Human Contact | <input checked="" type="checkbox"/> NEAH - No Evidence of Adverse Health/Environmental Impact |
| <input type="checkbox"/> OEEI - Observed or Evidence of Environmental Impact | <input type="checkbox"/> EFK - Evidence of Fish Kill |

Reported By **Chris Gordon** Title **Maintenance Controller** Telephone Number **(501) 623-7963**

Additional Comments if Needed:

CONFIRMATION NUMBER

7C64ED05-9C07-4487-B81E-81C5875BE50E

(NOTE: You will need this number should you ever need to contact ADEQ concerning this report)

The following information has been sent.

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24-Hour Sanitary Sewer Overflow Report

SSO ID#: 7C64ED05-9C07-4487-B81E-81C5875BE50E

Date Sent: 12/10/2012

SSO Bypass Upset

Facility Permit Number:	AR0033880	Facility name:	Hot Springs Wastewater
Date Overflow Began:	12/9/2012	Time:	8:00 am
Date Overflow Ended:	12/9/2012	Time:	9:00 am

Location: **Manhole # 1750, 100 blk Catherine Heights Rd, Overflowed in Guppha Creek**

(Give address, manhole number-if numbered. Include where the overflow went-yard, ditch, stream, storm sewer, building, other).

Type of Overflow

- Manhole Overflow
- Lift Station Overflow
- Main Line Overflow
- Service Line Overflow
- Other Overflow Type:

(Enter overflow type if not listed)

Cause of Overflow

- I & I - Rainfall
- Roots
- Grease
- Debris
- Equipment Failure
- Construction
- Vandalism
- Power Failure
- Line Failure/Break
- Other Cause:

Volume: **500**

(Give an estimate in gallons)

Impact of SSO Event: **SSO Reached Receiving Water (river,stream)**

Action Taken - Check all that apply

(Short term and long-term action, including clean-up and any plans to remediate I & I).

- | | |
|--|---|
| <input type="checkbox"/> Machine rodded | <input type="checkbox"/> Disinfected and Deodorized |
| <input type="checkbox"/> Jet-Vac | <input checked="" type="checkbox"/> Hydro Cleaned |
| <input type="checkbox"/> Hand rodded | <input type="checkbox"/> Spread Lime on Affected Area |
| <input type="checkbox"/> Used Generator To Power Pumps/Equipment | <input type="checkbox"/> Public Notification |
| <input type="checkbox"/> Other: Describe | Raked up |

Environmental Damage

- | | |
|--|---|
| <input type="checkbox"/> OEHC - Observed or Evidence of Human Contact | <input checked="" type="checkbox"/> NEAH - No Evidence of Adverse Health/Environmental Impact |
| <input type="checkbox"/> OEEI - Observed or Evidence of Environmental Impact | <input type="checkbox"/> EFK - Evidence of Fish Kill |

Reported By **Chris Gordon** Title **Maintenance Controller** Telephone Number **(501) 623-7963**

Additional Comments if Needed:

CONFIRMATION NUMBER

2F0FDB24-02F5-4E09-827F-2D6CC56C231D

(NOTE: You will need this number should you ever need to contact ADEQ concerning this report)

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24-Hour Sanitary Sewer Overflow Report

SSO ID#: 2F0FDB24-02F5-4E09-827F-2D6CC56C231D

Date Sent: 12/10/2012

SSO Bypass Upset

Facility Permit Number:	AR0033880	Facility name:	Hot Springs Wastewater
Date Overflow Began:	12/9/2012	Time:	8:00 am
Date Overflow Ended:	12/9/2012	Time:	9:00 am

Location: **Manhole # 1865, Fontana Rd, Ran over into Hot Spring Creek.**

(Give address, manhole number-if numbered. Include where the overflow went-yard, ditch, stream; storm sewer, building, other).

Type of Overflow

- Manhole Overflow
- Lift Station Overflow
- Main Line Overflow
- Service Line Overflow
- Other Overflow Type:

(Enter overflow type if not listed)

Volume: **1000**

(Give an estimate in gallons)

Impact of SSO Event: **SSO Reached Receiving Water (river,stream)**

Cause of Overflow

- I & I - Rainfall
- Roots
- Grease
- Debris
- Equipment Failure
- Construction
- Vandalism
- Power Failure
- Line Failure/Break
- Other Cause:

Action Taken - Check all that apply

(Short term and long-term action, including clean-up and any plans to remediate I & I).

- Machine rodded Disinfected and Deodorized
- Jet-Vac Hydro Cleaned
- Hand rodded Spread Lime on Affected Area
- Used Generator To Power Pumps/Equipment Public Notification
- Other: Describe **Raked up**

Environmental Damage

- OEHC - Observed or Evidence of Human Contact NEAH - No Evidence of Adverse Health/Environmental Impact
- OEEI - Observed or Evidence of Environmental Impact EFK - Evidence of Fish Kill

Reported By **Chris Gordon** Title **Maintenance Controller** Telephone Number **(501) 623-7963**

Additional Comments if Needed:

CONFIRMATION NUMBER

0DD02A46-E50A-4670-9414-8FA273C0BCE3

(NOTE: You will need this number should you ever need to contact ADEQ concerning this report)

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24-Hour Sanitary Sewer Overflow Report

SSO ID#: 0DD02A46-E50A-4670-9414-8FA273C0BCE3

Date Sent: 12/10/2012

SSO Bypass Upset

Facility Permit Number:	AR0033880	Facility name:	Hot Springs Wastewater
Date Overflow Began:	12/10/2012	Time:	7:30 am
Date Overflow Ended:	12/10/2012	Time:	8:30 am

Location: **Manhole # 8001, end of Foxwood St, Ran over in ditch to Lake Hamilton.**

(Give address, manhole number-if numbered. Include where the overflow went-yard, ditch, stream, storm sewer, building, other).

Type of Overflow

- Manhole Overflow
- Lift Station Overflow
- Main Line Overflow
- Service Line Overflow
- Other Overflow Type:

(Enter overflow type if not listed)

Cause of Overflow

- I & I - Rainfall
- Roots
- Grease
- Debris
- Equipment Failure
- Construction
- Vandalism
- Power Failure
- Line Failure/Break
- Other Cause:

Volume: **8000**

(Give an estimate in gallons)

Impact of SSO Event: **SSO Reached Receiving Water (river,stream)**

Action Taken - Check all that apply

(Short term and long-term action, including clean-up and any plans to remediate I & I).

- | | |
|--|--|
| <input type="checkbox"/> Machine rodded | <input type="checkbox"/> Disinfected and Deodorized |
| <input type="checkbox"/> Jet-Vac | <input checked="" type="checkbox"/> Hydro Cleaned |
| <input type="checkbox"/> Hand rodded | <input checked="" type="checkbox"/> Spread Lime on Affected Area |
| <input type="checkbox"/> Used Generator To Power Pumps/Equipment | <input type="checkbox"/> Public Notification |
| <input type="checkbox"/> Other: Describe | Raked up |

Environmental Damage

- | | |
|--|---|
| <input type="checkbox"/> OEHC - Observed or Evidence of Human Contact | <input checked="" type="checkbox"/> NEAH - No Evidence of Adverse Health/Environmental Impact |
| <input type="checkbox"/> OEEI - Observed or Evidence of Environmental Impact | <input type="checkbox"/> EFK - Evidence of Fish Kill |

Reported By **Chris Gordon**

Title

Maintenance Controller

Telephone Number **(501) 623-7963**

Additional Comments if Needed:

CONFIRMATION NUMBER

93374D64-4F30-4157-9EBE-D3B54B13AC5B

(NOTE: You will need this number should you ever need to contact ADEQ concerning this report)

The following information has been sent.

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24-Hour Sanitary Sewer Overflow Report

SSO ID#: 93374D64-4F30-4157-9EBE-D3B54B13AC5B

Date Sent: 12/13/2012

SSO Bypass Upset

Facility Permit Number: **AR0033880**

Facility name:

Hot Springs Wastewater

Date Overflow Began: **12/12/2012**

Time:

3:00 pm

Date Overflow Ended: **12/12/2012**

Time:

3:30 pm

Location:

151 Sunnyside St Manhole # 869 oerflowed into ditch

(Give address, manhole number-if numbered. Include where the overflow went-yard, ditch, stream, storm sewer, building, other).

Type of Overflow

- Manhole Overflow
- Lift Station Overflow
- Main Line Overflow
- Service Line Overflow
- <=""> Other Overflow Type:

(Enter overflow type if not listed)

Volume:

600

(Give an estimate in gallons)

Impact of SSO Event:

SSO Reached Public Land Only (ground)

Cause of Overflow

- I & I - Rainfall
- Roots
- Grease
- Debris
- Equipment Failure
- Construction
- Vandalism
- Power Failure
- Line Failure/Break
- Other Cause:

Action Taken - Check all that apply

(Short term and long-term action, including clean-up and any plans to remediate I & I).

- Machine rodded
- Jet-Vac
- Hand rodded
- Used Generator to Power Pumps/Equipment
- Other: Describe
- Disinfected and Deodorized
- Hydro Cleaned
- Spread Lime on Affected Area
- Public Notification

Environmental Damage

- OEHC - Observed or Evidence of Human Contact
- OEEI - Observed or Evidence of Environmental Impact
- NEAH - No Evidence of Adverse Health/Environmental Impact
- EFK - Evidence of Fish Kill

Reported By **Shawn Davis** Title **Sewer Collection Manager** Telephone Number **(501) 623-6981**

Additional Comments if Needed:

[Empty box for additional comments]

CONFIRMATION NUMBER

7C19D0C1-A8F8-4973-AD5E-E67DE3802EC9

(NOTE: You will need this number should you ever need to contact ADEQ concerning this report)

The following information has been sent.

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24-Hour Sanitary Sewer Overflow Report

SSO ID#: 7C19D0C1-A8F8-4973-AD5E-E67DE3802EC9

Date Sent: 12/27/2012

SSO Bypass Upset

Facility Permit Number:	AR0033880	Facility name:	Hot Springs Wastewater
Date Overflow Began:	12/26/2012	Time:	8:00 pm
Date Overflow Ended:	12/17/2012	Time:	12:00 am
Location:	Manhole #9451, Albert Pike Road, Ran over in Lake Hamilton		

(Give address, manhole number-if numbered. Include where the overflow went-yard, ditch, stream, storm sewer, building, other).

Type of Overflow

- Manhole Overflow
- Lift Station Overflow
- Main Line Overflow
- Service Line Overflow
- Other Overflow Type:

(Enter overflow type if not listed)

Cause of Overflow

- I & I - Rainfall
- Roots
- Grease
- Debris
- Equipment Failure
- Construction
- Vandalism
- Power Failure
- Line Failure/Break
- Other Cause:

Volume: **unknown**

(Give an estimate in gallons)

Impact of SSO Event: **SSO Reached Receiving Water (river,stream)**

Action Taken - Check all that apply

(Short term and long-term action, including clean-up and any plans to remediate I & I).

- | | |
|--|---|
| <input type="checkbox"/> Machine rodded | <input type="checkbox"/> Disinfected and Deodorized |
| <input type="checkbox"/> Jet-Vac | <input type="checkbox"/> Hydro Cleaned |
| <input type="checkbox"/> Hand rodded | <input type="checkbox"/> Spread Lime on Affected Area |
| <input type="checkbox"/> Used Generator To Power Pumps/Equipment | <input type="checkbox"/> Public Notification |
| <input type="checkbox"/> Other: Describe | |

Environmental Damage

- | | |
|--|---|
| <input type="checkbox"/> OEHC - Observed or Evidence of Human Contact | <input checked="" type="checkbox"/> NEAH - No Evidence of Adverse Health/Environmental Impact |
| <input type="checkbox"/> OEEI - Observed or Evidence of Environmental Impact | <input type="checkbox"/> EFK - Evidence of Fish Kill |

Reported By **Chris Gordon** Title **Maintenance Controller** Telephone Number **(501) 623-7963**

Additional Comments if Needed: **Manhole is still running over at this point due to the I&I .**

CONFIRMATION NUMBER

685917C9-ABC5-4FF6-B2C5-8D89C753DF0F

(NOTE: You will need this number should you ever need to contact ADEQ concerning this report)

The following information has been sent.

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24-Hour Sanitary Sewer Overflow Report

SSO ID#: 685917C9-ABC5-4FF6-B2C5-8D89C753DF0F

Date Sent: 12/27/2012

SSO Bypass Upset

Facility Permit Number: **AR0033880**
 Date Overflow Began: **12/26/2012**
 Date Overflow Ended: **12/17/2012**

Facility name: **Hot Springs Wastewater**
 Time: **8:00 pm**
 Time: **12:00 am**

Location: **Manhole # 1866, Fontana Rd, ran over in Hot Springs Creek**

(Give address, manhole number-if numbered. Include where the overflow went-yard, ditch, stream, storm sewer, building, other).

Type of Overflow

- Manhole Overflow
- Lift Station Overflow
- Main Line Overflow
- Service Line Overflow
- Other Overflow Type:

(Enter overflow type if not listed)

Cause of Overflow

- I & I - Rainfall
- Roots
- Grease
- Debris
- Equipment Failure
- Construction
- Vandalism
- Power Failure
- Line Failure/Break
- Other Cause:

Volume:

Unknown
(Give an estimate in gallons)

Impact of SSO Event:

SSO Reached Receiving Water (river,stream)

Action Taken - Check all that apply

(Short term and long-term action, including clean-up and any plans to remediate I & I).

- Machine rodded Disinfected and Deodorized
- Jet-Vac Hydro Cleaned
- Hand rodded Spread Lime on Affected Area
- Used Generator To Power Pumps/Equipment Public Notification
- Other: Describe

Environmental Damage

- OEHC - Observed or Evidence of Human Contact NEAH - No Evidence of Adverse Health/Environmental Impact
- OEEI - Observed or Evidence of Environmental Impact EFK - Evidence of Fish Kill

Reported By **Chris Gordon**

Title **Maintenance Controller**

Telephone Number **(501) 623-7963**

Additional Comments if Needed:

CONFIRMATION NUMBER

925D71AD-4426-49A8-83E5-FDA0476F78EF

(NOTE: You will need this number should you ever need to contact ADEQ concerning this report)

The following information has been sent.

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24-Hour Sanitary Sewer Overflow Report

SSO ID#: 925D71AD-4426-49A8-83E5-FDA0476F78EF

Date Sent: 12/28/2012

SSO Bypass Upset

Facility Permit Number:	AR0033880	Facility name:	Hot Springs Wastewater
Date Overflow Began:	12/26/2012	Time:	8:00 pm
Date Overflow Ended:	12/28/2012	Time:	8:00 am

Location: **Manhole # 9451, Albert Pike Road, Ran over in to stream of Lake Hamilton.**

(Give address, manhole number-if numbered. Include where the overflow went-yard, ditch, stream, storm sewer, building, other).

Type of Overflow

- Manhole Overflow
- Lift Station Overflow
- Main Line Overflow
- Service Line Overflow
- Other Overflow Type:

(Enter overflow type if not listed)

Cause of Overflow

- I & I - Rainfall
- Roots
- Grease
- Debris
- Equipment Failure
- Construction
- Vandalism
- Power Failure
- Line Failure/Break
- Other Cause:

Volume: **unknown**

(Give an estimate in gallons)

Impact of SSO Event: **SSO Reached Receiving Water (river,stream)**

Action Taken - Check all that apply

(Short term and long-term action, including clean-up and any plans to remediate I & I).

- | | |
|--|--|
| <input type="checkbox"/> Machine rodded | <input type="checkbox"/> Disinfected and Deodorized |
| <input type="checkbox"/> Jet-Vac | <input checked="" type="checkbox"/> Hydro Cleaned |
| <input type="checkbox"/> Hand rodded | <input checked="" type="checkbox"/> Spread Lime on Affected Area |
| <input type="checkbox"/> Used Generator To Power Pumps/Equipment | <input type="checkbox"/> Public Notification |
| <input type="checkbox"/> Other: Describe | Raked up |

Environmental Damage

- | | |
|--|---|
| <input type="checkbox"/> OEHC - Observed or Evidence of Human Contact | <input checked="" type="checkbox"/> NEAH - No Evidence of Adverse Health/Environmental Impact |
| <input type="checkbox"/> OEEI - Observed or Evidence of Environmental Impact | <input type="checkbox"/> EFK - Evidence of Fish Kill |

Reported By **Chris Gordon** Title **Maintenance Controller** Telephone Number **(501) 623-7963**

Additional Comments if Needed:

CONFIRMATION NUMBER

73A156EE-9C5F-4B1B-8979-0E6109364964

(NOTE: You will need this number should you ever need to contact ADEQ concerning this report)

The following information has been sent.

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24-Hour Sanitary Sewer Overflow Report

SSO ID#: 73A156EE-9C5F-4B1B-8979-0E6109364964

Date Sent: 12/31/2012

SSO Bypass Upset

Facility Permit Number:	AR0033880	Facility name:	Hot Springs Wastewater
Date Overflow Began:	12/31/2012	Time:	7:00 am
Date Overflow Ended:	12/31/2012	Time:	9:20 am

Location: **Carpenter dam pump station, on Lake Park Road, ran over in ditch.**

(Give address, manhole number-if numbered. Include where the overflow went-yard, ditch, stream, storm sewer, building, other).

Type of Overflow

- Manhole Overflow
- Lift Station Overflow
- Main Line Overflow
- Service Line Overflow
- Other Overflow Type:

(Enter overflow type if not listed)

Volume: **6000**

(Give an estimate in gallons)

Impact of SSO Event: **SSO Reached Receiving Water (river,stream)**

Cause of Overflow

- I & I - Rainfall
- Roots
- Grease
- Debris
- Equipment Failure
- Construction
- Vandalism
- Power Failure
- Line Failure/Break
- Other Cause:

Action Taken - Check all that apply

(Short term and long-term action, including clean-up and any plans to remediate I & I).

- | | |
|--|--|
| <input type="checkbox"/> Machine rodded | <input type="checkbox"/> Disinfected and Deodorized |
| <input type="checkbox"/> Jet-Vac | <input checked="" type="checkbox"/> Hydro Cleaned |
| <input type="checkbox"/> Hand rodded | <input checked="" type="checkbox"/> Spread Lime on Affected Area |
| <input type="checkbox"/> Used Generator To Power Pumps/Equipment | <input type="checkbox"/> Public Notification |
| <input type="checkbox"/> Other: Describe | raked up |

Environmental Damage

- OEHC - Observed or Evidence of Human Contact
- NEAH - No Evidence of Adverse Health/Environmental Impact
- OEEI - Observed or Evidence of Environmental Impact
- EFK - Evidence of Fish Kill

Reported By **Chris Gordon** Title **Maintenance Controller** Telephone Number **(501) 623-7963**

Additional Comments if Needed:

CONFIRMATION NUMBER

046BBE3E-EEEF-4F14-AEB4-EE6FF35CD87A

(NOTE: You will need this number should you ever need to contact ADEQ concerning this report)

The following information has been sent.

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24-Hour Sanitary Sewer Overflow Report

SSO ID#: 046BBE3E-EEEF-4F14-AEB4-EE6FF35CD87A

Date Sent: 12/31/2012

SSO Bypass Upset

Facility Permit Number: **AR0033880**

Facility name:

Hot Springs Wastewater

Date Overflow Began: **12/30/2012**

Time:

2:30 pm

Date Overflow Ended: **12/30/2012**

Time:

3:45 pm

Location:

804 Quapaw Ave Manhole #520 overflowed into storm sewer

(Give address, manhole number-if numbered. Include where the overflow went-yard, ditch, stream, storm sewer, building, other).

Type of Overflow

- Manhole Overflow
- Lift Station Overflow
- Main Line Overflow
- Service Line Overflow
- Other Overflow Type:

(Enter overflow type if not listed)

Cause of Overflow

- I & I - Rainfall
- Roots
- Grease
- Debris
- Equipment Failure
- Construction
- Vandalism
- Power Failure
- Line Failure/Break
- Other Cause: **Gas Services through top of sewer main.**

Volume: **500**

(Give an estimate in gallons)

Impact of SSO Event: **SSO Reached Receiving Water (river,stream)**

Action Taken - Check all that apply

(Short term and long-term action, including clean-up and any plans to remediate I & I).

- Machine rodded
- Jet-Vac
- Hand rodded
- Used Generator To Power Pumps/Equipment
- Other: Describe
- Disinfected and Deodorized
- Hydro Cleaned
- Spread Lime on Affected Area
- Public Notification

Environmental Damage

- OEHC - Observed or Evidence of Human Contact
- OEEL - Observed or Evidence of Environmental Impact
- NEAH - No Evidence of Adverse Health/Environmental Impact
- EFK - Evidence of Fish Kill

Reported By **Shawn Davis** Title **Sewer Collection Manager** Telephone Number **(501) 623-6981**

Additional Comments if Needed:



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Control No. 162234-1
Page 1 of 31

November 15, 2012

Test Results of
Fourth Quarter
Chronic 7-Day Renewal
Biomonitoring Testing
for
Plant Effluent
City of Hot Springs

Control No. 162234-1

Prepared for:

Mr. James Sorrells
City of Hot Springs
320 Davidson Drive
Hot Springs, AR 71901

Prepared by:

AMERICAN INTERPLEX CORPORATION
8600 Kanis Road
Little Rock, AR 72204-2322

City of Hot Springs
ATTN: Mr. James Sorrells
320 Davidson Drive
Hot Springs, AR 71901

Re: Chronic 7-Day Renewal utilizing *Pimephales promelas* (Fathead minnow) and *Ceriodaphnia dubia*
Plant Effluent - City of Hot Springs
NPDES Permit No. AR0033880 AFIN#26-00145

Dear Mr. James Sorrells:

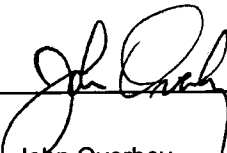
This report is the analytical results and supporting information for the samples submitted to American Interplex Corporation (AIC). The following results are applicable only to the sample identified by the control number referenced above. Accurate assessment of the data requires access to the entire document. Each section of the report has been reviewed and approved by the laboratory director or qualified designee.

Testing procedures and Quality Assurance were in accordance with "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" EPA-821-R-02-013, Fourth Edition, October 2002. Test results are summarized below:

Method 1000.0 Chronic *Pimephales promelas* (Fathead minnow) Survival and Growth Test: The No Observable Effects Concentration (NOEC) for survival occurred at 87 % effluent, which is above the critical dilution of 65 %. The NOEC for growth occurred at 87 % effluent, which is above the critical dilution of 65 %. **The sample, therefore, PASSED both lethal and sub-lethal effects for the Fathead minnow test.**

Method 1002.0 Chronic *Ceriodaphnia dubia* Survival and Reproduction Test: The No Observable Effects Concentration (NOEC) for survival occurred at 87 % effluent, which is above the critical dilution of 65 %. The NOEC for reproduction occurred at 87 % effluent, which is above the critical dilution of 65 %. **The sample, therefore, PASSED both lethal and sub-lethal effects for the *Ceriodaphnia dubia* test.**

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I. Control Acceptance Criteria

Pimephales promelas (Fathead minnow) Method 1000.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	97.5	PASS
Control Growth > or = 0.25 mg per Surviving minnow	0.473	PASS
Control Growth CV < or = 40%	17.7	PASS
Growth Minimum Significant Difference 12 to 30%	20.1	PASS
Critical Dilution CV < or = 40%	6.60	PASS

Ceriodaphnia dubia Method 1002.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	100	PASS
Control Reproduction > or = 15 per Surviving Female	18.0	PASS
Control CV < or = 40% per Surviving Female	21.8	PASS
Reproduction Minimum Significant Difference 13 to 47%	18.2	PASS
Critical Dilution CV < or = 40%	17.7	PASS

II. Outlined Report

A. Introduction

1. Permit Number: AR0033880 AFIN#26-00145
2. Test Requirements: Chronic Biomonitoring, Quarterly
Test Methods 1000.0 and 1002.0
3. Receiving Stream: Lake Catherine

B. Source of Effluent/Dilution Water

1. Effluent Samples:

- a. Sampling Point: Plant Effluent
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	8.2	9.0	8.3
pH (standard units)	7.6	7.5	7.7
Alkalinity (mg/l as CaCO ₃)	73	92	94
Hardness (mg/l as CaCO ₃)	96	130	130
Conductivity (umhos/cm)	430	480	490
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05
Ammonia as N (mg/l)	<0.1	0.86	<0.1

2. Dilution Water Samples: Synthetic Soft Water #3926

- a. Dates Prepared: October 24 through November 7, 2012
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	8.0	8.2	8.1
pH (standard units)	7.8	7.7	7.7
Alkalinity (mg/l as CaCO ₃)	30	30	30
Hardness (mg/l as CaCO ₃)	43	48	44
Conductivity (umhos/cm)	160	160	170
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05

C. Test Methods

1. Test methods used:

Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, EPA-821-R-02-013; test Methods 1000.0 and 1002.0, Fathead Minnow Survival and Growth and *Ceriodaphnia dubia* Survival and Reproduction.

2. Endpoint: No Observable Effects Concentration (NOEC)

3. Test Conditions:

Pimephales promelas (Fathead minnow) Survival and Growth Method 1000.0

Date & Time Test Initiated: November 6, 2012 at 1120
Date & Time Test Terminated: November 13, 2012 at 1110
Type & Volume of Test Chamber: 500 ml disposable beaker
Volume of Sample: 250 ml
Number of Organisms per replicate: 8
Number of Replicates per dilution: 5

Ceriodaphnia dubia Survival and Growth Method 1002.0

Date & Time Test Initiated: November 6, 2012 at 1130
Date & Time Test Terminated: November 13, 2012 at 1140
Type & Volume of Test Chamber: 30 ml disposable beaker
Volume of Sample: 15 ml
Number of Organisms per replicate: 1
Number of Replicates per dilution: 10

4. Acclimation of test organisms: Obtained from in-house cultures

5. Test Temperature: 25 +/- 1 degree Celsius

D. Test Organisms

1. Scientific Name

- a. Test 1000.0 *Pimephales promelas*
- b. Test 1002.0 *Ceriodaphnia dubia*

III. Data Analysis

The data was analyzed using American Interplex Corporation's Laboratory Information Management Software based on Toxstat.

Pimephales promelas (Fathead minnow) survival data was transformed using the Arc Sine transformation. Normality and homogeneity of variance were checked using Shapiro-Wilk's. The survival data was then analyzed using Steel's Many-One Rank Test to determine the No Observable Effects Concentration (NOEC).

Fathead minnow growth data was analyzed for normality and homogeneity of variance using Shapiro-Wilk's and Bartlett's test. Dunnett's Test was used to determine the No Observable Effects Concentration (NOEC) for growth.

Ceriodaphnia dubia survival data was analyzed with Fisher's Exact Test. Reproduction data was analyzed using Kolmogorov's Test for Normality and analyzed with Steel's Many-One Rank Test to determine the No Observable Effects Concentration (NOEC) for Reproduction. Dunnett's Test was used to calculate the PMSD.

IV. Standard Reference Toxicants

American Interplex Corporation has an ongoing test organism culturing program. The sensitivity of the offspring is determined by performing a standard reference toxicant test with each effluent test. Sodium chloride in synthetic moderately hard water is used as prescribed in EPA-821-R-02-013.

Pimephales promelas (Fathead minnow)

Chronic reference tests are performed monthly.

A chronic reference test was performed on November 6, 2012 at 1340 to November 13, 2012 at 1340

The results were as follows: (Control No. 162257-1.)

Survival LC-50: 5479 mg/l

Growth IC-25: 4562 mg/l

Growth PMSD: 31

Ceriodaphnia dubia

Chronic reference tests are performed monthly.

A chronic reference test was performed on November 6, 2012 at 1245 to November 13, 2012 at 1445

The results were as follows: (Control No. 162257-2.)

Survival LC-50: 2236 mg/l

Growth IC-25: 769.9 mg/l

Growth PMSD: 15

V. Chemical Analysis/Quality Control

Parameter	Method	% Recovery	Relative % Difference
Alkalinity	SM 2320 B	NA	0.00
Hardness	EPA 200.7	100	1.35
pH	SM 4500-H+ B	101	1.33
Conductivity	EPA 120.1	110	1.87

VI. Organism History

Pimephales promelas (Fathead minnow)

Date: November 6, 2012

Age: <24 hours

Source: In-house culture

Water Chemistry Record:

Alkalinity: 57-64 mg/l

Hardness: 80-100 mg/l

Temperature: 25 deg.C

Ceriodaphnia dubia

Date: November 6, 2012

Age: <24 hours

Source: In-house culture

Water Chemistry Record:

Alkalinity: 57-64 mg/l

Hardness: 80-100 mg/l

Temperature: 25 deg.C

VII. Results Summary *Pimephales promelas*, Fathead minnow Larval Survival and Growth Test -- Method 1000.0

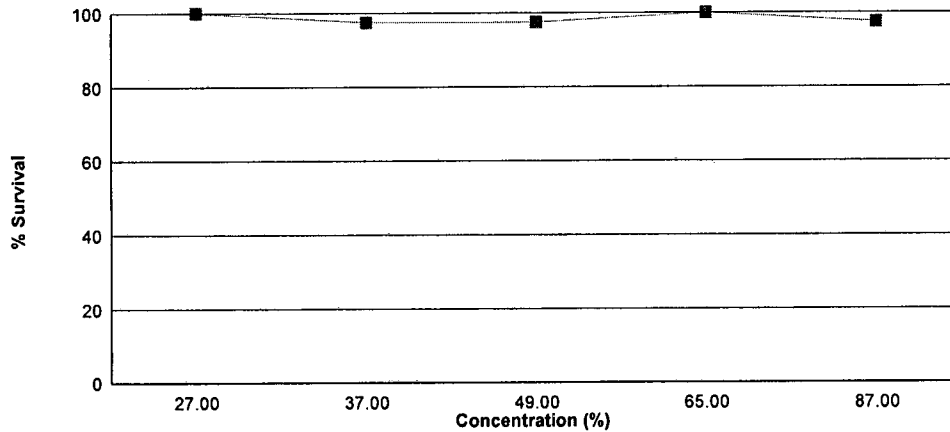
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (increase in weight) of the larvae.

Effluent dilutions for this test were 27 %, 37 %, 49 %, 65 %, 87 % in accordance with the NPDES permit.

The low flow or 'critical' dilution is specified in the NPDES permit as 65 % effluent.

The test was initiated on November 6, 2012 at 1120 and continued through November 13, 2012 at 1110. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

- a.) NOEC survival = 87 % effluent
- b.) NOEC growth = 87 % effluent



Summary of the 7-day Fathead Minnow Survival and Growth		
Concentration	Percent Survival	Mean Growth (mg)
Control	97.5	0.461
27 %	100	0.559
37 %	97.5	0.576
49 %	97.5	0.568
65 %	100	0.589
87 %	97.5	0.572

VII. Results Summary *Ceriodaphnia dubia*, Cladoceran Survival and Reproduction Test -- Method 1002.0

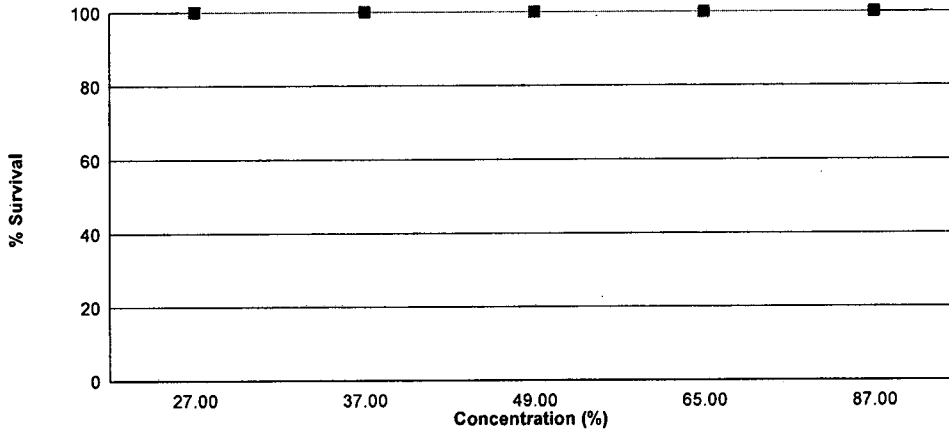
Neonates are exposed in a static renewal system to different concentrations of effluent with dilution water until 60% of surviving control organisms have three broods of offspring with an average of at least 15 young per female.

Effluent dilutions for this test were 27 %, 37 %, 49 %, 65 %, 87 % in accordance with the NPDES permit.

The low flow or 'critical' dilution is specified in the NPDES permit as 65 % effluent.

The test was initiated on November 6, 2012 at 1130 and continued through November 13, 2012 at 1140. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

- a.) NOEC survival = 87 % effluent
- b.) NOEC reproduction = 87 % effluent



Concentration	Percent Survival	Mean Reproduction
Control	100	18.0
27 %	100	18.1
37 %	100	20.0
49 %	100	18.7
65 %	100	18.2
87 %	100	16.9

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Survival

Date and Time Test Initiated: November 6, 2012 at 1120
Date and Time Test Terminated: November 13, 2012 at 1110

Concentration Replicate		Number of Survivors						
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Control	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	7
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
27 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
37 %	A	8	7	7	7	7	7	7
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
49 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	7	7
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
65 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
87 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	7	7	7	7
	E	8	8	8	8	8	8	8

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Growth

Test Initiated: November 6, 2012 at 1120
Test Terminated: November 13, 2012 at 1110

Drying Started: November 12, 2012 at 1135
Drying Ended: November 14, 2012 at 1220

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.93115	.93556	0.00441	8	0.551
	B	.93150	.93416	0.00266	8	0.332
	C	.93289	.93644	0.00355	8	0.444
	D	.93336	.93726	0.00390	8	0.488
	E	.93236	.93629	0.00393	8	0.491
27 %	A	.93251	.93685	0.00434	8	0.542
	B	.93109	.93597	0.00488	8	0.610
	C	.93736	.94143	0.00407	8	0.509
	D	.93623	.94090	0.00467	8	0.584
	E	.93446	.93887	0.00441	8	0.551
37 %	A	.93097	.93505	0.00408	8	0.510
	B	.93193	.93655	0.00462	8	0.578
	C	.93165	.93662	0.00497	8	0.621
	D	.93164	.93581	0.00417	8	0.521
	E	.92995	.93513	0.00518	8	0.648
49 %	A	.92901	.93423	0.00522	8	0.652
	B	.93289	.93658	0.00369	8	0.461
	C	.93023	.93475	0.00452	8	0.565
	D	.92946	.93359	0.00413	8	0.516
	E	.92979	.93496	0.00517	8	0.646
65 %	A	.93072	.93488	0.00416	8	0.520
	B	.92991	.93470	0.00479	8	0.599
	C	.92973	.93455	0.00482	8	0.602
	D	.94641	.95131	0.00490	8	0.612
	E	.94709	.95198	0.00489	8	0.611
87 %	A	.92936	.93424	0.00488	8	0.610
	B	.93047	.93471	0.00424	8	0.530
	C	.92974	.93470	0.00496	8	0.620
	D	.92934	.93332	0.00398	8	0.498
	E	.93030	.93512	0.00482	8	0.602

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: November 6, 2012 at 1130
Date and Time Test Terminated: November 13, 2012 at 1140

Concentration: Control														
Day	Replicate										No. of Young	No. of Adults	Young per Adult	
	1	2	3	4	5	6	7	8	9	10				
1	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	3	4	4	4	3	4	3	3	3	3	3	34	10	3.40
5	9	0	0	0	0	0	7	0	9	0	0	25	10	2.50
6	0	5	7	4	6	7	0	8	0	6	0	43	10	4.30
7	9	11	7	7	0	9	10	10	9	6	0	78	10	7.80
8														
TOTAL	21	20	18	15	9	20	20	21	21	15		180	10	18.0

Concentration: 27 %														
Day	Replicate										No. of Young	No. of Adults	Young per Adult	
	1	2	3	4	5	6	7	8	9	10				
1	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	2	3	3	4	3	4	3	3	4	3	3	32	10	3.20
5	8	0	0	0	0	0	6	0	8	0	0	22	10	2.20
6	0	5	5	8	6	1	10	10	0	9	0	54	10	5.40
7	11	9	0	10	12	8	9E	8	7	8	0	73	10	7.30
8														
TOTAL	21	17	8	22	21	13	19	21	19	20		181	10	18.1

E = Excluded fourth brood neonates

Concentration: 37 %														
Day	Replicate										No. of Young	No. of Adults	Young per Adult	
	1	2	3	4	5	6	7	8	9	10				
1	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	3	3	3	4	3	4	3	4	4	4	4	35	10	3.50
5	9	0	0	0	0	0	0	0	0	0	0	9	10	0.900
6	0	8	10	8	9	9	8	9	5	10	0	76	10	7.60
7	8	9	8	9	8	9	6	8	8	7	0	80	10	8.00
8														
TOTAL	20	20	21	21	20	22	17	21	17	21		200	10	20.0

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: November 6, 2012 at 1130
Date and Time Test Terminated: November 13, 2012 at 1140

Concentration: 49 %														
Day	Replicate										No. of Young	No. of Adults	Young per Adult	
	1	2	3	4	5	6	7	8	9	10				
1	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	4	3	3	4	2	3	2	4	3	3	31	10	3.10	
5	8	0	0	0	0	0	0	0	0	0	8	10	0.800	
6	0	7	9	8	9	6	5	6	7	6	63	10	6.30	
7	9	8	12	8	9	8	9	7	8	7	85	10	8.50	
8														
TOTAL	21	18	24	20	20	17	16	17	18	16	187	10	18.7	

Concentration: 65 %														
Day	Replicate										No. of Young	No. of Adults	Young per Adult	
	1	2	3	4	5	6	7	8	9	10				
1	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	3	2	4	4	4	4	3	4	4	3	35	10	3.50	
5	6	0	0	0	0	0	6	0	0	0	12	10	1.20	
6	0	7	7	9	5	9	0	3	7	8	55	10	5.50	
7	9	7	8	7	9	10	8	4	8	10	80	10	8.00	
8														
TOTAL	18	16	19	20	18	23	17	11	19	21	182	10	18.2	

Concentration: 87 %														
Day	Replicate										No. of Young	No. of Adults	Young per Adult	
	1	2	3	4	5	6	7	8	9	10				
1	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	2	3	2	3	2	3	3	4	4	4	30	10	3.00	
5	6	0	0	0	0	0	0	0	0	0	6	10	0.600	
6	2	8	7	7	6	6	6	6	6	9	63	10	6.30	
7	8	7	7	10	7	5	8	10	8	0	70	10	7.00	
8														
TOTAL	18	18	16	20	15	14	17	20	18	13	169	10	16.9	

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Survival

Transformation of Data				Transform: Arc Sin(Square Root(Y))	
Group	Identification	Rep	Value	Transformed	
1	Control	1	1.00000	1.39310	
1	Control	2	0.87500	1.20940	
1	Control	3	1.00000	1.39310	
1	Control	4	1.00000	1.39310	
1	Control	5	1.00000	1.39310	
2	27 %	1	1.00000	1.39310	
2	27 %	2	1.00000	1.39310	
2	27 %	3	1.00000	1.39310	
2	27 %	4	1.00000	1.39310	
2	27 %	5	1.00000	1.39310	
3	37 %	1	0.87500	1.20940	
3	37 %	2	1.00000	1.39310	
3	37 %	3	1.00000	1.39310	
3	37 %	4	1.00000	1.39310	
3	37 %	5	1.00000	1.39310	
4	49 %	1	1.00000	1.39310	
4	49 %	2	0.87500	1.20940	
4	49 %	3	1.00000	1.39310	
4	49 %	4	1.00000	1.39310	
4	49 %	5	1.00000	1.39310	
5	65 %	1	1.00000	1.39310	
5	65 %	2	1.00000	1.39310	
5	65 %	3	1.00000	1.39310	
5	65 %	4	1.00000	1.39310	
5	65 %	5	1.00000	1.39310	
6	87 %	1	1.00000	1.39310	
6	87 %	2	1.00000	1.39310	
6	87 %	3	1.00000	1.39310	
6	87 %	4	0.87500	1.20940	
6	87 %	5	1.00000	1.39310	

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Survival

Shapiro - Wilk's Test for Normality		Transform: Arc Sin(Square Root(Y))
<p>D = 0.108 W = 0.5958 Critical W = 0.9 (alpha = 0.01, N = 30) Critical W = 0.927 (alpha = 0.05, N = 30)</p> <p>Data FAIL normality test (alpha = 0.01).</p>		

Steel's Many-One Rank Test				Transform: Arc Sin(Square Root(Y))	
Ho:Control<Treatment					
Group	Identification	Rank Sum	Critical Value	DF	Sig 0.05
1	Control				
2	27 %	30.00	16.00	5.00	
3	37 %	27.50	16.00	5.00	
4	49 %	27.50	16.00	5.00	
5	65 %	30.00	16.00	5.00	
6	87 %	27.50	16.00	5.00	
Critical values are 1 tailed (k=5)					

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Growth

ANOVA Table				No Transformation	
SOURCE	DF	SS	MS	F	
Between	5	0.05418	0.01084	2.812	
Within (Error)	24	0.09252	0.003855		
Total	29	0.1467			
Critical F = 3.9 (alpha = 0.01, df = 5,24)					
2.62 (alpha = 0.05, df = 5,24)					
Since F > Critical F REJECT Ho: All equal (alpha = 0.05)					

Dunnett's Test - Table 1 of 2					No Transformation	
Ho:Control<Treatment						
Group	Identification	Transformed Mean	Mean In Original Units	T Stat	Sig 0.05	
1	Control	0.4612	0.4612			
2	27 %	0.5592	0.5592	-2.496		
3	37 %	0.5756	0.5756	-2.913		
4	49 %	0.568	0.568	-2.72		
5	65 %	0.5888	0.5888	-3.249		
6	87 %	0.572	0.572	-2.822		
Dunnett's critical value = 2.36 (1 Tailed, alpha = 0.05, df = 5,24)						

Dunnett's Test - Table 2 of 2						No Transformation	
Ho:Control<Treatment							
Group	Identification	Num of Reps	Min Sig Diff (In Orig. Units)	% of Control	Difference From Control		
1	Control	5					
2	27 %	5	0.09267	20.1	-0.098		
3	37 %	5	0.09267	20.1	-0.1144		
4	49 %	5	0.09267	20.1	-0.1068		
5	65 %	5	0.09267	20.1	-0.1276		
6	87 %	5	0.09267	20.1	-0.1108		

Appendix A2: Statistics

Ceriodaphnia dubia Survival

Fisher's Exact Test			
Identification	Alive	Dead	Total Animals
Control	10	0	10
27 %	10	0	10
Total	20	0	20

Critical Fisher's value (10,10,10) (alpha=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	Alive	Dead	Total Animals
Control	10	0	10
37 %	10	0	10
Total	20	0	20

Critical Fisher's value (10,10,10) (alpha=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	Alive	Dead	Total Animals
Control	10	0	10
49 %	10	0	10
Total	20	0	20

Critical Fisher's value (10,10,10) (alpha=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	Alive	Dead	Total Animals
Control	10	0	10
65 %	10	0	10
Total	20	0	20

Critical Fisher's value (10,10,10) (alpha=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.

Appendix A2: Statistics

Ceriodaphnia dubia Survival

Fisher's Exact Test			
Identification	Alive	Dead	Total Animals
Control	10	0	10
87 %	10	0	10
Total	20	0	20

Critical Fisher's value (10,10,10) (alpha=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 Test				
Group	Identification	Exposed	Dead	Sig 0.05
0	Control	10	0	
1	27 %	10	0	
2	37 %	10	0	
3	49 %	10	0	
4	65 %	10	0	
5	87 %	10	0	

Appendix A2: Statistics

Ceriodaphnia dubia Reproduction

Kolmogorov Test for Normality	No Transformation
D = 0.1359 D* = 1.066 Critical D* = 1.035 (alpha = 0.01, N = 60)	
Data FAIL normality test (alpha = 0.01).	

Steel's Many-One Rank Test					No Transformation
Ho:Control<Treatment					
Group	Identification	Rank Sum	Critical Value	DF	Sig 0.05
1	Control				
2	27 %	108.00	75.00	10.00	
3	37 %	121.50	75.00	10.00	
4	49 %	103.50	75.00	10.00	
5	65 %	101.00	75.00	10.00	
6	87 %	86.50	75.00	10.00	

Critical values are 1 tailed (k=5)

Appendix A2: Statistics

Ceriodaphnia dubia Reproduction

Dunnett's Test for PMSD Calculation (excluding deaths if applicable)

ANOVA Table				No Transformation	
SOURCE	DF	SS	MS	F	
Between	5	51.48	10.3	1.027	
Within (Error)	54	541.5	10.03		
Total	59	593			
Critical F = 3.38 (alpha = 0.01, df = 5,54)					
2.38 (alpha = 0.05, df = 5,54)					
Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)					

Dunnett's Test - Table 1 of 2					No Transformation	
Ho:Control<Treatment						
Group	Identification	Transformed Mean	Mean In Original Units	T Stat	Sig 0.05	
1	Control	18	18			
2	27 %	18.1	18.1	-0.0706		
3	37 %	20	20	-1.412		
4	49 %	18.7	18.7	-0.4942		
5	65 %	18.2	18.2	-0.1412		
6	87 %	16.9	16.9	0.7767		
Dunnett's critical value = 2.31 (1 Tailed, alpha = 0.05, df [used] = 5,40) (Actual df = 5,54)						

Dunnett's Test - Table 2 of 2					No Transformation	
Ho:Control<Treatment						
Group	Identification	Num of Reps	Min Sig Diff (In Orig. Units)	% of Control	Difference From Control	
1	Control	10				
2	27 %	10	3.272	18.2	-0.1	
3	37 %	10	3.272	18.2	-2	
4	49 %	10	3.272	18.2	-0.7	
5	65 %	10	3.272	18.2	-0.2	
6	87 %	10	3.272	18.2	1.1	

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: November 6, 2012 at 0815
Date and Time Test Terminated: November 13, 2012 at 1140

Effluent Conc.: Control		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.0	8.2	8.2	8.3	8.1	7.7	8.0
	Final *1	7.2	7.3	6.9	6.8	7.8	6.7	6.3
	Final *2	7.6	8.2	8.2	6.7	7.7	8.1	8.1
pH, units	Initial	7.8	7.8	7.7	7.7	7.7	7.8	7.8
	Final *1	7.8	7.4	7.5	7.5	8.0	7.5	7.2
	Final *2	8.4	7.9	8.0	7.4	8.0	8.1	7.9
Alkalinity, mg CaCO ₃ /l		30	NA	30	NA	30	NA	NA
Hardness, mg CaCO ₃ /l		43	NA	48	NA	44	NA	NA
Conductivity, umhos/cm		160	160	160	170	170	180	180
Res. Chlorine, mg/l		<0.05	NA	<0.05	NA	<0.05	NA	NA

Effluent Conc.: 27 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.8	8.1	8.3	8.1	8.5	8.1	8.3
	Final *1	4.6	6.9	7.2	6.6	8.1	6.7	6.9
	Final *2	7.8	7.9	8.4	6.4	7.7	8.2	8.1
pH, units	Initial	7.7	7.8	7.6	7.7	7.7	7.7	7.8
	Final *1	7.8	7.3	7.6	7.5	8.1	7.6	7.5
	Final *2	8.3	8.0	8.1	7.5	8.2	8.2	8.1

Effluent Conc.: 37 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.2	8.0	8.4	8.5	8.1	8.1	8.4
	Final *1	7.7	6.8	7.4	6.8	7.9	7.5	6.2
	Final *2	7.9	8.1	8.2	6.2	7.9	8.4	8.2
pH, units	Initial	7.7	7.8	7.7	7.8	7.7	7.7	7.8
	Final *1	7.9	7.3	8.1	7.5	8.2	7.7	7.4
	Final *2	8.4	8.1	8.2	7.5	8.2	8.3	8.2

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: November 6, 2012 at 0815
Date and Time Test Terminated: November 13, 2012 at 1140

Effluent Conc.: 49 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.1	8.1	8.3	8.0	8.1	7.4	8.2
	Final *1	4.0	6.9	7.7	7.0	7.8	6.6	5.9
	Final *2	7.6	8.2	8.2	6.3	7.6	8.3	8.1
pH, units	Initial	7.7	7.8	7.7	7.8	7.7	7.8	7.9
	Final *1	7.9	7.4	7.7	7.6	8.2	7.6	7.5
	Final *2	8.3	8.1	8.2	7.6	8.3	8.4	8.2

Effluent Conc.: 65 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.2	8.0	8.1	8.1	8.4	7.6	8.2
	Final *1	8.0	6.8	7.4	6.4	7.8	6.7	5.9
	Final *2	8.0	8.2	8.1	6.4	7.7	8.2	8.4
pH, units	Initial	7.6	7.8	7.7	7.8	7.7	7.7	7.9
	Final *1	8.1	7.4	8.2	7.6	8.3	7.7	7.5
	Final *2	8.4	8.1	8.2	7.6	8.3	8.5	8.2
Alkalinity, mg CaCO ₃ /l	55	NA	80	NA	81	NA	NA	NA
Hardness, mg CaCO ₃ /l	78	NA	100	NA	100	NA	NA	NA
Conductivity, umhos/cm	330	320	330	370	380	390	380	380
Res. Chlorine, mg/l	<0.05	NA	<0.05	NA	<0.05	NA	NA	NA

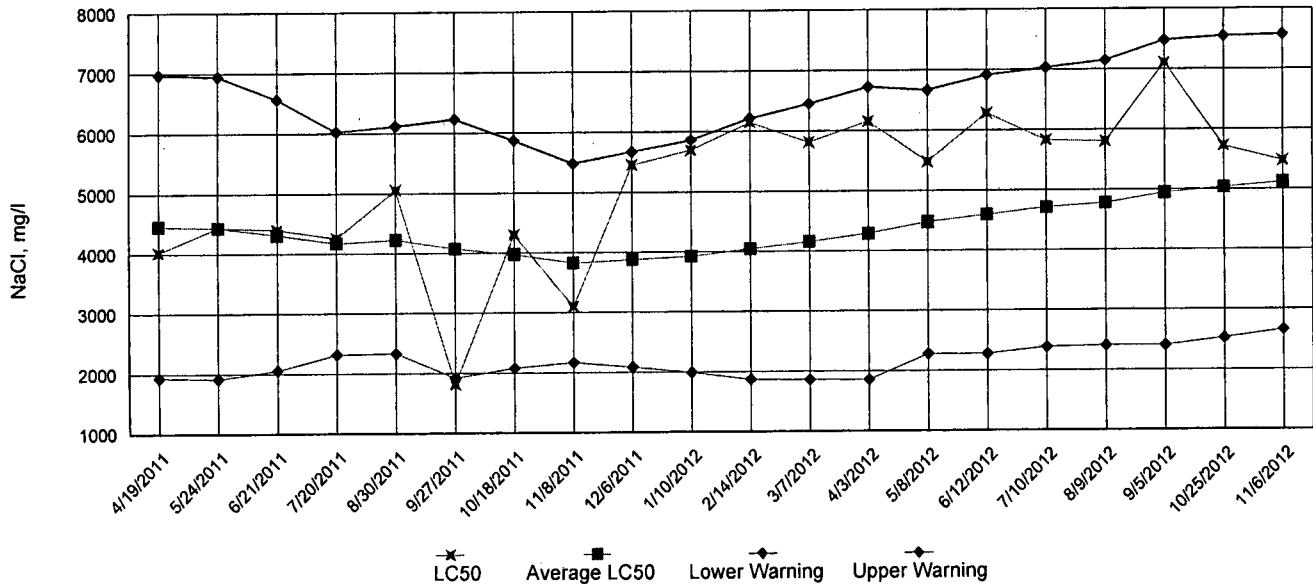
Effluent Conc.: 87 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.0	8.0	8.1	7.9	8.5	7.8	8.3
	Final *1	4.2	6.8	7.5	7.0	8.1	6.9	6.4
	Final *2	7.8	8.2	8.4	6.6	7.9	8.2	8.4
pH, units	Initial	7.6	7.8	7.6	7.7	7.7	7.7	7.9
	Final *1	8.0	7.5	7.8	7.8	8.4	7.8	7.6
	Final *2	8.4	8.2	8.3	7.8	8.4	8.5	8.3

*1 = data from the *Pimephales promelas* (Fathead Minnow) test *2 = data from the *Ceriodaphnia dubia* test

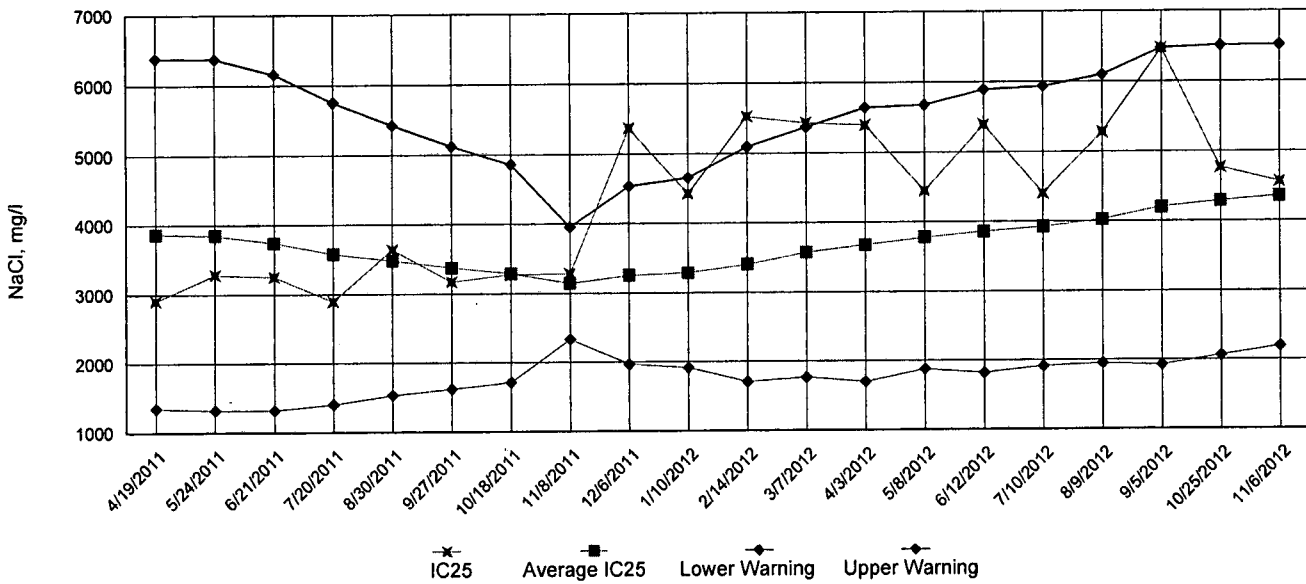
Appendix A4: Test 1000.0

Chronic Reference Toxicant, *Pimephales promelas* (Fathead Minnow)

LC50 Survival Data

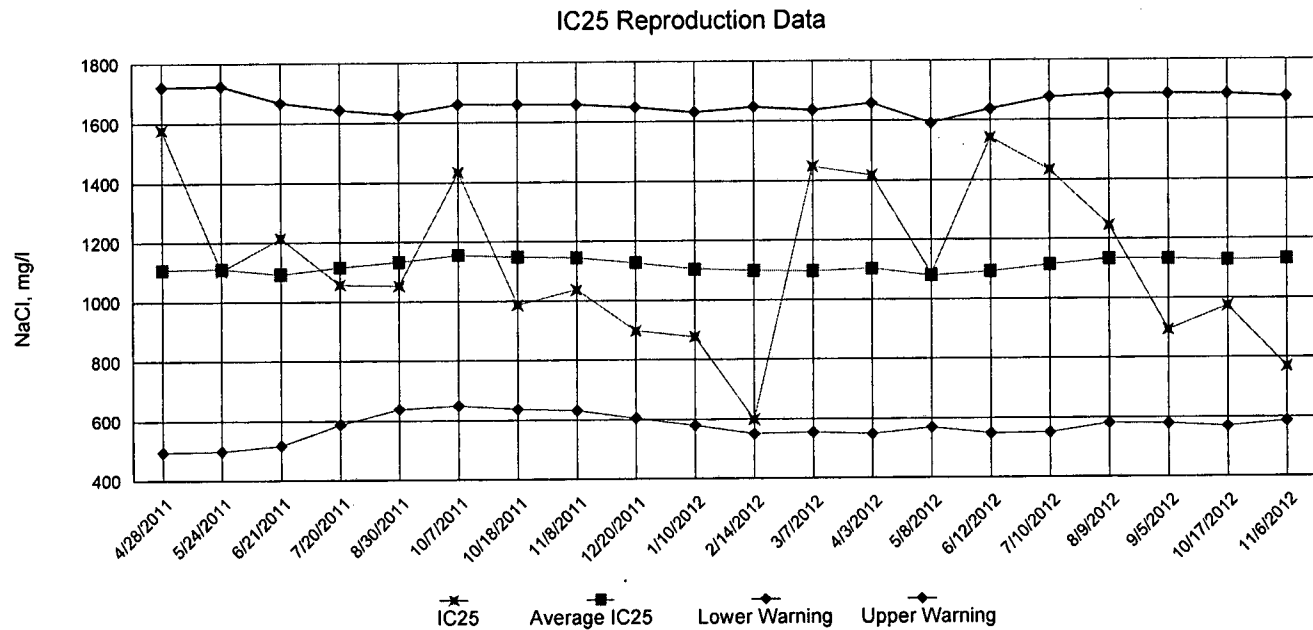
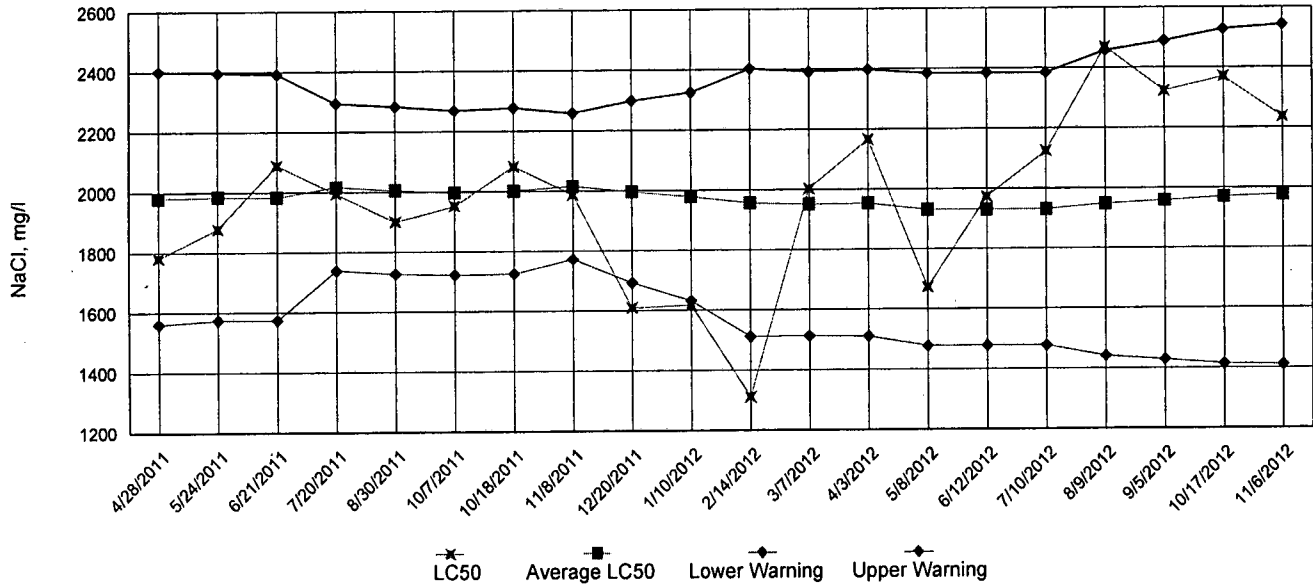


IC25 Growth Data



Appendix A4: Test 1002.0
Chronic Reference Toxicant, *Ceriodaphnia dubia*

LC50 Survival Data



Appendix B: Test 1000.0

SUMMARY REPORTING FORMS
CHRONIC BIOMONITORING
Pimephales promelas (Fathead Minnow)
SURVIVAL AND GROWTH

Permittee: City of Hot Springs

NPDES No.: AR0033880 AFIN#26-00145

Date and Time Test Initiated: November 6, 2012 at 1120

Date and Time Test Terminated: November 13, 2012 at 1110

Dilution water used: Synthetic Soft Water #3926

DATA TABLE FOR SURVIVAL

Effluent Conc. %	Percent Survival in replicate chambers					Mean percent survival			CV%
	A	B	C	D	E	24 hr	48 hr	7 days	
Control	100	87.5	100	100	100	100	100	97.5	5.73
27 %	100	100	100	100	100	100	100	100	0.00
37 %	87.5	100	100	100	100	100	97.5	97.5	5.73
49 %	100	87.5	100	100	100	100	100	97.5	5.73
65 %	100	100	100	100	100	100	100	100	0.00
87 %	100	100	100	87.5	100	100	100	97.5	5.73

DATA TABLE FOR GROWTH

Effluent Conc. %	Average dry weight, mg replicate chambers					Mean dry weight, mg	CV%
	A	B	C	D	E		
Control	0.551	0.332	0.444	0.488	0.491	0.461	17.7
27 %	0.542	0.610	0.509	0.584	0.551	0.559	6.97
37 %	0.510	0.578	0.621	0.521	0.648	0.576	10.5
49 %	0.652	0.461	0.565	0.516	0.646	0.568	14.5
65 %	0.520	0.599	0.602	0.612	0.611	0.589	6.60
87 %	0.610	0.530	0.620	0.498	0.602	0.572	9.53

CV = Coefficient of variation = standard deviation * 100 / mean

Appendix B: Test 1000.0
SUMMARY REPORTING FORMS
CHRONIC BIOMONITORING
Pimephales promelas (Fathead Minnow)
SURVIVAL AND GROWTH

1. Steel's Many-One Rank Test:

Is the mean survival significantly different ($p=0.05$) than the control survival for the % effluent corresponding to (lethality):

a.) LOW FLOW OR CRITICAL DILUTION	(65 %)	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<input type="checkbox"/> YES	<input type="checkbox"/> NO

2. Dunnett's Test:

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

a.) LOW FLOW OR CRITICAL DILUTION	(65 %)	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<input type="checkbox"/> YES	<input type="checkbox"/> NO

3. If you answered NO to 1.a) enter [0] otherwise enter [1]: 0 (TLP6C)
4. If you answered NO to 2.a) enter [0] otherwise enter [1]: 0 (TGP6C)
5. NOEC Pimephales Lethality: 87 % (TOP6C)
6. LOEC Pimephales Lethality: 87 % (TXP6C)
7. NOEC Pimephales Sublethality: 87 % (TPP6C)
8. LOEC Pimephales Sublethality: 87 % (TYP6C)
9. Coefficient of variation for Pimephales growth: 17.7 (TQP6C)

Appendix B: Test 1000.0

CHRONIC TOXICITY SUMMARY FORM
Pimephales promelas (Fathead minnow)
CHEMICAL PARAMETERS CHART

PERMITTEE: City of Hot Springs
NPDES NO.: AR0033880 AFIN#26-00145
CONTACT: Mr. James Sorrells
ANALYST: 275, 280, 298, 304

2400
2400
2400

Test Initiated: DATE: November 6, 2012 TIME: 1120
Test Terminated: DATE: November 13, 2012 TIME: 1110

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	8.2	8.2	8.3	8.1	7.7	8.0
Final	7.2	7.3	6.9	6.8	7.8	6.7	6.3
pH Initial	7.8	7.8	7.7	7.7	7.7	7.8	7.8
Final	7.8	7.4	7.5	7.5	8.0	7.5	7.2
Alkalinity	30	NA	30	NA	30	NA	NA
Hardness	43	NA	48	NA	44	NA	NA
Conductivity	160	160	160	170	170	180	180
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 27 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.8	8.1	8.3	8.1	8.5	8.1	8.3
Final	4.6	6.9	7.2	6.6	8.1	6.7	6.9
pH Initial	7.7	7.8	7.6	7.7	7.7	7.7	7.8
Final	7.8	7.3	7.6	7.5	8.1	7.6	7.5
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	230	220	230	250	260	260	260
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 37 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	8.0	8.4	8.5	8.1	8.1	8.4
Final	7.7	6.8	7.4	6.8	7.9	7.5	6.2
pH Initial	7.7	7.8	7.7	7.8	7.7	7.7	7.8
Final	7.9	7.3	8.1	7.5	8.2	7.7	7.4
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	260	250	260	280	290	300	290
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 49 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	8.1	8.3	8.0	8.1	7.4	8.2
Final	4.0	6.9	7.7	7.0	7.8	6.6	5.9
pH Initial	7.7	7.8	7.7	7.8	7.7	7.8	7.9
Final	7.9	7.4	7.7	7.6	8.2	7.6	7.5
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	290	280	290	320	330	340	330
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 65 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	8.0	8.1	8.1	8.4	7.6	8.2
Final	8.0	6.8	7.4	6.4	7.8	6.7	5.9
pH Initial	7.6	7.8	7.7	7.8	7.7	7.7	7.9
Final	8.1	7.4	8.2	7.6	8.3	7.7	7.5
Alkalinity	55	NA	80	NA	81	NA	NA
Hardness	78	NA	100	NA	100	NA	NA
Conductivity	330	320	330	370	380	390	380
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 87 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	8.0	8.1	7.9	8.5	7.8	8.3
Final	4.2	6.8	7.5	7.0	8.1	6.9	6.4
pH Initial	7.6	7.8	7.6	7.7	7.7	7.7	7.9
Final	8.0	7.5	7.8	7.8	8.4	7.8	7.6
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	390	380	390	440	450	450	440
Chlorine	NA	NA	NA	NA	NA	NA	NA

Appendix B: Test 1002.0
SUMMARY REPORTING FORMS
CHRONIC BIOMONITORING
Ceriodaphnia dubia
SURVIVAL AND REPRODUCTION

Permittee: City of Hot Springs

NPDES No.: AR0033880 AFIN#26-00145

Date and Time Test Initiated: November 6, 2012 at 1130

Date and Time Test Terminated: November 13, 2012 at 1140

Dilution water used: Synthetic Soft Water #3926

PERCENT SURVIVAL

Time of Reading	Control	Percent Effluent				
		27 %	37 %	49 %	65 %	87 %
24 hour	100	100	100	100	100	100
48 hour	100	100	100	100	100	100
7 day	100	100	100	100	100	100

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

Replicates	Control	Percent Effluent				
		27 %	37 %	49 %	65 %	87 %
A	21	21	20	21	18	18
B	20	17	20	18	16	18
C	18	8	21	24	19	16
D	15	22	21	20	20	20
E	9	21	20	20	18	15
F	20	13	22	17	23	14
G	20	19	17	16	17	17
H	21	21	21	17	11	20
I	21	19	17	18	19	18
J	15	20	21	16	21	13
Mean per Adult	18.0	18.1	20.0	18.7	18.2	16.9
Mean per Surviving Adult	18.0	18.1	20.0	18.7	18.2	16.9
CV %	21.8	24.4	8.50	13.6	17.7	14.1

CV = Coefficient of variation = standard deviation * 100 / mean
(calculated based on young produced by surviving females)

Appendix B: Test 1002.0
SUMMARY REPORTING FORMS
CHRONIC BIOMONITORING
Ceriodaphnia dubia
SURVIVAL AND REPRODUCTION

1. Fisher's Exact Test:

Is the mean survival significantly different ($p=0.05$) than the control survival for the % effluent corresponding to (lethality):

a.) LOW FLOW OR CRITICAL DILUTION	(65 %)	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<input type="checkbox"/> YES	<input type="checkbox"/> NO

2. Steel's Many-One Rank Test:

Is the mean number of young produced per female significantly different ($p=0.05$) than the control's number of young per female for the % effluent corresponding to (significant non-lethal effects):

a.) LOW FLOW OR CRITICAL DILUTION	(65 %)	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<input type="checkbox"/> YES	<input type="checkbox"/> NO

3. If you answered NO to 1.a) enter [0] otherwise enter [1]: 0 (TLP3B)
4. If you answered NO to 2.a) enter [0] otherwise enter [1]: 0 (TGP3B)
5. NOEC *Ceriodaphnia* Lethality: 87 % (TOP3B)
6. LOEC *Ceriodaphnia* Lethality: 87 % (TXP3B)
7. NOEC *Ceriodaphnia* Sublethality: 87 % (TPP3B)
8. LOEC *Ceriodaphnia* Sublethality: 87 % (TYP3B)
9. Coefficient of variation for *Ceriodaphnia* Reproduction: 21.8 (TQP3B)

Appendix B: Test 1002.0
CHRONIC TOXICITY SUMMARY FORM
Ceriodaphnia dubia
CHEMICAL PARAMETERS CHART

PERMITTEE: City of Hot Springs
NPDES NO.: AR0033880 AFIN#26-00145
CONTACT: Mr. James Sorrells
ANALYST: 275, 280, 298, 304

2400
2400
2400

Test Initiated: DATE: November 6, 2012 TIME: 1130
Test Terminated: DATE: November 13, 2012 TIME: 1140

DILUTION	DAY						
	1	2	3	4	5	6	7
Control							
D.O. Initial	8.0	8.2	8.2	8.3	8.1	7.7	8.0
Final	7.6	8.2	8.2	6.7	7.7	8.1	8.1
pH Initial	7.8	7.8	7.7	7.7	7.7	7.8	7.8
Final	8.4	7.9	8.0	7.4	8.0	8.1	7.9
Alkalinity	30	NA	30	NA	30	NA	NA
Hardness	43	NA	48	NA	44	NA	NA
Conductivity	160	160	160	170	170	180	180
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
27 %							
D.O. Initial	7.8	8.1	8.3	8.1	8.5	8.1	8.3
Final	7.8	7.9	8.4	6.4	7.7	8.2	8.1
pH Initial	7.7	7.8	7.6	7.7	7.7	7.7	7.8
Final	8.3	8.0	8.1	7.5	8.2	8.2	8.1
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	230	220	230	250	260	260	260
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
37 %							
D.O. Initial	8.2	8.0	8.4	8.5	8.1	8.1	8.4
Final	7.9	8.1	8.2	6.2	7.9	8.4	8.2
pH Initial	7.7	7.8	7.7	7.8	7.7	7.7	7.8
Final	8.4	8.1	8.2	7.5	8.2	8.3	8.2
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	260	250	260	280	290	300	290
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
49 %							
D.O. Initial	8.1	8.1	8.3	8.0	8.1	7.4	8.2
Final	7.6	8.2	8.2	6.3	7.6	8.3	8.1
pH Initial	7.7	7.8	7.7	7.8	7.7	7.8	7.9
Final	8.3	8.1	8.2	7.6	8.3	8.4	8.2
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	290	280	290	320	330	340	330
Chlorine	NA	NA	NA	NA	NA	NA	NA

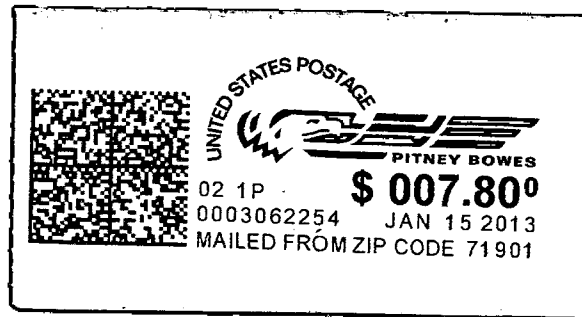
DILUTION	DAY						
	1	2	3	4	5	6	7
65 %							
D.O. Initial	8.2	8.0	8.1	8.1	8.4	7.6	8.2
Final	8.0	8.2	8.1	6.4	7.7	8.2	8.4
pH Initial	7.6	7.8	7.7	7.8	7.7	7.7	7.9
Final	8.4	8.1	8.2	7.6	8.3	8.5	8.2
Alkalinity	55	NA	80	NA	81	NA	NA
Hardness	78	NA	100	NA	100	NA	NA
Conductivity	330	320	330	370	380	390	380
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
87 %							
D.O. Initial	8.0	8.0	8.1	7.9	8.5	7.8	8.3
Final	7.8	8.2	8.4	6.6	7.9	8.2	8.4
pH Initial	7.6	7.8	7.6	7.7	7.7	7.7	7.9
Final	8.4	8.2	8.3	7.8	8.4	8.5	8.3
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	390	380	390	440	450	450	440
Chlorine	NA	NA	NA	NA	NA	NA	NA

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